DAIHATSU

F70,F75,F77

Service manual

APPENDIX

AP

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

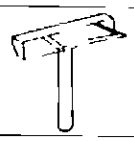
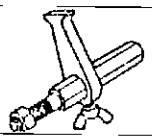
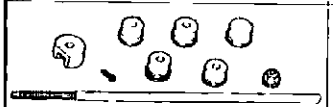
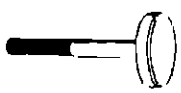
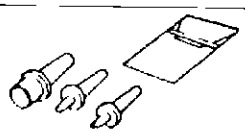
F70,F75,F77

APPENDIX

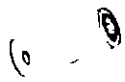
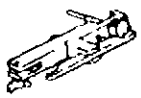
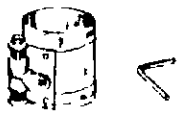
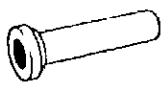
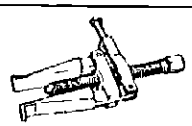
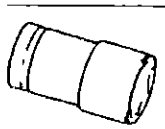
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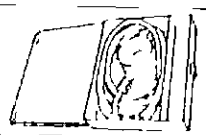
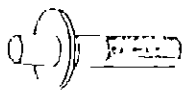
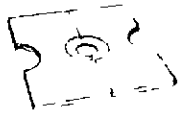
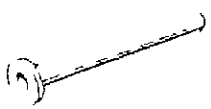
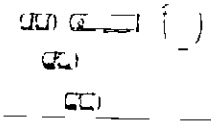
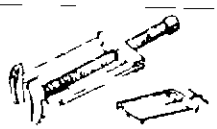
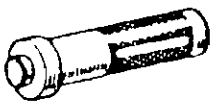
1. SSTs (Special Service Tools)

Shape	Part No & Part Name	P D I Manual	Maintenance	Engine Mechanical	Fuel System	Lubrication System	Clutch	Manual Transmission	Transfer	Propeller Shaft	Front & Rear Differential	Front Axle & Suspension	Rear Axle & Suspension	Brake System	Steering	Body
	09032-00100-000 Oil pan seal cutter			○		○										
	09201-60011-000 Valve guide bush remover & replacer			○												
	09201-87703 000 Valve stem oil seal replacer			○												
	09202-87002-000 Valve cutter remover & replacer			○												
	09210-87701-000 Flywheel holder			○												
	09213-31021-000 Crankshaft pulley puller			○												
	09214-60010-000 Crankshaft pulley gear replacer			○												
	09215-87601-000 Camshaft bearing remover & replacer			○												
	09221-87301-000 Cylinder liner remover & replacer			○												
	09221-87601-000 Piston pin remover & replacer			○												
	09222-87303-000 Connecting rod bush remover & replacer			○												
	09258-00030-000 Plug set			○	○											

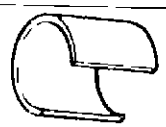
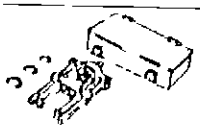
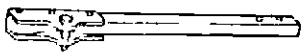
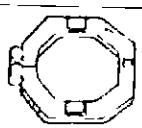
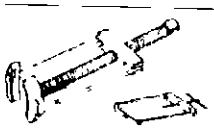
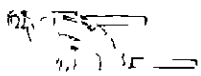
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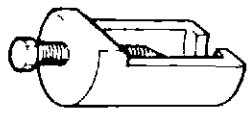
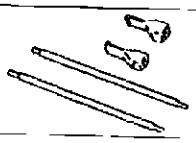
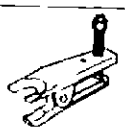
Shape	Part No & Part Name	P D I Manual	Maintenance	Engine Mechanical	Fuel System	Lubrication System	Clutch	Manual Transmission	Transfer	Propeller Shaft	Front & Rear Differential	Front Axle & Suspension	Rear Axle & Suspension	Brake System	Steering	Body
	09253-87201-000 Crankshaft bearing No 1 inner race replacer			○												
	09268-87310-000 Nozzle holder wrench			○	○											
	09275-87701-000 Plunger stroke measuring tool			○	○											
	09301-20020-000 Clutch guide tool			○			○									
	09303-35011-000 Input shaft front bearing puller			○												
	09304-12012-000 Input shaft front bearing replacer			○												
	09950-20017-000 Universal puller			○	○			○			○				○	
	09217-87001-000 Piston ring compressor			○												
	09310-87302-000 Counter shaft rear bearing replacer			○				○								
	09608-87302-000 Axle hub & drive pinion bearing tool set			○					○		○					
	09308-10010-000 Oil seal puller			○							○					
	09268-87704-000 Oil cooler set bolt box wrench					○										

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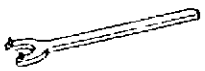
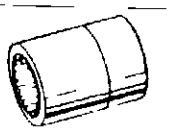
Illustration	Part No. & Part Name	EFI Manual	Maintenance	Engine Mechanical	Fuel System	Lubrication System	Clutch	Manual Transmission	Transfer	Propeller Shaft	Front & Rear Differential	Front Axle & Suspension	Rear Axle & Suspension	Brake System	Steering	Body
	09990-87702-000 Engine oil pressure gauge					○										
	09333-00012-000 Clutch diaphragm spring aligner						○									
	09388-87702-000 Clutch diaphragm spring height gauge						○									
	09253-87202-000 (09253-87201-000) Water pump bearing anvil (Crankshaft center bearing anvil)							○	○							
	09309-87301-000 Output shaft bearing replacer							○								
	09310-87301-000 Counter shaft front bearing replacer							○								
	09312-36010-000 Input shaft remover							○								
	09339-87301-000 Shift fork shaft guide							○								
	09506-87303-000 Differential drive pinion bearing cone front replacer							○	○		○					
	09602-87301-000 Counter gear bearing puller							○	○		○					
	09956-00010-000 Tightening piece							○		○						
	09517-30010-000 Rear axle shaft oil seal replacer								○			○				

NREF01A004

Shape	Part No. & Part Name	PDI Manual	Maintenance	Engine Mechanical	Fuel System	Lubrication System	Clutch	Manual Transmission	Transfer	Propeller Shaft	Front & Rear Differential	Front Axle & Suspension	Rear Axle & Suspension	Brake System	Steering	Body
	09710-06040-000 *A front suspension upper arm bush base								○							
	09520-87604-000 Puller universal joint									○						
	09330-00021-000 Companion flange holding tool										○					
	09401-87601-000 Differential gear case expander										○					
	09515-87601-000 Replacer oil seal										○					
	09530-87604-000 Differential drive pinion adjust gauge set										○					
	09602-87301-000 Counter gear bearing puller										○					
	09950-87701-000 Bearing remover										○		○			
	09608-20011-000 Front hub & drive pinion bearing tool set											○				
	09607-60020-000 Front hub bearing lock nut wrench											○				
	09511-87202-000 Brake drum stopper											○				
	09308-00010-000 Oil seal puller											○	○	○		

Shape / Part No & Part Name	P D I Manual	Maintenance	Engine Mechanical	Fuel System	Lubrication System	Clutch	Manual Transmission	Transfer	Propeller Shaft	Front & Rear Differential	Front Axle & Suspension	Rear Axle & Suspension	Brake System	Steering	Body
 09610-20012-000 Pitman arm puller											○				
 09521 87501-000 Rear wheel bearing puller												○			
 09515-21010-000 Rear axle shaft bearing replacer												○			
 09608 30012-000 Front hub & drive pinion bearing tool set												○			
 09608-87607-000 Leaf spring bush No 1 remover & replacer												○			
 09608-87608-000 Leaf spring bush No 2 remover & replacer											○	○			
 09521 87301-000 Rear wheel bearing puller												○			
 09520-00031-000 Rear axle shaft puller												○			
 09520-87601-000 Bolt with claw												○			
 09351-87601-000 Rear wheel bearing puller stopper												○			
 09921-00010-000 Spring tension tool													○		
 09611-87701-000 Tie-rod end puller														○	

WRF91 A006

Shape	Part No. & Part Name	PDI Manual	Maintenance	Engine Mechanical	Fuel System	Lubrication System	Clutch	Manual Transmission	Transfer	Propeller Shaft	Front & Rear Differential	Front Axle & Suspension	Rear Axle & Suspension	Brake System	Steering	Body
	09610-87301-000 Pitman arm puller														○	
	09617-28010-000 Worm bearing adjusting screw lock nut wrench														○	
	09616-30011-000 Worm bearing adjusting screw wrench														○	
	09616-00010-000 Steering pinion bearing adjusting socket														○	
	09631-00030-000 No. 1 wrench														○	
	09631-00040-000 No. 2 wrench														○	
	09515-87201-000 Rear axle bearing outer replacer														○	
	09812-00010-000 Door hinge set bolt wrench set															○

SST Number List (Numerical order)

SST	SECTION
09032-00100-000	EM LU
09201-60011-000	EM
09201-87702-000	EM
09202-87002-000	EM
09210-87701-000	LM
09213-41021-000	LM
09214-60010-000	EM
09216-87601-000	LM
09217-87001-000	LM
09221-87301-000	LM
09221-87601-000	EM
09222-87303-000	EM
09253-87201-000	FM
09253-87202-000	MT TR
09258-00030-000	LM, FU
09268-87510-000	EM FU
09266-87704-000	LU
09275-87701-000	LM FU
09301-20020-000	LM CL
09303-45011-000	EM
09304-12012-000	FM
09308-00010-000	FS RS SR
09308-10010-000	EM DF
09309-87301-000	MT
09310-87301-000	MT
09310-87302-000	LM MT
09312-36010-000	MT
09330-00021-000	DF
09333-00012-000	CL
09339-87301-000	MT
09351-87601-000	RS
09388-87702-000	CL
09401-87601-000	DF
09506-87303-000	MT TR DF

SST	SECTION
09511-87202-000	FS
09515-21010-000	RS
09515-87201-000	SR
09515-87601-000	DF
09517-30010-000	TR FS
09520-00031-000	RS
09520-87601-000	RS
09520-87604-000	PR
09521-87301-000	RS
09521-87501-000	RS
09530-87604-000	DF
09602-87301-000	MT, TR, DF
09607-60020-000	FS
09608-20011-000	FS
09608-30012-000	RS
09608-87302-000	EM TR DF
09608-87607-000	RS
09608-87608-000	FS RS
09610-20012-000	FS
09610-87301-000	SR
09611-87701-000	SR
09616-00010-000	SR
09616-30011-000	SR
09617-28010-000	SR
09631-00030-000	SR
09631-00040-000	SR
09710-06040-000	TR
09812-00010-000	BO
09921-00010-000	BR
09950-20017-000	EM FU MT, DF SR
09950-87701-000	DF, RS
09956-00010-000	MT PR
09990-87702-000	LU

WRE91A008

2. TIGHTENING TORQUE FOR MAIN COMPONENTS

1 When you want to find out a suitable tightening torque for a bolt, first determine the strength division of the said bolt, using the table below Then, locate suitable tightening torque in the tightening torque table described later

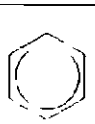
2 As for the tightening torque for nut, find out suitable tightening torque in the same way as with the paragraph 1 above, based on the mating bolt

3 tightening torque posted in the workshop manual is a standard valve for steel fasteners it is therefore, necessary to modify these tightening torque when you tighten fasteners made of materials other than steel This rule also applies to such instances where bolts are undergoing heat or other stress, such as vibratory loads and so forth

WR_01 A2X0

METHOD TO IDENTIFY STRENGTH DIVISION OF BOLTS

1. Identification Method by Checking Bolts Themselves

	Configuration and how to determine strength division		Strength division		Configuration and how to determine strength division		Strength division
Hexagon bolt		Bolt having an embossed or stamped figure at its head section	4 = 4T 5 = 5T 6 = 6T 7 = 7T	**Welded bolt**			4T
		No mark	4T	**Stud bolt**		No mark	4T
		Bolt having two embossed lines at its head section	5T 6T			Bolt having about 2 mm deep recess at one end or both ends	6T
		Bolt having two embossed lines at its head section	7T				6T

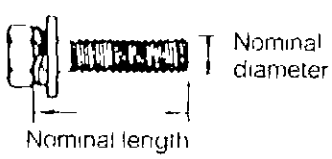
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2. Identification Method by Part Numbers

Hexagon Bolt

Part number example 9 1 1 1 1 - 4 0 6 2 0

- 4 0 6 2 0 — Nominal length (mm)
- 4 0 6 2 — Nominal diameter (mm)
- 4 — Strength division



Stud Bolt

Part number example 9 2 1 3 2 - 4 0 6 2 0

- 4 0 6 2 0 — Nominal length (mm)
- 4 0 6 2 — Nominal diameter (mm)
- 4 — Strength division



WR_01 A2X0

[Tightening Torque Table for General Standard Bolts]

Category	Nominal diameter	Pitch	Standard tightening torque kgf-m (ft-lb)	
			Standard torque	Tightening range
4T (Bolt having a mark of 4 at its head section) Example of part number (91OOO 4OOOO)	6	1	0 47 (3 4)	0 4 - 0 7 (2 9 - 5 1)
	8	1 25	1 11 (8 0)	1 0 - 1 6 (7 2 - 11 6)
	10	1 25	2 25 (16 3)	1 9 - 3 1 (14 - 22 5)
	10	1 5	2 14 (15 5)	1 8 - 3 0 (13 - 22)
	12	1 25 (ISO)	4 40 (31 8)	3 5 - 5 5 (25 - 40)
	12	1 5	3 89 (28 1)	3 5 - 5 5 (25 - 40)
	12	1 75	3 74 (27 1)	3 0 - 5 0 (22 - 36)
	13	1 5	5 08 (36 7)	4 5 - 7 0 (33 51)
	14	1 5	6 33 (45 8)	5 0 - 8 0 (36 58)
	14	2	5 93 (42 9)	4 7 - 7 7 (34 - 56)
	16	1 5	9 57 (69 2)	7 5 - 11 0 (54 - 80)
	16	2	9 10 (65 8)	7 1 - 10 6 (51 - 77 5)
5T (Bolt having a mark of 5 at its head section) Example of part number (91OOO - 5OOOO)	6	1	0 71 (5 1)	0 6 - 0 9 (4 3 - 6 5)
	8	1 25	1 66 (12 0)	1 5 - 2 2 (11 16)
	10	1 25	3 37 (24 4)	3 0 - 4 5 (22 - 33)
	10	1 5	3 20 (23 1)	2 7 - 4 2 (19 5 - 30 5)
	12	1 25 (ISO)	5 84 (42 2)	5 0 - 7 0 (36 - 51)
	12	1 5	5 84 (42 2)	5 0 - 7 0 (36 - 51)
	12	1 75	5 60 (40 5)	4 8 - 6 8 (34 - 49)
	13	1 5	7 63 (55 2)	6 5 - 9 0 (47 - 65)
	14	1 5	9 50 (68 7)	7 5 - 11 0 (54 - 79 5)
	14	2	8 90 (64 4)	7 0 - 10 5 (51 - 76)
	16	1 5	14 36 (103 9)	12 0 - 17 0 (87 - 123)
	16	2	13 58 (98 2)	11 5 - 16 5 (83 - 119)
6T (Bolt having a mark of 6 at its head section) Example of part number (91OOO - 6OOOO)	6	1	0 71 (5 1)	0 6 - 0 9 (4 3 - 6 5)
	8	1 25	1 66 (12 0)	1 5 - 2 2 (11 - 16)
	10	1 25	3 37 (24 4)	3 0 - 4 5 (22 - 33)
	10	1 5	3 20 (23 1)	2 7 - 4 2 (19 5 - 30 5)
	12	1 25 (ISO)	5 84 (42 2)	5 0 - 7 0 (36 - 51)
	12	1 5	5 84 (42 2)	5 0 - 7 0 (36 51)
	12	1 75	5 61 (40 6)	4 8 - 6 8 (35 49)
7T (Bolt having a mark of 7 at its head section) Example of part number (91OOO /OOOO)	6	1	0 95 (6 87)	0 8 - 1 2 (5 8 8 7)
	8	1 25	2 20 (15 9)	2 0 - 3 0 (14 5 - 22)
	10	1 25	4 50 (32 5)	4 0 - 5 5 (29 40)
	10	1 5	4 30 (31 1)	3 7 - 5 2 (27 - 38)
	12	1 25 (ISO)	7 78 (56 3)	7 0 - 9 0 (51 - 65)
	12	1 5	7 78 (56 3)	7 0 - 9 0 (51 - 65)
	12	1 75	7 48 (54 1)	6 0 - 8 5 (43 - 61 5)
	13	1 5	10 17 (73 6)	8 0 - 12 0 (58 - 88)
	14	1 5	12 67 (91 6)	10 0 - 15 0 (72 - 108)
	14	2	11 86 (85 8)	9 5 - 14 0 (69 - 101)
	16	1 5	19 15 (138 5)	15 0 - 23 0 (108 - 169)
	16	2	18 11 (131 0)	14 9 - 22 0 (108 159)

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2-1. Engine Mechanical

Tightening component			Tightening torque		
			N·m	kgf·m	ft-lb
Cylinder head	× Cylinder head cover		5.4 ± 1.5	0.55 ± 0.15	4.0 ± 1.1
	× Intake manifold		36.8 ± 7.4	3.75 ± 0.75	27.1 ± 5.4
	× Exhaust manifold		46.6 ± 7.4	4.75 ± 0.75	34.4 ± 5.4
	× Glow plug		12.8 ± 2.9	1.30 ± 0.30	9.4 ± 2.2
	× Injector pipe bracket		18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
	× Water temperature sender		22.1 ± 2.5	2.25 ± 0.25	16.3 ± 1.8
Cylinder block	× Cylinder head	(wet)	117.7 ± 9.8	12.00 ± 1.00	86.8 ± 7.2
	× Crankshaft bearing cap	(wet)	103.0 ± 6.9	10.50 ± 0.70	75.9 ± 5.1
	× Push rod cover		9.3 ± 2.5	0.95 ± 0.25	6.9 ± 1.8
	× Oil pan		9.3 ± 2.5	0.95 ± 0.25	6.9 ± 1.8
	× Engine mounting bracket (front)		36.8 ± 7.4	3.75 ± 0.75	27.1 ± 5.4
	× Camshaft retainer × belt case		18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
	× Oil hose No.1		17.2 ± 2.5	1.75 ± 0.25	12.7 ± 1.8
	× Oil hose No.2		22.1 ± 2.5	2.25 ± 0.25	16.3 ± 1.8
	× Oil pump inlet pipe		18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
	× Oil pump outlet pipe		44.1 ± 7.4	4.50 ± 0.75	32.5 ± 5.4
	× Idle shaft	(wet)	34.3 ± 4.9	3.50 ± 0.50	25.3 ± 3.6
	× Injection pump		18.1 ± 3.2	1.85 ± 0.35	13.4 ± 2.5
	× Timing belt cover		12.8 ± 2.9	1.30 ± 0.30	9.4 ± 2.2
	× Oil pump inlet pipe		18.1 ± 3.4	1.85 ± 0.35	13.1 ± 2.5
	× Oil pump outlet pipe		18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
	× Oil pump relief plug		39.2 ± 4.9	4.00 ± 0.50	28.9 ± 3.6
	× Oil filter bracket		36.8 ± 7.4	3.75 ± 0.75	27.1 ± 5.4
Connecting rod	× Connecting rod cap	(wet)	68.6 ± 4.9	7.00 ± 0.50	50.6 ± 3.6
Crankshaft	× Flywheel	(wet)	125.0 ± 12.3	12.75 ± 1.25	92.3 ± 9.0
Crankshaft	× Crankshaft pulley	(wet)	215.7 ± 19.6	22.00 ± 2.00	159.1 ± 14.5
Camshaft	× Camshaft pulley		41.7 ± 7.4	4.25 ± 0.75	30.8 ± 5.4
Rocker arm	× Adjusting screw	(wet)	19.6 ± 2.9	2.00 ± 0.30	14.5 ± 2.2
Valve rocker shaft	× Valve rocker support		5.9 ± 1.0	0.60 ± 0.10	4.3 ± 0.7
Oil filter bracket	× T/C oil inlet pipe		12.8 ± 2.9	1.30 ± 0.30	9.4 ± 2.2
Oil filter bracket	× Oil cooler		49.0 ± 9.8	5.00 ± 1.00	36.2 ± 7.2
Oil filter bracket	× Oil pressure valve		39.2 ± 4.9	4.00 ± 0.50	28.9 ± 3.6
T/C	× T/C oil outlet pipe		7.4 ± 1.5	0.75 ± 0.15	5.4 ± 1.1
Oil filter	× Oil filter bracket		19.6 ± 2.0	2.00 ± 0.20	14.5 ± 1.5

TIGHTENING TORQUE

Tightening component		Tightening torque		
		N·m	kgf-m	ft-lb
Injection pump	× Injection pump drive pulley	83.4 ± 4.9	8.50 ± 0.50	61.5 ± 3.6
	• Injection pipe	24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6
	• Delivery valve holder	49.0 ± 4.9	5.00 ± 0.50	36.2 ± 3.6
	× Nozzle leakage No.2	36.8 ± 2.5	3.75 ± 0.25	27.1 ± 1.8
	× Union (fuel return)	24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6
	Union	24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6
	× Distributive head bolt	17.2 ± 2.9	1.75 ± 0.30	12.7 ± 2.2
	Screw assembly overflow	7.4 ± 1.5	0.75 ± 0.15	5.4 ± 1.1
Nozzle holder	× Cylinder head	68.6 ± 9.8	7.00 ± 1.00	50.6 ± 7.2
	× Injection pipe	24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6
	• Nozzle leakage No.*	44.1 ± 4.9	4.50 ± 0.50	32.5 ± 3.6
Alternator	× Alternator bracket	36.8 ± 7.4	3.75 ± 0.75	27.1 ± 5.4
Vacuum pump	× Oil hose No.1	17.2 ± 2.5	1.75 ± 0.25	12.7 ± 1.8
	Oil hose No.2	22.1 ± 2.5	2.25 ± 0.25	16.3 ± 1.8
	Union	22.1 ± 2.5	2.25 ± 0.25	16.3 ± 1.8
Alternator	× Adjusting bar	29.4 ± 5.9	3.00 ± 0.60	21.7 ± 4.3
Oil pan	× Drain plug	34.3 ± 4.9	3.50 ± 0.50	25.3 ± 3.6
T/C	× Exhaust manifold	24.5 ± 4.9	2.50 ± 0.50	36.2 ± 3.6
	× Outlet elbow	24.5 ± 4.9	2.50 ± 0.50	36.2 ± 3.6
Glow plug	Glow plug connector	1.5 – 2.9	0.15 – 0.30	1.1 – 2.2
Crankshaft pulley	Crankshaft pulley No.2	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
Radiator		9.8 ± 15.7	1.0 ± 1.6	7.2 ± 11.6
Radiator	× Fan shroud	5.4 ± 1.5	0.55 ± 1.5	4.0 ± 1.1
Exhaust manifold	× Exhaust manifold cover	12.7 ± 2.9	1.3 ± 0.3	9.4 ± 2.2
Oil cleaner		12.7 ± 2.9	1.3 ± 0.3	9.4 ± 2.2
Water outlet		18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
Fuel filter adaptor		18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
	Fuel filter	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
	Union	36.8 ± 7.4	3.75 ± 0.75	27.2 ± 5.4
Glow plug connector		0.15 – 0.29	0.015 – 0.030	0.11 – 0.22
Clamp injection pipe		24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6
Oil pressure switch		32.4 ± 10.8	3.30 ± 1.10	23.9 ± 8.0

AB-ST-AC-3

2-2. Fuel System

Tightening component	Tightening torque		
	N·m	kgf-m	ft·lb
Cylinder head × Nozzle holder	68.6 ± 9.8	7.00 ± 1.00	50.6 ± 7.2
Cylinder head × Injection pipe bracket	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
Cylinder block × Injection pump	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
Injection pump × Injection pump drive pulley	83.4 ± 4.9	8.50 ± 0.50	61.5 ± 3.6
Injection pump × Injection pipe	24.5 ± 4.9	2.5 ± 0.50	18.1 ± 3.6
Injection pump × Delivery valve holder	49.0 ± 4.9	5.00 ± 0.50	36.2 ± 3.6
Injection pump × Nozzle leakage No. 2	36.8 ± 2.5	3.75 ± 0.25	27.1 ± 1.8
Injection pump × Union fuel return	24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6
Injection pump × Union fuel return	24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6
Injection pump × Distributive head bolt	17.2 ± 2.9	1.75 ± 0.3	12.7 ± 2.2
Injection pump × Screw assembly over flow	7.4 ± 1.5	0.75 ± 0.15	5.4 ± 1.1
Nozzle holder × Injection pipe	24.5 ± 4.9	2.50 ± 0.5	18.1 ± 3.6
Nozzle holder × Nozzle leakage No. 1	44.1 ± 4.9	4.50 ± 0.50	32.5 ± 3.6

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2-3. Cooling System

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
Cylinder head × Water temperature sender gauge	22.1 ± 2.5	2.25 ± 0.25	16.3 ± 1.8
Cylinder block · Water inlet	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5
Cylinder block × Water pump	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5

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2-4. Lubrication System

Tightening component	Tightening torque		
	N m	kgf-m	ft-lb
Cylinder Block × Oil pan	9 3 ± 2 5	0 95 ± 0 25	6 9 ± 1 8
Cylinder Block × Oil hose No 1	17 2 ± 2 5	1 75 ± 0 25	12 7 ± 1 8
Cylinder Block × Oil hose No 2	22 1 ± 2 5	2 25 ± 0 25	16 3 ± 1 8
Cylinder Block × Oil pump inlet pipe	18 1 ± 3 4	1 85 ± 0 35	13 4 ± 2 5
Cylinder Block × Oil pump outlet pipe	44 1 ± 7 4	4 50 ± 0 75	32 5 ± 5 4
Cylinder Block × Oil pump relief plug	39 2 ± 4 9	4 00 ± 0 50	28 9 ± 3 6
Oil filter bracket × Oil cooler	49 0 ± 9 8	5 00 ± 1 00	36 2 ± 7 2
Oil filter bracket × Oil pressure valve	39 2 ± 4 9	4 00 ± 0 50	28 9 ± 3 6
Oil filter bracket × Oil filter	19 6 ± 2 0	2 00 ± 0 20	14 5 ± 1 5
Oil filter bracket × T/C oil inlet pipe	12 8 ± 2 9	1 30 ± 0 30	9 4 ± 2 2
T/C × T/C oil outlet pipe	7 4 ± 1 5	0 75 ± 0 15	5 4 ± 1 1
Vacuum pump × Oil hose No 1	17 2 ± 2 5	1 75 ± 0 25	12 7 ± 1 8
Vacuum pump × Oil hose No 2	22 1 ± 2 5	2 25 ± 0 25	16 3 ± 1 8
Oil pan × Drain plug	34 3 ± 4 9	3 50 ± 0 50	25 3 ± 3 6

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2-5. Clutch

Tightening components	Tightening torque		
	N m	Kgf-m	ft-lb
Clutch cover × Flywheel	14 7 - 24 5	1 5 - 2 5	10 8 - 18 1
Clutch height adjusting bolt × Brake pedal bracket	17 7 - 29 4	1 8 3 0	13 0 - 21 7
Clutch pedal × Shaft bolt	14 7 - 21 6	1 5 - 2 2	10 8 - 15 9
Clutch housing × Support S/A release fork	29 4 - 49 0	3 0 - 5 0	21 7 - 36 2

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2-6. Manual Transmission

TRANSMISSION CASE COVER (5-Speed)

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Transmission case cover × Transmission	29 4 - 49 0	3 0 - 5 0	21 7 - 36 2
Transmission position detect switch × Transmission case cover	29 4 - 49 0	3 0 5 0	21 7 - 36 2
Back-up lamp switch × Transmission case cover	29 4 - 49 0	3 0 - 5 0	21 7 36 2
5th shift arm pivot × Transmission case cover	34 3 - 44 1	3 5 - 4 5	25 3 - 32 5
Shift lever housing dust cover × Transmission case cover	5 9 - 8 8	0 6 - 0 9	4 3 - 6 5
Reverse restrict pin holder × Transmission case cover	29 4 - 49 0	3 0 - 5 0	21 7 36 2
Shift arm pivot (for reverse) × Transmission case cover	39 2 - 58 8	4 0 - 6 0	28 9 - 43 4
Shift arm pivot (for 5th) × Transmission case cover	34 3 - 44 1	3 5 - 4 5	25 3 - 32 5

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TRANSMISSION CASE COVER (4-Speed)

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Transmission case cover × Transmission	29 4 - 44 0	3 0 - 5 0	21 7 - 36 2
Back-up lamp switch × Transmission case cover	29 4 - 44 0	3 0 - 5 0	21 7 - 36 2
Shift lever housing dust cover × Transmission case cover	5 9 - 8 8	0 6 - 0 9	4 3 - 6 5
Reverse restrict pin holder × Transmission case cover	29 4 - 49 0	3 0 - 5 0	21 7 36 2
Shift arm pivot (for reverse) × Transmission case cover	29 4 - 49 0	3 0 - 5 0	21 7 - 36 2

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TRANSMISSION (5-Speed)

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Clutch housing × Engine	49 0 - 78 5	5 0 - 8 0	36 2 - 57 9
Clutch housing × Rear end plate	14 7 - 24 5	1 5 - 2 5	10 8 - 18 1
Clutch housing × Transmission case	49 0 - 68 6	5 0 - 7 0	36 2 - 50 6
Transmission × Exhaust support pipe bracket	29 4 - 49 0	3 0 - 5 0	21 7 - 36 2
Crossmember No 2 × Chassis frame	49 0 - 68 6	5 0 - 7 0	36 2 - 50 6
Crossmember No 2 × Transmission	49 0 - 68 6	5 0 - 7 0	36 2 - 50 6
Shift lever boot × Front floor panel	9 8 - 15 6	1 0 - 1 6	7 2 - 11 6
Transmission case × Drain filler plugs	29 4 - 49 0	3 0 - 5 0	21 7 - 36 2
Output shaft × Lock nut	226 0 - 264 0	23 0 - 27 0	166 0 - 194 4
Counter gear shaft × Lock nut	98 0 - 137 0	10 0 - 14 0	72 0 - 101 0
Transmission case × Reverse idler stopper	17 7 - 29 4	1 8 - 3 0	13 0 21 7
Transmission rear mounting bracket × Chassis frame	49 0 - 68 6	5 0 - 7 0	36 2 - 50 6

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2-7. Transfer

5-SPEED

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Transfer shift lever retainer subassembly x Transfer case	9.8 - 15.6	1.0 - 1.6	7.2 - 11.6
Bolt (for transfer high & low shift fork shaft) x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Bolt x Vacuum switching valve No. 2	3.9 - 6.8	0.4 - 0.7	2.9 - 5.1
Transfer input shaft x Lock nut	226.0 - 264.0	23.0 - 27.0	166.0 - 194.4
Transmission position detect switch x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer position detect switch x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transmission position switch assembly x Diaphragm cylinder cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Diaphragm cylinder cover x Output shaft bearing front retainer	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing front retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Bolt (for transfer front drive shift fork shaft) x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing retainer front x Output shaft bearing front retainer	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer output front shaft x Lock nut	98.0 - 137.0	10.0 - 14.0	72.0 - 101.0
Transfer output rear shaft x Lock nut	98.0 - 137.0	10.0 - 14.0	72.0 - 101.0
Output shaft bearing rear retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing rear retainer x Speedometer sleeve lock plate	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5

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4-SPEED

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Transfer shift lever retainer subassembly x Transfer case	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Transfer position detect switch x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Filler & drain plug x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer case cover No. 1 x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Bolt (for transfer front drive shift fork shaft) x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer output front shaft x Lock nut	98.0 - 137.2	10.0 - 14.0	72.0 - 101.0
Output shaft bearing front retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing rear retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer output rear shaft x Lock nut	98.0 - 137.2	10.0 - 14.0	72.0 - 101.0
Output shaft bearing rear retainer x Speedometer sleeve lock plate	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5

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2-8. Propeller Shaft

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Front propeller shaft × Differential companion flange	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Rear propeller shaft × Differential companion flange	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9

WRE91-A023

2-9. Front & Rear Differential

FRONT

Tightening Components	Tightening Torque		
	N·m	kgf-m	ft-lb
Front axle housing cover S/A × Filler plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Front axle housing cover S/A × Front axle housing	17.7 - 23.5	1.8 - 2.4	13.0 - 17.4
Front axle housing × Drain plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Front axle housing × Bearing cap	78.5 - 118.0	8.0 - 12.0	57.9 - 87.0
Differential case S/A × Ring gear (w/wet condition)	88.3 - 103.0	9.0 - 10.5	65.1 - 75.9
Differential case × Differential case cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Drive pinion × Lock nut	196.0 - 245.0	20.0 - 25.0	145.0 - 180.0

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REAR

Tightening Components	Tightening Torque		
	N·m	kgf-m	ft-lb
Rear axle housing cover S/A × Filler plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Rear axle housing cover S/A × Rear axle housing	17.7- 23.5	1.8 - 2.4	13.0 - 17.4
Rear axle housing × Drain plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Rear axle housing × Bearing cap	78.5 - 118.0	8.0 - 12.0	57.9 - 87.0
Differential case S/A × Ring gear (w/wet condition)	88.3 - 103.0	9.0 - 10.5	65.1 - 75.9
Differential case × Differential case cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Drive pinion × Lock nut	196.0 - 245.0	20.0 - 25.0	145.0 - 180.0

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2-10. Front Axle & Suspension

Tightening component		N·m	kgf-m	ft-lb
Tie rod × adjusting nut	Temporarily tightening	19.6 - 29.4	2.0 - 3.0	14.5 - 21.7
	Final tightening	118 - 167	12.0 - 17.0	87 - 123
Knuckle stopper bolt lock nut		39.2 - 53.9	4.0 - 5.5	28.9 - 39.8
Front axle hub × Front disc		53.9 - 73.5	5.5 - 7.5	39.8 - 54.2
Front axle bearing lock nut (lock) × Lock nut (Torx® T20)		4.9 - 8.8	0.5 - 0.9	3.6 - 6.5
Axle outer shaft flange × Front axle hub (wet)		58.8 - 68.6	6.0 - 7.0	43.4 - 50.6
Free wheel hub assembly × Front axle hub (wet)		58.8 - 68.6	6.0 - 7.0	43.4 - 50.6
Brake drum (Automatic locking hub) × Lock nut (Torx® T20)		4.9 - 8.8	0.5 - 0.9	3.6 - 6.5
Brake mounting support × Steering knuckle		68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Free wheel hub cover × Free wheel locking hub		7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Bolt with plate washer (Automatic locking hub) × Drive shaft		14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Oil seal cover plate × Steering knuckle		9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Steering knuckle bearing cap × Steering knuckle		17.7 - 29.4	1.8 - 3.0	13.0 - 21.7
Disc brake dust cover × Steering nut		39.2 - 53.9	4.0 - 5.0	28.9 - 39.8
Lateral control rod × Frame		128 - 157	13.0 - 16.0	94 - 116
Lateral control rod × Front axle		49 - 78	5.0 - 8.0	36.2 - 57.9
Stabilizer × Front axle		29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Stabilizer link sub assembly × Stabilizer bracket cover		18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Stabilizer link sub assembly × Frame		29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Front shock absorber × Frame		18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Front shock absorber × Front spring seat		34.3 - 53.9	3.5 - 5.5	25.3 - 39.8
Front shock absorber × Actuator bracket		18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Absorber control actuator bracket × Control actuator		2.0 - 2.9	0.2 - 0.3	1.4 - 2.2
Front spring bumper × Frame		14.7 - 21.6	1.5 - 2.3	10.8 - 15.9
U bolt × Spring seat		58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Front spring × Frame		177 - 216	18.0 - 22.0	130 - 159
Front spring × Shackle		177 - 216	18.0 - 22.0	130 - 159
Shackle × Frame		29.4 - 44.1	3.0 - 4.5	21.7 - 32.5

WRE91A026

2-11. Rear Axle & Suspension

Tightening component			N m	kgf-m	ft-lb
Rear axle housing × Brake backing plate			39 2 - 53 9	4 0 - 5 5	28 9 - 39 8
Rear axle housing × Rear axle bearing case			39 2 - 53 9	4 0 - 5 5	28 9 - 39 8
U bolt seat × Shock absorber		F70 F75	34 3 - 53 9	3 5 - 5 5	25 3 - 39 8
		F77	18 6 - 30 4	1 9 - 3 1	13 7 - 22 4
Shock absorber × Frame		F70, F75	18 6 - 30 4	1 9 - 3 1	13 7 - 22 4
		F77	34 3 - 53 9	3 5 - 5 5	25 3 - 39 8
Shock absorber × Three-stage actuator bracket			18 6 - 30 4	1 9 - 3 1	13 7 - 22 4
Three-stage actuator × Three-stage actuator bracket			2 0 - 2 9	0 2 - 0 3	2 2 - 2 9
Spring seat × U bolt		F70 F75	58 8 - 78 5	6 0 - 8 0	43 4 - 57 9
		F77	108 - 137	11 0 - 14 0	80 0 101 0
Spring × Frame	Front side	F70 F75	118 - 137	12 0 - 14 0	87 0 - 101 0
		F77	118 - 157	12 0 - 16 0	87 0 - 116 0
	Shackle side	F70, F75	68 6 - 88 3	7 0 - 9 0	50 6 - 65 1
		F77	118 - 167	12 0 - 17 0	87 0 - 123

WTE91 A027

2-12. Brake System

Tightening component	N·m	kgf-m	ft·lb
[illegible]	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
[illegible] plug	8.8 12.7	0.9 - 1.3	6.5 - 9.4
[illegible] bolt	17.7 - 29.4	1.8 3.0	13.0 - 21.7
[illegible] (Brake pedal)	12.7 ± 2.6	1.3 ± 0.2	9.4 ± 1.9
Brake pedal attachment bolt & nut	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Master cylinder × Master cylinder reservoir sub assembly	5.4 - 6.9	0.55 0.70	4.0 5.1
Master cylinder set bolt	6.9 10.8	0.7 - 1.1	5.1 - 8.0
Brake booster × Master cylinder	10.2 15.3	1.04 - 1.56	7.52 - 11.3
Master cylinder × Flare nut	12.7 17.7	1.3 - 1.8	9.4 - 13.0
Brake booster adjust nut	20.4 30.6	2.08 - 3.12	15.1 - 22.5
Brake booster × Dash panel (metal bracket)	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Front caliper × Brake mounting support	31.4 41.2	3.2 - 4.2	23.1 - 30.4
Steering knuckle × Brake mounting support	68.6 88.3	7.0 9.0	50.6 65.1
Brake caliper × Brake hose	19.6 - 26.5	2.0 - 2.7	14.5 19.5
Rear wheel cylinder × Brake backing plate	7.8 11.8	0.8 - 1.2	5.0 - 8.7
Rear wheel cylinder × Flare nut	12.7 - 17.7	1.3 1.8	9.4 13.0
Brake shoe × Automatic adjusting lever pin	2.55 4.9	0.26 0.5	1.88 3.62
Parking brake shoe strut × screw	2.6 - 3.9	0.26 0.4	1.88 - 2.9
[illegible] × Rear axle shaft	88.3 - 118	9.0 - 12.0	65.1 - 87.0
Parking brake control lever assembly × Floor panel	9.8 15.7	1.0 - 1.6	7.2 - 11.6
Brake pedal × Lock nut	3.9 - 6.9	0.4 - 0.7	2.9 5.1
P valve × Dash panel	5.9 9.8	0.6 - 1.0	4.3 7.2
P valve × Flare nut	12.7 17.7	1.3 1.8	9.4 13.0
P&S valve × Dash panel	5.9 - 9.8	0.6 - 1.0	4.3 - 7.2
P&S valve × Flare nut	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
P&PV Bracket	9.8 15.7	1.0 1.6	7.2 11.6
Load sensing valve × bracket	14.7 - 21.6	1.5 2.2	10.8 15.9
Load sensing valve × spring shackle No. 1	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Spring shackle No. 1 × spring shackle No. 2	18.6 - 30.4	1.9 3.1	13.7 22.4
Spring shackle No. × shackle bracket No. 1	9.8 - 15.7	1.0 1.6	7.2 - 11.6

WE3 AC_6

2-13. Steering

Tightening component		N·m	kgf·m	ft-lb
Steering gear box × Check plug		29 - 49	03 - 05	22 36
Steering gear box × Hydraulic tube (flare nut)		39.2 - 49.0	40 50	28.9 36.2
Steering wheel × Steering shaft		29.4 - 49.0	3.0 5.0	21.7 36.2
Steering column tube × Brace		14.7 21.6	1.5 - 2.2	10.8 - 15.9
Steering column hole cover × Floor panel		3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Steering shaft universal joint × Intermediate shaft		24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Steering column tube × Steering column hole cover		3.6 - 6.9	0.4 - 0.7	2.7 - 5.1
Flexible coupling × Flexible coupling yoke		14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Steering shaft universal joint × Steering shaft		24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Flexible coupling yoke × Steering gear box		16.7 - 21.6	1.7 - 2.2	12.3 15.9
Flexible coupling yoke × Intermediate shaft		16.7 - 21.6	1.7 - 2.2	12.3 - 15.9
Tie rod end subassembly × Steering knuckle		49.0 - 88.2	5.0 9.0	36.2 65.1
Tie rod end subassembly × Steering relay rod		68.6 - 137	7.0 14.0	50.6 101
Steering relay rod × Pitman arm		68.6 - 137	7.0 - 14.0	50.6 101
Steering relay rod × Shimmy damper		73.5 - 103	7.5 10.5	54.2 75.9
Shimmy damper × Frame		73.5 - 103	7.5 - 10.5	54.2 75.9
Pitman arm × Steering gear box		147 - 196	15 20	109 145
End cover × Steering gear box		44.1 - 53.9	4.5 5.5	32.5 39.8
Sector shaft adjusting screw lock nut		19.6 - 34.3	2.0 - 3.5	14.5 25.3
Steering guide clamp screw (Power steering gear box)		2.0 - 3.9	0.2 - 0.4	1.4 2.9
Valve housing attaching nuts (Power steering gear box)		39.2 39.8	4.0 - 5.5	28.9 39.9
Worm shaft adjusting screw lock nut		49.0	5.0	36.2
Steering gear box × Frame		73.5 - 103	7.5 - 10.5	54.2 - 75.9
Vane pump front housing × Rear housing		43.1 53.9	4.4 5.5	31.8 - 39.8
Vane pump pressure port union		58.8 - 78.5	6.0 8.0	43.4 57.9
Suction port union × Vane pump rear housing		9.8 - 15.7	1.0 - 1.6	7.2 11.6
Vane pump shaft × Vane pump pulley		34.3 53.0	3.5 5.4	25.3 - 39.1
Vane pump × Pressure tube		39.2 - 49.0	4.0 - 5.0	28.9 36.2
Vane pump bracket × Cylinder block	M8	8.34 20.1	0.85 - 2.05	6.15 14.8
	M10	17.7 - 4.2	1.8 - 4.2	13.0 30.4
Vane pump × Adjusting bar Vane pump × Vane pump bracket		37.3 44.1	3.8 - 4.5	27.5 32.5

3. SERVICE SPECIFICATIONS

3-1. The Engine Proper

NOTE:

- The entry figures are those values at a temperature of 20°C.

Cylinder liner outer diameter × Cylinder block bore diameter

mm

Item / Combination number	Cylinder liner outer diameter	Cylinder block bore diameter	Interference
1	96 025 - 96 040	96 000 - 96 015	0 01 - 0 04
2	96 040 - 96 055	96 015 - 96 030	0 01 - 0 04
3	96 055 - 96 070	96 030 - 96 045	0 01 - 0 04

WRE91 A031

Cylinder liner inner diameter × Piston outer diameter (DL-42)

mm

Item / Combination alphabetical letter	Cylinder liner inner diameter	Piston outer diameter
A	92 02 - 92 03	91 95 - 91 96
B	92 01 - 92 02	91 94 - 91 95
C	92 00 - 92 01	91 93 - 91 94

WRE91 A032

Cylinder liner inner diameter × Piston outer diameter (DL-52)

mm

Item / Combination alphabetical letter	Cylinder liner inner diameter	Piston outer diameter
A	92 02 - 92 03	91 94 - 91 95
B	92 01 - 92 02	91 93 - 91 94
C	92 00 - 92 01	91 92 - 91 93

WRE91 A033

Cylinder block × Crankshaft × Crankshaft bearing

mm

Item / Combination number / Journal No		Cylinder block main journal inner diameter	Crankshaft bearing thickness	Crankshaft main journal outer diameter
No 1 5 Journal	1	72 000 - 72 010	1 995 - 2 000 [Brown]	67 960 - 67 975
	2	72 010 - 72 020	2 000 - 2 005 [Black]	
No 2, 3 4 Journal	1	72 000 - 72 010	1 995 - 2 000 [Brown]	67 955 - 67 970
	2	72 010 - 72 020	2 000 - 2 005 [Black]	

WRE91 A034

Connecting rod large end × Crankshaft × Connecting rod bearing

mm

Combination No	Connecting rod large end inner diameter	Crankshaft crankpin diameter	Connecting rod bearing thickness
1	58 000 - 58 010	54 975 - 54 990	1 485 - 1 490 [Blown]
2	58 010 - 58 020		1 490 1 495 [Black]

WRE91 A035

Piston pin × Connecting rod small end × Piston pin hole

mm

Piston pin outer diameter	Connecting rod small end inner diameter	Piston pin hole inner diameter
27 993 - 28 000	28 005 - 28 020	27 985 - 27 995

WRE91 A036

Valve lifter × Cylinder block

mm

Valve lifter outer diameter	Cylinder block valve lifter inner diameter
23 972 - 23 985	24 000 - 24 021

WRE91 A037

Valve stem × Valve guide bush

mm

	Valve stem outer diameter	Valve guide bush inner diameter
Intake valve	8 968 - 8 984	9 01 - 9 03
Exhaust valve	8 934 - 8 950	9 01 - 9 03

WRE91 A038

Valve rocker shaft × Valve rocker arm

mm

Valve rocker shaft outer diameter	Valve rocker arm inner diameter
18 472 - 18 493	18 512 18 533

WRE91 A039

Connecting rod × Crankshaft

mm

Connecting rod large end thickness	Crankshaft pin journal thickness
33 90 - 33 95	34 10 - 34 15

WRE91 A040

Pre combustion chamber × Cylinder head

mm

Pre combustion chamber outer diameter	Cylinder head pre combustion chamber inner diameter	Interference
37 030 37 045	37 000 - 37 030	0 - 0 045

WRE91 A041

Valve guide bush × Cylinder head

mm

Valve guide bush outer diameter	Cylinder head valve guide bush inner diameter	Interference
14 035 - 14 053	14 000 - 14 018	0 018 - 0 053

WRE91 A042

Camshaft bearing × Cylinder block

mm

	Camshaft bearing outer diameter	Cylinder block Camshaft bearing inner diameter	Interference
No 1	50 675 - 50 715	50 600 - 50 625	0 050 - 0 115
No 2	50 375 - 50 415	50 300 - 50 325	0 050 - 0 115
No 3	50 075 - 50 115	50 000 - 50 025	0 050 - 0 115
No 4	49 775 - 49 815	49 700 - 49 725	0 050 - 0 115
No 5	50 075 - 50 115	50 000 - 50 025	0 050 - 0 115

WHE91 A043

Valve guide bush × Valve stem oil seal

mm

Valve guide bush outer diameter	Valve stem oil seal inner diameter	Interference
14 023 - 14 041	13 91 - 13 99	0 024 - 0 131

WHE91 A044

Valve rocker shaft × Valve rocker support

mm

Valve rocker shaft outer diameter	Valve rocker support inner diameter No 1, 2, 3 4
18 472 - 18 493	18 500 - 18 521

WHE91 A045

Camshaft × Camshaft bearing

mm

	Camshaft journal outer diameter	Camshaft bearing inner diameter
No 1	46 559 - 46 575	46 600 - 46 625
No 2	46 259 46 275	46 300 - 46 325
No 3	45 969 - 45 975	46 000 - 45 025
No 4	45 659 - 45 675	45 700 - 45 725
No 5	45 359 - 45 375	45 400 - 45 425

WHE91 A046

Piston ring × Piston (DL-42)

mm

	Piston ring thickness	Piston ring groove thickness
Compression ring No 1	2 47 - 2 49	2 55 - 2 57
Compression ring No 2	1 97 - 1 99	2 03 - 2 05
Oil ring	3 97 - 3 99	4 01 - 4 03

WHE91 A047

Piston ring × Piston (DL-52)

mm

	Piston ring thickness	Piston ring groove thickness
Compression ring No 1	7° Keystone ring	7° Keystone ring
Compression ring No 2	1 97 - 1 99	2 06 - 2 08
Oil ring	3 97 - 3 99	4 01 - 4 03

WHE91 A048

Connecting rod × Connecting rod small end bush

mm

Connecting rod small end inner diameter	Connecting rod small end bush outer diameter	Interference
31 070 - 31 110	31 000 - 31 025	0 045 - 0 110

WRE91 A049

Cylinder liner × Cylinder block upper gasket surface

mm

Cylinder liner flange section thickness	Depth of cylinder block flange section	Amount of protrusion
3 01 - 3 04	2 92 - 3 00	0 01 - 0 12

WRE91 A050

Valve × Cylinder head lower gasket surface

mm

	Valve recession amount
Intake valve	1 00 - 1 70
Exhaust valve	1 00 - 1 70

WRE91 A051

Camshaft × Camshaft timing belt pulley

mm

Camshaft outer diameter	Camshaft timing belt pulley inner diameter	Interference
28 008 28 021	28 000 - 28 021	-0 013 - 0 021

WHE91 A052

Precombusion chamber × Cylinder head lower gasket surface

mm

Precombustion chamber flange height	Depth of cylinder head section	Amount of protrusion
6 000 6 005	5 950 - 0	0 0 100

WRE91 A053

Cylinder Head

Cylinder head lower gasket surface distortion		mm	0 1
Manifold gasket surface distortion		mm	0 2
Valve seat	Seat width mm	Intake	1 4
		Exhaust	1 4
	Correction angle °	Intake	15 45 75
		Exhaust	15, 45 75
Guide bush striking temperature		°C	Normal temperature

WRE91 A054

Valve Spring

Item		Specified value	Allowable limit
Free length	mm	46 0	43 7
Length installed	mm	40 1	—
Tension as installed	N(kgf)	264 8 (27 0)	225 6 (23 0)
Out-of-squareness	mm	—	1 6

WRE91 A055

Valve Lifter, Push Rod

Item		Specified Value	Allowable limit
Valve lifter oil clearance	mm	0 015 - 0 049	0 1
Push rod bend	mm	—	0 4

WRE91 A056

Valve Rocker Arm & Shaft

Item		Specified value	Allowable limit
Oil clearance	mm	0 019 - 0 061	0 1

WRE91 A057

Valve Guid Bush

Protrusion from cylinder head (IN & EX)	mm	16 0

WRE91 A058

Valve

Item			Specified value	Allowable limit
Stem oil clearance	mm	Intake	0 026 - 0 062	0 10
		Exhaust	0 044 - 0 096	0 12
Head stock thickness	mm	Intake	0 90 - 1 30	0 5
		Exhaust	0 90 - 1 30	0 5

WRE91 A059

Camshaft & Bearing

Item			Specified value	Allowable limit
Run-out		mm	—	0 05
Thrust clearance		mm	0 10 - 0 19	0 30
Bearing oil clearance	mm	No 1 to No 5	0 025 - 0 066	0 10
Cam lobe height	mm	Intake	37 767	1 0
		Exhaust	37 767	1 0

WRE91 A060

Valve Rocker Arm & Shaft

Item			Specified value	Allowable limit
Top gasket surface distortion		mm	—	0.1
Cylinder liner	Wear	mm	—	0.15
	Out-of roundness taper	mm	—	0.02
	Protrusion	mm	0.01 - 0.12	—
	Pressing force	N (kgf)	24518 (2500)	—

WRE91 A061

Connecting Rod

Item		Specified value	Allowable limit
Big end thrust clearance	mm	0.15 - 0.25	0.30
Bearing oil clearance	mm	0.030 - 0.065	0.15
Piston pin oil clearance	mm	0.005 - 0.027	0.05
Bend limit	mm	—	0.05
Twist limit	mm	—	0.05

WRE91 A062

Crankshaft

Item			Specified value	Allowable limit
Run-out		mm	—	0.05
Thrust clearance		mm	0.050 - 0.159	0.25
Journal uneven wear or taper		mm	—	0.015
Journal diameter [U/S finished diameter] mm	STD	No. 1, 5	67.960 - 67.975	—
		No. 2, 3, 4	67.955 - 67.970	
	U/S 0.25	No. 1, 5	68.210 - 68.225	—
		No. 2, 3, 4	68.205 - 68.220	
	U/S 0.50	No. 1, 5	68.460 - 68.475	—
		No. 2, 3, 4	68.455 - 68.470	
	U/S 0.75	No. 1, 5	68.710 - 68.725	—
		No. 2, 3, 4	68.705 - 68.720	
	U/S 1.00	No. 1, 5	68.960 - 68.975	—
		No. 2, 3, 4	68.955 - 68.970	
Stem oil clearance mm		No. 1, 5	0.025 - 0.060	0.15
		No. 2, 3, 4	0.030 - 0.065	
Crankpin diameter [U/S finished diameter] mm	STD		54.975 - 54.990	—
	U/S 0.25		54.725 - 54.740	—
	U/S 0.50		54.475 - 54.490	—
	U/S 0.75		54.225 - 54.240	—
	U/S 1.00		53.975 - 53.990	

WRE91 A063

Flywheel

Item		Specified value	Allowable limit
Run-out	mm	—	0 2

WRE91 A064

Intake, Exhaust Manifold

Item			Specified value	Allowable limit
Gasket surface distortion	mm	Intake	—	0 4
		Exhaust	—	0 4

WRE91-A065

Piston, Piston Ring

Item				Specified value	Allowable limit
Piston	mm	STD		91 93 - 91 96	—
		O/S 1 00		92 93 - 92 96	—
Piston oil clearance	mm	DL-42		0 060 - 0 080	0 12
		DL-52		0 070 - 0 090	0 12
Piston ring end gap	mm	No 1		0 35 - 0 50	—
		No 2		0 30 - 0 45	—
		OIL		0 30 - 0 50	—
Piston ring side clearance	mm	No 1	DL-42	0 06 - 0 10	—
			DL-52	7° Keystone ring	—
		No 2	DL-42	0 04 - 0 08	—
			DL-52	0 07 - 0 11	—
		OIL		0 02 - 0 06	—
Piston pin installing temperature	°C			60 - 70	—

WRE91 A066

Camshaft timing pulley, Crankshaft timing pulley, Injection timing pulley

Item			Specified value	Allowable limit
Timing pulley diameter	mm	Camshaft timing pulley	119 95 - 120 07	119 90
		Crankshaft timing pulley	59 37 - 59 47	59 30
		Injection pump timing pulley	119 904 - 120 044	119 85

WRE91 A067

Oil pump

Item		Specified value	Allowable limit
Relief valve opening pressure	kPa (kgf/cm^2)	441 3 - 539 4 (4 5 - 5 5)	—
Side clearance	mm	0 03 - 0 085	0 15
Body clearance	mm	0 1 - 0 16	0 40

WRE91 A068

Radiator

Item		Specified value	Allowable limit
Radiator cap relief valve opening pressure	kPa (kgf/cm^2)	73 6 - 103 0 (0 75 - 1 05)	58 8 (0 60)
Radiator leak test pressure	kPa (kgf/cm^2)	117 7 (1 2)	—

WRE91 A069

Water pump

Item		Specified value	Allowable limit
Bearing installing temperature	°C	80 - 90	—
Clearance between body and rotor	mm	0 5	—

WRE91 A070

Thermostat

Item		Specified value	Allowable limit
Valve opening temperature (Start to open at)	°C	80 - 84 (Cold area spec 86 - 90)	62
Valve full opening temperature	°C	95 (Cold area spec 100)	—
Valve opening travel	mm	10	6 0

WRE91 A071

Waste gate valve, Turbo indicator lamp

Item	Specified value
Checking turbo indicator lamp	When pressure exceeds 23 5 kPa (0 34 kgf/cm^2) Turbo indicator lamp goes on When pressure is below 19 6 kPa (0 20 kgf/cm^2) Turbo indicator lamp goes off
Checking operation of waste gate valve	Shaft stroke About 2 mm (With a pressure of 89 2 kPa (0 91 kgf/cm^2) applied)
Checking supercharging pressure (Running test)	58 9 - 83 4 kPa (0 55 - 0 85 kgf/cm^2)/at 3400 rpm

WRE91 A072

Starter

Item			Specified value
Motor type			12V type
Nominal output		kW	2 2 (Cold area spec 170)
No-load characteristics	Voltage	V	11 5
	Current	A	120 (Cold area spec 2 5)
	Revolution speed	rpm	Not less than 4000

WRE91 A073

Alternator

Item		Specified value
Type		12V type
Maximum output	A	45
Output revolution speed	rpm	Not more than 3500

WRE91 A074

Alternator Regulator

Item		Specified value
Regulating voltage	V	13.8 - 14.8
Voltage relay actuating voltage	V	4.0 - 5.8

WRE91 A075

Injection Nozzle, Nozzle Holder

Item		Specified value	Allowable limit
Nozzle opening pressure	kPa (kgf/cm)	10297 - 11278 (105 - 115)	—
Adjusting shim thickness (For adjusting nozzle opening pressure)		20 sizes in 0.05 mm (0.002 inch) increment	

WRE91 A076

INJECTION PUMP

			DL-42		DL-52	
			STD	OPT	General	Austria Switzerland
Pump specifications		Plunger diameter mm	9	9	9	9
		Cam lift mm	2 2	2 2	2 2	2 2
		Suction return amount mm^3	40	40	37 5	37 5
		Injection order	A B C D	A B C D	A B C D	A B C D
		Governor specifications	All speeds	All speeds	All speeds	All speeds
Characteristics	Overflow amount l/h/rpm		21 - 47/1900	21 - 47/1900	17 - 37/1700	17 37/1700
	Injection amount	Increase amount during starting period mm^3/St /rpm	66 - 85/100	66 - 85/100	66 - 85/100	66 85/100
		End of increase effect mm^3/St /rpm	41 5 - 50 5/400	41 5 - 50 5/400	50 - 58/350	50 - 58/350
		Full load mm^3/St /rpm	42 15 - 43 65/1100 38 - 43/500 44 - 49/1450 40 5 - 44 5/1900	39 25 - 40 75/1100 35 1 - 40 1/500 41 1 - 46 1/1450 38 6 - 43 6/1900	65 75 - 67 75/1100 42 7 - 45 7/500 51 - 54/680 65 - 70/1700	65 75 - 67 75/1100 42 7 45 7/500 51 - 54/680 65 - 70/1700
	Governor	High-speed side mm^3/St /rpm	16 5 - 24 5/2250 24 5 - 32 5/2100 2 or less/2600	17 5 - 23 5/2250 35 - 43/2100 2 or less/2450	*1 17 75 - 27 75/2250 56 5 - 64 5/1800 2 or less/2500	*1 17 75 27 75/2250 56 5 - 64 5/1800 2 or less/2500
		Low-speed side	6 5 - 11 5/350 2 or less/500	6 5 - 11 5/350 2 or less/500	*2 6 5 - 11 5/350 2 or less/500	*2 6 5 - 11 5/350 2 or less/500
	Timer mm/rpm		0 - 1 0/700 2 0 - 3 0/1100 3 7 - 4 7/1450 5 7 - 6 5/2250	0 - 0 98/700 1 85 - 1 85/1100 3 5 - 4 5/1450 6 16 - 6 95/2250	*1 0 7 - 1 7/700 2 3 - 3 3/1100 4 1 - 5 1/1500 4 9 - 5 7/1750	*1 0 6 - 1 6/750 2 2 - 3 2/1100 3 4 - 4 4/1500 4 1 - 4 9/1600
	Altitude compensator (N = 1100 rpm with lever positioned at full stroke position) mm /St /kPa (mmHg)		— — —	38 5 - 41/94 6 (710) 33 8 - 37 8/82 7 (620) 30 3 - 33 7/70 7 (530)	— — —	— — —
	Boost compensator (Np = 1100 rpm) mm/kPa (mmHg)		— — — — —	— — — — —	42 7 - 49 7/0 51 2 - 55 2/24 0 (180) 55 6 - 59 6/33 3 (250) 65 75 - 67 25/66 7 (500) 66 5 or less/106 7 (800)	42 7 - 49 7/0 51 2 55 2/24 0 (180) 55 6 59 6/33 3 (250) 65 75 67 25/66 7 (500) 66 5 or less/106 7 (800)
	Load sensing timer mm/mm^3/St		— —	— —	— —	1 53 - 2 53/50 3 38 - 4 38/Full
	Automatic cold start device mm/°C		— — —	— — —	— — —	2 05/–10 0 6 0 9/25 0/45

*1 Characteristics when diaphragm pressure = 66 7 kPa (500 mmHg)
* Characteristics when diaphragm pressure = 0 kPa (0 mmHg)

3-2. Fuel System

		DL-42	DL-52
Fuel tank capacity	dm^3	60	60
Injection pump	Type	Bosch VE type	←
	Injection timing	1° BTDC (High altitude compensator 3° BTDC)	1° BTDC
	Plunger diameter mm	9 0	9 0
	Cam lift	2 2	2 2
	Governor type	Centrifugal type	Centrifugal type
	Timer type	Hydraulic pressure type	Hydraulic pressure type
Injection Nozzle or injector	Nozzle retainer type	Screwed type	Screwed type
	Nozzle type	Throttle type	Throttle type
	Injection pressure kPa (kgf/cm^2)	10 788 ± 980 (110 ± 10)	12,749 ± 980 (130 ± 10)
Fuel filter	Type	Paper filter type	Paper filter type
	Filtering area m^2	0 4	0 4
	Rated flow rate dm^3/min	1 2	1 2
	Sedimentor alarm water level capacity	80	80
	Sedimentor maximum capacity	150	150

WRE91 A078

3-3. Cooling System

Coolant capacity [Excluding reserve tank]		10 5 ℓ (with heater) 9 8 ℓ (without heater)
Radiator cap	Relief valve opening pressure	73 5 - 103 0 kPa (0 75 - 1 05 kgf/cm^2)
Thermostat	Valve opening temperature Standard specifications Cold area specifications Valve lift Standard specifications Cold area specifications	 82 ± 2 C° 88 ± 2 C° 10 mm or more at 95°C 10 mm or more at 100°C

WRE91 A079

3-4. Lubrication System

Engine oil capacity			
	Whole amount		
	When only oil is changed	Full level	5 8 dm^3
		Low level	4 8 dm^3
	When oil and filter are changed		6 4 dm^3
Oil pump	Compression spring free length		57 mm
	Body clearance		0 20 - 0 28 mm
	Tip clearance		0 16 - 0 24 mm
	Side clearance		0 035 - 0 085 mm
	Oil pressure	Idling	147 - 196 kPa (1 5 - 2 0 kgf/cm^2)
		2200 rpm	294 - 392 kPa (3 0 - 4 0 kgf/cm^2)

WRE9 A080

3-5. Clutch

Unit mm

Item		Specified value	Allowable value	Remarks
Clutch disc	Rivet depth	—	0 3	Remaining lining stock
	Runout	—	1 0	Longitudinal runout
		—	0 7	Lateral runout
Clutch cover	Variation in height diaphragm spring	—	0 8	
Clutch pedal	Height	$221^{\ 6}_{\ 0}$ 221±3	—	RHD LHD
	Free travel	18 - 27	—	RHD LHD

WRE91 A081

3-6. Manual Transmission

Unit mm

			Specified value	Allowable limit	Remarks
Clearance between each gears and synchronizer rings			1.3 - 1.7	0.8	Using the filler gage
Contact width	Reverse gear		$7^{+0}_{-0.058}$	7.3	Using the micro meter
	Transmission hub sleeve No. 1, No. 2		$7^{+0}_{-0.058}$	7.3	
Contact width of each synchronizer ring and synchromesh shifting key	1st gear		8.4 ± 1	8.5	Using the vernier caliper gage
	Except 1st gear		11.0 ± 1	11.1	
Height of synchromesh shifting key		1st & 2nd gear	6 ± 0.15	5.6	Using the vernier caliper gage
		3rd, 4th & 5th gear	5.8 ± 0.15	5.4	
Thickness	1st gear thrust washer		4 ± 0.1	3.85	
Backlash	1st gear		0.06 - 0.20	0.25	
	2nd gear		0.06 - 0.20	↑	
	3rd gear & 4th gear		0.06 - 0.20	↑	
	5th gear		0.06 - 0.20	↑	
Thrust clearance	1st gear		0.11 - 0.29	0.35	
	2nd gear		0.10 - 0.30	0.35	
	3rd gear		0.13 - 0.57	0.60	
	5th gear		0.12 - 0.28	0.35	

WREG1 A052

3-7. Transfer

5-SPEED

Unit mm

			Specified value	Allowable limit	Remarks
Thickness		Transfer input gear thrust washer	4 ±0.05	3.9	
Contact width section		Transfer high & low shift fork	$7^{0.15}_{0}$	6.3	
		Transfer high & low clutch hub	$7^{+0.58}_{0}$	7.3	
Diameter	Outer	Transfer high & low shift fork shaft	$16^{-0.05}_{-0.040}$	15.07	
	Inner	Transfer high & low shift fork	$16^{+0.027}_{0}$	16.0	
Diameter	Outer	Transfer output rear shaft	$72.5^{-0.10}_{-0.17}$	72.3	
	Bore	Hub sleeve	$72.5^{+0.3}_{0}$	72.7	
Contact width section		Transfer front drive shift fork	$7^{0.1}_{0}$	6.3	
		Hub sleeve	$7^{+0.58}_{0}$	7.3	
Diameter	Outer	Transfer front drive shift fork shaft	$16^{-0.05}_{-0.040}$	15.06	
	Inner	Transfer front drive shift fork	$16^{+0.027}_{0}$	16.03	

WREG1 A053

4-SPEED

Unit: mm

			Specified value	Allowable limit	Remarks
Diameter	Outer	Transfer output rear shaft	72.5	72.3	
	Bore	Hub sleeve	72.5	72.7	
Contact width section		Transfer front drive shift fork	7	6.0	
		Hub sleeve (for high & low clutch hub)	7	7.3	
Diameter	Outer	Transfer front drive shift fork shaft	16	15.95	
	Inner	Transfer front drive shift fork	16	16.03	
Contact width section		Transfer high & low shift fork	7	6.3	
		Hub sleeve	7	7.3	
Diameter	Outer	Transfer high & low shift fork shaft	16	15.06	
	Inner	Transfer high & low shift fork	16	16.03	
		Transfer gear shift head	16	16.06	

WTE1T4G7

3-8. Propeller Shaft

Unit: mm

Item		Specified value	Allowable limit	Remarks
Propeller shaft (runout)		—	0.5	Front, rear
Yoke (Inner diameters)	Sleeve	28.0	—	Using an inner dial gauge
	Flange	28.0	—	
Universal joint spider (Starting torque)		0.05 - 1.47 N·m (0.005 - 0.15 kgf-m)	—	Using a spring scale or the like

WTE3T4G85

3-9. Front & Rear Differential

FRONT

nit mm

Item			Specified value	Allowable limit	Remarks
Ring gear runout			—	0 1	
Backlash	Ring gear		0 10 - 0 20	—	
	Pinion gear × Side gear		0 05 - 0 25	—	
Preload	Total	New bearing	0 89 - 2 35 N m (9 0 - 24 0 kgf-cm)	—	
		Bearing reused	0 89 - 2 35 N m (9 0 - 24 0 kgf-cm)	—	
	Drive pinion	New bearing	0 06 - 1 96 N m (7 0 - 20 0 kgf-cm)	—	
		Bearing reused	0 06 - 1 96 N m (7 0 - 20 0 kgf-cm)	—	

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REAR

Unit mm

Item			Specified value	Allowable limit	Remarks
Ring gear runout			—	0 1	
Backlash		Ring gear	0 10 0 20	—	
		Side gear	0 05 - 0 25	—	
Preload	Total	New bearing	0 89 2 35 N m (9 0 24 0 kgf-cm)	—	
		Bearing reused	0 89 - 2 35 N m (9 0 - 24 0 kgf-cm)	—	
	Drive pinion	New bearing	0 69 - 1 96 N m (7 0 - 20 0 kgf-cm)	—	
		Bearing reused	0 69 - 1 96 N m (7 0 - 20 0 kgf-cm)	—	
Clutch inner & outer plate thickness (L S D only)			1 6	1 4	Allowable wear limit at one side is 0 1
Clearance (differential case S/A × differential cover) (L S D only)			0 05 - 0 2	—	See page DF-53, 54

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3-10. Front Axle & Suspension

Toe in	Other than listed below	0 - 8 mm
	215R15 215/80R15 255/70R15 H78-15-4	–3 - 5 mm
Side slip		0 - 3 mm
Camber (degree)		1°00′ ±1°
Caster (degree)		1°30′ ±1°
King pin angle (degree)		9°30′ ±1°
Turning angle (degree)	H78-15-4 215R15, 215SR-15 225/70R-15 215/80R-15	Inner 28 Outer 26
	Other than those listed above (F77)	Inner 30 (29) Outer 28 (27)
Disc wheel runout		Not to exceed 1 0 mm
Tire runout	Radial runout	Not to exceed 1 4 mm
	Lateral runout	Not to exceed 2 0 mm
Front axle hub grease		Lithium-based MP grease
Front axle hub	Starting torque	1 4 - 3 6 kgf
	Reference Starting torque	0 98 - 2 45 N m (10 - 25 kgf-cm 8 7 - 21 7 inch-lb)
Steering knuckle starting torque starting load		16 7 - 41 2 N cm (1 7 - 4 2 kgf-cm, 1 5 - 3 6 inch-lb) 0 1 - 0 3 kgf

WRF91A088

3-11. Brake System

<table>
<tr><th colspan="3">Item</th><th></th></tr>
<tr><td colspan="3">Brake pedal height</td><td>220 ± 5 mm (8 66 ± 0 2 inch) However, on R H D vehicles the brake pedal height should be 24 ± 6 mm (0 94 ± 0 23 inch) higher than the upper surface of the accelerator pedal On L H D vehicles the brake pedal height should be 28 ± 6 mm (1 1 ± 0 24 inches) higher than the upper surface of the accelerator pedal</td></tr>
<tr><td colspan="3">Brake pedal free travel</td><td>2 - 4 mm (0 079 - 0 16 inch)</td></tr>
<tr><td colspan="3">Brake pedal reserve travel</td><td>80 mm (3 15 inch) or more with a pedal applying force of 50 kgf</td></tr>
<tr><td colspan="3">Brake booster air-tight performance (Loaded condition)</td><td>When the engine is stopped by applying a negative pressure of 500 mmHg the pressure should not rise (or the pressure should not exceed 25 mmHg)</td></tr>
<tr><td rowspan="2">Brake hydraulic pressure</td><td>Without booster</td><td colspan="2"><table><tr><th>Pedal applying force kgf</th><th>Hydraulic pressure kgf/cm²</th></tr><tr><td>10</td><td>0 6</td></tr><tr><td>20</td><td>8 - 18</td></tr><tr><td>30</td><td>19 29</td></tr></table></td></tr>
<tr><td>With booster</td><td colspan="2"><table><tr><th>Pedal applying force kgf</th><th>Hydraulic pressure kgf/cm²</th></tr><tr><td>5</td><td>6 - 14</td></tr><tr><td>10</td><td>24 34</td></tr><tr><td>20</td><td>63 - 73</td></tr><tr><td>30</td><td>74 84</td></tr></table></td></tr>
<tr><td colspan="3">Brake fluid</td><td>DOT3 or SAEJ-1703</td></tr>
<tr><td colspan="3">Booster push rod clearance with negative pressure of 500 mmHg</td><td>0 3 ± 0 2 mm
(0 012 ± 0 008 inch)</td></tr>
<tr><td colspan="3">Brake pad thickness</td><td>New part 9 mm (0 35 inch)
Minimum Limit 1 0 mm (0 04 inch)</td></tr>
<tr><td rowspan="3">Brake disc thickness</td><td>Standard (Solid)</td><td></td><td>New part 12 5 mm (0 49 inch)
Minimum Limit 11 5 mm (0 45 inch)</td></tr>
<tr><td>Ventilation</td><td></td><td>New part 18 0 mm (0 71 inch)
Minimum Limit 17 0 mm (0 67 inch)</td></tr>
<tr><td colspan="2">Difference in disc thickness on same circumference</td><td>Not to exceed 0 015 mm (0 00059 inch)</td></tr>
<tr><td colspan="3">Brake disc runout limit</td><td>0 15 mm (0 0059 inch)</td></tr>
<tr><td colspan="3">Brake drum inner diameter</td><td>New part 254 mm (10 0 inch)
Maximum Limit 256 mm (10 08 inch)</td></tr>
<tr><td colspan="3">Brake shoe thickness</td><td>New part 5 mm (0 197 inch)
Minimum Limit 1 mm (0 4 inch)</td></tr>
<tr><td colspan="3">Wheel cylinder compression spring free length</td><td>57 ± 1 5 mm (2 24 ± 0 059 inch)</td></tr>
<tr><td colspan="3">LSPV wear limit</td><td>0 7 mm (0 028 inch)</td></tr>
</table>

3-12. Steering

Item		
Steering wheel free play		Not more than 30 mm (1 18 inch)
Steering gear box fluid level		13 - 23 mm (0 51 - 0 91 inch) From upper edge of check hole center
Steering gear box oil (except power steering)		Gear oil GL3, SAE30
Vane pump drive belt	Specified deflection Belt tension	10 - 14 mm (0 4 - 0 55 inch) 50 - 75 kgf
Power steering fluid		ATF DEXRON® II
Power steering turning effort		Not to exceed 7 8 N m (80 kgf-cm, 5 8 ft-lb)
Vane pump hydraulic pressure	Maximum	75 - 80 kgf/cm^2
Difference in pressure under unloaded state (at 1000 and 3000 rpm)		Not more than 5 kg/cm^2
Steering shaft length		Approx 659 3 mm (25 96 inch)
Intermediate shaft	Without power steering With power steering	472 5 ± 1 mm (18 6 ± 0 4 inch) 503 5 ± 1 mm (19 8 ± 0 4 inch)
Manual steering gear box worm shaft starting torque (Worm shaft unit)		0 29 - 0 49 N m (0 03 - 0 05 kgf-m, 0 22 - 0 36 ft-lb)
Manual steering gear box worm shaft starting torque (Total preload)		0 69 - 1 0 N m (0 07 - 0 1 kgf-m 0 51 - 0 7 ft-lb)
Power steering gear box worm shaft starting torque (Worm shaft unit)		0 39 - 0 64 N m (0 04 - 0 065 kgf-m, 0 29 - 0 47 ft-lb)
Power steering gear box worm shaft starting torque (Total preload)		0 59 - 0 93 N m (0 06 - 0 095 kgf-m 0 43 - 0 69 ft lb)
Vane plate		Unit mm (inch) Position / Specified Value / Limit Length: 15 00 (0 59055) / 14 99 (0 59015) Height: 8 2 (0 32283) / 8 1 (0 31889) Width: 1 800 (0 07086) / 1 797 (0 07074)
Vane pump rotor and vane plate clearance	New part Maximum limit	0 01 mm (0 0003937 inch) 0 028 mm (0 0011023 inch)
Vane pump compression spring free length	New part Minimum limit	50 mm (1 96 inch) 47 mm (1 85 inch)
Vane pump drive belt deflection (with pushing force of 10 kg)		10 - 14 mm (0 39 - 0 55 inch)

WRE41 A091

DAIHATSU

F70,F75,F77

Service manual

BODY

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

BODY

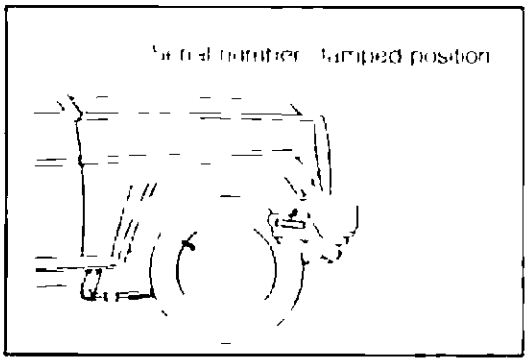
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BODY DIMENSIONS BO–182
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WRE91-BO001

GENERAL INFORMATION

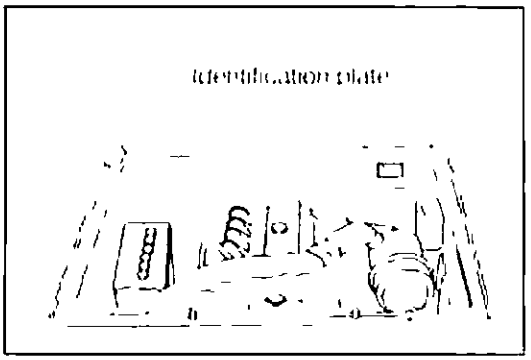
CHASSIS SERIAL NUMBER STAMPED POSITION

The chassis number is stamped on the right side member of the frame at its front side



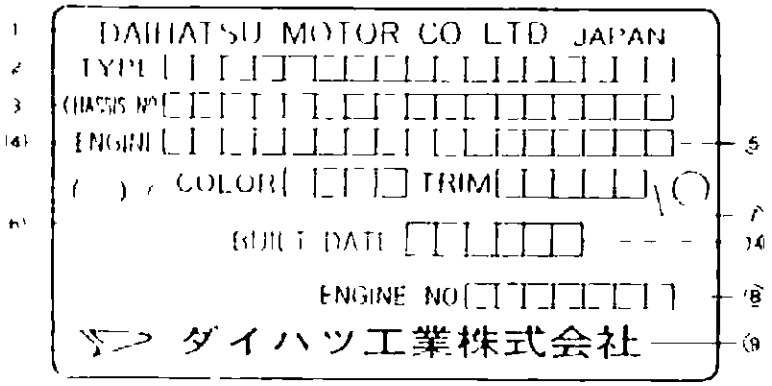
MANUFACTURER'S PLATE POSITION

The manufacturer's plate is attached on the cowl panel

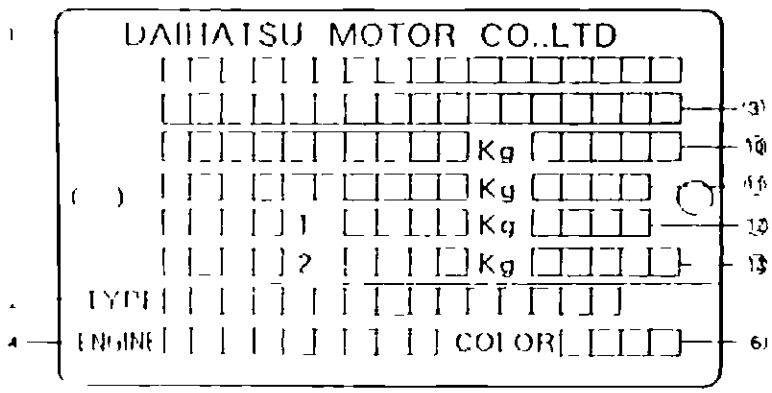


CONTENTS OF MANUFACTURER'S PLATE

(1) General and Australian Specification



(2) ECE & EEC Specification and New Caledonian Specification



① Manufacturer's name, Country
② Vehicle model
③ Chassis No
④ Engine type
⑤ Engine displacement
⑥ Body colors
⑦ Trim code
⑧ Engine number
⑨ Manufacturer's name in Japanese
⑩ Gross vehicle weight
⑪ Gross combination weight
⑫ Maximum permissible front axle weight
⑬ Maximum permissible rear axle weight
⑭ Production month year (Only for AUS spec.)

BODY COLOR INFORMATION

Mono. color	Code
White	045
Red	3E7
Green	G05
Grey Metallic	168
Black Metallic	6A5
Trad Green Metallic	G12
Marine Blue Metallic	B22

Two tone color	Code
Black Metallic/Grey Metallic	NA5 (6A5/168)
Red Mica Metallic/Grey Metallic	25L (3H1/168)
Trad Green Metallic/Grey Metallic	NB3 (G12/168)
Marine Blue Metallic/Grey Metallic	NB4 (B22/168)

WRE91-BO005

Table showing colors of principal paint manufacturers

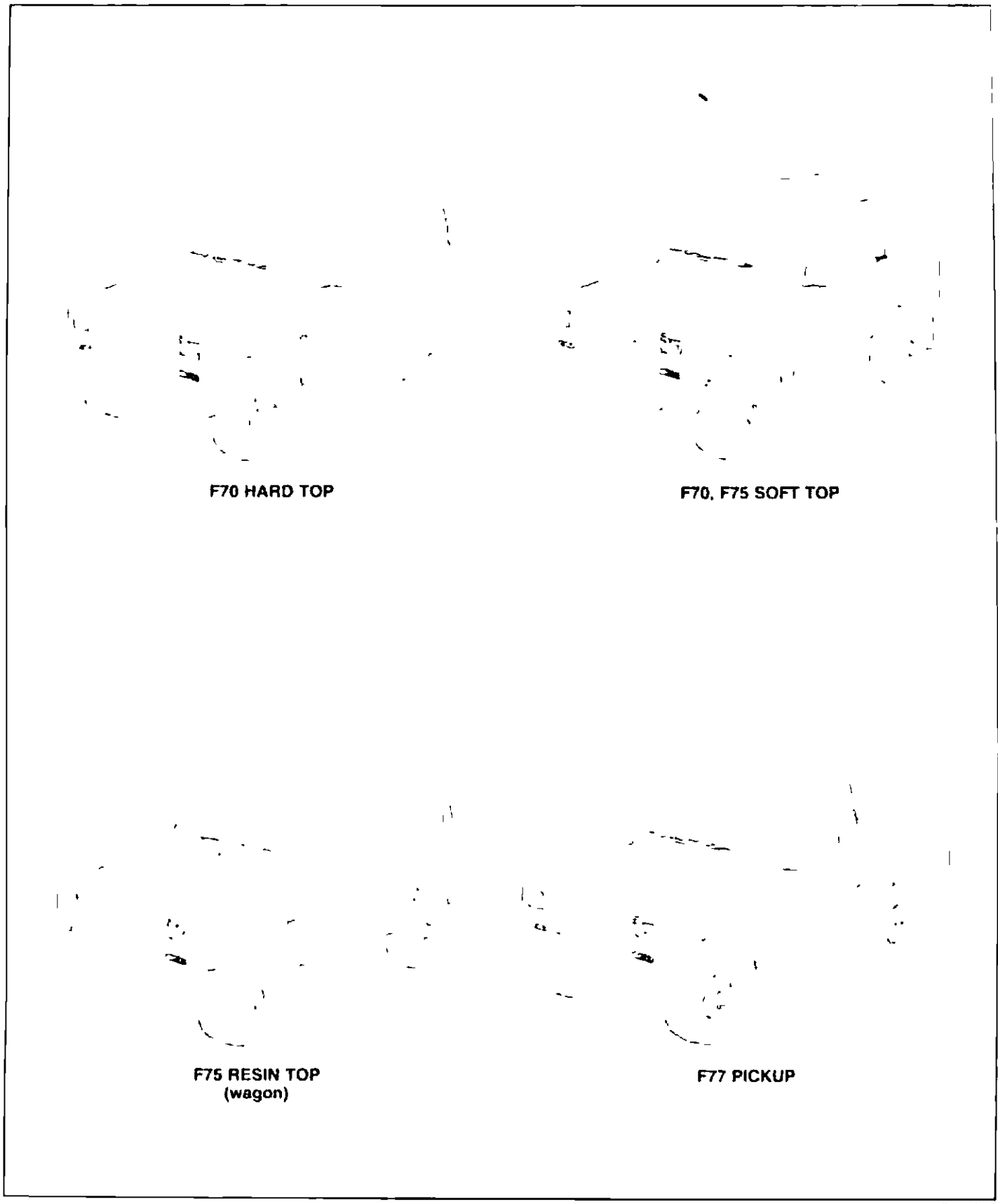
COLOR	CODE				
	DAIHATSU	DUPONT	ICI	SPIES HECKER	STANDOX
WHITE	045	L8997	NW80	16067	045
RED	3E7	G8690	KK26	38299	3E7
GREEN	G05	G8691	KV77	68470	G05
GREY METALLIC	168	N8832	B936B	97728	168
BLACK METALLIC	6A5	G8742	A403B	97806	6A5
TRAD GREEN METALLIC	G12	L9652	D575B	90149	G12
MARINE BLUE METALLIC	B22	L9651	D576B	90150	B22
TWO TONE	NA5	G8742/N8832	A403B/B936B	97806/97728	NA5
TWO TONE	25L	G8730/N8832	PC86B/B936B	97840/97728	25L
TWO TONE	NB3	L9652/N8832	D575B/B936B	48715	NB3
TWO TONE	NB4	L9651/N8832	D576B/B936B	48716	NB4

WRE91-BO006

OUTLINE OF EXTERIOR

BODY SHAPE

The body shapes comes in the following five kinds: F70 hardtop, F70 soft top, F75 resin top, F75 soft top and F77 pickup.



F70 HARD TOP

F70, F75 SOFT TOP

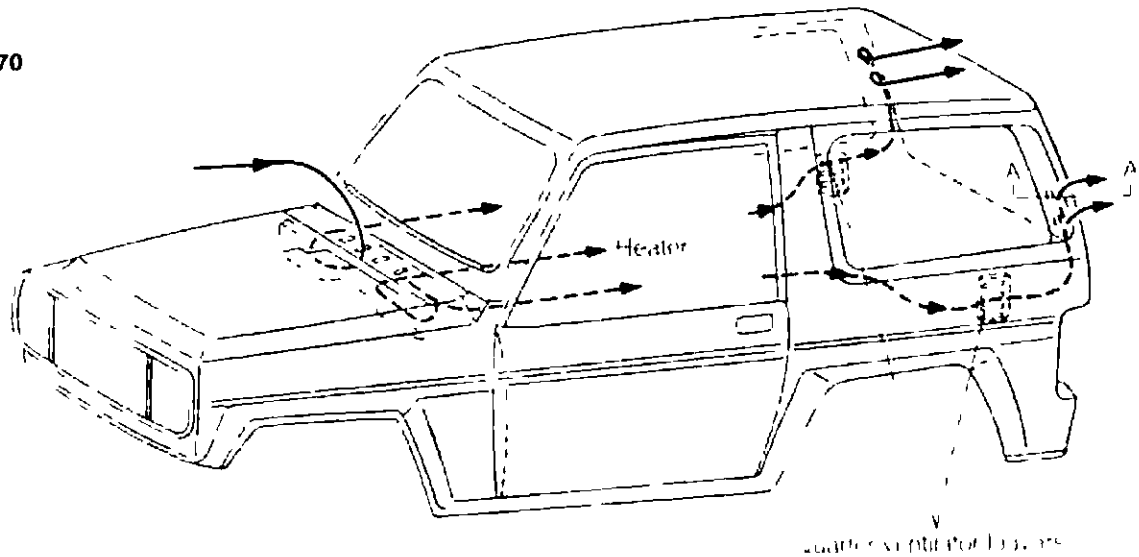
F75 RESIN TOP
(wagon)

F77 PICKUP

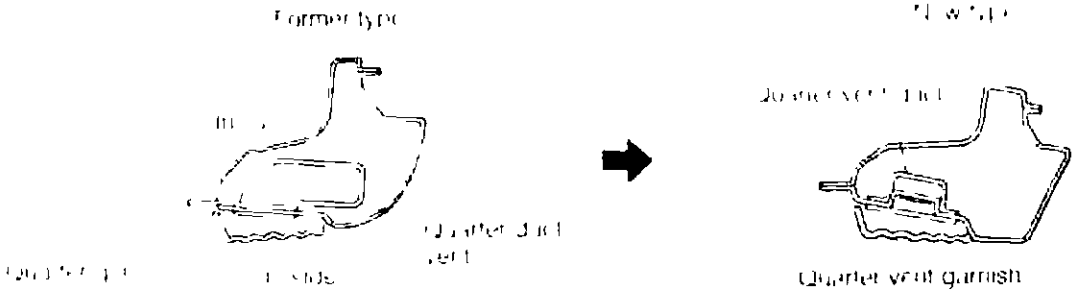
VENTILATION SYSTEM

Fresh air is taken into the vehicle through the louver on the cowl panel via the heater and both ends of the instrument panel as well as through the center ventilator
Moreover, air is discharged from the ventilation louvers on the front doors and quarter ventilator louvers in the case of the F70V and F75V. In the case of the F77, air is exhausted from the ventilation louvers on the front doors and rear pillars

F70



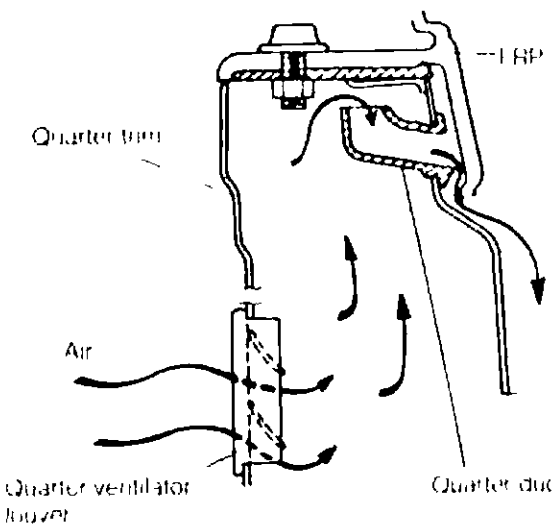
Ventilation of rear pillar section (A–A sectional view)

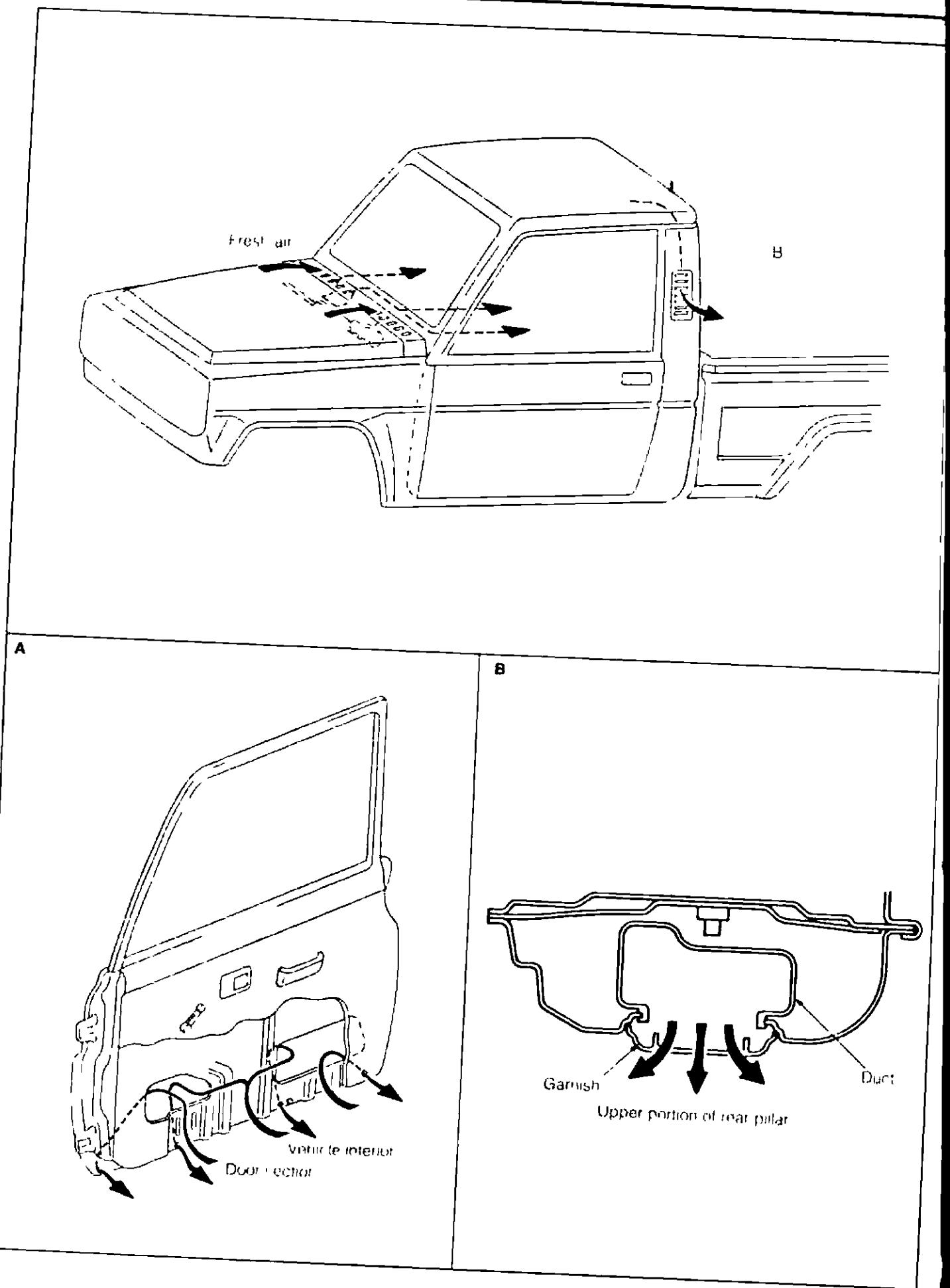


F75V



(B–B sectional view)

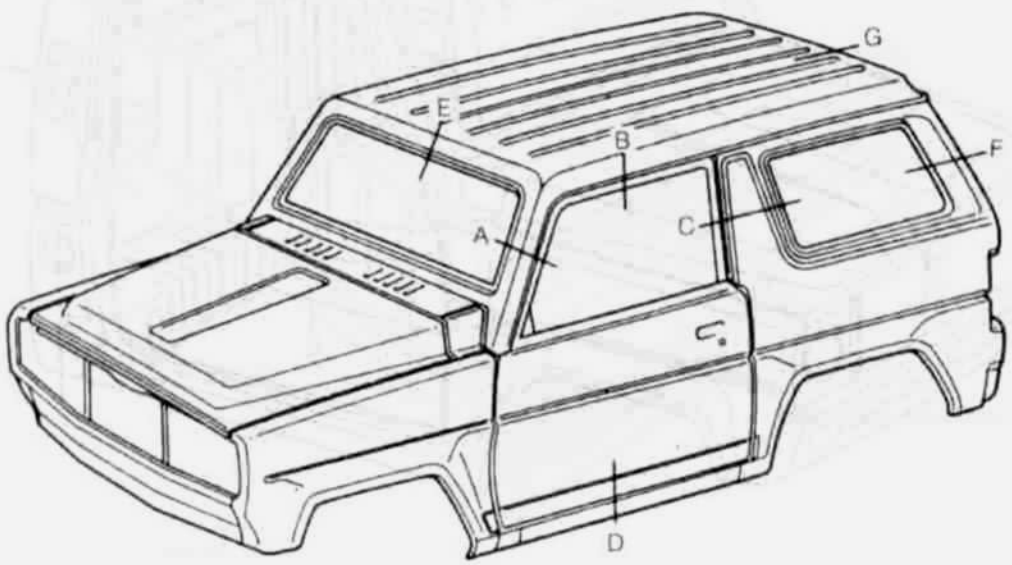



Fresh air
B
A
Vehicle interior
Door section
B
Garnish
Duct
Upper portion of rear pillar

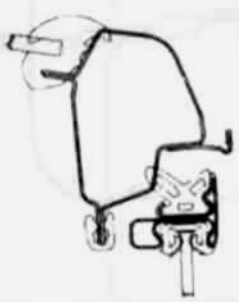
BODY SHELL

Reinforcements are provided at various parts of the body shell in order that adequate rigidity may be assured and the noise and vibration level may be reduced.
Basically, this body shell is shared in common with the hardtop, resin top (wagon) and soft top vehicles. The model F77 shares the same front body with the models F70 and F75. In addition, the model F77 is provided with a back panel.

F70V Model



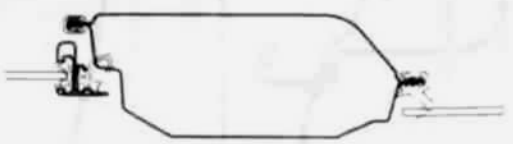
A



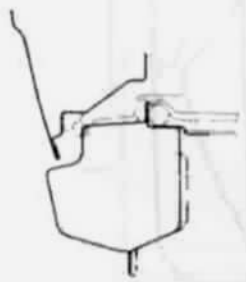
B



C



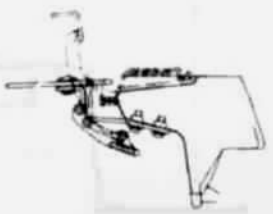
D



E



F

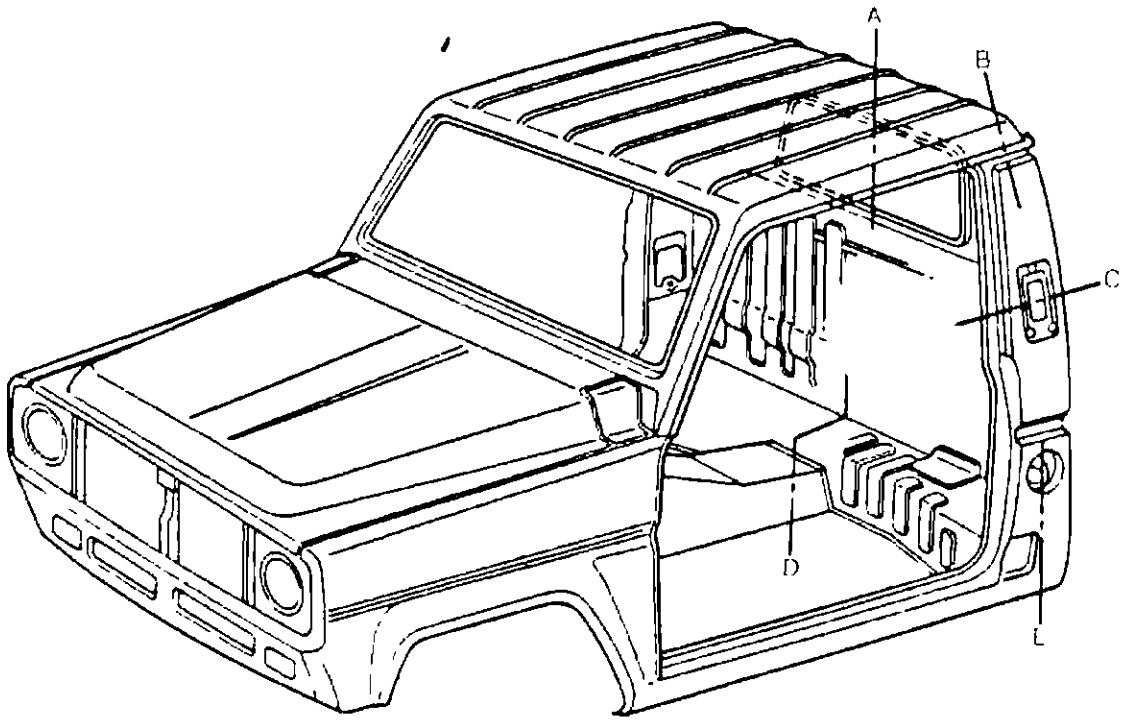


G

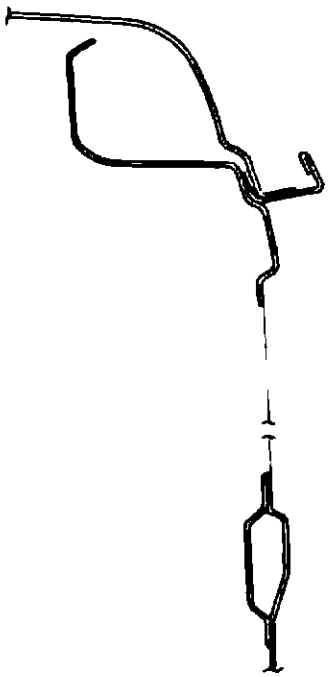


WREB1-BO010

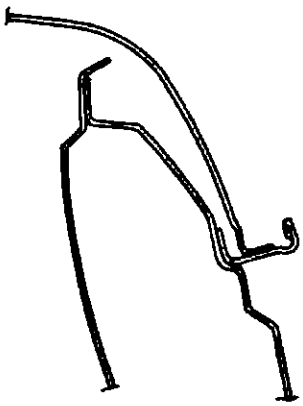
Model F77 Front body



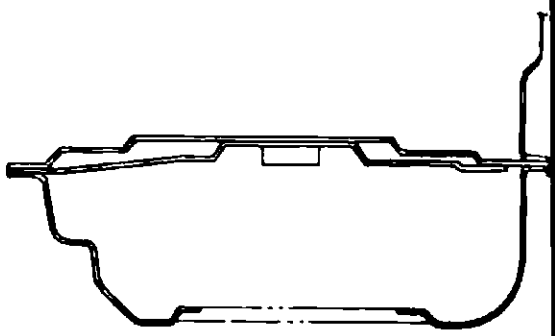
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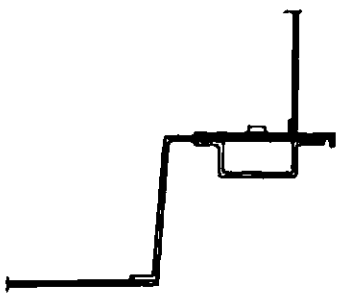
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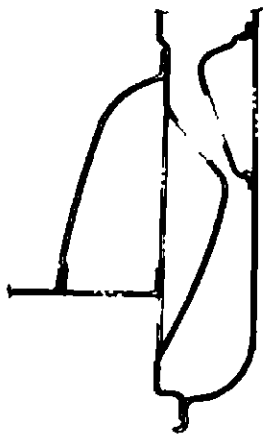
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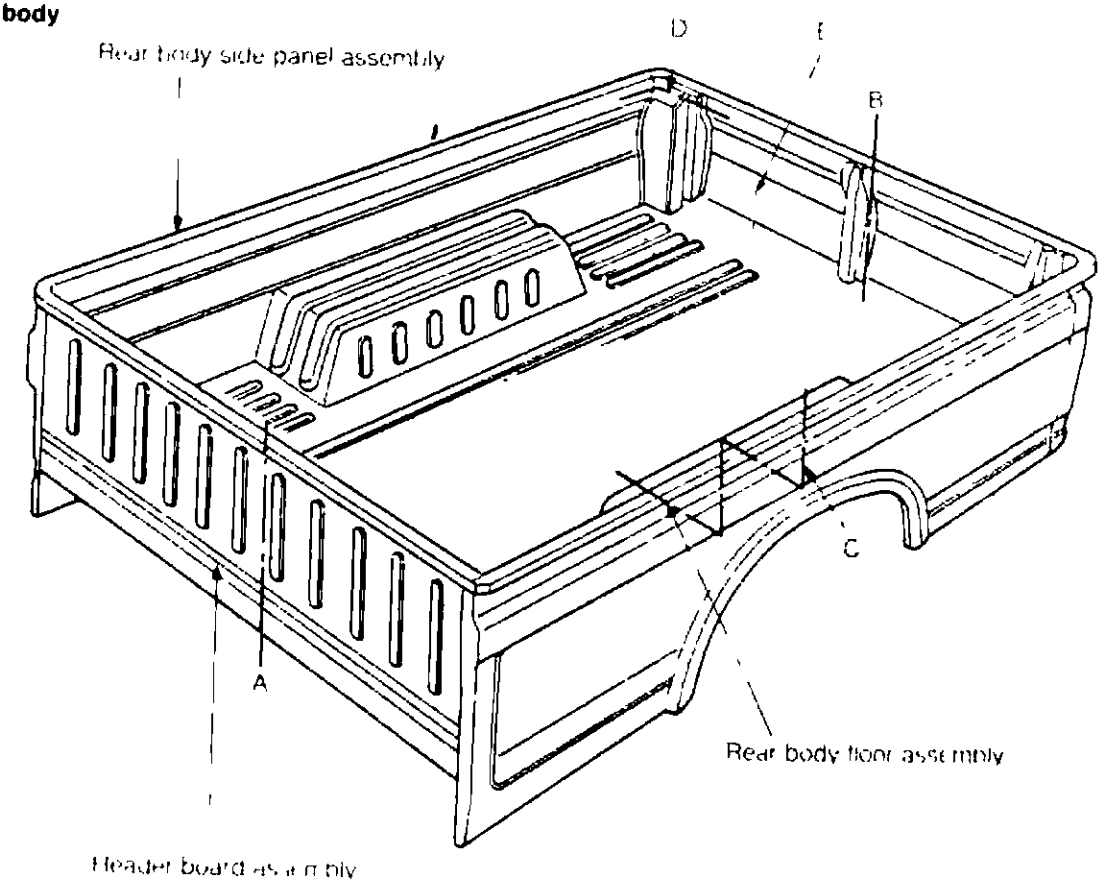
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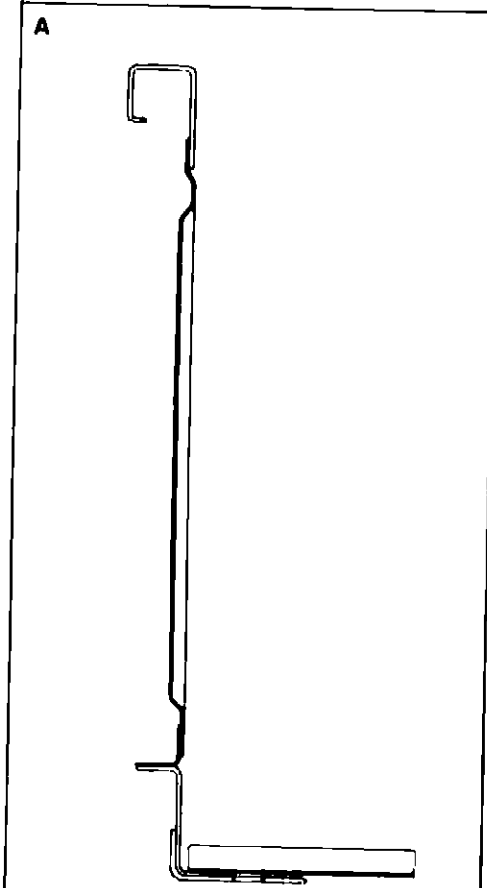


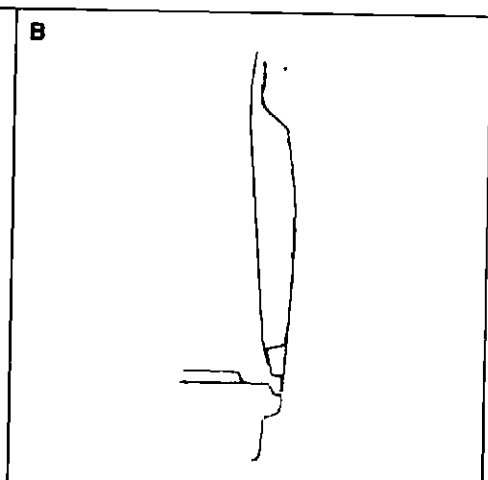
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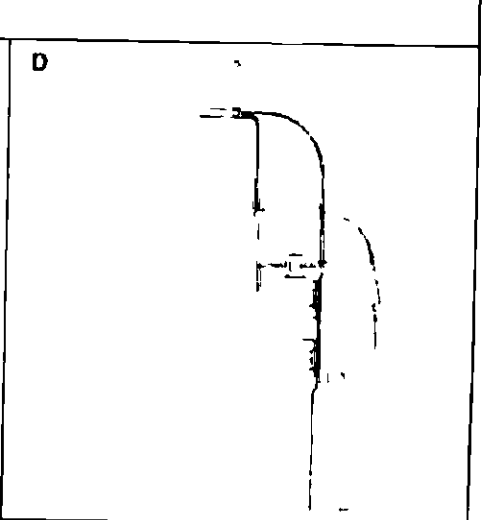


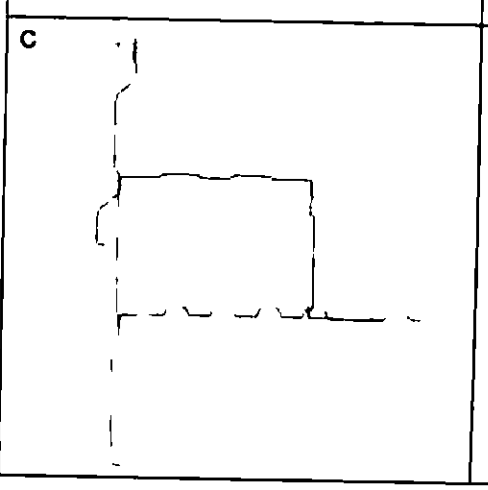
Model F77 Rear body

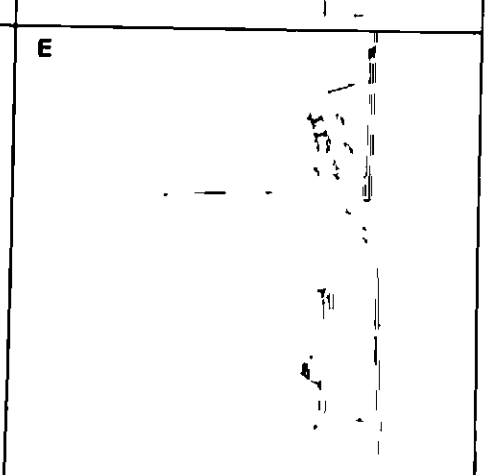






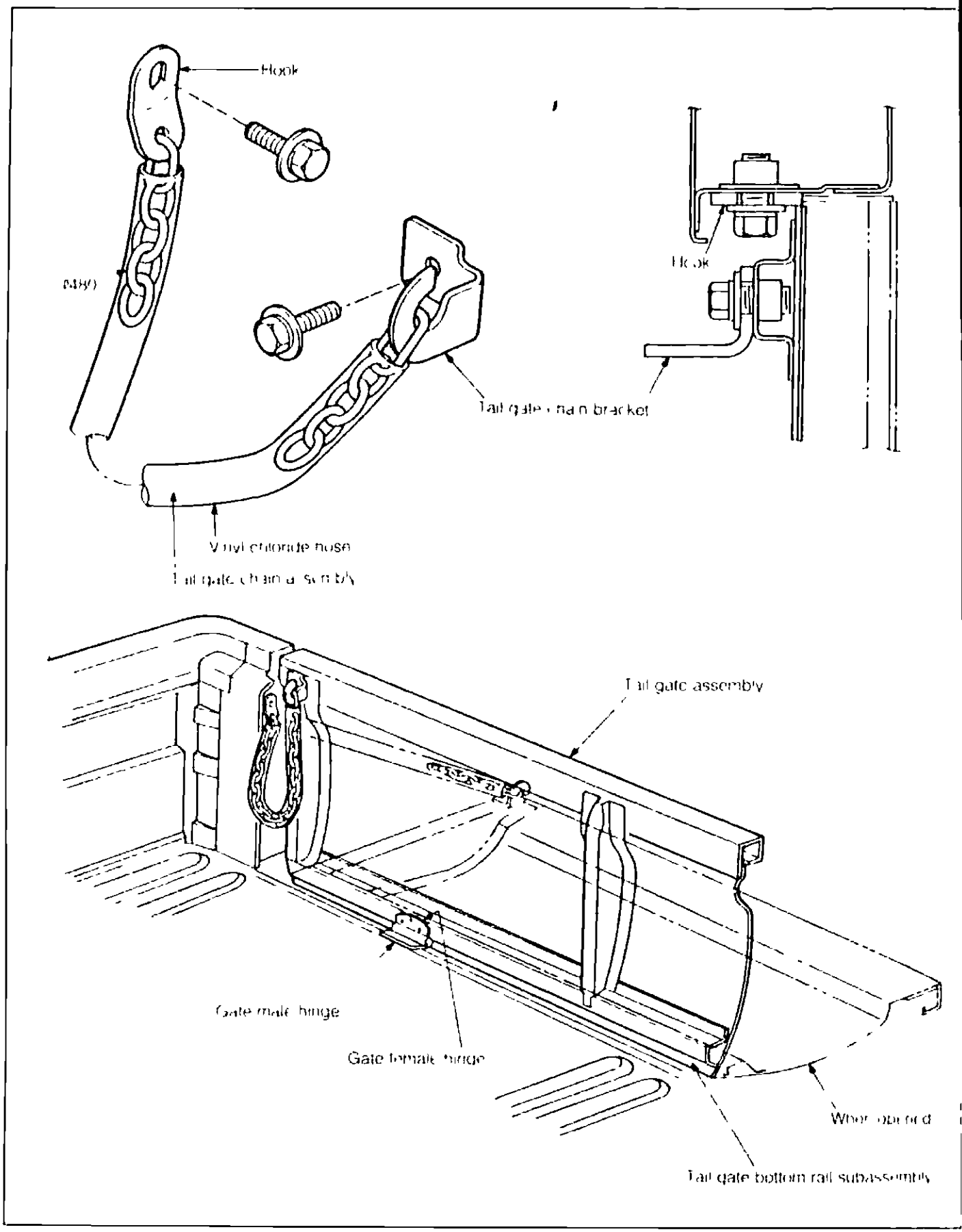






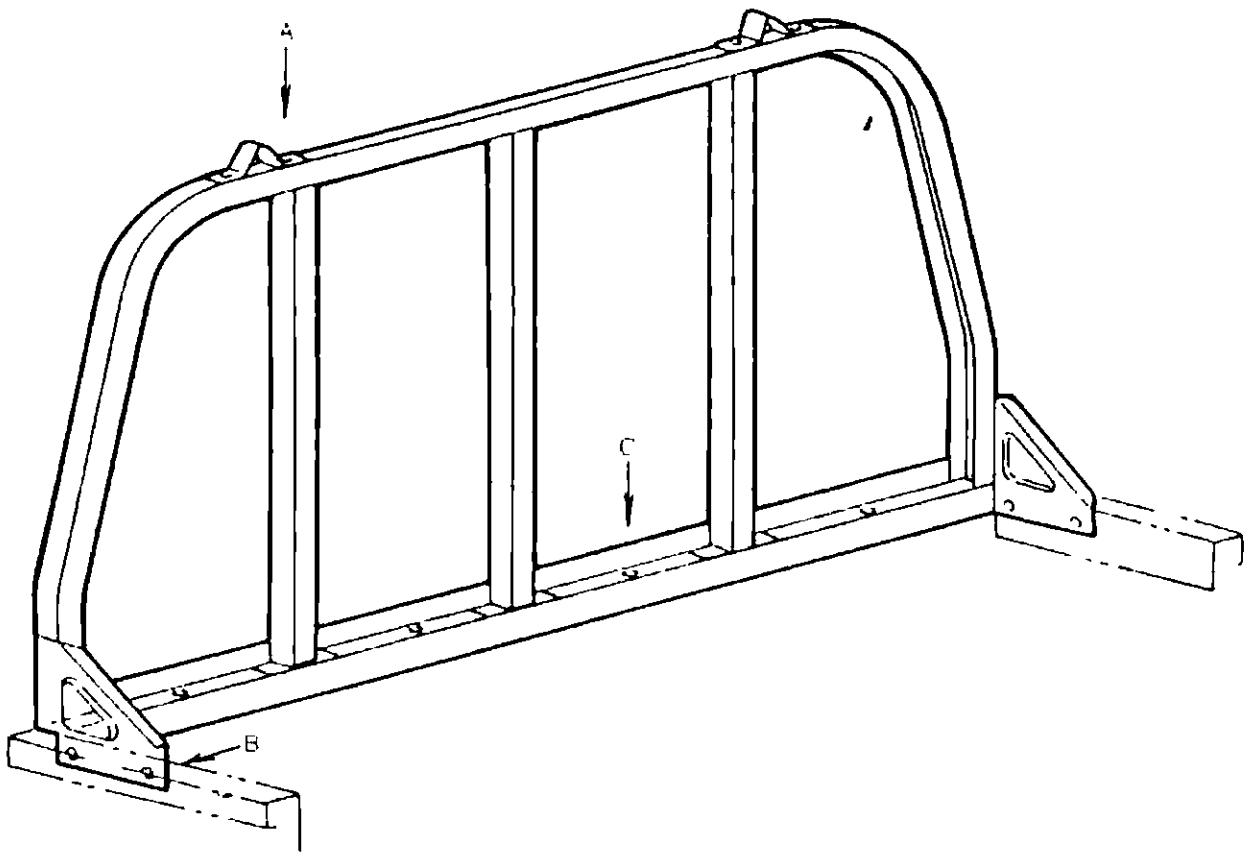
TAIL GATE CHAIN (Pickup)

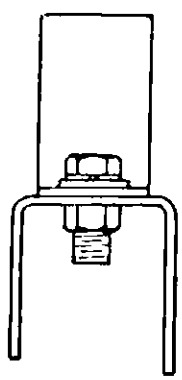
A tail gate chain is available as option on all pickup models



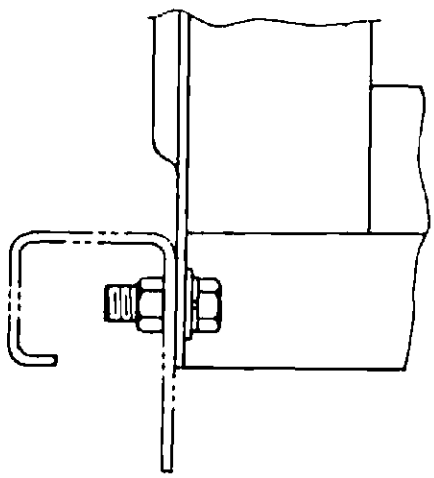
GUARD FRAME (Model F77)

A guard frame is available as optional equipment on all pickup models

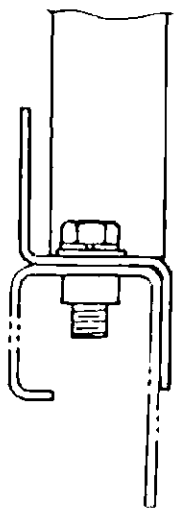




Section A
(4 points)



Section B
(2 points for each of right and left)

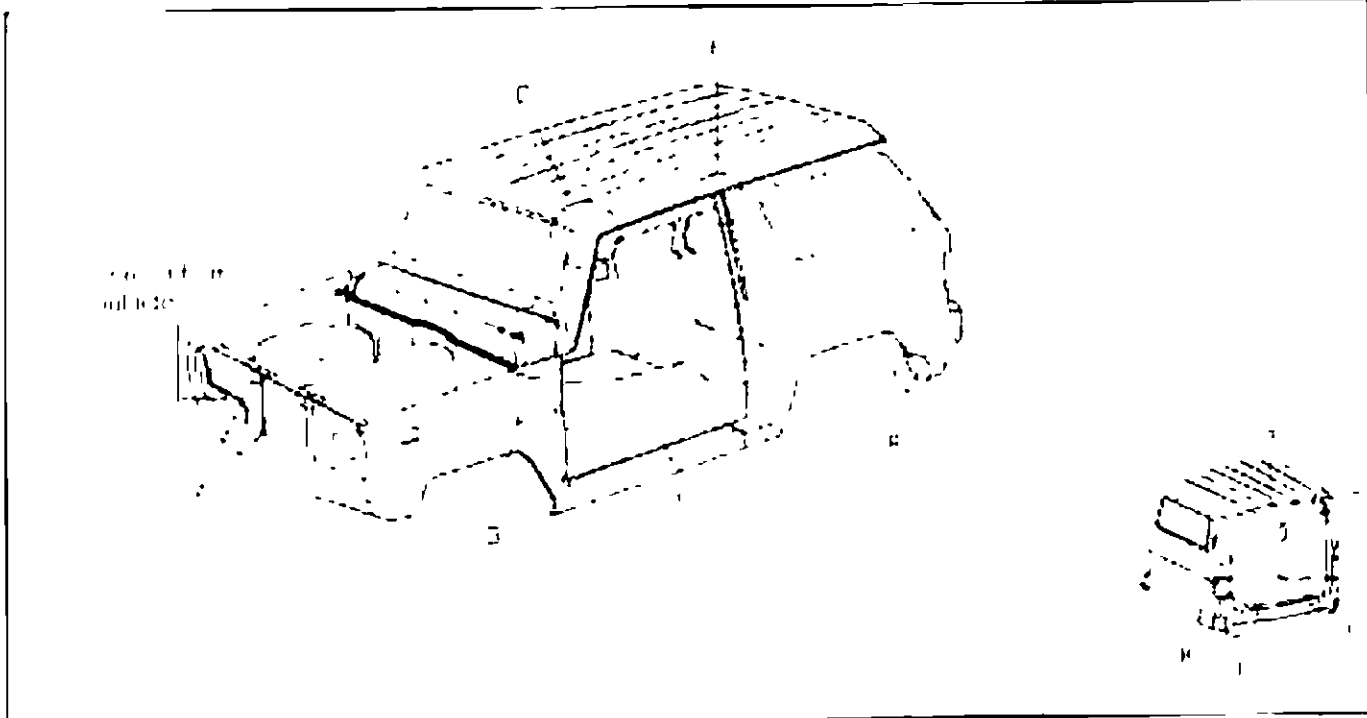


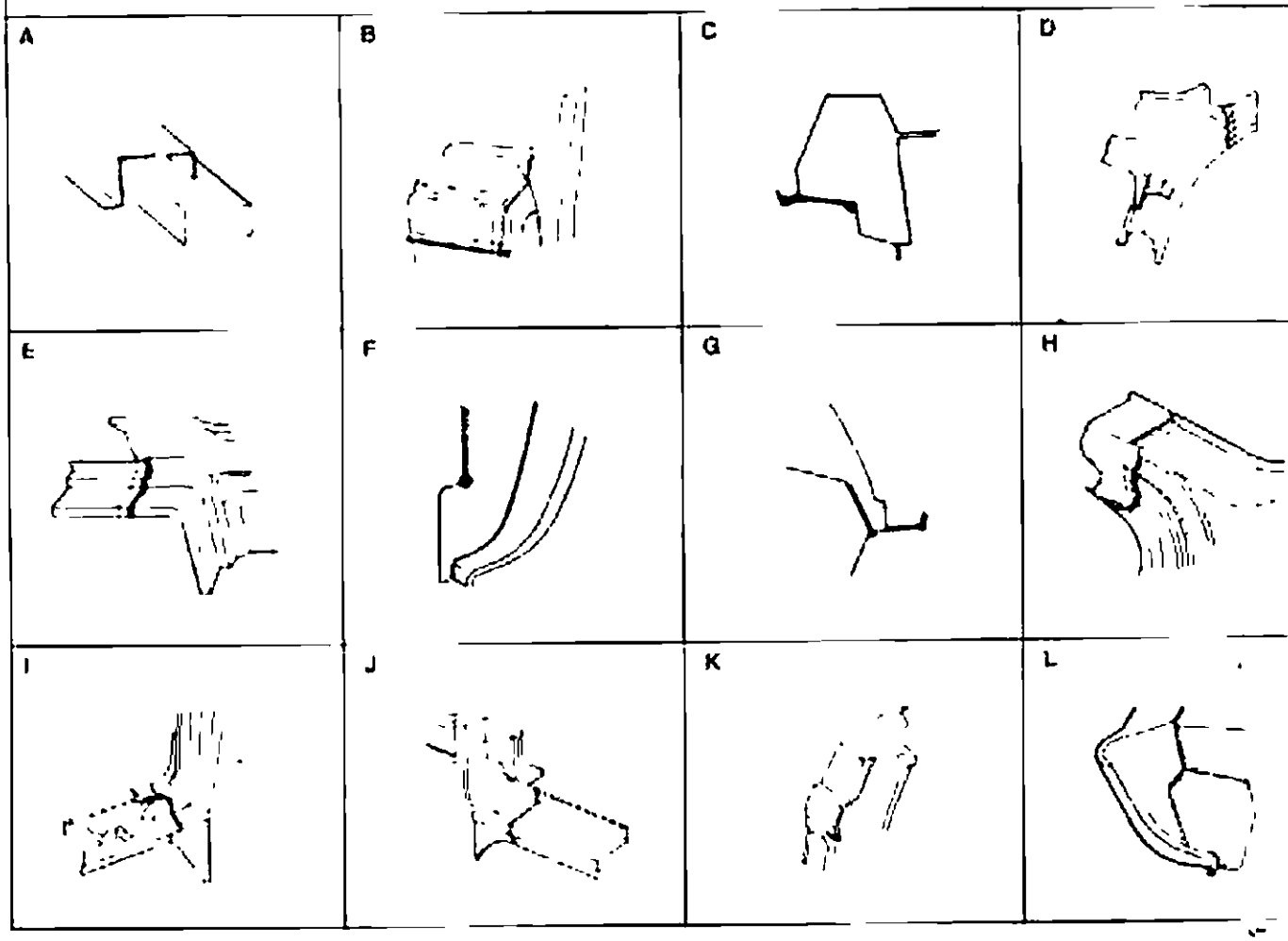
Section C
(4 points)

BODY SEALER

Apply sealer to the rust-prone areas at all the ends of the flanges at the connections of the body for higher anti-rust performance and characteristics.

(1) F70V (Hardtop)

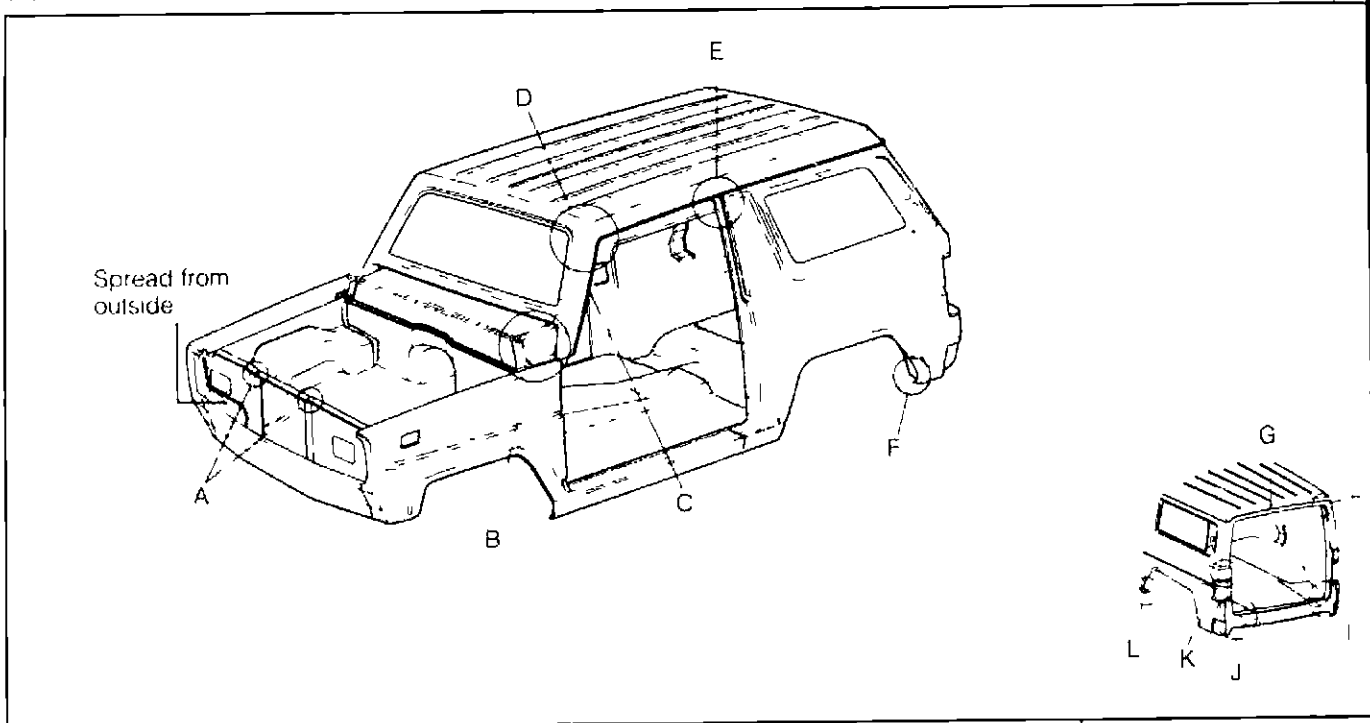


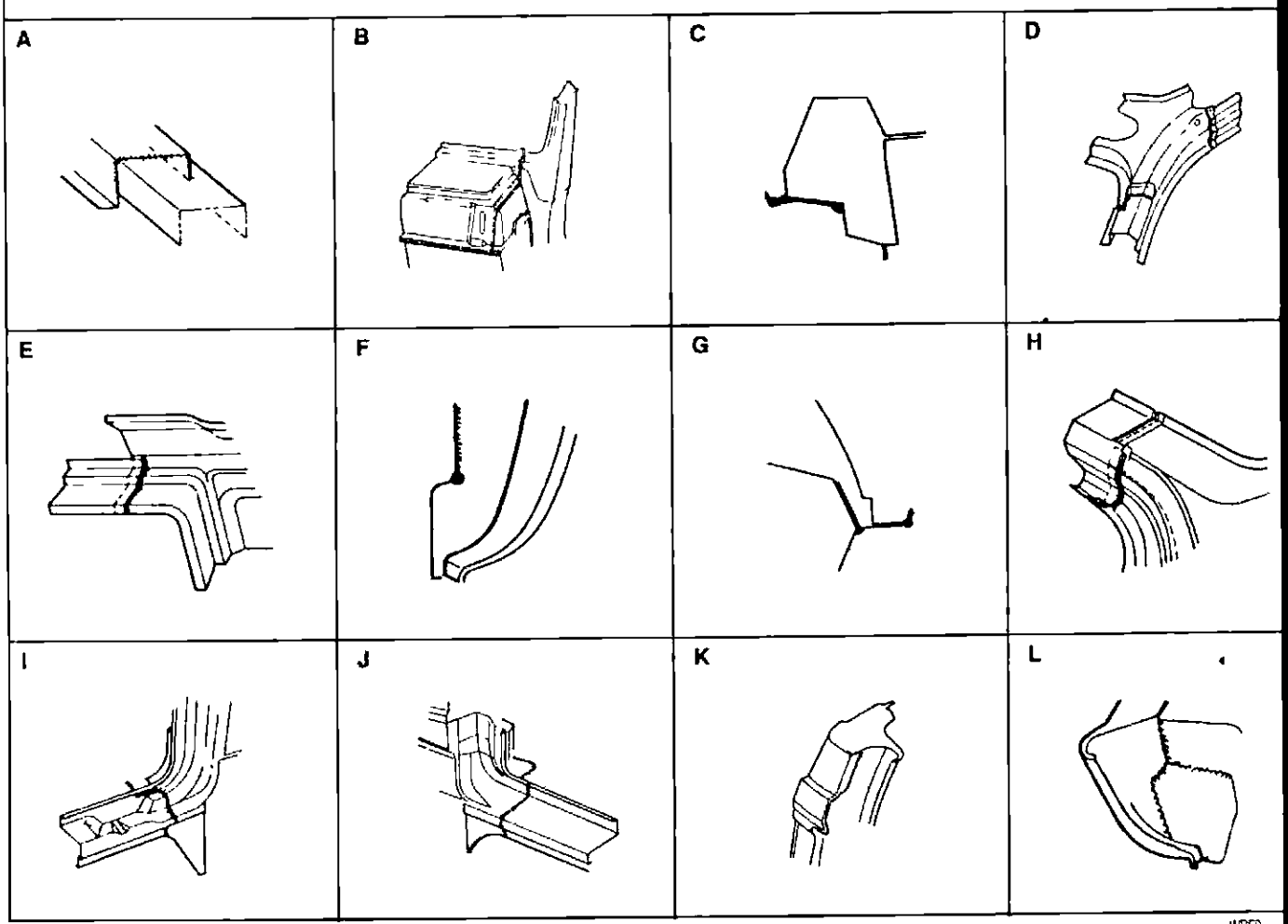


BODY SEALER

Body sealer has been applied to all the ends of the flanges at the connections on the body for higher wa-
dust- and corrosion resistant characteristics

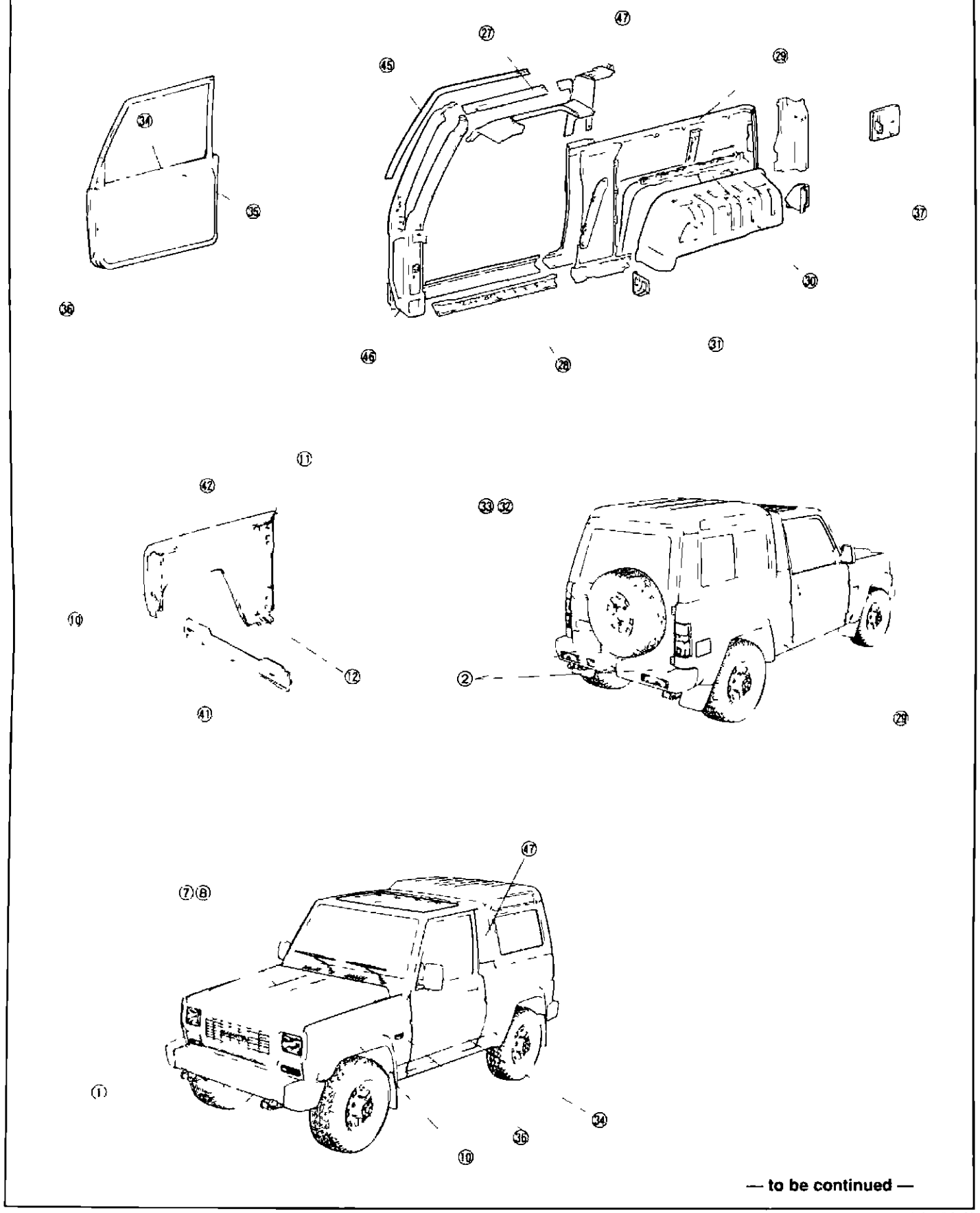
(1) F70V (Hardtop)





WRE9

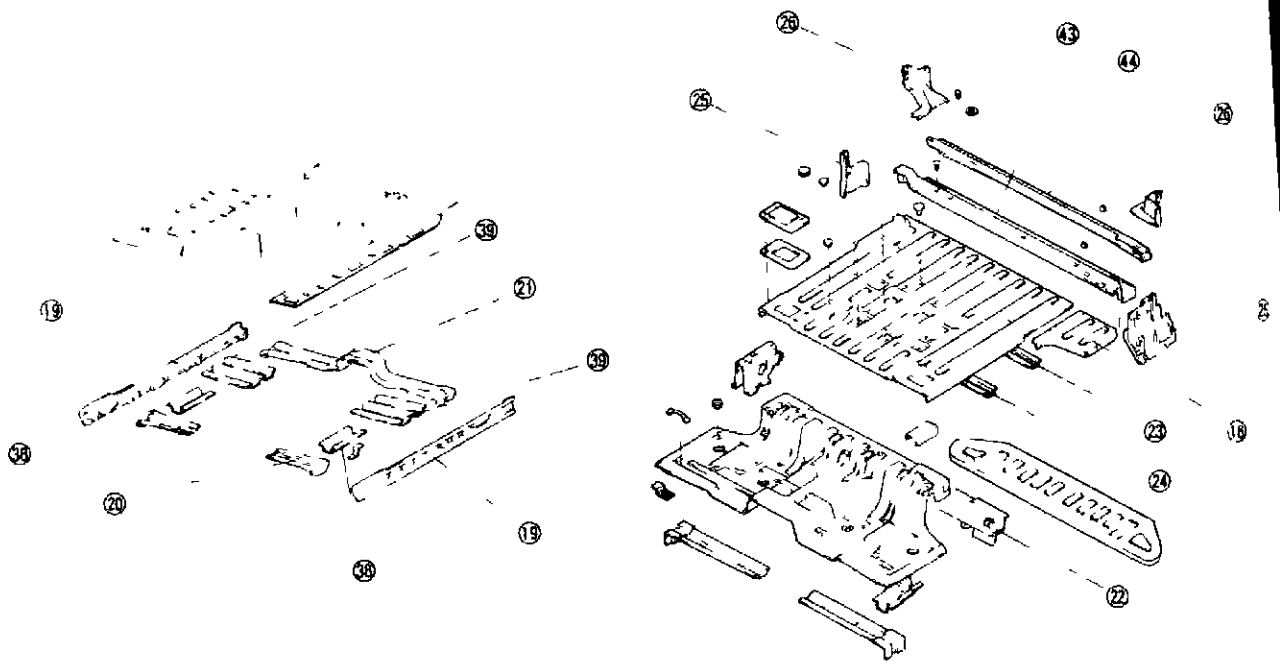
PARTS WHERE GALVANIZED STEEL SHEETS ARE USED

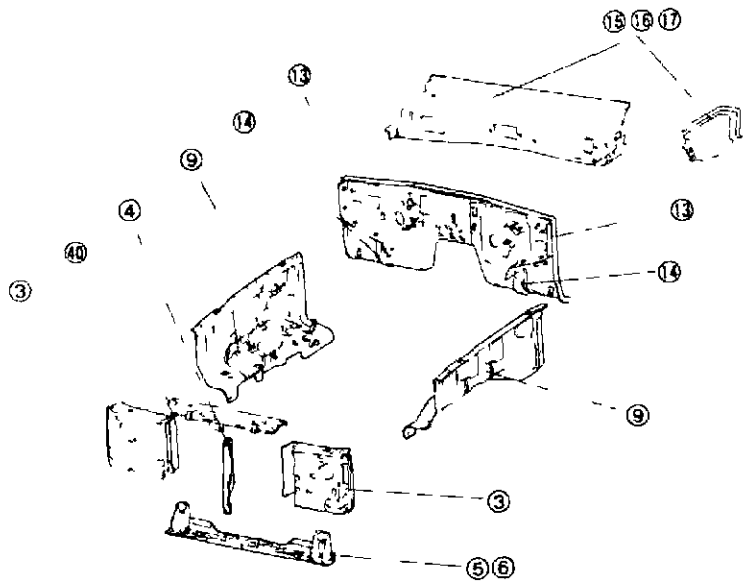


— to be continued —

WRE91 BO025

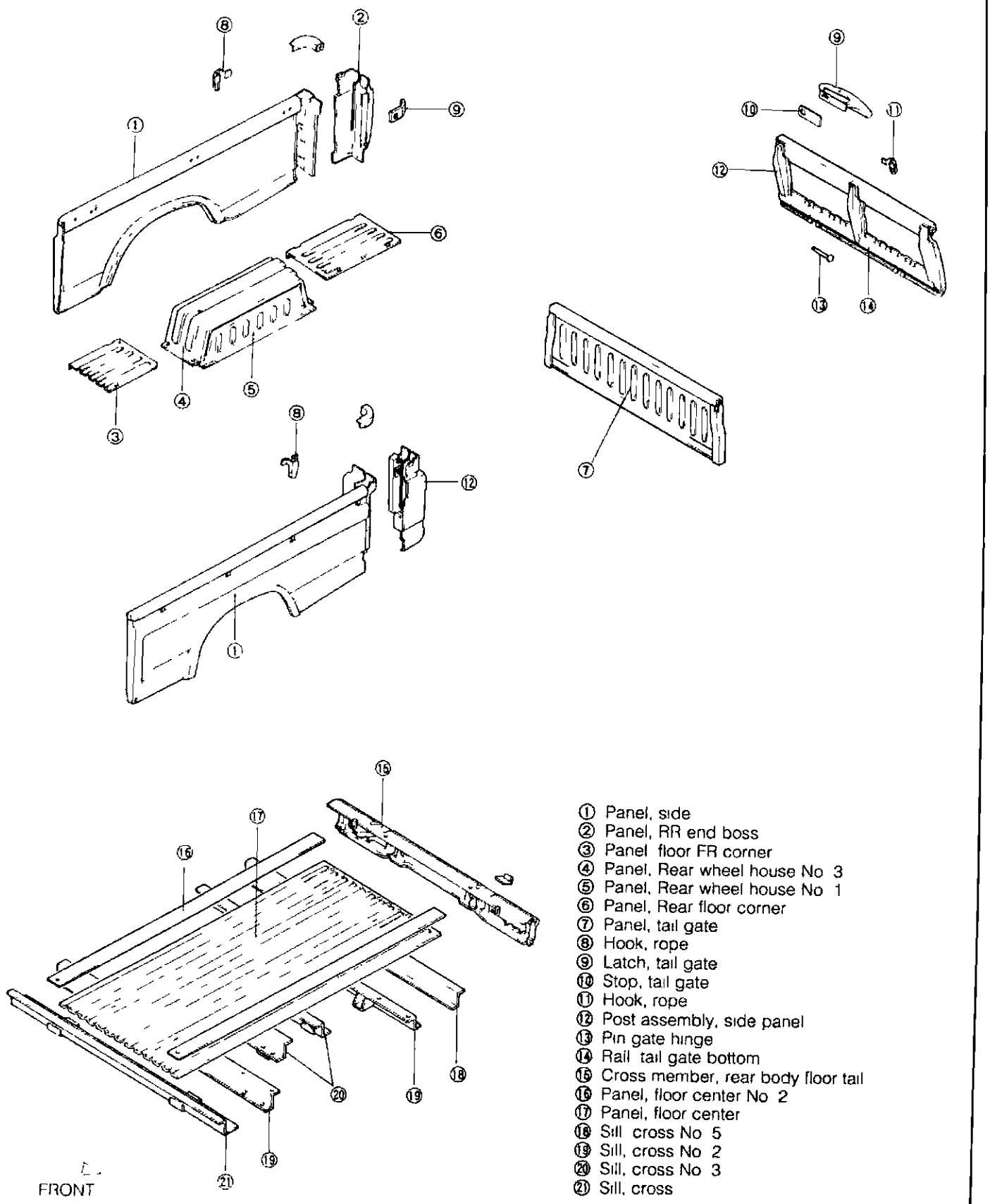
(Continued)





① Front bumper
② Rear bumper
③ Support, radiator R/L
④ Support, hood lock
⑤ Member front cross outer
⑥ Member, front cross inner
⑦ Panel, hood outer
⑧ Panel, hood inner
⑨ Apron, front fender R/L
⑩ Panel, front fender R/L
⑪ Bracket, front fender rear upper R/L
⑫ Bracket, front fender rear lower R/L
⑬ Support, apron fender to dash panel R/L
⑭ Reinforcement, dash panel to floor
⑮ Panel, cowl top outer
⑯ Panel, cowl top inner
⑰ Panel, cowl top outside corner R/L
⑱ Panel rear floor side, LH
⑲ Member, floor side inner R/L
⑳ Member front floor cross No 1
㉑ Member front floor cross No 2
㉒ Member, center floor cross
㉓ Member, rear floor cross No 1
㉔ Member rear floor cross No 2
㉕ Panel rear floor side rear R/L
㉖ Brace, rear floor panel R/L
㉗ Rail roof side outer R/L
㉘ Panel, rocker outer R/L
㉙ Panel quarter outer R/L
㉚ Panel, quarter wheel house outer R/L
㉛ Extension wheel house R/L
㉜ Panel, back door outside
㉝ Panel, back door inside
㉞ Panel front door outside R/L
㉟ Panel, front door inside R/L
㊱ Panel, front door hinge side R/L
㊲ Lid, fuel filler opening
㊳ Reinforcement, front floor under
㊴ Reinforcement sub assy, front floor
㊵ Support, radiator upper CTR
㊶ Panel, front balance
㊷ Panel, front fender side
㊸ Member, rear floor cross inner
㊹ Member, rear cross outer
㊺ Channel, roof
㊻ Panel cowl side
㊼ Panel roll bar outer

(Continued — Pickup model)

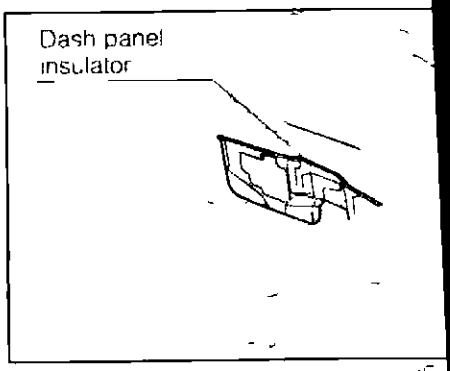


① Panel, side
② Panel, RR end boss
③ Panel floor FR corner
④ Panel, Rear wheel house No 3
⑤ Panel, Rear wheel house No 1
⑥ Panel, Rear floor corner
⑦ Panel, tail gate
⑧ Hook, rope
⑨ Latch, tail gate
⑩ Stop, tail gate
⑪ Hook, rope
⑫ Post assembly, side panel
⑬ Pin gate hinge
⑭ Rail tail gate bottom
⑮ Cross member, rear body floor tail
⑯ Panel, floor center No 2
⑰ Panel, floor center
⑱ Sill cross No 5
⑲ Sill, cross No 2
⑳ Sill, cross No 3
㉑ Sill, cross

WRE91 BO027

DASH PANEL INSULATOR

The dash panel insulator is employed on the resin top (wagon) and hardtop models mounted with Type DL engine. Also, the dash panel insulator is installed at the engine compartment side of the dash panel so as to reduce the noise penetration into the cab

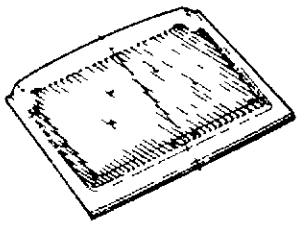


SILENCERS

For reduced engine noise transmitted into the vehicle interior and exterior, silencers are installed on the panel, glove compartment and hood panel
The installing position of the floor silencers differ according to the models (Except for the model F7

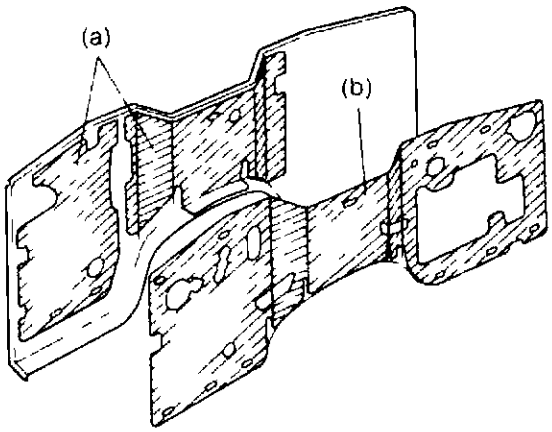
Silencer on hood
(Only for ECE & EEC specifications)

Material Soundproof material × inflammable non woven cloth

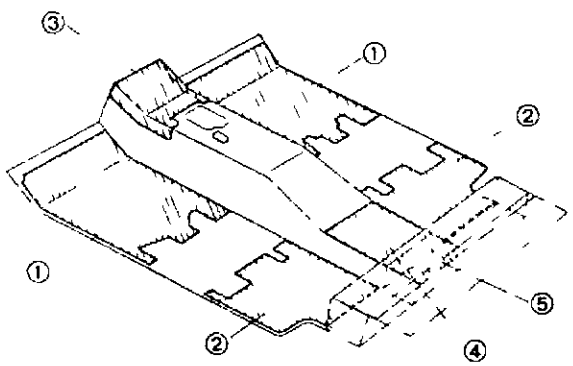


Silencers on glove compartment

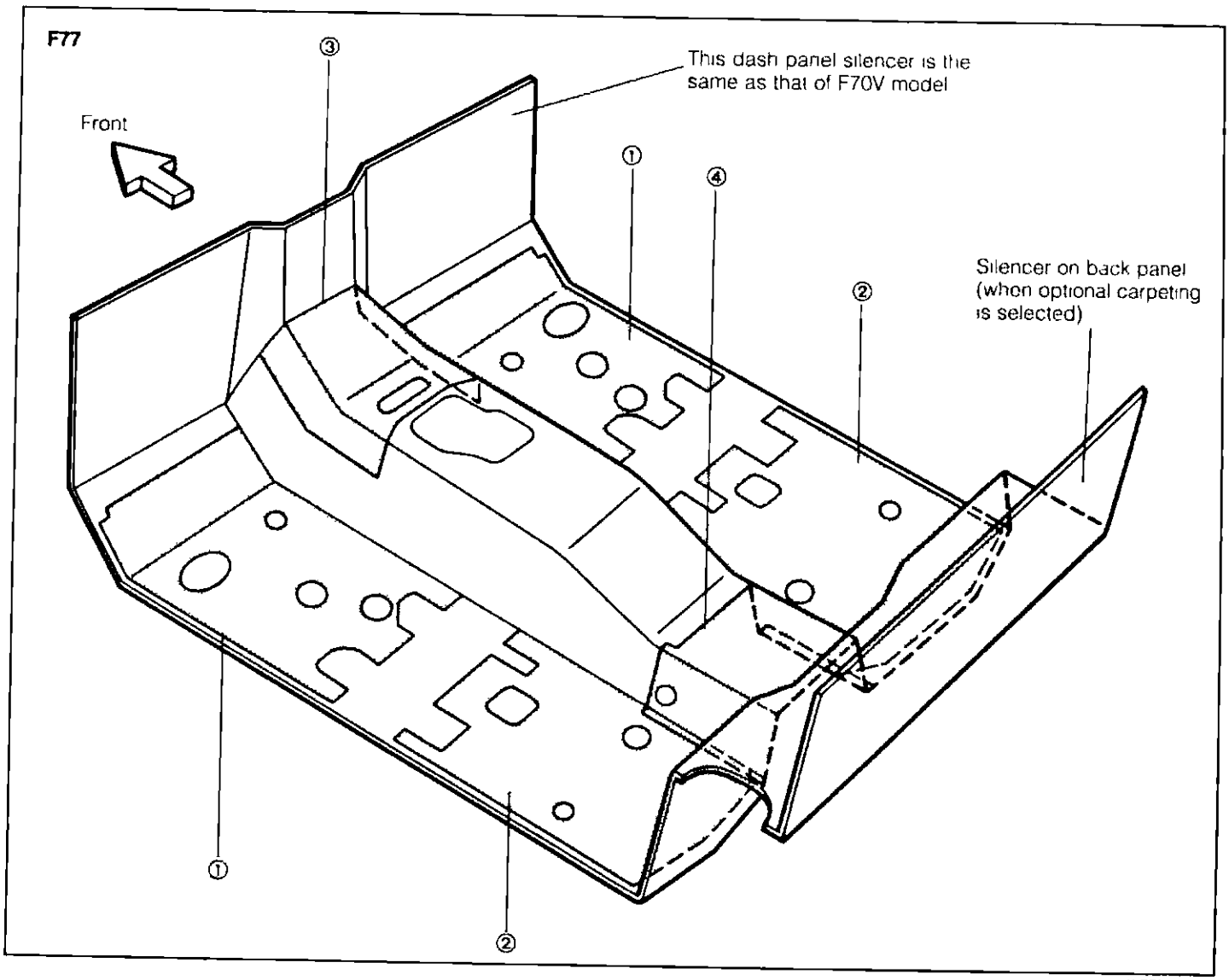
Materials Asphalt sheet (a)
vinyl chloride resin and cotton felt (b)



Silen cers on floor panel (F70 and F75)

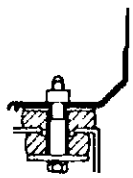
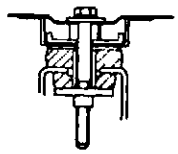
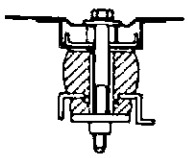
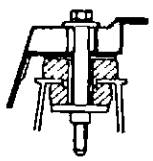
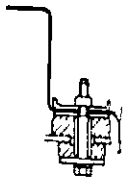


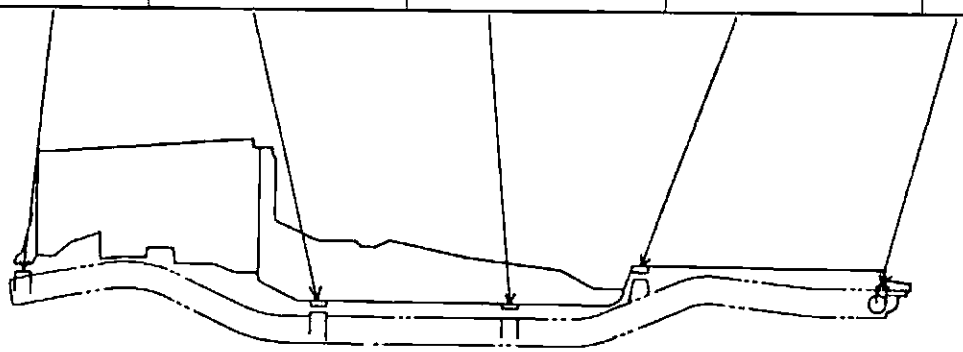
No	Nomenclature	Material	Application		
			Tarpaulin	Hardtop	Wago
①	Front floor silencer right pad (two)	NT high damp sheet (AA 999) (t4 0)		○	C
②	Center floor silencer right pad (two)	NT high damp sheet (AA 999) (t4 0)		○	C
③	Front floor silencer center pad (one)	NT high damp sheet (AA-999) (t2 3)	○	○	O
④	Center floor silencer rear center pad (one)	NT high-damp sheet (AA 999) (t4 0)		○	
⑤	Center floor silencer center pad (one)	NT high damp sheet (AA 999) (t4 0)			O


F77
③
This dash panel silencer is the same as that of F70V model
Front
①
④
②
Silencer on back panel (when optional carpeting is selected)
①
②
WRE91 BO030

BODY MOUNTS

The mounts where the vehicle body and frame are coupled are fitted in such a manner that effectively reduce the vibration from the suspension and drive system

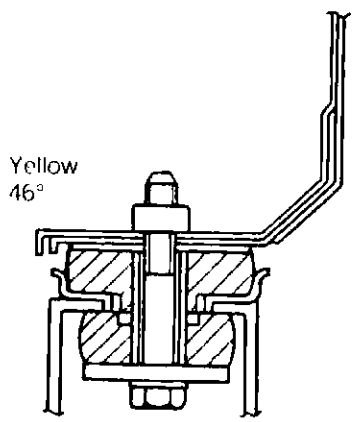
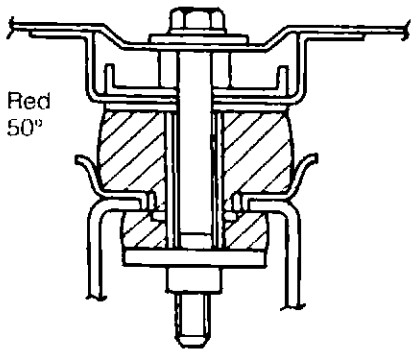
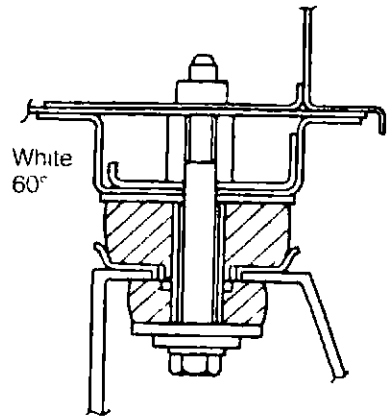
No	1	2	*3	4	5
Hardness	46°	60°	42°	46°	60°
Color code	Yellow	White	Two lines	Yellow	White
Configuration			(Except for hardtop) 		



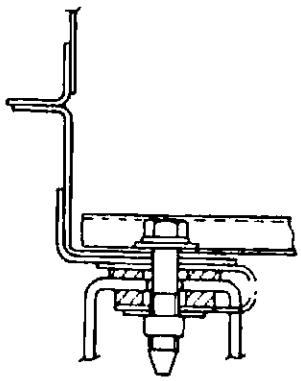
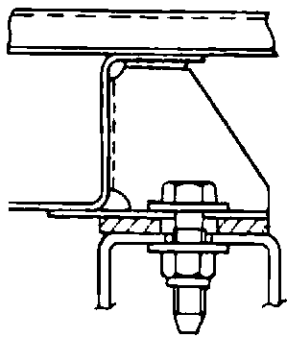
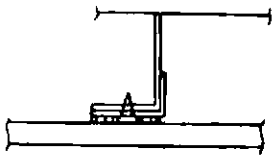
*Hard top are free ma

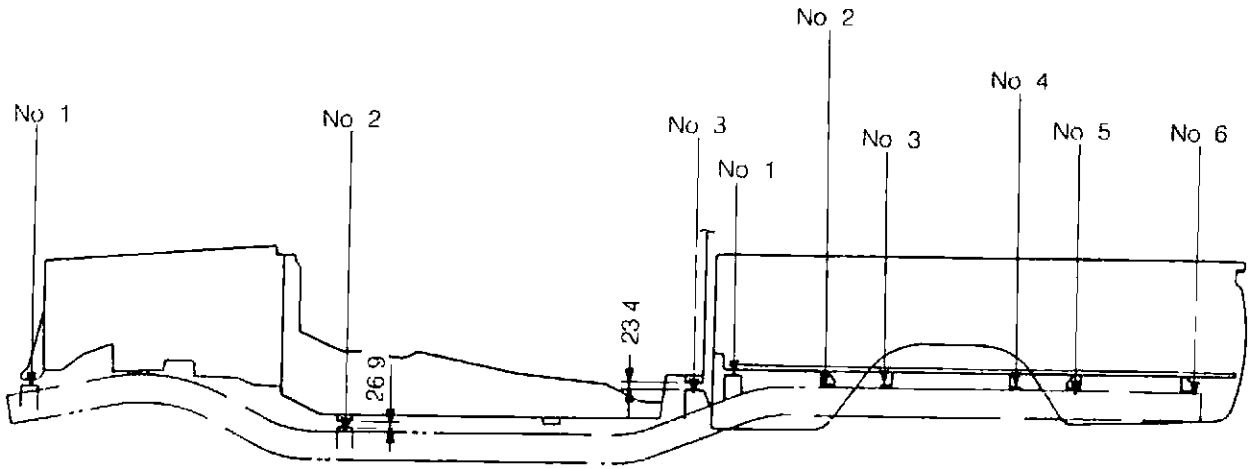
(Continued — Pickup model)

Front Body

No 1	No 2	No 3
		

Rear Body

No 1	No 2 No 5 No 6	No 3 No 4
		



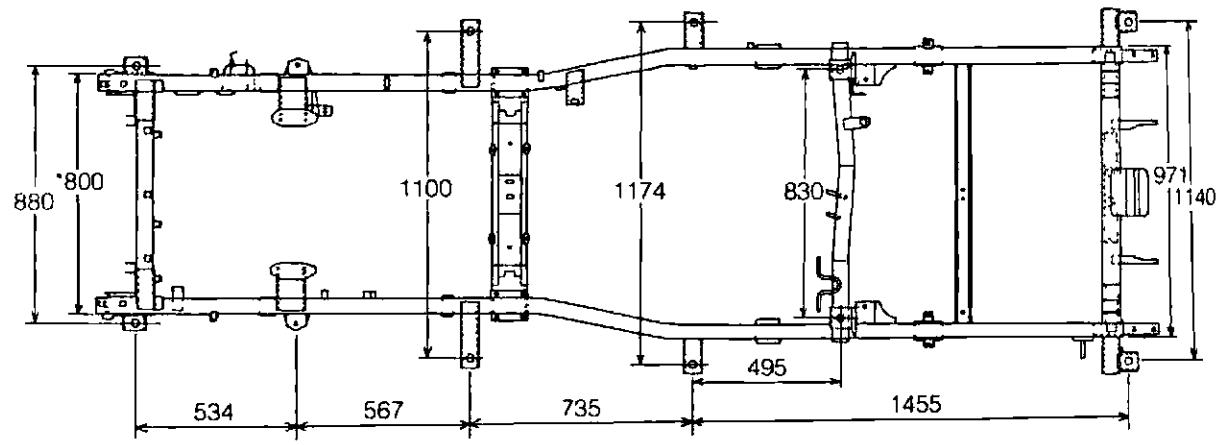
Unit mm

WHE91 80032

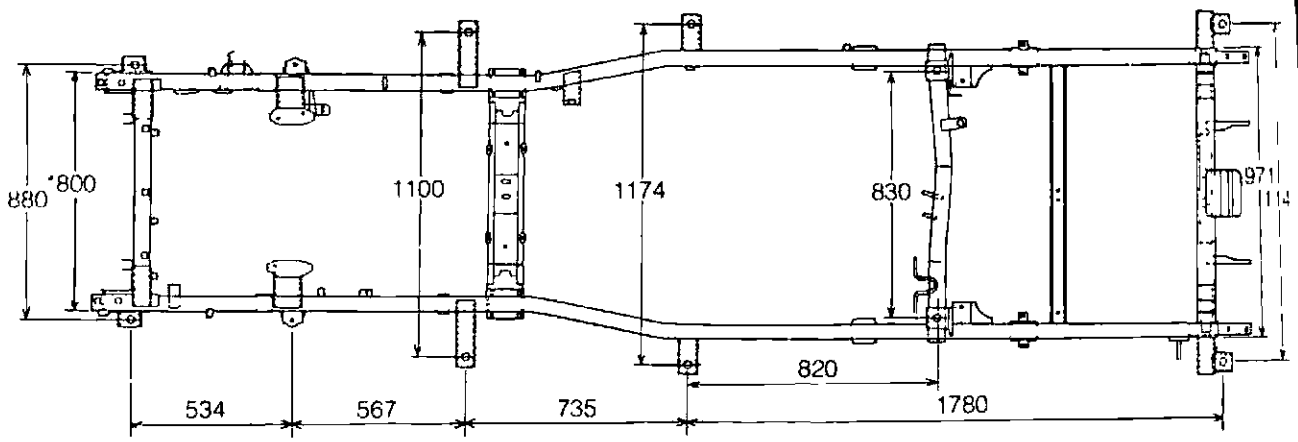
FRAME

The frame comes in three kinds, i.e. frames for the F70, F75 and F77 The ladder-shaped frame has t
employed

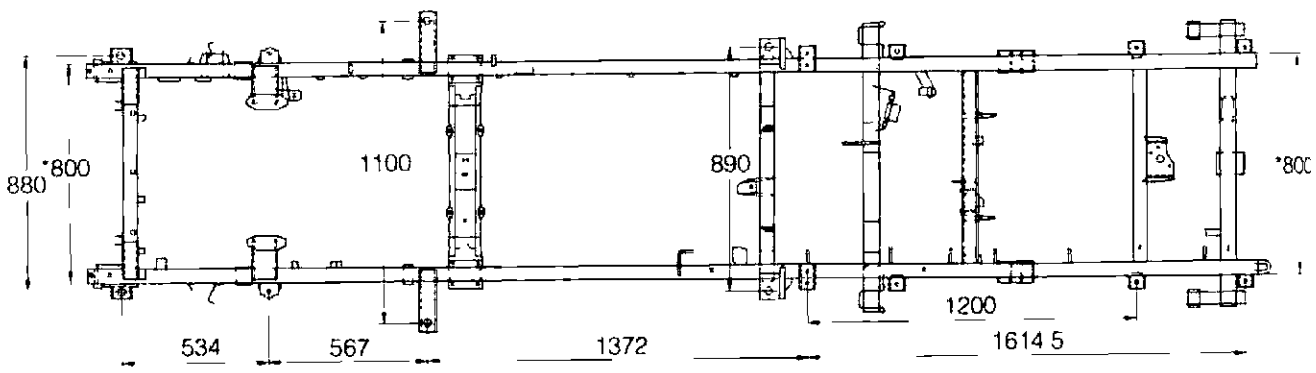
F70



F75



F77



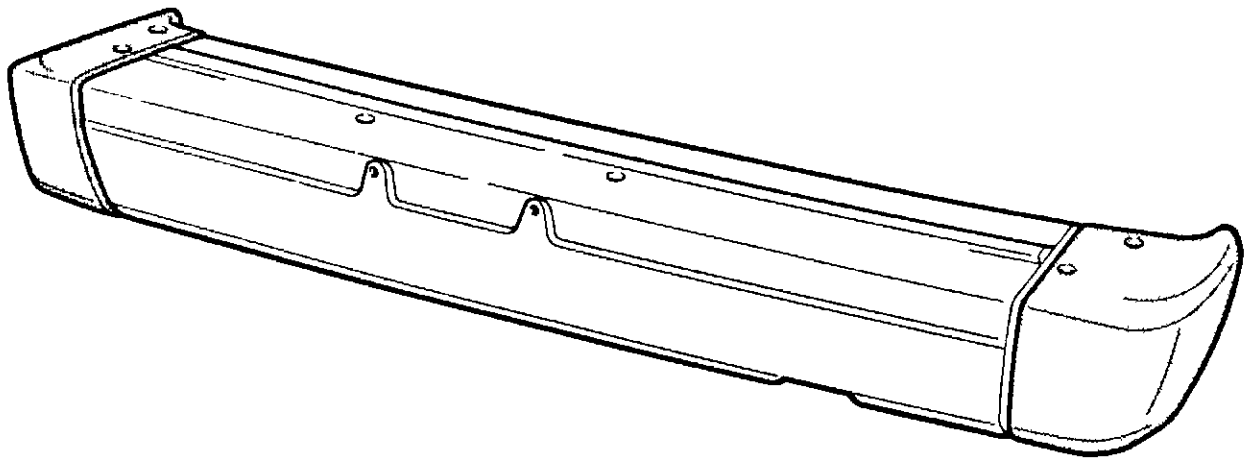
* Side rail width (size of side rail extension are not included)

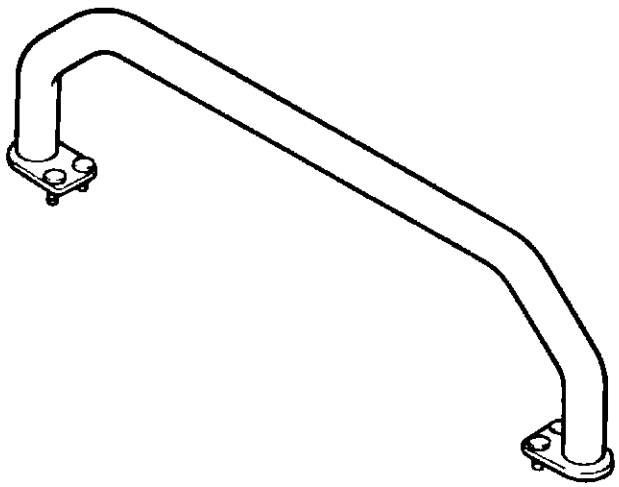
Unit: mm

WRE91 BO

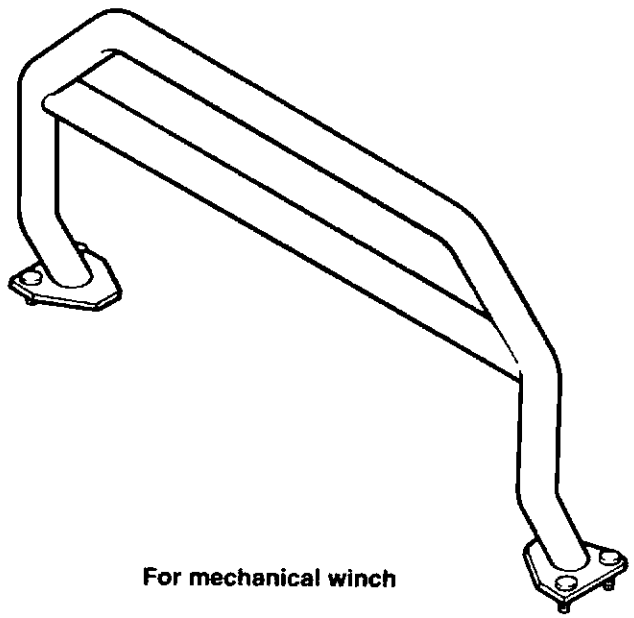
FRONT BUMPER

On all vehicles, the front bumper adopts the large-sized bumper, as standard equipment, which has been hitherto-employed on all models except for the pickup model for the ECE & EEC specifications.





For standard



For mechanical winch

NOTE

- The chrome-plated radiator grille guard is not available on the pickup models.
- The front bumper to be used when the winch is installed differs in shape from the standard front bumper

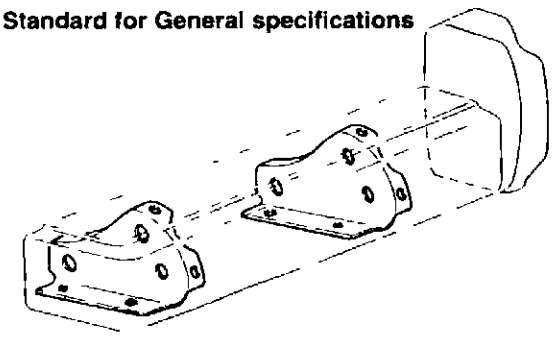
WRE91 BO035

REAR BUMPER

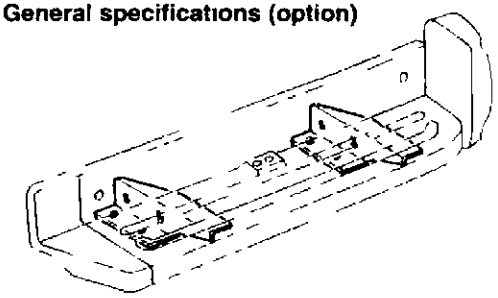
The rear bumper for the models F70 and F75 comes in three kinds Two of them are the standard and step bumper for the general specifications The other is the bumper for the ECE & EEC and ... specifications where the rear combination lamps and fog lamps are built in (The rear fog lamps are ... equipment only for U K , Germany and Belgium On other specifications, they are optional equipm...

F70 and F75 series

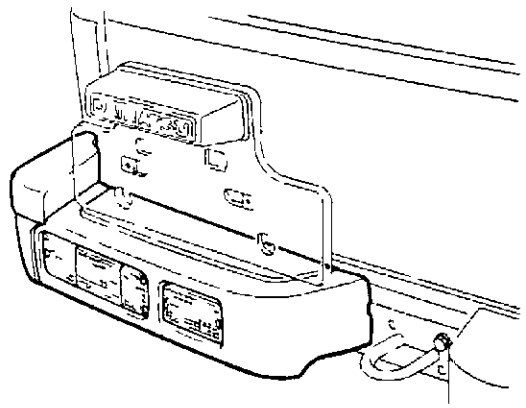
Standard for General specifications



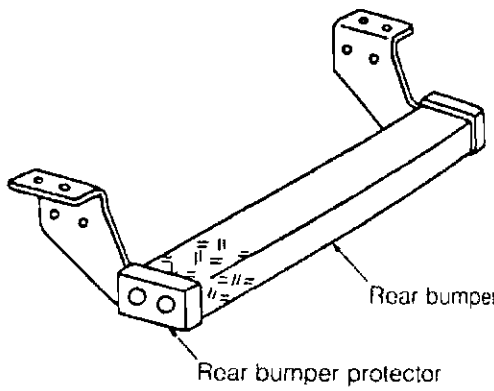
General specifications (option)



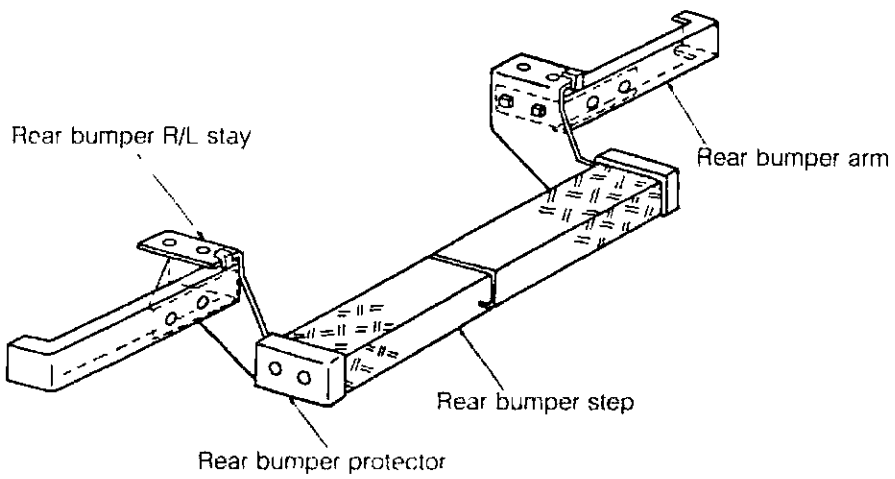
ECE & EEC (except for Norway) and Australian specifications



F77 option for all markets except for Germany Italy, Belgium and Austria

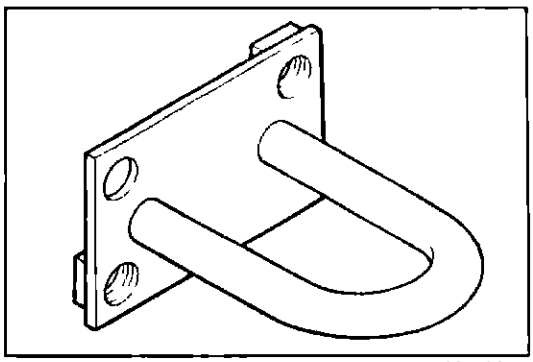


F77 option for Germany, Italy, Belgium and Austria



REAR TRACTION HOOK
[ECE & EEC specifications (except for Norway) and Australian specifications]

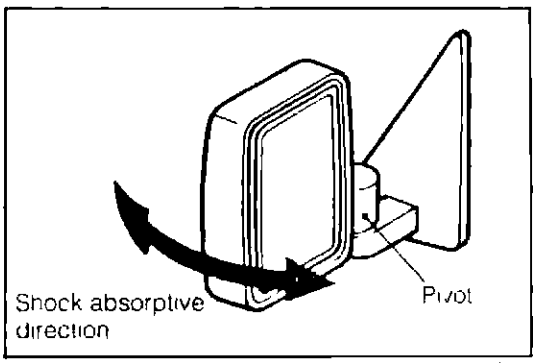
The length of the rear traction hook has been increased in accordance with the employment of the large-sized rear bumper



WRE91 BO037

OUTSIDE REAR VIEW MIRROR

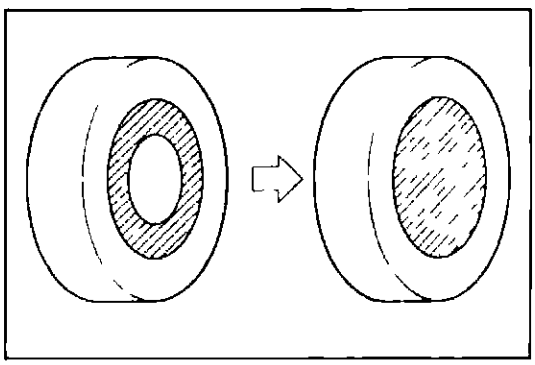
The outside rear view mirror is installed to the front door at the triangle piece section For shock absorption, the pivot turning type is employed
The motor-driven mirror is available as option For details, see the Body Electrical section



WRE91 BO038

SPARE TIRE COVER

The shape of the rubber pad has been changed from a doughnut shape to a disc shape



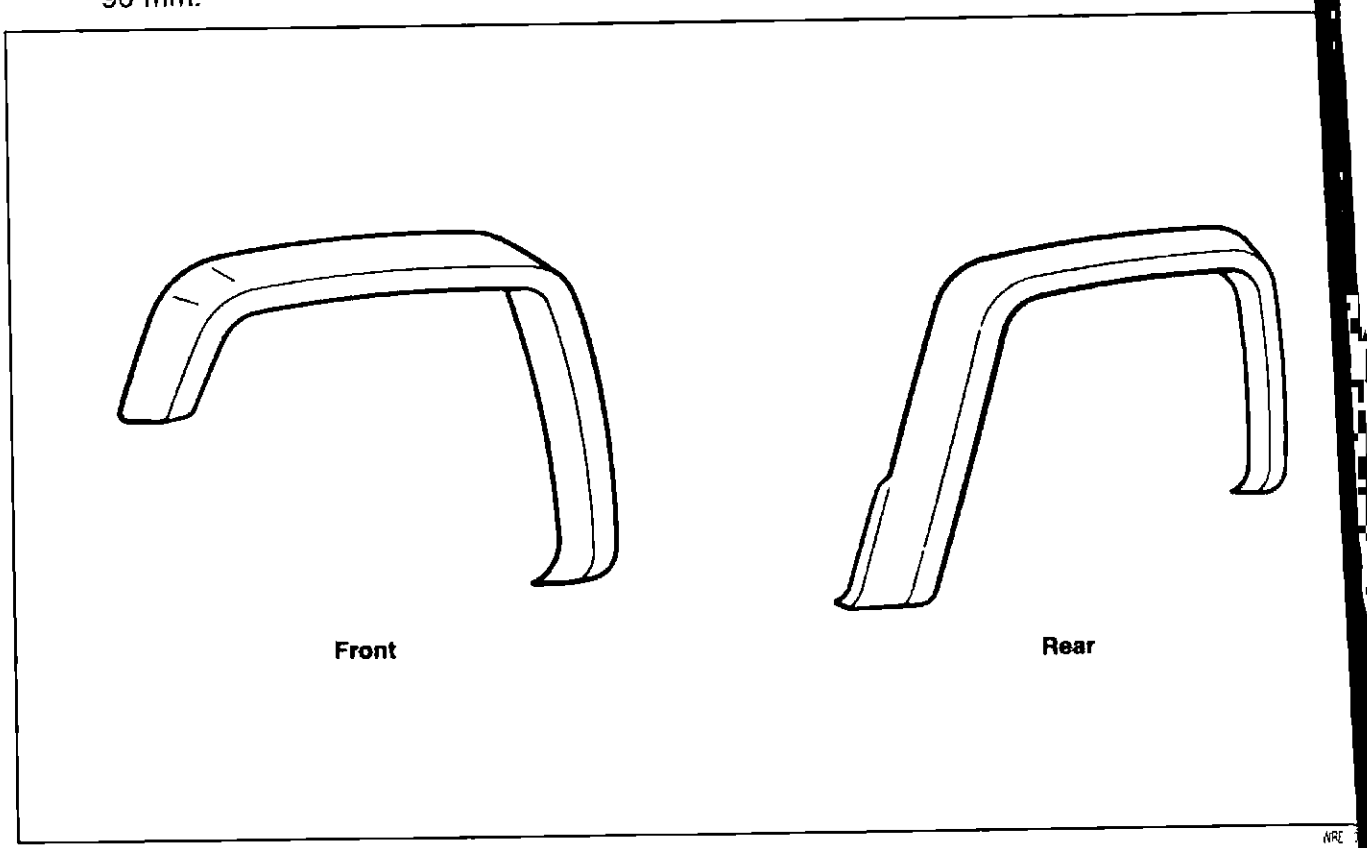
WRE91 BO039

WHEEL OPENING EXTENSION (OVER-FENDER)

Resin-made over-fenders have been provided on the EL wagon for the ECE & EEC and Australian sp
tions On other models, the over-fenders are optional equipment.
The over-fenders are available as a set option with tires having a tire size of 255/70R15

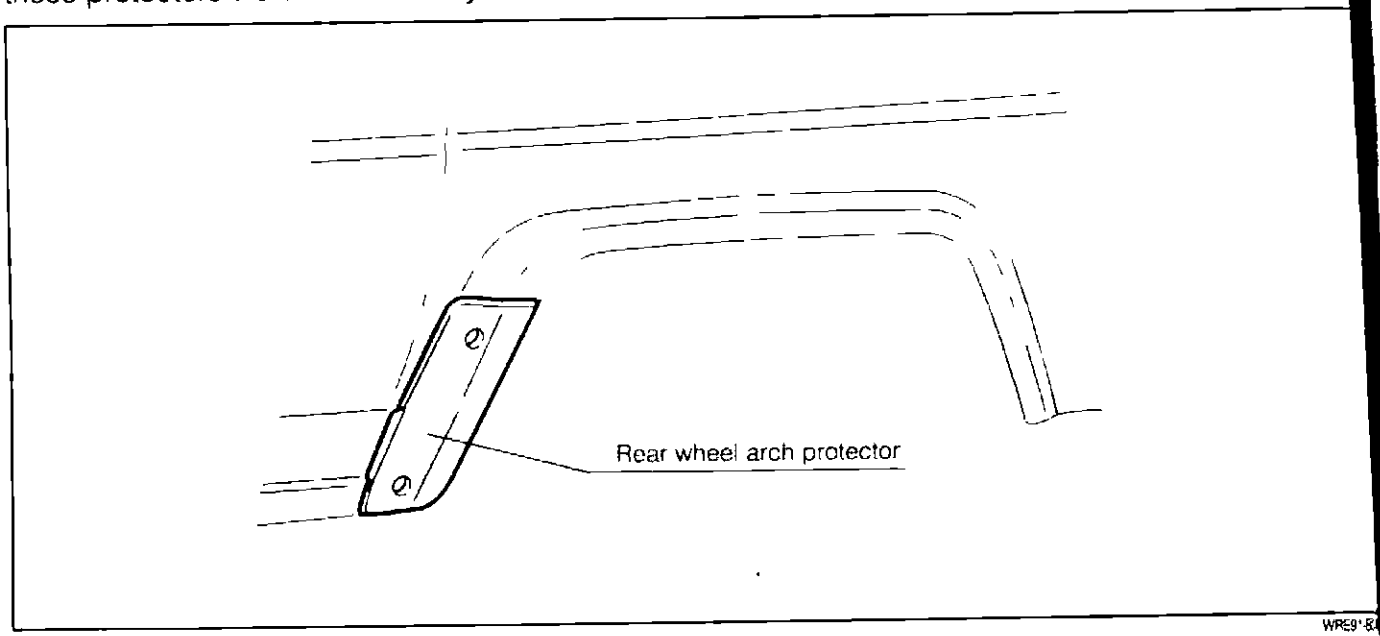
NOTE:

- This option will not apply to the pickup models.
- When the wheel opening extensions are installed to the vehicle, the total width of the vehicle inc
  90 mm.



REAR WHEEL ARCH PROTECTOR

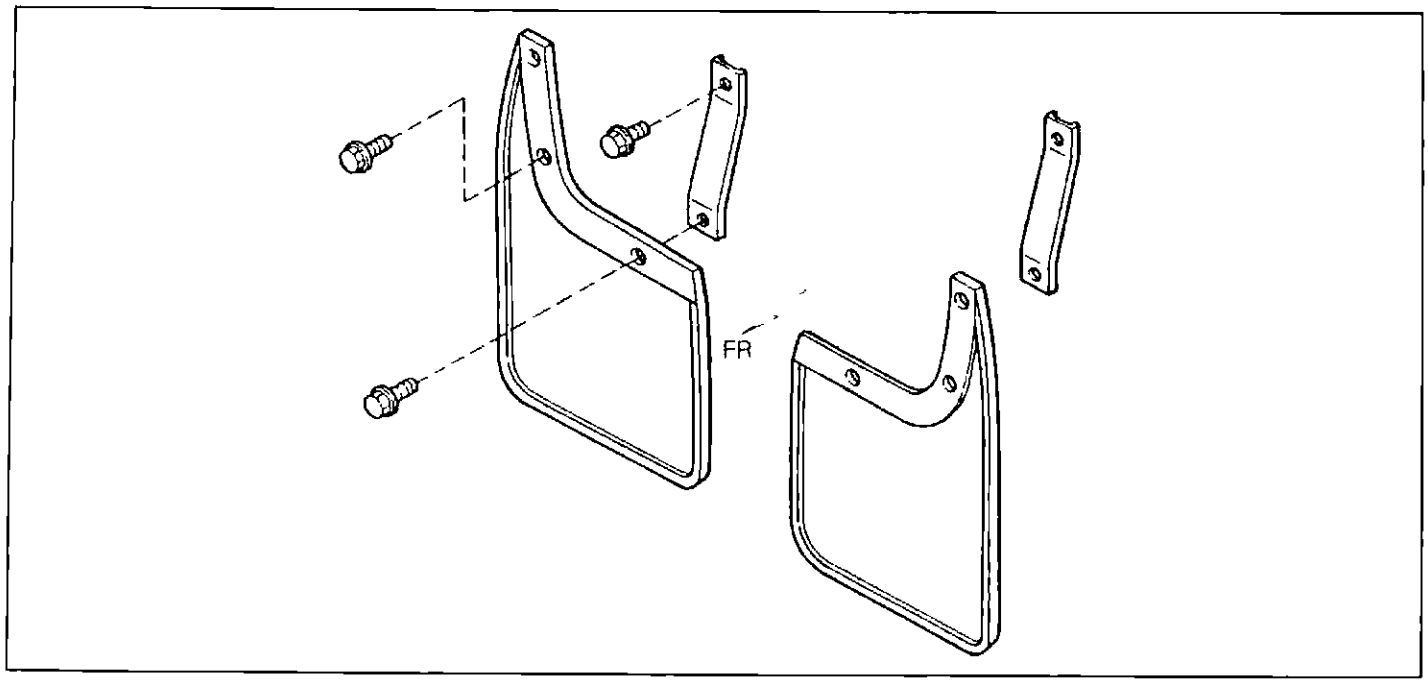
To attain a higher class image, rear wheel arch protectors have become standard on all models, wh
these protectors were installed only on limited models



MUD GUARD

1. Front mud guard

The front mud guards are standard equipment on the high- class models of the wagon for the general specifications and on the high-class models of the wagon and hardtop model for the ECE & EEC specifications On other models, the mud guards are optional equipment



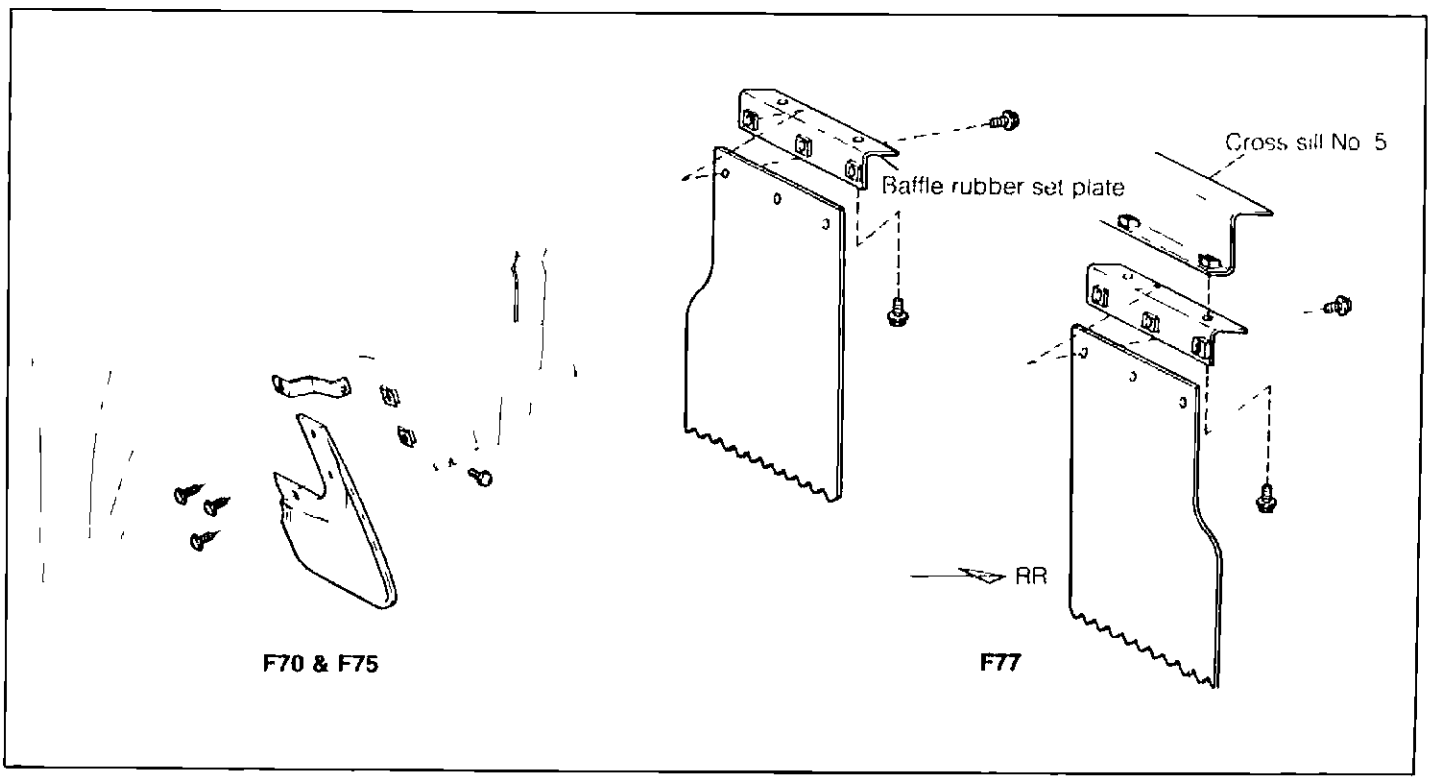
WRE91BC042

2. Rear mud guard

The rear mud guards are standard equipment on the high- class models of the wagon for the general specifications and on all models except for the pickup for the ECE & EEC specifications On other models, the mud guards are optionally available together with the front mud guards

NOTE·

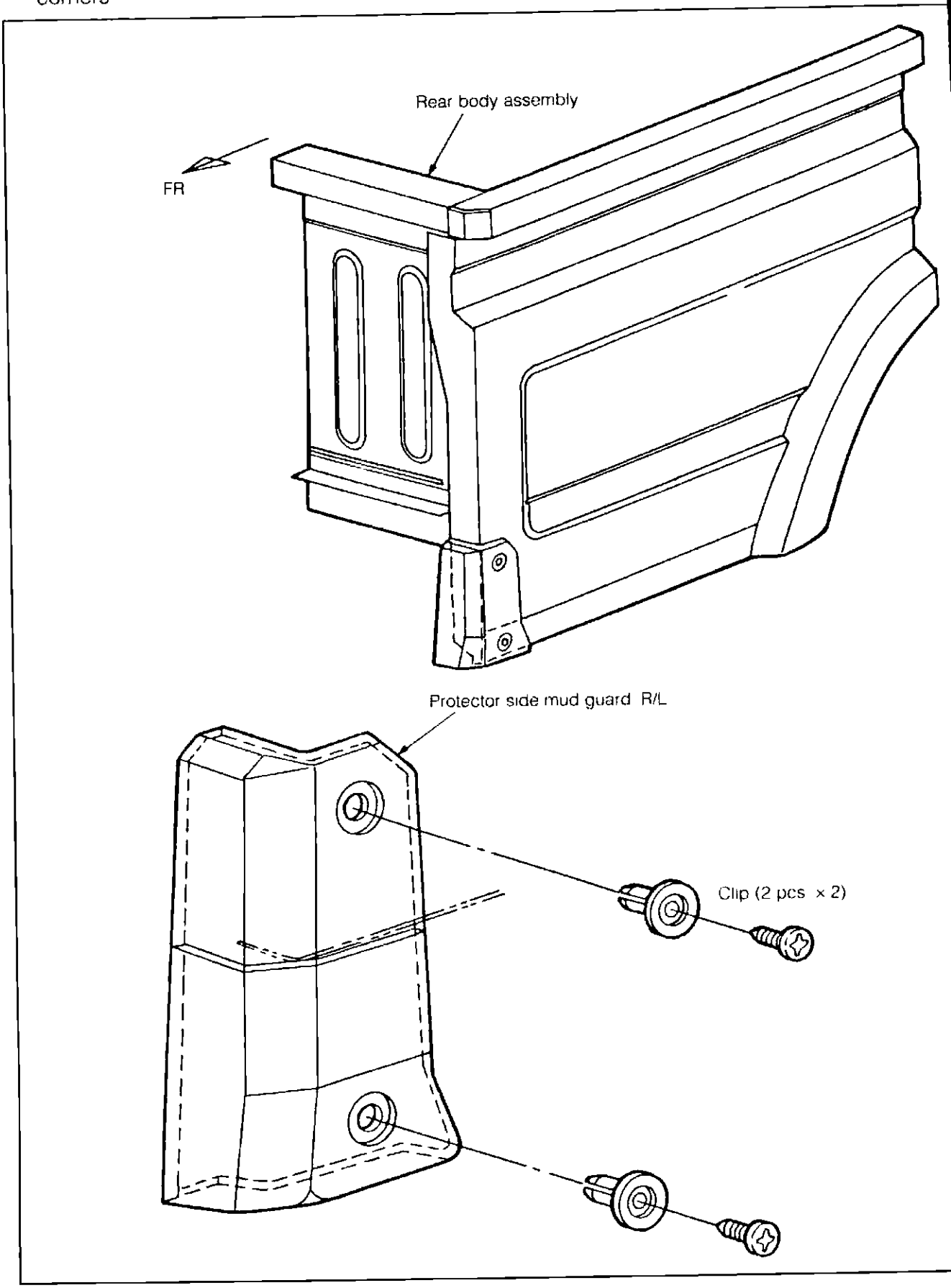
- As for the pickup model for the Australian specifications, the mud guards are standard equipment



WRE91BC043

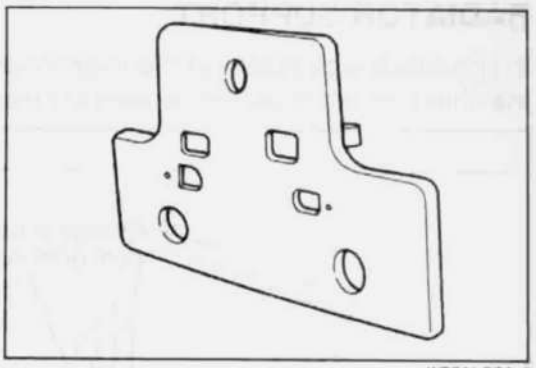
3. Side mud guard (Pickup)

Resin-made protectors have been provided on all pickup models at the front sections of the rear corners



REAR NUMBER PLATE BRACKET

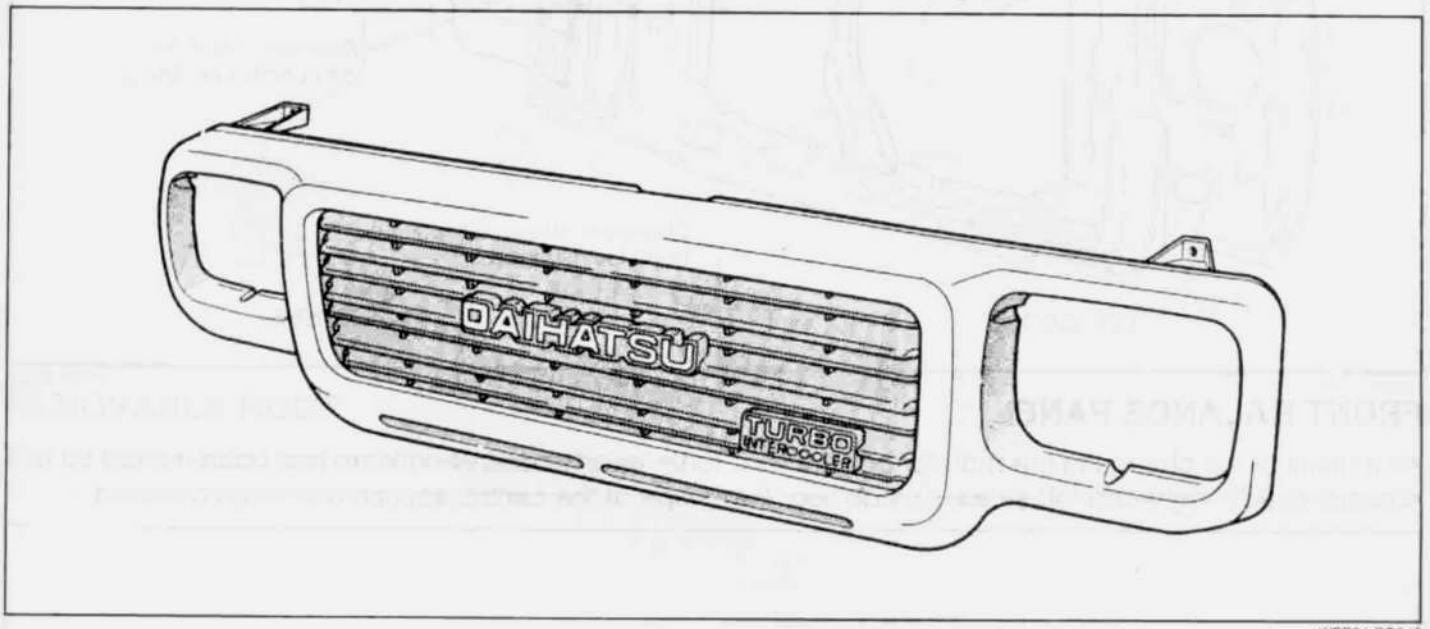
(Except for Model F77 and Norway specifications)
A resin-made rear number plate bracket is provided on those vehicles for the ECE & EEC and Australian specifications.



WRE91-BO045

FRONT GRILLE

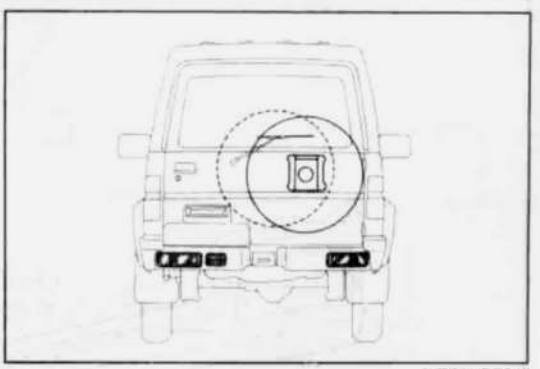
The front grille has been renewed in its design and enlarged.
A "TURBO" decor is provided on vehicles equipped with the turbocharger.



WRE91-BO046

SPARE WHEEL CARRIER

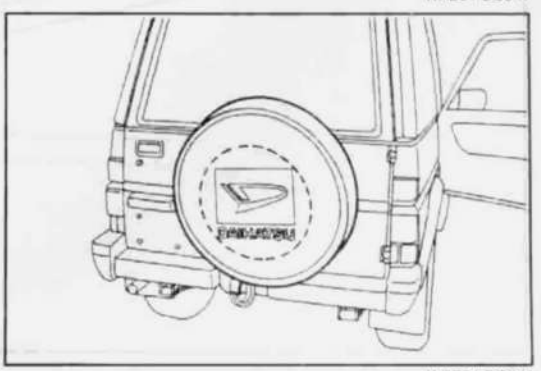
For greater field of vision to the rear, the spare tire installation position has been moved 190 mm rightward and 30 mm downward.



WRE91-BO047

SPARE WHEEL COVER

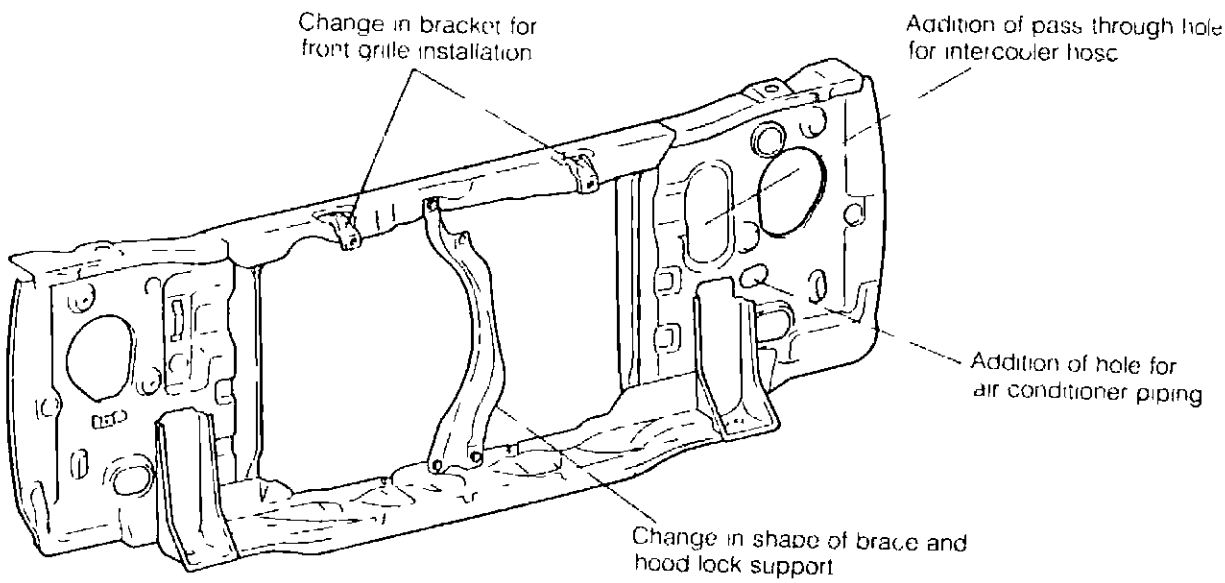
The pad of the spare wheel cover has been enlarged to cover the whole rear surface.



WRE91-BO048

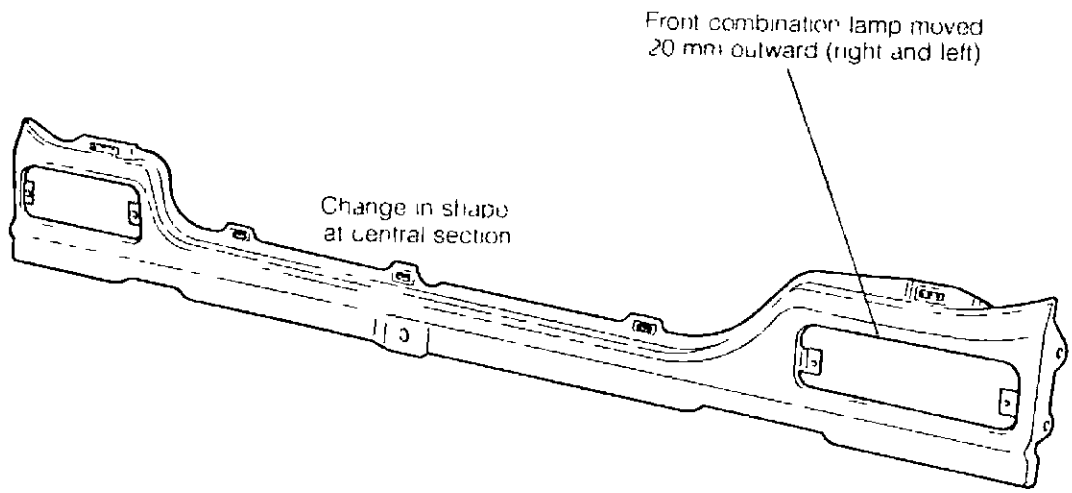
RADIATOR SUPPORT

In line with the provision of the intercooler, a pass-through hole of the intercooler hose has been adde the shape of each section is partially modified



FRONT BALANCE PANEL

As a result of the change in the radiator grille and so forth, each combination lamp has been moved 2 outward at both right and left sides In addition, the shape of the central section has been modified

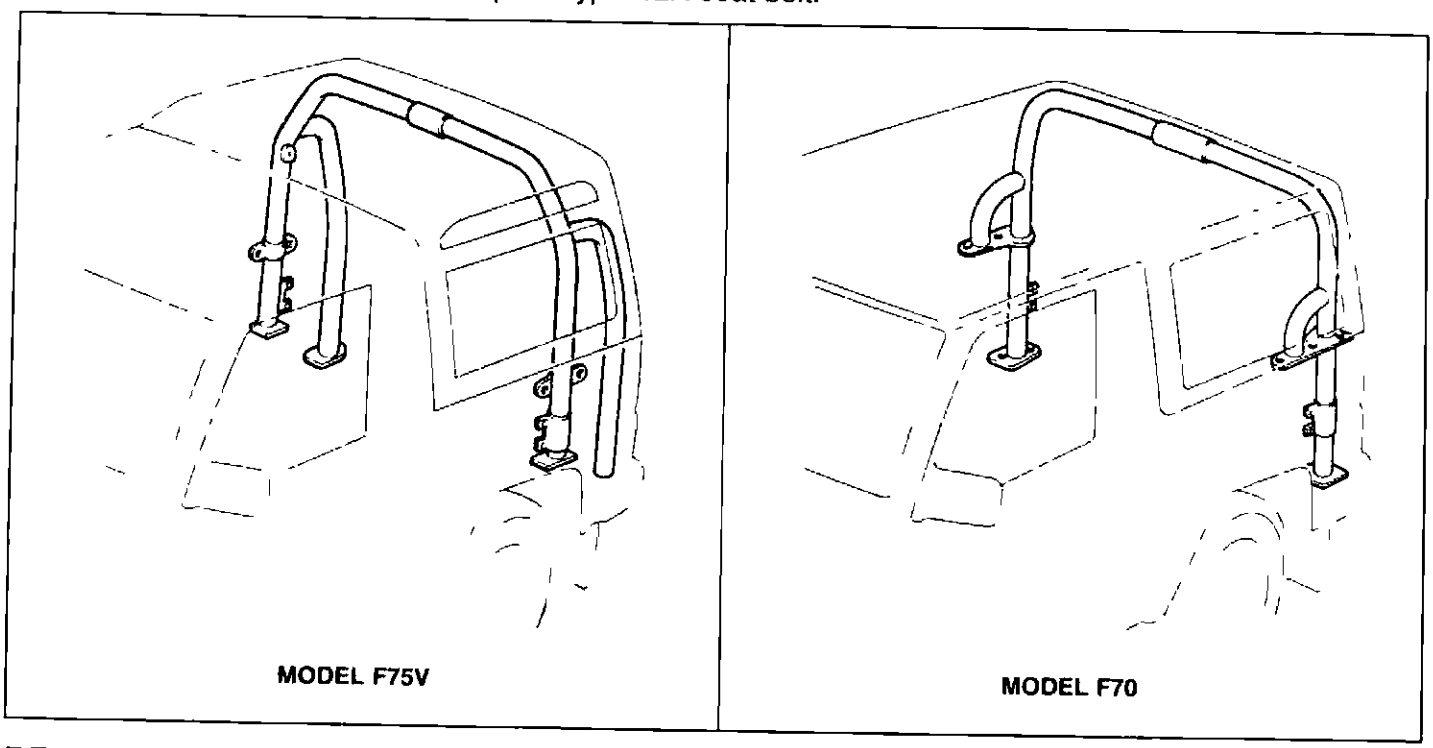


REAR PILLAR MEMBER

A rear pillar member has been newly provided for the anchor of the three-point type ELR rear seat belt

NOTE:

- Refer to the section of three-point type ELR seat belt.



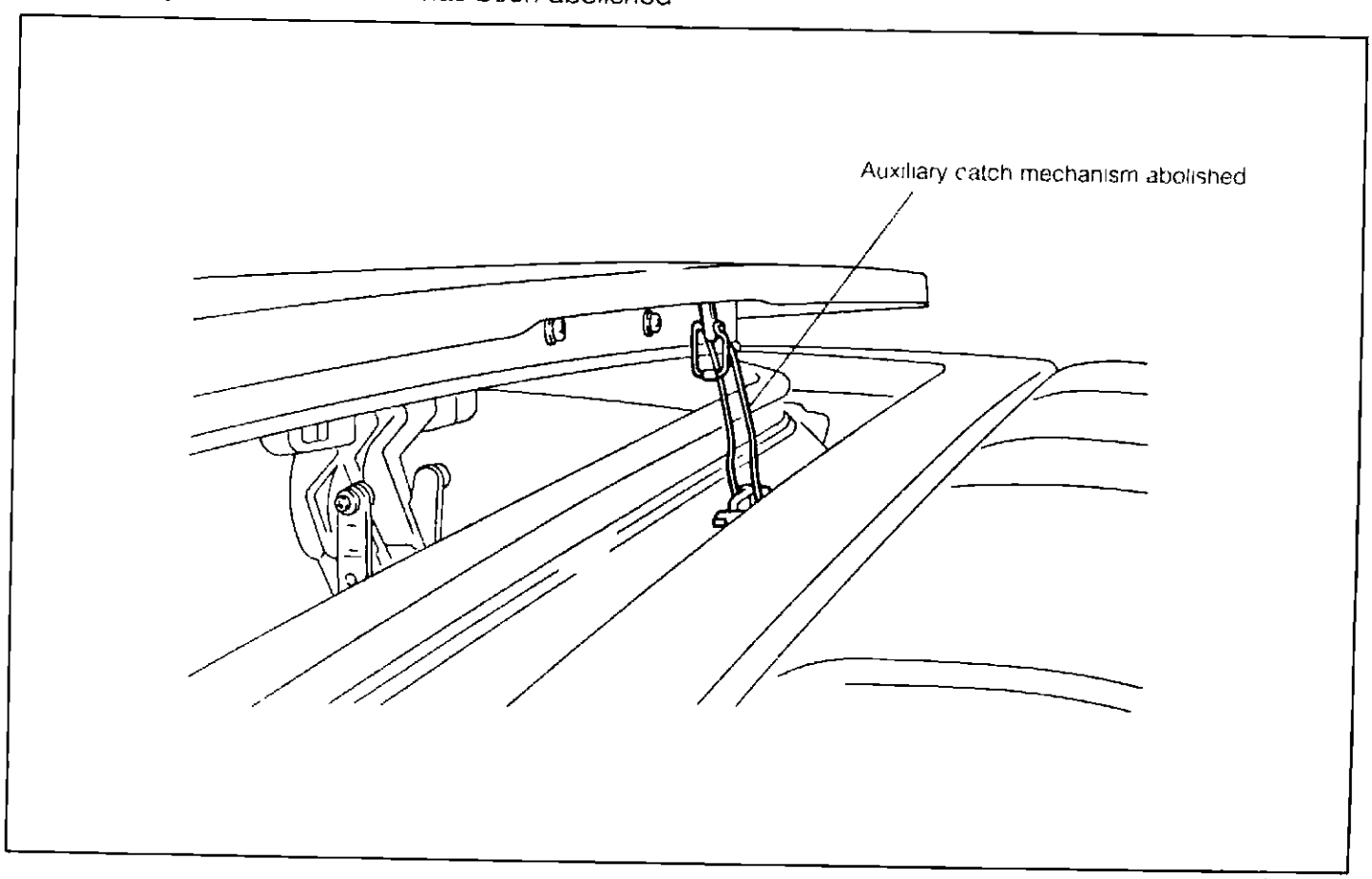
MODEL F75V

MODEL F70

WRE91 BO051

REMOVABLE ROOF

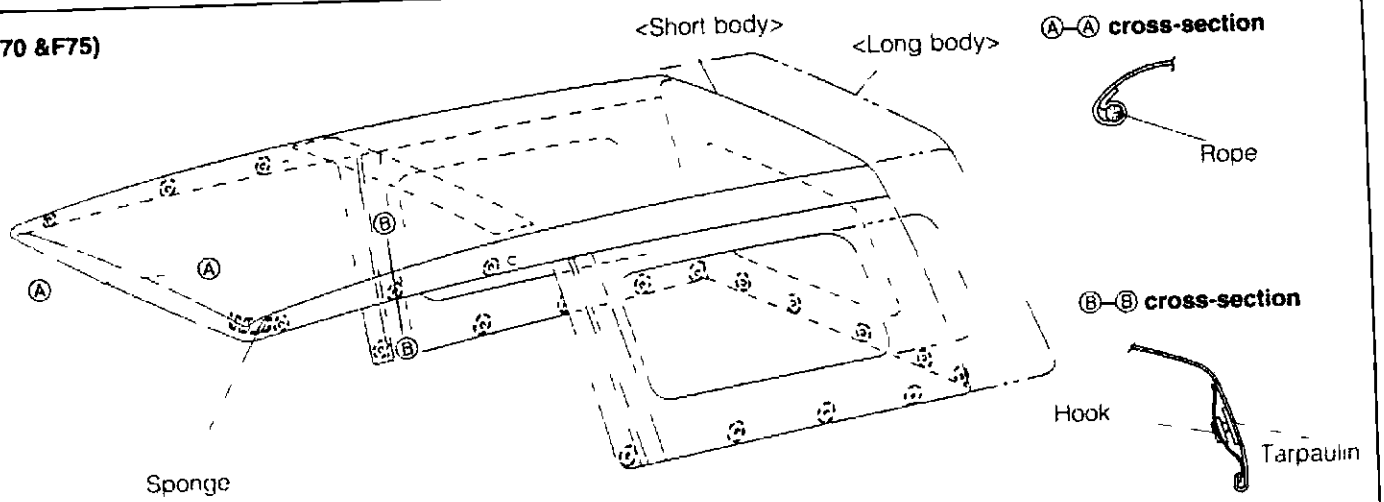
The auxiliary catch mechanism has been abolished



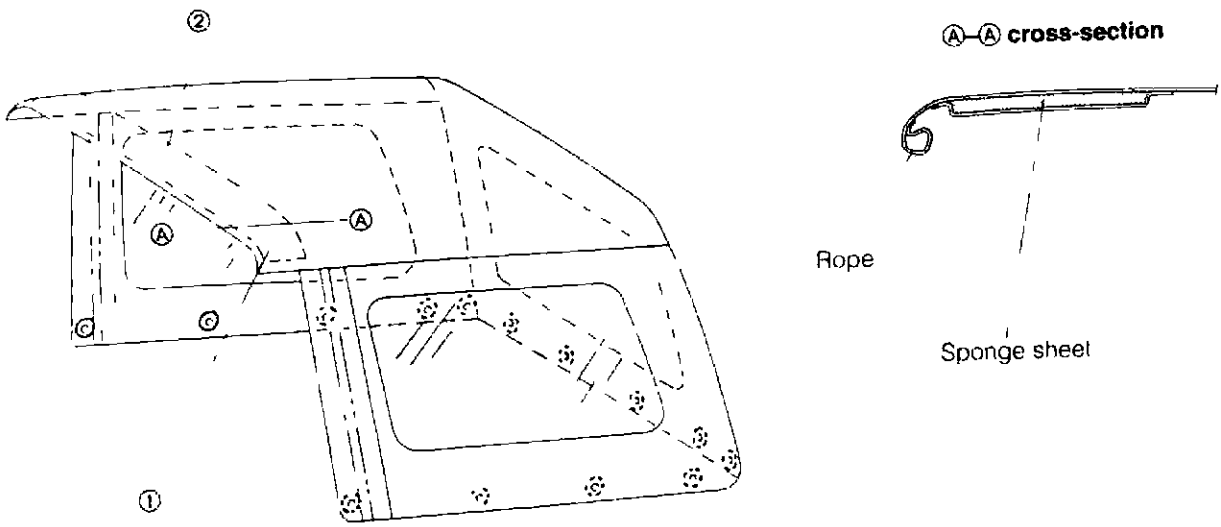
WRE91 BO052

TARPAULIN

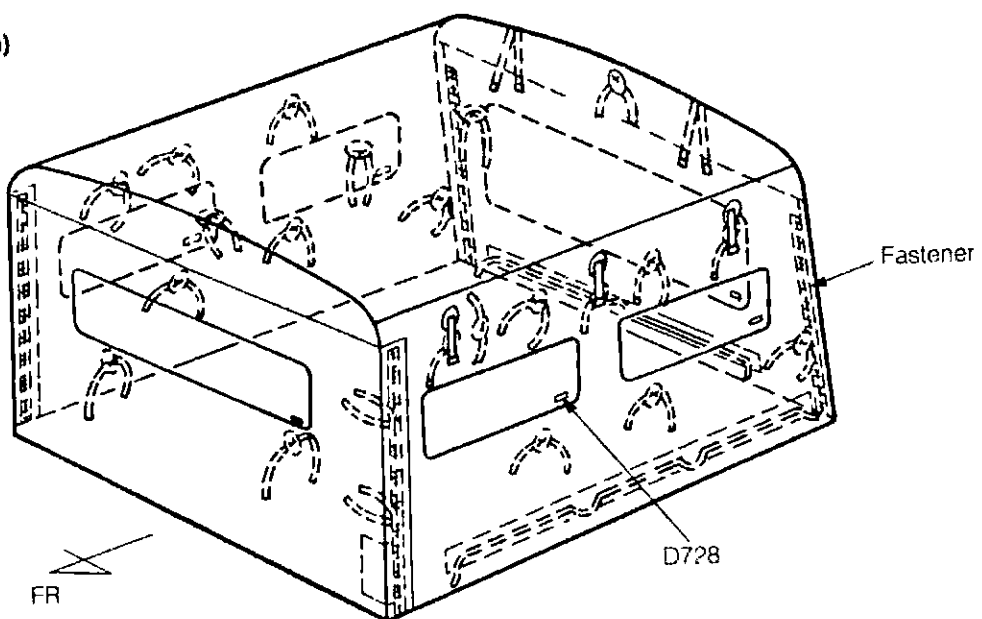
(F70 &F75)



(F70 with simple tarpaulin)



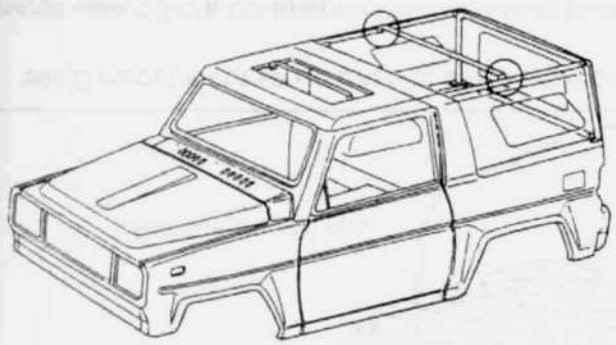
(F77 with option)



WRF91 BO053

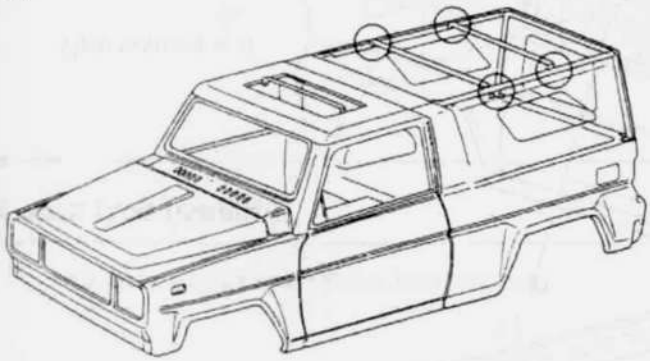
TARPAULIN BOW

A bolt tightening type tarpaulin bow has been employed.

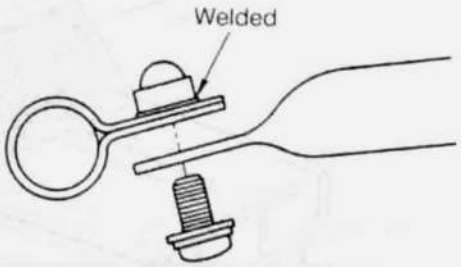


(Short body)

F75

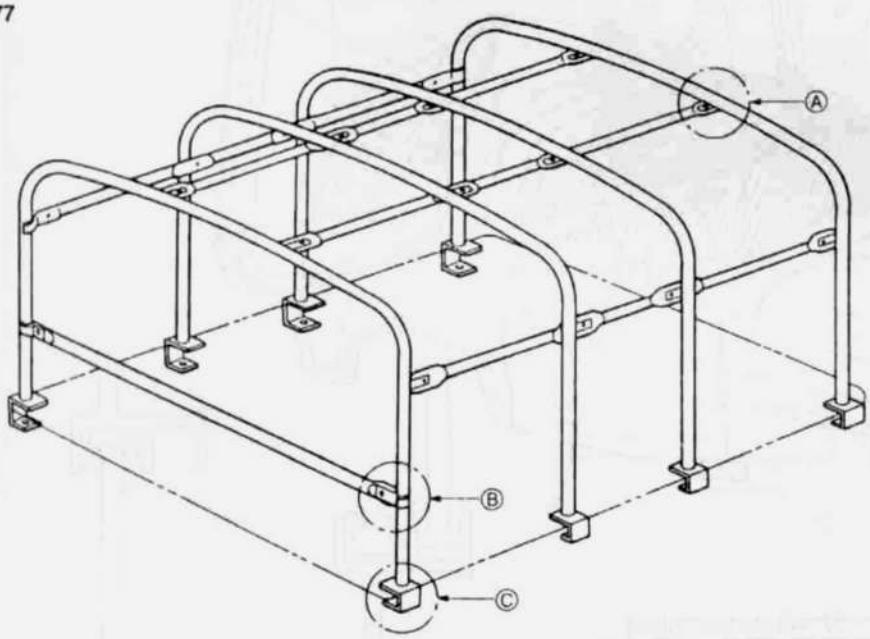


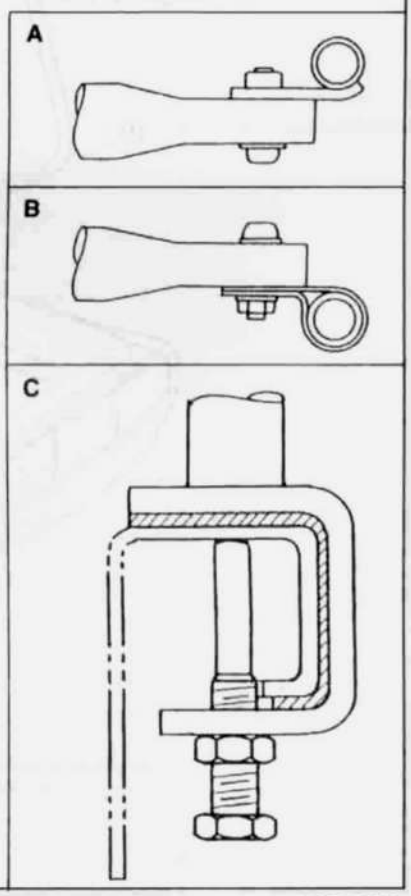
(Long body)



Bolt tightening

F77



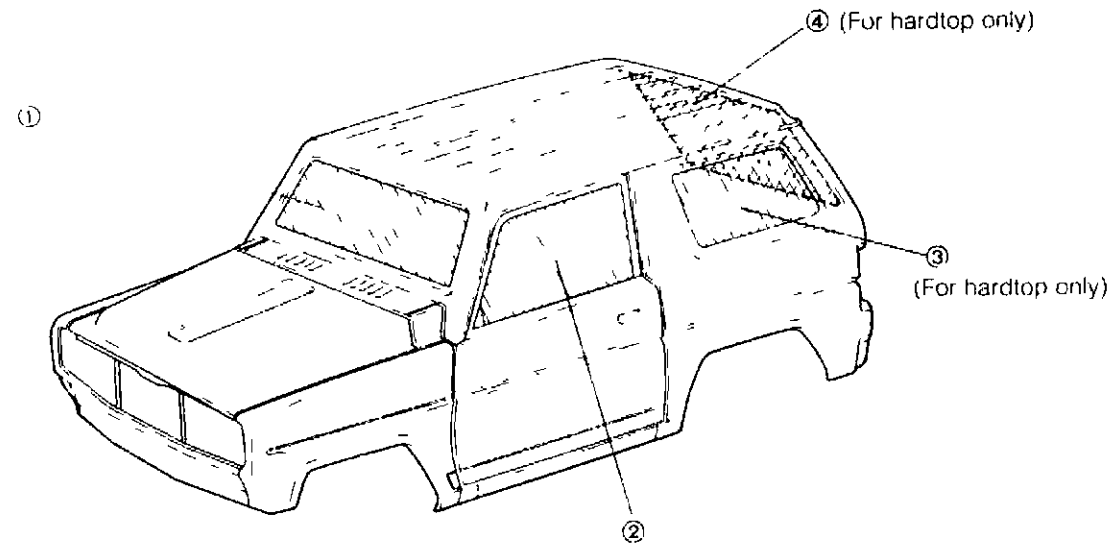


WRE91-BO054

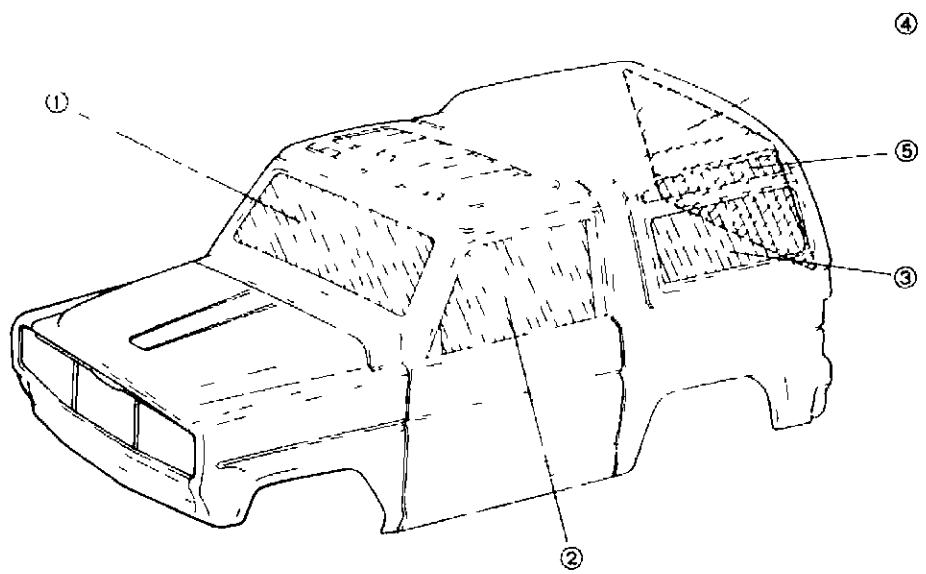
WINDOW GLASS

The front windshield glass employs laminated glass
The laminated glass with shade band is available as optional equipment on the general and ECE & EEC specifications In addition, bronzed glass with shade band is optional equipment on the general specifications except for the pickup
If the bronzed glass with shade band is selected, the bronzed glass is used on all the window glass

Hard-top and Soft-top vehicle



Wagon vehicle

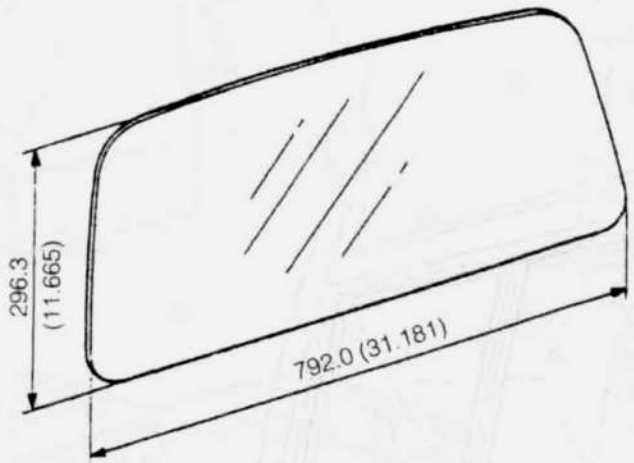


① Windshield glass
② Front door glass R/L
③ Quarter window glass, R/L
④ Back door glass
⑤ Panorama window glass

WRE91 BO055

BACK WINDOW GLASS (F77)

As the back window glass, toughened glass having a 792 mm (31.13 inches) width and 296.3 mm (11.64 inches) height has been employed, thereby assuring improved rear field of vision.

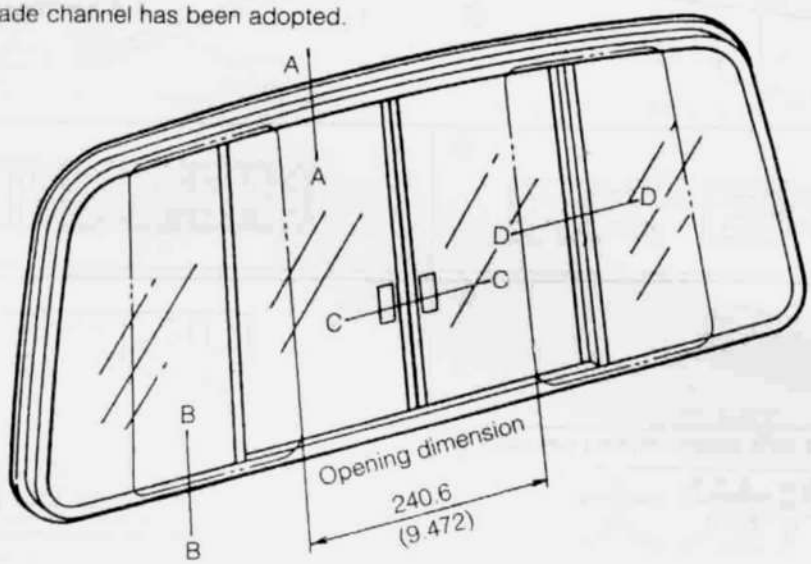


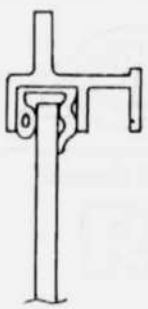
Unit: mm (inch)

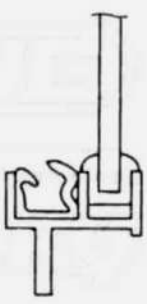
WRE91-BO056

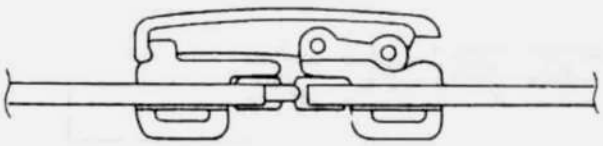
Slide open type (Option)

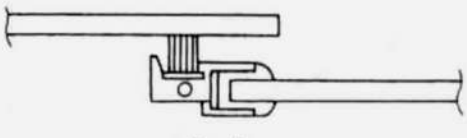
Alluminum-made channel has been adopted.




A - A


B - B


C - C

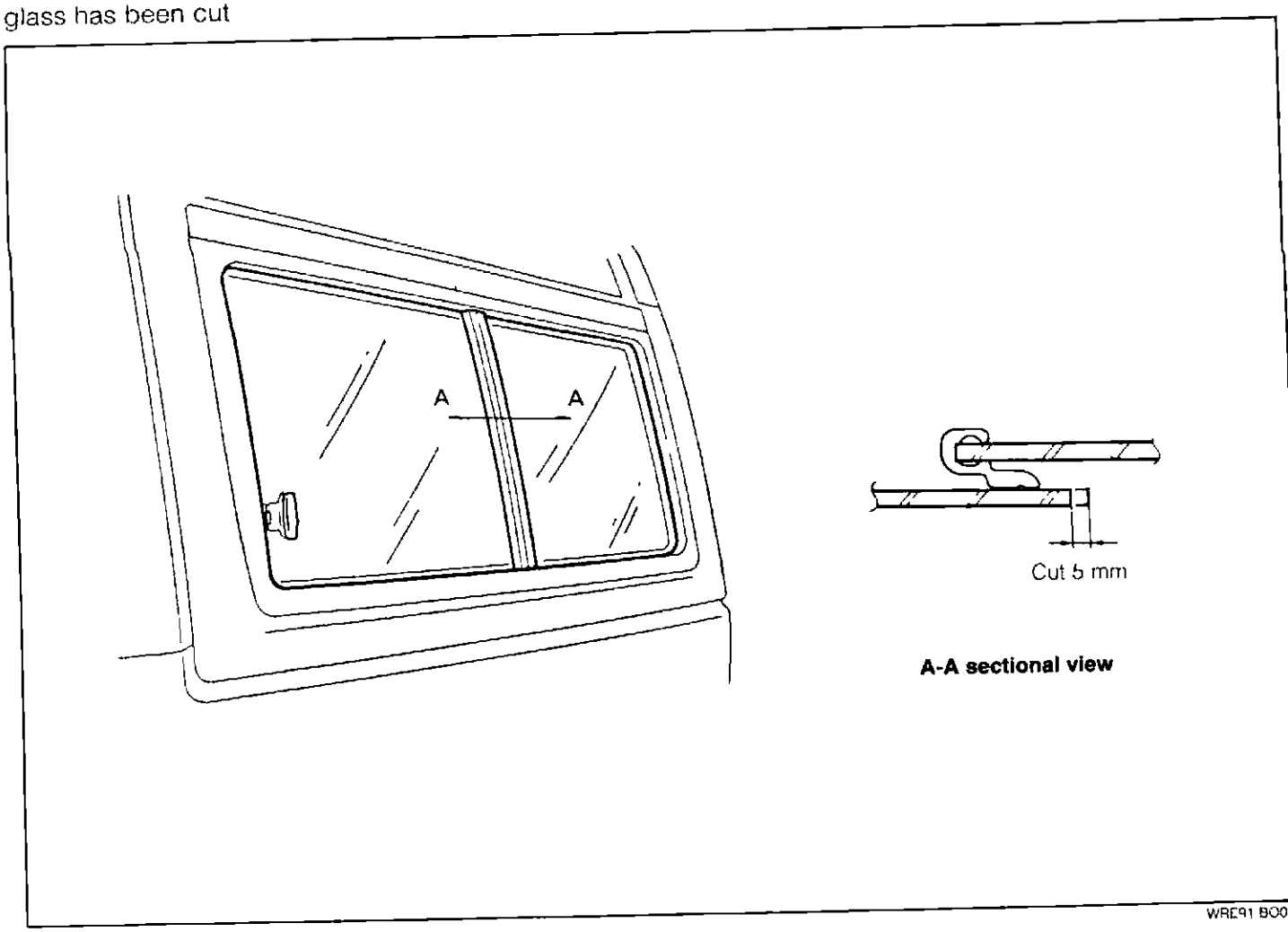

D - D

Unit: mm (inch)

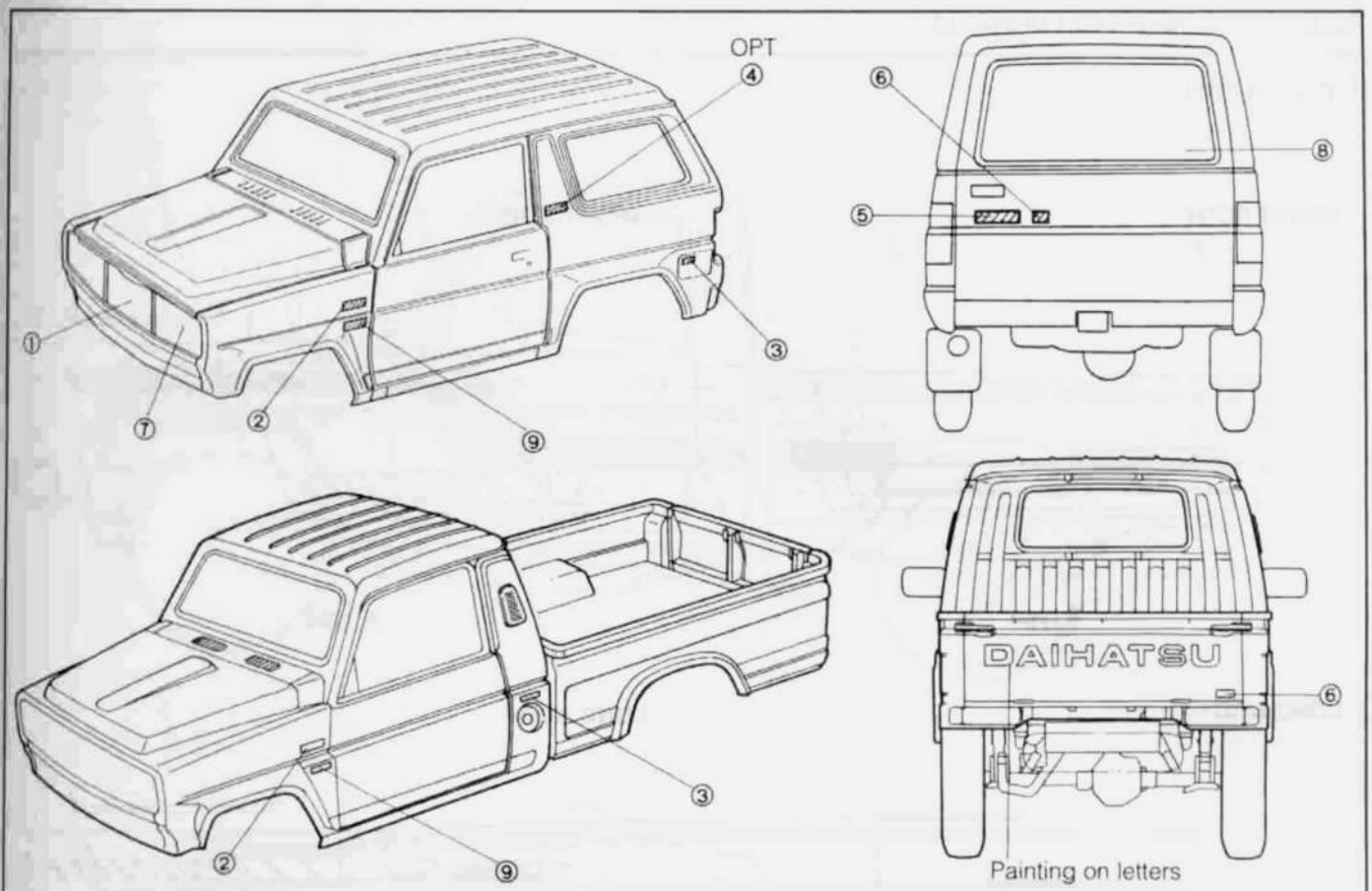
WRE91-BO057

QUARTER WINDOW GLASS (Wagon)

As for the quarter window glass at the front side, glass thickness has been changed and the rear end of the glass has been cut



EMBLEMS



① DAIHATSU	⑥ DX EX EL
② ROCKY	⑦ TURBO INTERCOOLER
③ DIESEL	⑧ Chinese specifications (For van only) 大发汽车
④ 4WD	⑨ Chinese specifications 大发汽车
⑤ General, ECE & EEC specifications ROCKY Chinese specifications (For motor vehicle with tarpaulin only) 大发汽车	

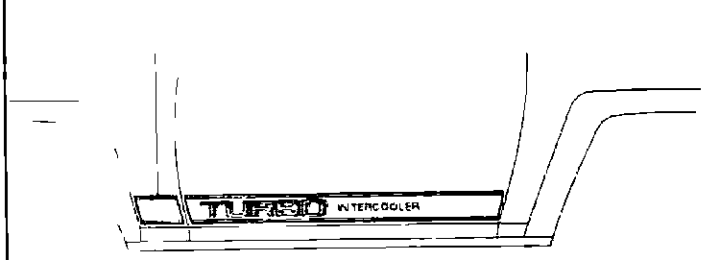
WRE91-BO059

BODY STRIPES

Body stripes have been provided

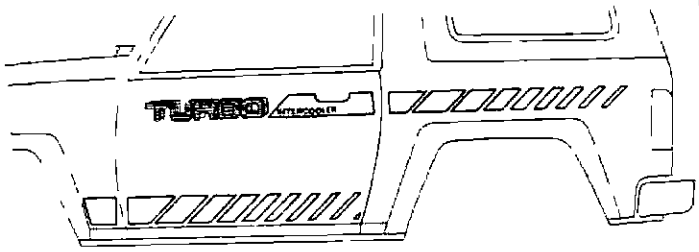
F70 and F70V

SHORT BODY



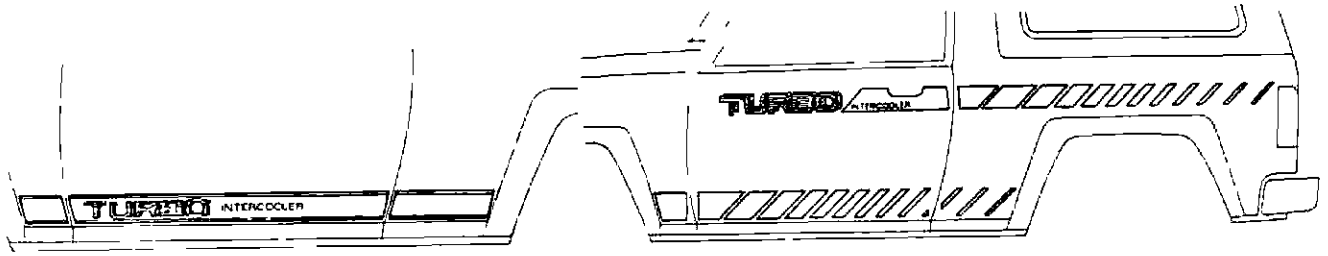
Z type

SHORT BODY



K type

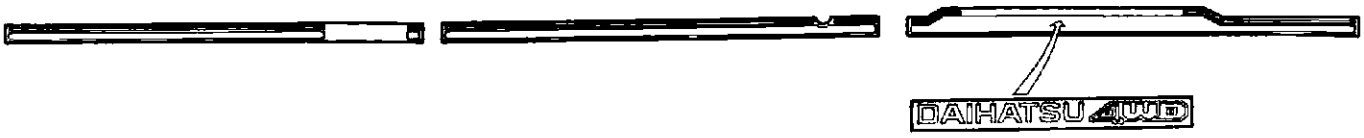
LONG BODY



Z type

LONG BODY

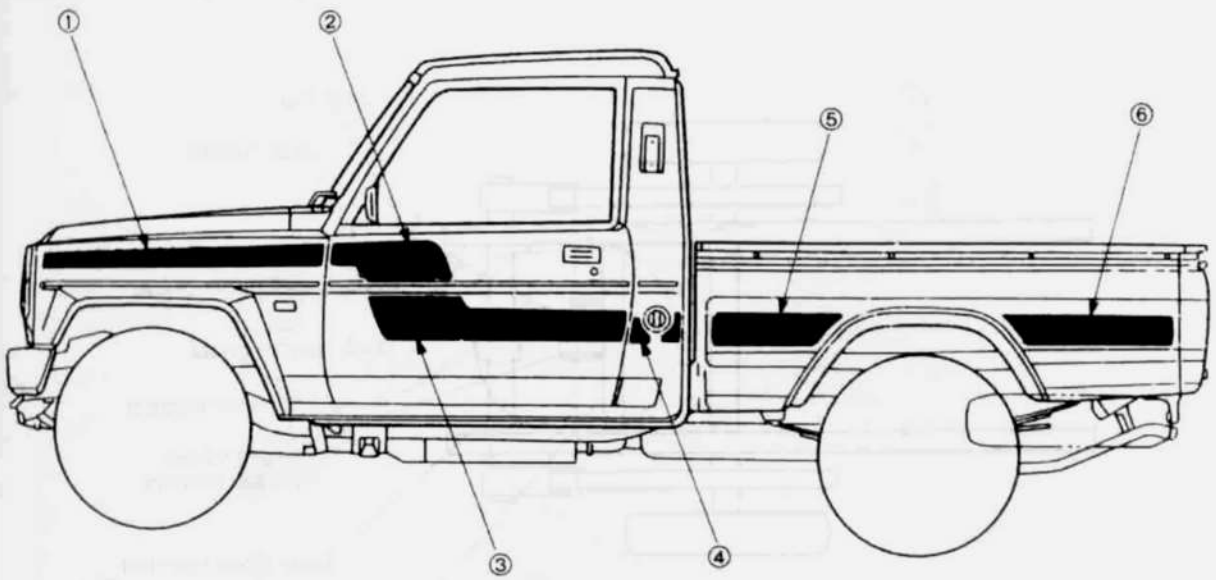
K type

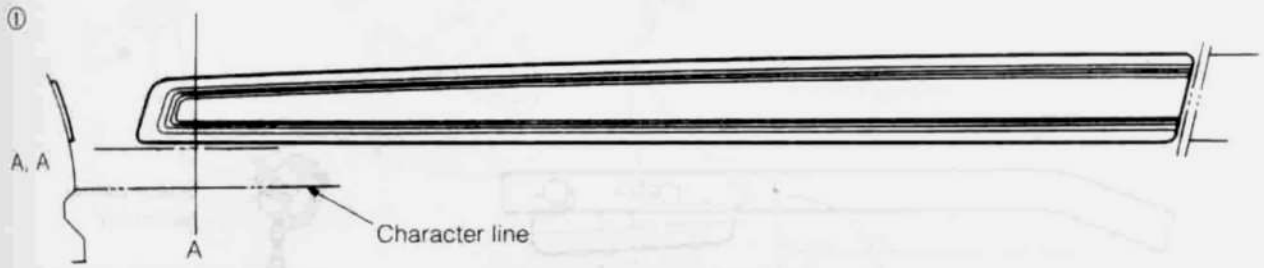


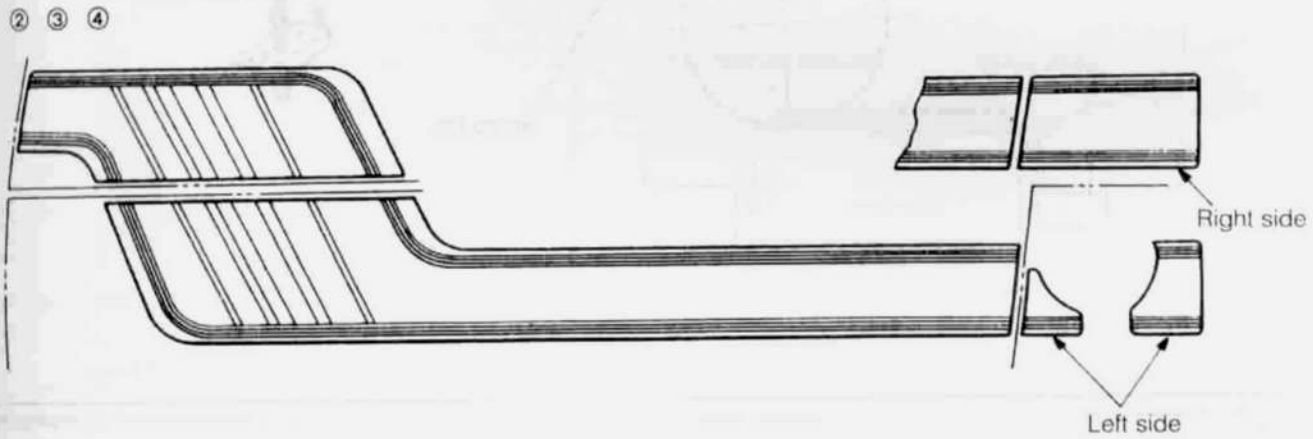
B type

WRE91 BO060

F77





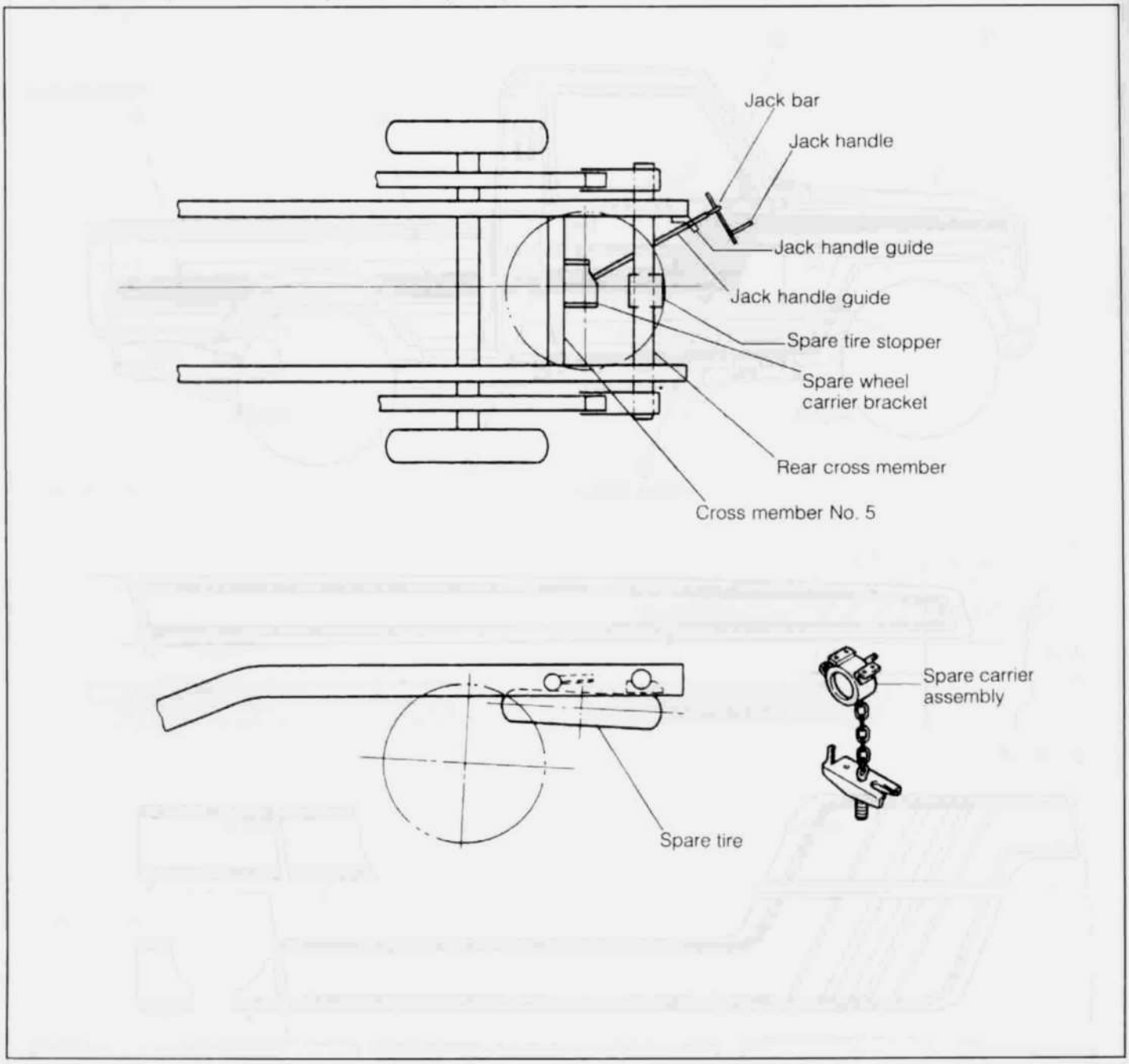




WRE91-BO061

SPARE WHEEL CARRIER

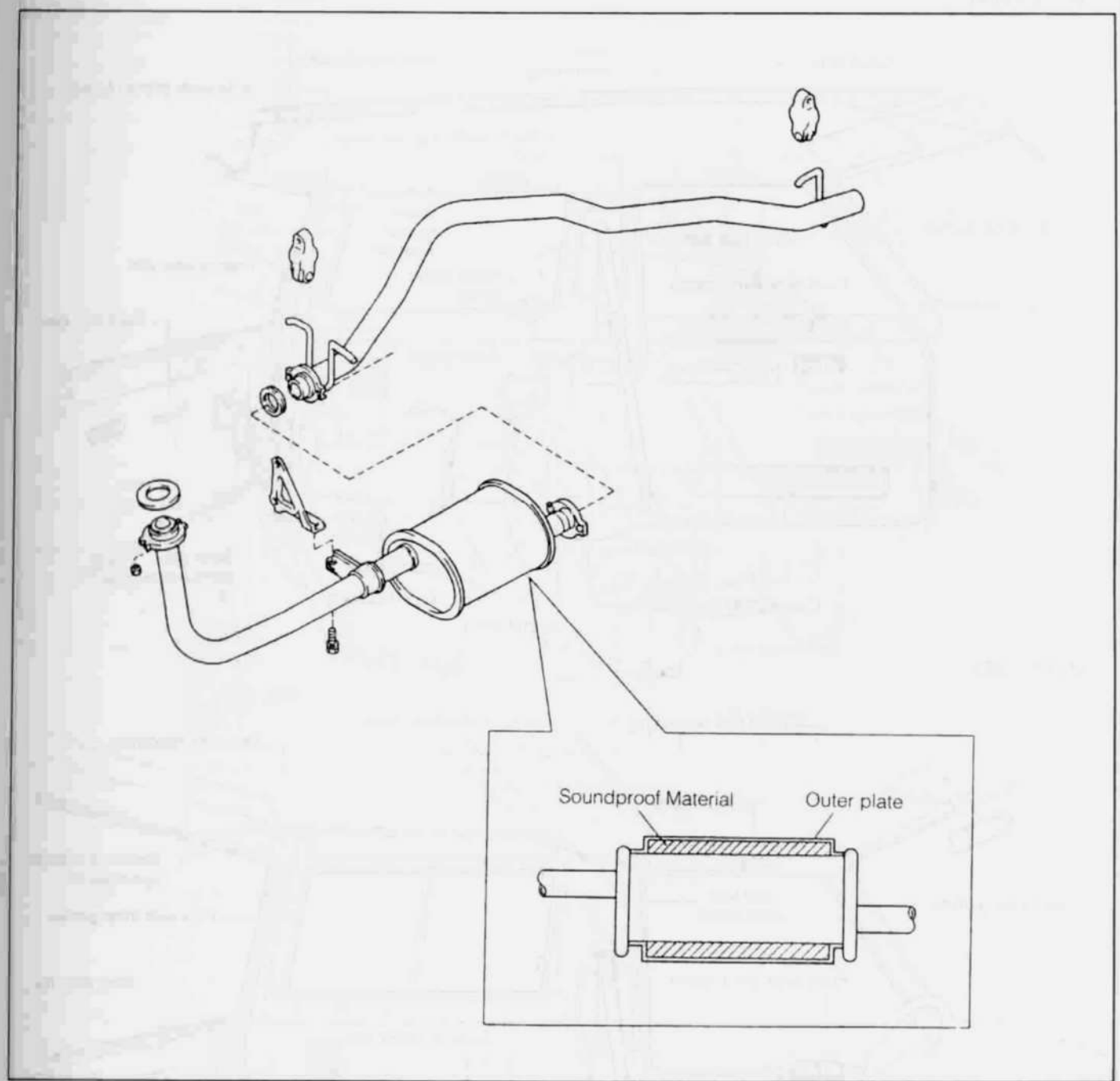
- The spare tire is stored at the rear section under the floor.
- The spare tire carrier has adopted a chain-winding type by means of a jack bar and a jack handle.
- For easier operation of the jack bar, a jack guide has been provided at the rear end of the right frame.



WRE91-BO062

EXHAUST PIPE

The exhaust pipe basically comes in three kinds; namely those for F70, F75 and F77. On the ECE & EEC specifications vehicles, soundproof material is wound at the muffler section so that the exhaust noise may be reduced.

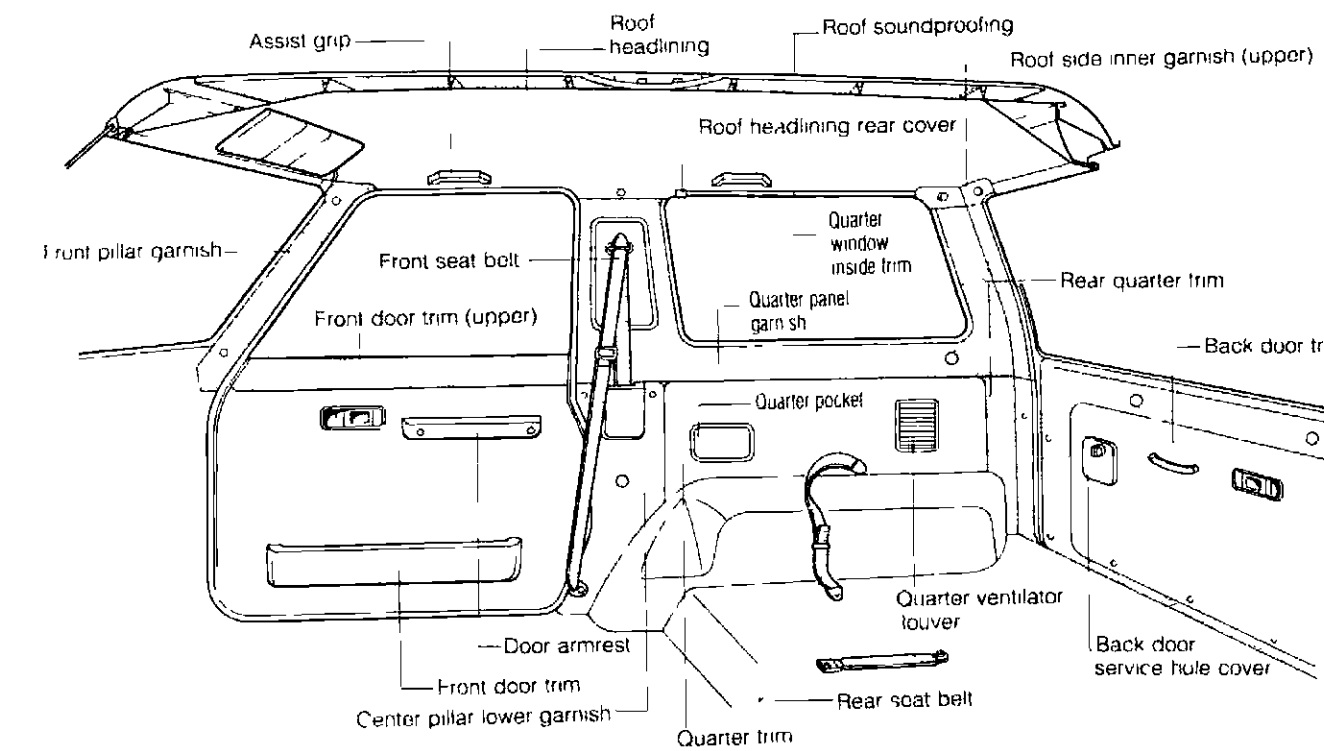


WRE91-BO063

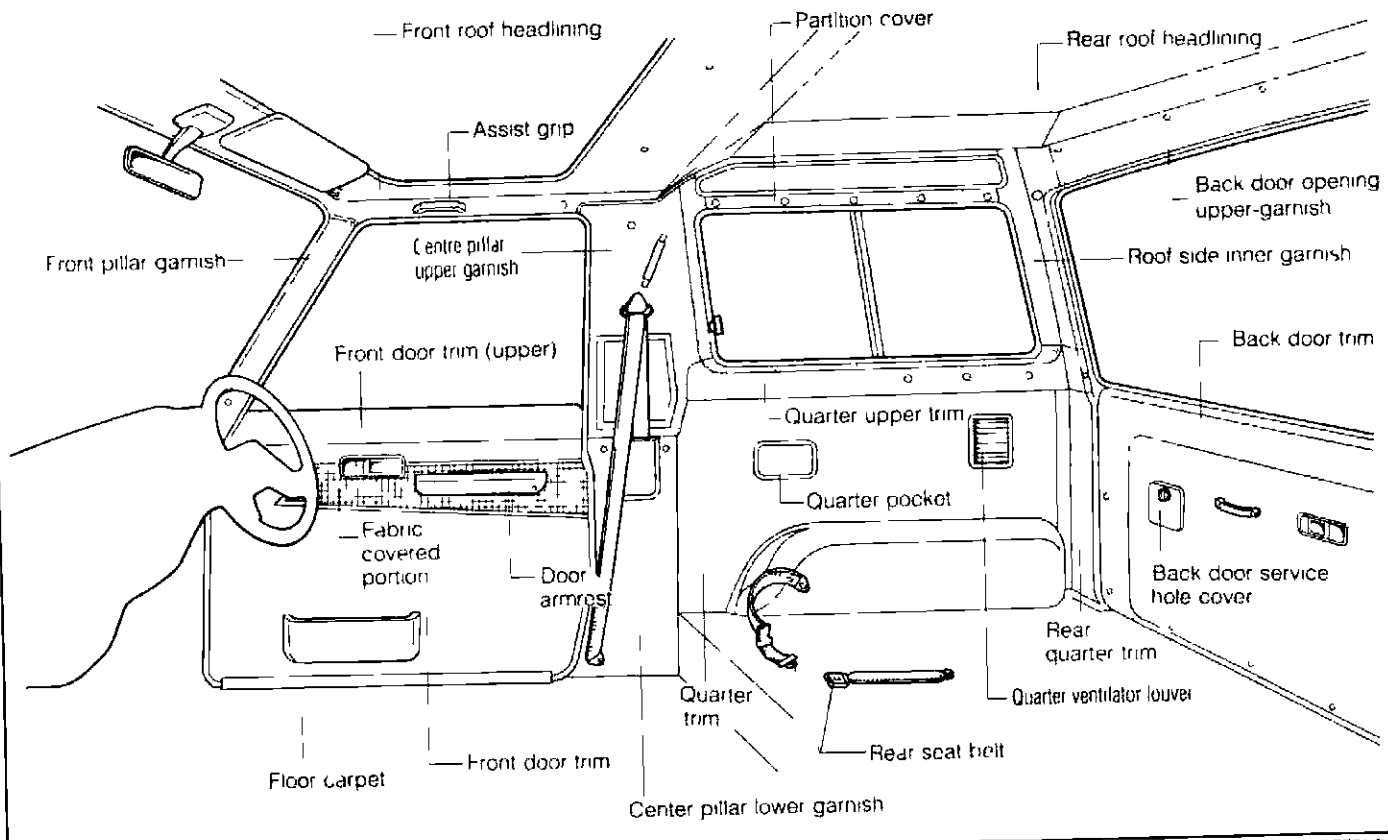
OUTLINE OF INTERIOR

INTERIOR TRIM

(F70V, F80V)

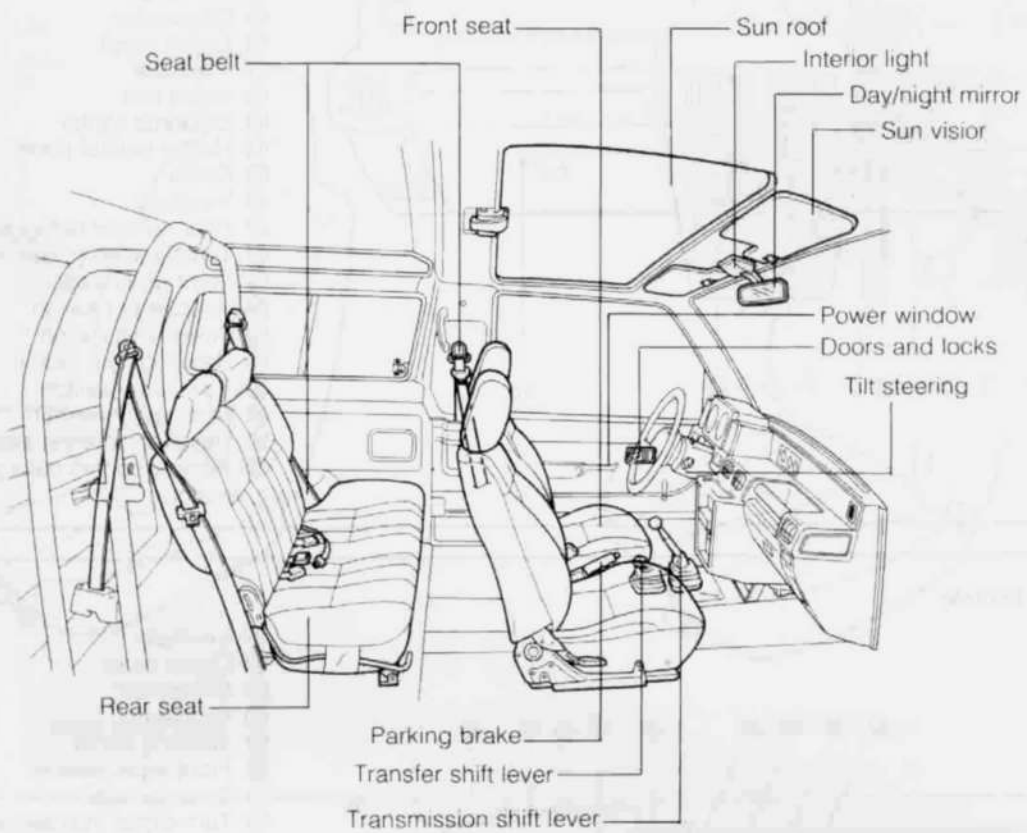


(F75V, F85V)



WRE91 BO064

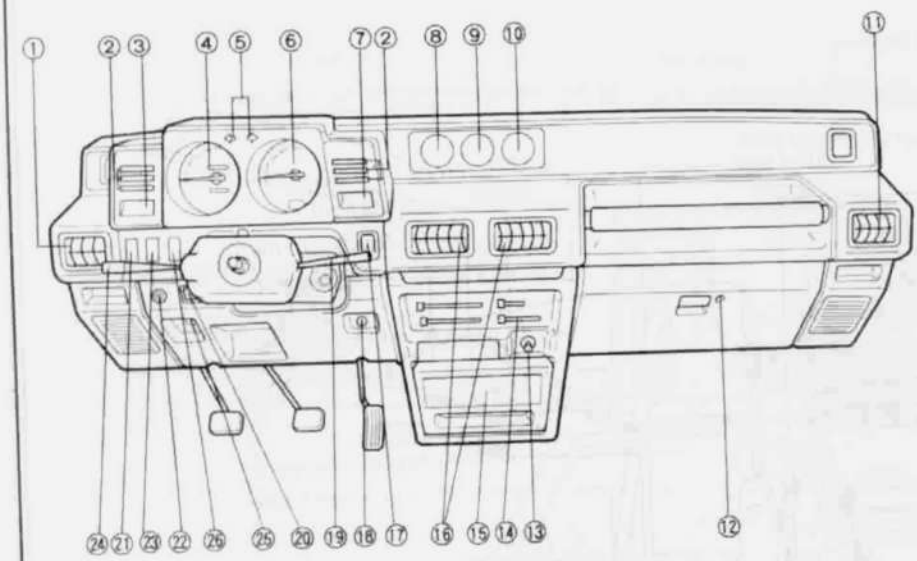
Interior view



WRE91-BO065

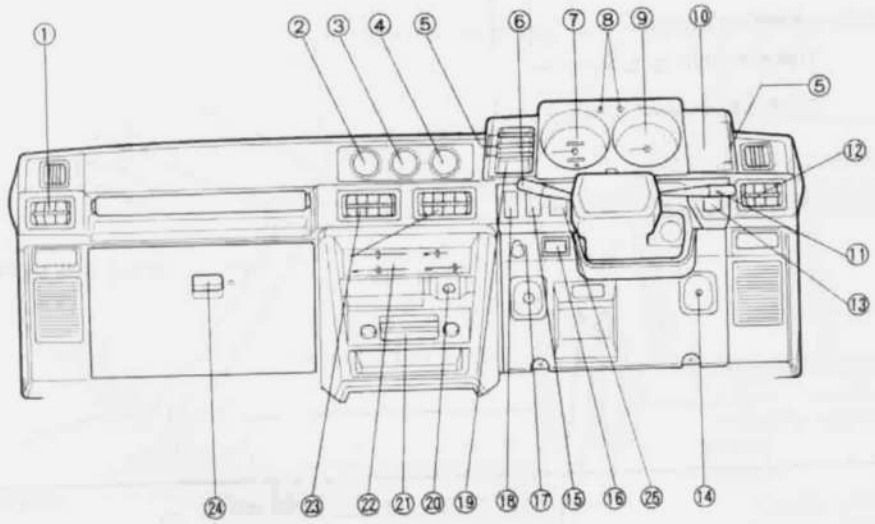
INSTRUMENT PANEL

For L.H. drive vehicle



① Ventilator
② Warning panel
③ Water temperature gauge
④ Speedometer
⑤ Turn signal indicator light
⑥ Tachometer
⑦ Fuel gauge
⑧ Voltmeter
⑨ Clinometer
⑩ Digital clock
⑪ Ventilator
⑫ Glove box
⑬ Cigarette lighter
⑭ Heater control panel
⑮ Radio
⑯ Ventilator
⑰ Rear window defogger switch
⑱ Throttle knob (Diesel engine)
⑲ Front wiper switch
⑳ Rear heater switch
㉑ Power shift switch
㉒ Rear fog light switch
㉓ Rear wiper switch
㉔ Multi-control switch
㉕ Headlight leveling switch
㉖ Remote control outer rear view mirror switch

For R.H. drive vehicle

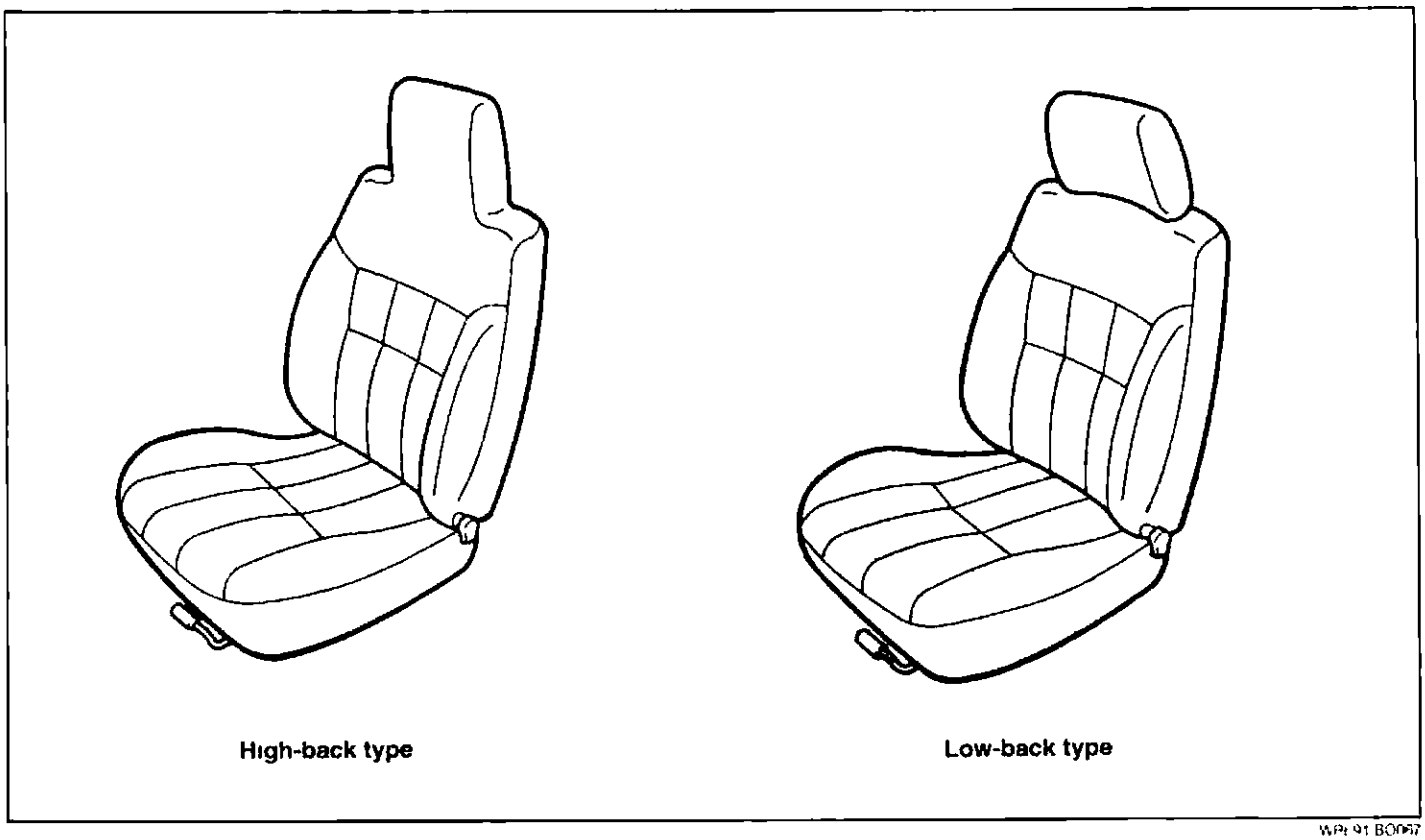


① Ventilator
② Digital clock
③ Clinometer
④ Voltmeter
⑤ Warning panel
⑥ Front wiper switch
⑦ Speedometer
⑧ Turn signal indicator lamp
⑨ Tachometer
⑩ Fuel gauge
⑪ Multi-control switch
⑫ Ventilator
⑬ Rear window defogger switch
⑭ Throttle knob (Diesel engine)
⑮ Rear wiper switch
⑯ Rear heater switch
⑰ Rear fog light switch
⑱ Power shift switch
⑲ Water temperature gauge
⑳ Cigarette lighter
㉑ Radio
㉒ Heater control panel
㉓ Ventilator
㉔ Glove box
㉕ Remote control outer rear view mirror switch

WRE91-BO066

FRONT SEAT

The front seat comes basically in two kinds; the high-back type and low-back type (headrest split type) The front seat differs, depending upon the grade
The seat surface material is available in the following kinds, print leather, flame-resisting print leather, semi-fabric, woven-full-fabric, moquette full-fabric. The kind of the seat surface material to be used differs according to the models, grades and destinations
On the wagon EL grade, a seat pocket is provided at the rear of the driver's seat
The suspension seat is available as optional equipment on the driver's seats on some specifications

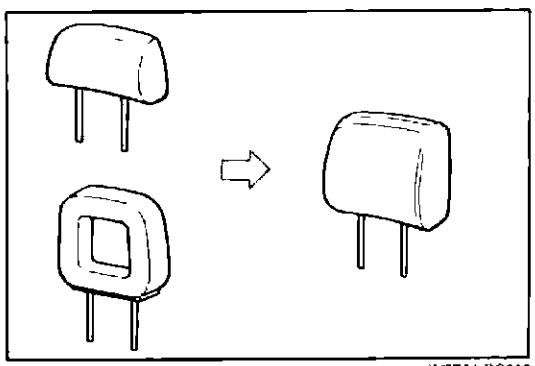


High-back type

Low-back type

WRE91 BO067

1. **Head restraint**
   For improved comfort, the shape of the headrest has been changed

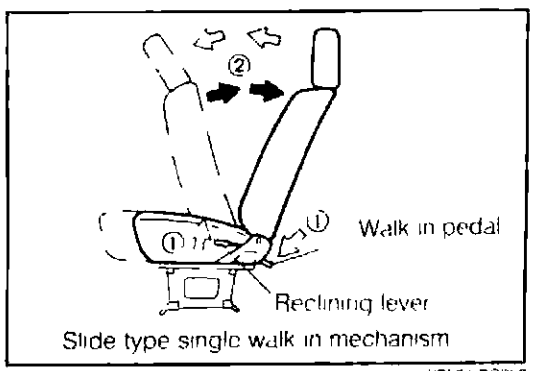


WRE91 BO068

2. **Walk-in mechanism**
   On the front passenger seat (excluding the pickup), a slide type walk-in mechanism is employed

   (Operation method of slide type single walk-in mechanism)
   ① When the walk-in pedal is depressed or the reclining lever is raised, the seatback is tilted forward And the seat automatically slides to the most forward position
   ② After completion of passenger's entry and exit to the rear seat, raise the seatback Then, push the seat backward and return it to the original position

   NOTE:
   - **Be sure to perform the operation ② after the operation ① has been performed. In addition, make sure that the front seat is locked before you enter to the front seat.**



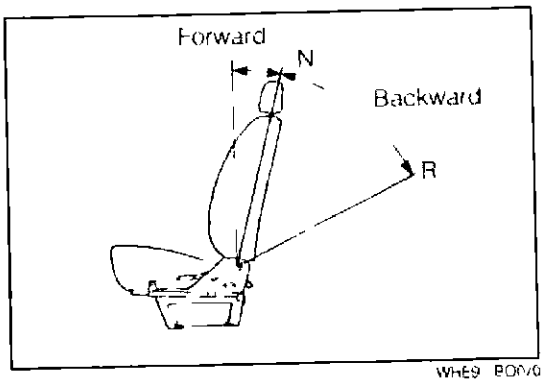
Slide type single walk in mechanism

WRL9' BO069

3. Front seat reclining

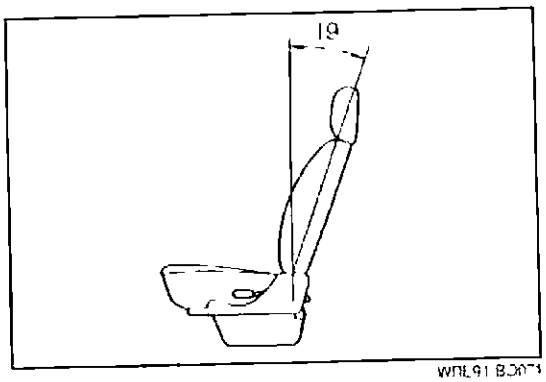
The table below indicates the reclining amount of the front seat of F70 and F75 series vehicles. This reclining amount is measured with the point N as the central point.

Backward	General specifications	2° × 29 stages = 58°
	Full flat specifications	2° × 29 stages = 58°
Forward (Except F77)	General specifications	2° × 3 stages = 6°
	Full flat specifications	2° × 3 stages = 6



WHE9 BO0

The front seat torso angle of F77 series is set to 19 degrees so that interference with the back panel may be prevented.

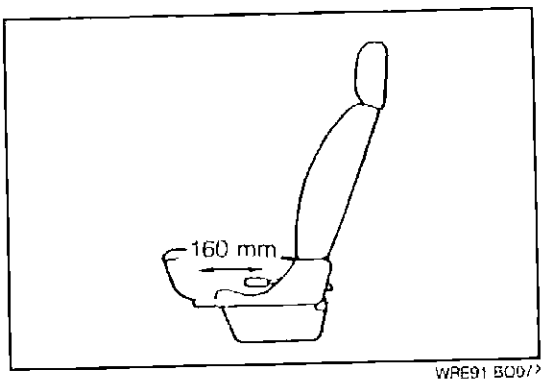


WHE91 BO073

4. Seat track sliding amount

The sliding amount of the seat track is 160 mm both for the driver's seat and for the front passenger seat.
However, the lock position differs between the driver's seat and front passenger seat, as indicated in the table below.

Seat track sliding amount	Unit: mm
(Sliding amount without lock) = front side sliding amount – Center point rear side sliding amount	
Driver's seat	(10) + (15 × 3 step) – N (15 × 7 step)
Passenger seat	(100) + (15 × 3 step) – N – (15 × 3 step)

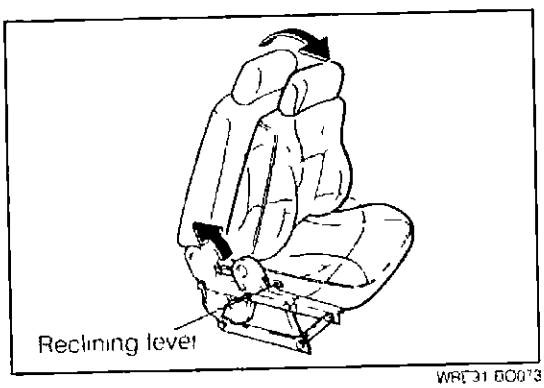


WRE91 BO072

On pickups, the sliding amount is the same as those of the driver's seat.

5. Double walk-in mechanism

This mechanism is employed on the front driver's seat of the full flat seat-equipped vehicles.
To operate the mechanism, pull the reclining lever upward to tilt the seatback. Fully slide the seat forward. Under this condition, push the seat forward while raising the whole seat. The seat will farther move forward.
To return the seat, raise the seatback. Move the seat backward while raising the whole seat.
CAUTION
- Never run the vehicle with the seat in a walked-in state, namely tilted forward. Failure to observe this caution will cause serious personal injuries.

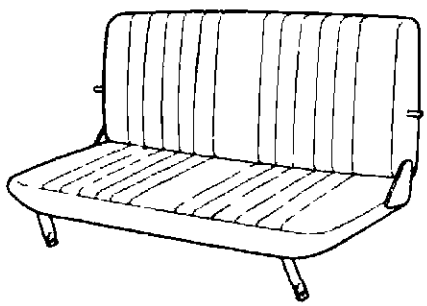


WRE91 BO073

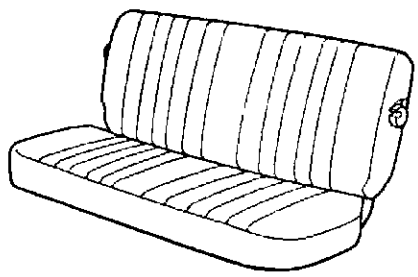
REAR SEAT

The rear seat is basically optional equipment, except for the wagon The rear seat comes in the following kinds, the semi 3-person seating seat, the 3-person seating seat for wagon use, the 3- person seating seat with armrest for wagon use, the 3-person seating seat for 3-point type seat belt for wagon use, the 3- person seating seat for hardtop use, the opposite-facing 4- person seating seat, the opposite-facing 6-person seating seat, the opposite-facing 8-person seating seat for pickup use and the opposite-facing 2-person seating sub-seat for wagon use The kind of the rear seat differs according to the models, grades, destinations and optional equipment

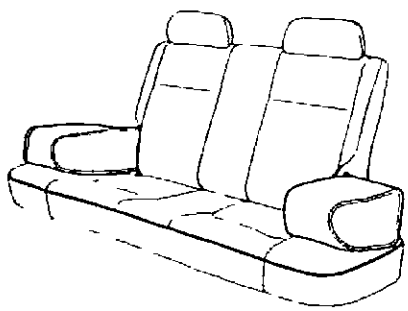
The seat surface material is available in the following kinds, leather, print leather, flame-resisting print leather, flame- resisting semi-fabric, woven-full-fabric, moquette full-fabric. The kind of the employed seat surface material differs according to the model, grade, destination and provision of option



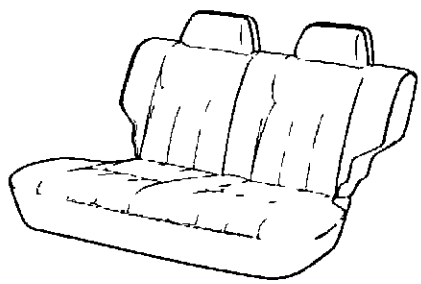
Semi 3-person seating seat



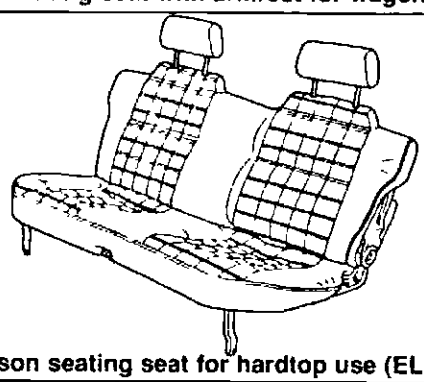
3-person seating seat for wagon use



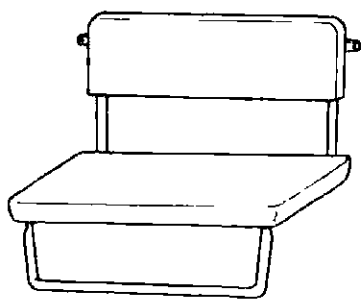
3-person seating seat with armrest for wagon use



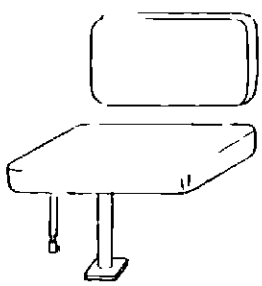
3-person seating seat for 3-point type seat belt for wagon use



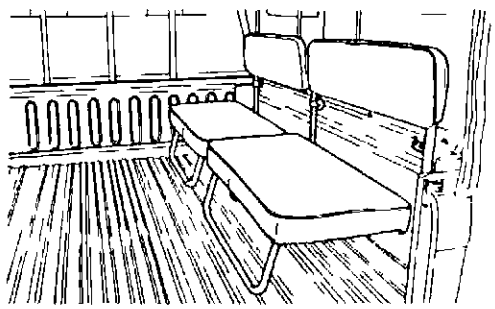
3-person seating seat for hardtop use (EL)



Side-facing 4-person seating seat (6-person seating set)



Sub-seat (for wagon use)



Side-facing 8-person seating seat (Pickup)

WRE91 BO074

SEAT BELT

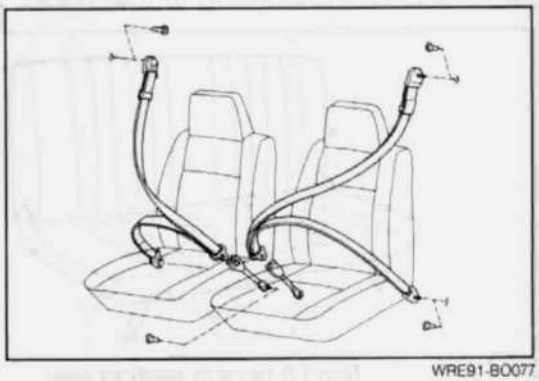
1. Front seat belt

The front seat belt comes in two kinds; One is 3-point NR (non-retractor) and the other is 3-point ELR (emergency locking retractor).

WRE91-BO076

(1) Three-point NR

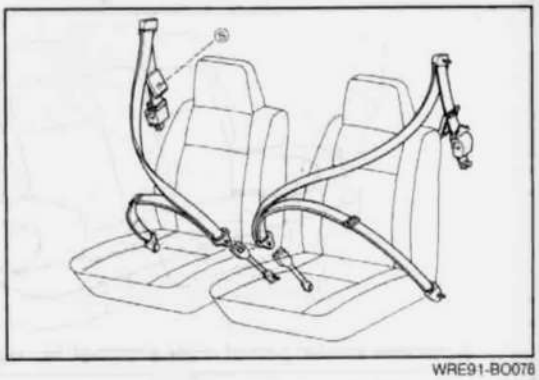
The 3-point non-retractor type seat belts are employed on all models as standard equipment, except for ECE & EEC specifications.



WRE91-BO077

(2) Three-point ELR

The 3-point emergency locking retractor seat belts are employed on all models with ECE & EEC specifications. These seat belts are optional equipment for other specifications.



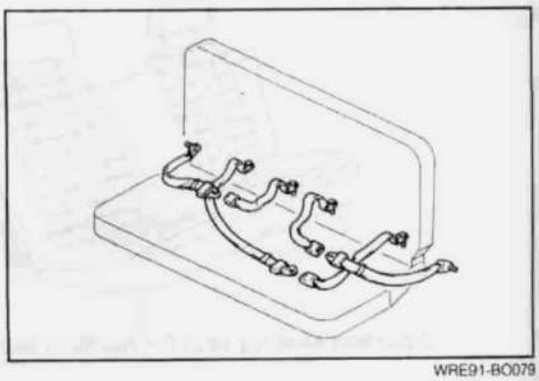
WRE91-BO078

2. Rear seat belt

The rear seat belt comes in three kinds as optional equipment; 2-point NR, 3-point NR and 3-point ELR.

(1) Two-point NR

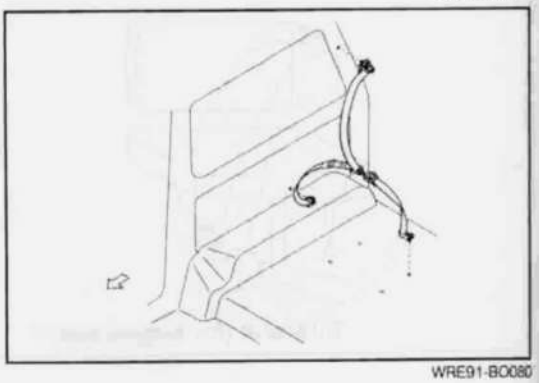
The 2-point non-retractor type seat belts are employed on all models, except for F70 and pick-up model.



WRE91-BO079

(2) Three-point NR

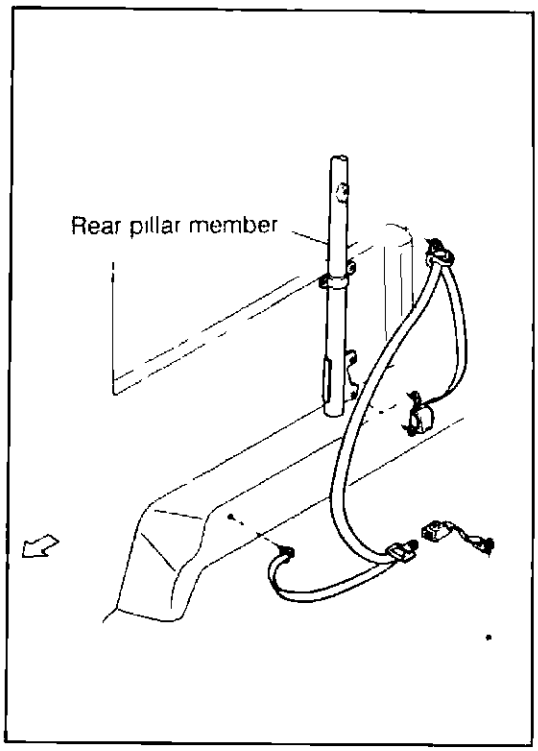
The 3-point non-retractor type seat belts are employed on hardtop model as optional equipment.



WRE91-BO080

3. Three-point ELR

The 3-point emergency locking retractor seat belts are employed on resin top models and soft-top model with short body (F70) as optional equipment



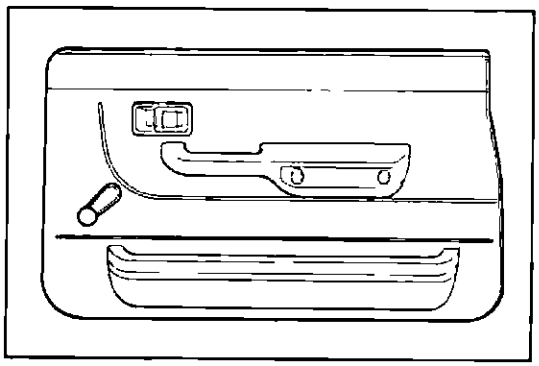
WRE91 BO081

FRONT DOOR ARMRESTS

A large-sized door armrest is employed.

FRONT DOOR TRIM

On the EL grade, the same material as that of the seat is employed on the upper section of the door trim.

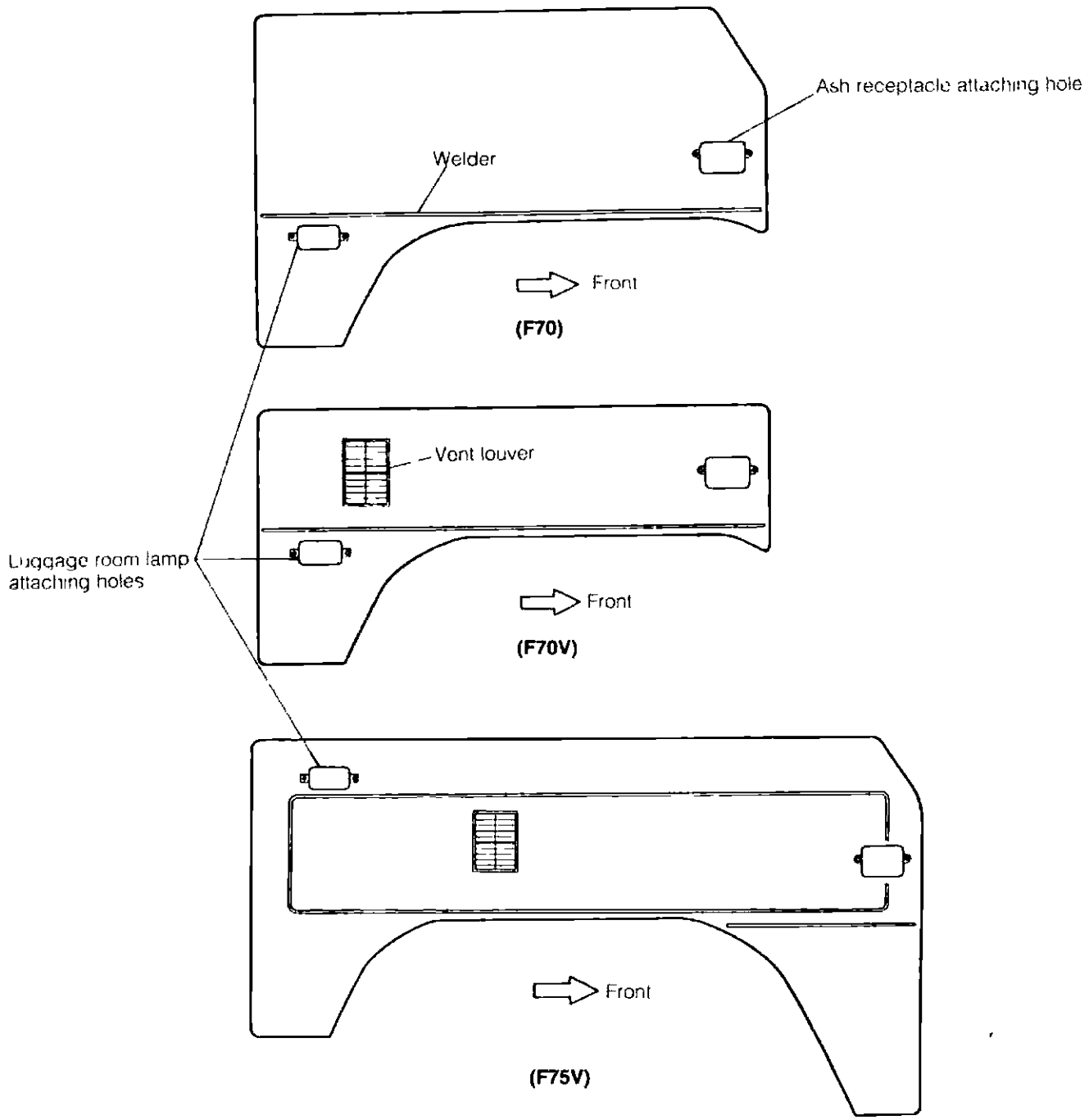


WRE91 BO082

QUARTER TRIM PANEL

In line with the installation of a luggage room lamp, the lamp attaching hole has been provided at the left side quarter trim panel

Quarter trim panel (left)



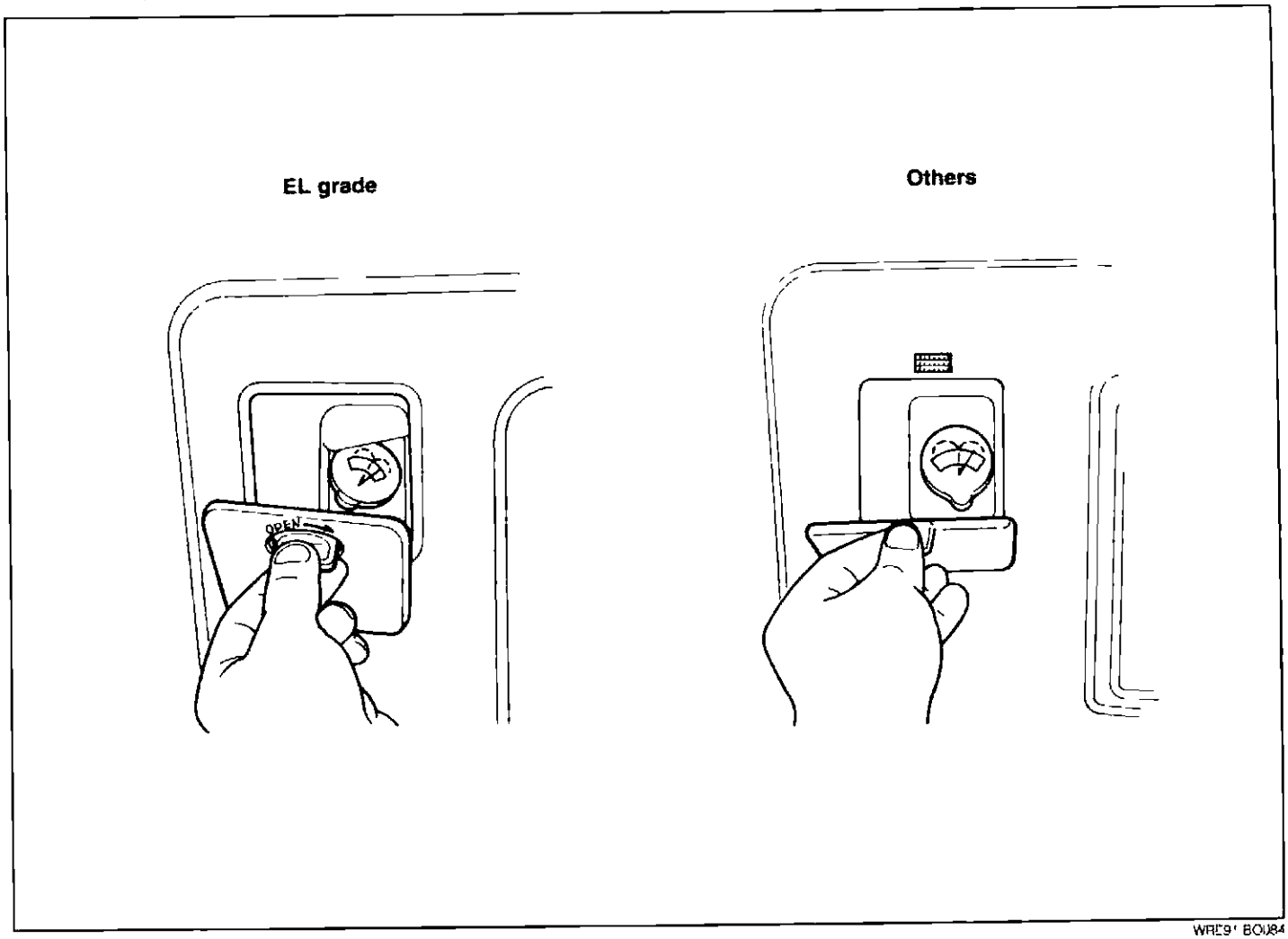
NOTE

- This figure does not apply to F75V vehicles equipped with sub-seats

WRE91 BO083

BACK DOOR SERVICE HOLE COVER

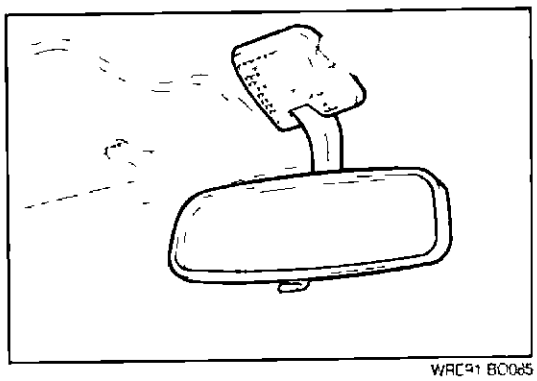
For easier operation, the rotational knob type has been adopted to the EL grade



WRE91 BO084

INNER MIRROR

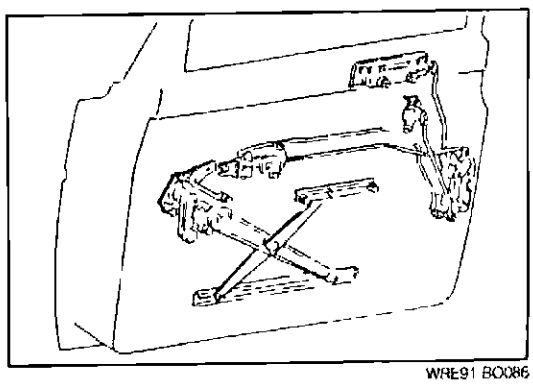
The inner mirror has adopted such construction that the room lamp is incorporated into the stay installing section For assured safety, it has employed a drop type.



WRE91 BO085

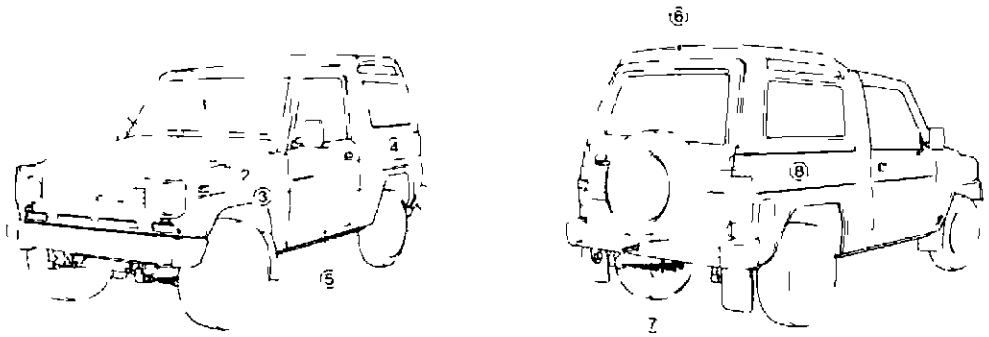
FRONT DOOR WINDOW REGULATOR

The front door window regulator employs an X-shaped arm type window regulator



WRE91 BO086

ALIGNMENT ADJUSTMENTS



Unit: mm

Check point / Item	①	②	③	④	⑤	⑥	⑦	⑧
Gap	3.1 - 7.4	9 - 6.9	3.4 - 7.1	←	3.3 - 7.3	4.4 - 8.4	3.9 - 7.9	4.1 - 8.4
Variation at same side	Not to exceed 2.0	←	Not to exceed 2.5	←	←	←	←	←
Difference in height	2.0 - 2.0	←	←	←	←	←	←	←
Variation between right and left sides	Not to exceed 2.5	←	Not to exceed 3.0	←	←	←	←	←
Hood lock	Slight looseness should be felt when hood's forward part at its center is pushed strongly							

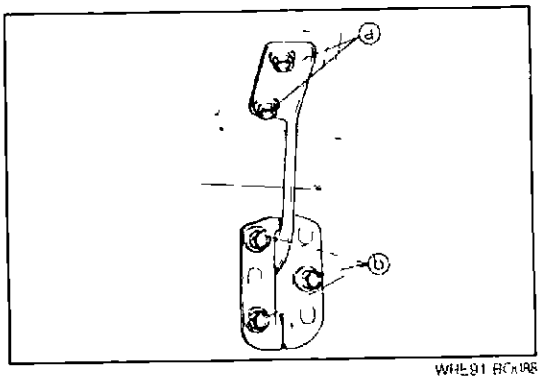
WRE91 BO14

ADJUSTMENT POINTS

HOOD

1 Gap

Loosen the hinge attaching bolts ⓐ provided at the rear part of the hood. Then, move the hood, as required.

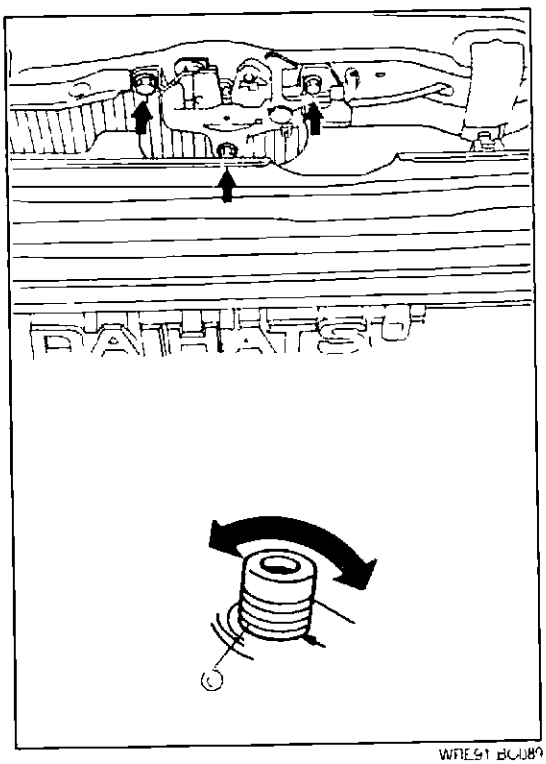


WRE91 BO198

2 Height

(1) To remedy the difference in height at the rear section, loosen the hinge attaching bolts ⓑ and move the hood, as required.

(2) To remedy the difference in height at the front section, loosen the hood lock attaching bolts. Then, move the hood lock mounting position and change the height of the hood bumper ⓒ by turning it, as required, until looseness no longer exists at the hood.



WRE91 BO089

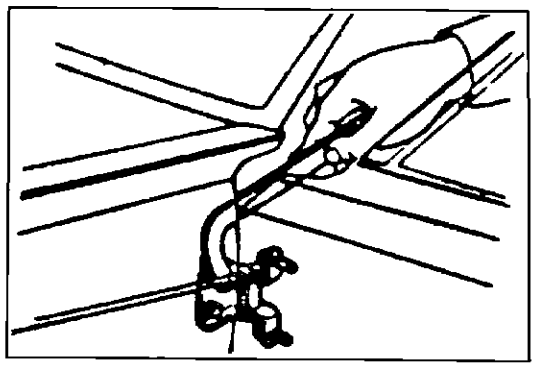
FRONT DOOR

1 Gap

Loosen the hinge to body attaching bolts at the upper and lower side

Then, move the door panel in right-and-left and up-and-down directions, as required

SST: 09812-00010-000



WRE91 BO090

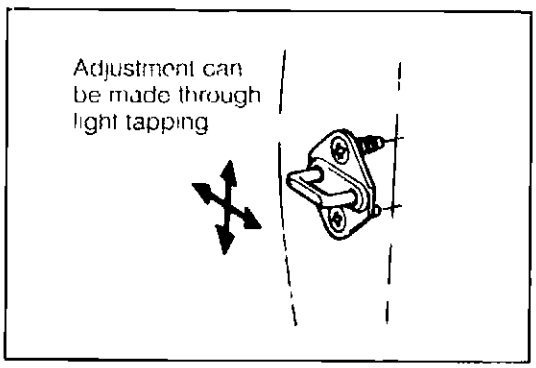
2 Height

(1) To remedy the difference in height, loosen the hinge-to-door attaching bolts Then, move the door panel in-board or outboard, as required

WRE91 BO091

(2) To remedy the difference in height of the lock striker section, loosen the screws of the lock striker

The adjustment can be performed by tapping the striker lightly



WRE91 BO092

REAR DOOR

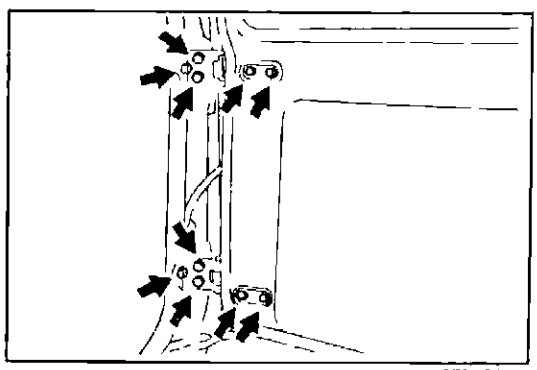
1 Gap

(1) Remove the back door trim board
(Full trim model only)

(2) Remove the hole plugs

(3) Loosen the hinge-to-back door attaching bolts at the upper and lower sides Then, move the door panel in a right-and-left direction, as required

(4) Loosen the hinge-to-side panel attaching bolts at the upper and lower sides Then, move the door panel in an up-and-down direction, as required



WRE91 BO093

NOTE:

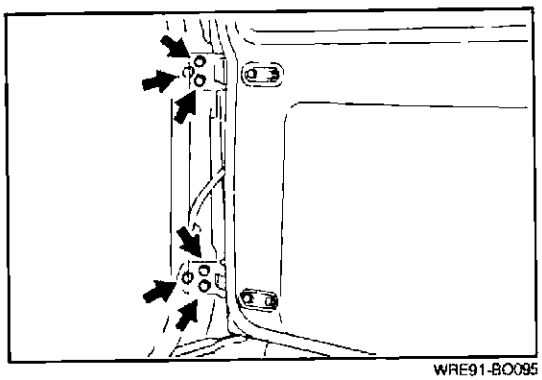
- **Be very careful not to move the back door inboard or outboard.**

(5) Adjust the lock striker
(See page BO-60)

2. Height
   (1) Loosen the screws of the back door down male stopper and back door down female stopper.

WRE91 BO094

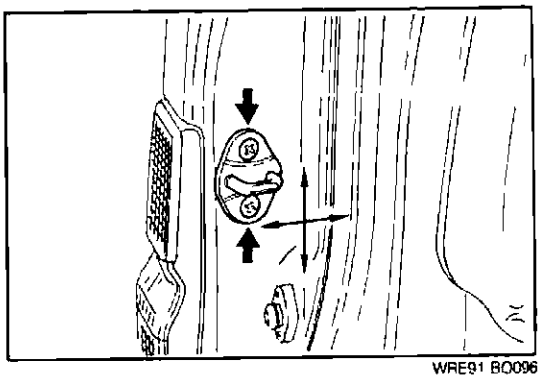
(2) To remedy the difference of the height, loosen the hinge-to-side panel attaching bolts at the upper and lower side
Then, move the door panel inboard or outboard, as required



WRE91-BO095

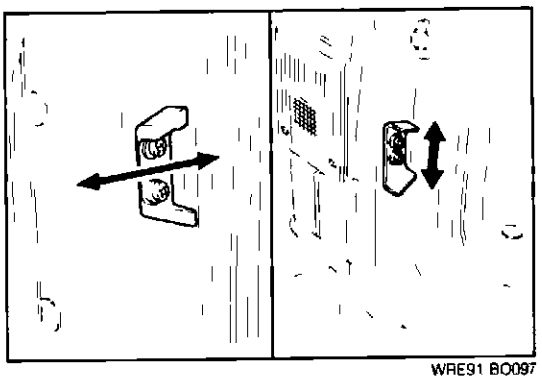
NOTE:
- **Be very careful not to move the back door in an up-and-down direction.**

(3) To remedy the difference of the lock striker section, loosen the screws of the lock striker The adjustment can be performed by tapping the striker lightly



WRE91 BO096

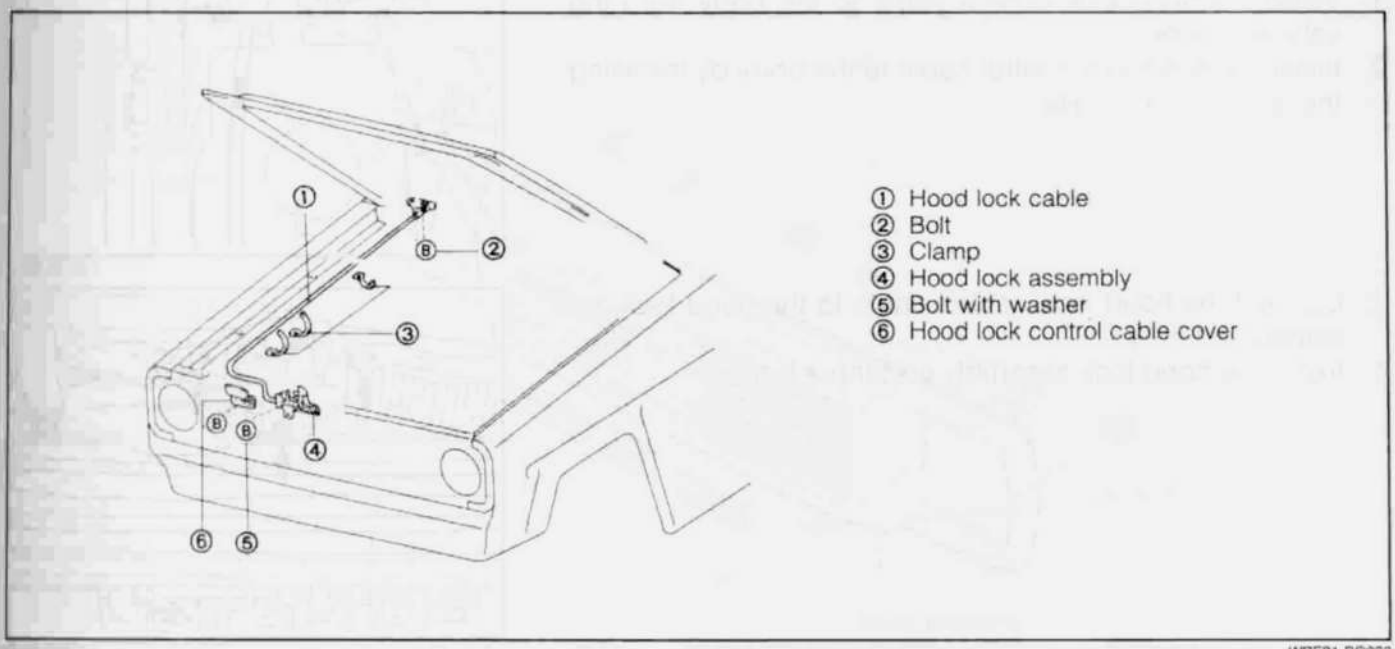
(4) Adjust the back door down male stopper and back door down female stopper respectively, until looseness no longer exists at the back door



WRE91 BO097

HOOD LOCK CONTROL CABLE

COMPONENTS

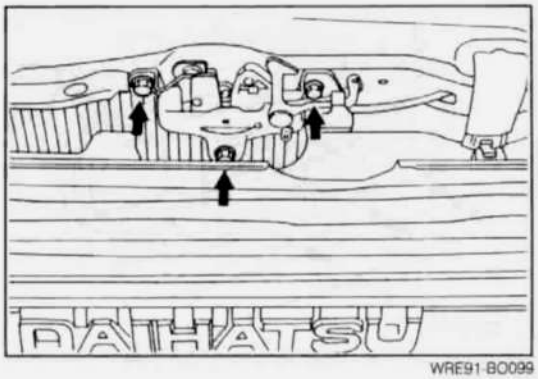


WRE91-BO098

REMOVAL

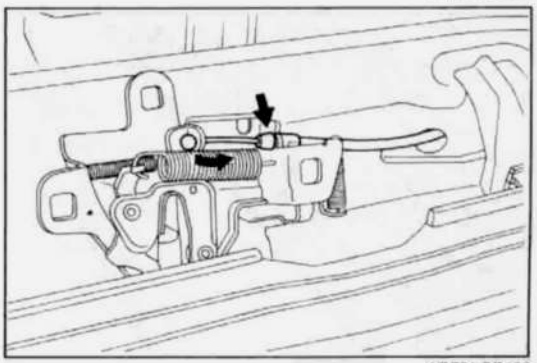
Removal of hood lock control cable assembly

1. Remove the hood lock assembly by removing the three bolts.



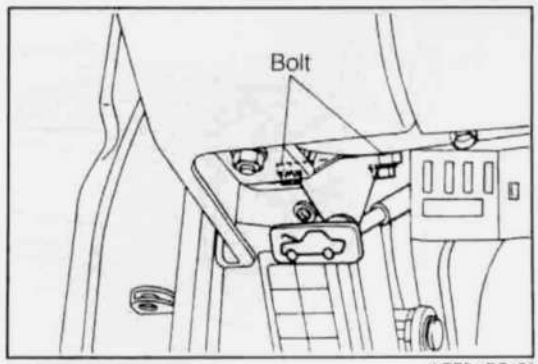
WRE91-BO099

2. Disconnect the hood lock control cable from the hood lock assembly.



WRE91-BO100

3. Remove the hood lock control cable attaching bolts.
4. Pull out the hood lock control cable from the vehicle interior. Then, take it out from the vehicle.

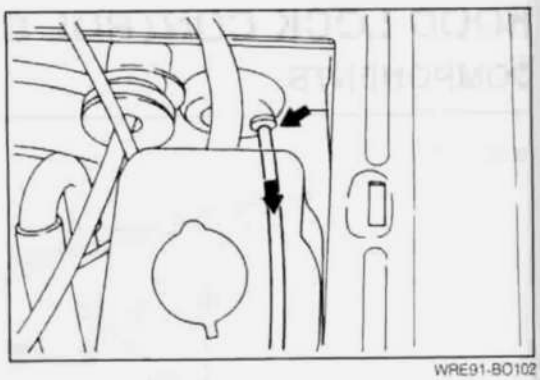


WRE91-BO101

INSTALLATION

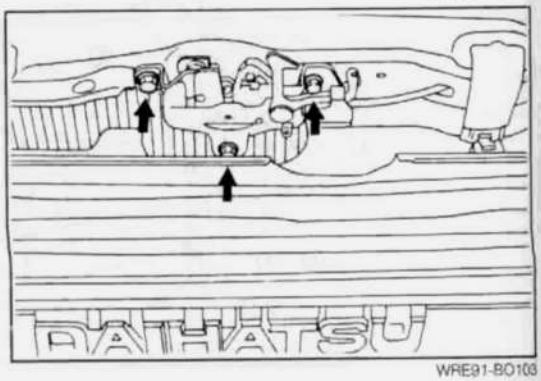
Installation of hood lock control cable assembly

1. Install the hood lock control cable to the body from the vehicle interior.
2. Install the hood lock control cable to the body by installing the two attaching bolts.



WRE91-BO102

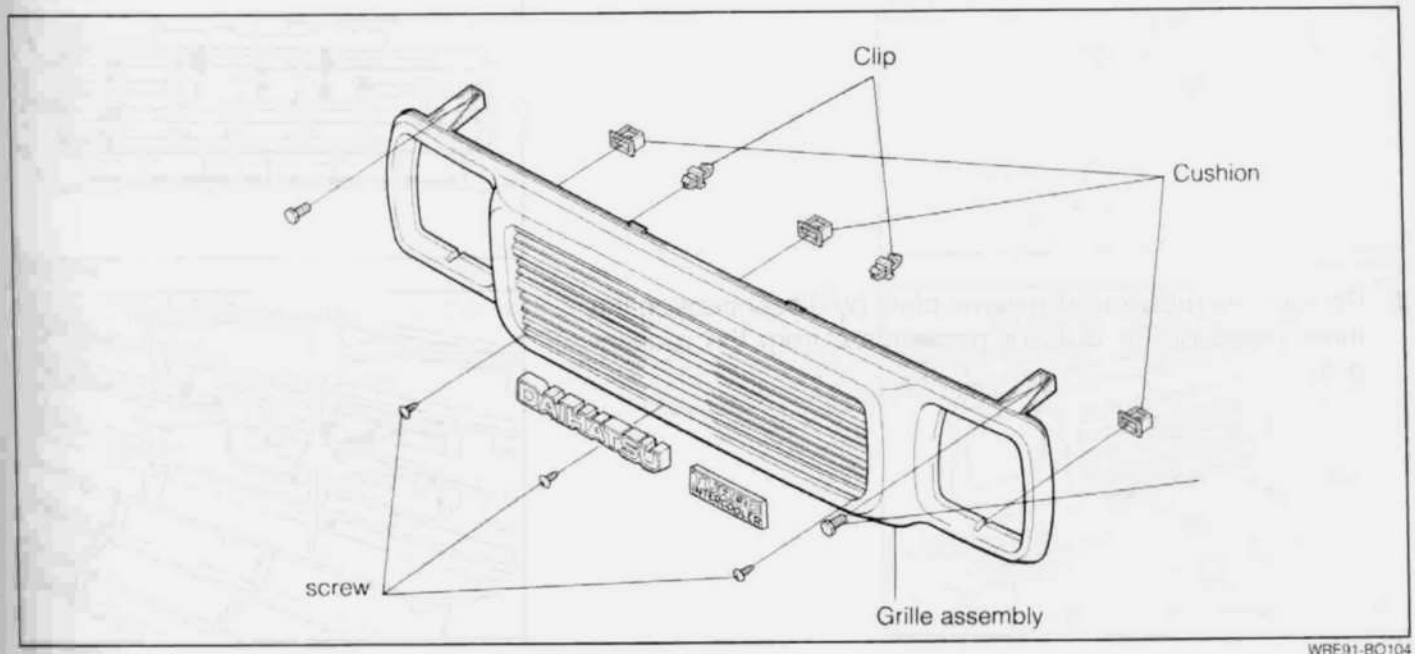
3. Connect the hood lock control cable to the hood lock assembly.
4. Install the hood lock assembly with three bolts.



WRE91-BO103

RADIATOR GRILLE

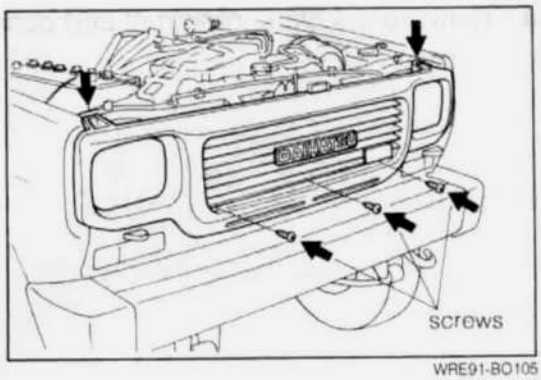
COMPONENTS



WRE91-BO104

REMOVAL

1. Removal of radiator grille assembly
   (1) Remove the two screws.
   (upper side of radiator grille)
   (2) Remove the three screws.
   (lower-front side of radiator grille)
   (There are some cases where no screw is provided.)

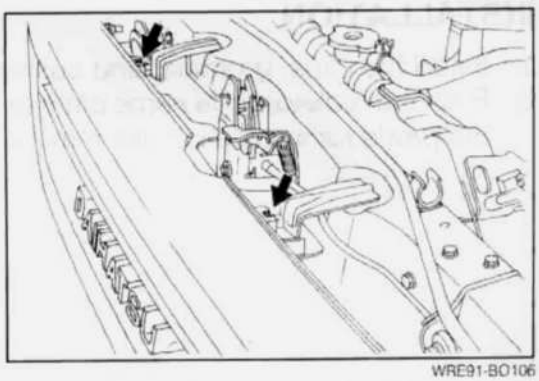


WRE91-BO105

(3) Detach the two clips.

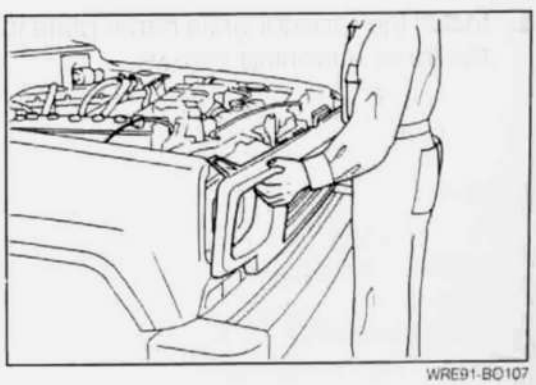
NOTE:

- While holding the pawl section at the top of the clip with a screwdriver or the like, remove the radiator grille from the radiator support by pulling it toward you.



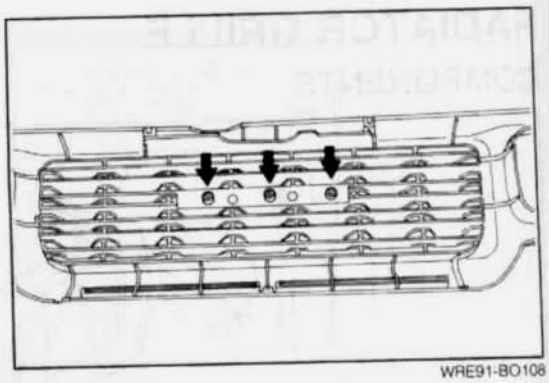
WRE91-BO106

(4) While lifting the radiator grille upward, remove the radiator grille by disconnecting the pawl section at the lower section of the radiator grille.

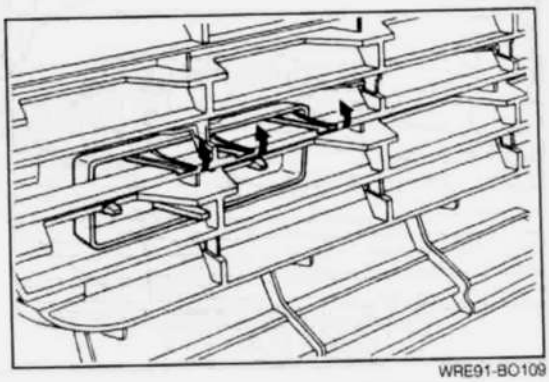


WRE91-BO107

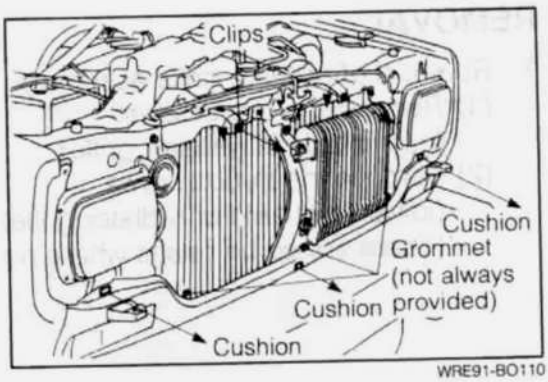
2. Remove the radiator grille name plate by removing the three attaching screws.


WRE91-BO108

3. Remove the radiator grille name plate by disconnecting the three pawls of the radiator name plate from the radiator grille.


WRE91-BO109

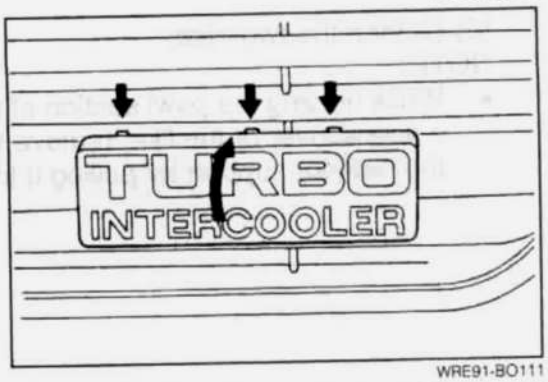
4. Remove the clips, grommet and cushion from the body.



WRE91-BO110

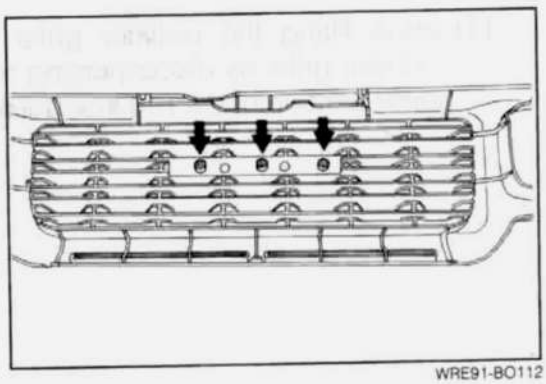
INSTALLATION

1. Install the clips, grommet and cushion to the body.
2. Push the radiator grille name plate to the radiator grille, until the pawls for installation use may be engaged positively.

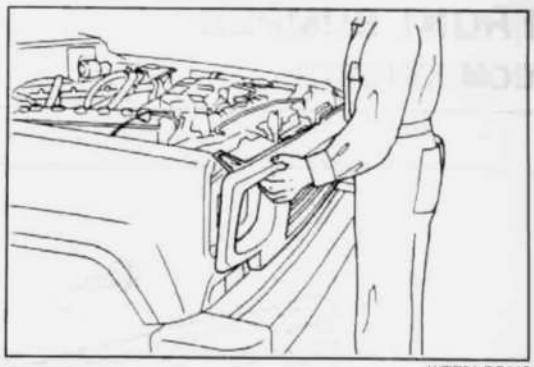


WRE91-BO111

3. Install the radiator grille name plate to the radiator grille with the three attaching screws.

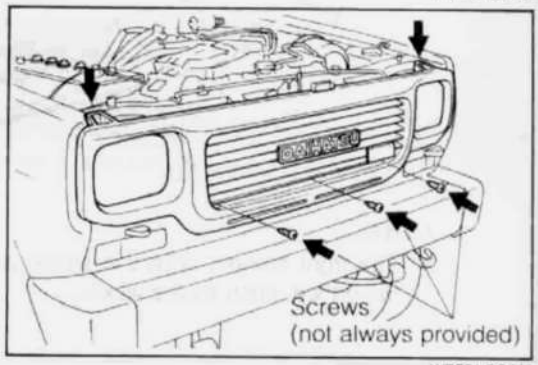

WRE91-BO112

4. While inserting the lower pawl of the radiator grille into the cushion, install the radiator grille on the vehicle.



WRE91-BO113

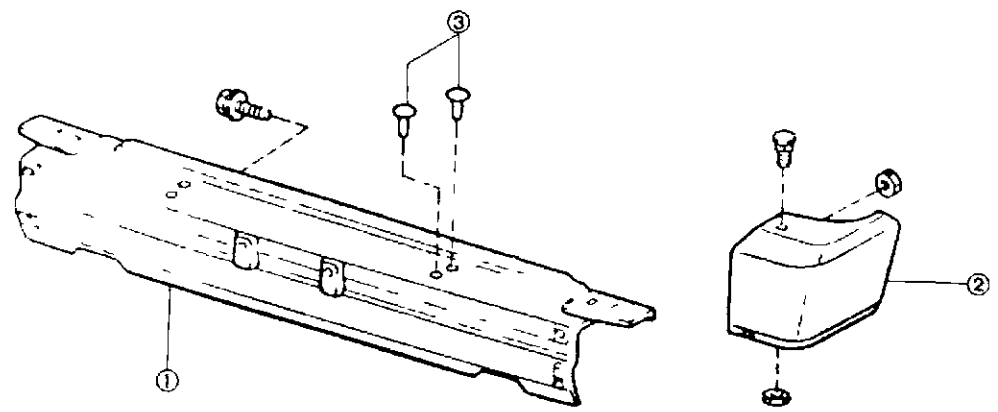
5. Insert the radiator grille into the two clip positions, until locking takes place.
6. Install the attaching screws.



WRE91-BO114

FRONT BUMPER

COMPONENTS



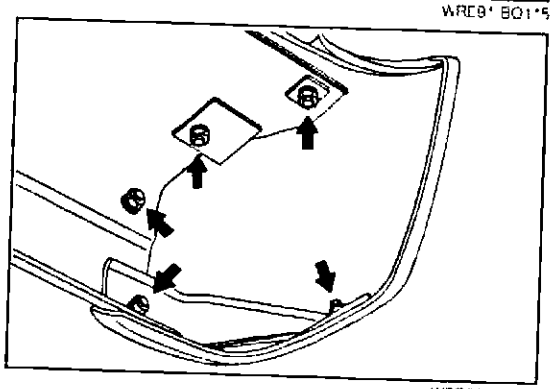
NOTE
- The front bumper differs in shape according to the option such as the winch

① Front bumper assembly
② Front bumper extension subassembly
③ Hole plug

WRE91 BO115

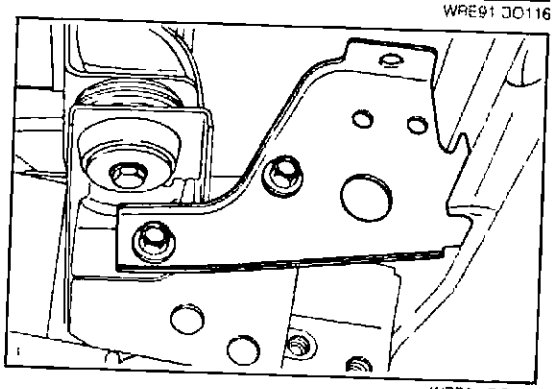
REMOVAL

1 Remove the number plate
2 Remove the winch (if so equipped)
3 Remove the front bumper guard bar subassembly, (if so equipped)
4 Remove the front bumper extension attaching nuts and bolts



WRE91 BO116

5 Remove the front bumper assembly from the frame by removing the attaching bolts



WRE91 BO117

INSTALLATION

1 Install the front bumper to the frame by the four attaching screws

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m 21.7 - 32.5 ft-lb)

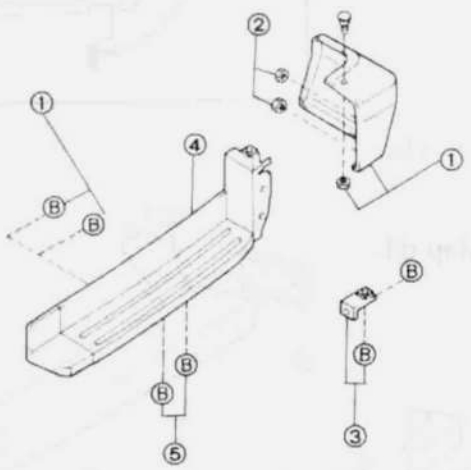
2 Install the front bumper extension attaching nuts and bolts
3 Install the front bumper guard bar subassembly, (if so equipped)
4 Install the winch (if so equipped)
5 Install the number plate

WRE91 BO118

REAR BUMPER <F70 & F75>

COMPONENTS

This figure shows the right side of the rear bumper.
The left side is symmetrical to the right side.

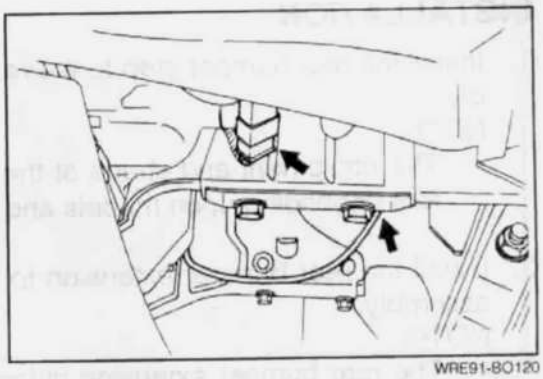


① Rear bumper extension subassembly & nut
② Nut
③ Rear bumper side support
④ Bumper assembly
⑤ Bolt

WRE91-BO119

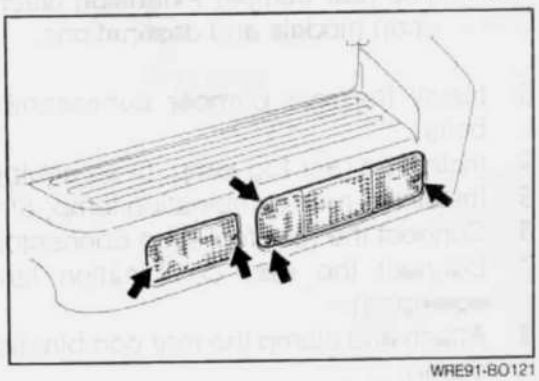
REMOVAL

1. Remove the rear combination lamp harness from the clamp, (if so equipped).
2. Disconnect the rear combination lamp connector, (if so equipped).
3. Disconnect the rear fog lamp connector, (if so equipped).



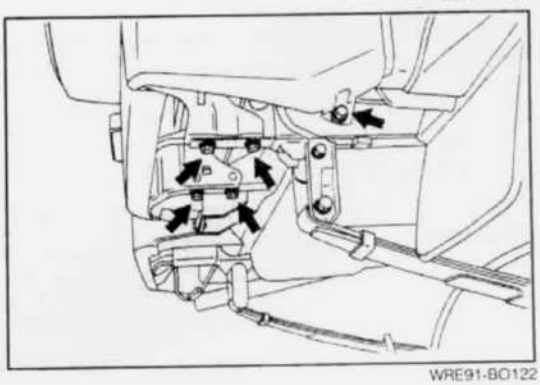
WRE91-BO120

4. Remove the rear combination lamp, (if so equipped).
5. Remove the rear fog lamp, (if so equipped).



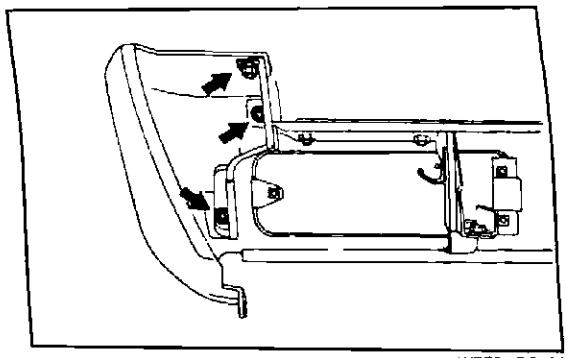
WRE91-BO121

6. Remove the rear bumper subassembly by removing the attaching bolts.



WRE91-BO122

7 Remove the rear bumper extension from the rear bumper subassembly
NOTE.
- The rear bumper extension differs in shape according to the models and destinations.



WRE91 BO123

8 Remove the rear bumper step from the rear bumper stay from the rear bumper subassembly
NOTE.
- The equipment and shape of the rear bumper step differs depending upon models and destinations.

WRE91-BO124

INSTALLATION

1 Install the rear bumper step to the rear bumper subassembly
NOTE:
- The equipment and shape of the rear bumper step differs depending upon models and destinations.

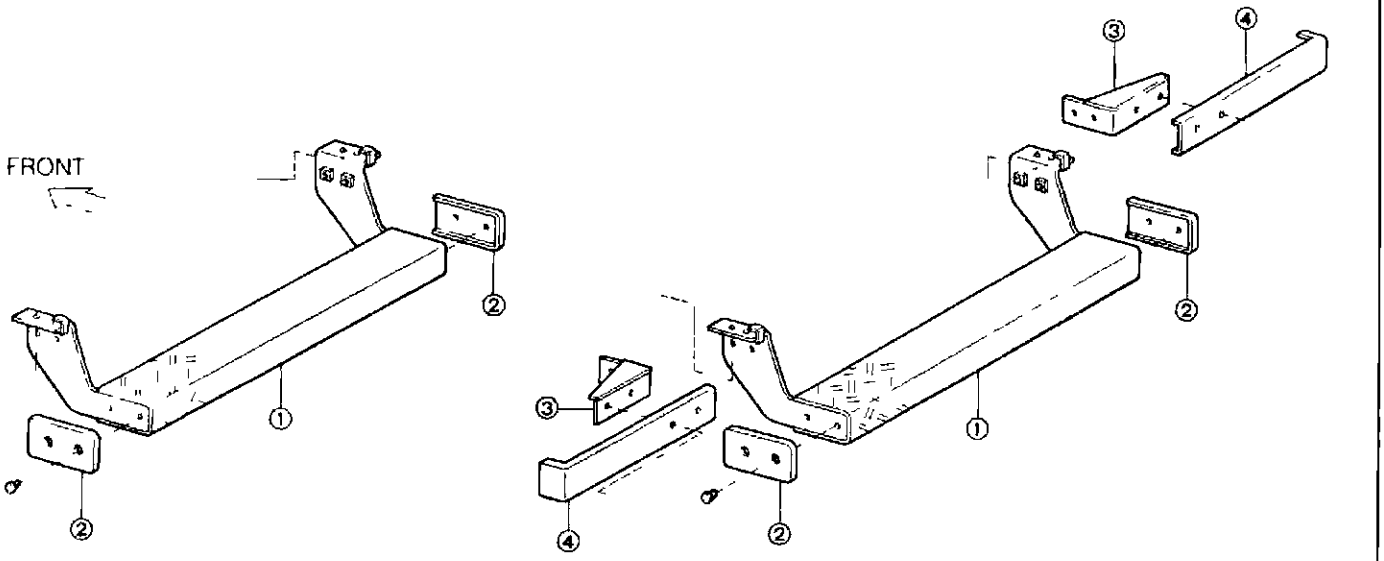
2 Install the rear bumper extension to the rear bumper subassembly
NOTE:
- The rear bumper extension differs in shape depending upon models and destinations.

3 Install the rear bumper subassembly with the attaching bolts.
4 Install the rear fog lamp, (if so equipped).
5 Install the rear combination lamp, (if so equipped)
6 Connect the rear fog lamp connector, (if so equipped)
7 Connect the rear combination lamp connector, (if so equipped)
8 Attach and clamp the rear combination lamp harness to the clamp

WRE91 BO125

REAR STEP BUMPER <F77>

COMPONENTS



① Rear step bumper
② Rear bumper protector
③ Rear bumper inner arm
④ Rear bumper arm mounting bracket

WRE91 BO126

REMOVAL

1 Remove the rear bumper inner arm by removing the attaching bolts, (if so equipped)
2 Remove the rear bumper arm mounting bracket by removing the attaching bolts, (if so equipped)
3 Remove the rear bumper protector
4 Remove the rear step bumper by removing the attaching bolts

WRE91 BO127

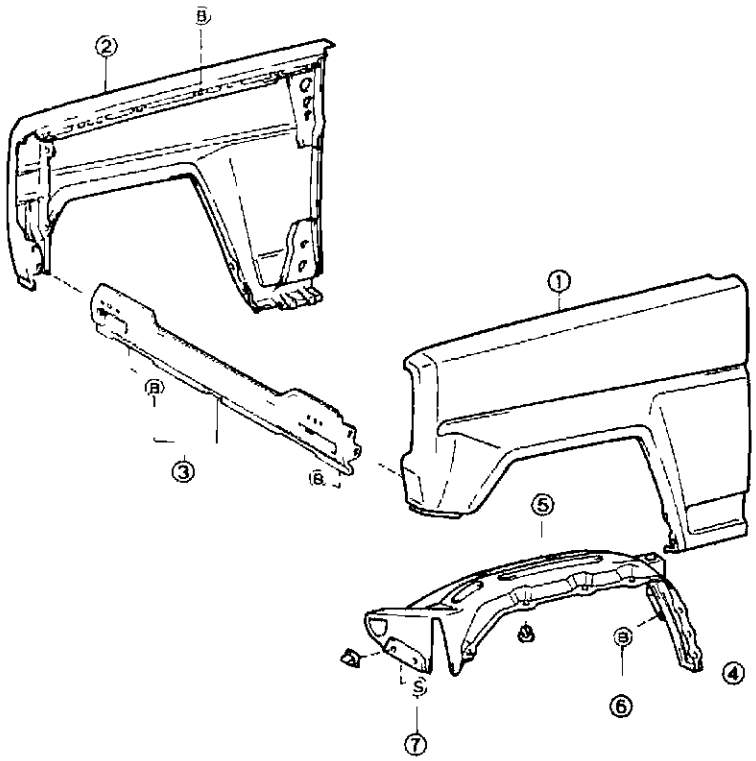
INSTALLATION

1 Install the rear step bumper with the attaching bolts
2 Install the rear bumper protector
3 Install the rear bumper arm mounting bracket with the attaching bolts, (if so equipped)
4 Install the rear bumper inner arm with the attaching bolts

WRE91 BO128

FRONT FENDER

COMPONENTS

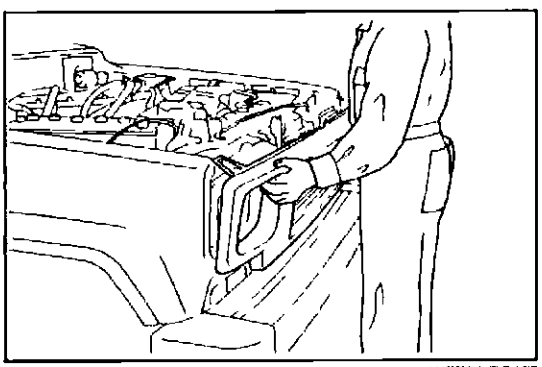


① Front fender subassembly
② Bolt
③ Front lower panel
④ Screw grommet
⑤ Front fender liner
⑥ Bolt with washer
⑦ Tapping screw with washer
⑧ Hood silencer & clip

WRE91 BO129

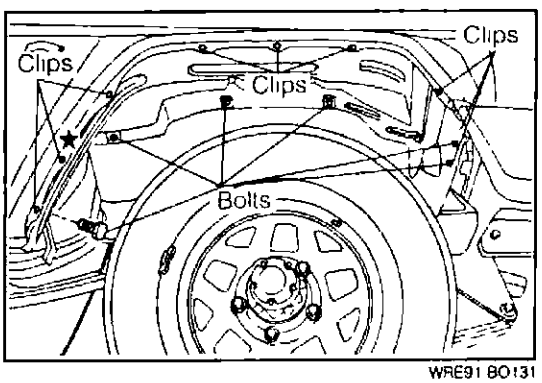
REMOVAL

1 Remove the radiator grille
(See page BO-63)



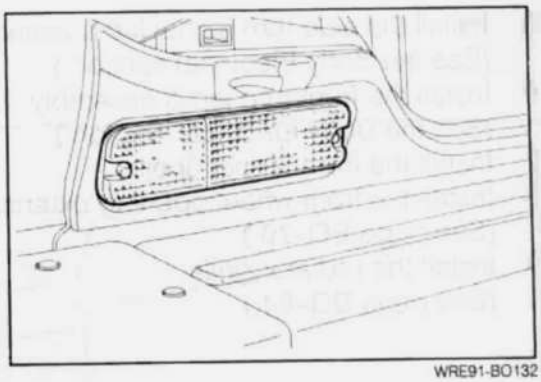
WRE91 BO130

2 Remove the front wheel opening extension
(See page BO-73)
3 Remove the front fender liner by removing the clip and bolts
NOTE.
- While preventing the clip outer from turning, detach the clip by loosening the clip center with a screwdriver.
- The clips bearing the asterisk (*) mark are for the vehicle equipped with wheel extensions.

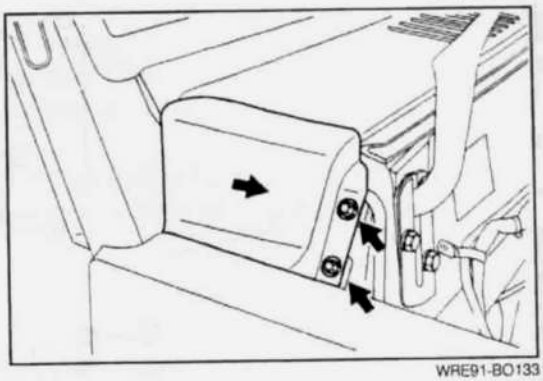


WRE91 BO131

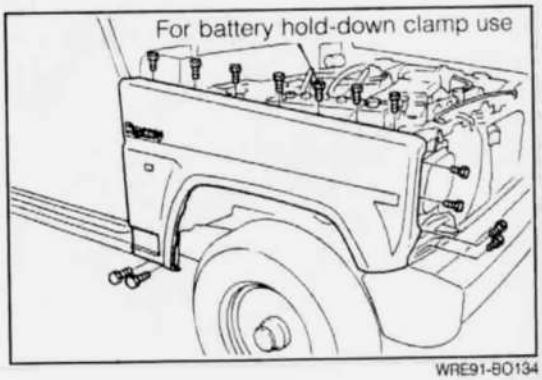
4. Remove the front turn lamp assemblies.


WRE91-BO132

5. Remove the attaching bolts of the cowl top outside corner panel subassembly.
6. Remove the cowl top side corner panel by pulling it to the front side.


WRE91-BO133

7. Remove the side turn signal lamp assembly. (See the Body Electrical section.)
8. Remove the battery hold down clamp bolt.
9. Remove the front fender by removing the twelve attaching bolts.



WRE91-BO134

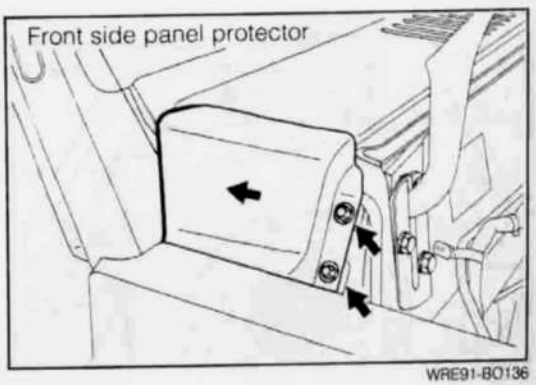
INSTALLATION

NOTE:

- To prevent rust formation, apply rust preventive liquid or paint having the same color as the body to the front fender attaching sections, attaching bolts and so forth.

WRE91-BO135

1. Install the front fender to the body with the twelve bolts.
2. Install the battery hold-down clamp attaching bolts.
3. Install the front side panel protector to the cowl top outside corner panel.
4. Install the cowl top outside corner panel in such a way that it may be inserted into the front side panel set retainer from the front side. Tighten the attaching bolts.



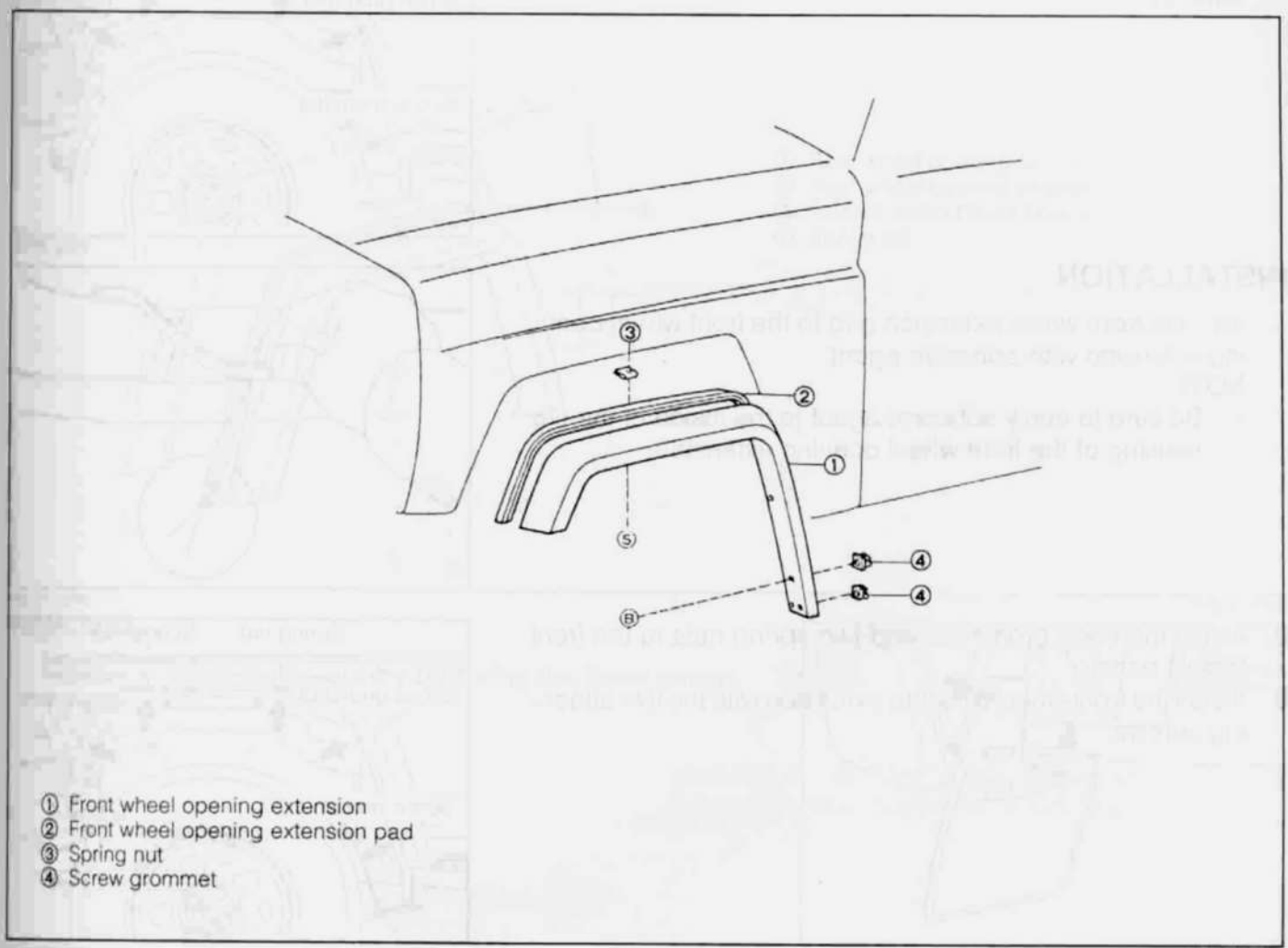
WRE91-BO136

5 Install the side turn signal lamp assembly
(See the Body Electrical section)
6 Install the front turn lamp assembly
(See the Body Electrical section)
7 Install the front fender liner
8 Install the front wheel opening extension
(See page BO–76)
9 Install the radiator grille
(See page BO–64)

WRE91 BO138

FRONT WHEEL OPENING EXTENSION

COMPONENTS

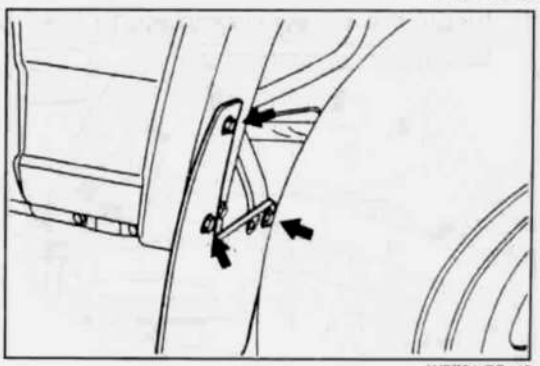


① Front wheel opening extension
② Front wheel opening extension pad
③ Spring nut
④ Screw grommet

WRE91-BO139

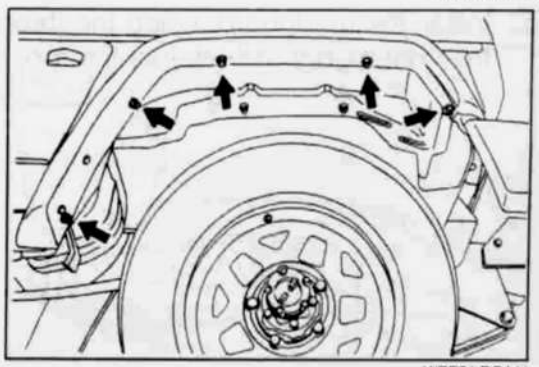
REMOVAL

1. Remove the front mudguard by removing the three attaching screws.



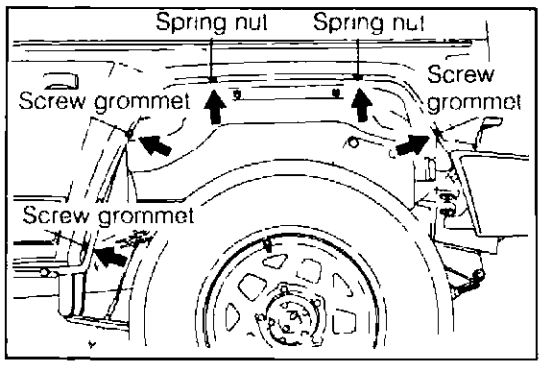
WRE91-BO140

2. Remove the front wheel opening extension by removing the five attaching screws.



WRE91-BO141

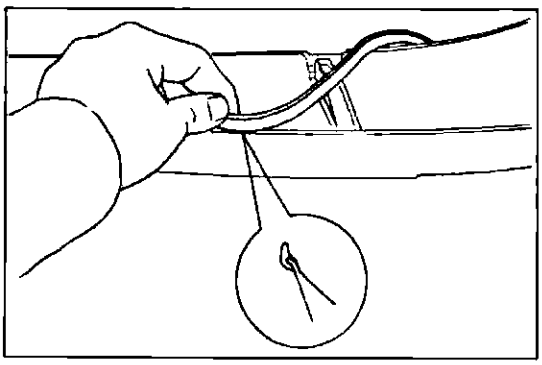
3 Remove the two spring nuts and three grommets
4 Remove the screw grommets from the front wheel opening extension



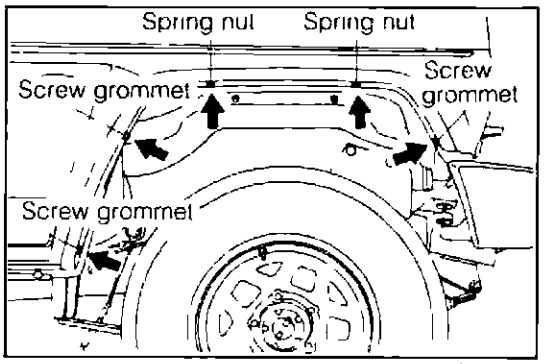
WRE91 BO142

INSTALLATION

1 Affix the front wheel extension pad to the front wheel opening extension with adhesive agent
NOTE:
- Be sure to apply adhesive agent to the inside of the tire housing of the front wheel opening extension

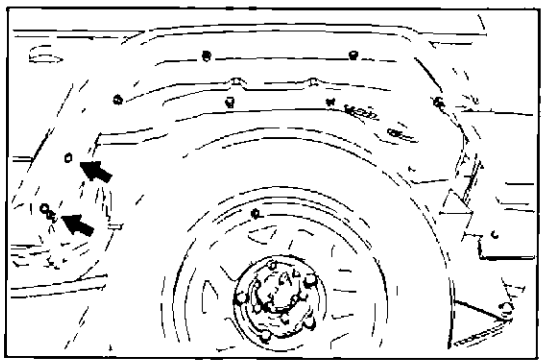

WRE91 BO143

2 Install the three grommets and two spring nuts to the front fender panel
3 Install the front wheel opening extension with the five attaching screws

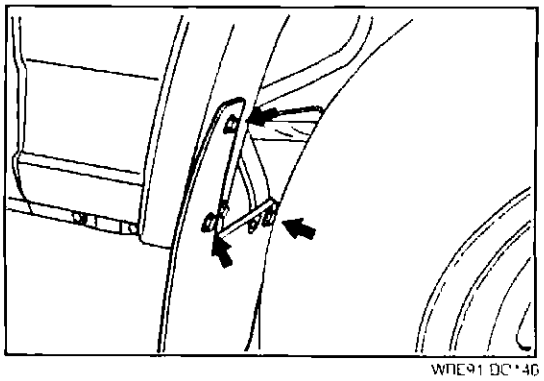


WRE9 BO141

4 Install the screw grommets to the front wheel opening extension

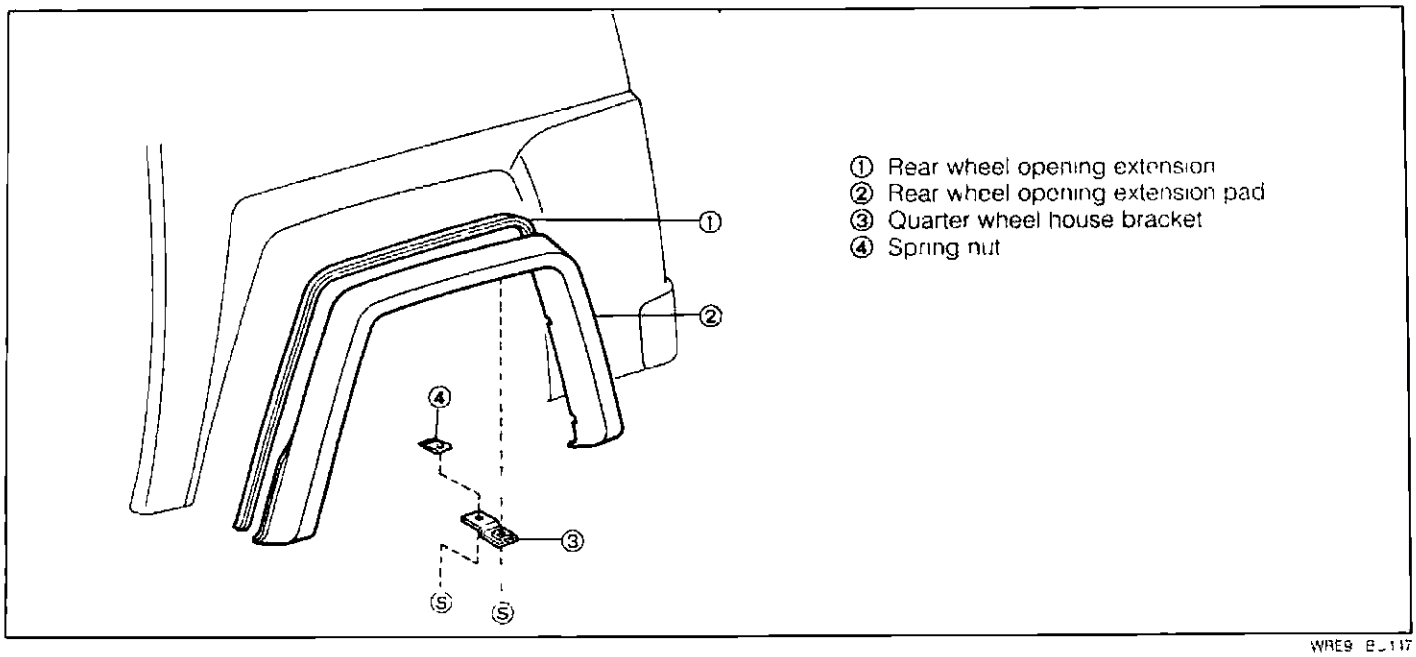

WRE91 BO115

5 Install the mudguard, using the three attaching bolts, with the front mudguard retainer interposed


WRE91 BO140

REAR WHEEL OPENING EXTENSION

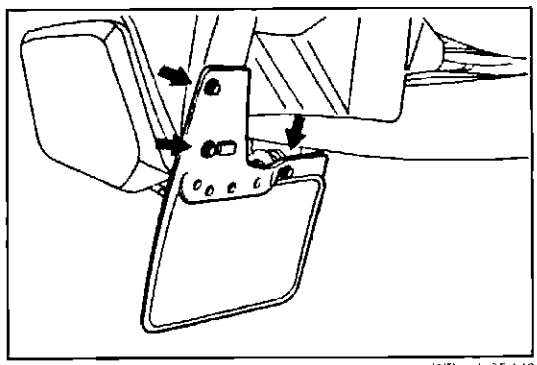
COMPONENTS



WRE9 BO117

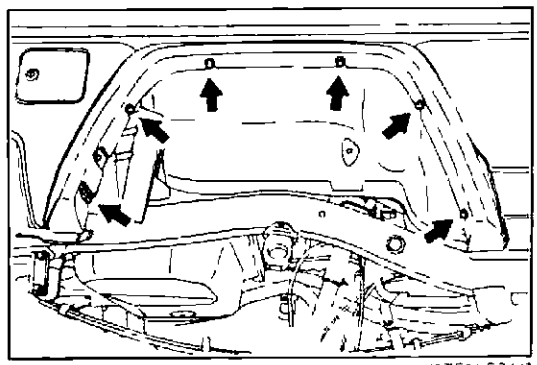
REMOVAL

1 Remove the rear mudguard by removing the three attaching screws



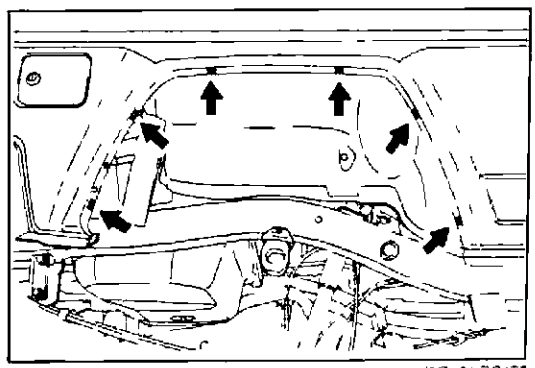
WRE91 BO149

2 Remove the rear wheel opening extension by removing the six attaching screws



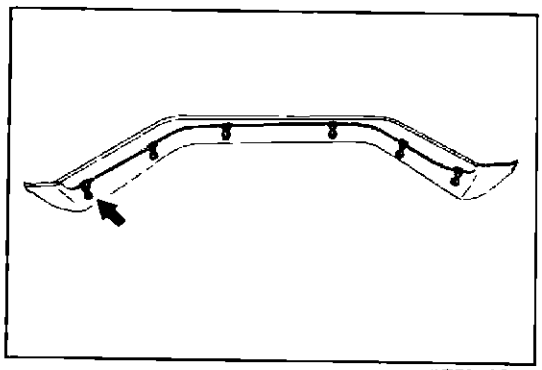
WRE91 BO149

3 Remove the six spring nuts from the quarter panel



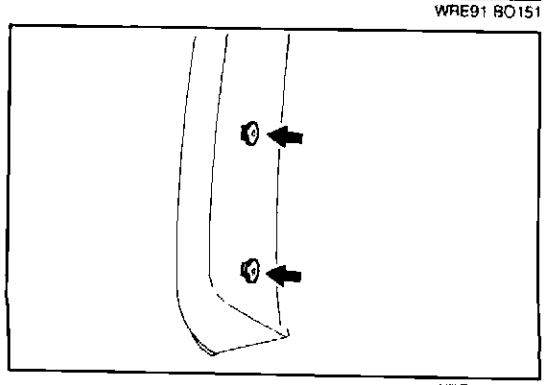
WRE91 BO150

4 Remove the quarter wheel house brackets from the rear wheel opening extension by removing the attaching screws



WRE91 BO151

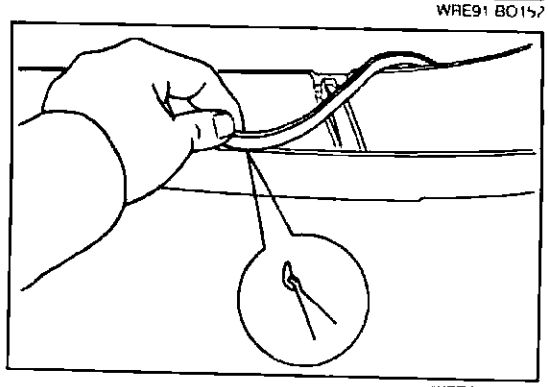
5 Remove the screw grommet from the rear wheel opening extension



WRE91 BO152

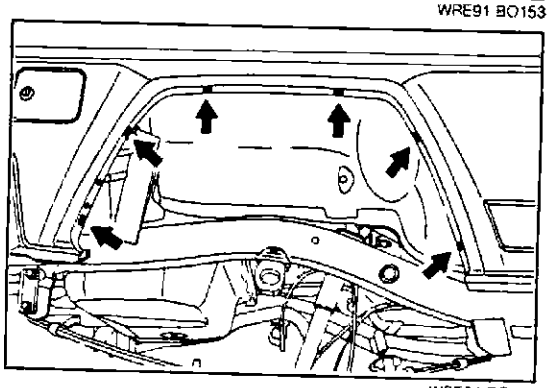
INSTALLATION

1 Affix the rear wheel extension pad to the rear wheel opening extension with adhesive agent
NOTE:
- **Be sure to apply adhesive agent to the inside of the tire housing of the rear wheel opening extension.**



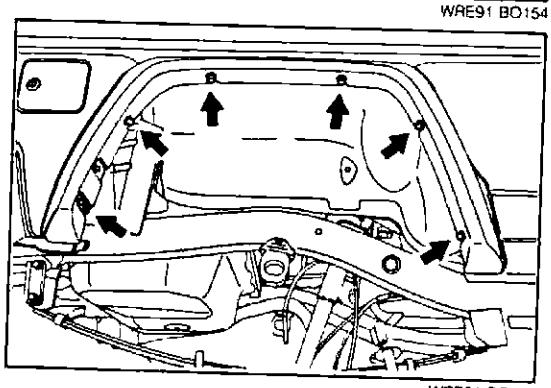
WRE91 BO153

2 Install the spring nuts to the quarter panel
3 Install the quarter wheel house brackets to the rear wheel opening extension with the attaching screws.



WRE91 BO154

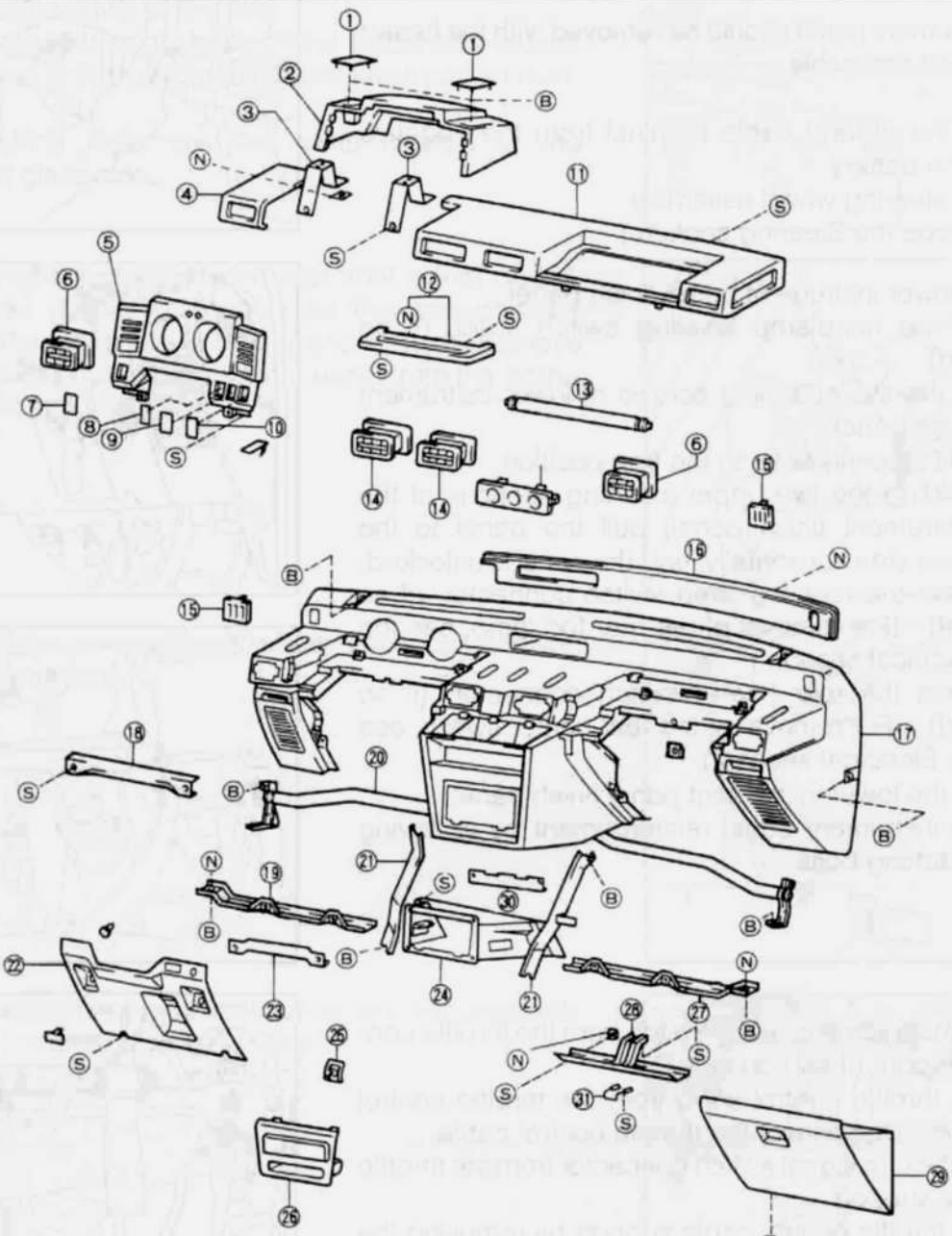
4 Install the rear wheel opening extension to the quarter panel with the six attaching screws
5 Install the screw grommets to the rear wheel opening extension
6 Install the rear mudguard with the three attaching screws.



WRE91 BO155

INSTRUMENT PANEL

COMPONENTS



① Instrument cluster finish panel cover
② Instrument cluster finish front panel
③ Meter hood set front bracket
④ Instrument panel safety side pad
⑤ Instrument panel cluster finish rear panel
⑥ Instrument panel side register
⑦ Base switch hole cover or power shift switch
⑧ Base switch hole cover or rear wiper switch
⑨ Base switch hole cover or remote control mirror switch
⑩ Base switch hole cover or rear window defogger switch
⑪ Instrument panel safety pad subassembly
⑫ Instrument panel center tray
⑬ Front grip
⑭ Instrument center register
⑮ Defroster nozzle
⑯ Instrument panel safety pad
⑰ Instrument panel
⑱ Throttle control cable support
⑲ Instrument panel reinforcement LH
⑳ Instrument panel reinforcement
㉑ Instrument panel brace subassembly
㉒ Instrument panel finish lower panel
㉓ Instrument panel finish panel No.1 retainer
㉔ Instrument panel center reinforcement
㉕ Cigarette lighter bezel
㉖ Tape player finish
㉗ Instrument panel reinforcement RH
㉘ Glove compartment door lock retainer
㉙ Glove compartment assembly
㉚ Instrument panel finish panel lower center reinforcement
㉛ Glove compartment door lock striker

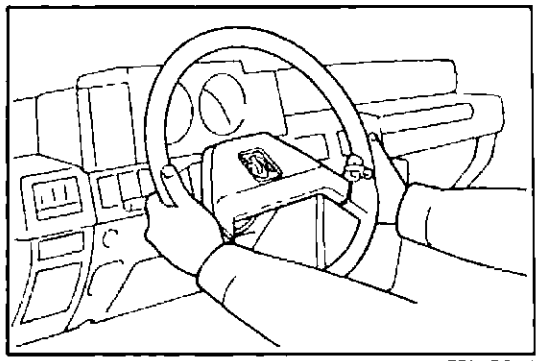
WRE91-BO156

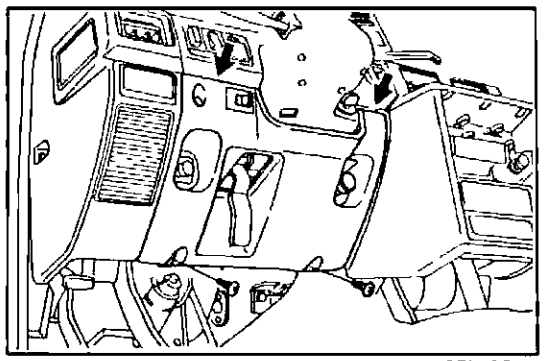
REMOVAL

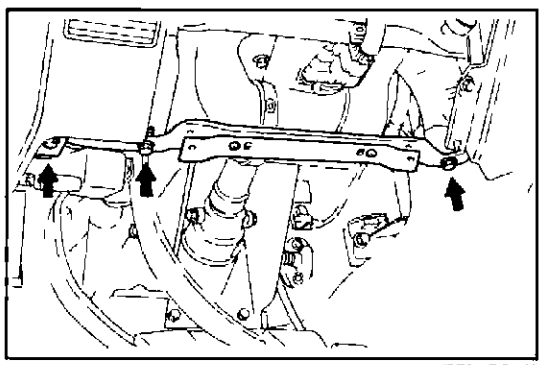
NOTE:
- The instrument panel should be removed with the heater control unit and cable.

1 Disconnect the ground cable terminal from the negative terminal of the battery
2 Remove the steering wheel assembly
(For details, see the Steering section)

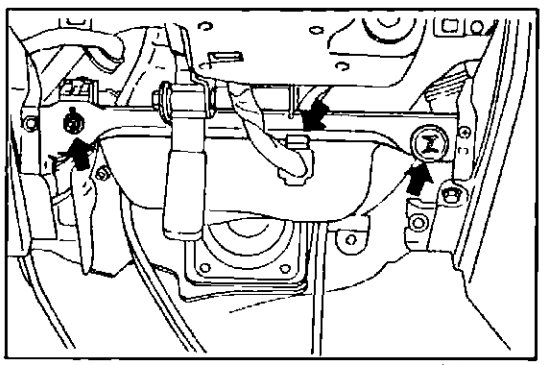
3. Removal of lower instrument panel finish panel
(1) Remove the headlamp leveling switch knob, (if so equipped)
(2) Remove the two attaching screws of lower instrument panel finish panel
(3) Set the tilt steering lever to the free position
(4) While holding the two upper inserting sections of the lower instrument finish panel, pull the panel to the vehicle rear side horizontally, until the panel is unlocked
(5) Disconnect the rear fog lamp switch connector, (if so equipped) (For removal of the rear fog lamp, see the Body Electrical section.)
(6) Disconnect the rear heater switch connector, (if so equipped) (For removal of the rear heater switch, see the Body Electrical section.)
(7) Remove the lower instrument panel finish panel
4 Remove the instrument panel reinforcement by removing the three attaching bolts


WRE91 BO157

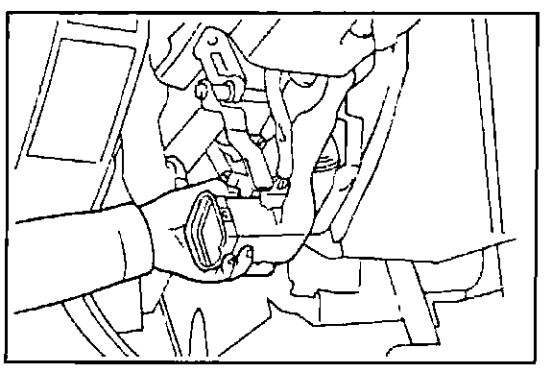

WRE91 BO158


WRE91 BO159

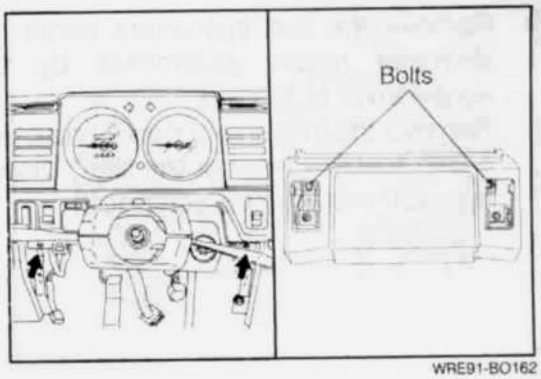
5 Remove the headlamp leveling switch from the throttle control cable support, (if so equipped).
6 Remove the throttle control knob from the throttle control cable support Disconnect the throttle control cable
7 Disconnect the turn signal switch connector from the throttle control cable support
8 Remove the throttle control cable support by removing the two attaching screws


WRE91 BO160

9 Push in the clip center of the air duct No. 1 by one stage
10 Detach the clip
11 Remove the air duct No 1

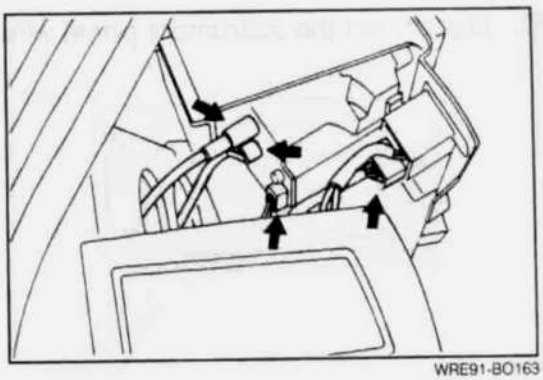

WRE91 BO161

12. Remove the two attaching screws of the instrument cluster finish rear panel.
13. Remove the instrument cluster finish panel covers by prying them with a screwdriver or the like.
14. Remove the two attaching bolts of the instrument cluster finish front panel in the instrument cluster finish panel cover.
    NOTE:
    - The attaching bolts are two bolts located at the windshield glass side.

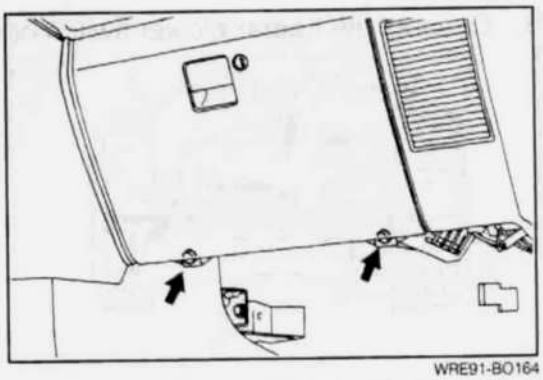


WRE91-BO162

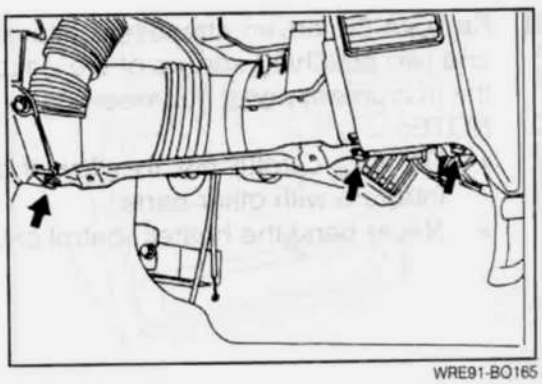
15. With the instrument cluster finish rear/front panel raised, disconnect the connectors, such as the speedometer cable, combination meter connector and so forth. Remove the instrument cluster finish rear/front panel from the instrument panel.


WRE91-BO163

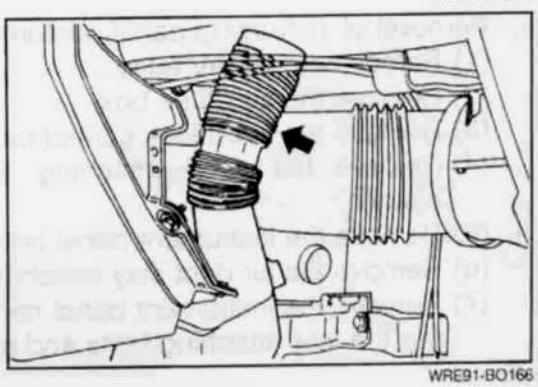
16. Remove the glove compartment subassembly by removing the two attaching screws.


WRE91-BO164

17. Remove the instrument panel reinforcement subassembly by removing the three attaching bolts.

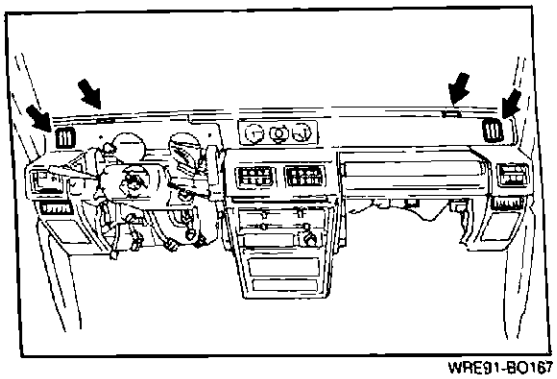

WRE91-BO165

18. Remove the defroster hoses (at both sides).
19. Disconnect the heater control cable from the front heater assembly and air damper case.
    (For details, see the Body Electrical section.)

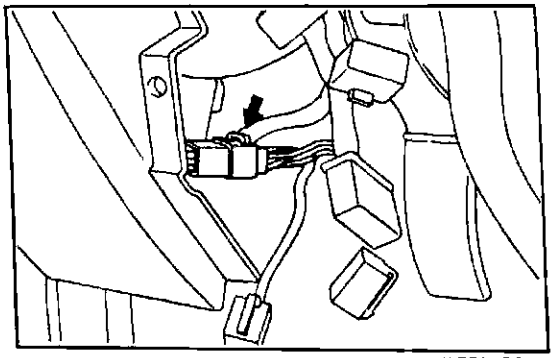

WRE91-BO166

20 Remove the two instrument panel hole covers and two defroster nozzle assemblies by prying them with a screwdriver or the like

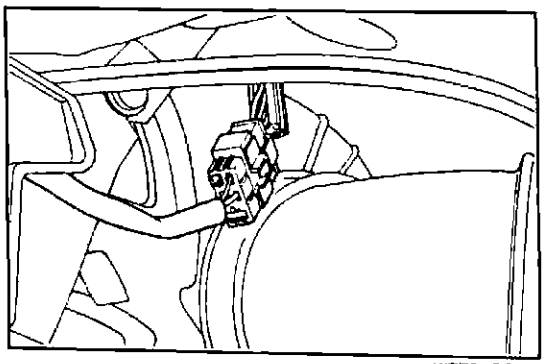
21 Remove the instrument panel finish upper panel by prying it with a screwdriver or the like. Disconnect the connector for each meter, (if so equipped).


WRE91-BO167

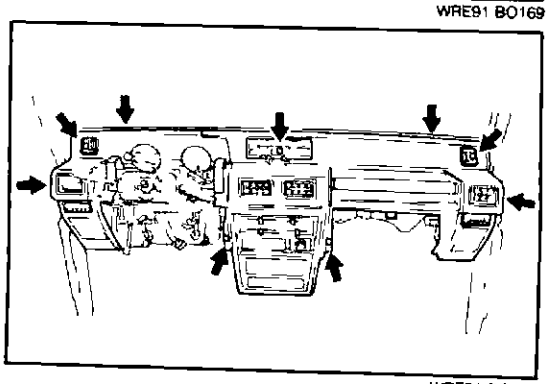
22 Disconnect the instrument panel wire connector.


WRE91 BO168

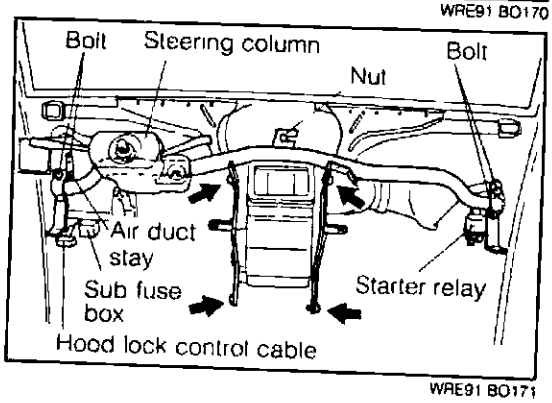
23 Connect the heater blower switch connector.


WRE91 BO169

24 Remove the seven attaching bolts of the instrument panel and two attaching screws of the defroster nozzle. Remove the instrument panel subassembly.
NOTE:
- **Be very careful not to allow the instrument panel to interfere with other parts.**
- **Never bend the heater control cable strongly.**

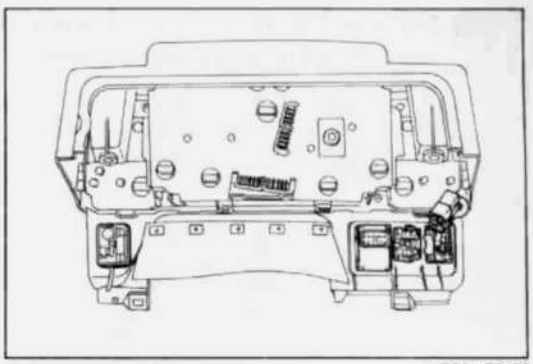

WRE91 BO170

25 Removal of instrument panel reinforcement
(1) Remove the starter relay
(2) Remove the sub-fuse box.
(3) Remove the hood lock control cable
(4) Remove the three attaching bolts of the steering column
(5) Remove the instrument panel braces No 1 and No 2
(6) Remove the air duct stay attaching screw.
(7) Remove the instrument panel reinforcement by removing the four attaching bolts and one nut.



WRE91 BO171

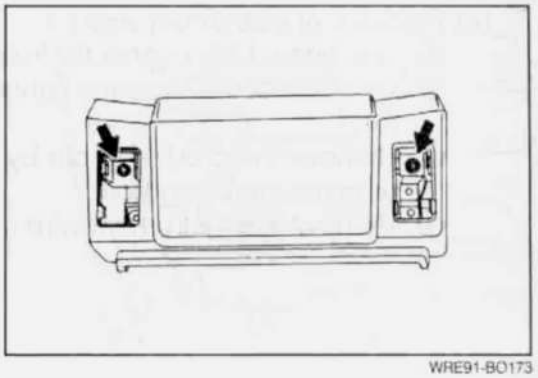
26. Disassembly of instrument cluster finish rear panel- related parts
    (1) Remove the power shift switch, rear wiper switch, power window switch and rear defogger switch by pushing them to the outside of the instrument cluster finish rear panel.



WRE91-BO172

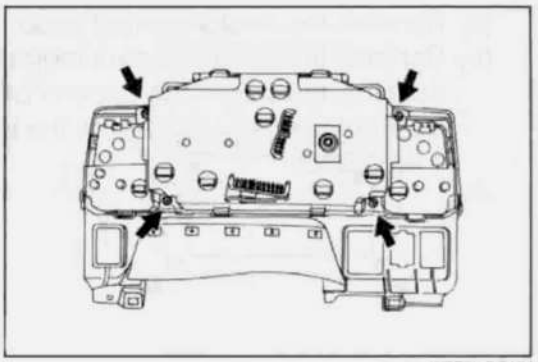
    (2) Remove the instrument cluster front panel from the instrument cluster finish rear panel by removing the two attaching bolts.

NOTE:
- The installing method is an insertion type.



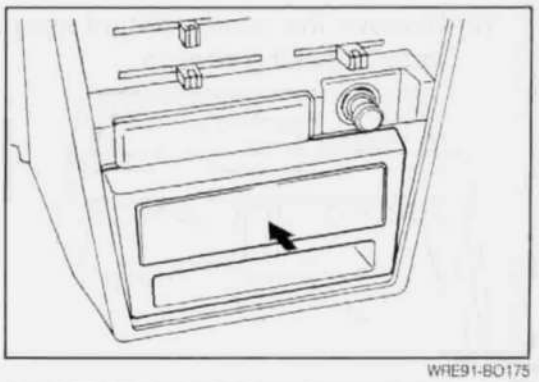
WRE91-BO173

    (3) Remove the combination meter by removing the four attaching screws.



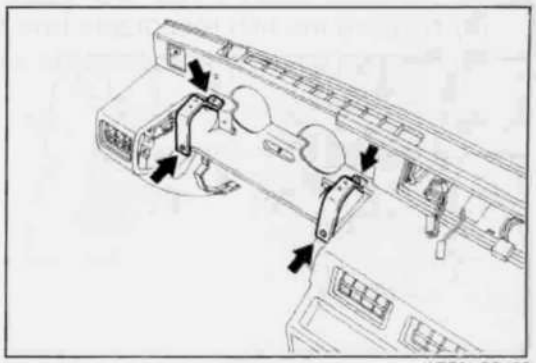
WRE91-BO174

27. Disassembly of instrument subassembly
    (1) Remove the radio cover. (For the radio and speakers, see the Body Electrical section.)



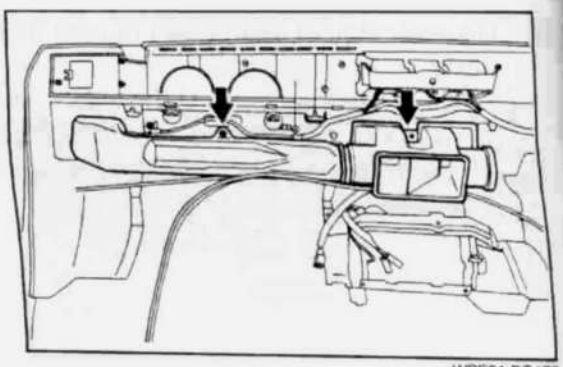
WRE91-BO175

    (2) Remove the meter hood set front bracket by removing the four attaching screws.



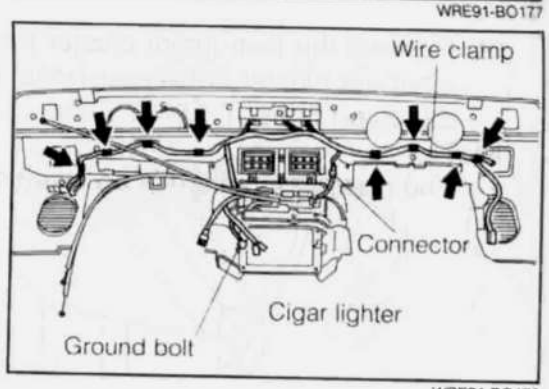
WRE91-BO176

(3) Remove the air duct No. 4 and center ventilator duct by removing the attaching screws.



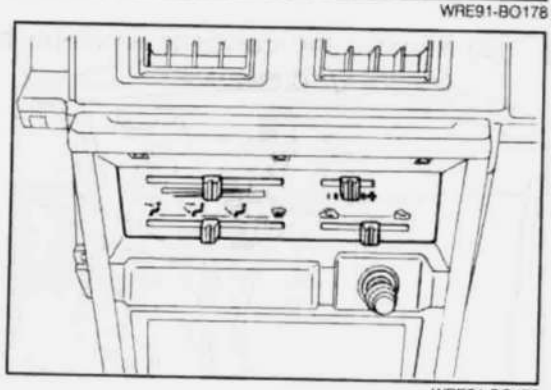
WRE91-BO177

(4) Removal of instrument wire
① Disconnect the connector from the cigarette lighter.
② Disconnect the cigarette lighter illumination connector.
③ Remove the ground cable by removing the ground terminal attaching bolt.
④ Remove the instrument wire from each clamp.



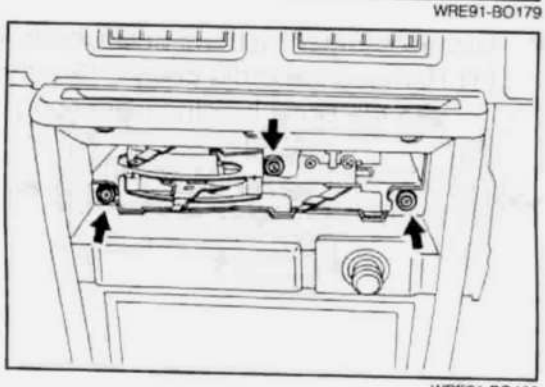
WRE91-BO178

(5) Remove the heater control knob.
(6) Remove the heater control indicator lamp assembly by pushing the pawl lock section of the heater control indicator lamp assembly from the back side of the instrument panel.



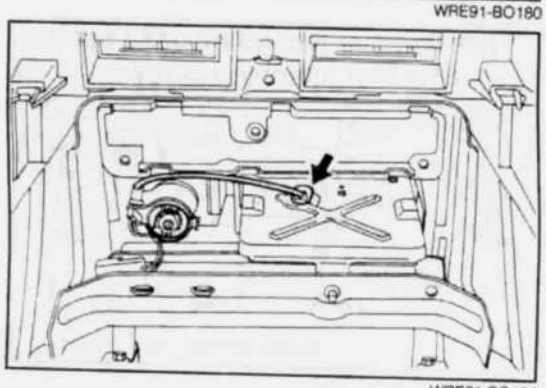
WRE91-BO179

(7) Remove the heater control assembly by removing the three attaching screws.



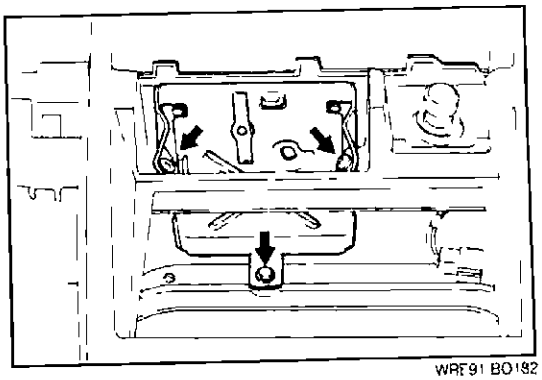
WRE91-BO180

(8) Remove the ash receptacle box No. 1.
(9) Remove the fiber cord from the ash receptacle retainer.

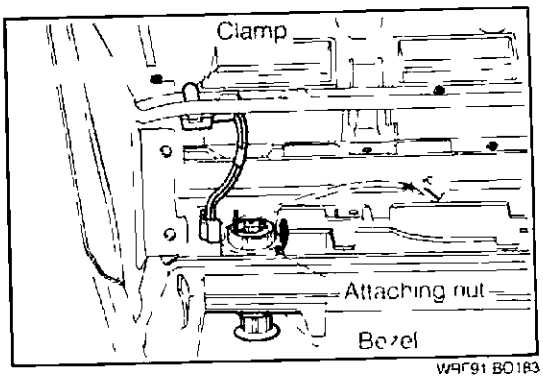


WRE91-BO181

(10) Remove the ash receptacle retainer by removing the three attaching screws

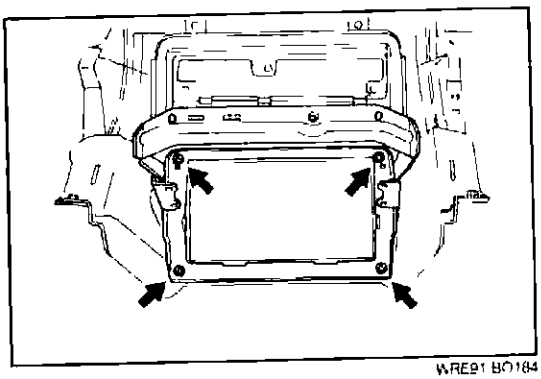

WRE91 BO182

(11) Remove the lamp connector clamp for cigarette lighter illumination from the center reinforcement
(12) Remove the cigarette lighter assembly and cigarette lighter bezel by removing the cigarette lighter attaching nut

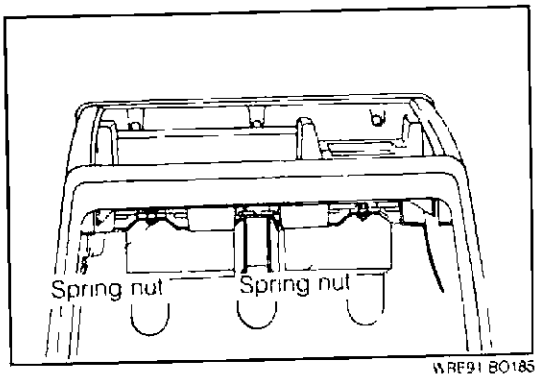


WRE91 BO183

(13) Remove the instrument panel center reinforcement sub-assembly by removing the attaching screw

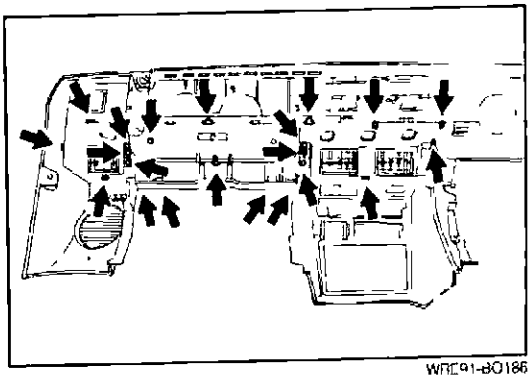

WRE91 BO184

(14) Remove the instrument panel center tray by removing the attaching screw.

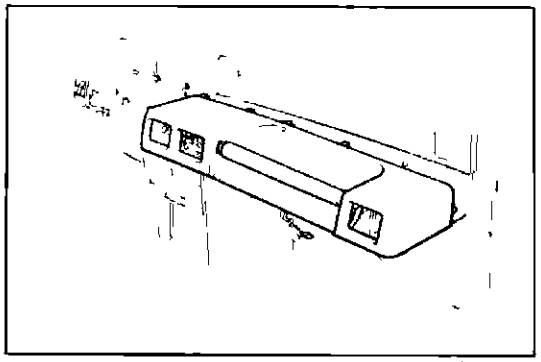


WRE91 BO185

(15) Remove the instrument panel safety pad subassembly by removing the eight attaching screws.
(16) Remove the glove compartment door lock retainer by removing the five attaching screws
(17) Straighten the eight bent clamps of the instrument panel safety pad subassembly.


WRE91-BO186

(18) Remove the instrument panel safety pad subassembly.

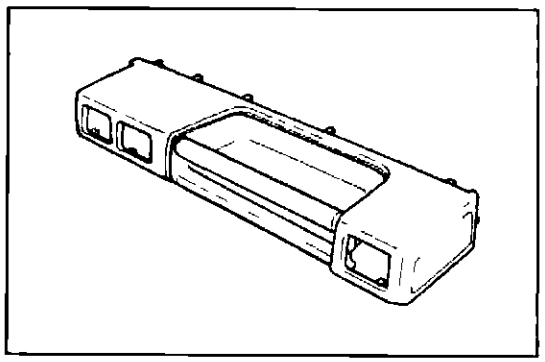


WRE91 BO187

(19) Remove the front grip from the instrument panel safety pad subassembly

NOTE:

- **Be very careful not to scratch the instrument panel safety pad.**

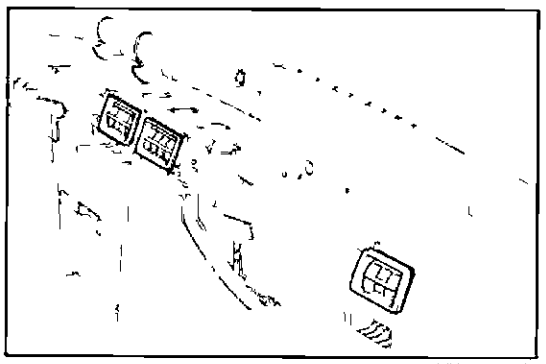


WRE91 BO188

(20) Remove the instrument panel center register and instrument panel side register from the instrument panel.

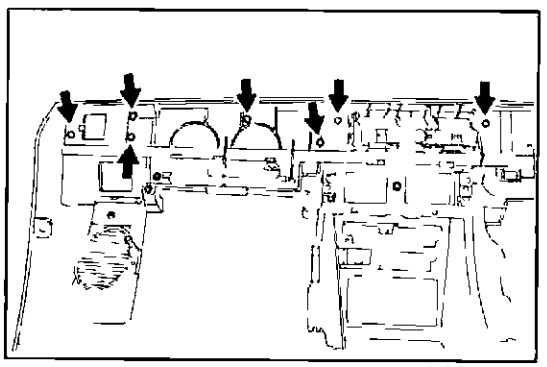
NOTE:

- **First, remove the register pawl side from the instrument panel. Then, remove the cut-out section of the register from the instrument panel.**



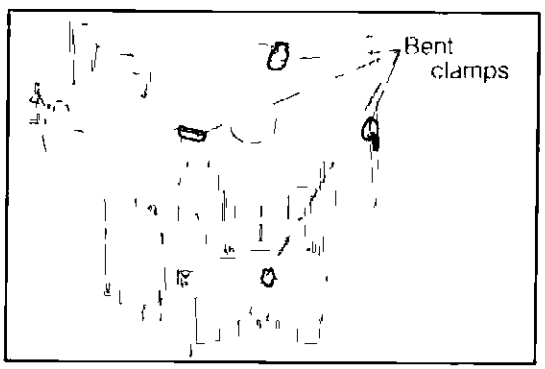
WRE91 BO189

(21) Remove the instrument panel safety pad by removing the attaching nut



WRE91 BO190

(22) Remove the instrument panel safety side pad by straightening the bent clamp

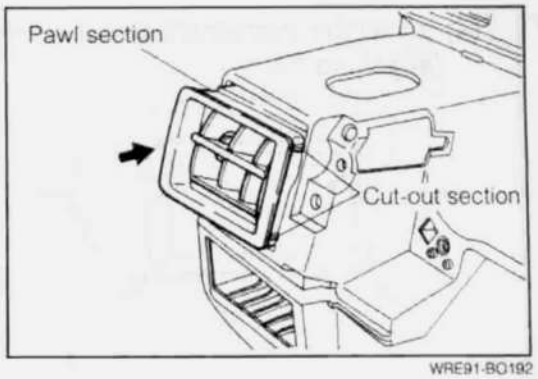


WRE91 BO191

(23) Remove the instrument panel side register from the instrument panel.

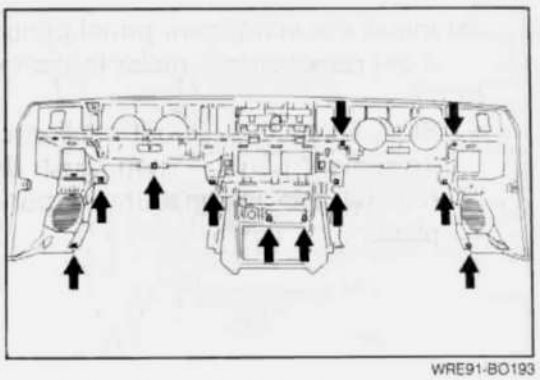
NOTE:

- First, remove the register pawl side from the instrument panel. Then, remove the cut-out section of the register from the instrument panel.



WRE91-BO192

(24) Remove the eleven spring nuts from the instrument panel.


WRE91-BO193

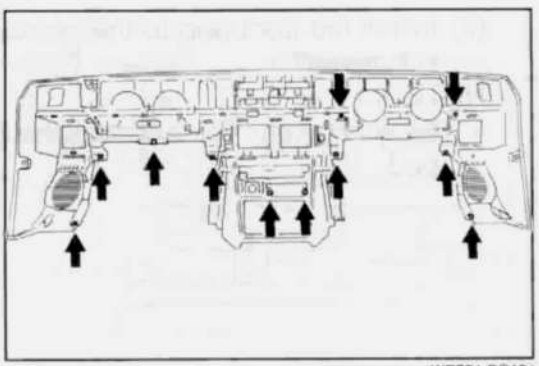
INSTALLATION

1. Assembly of instrument subassembly

(1) Install the ten spring nuts to the instrument panel.

NOTE:

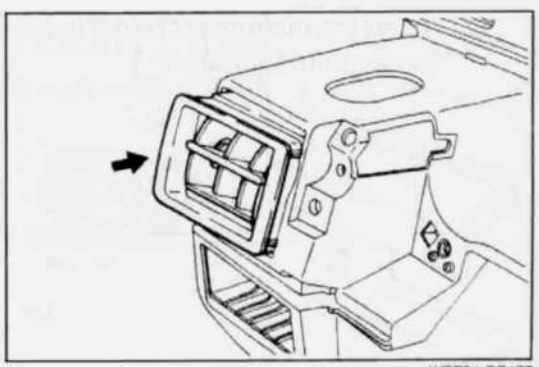
- The installation should be made in such a way that the nut side comes at the back side of the instrument panel.


WRE91-BO194

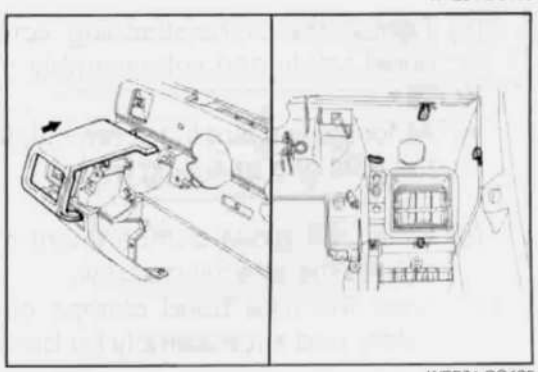
(2) Install the instrument panel side register to the instrument panel.

NOTE:

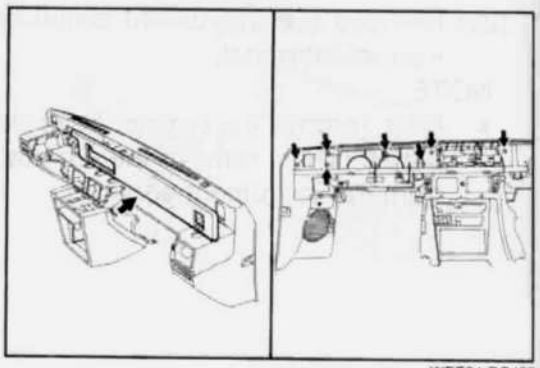
- First, insert the cut-out section of the instrument panel side register into the instrument panel. Then, push the pawl section of the instrument panel side register into the instrument panel, until locking takes place.


WRE91-BO195

(3) Install the instrument panel safety side pad into the instrument panel. Then, install it by bending the four bend clamps.


WRE91-BO196

(4) Install the instrument panel safety pad and tighten the attaching nut.

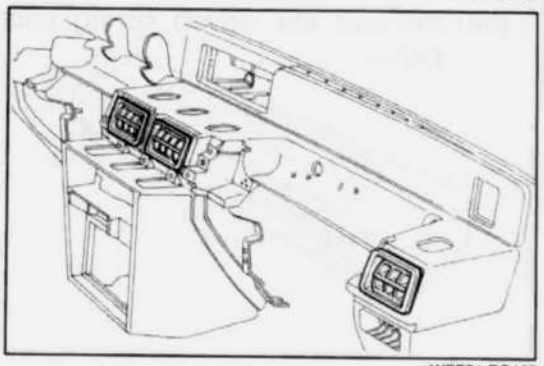


WRE91-BO197

(5) Install the instrument panel center registers and instrument panel side register to the instrument panel.

NOTE:

- First, insert the cut-out section of the register into the instrument panel. Then, push the pawl section of the register into the instrument panel, until locking takes place.

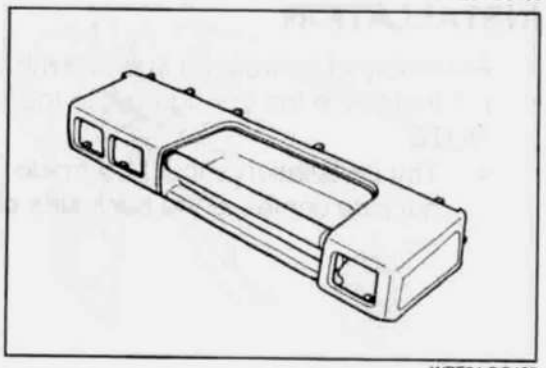


WRE91-BO198

(6) Install the front grip to the instrument panel safety pad subassembly.

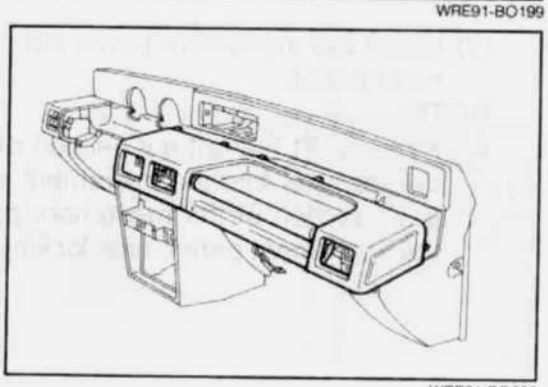
NOTE:

- Be very careful not to scratch the instrument panel safety pad.



WRE91-BO199

(7) Insert the instrument panel safety pad subassembly into the instrument panel.



WRE91-BO200

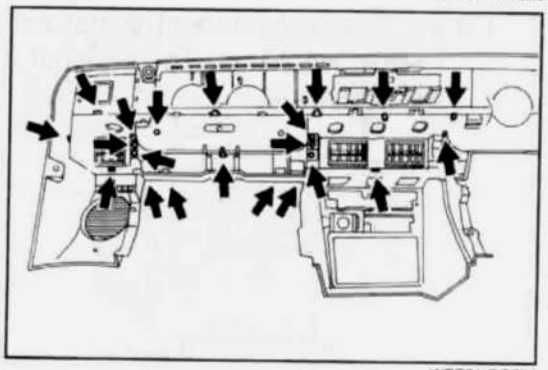
(8) Tighten the eight attaching screws of the instrument panel safety pad subassembly.

NOTE:

- As for the two tapping screws, tighten them after aligning the front grip attaching holes.

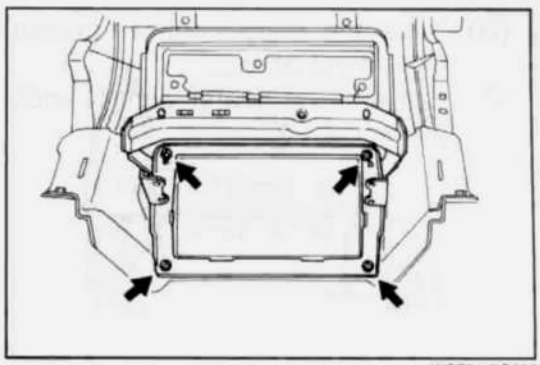
(9) Install the glove compartment door lock retainer and tighten the attaching screw.

(10) Lock the nine bend clamps of the instrument panel safety pad subassembly by bending them.

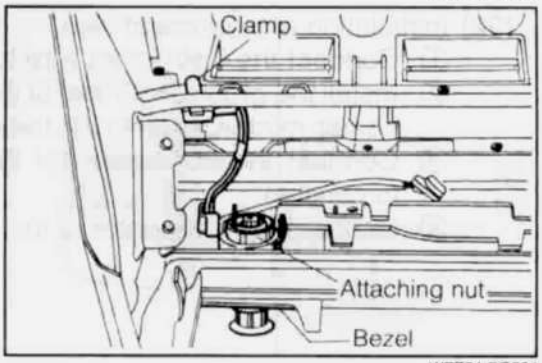


WRE91-BO201

(11) Install the two spring nuts to the instrument panel center tray.
(12) Install the instrument panel center tray to the instrument panel and tighten the five attaching screws.
(13) Install the instrument panel center reinforcement subassembly and tighten the attaching screw.

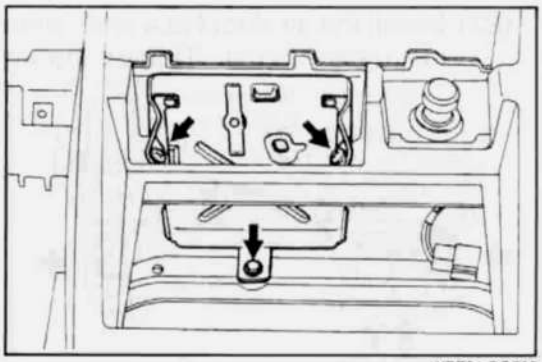

WRE91-BO202

(14) Install the cigarette lighter assembly and cigarette lighter bezel. Tighten the attaching nut.
(15) Install the lamp connector for cigarette lighter illumination to the center reinforcement.

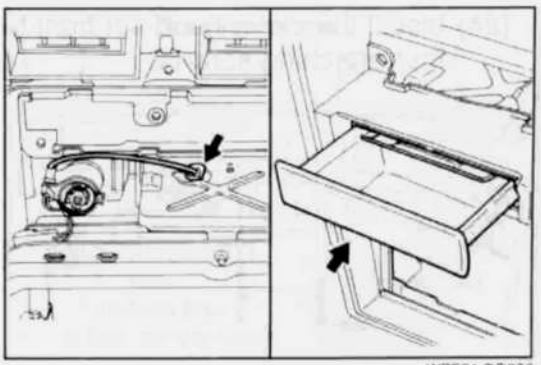


WRE91-BO204

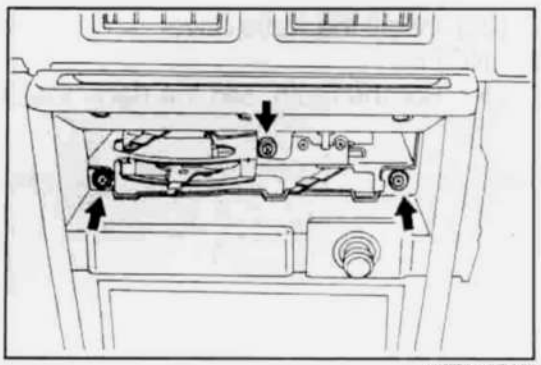
(16) Install the ash receptacle retainer and tighten the three attaching screws.


WRE91-BO205

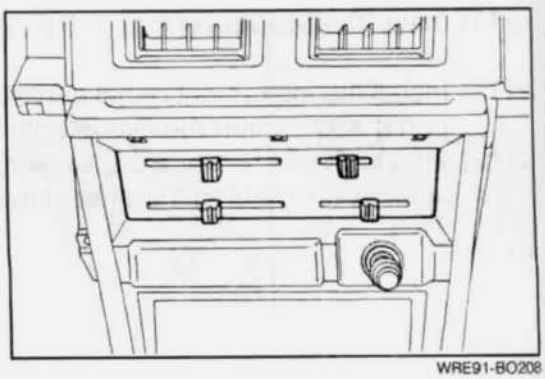
(17) Connect the fiber cord to the ash receptacle retainer.
(18) Install the ash receptacle box No. 1.


WRE91-BO206

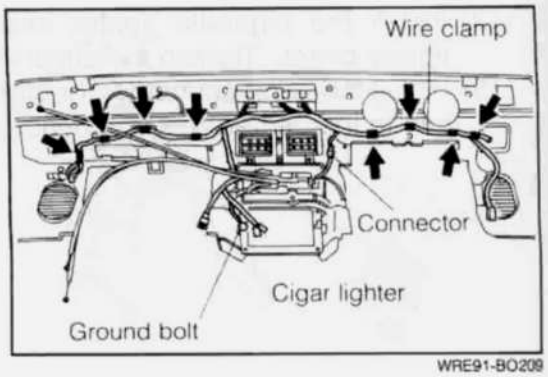
(19) Install the heater control assembly and tighten the three attaching screws.


WRE91-BO207

(20) Install the heater control indicator lamp assembly to the instrument panel.
(21) Connect the heater control knob to the heater control assembly.

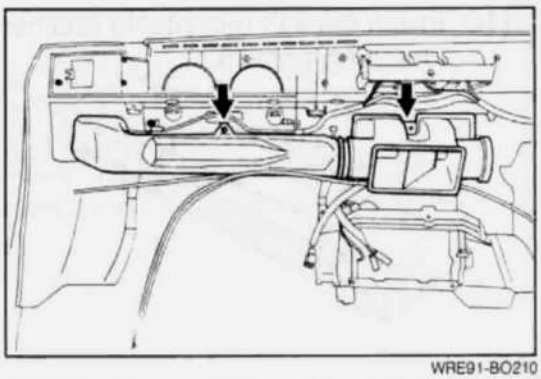

WRE91-BO208

(22) Installation of instrument wire
① Connect the instrument wire to each clamp.
② Install the ground terminal of the ground cable to the center reinforcement with the attaching bolt.
③ Connect the connector for the cigarette lighter illumination.
④ Connect the connector to the cigarette lighter.

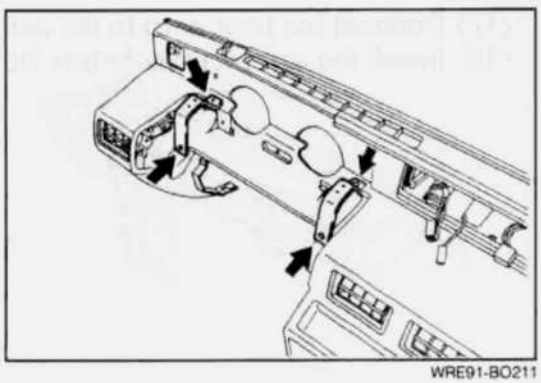


WRE91-BO209

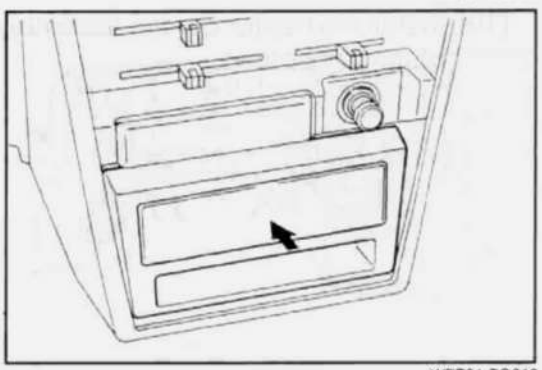
(23) Install the air duct No.4 and center ventilator duct to the instrument panel. Tighten the two attaching screws.


WRE91-BO210

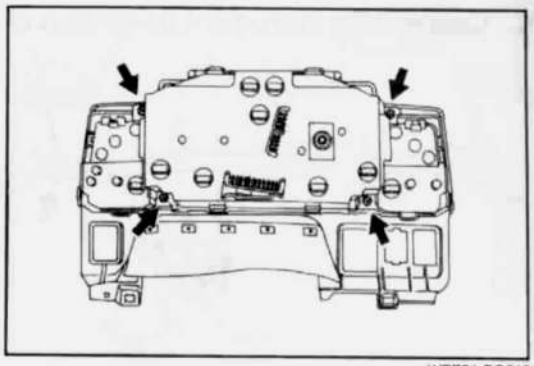
(24) Install the meter hood set front bracket and tighten the four attaching screws.


WRE91-BO211

(25) Install the radio cover.
NOTE:
- For the radio, see the Body Electrical section.

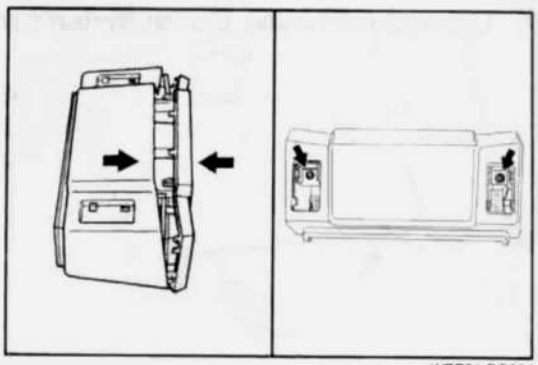

WRE91-BO212

2. Assembly of instrument cluster finish rear panel-related parts
   (1) Install the combination meter to the instrument cluster finish rear panel and tighten the attaching screw.



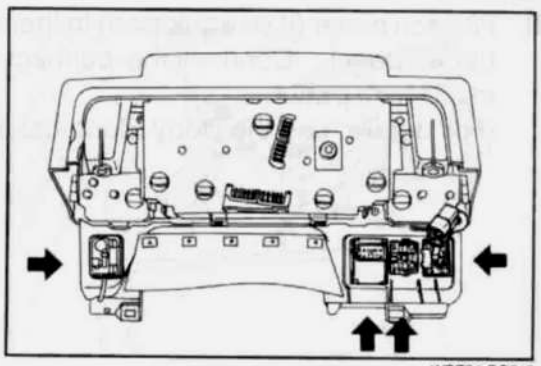
WRE91-BO213

   (2) Connect the instrument front panel to the instrument cluster finish rear panel.
   (3) Tighten the attaching bolt of the instrument cluster finish rear panel.



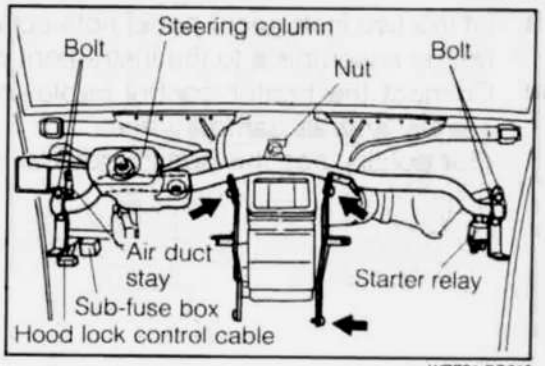
WRE91-BO214

   (4) Install the power shift switch, rear wiper switch, power window switch, rear defogger switch and so forth by inserting them into the instrument cluster finish rear panel.



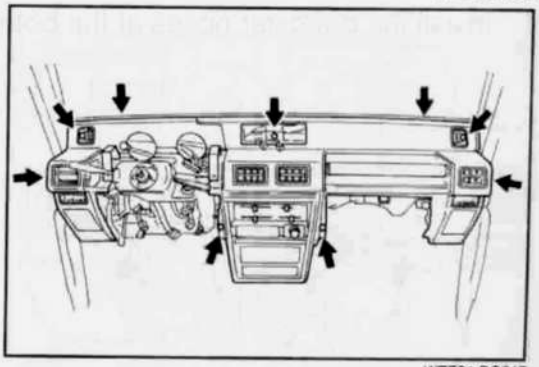
WRE91-BO215

3. Installation of instrument panel reinforcement
   (1) Install the instrument panel reinforcement with the four attaching bolts and one nut.
   (2) Install the instrument panel braces No. 1 and No. 2.
   (3) Install the three attaching bolts of the steering column. (For details, see the Steering section.)
   (4) Install the hood lock control cable to the instrument panel reinforcement with the two attaching bolts.
   (5) Install the sub-fuse box to the instrument panel reinforcement with the attaching bolt.
   (6) Install the starter relay to the instrument panel reinforcement with the bolt.
   (7) Install the defroster nozzle stay to the instrument panel reinforcement with the screw.



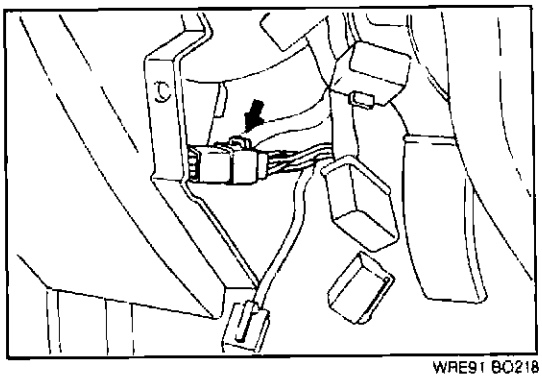
WRE91-BO216

4. Install the instrument panel subassembly to the vehicle. Tighten the seven attaching bolts of the instrument panel.
5. Install the defroster nozzle to the instrument panel subassembly with the screws.

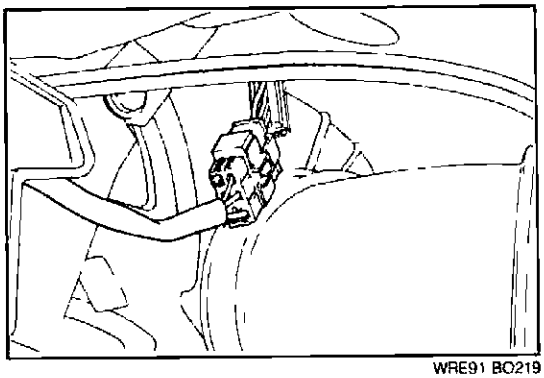


WRE91-BO217

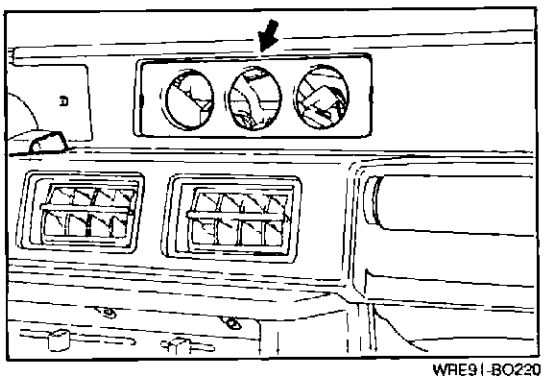
6 Connect the instrument panel wire connector.


WRE91 BO218

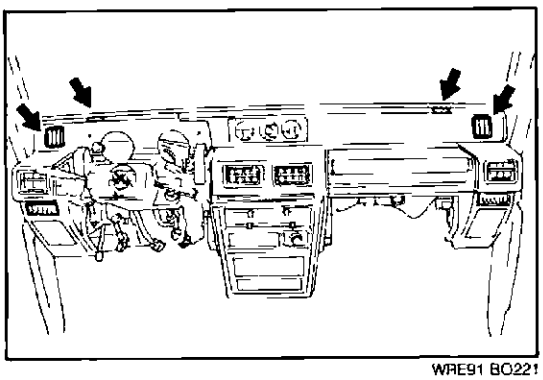
7 Connect the heater blower switch connector.


WRE91 BO219

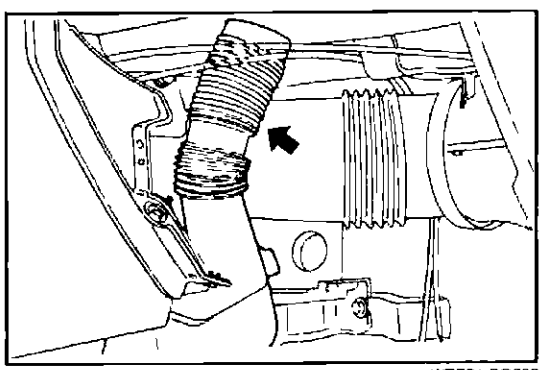
8 Fit each meter (if so equipped) to the instrument panel finish upper panel. Connect the connector. Fit them into the instrument panel
(For details, see the Body Electrical section.)


WRE91 BO220

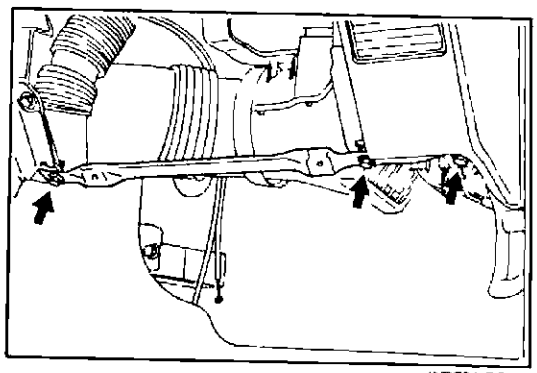
9 Fit the two instrument panel hole covers and two defroster nozzle assemblies to the instrument panel.
10. Connect the heater control cable to the front heater assembly and air damper case
(For details, see the Body Electrical section.)


WRE91 BO221

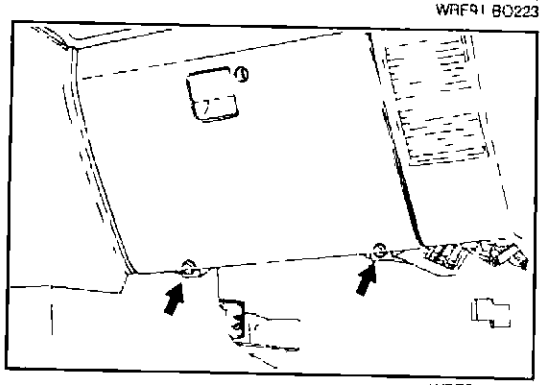
11 Install the defroster hoses at the both sides


WRE91 BO222

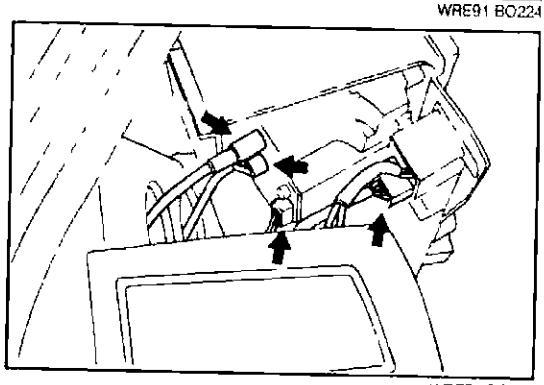
12 Install the instrument panel reinforcement subassembly with the three attaching bolts


WRE91 BO223

13 Install the glove compartment subassembly and tighten the two attaching screws

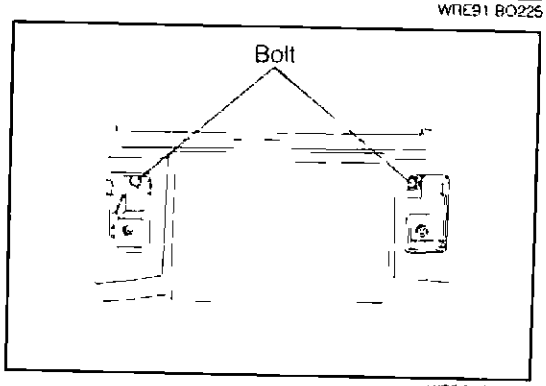

WRE91 BO224

14 Connect the connectors, such as the speedometer cable, combination meter connector and so forth to the instrument cluster finish rear/front panel Then, install the instrument cluster finish rear/front panel to the instrument panel


WRE91 BO225

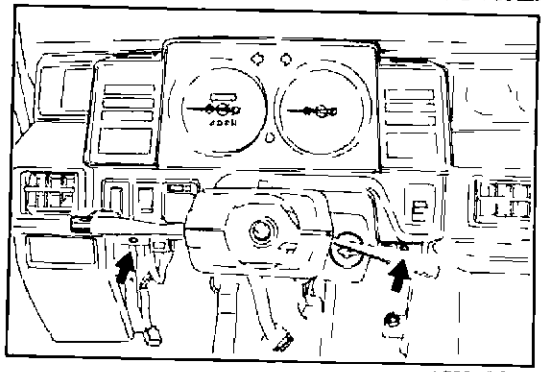
15 Tighten the two attaching bolts of the instrument cluster finish front panel

16 Fit the instrument cluster finish panel cover to the instrument cluster finish front panel

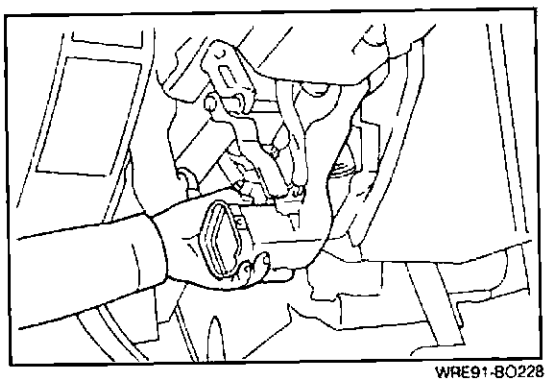


WRE91 BO226

17 Tighten the two attaching screws of the instrument cluster finish rear panel

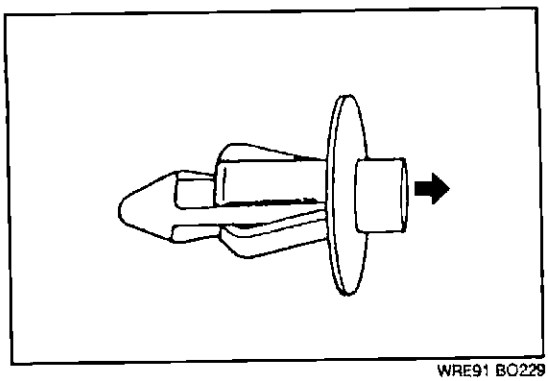

WRE91 BO227

18 Install the air duct No. 1.



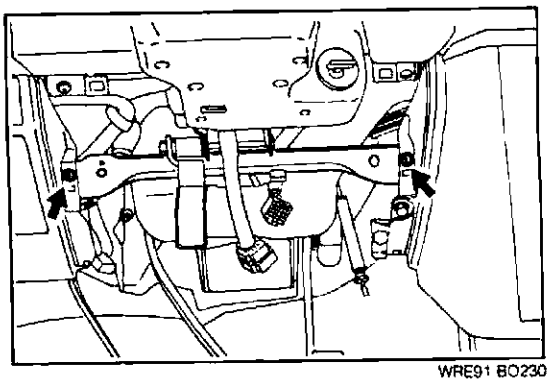
WRE91-BO228

19 With the clip central section pulled out, set the clip, as indicated in the right figure Insert the clip into the connecting section between the air duct No 1 and the air duct No. 3. Then, push the clip central section, until locking takes place



WRE91 BO229

20 Install the throttle control cable support and tighten the two attaching screws.



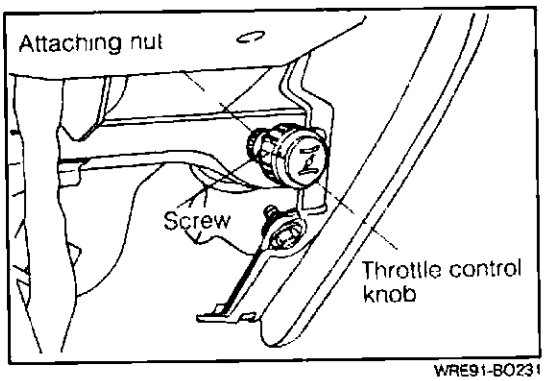
WRE91 BO230

21 Connect the throttle control cable to the throttle control cable support Tighten the attaching nut.

22 Install the throttle control knob and tighten the attaching screw

NOTE:

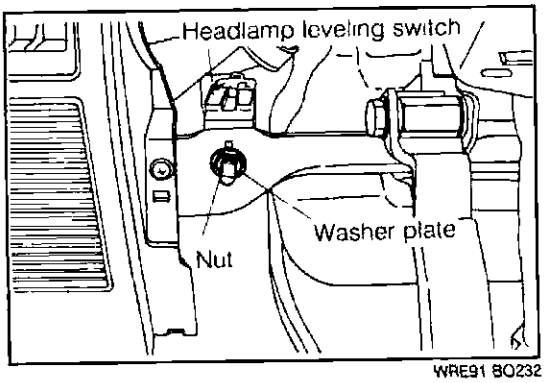
- **When screwing in the screw, be sure to align the throttle control cable hole with the knob attaching hole.**



WRE91-BO231

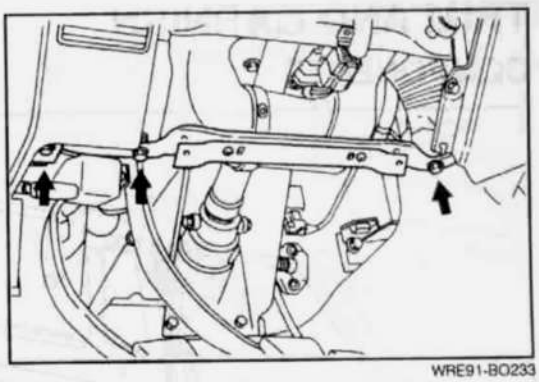
23 Install the headlamp levelling switch to the throttle control cable support, (if so equipped) Tighten the attaching nut with the attaching washer plate interposed

24 Connect the turn signal switch connector. Connect it to the throttle control cable support clamp.

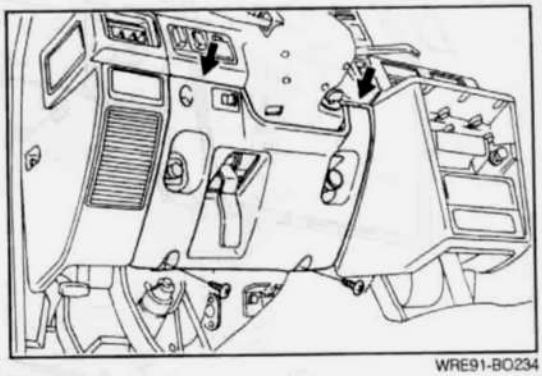


WRE91 BO232

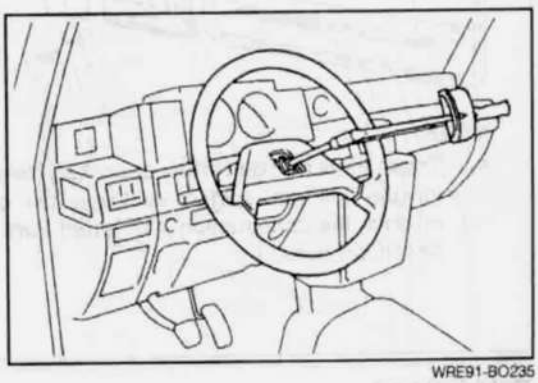
25. Install the instrument panel reinforcement and tighten the three attaching bolts.


WRE91-BO233

26. Installation of lower instrument panel finish panel
    (1) Connect the connector of the rear heater switch. (For installation of the rear heater switch, see the Body Electrical section.)
    (2) Connect the connector of the rear fog lamp switch. (For installation of the rear fog lamp switch, see the Body Electrical section.)
    (3) With the upper two insertion sections of the lower instrument finish panel inserted, install the lower instrument finish panel.
    (4) Tighten the two attaching screws.
    (5) Install the knob of the headlamp levelling switch, (if so equipped).
    (6) Lock the tilt steering lever.

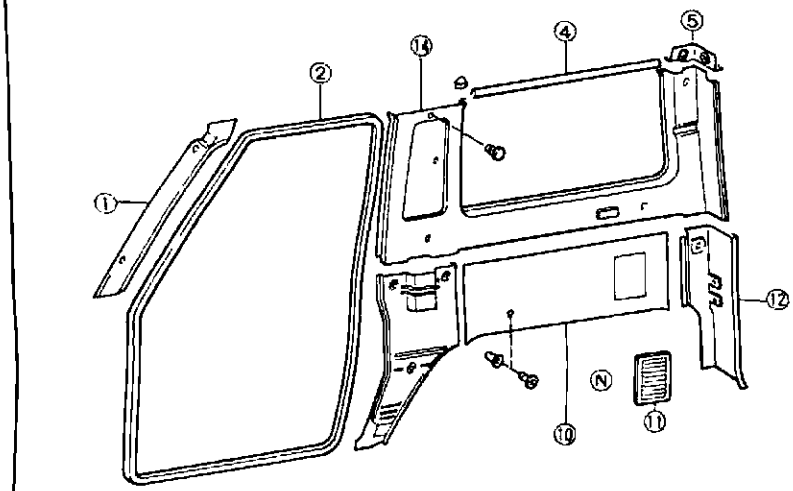

WRE91-BO234

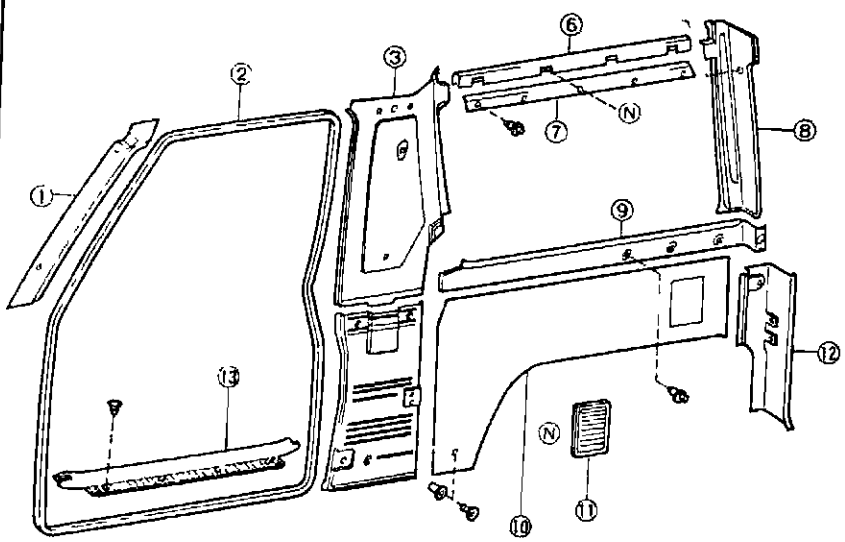
27. Install the steering wheel assembly. (For details, see the Steering section.)
28. Connect the ground cable terminal to the negative terminal.
29. Ensure that all electrical systems, such as switches and combination meter, are functioning properly.


WRE91-BO235

TRIM AND GARNISH

COMPONENTS





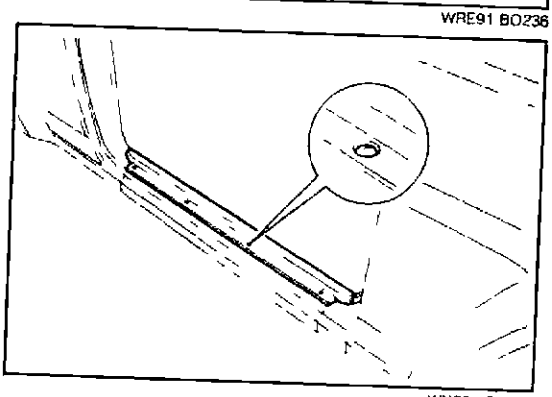
① Front pillar inner garnish
② Front door opening moulding
③ Center pillar upper garnish
④ Quarter window inside trim
⑤ Quarter panel rear corner garnish
⑥ Quarter window division inner bar
⑦ Quarter window division cover
⑧ Quarter panel rear corner garnish
⑨ Quarter upper trim
⑩ Quarter inside trim board
⑪ Quarter vent louver subassembly
⑫ Quarter trim rear lower cover
⑬ Front door scuff plate
⑭ Quarter trim rear lower cover

NOTE·

- These trims and garnishes described here are for the full-trim wagon vehicles. On other models, the construction is different from that described here

REMOVAL

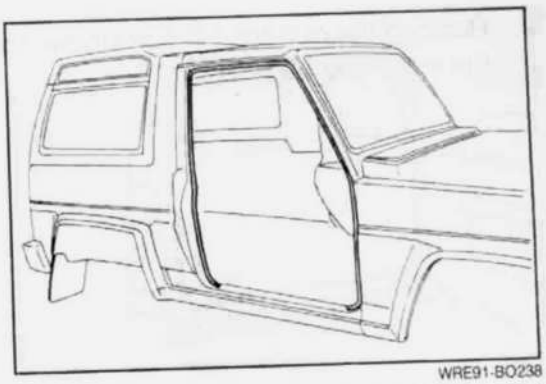
1 Removal of front door scuff
  (1) Detach the clips by backing off the clip center by means of a screwdriver, while preventing the clip outer from turning
  (2) Remove the front door scuff



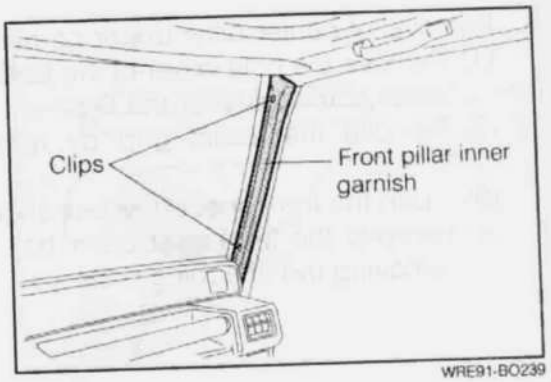
WRE91 BO236

WHE91 BO237

2. Remove the front door opening moulding.

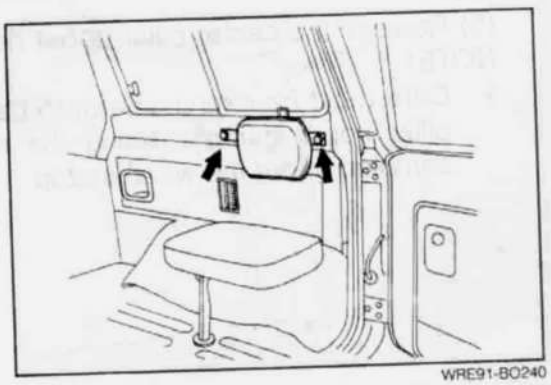

WRE91-BO238

3. Remove the clips of the front pillar inner garnish.
4. Remove the front pillar inner garnish.

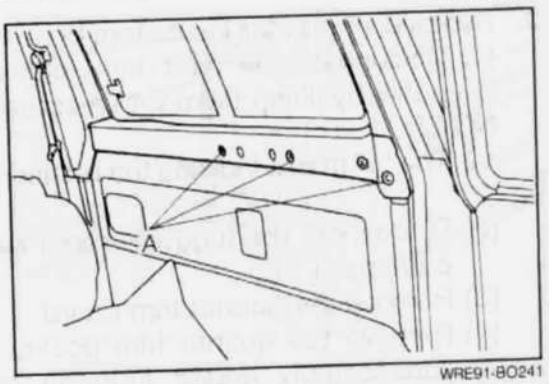


WRE91-BO239

5. Removal of quarter upper trim
   (1) Remove the seat belt, (if so equipped).
   (See page BO–169.)
   (2) Remove the rear sub-seatback by removing the attaching bolts.
   (3) Remove the rear pillar member, (if so equipped).
   (See page BO–151.)

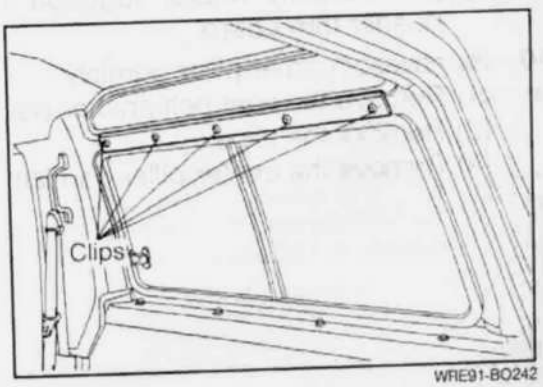

WRE91-BO240

   (4) Remove the clips.
   ① Remove the clip by pushing the clip A at the center, until you hear a clicking sound.
   ② Remove the quarter upper trim by slowly pulling it.



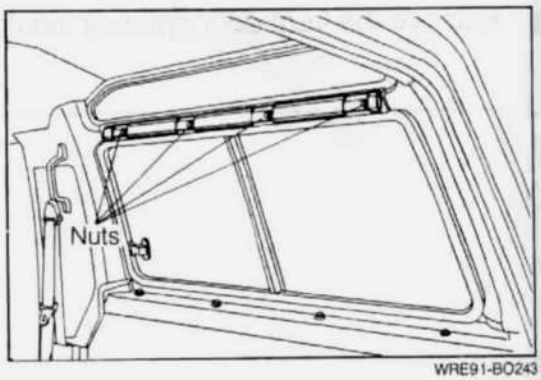
WRE91-BO241

6. Removal of quarter window division cover
   (1) Push the clip at the center one stage, until you hear a clicking sound. Then, remove the clip.
   (2) Remove the quarter window division cover.



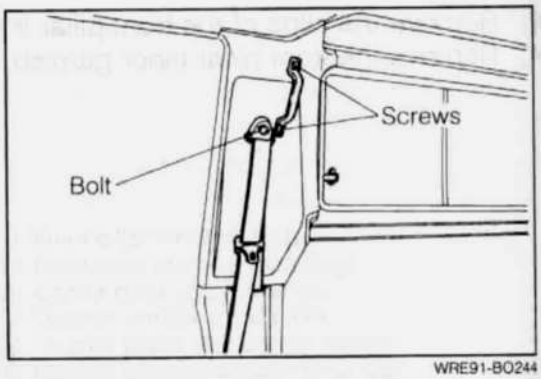
WRE91-BO242

7. Remove the quarter window division inner bar by removing the attaching nuts.



WRE91-BO243

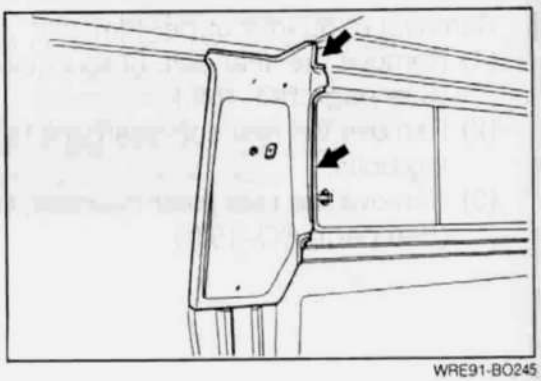
8. Removal of center pillar upper garnish
   (1) Remove the hole cover of the assist grip by means of a miner screwdriver or the like.
   (2) Remove the assist grip by removing the attaching screw.
   (3) Open the front seat outer belt shoulder anchor cover.
   (4) Remove the front seat outer belt shoulder anchor by removing the attaching bolts.



WRE91-BO244

   (5) Remove the center pillar upper garnish.

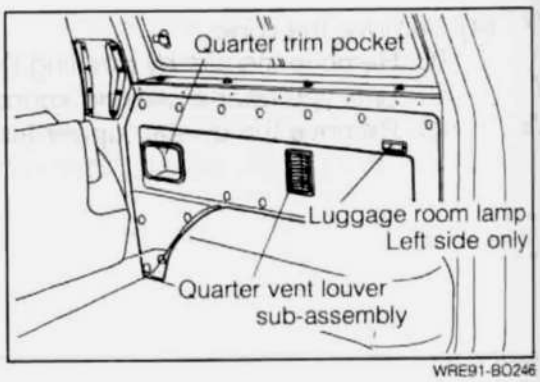
   NOTE:
   - **Care must be exercised not to damage the the center pillar upper garnish during the removal, for it is assembled under the weatherstrip.**


WRE91-BO245

9. Removal of quarter inside trim board
   (1) Disconnect the door trim retainers from the quarter panel by lifting them with a screwdriver or the like.

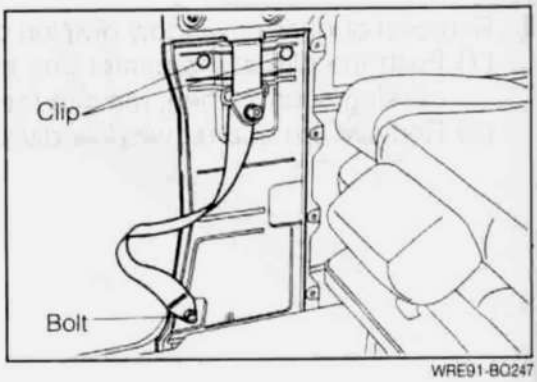
   NOTE:
   - **The "o" marks indicate the retainer installation positions.**

   (2) Disconnect the luggage room lamp connector, (if so equipped).
   (3) Remove the quarter trim board.
   (4) Remove the quarter trim pocket, quarter vent louver subassembly and/or luggage room lamp from the quarter trim board.



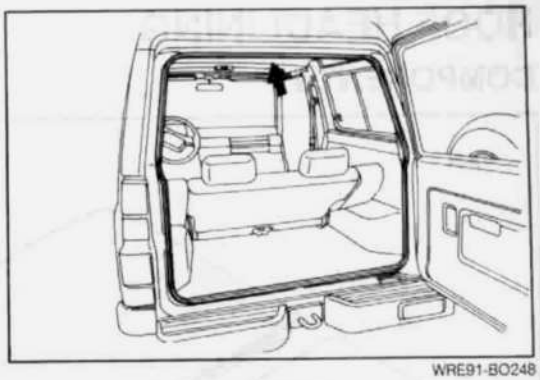
WRE91-BO246

10. Removal of center pillar garnish
    (1) Remove the seat belt anchor bolt.
    (2) Remove the clips.
    (3) Remove the center pillar garnish.

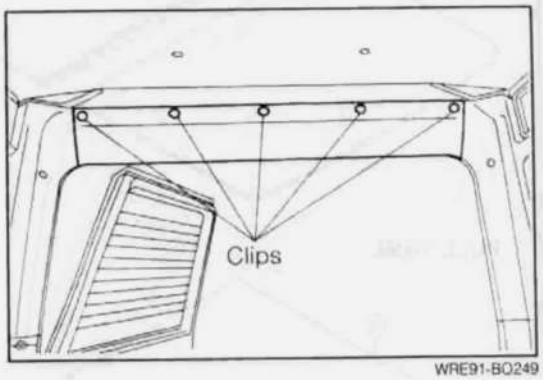


WRE91-BO247

11. Removal of quarter panel rear corner garnish
(1) Remove the rear door opening moulding.

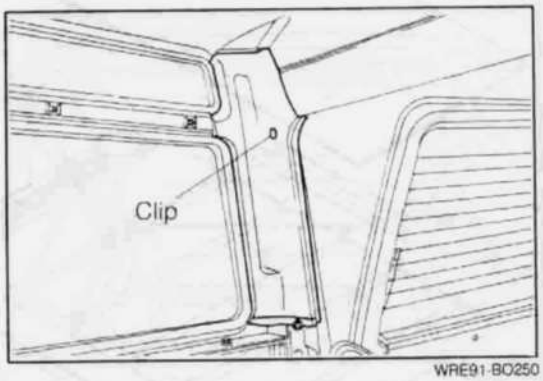

WRE91-BO248

(2) Remove the clips of the back door opening upper garnish.
(3) Remove the back door opening upper garnish.



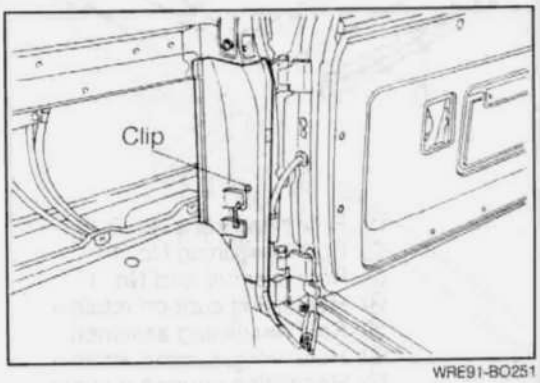
WRE91-BO249

(4) Remove the clips of the quarter panel rear corner garnish.
(5) Remove the quarter panel rear corner garnish.
NOTE:
- **Care must be exercised not to damage the the quarter panel rear corner garnish during the removal, for it is assembled under the weatherstrip.**



WRE91-BO250

12. Remove the quarter trim rear lower cover by removing the clip.



WRE91-BO251

INSTALLATION

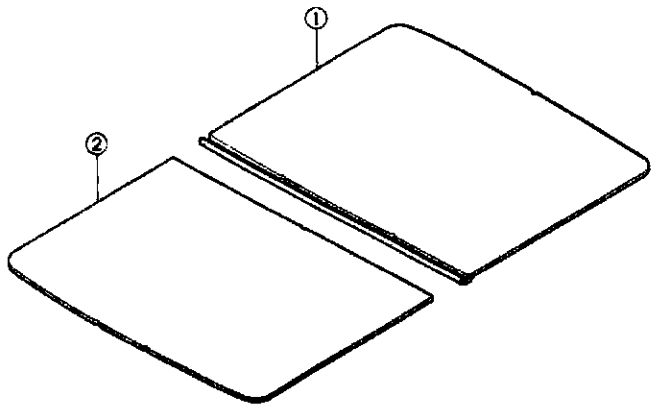
Reverse the removal procedure to perform the installation.

WRE91-BO570

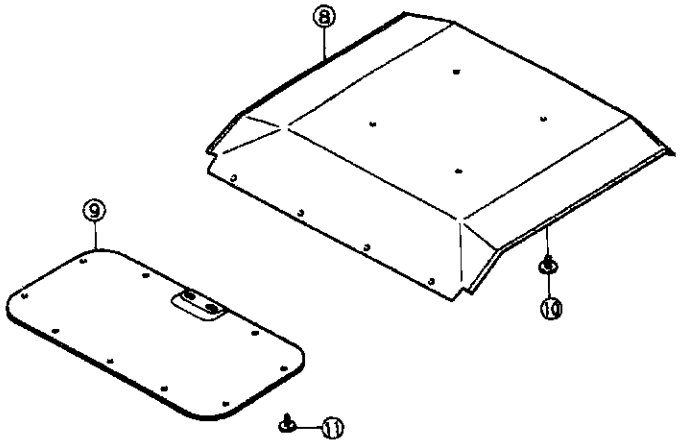
ROOF HEADLINING

COMPONENTS

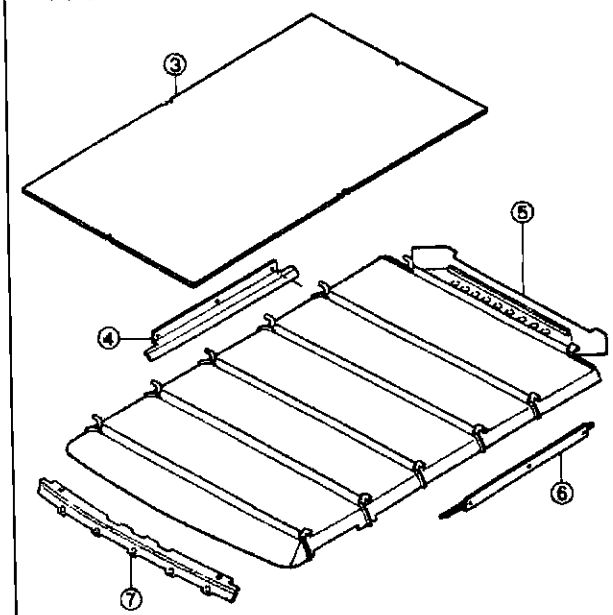
VAN



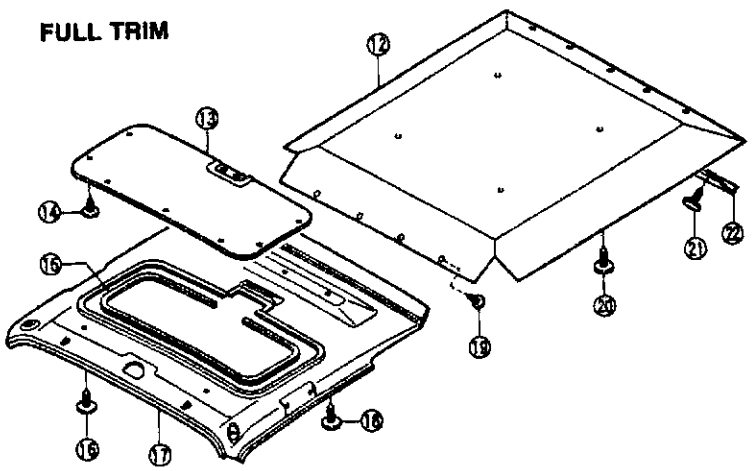
WAGON



FULL TRIM



FULL TRIM



① Roof headlining No 2
② Roof headlining No 1
③ Roof silencer pad No 1
④ Headlining support retainer
⑤ Roof headlining assembly
⑥ Headlining support retainer
⑦ Headlining support retainer
⑧ Roof headlining No 2
⑨ Sunroof headlining assembly
⑩ Clip
⑪ Clip
⑫ Roof headlining No 2
⑬ Sunroof headlining assembly
⑭ Clip
⑮ Sunroof opening trim moulding
⑯ Clip
⑰ Roof headlining No 1
⑱ Clip
⑲ Clip
⑳ Clip
㉑ Clip
㉒ Back door opening upper garnish

NOTE
- The following describes the installation and removal procedures for the full-trim wagon vehicles.

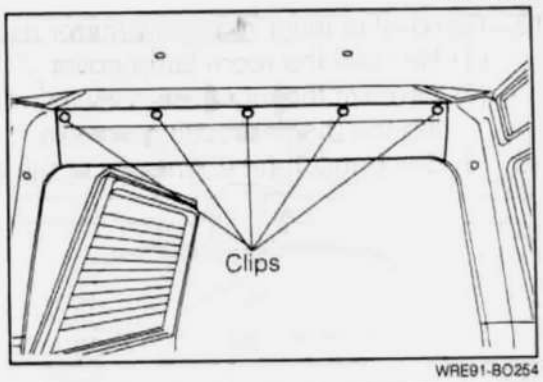
WRE91 BO252

REMOVAL

1. Remove the center pillar upper garnish.
   (See page BO–97.)
2. Remove the quarter panel rear corner garnish.
   (See page BO–97.)
3. Remove the front pillar inner garnish.
   (See page BO–95.)
4. Remove the front door opening moulding.
   (See page BO–97.)

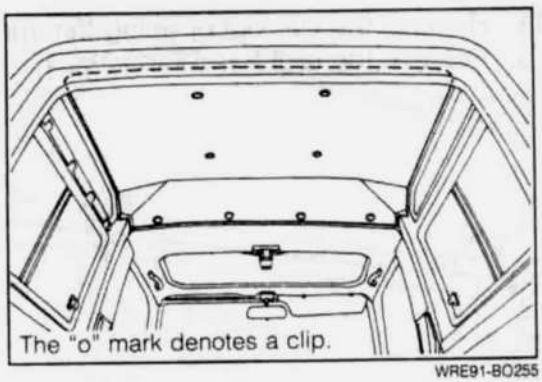
WRE91-BO253

5. Remove the back door opening upper garnish by removing the clips.



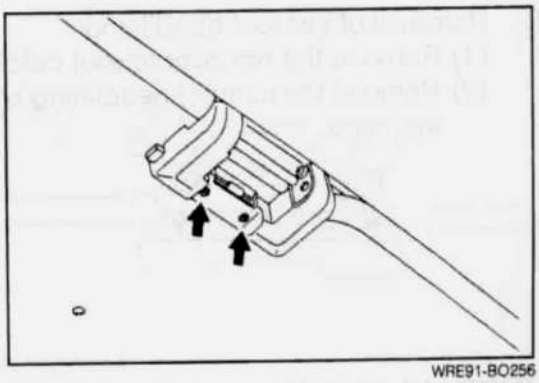
WRE91-BO254

6. Remove the clips of the roof headlining No. 2.
7. Remove the roof headlining No. 2.



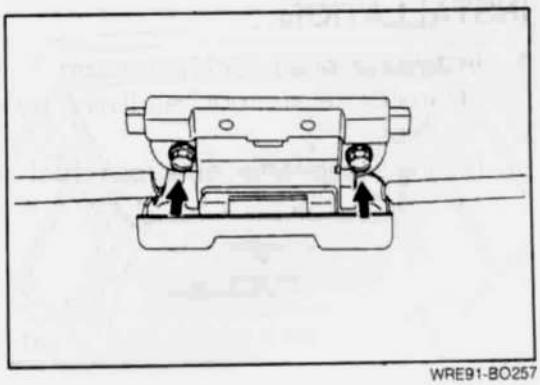
WRE91-BO255

8. Remove the removable roof panel.
9. Open the removable roof lock handle assembly cover by removing the two screws.



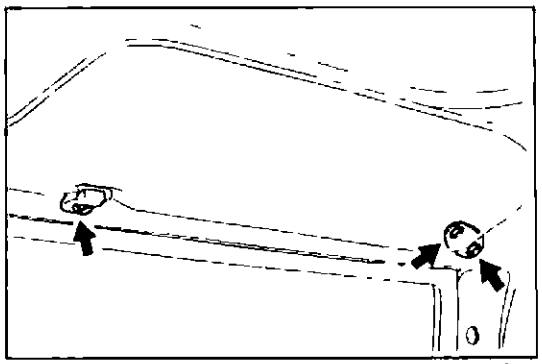
WRE91-BO256

10. Remove the removable roof lock handle assembly by removing the two bolts.

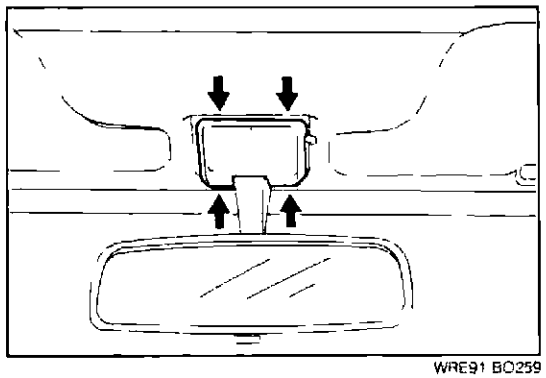


WRE91-BO257

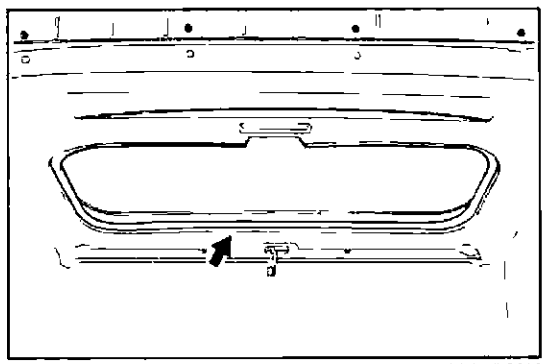
11 Remove the visor assemblies
12 Remove the visor holder


WRE91 BO258

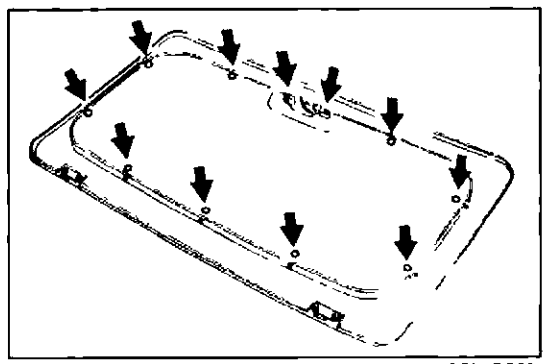
13 Removal of inner rear-view mirror assembly
(1) Remove the room lamp cover
(2) Remove the inner rear-view mirror assembly by removing the three attaching screws
(3) Disconnect the connector of the room lamp


WRE91 BO259

14 Remove the sunroof opening trim moulding
15 Remove the roof headlining No 1

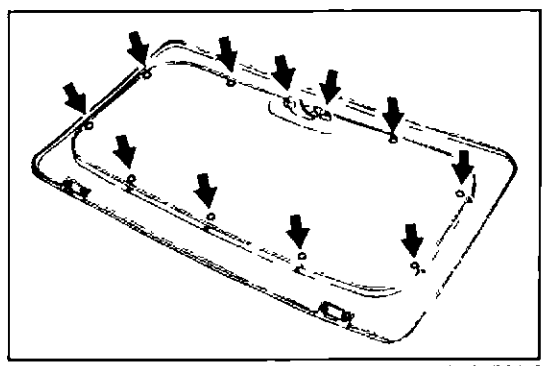

WRE91 BO260

16 Removal of sunroof headlining
(1) Remove the removable roof catch assembly.
(2) Remove the sunroof headlining by removing the attaching clips

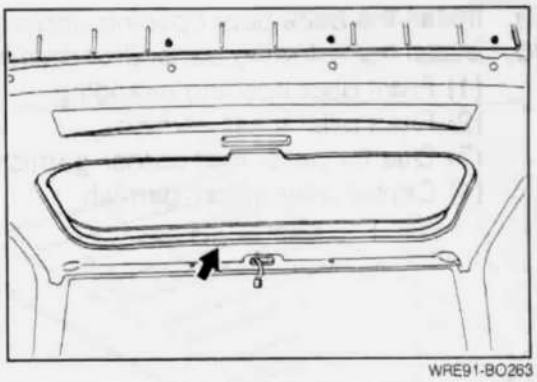

WRE91 BO261

INSTALLATION

1 Installation of sunroof headlining
(1) Install the sunroof headlining by installing the attaching clips
(2) Install the removable roof catch assembly

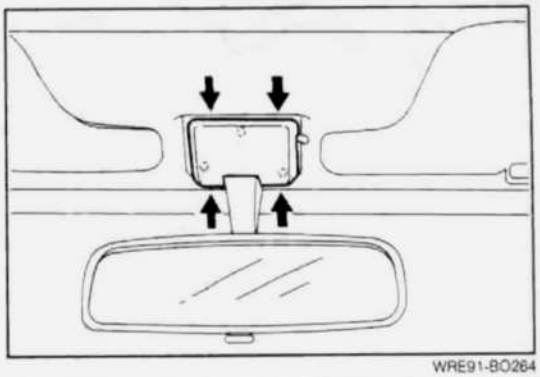

WRE91 BO262

2. Install the roof headlining No. 1. Install the sunroof opening trim moulding.



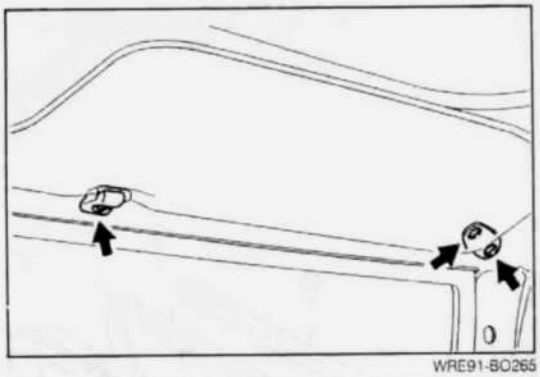
WRE91-BO263

3. Installation of inner rear-view mirror assembly
   (1) Connect the connector of the room lamp.
   (2) Install the inner rear-view mirror assembly by installing the three attaching screws.
   (3) Install the room lamp cover.



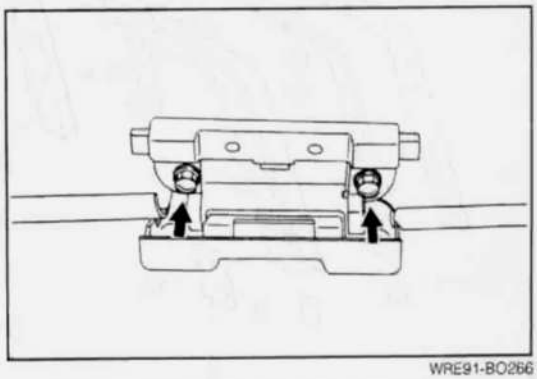
WRE91-BO264

4. Install the visor assembly.
5. Install the visor holder.



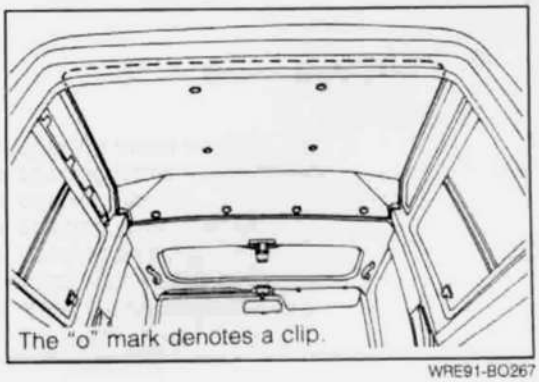
WRE91-BO265

6. Install the removable roof lock handle assembly with the two bolts.
7. Install the removable roof panel.



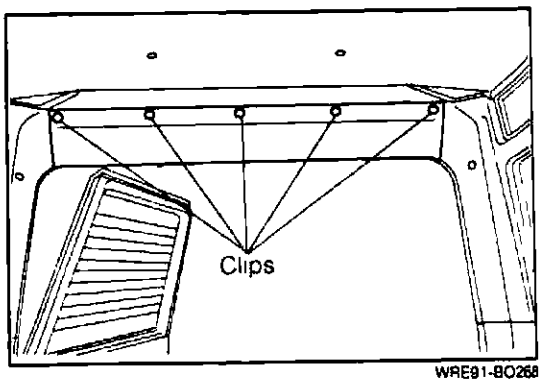
WRE91-BO266

8. Install the roof headlining No. 2 with the clips.



WRE91-BO267

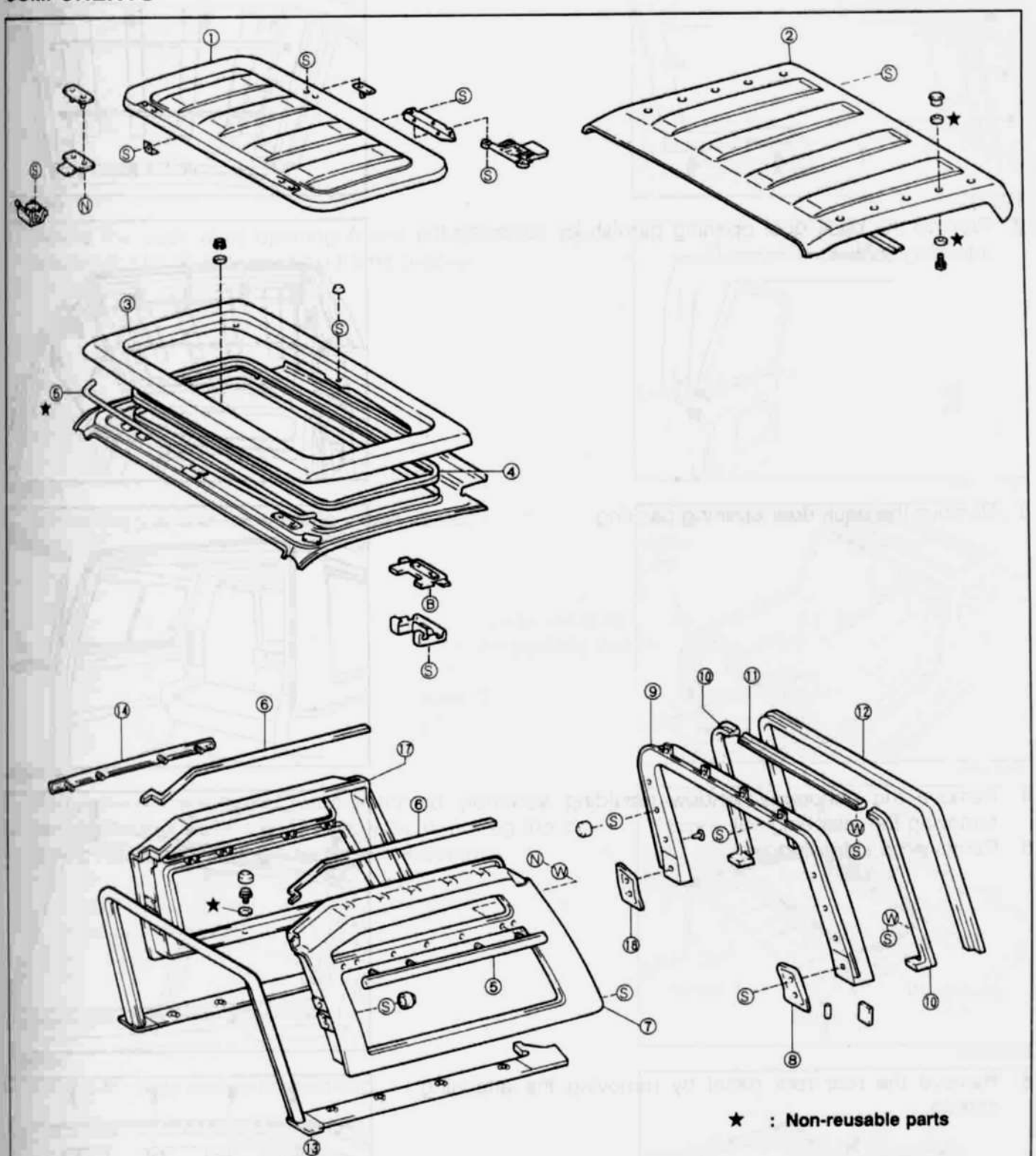
9 Install the back door opening upper garnish with the clips.
10. Install the following parts. (For details, see page BO-94.)
(1) Front door opening moulding
(2) Front pillar inner garnish
(3) Quarter panel rear corner garnish
(4) Center pillar upper garnish



WRE91-BO268

RESIN TOP

COMPONENTS



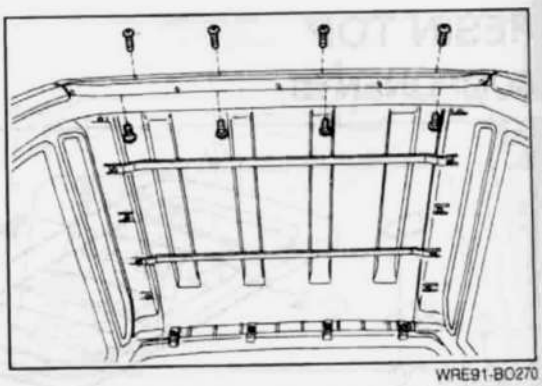
★ : Non-reusable parts

① Removable roof panel
② Rear roof panel
③ Roof panel subassembly
④ Removable roof weatherstrip
⑤ Front roof panel packing
⑥ Rear roof panel packing
⑦ Rear side upper outer panel
⑧ Back door opening frame bracket
⑨ Back door opening frame subassembly
⑩ Back door opening garnish
⑪ Back door opening upper garnish
⑫ Back door opening packing
⑬ Rear roof-to-rear side weatherstrip
⑭ Panorama window moulding assembly

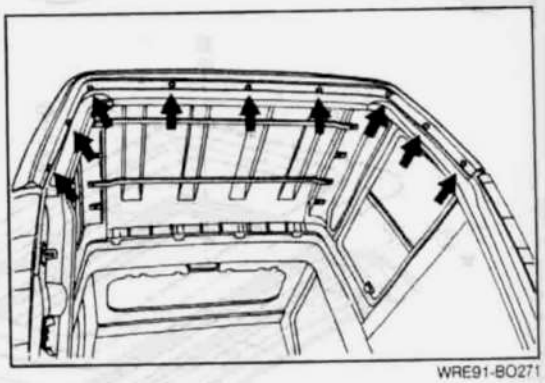
WRE91-BO269

REMOVAL

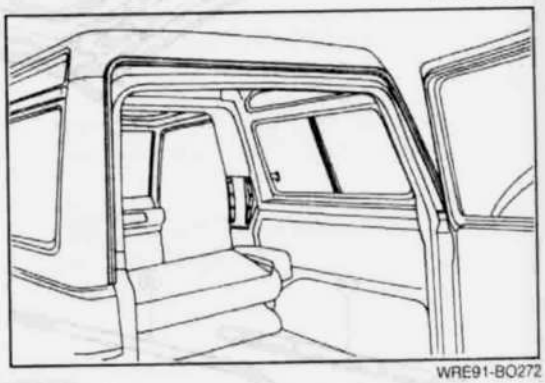
1. Remove the rear headlining. (See page BO–99.)


WRE91-BO270

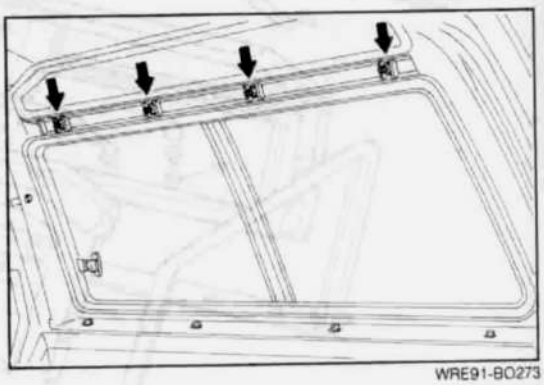
2. Remove the back door opening garnish by removing the attaching screws.


WRE91-BO271

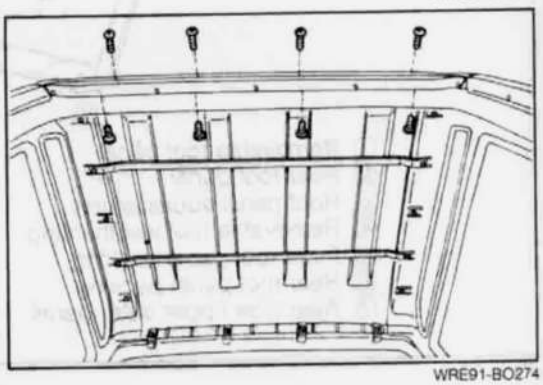
3. Remove the back door opening packing.


WRE91-BO272

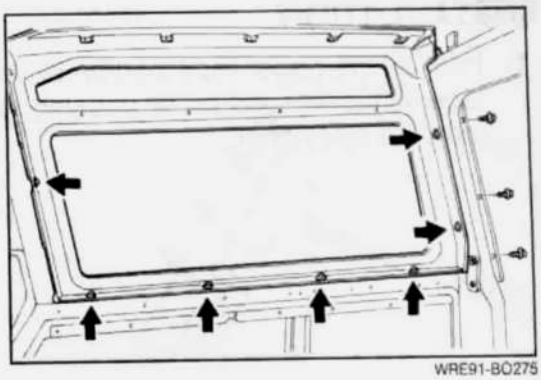
4. Remove the panorama window moulding assembly by removing the attaching nut.
5. Remove the side window.


WRE91-BO273

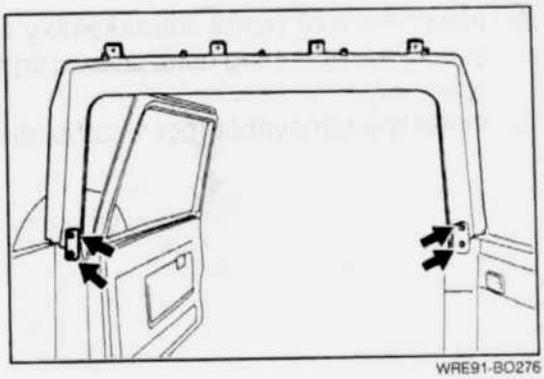
6. Remove the rear roof panel by removing the attaching screws.


WRE91-BO274

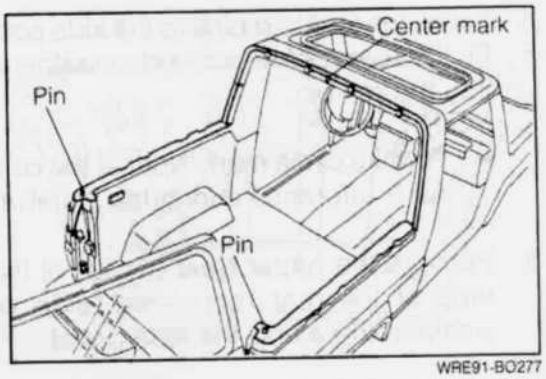
7. Remove the rear side upper outer panel by removing the attaching bolts and screws.


WRE91-BO275

8. Remove the back door opening frame subassembly by removing the back door opening frame bracket.

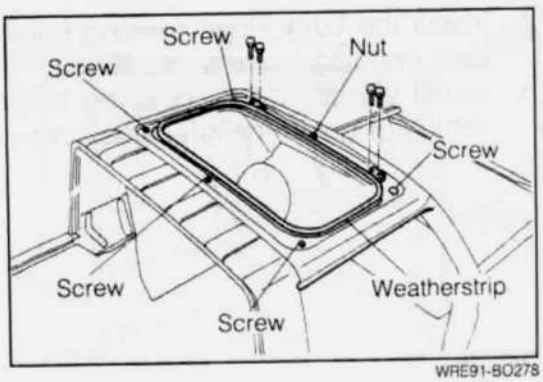

WRE91-BO276

9. Remove the rear roof-to-rear side weatherstrip.



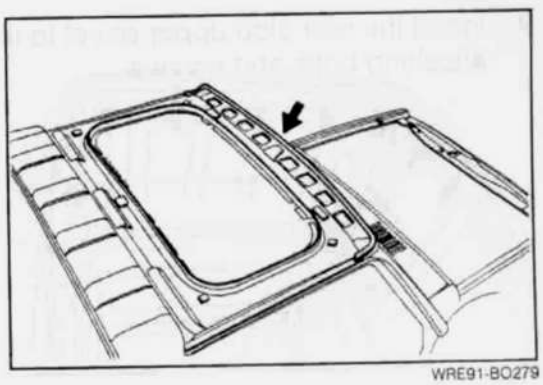
WRE91-BO277

10. Remove the removable roof weatherstrip.
11. Remove the roof panel subassembly by removing the attaching nuts and removable roof catch assembly.



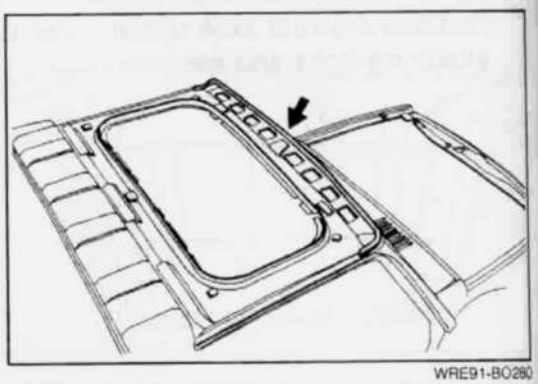
WRE91-BO278

12. Remove the front roof panel packing.

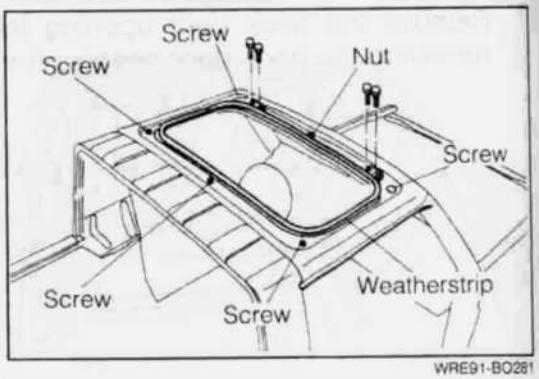

WRE91-BO279

INSTALLATION

1. Peel off the paper tape portion of the two-faced adhesive tape of the front roof panel packing. Affix the packing along the front roof panel.

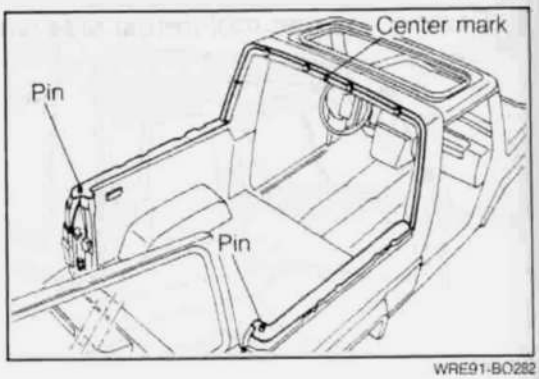

WRE91-BO280

2. Install the roof panel subassembly to the roof. Install and secure the attaching nuts, screws and removable roof catch assembly.
3. Install the removable roof weatherstrip.



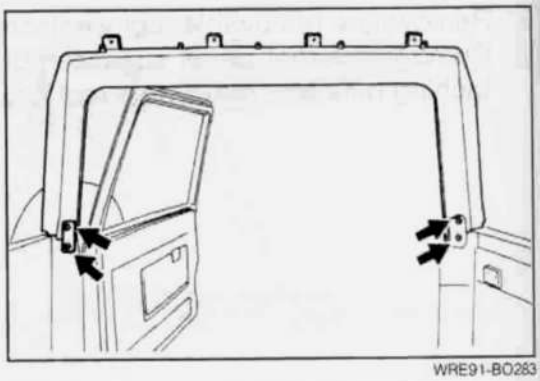
WRE91-BO281

4. Install the locating pins to the side panel upper. (Both sides)
5. Fit the rear roof-to-rear side weatherstrip at its roll bar side into the roll bar.
   NOTE:
   - A white circle mark is put at the center of the weatherstrip for a reference during the installation.

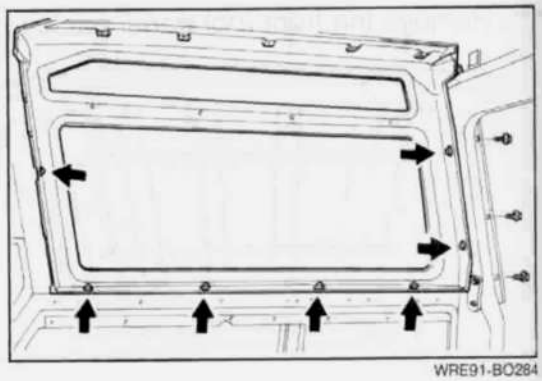


WRE91-BO282

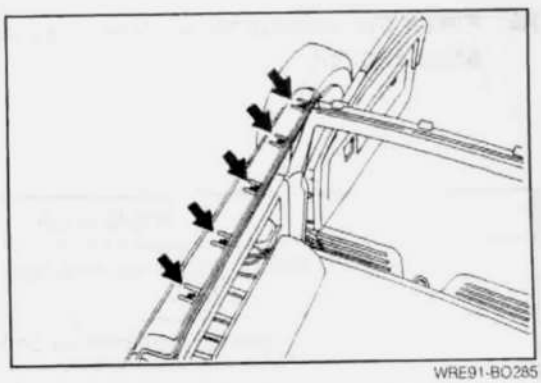
6. Remove the paper tape portion of the two-faced adhesive tape of the rear roof-to-rear side weatherstrip. Affix the weatherstrip along the side panel.
7. Install the back door opening frame bracket to the back door opening frame subassembly.
8. Install the back door opening frame subassembly to the vehicle. Tighten the attaching screws.


WRE91-BO283

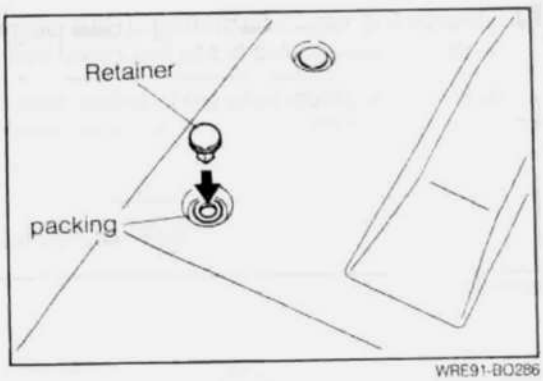
9. Install the rear side upper panel to the vehicle. Tighten the attaching bolts and screws.


WRE91-BO284

10. Peel off the paper tape portion of the rear roof panel packing. Affix the packing to the upper section of the rear side upper panel, as indicated in the right figure.
11. Affix the packing to the attaching hole at the rear side upper panel section.
12. Install the side window. (See page BO–112.)

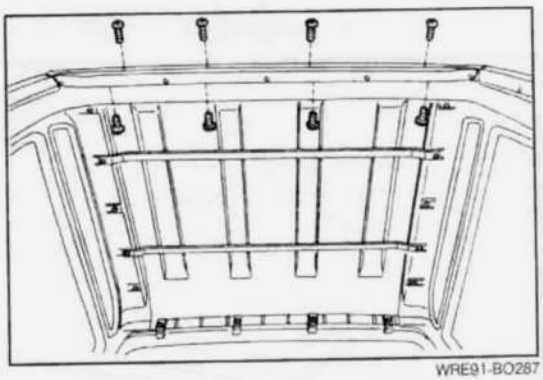

WRE91-BO285

13. Affix the packings to the upper attaching holes of the rear roof panel.
14. Insert the rear roof-to-rear side upper retainers into the upper attaching holes of the rear roof panel.

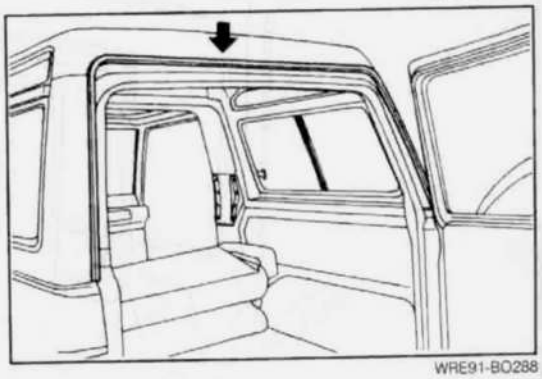


WRE91-BO286

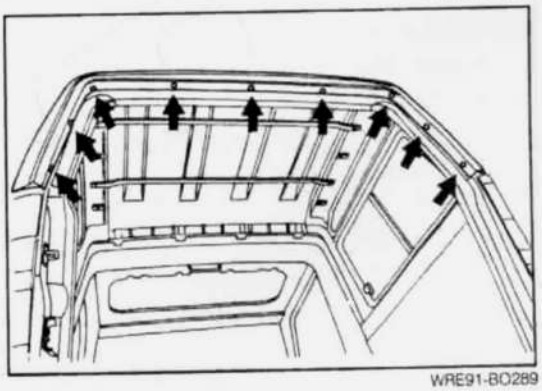
15. Install the rear roof panel to the vehicle. Tighten the attaching screws.
NOTE:
- At this time, the roof panel reinforcement should be tightened together, as indicated in the right figure.
- Be sure to tighten the attaching screws with the packing interposed.


WRE91-BO287

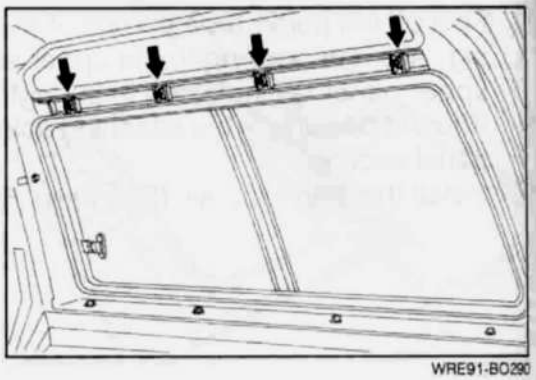
16. Peel off the paper tape portion of the back door opening packing. Affix the packing, as indicated in the right figure.
NOTE:
- During the installation, align the white circle mark at the center of the back door opening packing with the center of the rear roof.


WRE91-BO288

17. Install the back door opening garnish. Tighten the attaching screws.

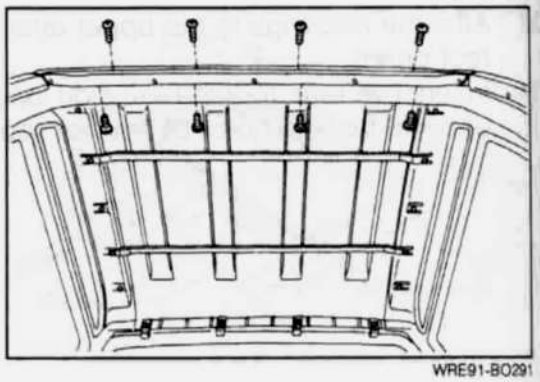

WRE91-BO289

18. Install the panorama window moulding assembly with the attaching nut.



WRE91-BO290

19. Install the rear headlining. (See page BO–98.)



WRE91-BO291

WINDOWS

FRONT WINDSHIELD GLASS

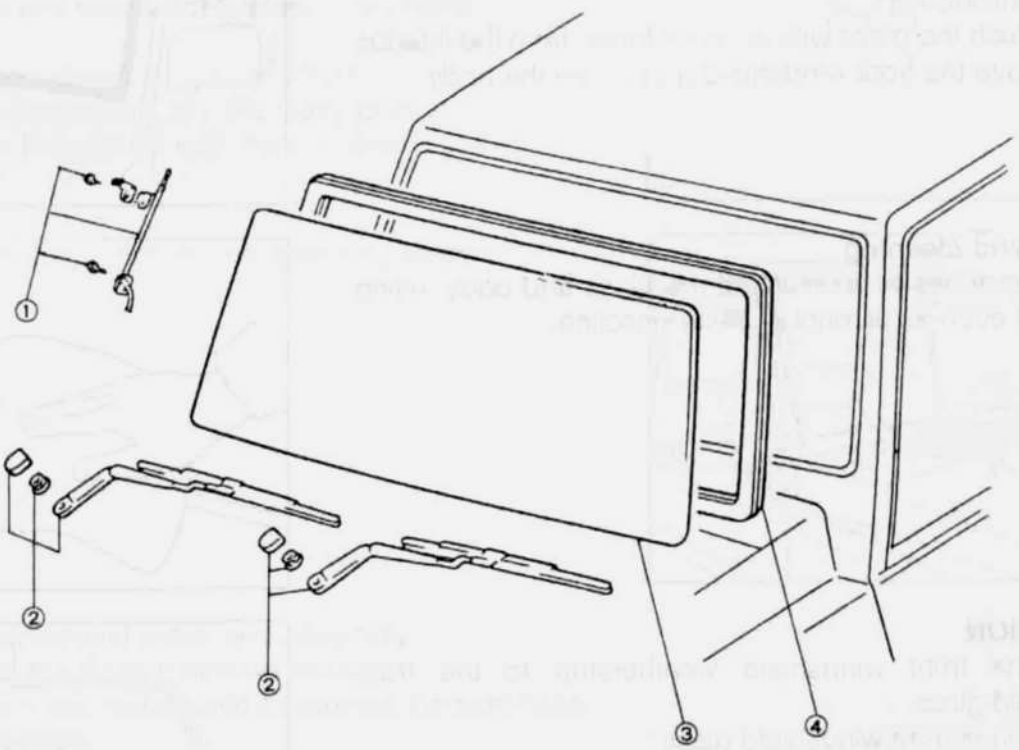
ARTICLES TO BE PREPARED

Lubricants and Others

	Part name	Applications
Lubricants and others	Non-drying window sealer	For use in repairing water leakage and use in refilling after the glass installation
	Tape	For use in preventing the finished surface from damage
	Brush, etc.	For use in applying soap water
	Cutter, etc.	For use in cut-separating adhesive layers and use in cutting weatherstrips
	Soap water	For use as an agent to provide easy sliding of the glass during its installation
	Operation rope (with a diameter of about 5 mm)	For use in installing the glass
	Solvent (Alcohol and white gasoline)	For use in cleaning the adhesive surface

WRE91-BO292

COMPONENTS

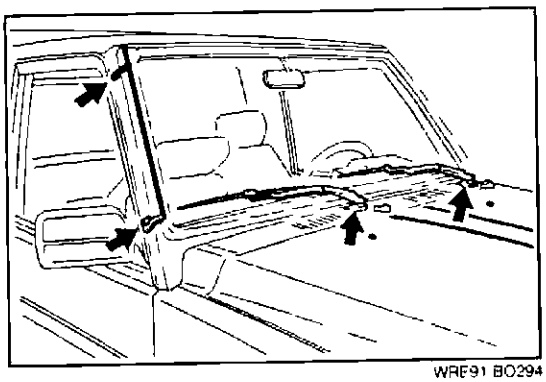


① Antenna assembly with holder
② Front wiper arm assembly
③ Front windshield
④ Weatherstrip

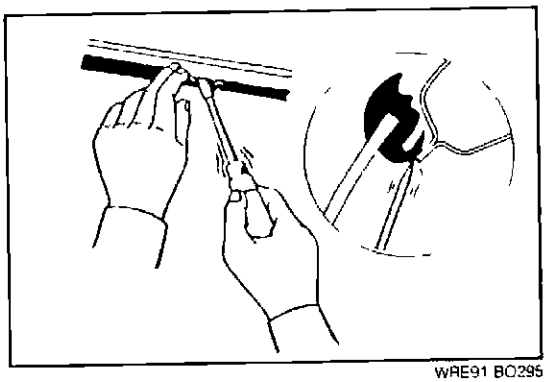
WRE91-BO293

REMOVAL

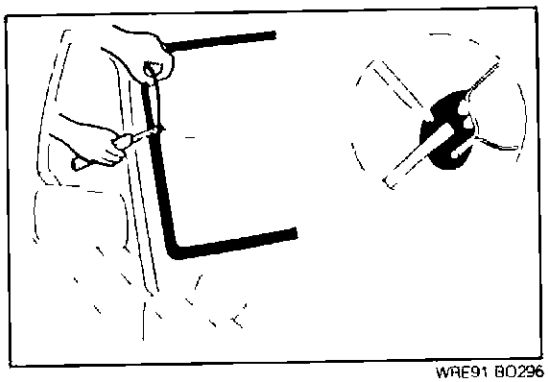
1 Remove the windshield wiper arm cover
(For details see the Body Electrical section)
2 Remove the windshield wiper arm assembly by removing the attaching nut of the front wiper arm assembly (For details, see the Body Electrical section)
3 Remove the antenna attaching screws. Affix them to the pillar with a tape so that they may not interfere the removal and installation of the windshield


WRE91 BO294

4 Removal of front windshield glass
(When weatherstrip is reused)
(1) Push the lip section of the weatherstrip outward from the body flange, using a screwdriver or a bamboo spatula. This operation is performed from the vehicle interior
NOTE:
- **Be very careful not to scratch the body paint finish surface.**

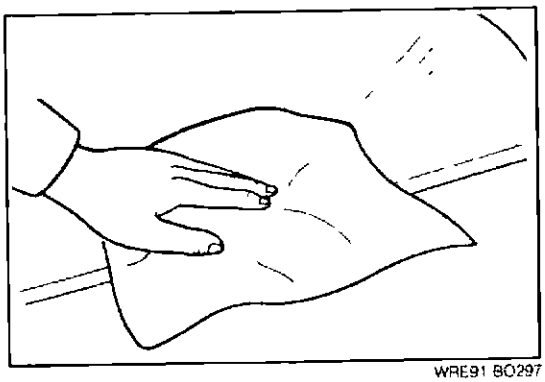

WRE91 BO295

(2) Remove the front windshield weatherstrip from the front windshield glass
(When weatherstrip is not reused)
① Cutting off the weatherstrip lip with a knife, from the outside
② Push the glass with an even force, from the interior
(3) Remove the front windshield glass from the body.


WRE91 BO296

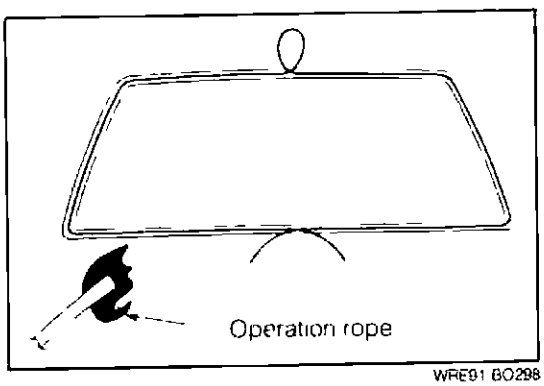
Inspection and cleaning

1 Clean the adhesion sections of the glass and body, using a solvent such as alcohol or white gasoline.


WRE91 BO297

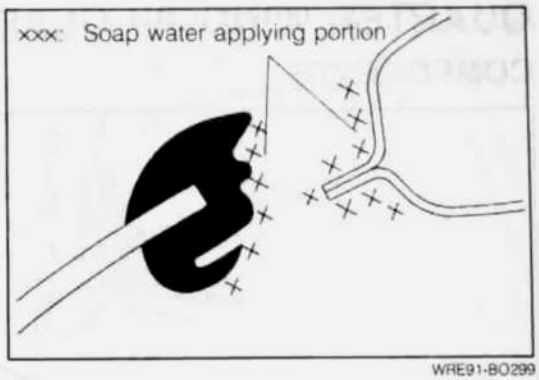
INSTALLATION

1 Install the front windshield weatherstrip to the front windshield glass
2 Installation of front windshield glass
(1) Set an operation rope to the weatherstrip
NOTE:
- **Never reuse any weatherstrip which exhibits deterioration. Failure to observe this instruction will cause water leakage.**



WRE91 BO298

(2) Apply soap water to the body flange contact sections of the weatherstrip. Also, apply soap water to the body flange.
(3) Install the front windshield glass to the body.

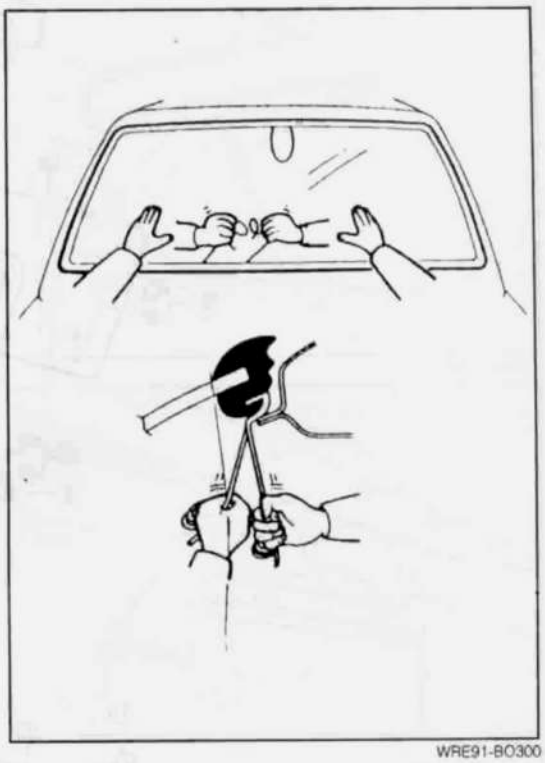


WRE91-BO299

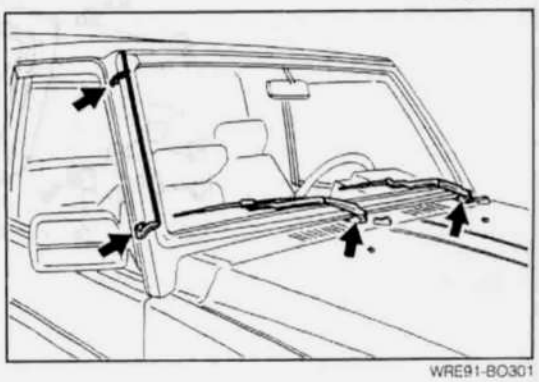
(4) Hold the one end of the rope that is suspending in the vehicle interior. Pull the rope in such an angle that allows the weatherstrip to cross over the flange. While so doing, pound the surface of the glass at points adjacent to the weatherstrip using one's palm from the vehicle exterior in order that the windshield may be installed into position.
(5) Pound the surface of the glass using one's palm from the vehicle exterior so that the windshield may be settled in place.
(6) Application of non-drying window sealer
Working from the outside, apply the non-drying window sealer between the weatherstrip and the glass as well as between the weatherstrip and the body.

NOTE:
- **Remove the any excessive sealer.**

(7) Water leakage check
If water leakage exists, dry the leaky point thoroughly. Then, fill the leaky point with the non-drying sealer.


WRE91-BO300

3. Install the antenna and tighten the attaching screws.

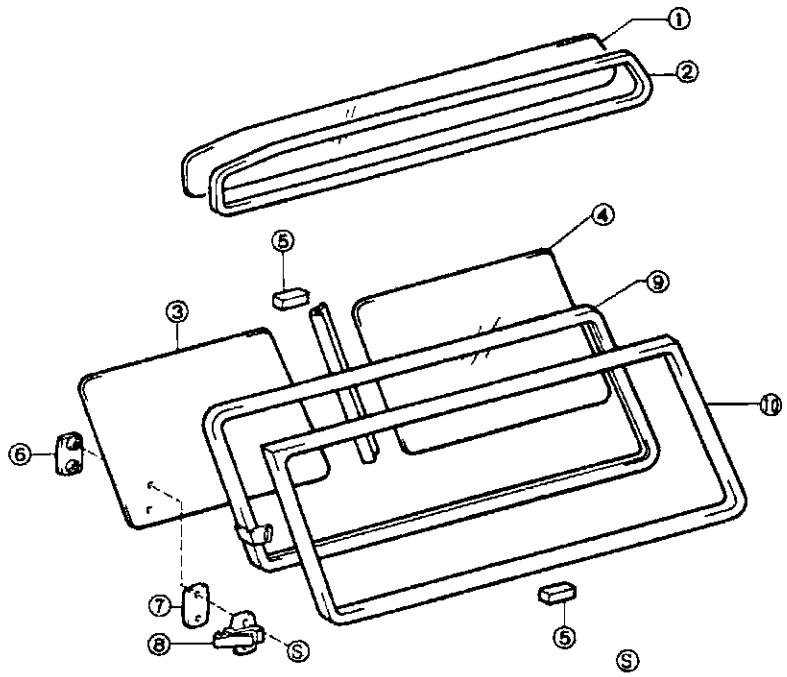

WRE91-BO301

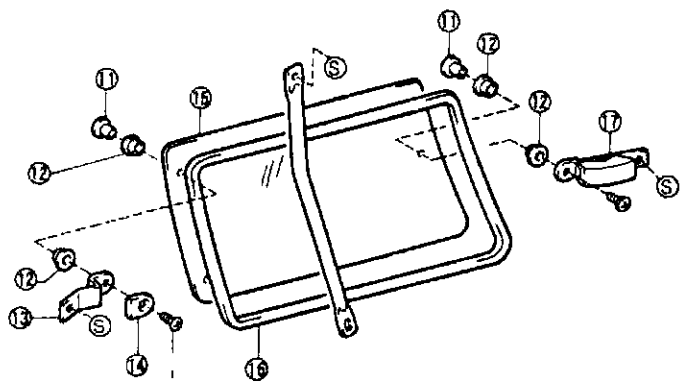
4. Installation of windshield wiper arm assembly
(For details, see the Body Electrical section.)
(1) Operate the wiper motor, until it assumes the automatic stopping position.
(2) Set the wiper arms at the correct position.
(3) Tighten the attaching nut.
(4) Install the front wiper arm cover.

WRE91-BO302

QUARTER WINDOW GLASS

COMPONENTS





① Quarter window panorama glass
② Quarter panorama window weatherstrip
③ Quarter window glass
④ Quarter window glass
⑤ Side window packing
⑥ Side window lock retainer
⑦ Side window lock packing
⑧ Side window lock assembly
⑨ Quarter window frame subassembly
⑩ Quarter window weatherstrip
⑪ Quarter window hinge retainer
⑫ Quarter window hinge packing
⑬ Quarter window hinge
⑭ Quarter window hinge plate
⑮ Quarter window glass
⑯ Quarter window weatherstrip
⑰ Quarter window lock assembly

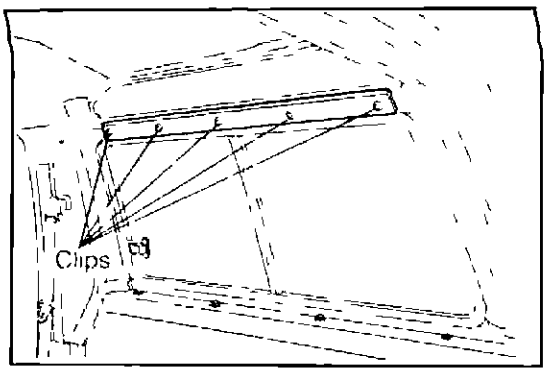
WRE91-BO303

QUARTER WINDOW GLASS

<WAGON>

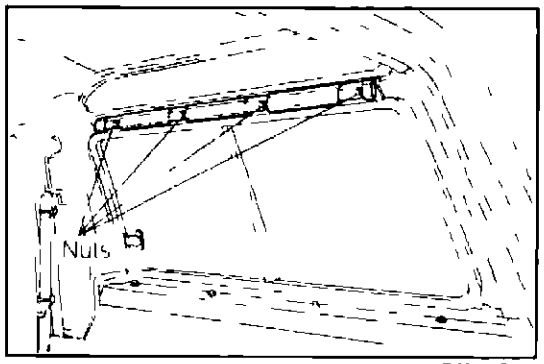
REMOVAL

1 Removal of quarter window division cover
(1) Push the clip at the center by one stage, until you hear a clicking sound Then, remove the clip
(2) Remove the quarter window division cover



WRE91 BO304

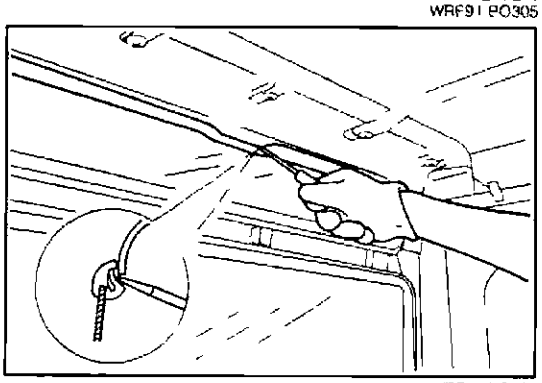
2 Remove the quarter window division inner bar by removing the attaching nuts
3 Remove the panorama window moulding assembly by removing the attaching nut



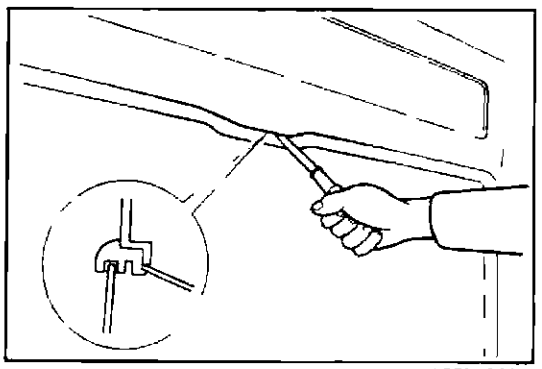
WRE91 BO305

4 Removal of quarter window panorama glass
(When weatherstrip is reused)
(1) Push the lip section of the weatherstrip outward from the flange, using a screwdriver or a bamboo spatula This operation is performed from the vehicle interior
NOTE:
- **Be very careful not to scratch the body paint finish surface and/or garnish.**

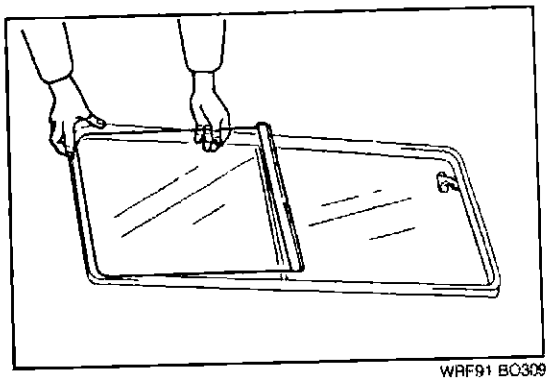
(If weatherstrip is replaced·)
(1) Cut off the weatherstrip lip with a knife
(2) Remove the quarter window panorama glass by pushing out the quarter window panorama glass.
(3) Remove the weatherstrip from the vehicle


WRE91-BO307

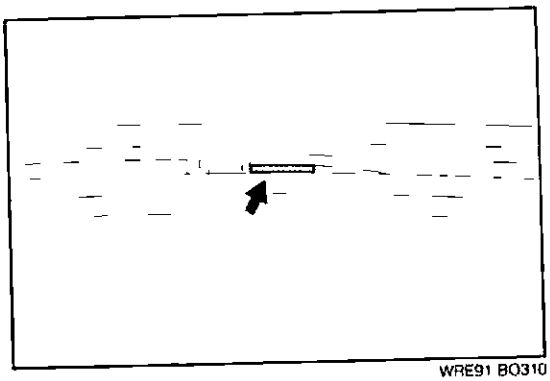
5 Removal of quarter window glass assembly
Push the lip section of the weatherstrip outward from the flange, using a screwdriver or bamboo spatula This operation is performed from the vehicle interior.
NOTE:
- **Be very careful not to scratch the body paint finish surface and/or garnish.**


WRE91 BO308

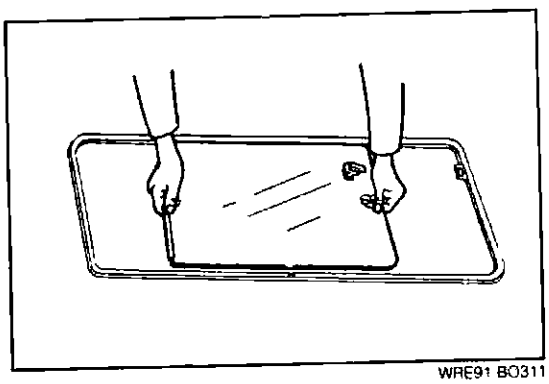
6 Disassembly of quarter window glass assembly
(1) Remove the quarter window weatherstrip and quarter window rear glass from the quarter window frame


WRF91 BO309

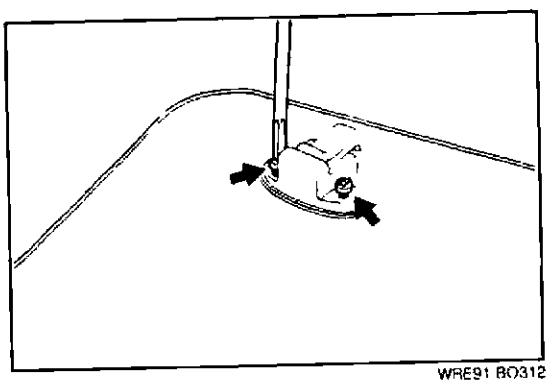
(2) Remove the side window glass packings from the quarter window weatherstrip. (if so equipped)


WRE91 BO310

(3) Remove the quarter window front glass from the quarter window frame

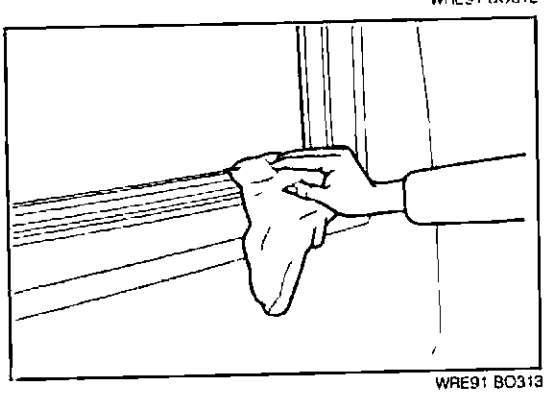

WRE91 BO311

(4) Remove the side window lock assembly from the quarter window glass by removing the attaching screw.


WRE91 BO312

INSPECTION AND CLEANING

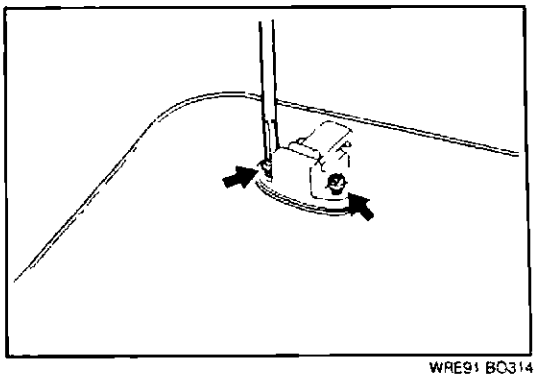
1 Clean the adhesion sections of the glass and flange section, using a solvent, such as alcohol or white gasoline.


WRE91 BO313

INSTALLATION

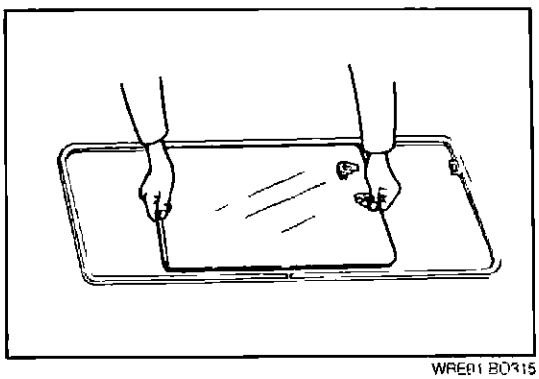
1 Assembly of quarter window glass assembly

(1) Install the side window lock assembly to the quarter window glass and tighten the attaching screws.



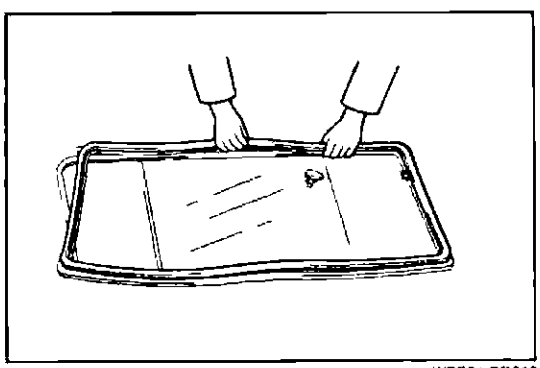
WRE91 BO314

(2) Assemble the quarter window front glass to the quarter window frame



WRE91 BO315

(3) Assemble the quarter window frame to the quarter window weatherstrip.

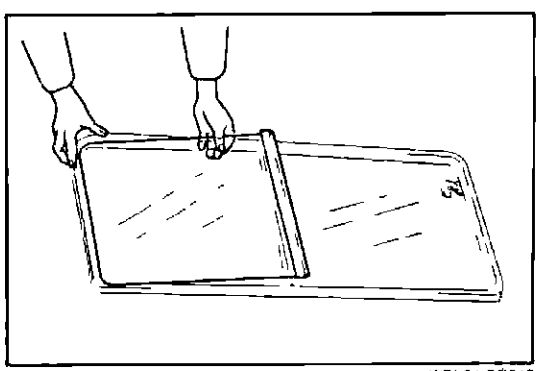


WRF91 BO316

(4) Assemble the quarter window rear glass to the quarter window weatherstrip.

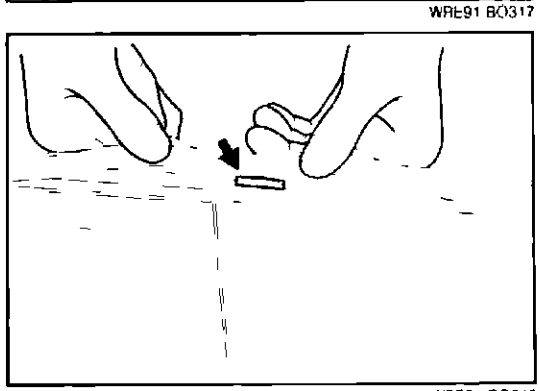
NOTE:

- **Fully push the rear glass toward the back side of the weatherstrip.**



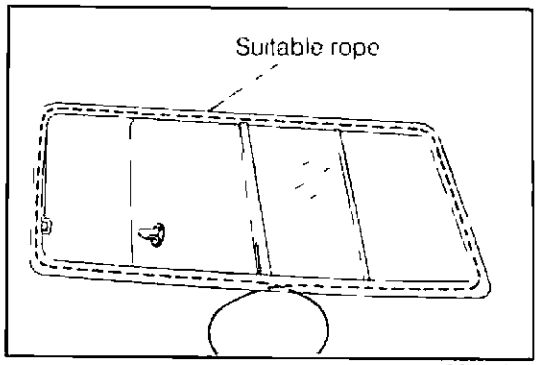
WRE91 BO317

(5) Affix the side window glass packings to the run section of the rear glass with an adhesive agent for rubber use so that the rear glass may be secured (Both upper and lower sections)



WRE91 BO318

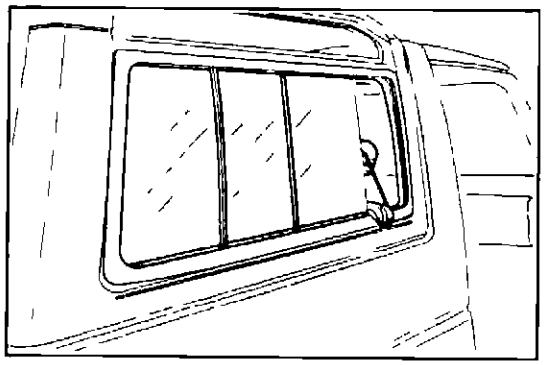
2 Installation of quarter window glass assembly
(1) Set an operation rope to the weatherstrip
NOTE.
- Never reuse any weatherstrip which exhibits deterioration. Failure to observe this instruction will cause water leakage



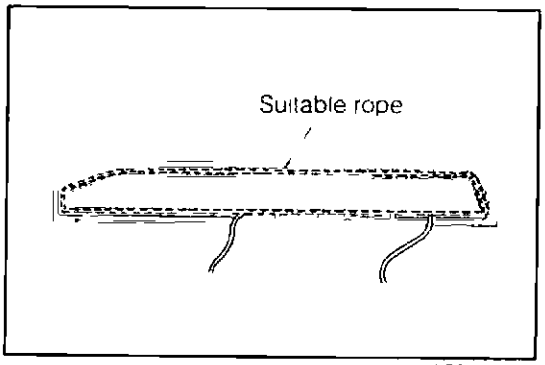
WRE91 BO319

(2) Apply soap water to the flange contact sections of the weatherstrip Also, apply soap water to the flange section
(3) Support the quarter window glass assembly while applying it to the attaching section of the rear side upper panel
At this time, suspend the rope in the vehicle interior

(4) Hold the one end of the rope that is suspending in the vehicle interior Pull the rope in such an angle that allows the weatherstrip to cross over the flange While so doing, pound the surface of the glass at points adjacent to the weatherstrip using one's palm from the vehicle exterior in order that the quarter window glass may be installed into position
(5) Pound the surface of the glass using one's palm from the vehicle exterior so that the quarter window glass may be settled in place


WRE91 BO320

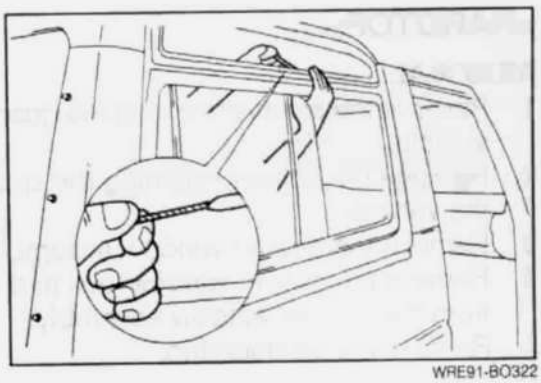
3 Installation of quarter window panorama glass
(1) Install the weatherstrip to the quarter window panorama glass
(2) Set an operation rope to the weatherstrip.
NOTE:
- Never reuse any weatherstrip which exhibits deterioration. Failure to observe this instruction will cause water leakage.



WRE91 BO321

(3) Apply soap water to the body flange contact sections of the weatherstrip Also, apply soap water to the flange section
(4) Support the quarter window panorama glass while applying it to the attaching section of the rear side upper panel
At this time, suspend the rope in the vehicle interior

(5) Hold the one end of the rope that is suspending in the vehicle interior. Pull the rope in such an angle that allows the weatherstrip to cross over the flange. While so doing, pound the surface of the glass at points adjacent to the weatherstrip using one's palm from the vehicle exterior in order that the quarter window glass may be installed into position.



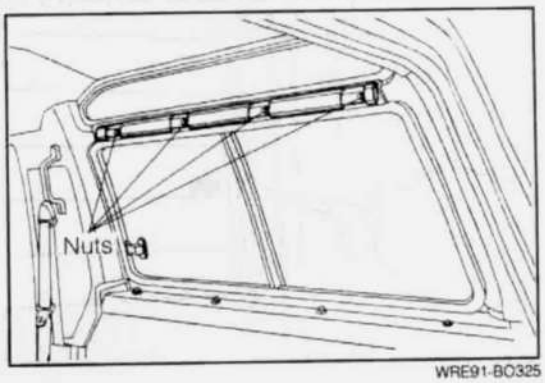
WRE91-BO322

(6) Pound the surface of the glass, using one's palm from the vehicle exterior, so that the quarter window glass may be settled in place.

(7) Check of water leakage
Ensure that no water leakage is present.
If water leakage is found, dry the leaky point thoroughly. Then, fill the leaky point with the non-drying sealer.

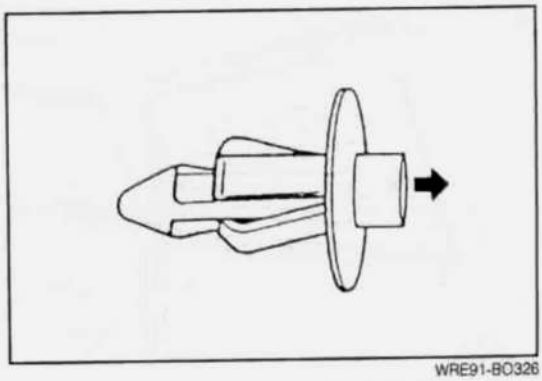
WRE91-BO323

4. Install the panorama window moulding assembly with the attaching nut.
5. Install the quarter window division inner bar with the attaching nuts.



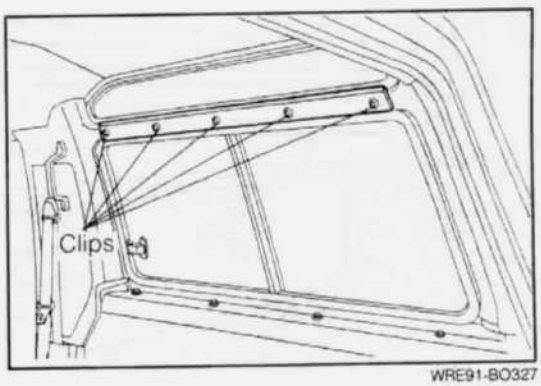
WRE91-BO325

6. Installation of quarter window division cover
(1) Set the clip, as indicated in the right figure.



WRE91-BO326

(2) Install the quarter window division cover and insert the clips into the attaching hole. Lock the clips by pushing the center of the clip.

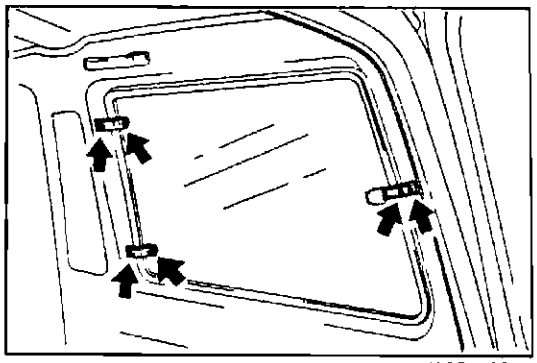


WRE91-BO327

<HARDTOP>

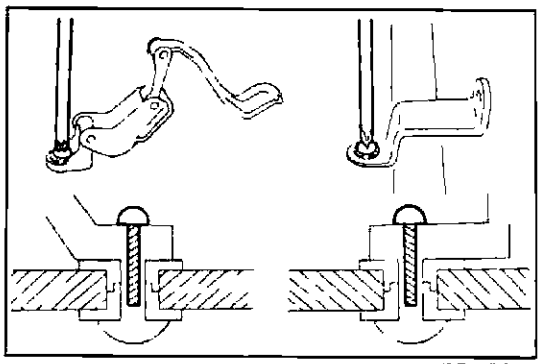
REMOVAL

1 Remove the screws retaining the quarter window lock to the vehicle
2 Remove the screws retaining the quarter window hinge to the vehicle
3. Remove the quarter window assembly from the vehicle.
4 Remove the quarter window lock and quarter window hinge from the quarter window assembly
5 Remove the weatherstrip


WRE91 BO328

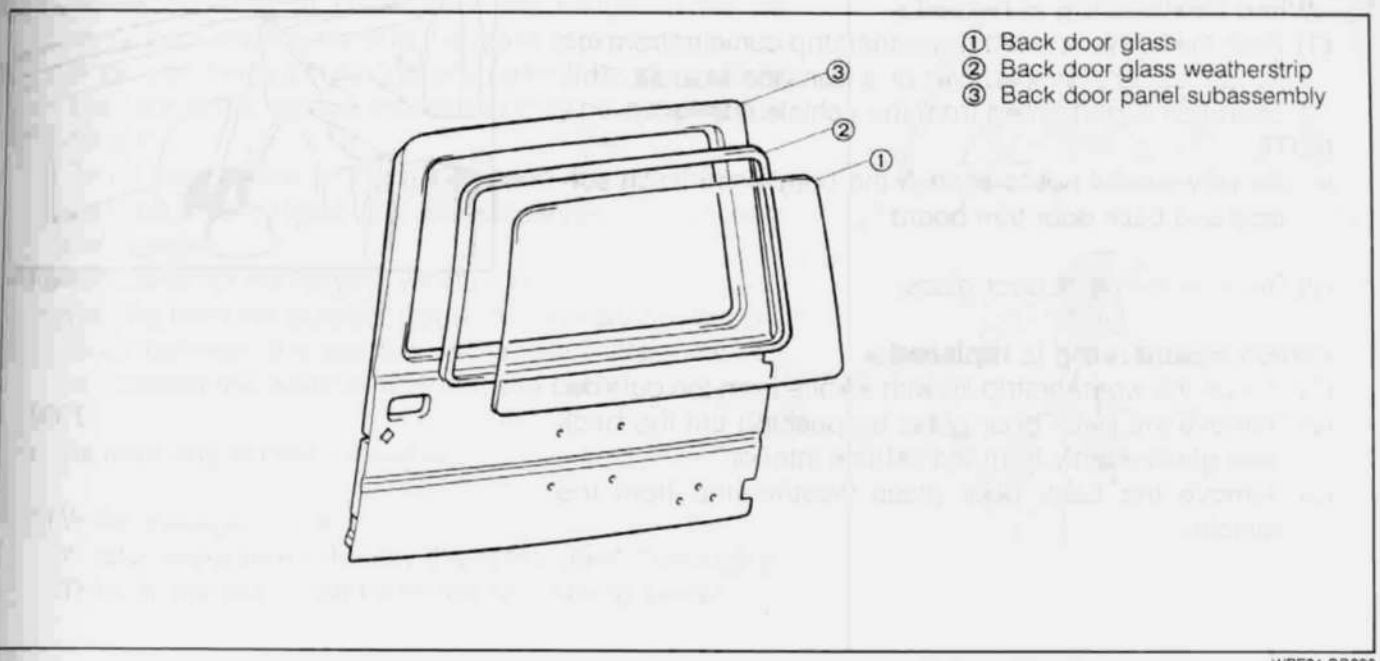
INSTALLATION

1 Install the weatherstrip
2 Install the quarter window lock and quarter window hinges to the quarter window glass.
3 Install the quarter window hinge to the vehicle with the screws
4 Install the quarter window lock to the vehicle with the screws
NOTE:
- When tightening the screw, fill the nut with an adhesive agent (instantaneous adhesive agent).


WRE91 BO329

BACK DOOR GLASS

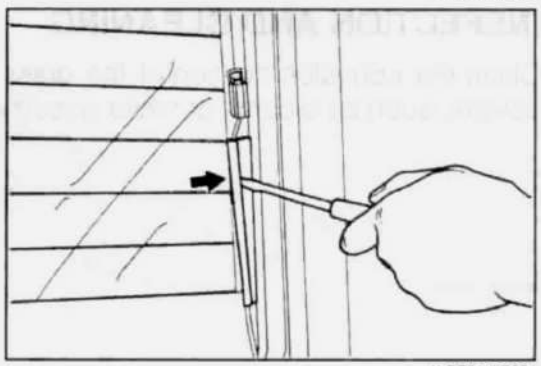
COMPONENTS



WRE91-BO330

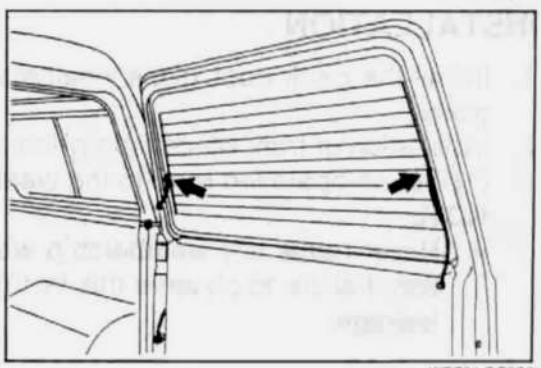
REMOVAL

1. Detach the defogger wire clamp by pulling it from the weatherstrip, (if so equipped).



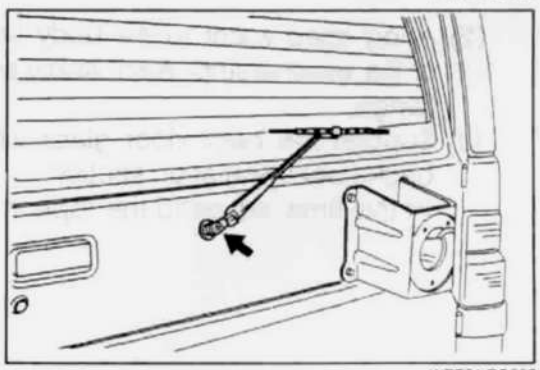
WRE91-BO331

2. Disconnect the defogger wire connector, (if so equipped).
3. Remove the spare wheel.



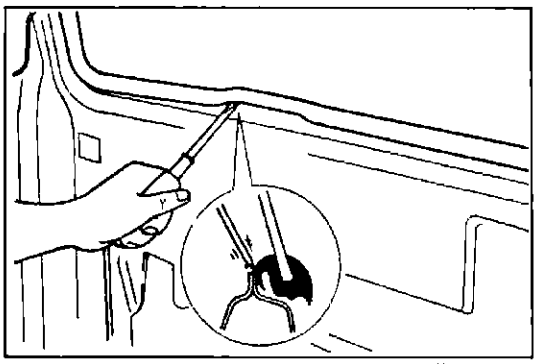
WRE91-BO332

4. Removal of rear wiper arm assembly
   (1) Remove the rear wiper arm cover.
   (2) Remove the rear wiper arm assembly by removing the attaching nut of the front wiper arm assembly.



WRE91-BO333

5 Removal of back door glass


WRE91 BO334

<When weatherstrip is reused:>

(1) Push the lip section of the weatherstrip outward from the flange, using a screwdriver or a bamboo spatula. This operation is performed from the vehicle interior

NOTE:

- **Be very careful not to scratch the body paint finish surface and back door trim board.**

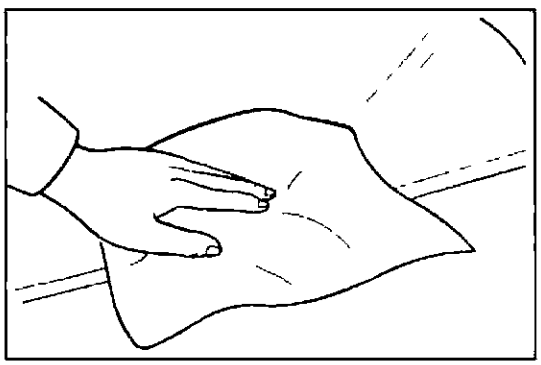
(2) Remove the back door glass

<When weatherstrip is replaced:>

(1) Cut off the weatherstrip lip with a knife from the outside.
(2) Remove the back door glass by pushing out the back door glass evenly from the vehicle interior.
(3) Remove the back door glass weatherstrip from the vehicle

INSPECTION AND CLEANING

Clean the adhesion section of the glass and vehicle, using a solvent, such as alcohol or white gasoline


WRF91-BO335

INSTALLATION

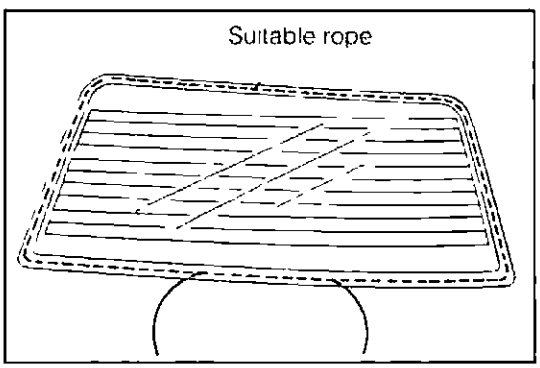
1 Install the back door glass weatherstrip to the back door glass

2 Installation of front windshield glass

(1) Set an operation rope to the weatherstrip

NOTE:

- **Never reuse any weatherstrip which exhibits deterioration. Failure to observe this instruction will cause water leakage.**

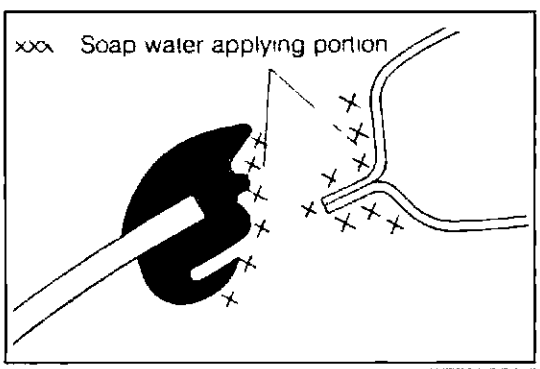


WRE91 BO336

(2) Apply soap water to the body flange contact sections of the weatherstrip Also, apply soap water to the body flange.

(3) Support the back door glass while applying it to the back door installation section

At this time, suspend the rope in the vehicle interior

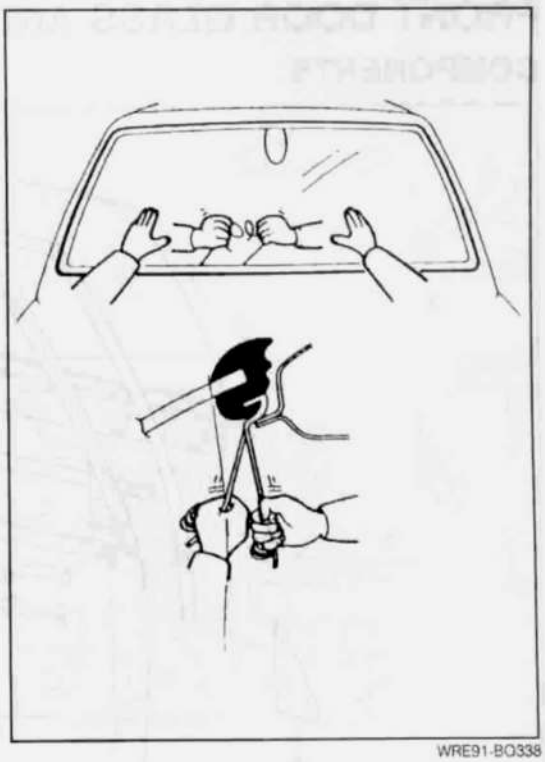


WRE91 BO337

(4) Hold the one end of the rope that is suspending in the vehicle interior. Pull the rope in such an angle that allows the weatherstrip to cross over the flange. While so doing, pound the surface of the glass at points adjacent to the weatherstrip using one's palm from the vehicle exterior in order that the windshield may be installed into position.
(5) Pound the surface of the glass using one's palm from the vehicle exterior so that the windshield may be settled in place.
(6) Application of non-drying window sealer
Working from the outside, apply the non-drying window sealer between the weatherstrip and the glass as well as between the weatherstrip and the body.

NOTE:
- Remove any excessive sealer.

(7) Water leakage check
If water leakage exists, dry the leaky point thoroughly. Then, fill the leaky point with the non-drying sealer.



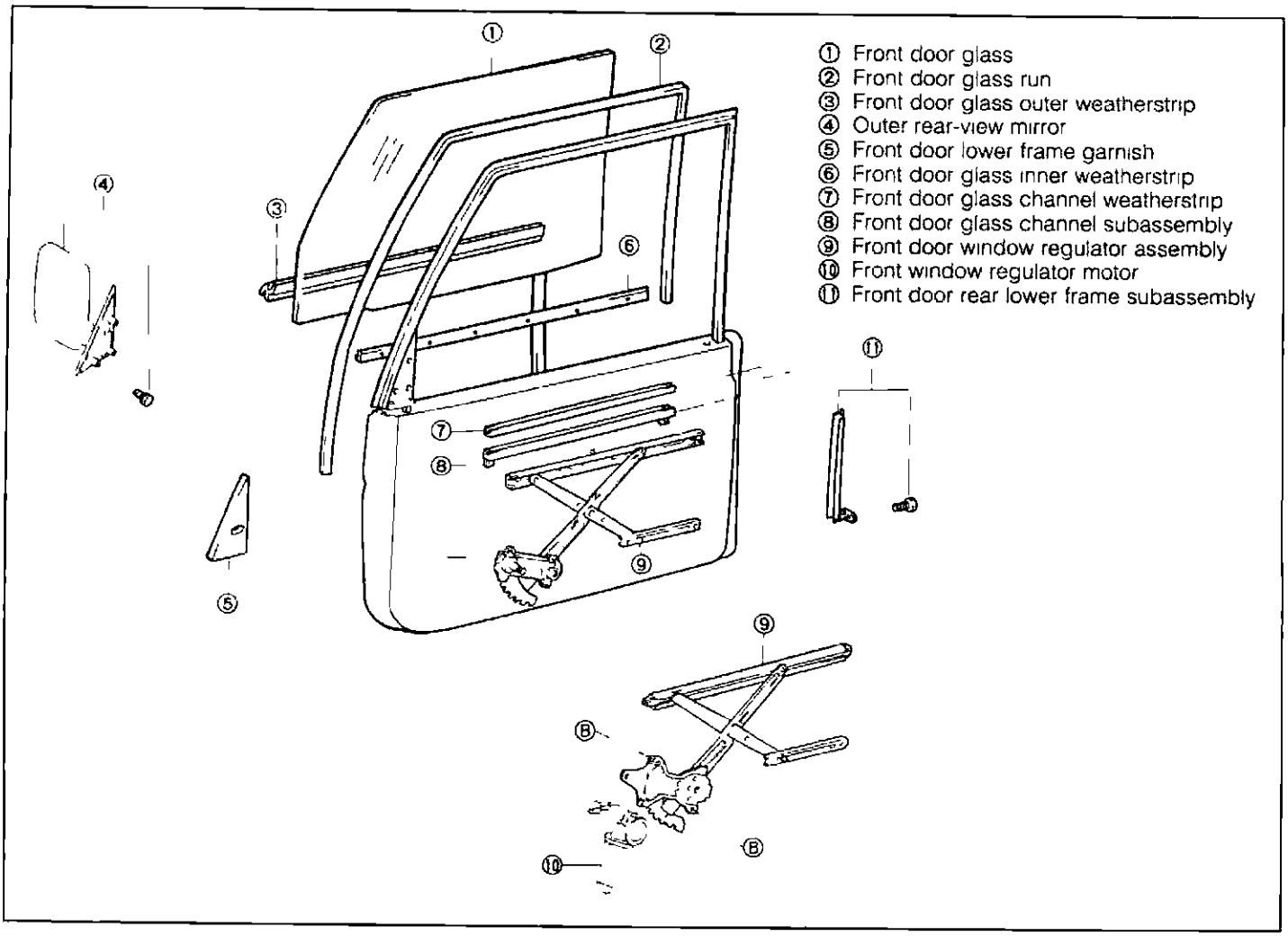
WRE91-BO338

3. Installation of windshield wiper arm assembly
(For details, see the Body Electrical section.)
(1) Operate the wiper motor, until it assumes the automatic stopping position.
(2) Set the wiper arms at the correct positions.
(3) Tighten the nut.
(4) Install the wiper arm cover.

WRE91-BO339

FRONT DOOR GLASS AND REGULATOR

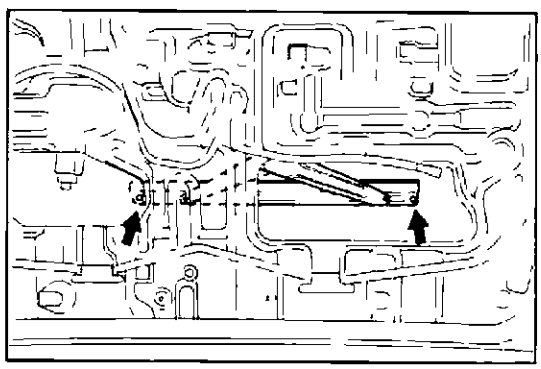
COMPONENTS



WRE91 BO340

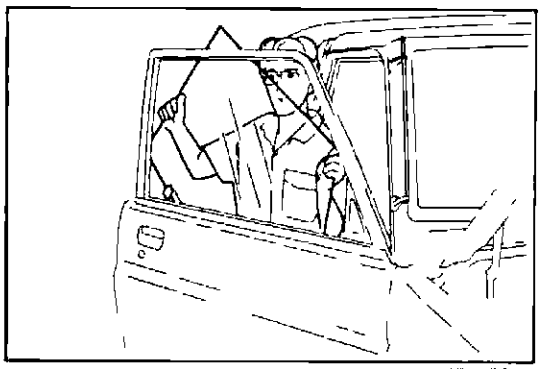
REMOVAL

1 Removal of door trim and service hole cover (See page BO-126)
2 Remove the outer rear-view mirror. (See page BO-127)
3 Remove the front door glass outer weatherstrip and front glass inner weatherstrip (See page BO-128.)
4 Set the front door glass to the position indicated in the right figure Remove the front door glass channel attaching bolts



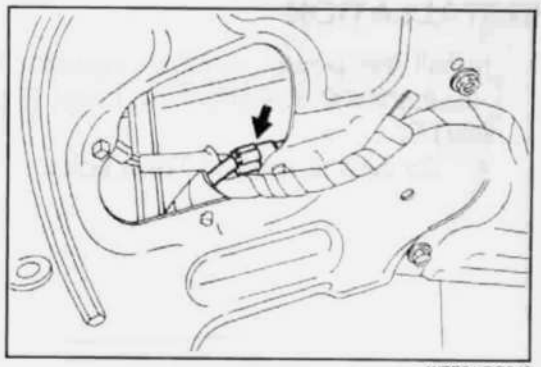
WRE91 BO341

5 Remove the front door glass from the door panel by lifting the glass, as indicated in the right figure



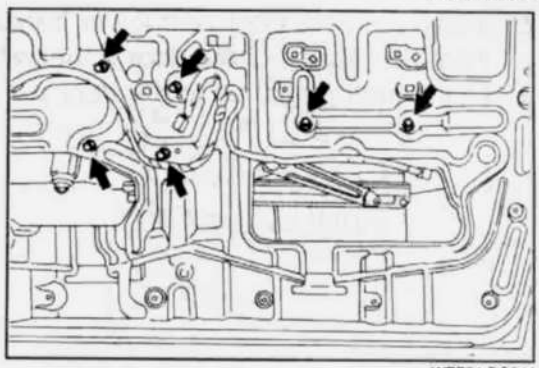
WRE91 BO342

6. Disconnect the connector of the power window regulator front motor assembly, (if so equipped). Detach the clamp from the door panel.



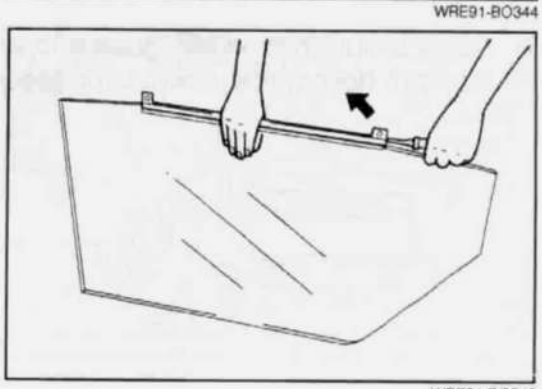
WRE91-BO343

7. Remove the window regulator attaching bolt.
8. Remove the window regulator from the door panel.



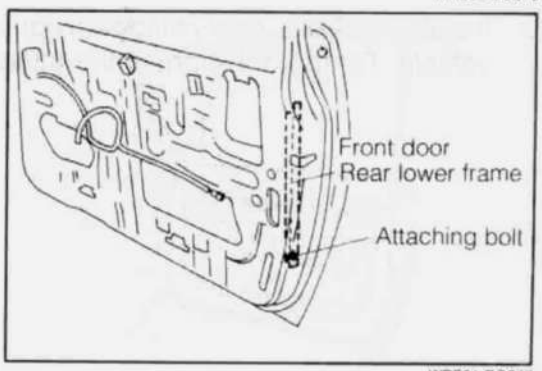
WRE91-BO344

9. Remove the front door glass channel subassembly and front door glass channel weatherstrip from the front door glass.



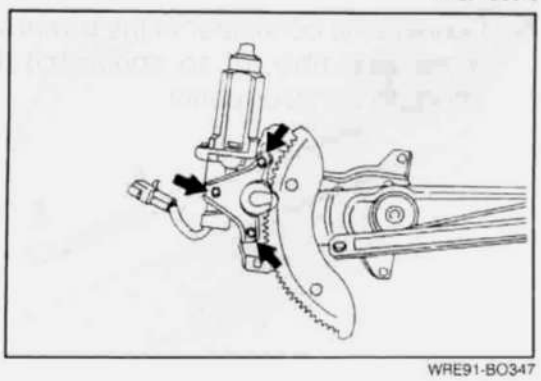
WRE91-BO345

10. Remove the front door glass run.
11. Remove the front door rear lower frame subassembly by removing the attaching bolt.



WRE91-BO346

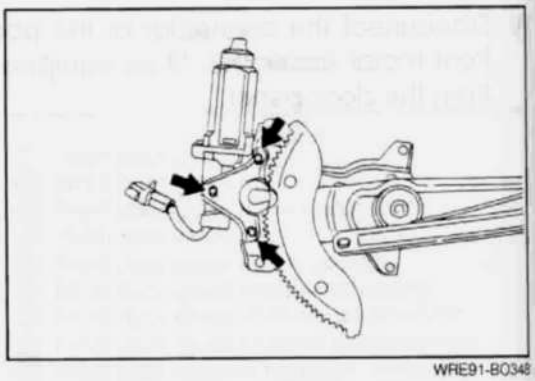
12. Remove the power window regulator front motor from the window regulator, (if so equipped).
    NOTE:
    - The attaching bolts is Torx®.



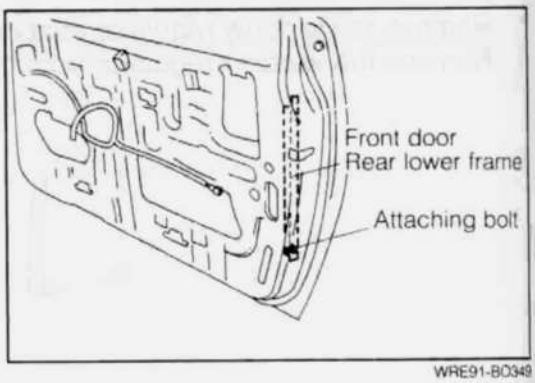
WRE91-BO347

INSTALLATION

1. Install the power window regulator motor to the window regulator with the attaching bolts, (if so equipped).
   NOTE:
   - Be sure to use the Torx® bolts.

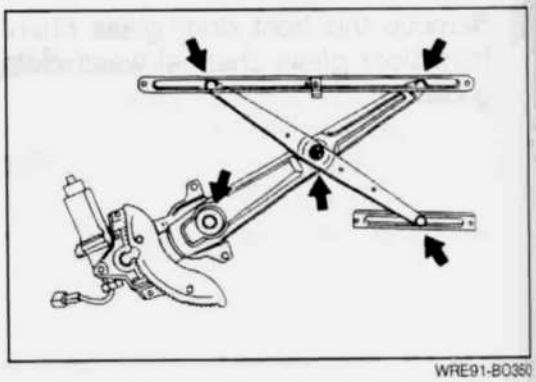

WRE91-BO348

2. Install the front door rear lower frame subassembly to the insertion section of the door panel with the attaching bolts.
3. Fit the front glass run to the door panel.

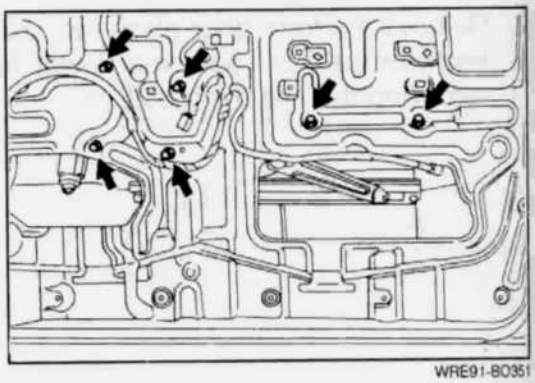


WRE91-BO349

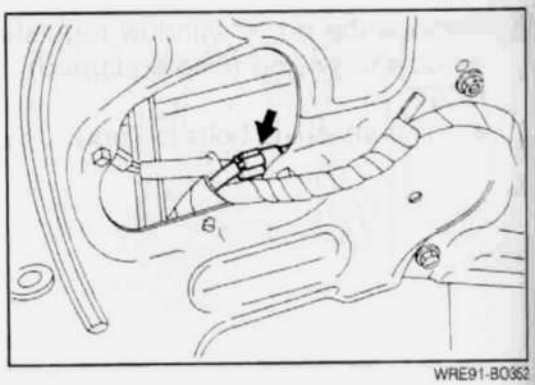
4. Apply lithium-based MP grease to each sliding section of the front door window regulator assembly.


WRE91-BO350

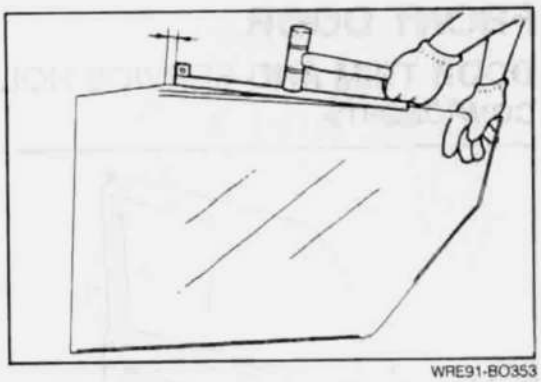
5. Install the front door window regulator assembly to the vehicle. Temporarily tighten the attaching bolts.


WRE91-BO351

6. Connect the connector of the power window regulator front motor assembly, (if so equipped). Clamp the connector clamp to the door panel.


WRE91-BO352

7. Install the weatherstrip to the front glass.
8. Apply soap water to the weatherstrip. Install the front door glass channel to the position indicated in the right figure by lightly tapping it with a plastic hammer or the like.



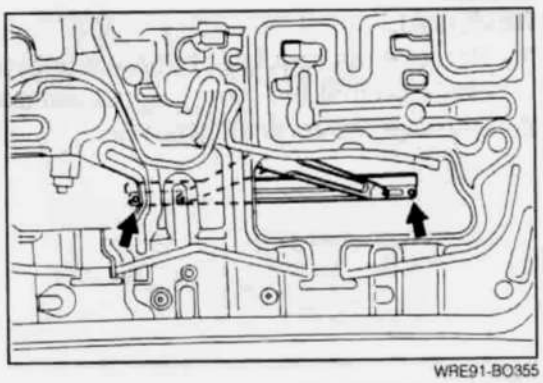
WRE91-BO353

9. Insert the front door glass along the front glass run.



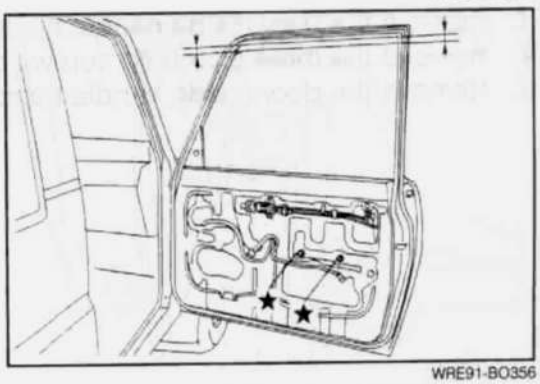
WRE91-BO354

10. Install the front door glass channel to the regulator with the attaching bolts.



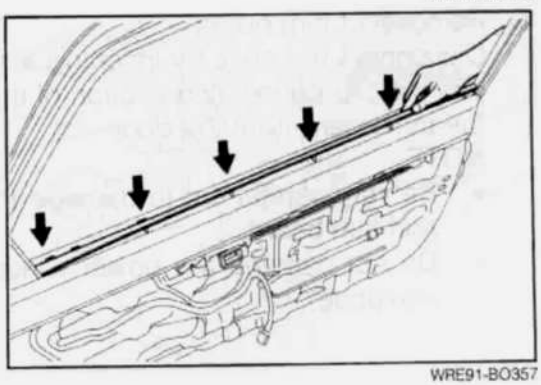
WRE91-BO355

11. Close the front door glass, as indicated in the right figure. Loosen the bolt bearing the ★ mark and adjust it so that the heights of the right and left front door glass become the same as with each other. Then, tighten the attaching bolts of the front door window regulator.



WRE91-BO356

12. Install the front door glass inner weatherstrip and front door glass outer weatherstrip. (See page BO–129.)
13. Install the outer rear-view mirror. (See page BO–129.)
14. Installation of door trim and service hole cover (See page BO–130.)
15. Ensure that the front door glass operates smoothly.

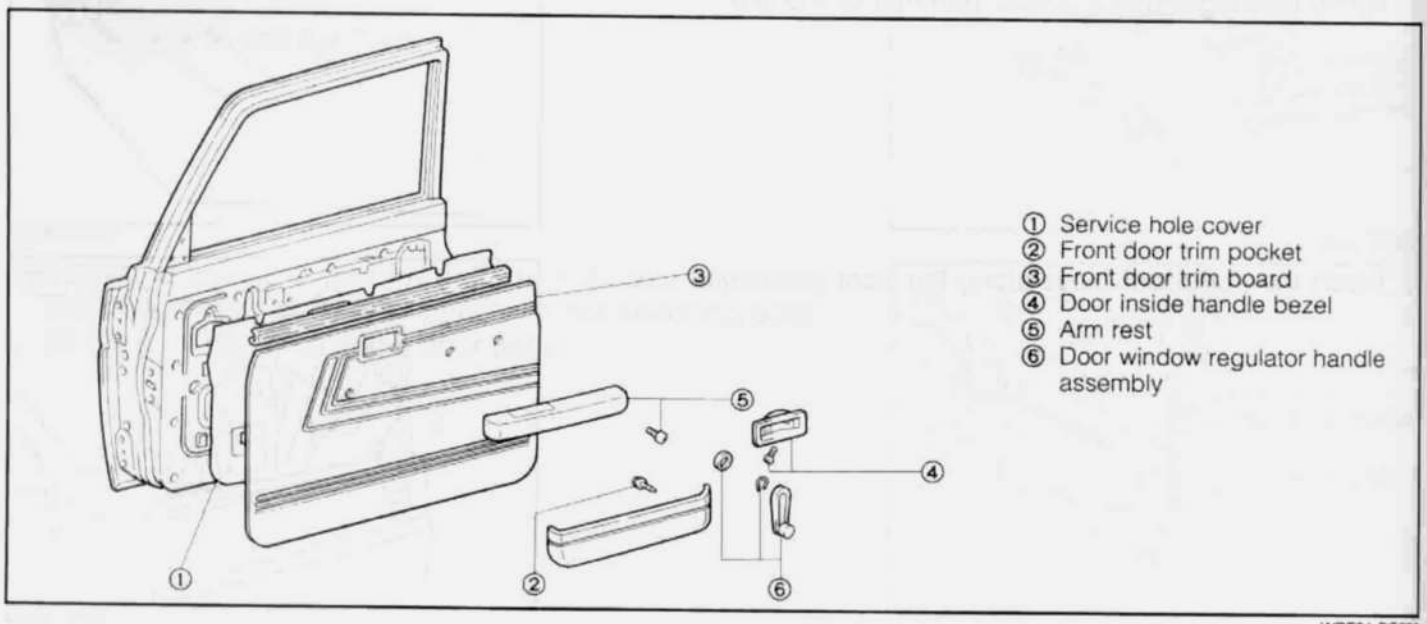


WRE91-BO357

FRONT DOOR

DOOR TRIM AND SERVICE HOLE COVER

COMPONENTS



WRE91-BO358

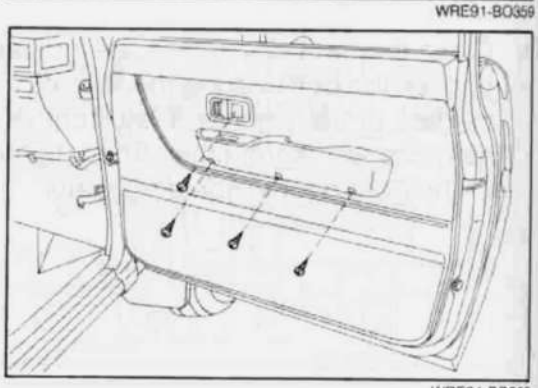
REMOVAL

1. Remove the regulator handle shaft snap ring, using a clean cloth, so that the trim may not get soiled.
2. Remove the regulator handle.



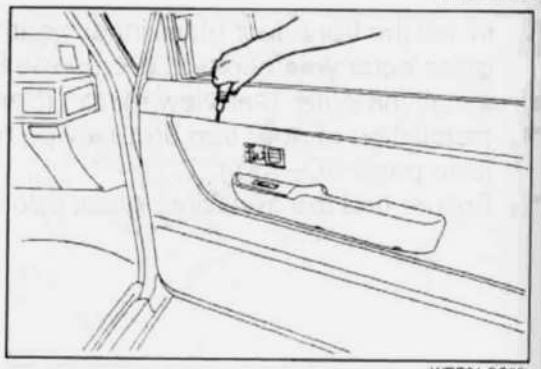
WRE91-BO359

3. Remove the door inside handle bezel attaching screw.
4. Remove the three attaching screws of the arm rest.
5. Remove the door inside handle bezel.



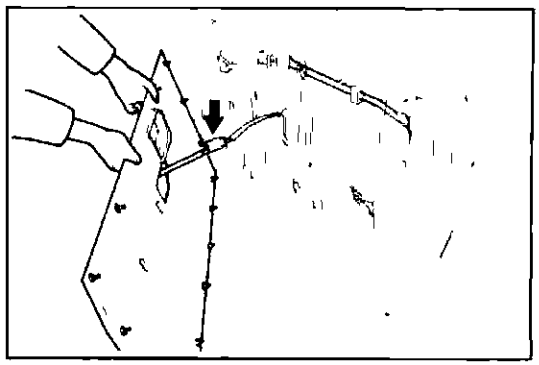
WRE91-BO360

6. Removal of trim board
   Disconnect the clips by inserting a screwdriver or the like into the clip connecting section of the trim board. Remove the trim board from the door.
   NOTE:
   - Be very careful not to damage the paint finish surface and trim board.
   - Do not damage the power window switch wire, (if so equipped).

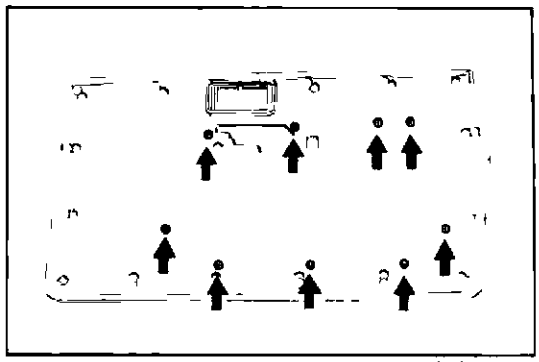


WRE91-BO361

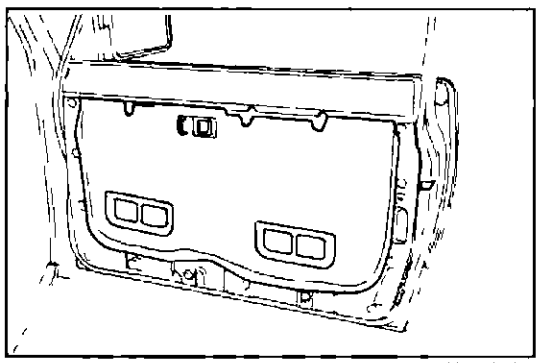
7 Disconnect the power window switch connector.


WRE91 BO362

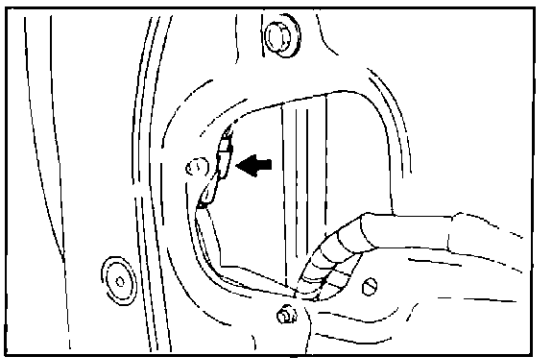
8 Remove the armrest by removing the four attaching screws.
9 Remove the door pocket by removing the five attaching screws, (if so equipped)


WRE91 BO363

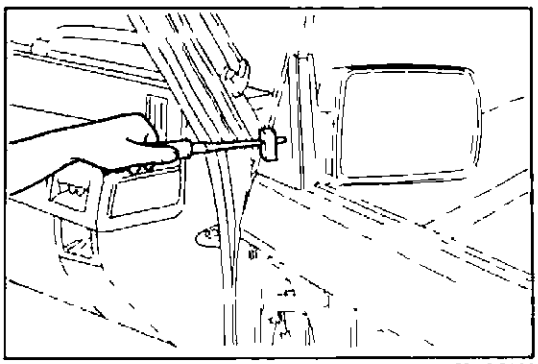
10 Remove the service hole cover.
NOTE:
- **Care must be exercised not to tear off the service hole cover.**


WRE91 BO364

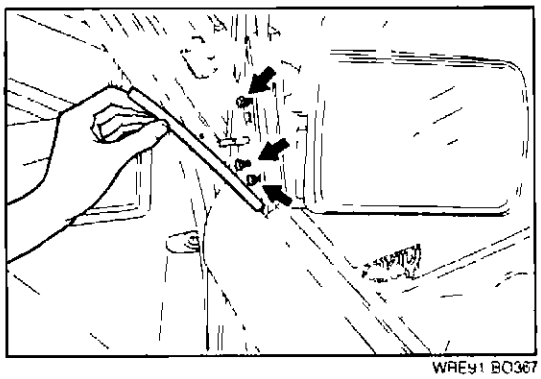
11 Removal of front door upper trim
(1) Disconnect the connector of electrically operated outer rear-view mirror, (if so equipped). (For details, see the Body Electrical section)


WRE91 BO365

(2) Remove the outer rear-view mirror handle by removing the attaching screw, (if so equipped)

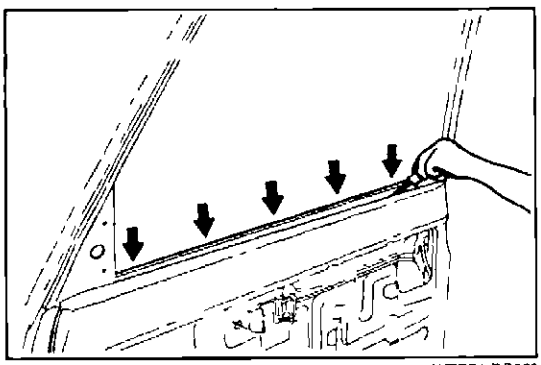

WRE91 BO366

(3) Remove the front door lower frame garnish by pulling out the upper part of the garnish
(4) Remove the outer rear-view mirror by removing the attaching screws


WRE91 BO367

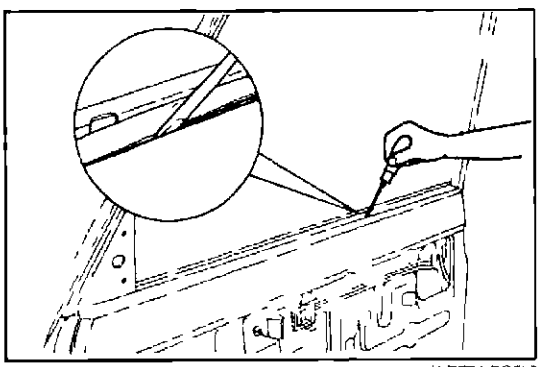
(5) While lifting the clip section of the front door glass outer weatherstrip with a screwdriver or the like, remove the front door glass outer weatherstrip

NOTE:
- Be very careful not to damage the paint surface and trim of the door panel.

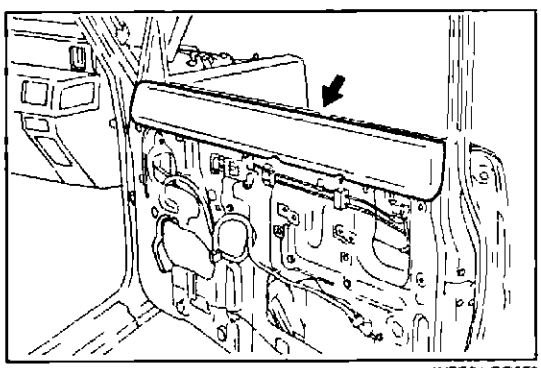

WRE91 BO368

(6) Remove the front door glass inner weatherstrip by inserting a screwdriver or the like into between the front door glass inner weatherstrip and the door panel to release the locking

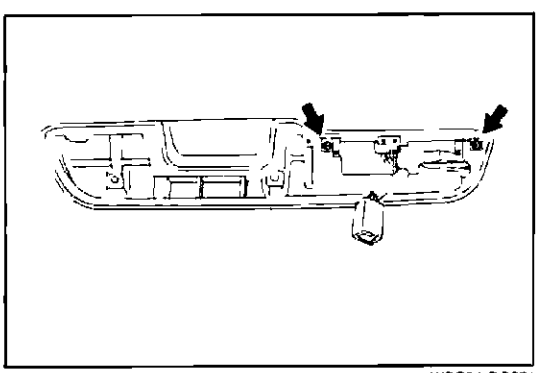
NOTE:
- Be very careful not to damage the paint finish surface and trim.


WRE91 BO369

(7) Remove the front door upper trim

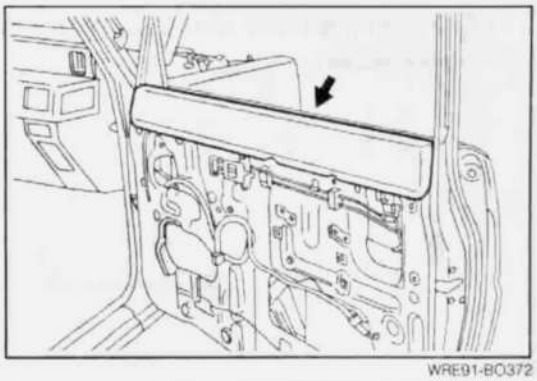

WRE91 BO370

(8) Remove the power window switch by removing the two attaching screws.


WRE91 BO371

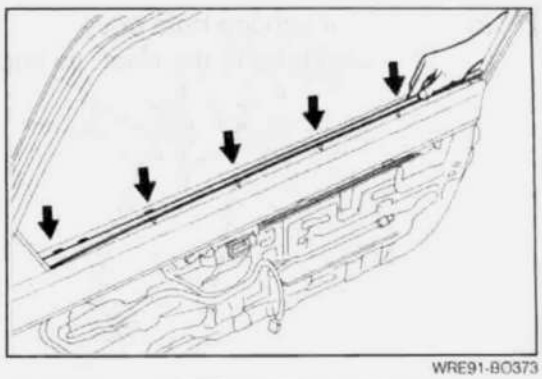
INSTALLATION

1. Installation of front door upper trim
   (1) Install the front door upper trim to the door.



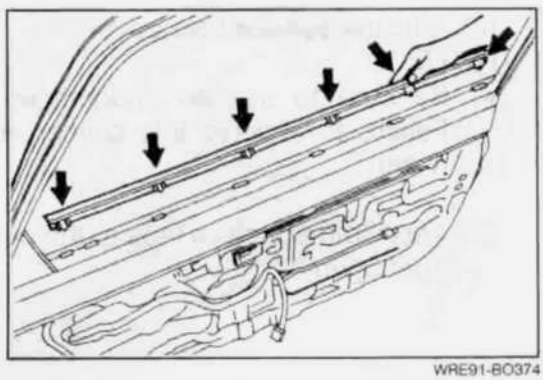
WRE91-BO372

(2) Align the lock section of the front door glass inner weatherstrip with the installing hole at the door side. Install the weatherstrip by pushing it.



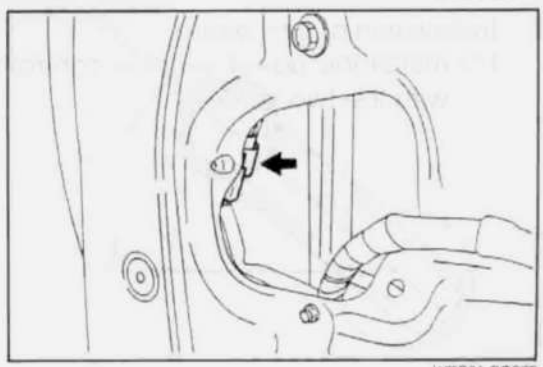
WRE91-BO373

(3) Align the clip section of the front door glass outer weatherstrip with the clip section at the door side. Install the weatherstrip by pushing it.



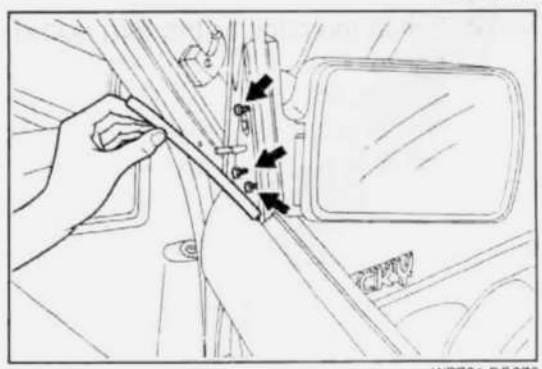
WRE91-BO374

(4) Connect the connector of the electrically operated outer rear-view mirror, (if so equipped). (For details, see the Body Electrical section.)



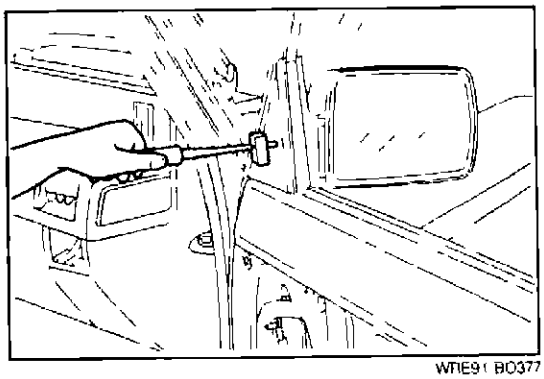
WRE91-BO375

(5) Install the outer rear-view mirror and tighten the attaching screw.
(6) Install the front door lower frame garnish.

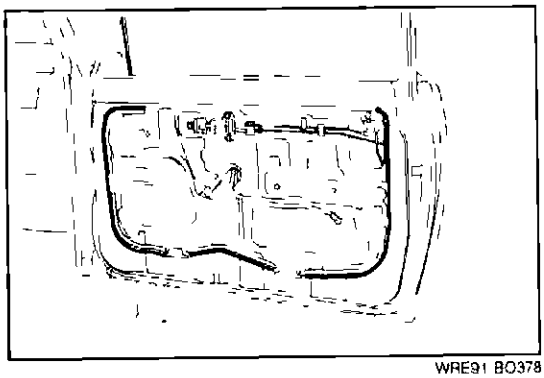


WRE91-BO376

(7) Install the outer rear-view mirror handle with the attaching screw

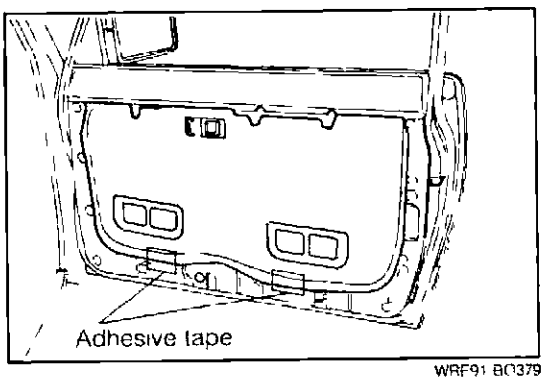

WRE91 BO377

2 Installation of service hole cover
(1) Affix butyl tape to the door, as shown in the right figure


WRE91 BO378

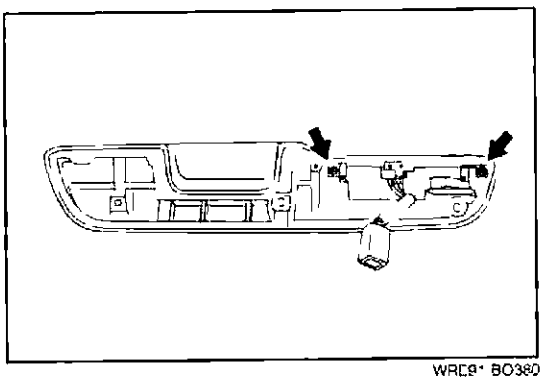
(2) Affix the service hole cover.
NOTE:
- **Be sure to use an undamaged service hole cover. Failure to observe this caution may cause ingress of water.**

(3) Affix cloth adhesive tape to the portions indicated in the right figure

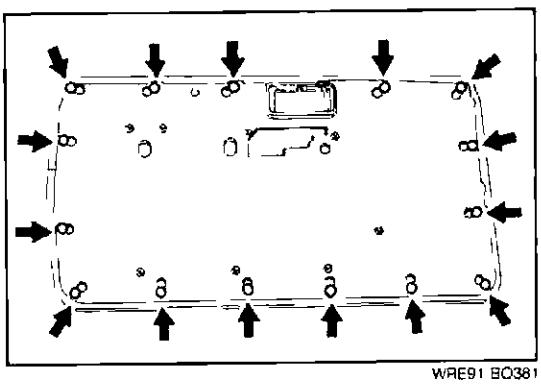


WRE91 BO379

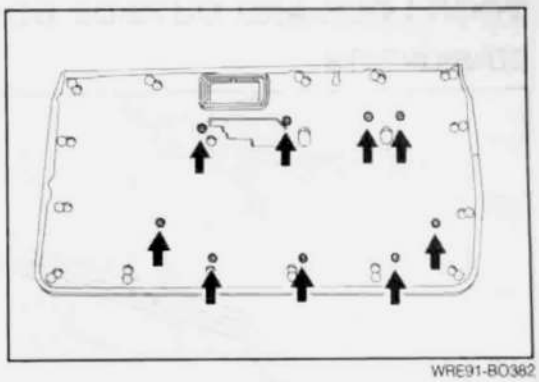
3 Installation of trim board
(1) Install the power window control switch to the armrest with the two screws


WRE91 BO380

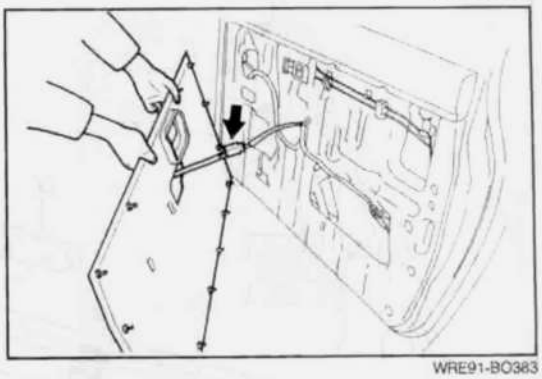
(2) Install the clips to the trim board, as shown in the right figure


WRE91 BO381

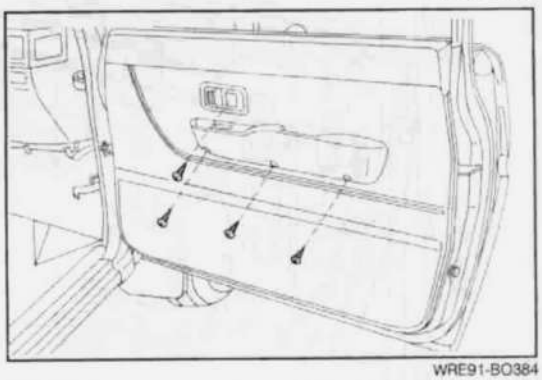
(3) Install the armrest to the trim board with the four screws.
(4) Install the door pocket to the trim board with the five screws, (if so equipped).


WRE91-BO382

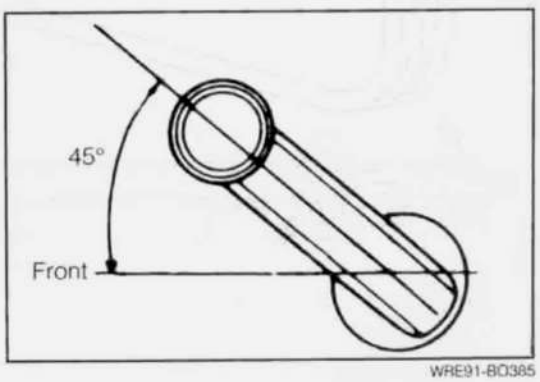
(5) Connect the power window connector.
(6) Install the trim board to the door. Lock the clip by pushing it to the door side.


WRE91-BO383

4. Install the door inside handle bezel to the door.
5. Tighten the attaching screw of the door inside handle bezel.
6. Tighten the attaching screw of the armrest.


WRE91-BO384

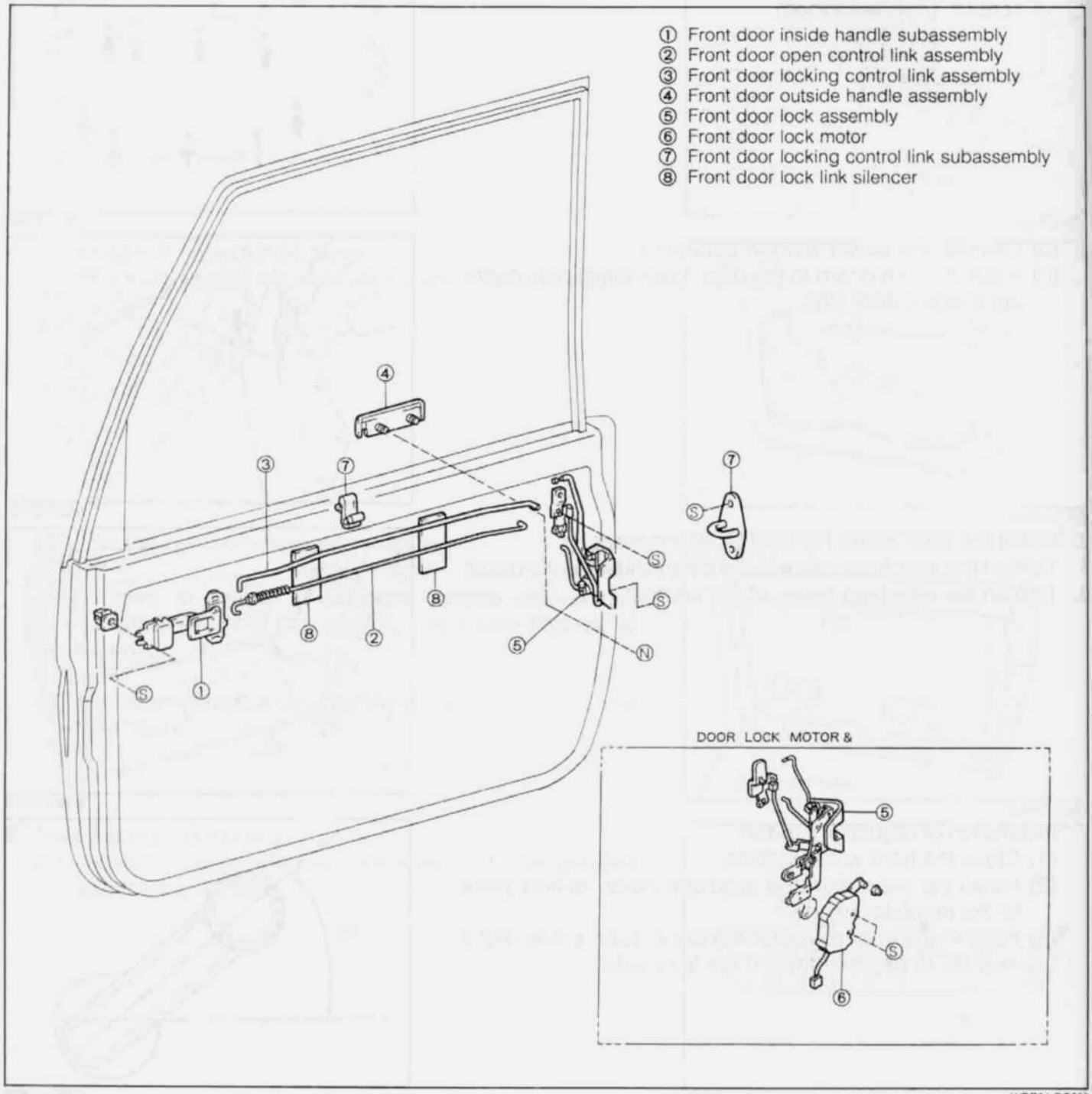
7. Installation of regulator handle
   (1) Close the front window glass.
   (2) Install the snap ring and regulator inside handle plate to the regulator handle.
   (3) Push in the door regulator handle in such a way that it may tilt 45 degrees toward the front side.



WRE91-BO385

DOOR LOCK AND OUTSIDE DOOR HANDLE

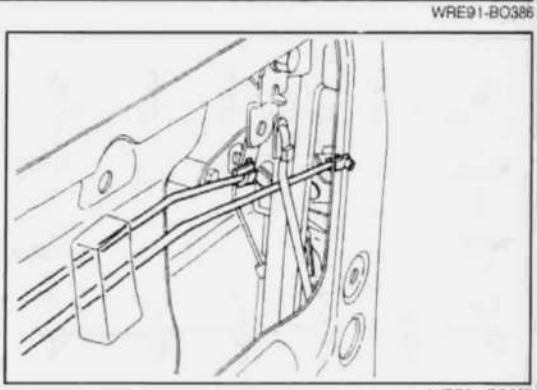
COMPONENTS



WRE91-BO386

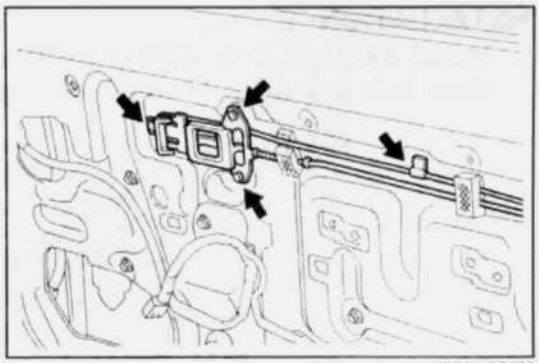
REMOVAL

1. Remove the door trim and service hole cover, as required. (See page BO–126.)
2. Close the front door glass.
3. Disconnect the front door locking control link and front door open control link from the front door lock assembly.



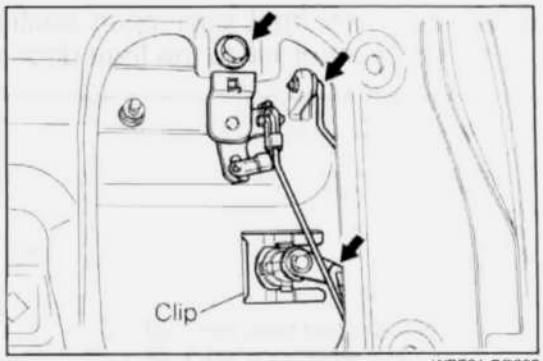
WRE91-BO387

4. Disconnect the front door locking control link from the front door locking control link clamp.
5. Remove the front door inside handle subassembly by removing the three attaching bolts.



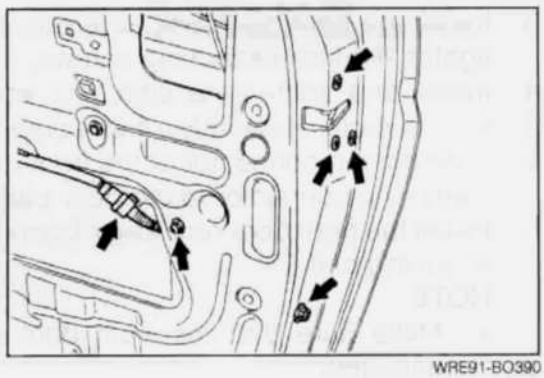
WRE91-BO388

6. Disconnect the door open control link from the front door outside handle subassembly.
7. Remove the front door outside handle by removing the two attaching nuts.
8. Disconnect the door lock control link from the door lock cylinder.
9. Remove the door lock cylinder by removing the sleeve clamp.
10. Remove the front door locking control link assembly from the door panel.

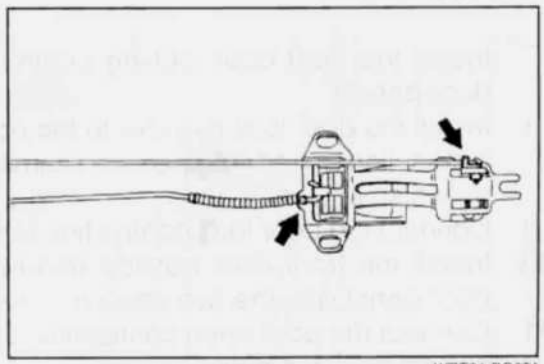


WRE91-BO389

11. Remove the front door rear lower frame subassembly attaching bolt.
12. Remove the front door control motor assembly attaching bolt, (if so equipped).
13. Disconnect the front door control motor connector, (if so equipped).
14. Disconnect the front door control motor connector from the body, (if so equipped).
15. Remove the three attaching screws of the front door lock assembly.
16. Remove the front door lock assembly.
17. Disconnect the front door open control link and front door locking control link from the front door inside handle.

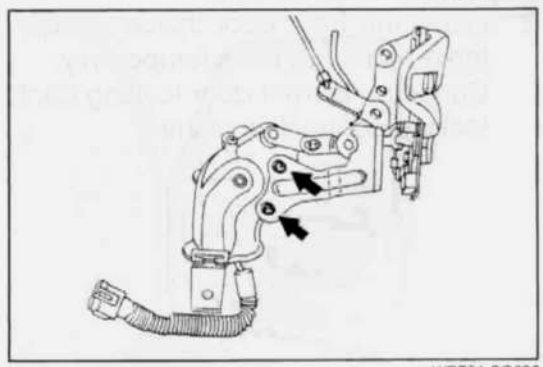


WRE91-BO390



WRE91-BO391

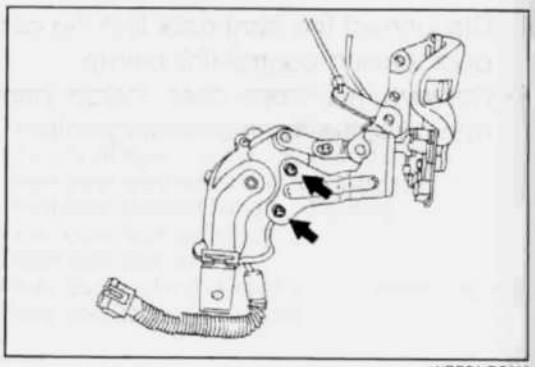
18. Remove the front door control motor assembly from the front door lock assembly, (if so equipped). (For details of the front door control motor, see the Body Electrical section.)



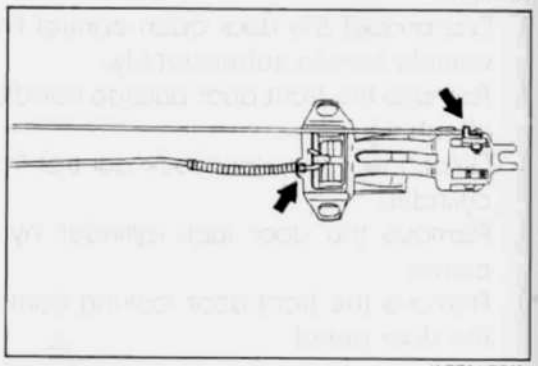
WRE91-BO392

INSTALLATION

1. Install the front door control motor assembly to the front door lock assembly, (if so equipped).

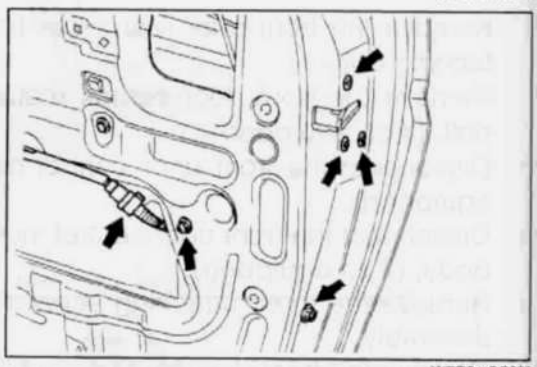

WRE91-BO393

2. Connect the front door open control link and front door locking control link to the front door inside handle.

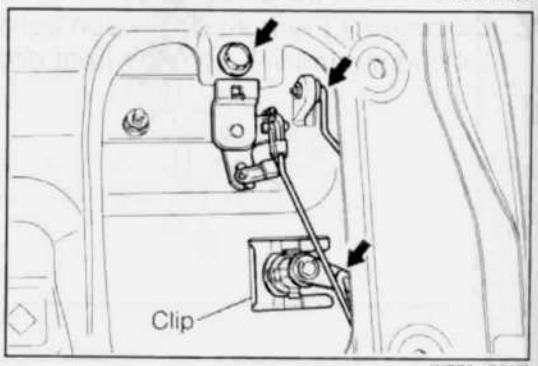

WRE91-BO394

3. Install the front door lock assembly to the door panel and tighten the three attaching screws.
4. Install and tighten the attaching screw of the front door control motor assembly, (if so equipped).
5. Connect the connector of the front door control motor and clamp the connector to the door panel, (if so equipped).
6. Install the front door rear lower frame subassembly with the attaching bolt.

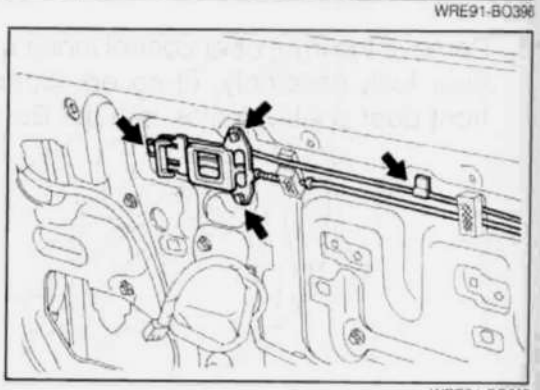
   NOTE:
   - Make sure that the front door glass run is not disengaged.


WRE91-BO395

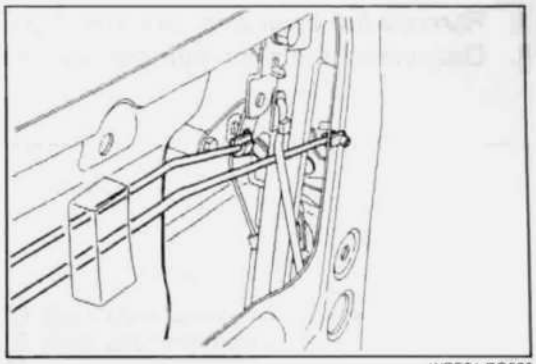
7. Install the front door locking control link assembly to the door panel.
8. Install the door lock cylinder to the door panel with the new lock cylinder pad interposed. Clamp the cylinder with the new clamp.
9. Connect the door lock control link to the the door lock cylinder.
10. Install the front door outside handle subassembly to the door panel with the two attaching nuts.
11. Connect the door open control link to the front door outside handle subassembly.
12. Install the front door inside handle subassembly with the three attaching bolts temporarily.
    Connect the front door locking control link to the front door locking control link clamp.



WRE91-BO396

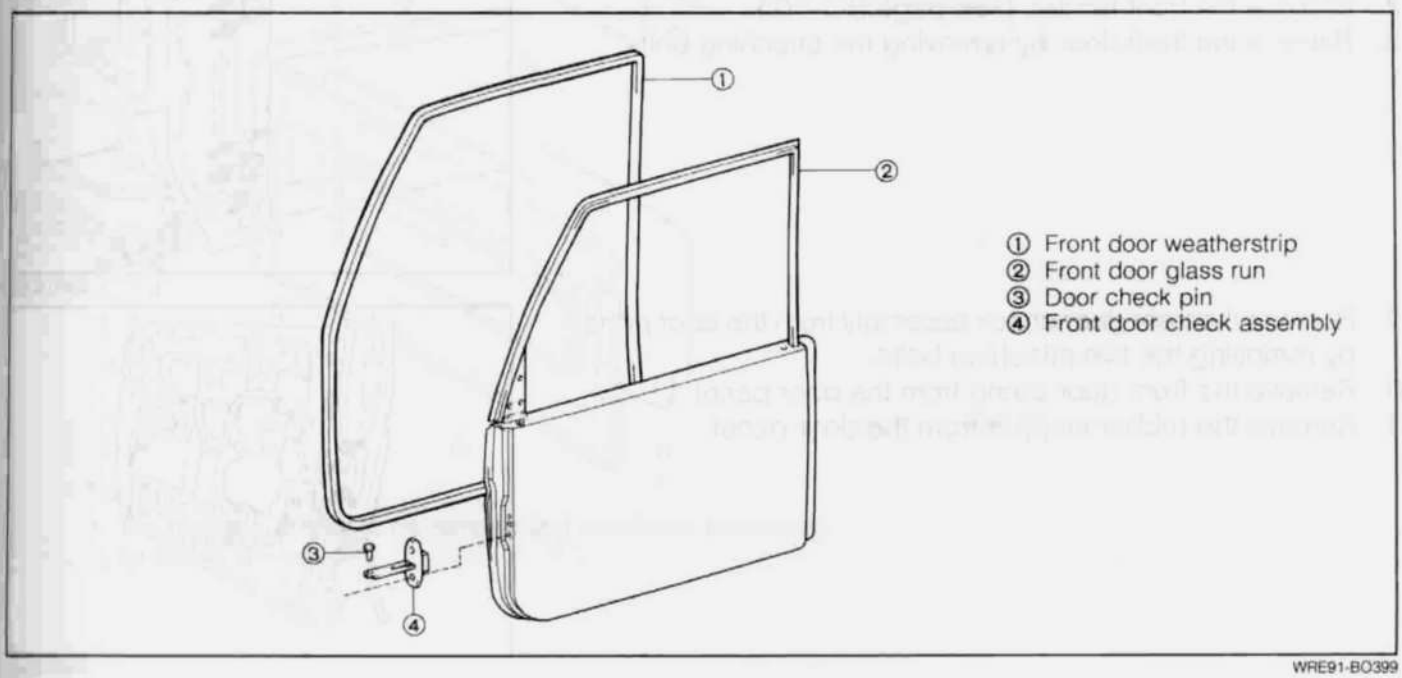

WRE91-BO397

13. Connect the front door locking control link and front door open control link to the front door lock assembly.
14. Tighten the attaching bolts of the front door inside handle assembly.
15. Install the service hole cover and door trim.
(See page BO–129.)


WRE91-BO398

FRONT DOOR

COMPONENTS

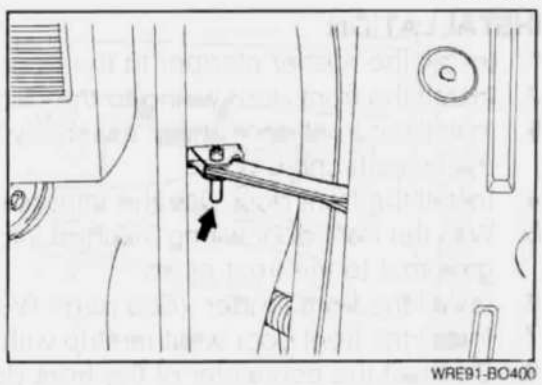


① Front door weatherstrip
② Front door glass run
③ Door check pin
④ Front door check assembly

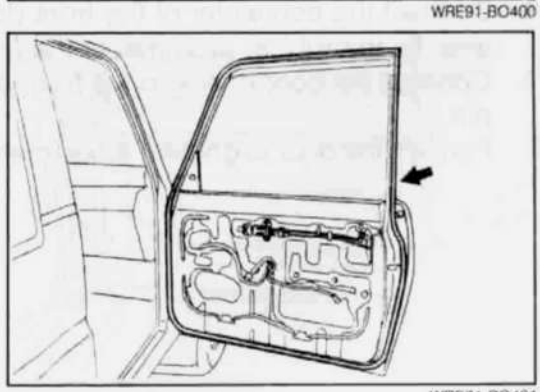
WRE91-BO399

REMOVAL

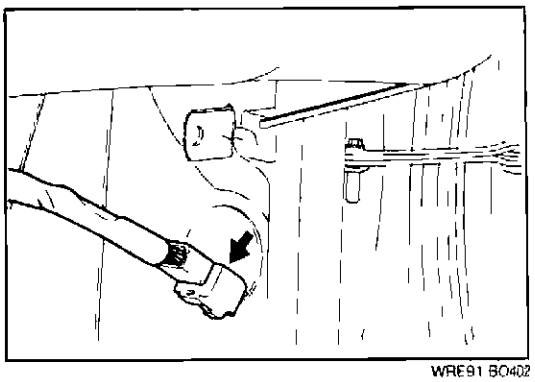
1. Remove the door check pin.
2. Remove the rubber grommet from the front pillar. Disconnect the front door wiring connector from the cowl wire.


WRE91-BO400

3. Remove the front door weatherstrip.
NOTE:
- Be sure to disconnect the weatherstrip clip from the door panel, using a screwdriver or the like.

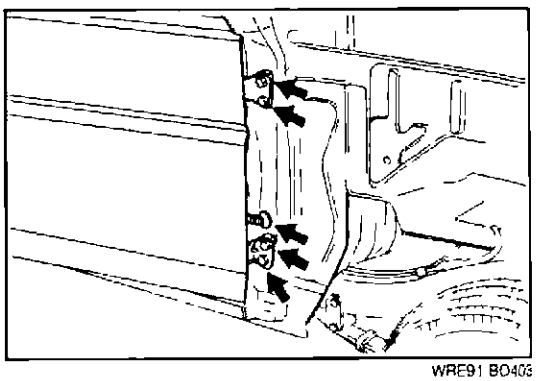

WRE91-BO401

4 Remove the cowl wire grommet from the front pillar
5 Disconnect the door wire connector from the cowl wire



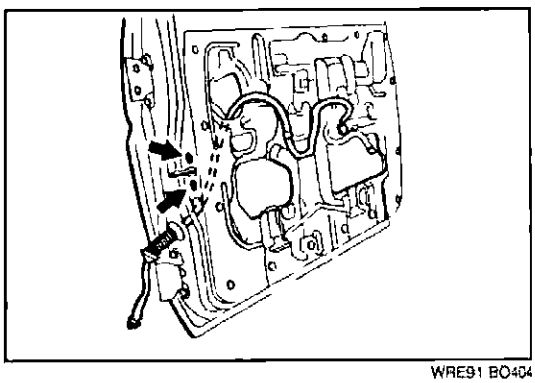
WRE91 BO402

6. Remove the rubber grommet of the front door wiring from the front pillar
7 Remove the front fender (See page BO–70)
8 Remove the front door by removing the attaching bolts.



WRE91 BO403

9 Remove the front door check assembly from the door panel by removing the two attaching bolts
10 Remove the front door wiring from the door panel.
11 Remove the rubber stopper from the door panel



WRE91 BO404

INSTALLATION

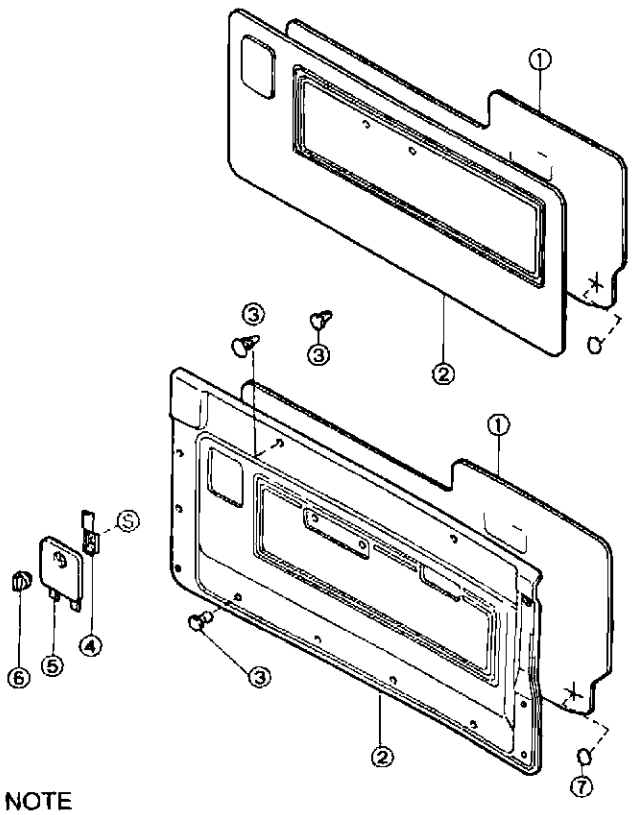
1 Install the rubber stopper to the door panel
2 Install the front door wiring to the door panel
3 Install the front door check assembly to the door panel with the two attaching bolts
4 Install the front door with the attaching bolts
5. With the front door wiring inserted into the front pillar, fit the grommet to the front pillar
6 Install the front fender (See page BO–71.)
7 Install the front door weatherstrip with the weatherstrip clip.
8 Connect the connector of the front door wiring to the cowl wire. Fit the rubber grommet to the front pillar.
9 Connect the door check to the front pillar Insert the check pin
10. Perform the door alignment adjustment (See page BO–59)

WRE91 BO105

BACK DOOR

DOOR TRIM AND SERVICE HOLE COVER

COMPONENTS



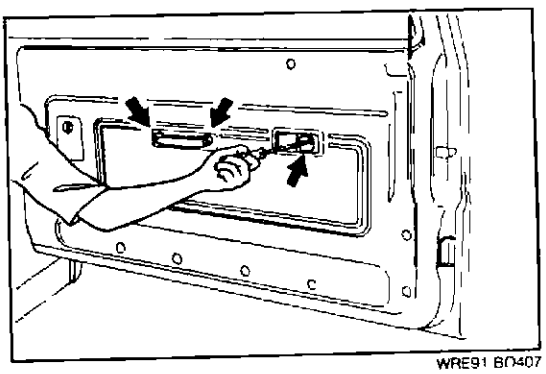
① Back door service hole cover
② Back door trim board
③ Clip
④ Washer tank cover stopper
⑤ Back door service hole cover
⑥ Washer tank cover knob
⑦ Hole cover

NOTE
- The following describes the removal and installation procedures for the full-trim vehicles.

WRE91 BO406

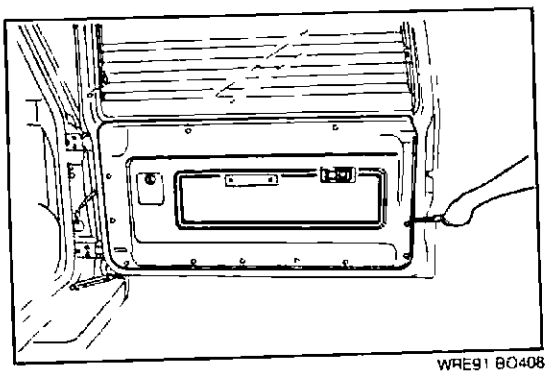
REMOVAL

1 Remove the attaching screw of the back door inside handle bezel
2 Remove the assist grip by removing the two attaching screws, (if so equipped)
3 Remove the back door inside handle bezel, (if so equipped).



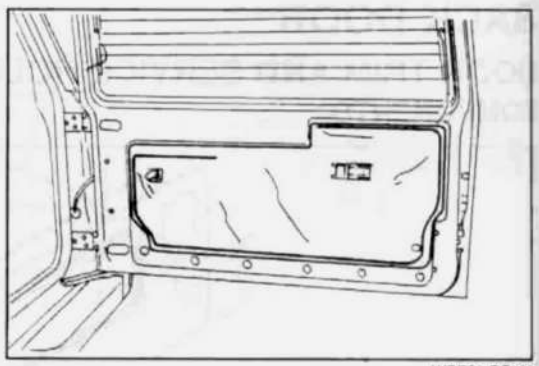
WRE91 BO407

4 Removal of trim board
Disconnect the clips from the door by inserting a screwdriver or the like into the clip connecting section of the trim board.
NOTE:
- Be very careful not to damage the paint finish surface and trim board.
- On the full-trim vehicles, care must be exercised not to damage the trim board, for the upper section of the trim board is inserted into the lower side of the weatherstrip.



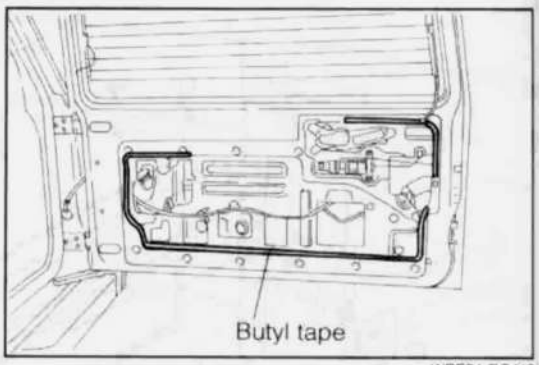
WRE91 BO408

5. Remove the back door service hole cover.
   NOTE:
   - Be very careful not to tear off the service hole cover. Failure to observe this caution may cause ingress of water.


WRE91-BO409

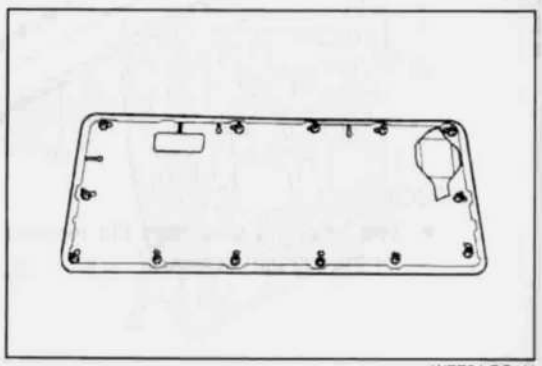
INSTALLATION

1. Installation of service hole cover
   (1) Affix butyl tape to the door, as shown in the right figure.
   (2) Affix the service hole cover.

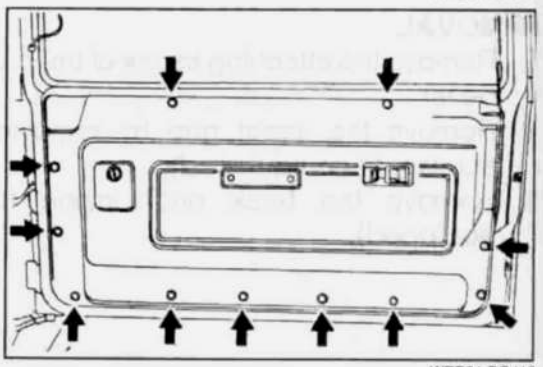


WRE91-BO410

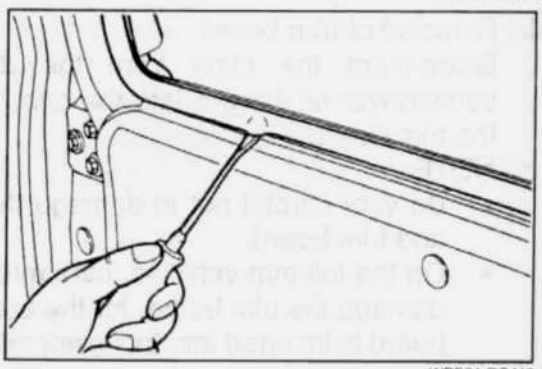
2. Installation of trim board
   (1) Install the clips to the trim board, as shown in the right figure.
   (Except for full-trim vehicle)


WRE91-BO411

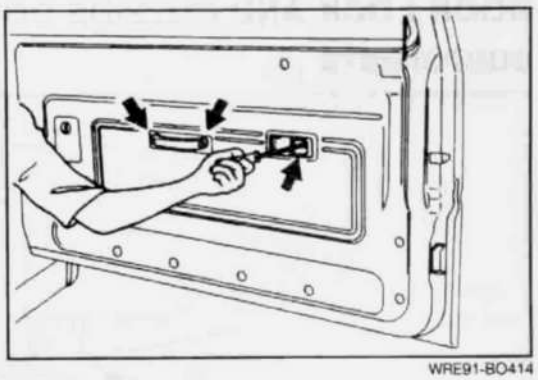
   (2) Install the trim board to the rear door.
   (3) Install the trim board to the rear door with the clip.
   (full-trim vehicle)


WRE91-BO412

4. Insert the upper section of the trim board into the lower side of the weatherstrip. (Full-trim vehicle only)


WRE91-BO413

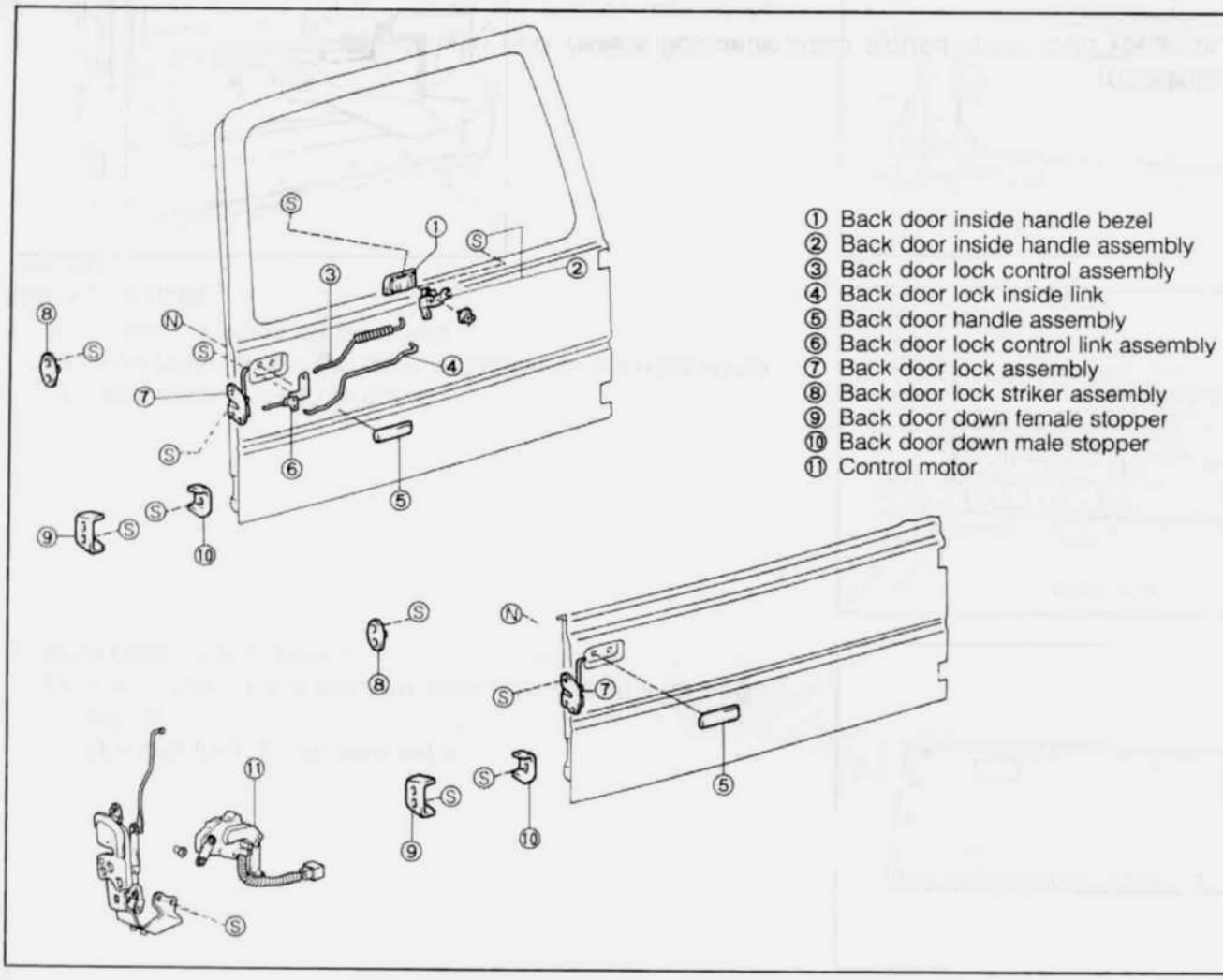
5. Install the back door inside handle bezel, (if so equipped).
6. Install the assist grip with the two attaching screws, (if so equipped).
7. Install the back door inside handle bezel attaching screw, (if so equipped).



WRE91-BO414

DOOR LOCK AND OUTSIDE DOOR HANDLE

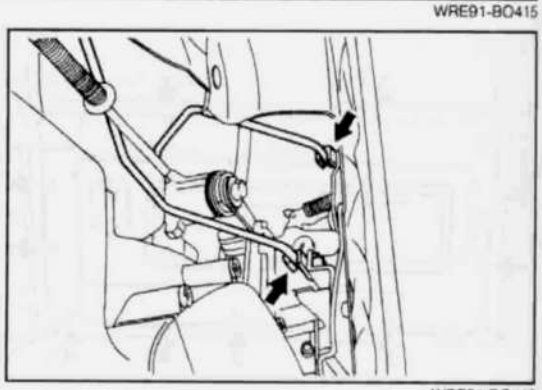
COMPONENTS



WRE91-BO415

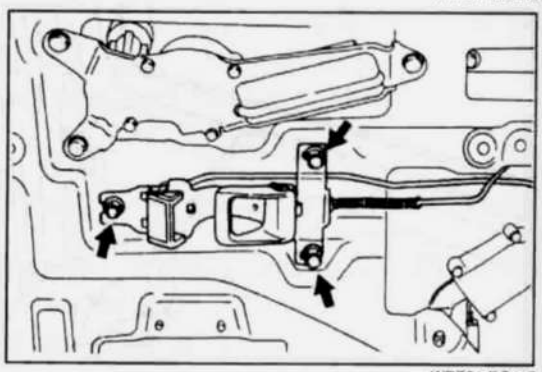
REMOVAL

1. Remove the door trim and service hole cover. (See page BO–137.)
2. Disconnect the back door lock control link and back door lock link from the back door lock assembly.



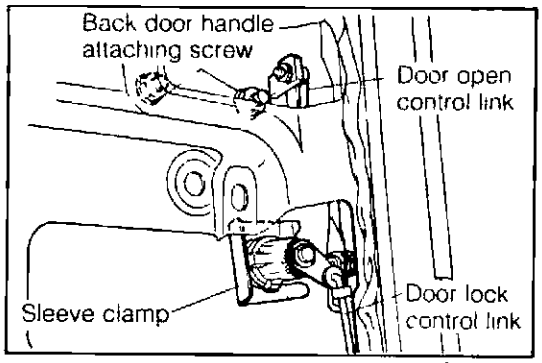
WRE91-BO416

3. Remove the back door inside handle assembly by removing the three attaching bolts.



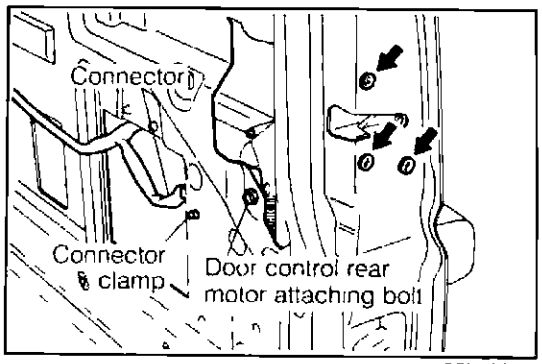
WRE91-BO417

4 Disconnect the back door open control link from the back door handle assembly.
5 Remove the back door handle assembly by removing the two attaching nuts
6 Disconnect the back door lock control link from the back door lock cylinder
7 Remove the back door lock cylinder by removing the door lock cylinder and sleeve clamp



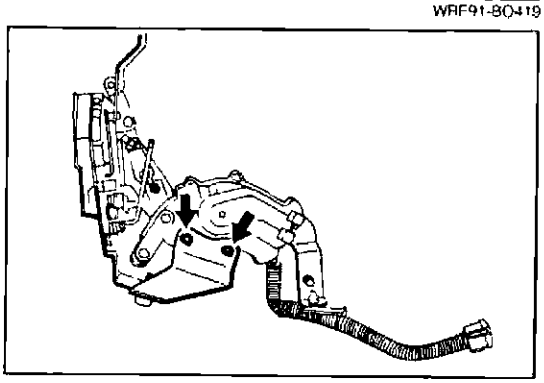
WRE91 BO418

8 Disconnect the connector of the door control rear motor Disconnect the clamp from the door panel
9 Remove the door control rear motor attaching bolt, (if so equipped)
10 Remove the back door lock assembly by removing the attaching screws

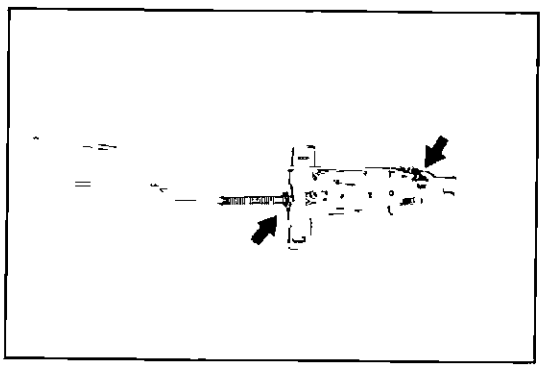


WRE91-BO419

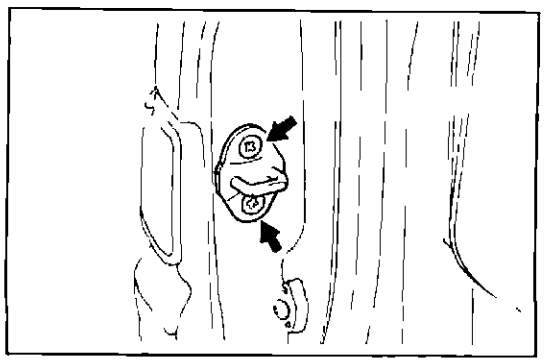
11 Remove the door control rear motor from the back door lock assembly, (if so equipped), by removing the attaching bolts


WRE91 BO420

12 Remove the back door lock control link and back door lock link from the back door inside handle assembly.

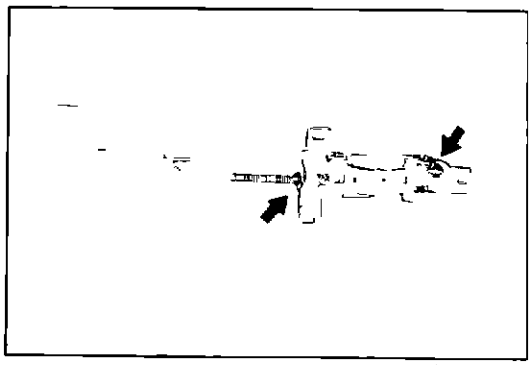

WRE91 BO421

13 Remove the back door lock striker, as required.


WRE91 BO122

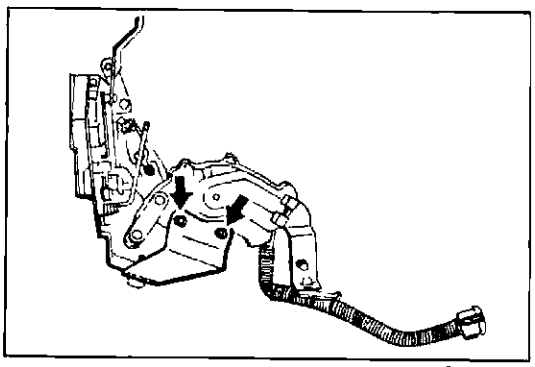
INSTALLATION

1 Connect the back door lock control link and back door lock link to the back door inside handle



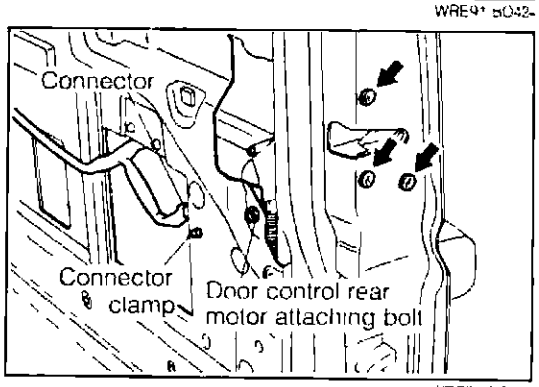
WRE91 BO423

2 Install the door control rear motor to the back door lock assembly with the attaching bolts, (if so equipped)



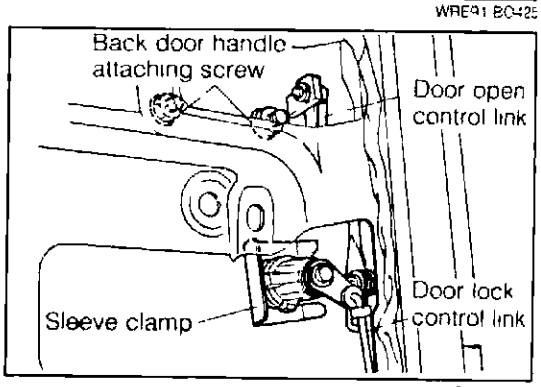
WRE91 BO42-

3 Install the back door lock assembly with the attaching screws
4 Install the door control rear motor attaching bolt, (if so equipped)
5 Connect the connector of the door control rear motor, (if so equipped)



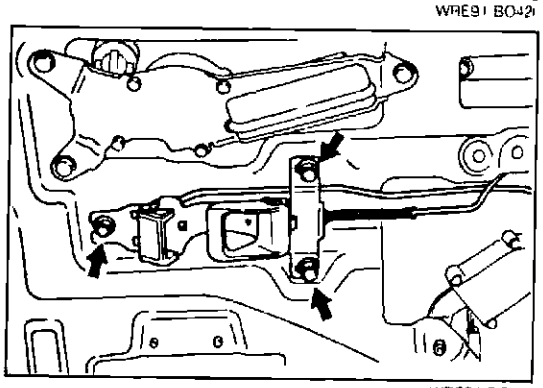
WRE91 BO425

6 Install the back door lock cylinder with the door lock cylinder and sleeve clamp with the lock cylinder pad interposed
7 Connect the back door lock control link to the back door lock cylinder
8 Install the back door handle assembly with the two attaching nuts
9 Connect the back door open control link to the back door handle assembly



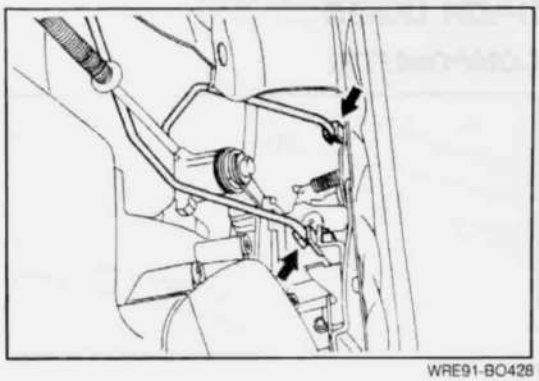
WRE91 BO42(

10 Install the back door inside handle assembly with the three attaching bolts temporarily



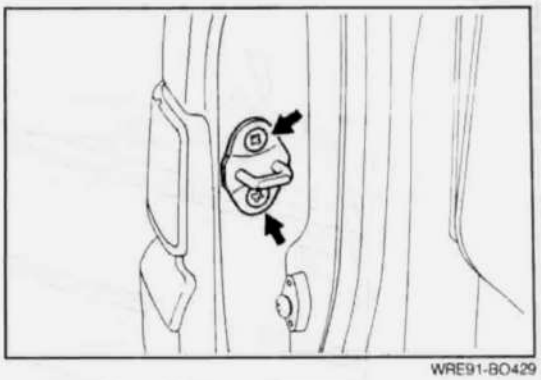
WRE91 BO42-

11. Connect the back door lock control link and back door link to the back door lock assembly.
12. Tighten the back door inside handle attaching bolts.
13. Install the door trim and service hole cover.
(See page BO–138.)



WRE91-BO428

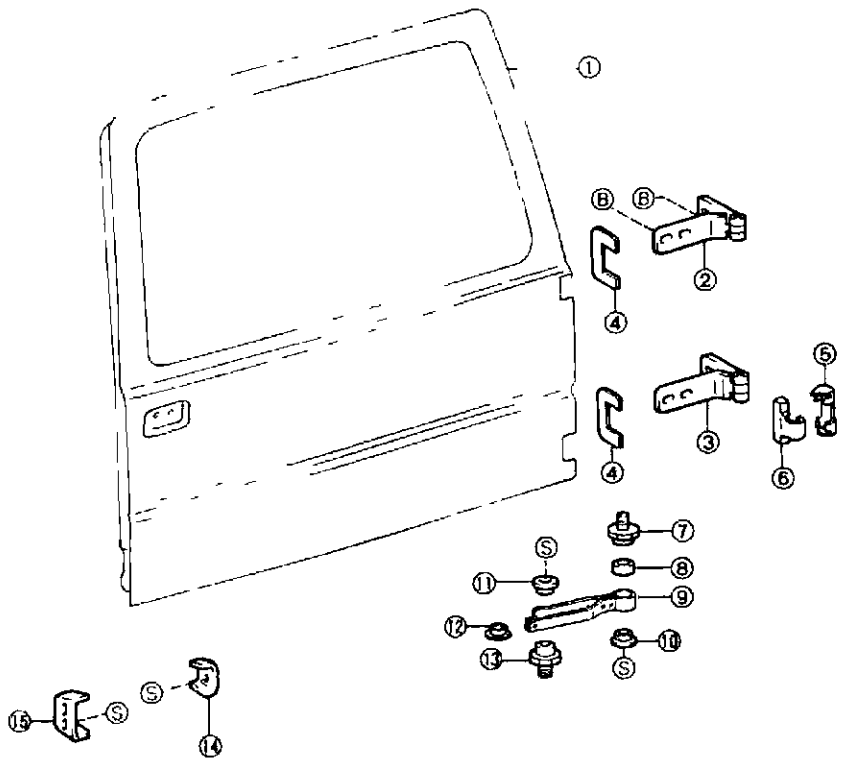
14. Install the back door lock striker.
15. Adjust the door lock.



WRE91-BO429

BACK DOOR

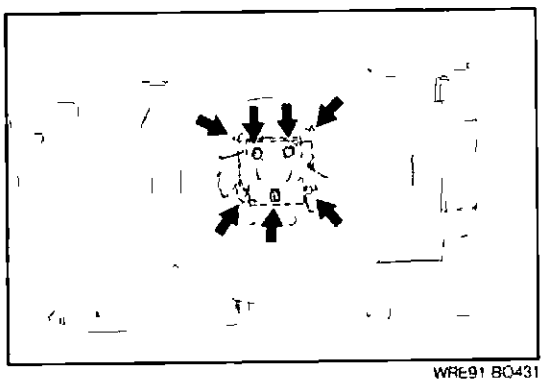
COMPONENTS



① Back door panel subassembly
② Back door upper hinge assembly
③ Back door lower hinge assembly
④ Back door hinge packing
⑤ Back door hinge female cover
⑥ Back door hinge cover
⑦ Door check pin
⑧ Bush
⑨ Back door check
⑩ Washer plate
⑪ Washer plate
⑫ Spacer
⑬ Door check pin
⑭ Back door down female stopper
⑮ Back door down male stopper

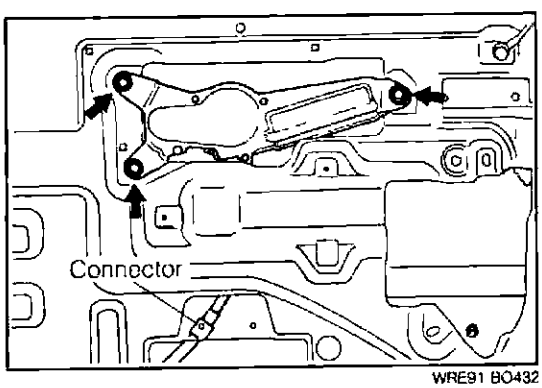
WRE91 BO430

1 Remove the spare tire and spare wheel carrier
2 Remove the wiper arm and blade, (if so equipped) (For details, see the Body Electrical section.)
3 Remove the back door glass
(See page BO-119)
4 Remove the trim and service hole cover
(See page BO-137)
5 Remove the door lock and outside door handle
(See page BO-140)



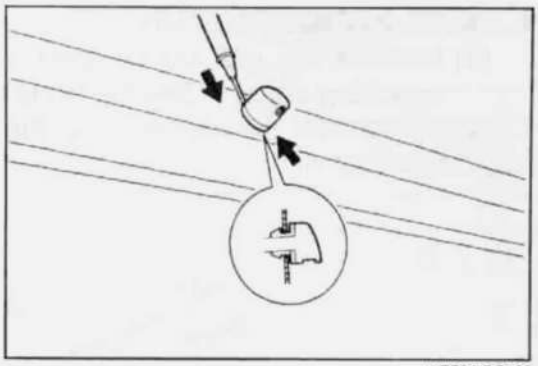
WRE91 BO431

6 Removal of rear wiper motor assembly
(For details, see the Body Electrical section)
(1) Disconnect the connector
(2) Remove the rear wiper motor assembly by removing the three attaching bolts and nuts

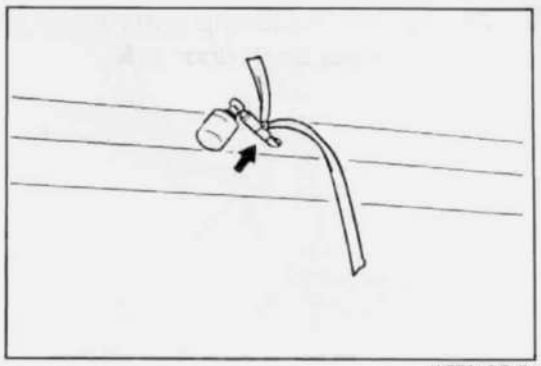


WRE91 BO432

7. Removal of rear window washer-related parts
   (1) Release the lock of the washer nozzle with a small screwdriver or the like. Remove the washer nozzle from the back door.


WRE91-BO433

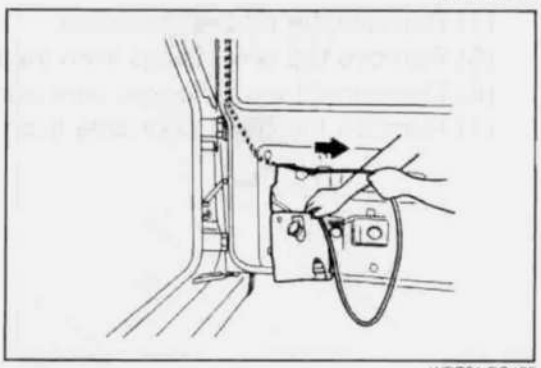
   (2) Tie a string to the washer hose.
   (3) Remove the washer nozzle from the hose.


WRE91-BO434

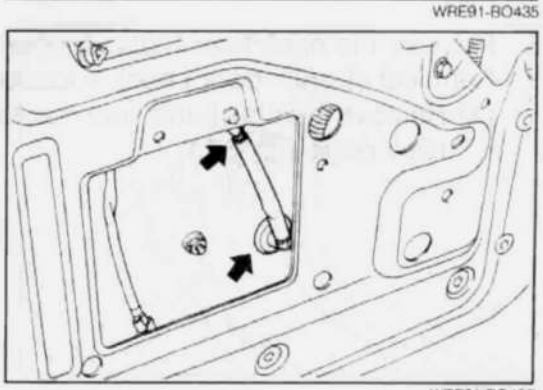
   (4) Disconnect the connector of the rear washer jar.
   (5) Pull out the rear washer hose, until the string tied to the forward end of the rear washer hose appears.
   (6) Untie the string from the washer hose.

   NOTE:
   - Leave the string at the door panel side.

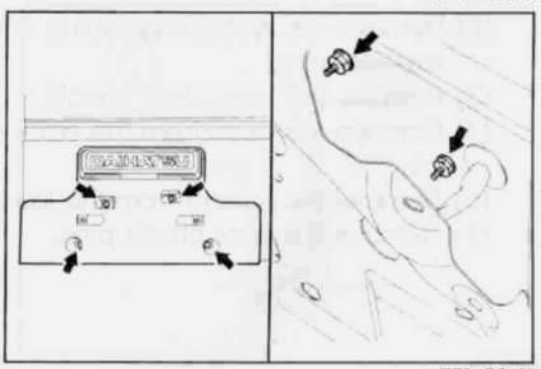
   (7) Remove the rear washer jar from the back door panel.


WRE91-BO435

8. Removal of rear license plate lamp
   (1) Disconnect the rear license plate lamp connector.
   (2) Disconnect the rubber grommet to the outside. (ECE & EEC specifications equipped vehicle only)


WRE91-BO436

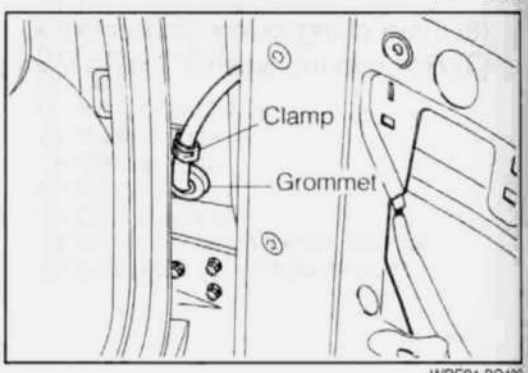
   (3) Remove the license plate lamp assembly or license plate lamp assembly with the license plate lamp bracket.


WRE91-BO437

9. Removal of back door wire
   (1) Remove the rear combination lamp by removing the attaching screw. (See the Body Electrical section.)
   (2) Disconnect the connector of the back door wire from the floor wire.

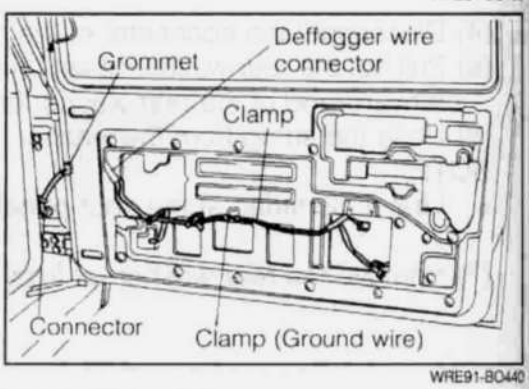

WRE91-BO438

   (3) Remove the clamp and rubber grommet and pull them out to the back door side.



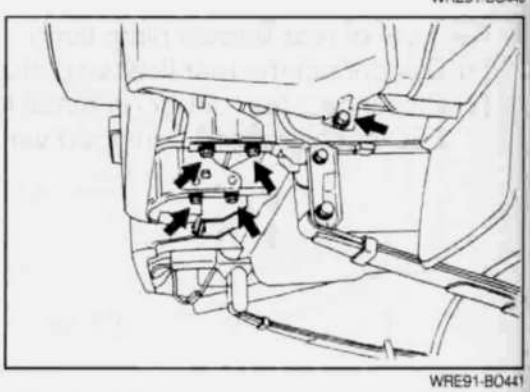
WRE91-BO439

   (4) Remove the rubber grommet.
   (5) Remove the wire clamp from the back door panel.
   (6) Disconnect the defogger wire connector.
   (7) Remove the back door wire from the back door panel.

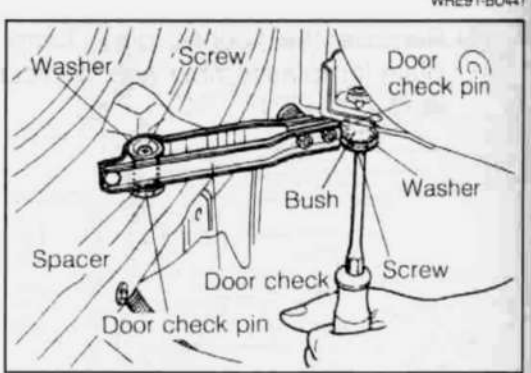


WRE91-BO440

8. Remove the back door male stopper.
9. Removal of back door check subassembly
   (1) Remove the right hand side rear bumper, (if necessary). (See page BO-67.)

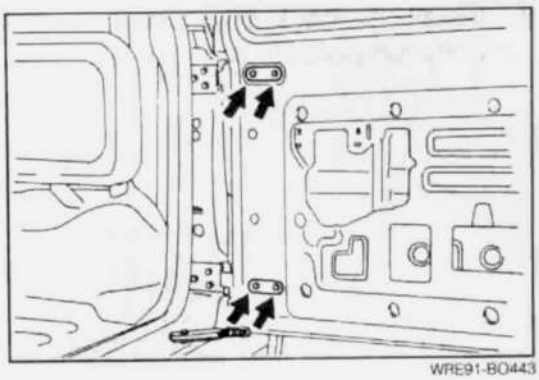

WRE91-BO441

   (2) Remove the washer attaching screws and remove the washer.
   (3) Remove the back door check.
   (4) Remove the bush from the back door side door check pin.
   (5) Remove the spacer from the lower back panel side.
   (6) Remove the door check pins.

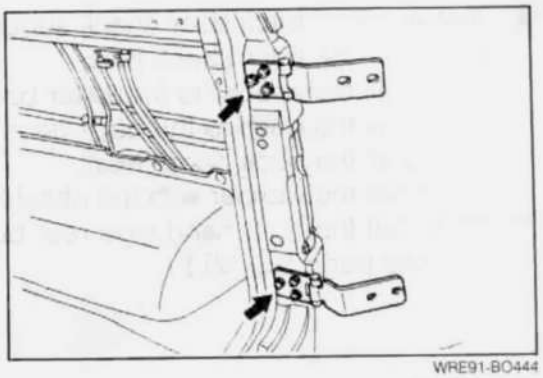


WRE91-BO442

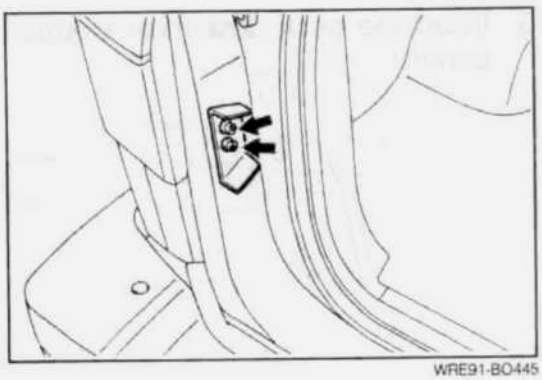
10. Remove the hole plugs.
11. Remove the back door panel assembly by removing the attaching bolts.


WRE91-BO443

12. Remove the back door hinges by removing the attaching bolts.

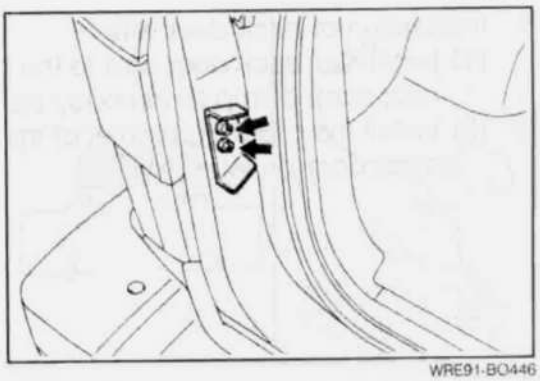

WRE91-BO444

13. Remove the back door down female stopper.

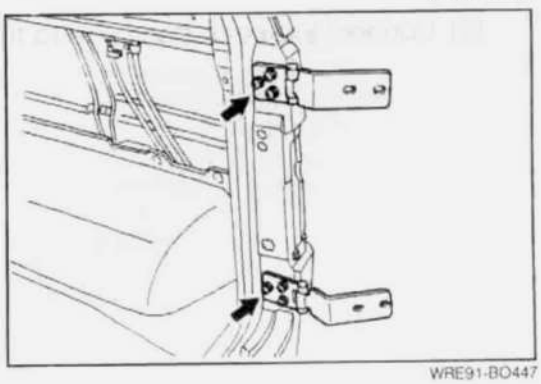

WRE91-BO445

INSTALLATION

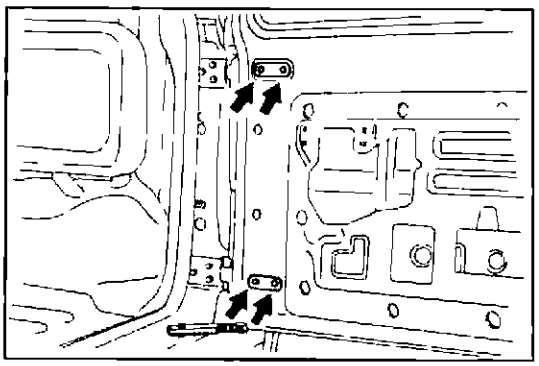
1. Install the back door down female stopper temporarily.


WRE91-BO446

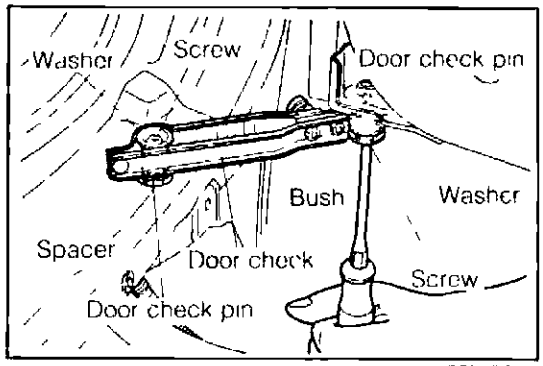
2. Install the back door hinges with the attaching screws temporarily.


WRE91-BO447

3 Install the back door panel assembly with the attaching bolts temporarily

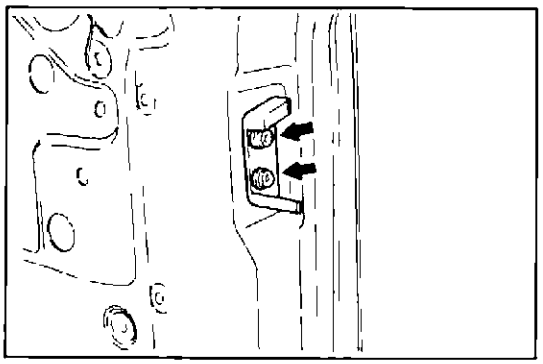

WRE91 BO448

4 Installation of back door check subassembly
(1) Install the door check pins
(2) Install the spacer to the lower back panel side
(3) Install the bush to the back door side door check pin
(4) Install the back door check
(5) Install the washer with the attaching screw
(6) Install the right hand side rear bumper, (if necessary) (See page BO-68)

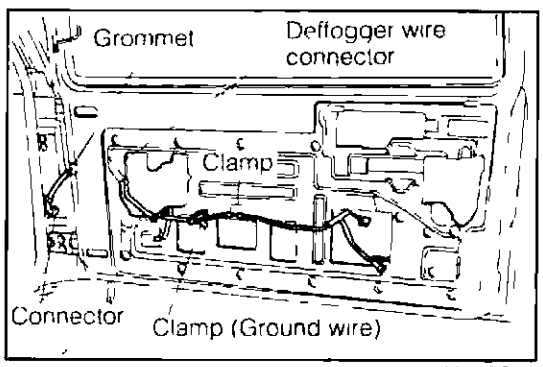


WRE91 BO449

5 Install the back door male stopper with the screws temporarily


WRE91 BO450

6 Installation of back door wire
(1) Install the back door wire to the back door panel Connect each clamp to the body panel
(2) Install the rubber grommet of the back door wire to the back door panel

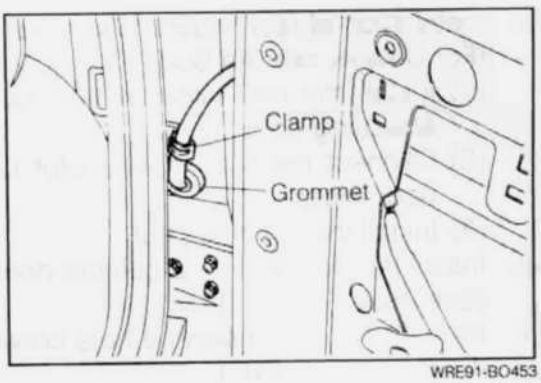


WRE91 BO451

(3) Connect the back door wire to the floor wire


WRE91-BO452

(4) Fit the rubber grommet to the side panel. Clamp the wire with the wire clamp.
(5) Install the rear combination lamp with attaching screws. (See the Body Electrical section.)

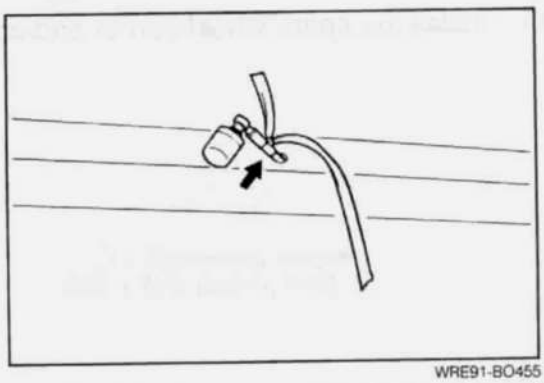


WRE91-BO453

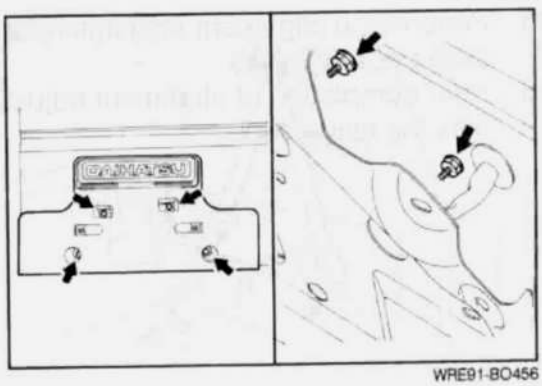
7. Installation of rear window washer-related parts
(1) Insert a suitable string through the washer nozzle hole, until it reaches around washer jar.
(2) Install the rear washer jar to the back door panel with the hooks.
(3) Connect the washer pump connector.

WRE91-BO454

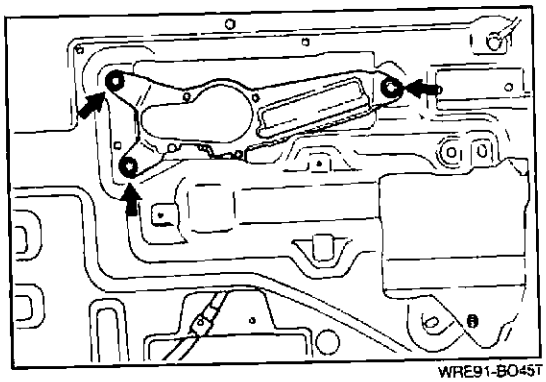
(4) Tie the string to the washer hose.
(5) Pull the string from the washer nozzle attaching hole to pull out the washer hose.
(6) Connect the washer hose to the washer nozzle and push it to the back door panel installing section. Lock the lock section.


WRE91-BO455

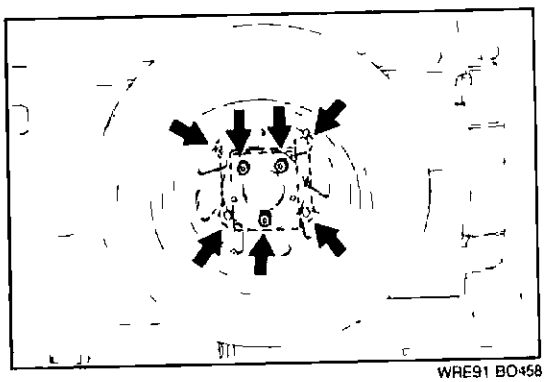
8. Installation of rear license plate lamp
(1) Install the license plate lamp assembly or the license plate lamp assembly with license plate lamp bracket to the back door panel.
(2) Connect the grommet of the license plate lamp to the back door panel.
(3) Connect the rear license plate connector.


WRE91-BO456

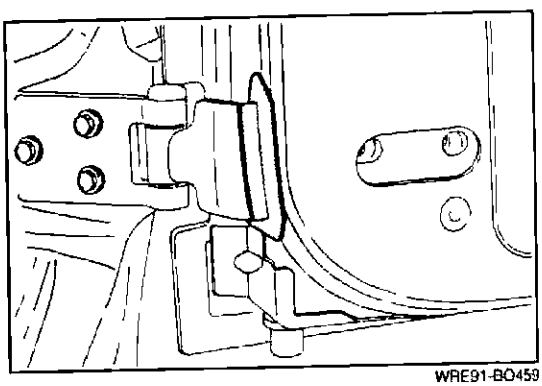
9 Installation of rear wiper motor assembly
(For details, see the Body Electrical section)
(1) Install the rear wiper motor assembly with the three attaching bolts.
(2) Connect the rear wiper motor connector to the back door wiper
(3) Install the attaching nut
10 Install the door lock and outside door handle.
(See page BO-142)
11 Install the trim and service hole cover.
(See page BO-137)
12 Install the back door glass.
(See page BO-120)
13 Install the wiper arm and blade.
(See the Body Electrical section.)


WRE91-BO457

14 Install the spare wheel carrier and spare tire

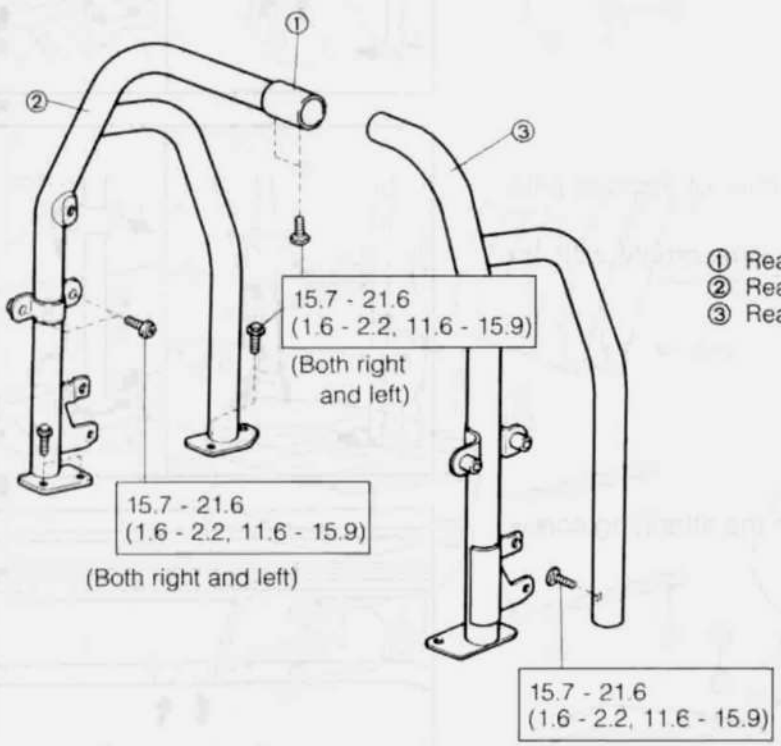

WRE91 BO458

15 Perform the alignment adjustment of the rear door.
(See page BO-59.)
16 After completion of alignment adjustment of the rear door, affix the hinge seal.


WRE91-BO459

REAR PILLAR MEMBER

COMPONENTS



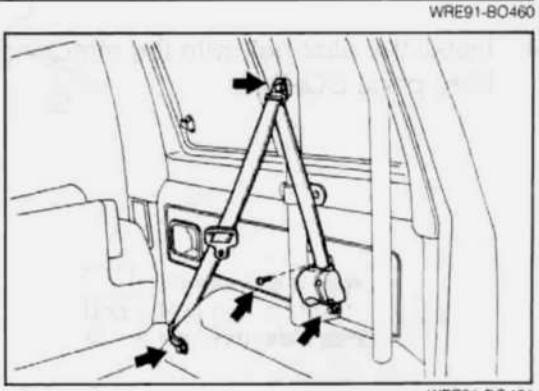
① Rear pillar member No. 2
② Rear pillar side right member subassembly
③ Rear pillar side left member subassembly

□ : Tightening torque
Unit : N·m (kgf-m, ft-lb)

WRE91-BO460

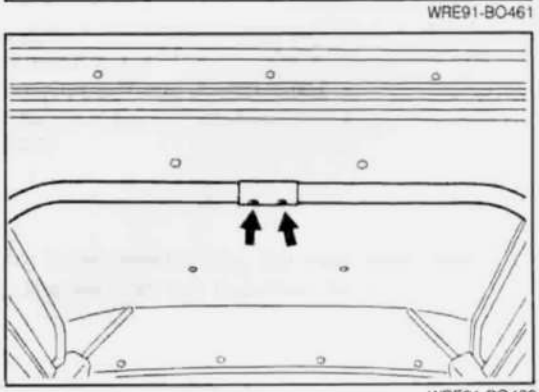
REMOVAL

1. Remove the seat belt by removing the attaching bolts and screws. (See page BO-169.)



WRE91-BO461

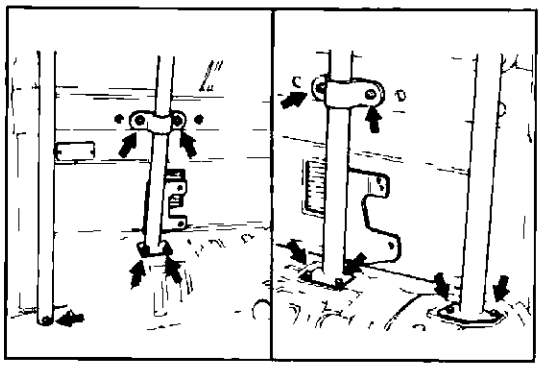
2. Remove the rear pillar member No. 2 attaching screws. Move the rear pillar member to either of the rear pillar side members.
   NOTE:
   - The size of the attaching screw is Torx® T40.



WRE91-BO462

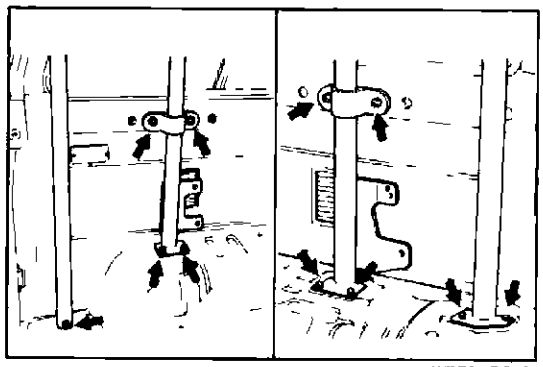
3. Remove the attaching screws of the rear pillar side member
   NOTE:
   - The size of the attaching screw is Torx® T40.

4 Remove the rear pillar member No 2

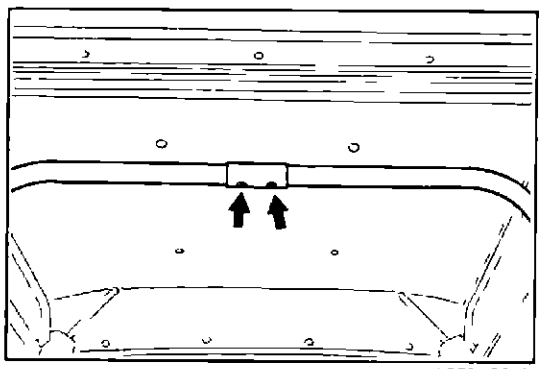

WRE91 BO463

INSTALLATION

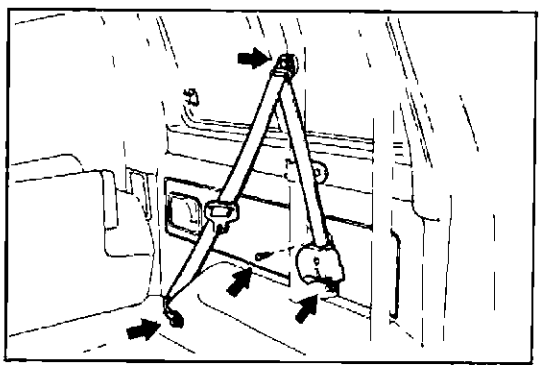
1 Assemble the rear pillar member to either of the rear pillar side member subassemblies
2 Install the rear pillar side member subassembly with the attaching screw.


WRE91 BO464

3 Install the rear pillar member No. 2 with the attaching screw.

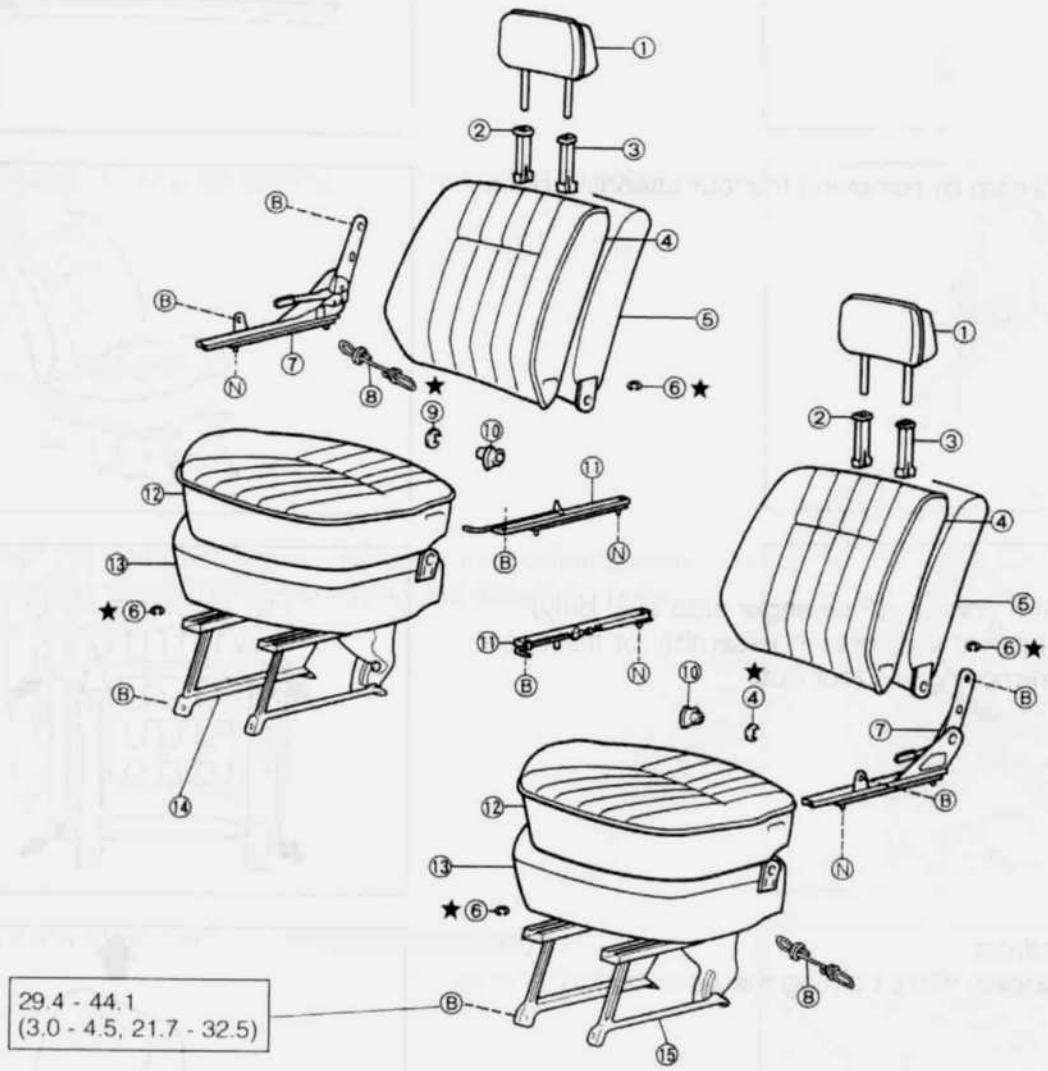

WRE91 BO465

4 Install the seat belt with the attaching bolts and screws (See page BO–70)


WRE91 BO466

FRONT SEAT

COMPONENTS



WRE91-BO467

□ : Tightening torque
Unit : N·m (kgf-m, ft-lb)
★ : Non-reusable parts

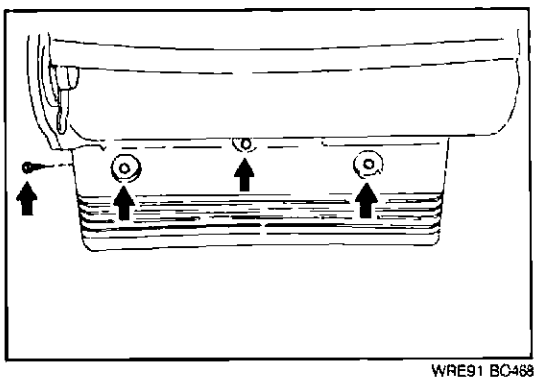
① Front seat headrest assembly
② Seat headrest support
③ Seat headrest support assembly
④ Front seat back cover
⑤ Front seat back cushion & frame
⑥ Hook small ring
⑦ Reclining seatback adjuster assembly
⑧ Seat track equalizing wire subassembly
⑨ "E" ring
⑩ Bush
⑪ Front seat track
⑫ Front seat cushion cover
⑬ Front seat cushion & frame
⑭ Front seat track
⑮ Front seat track

NOTE:

- The following describes the disassembling and assembling procedures for those seats having the most basic seat construction. There are instances where the seat construction is partially different from that described here.

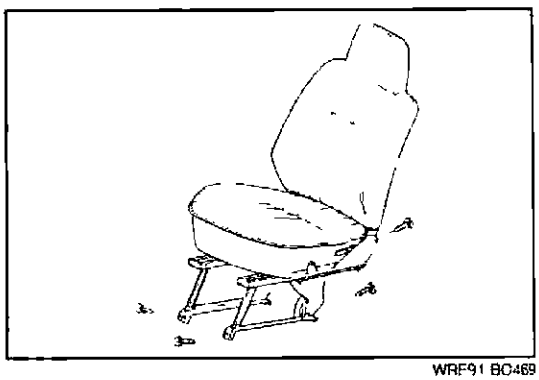
REMOVAL

1 Remove the front seat suspension cover by removing the attaching screws, (if so equipped)



WRE91 BO468

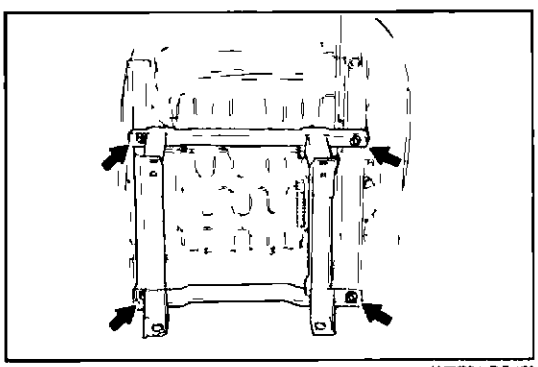
2 Remove the front seat by removing the four attaching bolts.



WRE91 BO469

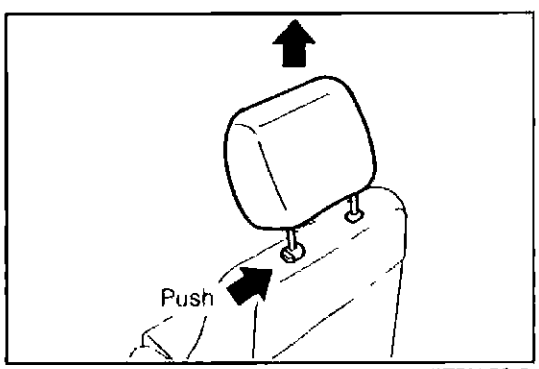
DISASSEMBLY

1 Remove the return spring. (Passenger side seat only)
2 Remove the front seat suspension assembly or front seat cushion leg by removing the four nuts



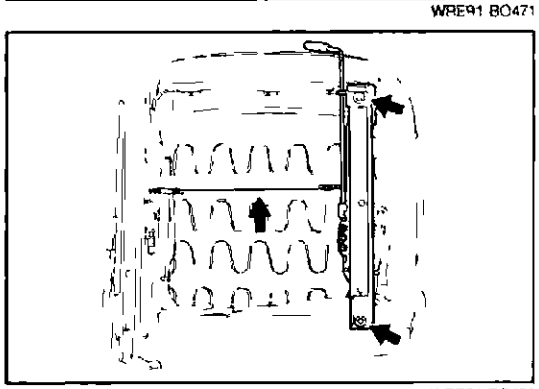
WRE91 BO470

3 Removal of headrest
Pull out the headrest, while holding the push button.



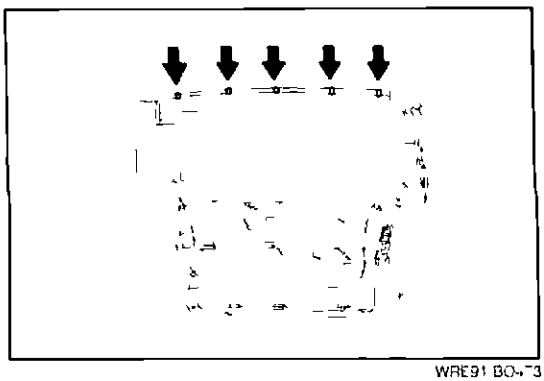
WRE91 BO471

4 Remove the front seat inner track assembly by removing the two attaching bolts.
5 Remove the seat track equalizing wire



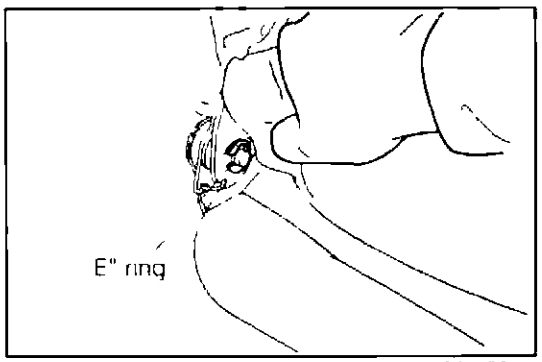
WRE91 BO472

6 Detach the hook rings of the front seatback cover, as shown in the right figure



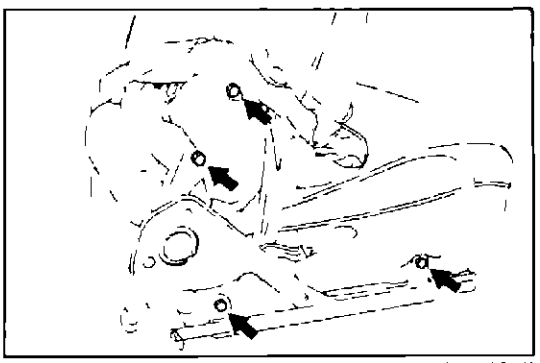
WRE91 BO473

7 Remove the "E" ring by turning over the seatback cover



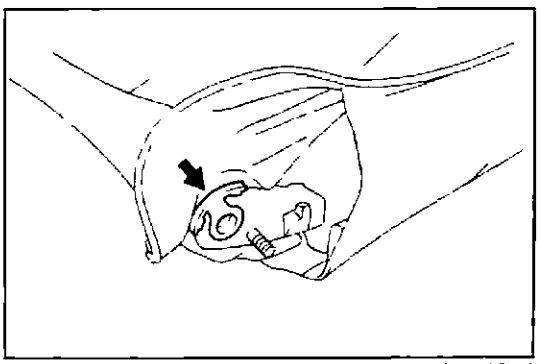
WRE9 BO474

8 Turn over the seatback cover Remove the reclining seatback adjuster assembly by removing the attaching bolts
9 Remove the seatback assembly



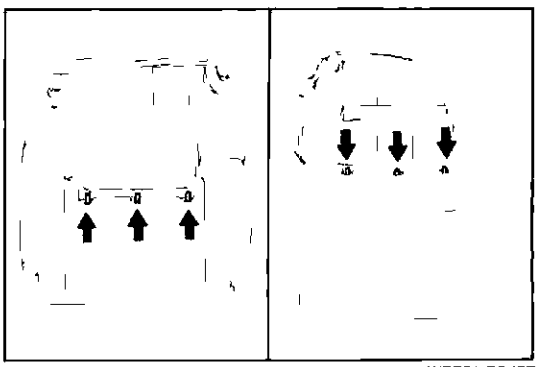
WRE91 BO475

10 Remove the bush from the seatback assembly.



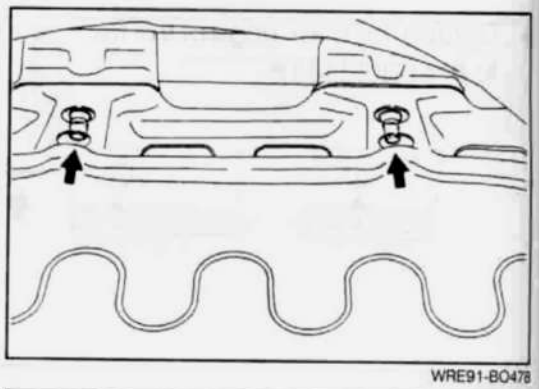
WRE91 BO476

11 Turn over the seatback cover Detach the three hook rings
12 Turn over the seatback cover further Detach the three hook rings



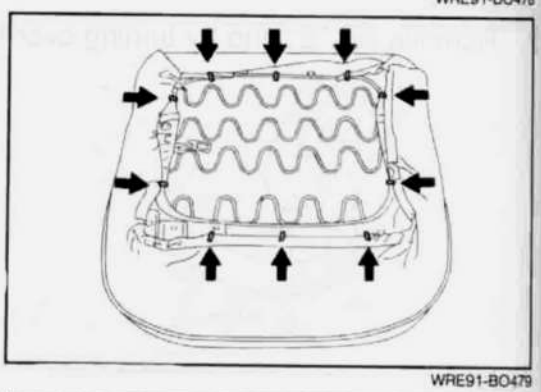
WRE91 BO477

13. Turn over the seatback cover further.
14. Remove the seat headrest support assemblies by releasing the lock section of the seat headrest support assembly.



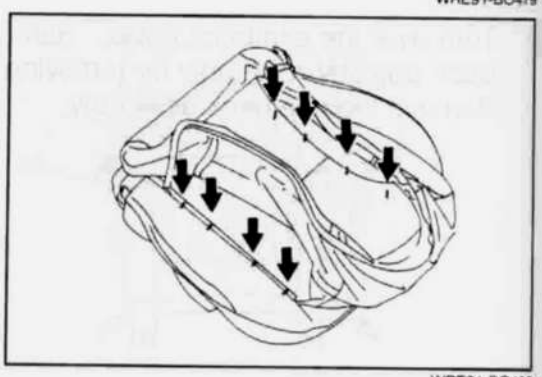
WRE91-BO478

15. Detach the hook ring of the front seat cushion cover and hook rings indicated in the right figure.



WRE91-BO479

16. Turn over the front seat cushion cover. Detach the hook rings indicated in the right figure.
    NOTE:
    - The hook ring is installed between the wires which are incorporated in the front seat cushion. Therefore, when the front seat cushion is to be reused, care must be exercised not to damage the wires of the front seat cushion.
17. Remove the front seat cushion cover.



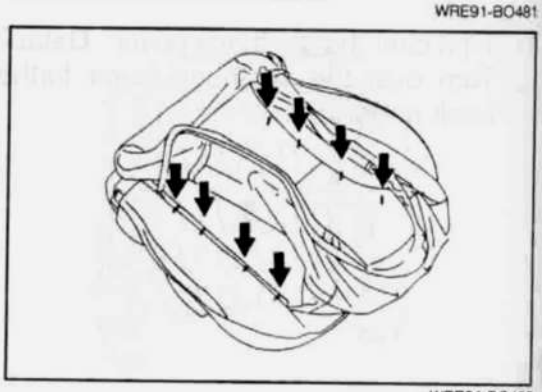
WRE91-BO480

ASSEMBLY

NOTE:
- Make sure that the pawl side of the hook ring will not face toward the seat cover surface.
- Never reuse the hook rings.
- Be very careful not to stain or scratch the seat cover during the assembly.
- When attaching the hook ring, make sure that no wrinkle is formed on the seat cover.

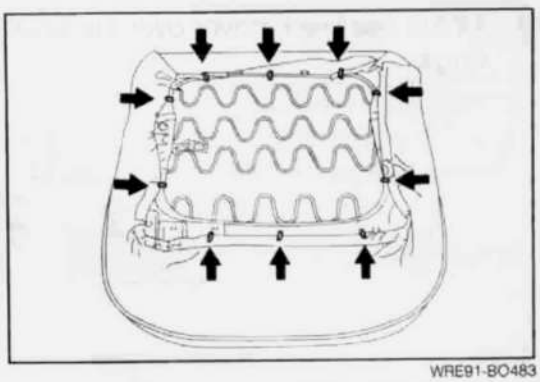
WRE91-BO481

1. Install the cushion cover to the front seat cushion. Install new hook rings between the wire incorporated in the front seat cushion and the front seat cushion cover.



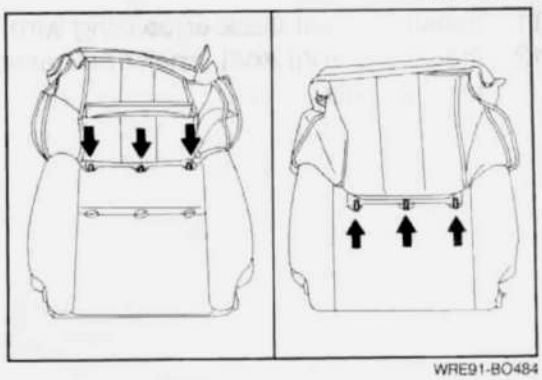
WRE91-BO482

2. Assemble the front seat cushion cover to the front cushion. Install the hook rings indicated in the right figure.



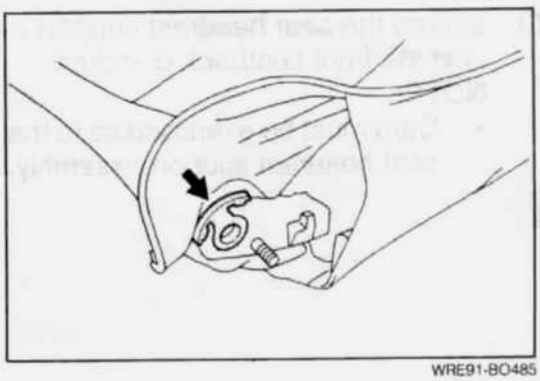
WRE91-BO483

3. Fit the seatback cover over the seatback. Install new hook rings between the seatback cover and the spring.
4. Fit the seat cover further. Install new hook rings between the seatback cover and the spring.



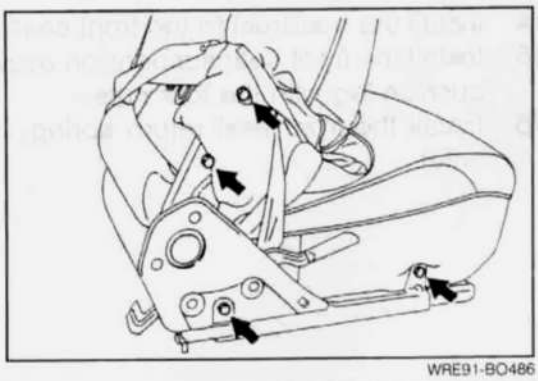
WRE91-BO484

5. Install the bush to the seatback assembly.
6. Hang the band of the seatback cover to the seatback frame.



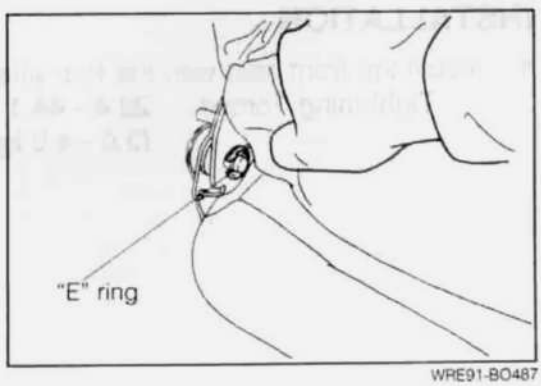
WRE91-BO485

7. Fit the seatback assembly to the seat cushion assembly.
8. Install the reclining seatback adjuster assembly with the attaching bolts.



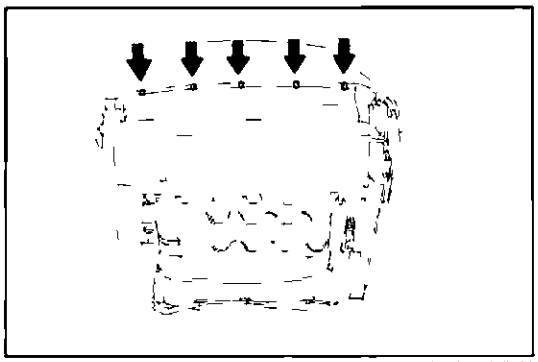
WRE91-BO486

9. Attach a new "E" ring to the seatback frame pin.

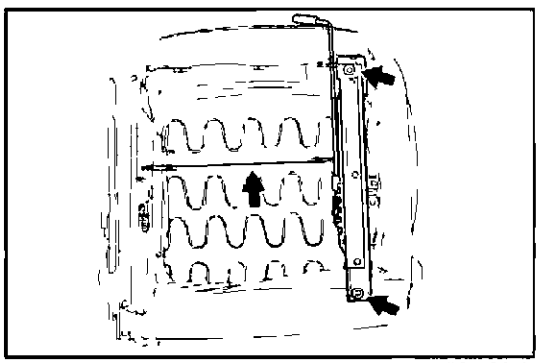


WRE91-BO487

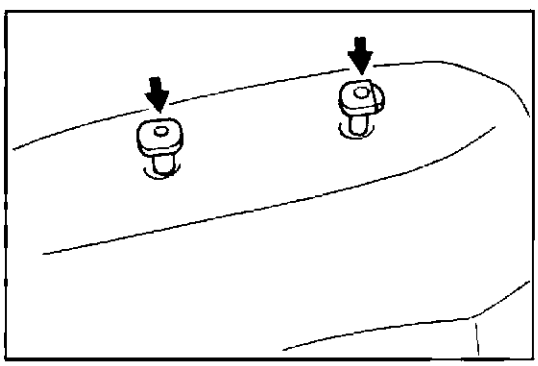
10 Fit the seatback cover over the seatback. Install new hook rings


WRE91 BO488

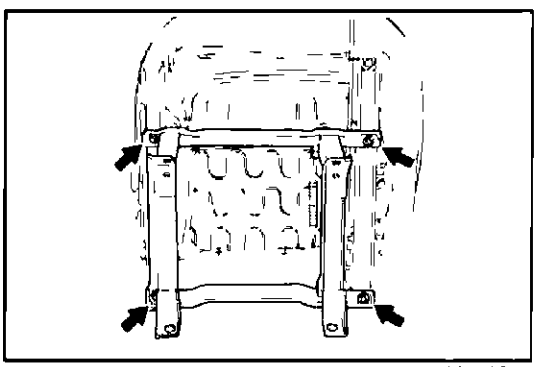
11 Install the seat track equalizing wire.
12 Install the front seat inner track assembly with the two attaching bolts


WRE91 BO489

13 Secure the seat headrest support assembly by pushing it, until the front seatback is locked.
NOTE:
- **Care must be exercised as to the correct direction of the seat headrest support assembly.**

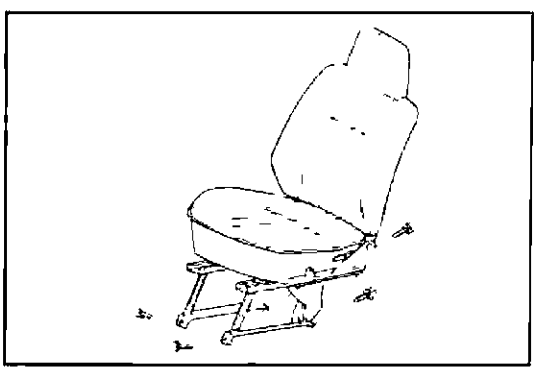

WRE91 BO490

14 Install the headrest to the front seatback.
15 Install the front seat suspension assembly or the front seat cushion leg with the four nuts.
16 Install the front seat return spring. (passenger side seat only)

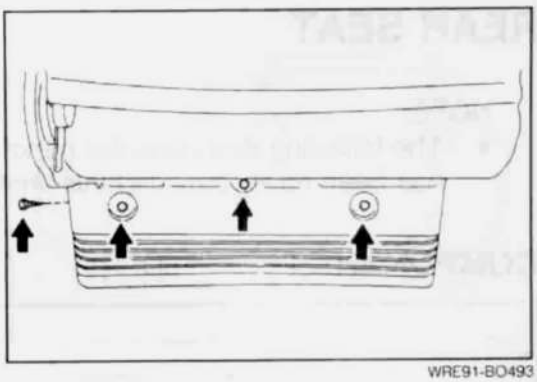

WRE91 BO491

INSTALLATION

1 Install the front seat with the four attaching bolts
Tightening Torque: 29.4 - 44.1 N·m
(3.0 - 4.5 kgf-m, 21.7 - 32.5 ft-lb)


WRE91 BO492

2. Install the front seat suspension cover with the attaching screws.
3. Ensure that the front seat tilts and slides smoothly.



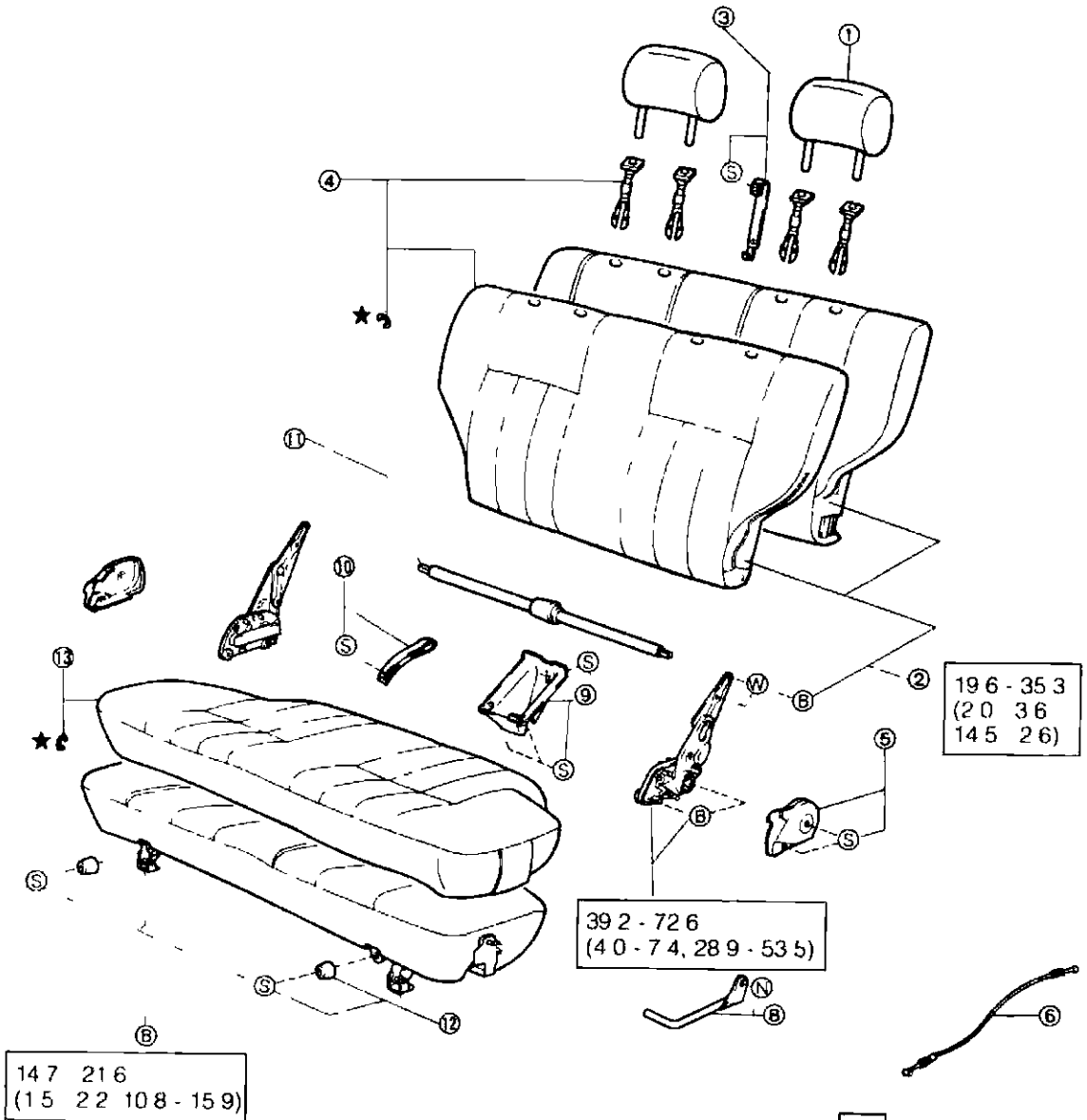
WRE91-BO493

REAR SEAT

NOTE:
- The following describes the bench type seat exclusively used for the three-point ELR seat belt which has been newly provided this time.

COMPONENTS

WRE91 BO494

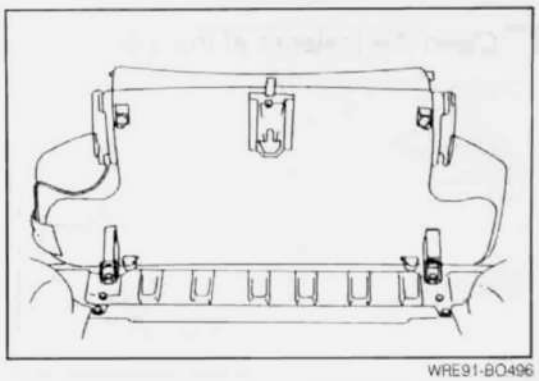


① Headrest assembly
② Rear seatback assembly
③ Rear seat stop band
④ Rear seatback cover
⑤ Reclining adjuster cover
⑥ Reclining control cable assembly
⑦ Reclining adjuster assembly
⑧ Reclining adjuster lever
⑨ Rear seat cushion undercover
⑩ Rear seat lock release band
⑪ Reclining adjuster equalizing rod
⑫ Cushion
⑬ Rear seat cushion cover

WRE91-BO495

REMOVAL

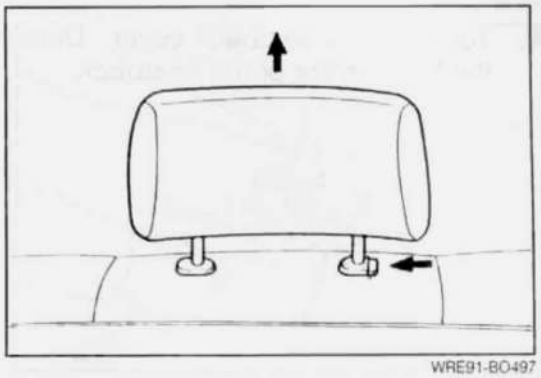
Remove the rear seat by removing the two attaching bolts.



WRE91-BO496

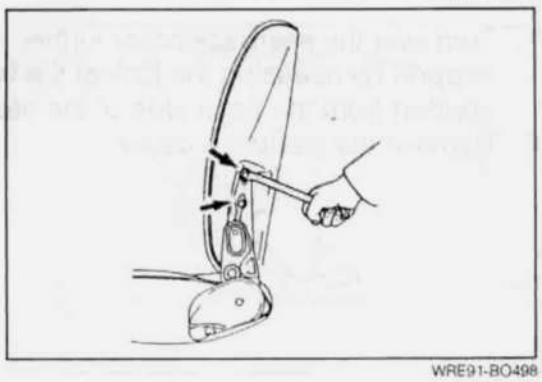
DISASSEMBLY

1. Removal of headrest
   Pull out the headrest, while holding the push button.



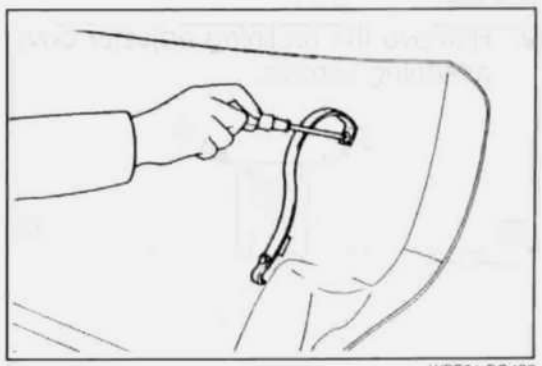
WRE91-BO497

2. Remove the seatback assembly by removing the seatback attaching bolts (two each) at the right and left sides.



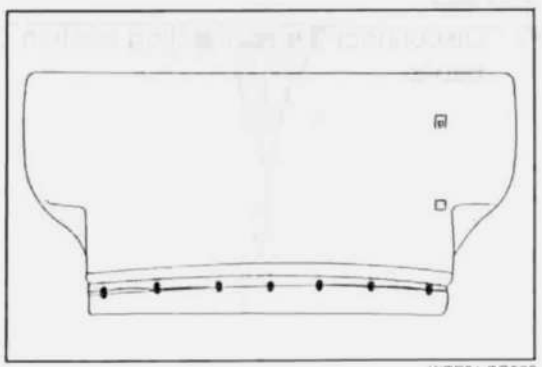
WRE91-BO498

3. Remove the stop band by removing the rear seat stop band attaching screw.



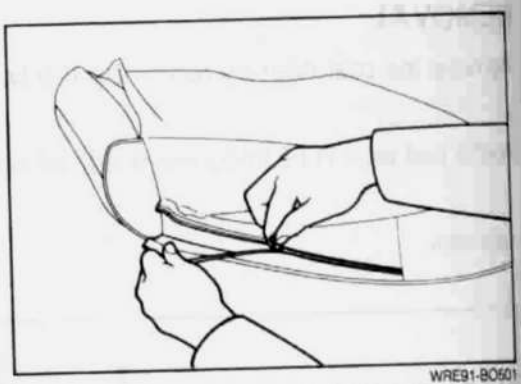
WRE91-BO499

4. Detach the seven hook rings at the back side of the rear seatback.
   NOTE:
   - Be very careful not to tear the seatback cover.

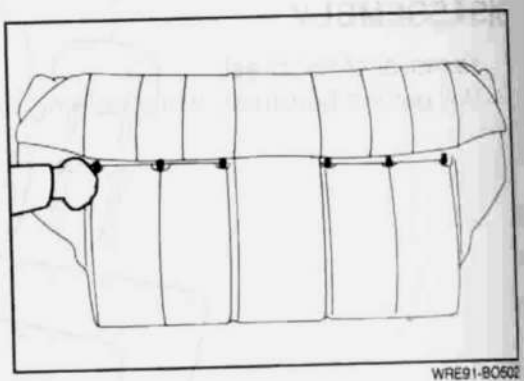


WRE91-BO500

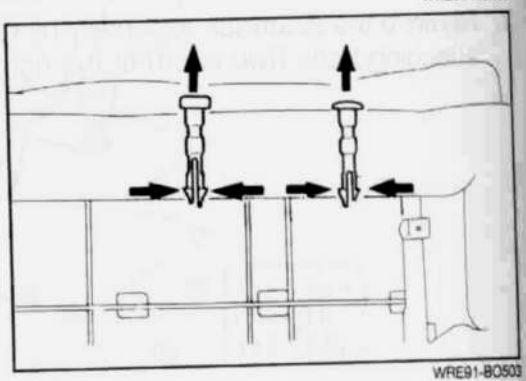
5. Open the fastener at the side of the seatback.


WRE91-BO501

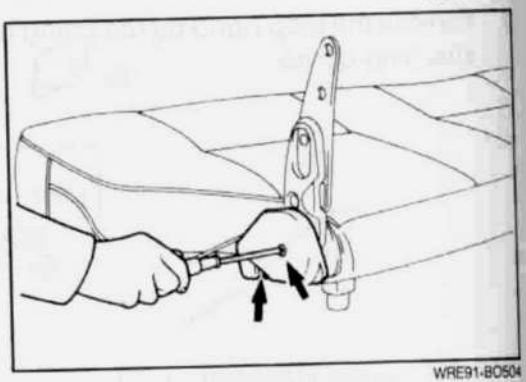
6. Turn over the seatback cover. Detach the six hook rings at the front center of the seatback.


WRE91-BO502

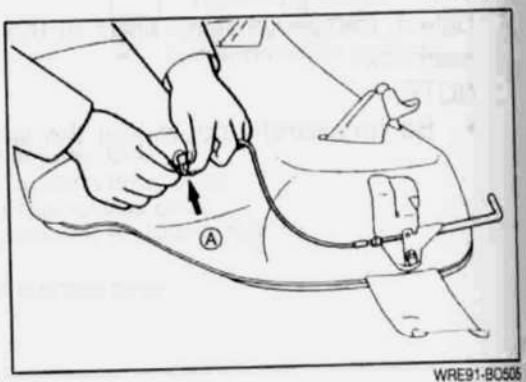
7. Turn over the seatback cover further. Remove the headrest support by releasing the lock at the tip-end of the headrest support from the back side of the seatback.
8. Remove the seatback cover.


WRE91-BO503

9. Remove the reclining adjuster cover by removing the two attaching screws.

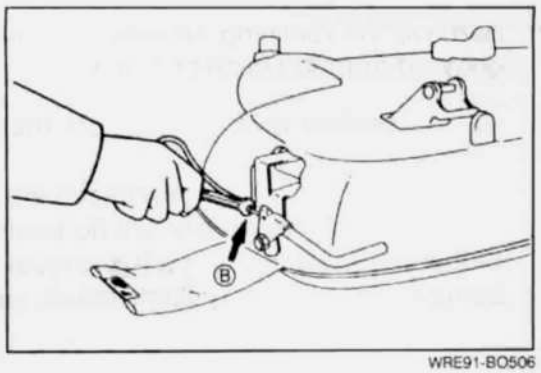

WRE91-BO504

10. Disconnect the connecting section of the reclining control cable.



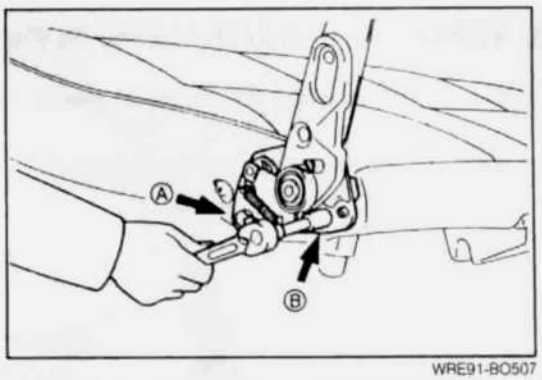
WRE91-BO505

11. Loosen the reclining control cable attaching nut.
12. Remove the reclining control cable by disconnecting it from the connecting section.



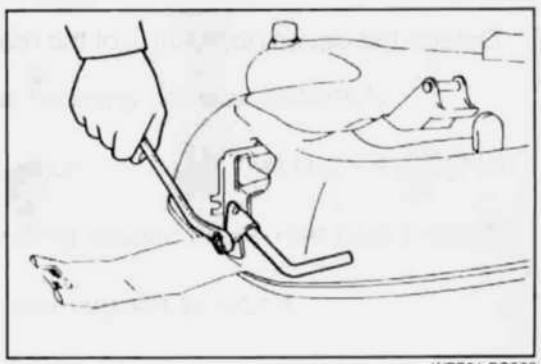
WRE91-BO506

13. Remove the reclining adjuster assembly by removing the two attaching bolts.

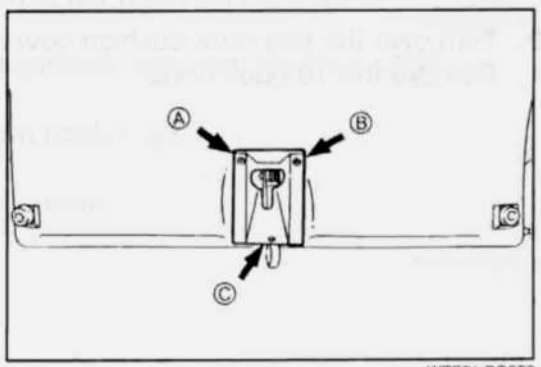


WRE91-BO507

14. Remove the reclining adjuster lever by removing the attaching nut (cap nut).

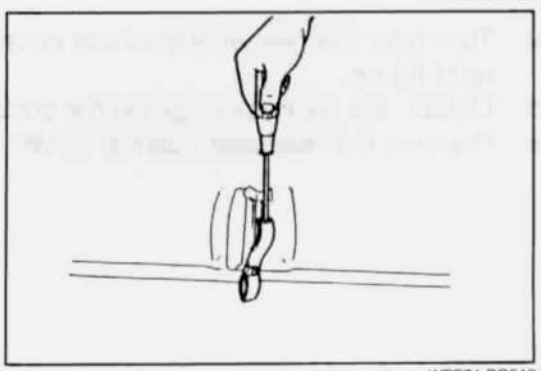

WRE91-BO508

15. Remove the rear seat cushion undercover by removing the three attaching screws.

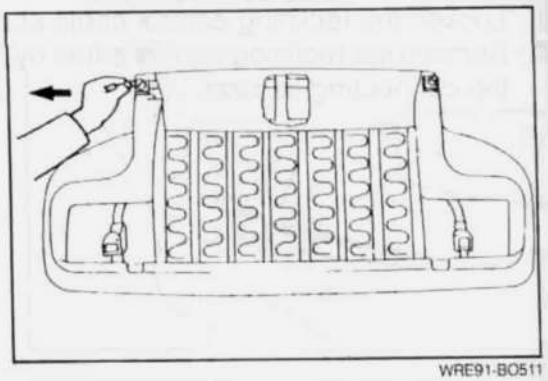


WRE91-BO509

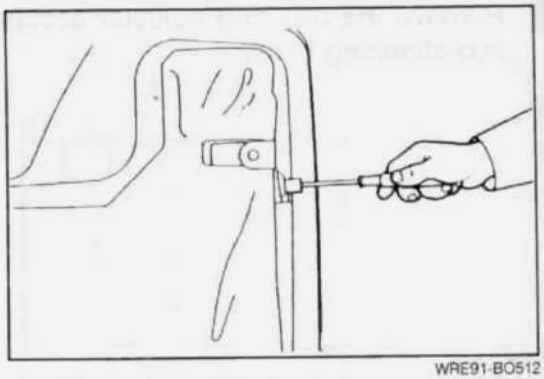
16. Remove the rear seat lock release band by removing the attaching screws.


WRE91-BO510

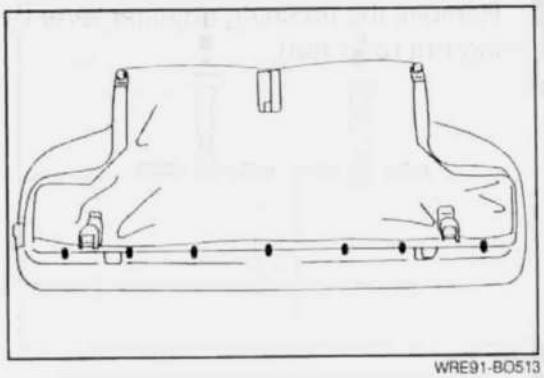
17. Remove the reclining adjuster equalizing rod by pulling it outward from the cushion frame.


WRE91-BO511

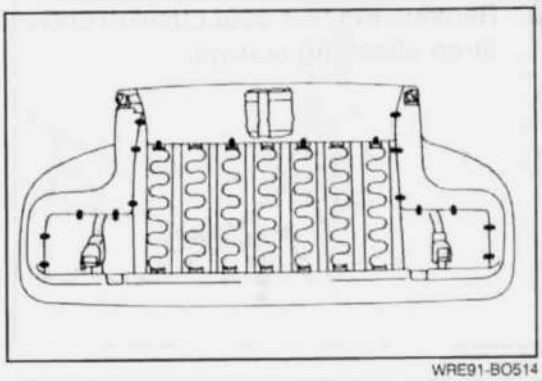
18. Remove the cushion by removing the attaching screws.


WRE91-BO512

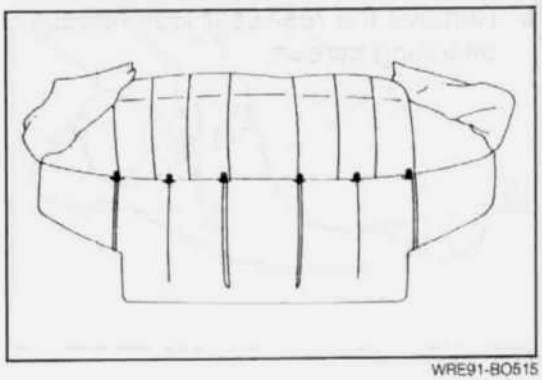
19. Detach the seven hook rings of the rear seat cushion cover.


WRE91-BO513

20. Turn over the rear seat cushion cover.
21. Remove the 18 hook rings.


WRE91-BO514

22. Turn over the rear seat cushion cover, as indicated in the right figure.
23. Detach the six hook rings on the surface of the cushion.
24. Remove the rear seat cushion cover.


WRE91-BO515

ASSEMBLY

NOTE:
- Make sure that the pawl side of the hook ring will not face toward the cushion cover surface.
- Never reuse the hook ring.
- Be very careful not to stain and scratch the seat cover during the assembly.
- When installing the hook ring, make sure that no wrinkle is formed on the seat cover.
- The assembly and installation should be performed basically by reversing the disassembling procedure. In this section, no illustration is provided. Therefore, refer to the disassembly procedure, as required.

1. Fit the rear seat cushion cover over the cushion.
2. Install the cushion cover to the seat cushion by installing new six hook rings to the hook ring attaching section on the surface of the cushion.
3. Fit the cushion cover over the cushion further. Install the cushion cover to the seat cover with new 18 hook rings.
4. Fit the cushion cover over the cushion. Install the cushion cover to the seat cushion with new seven hook rings.
5. Install the cushion with the attaching screws.
6. Insert the reclining adjuster equalizing rod into the cushion frame.
7. Install the rear seat lock release band with the screw.
8. Install the rear seat cushion undercover with the three attaching screws.
9. Install the reclining adjuster lever. Tighten the attaching nut (cap nut).
10. Install the reclining adjuster assembly with the two attaching bolts.

NOTE:
- In advance, connect the reclining adjuster equalizing rod to the reclining adjuster assembly.

11. Connect one end of the reclining control cable to the connecting section of the rear seat cushion. Tighten the reclining control cable attaching nut.
12. Connect the other end of the reclining control cable to the connecting section of the rear seat cushion.
13. Install the reclining adjuster cover with the two attaching screws.
14. Fit the seatback cover over the seatback slightly. Push the headrest support to lock it.

NOTE:
- Care must be exercised as to the correct direction and position of the headrest support.

15. Fit the seatback cover further. Install the seatback cover to the seatback with new six hook rings.
16. Fit the seatback further and close the fastener.
17. Fit the seatback further. Close the seatback cover with new seven hook rings.
18. Install the rear seat stop band to the seatback with the screw.
19. Install the seatback to the seat cushion. Tighten the four attaching bolts.
20. Install the headrest to the seatback.

WRE91-BO516

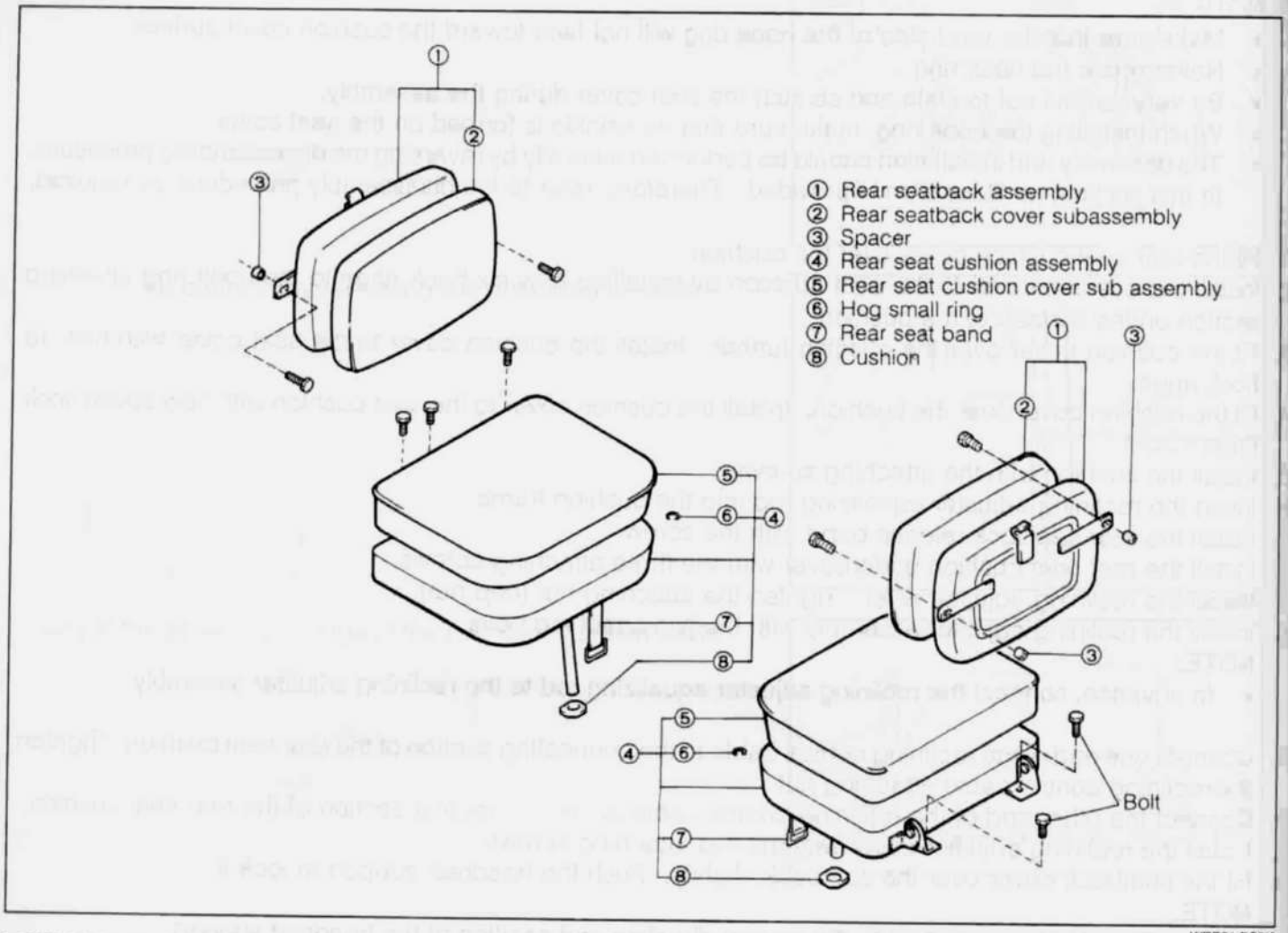
INSTALLATION

Install the rear seat with the two attaching bolts.

WRE91-BO517

SUB SEAT

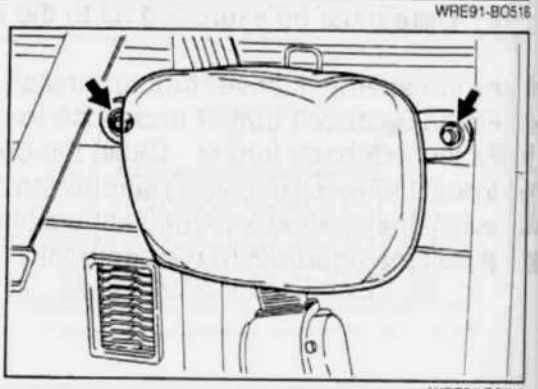
COMPONENTS



WRE91-BO516

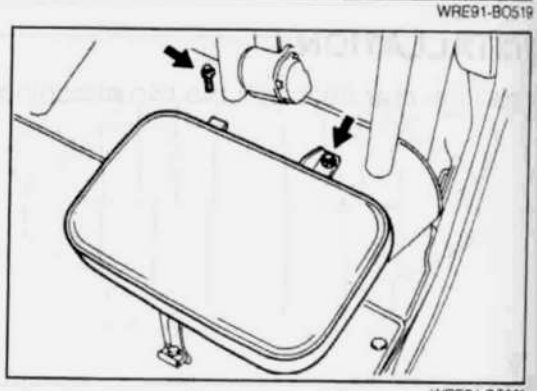
REMOVAL

1. Remove the rear seatback assembly by removing the two attaching bolts.
2. Remove the spacer.
   (Full-trim vehicle only)



WRE91-BO519

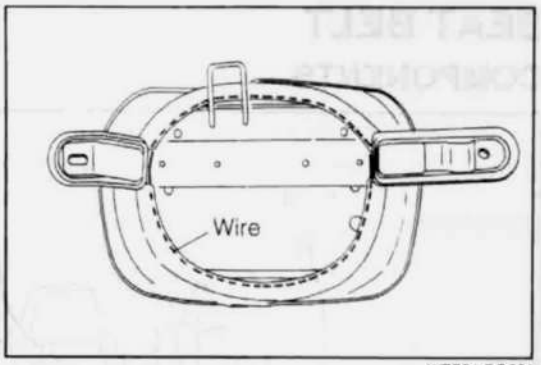
3. Remove the rear seat cushion assembly attaching bolts.
   NOTE:
   - Three attaching bolts are provided at the left side, whereas two attaching bolts are provided at the right side.



WRE91-BO520

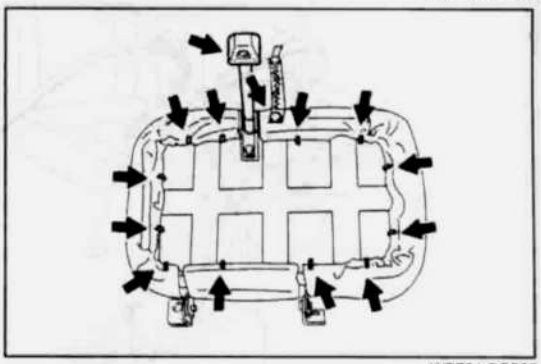
DISASSEMBLY

1. Disassembly of rear seatback assembly
   (1) Cut off the wire tightening the rear seatback cover.
   (2) Pull out the wire.
   (3) Remove the rear seatback cover from the seatback.



WRE91-BO521

2. Disassembly of rear seat cushion assembly
   (1) Remove the rear seat band by removing the attaching screw.
   (2) Remove the rear seat cushion cover subassembly by removing the hook ring.
   (3) Remove the cushion from the rear seat leg.



WRE91-BO522

ASSEMBLY

NOTE:
- Never reuse the hook rings.
- Be very careful not to stain and scratch the seat cover during the assembly.
- When attaching the hook rings, make sure that no wrinkle is formed on the seat cover.

1. Assembly of rear seat cushion
   (1) Install the cushion to the rear seat leg.
   (2) Fit the rear seat cushion cover over the rear seat cushion. Install the rear seat cushion cover to the rear seat cushion with new hook ring.
   (3) Install the rear seat band with the screw.
2. Assembly of rear seatback assembly
   (1) Fit the rear seatback cover over the rear seatback.
   (2) Pass the wire through the rear seatback cover.
   (3) Install the rear seatback cover to the rear seatback by twisting the wire of the rear seatback cover.
   (4) Cut off any excess wire. Bend the tip-end of the wire toward inside of the seat.

WRE91-BO523

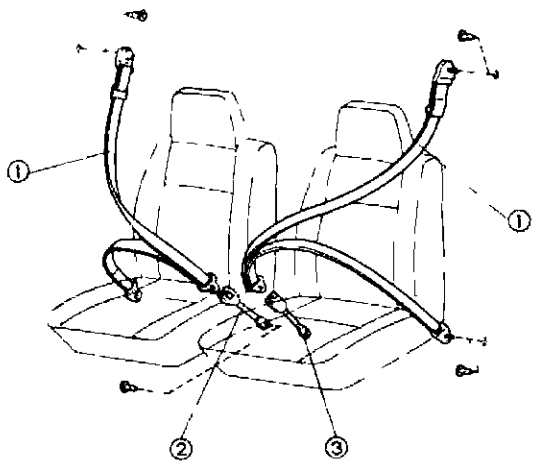
INSTALLATION

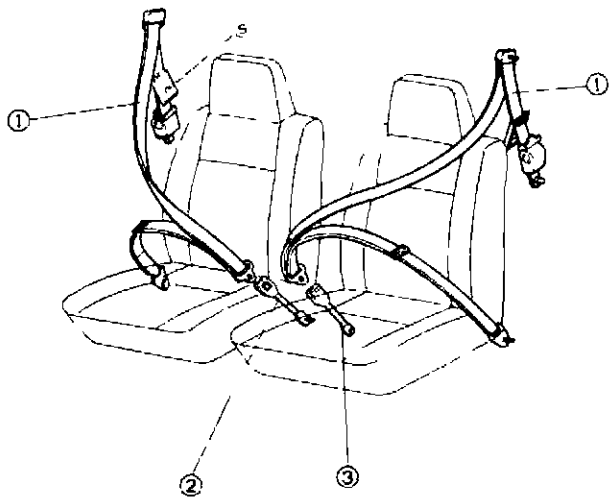
1. Install the rear seat cushion assembly with the attaching bolts.
2. Install the rear seatback assembly with the two attaching bolts.
   (On those full-trim vehicles, place a spacer between the seatback and the trim.)

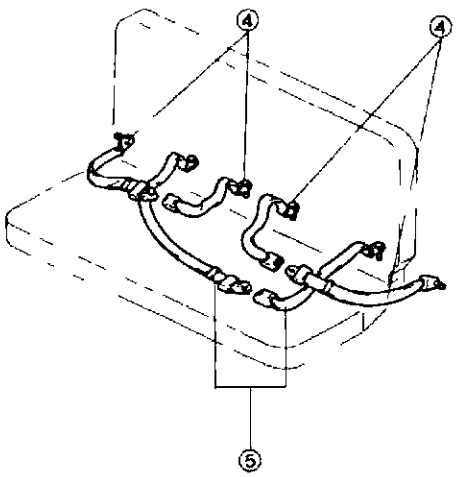
WRE91-BO524

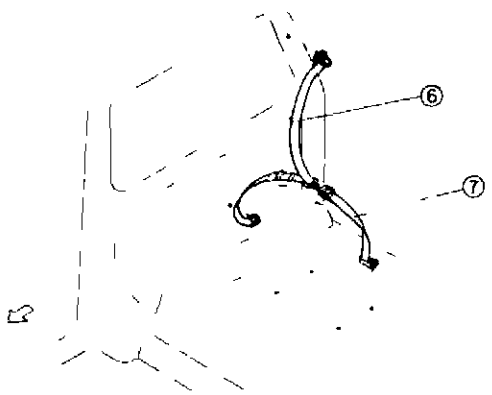
SEAT BELT

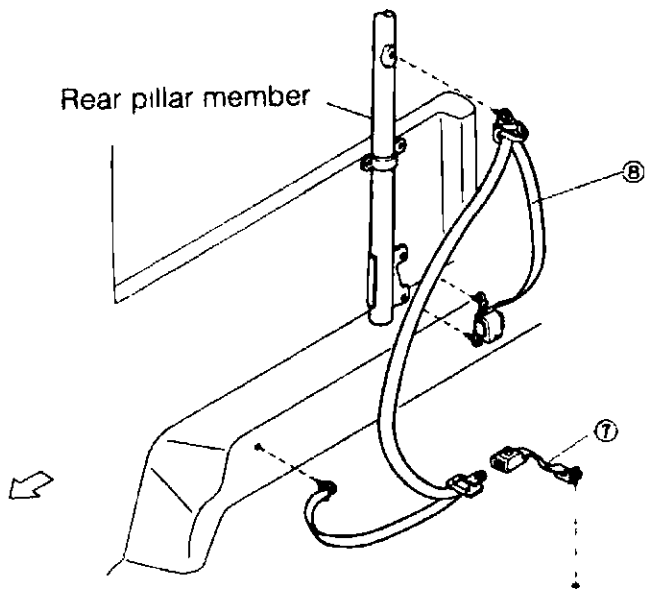
COMPONENTS











① Front seat outer belt assembly
② Front seat inner RH belt assembly
③ Front seat inner LH belt assembly
④ Rear seat lap type belt assembly
⑤ Rear seat lap type center belt assembly
⑥ Rear seat outer belt subassembly
⑦ Rear seat inner belt assembly
⑧ Rear seat ELR type outer belt subassembly

WRE91-BO525

REMOVAL

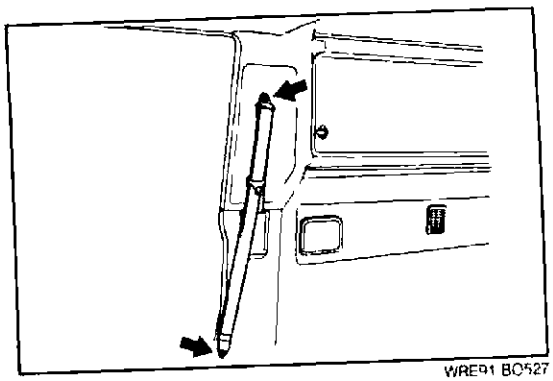
1 Removal of front seat belt

NOTE:

- The following describes the removal and installation procedures for the ELR type front seat belt of the full-trim vehicles.

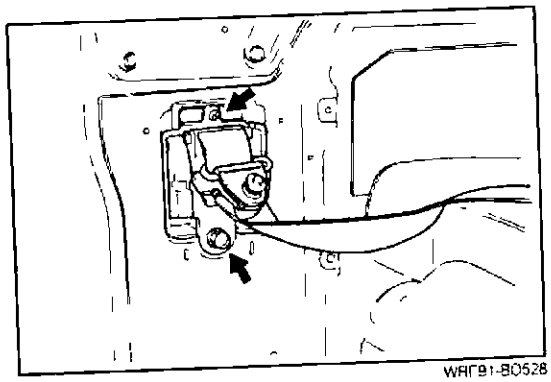
WRE91 BO526

(1) Open the front seat outer belt shoulder anchor cover.
(2) Remove the front seat outer belt shoulder anchor by removing the attaching bolt
(3) Remove the front seat outer belt anchor by removing the attaching bolt
(4) Remove the center pillar lower garnish
(See page BO–94)



WRE91 BO527

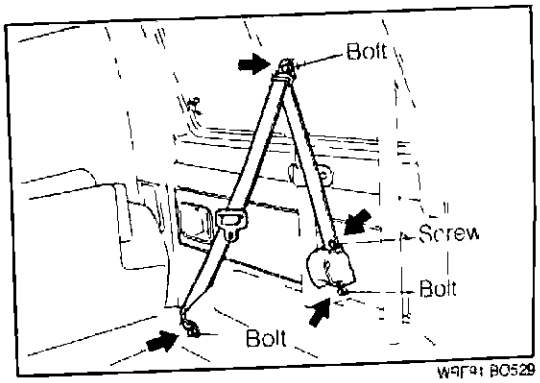
(5) Remove the attaching bolt of the ELR assembly
(6) Remove the attaching screw of the ELR assembly
(7) Remove the seat inner belt assembly by removing the attaching bolt



WRE91-BO528

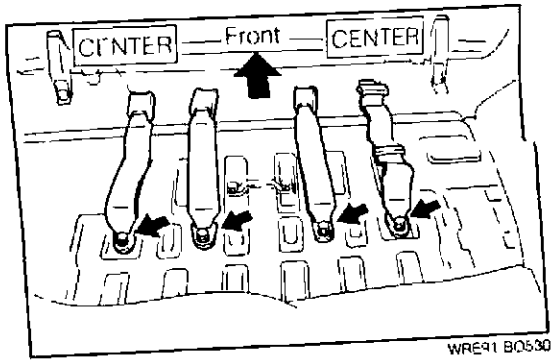
2 Removal of rear seat belt

(1) Open the front seat outer belt shoulder anchor cover.
(2) Remove the rear seat belt shoulder anchor by removing the attaching bolt
(3) Remove the rear seat belt anchor by removing the attaching bolt.
(4) Remove the attaching bolt and screw of the ELR assembly



WRE91 BO529

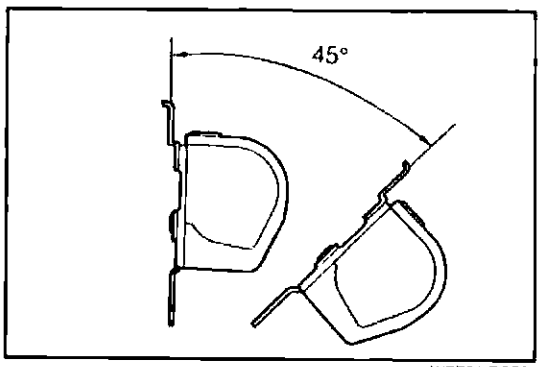
(5) Remove the seat belt anchors by removing the attaching bolts



WRE91 BO530

BO525

INSPECTION



WRE91 BO531

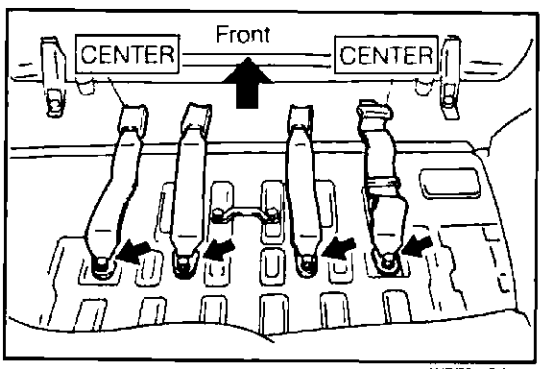
NOTE:
- Never attempt to disassemble the retractor. If the retractor is faulty, replace it with new one as an assembly.

1 Ensure that the seat belt exhibits no scratches, breakage and so forth
2 Ensure that no belt locking takes place when the ELR assembly is tilted 15° from the installed state
3. Ensure that belt locking takes place when the ELR assembly is tilted 45° or more from the installed state.
4. Ensure that the belt is locked when the seat belt is pulled strongly from the ELR.
5 Ensure that no belt locking takes place when the seat belt is pulled slowly from the ELR

INSTALLATION

1. Installation of rear seat belt
   (1) Install the seat belt anchor with the attaching bolts.
   NOTE:
   - Be sure to install the anchor, facing toward the front.

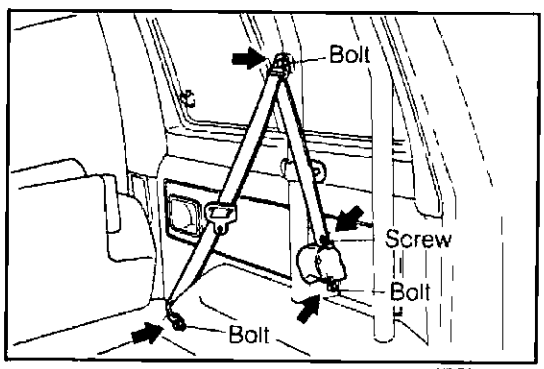
   Tightening Torque: 24.5 - 53.0 N·m (2.5 - 5.4 kgf-m, 18.1 - 39.1 ft-lb)



WRE91-BO532

   (2) Install the ELR assembly with the attaching screw.
   (3) Install the ELR assembly attaching bolt.

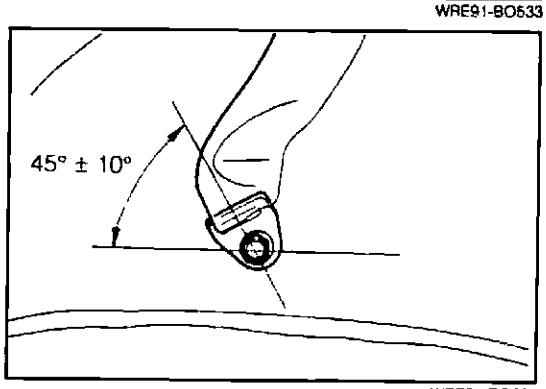
   Tightening Torque: 24.5 - 53.0 N·m (2.5 - 5.4 kgf-m, 18.1 - 39.1 ft-lb)



WRE91-BO533

   (4) Install the rear seat belt anchor by means of the bolt in such a way that the anchor is tilted 45° ±10° toward the front side.

   Tightening Torque: 24.5 - 53.0 N·m (2.5 - 5.4 kgf-m, 18.1 - 39.1 ft-lb)

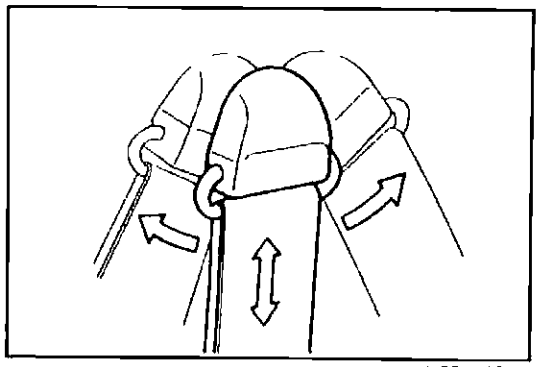


WRE91-BO534

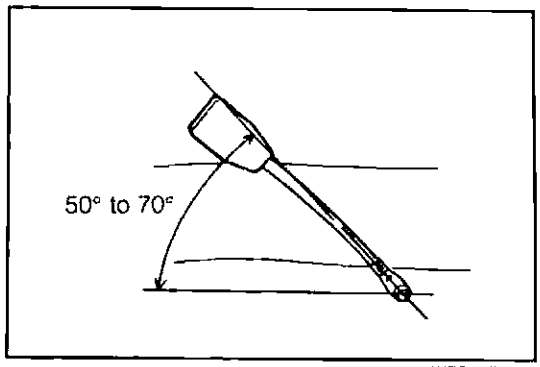
(5) Install the rear seat belt shoulder anchor with the bolt
Tightening Torque: 24.5 - 53.0 N·m
(2.5 - 5.4 kgf-m, 18.1 - 39.1 ft-lb)

NOTE:
- After the shoulder anchor has been installed, make sure that the shoulder anchor moves smoothly.

(6) Install the rear seat belt shoulder anchor cover.


WRE91 BO535

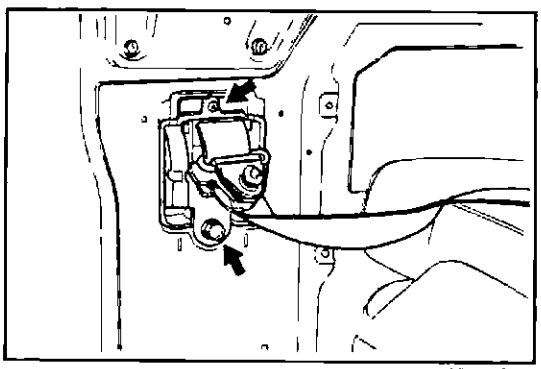
2 Installation of front seat
(1) Install the seat inner belt by means of the attaching bolt so that the installation angle may become 60° ±10°.
Tightening Torque: 24.5 - 53.0 N·m
(2.5 - 5.4 kgf-m, 18.1 - 39.1 ft-lb)



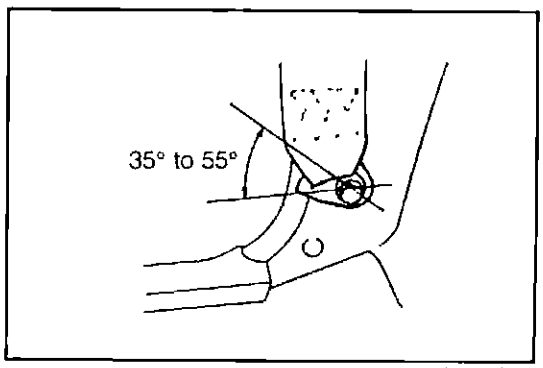
WRE91-BO536

(2) Install the ELR assembly with the screw.
(3) Install the ELR assembly attaching bolt
Tightening Torque: 24.5 - 53.0 N·m
(2.5 - 5.4 kgf-m, 18.1 - 39.1 ft-lb)

(4) Install the center pillar lower garnish.
(See page BO-94)


WRE91-BO537

(5) Install the front seat outer belt anchor by means of the attaching bolt so that the installation angle may become 45° ±10°.

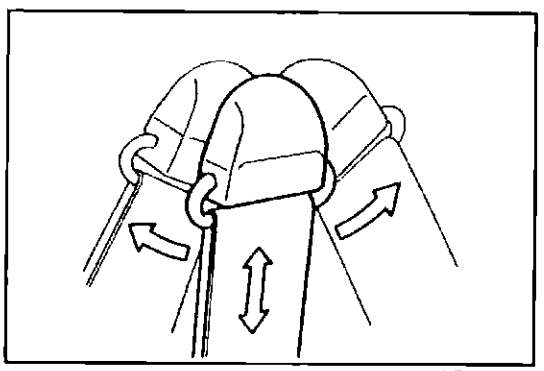


WRE91 BO538

6. Install the front seat outer belt shoulder anchor with the attaching bolt
Tightening Torque: 24.5 - 53.0 N·m
(2.5 - 5.4 kgf-m, 18.1 - 39.1 ft-lb)

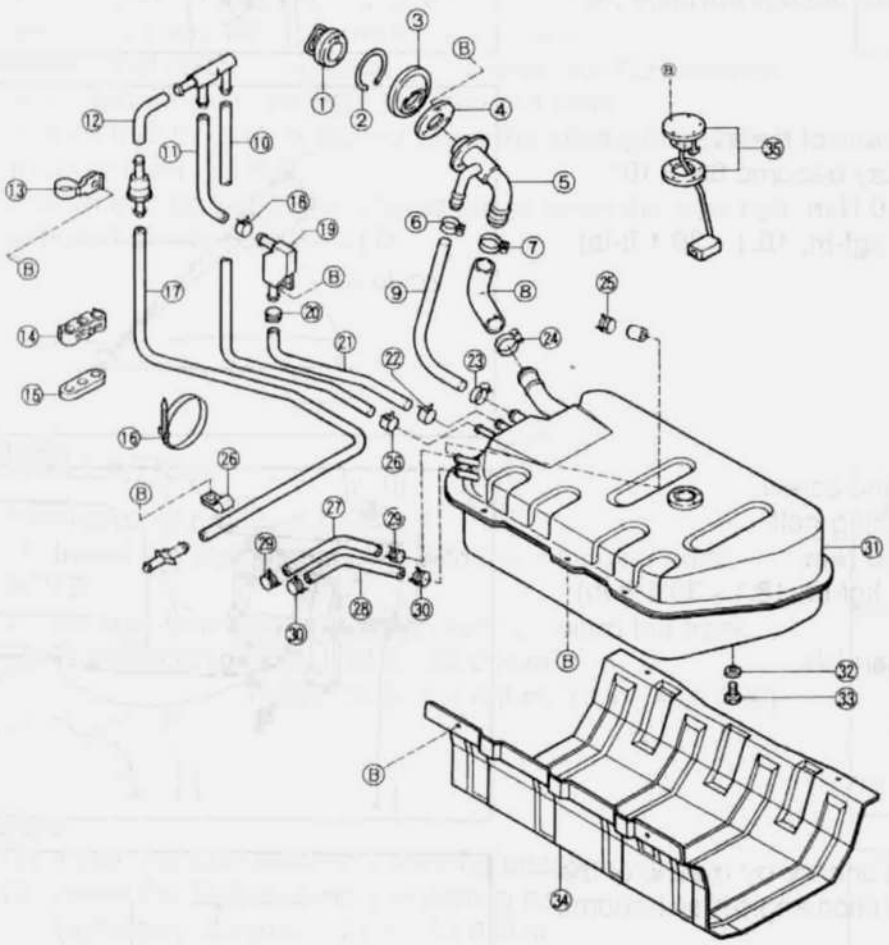
NOTE:
- After the shoulder anchor has been installed, make sure that the shoulder anchor moves smoothly.

7 Install the seat belt shoulder anchor cover.


WRE91 BO539

FUEL TANK

COMPONENTS



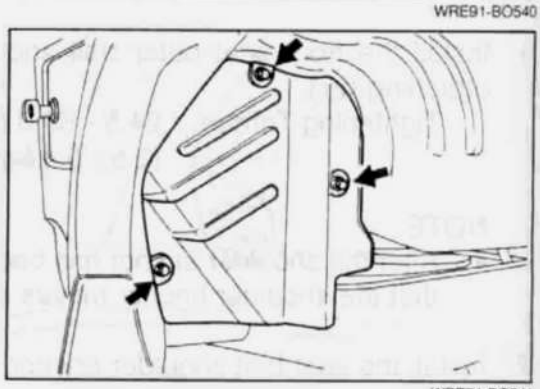
① Fuel tank cap assembly
② Inlet box ring
③ Fuel tank inlet shield No. 1
④ Fuel tank filler pipe shield No. 2
⑤ Fuel tank inlet pipe subassembly
⑥ Hose clamp
⑦ Clamp
⑧ Fuel tank sub-inlet hose
⑨ Breather tube hose
⑩ Fuel hose
⑪ Fuel hose
⑫ Hose
⑬ Safety valve subassembly
⑭ Clamp
⑮ Grommet
⑯ Clamp
⑰ Hose
⑱ Clip
⑲ Fuel vapor liquid separator
⑳ Clip
㉑ Fuel hose
㉒ Clip
㉓ Clamp
㉔ Clamp
㉕ Hose clip
㉖ Clip
㉗ Fuel return hose
㉘ Fuel main hose
㉙ Hose clip
㉚ Clip
㉛ Fuel tank assembly
㉜ Gasket
㉝ W/Head straight screw plug
㉞ Fuel tank protector subassembly

WRE91-BO540

FUEL INLET PIPE

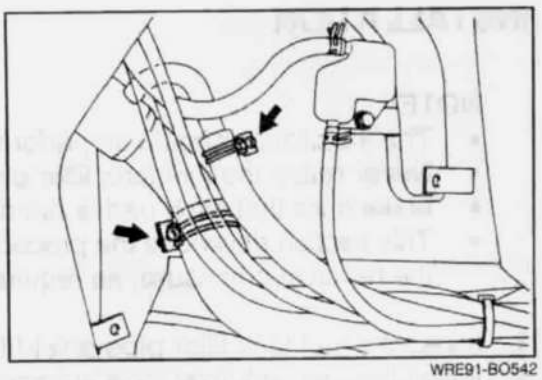
REMOVAL

1. Remove the fuel inlet protector by removing the three attaching bolts.



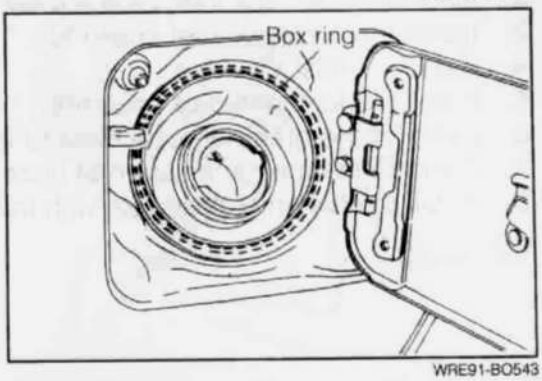
WRE91-BO541

2. Disconnect the fuel tank sub-inlet hose from the fuel tank inlet pipe subassembly by loosening the hose bands.
3. Disconnect the breather tube hose from the fuel tank inlet pipe subassembly by loosening the hose bands.



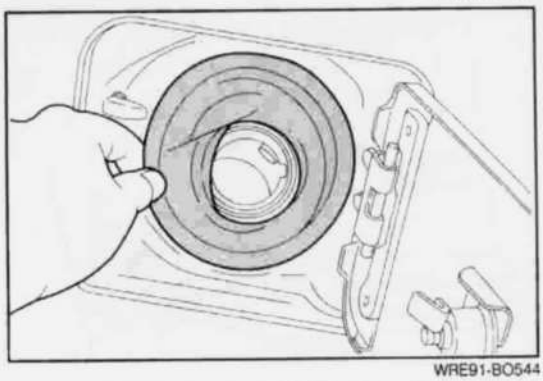
WRE91-BO542

4. Remove the fuel tank cap assembly.
5. Remove the inlet box ring, using a screwdriver or the like.



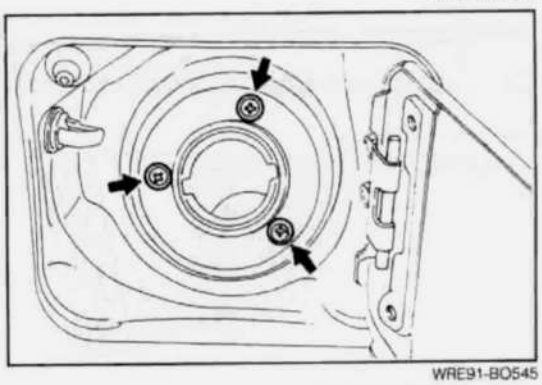
WRE91-BO543

6. Remove the fuel tank inlet No. 1 shield.



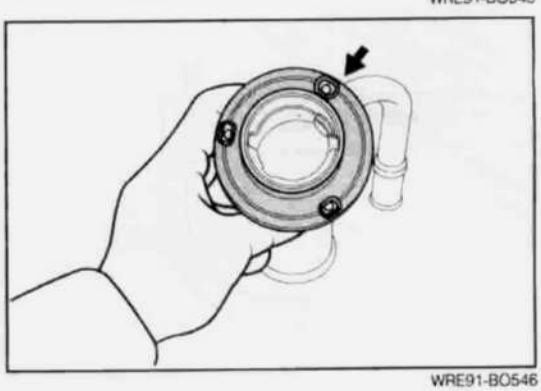
WRE91-BO544

7. Remove the fuel tank inlet pipe subassembly by removing the three attaching screws.



WRE91-BO545

8. Remove the fuel tank filler pipe shield from the fuel tank inlet pipe subassembly.



WRE91-BO546

INSTALLATION

NOTE:
- The installation should be performed basically by reversing the removal procedure.
- Never reuse the fuel tank filler pipe shields No. 1 and No. 2.
- Make sure that each part is not damaged.
- This section describes the procedures only, without illustrations. Therefore, refer to the illustrations in the removal procedure, as required.

1 Install the fuel tank filler pipe shield from the fuel tank inlet pipe subassembly.
2 Install the fuel tank inlet pipe subassembly to the side panel with the three attaching screws
3 Install the fuel tank inlet shield No. 1
4. Install the inlet box ring.
5. Install the fuel tank cap assembly.
6 Connect the breather tube hose to the fuel tank inlet pipe subassembly and install the hose clamp
7 Connect the fuel tank sub-inlet hose to the fuel tank inlet pipe subassembly and install the hose clamp
8 Install the fuel inlet protector with the three attaching bolts.

WRE91-BO547

FUEL TANK

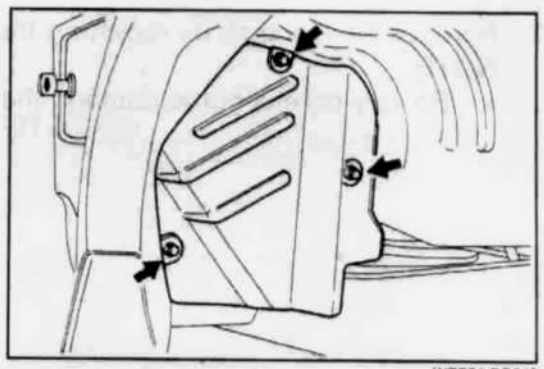
REMOVAL

1. Drain the fuel from the fuel tank by removing the drain plug.
2. After the fuel has been drained, install the drain plug with a new gasket interposed.

   Tightening Torque: 39.2 - 53.9 N·m
   (4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)

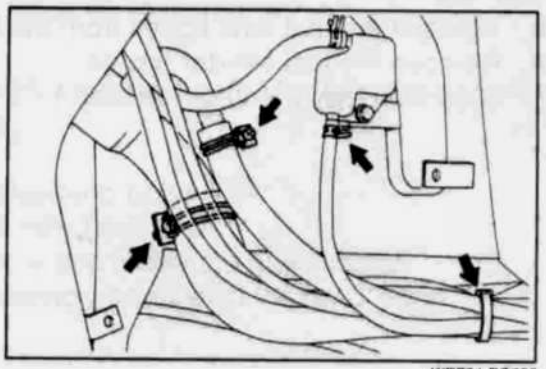
WRE91-BO548

3. Remove the inlet fuel protector by removing the three attaching bolt.



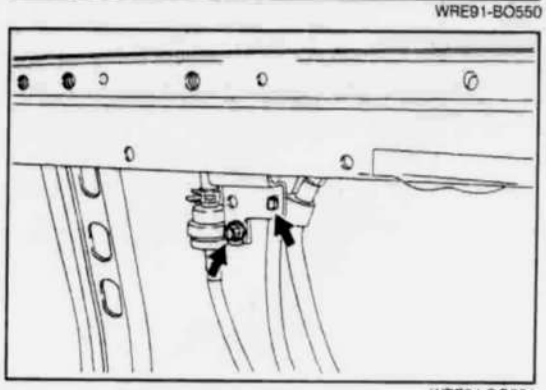
WRE91-BO549

4. Disconnect the fuel tank sub-inlet hose from the fuel tank inlet pipe subassembly by loosening the hose bands.
5. Disconnect the breather tube hose from the fuel tank inlet pipe subassembly by loosening the hose bands.
6. Disconnect the hose from the fuel vapor liquid separator by loosening the hose bands.
7. Remove the hose bands.



WRE91-BO550

8. Remove the right hand side quarter inside trim board. (See page BO–94.)
9. Remove the safety valve subassembly attaching bolt.
10. Remove the hose clamp.

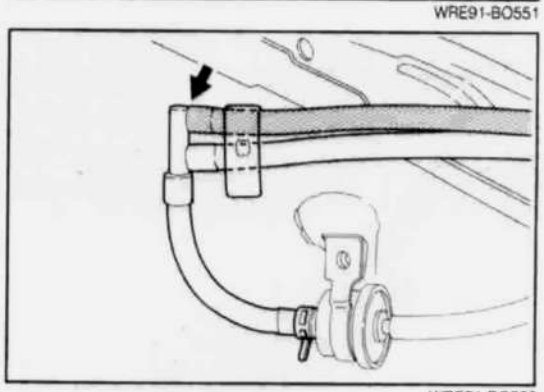


WRE91-BO551

11. Disconnect the air breather hose (fuel tank) from the three-way joint.
12. Pull out the air breathe hose to the fuel tank side.

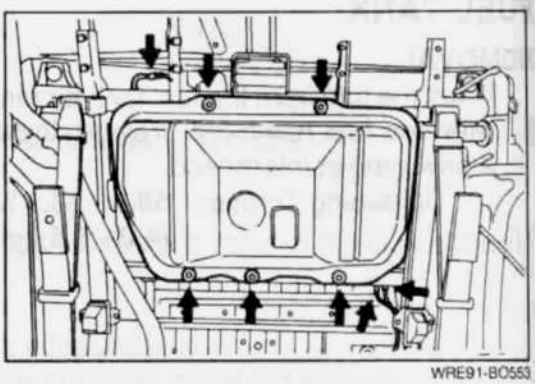
    NOTE:

    - Be very careful not to remove the rubber grommet.



WRE91-BO552

13. Remove the fuel tank protector, (if so equipped).
14. Disconnect the fuel main hose from the fuel main tube No. 1 by removing the hose clamp.
15. Disconnect the fuel return hose from the fuel emission tube by removing the hose clamp.
16. Disconnect the fuel sender gauge connector.

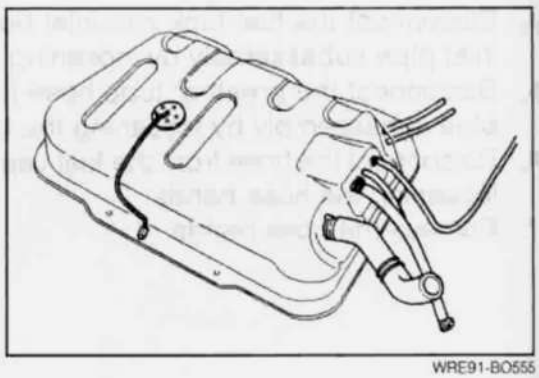


WRE91-BO553

17. Remove the fuel tank by removing the attaching bolts.
    NOTE:
    - Be very careful not to damage the hose, etc.

WRE91-BO554

18. Remove the fuel tank hoses from the fuel tank.
19. Remove the fuel sender gauge.
    (See the Body Electrical section.)



WRE91-BO555

INSTALLATION

NOTE:
- The installation should be performed basically by reversing the removal procedure.
- Be sure to install the hose band or hose clip at the midpoint between the spools.
- Never reuse the fuel sender gauge gasket.
- Make sure that each part is not damaged.
- This section describes the procedures only, without illustration. Therefore, refer to the illustrations in the removal procedure, as required.

1 Install the fuel sender gauge.
(See the Body Electrical section.)
2 Install the fuel tank hoses to the fuel tank.
3. Install the fuel tank with the five attaching bolts.
Tightening Torque: 36.3 - 51.0 N·m (3.7 - 5.2 kgf-m, 26.8 - 37.6 ft-lb)

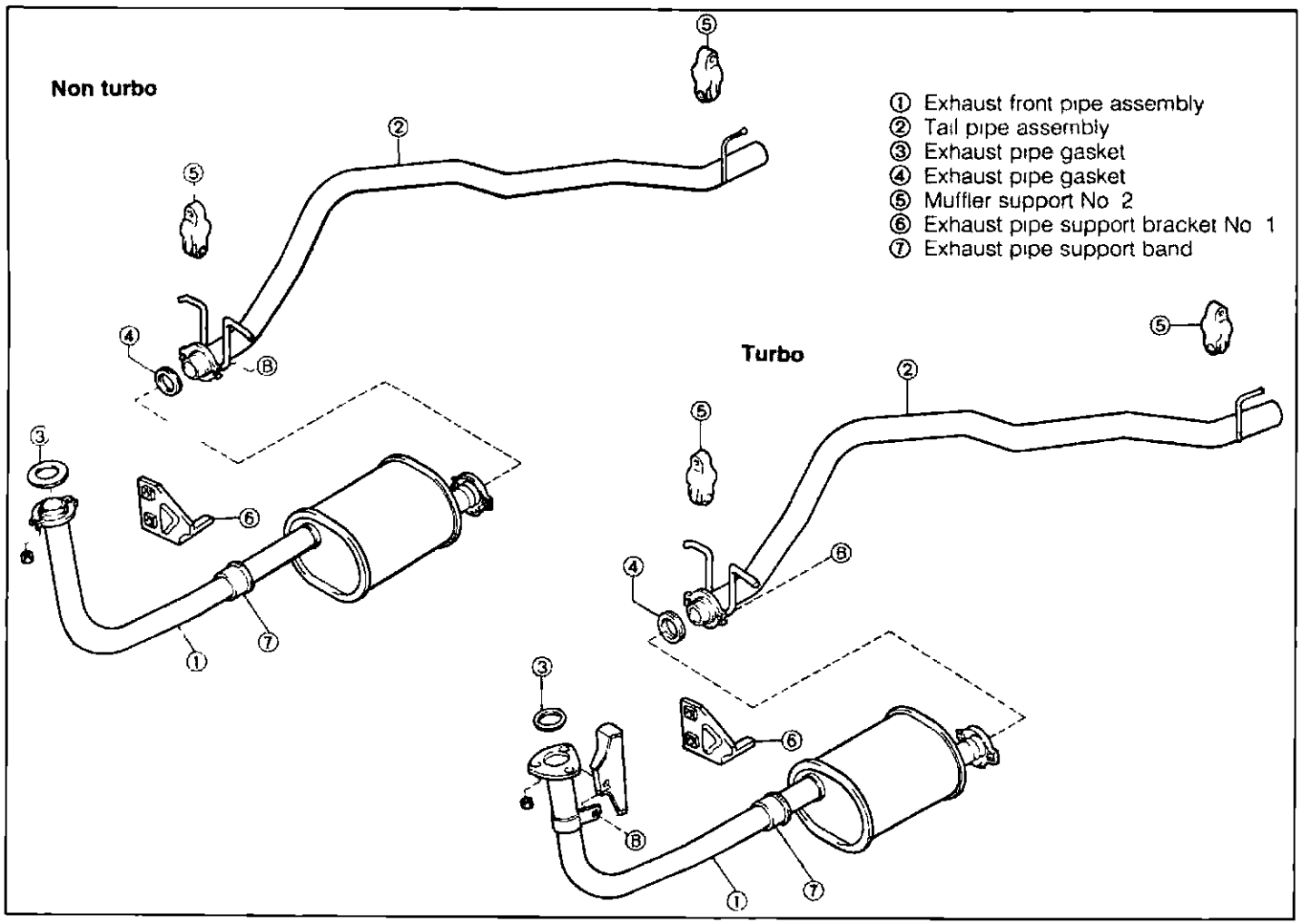
NOTE:
- Be very careful not to damage the hoses, etc.

4 Connect the fuel sender gauge connector.
5 Connect the fuel return hose to the fuel emission tube.
6 Install new clamps
7 Connect the fuel main hose to the fuel main tube No 1.
8 Install the fuel tank protector, (if so equipped)
9 Connect the air bleeder hose (for fuel tank use) to the three-way joint, passing through the rubber grommet of the side panel
10 Attach the hose clamp to the air hose.
11 Install the safety valve subassembly to the side panel with the attaching bolt
12. Connect the hose to the fuel vapor liquid separator and install a new hose clip.
13 Connect the breather tube hose to the fuel inlet pipe subassembly and install the hose clamp
14 Connect the fuel tank sub-inlet hose to the fuel inlet pipe subassembly and install the hose band
15 Attach the hose band
16 Install the fuel inlet protector with the three attaching bolts.

WRE91 BO556

EXHAUST PIPE

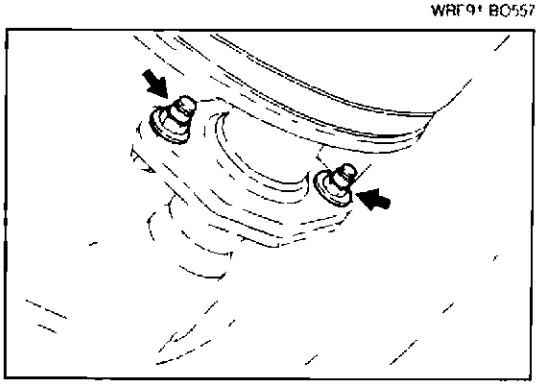
COMPONENTS



WRE91 BO557

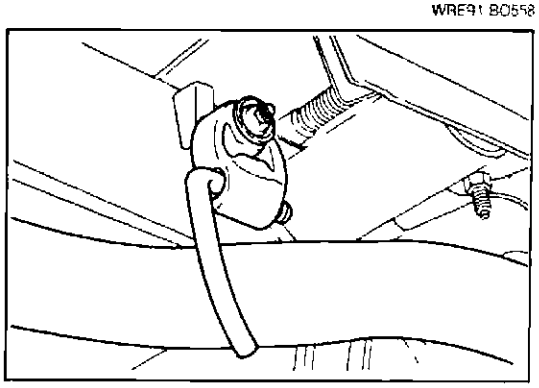
REMOVAL

1 Remove the bolt connecting the exhaust front pipe to the tail pipe



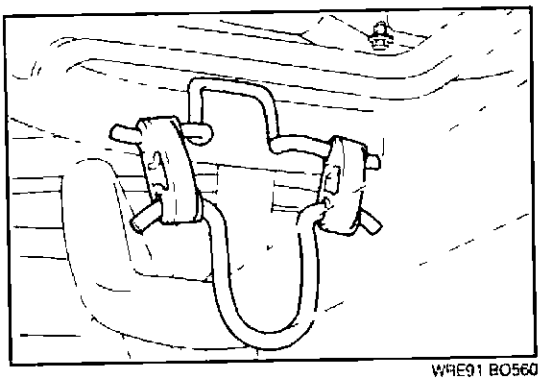
WRE91 BO558

2 Remove the muffler support attaching nut located at the back of the tail pipe

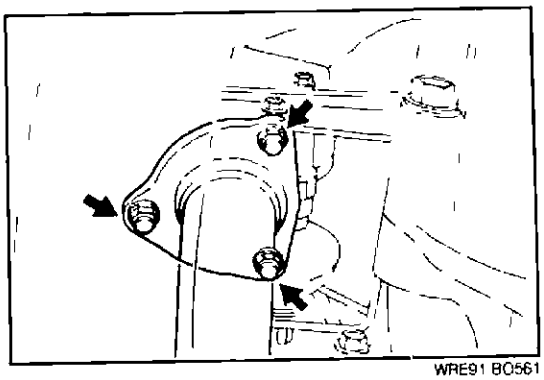


WRE91 BO559

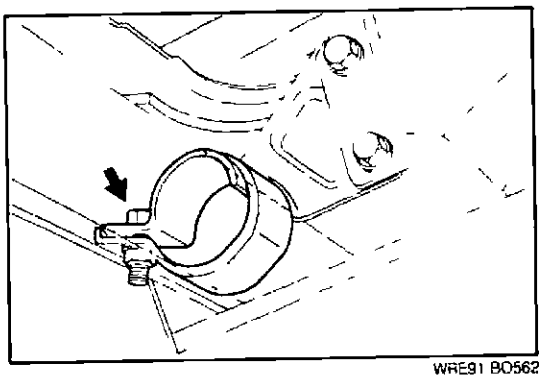
3 Remove the tail pipe by removing the tail pipe supports at the center of the tail pipe


WRE91 BO560

4 Remove the bolt connecting the exhaust front pipe to the exhaust manifold


WRE91 BO561

5. Loosen the clamp bolt of the exhaust front pipe. Remove the clamp from the exhaust pipe support. Remove the exhaust front pipe
6. Remove the gasket from the exhaust front pipe


WRE91 BO562

INSTALLATION

1. Install a new gasket to the exhaust front pipe.
2. With the exhaust front pipe aligned with the exhaust manifold, attach the clamp to the exhaust pipe support.
3 Install the exhaust front pipe to the exhaust manifold with the attaching nuts.
   Tightening Torque: 44.1 - 53.9 N m
   (4.5 - 5.5 kgf-m, 32.5 - 39.8 ft-lb)

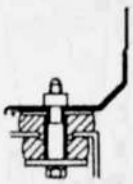
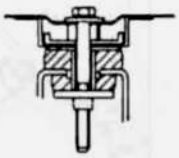
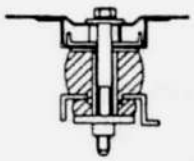
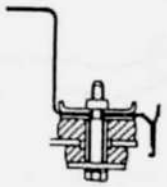
4 Tighten the exhaust pipe clamp.
   Tightening Torque: 34.3 - 44.1 N m
   (3.5 - 4.5 kgf-m, 25.3 - 32.5 ft-lb)

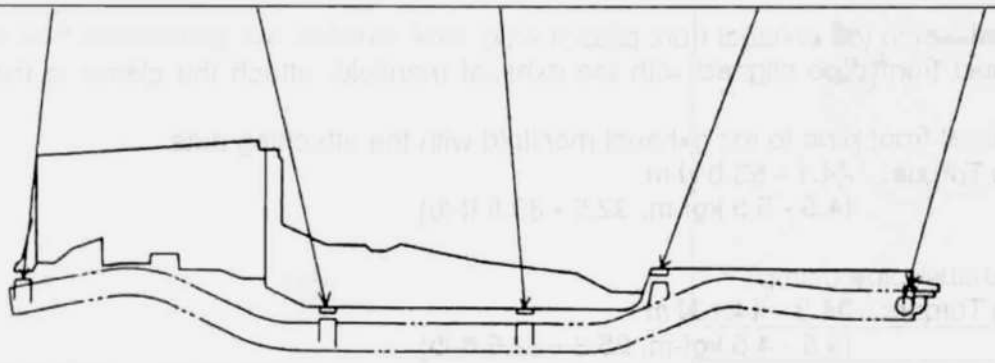
5 Connect the tail pipe to the front pipe with a new gasket interposed.
6 Connect the tail pipe support at the tail pipe rear side and install it with the attaching nut
7 Install the tail pipe support the center of the tail pipe
8 Tighten the bolt connecting the exhaust front pipe to the tail pipe
   Tightening Torque: 44.1 - 53.9 N m
   (4.5 - 5.5 kgf-m, 32.5 - 39.8 ft-lb)

WRE91 BO563

BODY MOUNTINGS

MODEL F70 and F75

No.	1	2	*3	4	5
Hardness	46°	60°	42°	46°	60°
Color code	Yellow	White	Two lines	Yellow	White
Configuration			(Except for hard top) 		
Tightening torque N·m (kgf-m, ft-lb)	41.2 - 53.9 (4.2 - 5.5, 30.4 - 39.8)				

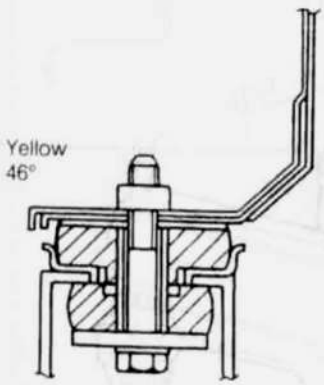
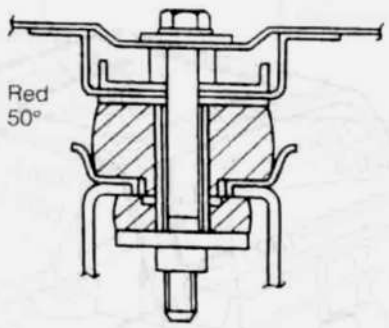
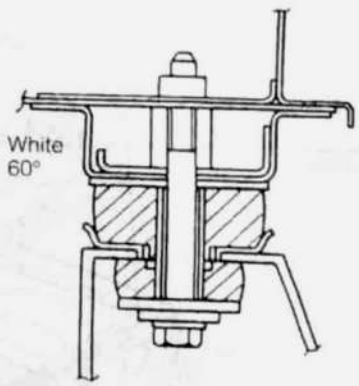


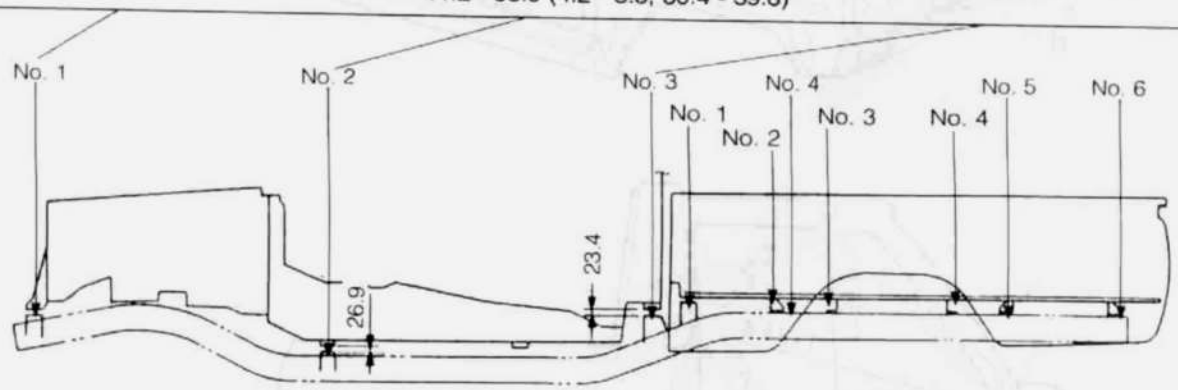
*Hard top (F70V) is free mount.

WRE91-BO564

MODEL F77

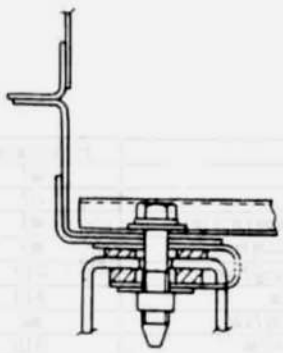
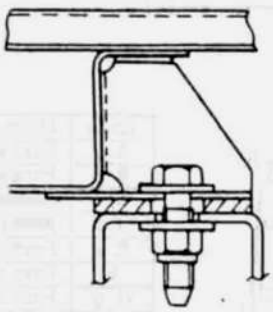
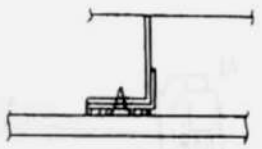
Front Body

No. 1	No. 2	No. 3
		
Tightening torque N·m (kgf-m, ft-lb)		
41.2 - 53.9 (4.2 - 5.5, 30.4 - 39.8)		



Unit: mm

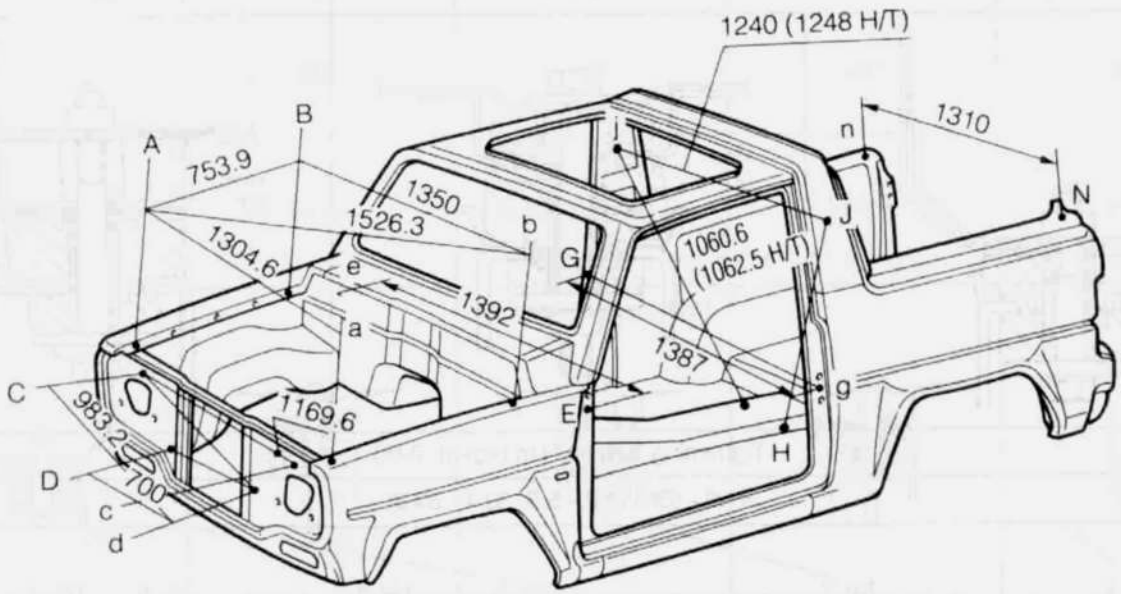
Rear Body

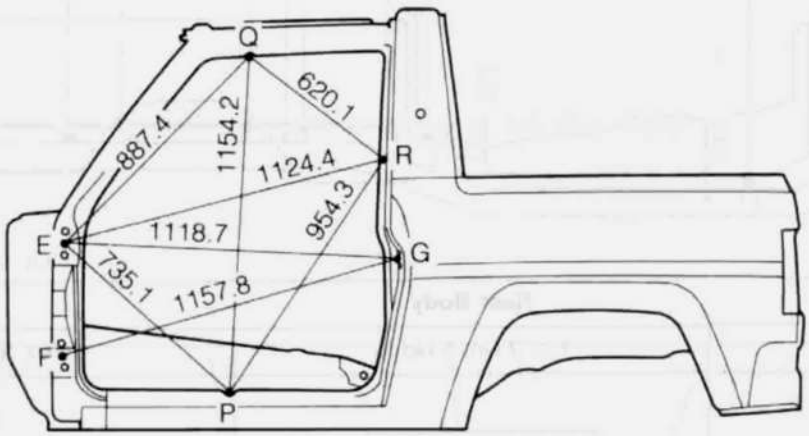
No. 1	No. 2 No. 5 No. 6	No. 3 No. 4
		
Tightening torque N·m (kgf-m, ft-lb)		
41.2 - 53.9 (4.2 - 5.5, 30.4 - 39.8)		

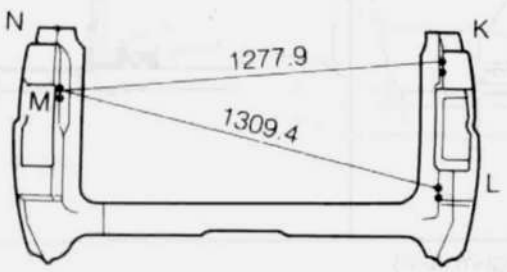
WRE91-BO564

WRE91-BO565

BODY DIMENSIONS







Code	Measuring position	Hole diameter
A, a	Front fender	ϕ7
B, b	Front fender	ϕ7
C, c	Radiator support, headlamp attaching hole	ϕ7
D, d	Radiator support, harness clamp attaching hole	ϕ7
E, e	Front door upper hinge attaching hole	ϕ10
F	Front door lower attaching hole	ϕ10
G, g	Front door lock striker attaching hole	ϕ9
H, h	Front floor seat belt attaching hole	ϕ16
J, j	Rear pillar upper seat belt attaching hole	ϕ15
K	Back door upper hinge attaching hole	ϕ13
L	Back door lower hinge attaching hole	ϕ13
M	Back door lock striker attaching hole	13 square
N, n	Side panel top rail rear hole (knock pin hole)	ϕ9
P	Rocker panel flange mating mark	R 3.5
Q	Roof side rail flange mating mark	R 3.5
R	Rear pillar upper mating hole	ϕ6

HT : Hardtop
Unit : mm

WRE91-BO568

SST

Shape	Part No and name	Purpose	Remarks
	09812-00010-000 Door hinge set bolt wrench set	Adjustment of front door alignment adjustment	

WRE91 BO569

DAIHATSU

F70,F75,F77

Service manual

BODY ELECTRICAL SYSTEM

BE

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

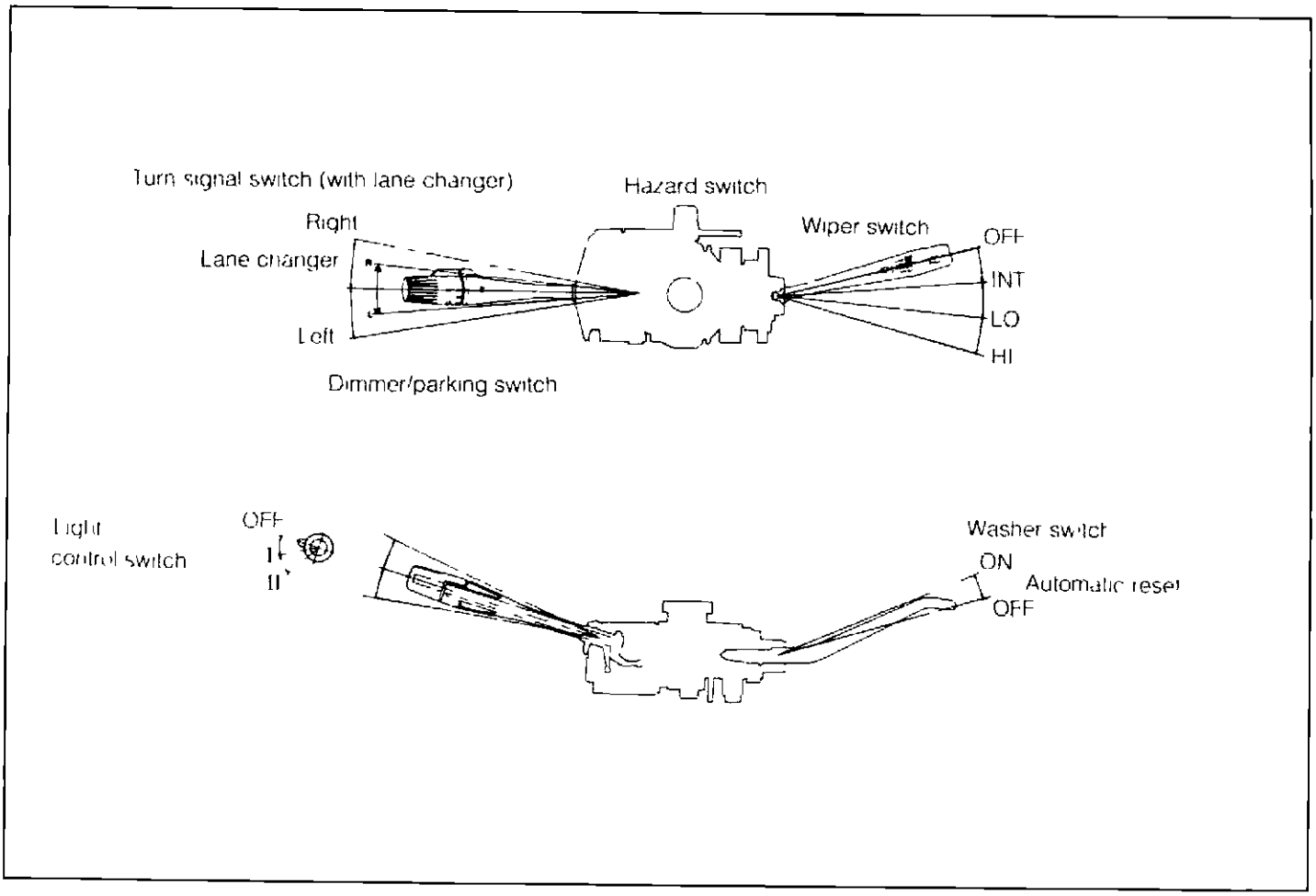
BODY ELECTRICAL SYSTEM

1. COMBINATION METER ..... BE– 6
2. WARNING & INDICATOR BE–15
3. IGNITION KEY SWITCH BE–21
4. HORN BE–23
5. MULTI-USE LEVER SWITCH BE–24
6. LIGHTING BE–32
7. FRONT WIPER & WASHER BE–47
8. REAR WIPER & WASHER BE–52
9. REAR WINDOW DEFOGGER BE–55
10. HEADLAMP CLEANER BE–57
11. FRONT HEATER BE–58
12. REAR HEATER BE–63
13. REMOTE CONTROL MIRROR BE–64
14. POWER WINDOW BE–66
15. POWER FRONT DOOR LOCK BE–68
16. BACK DOOR OPENER BE–70
17. THREE-STAGE DAMPER BE–71
18. DAY-LIGHT RELAY BE–74
19. DIM-DIP LAMP BE–76
20. VOLT METER BE–78
21. INCLINOMETER BE–79
22. CLOCK BE–82

AREA BE001

5. MULTI-USE LEVER SWITCH

A multi-use lever type in which all switches to be used most frequently during the driving, such as the lighting switches, turn signal switch and wiper switch, are arranged concentrated around the steering column has been employed

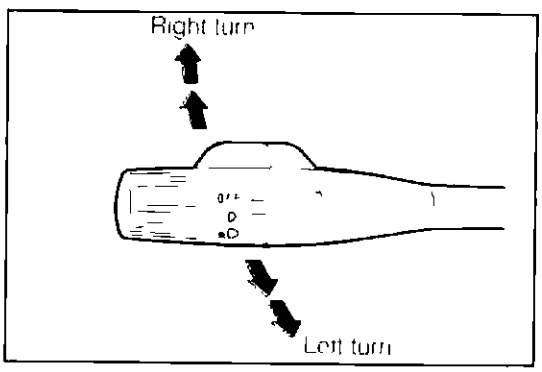


WRE 0 BE06

5-1. IN VEHICLE INSPECTION

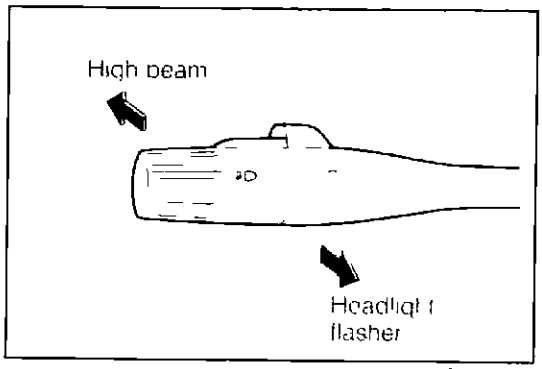
1 Ensure that each of the turn signal, dimmer, lighting, hazard warning and front wiper switches is functioning smoothly with a positive detent feeling

2 With the ignition switch turned ON, move the turn signal switch to the right or left Ensure that the turn signal indicator lamp flashes



W IE 1 TE0 6

3 Ensure that the upper beam indicator lamp glows regardless of the ignition switch position when the dimmer switch and passing light switch are operated



WB 1 -0L067

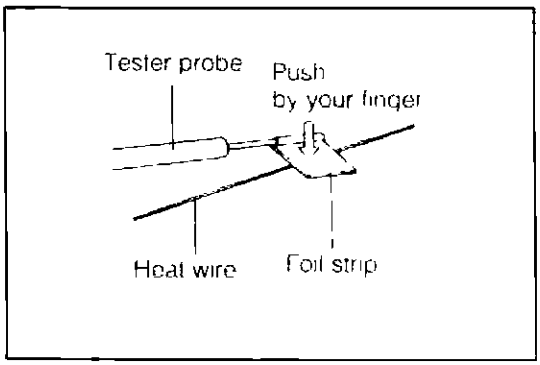
9-2. DEFOGGER WIRE

NOTE:

(1) When wiping the glass surface, use a soft, dry cloth. Move the cloth along the wire Be careful not to damage the wire.

(2) Never use washing agent or glass cleaner which contains abrasive compound.

(3) Wrap the tip end of the tester probe with foil strip so that the tester probe causes no damage on the heat wire during the voltage measurement. Check the voltage by pushing the foil strip against the heat wire by your finger, as shown in the figure.



WRE31 BE162

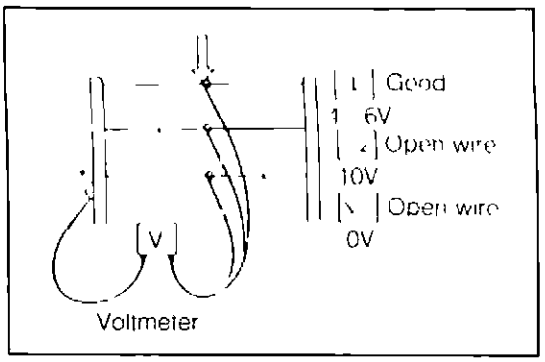
OPEN WIRE CHECK

1 Turn ON the ignition key switch

2 Turn ON the defogger switch so as to energize the defogger wire

3 Check the voltage at the center section of each heat wire

Voltage	Judgement criteria
Approx. 5V	Good (No open wire)
Approx. 10V or 0V	Open wire



WRE31 BE163

REFERENCE:

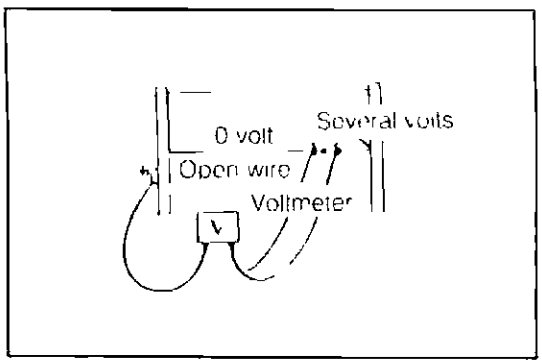
- If the voltage is 10V, it means that open wire exists between the center of the wire and the end of the positive ⊕ side if the voltage is 0V, it means that open wire exists between the center of the wire and the end of the earth side.

LOCATING POINT OF OPEN WIRE

1 Connect the positive ⊕ terminal of the voltmeter to the positive ⊕ side of the defogger wire.

2 Slide the voltmeter's negative ⊖ terminal wrapped with foil strip on the defogger wire from its positive ⊕ side to its negative ⊖ side

3 The voltmeter reading changes from 0V to several volts at the point where open wire exists



WRE31 BE164

REPAIRING POINT OF OPEN WIRE

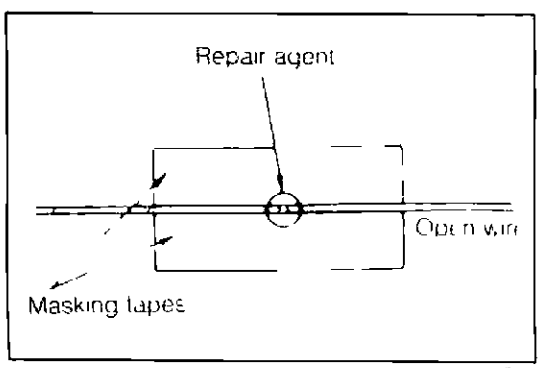
1 Clean the point of open wire with white gasoline

2 Affix masking tapes to both upper and lower portions of the point to be repaired

3 Stir repair agent (Du Pont Paste No. 4817) thoroughly Apply a small amount of the repair agent to the repairing point using a fine brush

4 Two to three minutes later, peel off the masking tapes

5 Do not energize the defogger wire within 24 hours after the repair

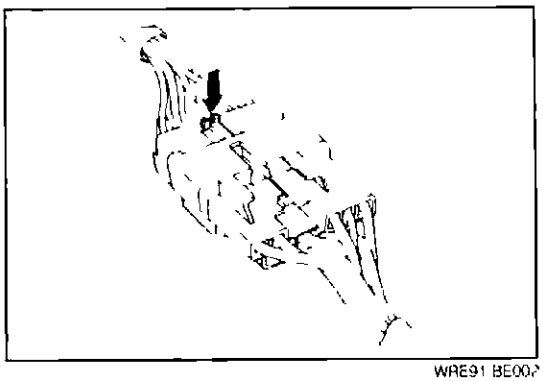


WRE31 BE165

INTRODUCTION

1. Handling of Connectors with Lock

(1) Disconnection
While pushing the lock lever as shown in the right figure, disconnect the connector. Do not pull the harness during this operation.

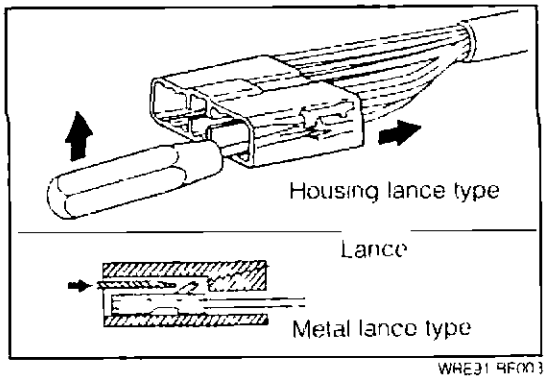


WRE91 BE002

(2) Connection
Connect the male connector to the female connector. Ensure that the lock is engaged completely.

(3) Removal of terminal
Housing lance type
Insert a miniature screwdriver through the opening section of the connector into between the locking lug and the terminal. While prying up the locking lug with the screwdriver, pull the terminal backward.

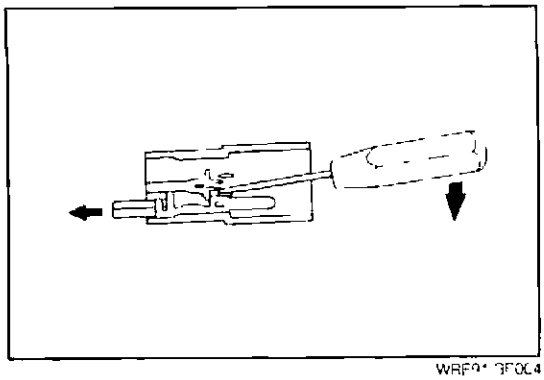
Metal lance type
While pushing the lance with the screwdriver, pull the terminal backward.



WRE91 BE003

(4) Installation of terminal
Housing lance type
Push the terminal into the protruding section of the connector, until the lock is engaged completely.
Lightly pull the harness to assure that the locking has been made completely.

Metal lance type
Insert the terminal into the connector, until lance is locked completely.
Lightly pull the harness to assure that the locking has been made completely.



WRE91 BE004

CAUTION.

- HANDLING INSTRUCTIONS ON LOCK TYPE CONNECTOR
  Do not disconnect or connect the lock type connector, unless such operation is absolutely necessary. If the connector should be disconnected or connected, be sure to follow the procedure given below.

WRE91 BE005

2. Disconnection

The lock type of the connector comes in a push release type, a pull release type, a spring lock type, an one-way lock type and so on

After confirming the shape of the lock, unlock the lock. Disconnect the connector while holding the connector by hand

NOTE:

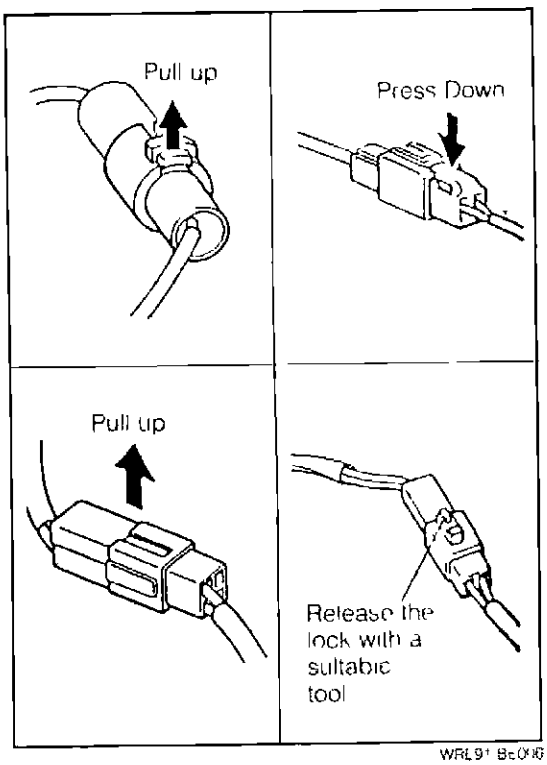
- Never pull the harness during the disconnection.
- Be sure to pull out the connector straight so as not to damage the terminal

3. Connection

Perform the connection, until the lock is completely engaged

NOTE:

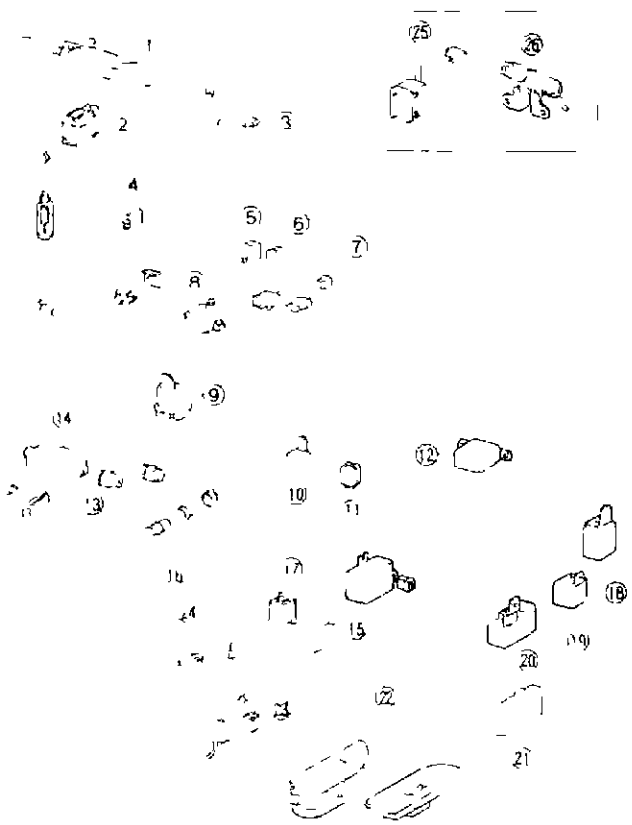
- To confirm whether the connector has been locked or not, lightly pull the connector. Make sure that the connector will not be disconnected. Be sure to press the connector again before finishing the confirmation



WRL91BE010

LOCATION OF THE PARTS

LHD



RHD



① Turn signal switch
② Head light leveling switch
③ Ignition switch
④ Rear window defogger switch
⑤ Fog lamp switch
⑥ Rear wiper switch
⑦ Heater blower switch
⑧ Stop lamp switch
⑨ Starter relay
⑩ Int wiper relay
⑪ Turn signal flasher
⑫ Glow plug relay
⑬ Power shift relay
⑭ Fuse block
⑮ Day light relay
⑯ Cigarette lighter
⑰ Door control switch
⑱ Seat belt warning relay
⑲ Fuel control relay
⑳ Headlamp cleaner relay
㉑ Preheating timer
㉒ Power window switch
㉓ Parking brake switch
㉔ 3 stage dumper switch
㉕ 4WD Switch
㉖ Rear fog lamp switch
㉗ Remote control mirror switch
㉘ Dim dip lamp relay

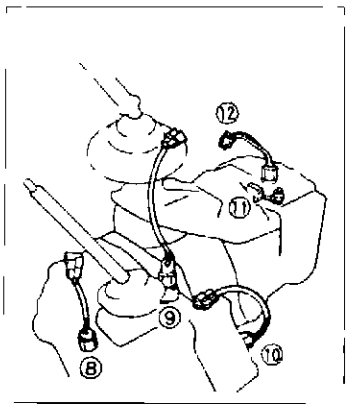
WBE91 0E30

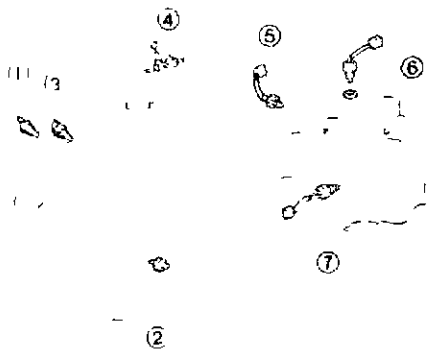


① Fusible link block
② Fuel heater relay
③ Glow plug relay
④ Motor winch relay
⑤ Door lock control relay
⑥ Dim-dip lamp resister
⑦ Voltage regulator
⑧ Window regulator motor
⑨ Courtesy lamp switch
⑩ Door control motor
⑪ 3 stage dumper computer
⑫ Fuel sender gauge
⑬ Door lock solenoide

W-LB-BL-018

Power shift switch

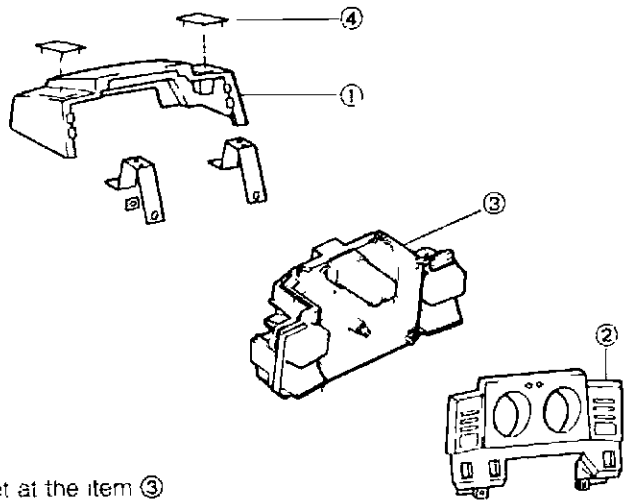




① Water temp. sender gauge
② Oil pressure switch
③ Water temp. sensor
(For preheating timer)
④ Glow plug current sensor
⑤ Back up lamp switch
⑥ Transfer position detect switch
⑦ 4WD detect switch
⑧ High/Low SW = Push/OFF
⑨ Position SW = Push/ON
⑩ 4WD Detecting SW = Push/ON
⑪ Back up SW = Push/ON
⑫ Shift SW = Push/OFF

W-BE-01-BE019

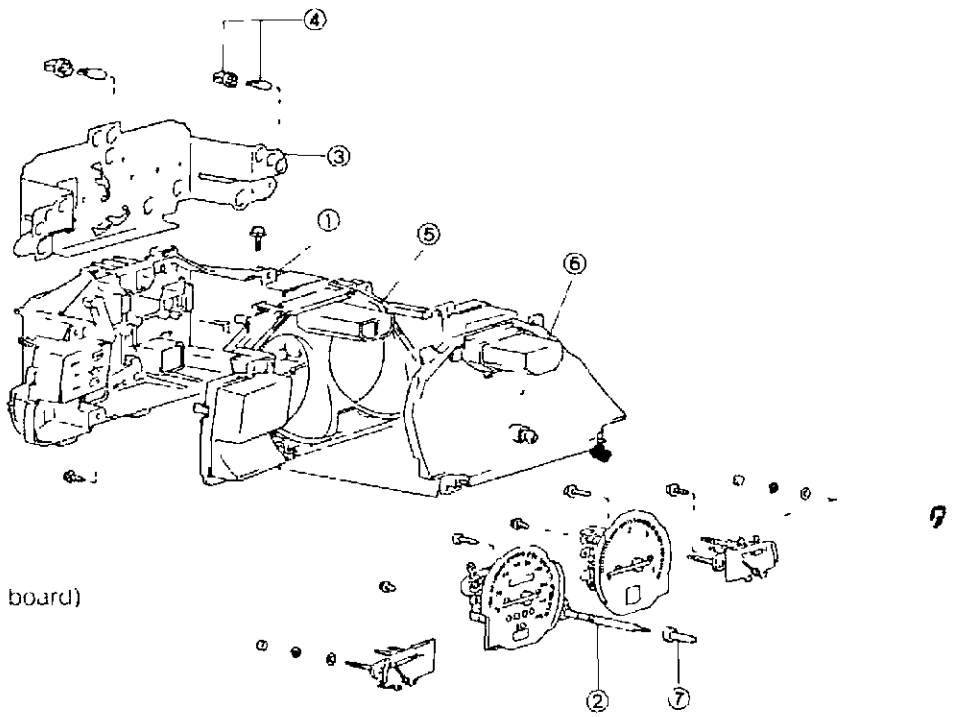
1. COMBINATION METER



① Speedometer cluster finish front panel
When installing, the items ① and ② should be set at the item ③
② Instrument cluster finish rear panel
③ Combination meter assembly
When installing, remove the items ⑤ and ⑥ from the vehicle as a set
④ Instrument cluster finish panel cover

WHF1-3E?-3

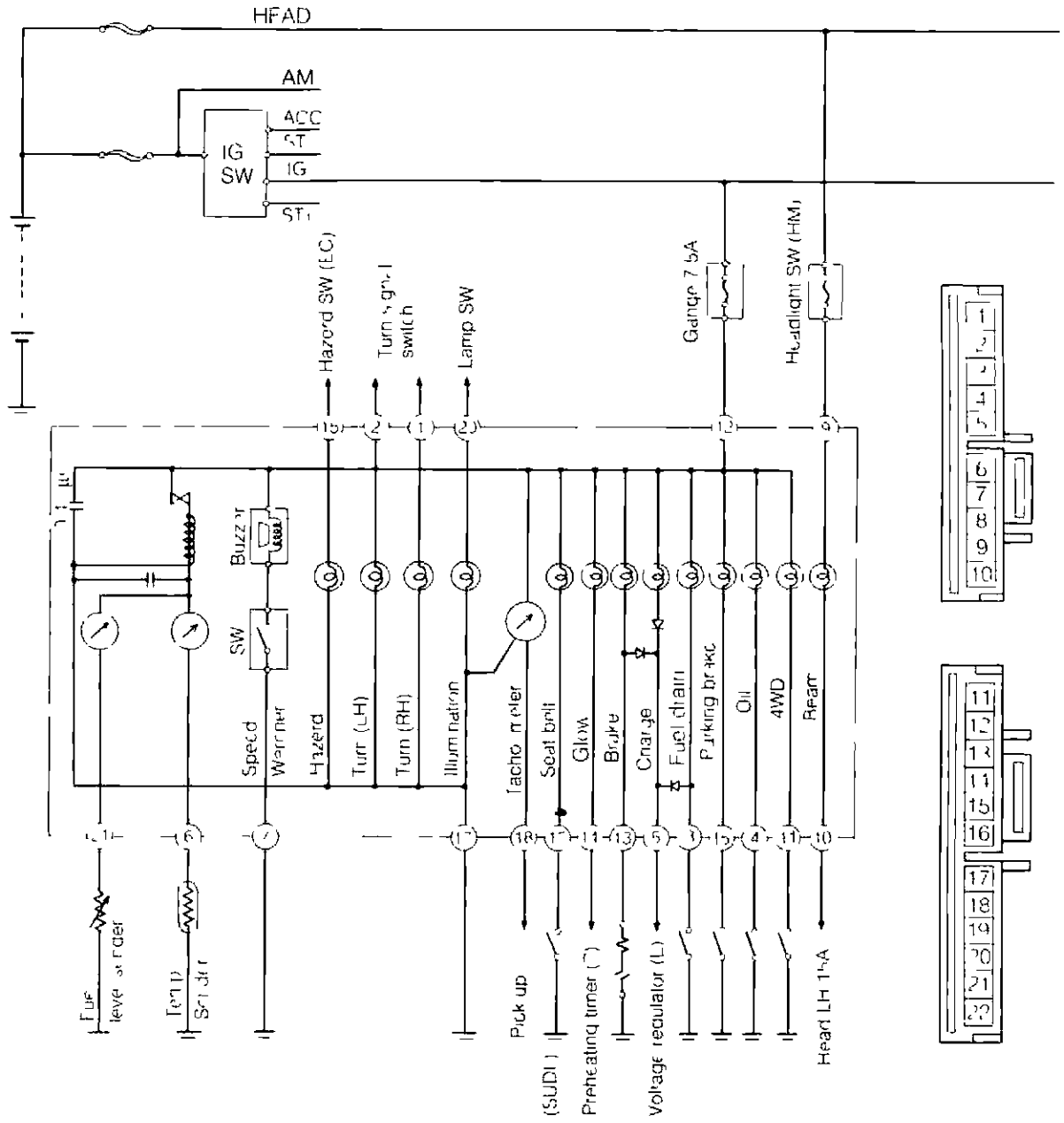
COMPONENTS

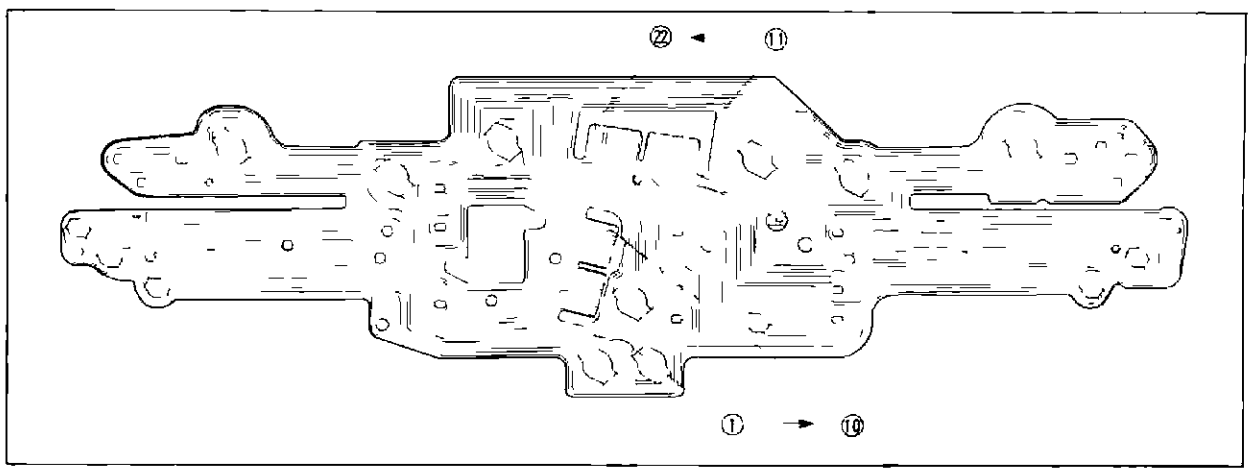


① Case subassembly
② Speedometer and tachometer, etc.
③ Plate subassembly (Printed circuit board)
④ Bulb, etc.
⑤ Wind plate subassembly
⑥ Front glass subassembly
⑦ Knob

WHF1-3E0-1

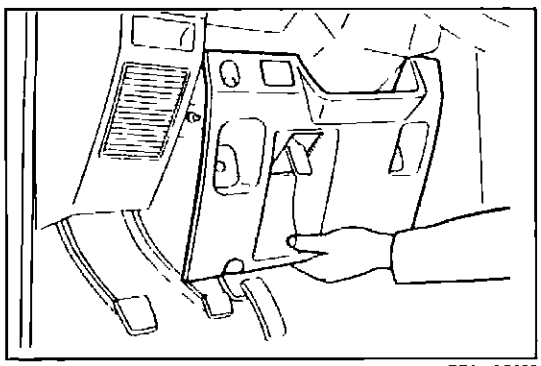
1-1. WIRING DIAGRAM





(This is a sample of the circuit panel)

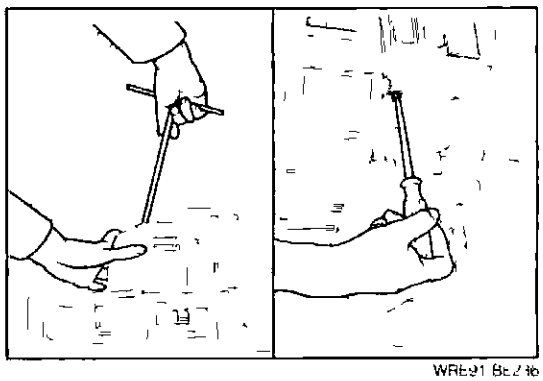
1-2. REMOVAL AND INSTALLATION


WRE91 BE235

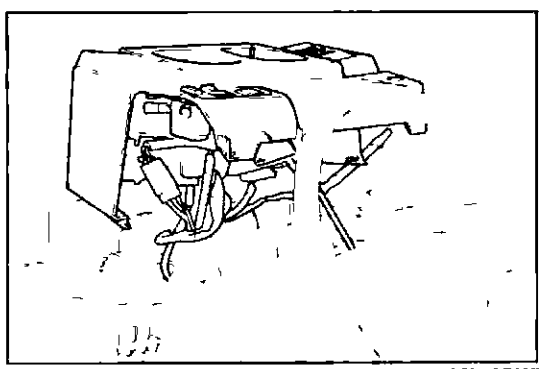
Removal

1 Disconnect the battery cable from the negative (–) terminal
2 Remove the lower instrument panel finish by removing the two screws
   - Remove the headlight levering switch knob

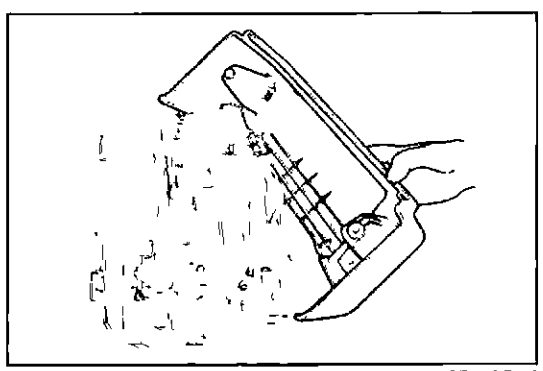
3 Remove the two screws and the two bolts


WRE91 BE236

4 Remove the combination meter Assy
   - Combination meter coupler
   - Speedometer cable
   - 4 H switch coupler
   - Rear wiper switch
   - Remote mirror switch
   - Rear defogger switch

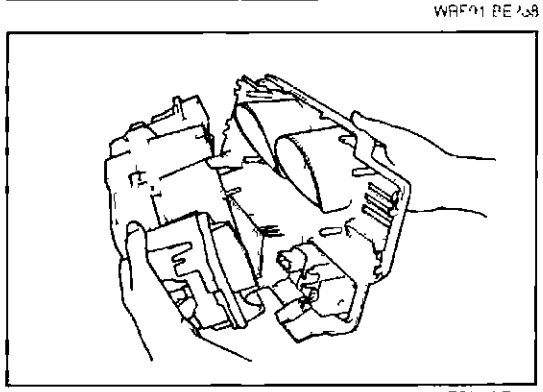

WRE91 BE237

5 Remove the combination meter from the combination cluster

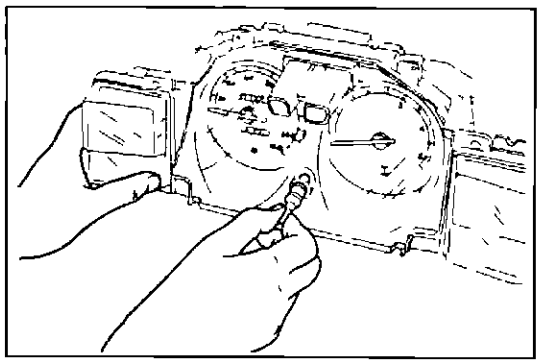

WRE91 BE238

Disassembly of combination meter

1 Remove the combination meter from the cluster

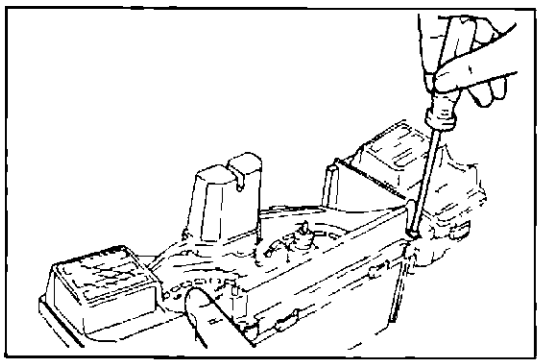

WRE91 BE239

2 Remove the odometer knob by counter-clock-wise



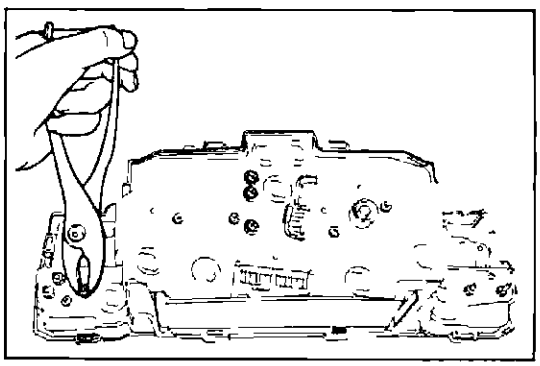
WRE91 BE240

3 Remove the combination meter cover



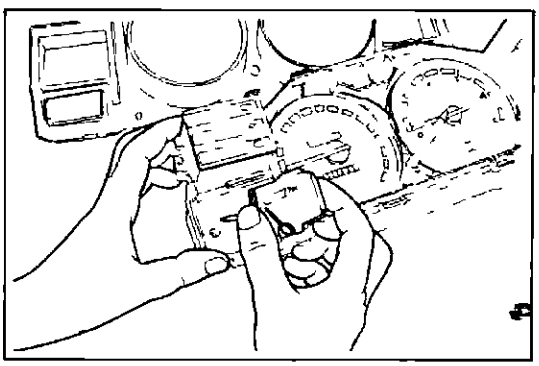
WRE91 BE241

4 Remove the circuit panel



WRE91 BE242

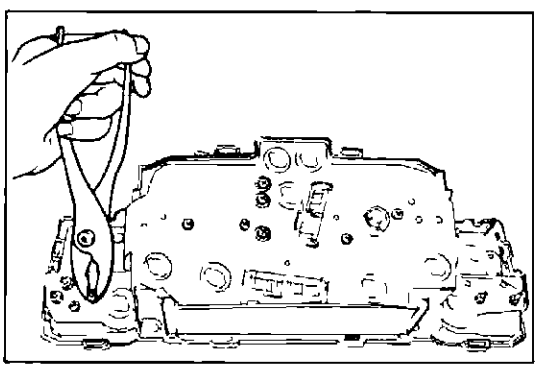
5 Remove the tacho-meter, the speedometer and the gauges.



WRE91 BE243

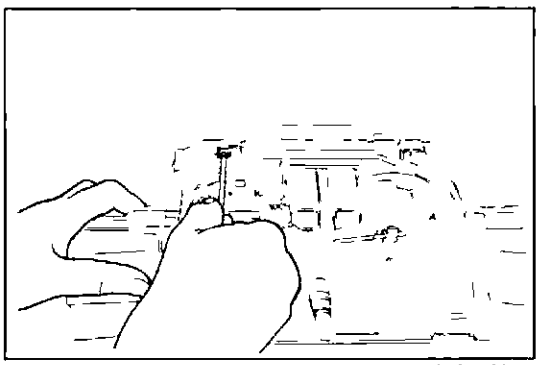
Assembly of combination meter

1 Install the tacho-meter, the speedometer and gauges
2 Install the circuit panel



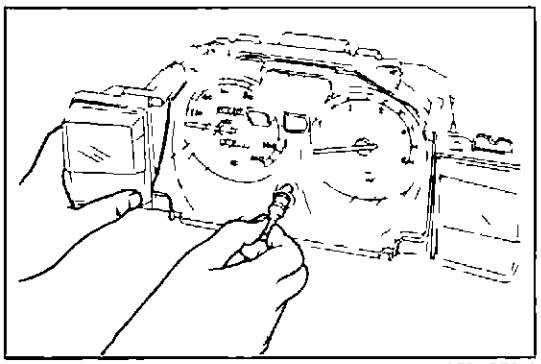
WRE91 BE244

3 Install the combination cover



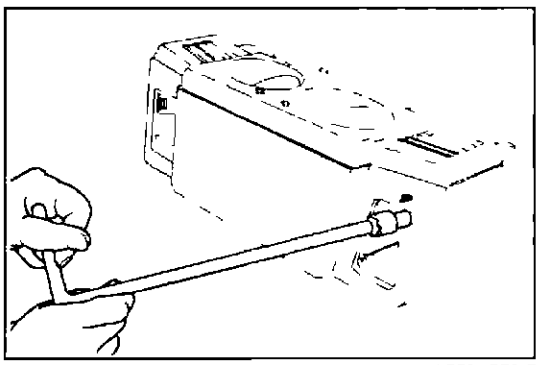
WRE91 BE245

4 Screw on the odometer knob



WRE91 BE246

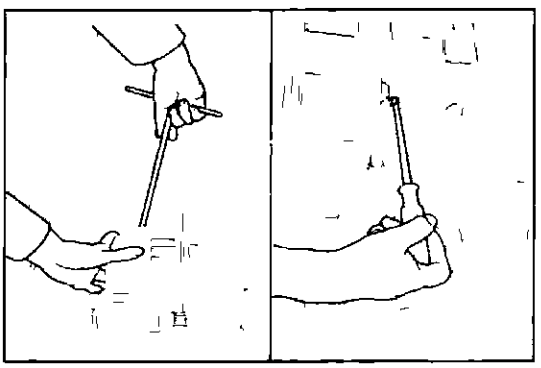
5 Install the combination meter to the cluster



WRE91 BE247

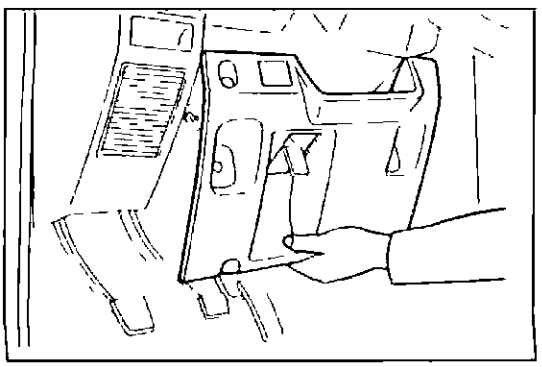
Installation

1 Install the combination Assy to the instrument panel
- Combination meter coupler
- Speedometer cable
- 4 H switch coupler
- Rear wiper switch
- Remote mirror switch
- Rear defogger switch



WRE91 BE248

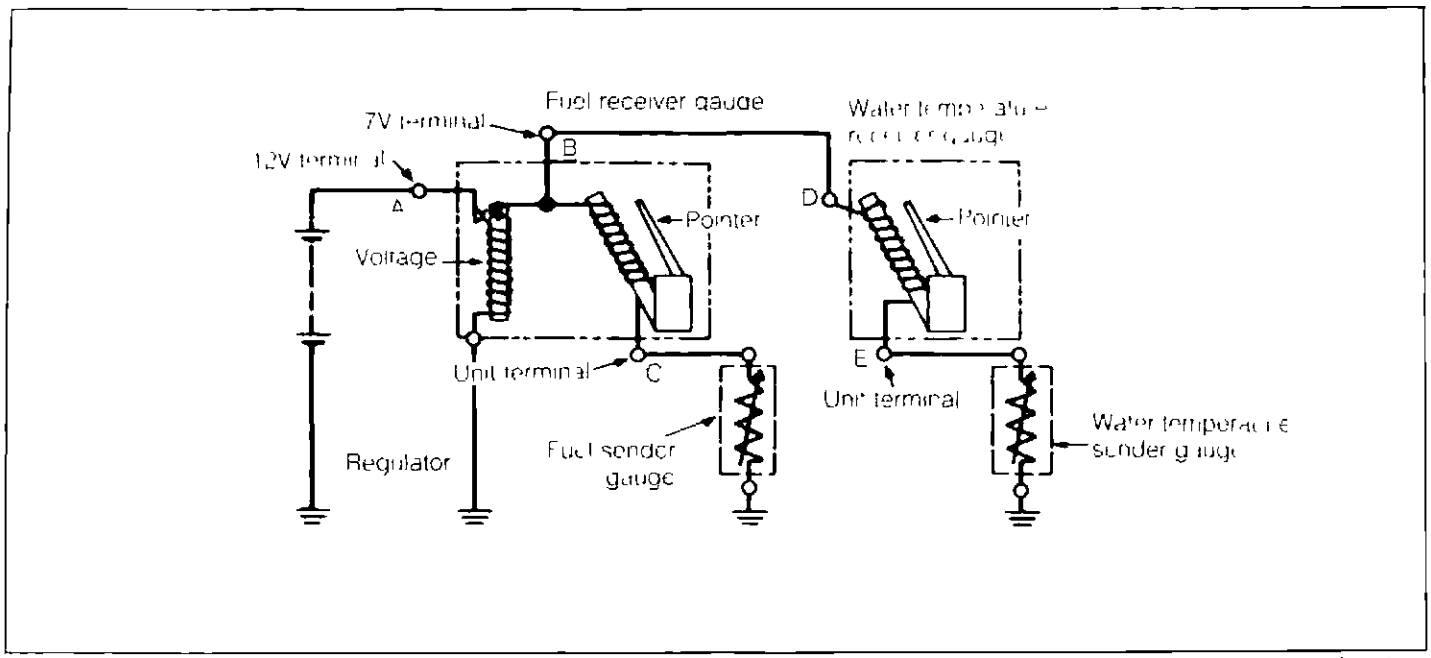
2 Tighten the screws and the bolts.
3 Install the lower instrument panel finish
4 Connect the battery cable to the negative (–) terminal



WRE91 BE249

1-3. GAUGE

CIRCUIT DIAGRAM



BIMETAL GAUGE

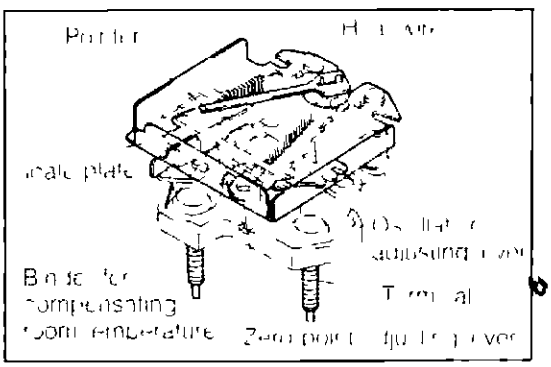
A bimetal type gauge is employed for the water temperature gauge and for the fuel gauge

This gauge adopts such a combination that a bimetal is employed at the receiver section, whereas a resistor is installed at the sender section

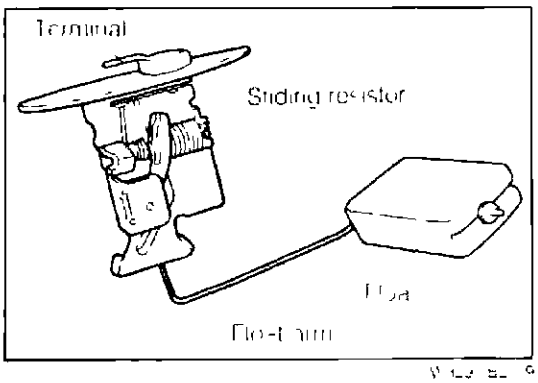
The following is brief description of the construction A heat wire is wound around the bimetal As a result the bimetal bends in proportion to the heat amount which the bimetal receives form the heat wire As the bimetal bends the pointer is interlocked with that deflection of the heat wire

As respects the resistance at the sender section, a sliding type resistor is employed in the case of the fuel gauge while a thermistor is used in the case of the water temperature gauge

The right figure indicates the receiver section
In the case of the bimetal-resistor combination type gauge, heat is generated by current which flows through the circuit
Therefore, any variation in the power supply voltage will affect the amount of current flowing through the circuit thereby causing an error in the reading at the receiving section To prevent this error the gauge incorporates a voltage regulator



The right figure represents the sender section which employs a sliding resistor The gauge of this type is used for the fuel gauge



FUEL RECEIVER GAUGE
(Bimetal type)

1. IN-VEHICLE INSPECTION

Disconnect the connector located at the upper part of the fuel tank Carry out the following checks at the terminal at the receiver side

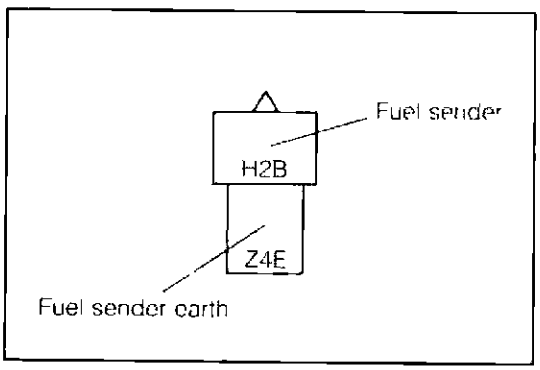
(1) Disconnect the connector from the harness of the fuel sender gauge Ground the gauge through a test lamp (12V - 3 4W)

(2) Turn ON the engine switch Ensure that the test lamp goes on and, several seconds later, the test lamp starts flashing

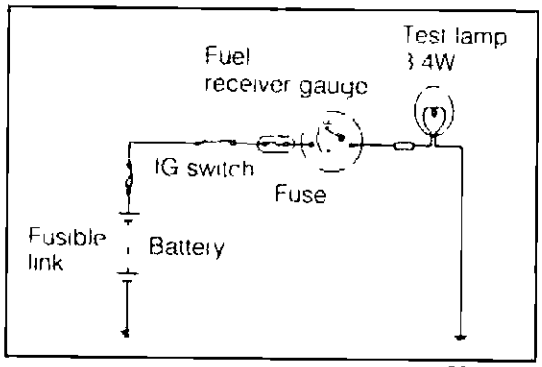
(3) Ensure that the pointer of the receiver gauge starts to rise gradually

NOTE:

- **In case that the fuel sender earth terminal is used, in advance, make sure that it has continuity with the body earth.**



WRE91 BE020



WRE91 BE02

2. UNIT CHECK

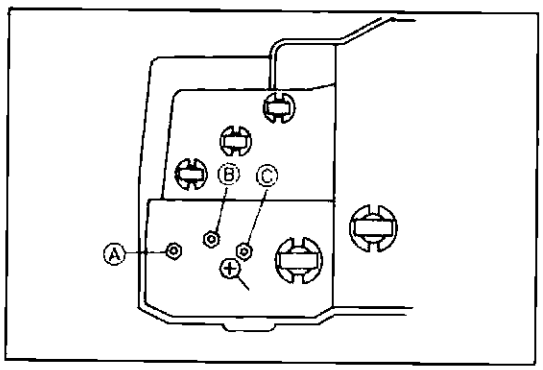
(1) Remove the combination meter

(2) Measure the resistance between the terminals Ⓑ and Ⓒ

Specified Value: 55Ω

(3) Connect the multi-pole connector to the combination meter Turn ON the engine key Ensure that the battery voltage is applied between the terminal Ⓐ and the body earth

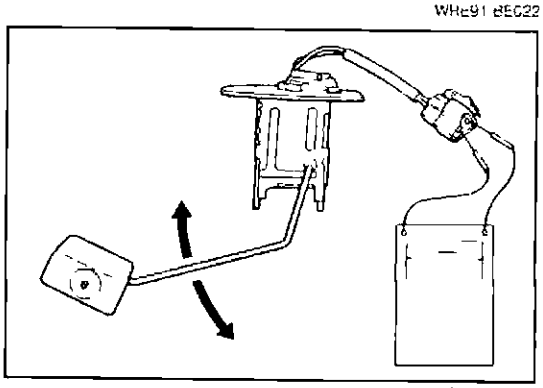
(4) Under the conditions in the step (3), ensure that a voltage varying approximately from 2 to 7V is applied between the terminal Ⓑ and the body earth



WRE91 BE022

FUEL SENDER GAUGE

The fuel sender gauge is located at the upper part of the fuel tank

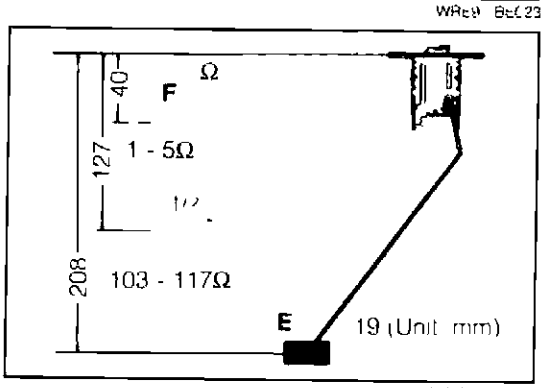


WRE9 BE023

1. MEASUREMENT OF RESISTANCE OF FUEL SENDER GAUGE

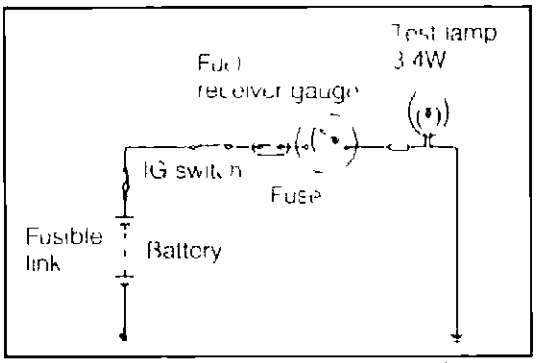
(1) Ensure that the resistance varies when the float is moved from the upper position to the lower position

(2) Measure the resistance between the fuel terminal and the body at each float level



WRE91 BE024

WATER TEMPERATURE RECEIVER GAUGE (Bimetal type use)



WBL91BE02b

1. IN-VEHICLE INSPECTION

(1) Disconnect the connector from the harness of the water temperature sender gauge. Ground the gauge to the connector at the harness trough a test lamp (12V - 3.4W).

(2) Turn ON the engine switch. Ensure that the test lamp goes on and, several seconds later, the test lamp starts flashing.

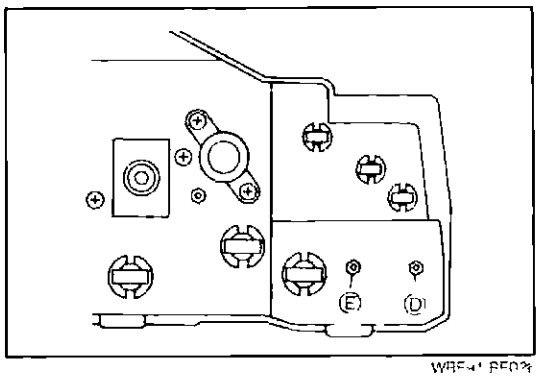
(3) Ensure that the pointer of the receiver gauge starts to rise gradually.

2. UNIT CHECK

(1) Remove the combination meter.

(2) Measure the resistance between the terminals Ⓓ and Ⓔ.

Specified Value: Approx 55Ω



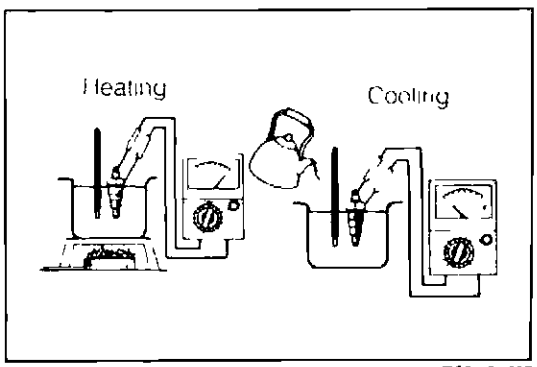
WBE41BE03

(3) Connect the multi-pole connector to the combination meter. Turn ON the engine key. Ensure that the battery voltage is applied between the terminal Ⓐ and the body earth.

(4) Under the conditions in the step (3), ensure that a voltage varying approximately from 2 to 7V is applied between the terminal Ⓓ and the body earth.

WATER TEMPERATURE SENDER GAUGE

The water temperature sensor gauge is located at the rear end of the cylinder head.



WBE91BE02

UNIT INSPECTION

Measure the resistance between the terminal and the earth, as indicated in the right figure.

Specified Value (Reference).

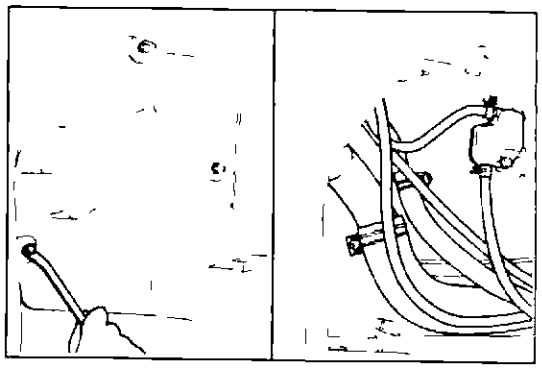
50°C: 189 - 259Ω

110°C: 24 - 28Ω

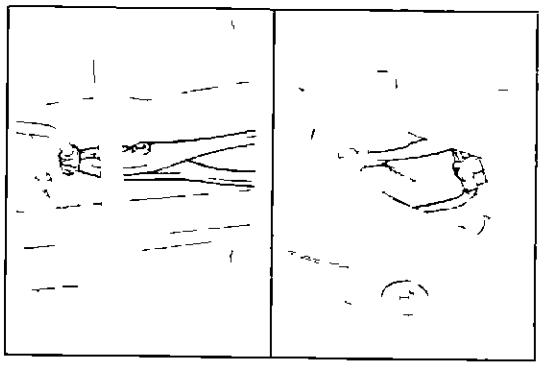
FUEL SENDER GAUGE

Removal

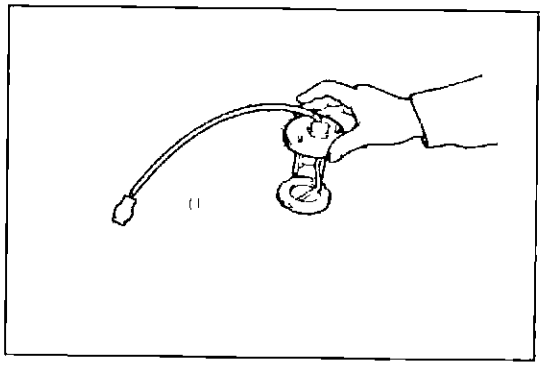
1 Remove the fuel inlet protector
2 Disconnect the fuel hoses and the breather hoses



3 Disconnect the fuel pipes
4 Disconnect the connector of the fuel sender gauge
5 Remove the fuel tank assembly

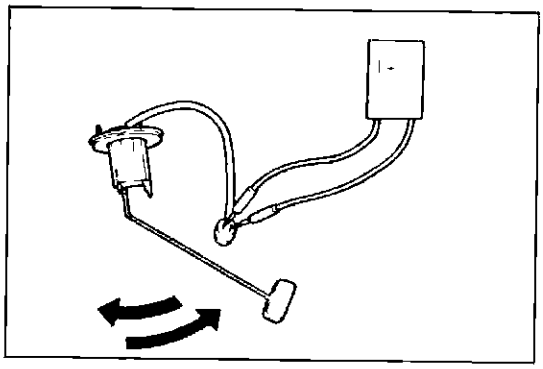


6 Remove the fuel sender gauge from the fuel tank



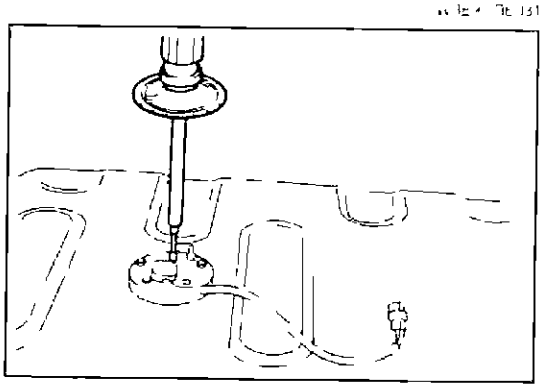
Inspection

Ensure that the resistance varies when the float is moved from the upper position to the lower position
Refer to previous pages



Installation

1 Install the fuel sender gauge to the tank
Tightening Torque: 0.18 - 0.20 N·m (1.8 - 2.0 kgf-m)

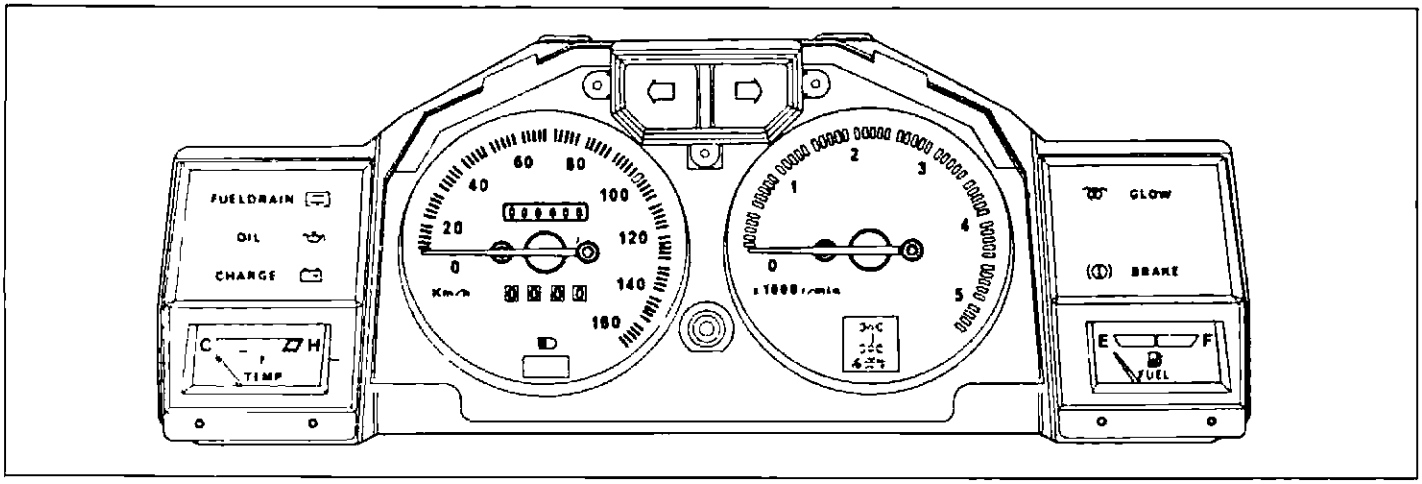


2. WARNING & INDICATOR

CHECK WARNING LAMPS

1 Set the ignition switch to the ON position. Ensure that the warning lamps given below are illuminated.
2 Set the ignition switch to the START position. Start the engine. Ensure that the warning lamps given below are extinguished. (With the parking lever not applied)
3 Stop the engine. Set the ignition switch to the START position again. Start the engine. Ensure that four to eight seconds later, the seat belt warning buzzer ceases its operation and the seat belt warning lamp goes out.

2-1. WARNING & INDICATOR



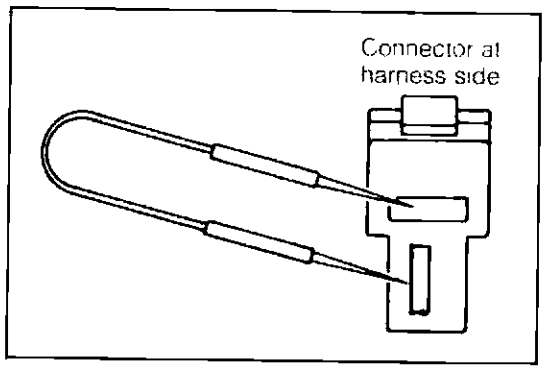
	Kind	Indication	Function
Warning lamp	Hazard warning	HAZARD	Flashes when hazard switch is turned ON Indicating color: Red
	Brake warning	BRAKE	Glows when brake fluid becomes too low or empty, or when parking brake is applied Indicating color: Red
	Parking brake warning	PARK BRAKE	Glow when parking brake is applied while the engine is running Indicating color: Red
	Oil pressure warning	OIL	Glows when engine oil pressure system is encountered with abnormality while engine is running Indicating color: Red
	Charge warning	CHARGE	Glow when engine charging system is encountered with abnormality while engine is running Indicating color: Red
	Seat belt warning	FASTEN BELTS	Glows for about six seconds when driver fails to buckle up seat belt at driver's seat after ignition switch has been turned ON or engine has started Indicating color: Red
	Fuel drain warning	FUEL DRAIN	Glows when the water in fuel is accumulated in the fuel filter in excess of the stipulated amount Indicating color: Red
Indicator lamp	High beam indicator		Glows when upper beams of headlamps are turned ON Indicating color: Green
	Turn signal indicator		Flashes when turn signal switch or hazard warning switch is turned ON Indicating color: Green
	4WD indicator		Glows when the transfer shift lever is moved to the 4H or 4L position with the engine switch turned ON Indicating color: Green
	Glow plug indicator	GLOW	Glows when ignition key holds at the G position or ON position Indicating color: Red

2-2. BRAKE WARNING

BRAKE FLUID LEVEL SWITCH

In-vehicle inspection

1 Start the engine
2 Return the parking brake lever to the original position
3 Disconnect the connector of the brake level warning switch Short the connector terminals at the wire harness side with each other as indicated in the right figure Ensure that the brake warning lamp glows

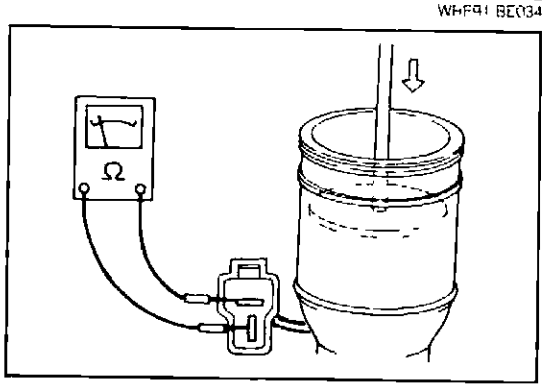


WHE91 BE034

4 Pull out the connector of the brake fluid level warning switch and connect a tester
5 Press down the brake fluid level warning switch (float) with a rod
6 Ensure that continuity exists between the connector terminals

NOTE:

- As for a rod to be used for pressing down the float, be sure to thoroughly clean it. Special care must be exercised to ensure that no dust nor water gets into the reservoir.

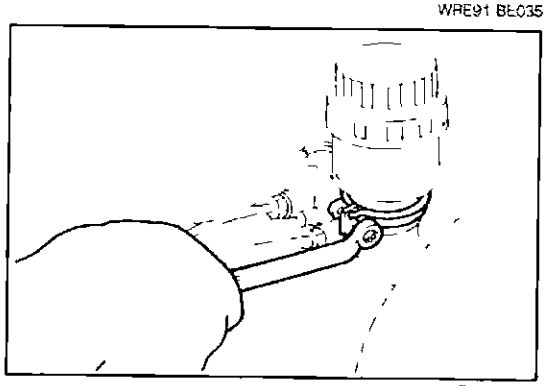


WRE91 BE035

Removal

Replace the brake fluid level switch, If the switch exists malfunction while the above inspection

1 Detach the reservoir tank cap
2 Drain the brake fluid from the reservoir tank
3 Remove the reservoir assembly


WRE91 BE036

Installation

1 Install the master cylinder reservoir assembly to the master cylinder

Tightening Torque: 4.9 - 6 9 N m (0.55 - 0.7 kgf-m)

2 Fill the reservoir tank with brake fluid up to the MAX level.

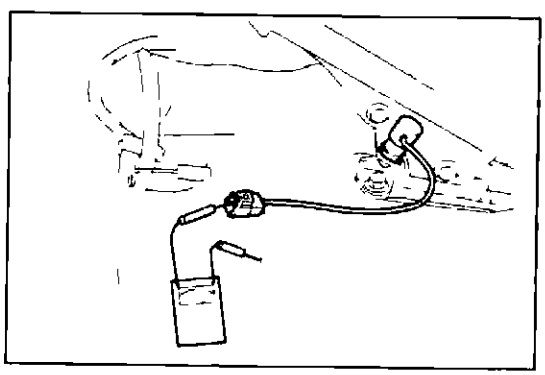
Brake Fluid to be Used: DOT3 or SAE J1703.

WRE91 BE037

PARKING BRAKE SWITCH

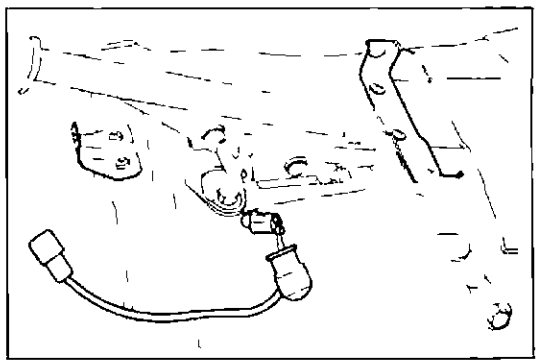
In-vehicle inspection

1 Pull out the connector of the parking brake switch and conduct continuity checks between the terminal and the body earth
   (1) Ensure that continuity exists between the terminals when the parking brake lever is pulled upward
   (2) Ensure that no continuity exists between the terminals when the parking brake lever is returned

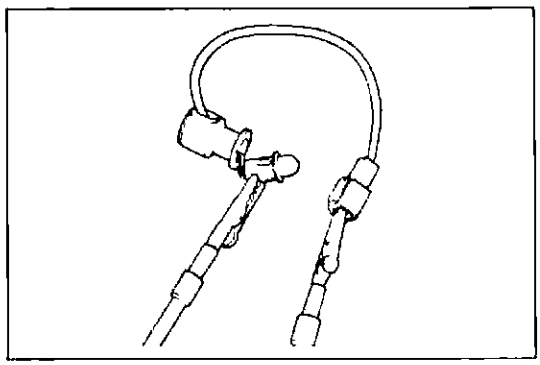

WRE91 BE038

Unit inspection

1 Remove the rear console box
2 Remove the parking brake switch



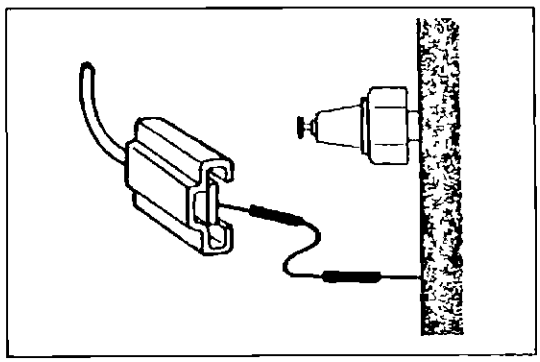
(1) Ensure that continuity exists between the terminal and the switch body
(2) When push the plunger no continuity exists the terminal and the switch body



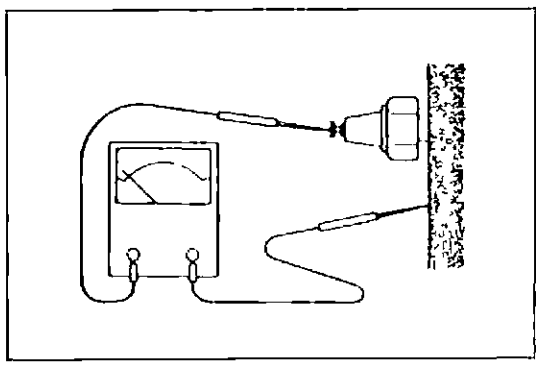
2-3. OIL PRESSURE WARNING

In-vehicle inspection

1 Disconnect the connector of the oil pressure switch at the engine oil cleaner
2 Ground the connector at the harness side
3 Turn ON the IG switch
4 Ensure that the oil pressure warning glows



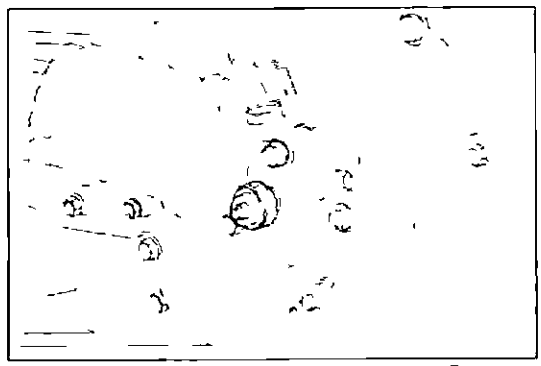
5 Connect a tester between the oil pressure switch terminal and the earth
6 Ensure that continuity exists while the engine is stopped
7 Ensure that no continuity exists while the engine is running



Removal

Replace the oil pressure switch If the switch exists malfunction while above inspection

1 Turn OFF the IG switch
2 Remove the oil pressure switch with 26 mm hexagonal box wrench



Installation

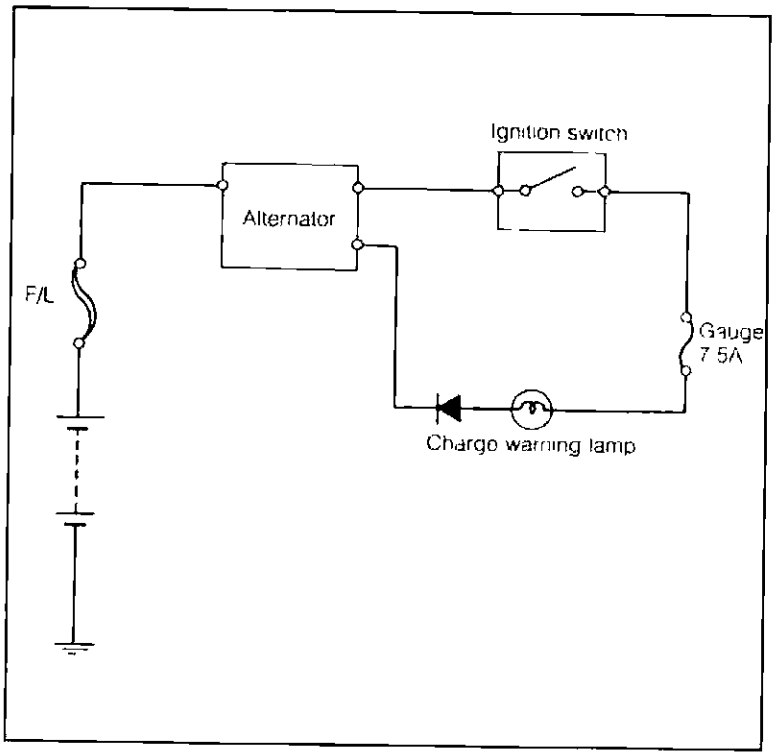
1 Clean the threaded portion of the switch
2 Wind seal tape around the threaded portion
3 Install the oil pressure switch in the engine
Tightening Torque: 1.2 - 2.0 kg-m (8.7 - 14.5 ft-lb).

WRE91 BE044

2-4. CHARGE WARNING

Inspection

The inspection of the charge warning lamp is performed under the inspection of the charge system



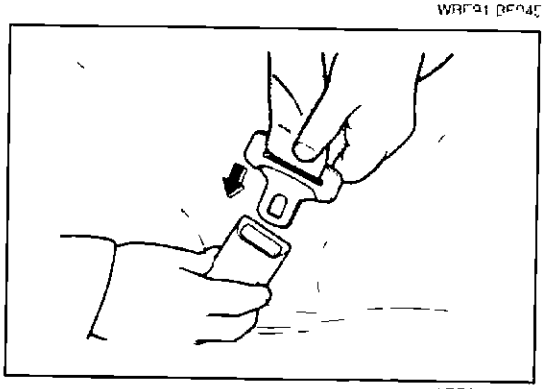
WRE91 BE045

2-5. SEAT BELT WARNING

Operation check

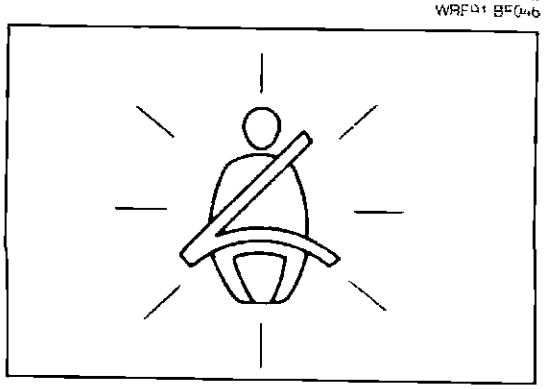
1 Seat belt warning buzzer
(1) Ensure that the buzzer is set off for the specified time when the ignition switch is turned ON
Specified Set-off Time: 4 - 8 seconds

(2) Ensure that the buzzer is not set off when the ignition switch is turned ON with the seat belt locked



WRE91 BE046

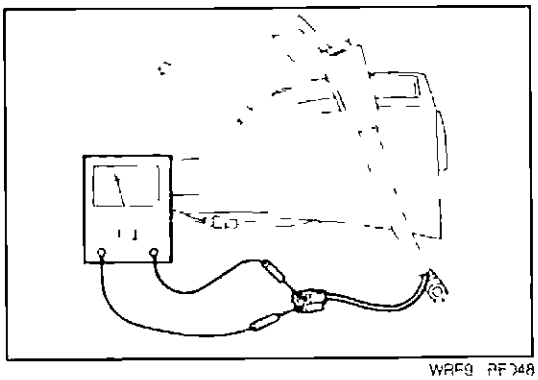
2 Seat belt warning lamp
(1) Ensure that, when the ignition switch is turned ON, the lamp glows for the specified time regardless of the seat belt lock
Specified Set-off Time: 4 - 8 seconds



WRE91 BE047

Inspection of seat belt switch

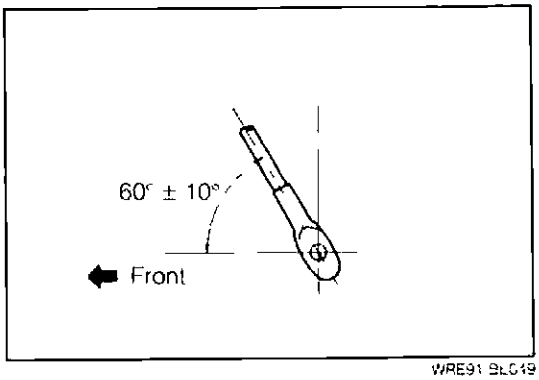
1 Pull out the connector of the seat belt switch and connect a tester
2 Buckle the seat belt Ensure that continuity exists between the connector terminals



Removal and installation

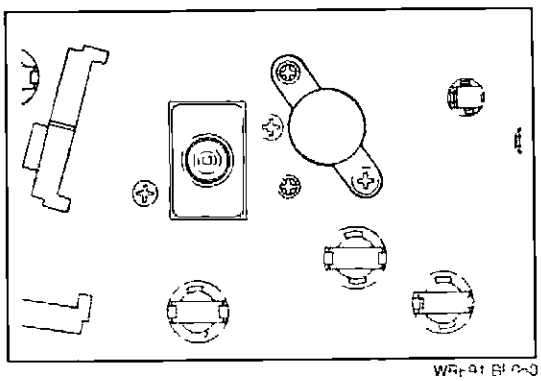
Install the seat bilt so that the installation angle of the front/inner seat belt may become 50 - 70 degrees

Tightening Torque: 2.9 - 5.4 kg-m
(21.0 - 39.1 ft-lb, 28.4 - 53.0 N m)



Inspection of buzzer

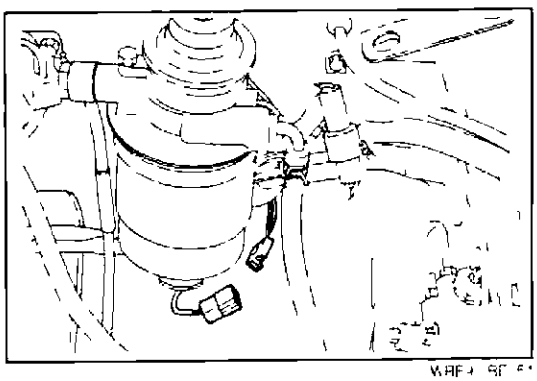
1 Remove the buzzer
2 Apply a voltage of 12V between the terminals of the buzzer
3 Ensure that the buzzer is set off
NOTE:
- It must be noted that the buzzer will not be set off if the positive ⊕ and negative ⊖ terminals are connected reversely.



2-6. FUEL DRAIN WARNING

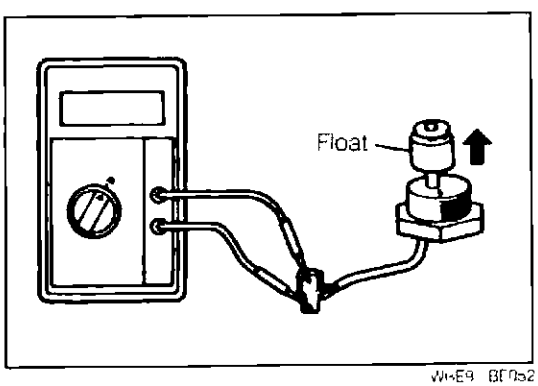
In-vehicle check

1 Disconnect the connector
2 Turn ON the IG switch
3 Short the connector at the harness side
4 Ensure that the fuel drain warning glows



Sensor check

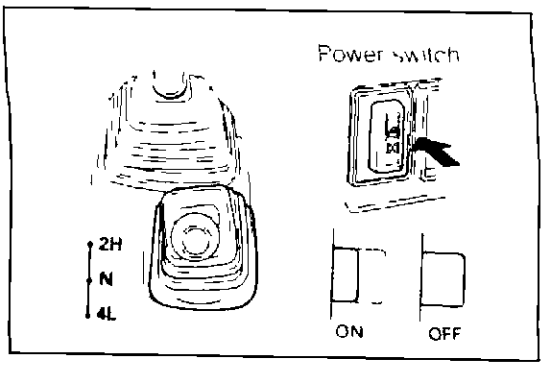
1 Drain fuel from the fuel filter
2 Disconnect the connecter
3 Remove the sensor unit by water pump pliers
4 Connect a circuit tester
5 Lift the float
6 Continuity should exist between the connector terminals



2-7. 4WD INDICATOR

In-vehicle check

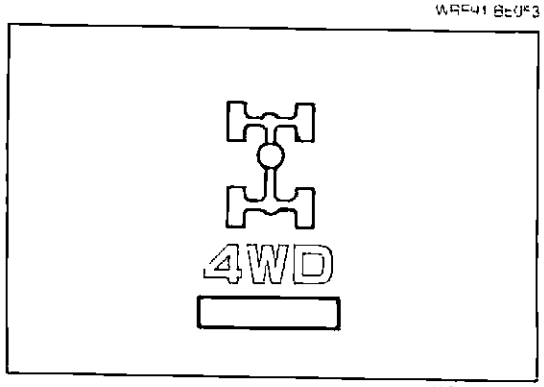
1 Start the engine
2 Place the transfer shift lever in the 4L position. Ensure that the indicator glows.
3 Place the transfer shift lever in the 2H position. Ensure that the indicator is extinguished.
4 Turn ON the power switch. Ensure that the indicator glows.



WRE91 BE053

WARNING

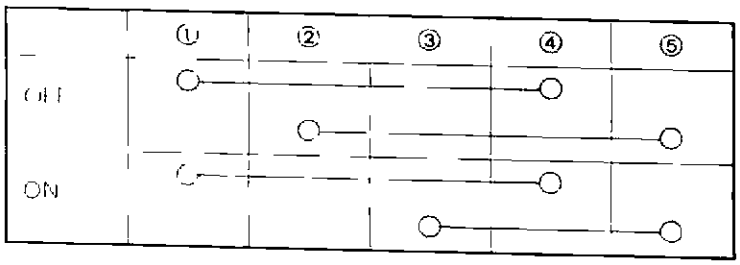
- Prior to the check, be sure to place the transmission shift lever in the neutral position.
- Also make sure to apply the parking brake to the vehicle.

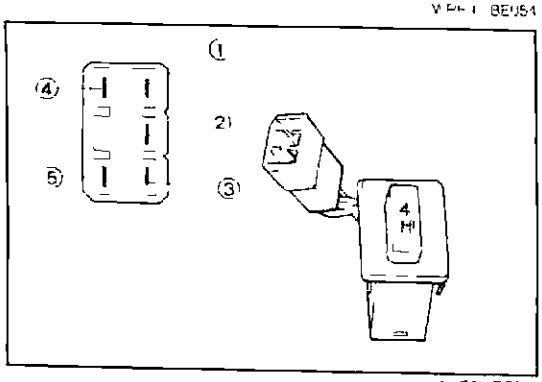


WRE91 BE054

Unit inspection

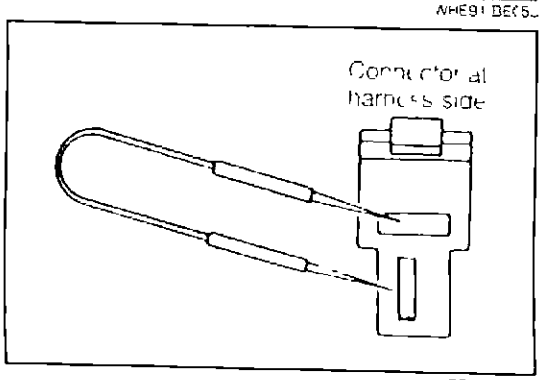
1 Power switch
(1) Connect a circuit tester between the respective terminals.





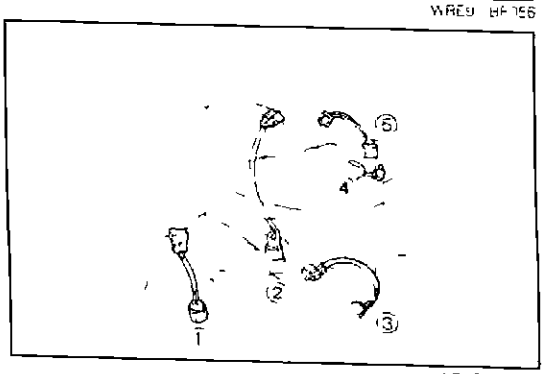
WRE91 BE055

2 Position detecting switch
(1) Disconnect the connector located at the transfer case end.
(2) Short the connector at the harness side. (As for connector ②)
(3) Ensure that the 4WD indicator glows.



WRE91 BE056

(4) Connect a circuit tester between the terminal of the connector.
(5) Shift the transfer shift lever to 4L. Ensure that continuity exists between the connector terminals (① and ⑤).
(6) Screw out the 4WD detecting switch and push the plunger. Ensure that continuity exists between the connector terminals (③).



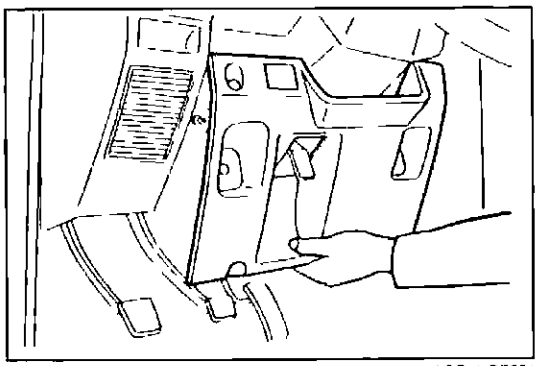
WRE91 BE057

3. IGNITION KEY SWITCH

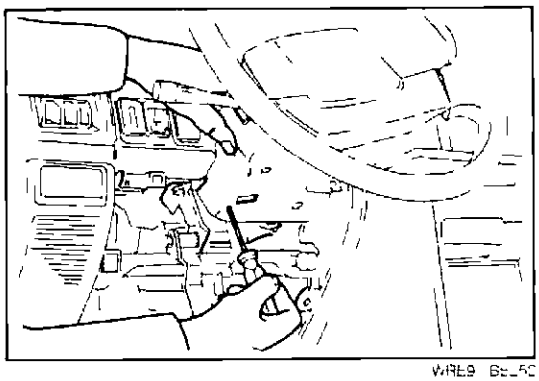
3-1. INSPECTION

(1) Disconnect the battery cable from the negative (–) terminal

(2) Remove the lower instrument panel finish by removing the two screws
- Remove the headlight levering switch knob

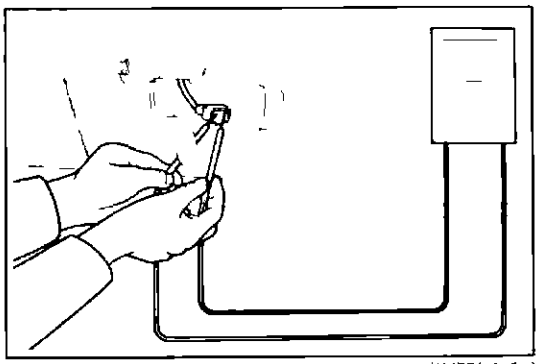


(3) Remove the steering column lower cover



(4) Disconnect the connector of the ignition key switch.

(5) Connect a circuit tester between the terminal of the connector



(6) Ensure that continuity exists between the respective terminals as indicated in the table

Table of connection

Terminal / Position	AM	ACC	IG	ST1	ST2
LOCK					
ACC	○	○			
ON	○	○	○		
START	○		○	○	○

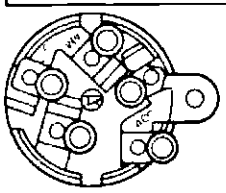
(Diesel engine with QSI system)

Terminal / Position	AM	ACC	M	G	ST
LOCK					
ACC	○	○			
ON	○	○	○		
G	○		○	○	
START	○		○		○

(Diesel engine)

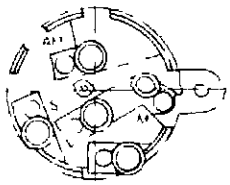
(With QSI system)

AM	ST_2	ACC
M	ST_1	



(Without QSI system)

AM	G	ACC
M	ST	

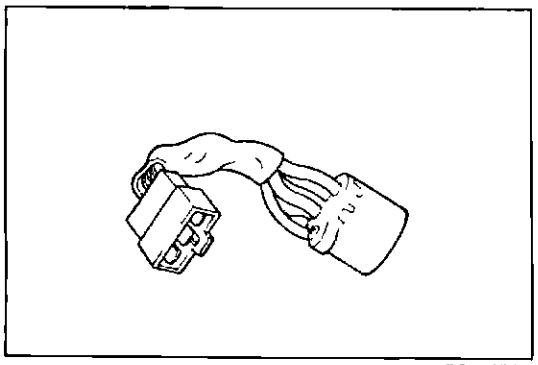


3-2. REMOVAL

(1) Remove the IG switch assy from the holder by removing the screw
(2) Replace the IG switch assy if the switch assy exists malfunction

NOTE:

- Do not remove the ignition key cylinder during the removal of ignition switch assy.



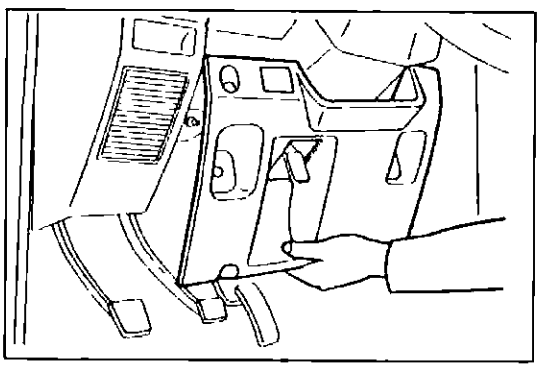
WRE91 BE254

3-3. INSTALLATION

(1) Install the ignition switch assy to the steering column upper bracket by the screw
(2) Connect the coupler of the ignition switch

WRE91 BE255

(3) Install the steering column lower cover
(4) Install the lower instrument panel finish
(5) Connect the battery cable to the negative (–) terminal

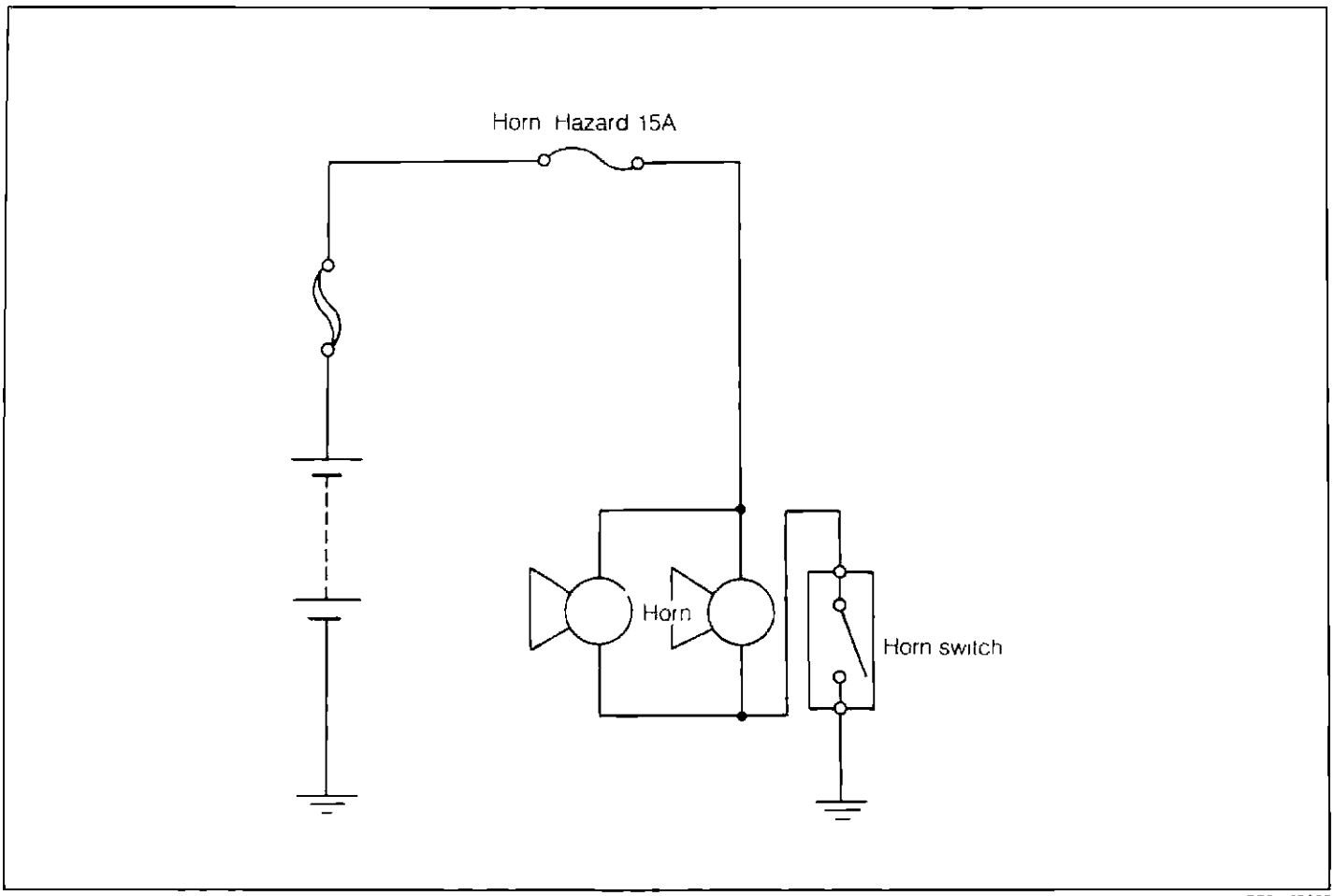


WRE9 BE25r

4. HORN

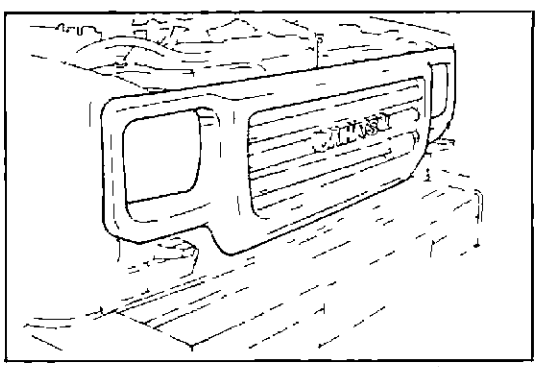
The horn is installed at the front of the radiator support panel

CIRCUIT DIAGRAM



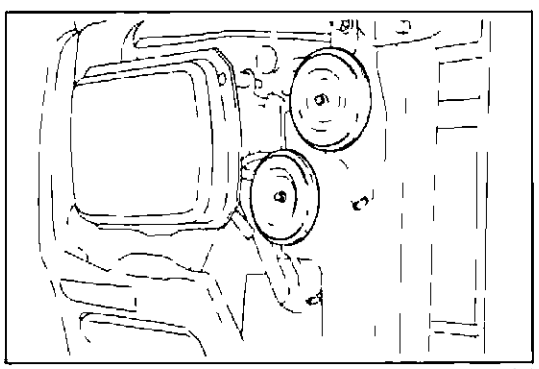
REMOVAL

1 Removal of radiator grille
  (1) Remove the two screws
  (2) Detach the two clips, using a screwdriver
  (3) Remove the radiator grille from the vehicle body by raising it diagonally toward you
2 Removal of horn assembly
  (1) Disconnect the connector
  (2) Remove the horn



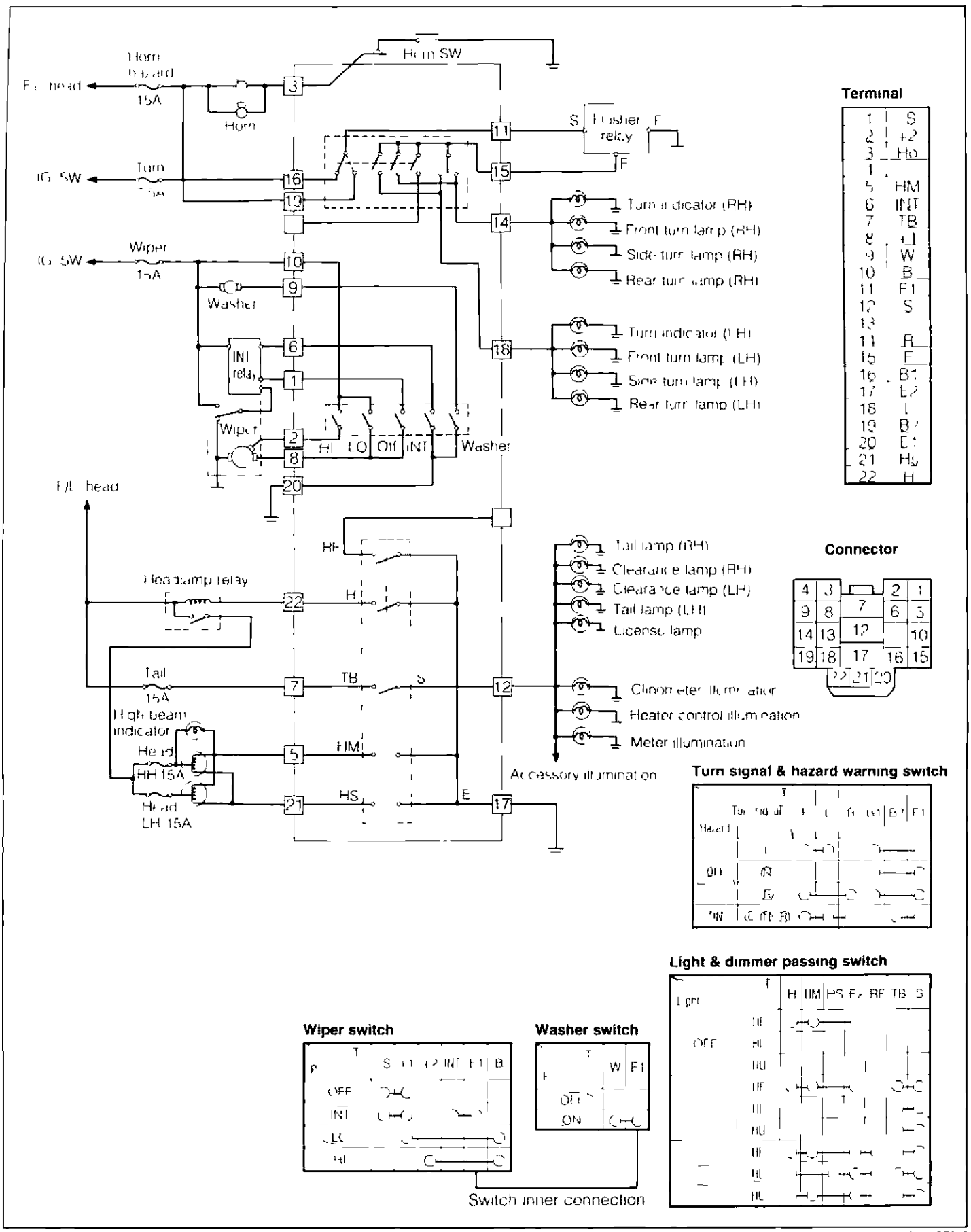
INSTALLATION

1 Install the horn assembly
2 Installation of headlamp grille
  (1) Ensure that three clips are provided at the body side
  (2) Set the headlamp grille on the body Secure the headlamp grille with the two clips a the upper side
  (3) Attach the headlamp grille to the body with the two screws

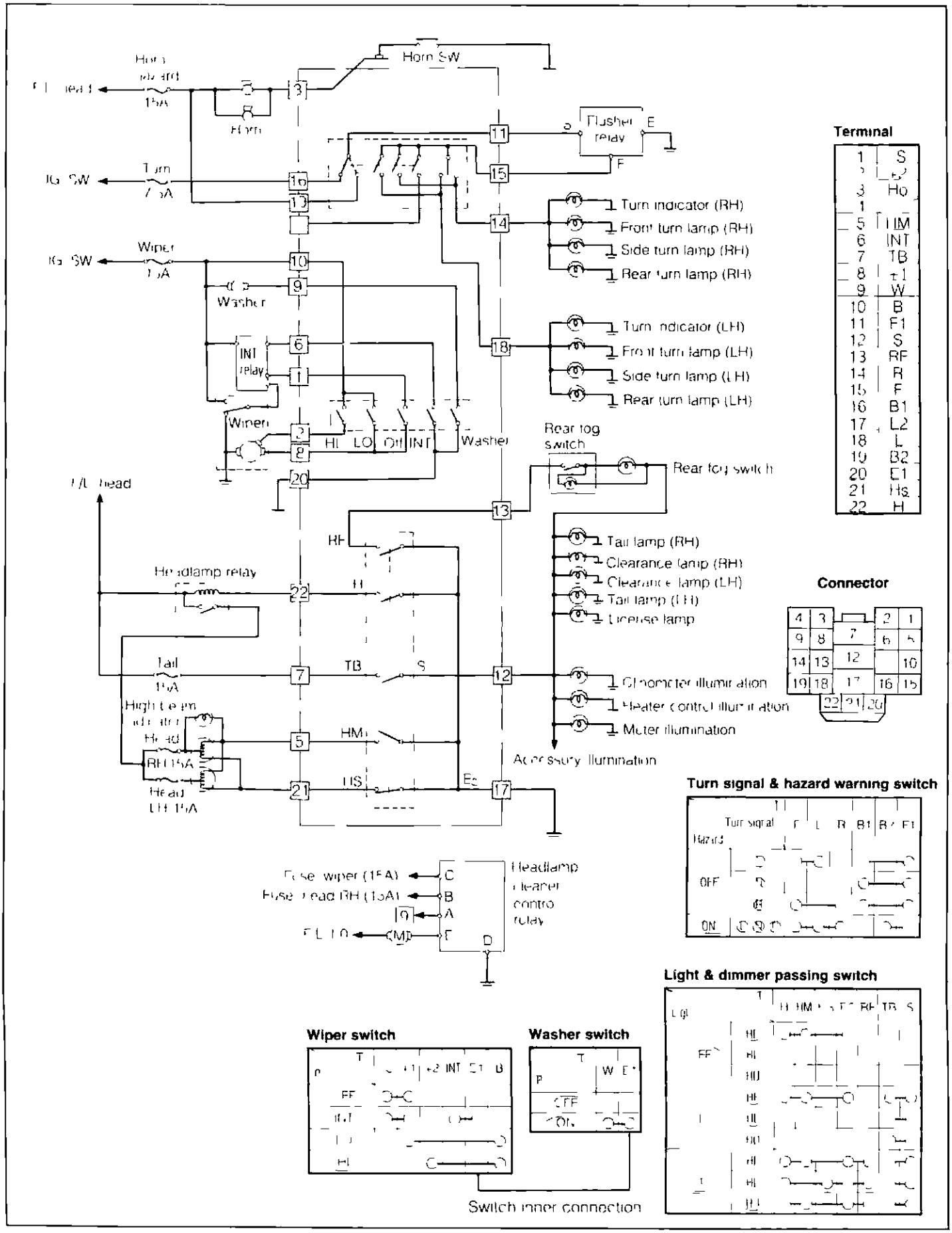


5-2. WIRING DIAGRAM

Version A: AUS, GE Specification

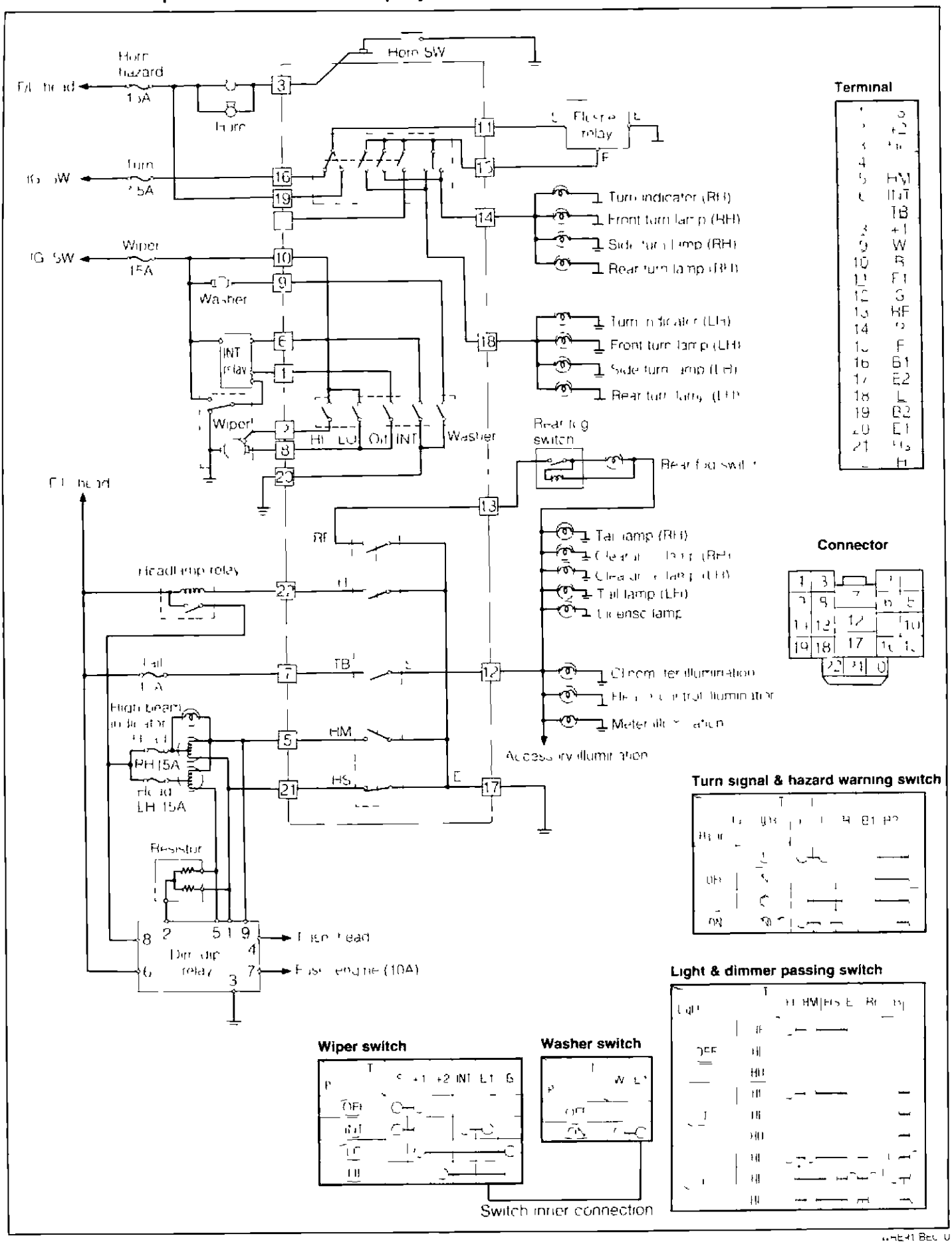


Version B: EC Specification

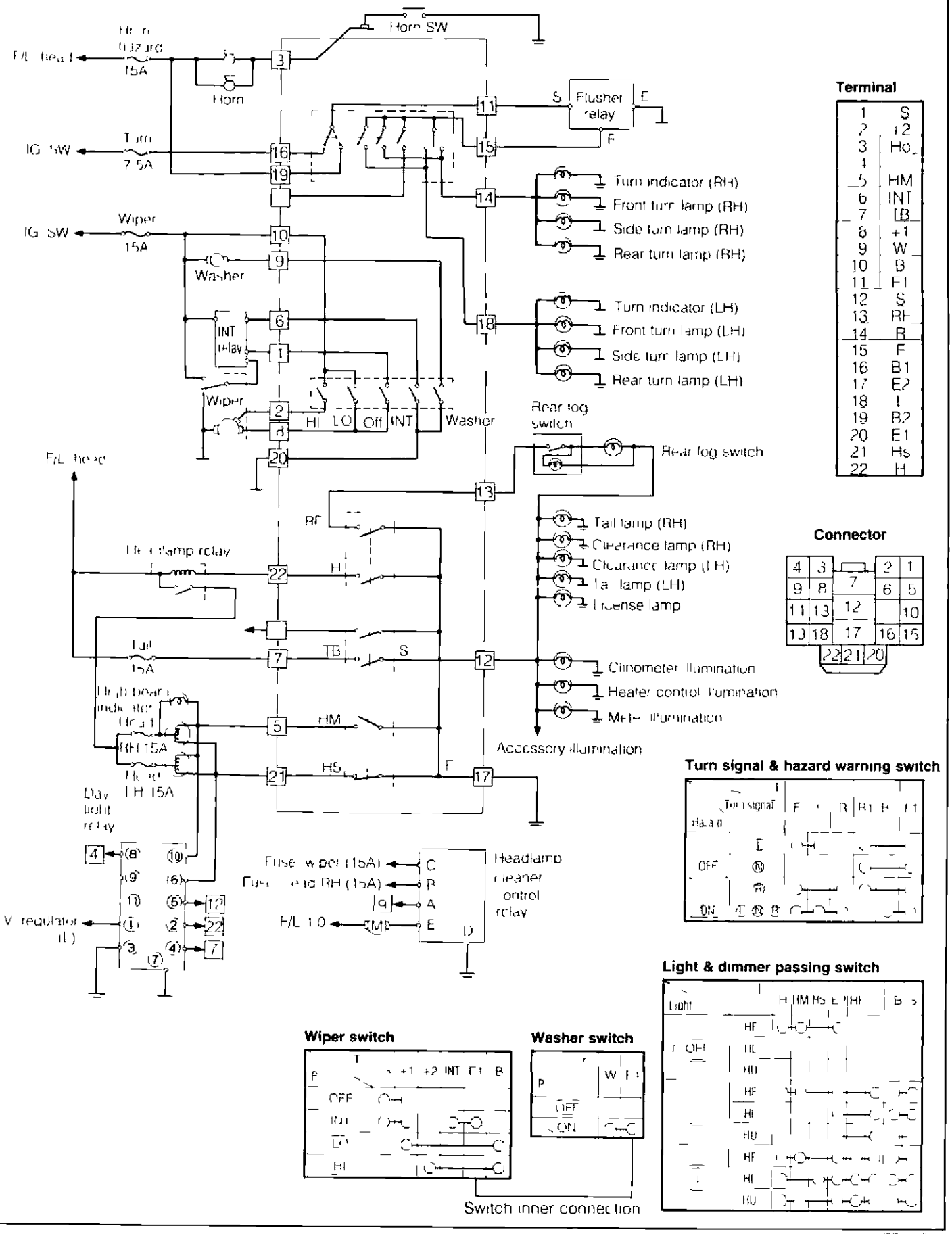


WRE91 BE069

Version C: EC Specification with Dim-dip System

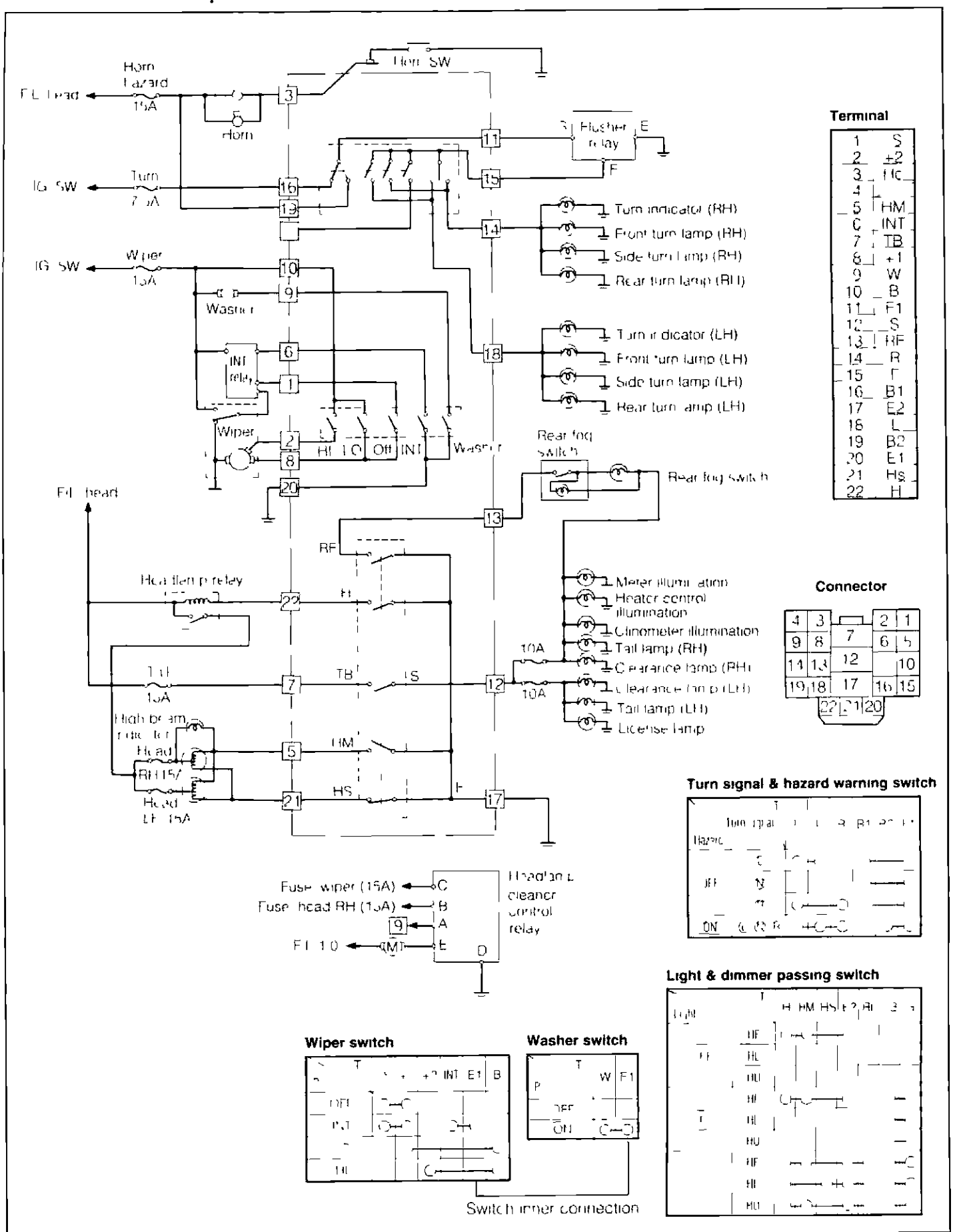


Version D: EC Specification with Day-light System



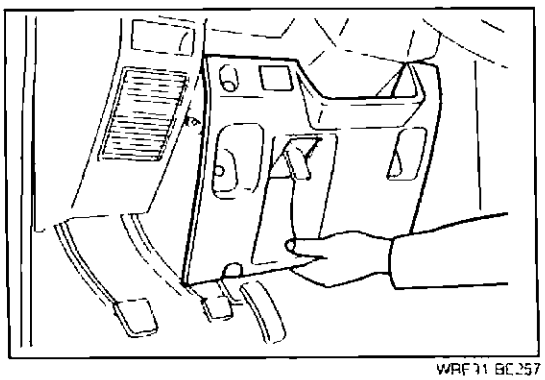
WRE4 BE071

Version E: German Specification

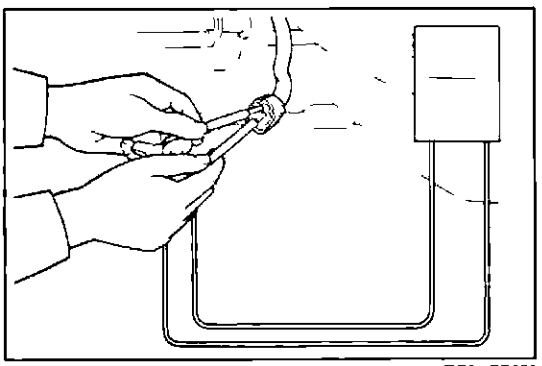


5-3. INSPECTION

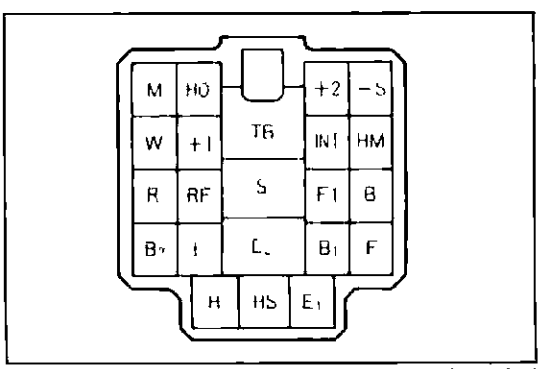
(1) Disconnect the battery cable from the negative (–) terminal
(2) Remove the lower instrument panel finish


WRE91 BE257

(3) Disconnect the coupler of the turn signal switch assy
(4) Connect a circuit tester between the respective terminal of the connector


WRE91 BE258

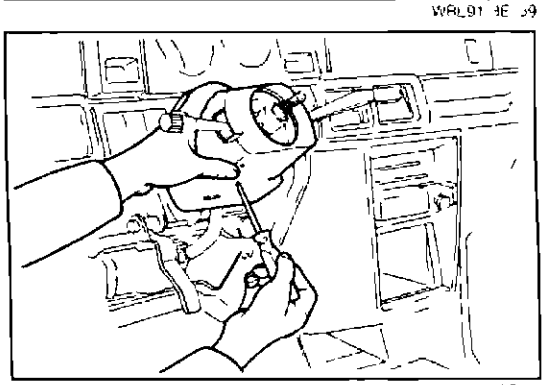
(5) Ensure that continuity exists between the respective terminals as indicated in the table
Refer to the previous pages



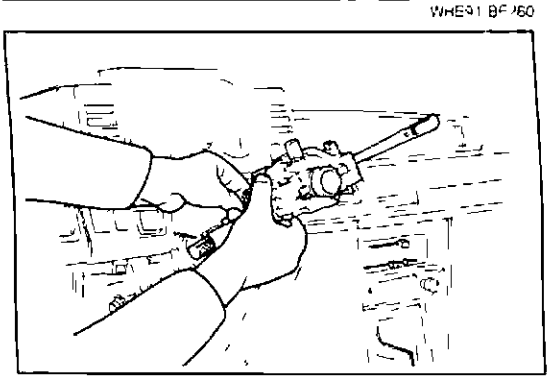
WRL91 BE 59

5-4. REMOVAL

(1) Remove the steering wheel assy.
(2) Remove the steering column upper and lower covers

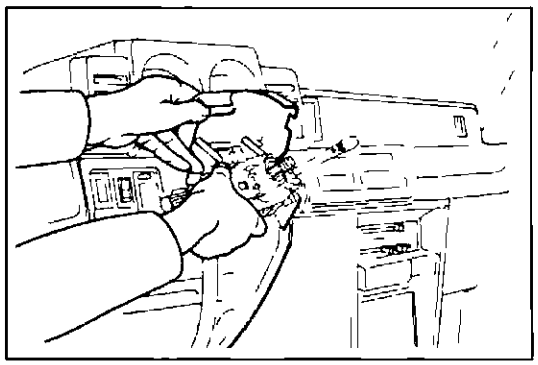

WRE91 BE260

(3) Remove the turn signal switch assy

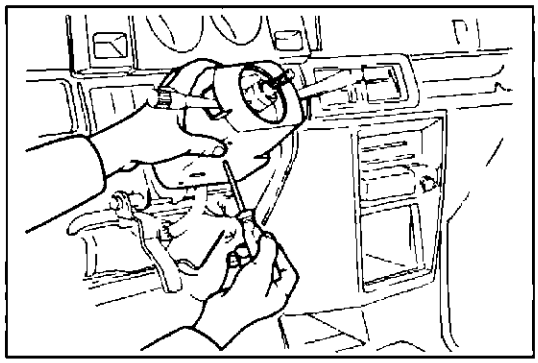

WRE91 BE261

5-5. INSTALLATION

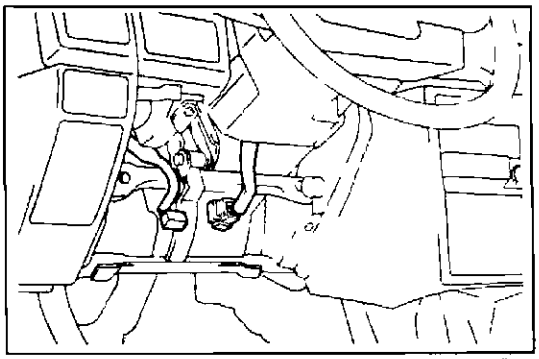
(1) Install the turn signal switch assy to the steering shaft
(2) Install the steering column upper and lower covers


WRE91 BE262

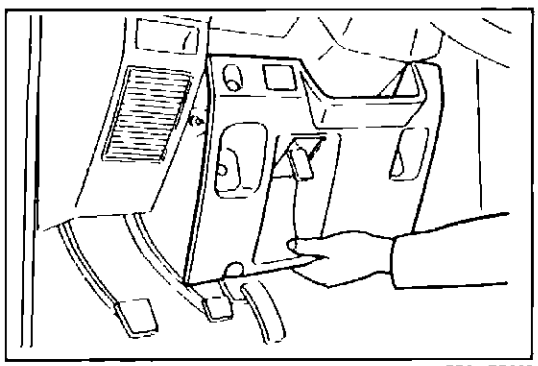
(3) Tighten the screws
(4) Install the steering wheel assy
Tightening Torque: 29.4 - 49.0 N m (3.0 - 5.0 kgf-m)


WRE91 BE263

(4) Connect the coupler of the turn signal switch assy

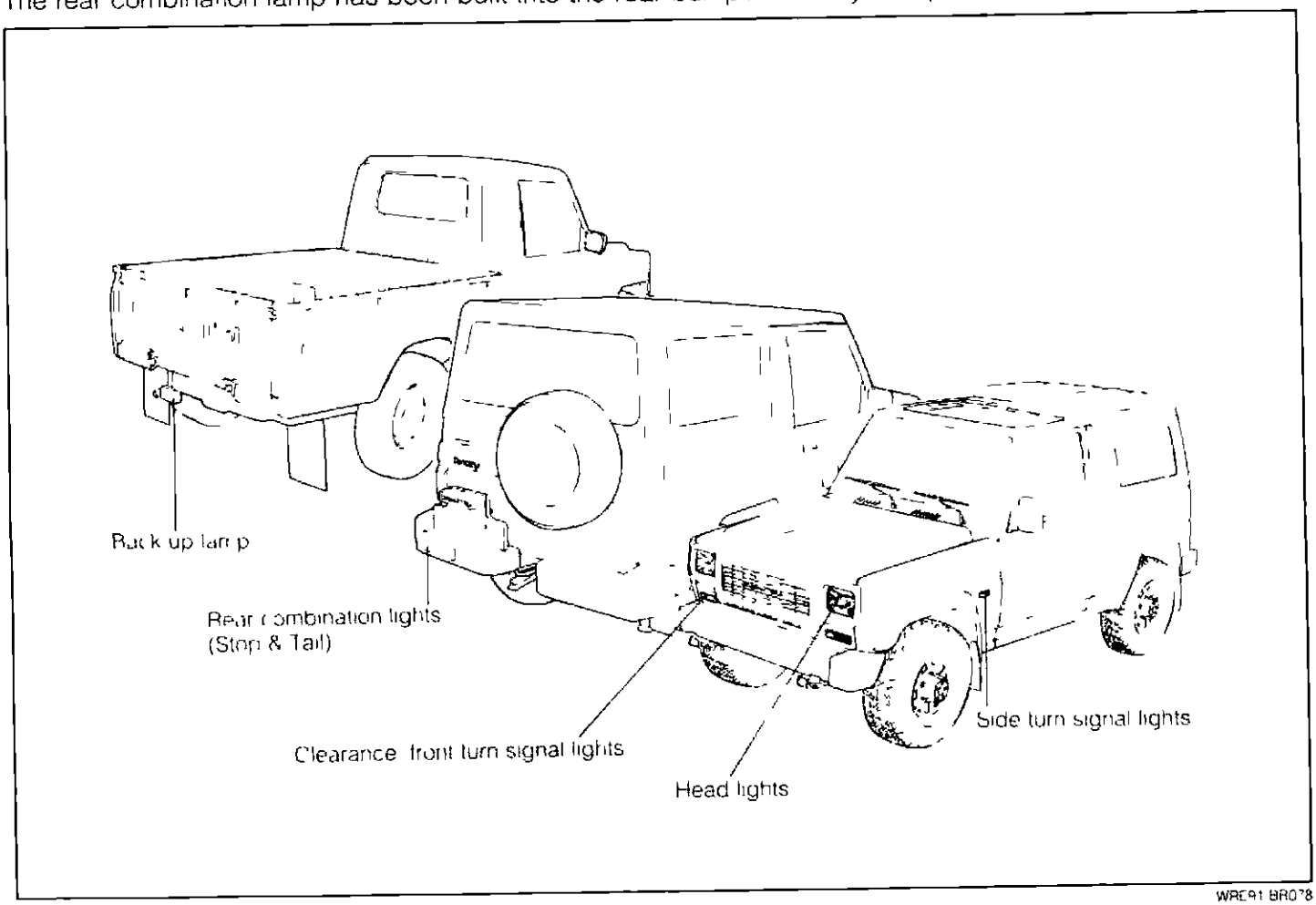

WRE91 BE264

(5) Install the lower instrument panel finish
(6) Connect the battery cable to the negative (–) terminal


WRE91 BE265

6. LIGHTING

The rear combination lamp has been built into the rear bumper for only European and Australian markets



WRE91 BR078

6-1. Lamp specifications

Lamp		Specifications	Wattage	Remarks
Headlamp	Bulb specifications	Candescent	45/40	
		Halogen	60/55	
		Yellow	45/40	
Front combination lamp		Clearance lamp	5	
		Turn signal lamp	21	
Side turn signal lamp			5	
Rear combination lamp		Stop/tail lamp	21/5	
		Turn signal lamp	23(21)	Figures in ( ) denote European specifications
		Back up lamp	21	
License plate lamp			5	
Room lamp			10	
Fog lamp		Front	35	• Option on Australian & General specifications
		Rear	21	• Standard on R H D vehicles for European specifications • Option on L H D vehicles for European specifications

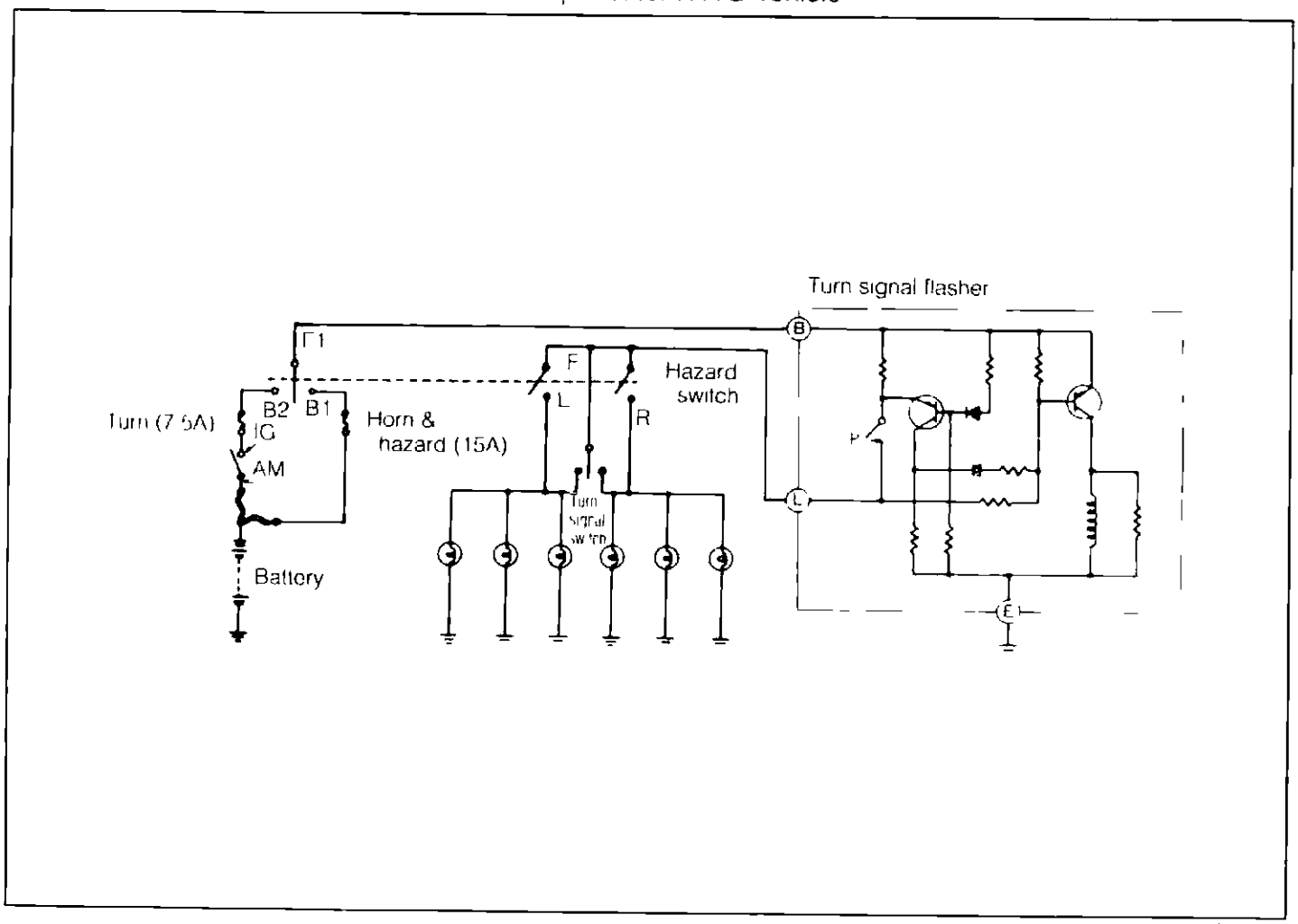
WRE91 BR079

6-2. TROUBLE SHOOTING

Problem	Possible causes	Remedies
One headlamp will not glow	• Burnt bulb • Faulty socket • Faulty wiring or earth	• Replace bulb • Repair as required
Headlamps will not glow	• Fusible link and/or fuse blown out • Faulty lighting switch • Faulty headlamp relay • Faulty wiring or earth	• Replace fusible link and/or fuse • Check switch • Check relay • Repair as required
High beam or low beam will not glow	• Faulty lighting switch or dimmer switch • Faulty wiring	• Check switch • Repair as required
Clearance lamp, tail lamp or license lamp will not glow	• Tail fuse blown out • Fusible link blown out • Faulty side lamp switch • Faulty wiring or earth	• Check for short. Replace fuse • Replace fusible link • Check switch • Repair as required
Turn signal lamps at one side will not glow	• Faulty turn signal lamp switch • Faulty wiring or earth	• Check switch • Repair as required
Turn signal lamps at both sides will not glow	• Turn fuse blown out • Faulty turn signal/hazard switch • Faulty turn signal flasher relay • Faulty wiring or earth	• Check for short. Replace fuse • Check switch • Check flasher relay • Repair as required
Stop lamp will not glow	• Stop fuse blown out • Faulty stop lamp switch • Faulty wiring or earth	• Check for short. Replace fuse • Check switch • Repair as required
Stop lamp remains in glow state	• Faulty stop lamp switch	• Adjust or replace switch
Hazard warning lamp will not glow	• Horn fuse blown out • Faulty flasher relay • Faulty hazard switch • Faulty wiring or earth	• Check for short. Replace fuse • Check flasher • Check switch • Repair as required

6-3. TURN SIGNAL FLASHER

The turn signal flasher controls turn signal and hazard warning The flasher is located above the accelerator pedal for L H D vehicle and above the clutch pedal for R H D vehicle



WRF91 BEJ81

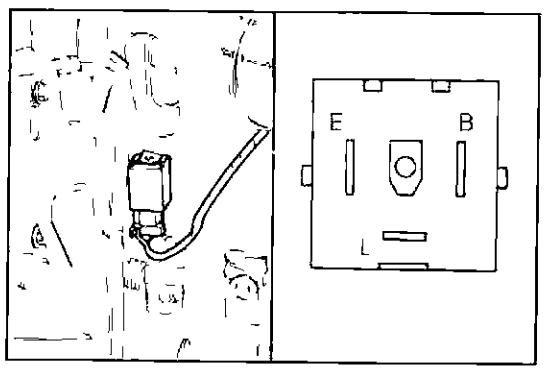
Inspection

Check each lamp for the state of glowing, flashing and not glowing

Specified Flashing Speed: 85 ± 10 times/min.

NOTE.

- If any of the front or rear turn signal lamps has open wire, the flashing speed will exceed 120 times/min.
- If any abnormality is found in the inspection, check for burnt bulb and check each switch. When no abnormality is found in these checks, replace the turn signal flasher.

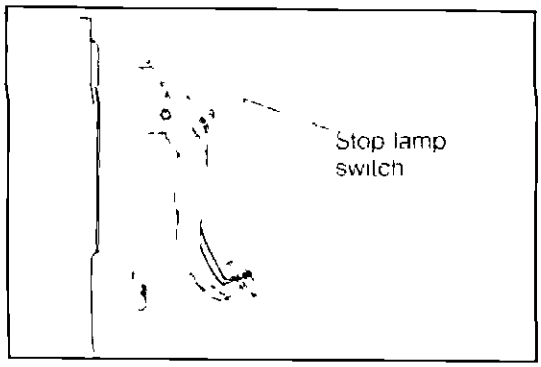


WRF91 BE082

6-4. STOP LAMP SWITCH

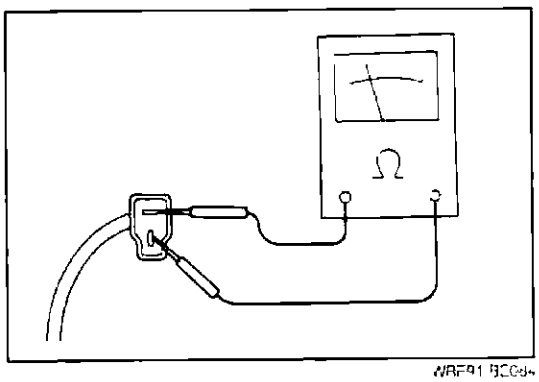
Inspection

1 Disconnect the connector of the stop lamp switch
2 Ensure that continuity exists between the terminals when the brake pedal is depressed

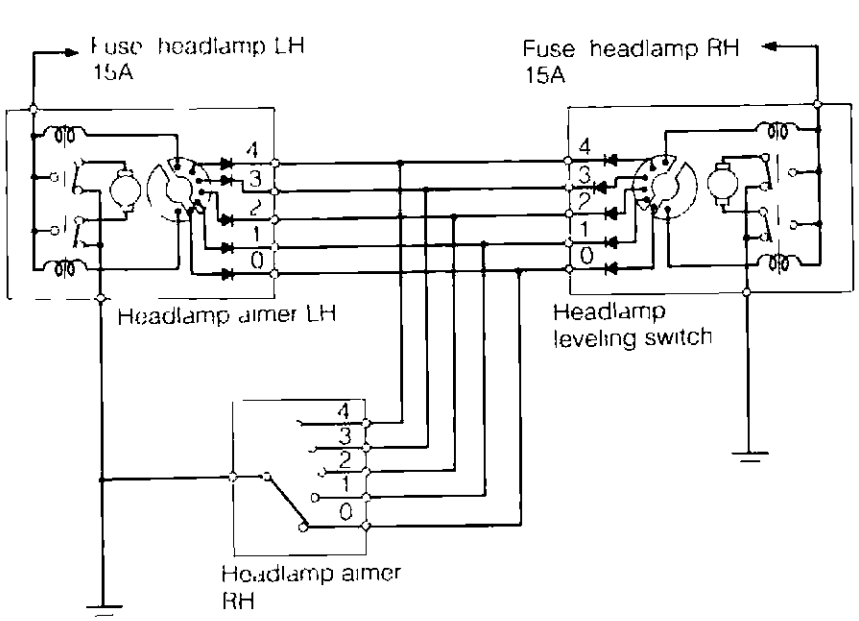


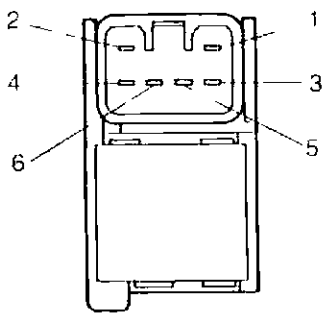
WRF91 BF083

3 Ensure that no continuity exists between the terminals when the brake pedal is not depressed



6-5. HEADLAMP LEVELING SWITCH



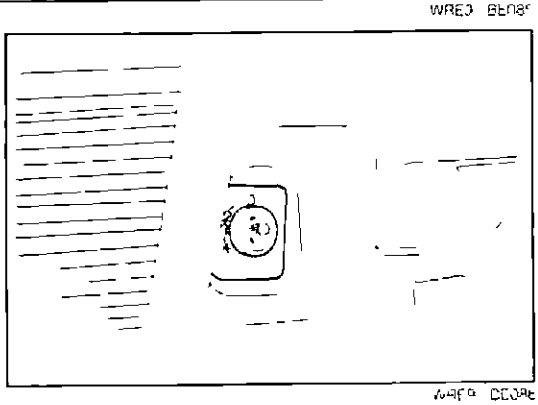


No	Terminal name
1	GND
2	Switch 0
3	Switch 4
4	Switch 3
5	Switch 2
6	Switch 1

In vehicle inspection

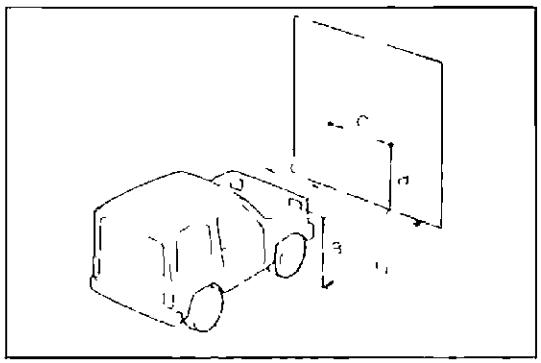
1 Set the headlamp leveling switch to the position "O" The height of the photometric axis projected on a screen placed 3 meters in front of the headlamps becomes the reference line

2 Set the switch to the position "1" Ensure that the photometric axis moves 21 mm (0 83 inch) down below the reference line



3 In the same way as above, set the switch to each of the positions 2 through 4. Ensure that each distance between the headlamp optical axis and the reference line conforms to the table.

	1 (0.04)
	2 (1.97)
	64 (2.52)
1	94 (3.70)

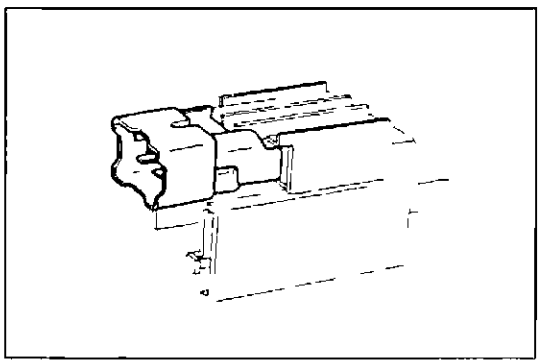


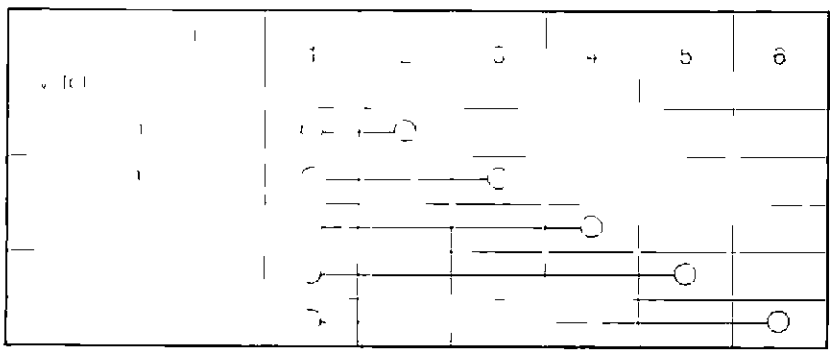
Removal

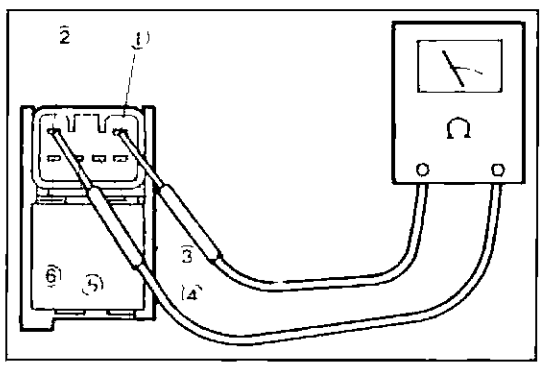
1 Remove the switch knob.
2 Remove the lower instrument panel finish panel.
3 Remove the nut.
4 Disconnect the connector. Remove the headlamp levelling switch.

Unit inspection

1 Check that continuity exists between the respective terminals as indicated in the continuity table.

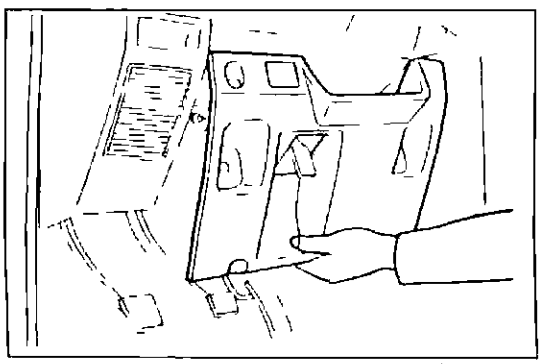






Installation

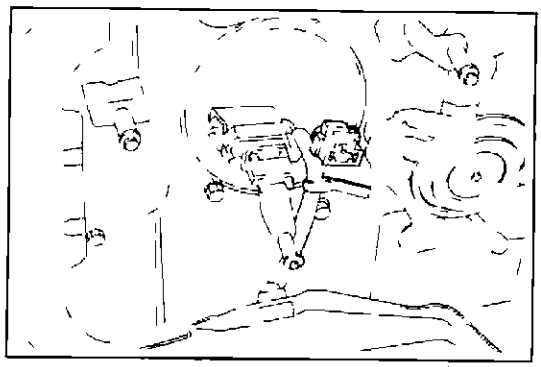
1 Install the headlamp levelling switch. Install the connector.
2 Install the nut.
3 Install the lower instrument panel finish panel.
4 Install the switch knob.



ACTUATOR

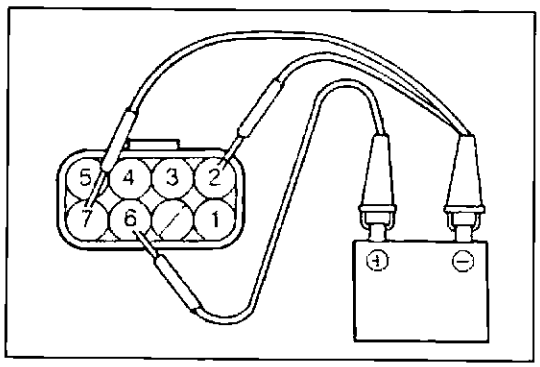
Removal

1 Remove the radiator grille assembly
2 Remove the headlamp
3 Remove the actuator from the headlamp
4 Remove the connector

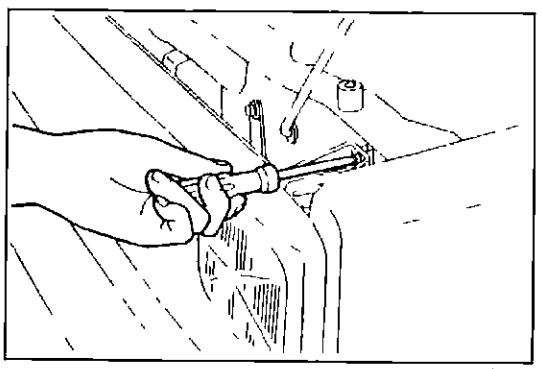


Inspection

Apply a voltage of 12 V in accordance with the table below Ensure that the motor operates properly



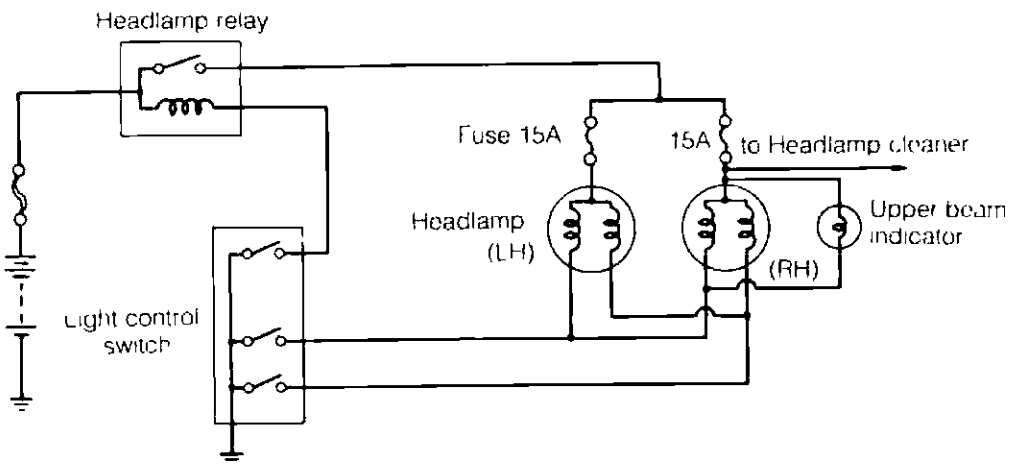
Switch position \ Terminal	1	2	3	4	5	6	7
0	⊖					⊕	⊖
1		⊖				⊖	⊖
2			⊖			⊕	⊖
3				⊖		⊕	⊖
4					⊖	⊖	⊖



Installation

1 Install the actuator to the headlamp
2 Install the connector
3 Install the headlamp
4 Install the radiator grille assembly

6-6. HEADLAMP RELAY

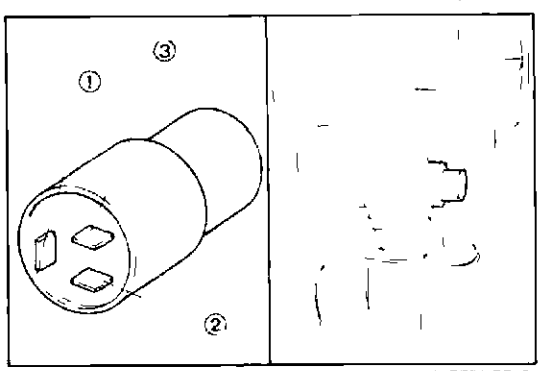


WRE91 BE06

Unit inspection

Ensure that continuity exists between the respective terminal

① ②
② ③
③ — ①

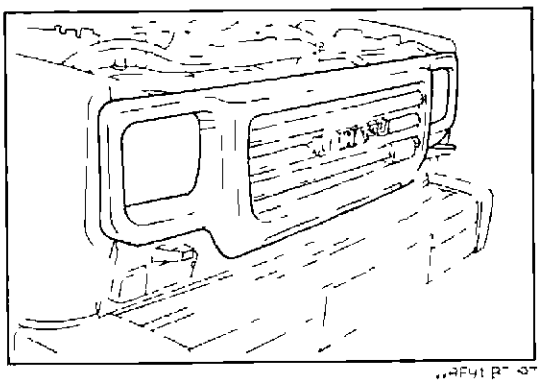


WRF91 BE 09b

6-7. HEADLAMP

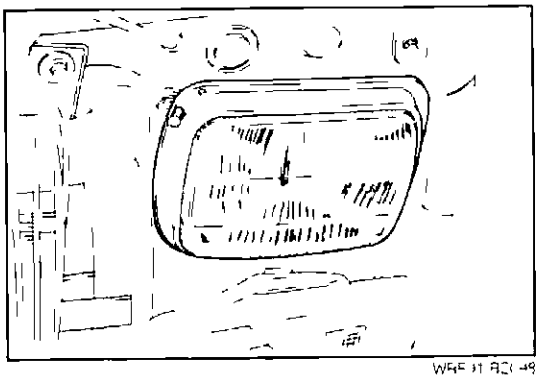
NOTE:

- If should be noted that the bulb replacement can be performed only after socket cover has been detached.



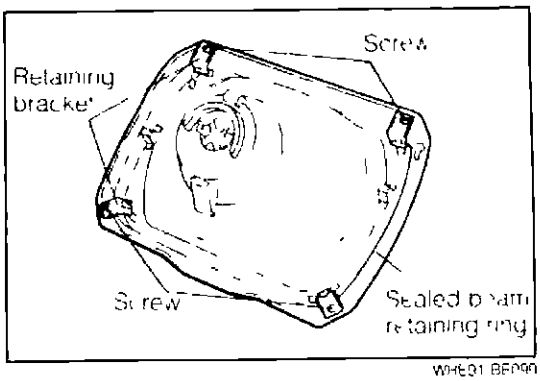
Removal

1 Removal of radiator grille
  (1) Remove the two screws
  (2) Detach the two clips, using a screwdriver
  (3) Remove the radiator grille from the vehicle body by raising it diagonally toward you
2 Removal of headlamp assembly
  (1) Turn the headlamp counterclockwise while pushing it
  (2) Remove the headlamp from the vehicle body. Disconnect the connector

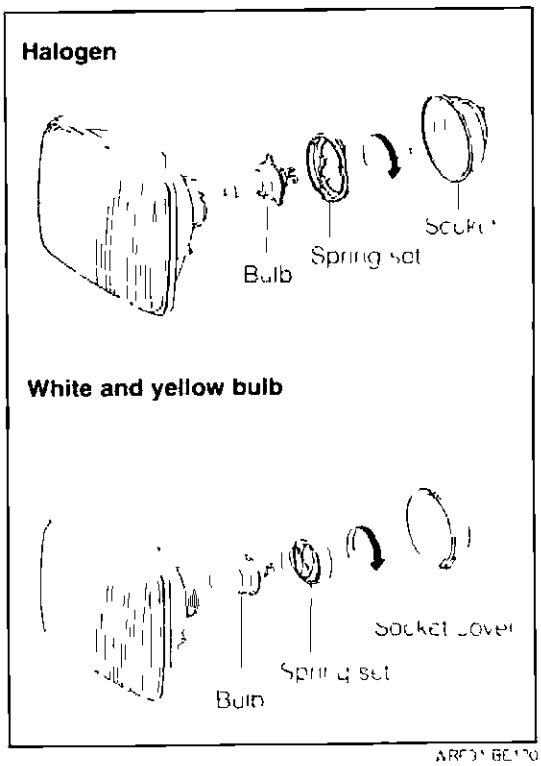


Disassembly

1 Remove the retaining bracket and sealed beam retaining ring by removing the four screws located at the back side of the headlamp.



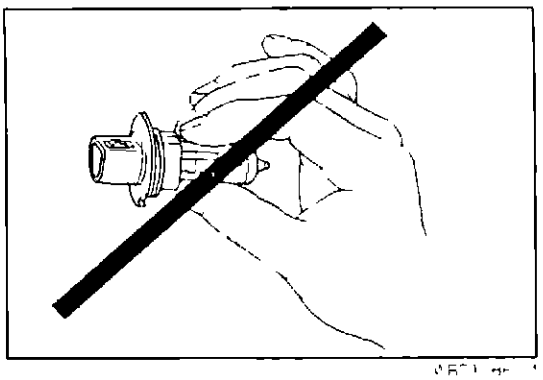
2 Removal of bulb (halogen, white and yellow bulb)
  (1) Remove the socket cover
  (2) Remove the spring set by turning it counterclockwise while pushing it
  (3) Remove the bulb



Replacement of halgen headlamp bulb

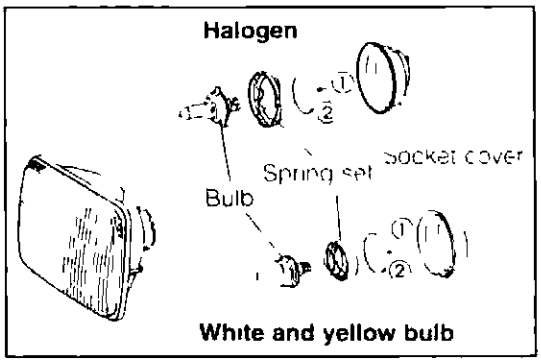
The bulb can be replaced from the engine compartment without a need of removing the headlamp proper

WARNING:
The halogen bulb reaches a very high temperature while it is put into use. If any lubricant gets on the bulb surface, it will result in significantly reduced lamp life. Hence, be very careful not to allow your fingers, etc. to touch with the glass portion during the replacement. Be sure to hold the flange section to replace the bulb.



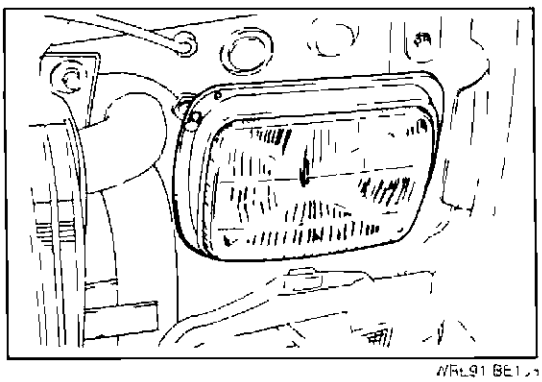
Assembly

1 Installation of bulb (halogen, white and yellow bulb)
  (1) Set the bulb in the headlamp socket
  (2) Secure the bulb by turning it clockwise while pushing it
  (3) Install the socket cover
2 Install the sealed beam retaining ring and retaining bracket to the headlamp by means of the four screws

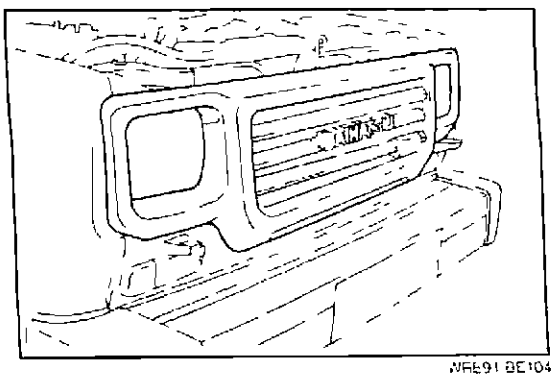


Installation

1 Install the headlamp



2 Installation of headlamp grille
  (1) Ensure that three clips are provided at the body side
  (2) Set the headlamp grille on the body Secure the headlamp grille with the two clips at the upper side
  (3) Attach the headlamp grille to the body with the two screws



HEADLAMP AIMING ADJUSTMENT PROCEDURE

NOTE:

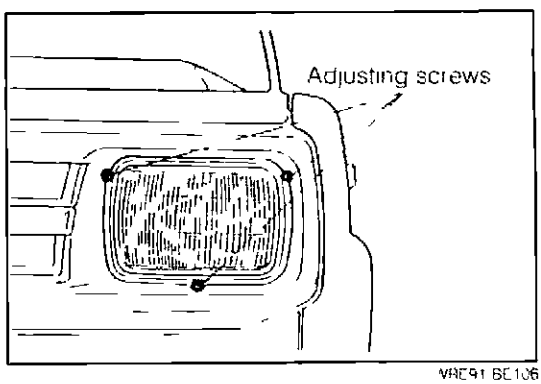
- Vehicle conditions during headlamp aiming adjustment

(1) Ensure that the tire air inflation pressure is the specified value
(2) Ensure that a driver is seated at the driver's seat
(3) Ensure that the gasoline, oil and water are filled to their full level
(4) Ensure that the spare tire, tools and jack are mounted on their specified positions
(5) Rock the vehicle in the up-&-down direction as well as in the right &-left direction so that the suspensions may be settled to the specified conditions
(6) The engine revolution speed should be 1500 rpm or more

WBE4* BE105

Preparation of procedure

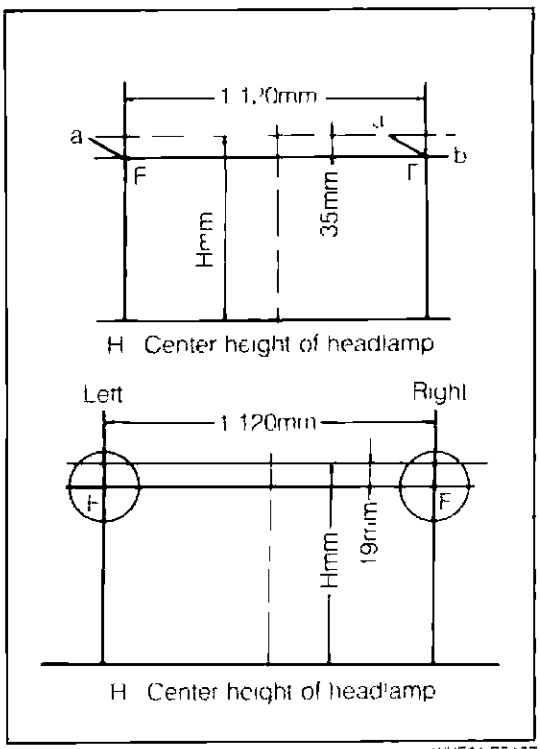
1 Set the headlamps to the low beam position
2 Set the headlamp levelling switch to the position "0"
3 Place the screen 3 meters in front of the headlamps
4 Adjust the adjusting screws in such a way that the photometric axis may comply with the requirements indicated in the figure



WBE91 BE106

Incandescent bulb

1 On the screen, set the reference points for the headlamp aiming adjustment as follows
   (1) Measure the headlamp center height [H] Draw a reference line on the screen at a height 19 mm below the above measured height
   (2) Draw vertical center lines of the right and left headlamps on the screen Thus, obtain each intersection point [F] made by the vertical center lines and the horizontal reference line
2 Turn ON the upper beam of the headlamp Adjust the adjusting screws so that the beam may come to the intersection [F] on the screen
   NOTE:
   - Make sure that photometric axis of the right headlamp will not deflect toward the outside.
3 Upon completion of the aiming adjustment, turn ON the lower beam of the headlamp Ensure that the beam aims the lower left direction



WBE9* BE107

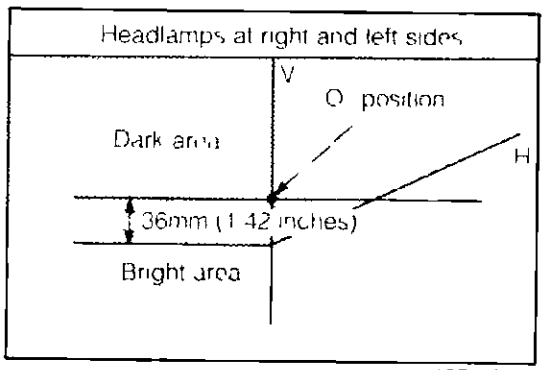
Halogen bulb

1 On the screen set the reference points for the headlamp aiming adjustment as follows
   (1) Measure the headlamp center height [H] Draw a reference line on the screen at a height 35 mm below the above measured height
   (2) Draw vertical center lines of the right and left headlamps on the screen Thus, obtain each intersection point [F] made by the vertical center lines and the horizontal reference line
2 Turn ON the lower beam of the headlamp Adjust the adjusting screws so that the intersection of the cut-off lines come to the intersection [F] on the screen

WHE31 BE105

With headlamp leveling system

1 Perform the adjustment in such a way that each of the right and left headlamps aims their respective "0" position Then, adjust each headlamp so that its photometric axis comes at a point 36 mm (1 42 inches) below the "0" position
2 Confirmation of Operation
   Turn the headlamp levelling switch progressively from the "0' position in a sequence of 1, 2, 3 and 4 Ensure that the photometric axis moves downward

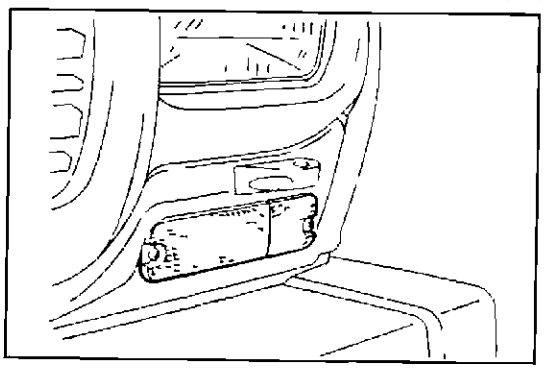


WRE91 BE109

6-8. FRONT TURN SIGNAL LAMP

Removal

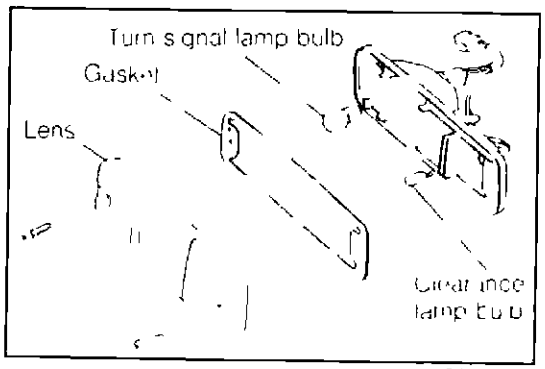
1 Remove the front turn signal lamp by removing the two screws
2 Detach the lens and gasket
3 Remove the turn signal bulb and clearance bulb



WRE91 BE110

Installation

1 When the bulb is burnt out, install a new bulb with the designated wattage
2 Install the gasket and lens Secure the front turn signal lamp assembly with the two screw

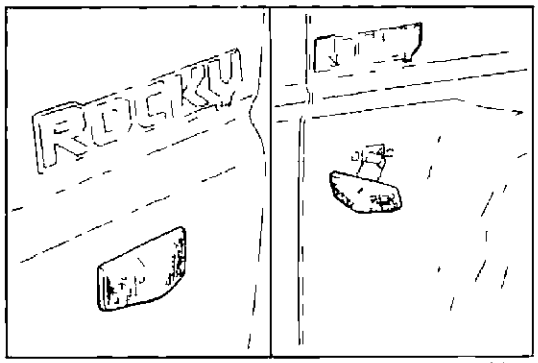


WRE3 BE111

6-9. SIDE TURN SIGNAL LAMP

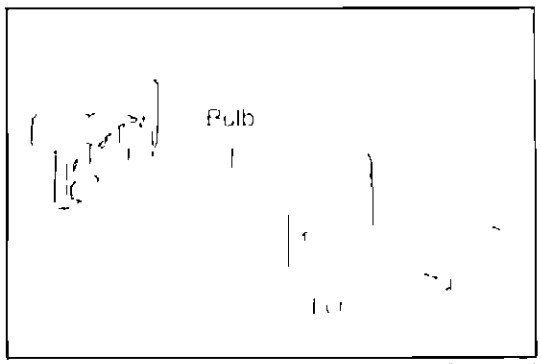
Removal

1 Remove the side turn signal lamp by removing the two screws
2 Detach the lens
3 Remove the bulb



Installation

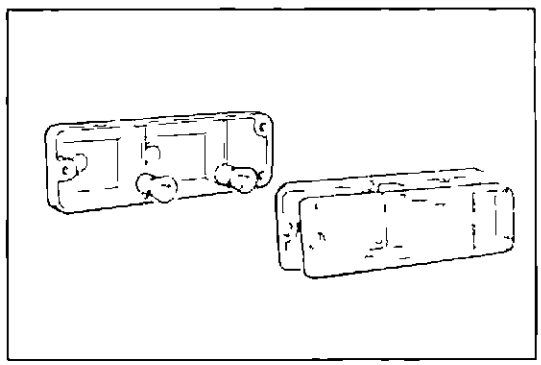
1 When the bulb is burnt out, install a new bulb with the designated wattage
2 Install the lens. Secure the side turn signal lamp assembly with the screw



6-10. REAR COMBINATION LAMP

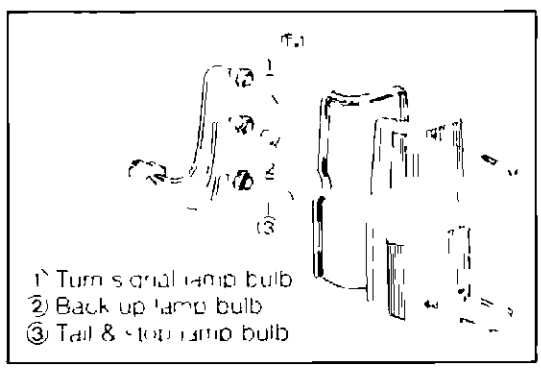
Removal

1 Remove the rear combination lamp assembly by removing the three screws
2 Detach the socket and bulb



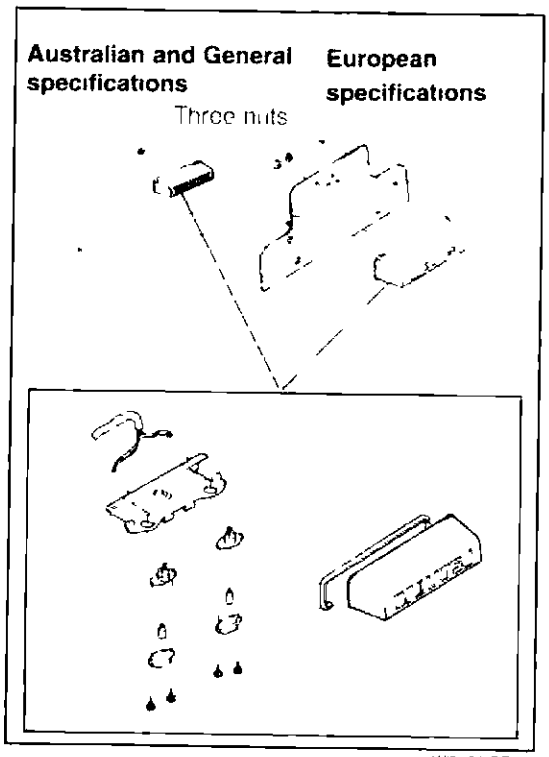
Installation

1 When the bulb is burnt out, install a new bulb with the designated wattage
2 Install the bulb and socket in the rear combination lamp assembly
3 Install the rear combination lamp assembly with the three screws



6-11. LICENSE PLATE LAMP

NOTE:
- It should be noted that the bulb replacement can be performed only after the lens has been detached by removing the two screws.
- Install a new bulb with the designated wattage.

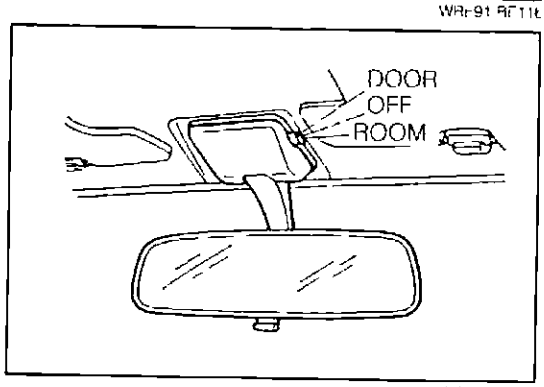


Removal
1 Remove the back door trim and back door service hole cover
2 Disconnect the connector
3 Remove the license plate lamp assembly by removing the three nuts

Installation
1 Install the license plate lamp assembly with the three screws
2 Connect the connector
3 Install the back door service hole cover and back door trim

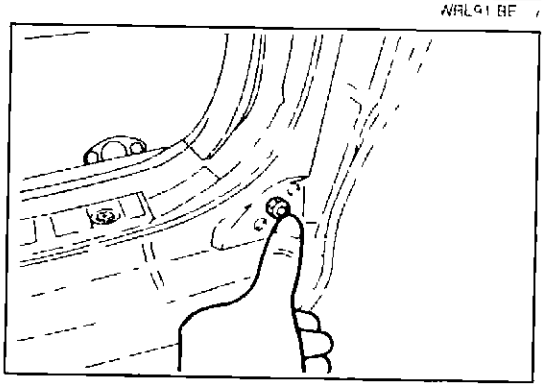
6-12. ROOM LAMP

Inspection
1 When the room lamp switch is set to the ROOM position with the door in its closed state, the room lamp goes on

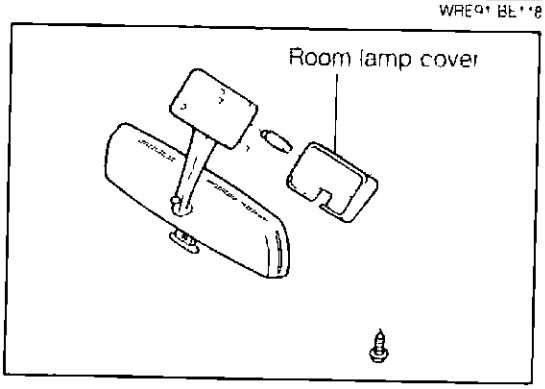


If the room lamp fails to go on, replace the room lamp bulb or the room lamp assembly

2 When the courtesy lamp is pushed in repeatedly, the room lamp should go on and off
If the room lamp fails to go on, replace the courtesy lamp or check for proper installation conditions.



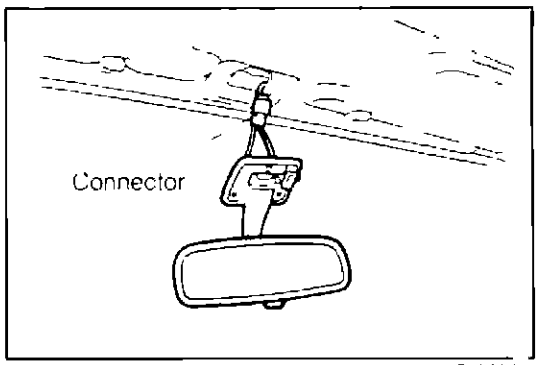
NOTE:
- It should be noted that the bulb replacement can be performed only after the room lamp cover has been detached.



Removal
1 Detach the room lamp cover.
2 Remove the room lamp assembly by removing the three screws and disconnect the connector

Installation

1 Connect the connector
2 Install the room lamp assembly with the three screws
3 Attach the room lamp cover



WRE91BE120

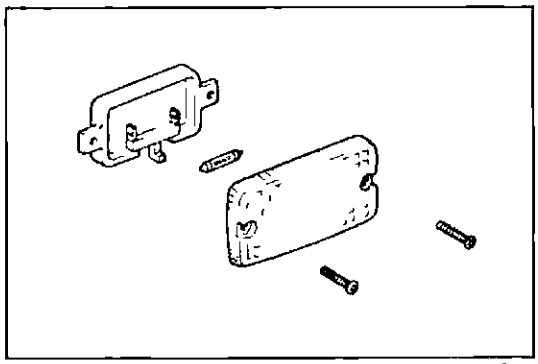
6-13. LUGGAGE ROOM

Removal

1 Remove the two screws to detach the lamp assembly
2 Pull the bulb straight out

Installation

Reverse the removal procedure to install the lamp assembly



WRE91BE121

6-14. BACKUP LAMP

The backup lamp switch is mounted on the transmission case cover

Inspection

1 Draw out the coupler which is connected to the backup lamp switch This disconnection should be made at the vehicle side Then, short the coupler

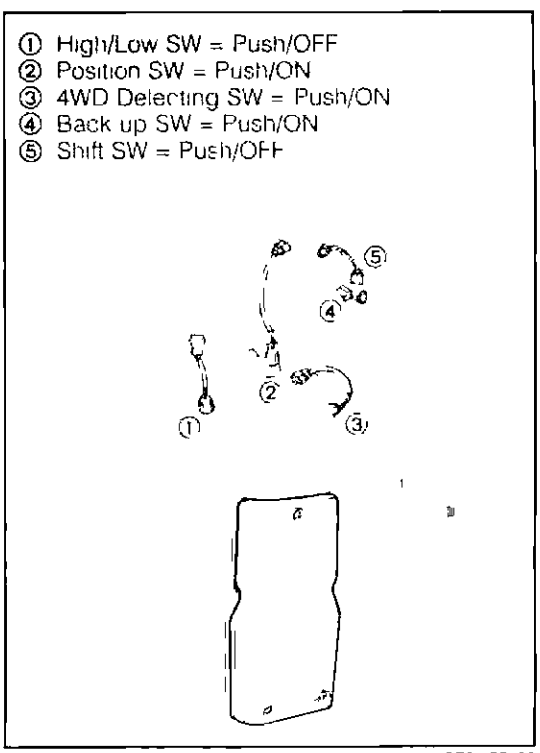
2 Ensure that the backup lamp goes on

3 Connect the backup lamp switch coupler again Place the transmission in the reverse gear

4 If the backup lamp fails to go on, replace the backup lamp switch

Tightening Torque: 2.9 - 4.9 N·m (0.3 - 0.5 kg-m)

① High/Low SW = Push/OFF
② Position SW = Push/ON
③ 4WD Detecting SW = Push/ON
④ Back up SW = Push/ON
⑤ Shift SW = Push/OFF

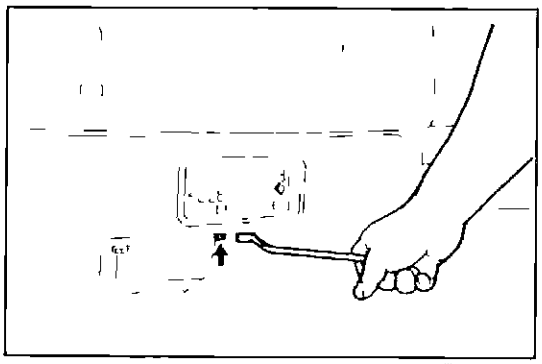


WRE91BE122

6-15. REAR FOG LAMP

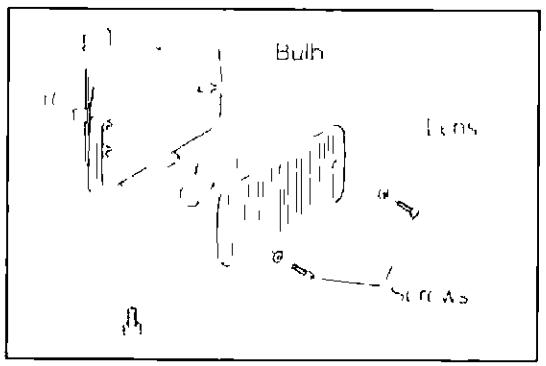
Removal

1 Remove the rear fog lamp assembly by removing the two bolts and disconnect the connector
2 Disassembly the rear fog lamp
  (1) Remove the two screws
  (2) Detach the lens
  (3) Remove the bulb



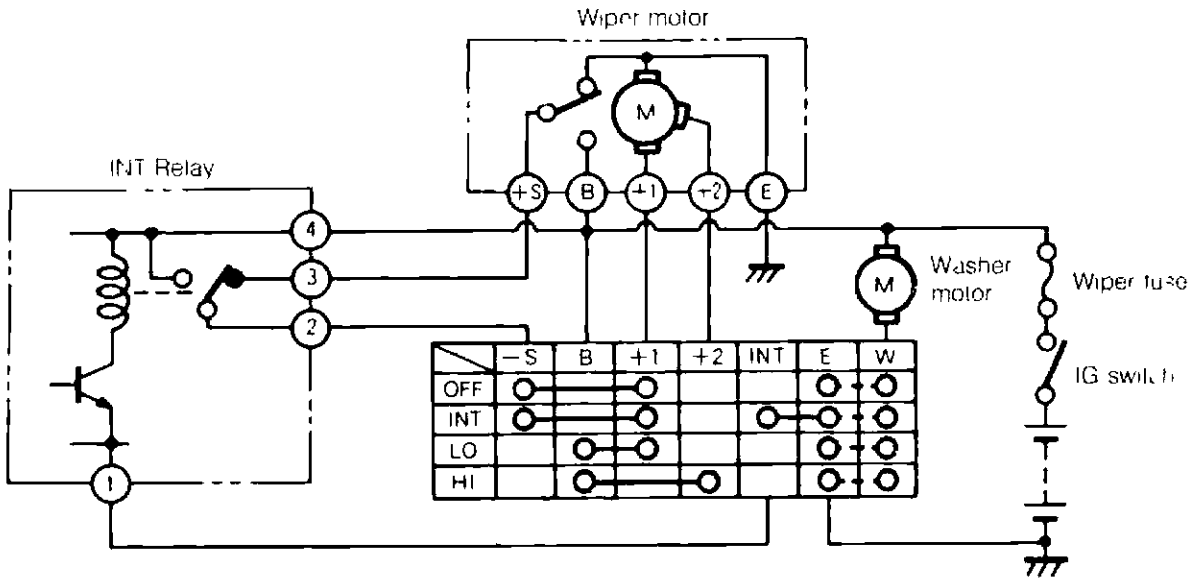
Installation

1 Assembly the rear fog lamp
  (1) When the bulb is burnt out, install a new bulb with the designated wattage
  (2) Attach the lens
  (3) Install the two screws
2 Connect the connecter
3 Install the rear fog lamp assembly with the two bolts

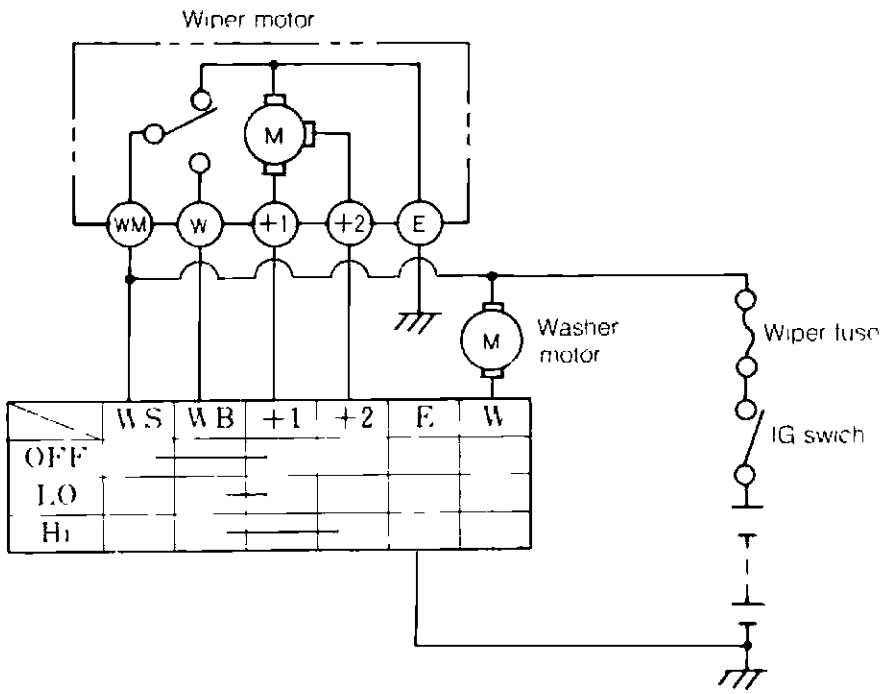


7. FRONT WIPER & WASHER

WIRING DIAGRAM



(WITH INT)



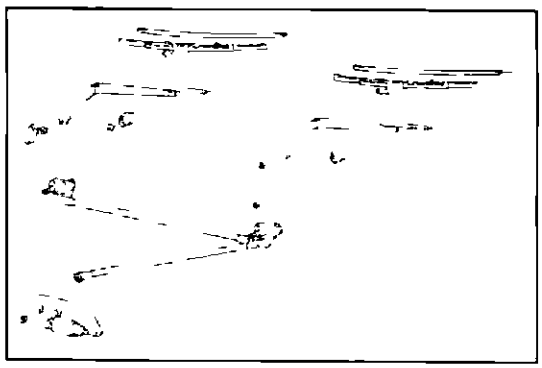
(WITHOUT INT)

J 369 BE125

7-1. WIPER MOTOR & BLADE

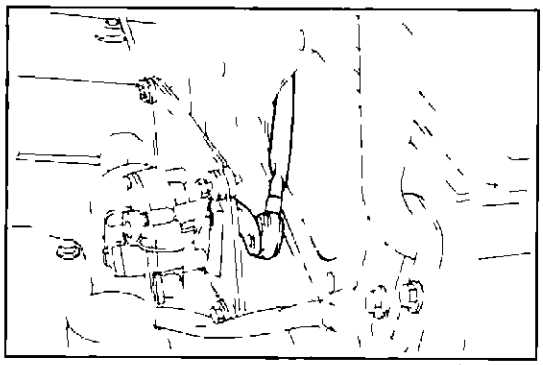
Removal

1 Removal of wiper arm and blades
  (1) Remove the windshield wiper arm cover
  (2) Remove the nut
  (3) Remove the wiper arm and blades



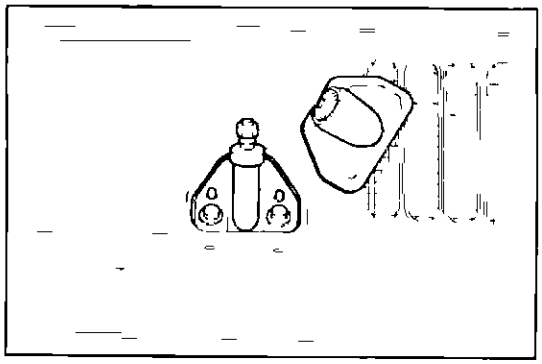
WRE91BE126

2 Removal of wiper motor assembly
  (1) Disconnect the connector
  (2) Remove the set bolt
  (3) Disconnect the motor from the link
  (4) Remove the motor



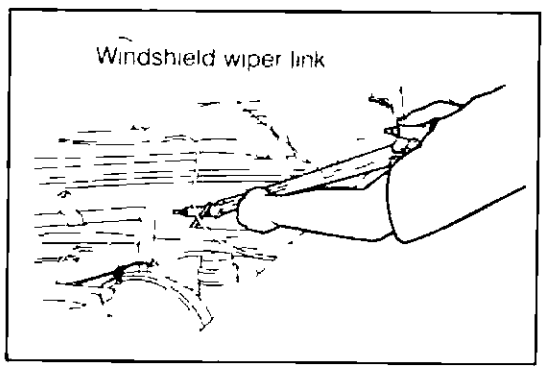
WRE91BE127

3 Removal of wiper link assembly
  (1) Remove the wiper link bush
  (2) Remove the set bolt



WRE91BE128

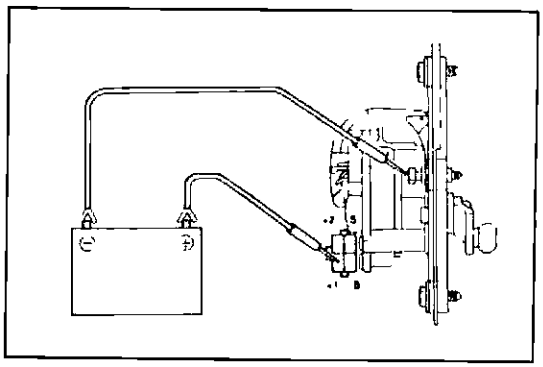
  (3) Take out the windshield wiper link assembly from the cowl louver hole



WRE91BE129

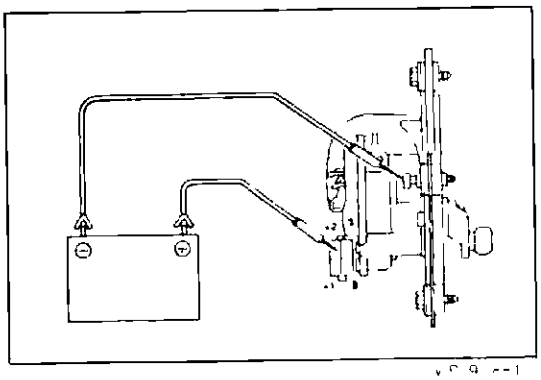
Inspection of wiper motor unit

1 Low speed operation check
  (1) Connect the terminal +1 to the positive ⊕ terminal of the battery, the body to the negative ⊖ terminal of the battery. Ensure that the wiper operates at the low speed

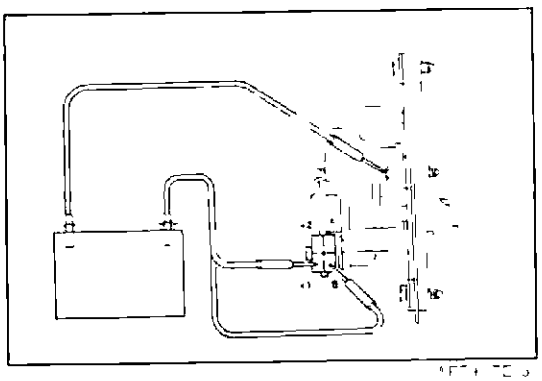


WRE91BE130

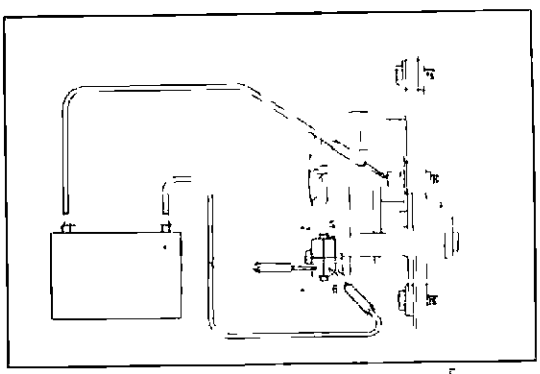
2 High speed operation check
(1) Connect the terminal +2 to the positive ⊕ terminal of the battery the body to the negative ⊖ terminal of the battery Ensure that the wiper operates at the high speed



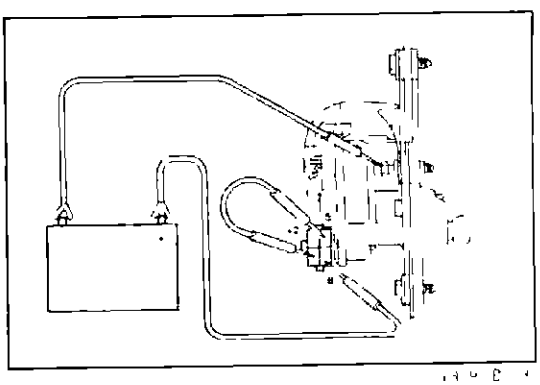
3 OFF operation check
With the wiper motor body connected to the negative ⊖ terminal of the battery, perform the following checks
(1) Connect the terminal B to the positive ⊕ terminal of the battery
(2) Operate the wiper at the low speed by connecting the terminal +1 to the positive ⊕ terminal of the battery

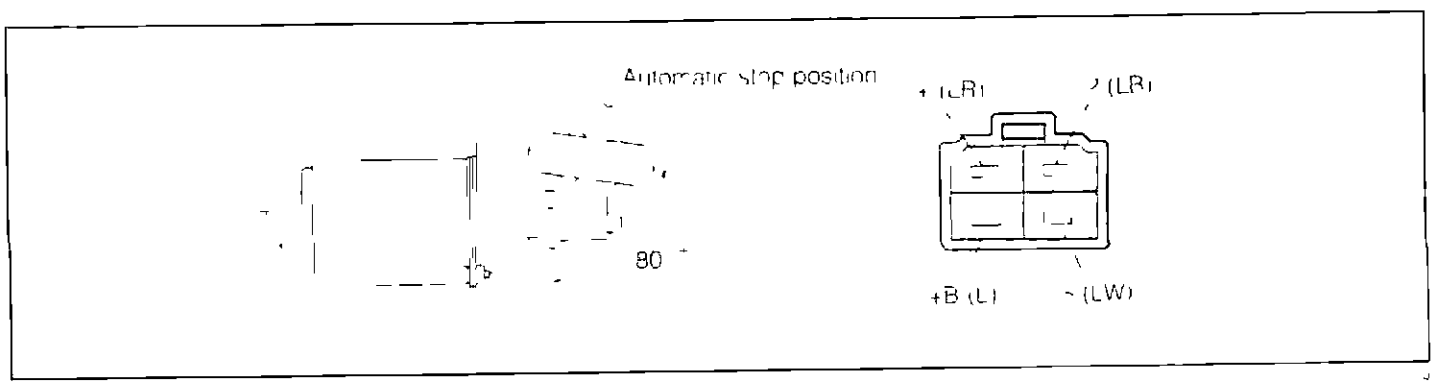


(3) Under the operating conditions in the step (2) disconnect the terminal +1 so as to interrupt the wiper motor operation



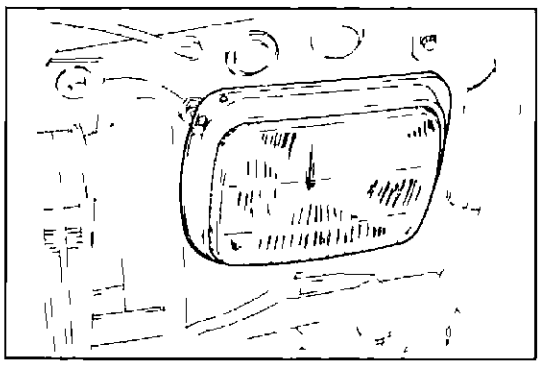
(4) Connect the terminal +1 to the terminal S Ensure that the wiper operates and stops at the automatic stopping position



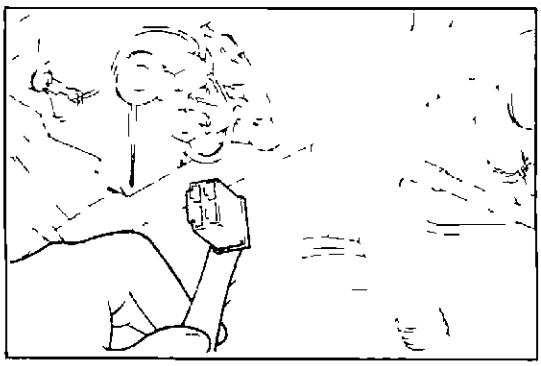


Installation

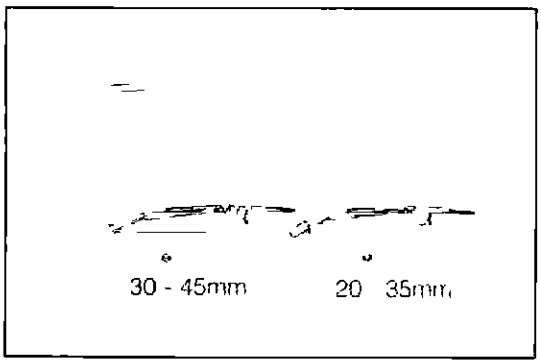
1 Installation of wiper link assembly
(1) Into the wiper link assembly to the cowl louver hole.
(2) Install the wiper link assembly to the body using a bolts
(3) Install the wiper link bush



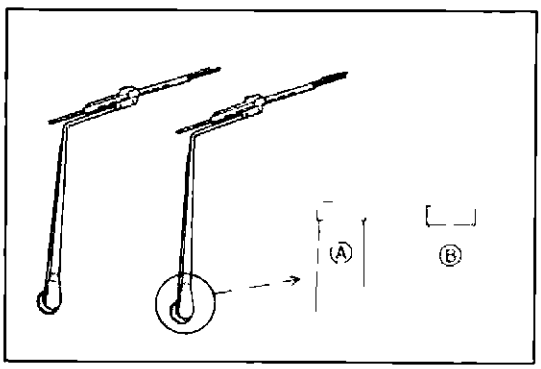
2 Installation of motor assembly
(1) Connect the motor with the link securely
(2) Install the motor assembly with the bolts



3 Installation of wiper arm assembly
(1) Operate the wiper motor, until it assumes the automatic stopping position
(2) Set the wiper arms at the positions indicated in the illustration
(3) Tighten the nut and attach the front wiper arm cover



NOTE.
- As for the wiper arms, follow to the marks given below. Install wiper arms in accordance with the following identification marks given below.
- It should be noted that the arm and blade length differ according to the vehicle model.



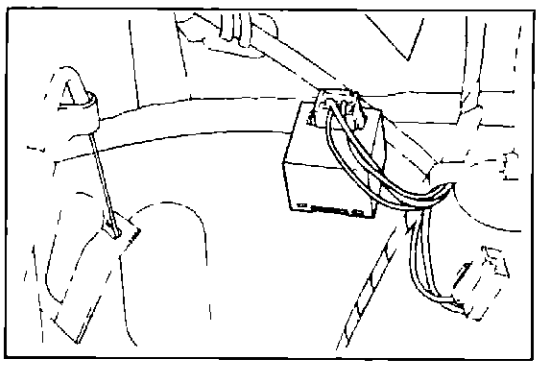
Item / Vehicle model	RH Unit		LH Unit	
	Driver side	Co-driver side	Driver side	Co-driver side
F70V F75V	Ⓐ	Ⓑ	Ⓔ	Ⓕ
F70	Ⓒ	Ⓓ	Ⓖ	Ⓗ

Item / Vehicle model		F70V F75V	F70	
Arm length	(mm)	380	Right Left	376 400
Blade length	(mm)	400	Right Left	400 350

7-2. INTERMITTENT WIPER RELAY

Removal

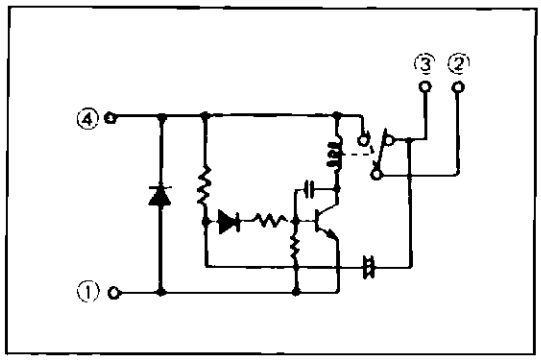
(1) Remove the lower instrument panel finish
(2) Remove the relay from the dash panel



WHE91 BE140

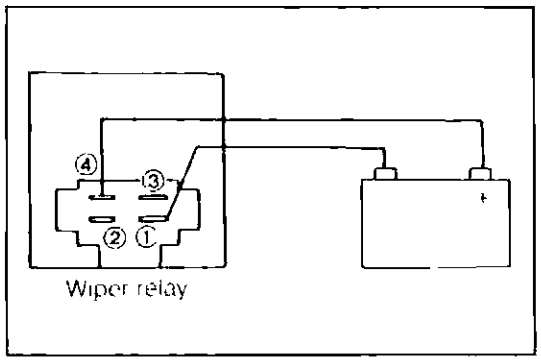
Unit inspection

1 Perform continuity checks between terminals given below
(1) Between terminals ② and ③ Continuity exists
(2) Between terminals ② and ④ No continuity exists



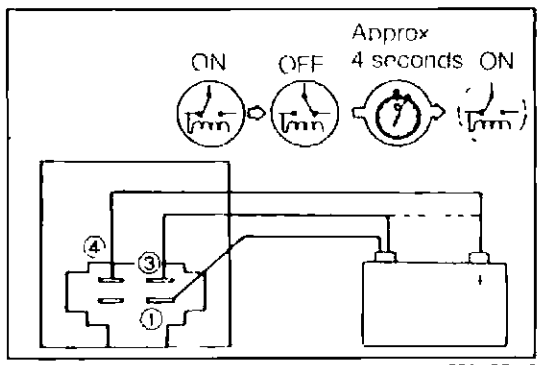
WRE91 BE 1

2 Intermittent operation check
(1) Connect the terminal ④ to the positive ⊕ terminal of the battery, terminal ① to the negative ⊖ terminal of the battery
(At this time, the relay emits an operating sound) The relay is turned ON



WHE91 BE142

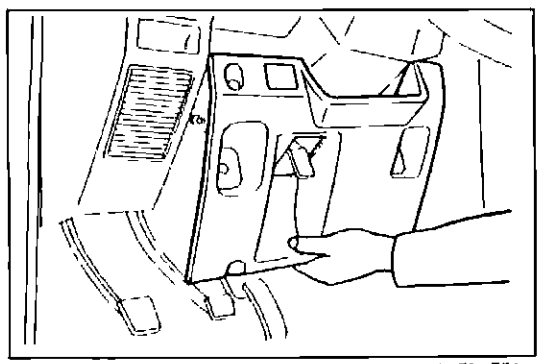
(2) Connect the terminal ③ to the positive ⊕ terminal of the battery for about one second Then, ground the terminal ③
(The relay emits an operating sound) The relay is turned OFF
(3) Ensure that, about four seconds later the relay emits an operating sound (intermittent operation)



WRE91 BE143

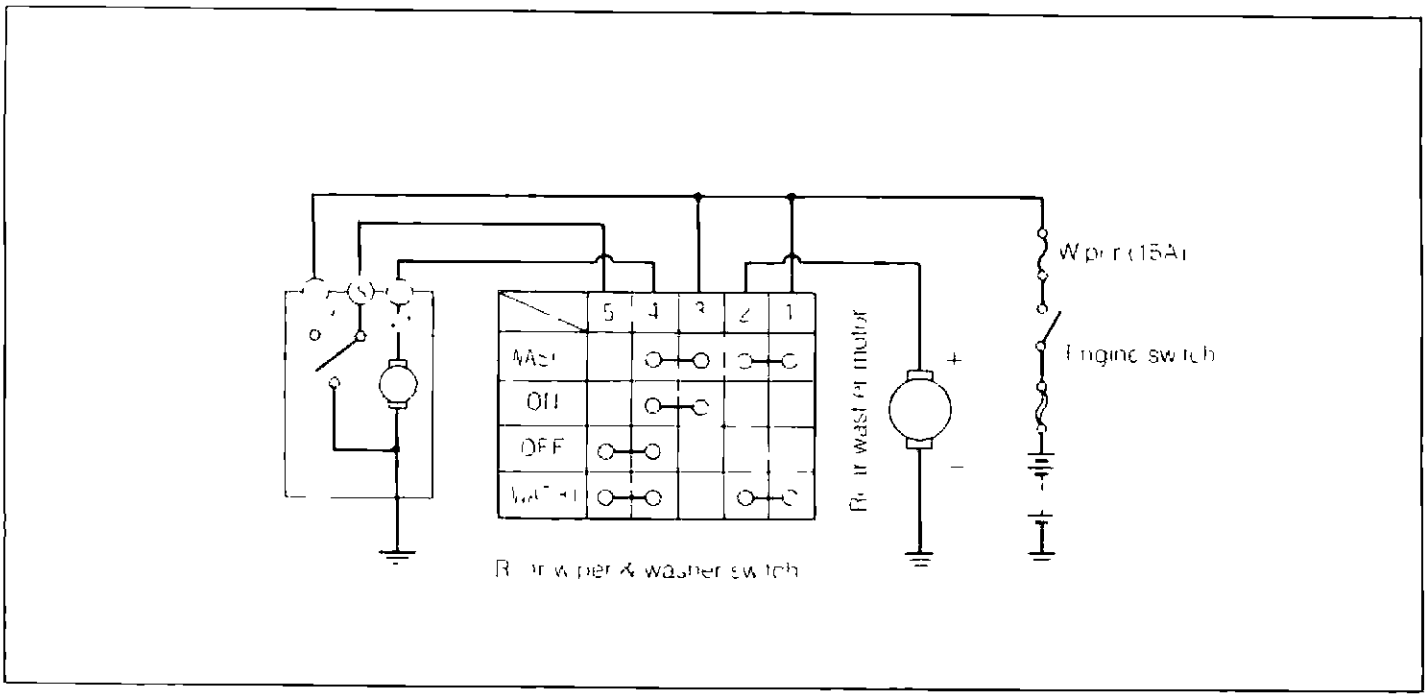
Installation

(1) Install the intermittent wiper relay to the dash panel
(2) Install the lower instrument panel finish



WHE91 BE144

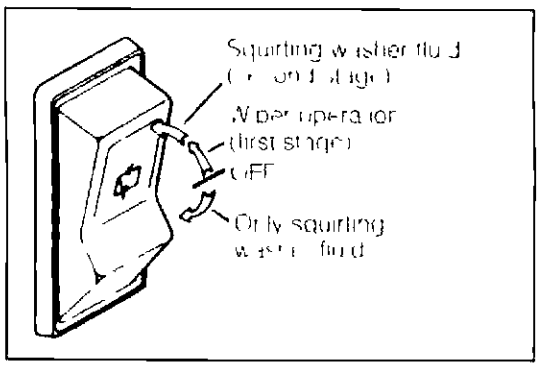
8. REAR WIPER & WASHER



8-1. REAR WIPER AND WASHER SWITCH

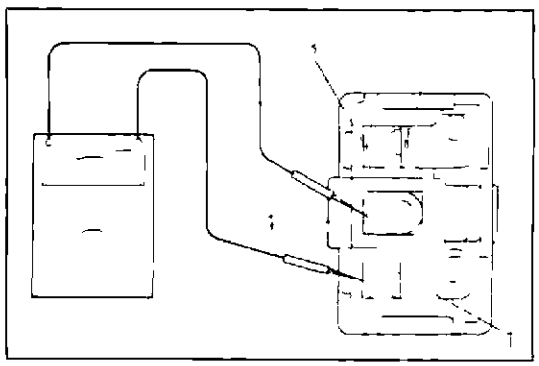
Removal

1. Remove the rear wiper/washer switch with a screwdriver
2. Disconnect the coupler



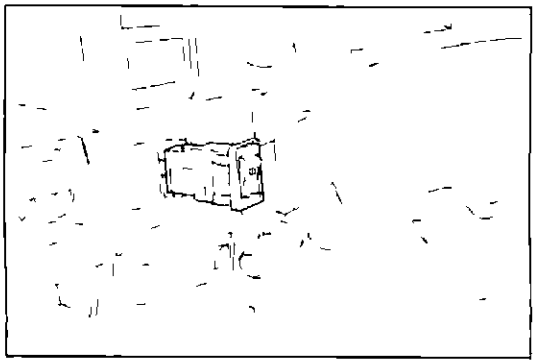
Unit inspection

1. Make sure that continuity exists between the respective terminals
2. As indicated in the continuity table



Installation

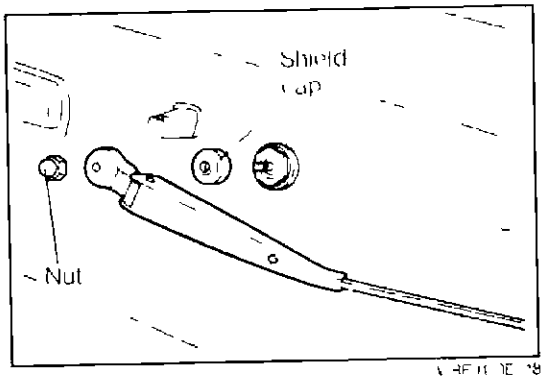
1. Connect the coupler
2. Install the switch into the instrument panel



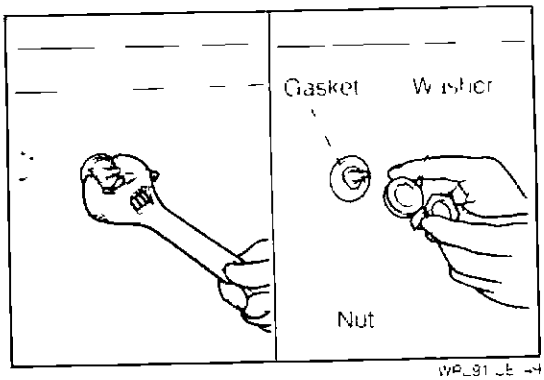
8-2. REAR WIPER MOTOR AND BLADE

Removal

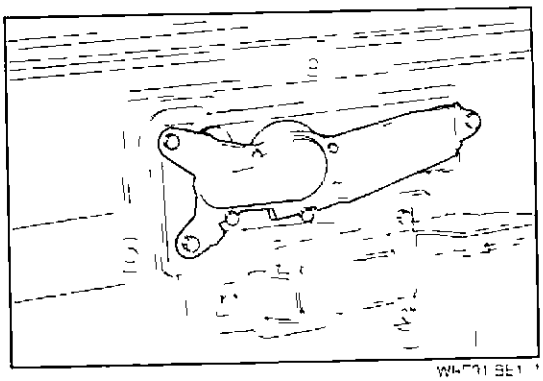
1 Remove the wiper arm and blade by removing the nut
2 Remove the shield cap



3 Remove the washer and gasket by removing the nut

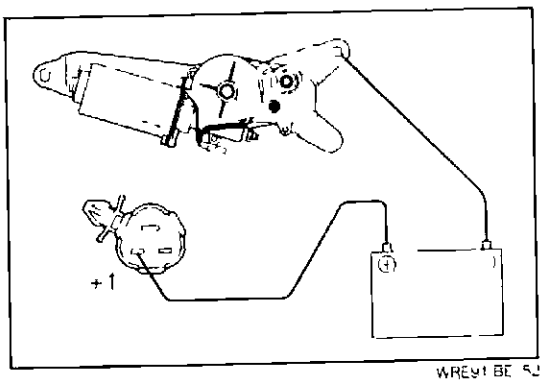


4 Remove the door trim
5 Turn over the service hole cover (vinyl) at the right upper section of the rear wiper motor
6 Disconnect the terminal
7 Remove the wiper motor installation bolts
8 Remove the wiper motor assembly

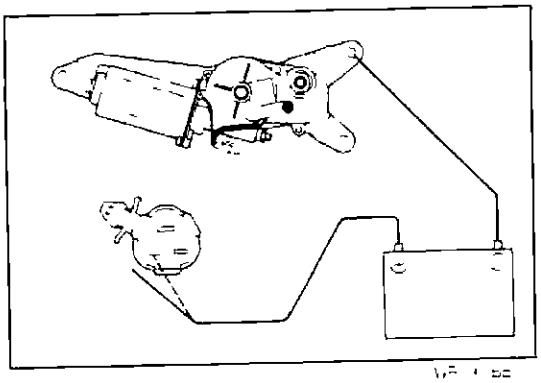


Inspection of wiper motor unit

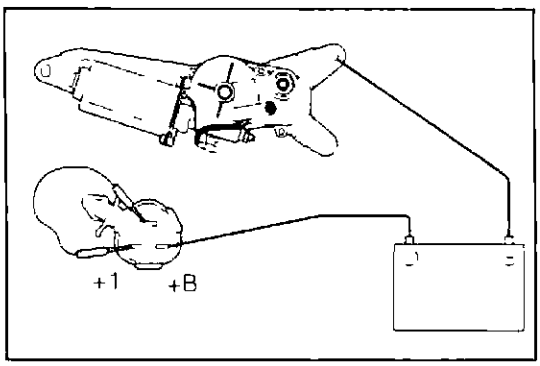
1 Connect the terminal +1 to the positive ⊕ terminal of the battery, the body to the negative ⊖ terminal of the battery. Ensure that the wiper operates



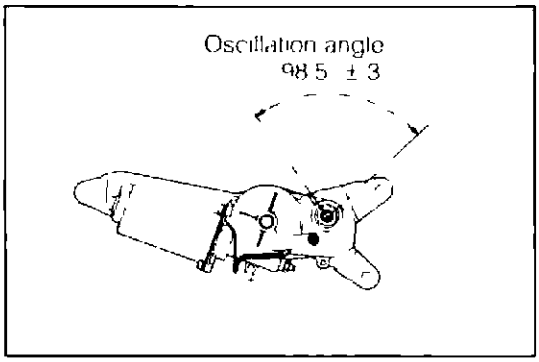
2 Under the operating conditions in the step 1, disconnect the terminal +1 so as to interrupt the wiper motor operation



3 Connect the terminal +1 to the terminal S the terminal +B to the positive ⊕ terminal of the battery Ensure that the wiper operates and stops at the automatic stopping position



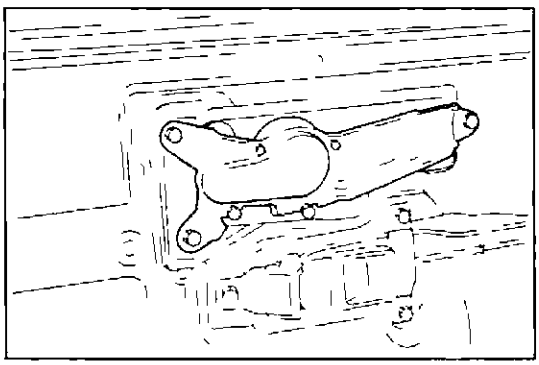
WRE91 BE154



WRE91 BE155

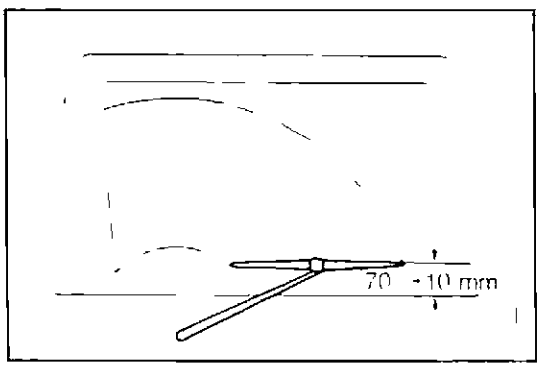
Installation

1 Install the wiper motor to the back door
2 Connect the terminal
3 Operate the wiper motor and set it at the automatic stop position



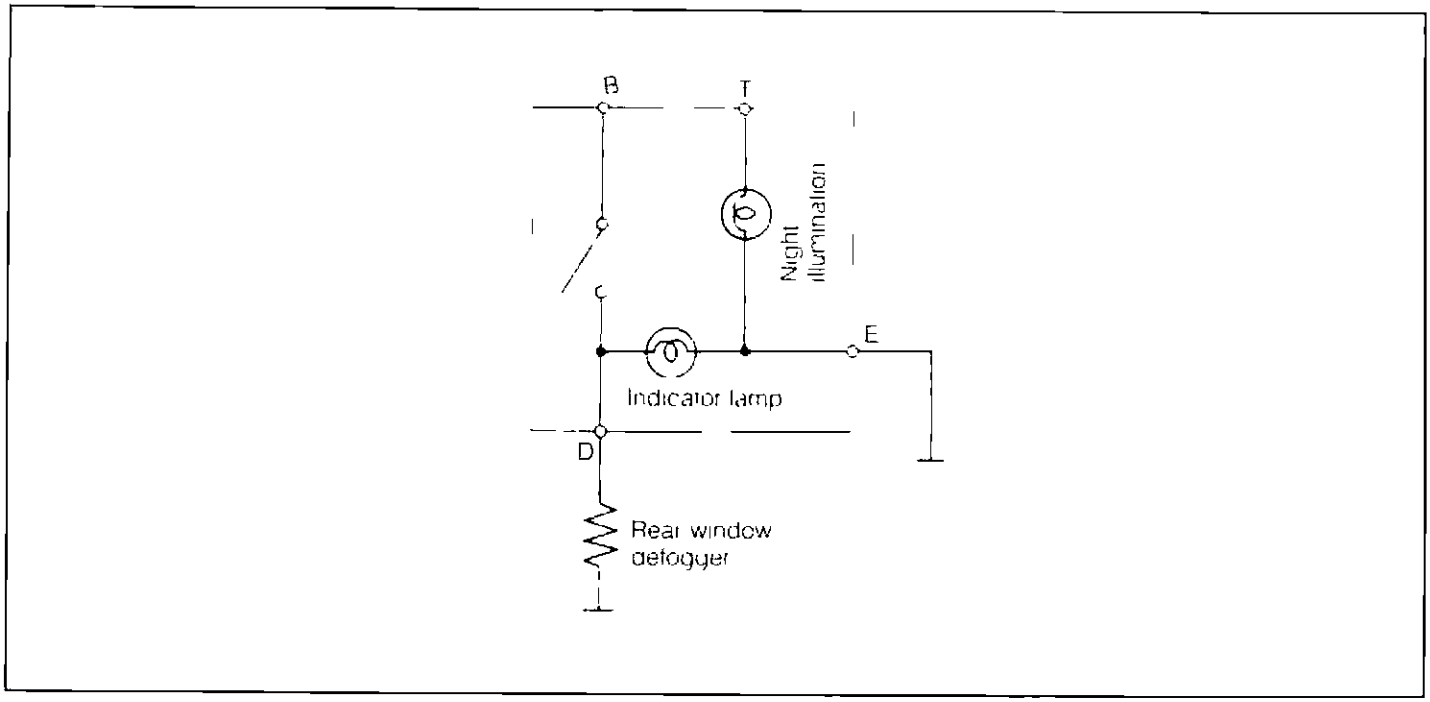
WRE91-BE 156

4 Set the wiper arm and blade in the positions shown in the illustration Then, tighten the pivot nut



WRE91 BE15

9. REAR WINDOW DEFOGGER

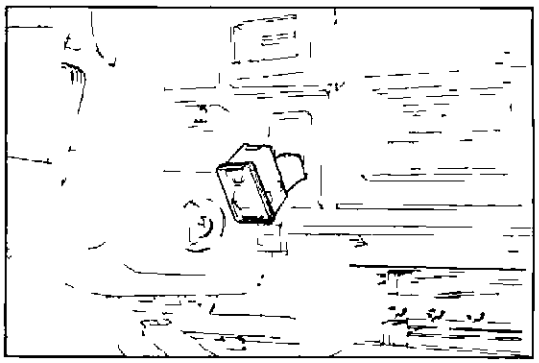


WRE91 BE1-8

9-1. DEFOGGER SWITCH

Removal

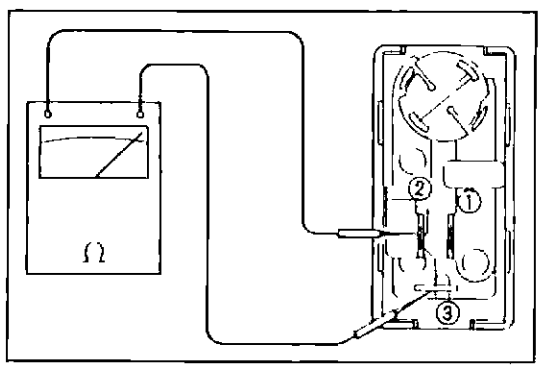
(1) Remove the rear defogger switch with a screwdriver
(2) Disconnect the coupler



WRE9 BE 9

Unit inspection

Ensure that continuity exists between the respective terminals as indicated in the continuity table below



WRE91 BE1-9

Continuity table

○—○ Continuity exists
○—◎—○ Bulb in installed state

Switch \ Terminal	B	D	E	T
OFF		○	○	○
ON	○	○	○	○

Installation

(1) Connect the coupler
(2) Install the defogger switch

WRE91 BE1-10

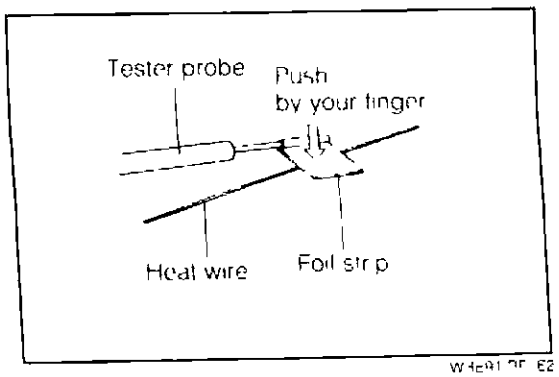
9-2. DEFOGGER WIRE

NOTE:

(1) When wiping the glass surface, use a soft, dry cloth. Move the cloth along the wire. Be careful not to damage the wire.

(2) Never use washing agent or glass cleaner which contains abrasive compound.

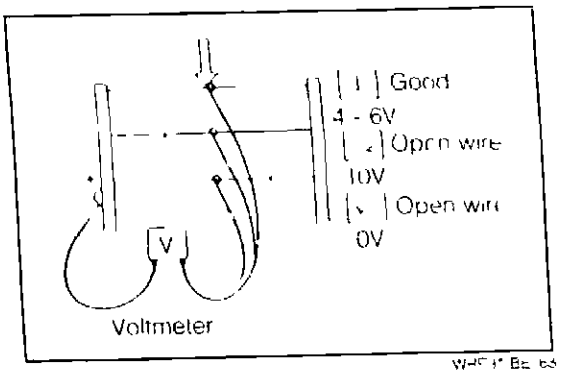
(3) Wrap the tip end of the tester probe with foil strip so that the tester probe causes no damage on the heat wire during the voltage measurement. Check the voltage by pushing the foil strip against the heat wire by your finger, as shown in the figure.



OPEN WIRE CHECK

1 Turn ON the ignition key switch
2 Turn ON the defogger switch so as to energize the defogger wire
3 Check the voltage at the center section of each heat wire

Voltage	Judgement criteria
Approx. 5V	Good (No open wire)
Approx. 10V or 0V	Open wire

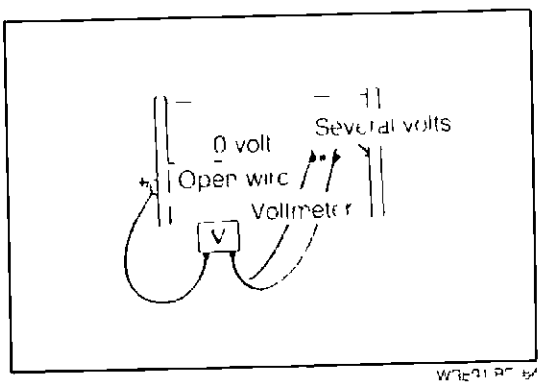


REFERENCE.

- If the voltage is 10V, it means that open wire exists between the center of the wire and the end of the positive ⊕ side. If the voltage is 0V, it means that open wire exists between the center of the wire and the end of the earth side.

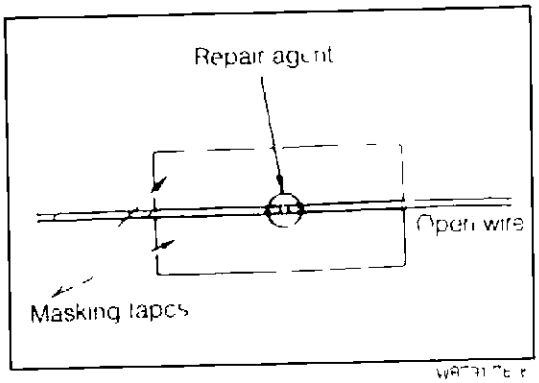
LOCATING POINT OF OPEN WIRE

1 Connect the positive ⊕ terminal of the voltmeter to the positive ⊕ side of the defogger wire
2 Slide the voltmeter's negative ⊖ terminal wrapped with foil strip on the defogger wire from its positive ⊕ side to its negative ⊖ side
3 The voltmeter reading changes from 0V to several volts at the point where open wire exists

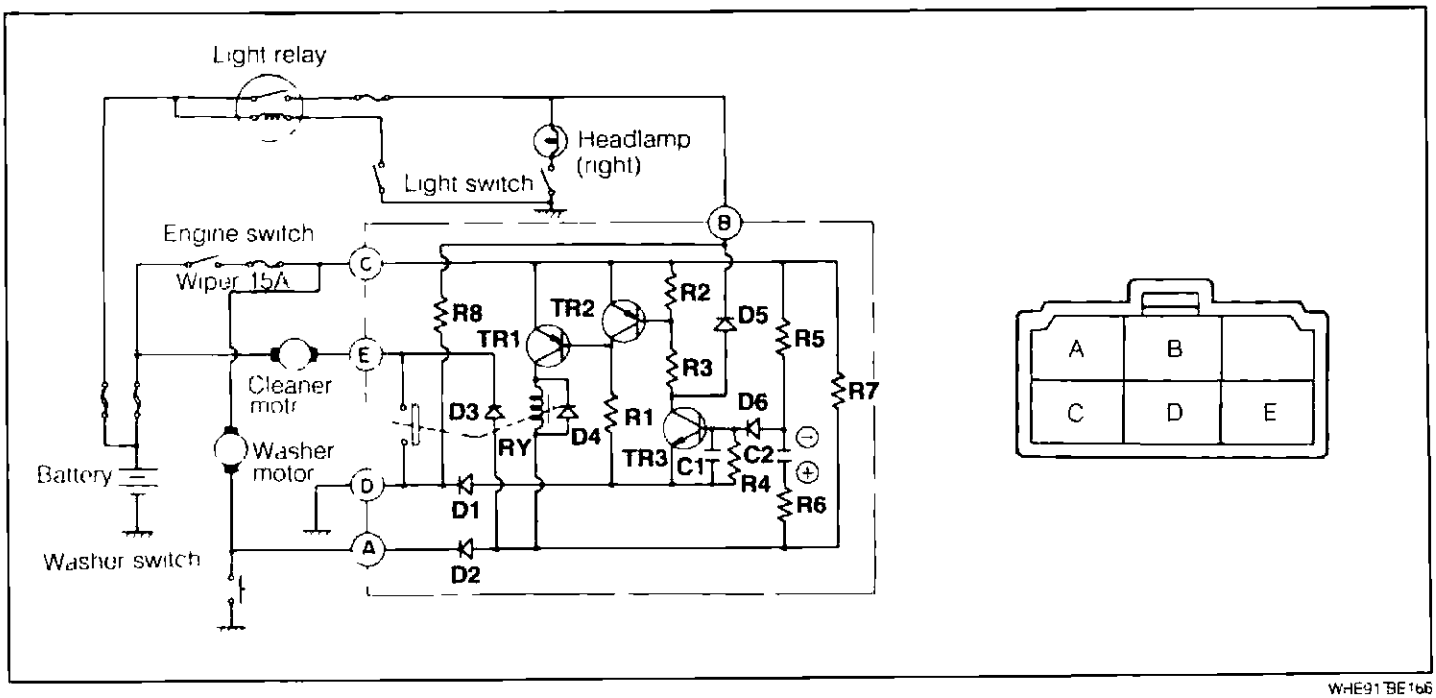


REPAIRING POINT OF OPEN WIRE

1 Clean the point of open wire with white gasoline
2 Affix masking tapes to both upper and lower portions of the point to be repaired
3 Stir repair agent (Du Pont Paste No. 4817) thoroughly Apply a small amount of the repair agent to the repairing point using a fine brush
4 Two to three minutes later, peel off the masking tapes
5 Do not energize the defogger wire within 24 hours after the repair



10. HEADLAMP CLEANER

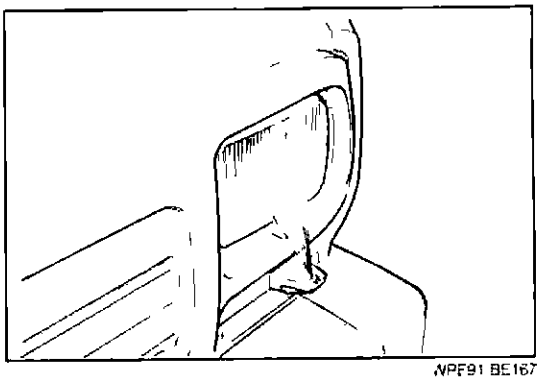


WHE91BE166

Invehicle inspection

While the ignition switch is turned ON, carry out the following check

1 Operate the washer switch one time Within about 0 8 second, operate the washer switch again
2 Ensure has the cleaner motor operates for about 0 5 second



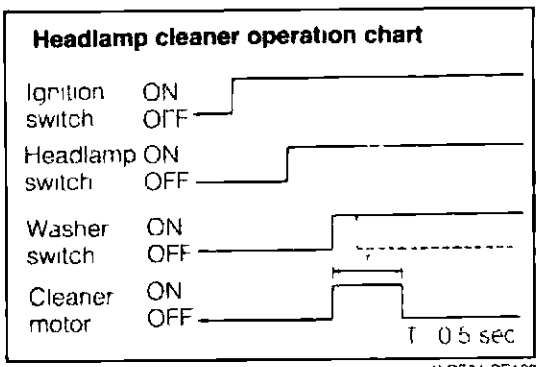
WPF91 BE167

10-1. CONTROL RELAY

Inspection

If the headlamp cleaner is malfunctioning persistently when the following unit inspection reveals no malfunction, replace the headlamp cleaner relay

(1) Wiper fuse 15A
(2) Headlamp cleaner motor
(3) Washer switch
(4) Front windshield washer motor

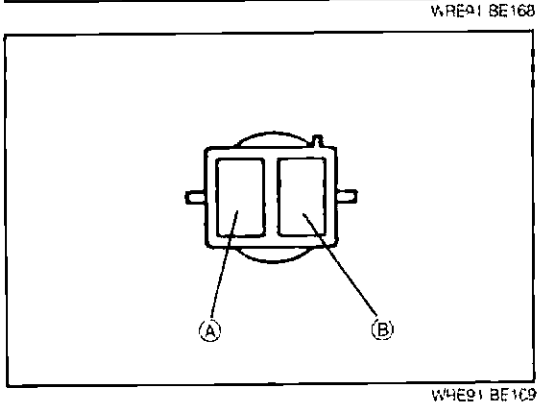


WHE91 BE168

10-2. CLEANER MOTOR

Inspection

When the positive ⊕ terminal of the battery is connected to the terminal Ⓐ, and the negative ⊖ terminal of the battery to the terminal Ⓑ, the motor should operate, thereby discharging pressurized water

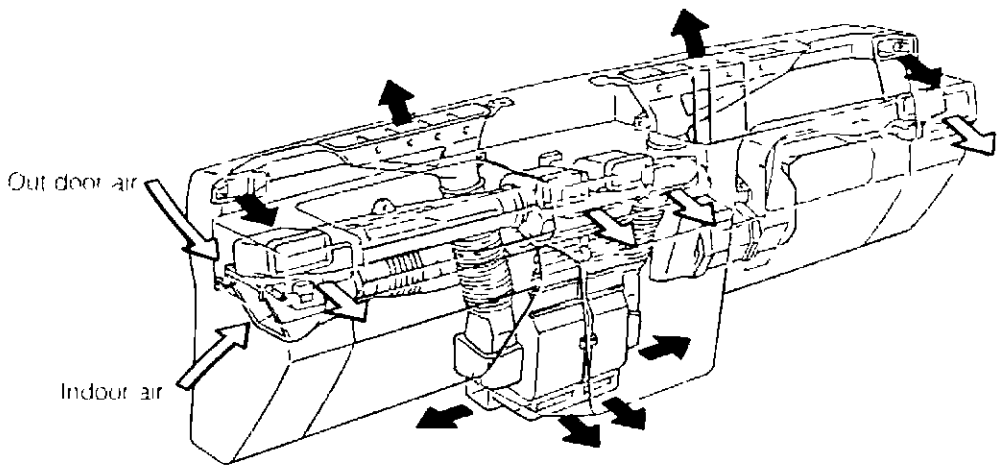


WHE91 BE169

11. FRONT HEATER

The front heater is a semi-air-mixing type

R.H.D

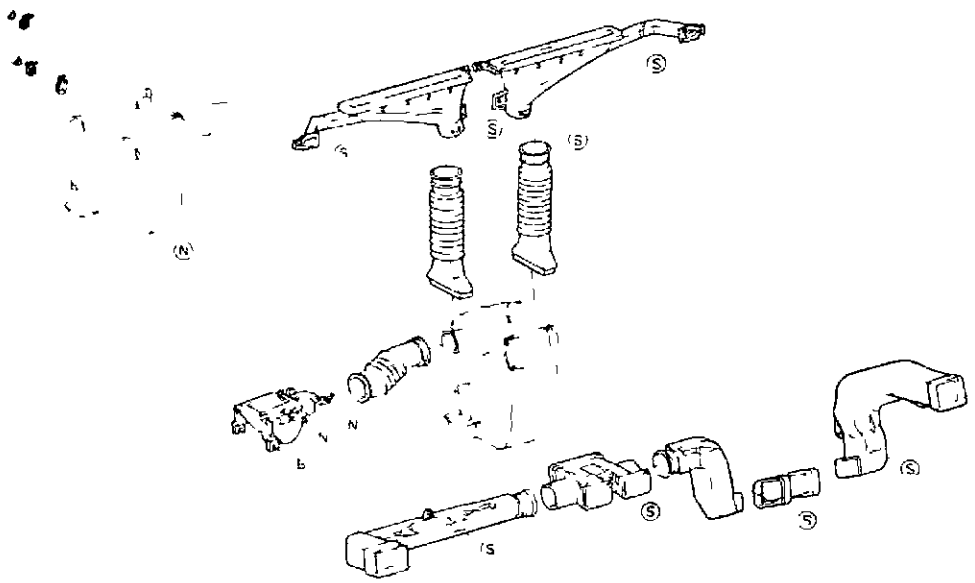


This picture shows a R.H.D vehicle

WHE91 BE170

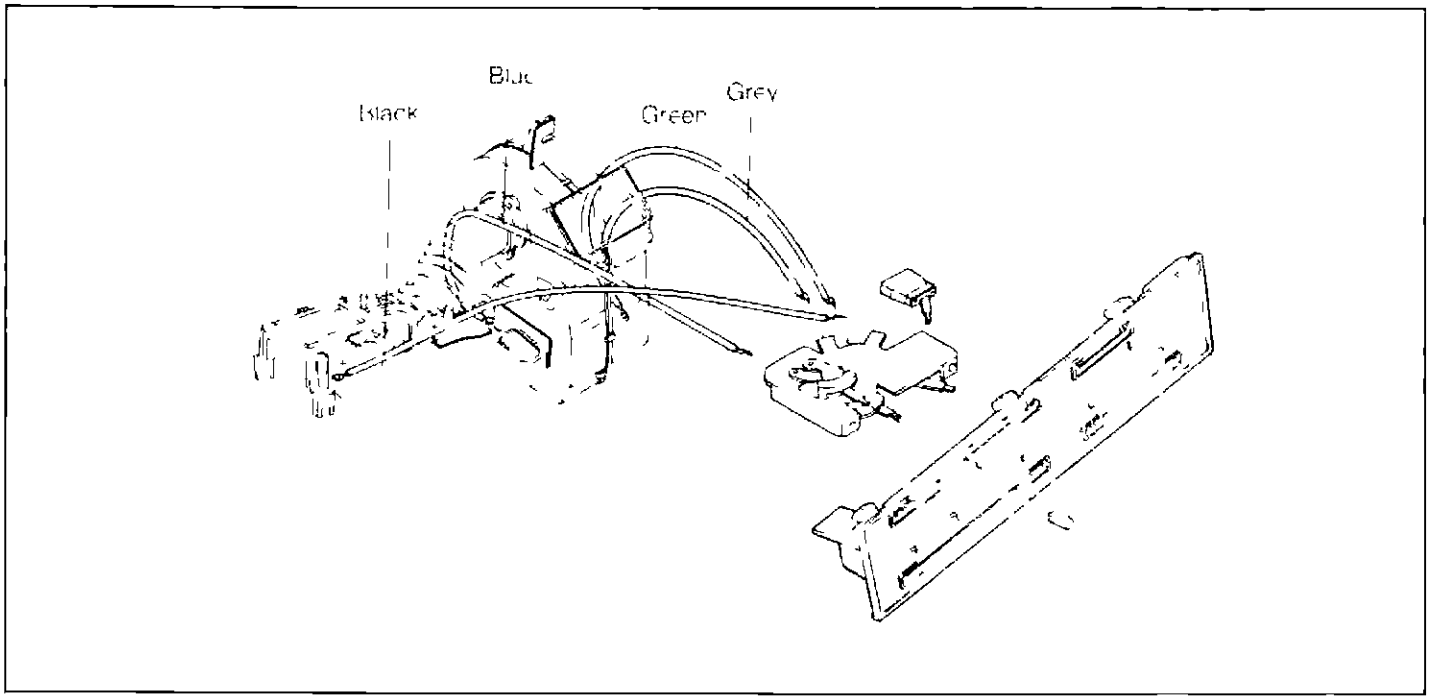
HEATER UNIT

R.H.D



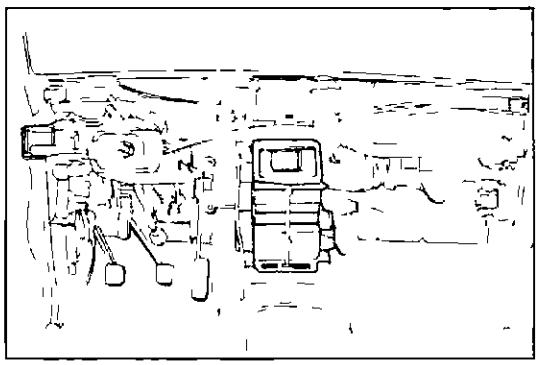
WHE91 BE

HEATER CONTROL ASSEMBLY



Removal

1 Remove the negative ⊖ terminal of the battery
2 Drain the cooling water
3 Remove the steering wheel
4 Remove the instrument panel
5 Disconnect each heater control cable

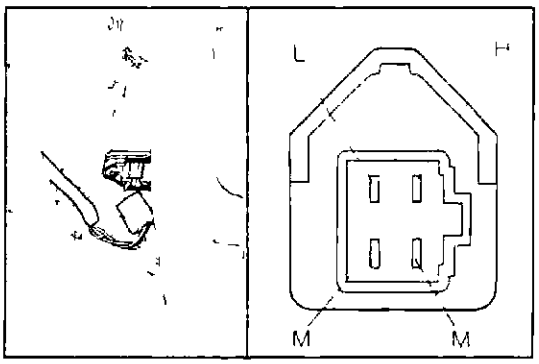


Unit inspection

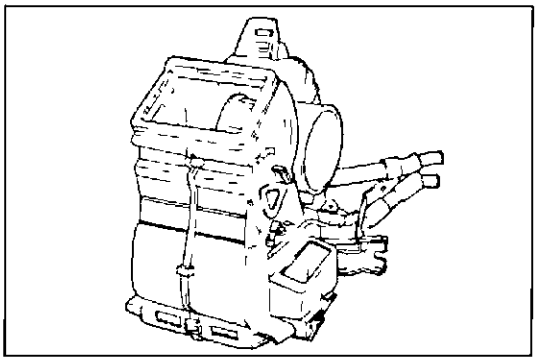
1 Blower resistor
Ensure that the resistance between the respective terminals conforms to the specifications blow

Specified Values.

Hi and Me: About 0.6 Ω
Lo and Me. About 1.5 Ω

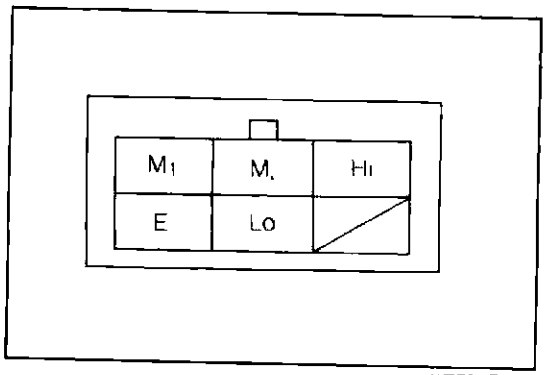


2 Blower motor & case
(1) Turn the blades of the blower by hand Ensure that the blades rotate lightly
(2) Ensure that the screws retaining the blades to the motor axle are not loose
(3) Ensure that the blades are not turning eccentrically
(4) Check the flow route switching plate and packing for damage Also ensure that they can be switched smoothly



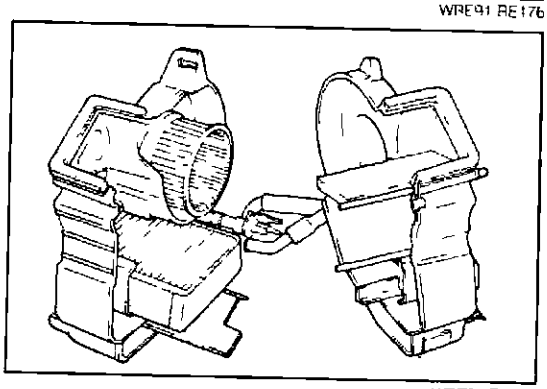
3 Blower switch
When the blower switch is set to each stage, ensure that continuity exists between the respective terminals, as indicated in the continuity table below

Switch \ Terminal	E	Lo	M_1	M_2	H_2
OFF					
I	○	○			
II	○	○	○		
III	○	○		○	
IV	○	○			○

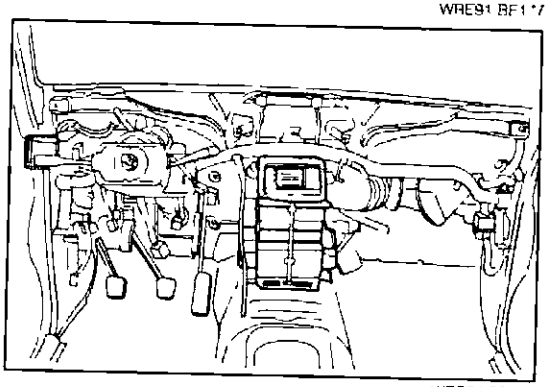


WRE91 BE176

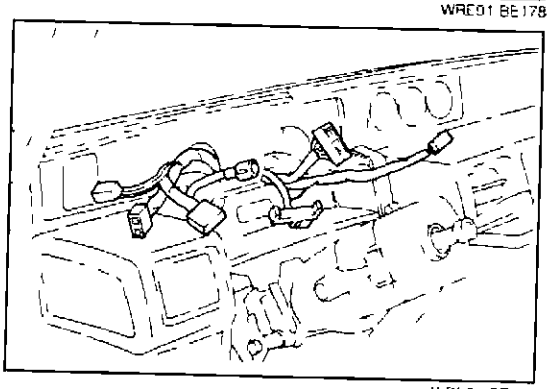
4 Heater core assembly
(1) Check the heater core for cracks
(2) Check the packing for damage


WRE91 BE177

Installation
1 Install the heater unit
2 Connect the heater hoses (water)
3 Connect the couplers.
4. Connect the air duct


WRE91 BE178

5 Install the instrument panel
6 Connect the heater/ventilation control wire as following page
7 Connect the radio/speaker connector
8 Install the idle adjust knob
9 Connect the respective connector
10 Install the combination meter unit
11 Install the steering handle


WRE91 BE179

Operation after installation

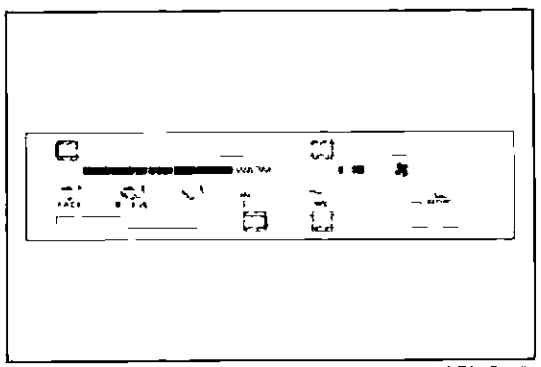
1 Connect the battery
2 Ensure that each switch of the instrument panel functions properly
3 Start the engine
NOTE:
(1) Replenish cooling water in advance if the cooling water has been drained out.
(2) When starting the engine, place the shift lever of the transmission in the neutral position and apply the parking brake.

4 Ensure that all of the electrical system functions properly
5 Ensure that the corresponding outlet is delivering proper air flow in accordance with the position of the heater control level

WPC9 BE180

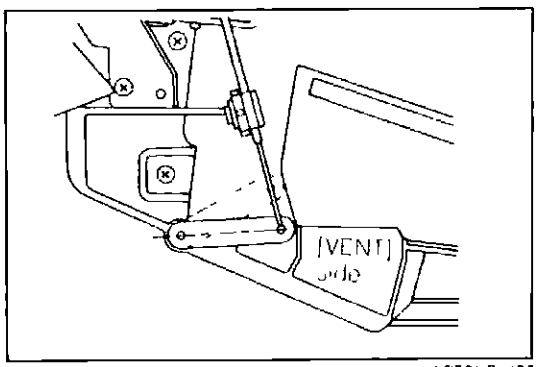
Main points of installation

1 Heater control assembly
(1) Heater control assembly
Prior to the installation, set the heater control levers at the respective positions specified in the right figure



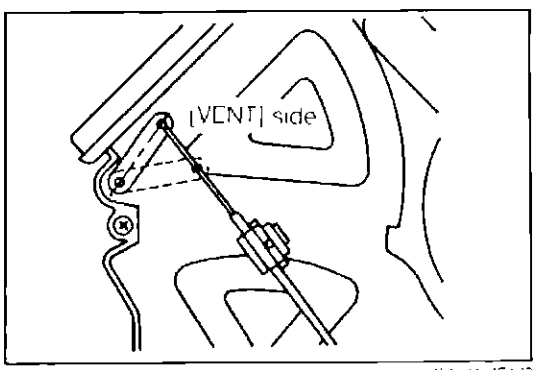
WHE91 BE181

(2) Cable for mode selection (blue)
Set the selection lever of the heater unit at the [VENT] side. Then, insert the heater control cable into position



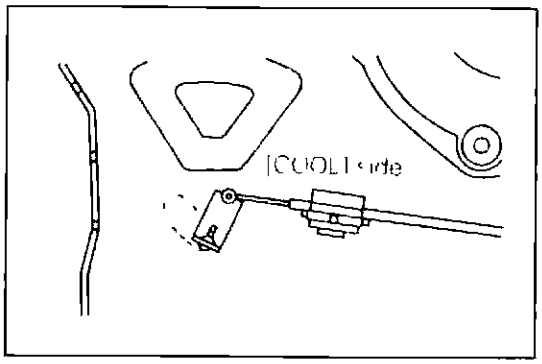
WAF91 BE182

(3) Cable for vent damper selection (grey)
Set the selection lever of the heater unit at the [VENT] side. Then, insert the heater control cable into position



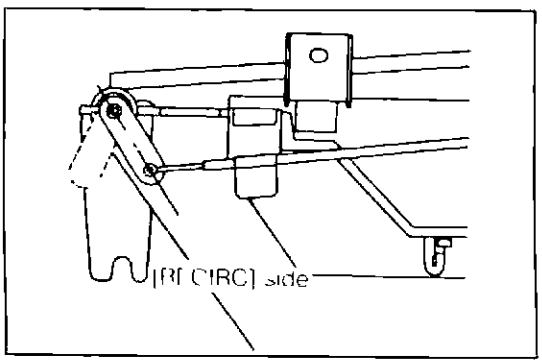
WH 91 BE183

(4) Cable for water valve selection (green)
Set the selection lever of the heater unit at the [COOL] side. Then, insert the heater control cable into position.



WRE91 BE164

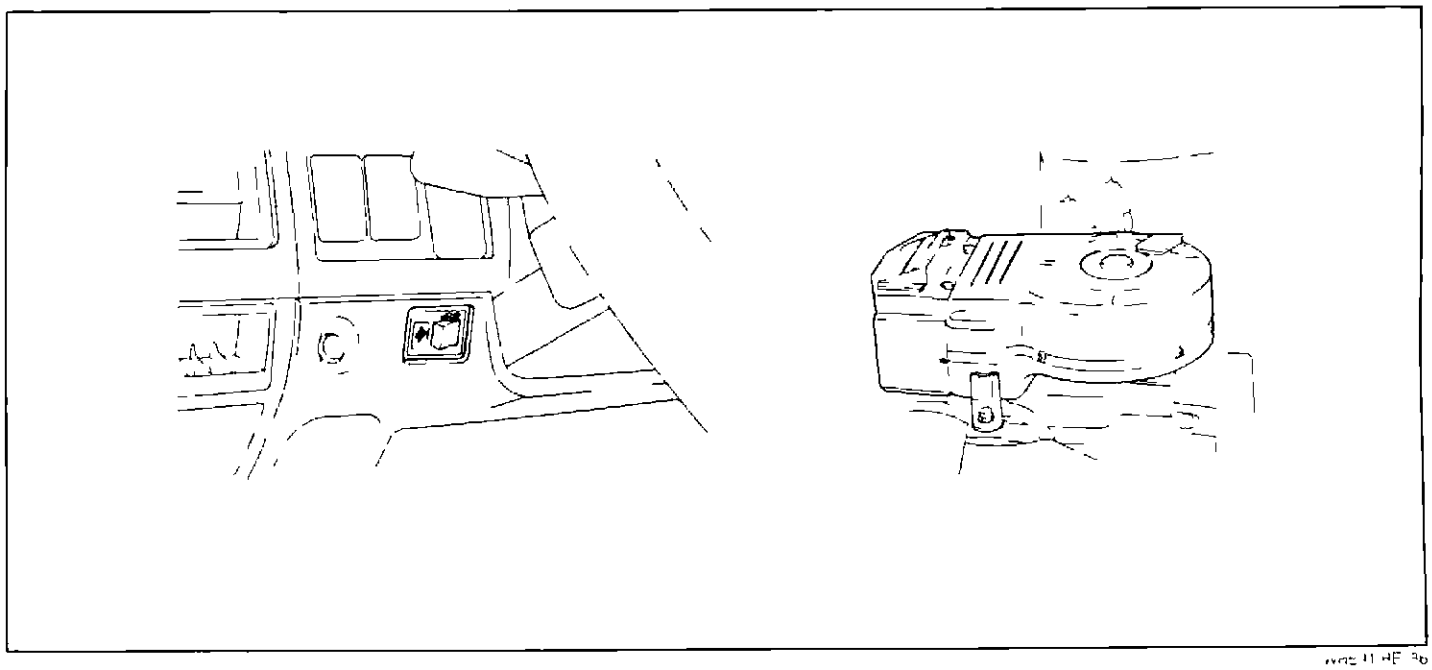
(5) Cable for inside/outside air selection (black)
Set the selection lever of the heater unit at the [RECIRC] side. Then, insert the heater control cable into position.



WRE91 BE165

12. REAR HEATER

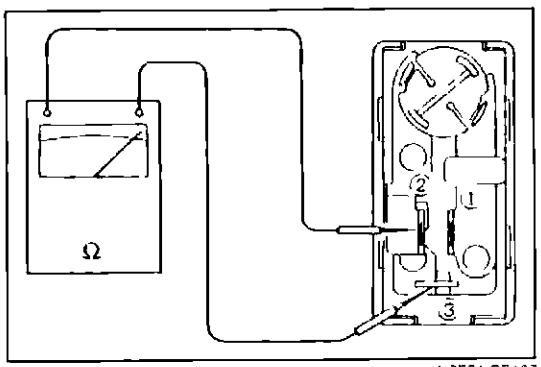
HEATER UNIT



UNIT INSPECTION

(1) REAR HEATER SWITCH

Ensure that continuity exists between the respective terminals as indicated in the continuity table below



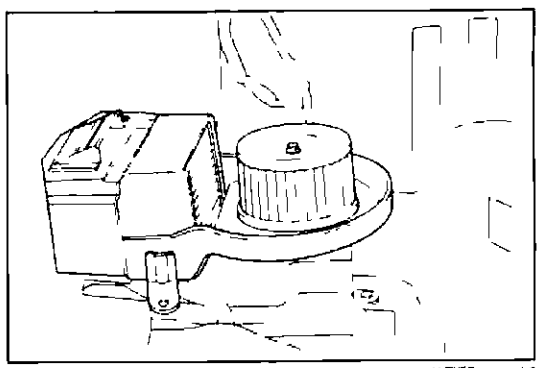
Continuity table

○—○ Continuity exists
○—○ Bulb in installed state

Switch \ Terminal	3	1	2
OFF		○	○
ON	○	○	○

(2) HEATER CORE

- Check the heater core for cracks
- Check the packing for damage



(3) BLOWER

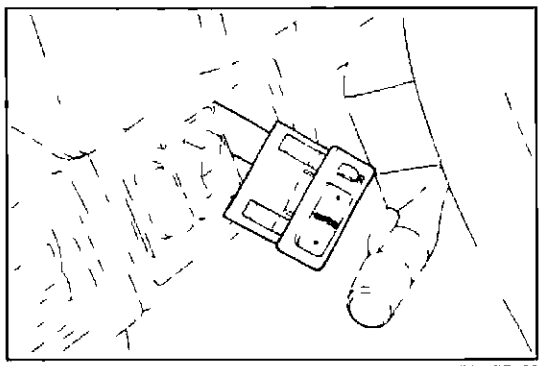
- Check the blades for damage
- Turn the blades of the blower by hand. Ensure that the blades rotate lightly

13. REMOTE CONTROL MIRROR

13-1. REMOTE CONTROL SWITCH

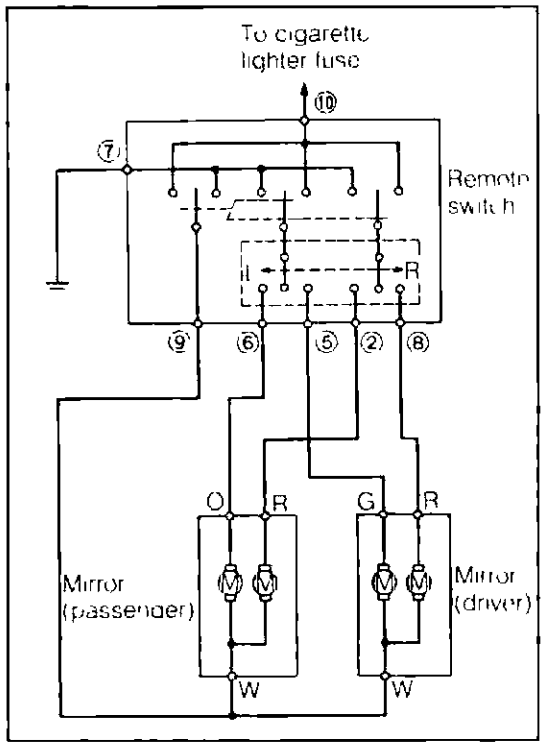
Inspection

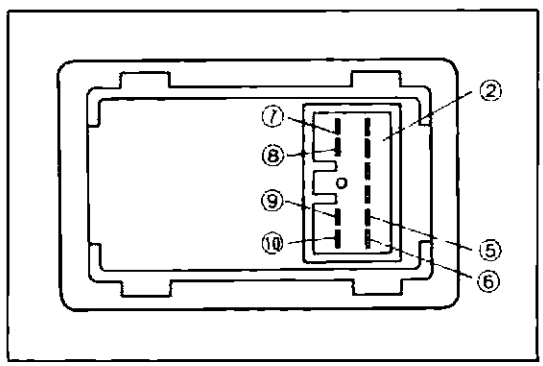
1 Remove the switch with screw driver
2 Disconnect the coupler
3 Ensure that continuity exists between the respective terminals by operating the switch as indicated in the table below



WRE91 BE190

	Switch	⑩	⑨	⑧	⑦	⑥	⑤	②
Left	Up	○				○		
			○		○			
	Down				○	○		
		○	○					
	OFF							
	Left	○					○	
			○		○			
	Right				○		○	
		○	○					
OFF	Up		○		○			
	Down	○	○					
	OFF							
	Left		○		○			
	Right	○	○					
Right	Up	○						○
			○		○			
	Down				○			○
		○	○					
	OFF							
	Left	○		○				
			○		○			
	Right			○	○			
		○	○					



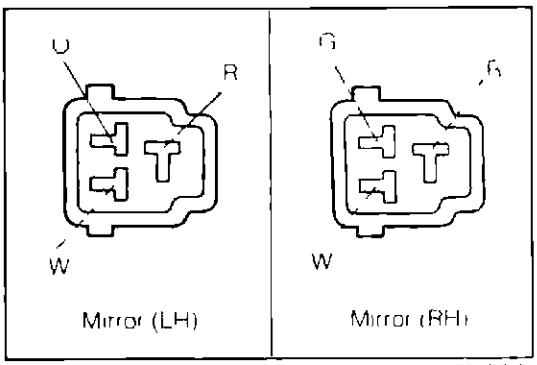


13-2. REMOTE CONTROL MOTOR

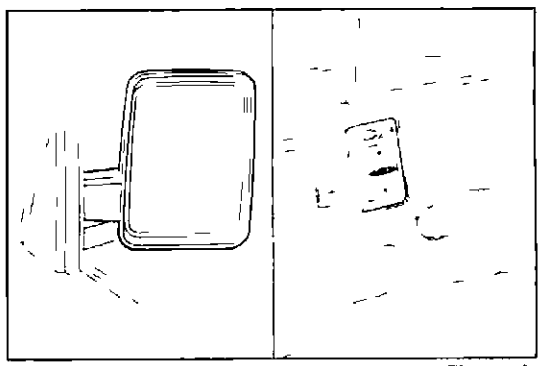
Inspection

1 Remove the door trim. Take out the coupler.
2 Ensure that the motor operates properly by applying the battery voltage across the respective terminals as indicated in the table below.

(RH)	W	G	R
Up	—	+	
Down	+	—	
Left	—		+
Right	+		—

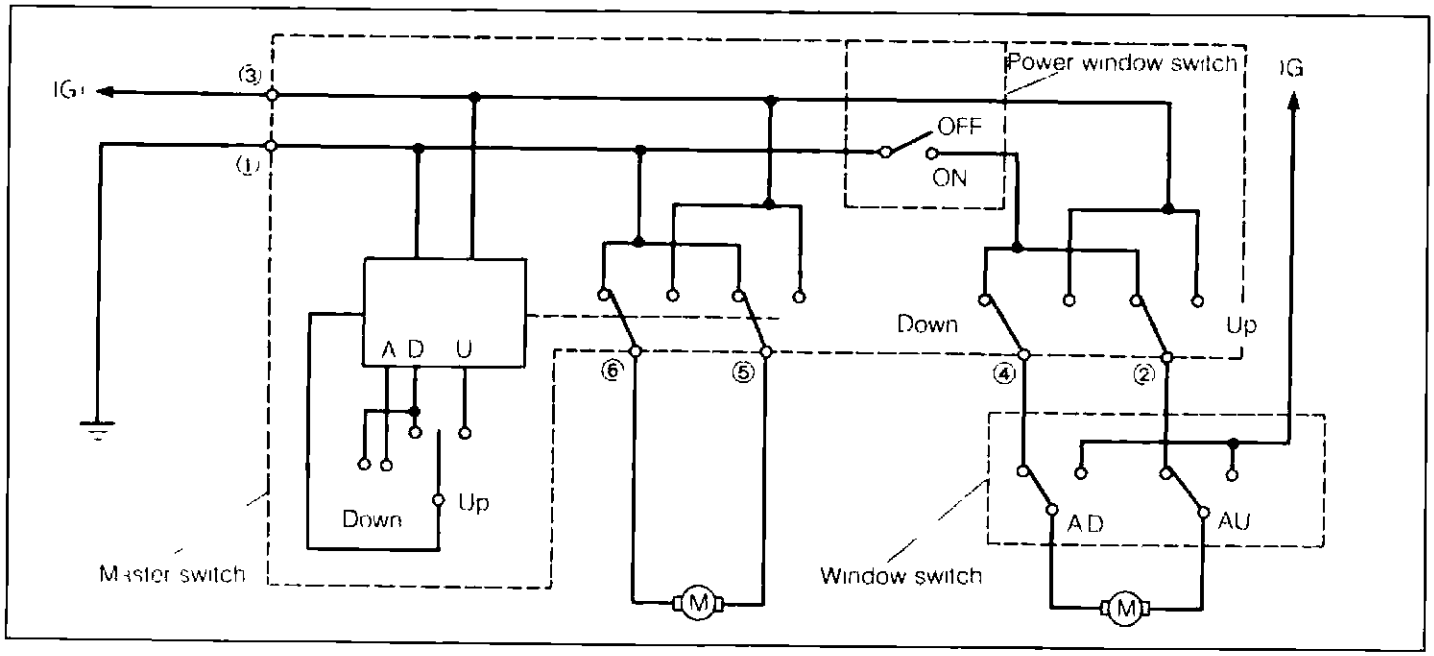


(LH)	W	O	R
Up		+	
Down	+	—	
Left			+
Right	+		—



14. POWER WINDOW

14-1. CIRCUIT DIAGRAM

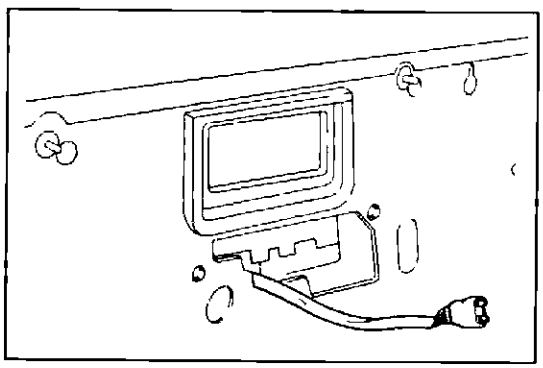


WHE9 BE 93

14-2. MASTER SWITCH (Driver's switch)

Removal

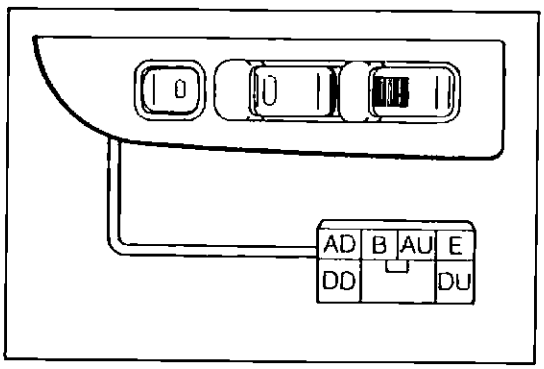
1 Remove the three screws of the arm rest
2 Remove the screw of the door inside handle Remove the bezel
3 Remove the door trim board assembly
4 Disconnect the wiring coupler



WBE91 BE'94

Inspection

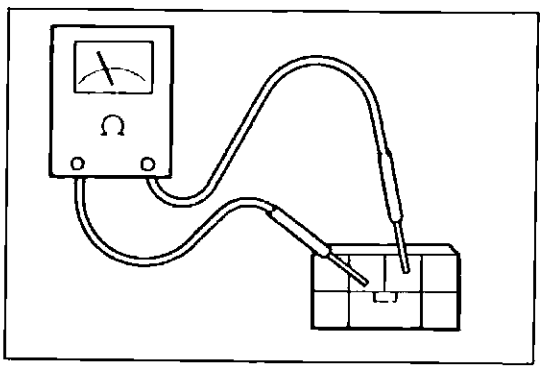
Ensure that continuity exists between the respective terminals as indicated in the continuity table below



Continuity table

○—○ Continuity exists

Window lock switch		Switch at driver s seat side				Switch at front passenger seat side			
		B	DU	DD	E	B	AU	AD	E
ON	UP	○—○		○—○		○—○		○—○	
	OFF		○—○		○—○		○—○		○—○
	DOWN	○—○			○—○	○—○			○—○
OFF	UP	○—○		○—○		○—○			
	OFF		○—○		○—○		○—○		
	DOWN	○—○			○—○	○—○			

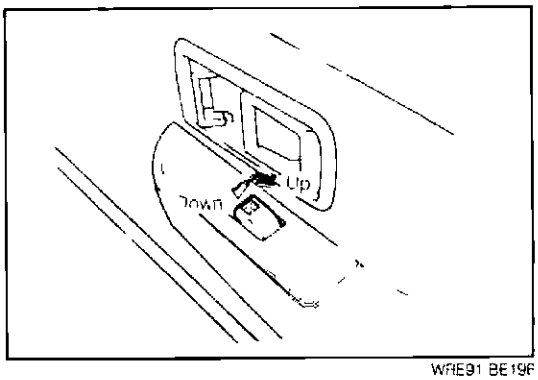


WHE91 BE'95

14-3. WINDOW SWITCH (Passenger's switch)

Removal

1 Remove the three screws of the arm rest
2 Remove the screw of the door inside handle Remove the bezel
3 Remove the door trim board assembly
4 Disconnect the wiring coupler.



WRE91 BE196

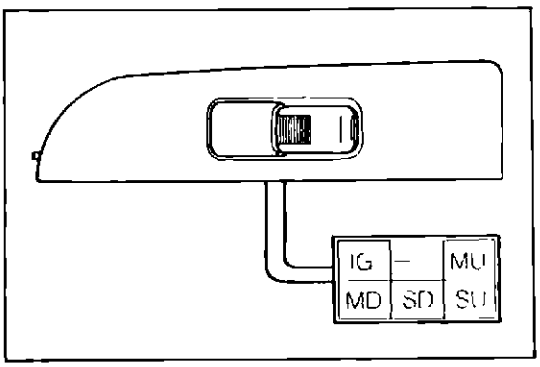
Inspection

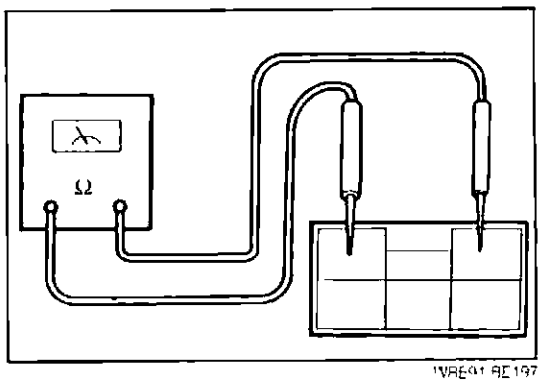
Ensure that continuity exists between the respective terminals as indicated in the continuity table below

Continuity table

○—○ Continuity exists

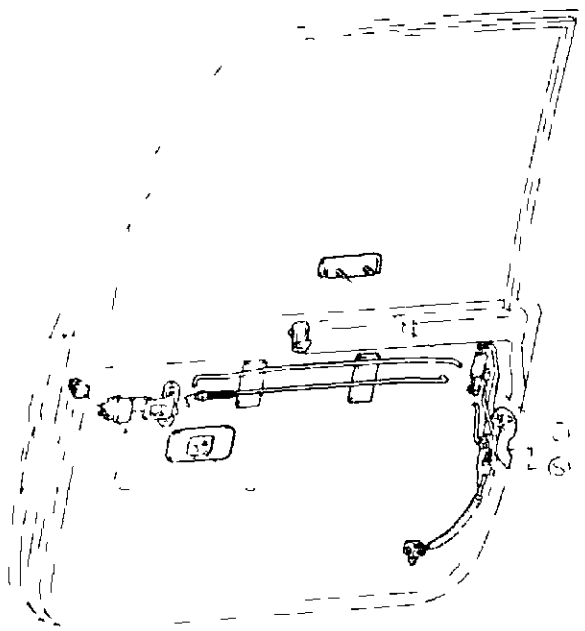
Switch \ Terminal	MU	SU	SD	IG	MD
UP	○			○	
			○		○
OFF	○	○	○		○
DOWN				○	○
	○	○			

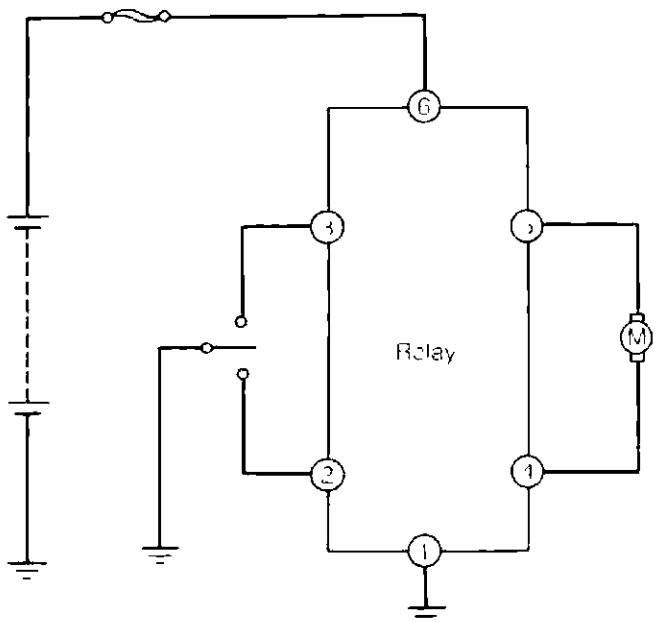




WRE91 BE197

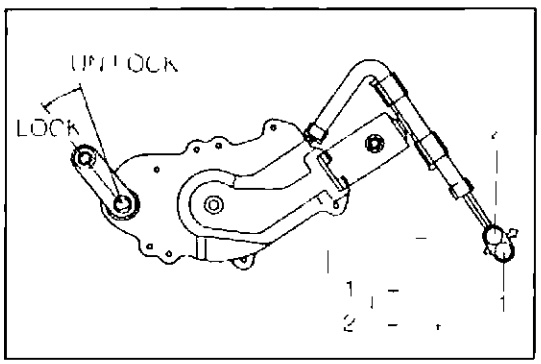
15. POWER FRONT DOOR LOCK





WBE9 BE13

15-1. DOOR LOCK CONTROL MOTOR (Passenger side door)



WBE01BE34

Removal

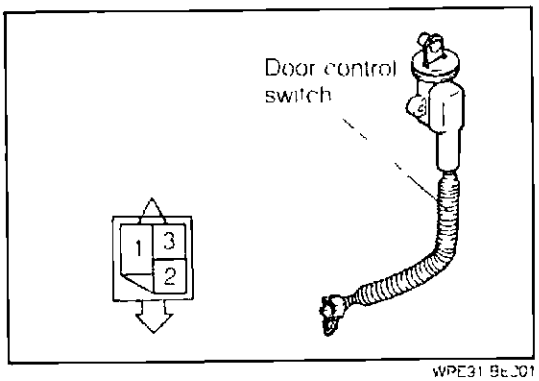
1 Remove the three screws of the arm rest
2 Remove the screw of the door inside handle. Remove the bezel.
3 Remove the door trim board assembly. Disconnect the wiring coupler.
4 Remove the water seal.

Inspection

When the positive ⊕ and negative ⊖ polarities of a 12V battery are connected to the terminals of the coupler, the lever of the motor should move to the LOCK or UNLOCK direction.

WBE01BE35

15-2. DOOR LOCK CONTROL SWITCH (Driver side door)



WPE31 8E001

Removal

1 Remove the three screws of the arm rest
2 Remove the screw of the door inside handle Remove the bezel
3 Remove the door trim board assembly Disconnect the wiring coupler
4 Remove the water seal

Inspection

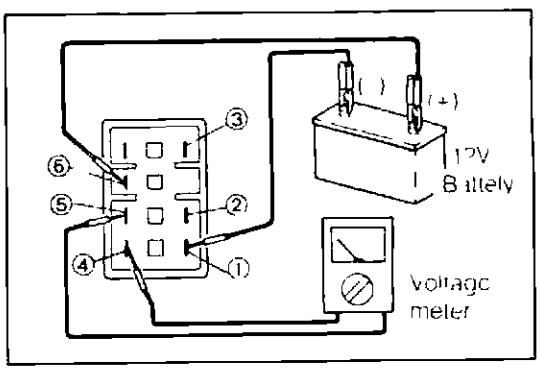
Ensure that continuity exists between the respective terminals as indicated in the table below

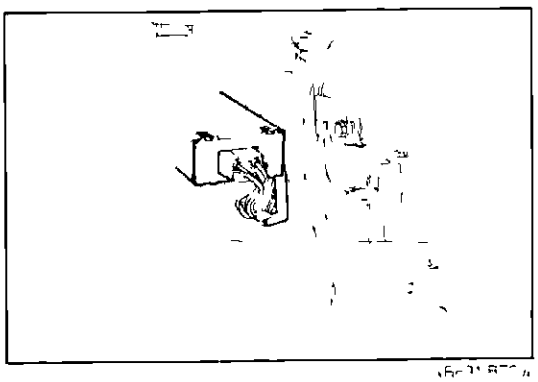
	1	2	3
Lock	○	○	
Unlock	○		○

15-3. DOOR LOCK CONTROL RELAY

Inspection

1 Fabricate a test circuit as indicated in the right figure
2 Set the circuit tester to the voltmeter range
3 When the terminal ② is connected to the negative (–) terminal of the battery, ensure that the battery voltage is momentarily applied across the terminals ④ and ⑤
4 When the terminal ③ is connected to the negative (–) terminal of the battery, ensure that the battery voltage is momentarily applied across the terminals ④ and ⑤ However the polarity of the voltage at this time should be opposite to that under the step ③ above page 80

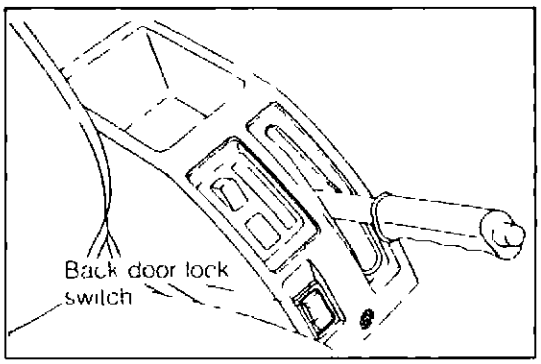




16. BACK DOOR OPENER

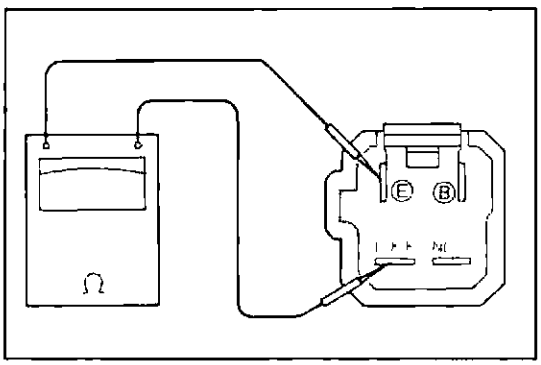
16-1. BACK DOOR OPENER SWITCH

The back door opener switch is located at the rear console box



INSPECTION

Remove the back door opener switch. Ensure that continuity exists between the respective terminals as indicated in the continuity table below



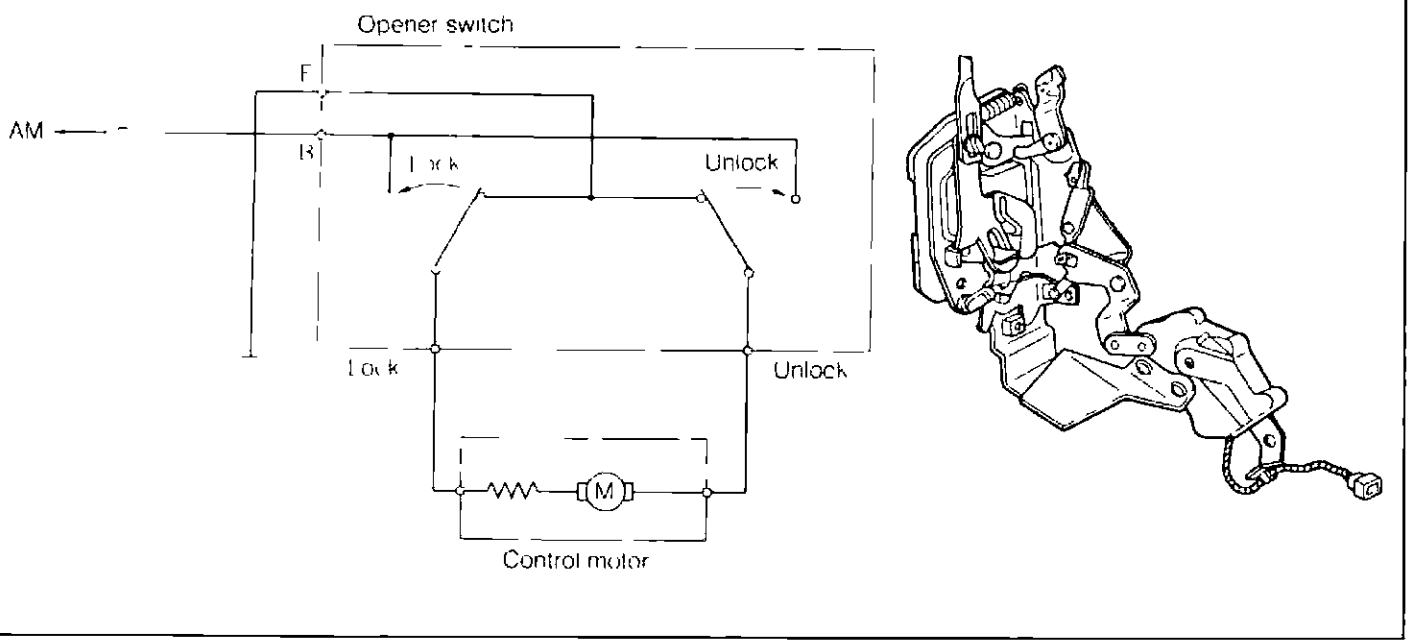
WRE91BE203

Continuity table

○—○ Continuity exists

Switch \ Terminal	B	E	LOCK	UNLOCK
LOCK	○		○	
		○		○
OFF		○	○	○
UNLOCK	○			○
		○	○	

CONTROL MOTOR CIRCUIT DIAGRAM



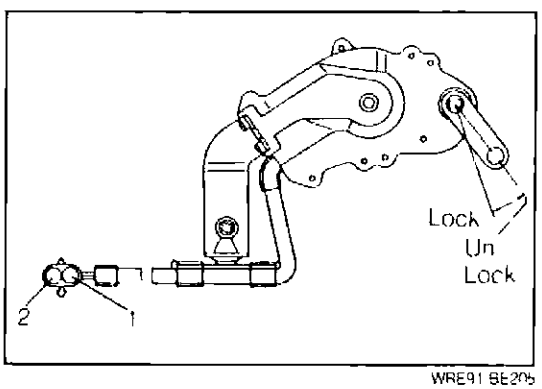
WRE91BE204

INSPECTION

Solenoid assembly

Apply a voltage of 12V across the following two terminals. Ensure that the motor operates in accordance with the table below

Operation direction \ Terminal	①	②
UNLOCK	⊕	⊖
LOCK	⊖	⊕



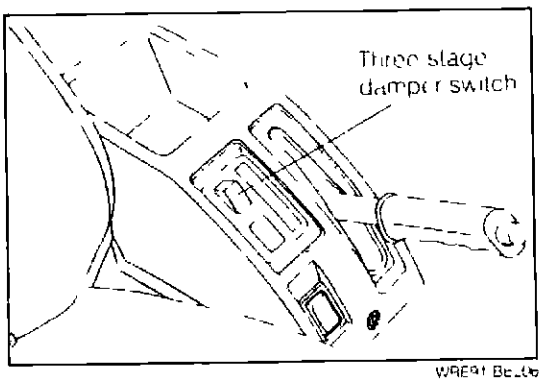
WRE91BE205

17. THREE-STAGE DAMPER

THREE-STAGE DAMPER SWITCH

Removal

1 Remove the console box
2 Remove the three-stage damper switch
3 Disconnect the connector



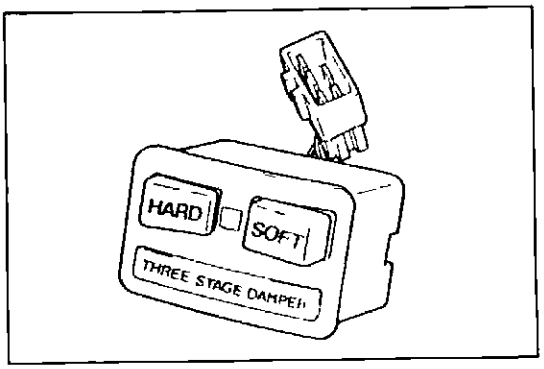
WRE91 BE206

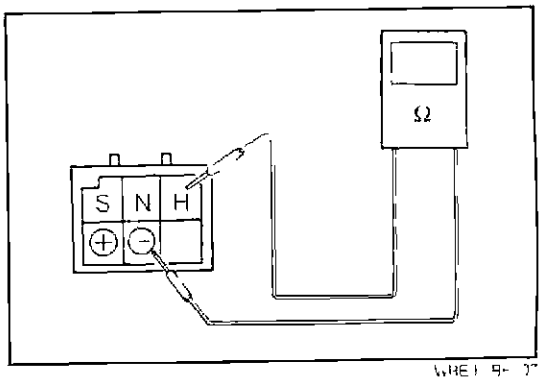
Inspection

Ensure that continuity exists between the respective terminals as indicated in the continuity table below, using a tester

○—○ Continuity exists

Terminal / Switch position	⊖	S	N	H	⊕
SOFT	○	○			
NORMAL	○		○		
HARD	○			○	





WRE1 BE207

Installation

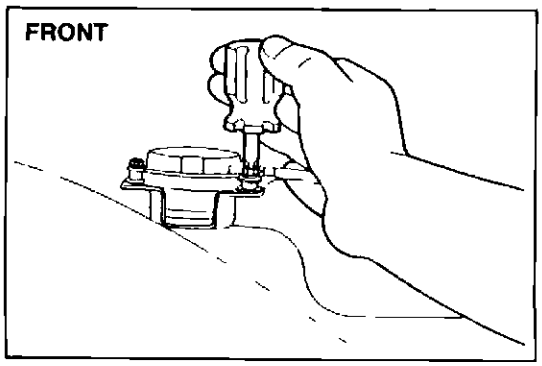
1 Install the three-stage damper switch
2 Connect the connector
3 Install the console box

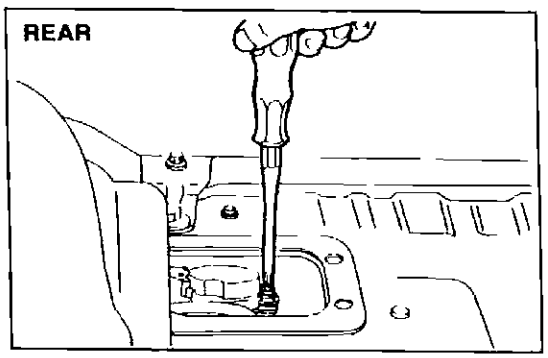
WRE9 BE208

ACTUATOR

Removal

1 Remove the actuator
2 Disconnect the connector



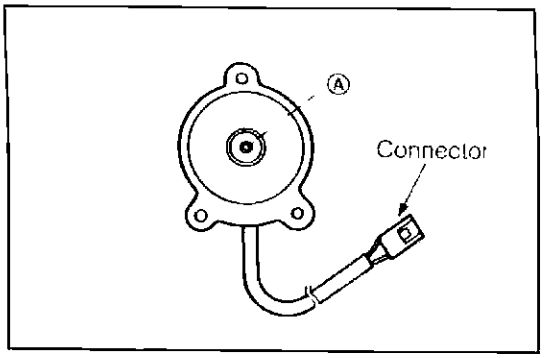


WRE91 BE209

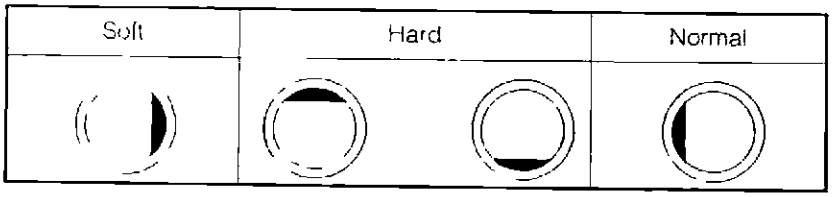
Inspection

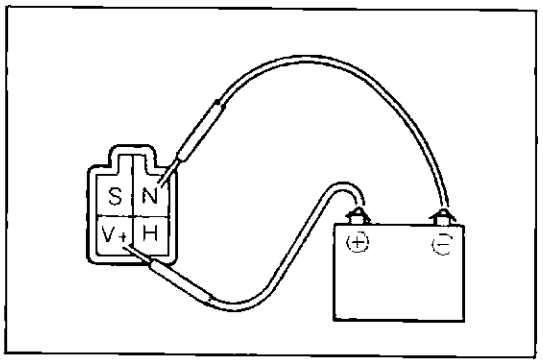
Apply a voltage of 12 V to the connector Ensure that the center section Ⓐ of the actuator rotates in accordance with the table below

Terminal / Switch position	S	N	H	V.
Soft	⊖			⊕
Normal		⊖		⊕
Hard			⊖	⊕



Position of Ⓐ at each switch position





WRE91 BE210

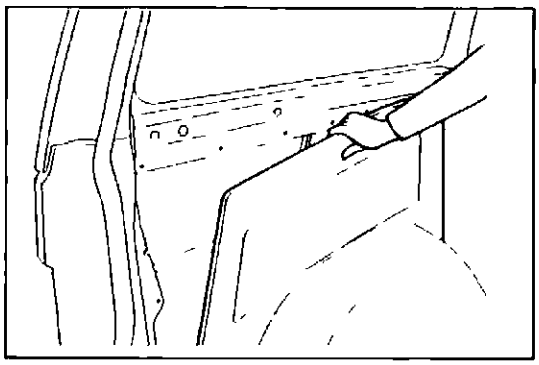
Installation

1 Install the actuator
2 Connect the connector

WRE91 BE211

ECU

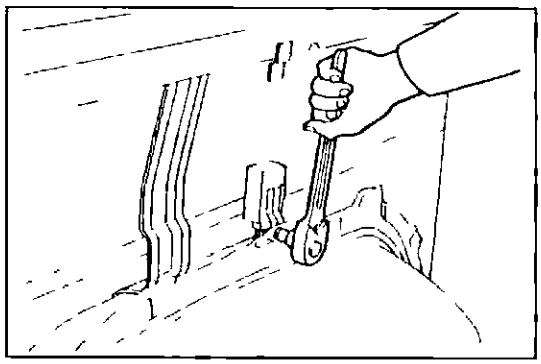
Replace the ECU if the three-stage damper switch and actuator exhibit no abnormality



Removal

1 Remove the left quarter inside trim board

2 Remove the ECU
3 Remove the connector



WRE91 BE212

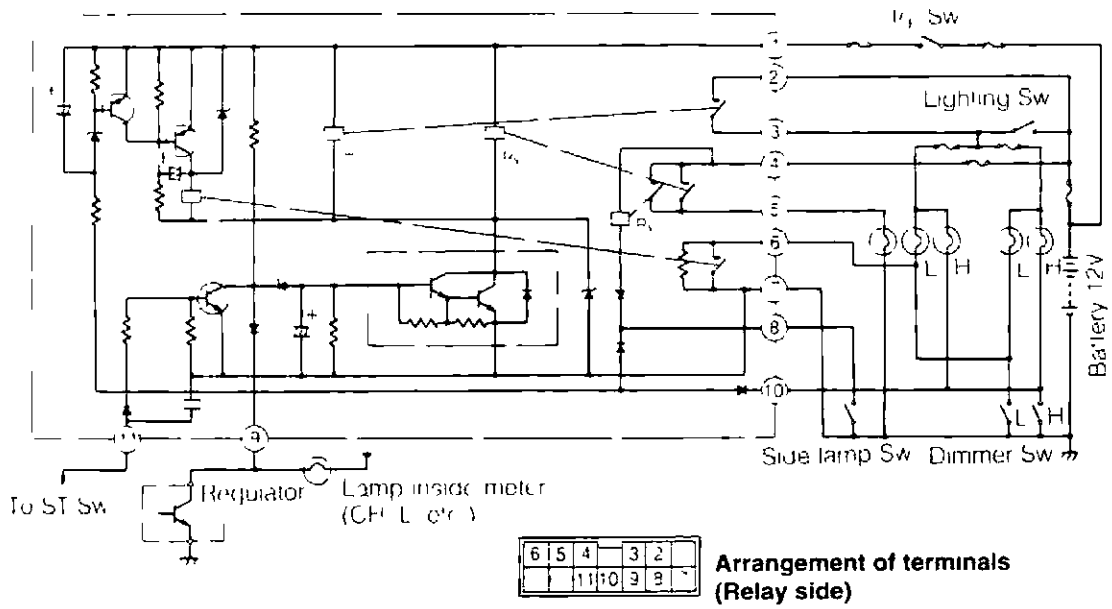
Installation

1 Install a new ECU
2 Connect the connector
3 Install the quarter inside trim board
NOTE:
- Ensure that the connector has been installed properly.

WRE91 BE213

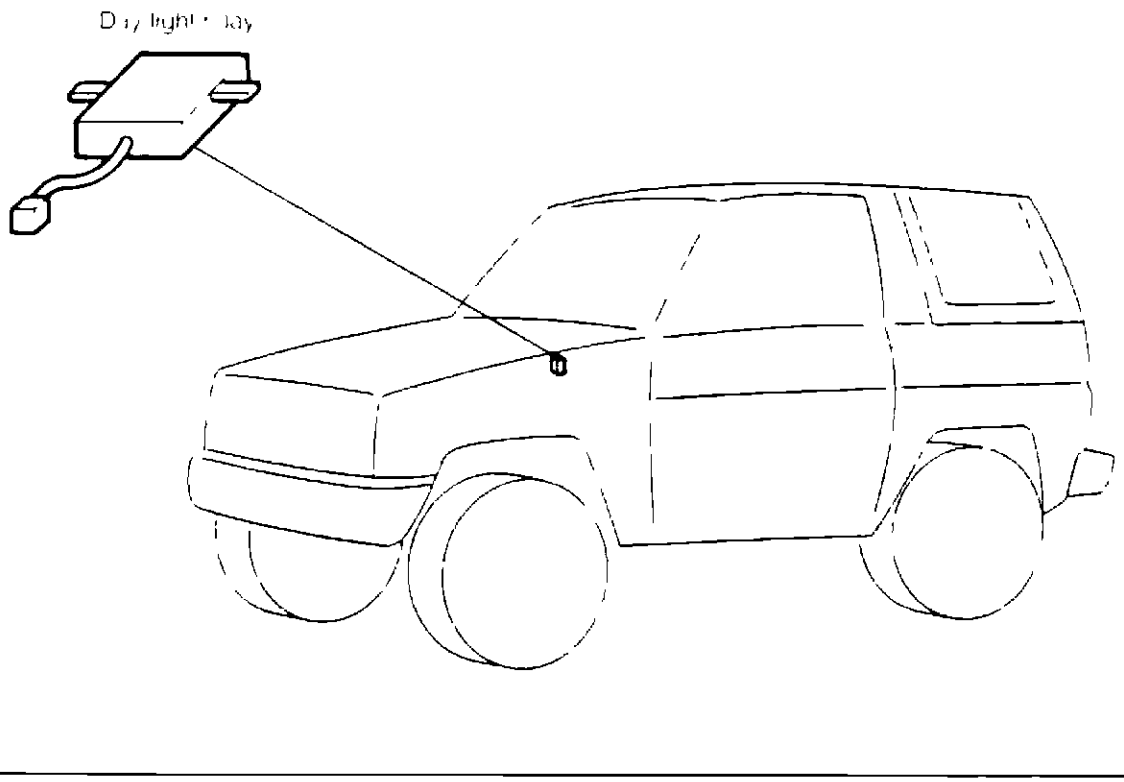
18. DAY-LIGHT RELAY

CIRCUIT DIAGRAM



Arrangement of terminals (Relay side)

LOCATION OF DAY-LIGHT RELAY



OPERATION CHECK

While the engine is rotating, ensure that the day-light goes on under the conditions given below

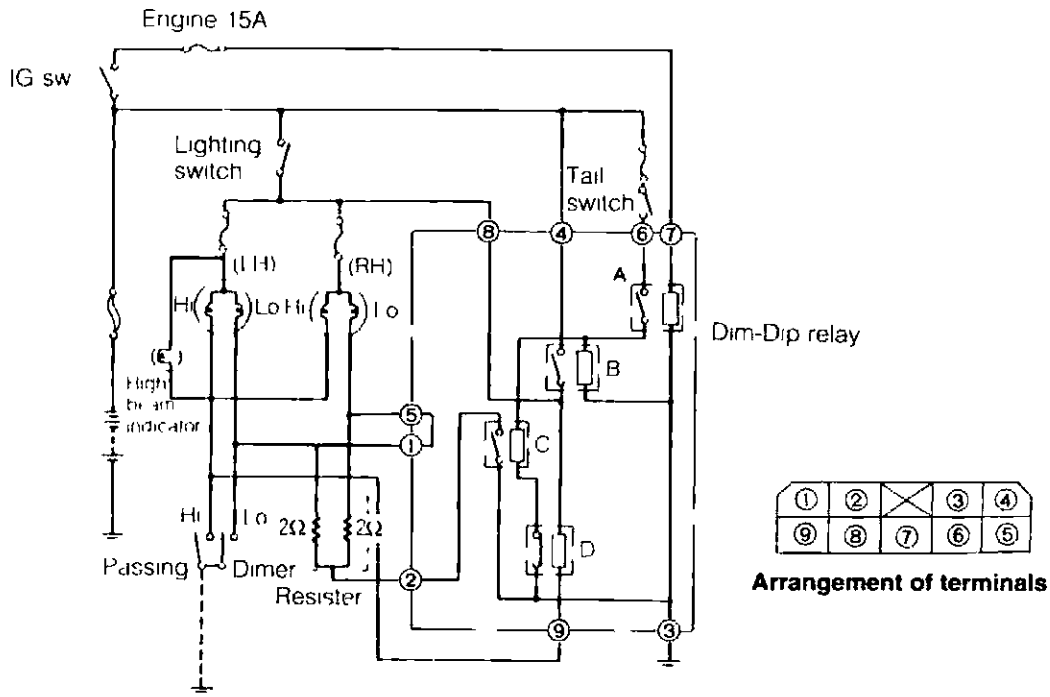
○ Goes on
- Goes off

Engine	Ignition switch	Side lamp switch	Lighting switch	Dimmer switch	Tail & license lamp	Headlamp	
						Lo	Hi
STOP	ON / OFF	Normal glowing mode					
RUN	ON	OFF	OFF	OFF	○	○	-
	ON	ON	OFF	OFF	○	-	-
	ON	ON	ON	Lo	○	○	-
	ON	ON	ON	Hi	○	-	○
	ON	ON	Passing	Passing	○	-	○

WP 3E-16

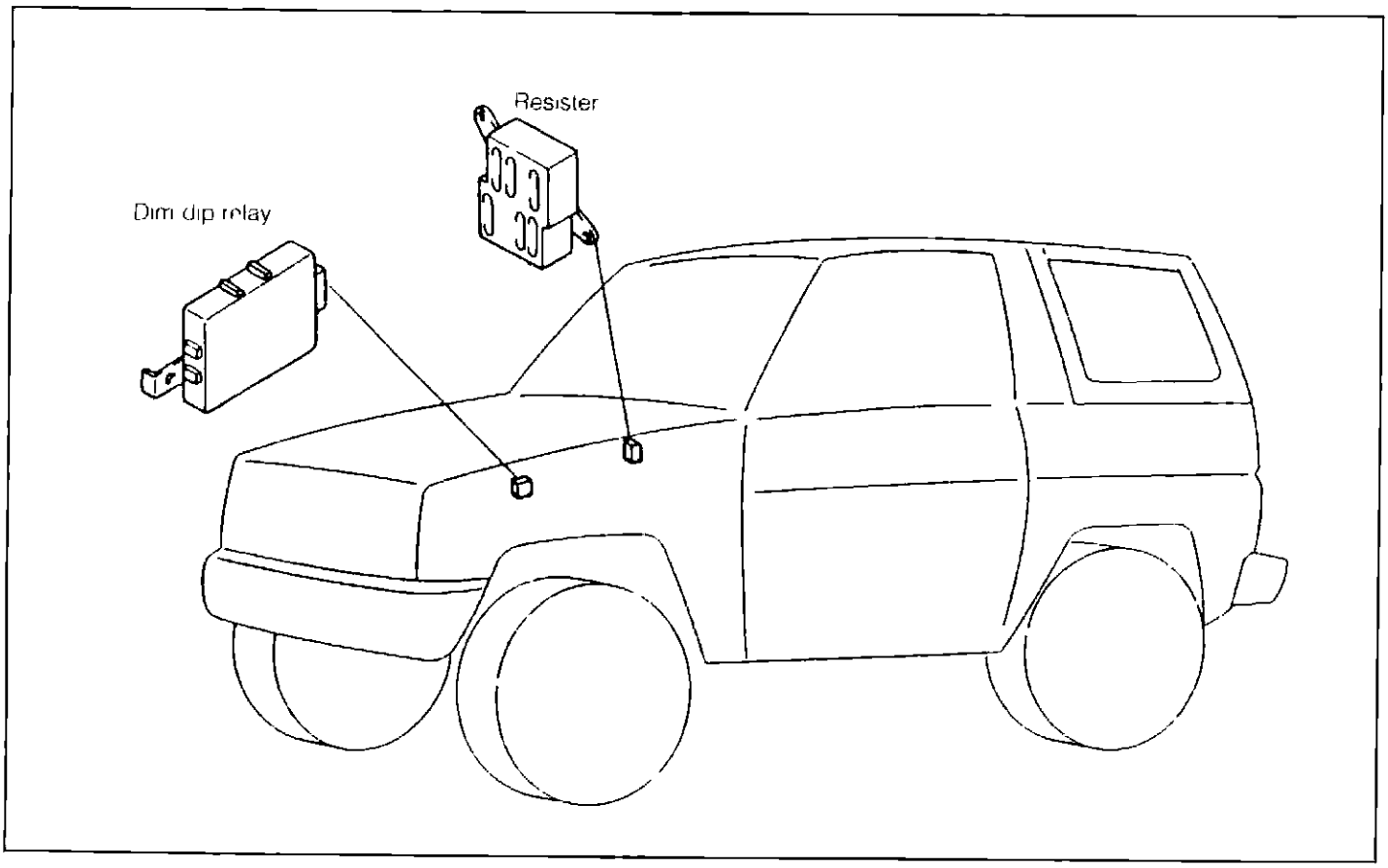
19. DIM-DIP LAMP

CIRCUIT DIAGRAM



WRE91 BE217

LOCATION OF DIM-DIP RELAY AND RESISTER



WRE91 BE218

OPERATION CHECK

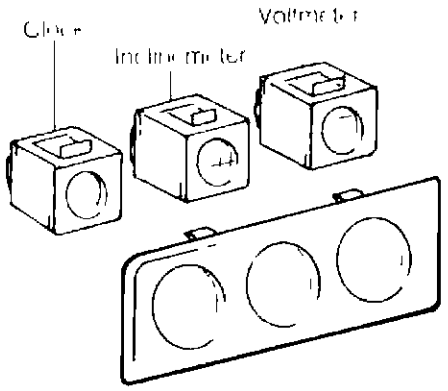
Under the conditions given below, ensure that the luminous intensity of the dim-dip lamp is reduced 10% compared with the normal operation

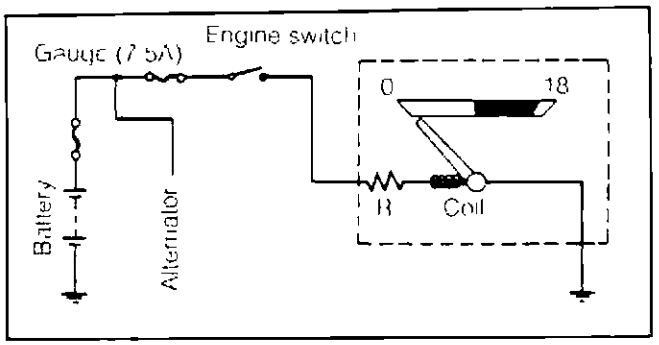
Switch condition				Headlamp condition	Remarks
Ignition switch	Tail switch	Lighting switch L	Lighting switch H		
OFF	OFF	OFF	OFF	OFF	
	ON	OFF	OFF	OFF	Tail lamp only goes on
	ON	ON	OFF	Lo	
	ON	OFF	ON	Hi	
	OFF	OFF	ON	Hi	Passing
ON	OFF	OFF	OFF	OFF	
	ON	OFF	OFF	Dim-dip	
	ON	ON	OFF	Lo	
	ON	OFF	ON	Hi	
	OFF	OFF	ON	Hi	Passing

WRP-91 BE-19

20. VOLT METER

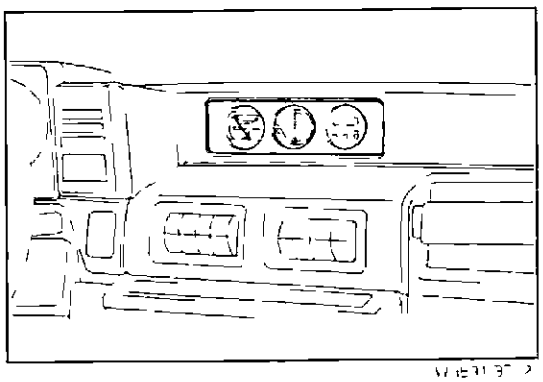
While the engine is running, the voltmeter indicates the charging voltage. When the engine is stopped (with the engine switch turned ON), this voltmeter indicates the battery voltage.





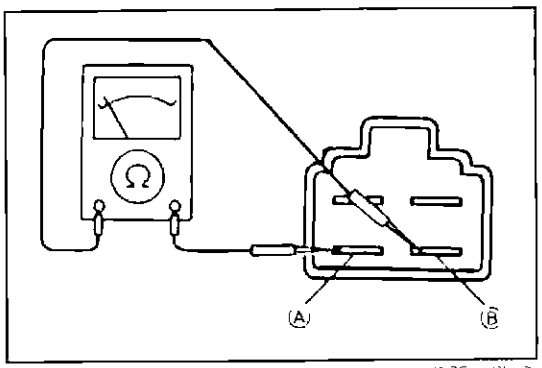
REMOVAL

(1) Remove the panel instrument finish with a screwdriver.
(2) Insert a screwdriver into the upper and lower notches and pry the screwdriver so as to remove the voltmeter.
(3) Disconnect the connector.



UNIT INSPECTION

(1) Connect a circuit tester to the terminals Ⓐ and Ⓑ.
Specified Value about 530 Ω

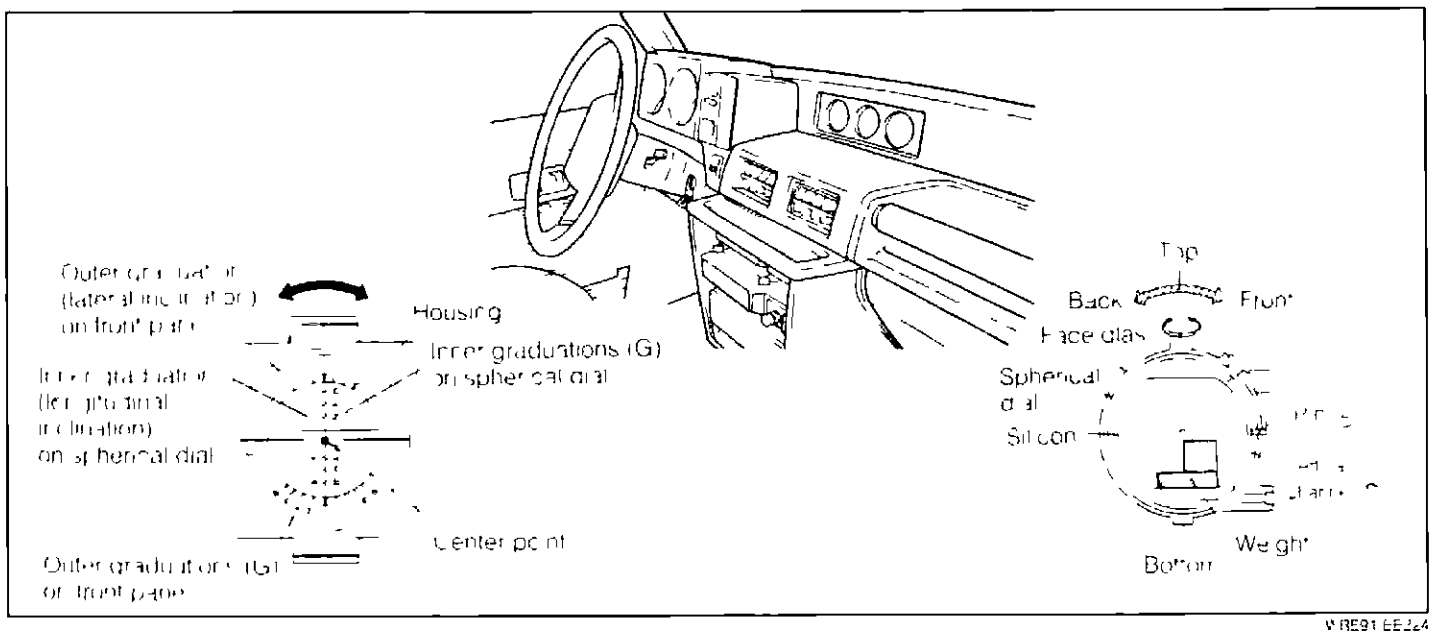


INSTALLATION

(1) Connect the connector.
(2) Install the voltmeter to the instrument panel.
(3) Install the panel instrument finish.

21. INCLINOMETER

The inclinometer indicates any inclination angle of the vehicle in a fore-and aft direction or in a right-and left direction as well as an acceleration being applied to the vehicle



WRE91EE024

Specifications

Item		Specification
Operative method		Gravity method by weight
Indications	Front-back	40 degrees max
	Right-left	30 degrees max
Illumination		12V 1.4W bulb

Construction

The inclinometer consists of an outer casing which inclines in the same way as with the vehicle inclination, a front panel scale plate, a front glass (fixed to the outer casing) and a spherical dial which maintains the horizontal state at all times

The inclinometer has a pin Ⓐ which protrudes at the rear/inner part of the front glass. Also, a vertical groove Ⓑ is provided at the back side of the spherical dial

The provision of this pin Ⓐ and vertical groove Ⓑ prevents any rotation of the inclinometer (↻ ↺) around an axis in an up-and-down direction. However, this construction makes it possible for the inclinometer to turn in a fore-and-aft direction (↷) as well as in a right-and left direction (↶)

A weight is fixed at the inside of the spherical dial. This weight indicates always the direction of gravity (lower side)

Furthermore, silicon oil is filled between the spherical dial and the front glass in order that the spherical dial may slide smoothly

Operation

This weight indicates always the direction of gravity regardless of the vehicle posture Thus, the inclinometer indicates the vehicle posture in a unit of degree While the vehicle is running, the meter indicates the acceleration (G)

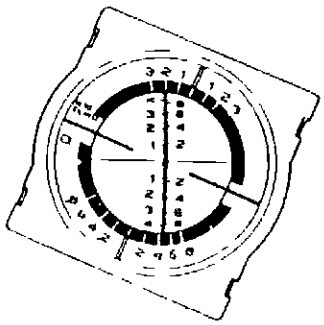
WRE91 BE227

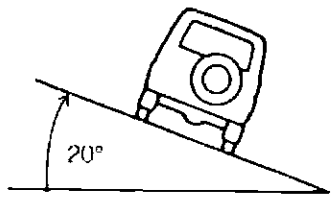
Example of indication

1 Inclination condition when vehicle is running at a constant speed or stopped·

- Case where vehicle is inclined in right-&-left direction
  (inclined 20 degrees to left)

  The front panel dial is inclined in the same inclination of the vehicle However, the spherical dial retains its horizontal state Hence, the vertical center line of the spherical dial indicates the inclination angle in a right-and-left direction



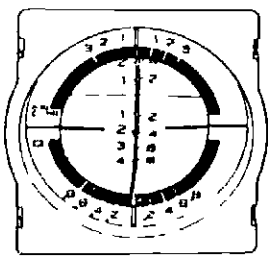


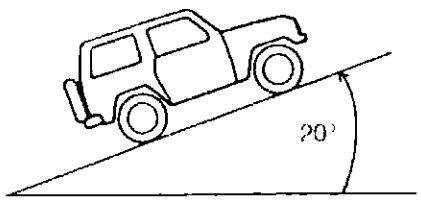
Inclined to right 20 degrees

WRE91 BE228

- Case where vehicle is inclined in fore-&-aft direction
  (with nose upward 20 degrees)

  The front glass is inclined in the same inclination of the vehicle However, the spherical dial retains its horizontal state Hence, the the intersection of the center point of the front glass with the spherical dial indicates the inclination angle in a fore-and-aft direction



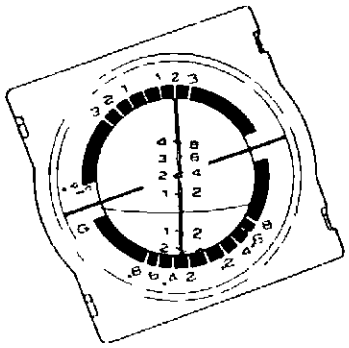


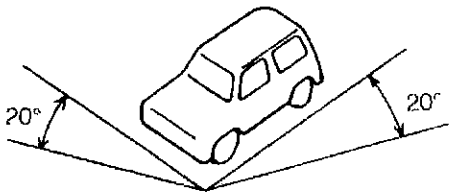
With nose up 20 degrees

WRE91 BE229

- Case where vehicle is inclined in fore&-aft direction as well as in right-&-left direction (with nose down 20 degrees and inclined to left 20 degrees)

  The inclination angle in a fore-and-aft direction as well as in a right-and-left direction is indicated by means of the spherical dial, front glass and front panel dial





With nose down 20 degrees and inclined to left 20 degrees

WRE91 BE230

2 When vehicle is under accelerating or decelerating condition

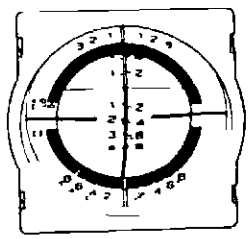
When an acceleration is applied to the vehicle, the indication of the clinometer changes even while the vehicle is running on a level road.
The greater this rate of change, the greater the acceleration

- Case where vehicle is under acceleration
  A dipping force is applied to front glass in the same dipping direction of the vehicle However, the spherical dial tends to turn upward As a result, the intersection of the center point of the front glass with the spherical dial indicates the acceleration

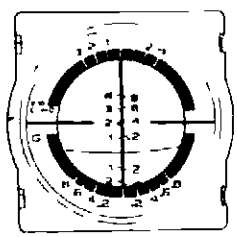
- Case where vehicle is under deceleration
  A floating force is applied to front glass in the same floating direction of the vehicle However, the spherical dial tends to turn downward As a result, the intersection of the center point of the front glass with the spherical dial indicates the deceleration

- Case where vehicle is cornering
  A centrifugal is applied to the vehicle, thereby changing the indication The greater this rate of change, the quicker the vehicle is making a turn

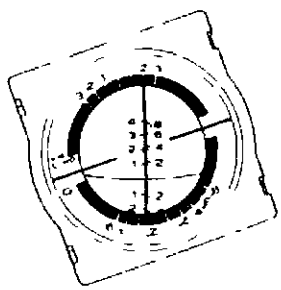
Indication of acceleration



Indication of deceleration



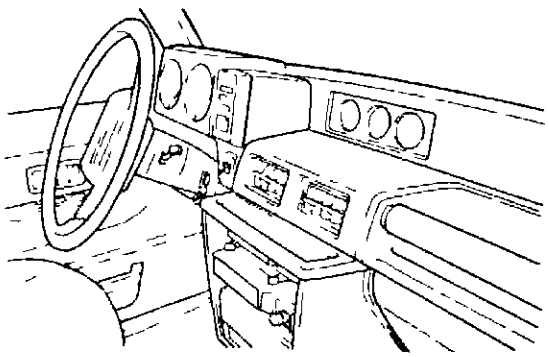
Indication during running while cornering

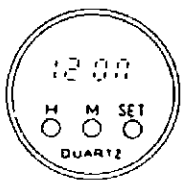


WRE91 BE231

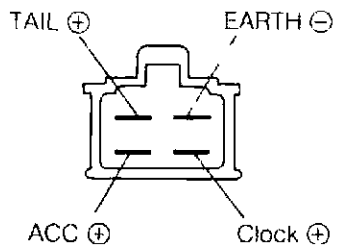
22. CLOCK

The clock is provided at the central part of the instrument panel





Connector Arrangement



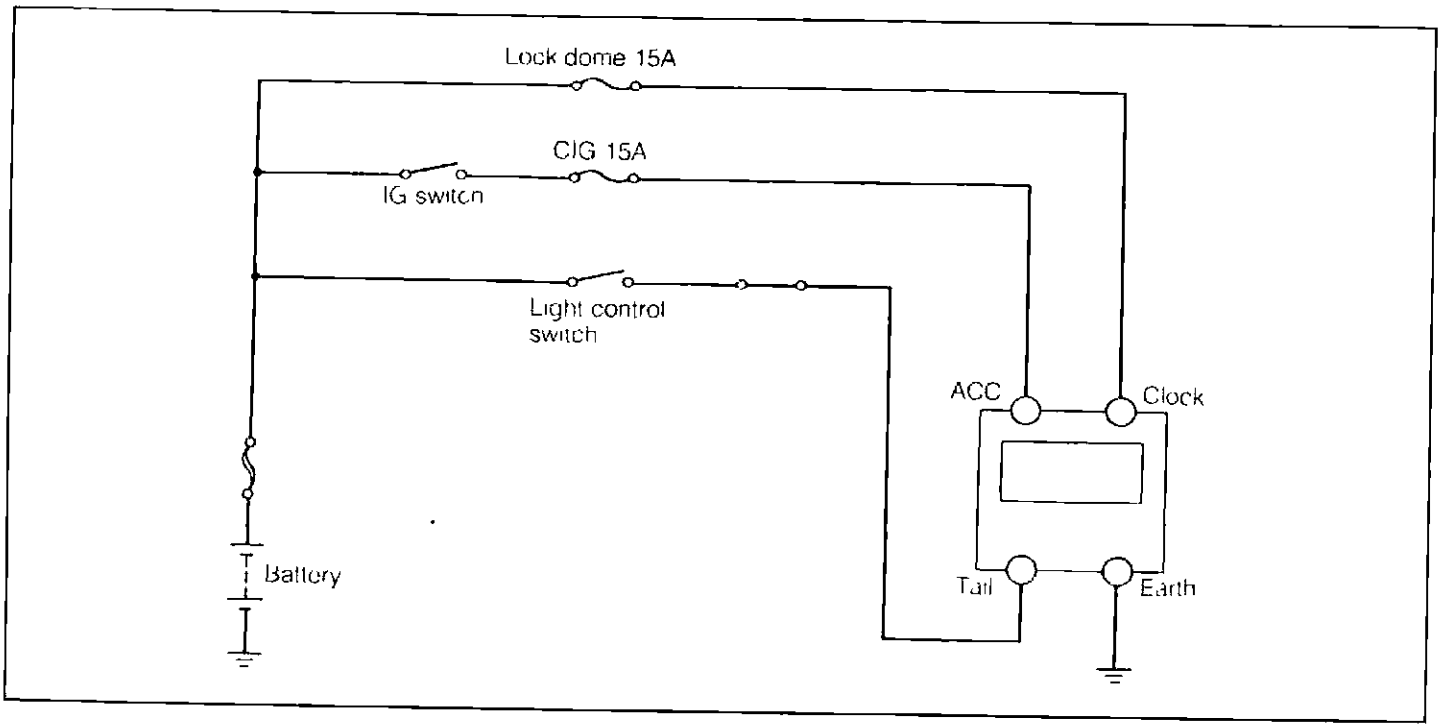
WRE91 BE232

Clock specification

		Specifications
Rating voltage	(V)	12
Accuracy	(second/day)	± 1.5
Consuming current	(mA)	160 (During indication period with glowing) 5 (During indications period without glowing)
Operating range characteristics	(V)	10 - 12

WHL91 BE233

CIRCUIT DIAGRAM



WTE01 BE 34

DAIHATSU

F70,F75,F77

Service manual

BRAKE SYSTEM

BR

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

BRAKE

OUTLINE OF BRAKE SYSTEM ..... BR– 2
PRECAUTION ..... BR– 21
TROUBLE SHOOTING ..... BR– 22
CHECK OF BRAKE SYSTEM ..... BR– 22
BRAKE PEDAL ..... BR– 27
BRAKE MASTER CYLINDER ..... BR– 32
BRAKE BOOSTER ..... BR– 40
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PARKING BRAKE ..... BR– 87
P VALVE (Proportioning Valve) ..... BR– 94
P & B VALVE (Proportioning and By-PASS Valve) ..... BR– 96
L.S.P.V. (Load Sensing Proportioning Valve) ..... BR– 98
SSTs (Special Service Tools) BR–107
SERVICE SPECIFICATIONS BR–107
TIGHTENING TORQUE BR–108

WRE91-BR001

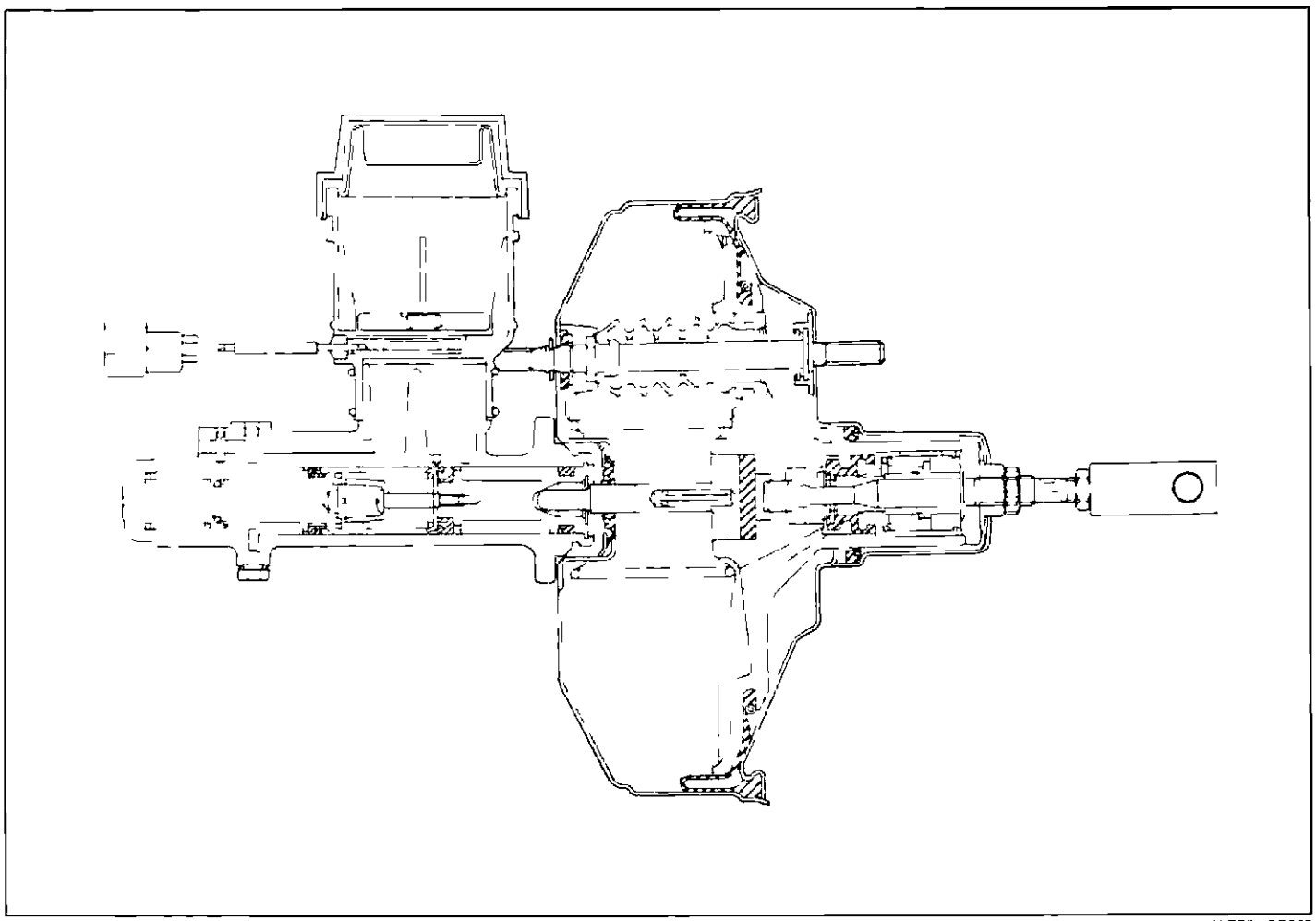
OUTLINE OF BRAKE SYSTEM

The brake system features 8-inch brake booster, large rear wheel cylinder use of P valve, P&B valve or L S P V and a parking brake built into the rear brake All these contribute to increased braking capacity

WRE91 BR004

BRAKE BOOSTER

The brake booster is 8 inches in size The Garback type booster where two tie-rods support from the master cylinder to the instrument panel increases stiffness of the brake pedal when it is pressed



WRF91 BR005

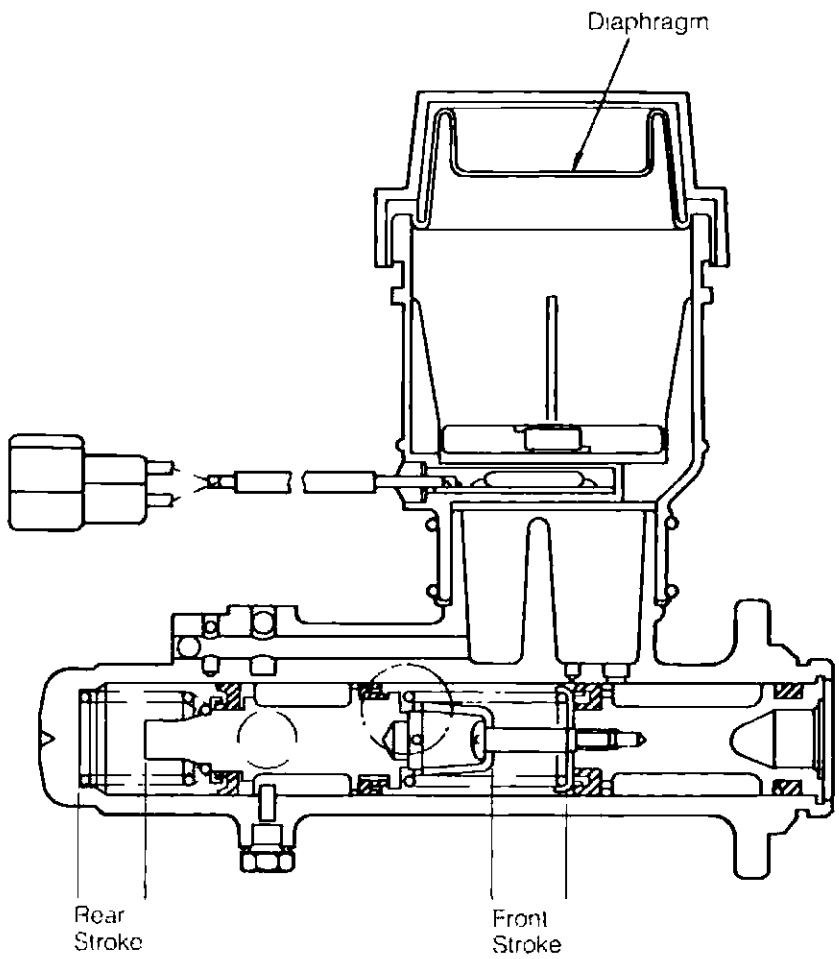
Specifications

Diaphragm effective diameter	mm	203
Effective stroke	mm	31 5 or more
Servo ratio		3 5
Jumping amount	kgf	10

WRF91 BR006

MASTER CYLINDER AND RESERVOIR

The master cylinder is an aluminum casting. The reservoir is a sealed type which shuts off the brake fluid from the atmosphere with the diaphragm, thus preventing the fluid from oxidation and maintaining high braking capacity for long periods of time.



WRE91 BR002

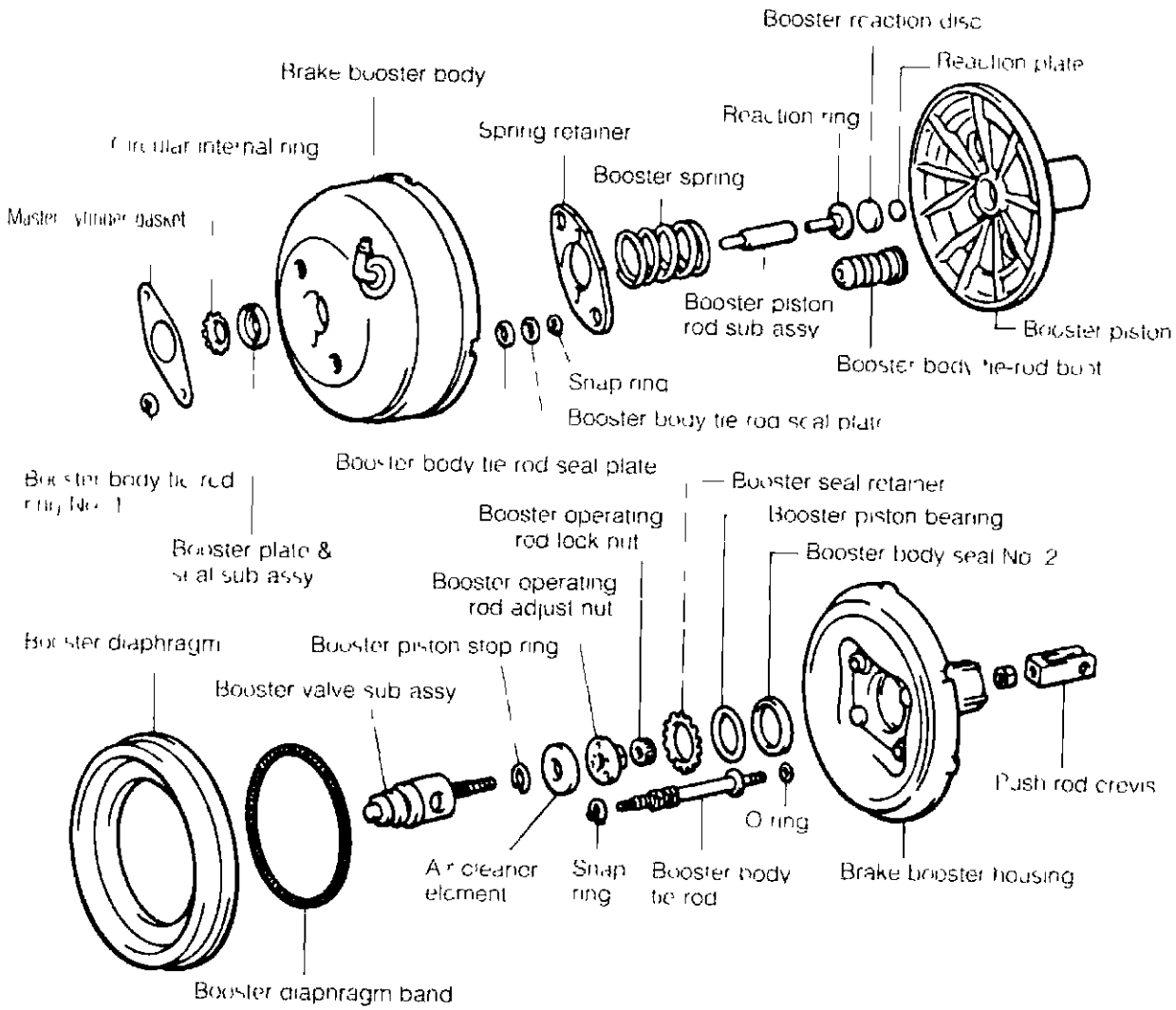
Master cylinder specifications

Stroke	Front	mm	18.5
	Rear	mm	11.5
Inner diameter		mm	22.22
Reserve tank capacity	Front	cc	16
	Rear	cc	12
	Portion shared in common	cc	114

WRE91 BR003

Construction

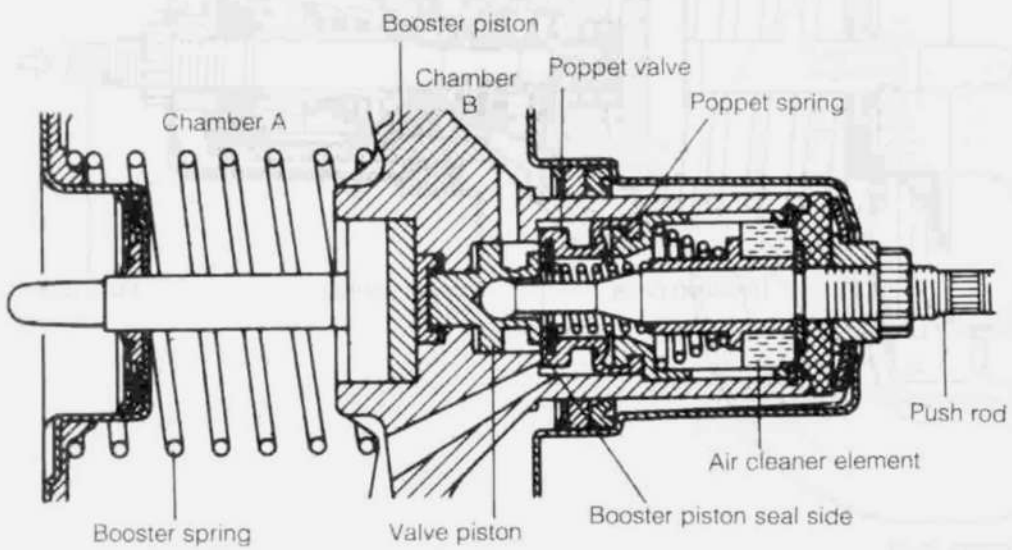
The brake booster body and housing are penetrated and supported by two booster body tie-rods, and are fixed in place with the booster body tie-rod ring No. 1 and snap ring.
The booster body tie-rod and brake booster body are sealed together with the seal, the booster piston and booster body tie rod with the booster body tie-rod boot, and the brake booster housing and booster body tie-rod by the O ring. The spring retainer is fixed to the two booster body tie-rods with the snap rings so the booster spring force will not act upon the booster body



Operation

With brake not operated

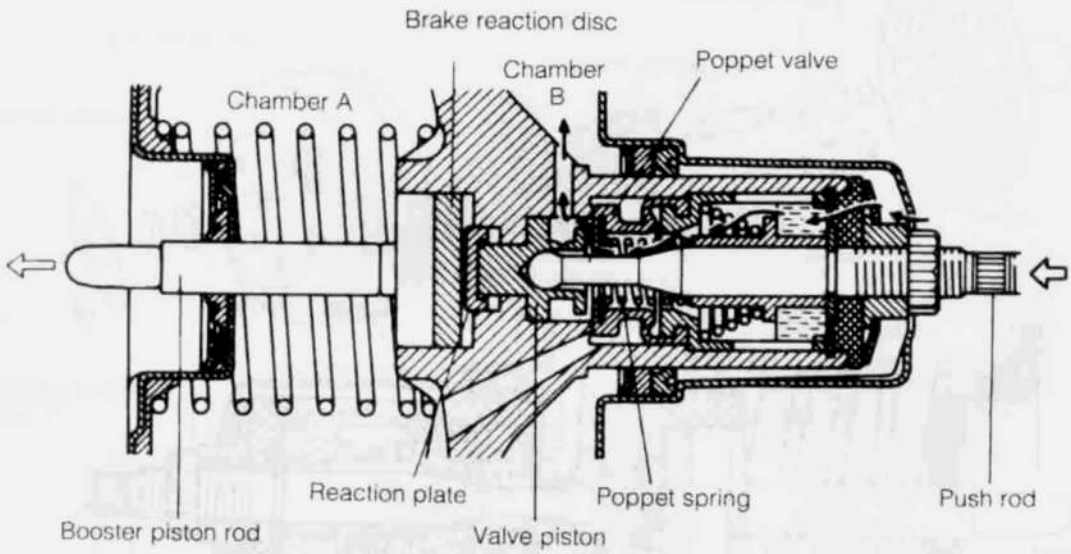
1. The poppet valve is pressed against the valve piston by the poppet spring to prevent the air from the air cleaner element from entering the booster.
2. The poppet valve is also in contact with the booster piston seal surface, thus shutting the chambers A and B off from each other. As a result, the chamber B is free from the negative and atmospheric pressure, and keeps the "semi-negative pressure" state where a small quantity of air equivalent to the load of the spring booster has flown in.
3. This "semi-negative pressure" state continues as long as the push rod and the valve piston remain still. The booster piston stays in such a position that the poppet valve closes both the valve piston and the booster piston seal surface at the same time.



WRE91-BR008

With brake operated

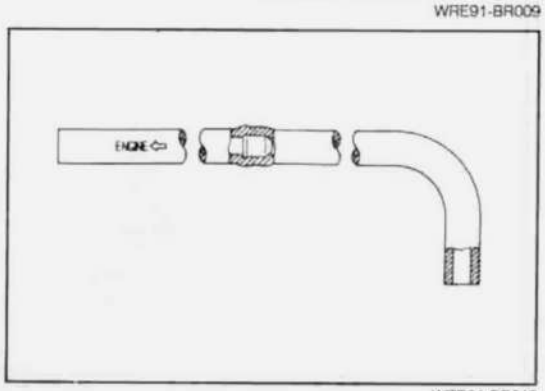
1. When the brake pedal is pushed, the push rod is also pressed down to cause the valve piston to advance.
2. This causes the poppet valve to shift forward due to the poppet spring to close the booster piston seal surface, and as a result the chambers A and B are shut off from each other.
3. As the valve piston advanced further, the valve piston and the poppet valve separate from each other. Then, the air from the air cleaner element passes through the clearance between them to reach the chamber B.
4. This entrance of air into the chamber B generates a difference in pressures in the chambers A and B. Then, overcoming the booster spring force, the booster piston shifts forward to have the booster piston rod push the piston in the master cylinder via the reaction plate and booster reaction disc.



WRE91-BR009

CHECK VALVE

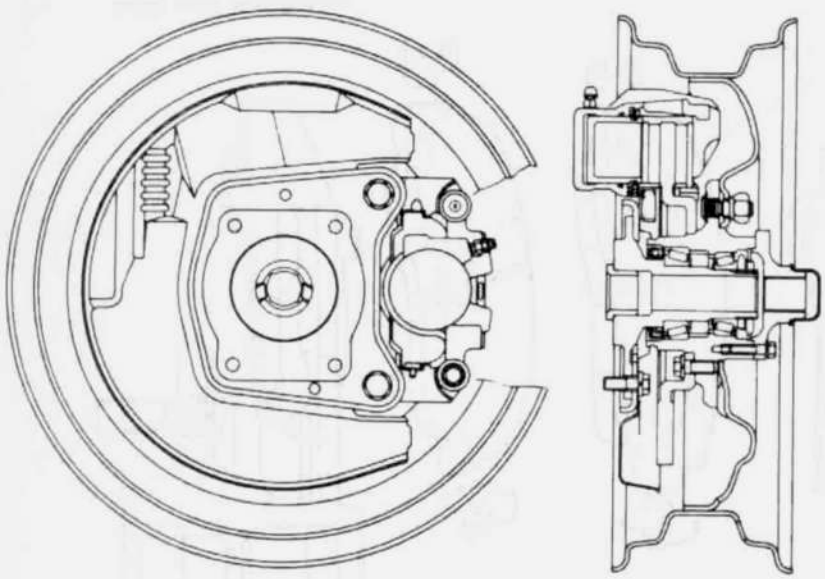
The one-way valve a called check valve is incorporated into the vacuum hose so as to maintain the negative pressure applied to the brake booster chamber side.
Make sure to install the check valve in such a direction that the "ENGINE ⇦ " side comes at the engine side.

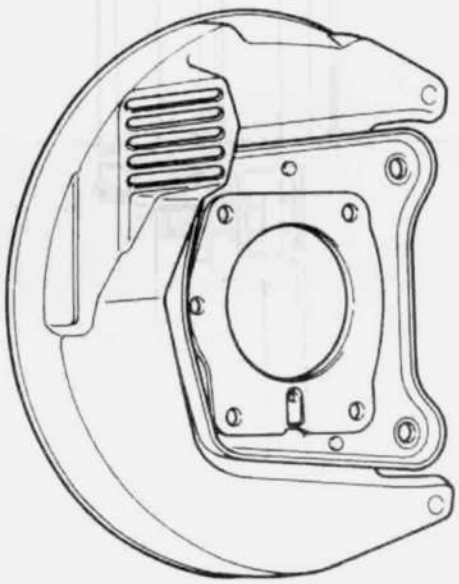


WRE91-BR010

FRONT BRAKE

The front brake is a disc type whose dust cover is of resin for light weight.





Dust cover

WRE91-BR011

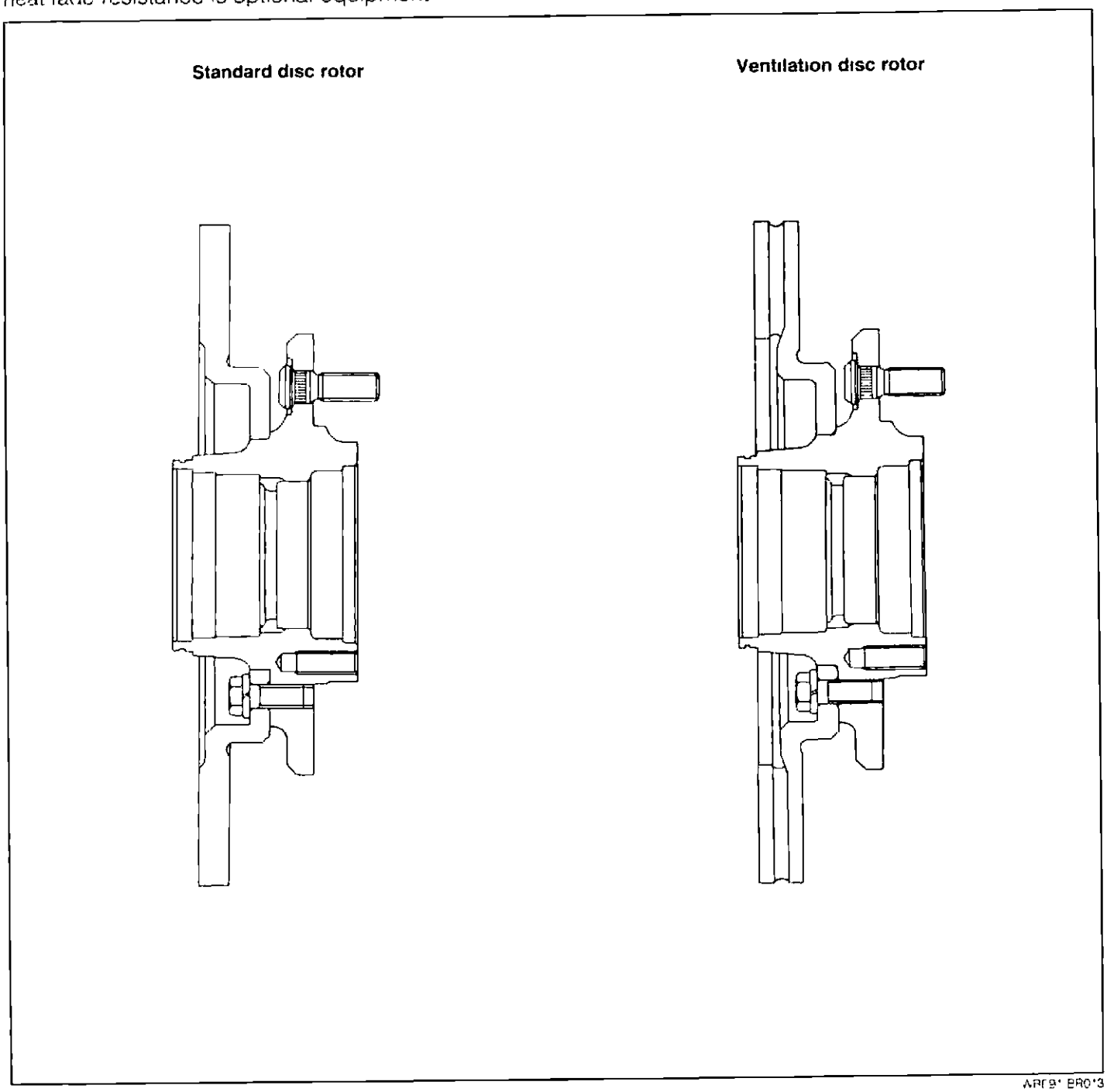
Specifications

Type		AD disc type
Cylinder bore	mm	53.97
Pad size	mm	115.7 × 48.0 × 9.0
Pad surface area [per pad]	cm^2	49
Pad material		NS 101C

WRE91-BR012

DISC ROTORS

As for the disc rotor, a solid type disc rotor is standard, whereas a ventilated disc rotor having improved heat fade-resistance is optional equipment



AREB1 BR013

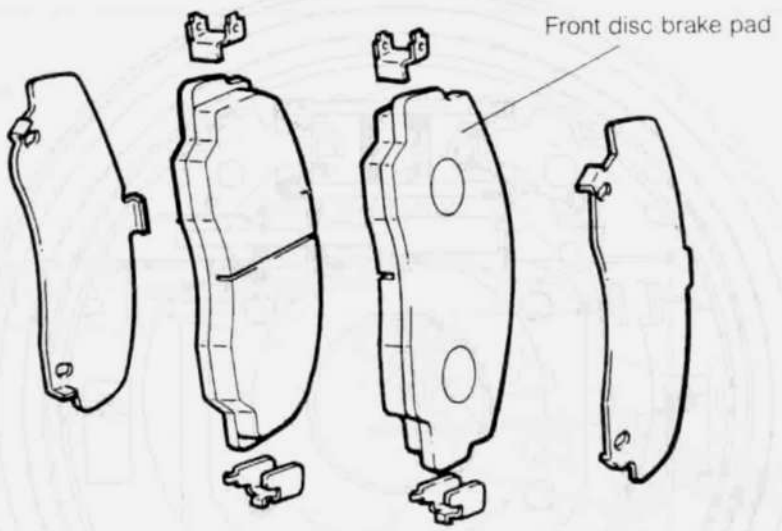
Disc rotor specifications

Item \ Type		Standard disc rotor	Ventilation disc rotor
Disc rotor outer diameter	mm	277	277
Disc rotor thickness	mm	12.5	18.0

AREB1 BR014

FRONT DISC BRAKE PADS

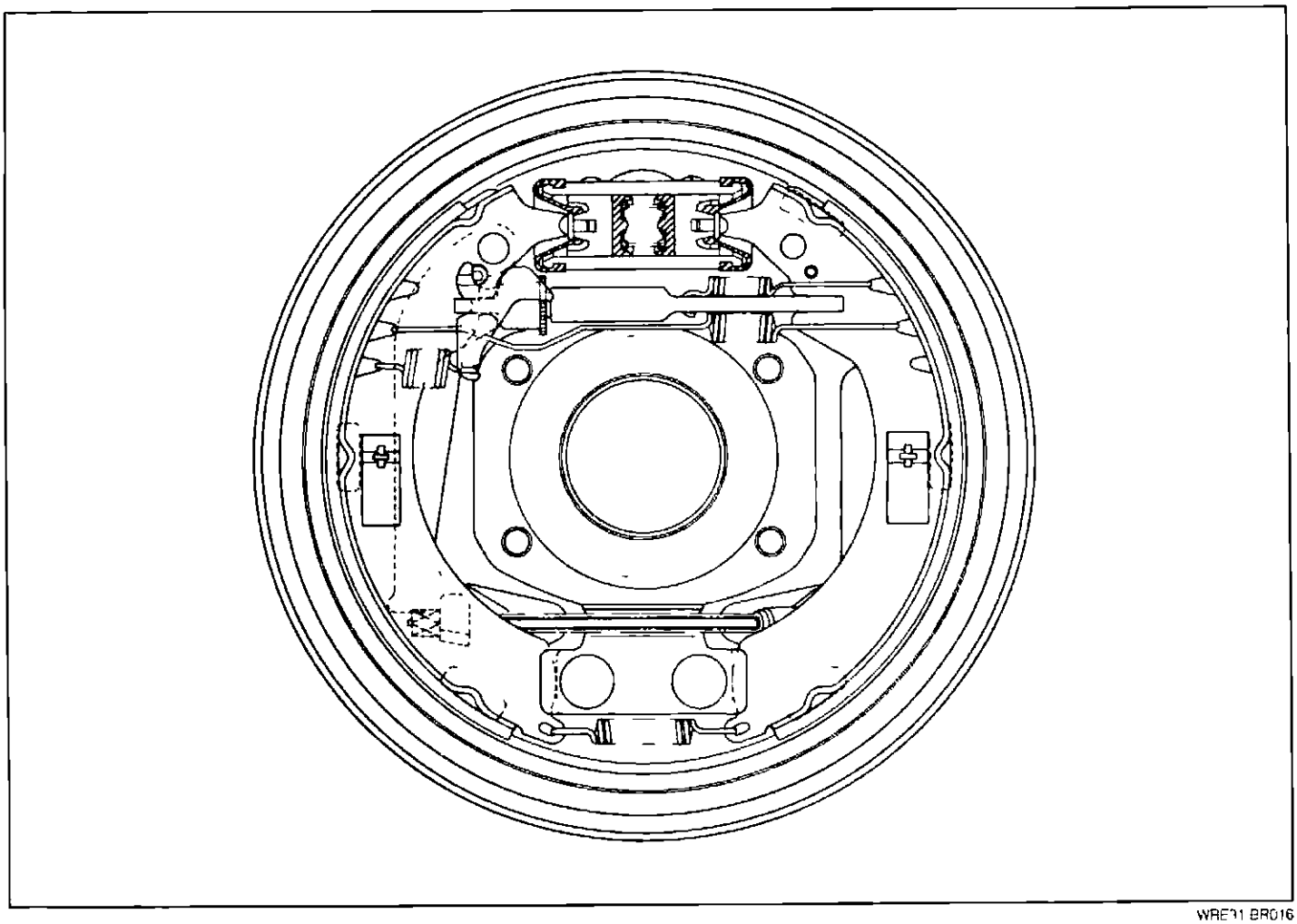
The AK NS101C (asbestos-free pad material) has been employed in the front disc brake pads.



WRE91-BR015

REAR BRAKE

The bore size of rear wheel cylinder is 22 2 mm This brake incorporates a parking brake inside, and the rear brake shoe automatic adjuster is designed to activate when the parking brake lever is operated



WRE91 BR016

Specifications

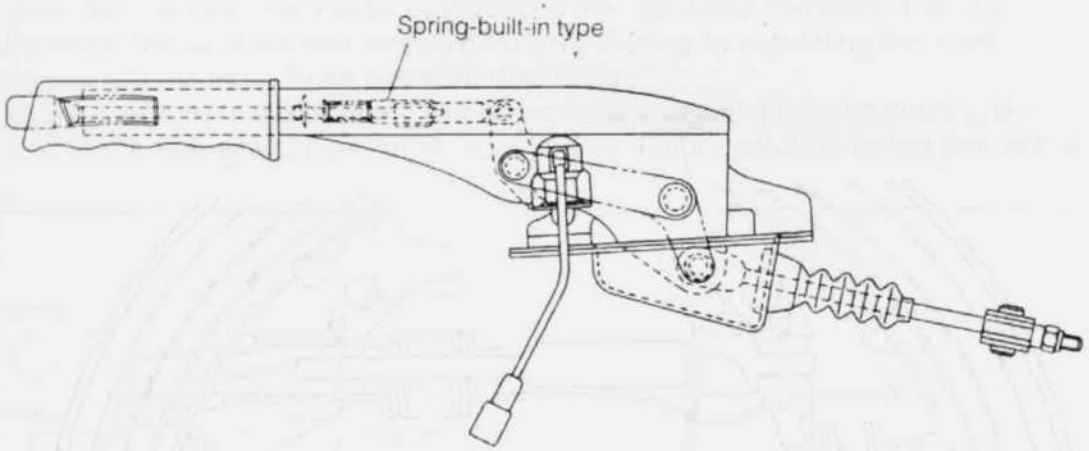
Item \ Model	F70, F75 and F77
Type	Leading, Trading
Drum inner diameter mm	254
Lining size mm	265 9 × 44 0 × 5 0
Lining area [per lining] cm^2	117
Lining material	AKL610A (Asbestos-free)
Cylinder bore mm	22 2

WHE91 BR017

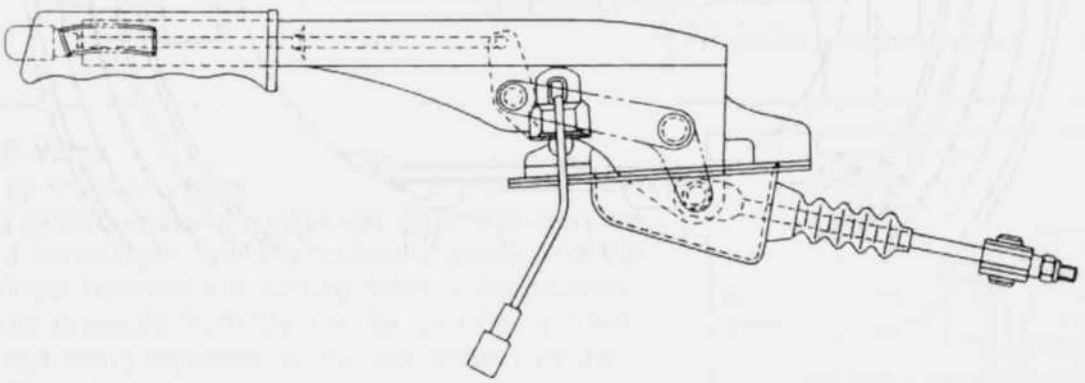
PARKING BRAKE

The parking brake is a mechanically-operated, rear wheel braking type. The parking brake lever is located at the center between the right and left front seats. The cable adjustment method employs a center lever type which can be adjusted from the under side of vehicles.
The parking brake comes in two kinds; one for the EC and general specifications and the other for the Australian specifications.

Australian specifications



EC and General specifications



WRE91-BR018

Parking brake specifications

Type			Mechanically-operated, wheel braking type
Braked wheel			Two rear wheels
Lining	Area	cm^2	117 × 2-piece × 2-wheel
	Material		AKL610A (asbestos-free)
	Dimensions	mm	265.9 × 44.0 × 5.0
Brake drum inner diameter		mm	ϕ254

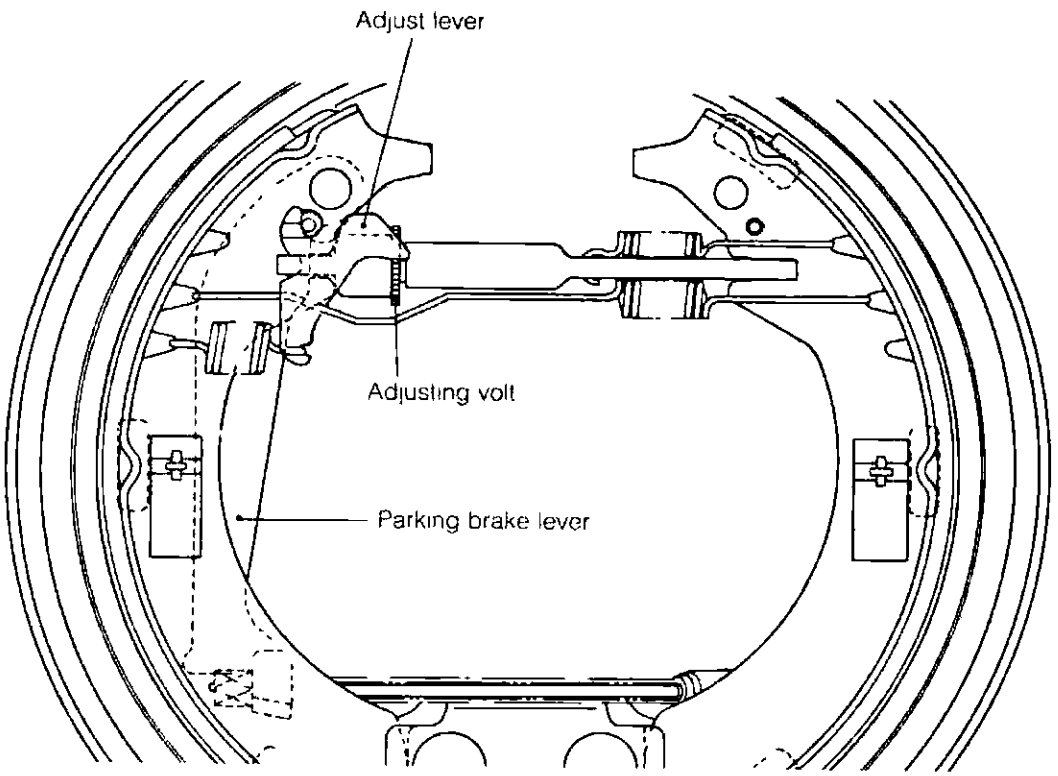
WRE91-BR019

Operation of automatic adjuster

The automatic rear brake shoe clearance adjuster is activated when the parking brake is operated. As shown in the figure below, the adjuster adjust lever is fixed to the parking brake lever

This adjust lever serves to hold the adjuster teeth, thus locking it in place It acts in such a manner as causes the adjuster teeth to advance when the parking brake is applied If the shoe clearance is normal, the amount of shift of the adjust lever is not big enough to move one tooth of the adjuster But if the lining is worn and the shoe clearance is bigger, the lever operating angle is big, and as a result, the amount of shift of the adjust lever is big enough to cause the adjuster to advance by one tooth

Thus normal shoe clearance is maintained



P VALVE (Proportioning Valve)

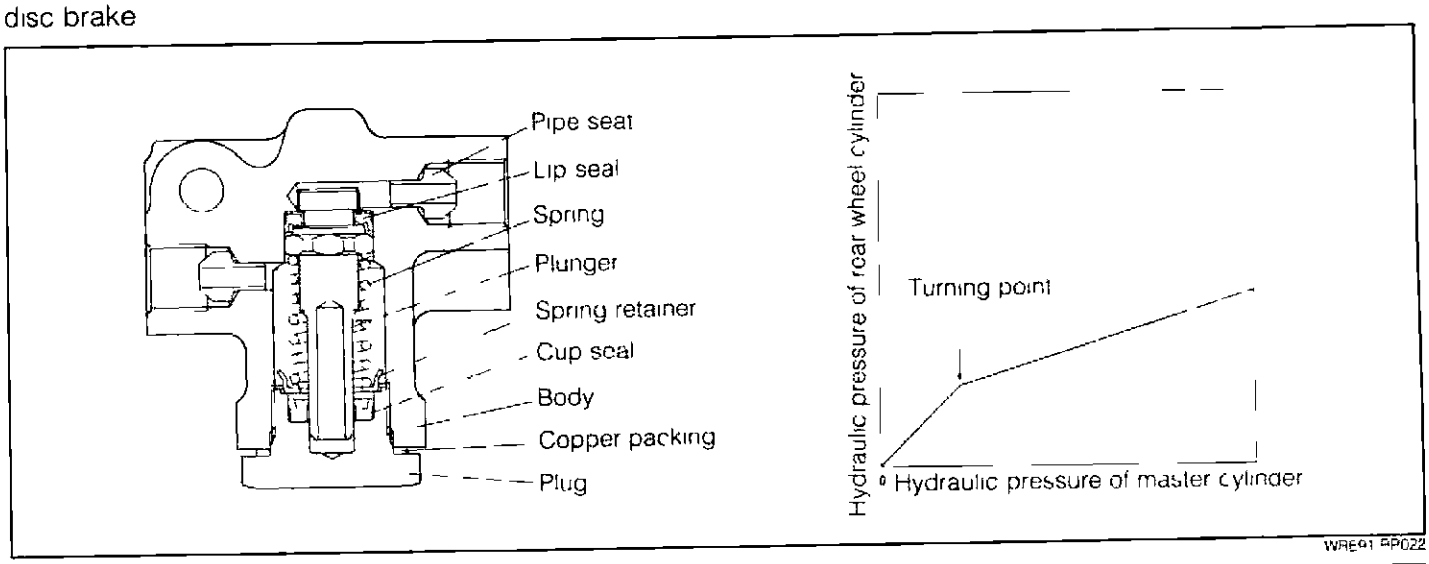
The P valve installed on the F70 & F75 having the general specifications has been employed on all vehicle models

WHE91-BR02*

What is P valve?

The P valve is provided between the master cylinder and the rear wheel cylinders. This is a hydraulic pressure regulating valve which prevents the rear wheels from early locking by regulating the braking force distribution of the front and rear wheels close to an optimum distribution

When the hydraulic pressure of the master cylinder exceeds a certain pressure (turning point), the hydraulic pressure applied to the rear wheel cylinder is regulated so that it may drop below that applied to the front disc brake

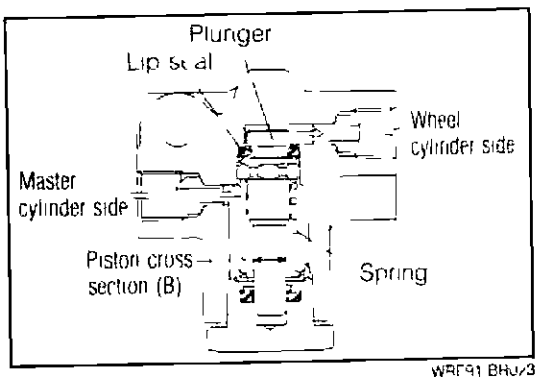


WRE91 BR022

Operation of P Valve

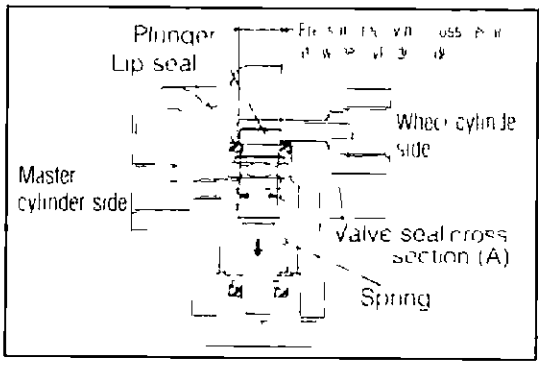
1 Operation up to turning point
The spring tension keeps the passage open between the lip seal and the plunger, until the hydraulic pressure of the master cylinder reaches the turning point. Consequently, the hydraulic pressure from the master cylinder is transmitted without being regulated to the rear wheel cylinder

2 Operation at turning point
When the hydraulic pressure of the master cylinder reaches the pressure at the turning point, the pressure being applied to the cross section of the piston overcomes the spring tension, thereby lowering the piston. In this way, the passage between the plunger and the lip seal is closed



WRE91 BR023

3 Operation after turning point
After the passage between the plunger and the lip seal is closed, two kinds of pressures act on the plunger. One is a pressure being applied to the pressure receiving cross section of the wheel cylinder. The other is a pressure (+ spring tension) being applied to the annular cross section (A - B) which is obtained by subtracting the piston cross section from the valve seal cross section. Both of them act in such a way that they may balance with each other.
The pressure receiving cross section at the wheel cylinder side is larger than the pressure receiving (annular) cross section (A - B) at the master cylinder side. Consequently, the balance is achieved under such a condition that the hydraulic pressure of the wheel cylinder is lower than that of the master cylinder.



P & B VALVE (Proportioning & By-pass Valve)

The P valve which is installed on the F70 & F75 having the ECE & EEC and the Australian specifications has been employed on all vehicle models

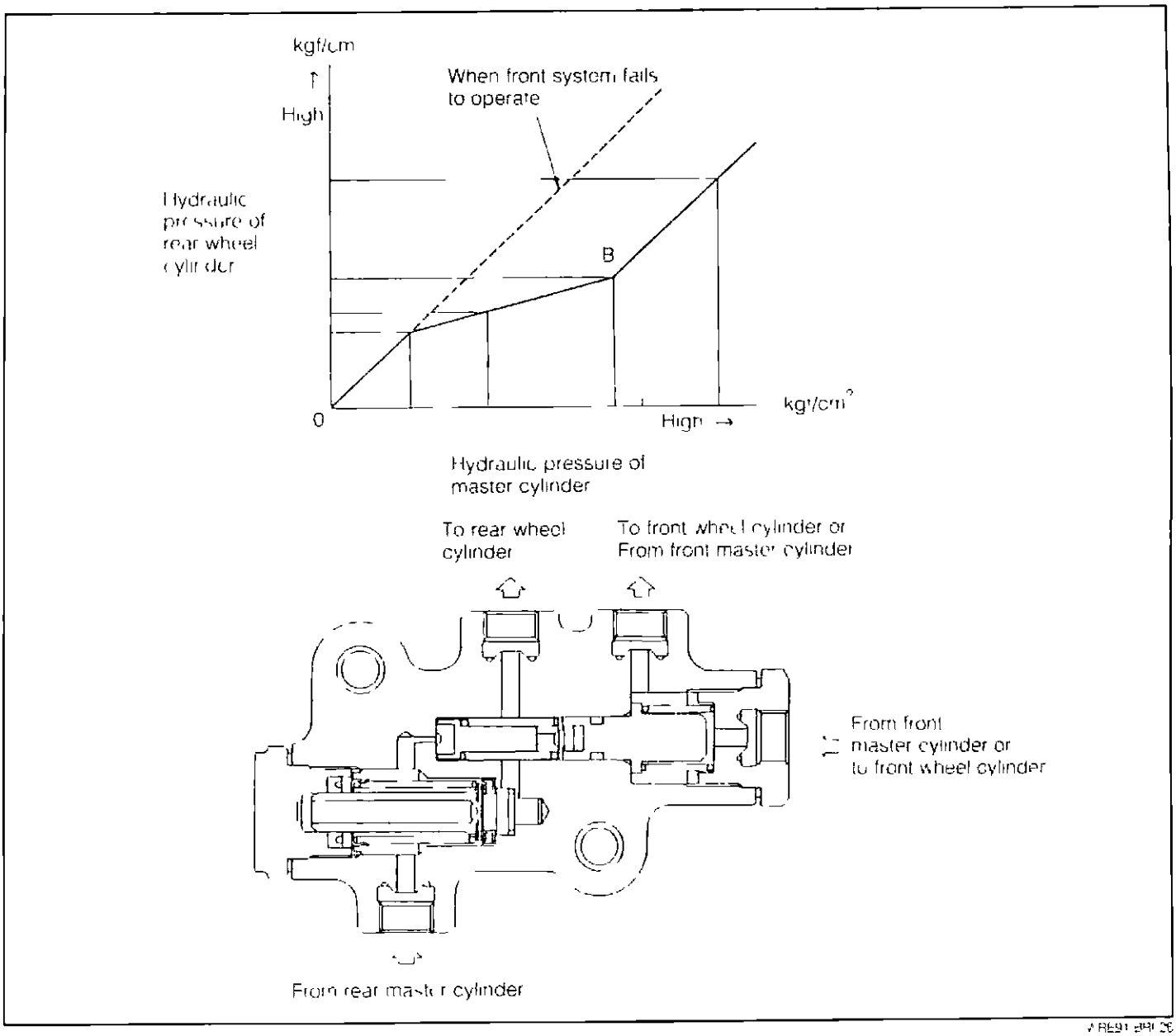
WRE9* BR025

What is P & B Valve

The P & B valve is provided in the brake line between the front and rear wheel brake systems The purpose of the P & B valve is to assure braking stability by distributing the braking forces of the front and rear wheels at an optimum ratio The P & B valve is provided with a mechanism whereby the hydraulic pressure of the rear wheel cylinder bypasses the proportioning valve and is applied directly to the rear wheel cylinder in the event that the front brake system is encountered with a malfunction

The proportioning valve employs a secondary turning point type

In addition to the normal proportioning valve functions, the secondary turning point type proportioning valve has such characteristics that the hydraulic pressure ratio for the rear wheels is increased again at a middle point (point B in the figure below) in the hydraulic pressure characteristics diagram This increase is necessary because the braking forces become insufficient for the rear wheels due to greater rear wheel load when the vehicle is loaded fully

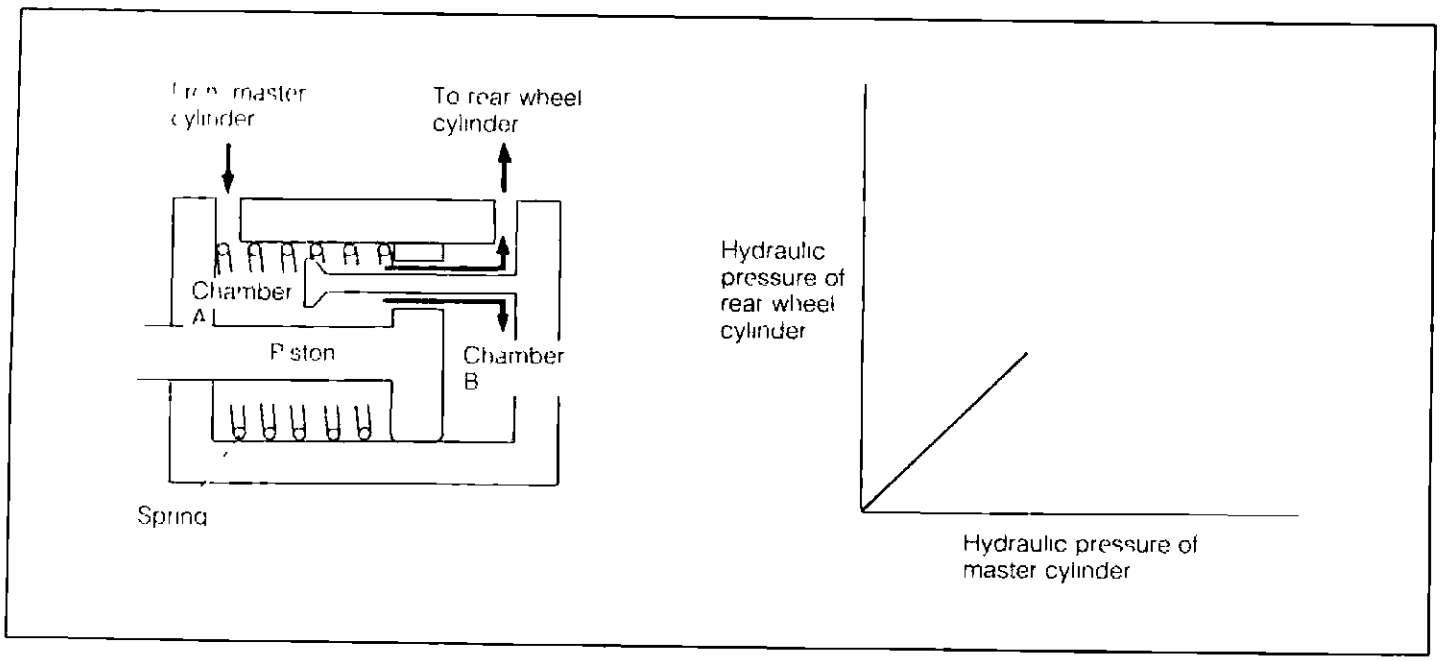


A RE91 BR026

Outline of P & B valve operation

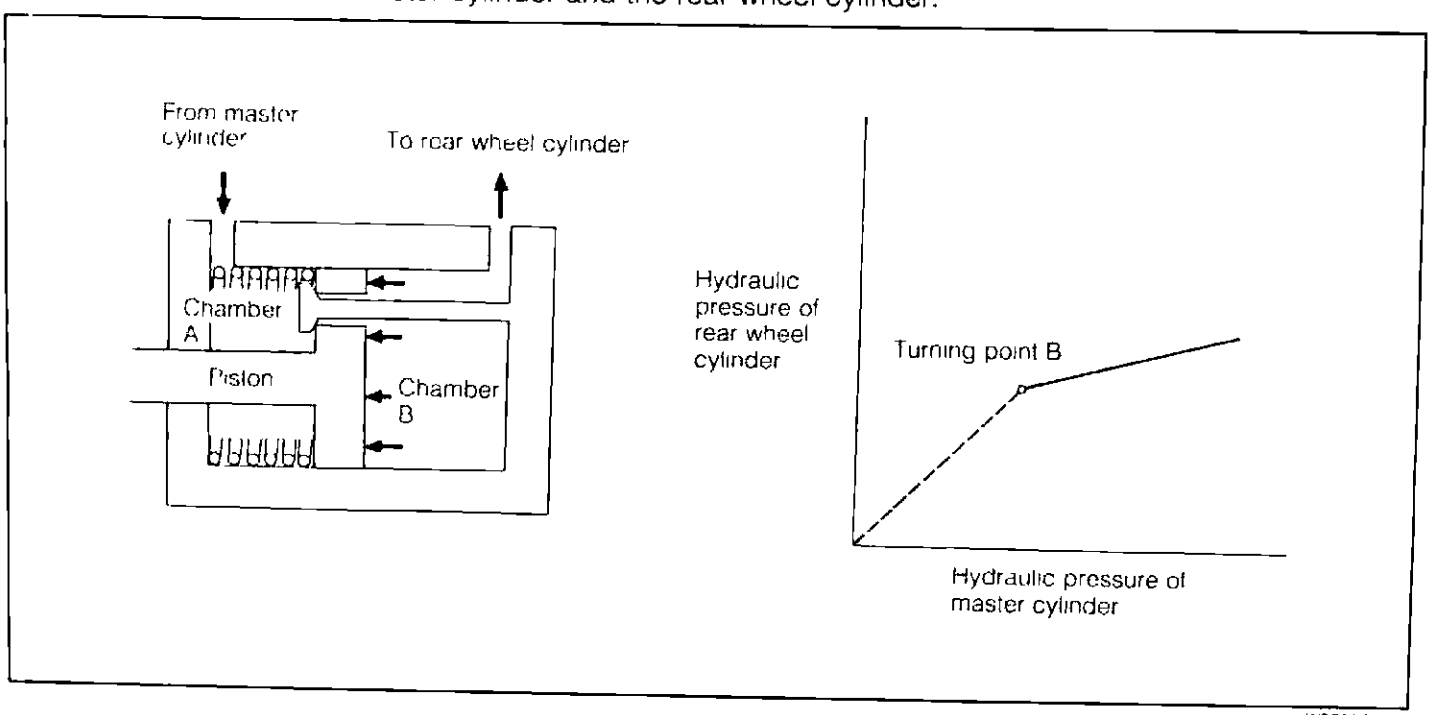
Operation principle of proportioning valve

1 The hydraulic pressure from the master cylinder is applied through the chamber A to the chamber B, as shown in the figure below. The same pressure is applied to both the chambers A and B. Since the hydraulic pressure-receiving area of the chamber A is smaller than that of the chamber B, the piston moves to the left. Hence, while the piston is moving, the hydraulic pressure of the master cylinder is equal to that of the rear wheel cylinder.



WRE91 BR027

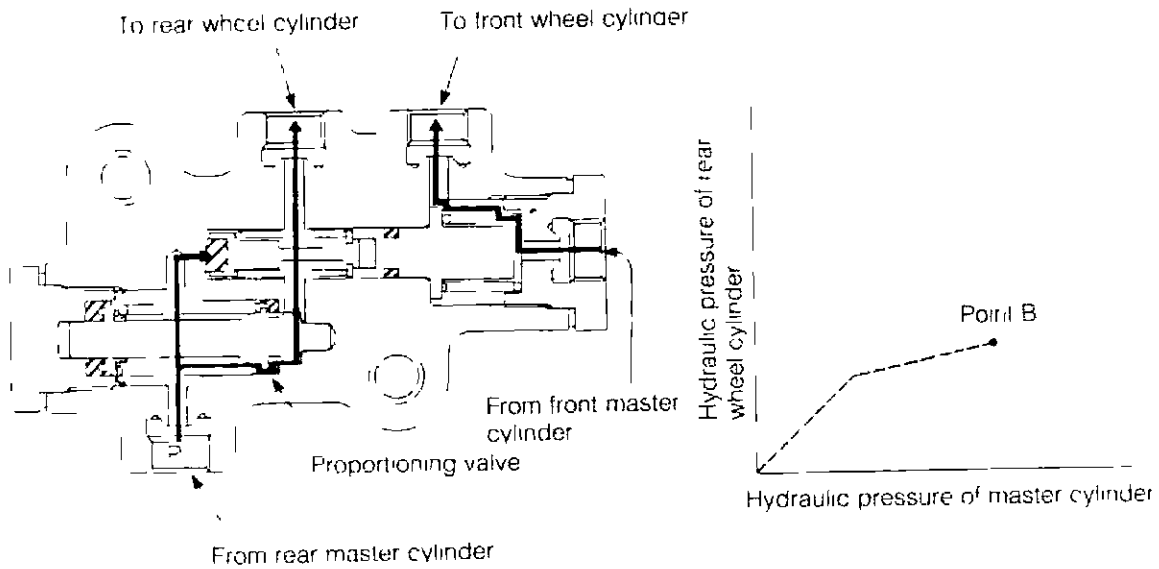
2 The piston further moves to the left, until the chamber A and the chamber B are shut off completely, thus attaining a balance in pressure. This state is accomplished at a turning point B in the figure below. As the hydraulic pressure from the master cylinder continues to rise and the pressure in the chamber A also increases, the piston moves to the right and the valve becomes open. Then, the pressure in the chamber B increases, until the hydraulic pressure of the chamber A equals to that of the chamber B. At this point, the piston, in turn, moves to the left due to the difference in surface area between the chamber A and the chamber B. These operations are repeated, thus making it possible to produce a difference in pressure between the master cylinder and the rear wheel cylinder.



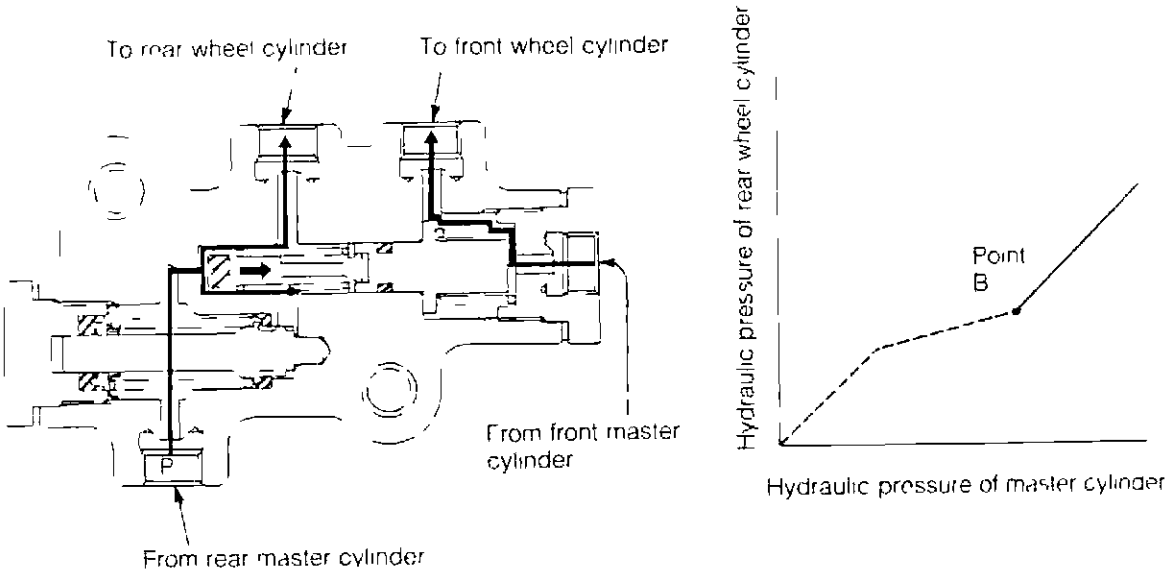
WRE91 BR028

Operation principle of secondary turning point

1 The hydraulic pressure of the rear master cylinder is reduced by the proportioning valve and is applied to the rear wheel cylinder. As the pressure P1 shown in the figure below rises gradually, the pressure overcomes the spring tension of the by-pass valve This takes place at a point B in the figure below

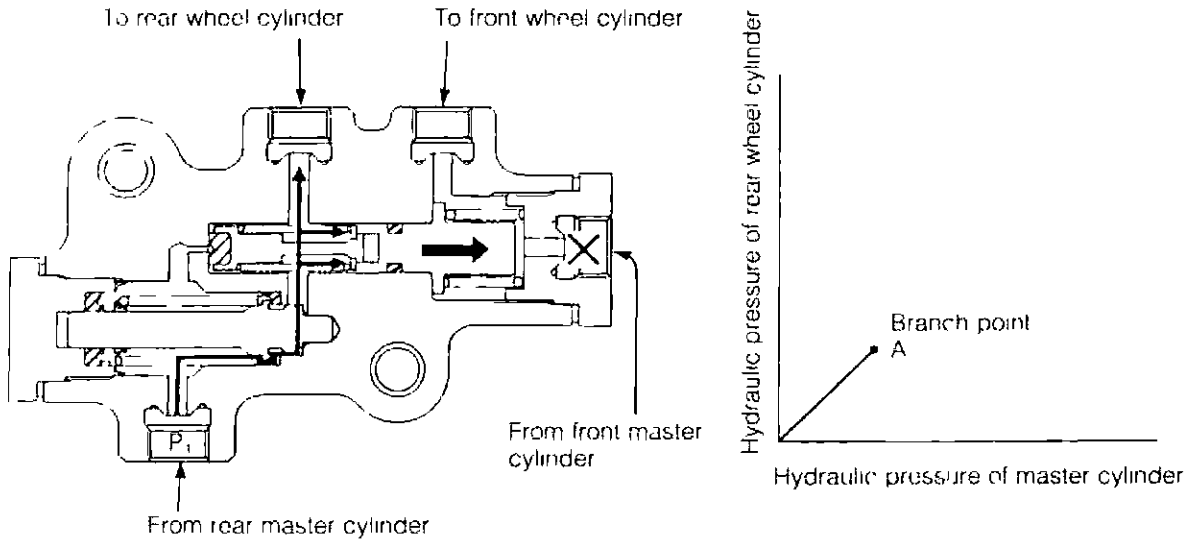


2 The hydraulic pressure of the rear master cylinder which has overcome the spring tension of the by-pass valve is applied to the rear wheel cylinders through the by-pass valve directly rather than through the proportioning valve As a result, the hydraulic pressure again begins to increase as shown in the figure below



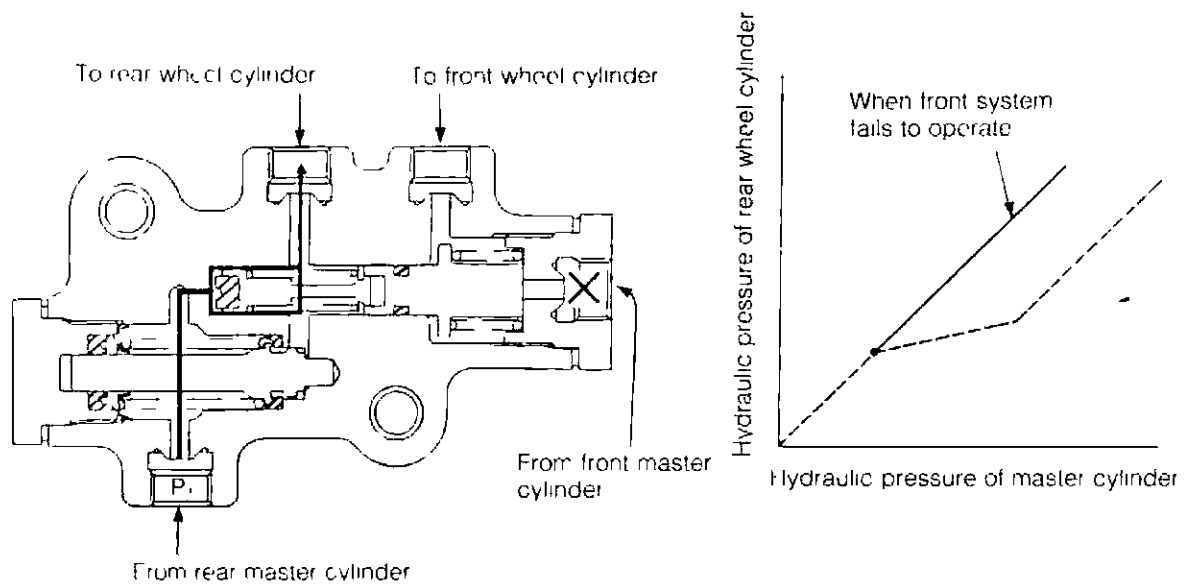
Operation principle of by-pass valve

1 If the front brake system should fail to operate due to some reasons, the hydraulic pressure applied to the front wheel cylinders drops Then, the hydraulic pressure P1 which has been applied to the rear wheel cylinder overcomes the spring tension of the by-pass valve, thus causing the by-pass valve to start moving to the right This operation takes place at a branch point A in the figure below



WRE91 BR031

2 Inasmuch as the hydraulic pressure of the front wheel cylinder drops, the by-pass valve moves to the right This by-pass valve's movement to the right forms a by-pass circuit for the hydraulic pressure of the rear wheel cylinders Hence, the pressure is no longer reduced by the proportioning valve and is applied directly to the rear wheel cylinders As a result, no turning point exists, as shown in the figure below



WRF91 BR032

LSPV (LOAD SENSING PROPORTIONING VALVE) (PICK UP)

The LSPV has been provided as standard equipment for all specifications.
This valve controls the brake hydraulic pressure by changing the proportioning valve's turning point in the hydraulic pressure according to the rear axle weight of the motor vehicle.

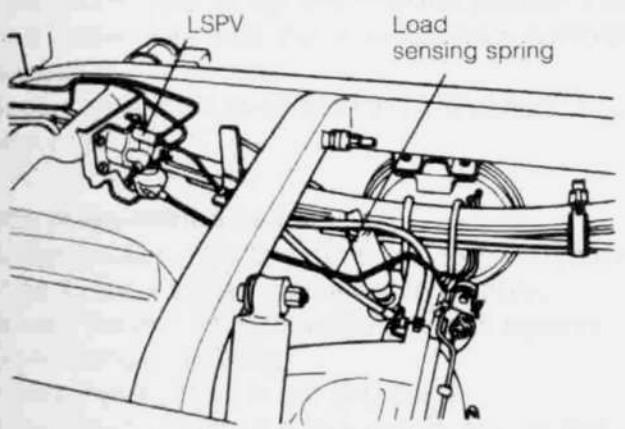
For improved brake performance, the valve has been changed from the P valve to the LSPV valve.

WRE91-BR033

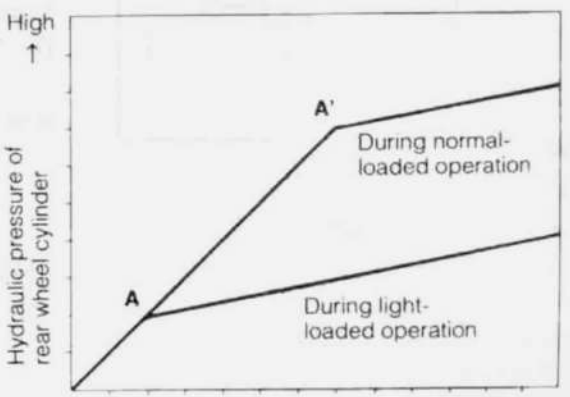
Specifications

		F77
Under no-loaded state Turning point [kgf/cm^2] × grade		14 × 0.25
Under loaded state Turning point [Kgf/cm^2] × grade	ECE & EEC	88 × 0.25
	Other than ECE & EEC	86 × 0.25

WRE91-BR034



LSPV Schematic Diagram



LSPV Controlled Hydraulic Pressure

WRE91-BR035

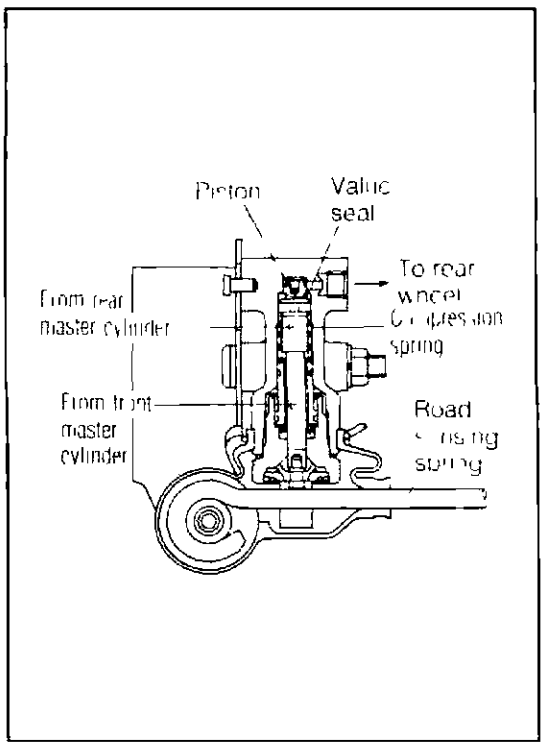
Construction and operation

The hydraulic pressure from the rear master cylinder is applied to the rear wheel cylinder through a gap between the valve seal and the piston. At this state, a down force is applied to the piston because of the difference in pressure-receiving area between the upper part and the lower part.

As the hydraulic pressure rises, the piston moves down, because the increasing hydraulic pressure overcomes the combined force of the compression spring tension, and the load sensing spring tension. Thus, the piston descends until it comes in contact with the valve seal, thereby interrupting the fluid passage between the master cylinder and the wheel cylinder. (See the A-A range in the illustration above.)

Moreover the master cylinder hydraulic pressure further rises, the piston starts moving upward, at this moment, the piston is separated from the valve seat, the hydraulic pressure is applied to the wheel cylinder. Then, the piston moves downward again, thus closing the fluid passage. The foregoing operations are repeated, thus making it possible to perform the pressure-reducing control of the rear wheel cylinder hydraulic pressure (as indicated in the curve beyond the A-A' range in the illustration above.)

The brake pipe from the front master cylinder is a brake pipe which has been provided to transmit the regulating hydraulic pressure to the LSPV whereby the hydraulic pressure is applied to the rear wheel cylinder without the hydraulic pressure regulation at the LSPV in the event that the hydraulic pressure in the front brake pipe drops abnormally.



WRE3FBR036

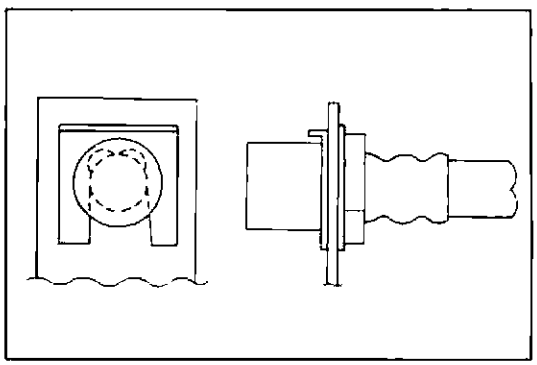
PRECAUTION

Brake piping-related items

1 Never assemble the brake tube by deforming it purposely
2 When tightening the flare nut, torque it to the specified value, while retaining the way section or the hose union section by means of a flare nut wrench or the like
Tightening Torque. 12 7 - 17.7 N m (1.3 -1.8 kgf-m, 9.4 - 13.0 ft-lb)
3 Be sure to clamp bending clamps (winding clamps) in such a way that there is no displacement in relation with the brake tube
4 Care must be exercised to ensure that clamps are installed without deforming the brake tube
5 Be certain to install clamps in such a way that no gap is formed between the brake tube and the clamp
6 Be very careful not to get brake fluid and/or mineral oil (e g grease and shock absorber oil) to the brake hoses and/or brake tubes
If such fluid or lubricant, etc should get to these parts, be sure to wipe it off immediately
7 Make sure that the flexible hoses are not assembled in a twisted state
However, if the hexagonal section of the flexible hose is not aligned with the groove of the bracket it is permissible to twist the flexible hose within the allowable angle
Allowable Angle: Not to exceed 30 degrees

WHE? KHF3

8 As regards the installation of clips, positively insert the clip from the direction as indicated in the right figure, until the protruded section provided at the central part of the clip contacts the hose union, as indicated in the right figure
9 Do not reuse the clips
10 After completion of brake air bleeding, depress the brake pedal at a force of 25 kgf and hold the pedal in a depressed state Make sure that the brake system exhibits no fluid leakage
11 Be very careful not to scratch the brake hose and/or brake tube surfaces



WHF? BR038

Parking brake-related items

1 Special caution must be paid so as not to scratch the cable
2 Make sure not to deform the cable forcibly
3 Be very careful not to damage the boot section
4 Do not remove the boot
5 Ensure that the boot is not detached
6 As regards the parking brake switch ensure that the switch functions positively at the first notch Also, ensure that the switch makes correct contact with the parking brake lever attaching bolt when the parking brake lever is returned to the original position
7 As for the section where the parking brake cables are crossed with each other, make sure that there exists a gap of at least 20 mm between the cables under the unloaded state of the vehicle

WBF? BR039

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Brake juddering	Runout of front disc rotor	Check disc rotor for runout
	Rear brake drum out-of round	Check rear brake drum
Improper height of brake pedal	Brake pedal improperly installed or adjusted	Check installation height of brake pedal
Abnormal noise	Brake pedal emitting abnormal noise	Check brake pedal for proper lubrication
	Disc pad improperly installed	Check disc pad
	Brake shoe improperly installed	Check brake shoe
	Disc rotor bearing damaged or improperly lubricated	Check disc rotor bearing
	Dust cover distortion	Check dust cover
Car pulls to one side on application of brakes	Faulty disc pad or brake shoe	Check pad or shoe
	Disc pad and brake shoe contaminated by lubricant etc	Check pad or shoe
	Attachment curvature of parking brake cable too sharp	Check parking brake cable
Low or spongy brake pedal	Air trapped in brake line	Perform air bleeding operation
Brake will not work effectively	Brake fluid leaky	Check brake tube etc
	Brake vacuum line leaky	Check brake vacuum line

WRE91 3RU-J

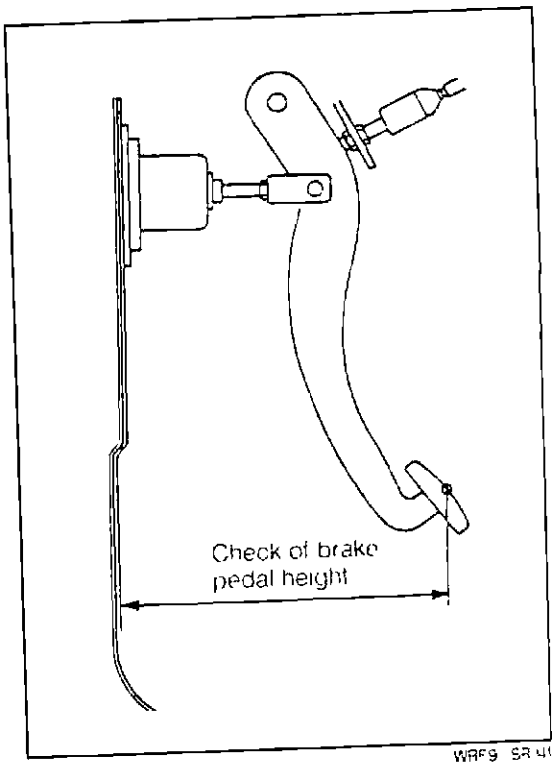
CHECK OF BRAKE SYSTEM

1. Check of brake pedal height

Measure the distance between the center of the pedal applying surface and the dash panel surface which is in parallel to the brake pedal applying center surface Ensure that the measured value complies with the specifications Also, ensure that the center of the brake pedal surface is located higher than the center of the accelerator pedal surface by 24 ± 6 mm in the case of the R H D vehicle, 28 ± 6 mm in the case of the L H D vehicle

Specified Brake Pedal Height. 220 ± 5 mm

If not adjust the brake pedal height (See page BR–27)



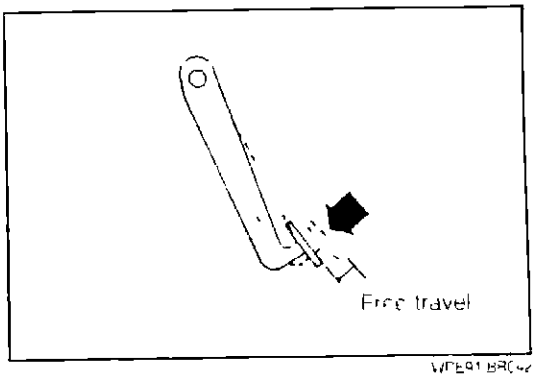
WRF9 SR4(

2. Check of brake pedal free travel

(1) After stopping the engine, depress the brake pedal firmly four or five times so that no vacuum may remain in the brake booster

(2) Measure the brake pedal free travel by pushing the brake pedal lightly with fingers. Ensure that the free travel is with the specifications.
Specified Value: 2 - 4 mm

If not, adjust the brake pedal free travel.
(See page BR-27)

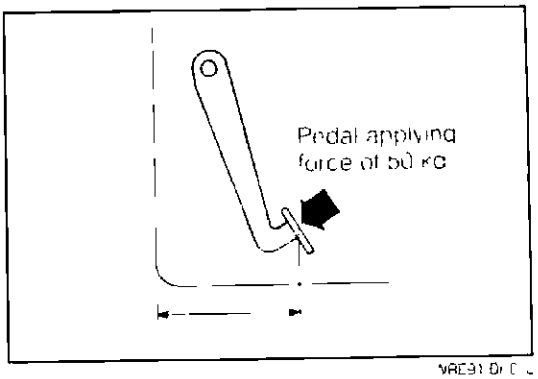


3. Check of brake pedal reserve travel

(1) With the engine running at the idling speed and with the parking brake lever released, apply the specified load to the brake pedal. Measure the distance between the center of the brake pedal applying surface and the lower end of the dash panel. Ensure that the distance complies with the specifications.
Specified Load: 50 kgf
Specified Value: 80 mm or more

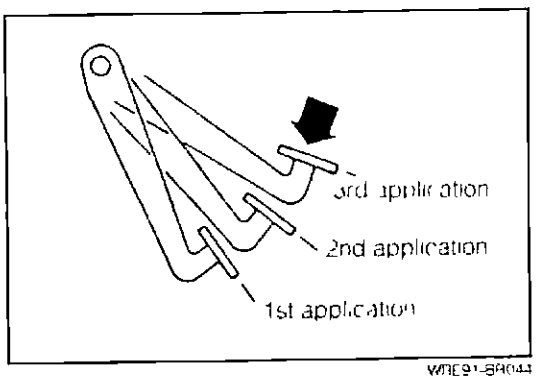
If the measured value is lower than the specified value, check the air bleeding condition and/or check and repair the brake automatic adjustment system.

(2) When the brake pedal is held under the specified load in (1), ensure that the height of the brake pedal applying surface remains unchanged.
If the brake pedal applying surface drops, check the brake fluid for leakage and/or repair the brake fluid leakage, as required. Moreover, perform the brake master cylinder overhauling, as required.

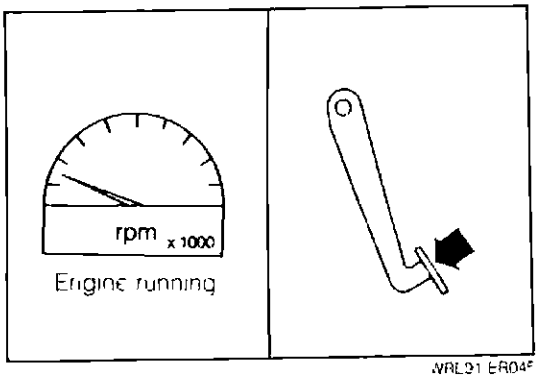


4. Check of brake booster

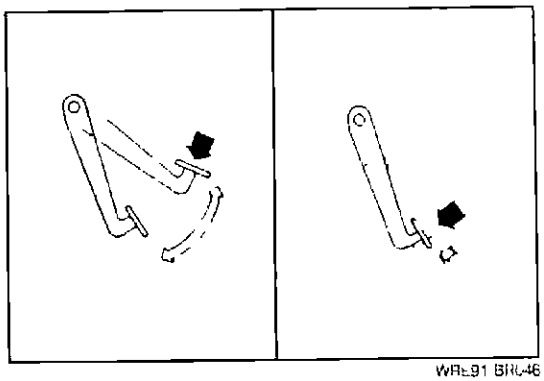
(1) Check of brake booster air-tight performance
① Start the engine. After allowing the brake booster to hold negative pressure, stop the engine.
② Depress the brake pedal several times, applying force used during normal brake applications and allowing at least five seconds between each application. Ensure that the position of the brake pedal rises progressively at the second and third applications.



(2) Check of brake booster air-tight performance under loaded condition
With the engine running, depress the brake pedal. While maintaining this condition, stop the engine. Ensure that no change in the pedal height occurs in about 30 seconds.



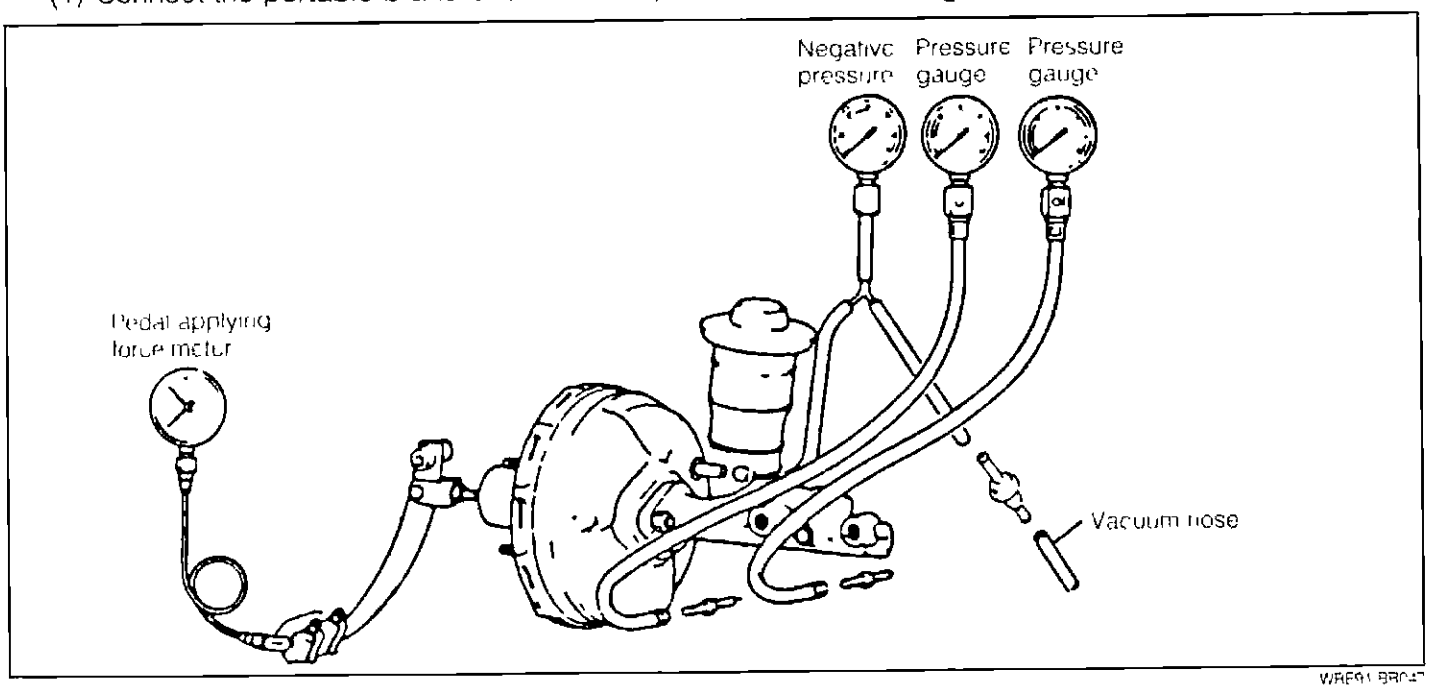
(3) Check of booster operation
① With the engine stopped depress the brake pedal several times, until the brake pedal height will not vary at each application
② With the engine stopped, depress the brake pedal While maintaining the same applying force, start the engine If the brake pedal moves in slightly, it indicates that the booster operates satisfactory



WRE91 BR046

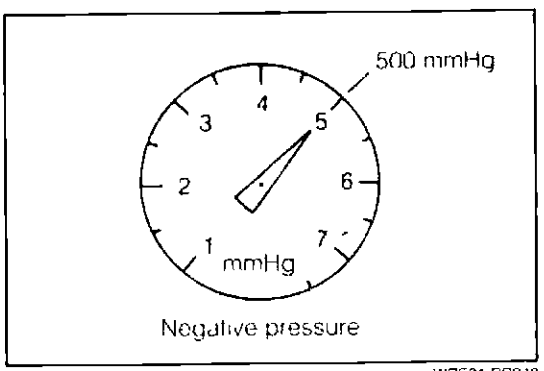
5. Check employing portable brake booster tester

(1) Connect the portable brake booster tester, as indicated in the figure Perform air bleeding.



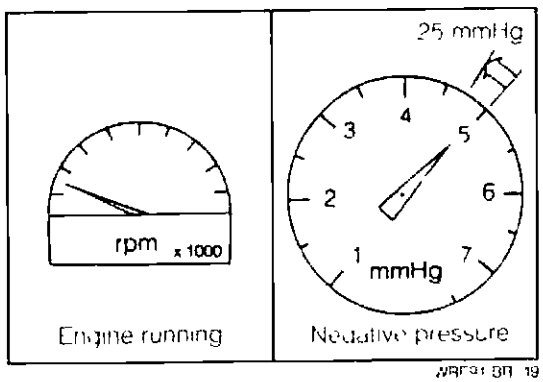
WRE91 BR047

(2) Check of booster air-tight performance
① Start the engine. Apply a negative pressure of 500 mmHg to the brake booster
② Stop the engine Ensure that no negative pressure drops for 15 seconds after the engine has stopped If not, check the check valve and brake booster



WRE91 BR018

(3) Check of booster air-tight performance under loaded condition
① Start the engine
② Depress the brake pedal with a force of 20 kgf
③ Apply a negative pressure of 500 mmHg to the booster
④ Stop the engine
⑤ Ensure that the negative pressure drop does not exceed 25 mmHg after the engine has stopped If not, repair the brake booster



WRE91 BR 19

(4) Check of brake hydraulic pressure
① With the engine stopped, depress the brake pedal several times so that no negative pressure may not apply to the brake booster
② Ensure that the hydraulic pressure is obtained in accordance with the pedal applying force, as indicated in the right table.
If not, check the air bleeding condition

Pedal applying force kgf	Hydraulic pressure kgf/cm
10	0 - 6
20	8 - 18
30	19 - 29

WHE91 BR 050

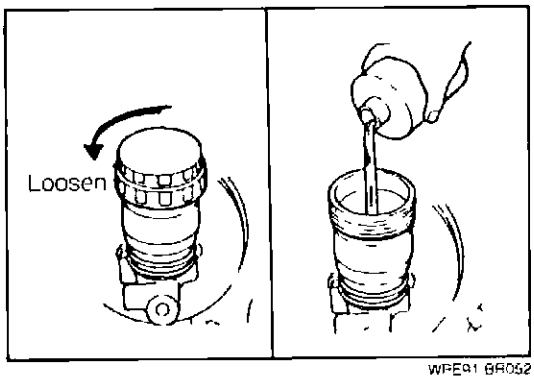
(5) Check of booster operation
① Start the engine
② Set the booster negative pressure to 500 mmHg
Ensure that the hydraulic pressure is obtained in accordance with the pedal applying force
If not, repair the brake booster

Pedal applying force kgf	Hydraulic pressure kgf/cm^2
5	6 - 14
10	24 - 34
20	63 - 73
30	74 - 84

WHE91 BR051

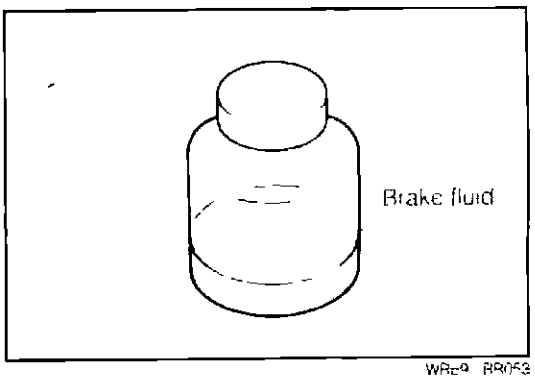
Air bleeding of brake system

1 Filling brake fluid
Fill the brake reservoir tank with the specified brake fluid to the full level. Maintain the full level at all times during the brake air bleeding
Specified Brake Fluid: DOT 3 or SAEJ 1703



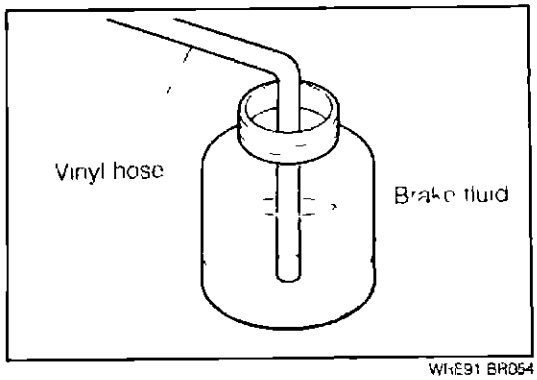
WHE91 BR052

2 Prepare an adequate container for the air bleeding. Fill a small amount of brake fluid in the container



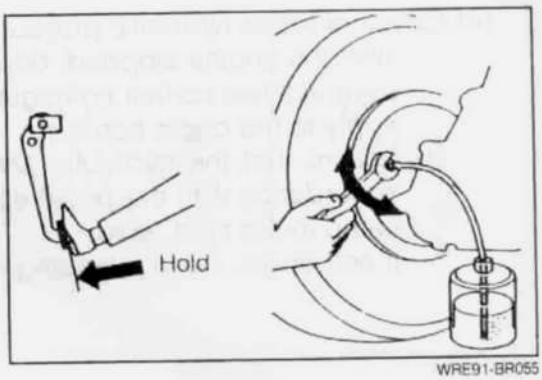
WHE91 BR053

3. Detach the air bleeder cap connect one end of a suitable vinyl hose to the air bleeder plug. Insert the other end of the vinyl hose into the prepared container in such a way that the vinyl hose may be submerged in the brake fluid in the container. Start this air bleeding operation at the brake which is located at the furthermost point from the master cylinder

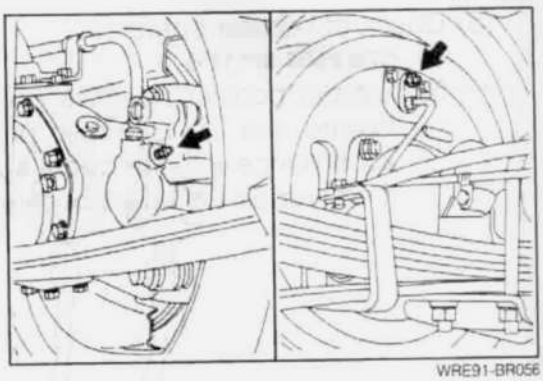


WHE91 BR054

4. Air bleeding
   This operation should be performed by two persons.
   (1) One person depresses the brake pedal several times and hold it in a depressed state.
   (2) The other person loosens the air bleeder plug 1/3 through 1/2 turn to bleed the air. Tighten the plug again.
   (3) Repeat the steps (1) and (2), until no air or bubble comes from the air bleeder plug.
   (4) Start the engine. Repeat the steps (1) and (2), until no air or bubble comes from the air bleeder plug. (Rear-ABS equipped vehicle only)
5. Tighten the air bleeder plug to the specified torque.
   Tightening Torque: 8.8 - 12.7 N·m (0.9 - 1.3 kgf·m, 6.5 - 9.4 ft-lb)



WRE91-BR055

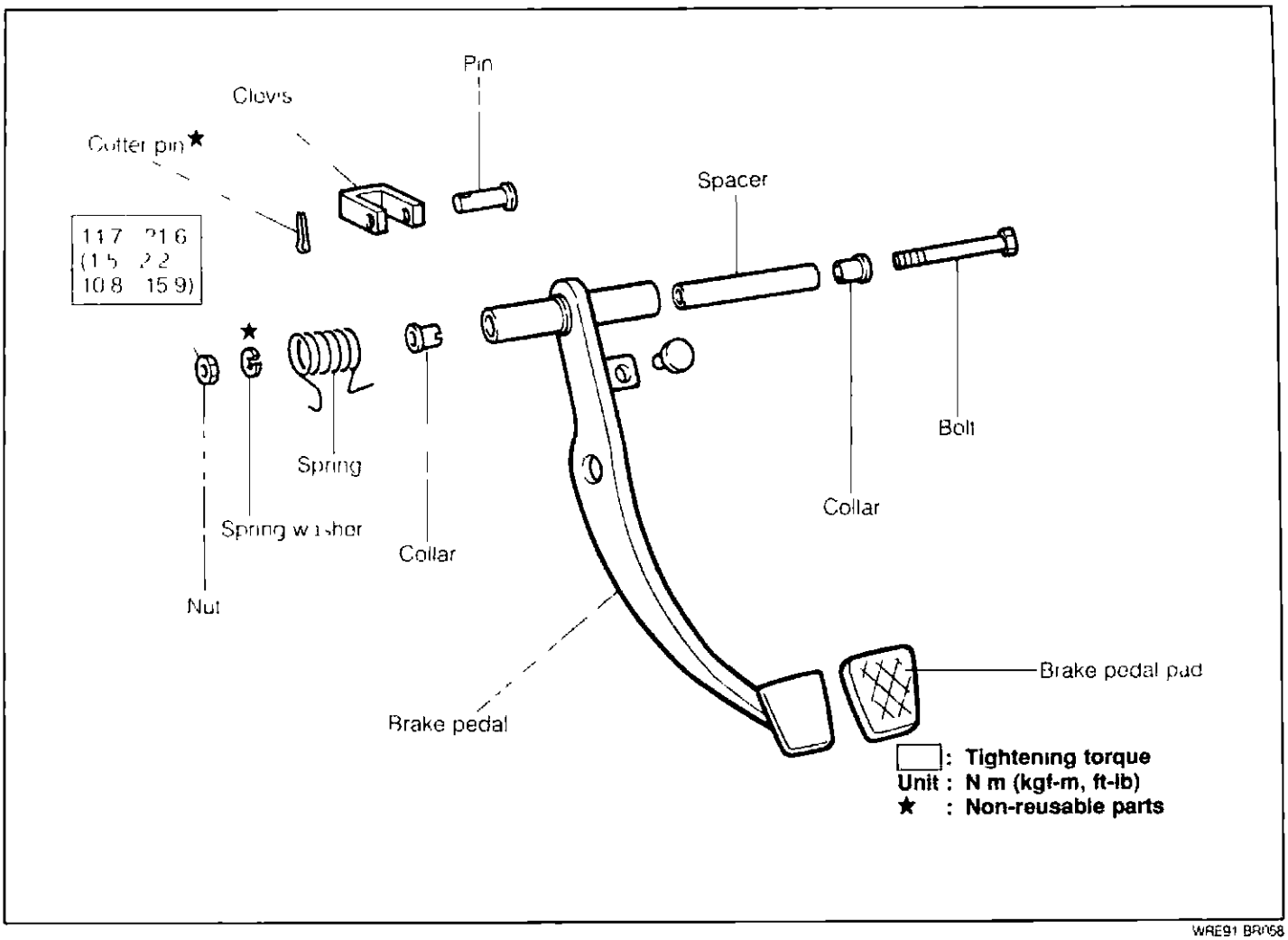

WRE91-BR056

6. Install the bleeder plug cap to the bleeder plug.
7. Perform air bleeding for the other brakes in turn, starting from the step (3).
8. Perform the brake pedal reserve travel check.
   (See page BR–23.)

WRE91-BR057

BRAKE PEDAL

COMPONENTS



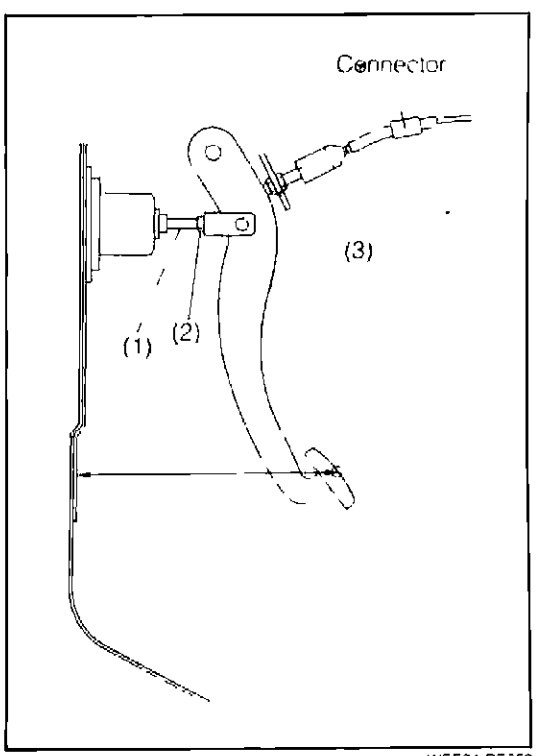
WAE91 BR058

ADJUSTMENT OF BRAKE PEDAL HEIGHT

1 Disconnect the connector of the stop lamp switch
2 Loosen the lock nut (3) of the stop lamp switch
3 Back off the stop lamp switch
NOTE:
- Be very careful not to twist the cord by turning it together with the switch.

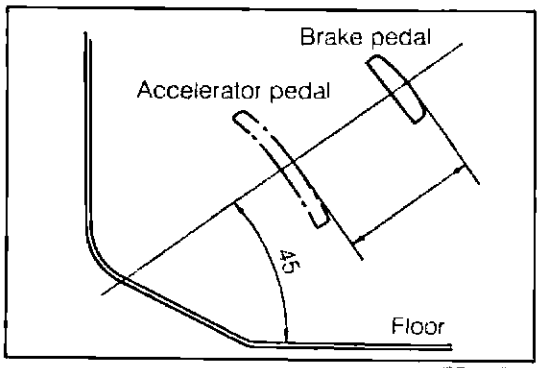
4 Loosen the lock nut of the clevis (2)
5 Turn the push rod (1) to adjust the pedal height to the specified height
Specified Height: 220 ± 5 mm

The measurement should be made between the center of the brake pedal applying surface and the dash panel surface which is in parallel to the brake pedal applying center surface



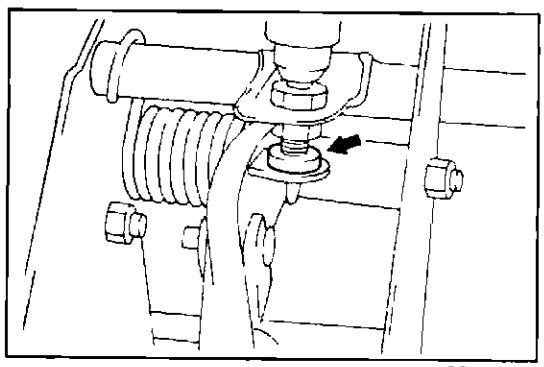
WAE91 BR059

NOTE:
- Adjust the brake pedal height so that the difference in height between the accelerator pedal and the brake pedal may become.
  Specified Value. RHD 24 ±6 mm
  LHD 28 ±6 mm



WRE91-BR060

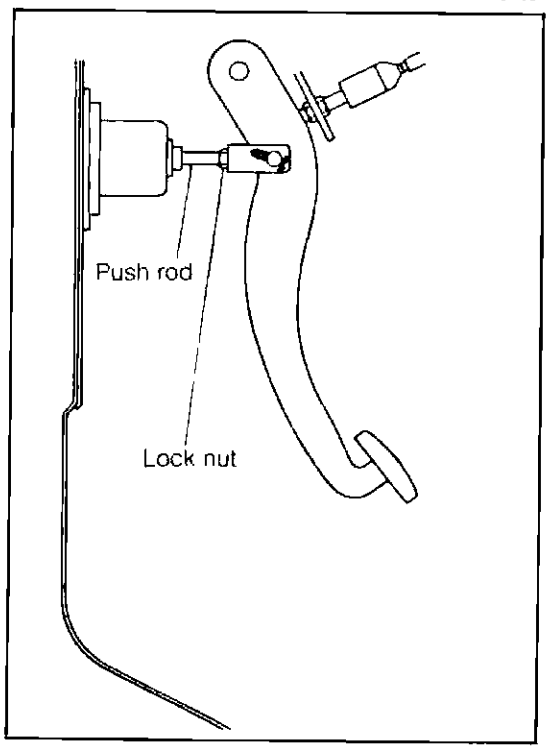
6 Screw in the stop lamp switch, until the lower end of the threaded portion is brought into contact with the brake pedal cushion
7 Tighten the stop lamp switch lock nut
  Tightening Torque: 17.7 - 29.4 N m
  (1.8 - 3.0 kgf-m, 13.0 - 21.7 ft-lb)


WRF91 BR061

8 Turn the push rod, until the brake pedal free travel becomes the specified value
  Specified Value: 2 - 4 mm

NOTE:
- The free travel represents a mechanical play observed before the brake pedal pushes the push rod of the brake booster.

9 Tighten the clevis lock nut
  Tightening Torque: 12.7 ± 2.6 N m
  (1.3 ± 0.2 kgf-m, 9.4 ± 1.9 ft-lb)



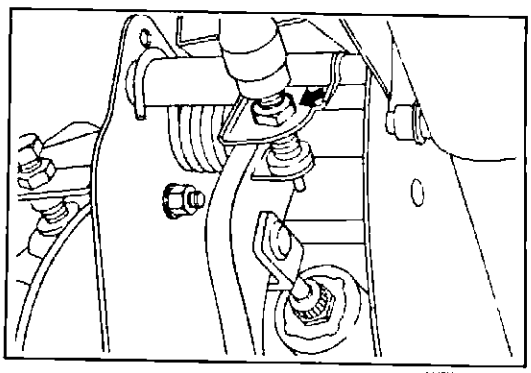
WRF91 BR062

10 Check the brake pedal height (See the step 5.)
  If the height fails to conform to the specifications, repeat the operation from the step 2 onward
11 Reconnect the stop lamp switch connector
12 Depress the brake pedal Ensure that the stop lamp goes on
  If not, check and repair the brake lamp system
  (See the Body Electrical Section)

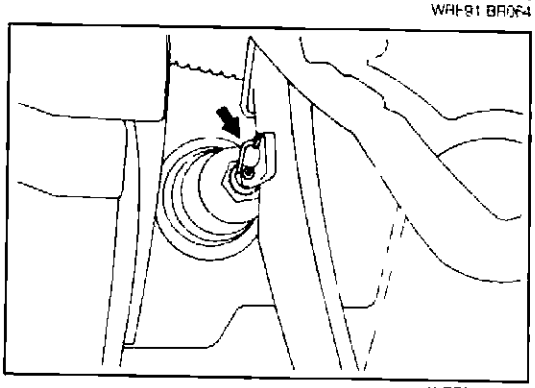
WRE91 BR063

REMOVAL

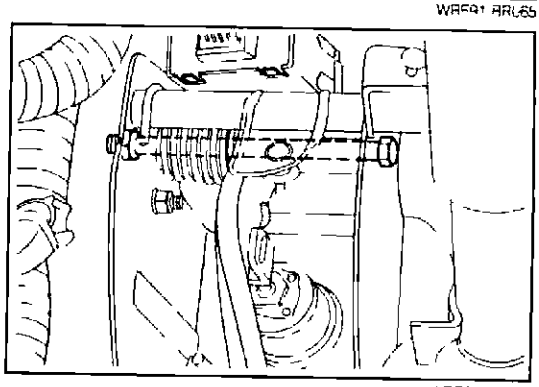
1 Disconnect the connector of the stop lamp switch
2 Remove the stop lamp switch by loosening its lock nut.


WRE91 BR064

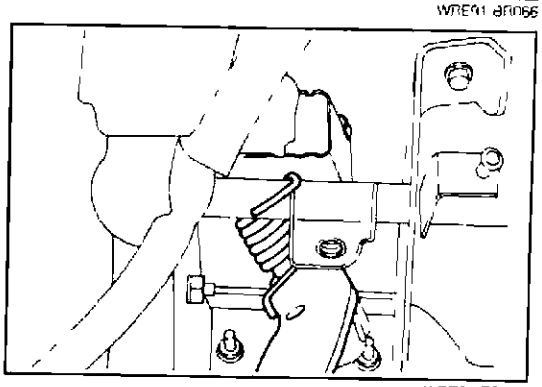
3 Pull out the clevis pin by removing its cotter pin


WRE91 BR065

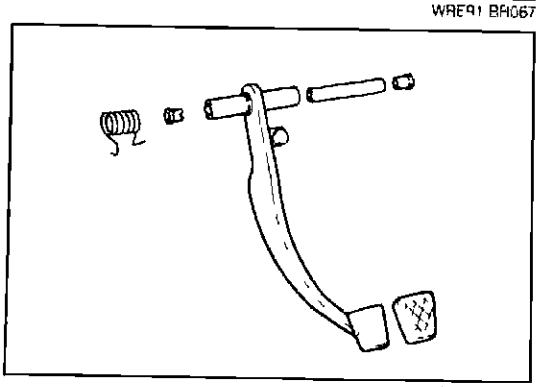
4 Remove the brake pedal set nut and pull out the set bolt
NOTE:
- Before pulling out the set bolt, be sure to align the end surface across the two flat sections of the set bolt with the clutch pedal end surface so that they may not interfere with each other.


WRE91 BR066

5 Remove the return spring from the pedal bracket while changing the brake pedal angle.

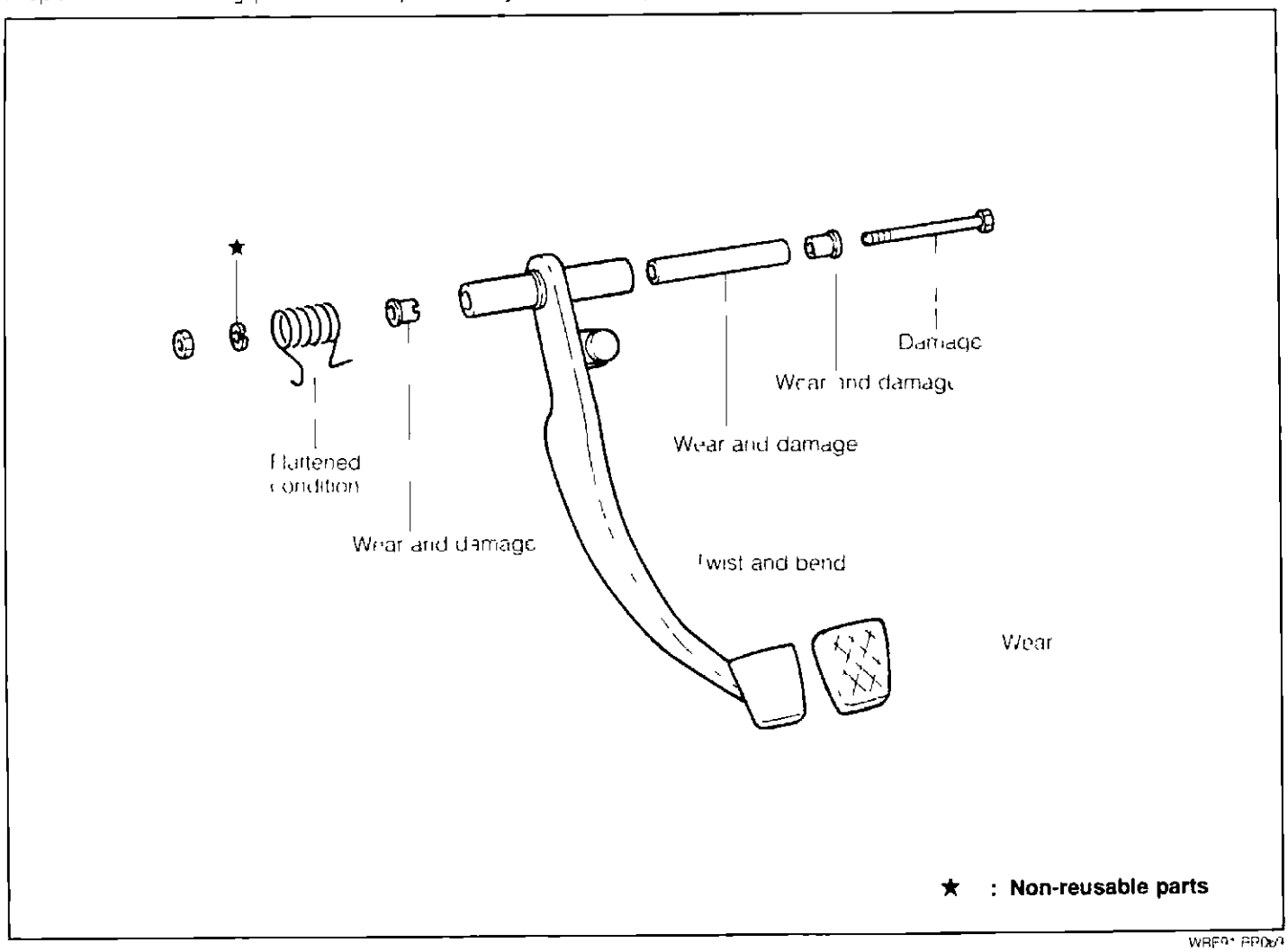

WRE91 BR067

6 Remove the spring, bushes, spacer, cushion and pedal pad from the brake pedal


WRE91 BR068

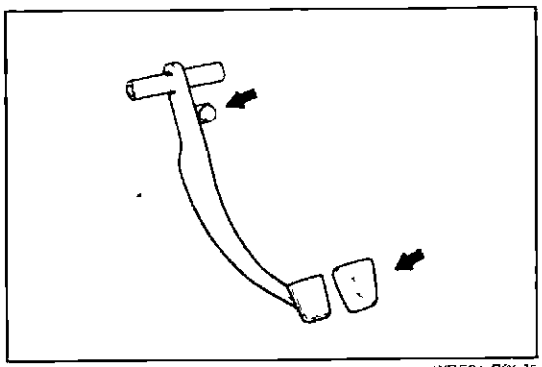
INSPECTION

Inspect the following parts and replace any defective part

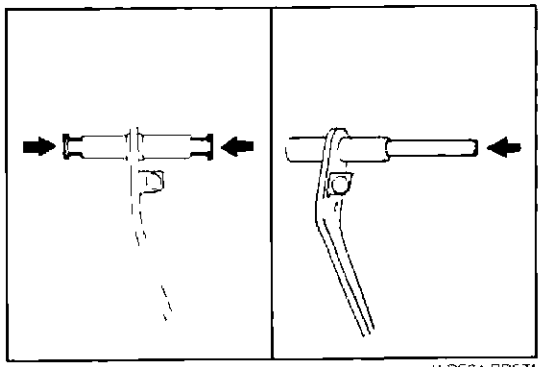


INSTALLATION

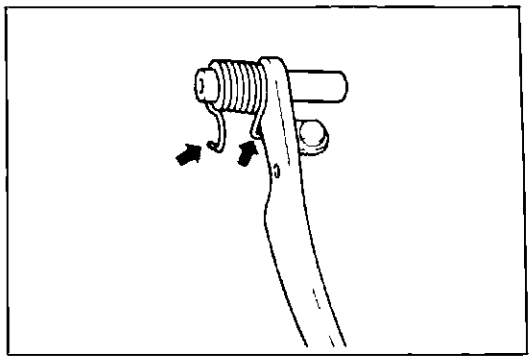
1 Install the pedal pad and cushion to the brake pedal



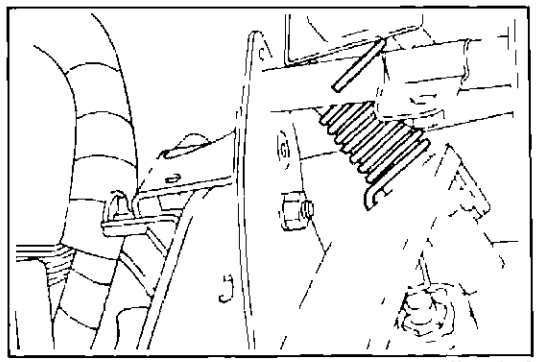
2 Insert the bushes into the brake pedal
3 Apply a thin film of lithium-based MP grease to the spacer
Insert the spacer into the bush



4 Apply a thin film of lithium based MP grease to the supporting section of the return spring. Install the return spring to the brake pedal



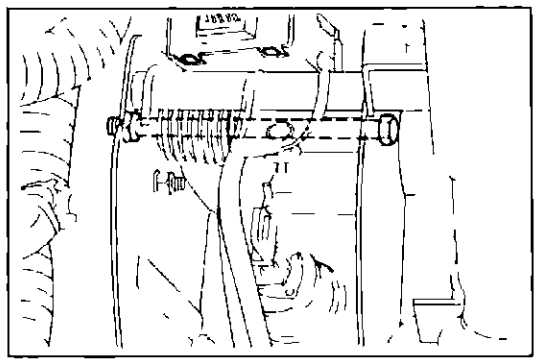
5 Hook the return spring to the pedal bracket



6 With the brake pedal aligned with the attaching hole, insert the attaching bolt

7 Tighten the attaching nut to the specified torque

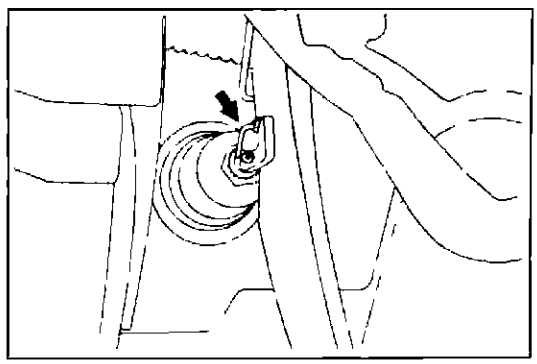
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)



8 Connect the clevis to the brake pedal by means of the clevis pin. Install the new cotter pin and bend its legs

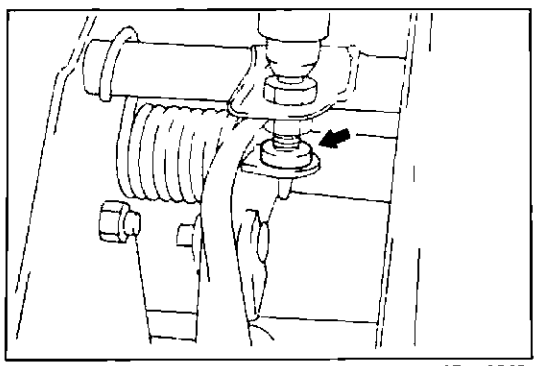
NOTE:

- **Be sure to bend the cotter pin beyond 90 degrees.**



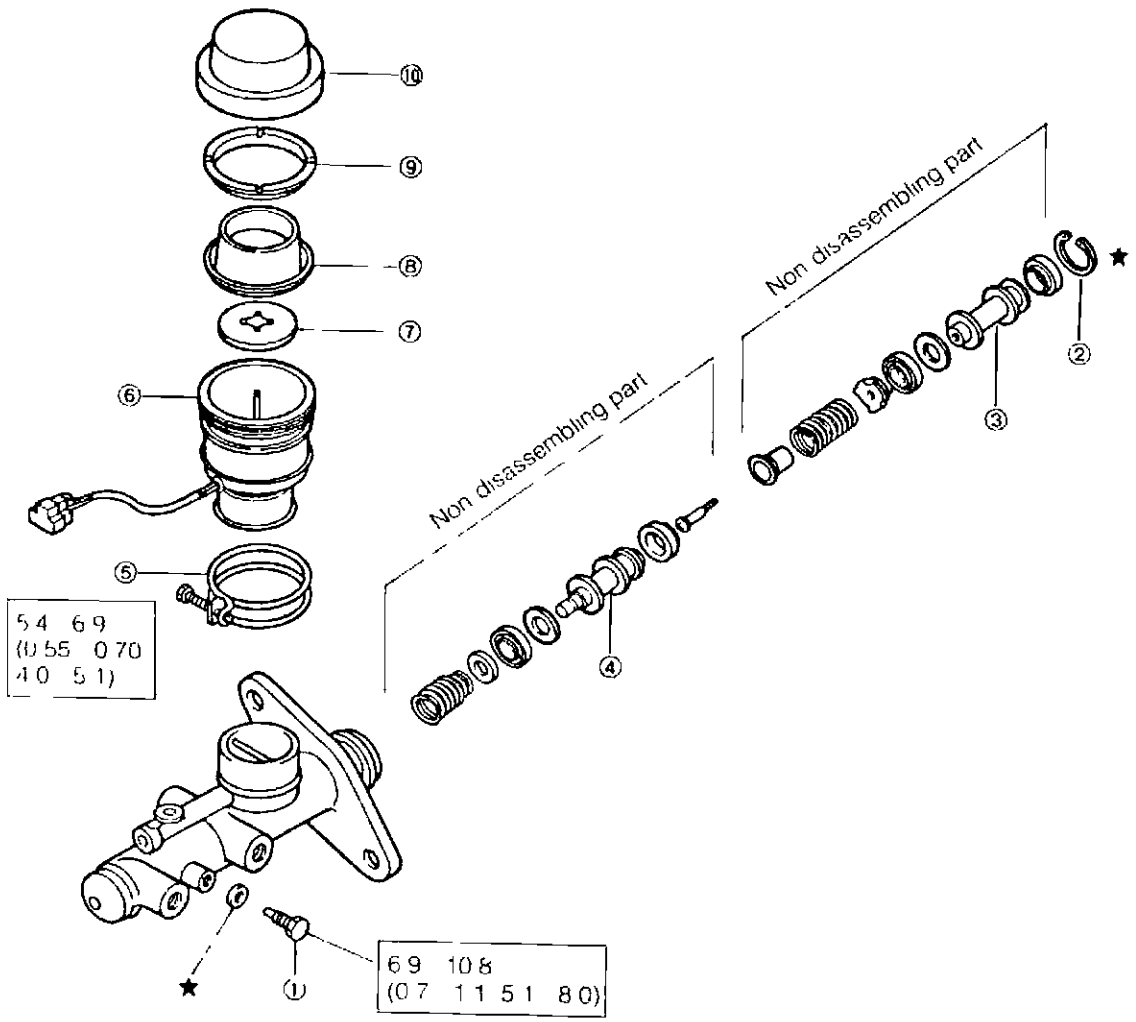
9 Install the stop lamp switch. Adjust the brake pedal height (See page BR-27)

10 Operate the brake pedal and check to see if any trouble exists



BRAKE MASTER CYLINDER

COMPONENTS



□ : Tightening torque
Unit : N·m (kgf-m, ft-lb)
★ : Non-reusable parts

① Set bolt
② Snap ring
③ Piston master cylinder No. 1
④ Piston master cylinder No. 2
⑤ Hose clamp
⑥ Master cylinder reservoir sub-assembly
⑦ Master cylinder reservoir float
⑧ Reservoir diaphragm
⑨ Spacer
⑩ Reservoir filler cap

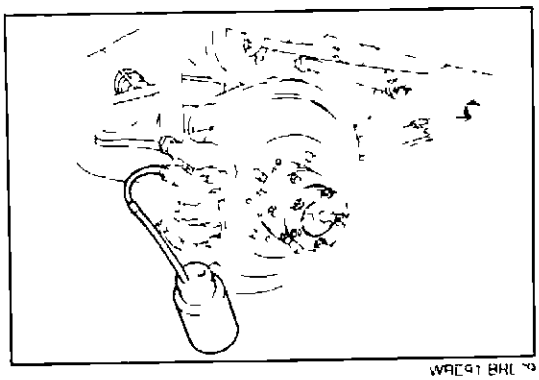
REMOVAL

CAUTION:

- If the brake fluid is spilled inadvertently over the paint-finish surface of the vehicle, quickly wipe off the brake fluid In addition, wipe the affected area, using white gasoline or the like.

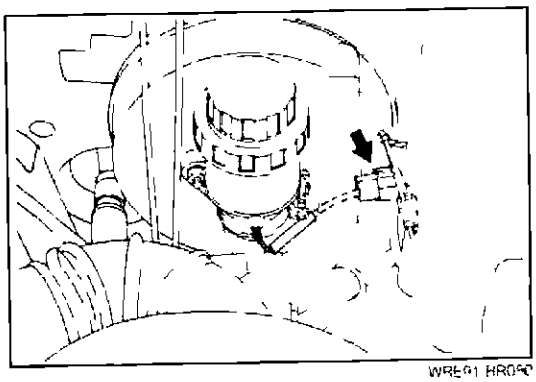
WRE91 BR078

1 Drain the brake fluid from the rear and front wheel cylinder



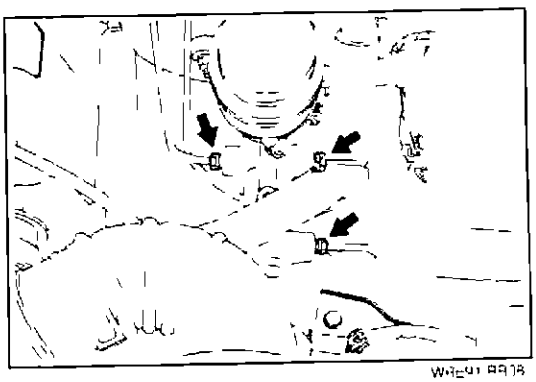
WRE91 BR[illegible]

2 Disconnect the brake fluid level switch connector



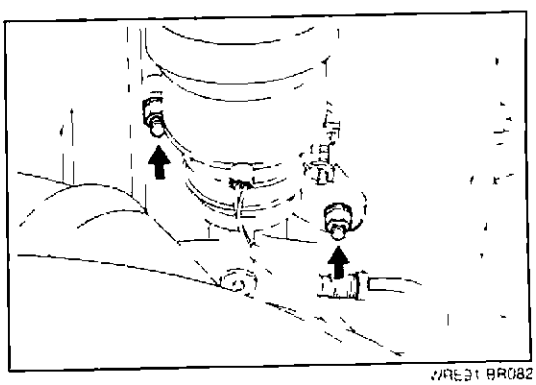
WRE91 BR080

3 Disconnect the brake tubes from the master cylinder, using a flare nut wrench



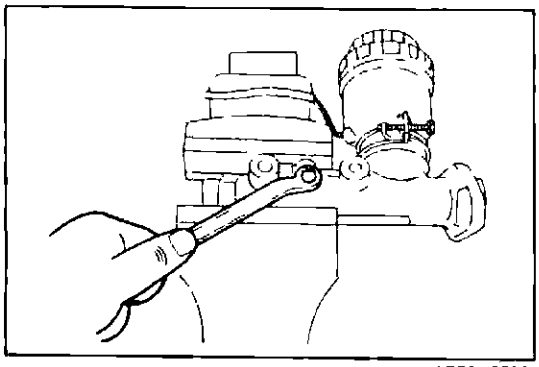
WRE91 BR[illegible]

4 Remove the brake master cylinder from the brake booster by removing the brake master cylinder attaching nuts

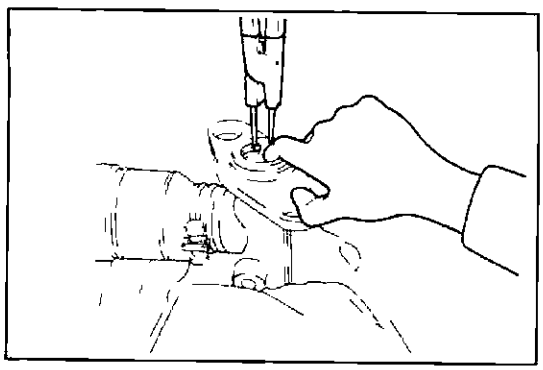


WRE91 BR082

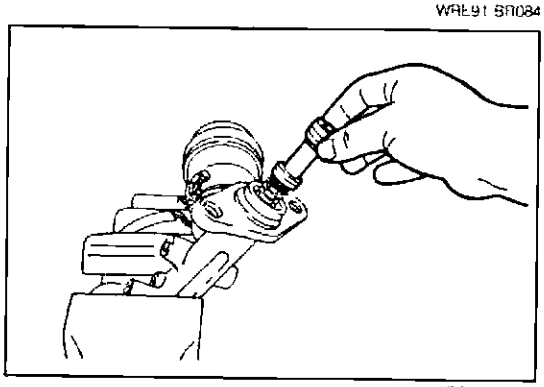
5 Remove the piston set bolt
NOTE.
- Do not apply excessive force when installing the cylinder to a vise


WRE91 BR083

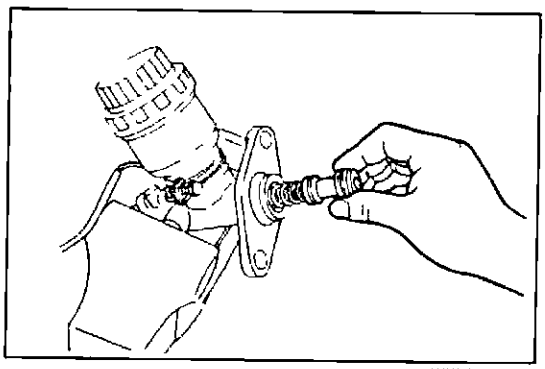
6 While holding the piston by hand, remove the snap ring
CAUTION:
- Do not scratch the cylinder bore surface.


WRE91 BR084

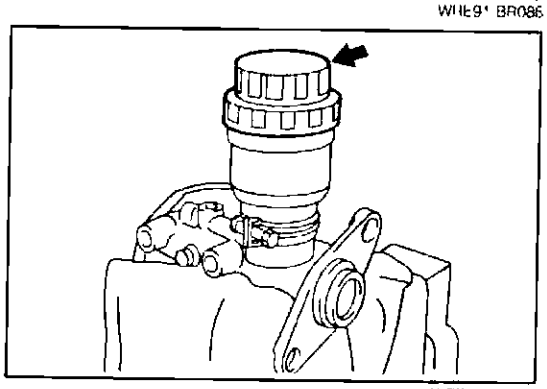
7 Remove the brake master cylinder piston No 1


WRE91 BR085

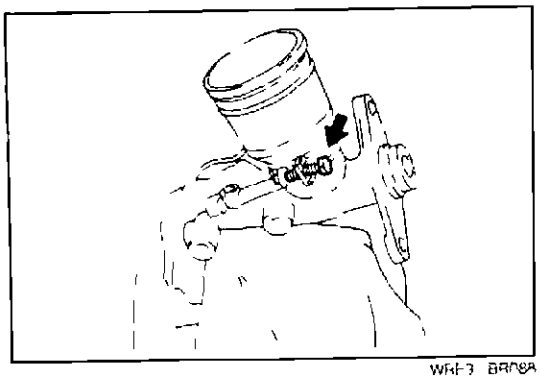
8 Remove the brake master cylinder piston No. 2 by blowing air from the brake pipe connecting hole


WRE91 BR086

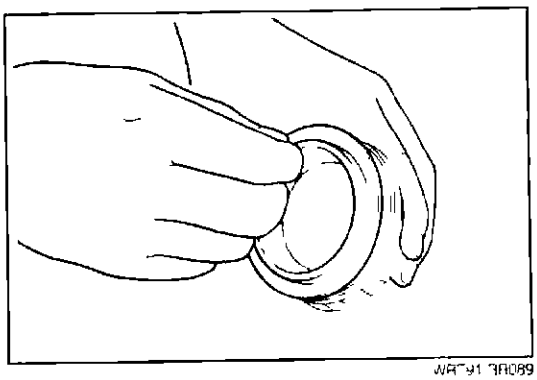
9 Remove the reservoir filler cap Take out the float


WRE91 BR087

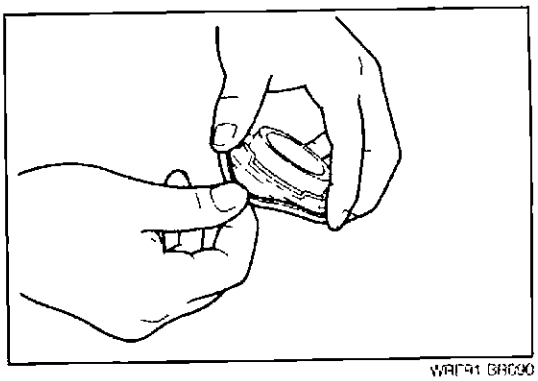
10 Remove the reservoir tank by loosening the reservoir tank hose clamp



11 Remove the spacer together with the reservoir diaphragm from the reservoir filler cap

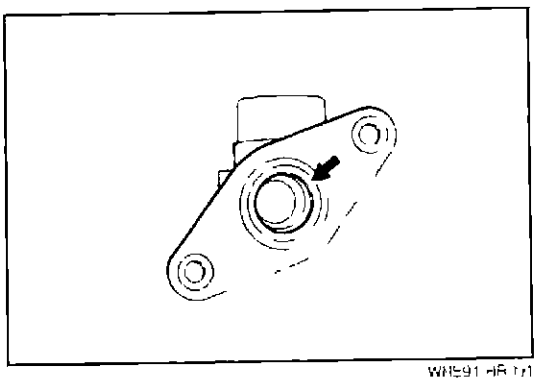


12 Remove the reservoir diaphragm from the spacer

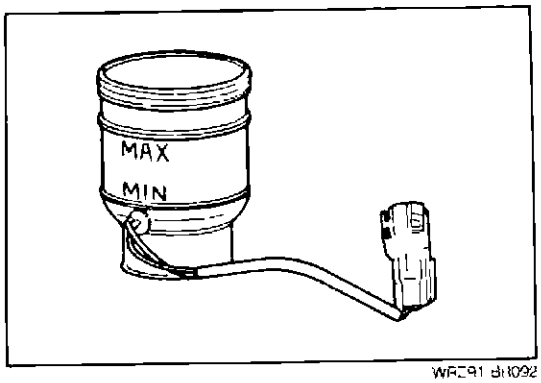


INSPECTION

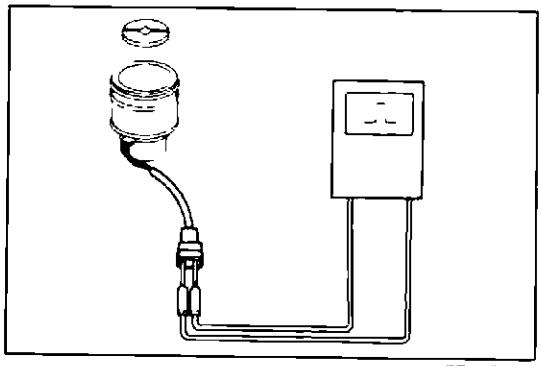
1 Check of master cylinder
(1) Ensure that the inner surface of the master cylinder exhibits no scratches
(2) Ensure that each part of the master cylinder exhibits no damage, such as deformation.



2 Check of reservoir tank
(1) Ensure that the reservoir tank exhibits no damage, such as cracks



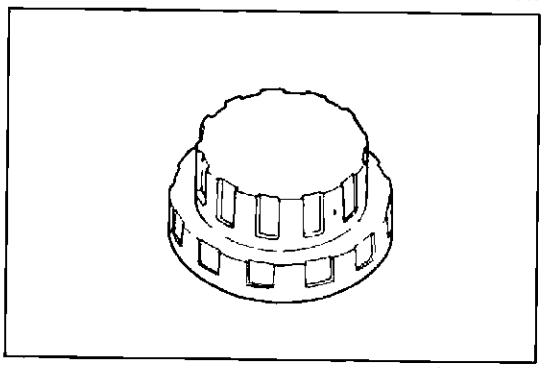
(2) Ensure that continuity exists between the terminals of the connector when the float is put in the reservoir tank. Also, ensure that no continuity exists when the float is taken out from the reservoir tank. If not, replace the reservoir tank.



WRE11BR093

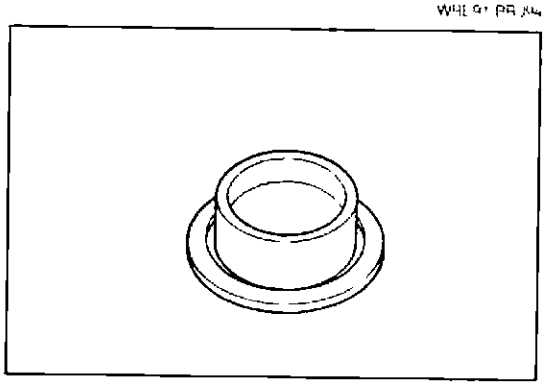
3 Inspection of reservoir tank cap

(1) Ensure that the reservoir tank cap exhibits no damage, such as cracks.



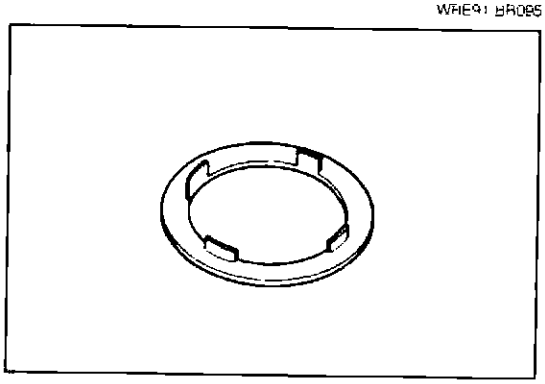
WRE91BR094

(2) Ensure that the reservoir diaphragm exhibits no damage, such as cracks and holes.



WRE91BR095

(3) Ensure that the spacer exhibits no damage, such as cracks.



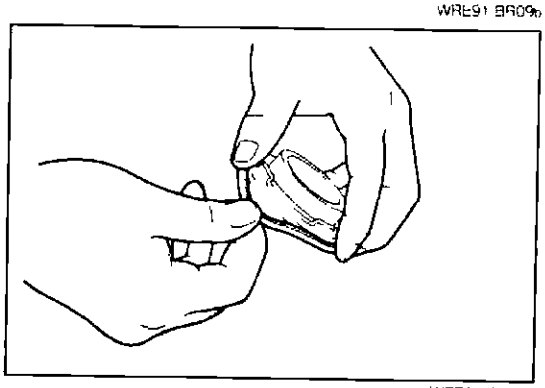
WRE91BR096

ASSEMBLY

1 Install the reservoir diaphragm to the spacer.

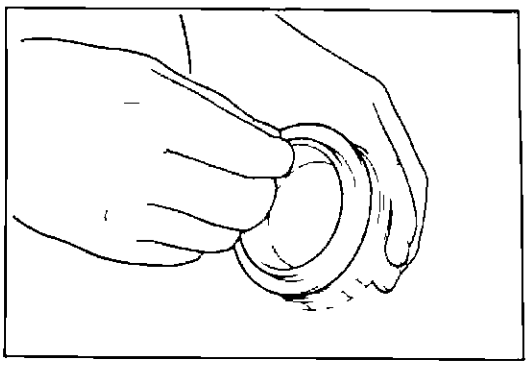
NOTE

- Be sure to fit the reservoir diaphragm to the recessed section of the spacer.

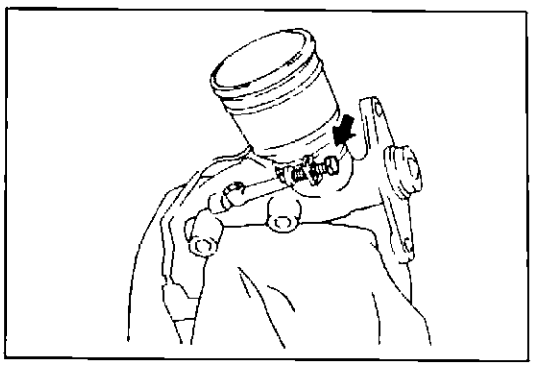


WRE91BR097

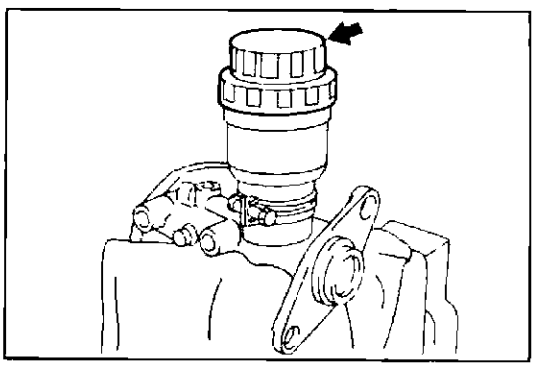
2 Install the spacer together with the reservoir diaphragm to the reservoir tank cap
NOTE:
- Fit the pawl section of the spacer into the reservoir tank cap securely.



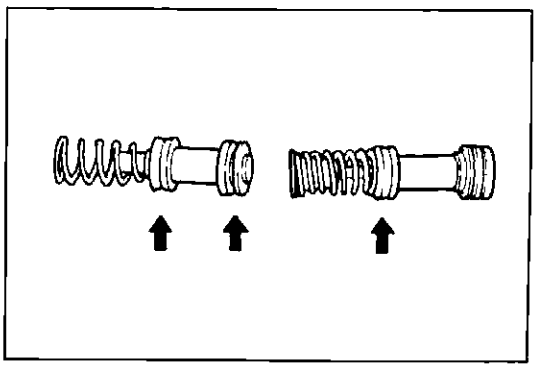
3 Install the reservoir tank to the master cylinder. Tighten the clamp
Tightening Torque. 5.4 - 6.9 N·m
(0.55 - 0.70 kgf-m, 4.0 - 5.1 ft-lb)



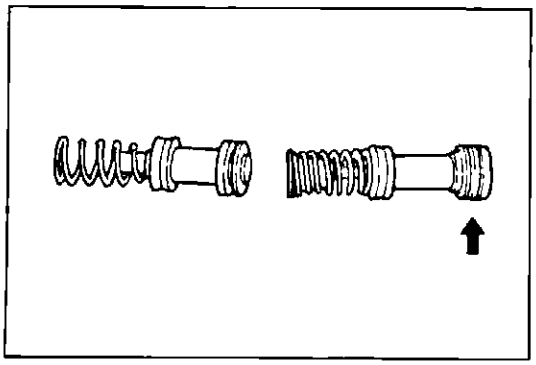
4 Insert the float in the reservoir tank. Install the reservoir tank cap



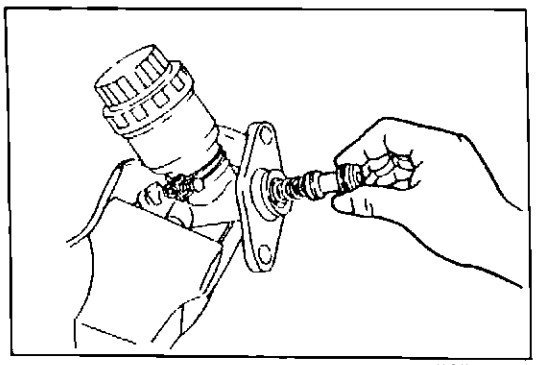
5 Apply brake fluid to the piston cups indicated in the right figure



6 Apply rubber grease to the piston cups indicated in the right figure

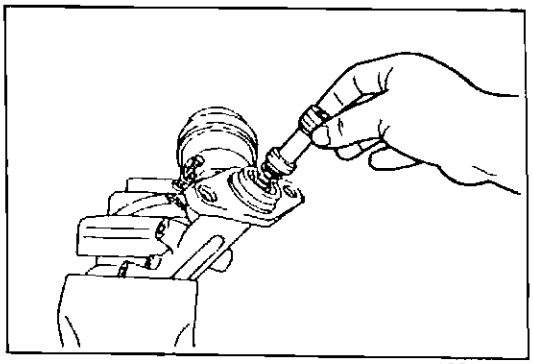


7 Insert the piston No. 2 into the master cylinder



WRE91 BR103

8 Insert the piston No. 1 into the master cylinder.

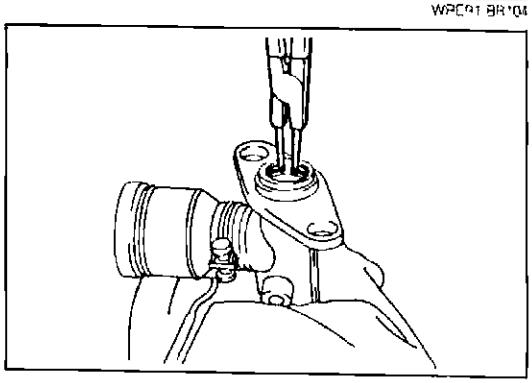


WRE91 BR104

9 While holding the piston No. 1 by hand, install a new snap ring.

NOTE

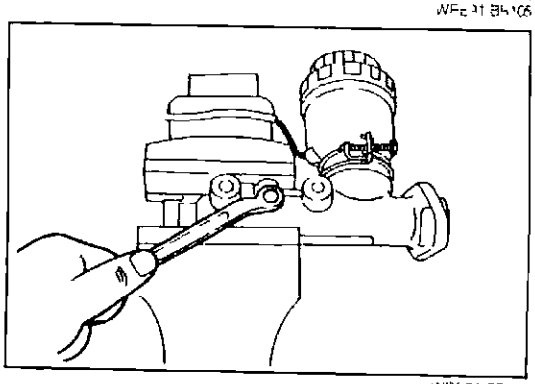
- Never reuse the snap ring.



WRE91 BR105

10 Install the set bolt to the master cylinder with a new gasket interposed.

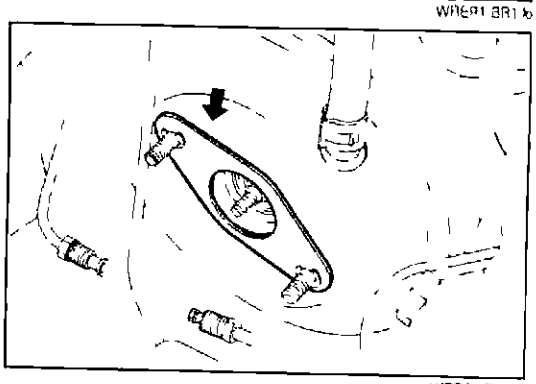
Tightening Torque: 6.9 - 10.8 N·m (0.7 - 1.1 kgf-m, 5.1 - 8.0 ft-lb)



WRE91 BR106

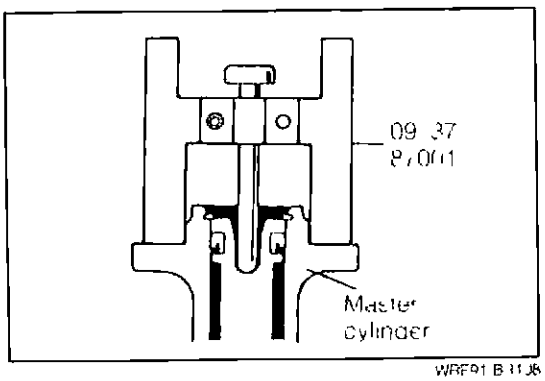
11 Ensure that the gasket at the brake booster side exhibits no damage.

If any damage is present, replace the gasket.

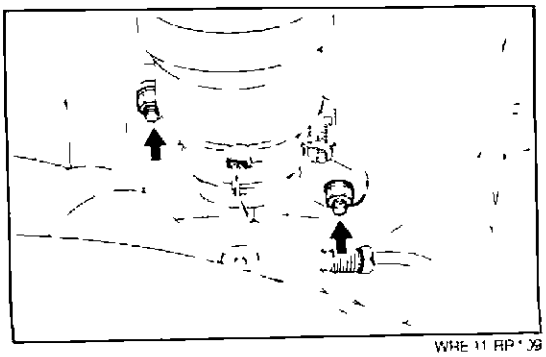


WRE91 BR107

12 Adjust the clearance between the brake booster push rod and the master cylinder
(See page BR–54)

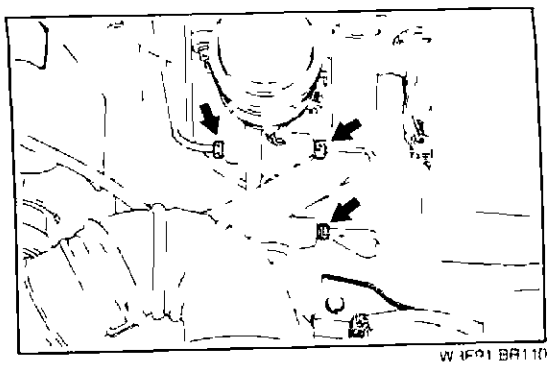


13 Install the master cylinder to the brake booster Tighten the attaching nuts evenly to the specified torque over two or three stages
Tightening Torque: 10.2 - 15.3 N·m
(1.04 - 1.56 kgf-m, 7.52 - 11.3 ft-lb)

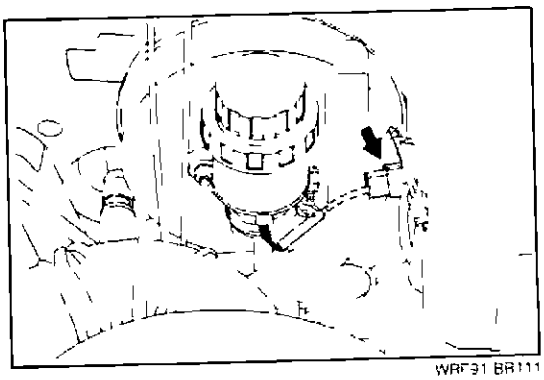


NOTE:
- The installation section at the vehicle exterior side should be tightened together with the connector bracket of the brake fluid level switch.

14 Connect the brake tubes to the master cylinder Tighten the flare nut to the specified torque using a flare nut wrench.
Tightening Torque: 12.7 - 17.7 N·m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)

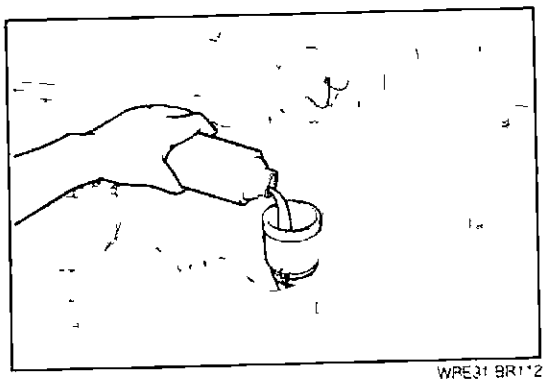


15 Reconnect the brake fluid level switch connector.



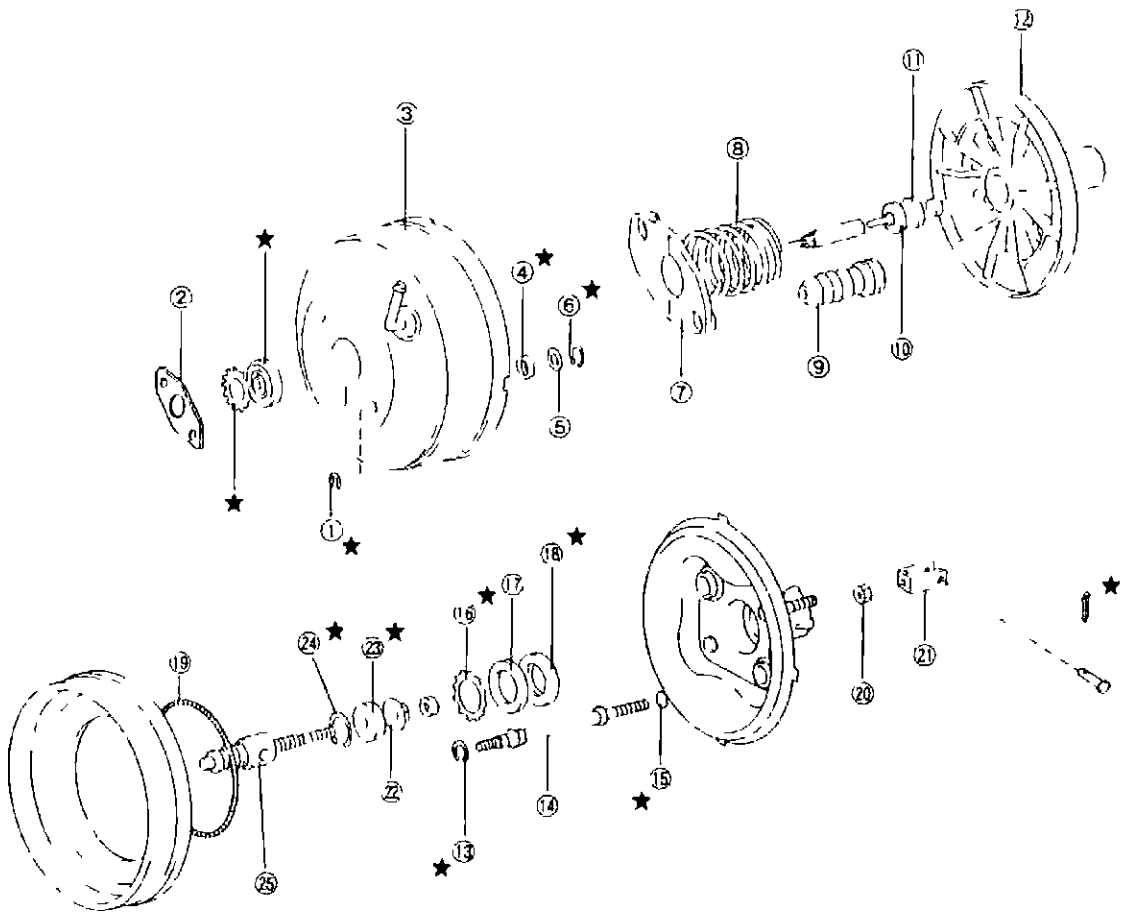
16 Fill brake fluid to the reservoir tank
Specified Brake Fluid: DOT 3 or SAEJ - 1703

17 Perform air bleeding
(See page BR–25)
18 Ensure that no brake fluid leakage is present
19 Check and adjust the brake pedal height
(See page BR–22.)



BRAKE BOOSTER

COMPONENTS



★ : **Non-reusable parts**

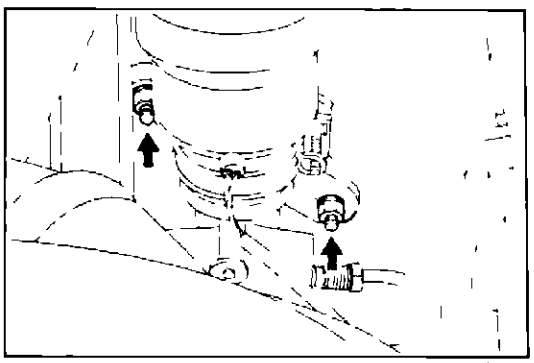
① E ring
② Gasket
③ Booster body
④ Tie rod seal
⑤ Seal plate
⑥ Snap ring
⑦ Spring retainer
⑧ Booster spring
⑨ Tie rod boot
⑩ Reaction ring
⑪ Reaction rubber
⑫ Booster piston
⑬ Snap ring
⑭ Tie rod
⑮ O ring
⑯ Bush stopper
⑰ Bush
⑱ Piston seal
⑲ Diaphragm band
⑳ Nut
㉑ Clevis master cylinder push rod
㉒ Booster operating rod adjusting nut
㉓ Element
㉔ Booster piston stop ring
㉕ Poppet valve complete

REMOVAL

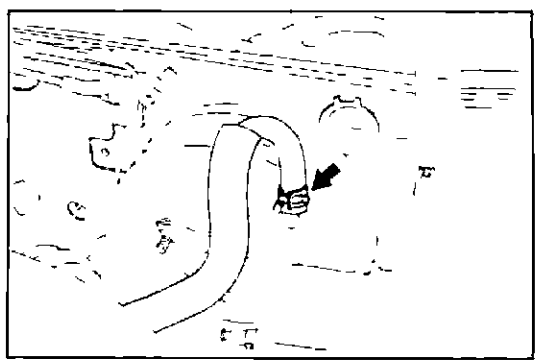
NOTE:

- If any brake fluid gets on the painting surface, immediately wipe off the brake fluid and wash the painting surface with water.

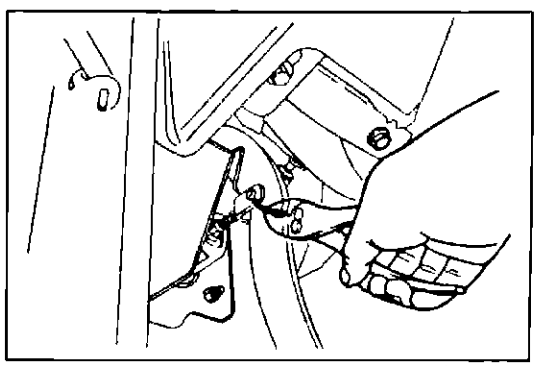
1 Remove the master cylinder
(See page BR–33)



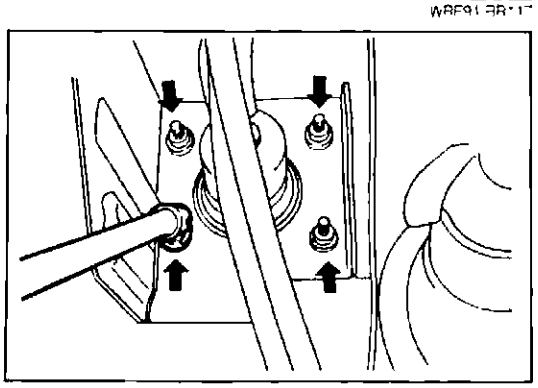
2 Disconnect the brake booster hose from the brake booster.



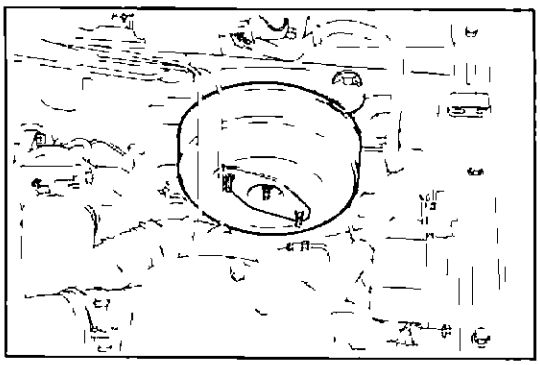
3 Remove the clevis pin by removing the cotter pin



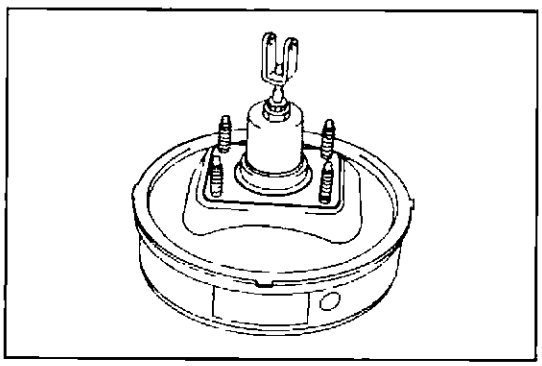
4 Remove the brake booster attaching nuts.



5 Remove the brake booster from the dash panel
CAUTION:
- Be very careful not to damage the brake tubes.

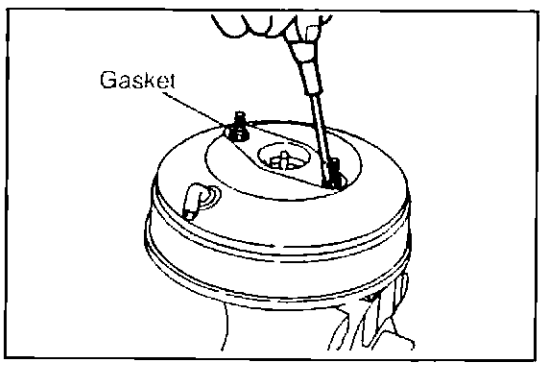

WRE91 BR119

6 Remove the gasket from the brake booster


WRE91 BR120

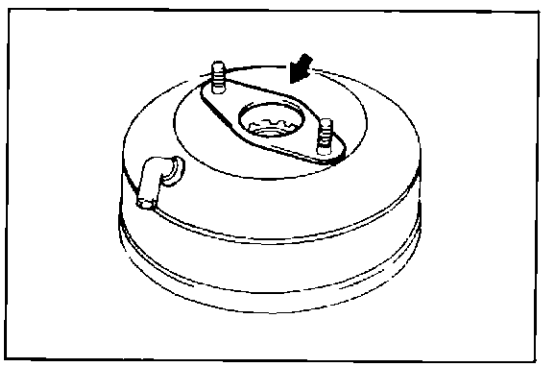
DISASSEMBLY

1 Remove the "E" ring
NOTE:
- Never reuse the "E" ring.

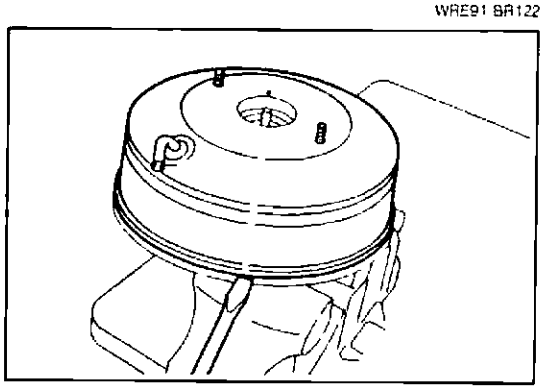


WRE91 BR121

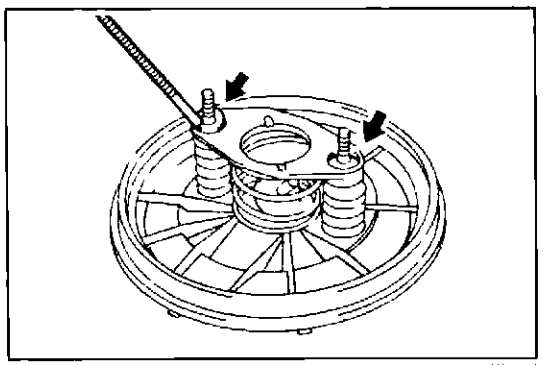
2 Remove the gasket
NOTE:
- Never reuse the gasket.


WRE91 BR122

3 Remove the booster piston rod
4 Remove the booster body from the booster housing, using a standard screwdriver or the like.
NOTE:
- Be very careful not to deform the booster body and booster housing.

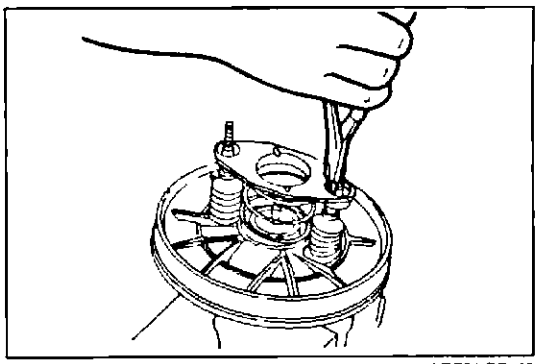

WRE91 BR123

5 Remove the tie rod seal, using a minor screwdriver or the like
NOTE:
- Never reuse the tie rod seal.

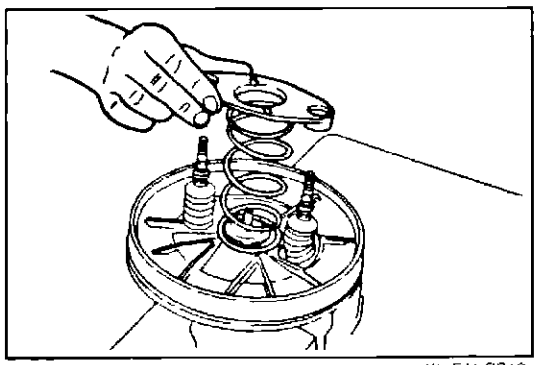

WRE91 BR124

6 Remove the tie rod seal plate, using a magnet finger or the like

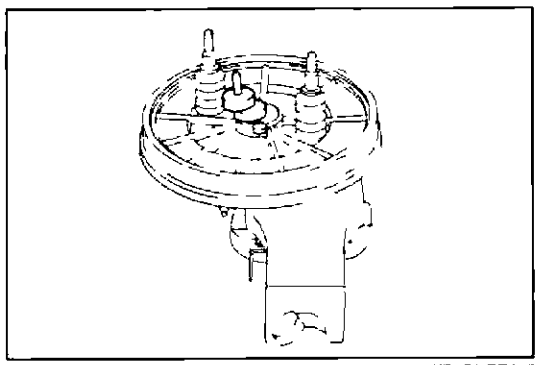
7 While holding the spring retainer, remove the snap rings


WRE01 BR 25

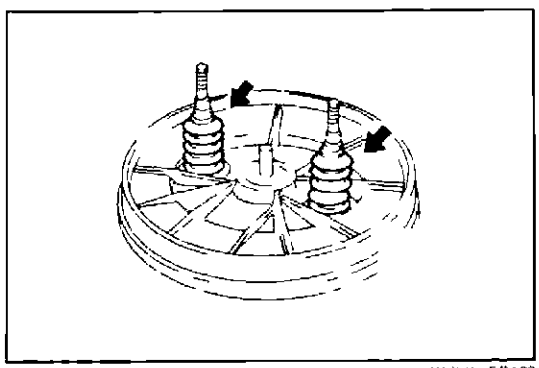
8 Remove the spring retainer and booster spring from the booster piston


W-E31 BR126

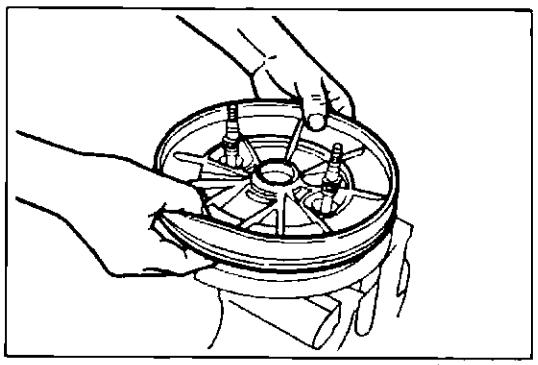
9 Remove the reaction ring, rubber and reaction plate


WRE91 BR127

10 Remove the tie rod boot from the tie rod and piston

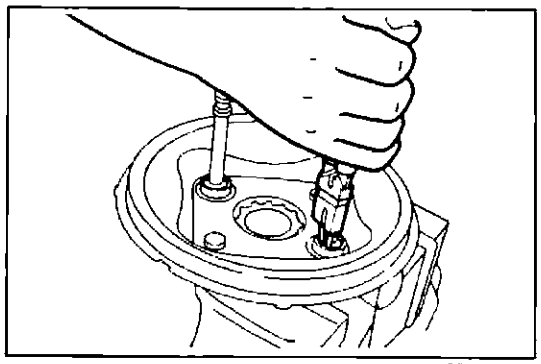

WRE9 BR128

11 Remove the booster piston from the booster housing



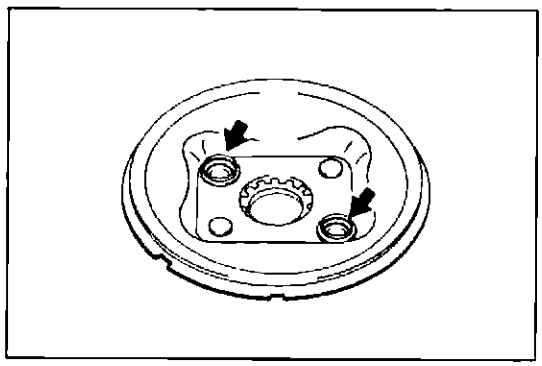
WRE91 BR129

12 Remove the snap rings. Remove the tie rod from the booster housing



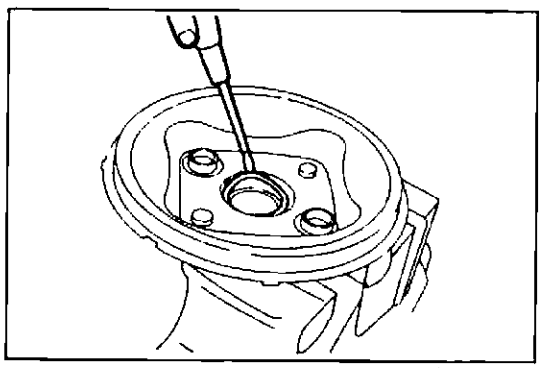
WRE91 BR130

13 Remove the "O" ring from the booster housing
NOTE:
- Never reuse the "O" ring.



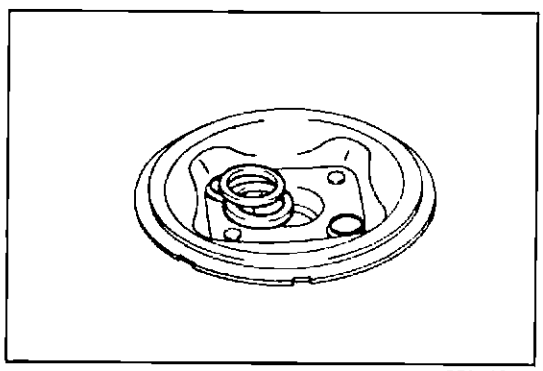
WRE91 BR131

14 Remove the bush retainer
NOTE:
- Never reuse the bush retainer.



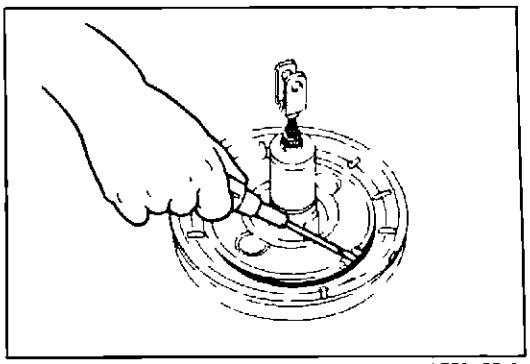
WRE91 BR132

15 Remove the bush and piston seal from the booster housing
NOTE:
- Never reuse the piston seal.



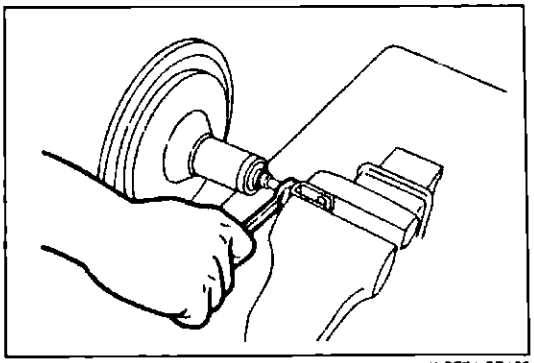
WRE91 BR133

16 Remove the diaphragm band Remove the diaphragm



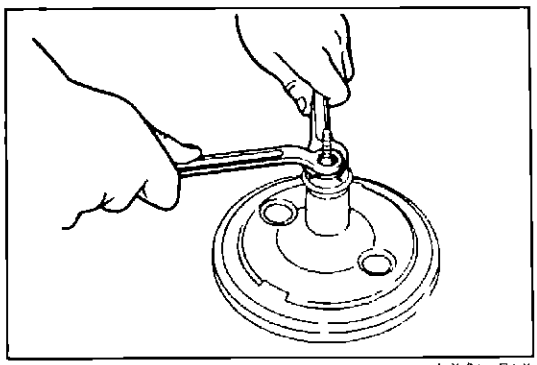
ARF91 BR134

17 Loosen the lock nut Remove the clevis and lock nut



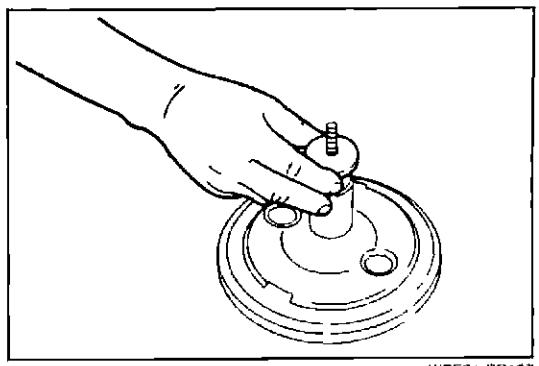
WRE91 BR135

18 Loosen the lock nut Remove the lock nut and adjusting nut



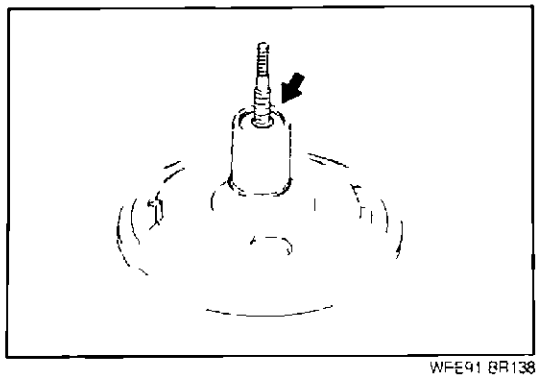
WRE91 BR136

19 Remove the element from the booster piston



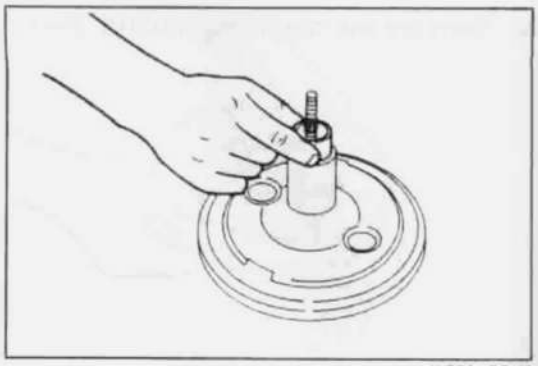
WRE91 BR137

20 Remove the booster piston stop ring



WRE91 BR138

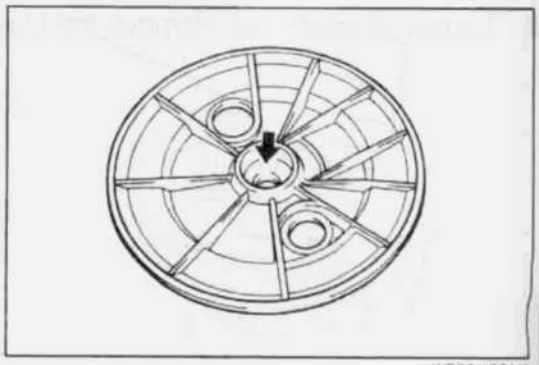
21. Remove the poppet valve assembly from the booster piston.



WRE91-BR139

NOTE:

- If any difficulty is encountered in drawing out the poppet valve, lightly tap the poppet valve from the back side of the piston with a suitable rod interposed.

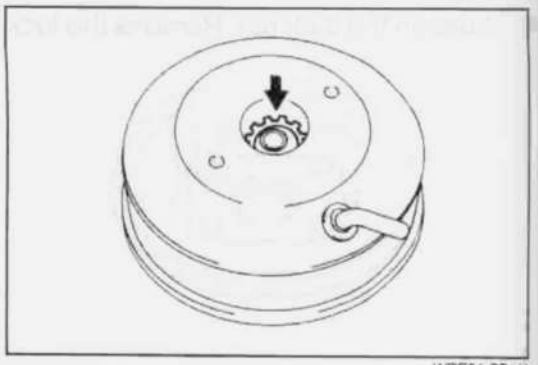


WRE91-BR140

22. Remove the circular internal ring from the booster body.

NOTE:

- Never reuse the circular internal ring.

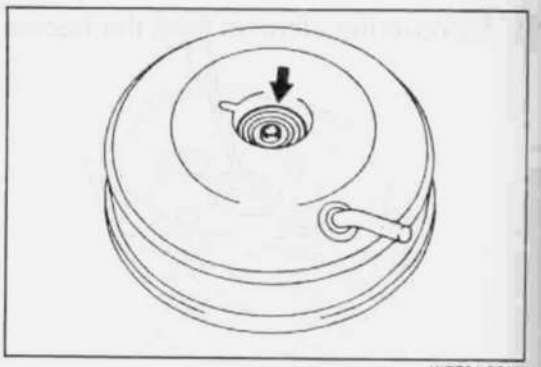


WRE91-BR141

23. Remove the booster plate and seal from the booster body.

NOTE:

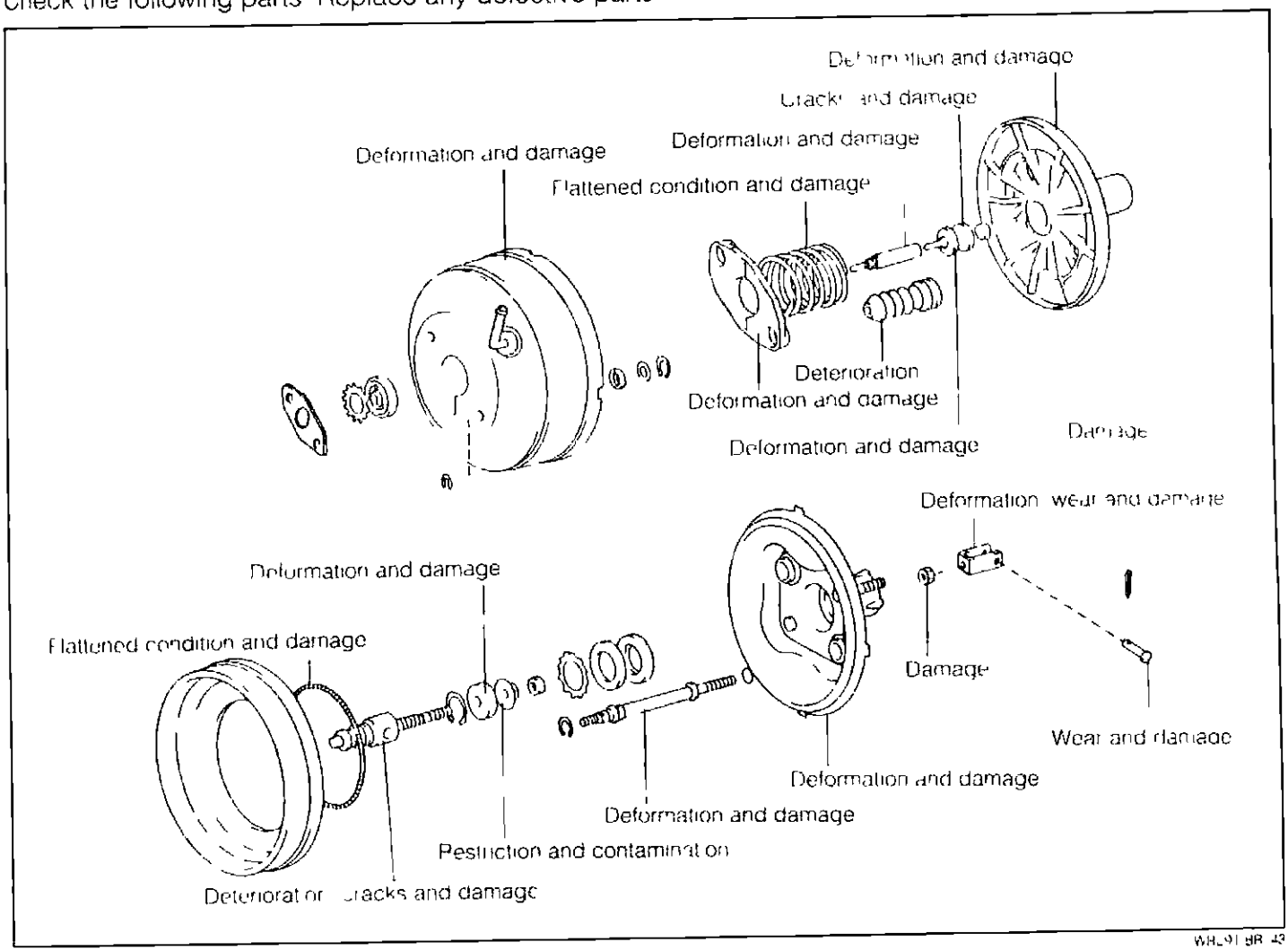
- Never reuse the booster plate and seal.



WRE91-BR142

INSPECTION

Check the following parts Replace any defective parts



WHL91 BR 43

ASSEMBLY

NOTE:

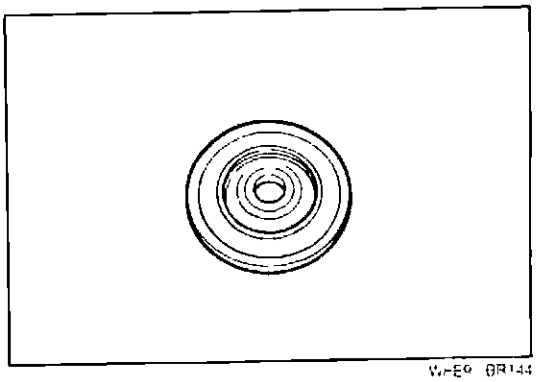
- Be sure to use the silicone grease furnished in the gasket kit.

1 Thinly apply silicone grease to the inner surfaces of the booster plate and seal

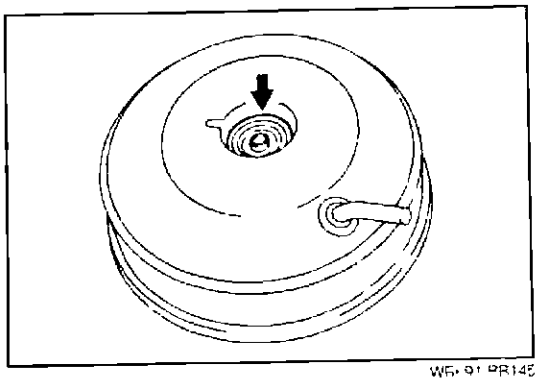
NOTE:

- Be sure to use a new booster plate and seal.
- If silicone grease has been already applied to those new parts, it is unnecessary to perform this step.

2 Install the booster plate and seal to the booster body

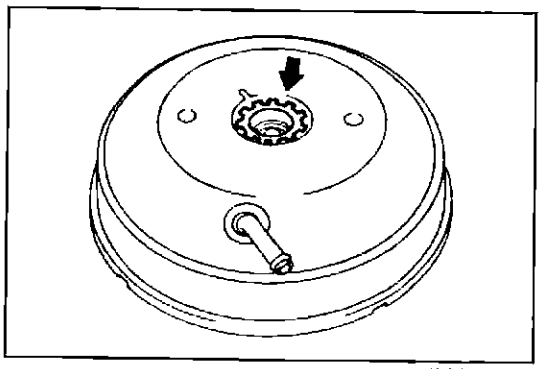


WHE9 BR144



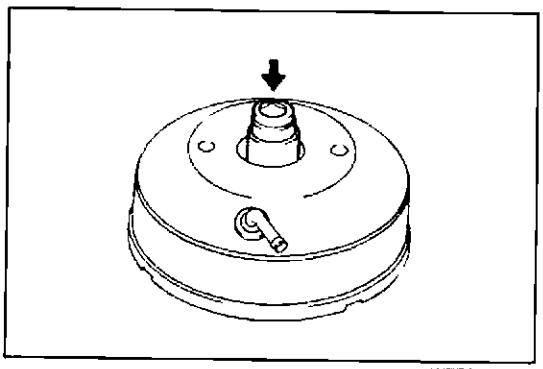
WHE91 BR145

3 Place the circular internal ring on the booster body



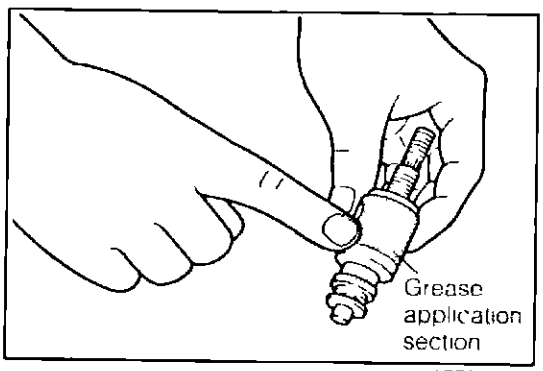
WRE91 BR146

4 While applying a box wrench having a suitable outer diameter on the circular internal ring, press the circular internal ring into the booster body



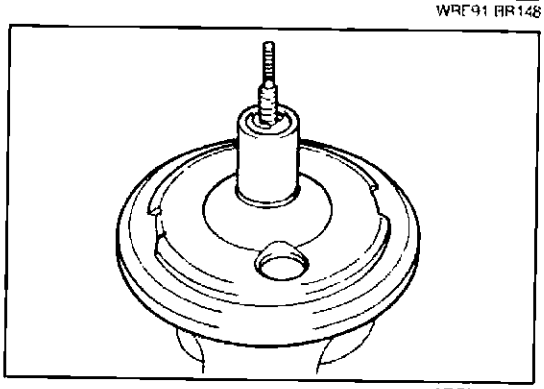
WRE91 BR147

5 Thinly apply silicone grease to the poppet valve at the section indicated in the right figure



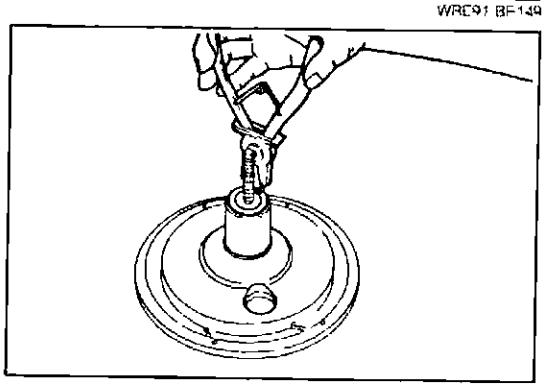
WRE91 BR148

6 Insert the poppet valve into the piston



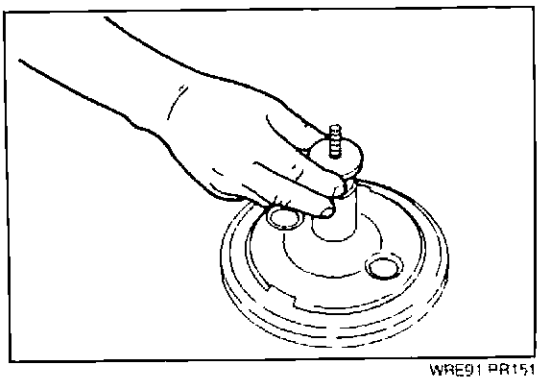
WRE91 BR149

7 While pushing the booster piston stop ring toward the poppet valve, install the booster piston stop ring to the piston
NOTE.
- Make sure that the stop ring is securely fitted into the groove of the piston inner surface.

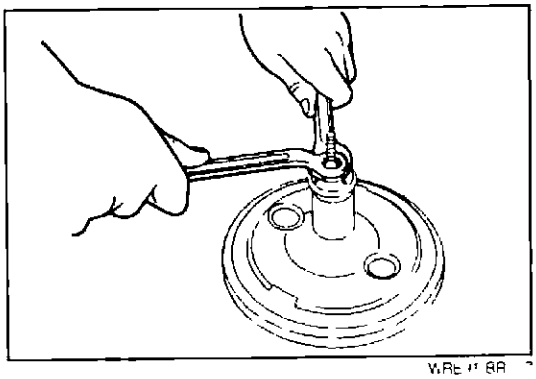


WRE91 BR150

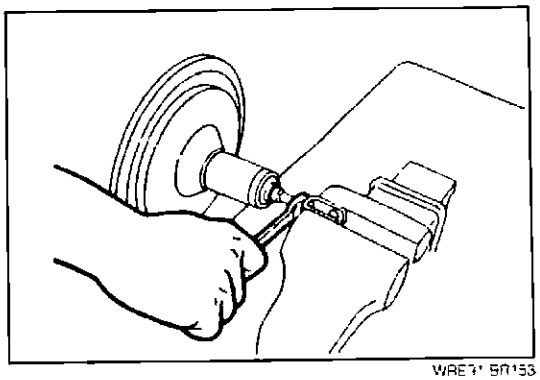
8 Install the element to the booster piston



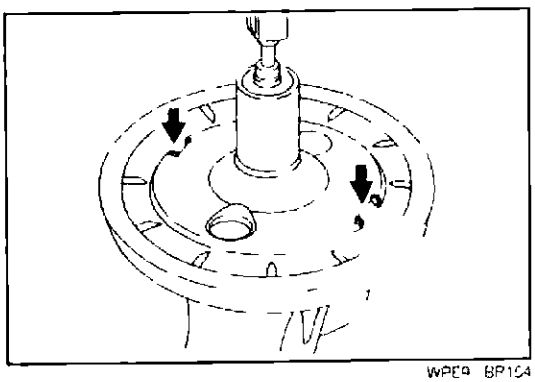
9 Install and temporarily tighten the lock nut and adjusting nut



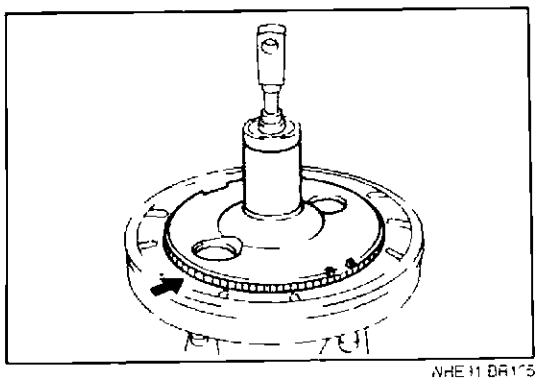
10 Install and temporarily tighten the lock nut and clevis



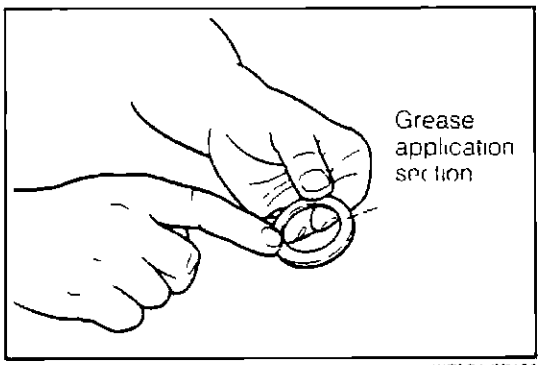
11 Install the diaphragm to the piston while aligning the diaphragm with the cut-out section



12 Install the diaphragm stopper to the diaphragm in such a way that its connection may not be aligned with the cut-out section



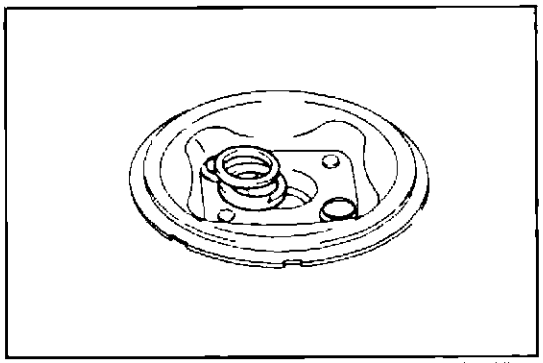
13 Thinly apply silicone grease to the piston seal



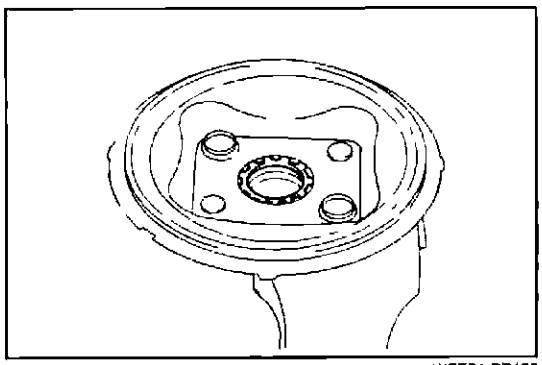
WRE91 BR156

14 Install the piston seal to the booster housing
NOTE:
- Be sure to use a new piston seal.

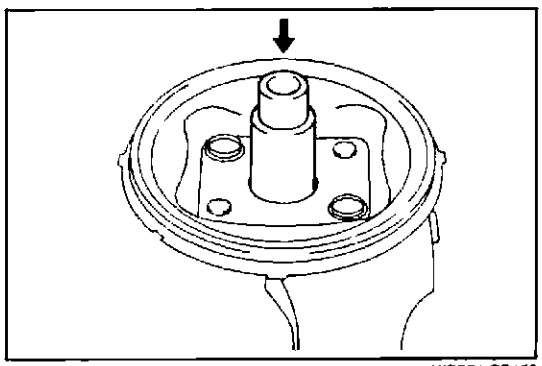
15 Install the bush to the booster housing.


WRE91 BR157

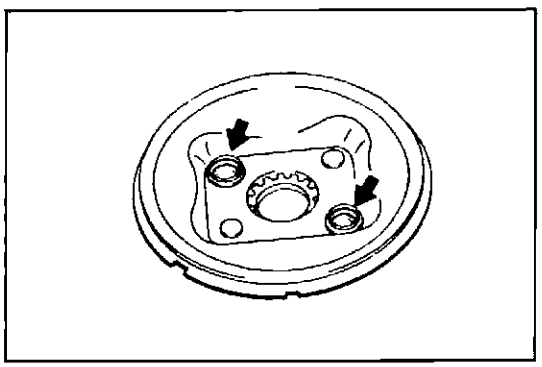
16 Lightly fit the bush retainer to the booster housing.
NOTE:
- Be sure to use the new bush retainer.


WRE91 BR158

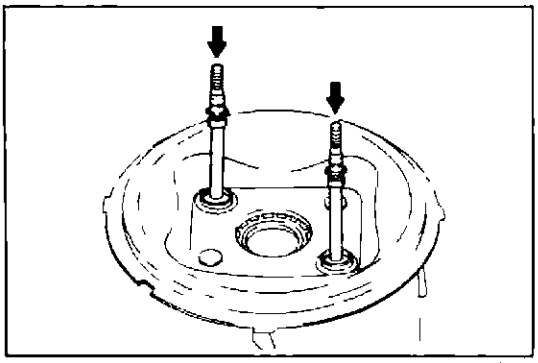
17 Press the retainer into the booster housing, using a box wrench having a suitable outer diameter or the like


WRE91 BR159

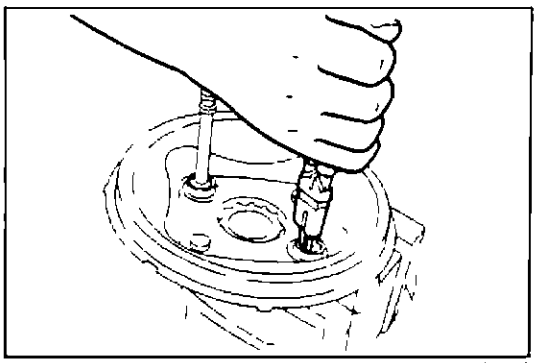
18 Install the "O" ring to the booster housing.
NOTE.
- Be sure to use the new "O" ring.


WRE91 BP160

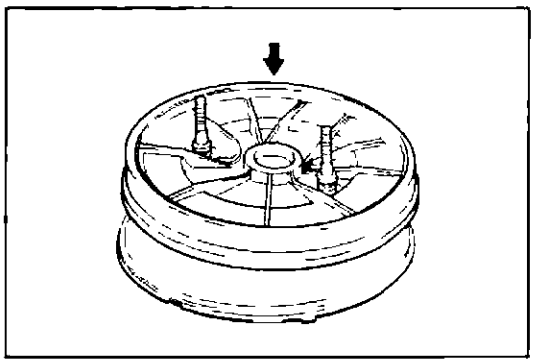
19 Install the tie rod to the booster housing


WRE91 BR161

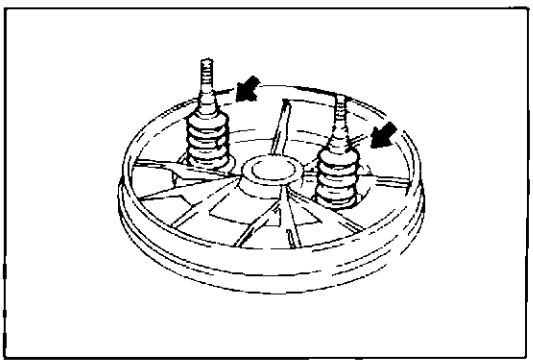
20 Secure the tie rod to the booster housing with a snap ring
NOTE.
- Be sure to use a new snap ring.
- Make sure that the snap ring is securely fitted into the groove section of the booster housing.


WRE91 BR162

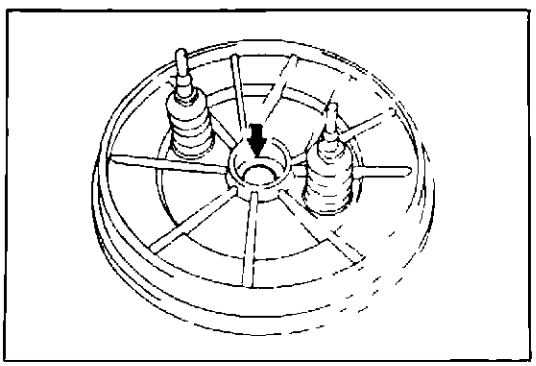
21 Install the booster piston to the booster housing while aligning the protruding section of the diaphragm with the cut-out section of the booster housing


WRE91 BR163

22 Assemble the tie rod boot to the tie rod and piston
NOTE:
- Be sure to use a new tie rod boots.
- Be very careful not to damage the rod boot by the threaded portion of tie rod.

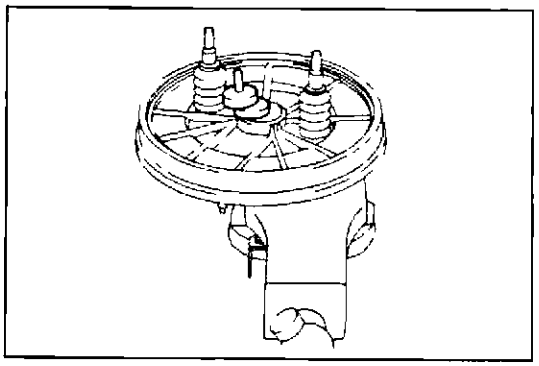

WRE91 BR164

23 Install the reaction plate to the booster piston
NOTE:
- The reaction plate should be assembled in such a way that the recessed side may come at the piston side.

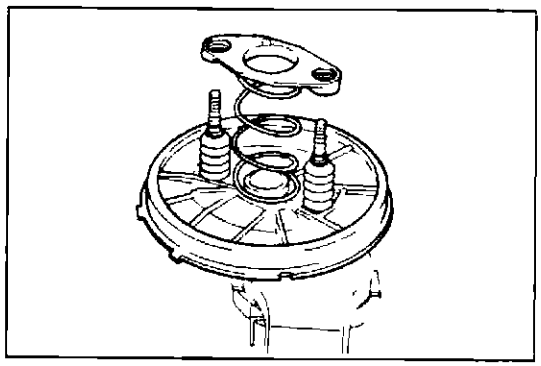

WRE91 BR165

24 Thinly apply silicone grease to the rubber surface
NOTE:
- Never reuse the rubber.

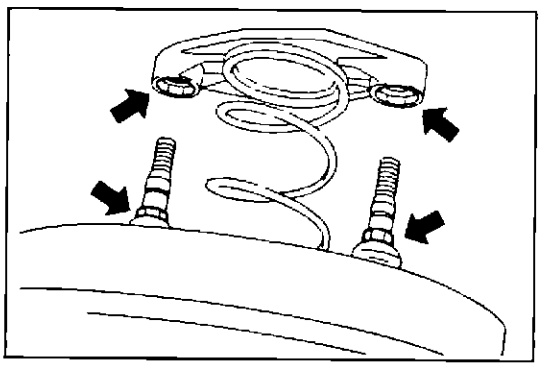
25 Install the rubber and reaction ring to the booster piston.


WRE91 BR167

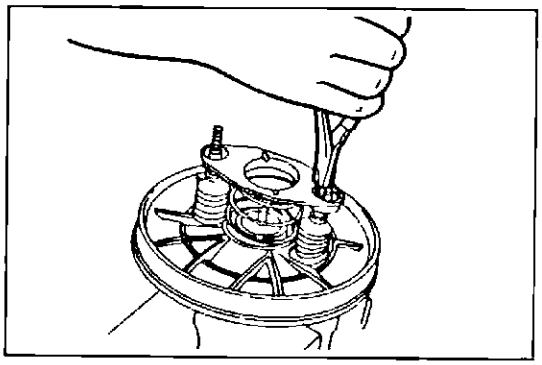
26 Place the booster spring and retainer on the piston


WRE91 BR167

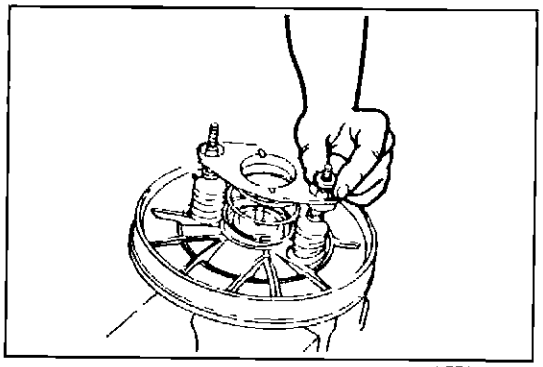
27 Align the recessed section of the retainer with the direction of the tie rod connecting section


WRE91 BR168

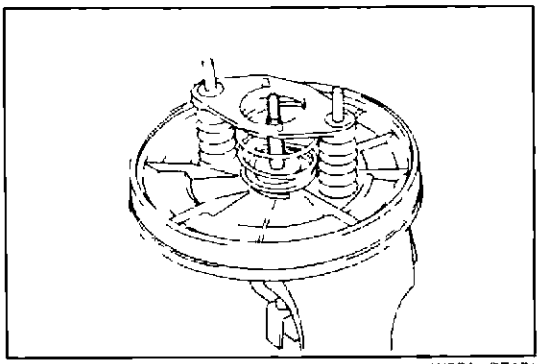
28 While holding the retainer, install the snap ring


WRE91 BR169

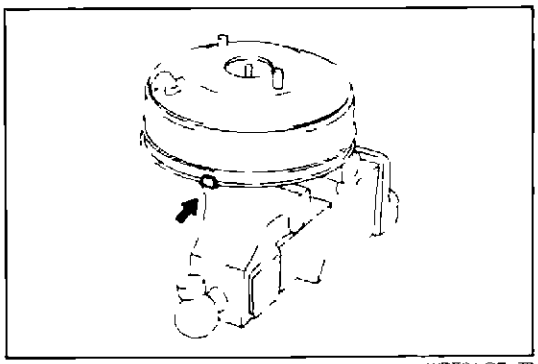
29 Install the tie rod seal plate to the tie rod section
30 Thinly apply silicone grease to the tie rod seal Install the tie rod seal to the tie rod section
NOTE:
- Make sure that the lip surface of the oil seal faces upward.


WRE91 BR170

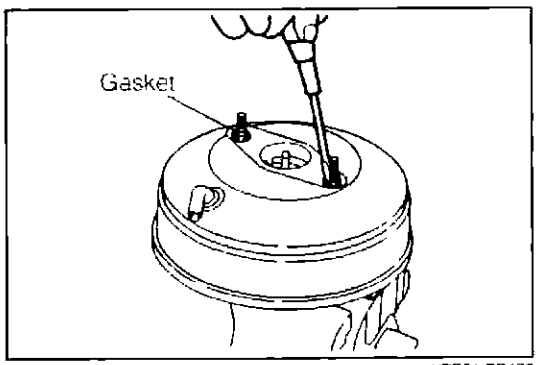
31 Apply a small amount of silicone grease to the forward end of the reaction ring shaft
32 Install the booster piston rod Apply a small amount of silicone grease to the forward end of the booster piston rod



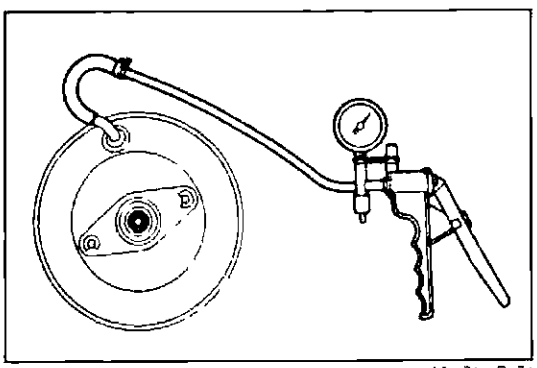
33 Install the booster body to the booster housing while aligning the cut-out section
NOTE.
- Slowly and completely fit the booster body with the housing.



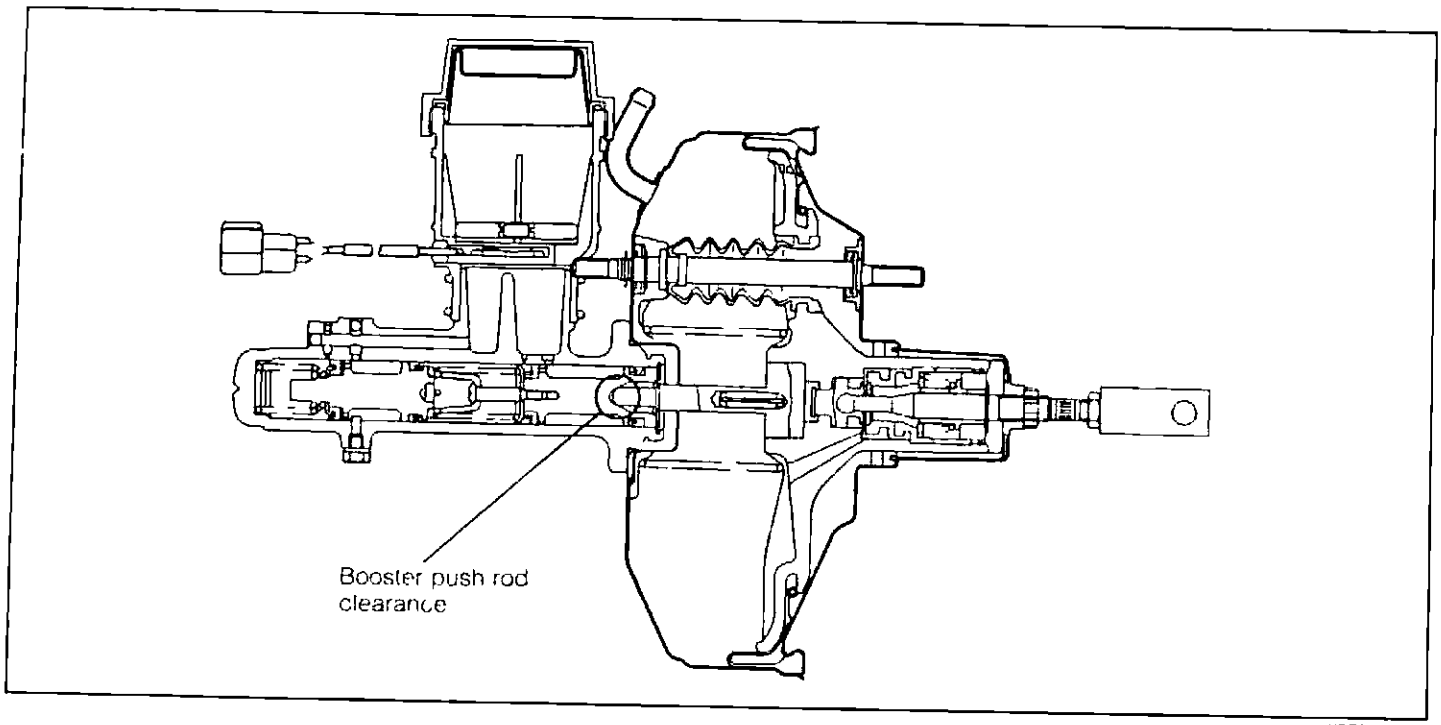
34 Install the gasket to the booster body
35 Install the new "E" rings.
NOTE:
- Do not reuse the "E" rings.



36 Apply negative pressure to the brake booster, using a Mity-Vac At this time, ensure that no air leakage is present



ADJUSTMENT OF PUSH ROD CLEARANCE



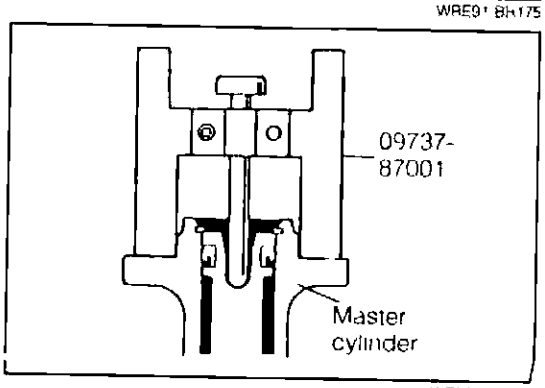
WRE91 BR175

1 Place the following SST on the master cylinder. Adjust the central rod of the SST so that it may contact with the bottom of the piston.

SST: 09737-87001-000

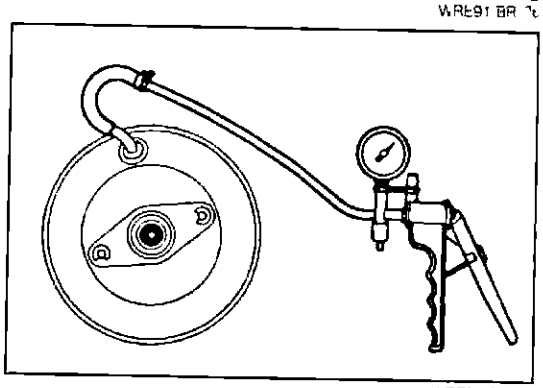
CAUTION:

- Be very careful not to allow the SST or rod to tilt. Failure to observe this caution may lead to brake malfunctioning.



WRE91 BR 7c

2 Apply a negative pressure of 500 mmHg to the brake booster, using a MityVac or the like.



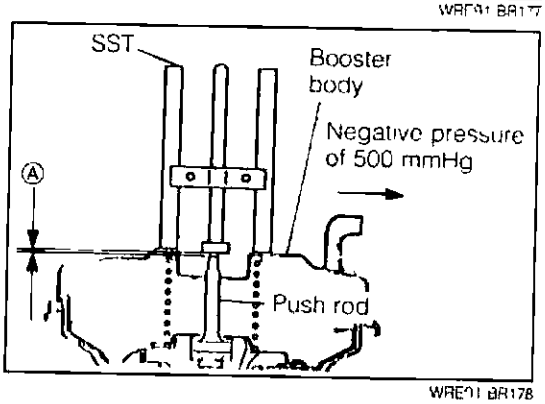
WRE91 BR177

3 Place the SST which was adjusted at the step 1 on the brake booster in a turned-over state, as shown in the right figure. Ensure that the clearance between the push rod and the SST is zero.

If not, adjust the push rod height.

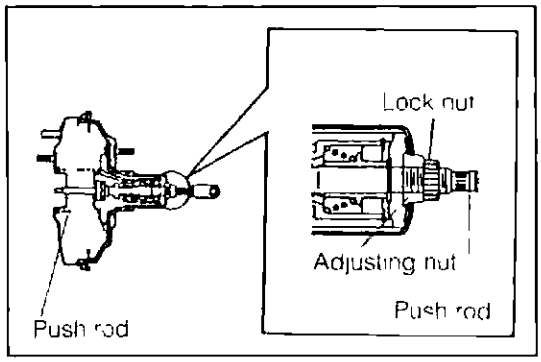
NOTE:

- This operation should be performed with the gasket installed.



WRE91 BR178

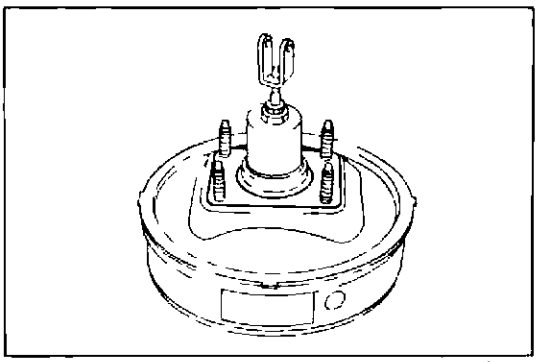
4 Adjustment of push rod height
Loosen the lock nut. While preventing the push rod from turning, turn the adjusting nut, until the push rod height becomes the same height as at the step 3.
5 Tighten the lock nut, while preventing the adjusting nut from turning
Tightening Torque: 20.4 - 30.6 N·m
(2.08 - 3.12 kgf-m, 15.1 - 22.5 ft-lb)



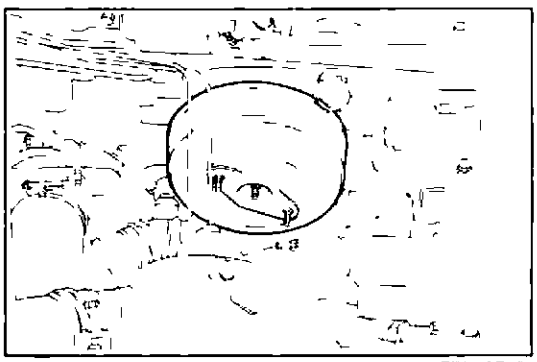
WRF9' BR179

INSTALLATION

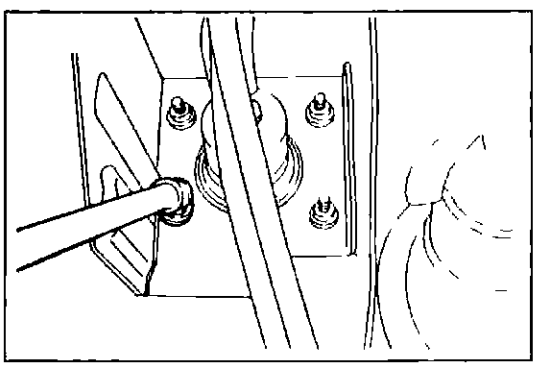
1 Install a new gasket to the dash panel installation surface of the brake booster


WR-97 BR140

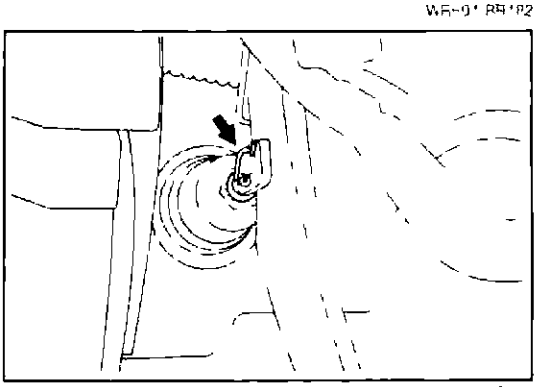
2 Install the brake booster to the dash panel in such a way that the brake booster hose connection may be positioned as indicated in the right figure and that the clevis may be incorporated into the brake pedal
NOTE.
- Be very careful not to deform the brake pipe.


WR'97 BR181

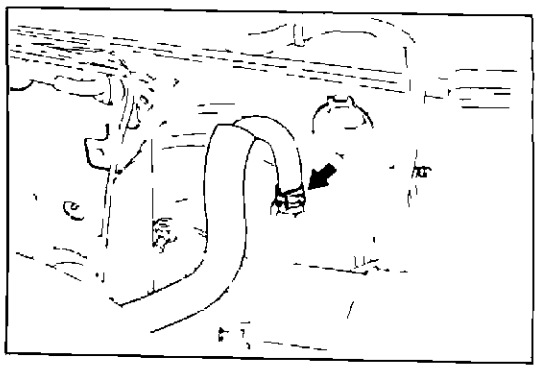
3 Tighten the brake booster attaching nuts
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)


WR-97 BR182

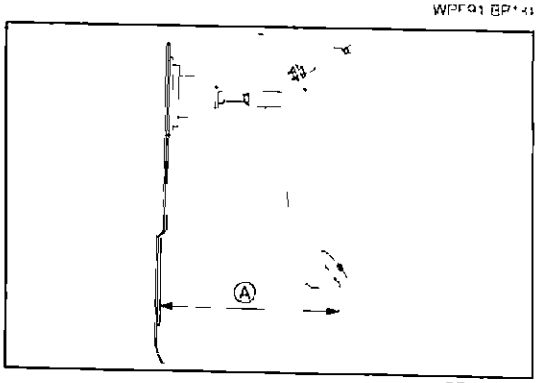
4 Connect the clevis to the brake pedal by means of the clevis pin. Install the cotter pin to prevent the pin from dropping
NOTE:
- Be sure to bend the cotter pin beyond 90 degrees.
- Be sure to apply chassis grease to the pin


WR-97 BR183

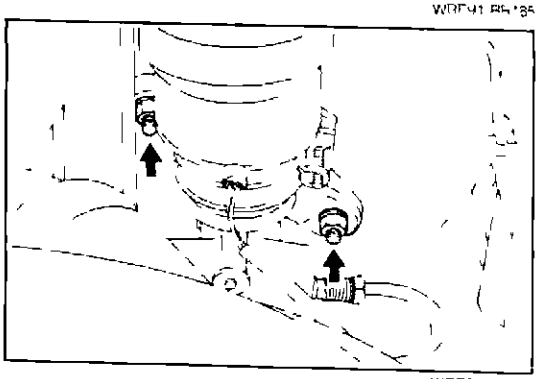
5 Connect the brake booster hose to the brake booster
CAUTION.
- The hose should be connected in such a way that the arrowheaded direction may face toward the engine side. Failure to observe this caution may lead to booster malfunctioning
- Be sure to insert the hose up to the bottom of the spool at the inner side.
- Be sure to install the hose band between the spools.



6 Adjust the brake pedal height
(See page BR-22)

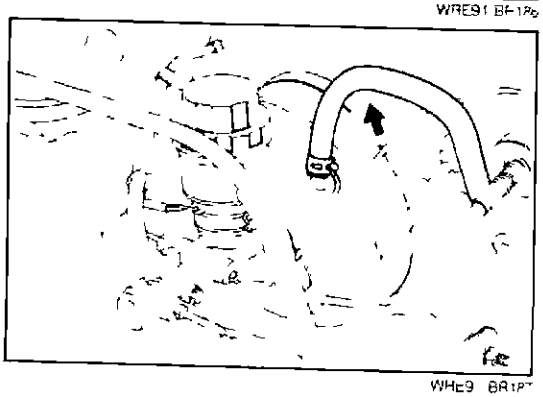


7 Install the master cylinder
(See page BR-36)
CAUTION·
- Prior to the installation of the master cylinder, be sure to adjust the brake booster push rod clearance.



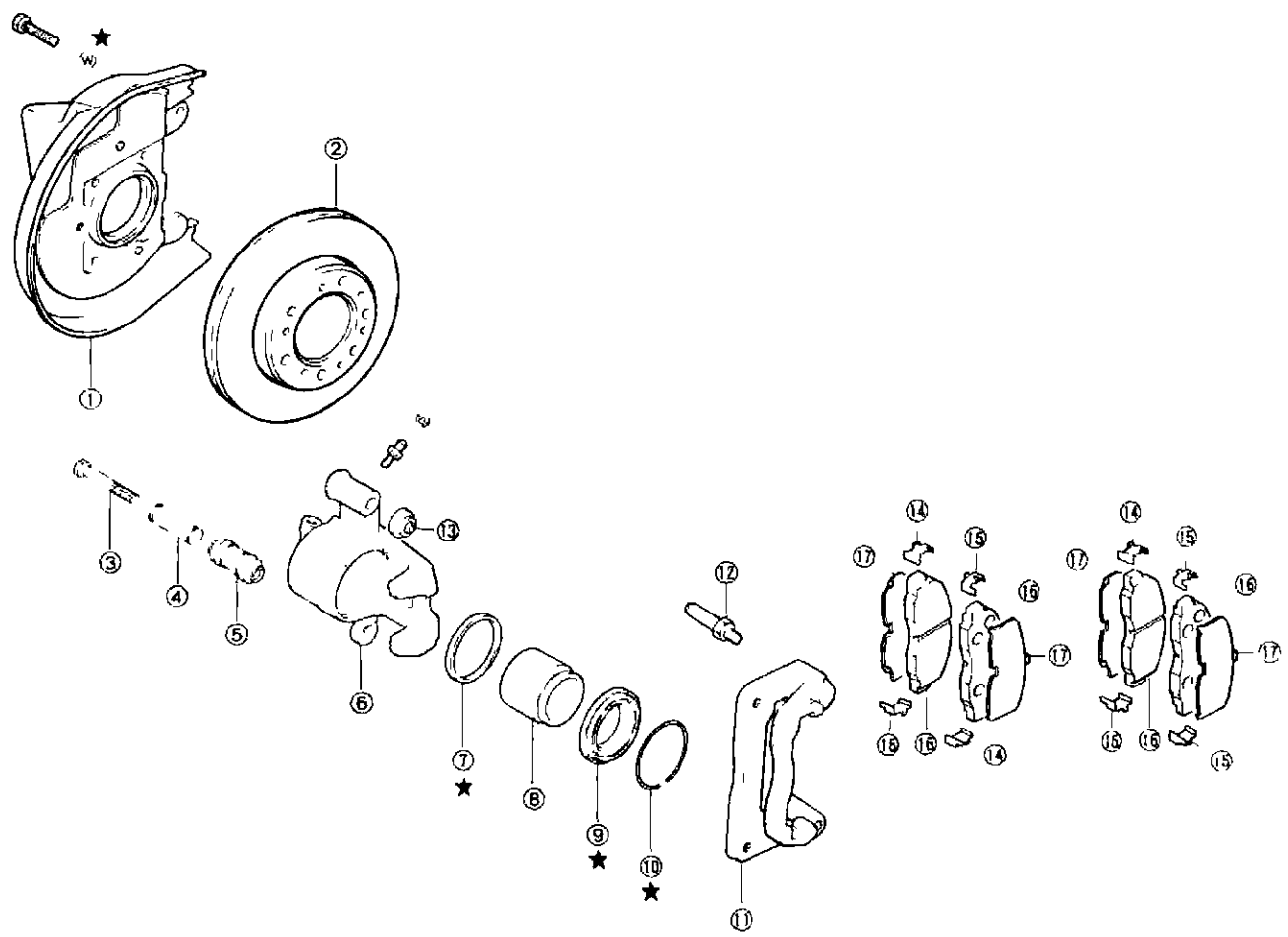
CHECK OF VACUUM HOSE CHECK VALVE

1 Disconnect the booster vacuum hose from booster
2 Apply negative pressure to disconnected hose
Ensure that negative pressure applied and the applied pressure is maintained
If not replace the booster vacuum hose
3 Blow air into the booster vacuum hose from the booster side
Ensure that air continuity exists
If not, replace the booster vacuum hose
4 Connect the brake booster hose to booster Install new hose band
CAUTION.
- Be sure to insert the hose up to the bottom of the spool at the inner side.
- Be sure to install the new hose band between the spools



FRONT BRAKE

COMPONENTS



★ : **Non-reusable parts**

① Disc brake dust cover
② Front disc
③ Bolt
④ Cylinder slide bush
⑤ Bush dust boot
⑥ Brake caliper body
⑦ Piston seal
⑧ Piston
⑨ Rubber boot
⑩ Boot set ring
⑪ Brake mounting support
⑫ Mounting support pin
⑬ Dust boot
⑭ Disc brake pad guide plate
⑮ Disc brake pad guide plate No 2
⑯ Disc brake pad
⑰ Anti-squeal

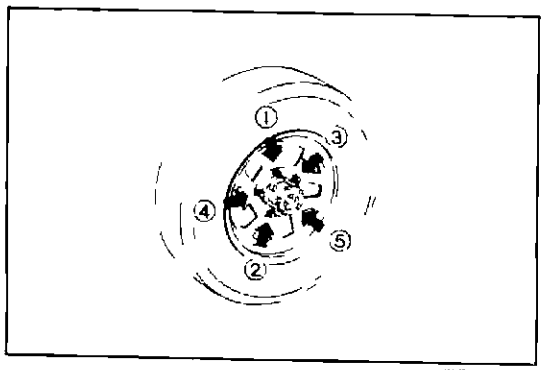
WR_91 BR188

INSPECTION OF BRAKE PAD AND DISC

1 Jack up the vehicle and support it with rigid racks
(As for the jack-up point and rigid rack supporting position, see GI section)

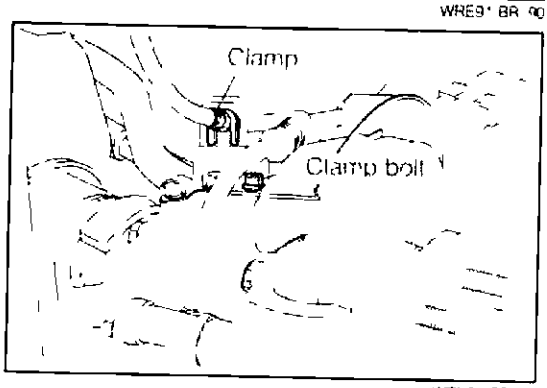
WRE91 BR199

2 Remove the front wheel



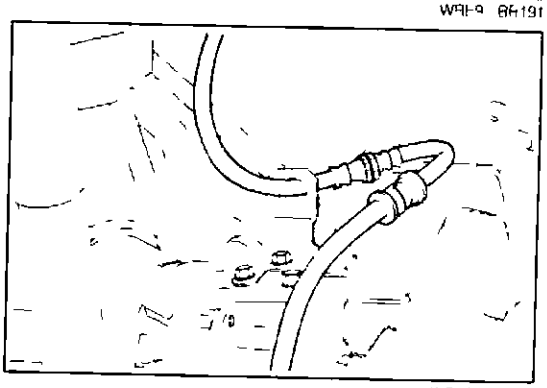
WRE9' BR 00

3 Detach the clamp
4 Remove the brake hose clamp attaching bolt



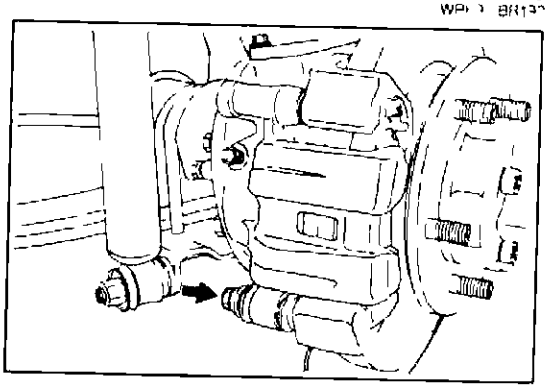
WRE9 BR191

5 Detach the brake hose from the clamp



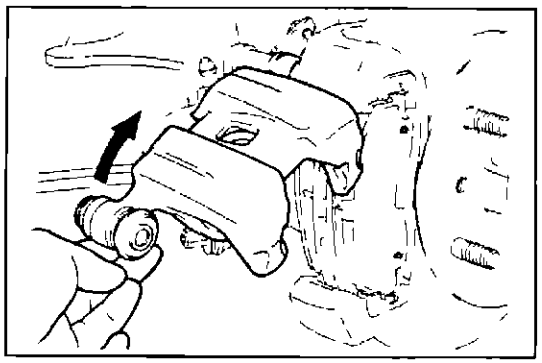
WR[illegible] BR13[illegible]

6 Remove the caliper body attaching bolt



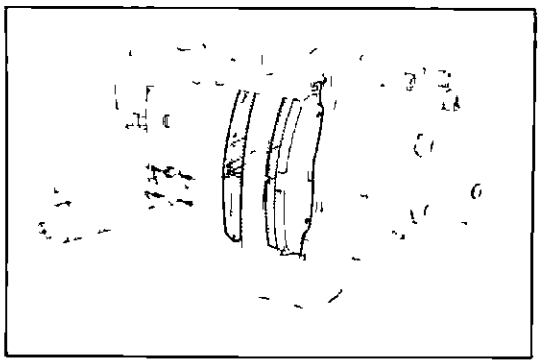
WRE91 BR143

7 Lift the caliper body

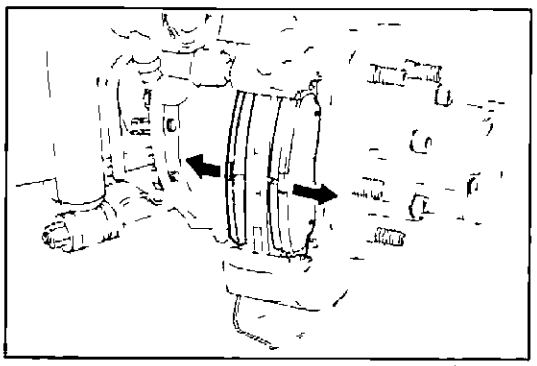


8 Measure the brake pad thickness
New Part: 9 mm
Minimum Limit: 1 0 mm

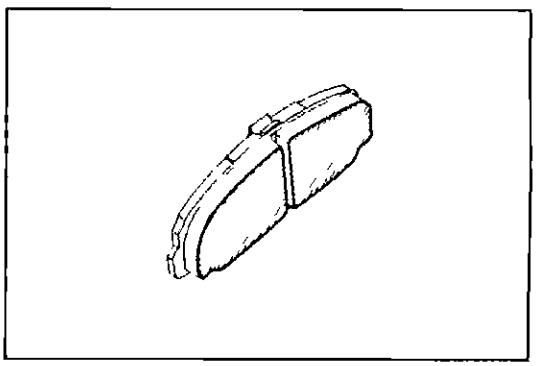
If the measure value is lower than the minimum limit, replace the brake pad



9 Inspection of brake pad
(1) Remove the brake pad
Note:
- **Be very careful not to disengage the disc brake pad guide plate during this operation.**

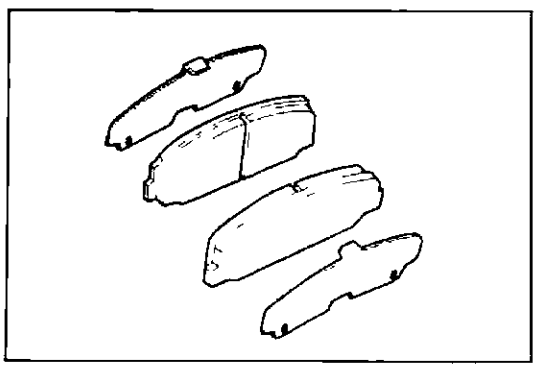


(2) Inspect the brake pad surface for burning
If the brake pad exhibits burning, replace the brake pad



10 Replacement of brake pad
NOTE:
- **When replacing the brake pad be sure to replace the pads inside and outside for both the right and left sides as a set. This replacement is required so as to prevent the vehicle from pulling to one side on application of the brakes.**

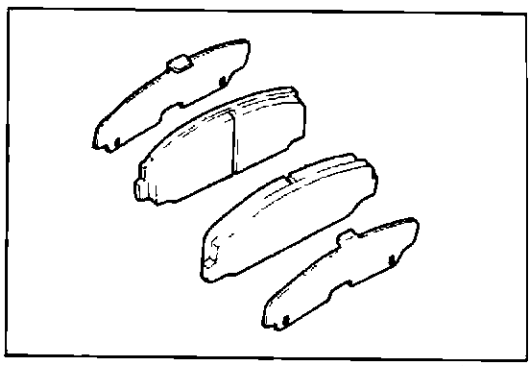
(1) Remove the anti-squeal shims from the disc brake pad.



(2) Clean the anti-squeal shims
(3) Ensure that the anti-squeal shims exhibit no damage
Replace any shim which exhibits damage.

WRE91 BR200

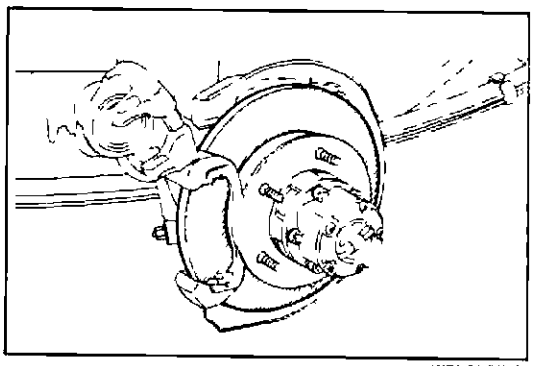
(4) Install the anti-squeal shims to the disc brake pad.



WRE91 BR203

11 Inspection of brake disc
NOTE:
- **Never allow any oil to get to the disc and/or pad surface.**

(1) Ensure that the disc surface exhibits no damage, such as abnormal wear and cracks
If any damage exists on the disc surface, replace the disc (See the front axle & suspension system)

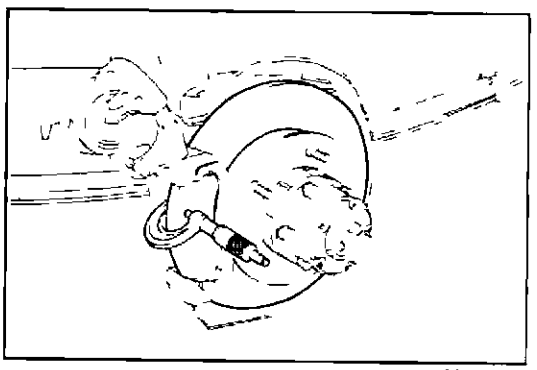


WRE91 BR204

(2) Measure the disc thickness Ensure that the measured value is above the minimum limit

Unit mm

	Standard	Ventilation
New parts thickness	12 5	18 0
Minimum limit thickness	11 5	17 0



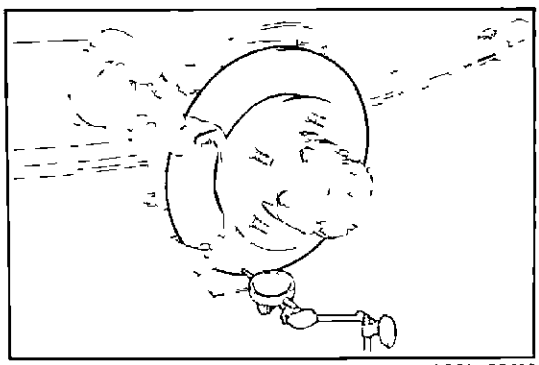
WRE91 BR205

Difference in Disc Thickness on The Same Circumference: **Not to exceed 0.015 mm**

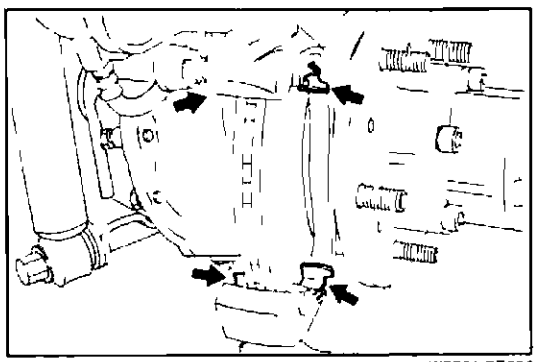
If the measured value is less than the minimum limit, replace the disc
(See the front axle & suspension system.)

(3) Ensure that the runout of the brake disc is within the allowable limit.
Allowable Runout Limit: 0.15 mm

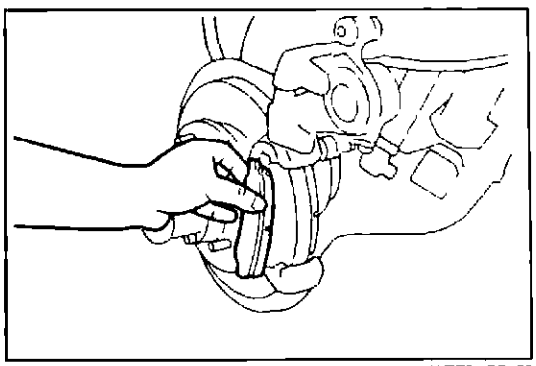
NOTE:
- **Measuring point should be point 10 mm inward from outer periphery of rotor.**


WRE91 BR206

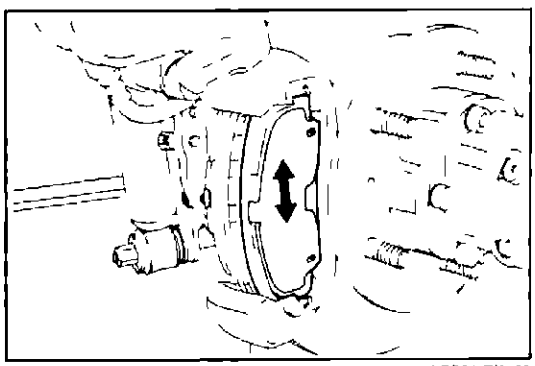
12 Inspection of disc brake pad guide
(1) Ensure that no damage exists on the disc brake pad guide
If any damage is present, replace the disc brake pad guides


WRE91 BR207

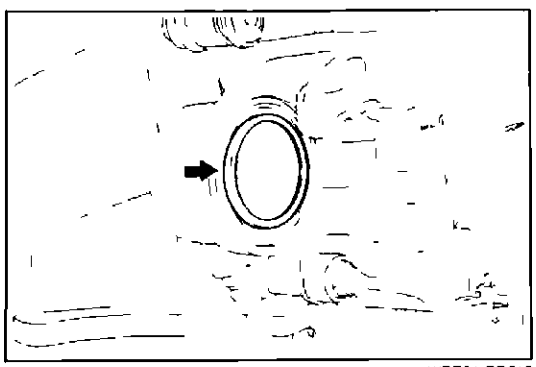
(2) Install the pad to the mounting support.
NOTE:
- **The pad equipped with the warner should come at the inside of the vehicle.**
- **Never allow any oil to get to the pad.**


WRE91 BR208

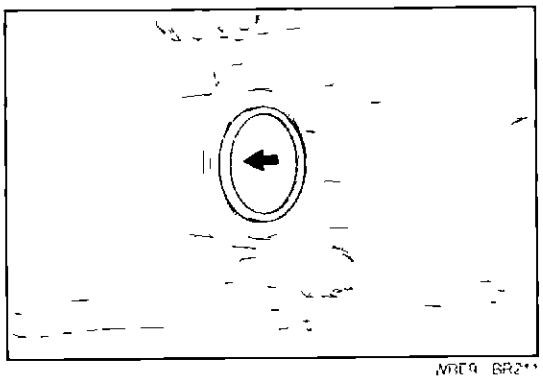
(3) Turn the pad in the rotating direction to ensure that no excessive looseness exists
If any excessive looseness exists, replace the disc brake pad guides.


WRE91 BR209

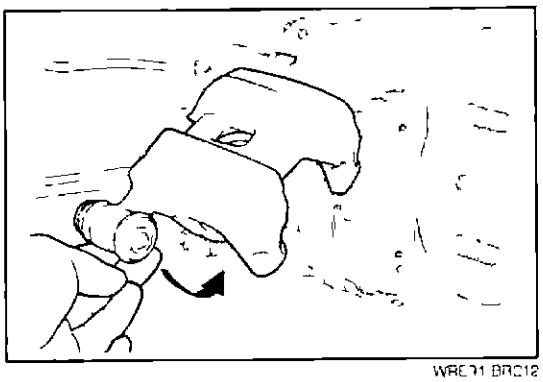
13. Installation of caliper
(1) Inspect the caliper piston for brake fluid leakage
NOTE:
- **If fluid leakage is present, repair the fluid leakage.**


WPF91 BR210

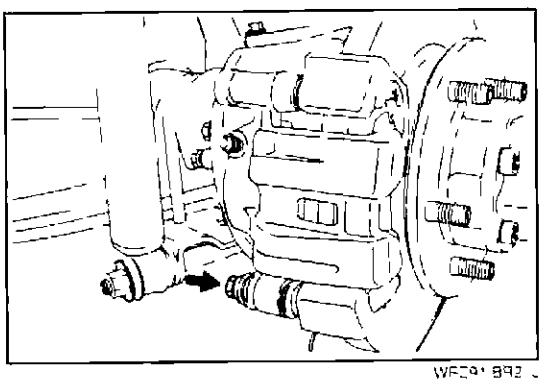
(2) Push the caliper piston to the cylinder side
NOTE:
- Prior to this operation, drain the brake oil, as required, so that no brake oil overflows from the brake reservoir tank during this operation.



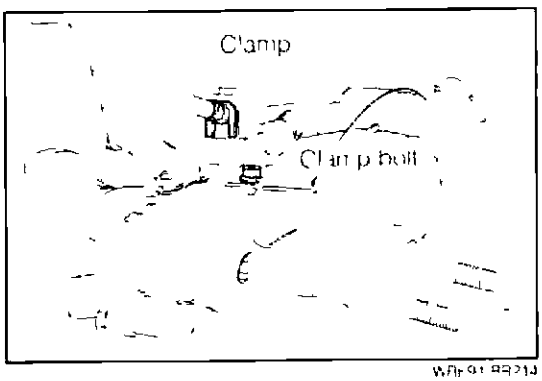
(3) Install the caliper on the brake pad
NOTE:
- Care must be exercised not to bring the caliper into contact with the antisqueal shims during this operation.



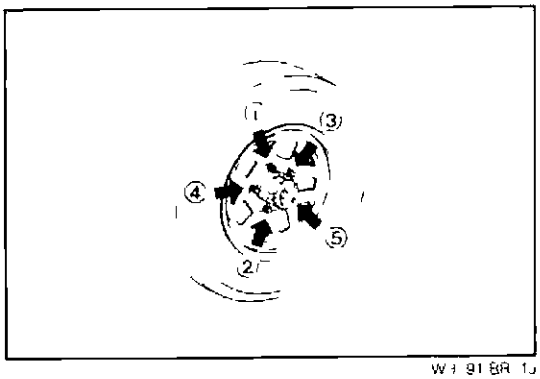
(4) Install the caliper attaching bolt and tighten it to the specified torque
Tightening Torque: 31.4 - 41.2 N·m
(3.2 - 4.2 kgf-m, 23.1 - 30.4 ft-lb)



14 Connect the brake hose clamp to the knuckle and tighten the attaching bolt
15 Connect the brake hose to the bracket. Install a new clamp
NOTE:
- Never reuse the clamp.



16 Install the front wheel and tighten the attaching bolts
17 Check the brake fluid level
18 Perform the brake tests on a brake tester

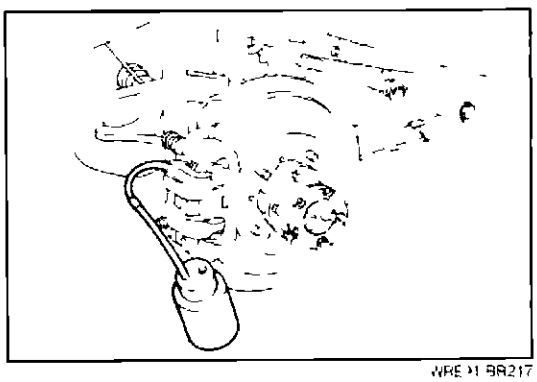


REMOVAL OF BRAKE CALIPER

1 Jack up the vehicle and support it with safety stands (As for the jacking-up points and supporting points for the safety stands, see page GI section)

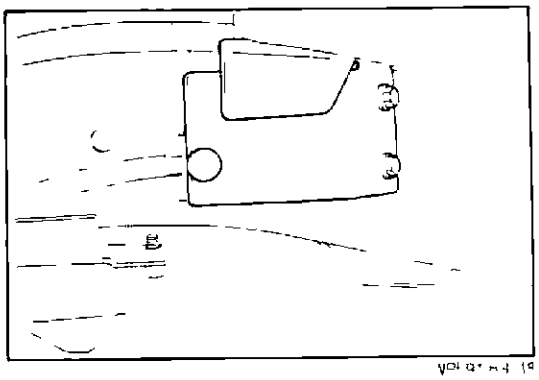
WRE41 BR216

2 Remove the front wheel
3 Drain the brake fluid of the caliper from the air bleeder plug

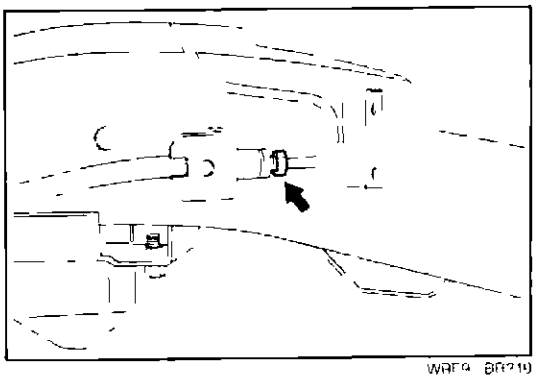


WRE41 BR217

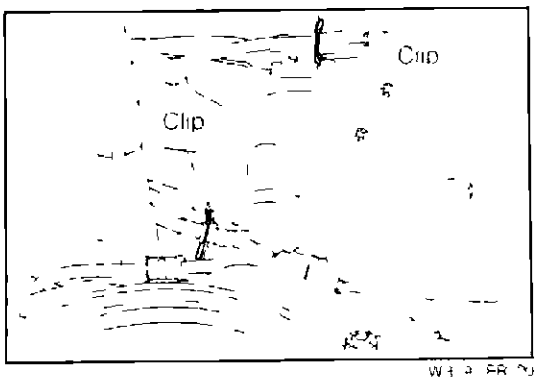
4 Remove the brake pipe protector by removing bolts and clip



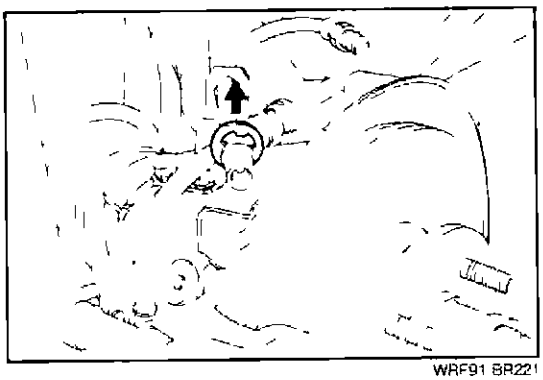
5 Disconnect the brake pipe from brake hose



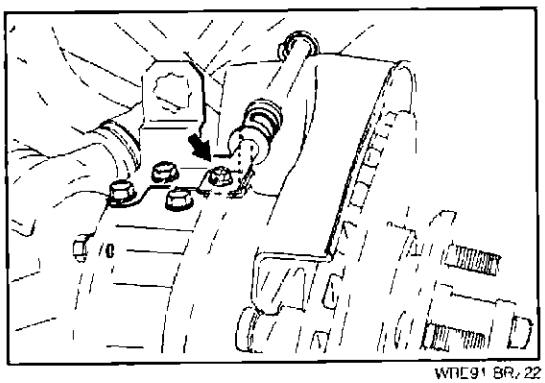
6 Detach the clips
NOTE:
- Do not reuse the removed clips



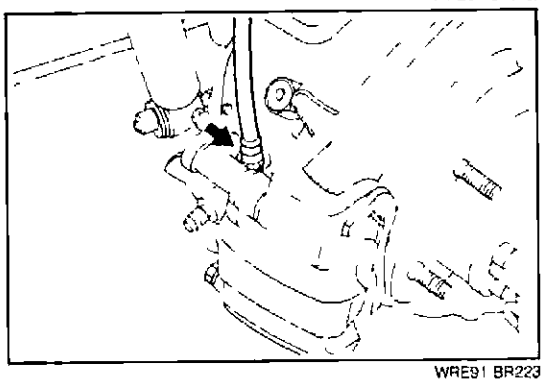
7 Remove the "E" ring from the brake pipe side of brake hose


WRF91 BR221

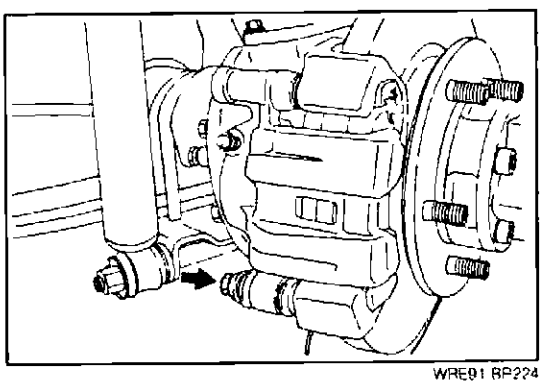
8 Remove the brake hose clamp attaching bolt.


WRE91 BR222

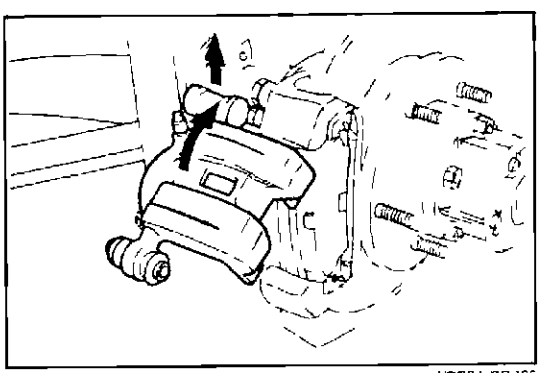
9 Disconnect the brake hose from the disc brake caliper


WRE91 BR223

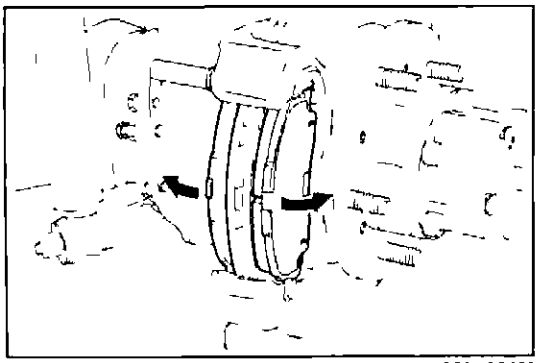
10 Remove the brake caliper attaching bolt


WRE91 BR224

11 Remove the brake caliper from the mounting support pin

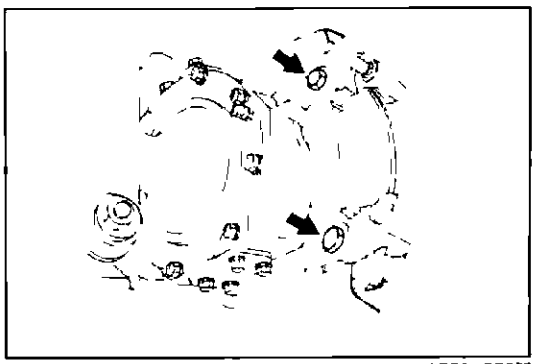

WRE91 BR225

12 Remove the brake pads.



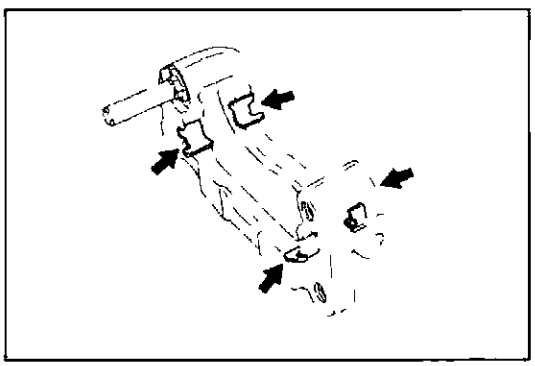
WRE91 BR226

13 Remove the brake mounting support



WRE91 BR227

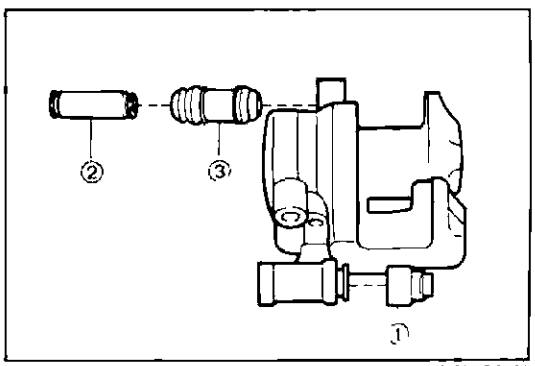
14 Remove the disc brake pad guide plates from the brake mounting support



WRE91 BR228

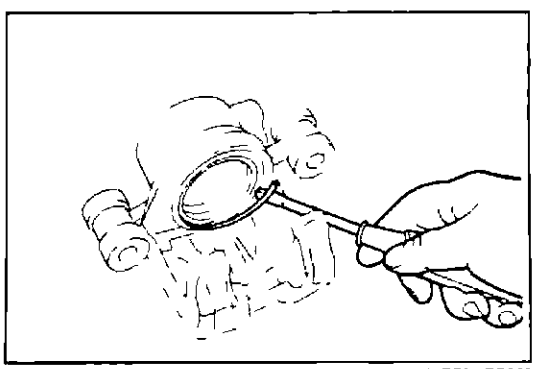
DISASSEMBLY OF CALIPER

1. Remove the rubber boot from caliper
2. Pull out the cylinder side bush
3. Remove the bush dust boot



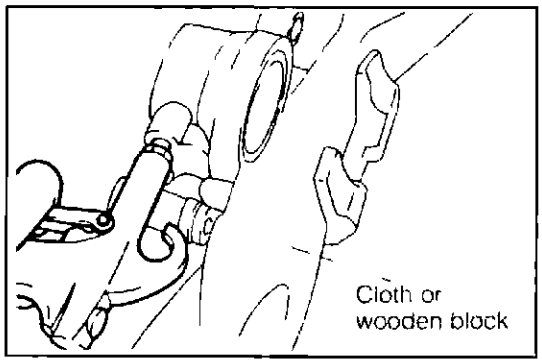
WRE91 BR229

4 Remove the boot set ring
NOTE:
- Never reuse the removed set ring.



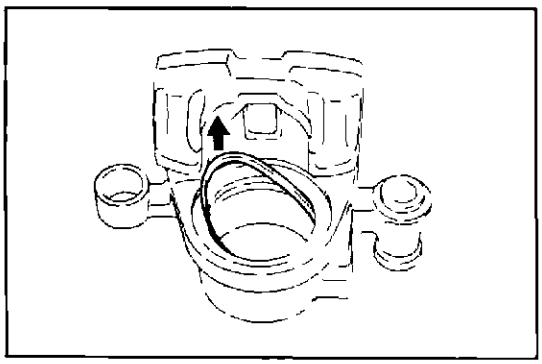
WRE91 BR230

5 Insert a suitable cloth or a wooden block in front of the piston. Then, pull out the piston by applying compressed air from the brake hose connecting section.
WARNING:
- Since the piston jumps out strongly when applying compressed air, care must be exercised so that your fingers or the like may not be caught in.
- Be sure to put on safety goggles when using compressed air.

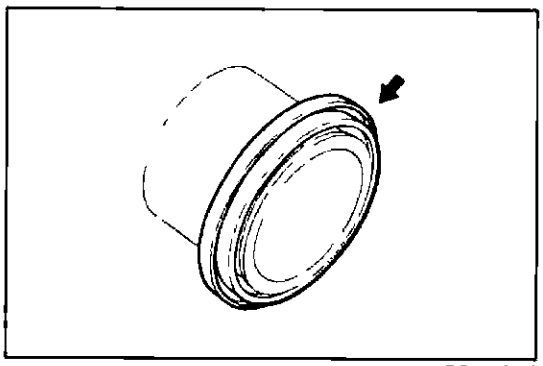


WRE91 BR231

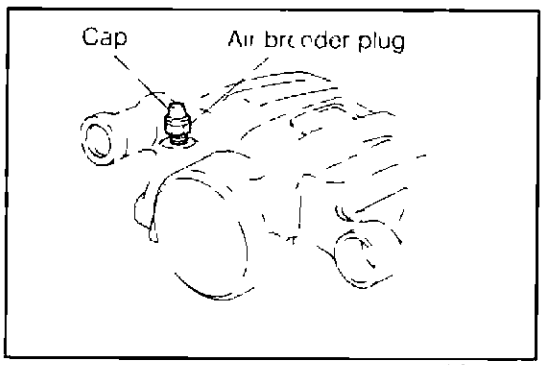
6 Remove the piston seal from the cylinder section
NOTE:
- Never reuse the removed piston seal.


WRE91 BR232

7 Remove the rubber boot from the piston
NOTE:
- Never reuse the removed boot.


WRE91 BR233

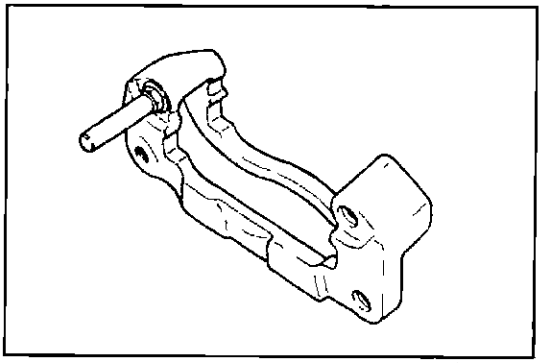
8 Remove the air bleeder plug cap
9 Remove the air bleeder plug



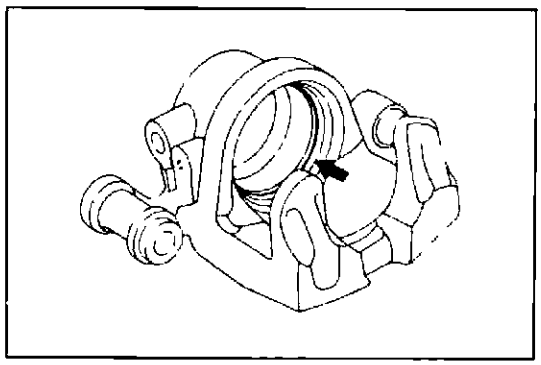
WRE91 BR234

INSPECTION

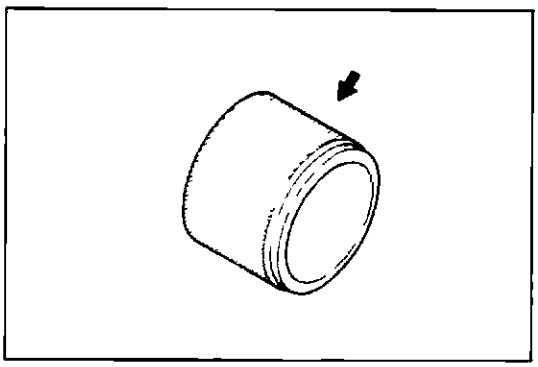
1 Ensure that the mounting support exhibits no damage, such as cracks and/or wear


WRE91 BR235

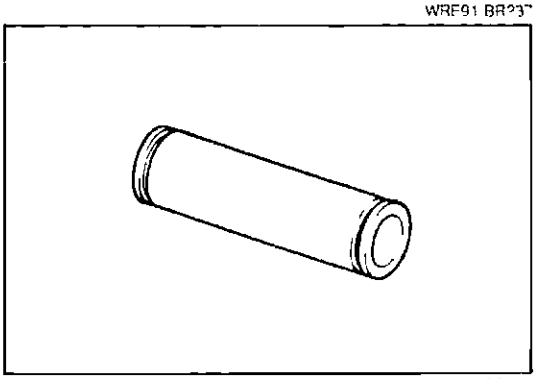
2 Ensure that the caliper exhibits no damage, such as cracks, rust and/or wear.
3 Ensure that the inner surface of the caliper exhibits no damage, such as rust and/or scratches


WRE91 BR236

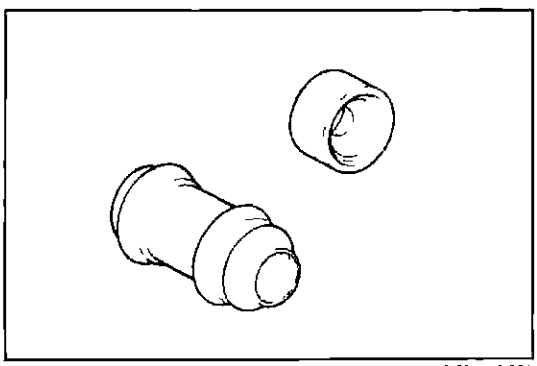
4 Ensure that the piston exhibits no damage, such as rust and scratches


WRE91 BR237

5 Ensure that the cylinder slide bush exhibits no damage, such as rust and/or scratches.


WRE91 BR238

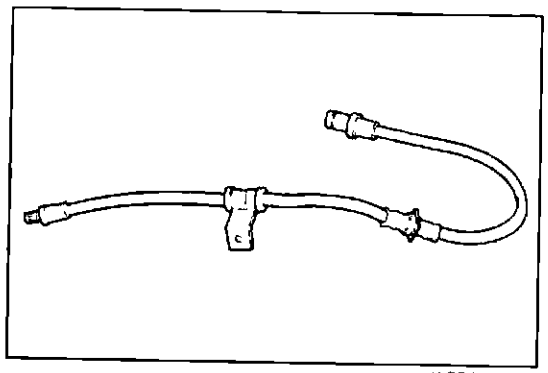
6 Ensure that the bush dust boot and rubber boot exhibits no damage, such as cracks and/or scratches.


WRE91 BR239

7 Ensure that the pad guide plate exhibits no wear or damage


WRE91 BR240

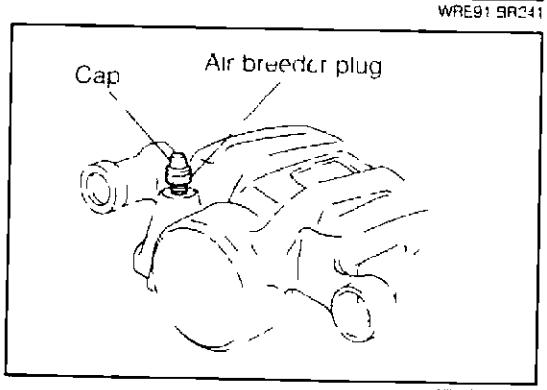
8 Ensure that the brake hose exhibits no damage, such as cracks, scratch and/or deterioration by oxidation



WRE91 BR241

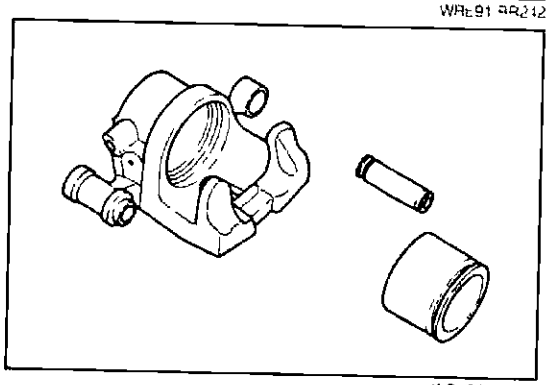
ASSEMBLY OF CALIPER

1 Install the air bleeder plug
2 Install the air bleeder plug cap



WRE91 BR242

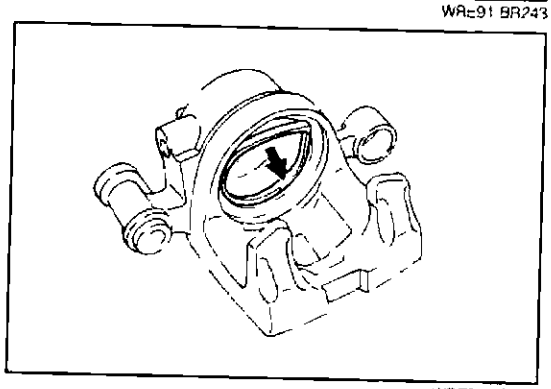
3 Wash the reassembling parts and dry them with compressed air
WARNING.
- Be sure to put on safety goggles when using compressed air.



WRE91 BR243

4 Apply rubber grease to the piston seal. Install the piston seal to the cylinder
CAUTION:
- Never reuse the piston seal.
- Be very careful not to scratch the edge of the piston seal.

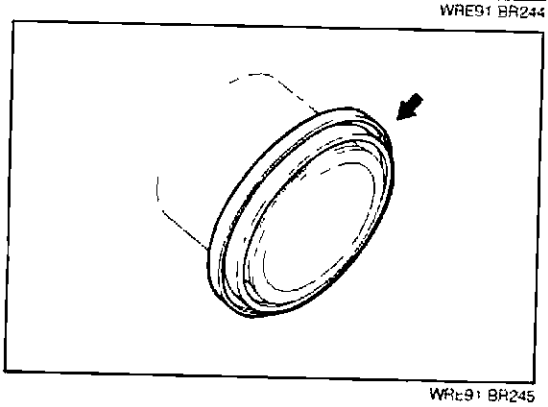
NOTE:
- The rubber grease is also included in the repair kit.



WRE91 BR244

5 Apply rubber grease to the new cylinder boot Install the cylinder boot to the piston
CAUTION:
- Never reuse the cylinder boot.

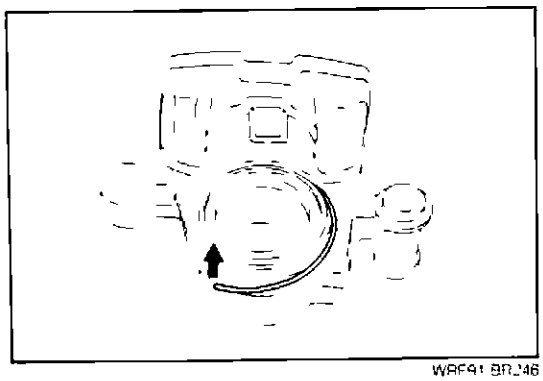
6 Apply rubber grease to the piston sliding surface



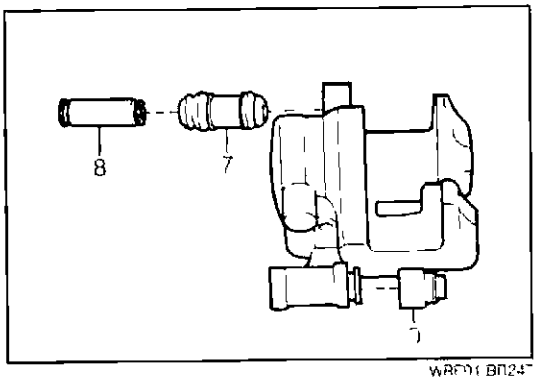
WRE91 BR245

7 Insert the piston into the cylinder
NOTE.
- At this time, be very careful not to damage the rubber boot.

8 Fit the cylinder boot into the groove at the cylinder side Fit the set ring into the groove of the cylinder boot
CAUTION:
- Never reuse the set rings.


WRE91 BR246

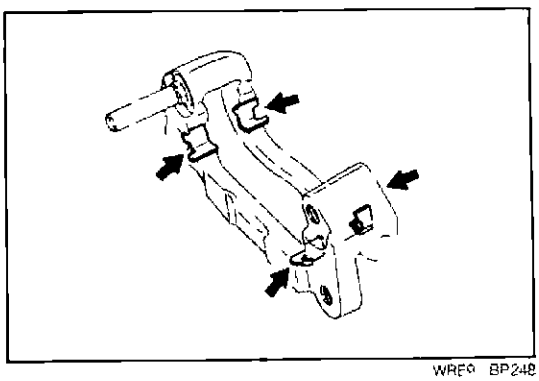
9 Insert the bush dust boot into the caliper
10 Apply rubber grease to the cylinder slide bush Insert the cylinder slide bush into the bush dust boot Then, fit both edge sections of the bush dust boot into the groove sections of the cylinder slide bush
11 Install the rubber boot to the caliper



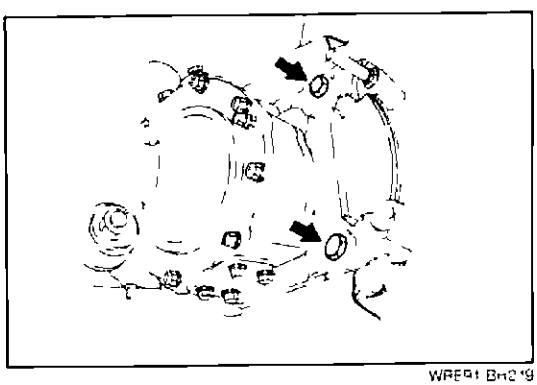
WRE91 BR247

INSTALLATION OF BRAKE CALIPER

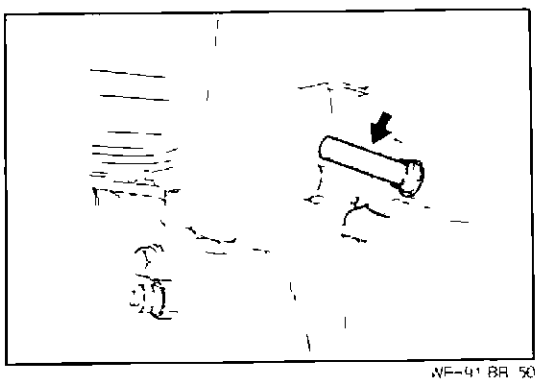
1 Install the disc brake pad guide plates to the brake mounting support


WRE9 BP248

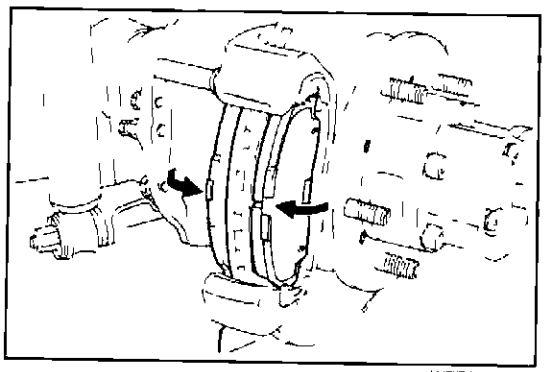
2 Install the brake mounting support to the steering knuckle by attaching bolts with new spring washers interposed
Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9 0 kgf-m, 50 6 - 65.1 ft-lb)


WRE91 BR249

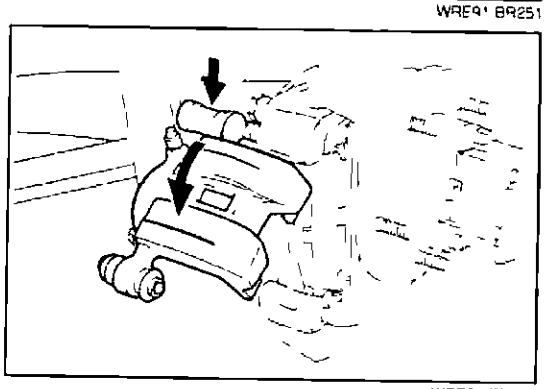
3 Apply rubber grease to the brake mounting support pin


WE-91 BR 50

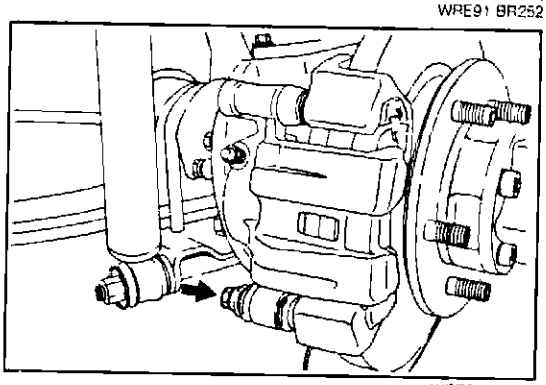
4 Install the brake pad to the brake mounting support.
NOTE:
- At this time, be very careful not to damage the disc brake pad guide plates.


WRE91 BR251

5 Install the brake caliper to the mounting support. Place the mounting support over the brake pad
NOTE:
- Be very careful not to damage the antisqueal shim during this operation.

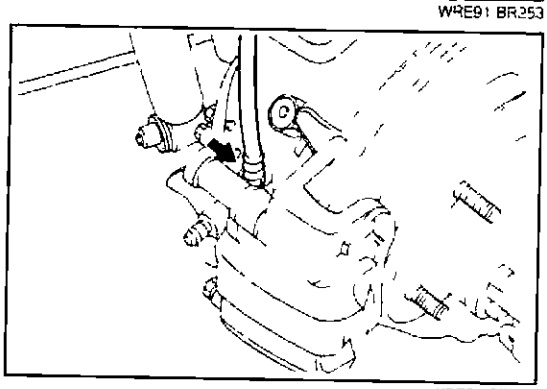

WRE91 BR252

6 Tighten the brake caliper attaching bolts.
Tightening Torque: 31.4 - 41.2 N·m
(3.2 - 4.2 kgf-m, 23.1 - 30.4 ft-lb)

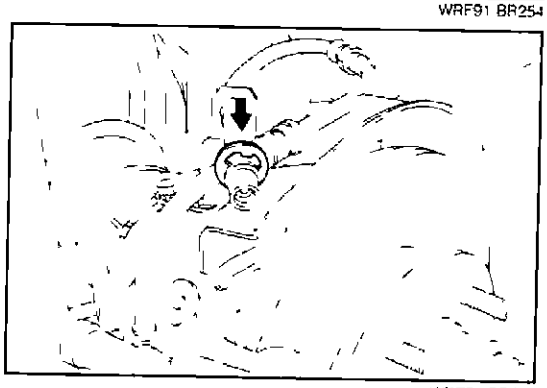

WRE91 BR253

7 Ensure that each boot of the caliper exhibits no damage, such as cracks Also, ensure that no turning-over is present at the fitting section of each boot

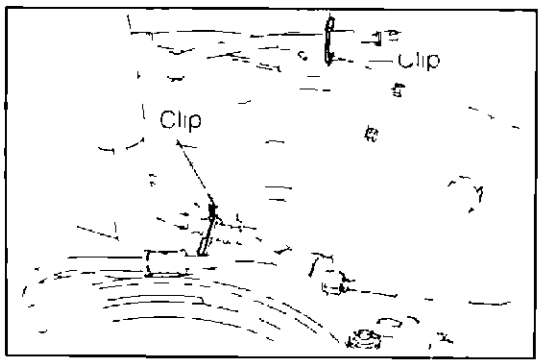
8 Connect the brake hose to the caliper.
Tightening Torque: 19.6 - 26.5 N·m
(2.0 - 2.7 kgf-m, 14.5 - 19.5 ft-lb)


WRE91 BR254

9 Pass the brake hose through the brake hose clamp bracket at the steering knuckle side. Attach a new "E" ring to the brake hose at the brake pipe connecting side

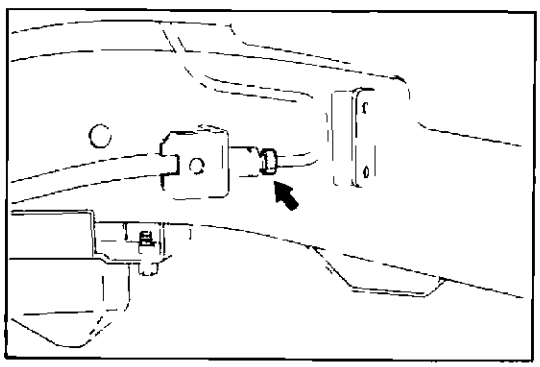

WRE91 BR255

10 Install the new clips
NOTE:
- Do not reuse the clips.

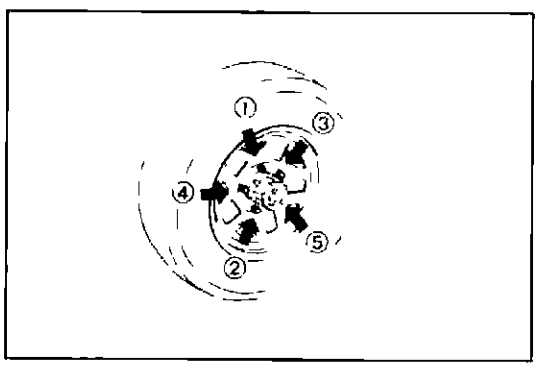


WRE91 BR256

11 Connect the brake pipe to brake hose
Tightening Torque: 12.7 - 17.7 N m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)


WRE91 BR257

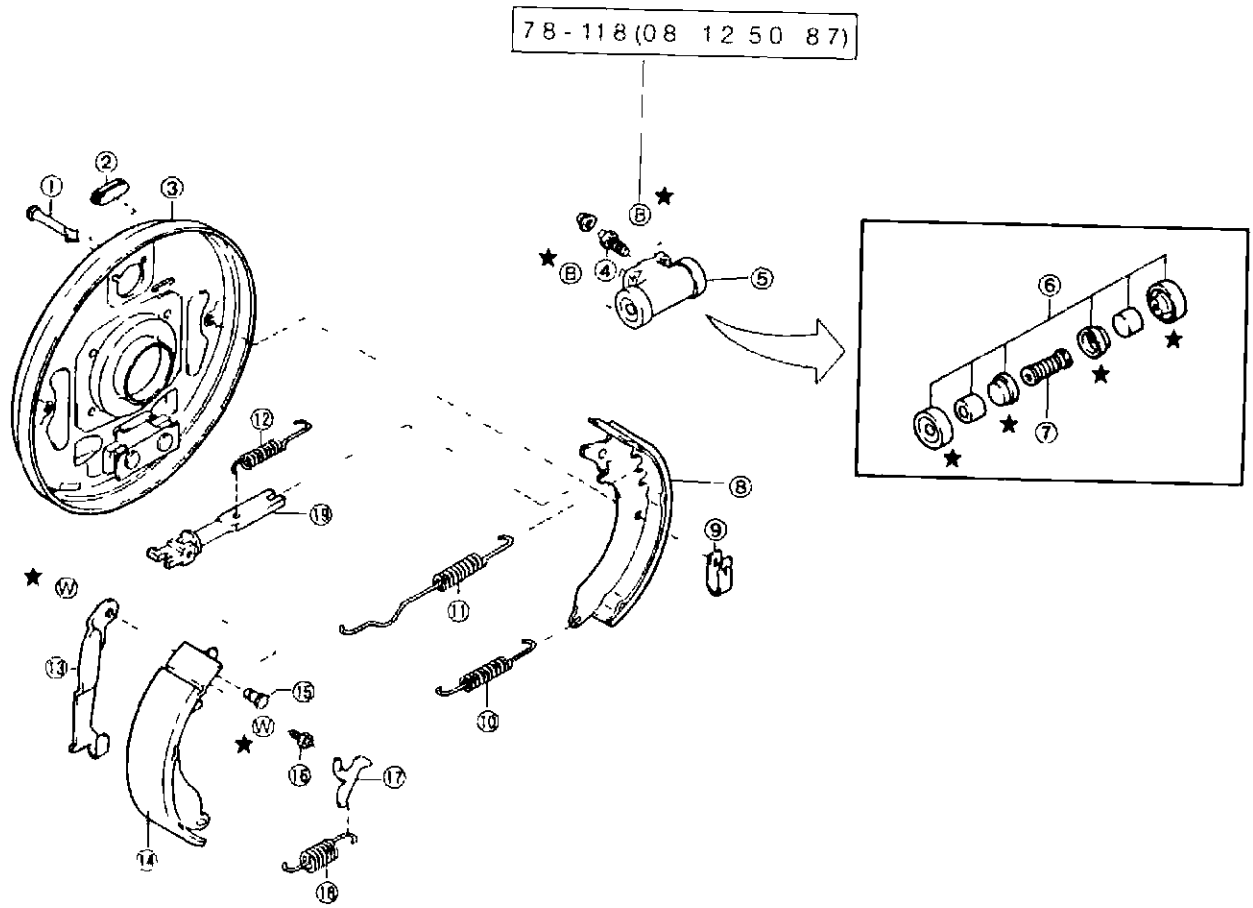
12 Install the front wheel
13 Perform brake air bleeding.
(See page BR-25.)
14 Perform the brake test, using a brake tester



WRE91 BR258

REAR BRAKE

COMPONENTS



: Tightening torque
Unit : N m (kgf-m, ft-lb)
★ : Non-reusable parts

① Shoe hold down spring pin
② Hole plug
③ Rear brake backing plate sub-assembly
④ Bleeder plug
⑤ Rear wheel brake cylinder assembly
⑥ Rear wheel cylinder cap kit
⑦ Compression spring
⑧ Rear brake shoe
⑨ Shoe hold down spring
⑩ Tension spring
⑪ Tension spring
⑫ Tension spring No. 2
⑬ Parking brake shoe lever sub-assembly
⑭ Rear brake shoe
⑮ Parking brake lever pin
⑯ Bolt
⑰ Automatic adjust lever
⑱ Tension spring
⑲ Parking brake shoe strut

WRE01 BR259

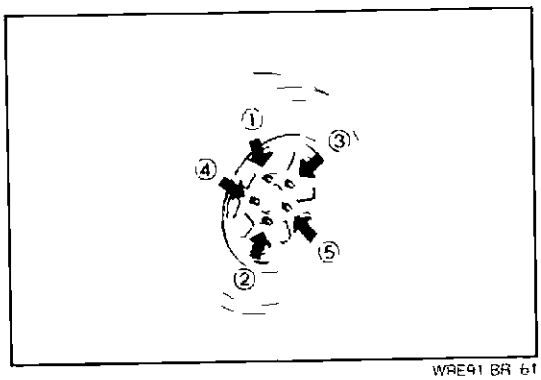
DISASSEMBLY

CAUTION:
- Make sure that no lubricant, such as grease, gets to the brake shoe and/or drum surfaces.

1 Jack up the vehicle and support it with safety stands (As for the jacking-up points and supporting points for the safety stands, see page GI section)

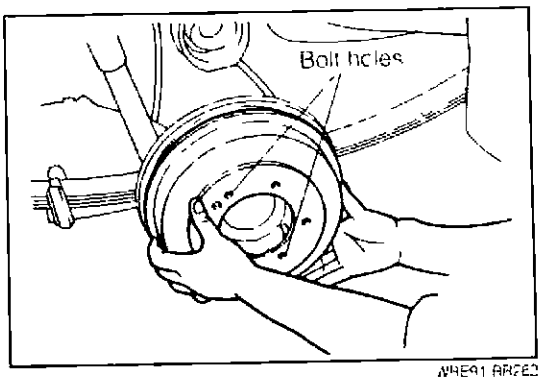
WRE91 BR28

2 Remove the rear wheel
NOTE:
- Be sure to loosen the attaching bolts evenly over two or three stages in the sequence indicated in the right figure.



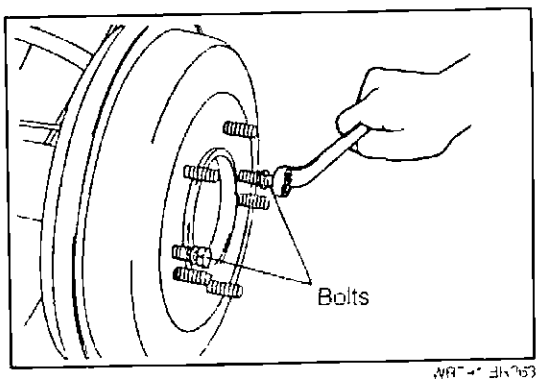
WRE91 BR 61

3 Removal of the brake drum
(1) Release the parking brake
(2) Remove the brake drum



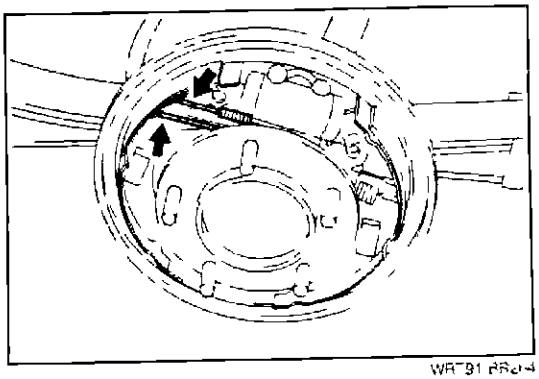
WRE91 BR262

If any difficulty is encountered in removing the brake drum, install the bolts (M10 × 1 25) to each bolt hole, as indicated in the right figure The brake drum can be detached easily by screwing-in the bolts alternately



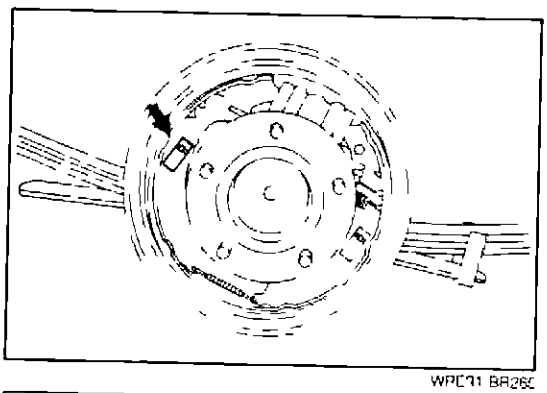
WRE91 BR263

4 Detach the tension springs from the trailing side shoe, using the following SST and remove the tension springs
SST: 09921-00010-000



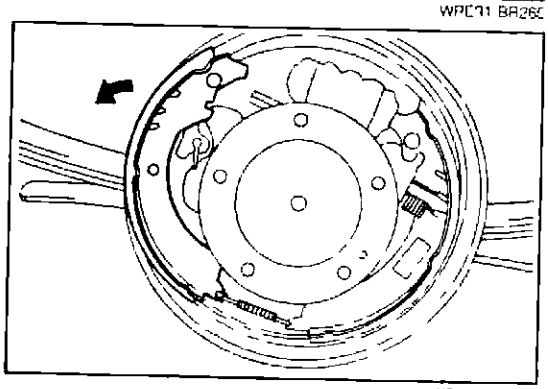
WRE91 BR264

5 Detach the shoe hold down spring pin and hold down spring at the trailing side



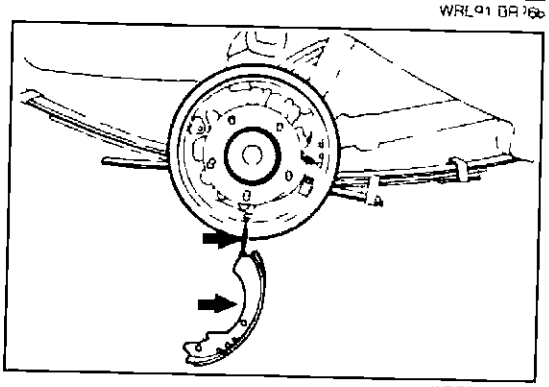
WRE91 BR265

6 Remove the shoe at the trailing side from the backing plate



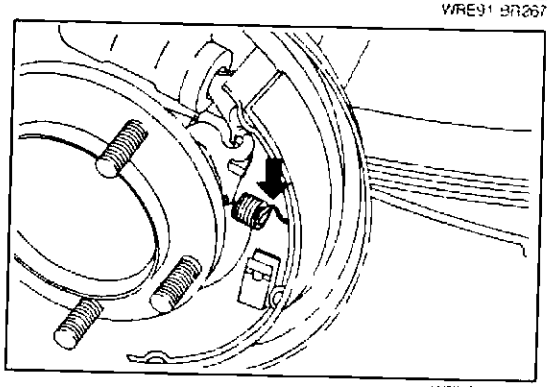
WRE91 BR266

7 Remove the shoe at the trailing side from the tension spring
8 Remove the tension spring from the shoe at the leading side



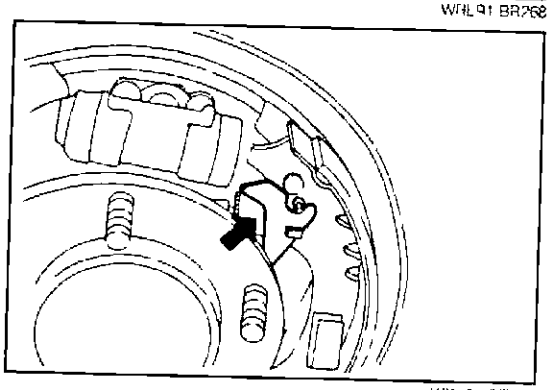
WRE91 BR267

9 Remove the tension spring, using the following SST
SST. 09921-00010-000



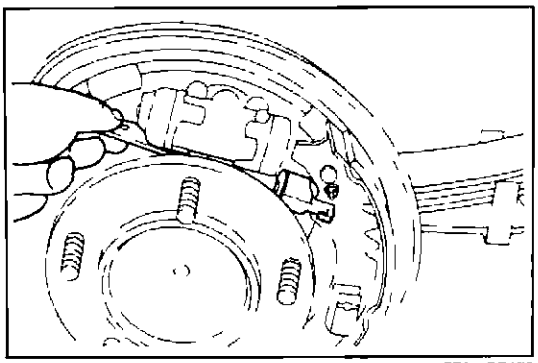
WRE91 BR268

10 Remove the automatic adjusting lever



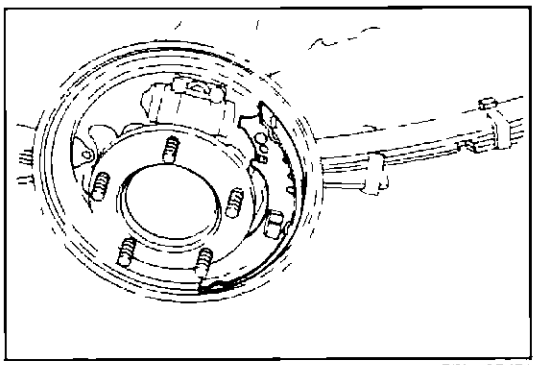
WRE91 BR269

11 Remove the parking brake shoe strut



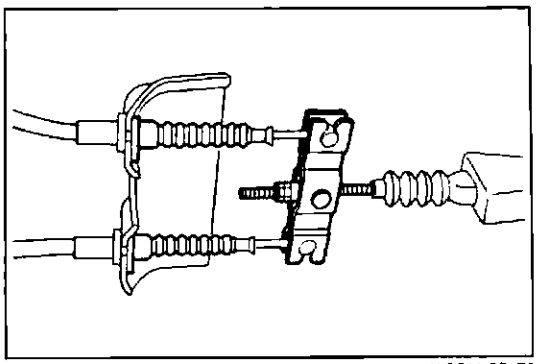
WRE91 BR270

12 Remove the hold-down spring and pin of the leading side shoe
13 Remove the leading side shoe from the backing plate



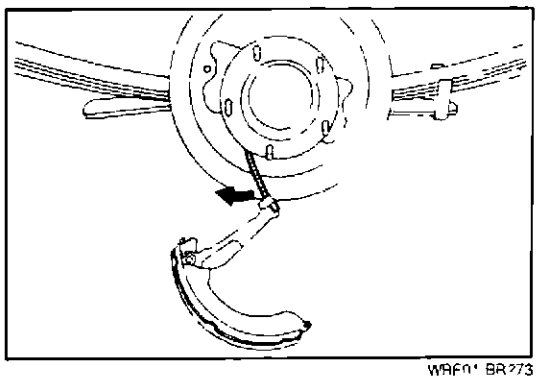
WRE9 BR271

14 Loosen the lock nut of the parking brake lever adjusting screw. Fully loosen the adjusting screw



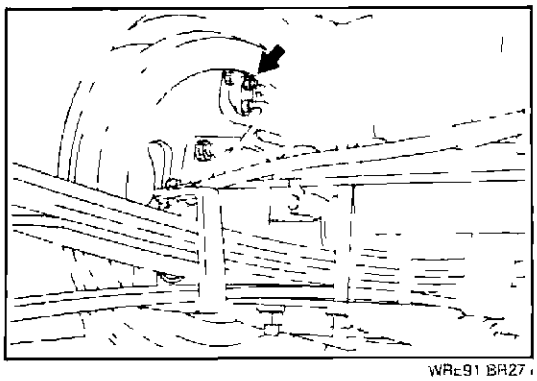
WRE91 BR272

15 Disconnect the parking brake cable from the parking brake shoe lever



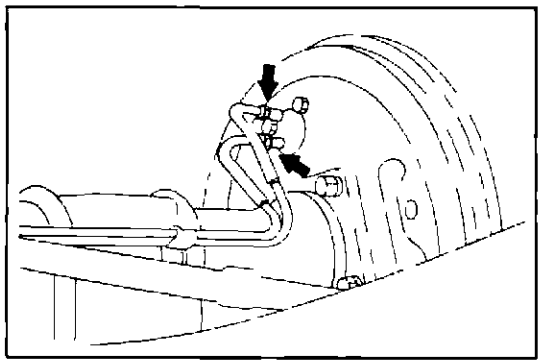
WRE91 BR273

16 Drain the brake fluid by loosening the rear wheel cylinder air bleeder plug

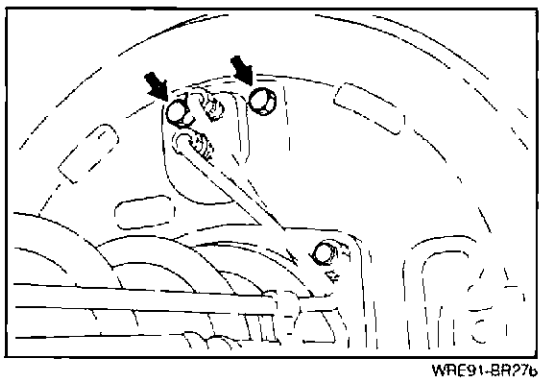


WRE91 BR274

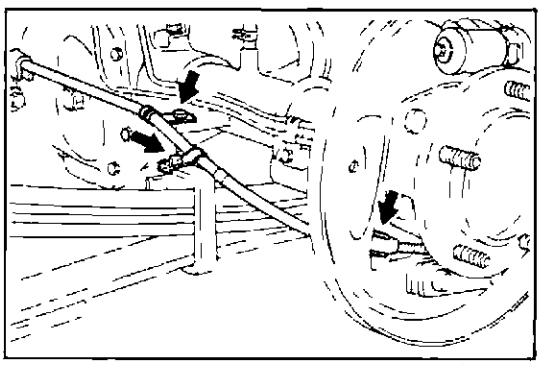
17 Disconnect the brake pipes from the rear wheel cylinder, using a brake tube union nut wrench.


WRE91 BR275

18 Remove the rear wheel cylinder from the backing plate.

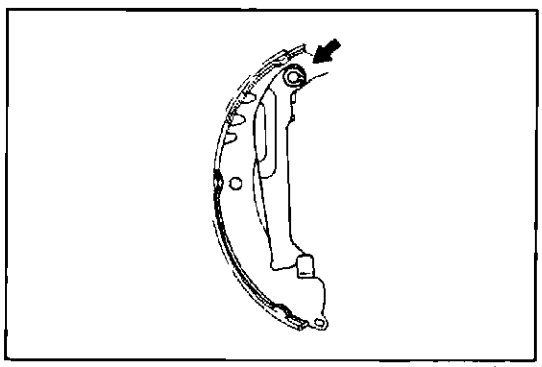

WRE91-BR276

19 Removal of parking brake cable
(1) Remove the parking brake cable clamp bolts.
(2) Pull out the parking brake cable from the backing plate by retracting the pawl of the parking brake cable

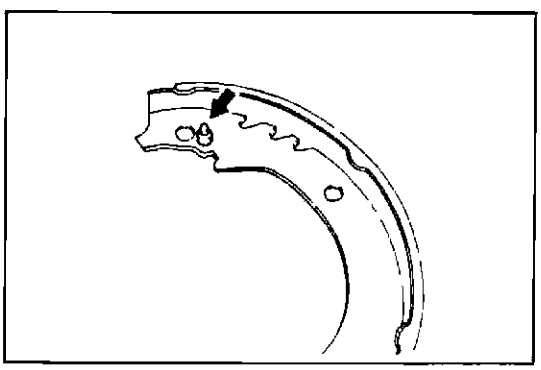

WRE91 BR277

20 Disassembly of leading side shoe
(1) Remove the "C" washer.
NOTE:
- **Never reuse the "C" washer.**

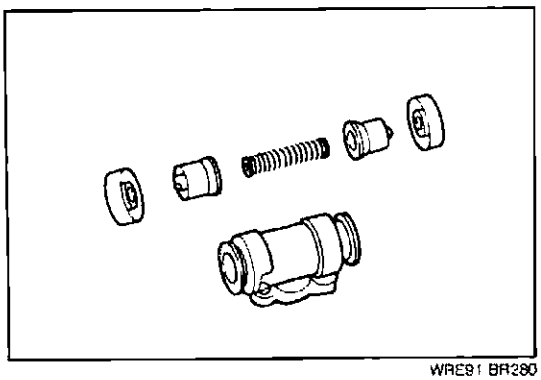
(2) Remove the parking brake shoe lever and parking brake lever pin


WRF91 BR278

(3) Remove the washer and automatic adjusting lever pin.


WRE91 BR279

21 Disassembly of rear wheel cylinder
(1) Remove the wheel cylinder boots
(2) Remove the wheel cylinder pistons
(3) Remove the piston cup
(4) Remove the compression spring



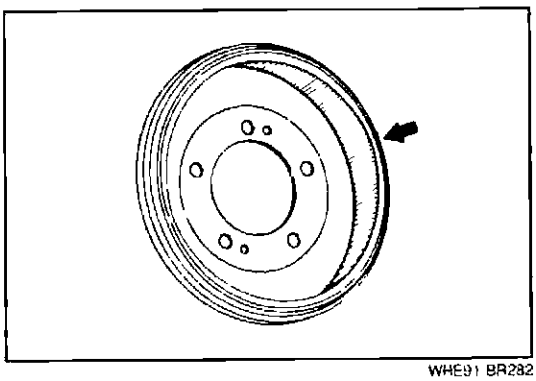
WRE91 BR280

22 Removal of brake backing plate
(See the Rear Axle section if necessary.)

WRE91 BR281

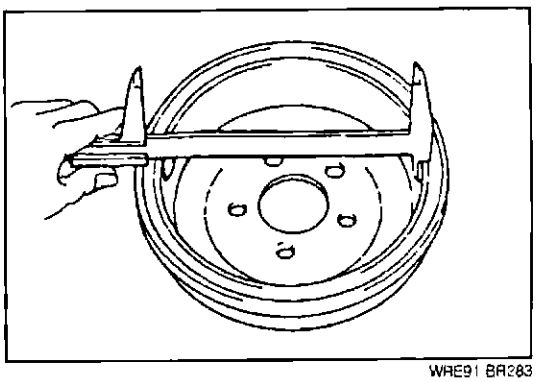
INSPECTION

NOTE:
- **When replacing the brake shoe, be sure to replace the leading and trailing shoe for both the right and left side as a set. This replacement required so as to prevent the vehicle from pulling to one side on application of the brakes.**



WHE91 BR282

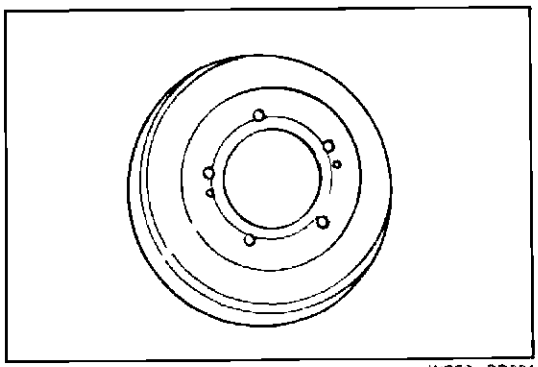
1. Check of brake drum
(1) Ensure that the brake shoe contact surface exhibits no defect, such as severe roughness and abnormal wear
If any defect is present, replace the brake drum with a new one



WRE91 BR283

(2) Measure the inner diameter of the brake drum Ensure that the measured value is less than the maximum limit
If the measured value is greater than the maximum limit, replace the brake drum with a new one
New Part: 254.00 mm
Maximum Limit: 256.00 mm

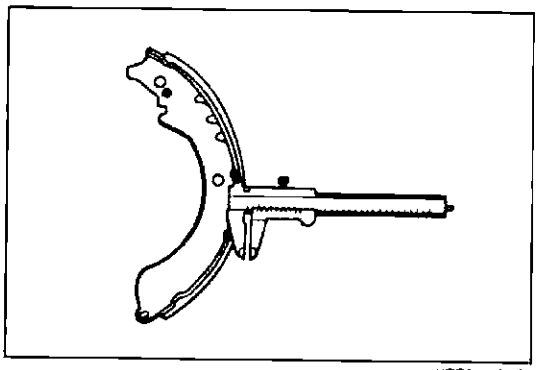
(3) Ensure that the brake drum exhibits no damage, such as cracks.
If any damage is present, replace the brake drum



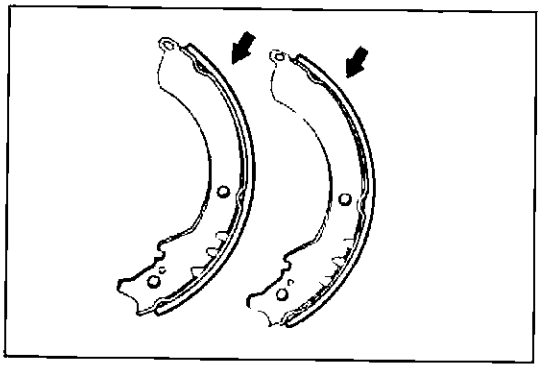
WRE9 BR284

2 Check of brake shoe

(1) Ensure that the remaining amount of the brake lining exceeds the minimum limit.
If the remaining amount is less than the minimum limit, replace the brake lining as a set.
New Part 5 mm
Minimum Limit. 1 mm

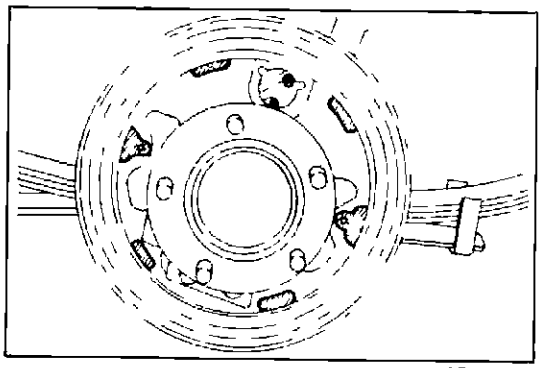


(2) Ensure that each brake shoe contact surface exhibits no defect, such as abnormal wear and cracks.
If any defect is present, replace the brake shoe as a set.



3 Check of brake backing plate

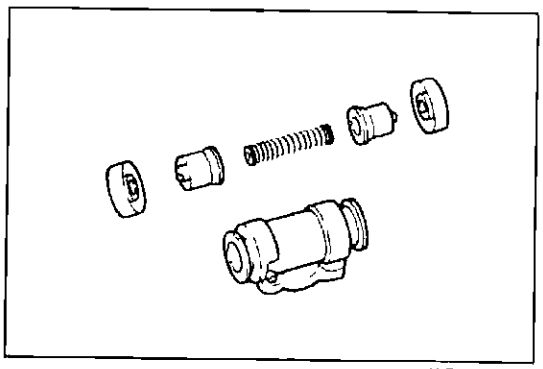
(1) Ensure that the brake shoe contact surface exhibits no abnormal wear.
(2) Ensure that the backing plate exhibits no damage, such as bend.
If any defect is present, replace the backing plate.
(See the Rear Axle section.)



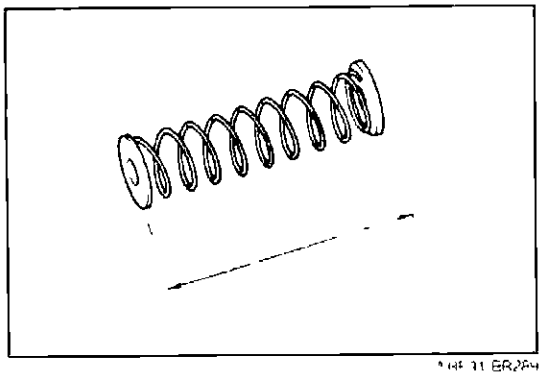
4 Check of wheel cylinder

CAUTION
- Never reuse the cups and boots.

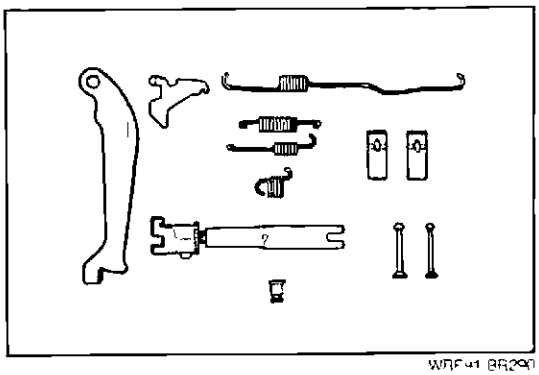
(1) Ensure that the inner surface of the wheel cylinder exhibits no rust and scratches.
If any rust or scratch is present, replace the wheel cylinder.
(2) Ensure that no rust or scratch is present at the piston-to-cylinder contact surface and cup-to-cylinder contact surface. Also, ensure that the brake shoe contact surface exhibits no abnormal wear.
If any rust or scratch is present, replace the piston.
(3) Ensure that the compression spring exhibits no damage such as flattened condition.
If any damage is present, replace the compression spring.



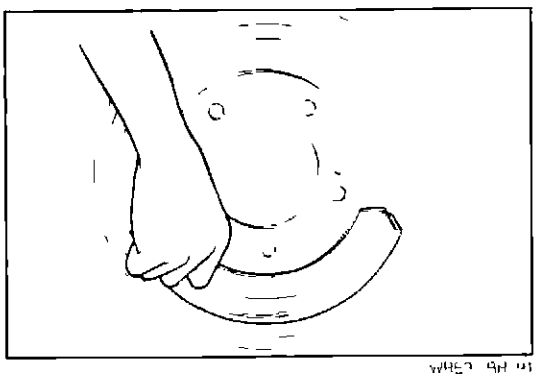
(4) Ensure that the free length of the compression spring is within standard value
Standard: 57 ± 1.5 mm



5 Check of related parts
(1) Ensure that the tension springs exhibit no damage, such as wear and flattened condition
(2) Ensure that the parking brake strut exhibits no wear and rust. Also, ensure that the connecting section of parking brake strut turns smoothly
(3) Ensure that each of the levers, pins and so forth exhibits no damage, such as wear
If any defect is present, replace the defective parts



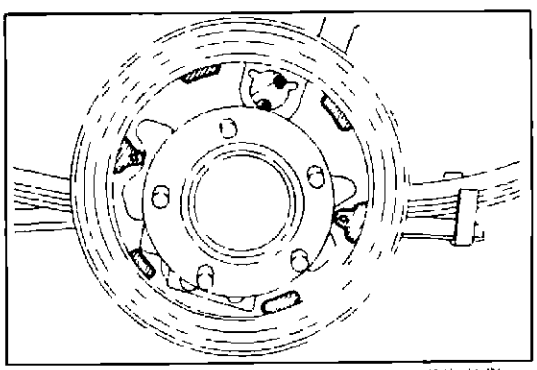
6 Check of brake shoe-to-drum contact
Coat the inner surface of the brake drum with a light film of chalk. Slide the brake shoes against the inner surface of the drum. Check to see if the chalk particles can be seen evenly over the whole surface of the brake linings. If the brake linings show a poor contact, correct the brake linings, using a shoe grinder



ASSEMBLY

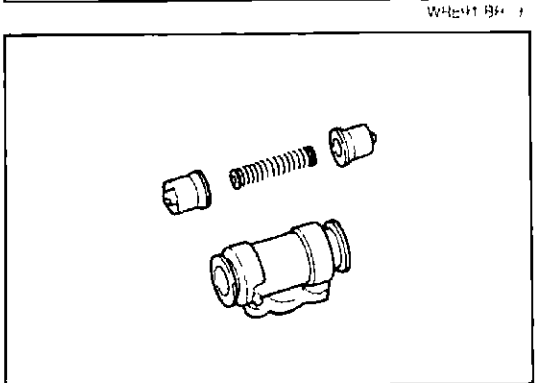
CAUTION:
- Make sure that no lubricant, such as grease, gets to the brake shoe and/or drum surfaces.

1 Clean the backing plate

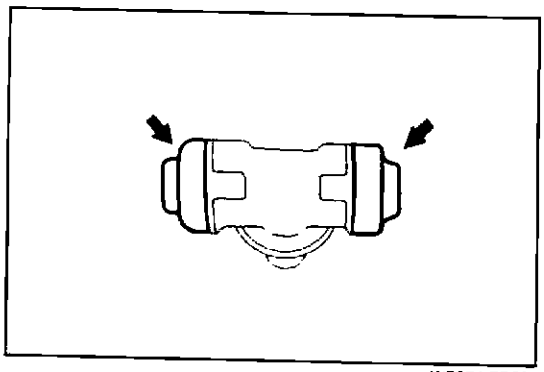


2 Installation of wheel cylinder
(1) Thinly apply rubber grease to the pistons and cup. Assemble the pistons and cup to the cylinder together with the compression spring

CAUTION
- Make sure that the cup is installed in the correct direction. The cup should be assembled so that its protruding surface may face toward the piston.

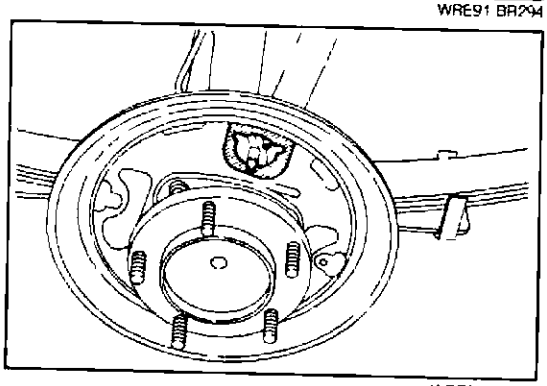


(2) Install the boot to the cylinder Assemble the boot to the piston



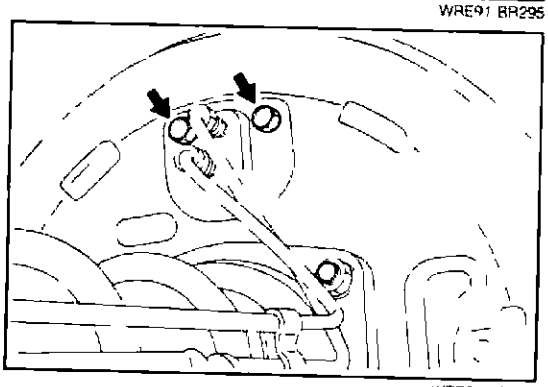
WRE91 BR294

(3) Apply the Three Bond, 1105B to the wheel cylinder installation surface of the backing plate.



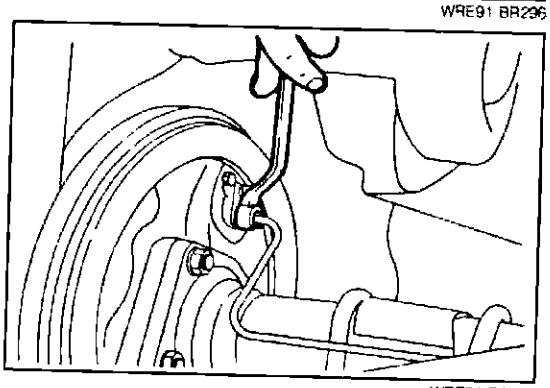
WRE91 BR295

(4) Install the wheel cylinder to the backing plate
Tightening Torque: 7.8 - 11.8 N·m
(0.8 - 1.2 kgf-m, 5.8 - 8.7 ft-lb)



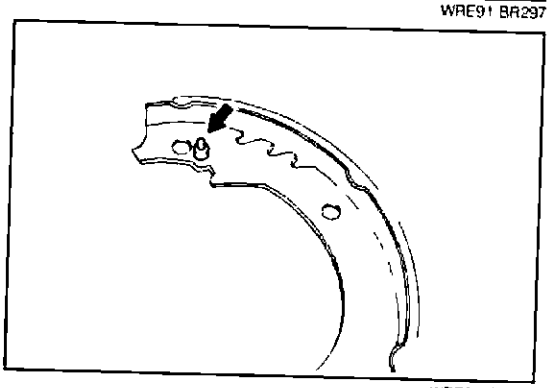
WRE91 BR296

(5) Connect the brake tube to the wheel cylinder, using a brake tube union nut wrench
Tightening Torque: 12.7 - 17.7 N·m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)



WRE91 BR297

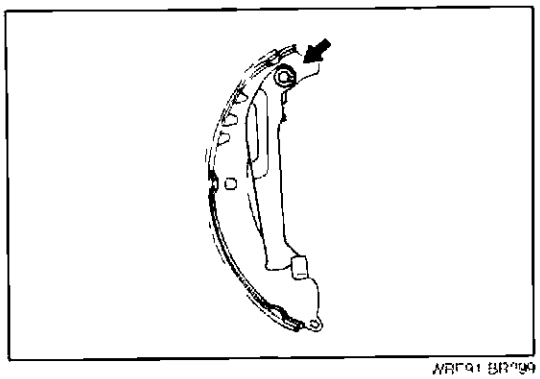
3 Assembly of shoe at leading side
(1) Install the washer and automatic adjusting lever pin
Tightening Torque: 2.55 - 4.9 N·m
(0.26 - 0.5 kgf-m, 1.88 - 3.62 ft-lb)



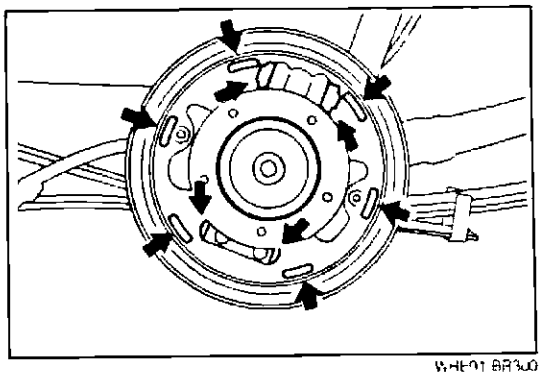
WRE91 BR298

(2) Thinly apply brake grease to the parking brake lever pin. Install the parking brake lever pin to the shoe
(3) Install the parking brake lever to the pin
(4) Install a new "C" washer to the parking brake lever pin. Bend the "C" washer by means of pliers, until both ends of the "C" washer come in contact with each other

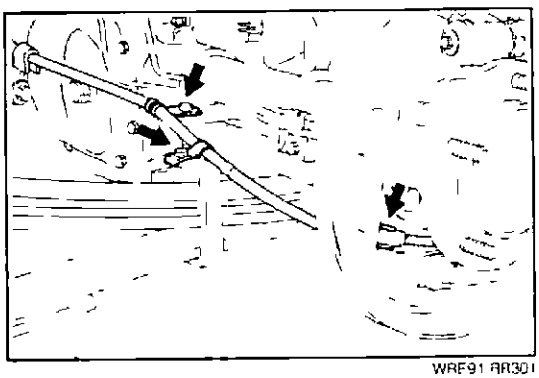
NOTE:
- NEVER reuse the "C" washer.



4 Assembly of brake shoe at leading side
(1) Apply a thin film of brake grease to the shoe contact surface of the backing plate
(2) Apply a thin film of brake grease to the pawl section of the wheel cylinder piston

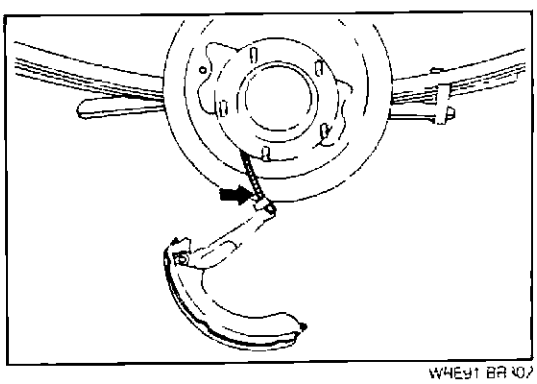


(3) Connect the parking brake cable to the backing plate
(4) Install the cable clamp.

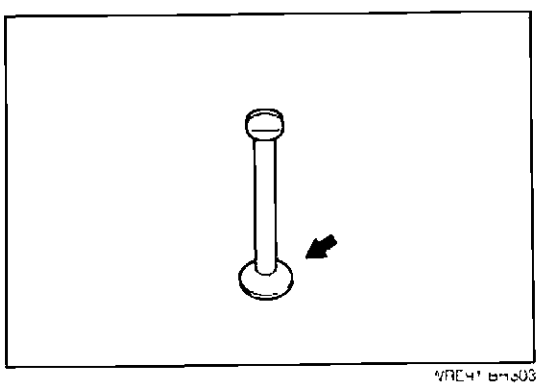


(5) Connect the parking brake cable to the parking brake lever

NOTE:
- Be very careful not to bend the parking brake cable by applying undue force to it.



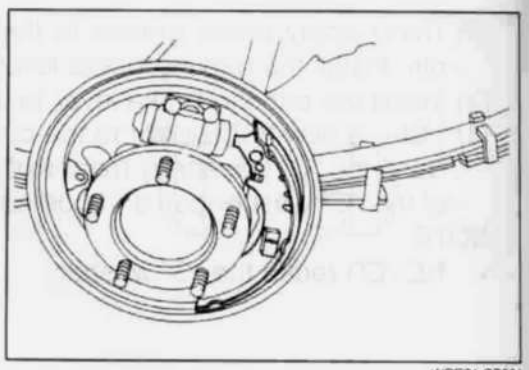
(6) Apply the Three Bond ® 1105B to the head section of the hold down spring pin



(7) While holding the shoe toward the backing plate, install the shoe to the backing plate by means of the shoe hold down spring pin and shoe hold down spring.

NOTE:

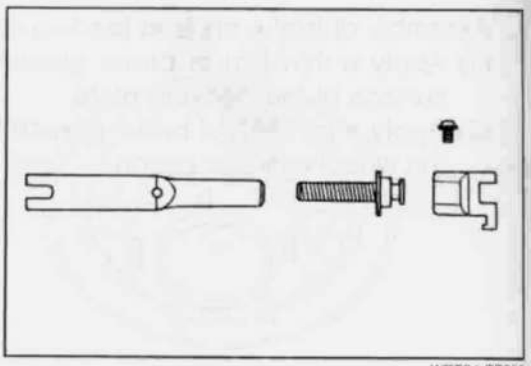
- Make sure that the head of the shoe hold down spring pin is positively fitted into the groove of the shoe hold down spring.



WRE91-BR304

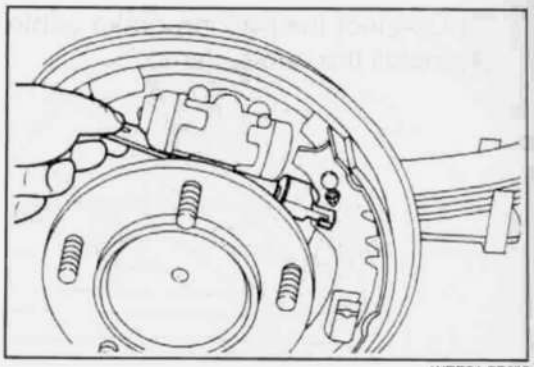
(8) Disassemble the parking brake shoe strut. Apply a thin film of brake grease to each sliding section. Assemble the parking brake shoe strut.

Tightening Torque: 2.6 - 3.9 N·m
(0.26 - 0.4 kgf-m, 1.88 - 2.9 ft-lb)



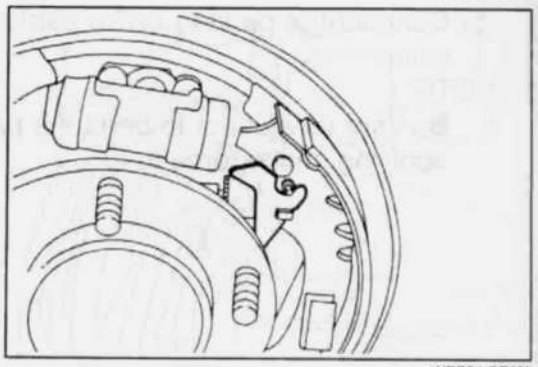
WRE91-BR305

(9) Connect the parking brake shoe strut to the shoe.



WRE91-BR306

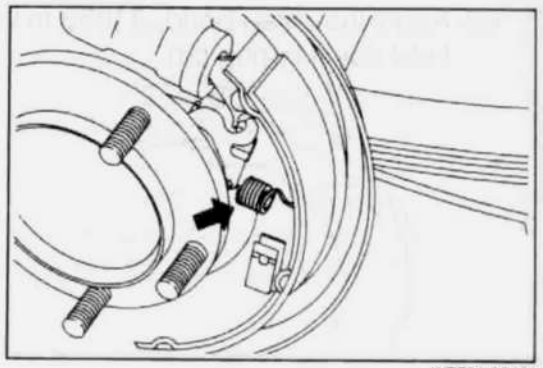
(10) Apply brake grease to each contact surface of the automatic adjusting lever. Install the automatic adjusting lever to the shoe.



WRE91-BR307

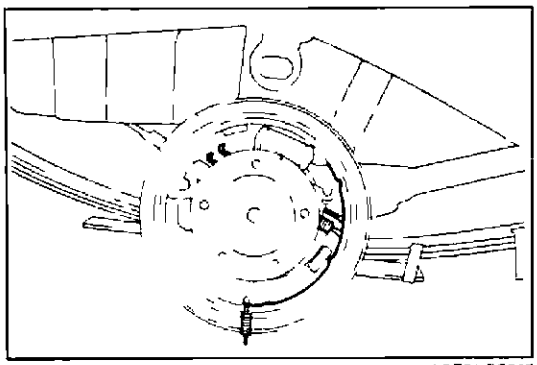
(11) Install the tension spring, using the following SST or a suitable lever.

SST: 09921-0001-000

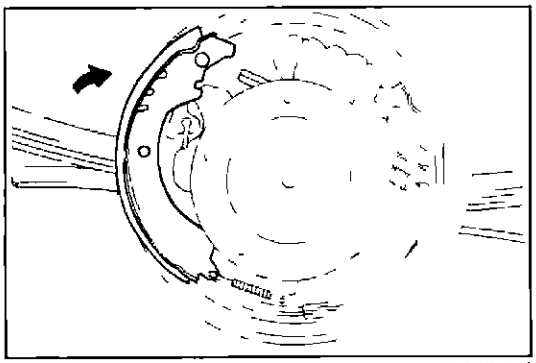


WRE91-BR308

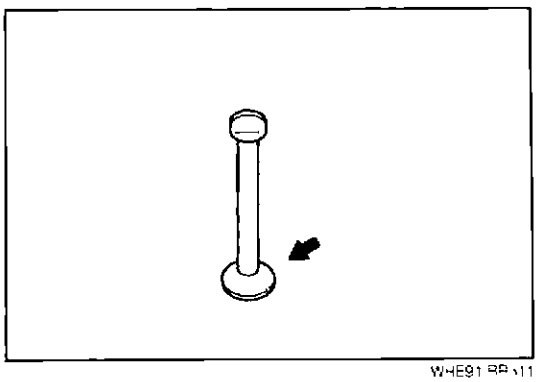
5 Installation of shoe at trailing side
(1) Install the tension spring to the shoe at the leading side.
(2) Install the shoe at the trailing side to the tension spring



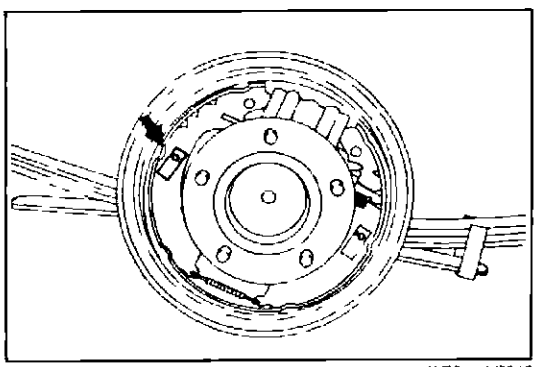
(3) Lift the shoe at the trailing side over the backing plate



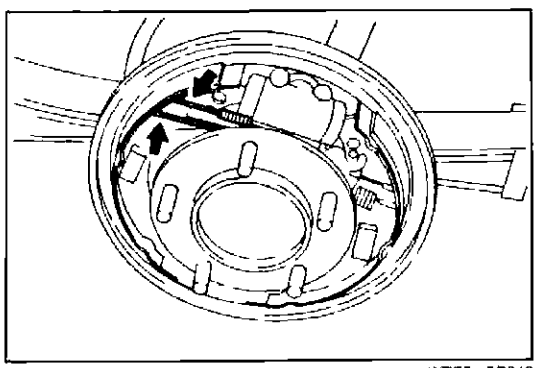
(4) Apply the Three Bond 1105B to the head section of the shoe hold down spring pin



(5) While holding the shoe at the trailing side toward the backing plate, install the shoe to the backing plate by means of the shoe hold down spring pin and shoe hold down spring



(6) Install the tension springs



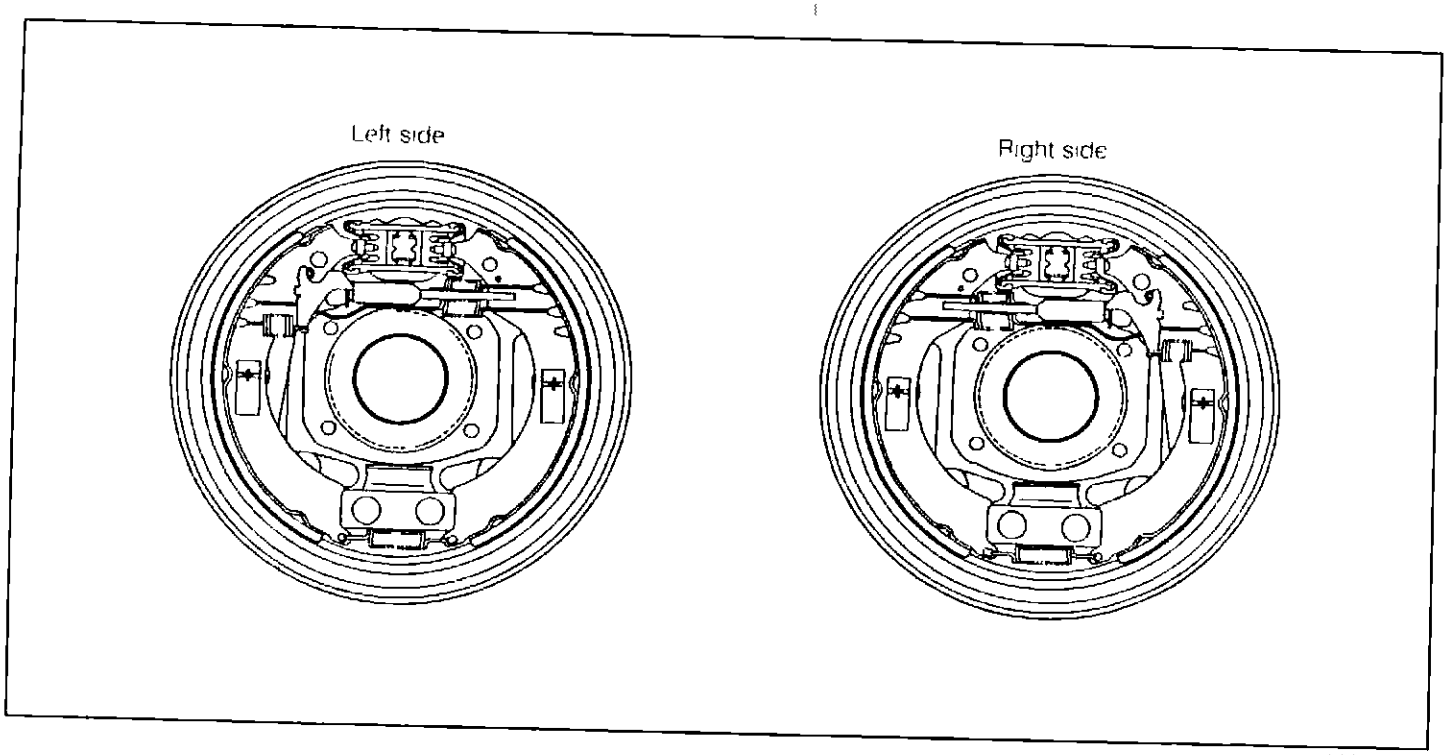
6 Inspection

Be sure to perform the following inspection to assure safe running.

(1) Ensure that the rear brake is mounted correctly as indicated in the figure below

WARNING:

If the rear brake is not mounted correctly, it may cause brake failure during the running or parking brake failure.



WRE91 BR311

(2) Inspect that lubricant, such as oil or grease, gets on the surface of the rear brake drum or brake lining. If any lubricant gets on the surface, remove the lubricant, using abrasive paper

WARNING:

If any lubricant gets on the surface of the rear brake drum or the brake lining, it may cause inadequate braking.

(3) Check that the rear wheel cylinder and brake tube attaching sections are tightened to the specified torque. Inspect the attaching sections for brake fluid leakage.

WARNING:

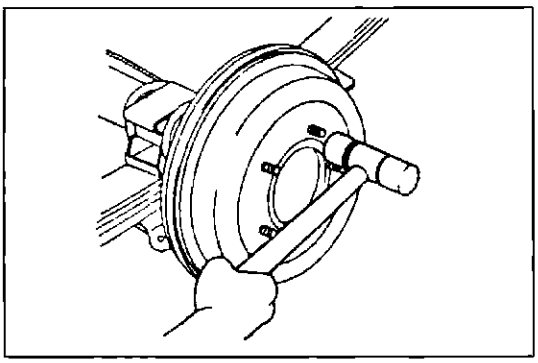
- If the brake tubes are not installed correctly, it may cause brake failure.

WRE91 BR315

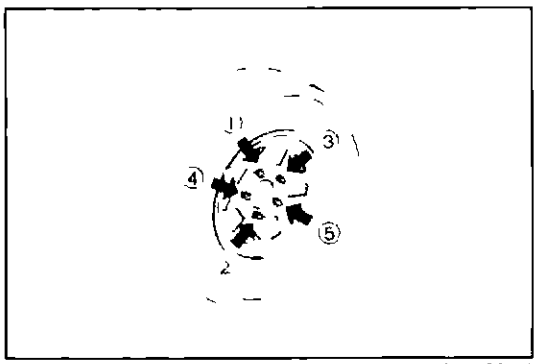
7 Install the brake drum
Attach the brake drum to the axle shaft. Tap the brake drum lightly into the axle shaft using a plastic hammer or the like.

WARNING:
If any lubricant, such as grease or oil, gets on the inner surface of the brake drum, be sure to wipe it off.
Failure to observe this warning may cause inadequate braking.

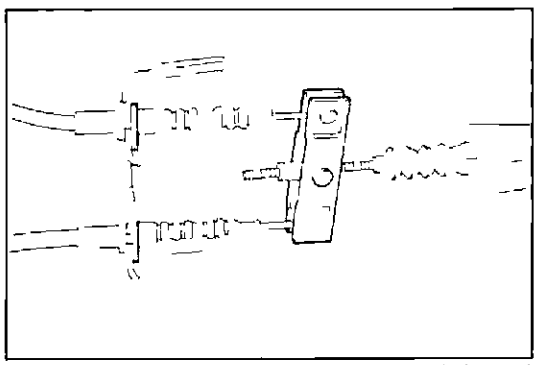
NOTE
- When assembling the axle shaft, never apply impact strong enough to produce traces inside the bearing. Moreover, be very careful not to damage the oil seal provided at the housing end.
- If paint was removed during the installation, be sure to apply chassis black to such areas to prevent rust formation. However, no paint should be applied to the threaded portions.



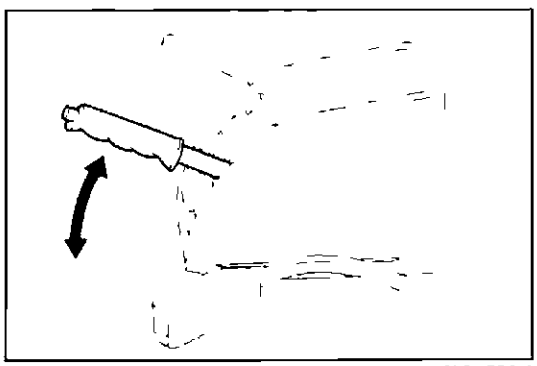
8 Install the wheel. Tighten the attaching bolts to the specified torque evenly over two or three stages in the sequence indicated in the right figure.
Tightening Torque: 88.3 - 118 N·m
(9.0 - 12 kgf-m, 65.1 - 87.0 ft-lb)



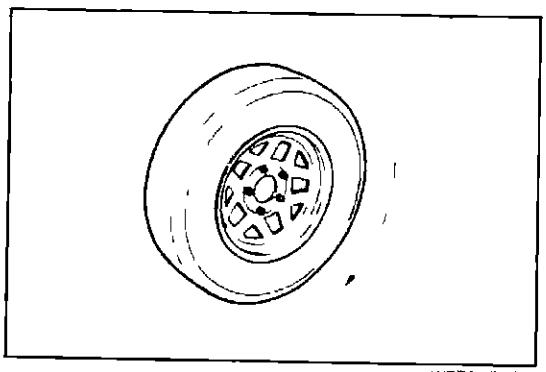
9 Screw in the parking brake lever adjusting screw lock nut about halfway.



10 Repeat the pulling/returning operation of the parking brake lever, until no clicking noise is emitted from the brake drum.



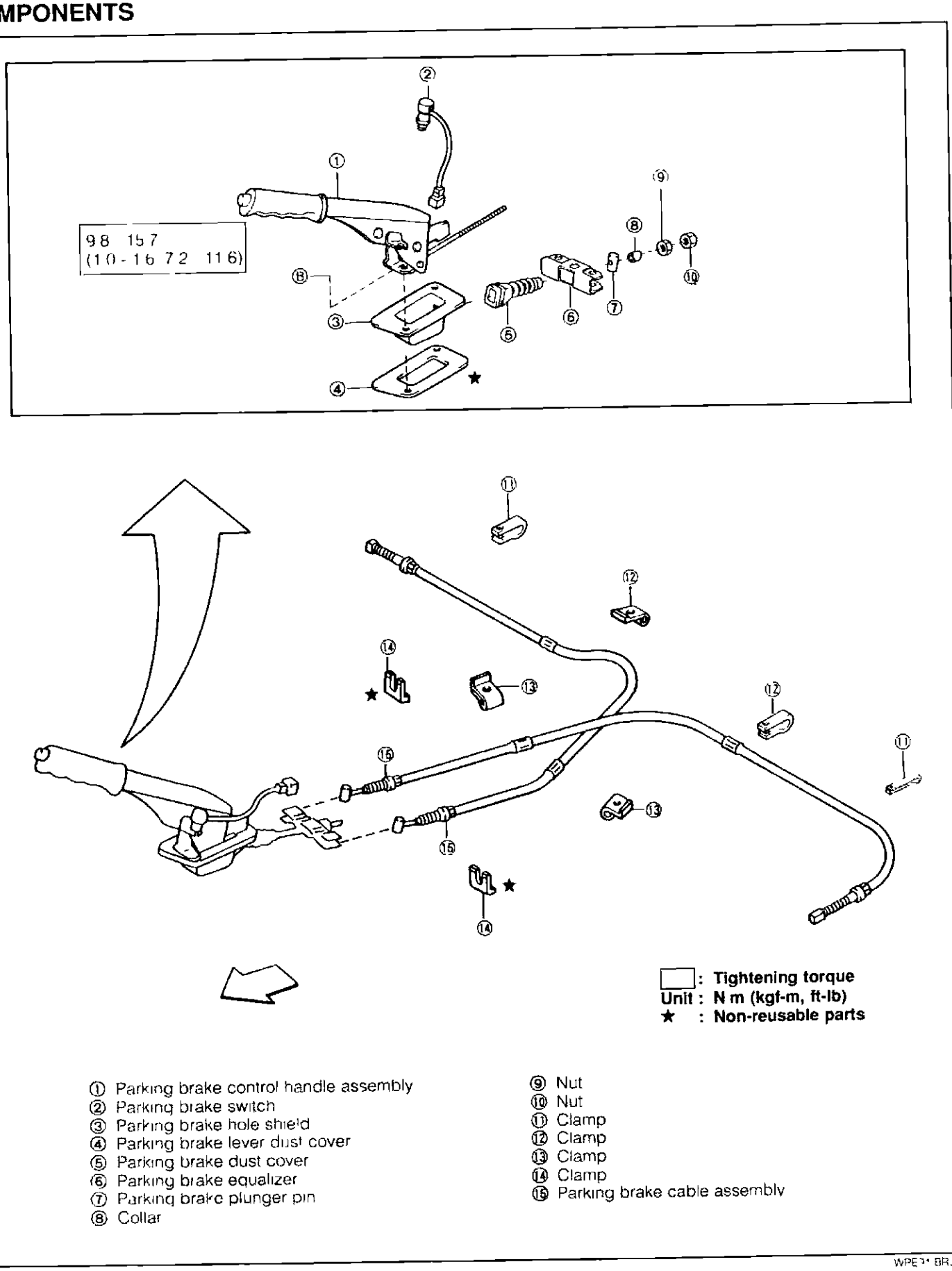
11 Turn the wheel. At this time, ensure that the brake is not dragging.
12 Perform brake air bleeding.
(See page BR-25)
13 Perform the brake fluid leakage check.
(See page BR-23)
14 Perform the brake test, using a brake tester.
15 Adjust the height of the parking brake lever.
(See page BR-93)



WRE91 BR320

PARKING BRAKE

COMPONENTS



① Parking brake control handle assembly
② Parking brake switch
③ Parking brake hole shield
④ Parking brake lever dust cover
⑤ Parking brake dust cover
⑥ Parking brake equalizer
⑦ Parking brake plunger pin
⑧ Collar
⑨ Nut
⑩ Nut
⑪ Clamp
⑫ Clamp
⑬ Clamp
⑭ Clamp
⑮ Parking brake cable assembly

WPE21 BR321

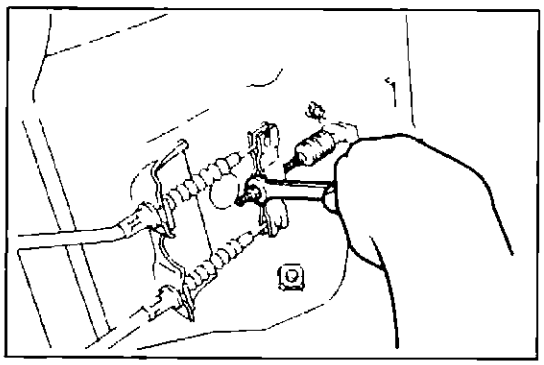
REMOVAL

CAUTION.
- Be very careful not to damage the cable.
- Be sure not to deform the cable by applying undue force to it.

1 Jack up the vehicle and support it with safety stands (See GI section)

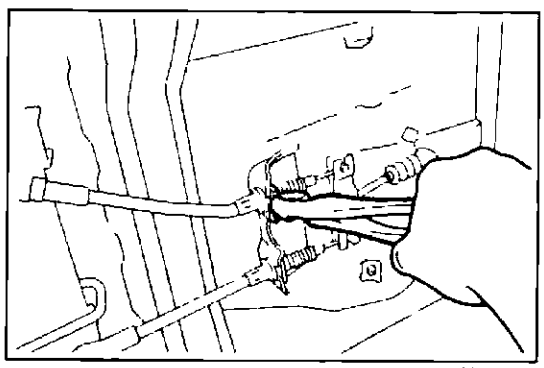
WRE91 BR322

2 Loosen the lock nut of the parking brake lever adjusting nut



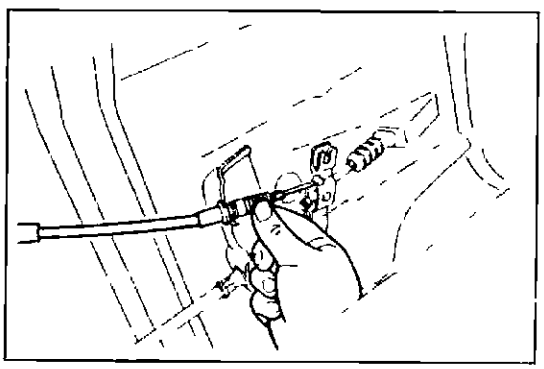
WRE91 BR323

3 Remove the lock nut and adjusting nut
4 Remove the collar
5 Detach the cable clamp clip
NOTE:
- Do not reuse the clip.



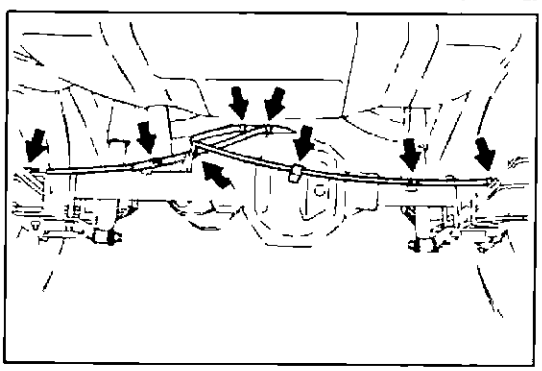
WRE91 BR321

6 Disconnect the parking brake cable from the bracket and remove it from the equalizer
7 Pull out the parking brake plunger from the equalizer Remove the parking brake plunger pin



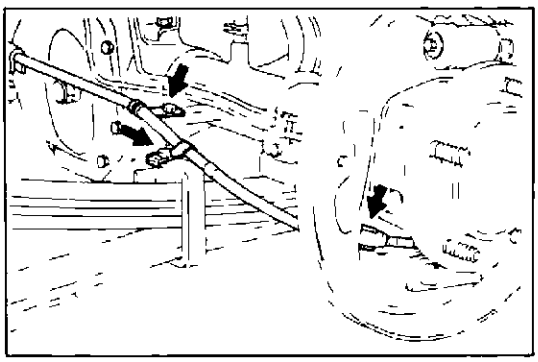
WRE91 BR325

8 Remove the parking brake cable clamps and bolts



WRE91 BR326

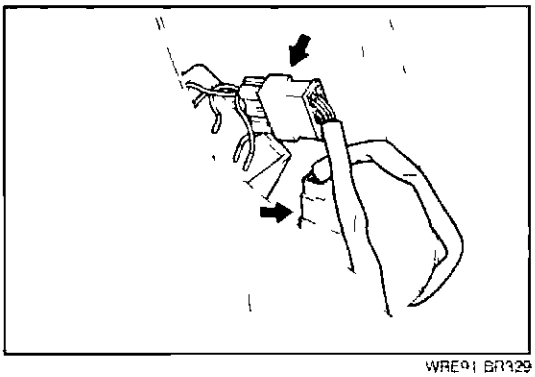
9 Disconnect the parking cable from the brake backing plate (See the Rear Brake section)



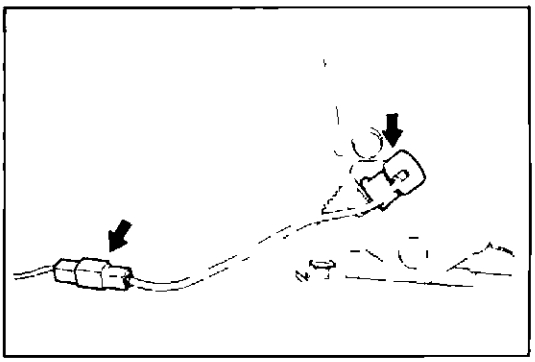
10 Removal of console box
(1) Remove the console box attaching screws



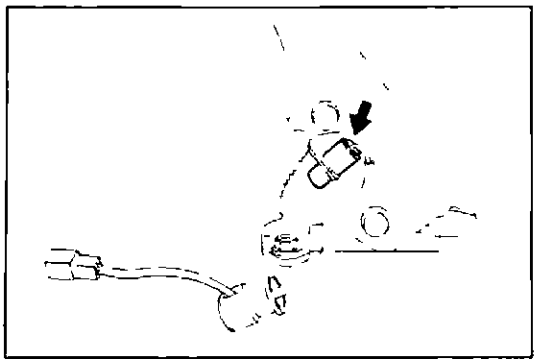
(2) Lift the console box and disconnect the connectors of the door lock control switch and/or the three-stage damper control switch.
(On vehicle so equipped)
(3) Remove the console box



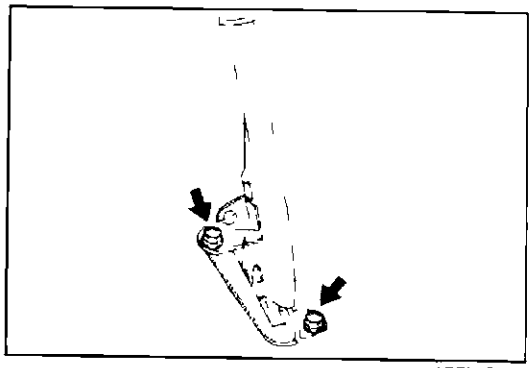
11 Removal of parking brake lever switch
(1) Disconnect the connector of the parking brake lever switch connector
(2) Remove the rubber cap of the parking brake lever switch from the switch



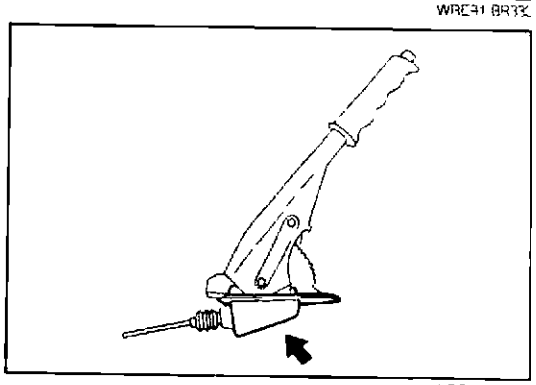
(3) Push the parking brake lever switch to release the lock section Then, remove the parking brake lever switch from the parking brake lever



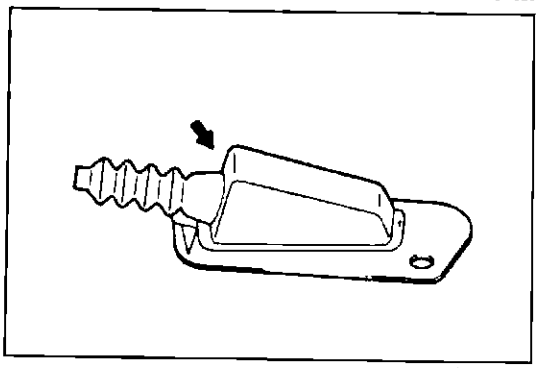
12 Remove the attaching bolts of the parking brake control handle
Then, remove the parking brake countrol handle from the vehicle



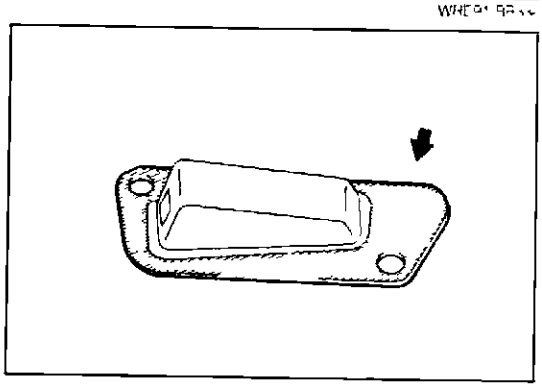
13 Remove the parking brake lever dust cover from the parking brake control handle



14 Remove the parking brake dust cover from the parking brake lever dust cover

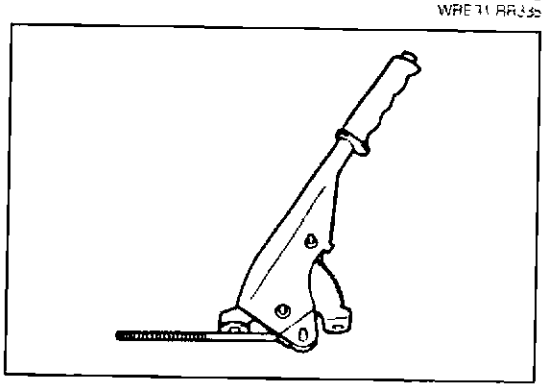


15 Remove the parking brake hole shield from the parking brake lever dust cover

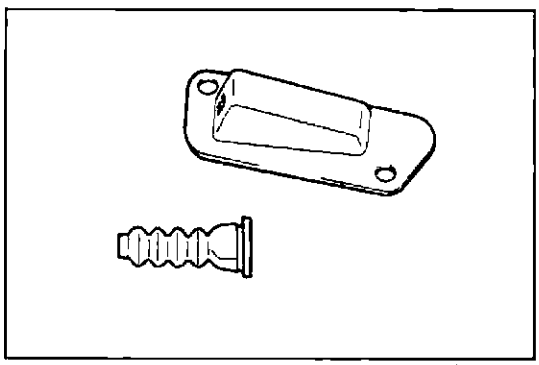


INSPECTION

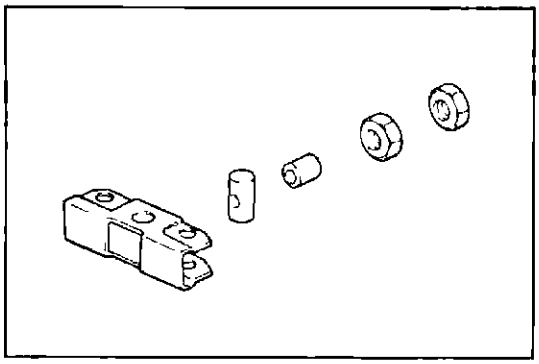
1 Check of parking brake control lever
(1) Ensure that the rack and pawl sections exhibit no wear or deformation
(2) Ensure that the pawl for the rack operates smoothly, interlocking with the release button
(3) Ensure that the screw section exhibits no damage.
(4) Ensure that each staking section exhibits no excessive play
(5) Ensure that the lever section exhibits no damage, such as deformation.



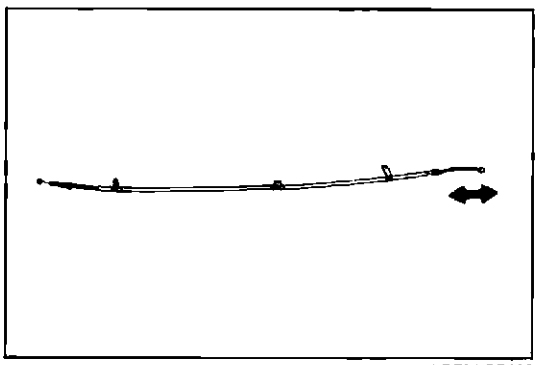
2 Inspection of parking brake lever dust cover
Ensure that the parking brake lever dust cover exhibits no damage, such as cracks
3 Inspection of parking brake dust cover
Ensure that the parking brake dust cover exhibits no damage, such as wear and cracks


WRE91 BR337

4 Ensure that no damage, such as wear, is present at the parking brake equalizer, parking brake plunger pin, collar, adjusting nut and lock nut
Replace any defective part

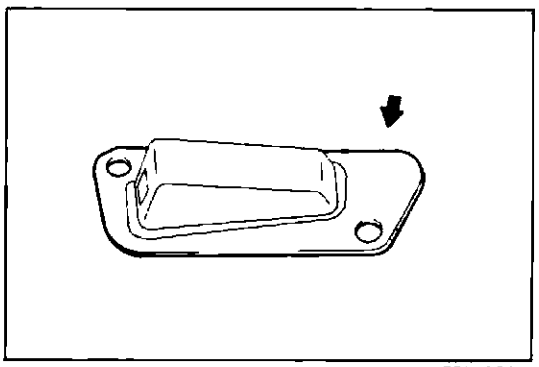

WRE91 BR338

5 Check of parking brake cable
Ensure that the parking brake cable and rubber boot exhibits no damage, such as wear, cut and deformation Also, ensure that the inner cable operates smoothly

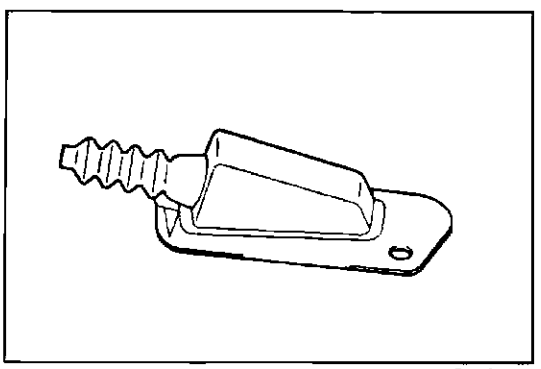

WRE91 BR339

INSTALLATION

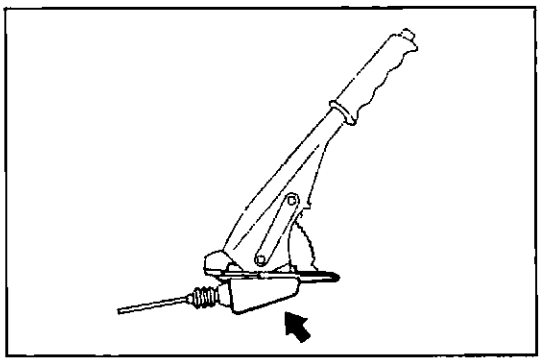
1 Install the parking brake hole shield to the parking brake lever dust cover


WRE91 BR340

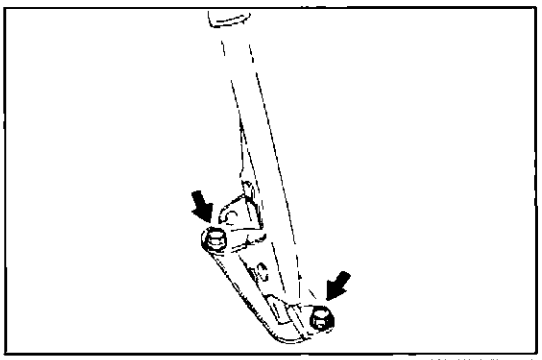
2 Assemble the parking brake dust cover to the parking brake lever dust cover


WRE91 BR341

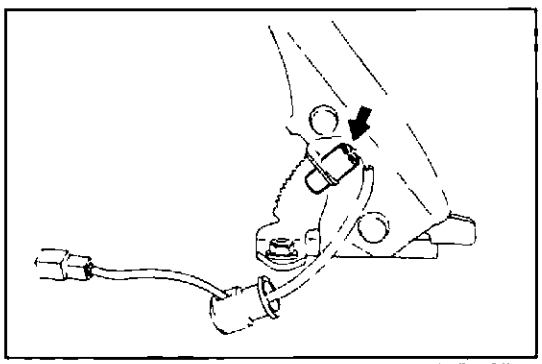
3 Insert the parking brake lever dust cover through the parking brake control handle


WRE91 BR342

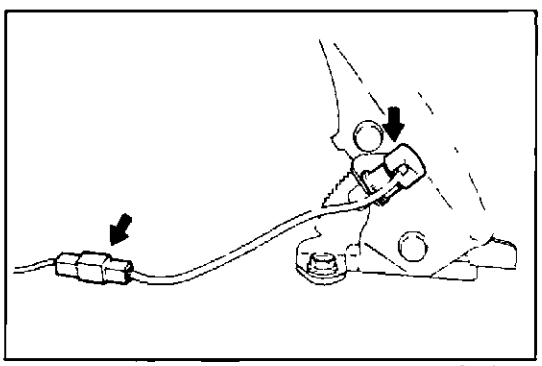
4 Install the parking brake control handle to the floor panel Tighten the attaching bolts to the specified torque.
Tightening Torque: 9.8 - 15.7 N·m (1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)


WRE91-BR343

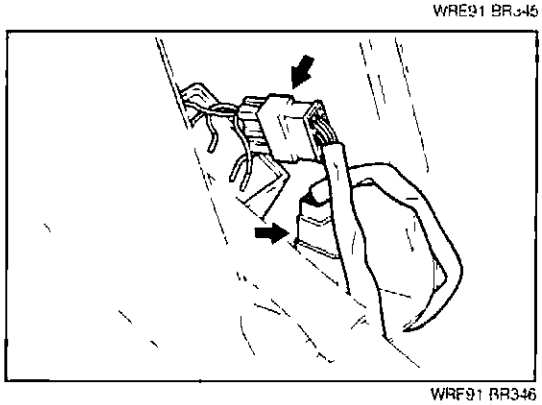
5 Insert the parking brake switch into the parking brake lever


WRE91 BR344

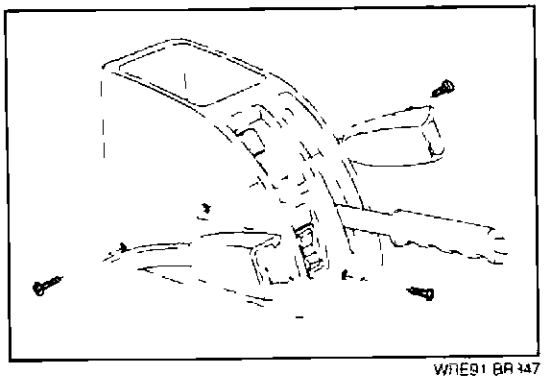
6 Put the rubber cap of the parking brake lever switch over the switch
7 Connect the connector of parking brake lever switch


WRE91 BR345

8 Installation of console box
(1) Connect the connectors of the door lock control switch and/or the three-stage damper control switch (On vehicle so equipped)

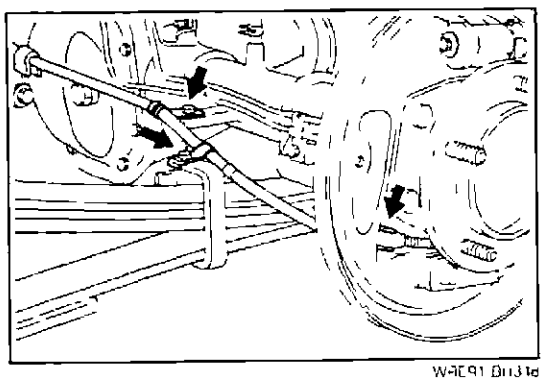

WRE91 BR346

(2) Install the console box and tighten the attaching screws



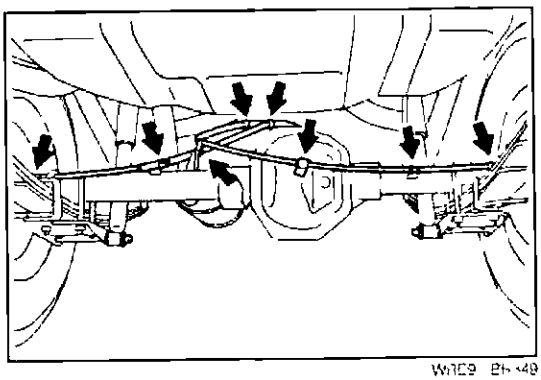
WRE91 BR347

9 Connect the parking brake cable to the brake backing plate
(See the Rear Brake section)
10 Assemble the rear brake
(See the Rear Brake section)



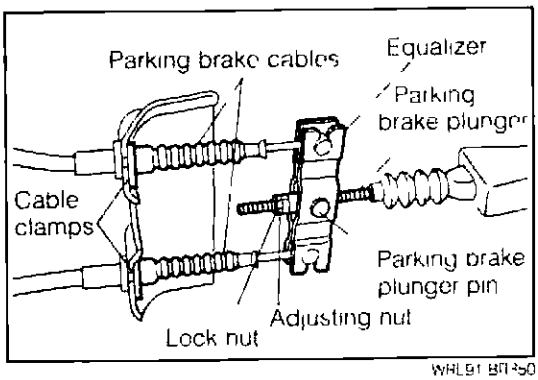
WRE91 BR348

11 Secure the parking brake cable clamps by installing the attaching bolts



WRE9 BR349

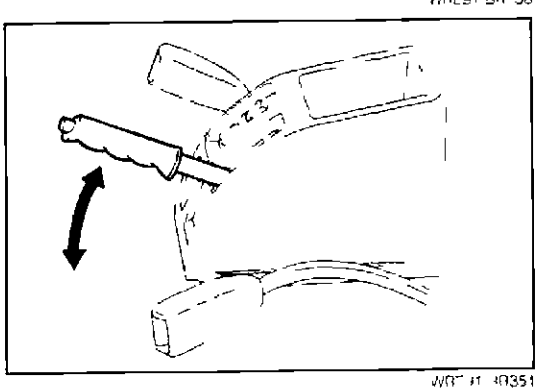
12 Connect the parking brake cable to the equalizer
13 Install the parking brake plunger pin to the equalizer Pass the parking brake plunger in place
14 Install the adjusting nut and lock nut to the plunger
15 Insert the parking brake cable to the bracket Clamp the parking brake cable with new cable clamp clips
NOTE:
- **Never reuse the cable clamp clips.**



WRE91 BR350

16 Remove the slack of the parking brake cable by pulling the parking brake lever with a force of around 30 - 40 kgf

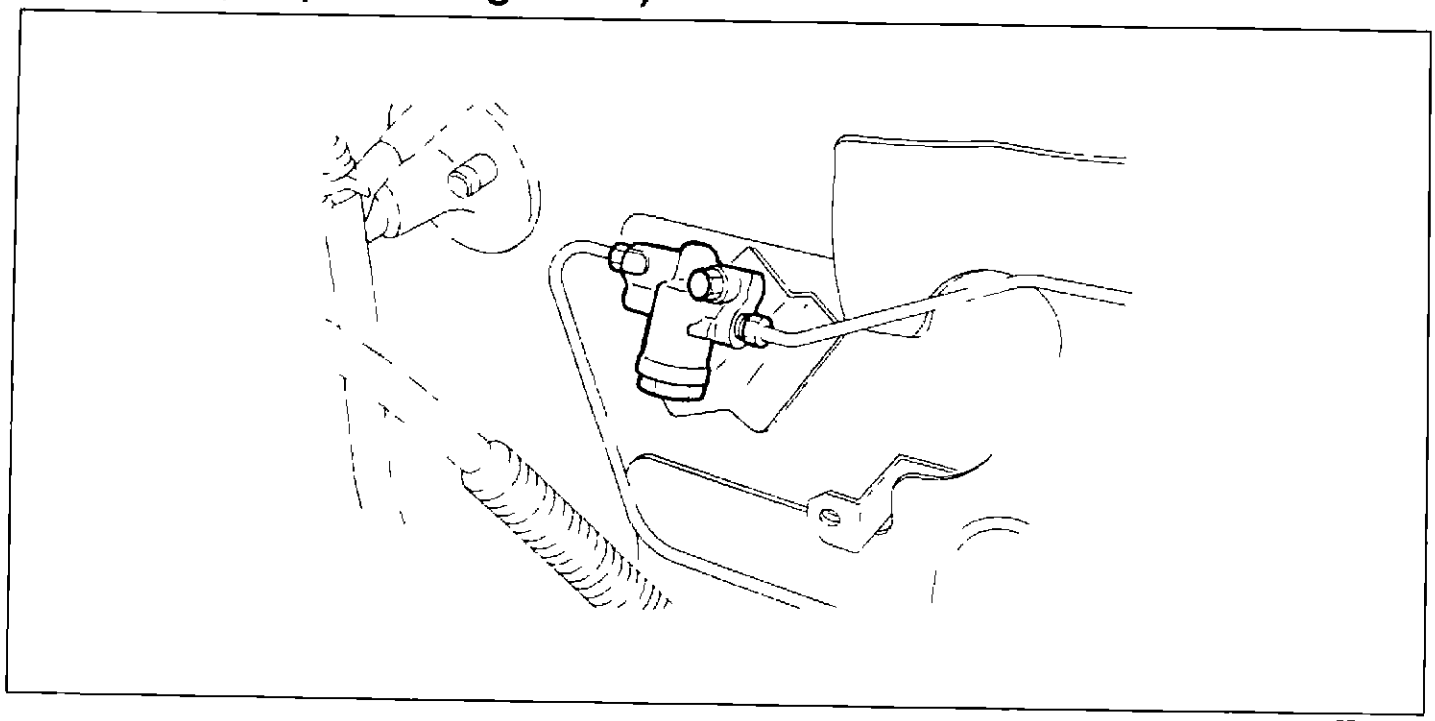
17 Adjust the adjusting nut so that the working travel of the parking brake lever may become the specified value when the lever is pulled with a force of 25 kgf.
Specified Working Travel of Parking Lever:
4 - 6 notches
(with an operating force of 25 kgf applied)



WRE91 BR351

18 While preventing the adjusting nut from turning, tighten the lock nut to the specified torque
Tightening Torque: 3.9 - 6.9 N·m
(0.4 - 0.7 kgf-m, 2.9 - 5.1 ft-lb)

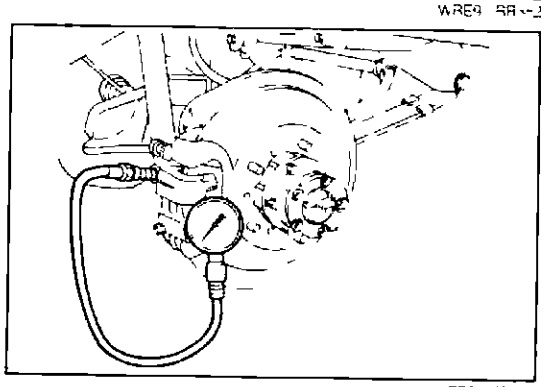
P VALVE (Proportioning Valve)



WRE9 BR-2

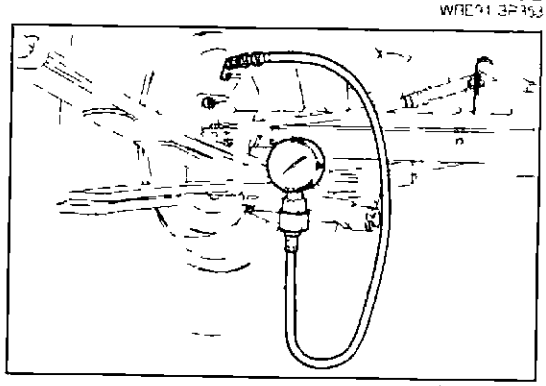
INSPECTION

1 Connect a suitable brake hydraulic pressure gauge to the front wheel brake. Perform air bleeding.
NOTE:
- Be sure to follow the manufacturer's instructions of the brake hydraulic pressure gauge during the connection.



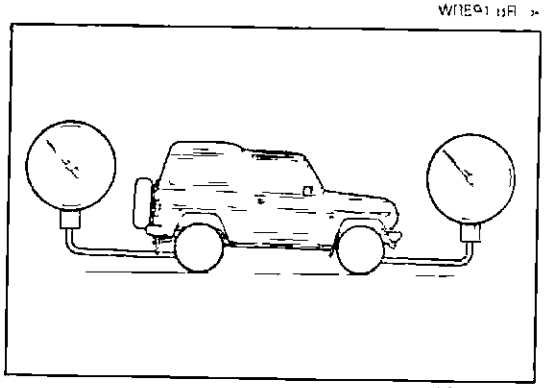
WRE91 BR-3

2 Connect a suitable brake hydraulic pressure gauge to the rear wheel brake. Perform air bleeding.
NOTE:
- Be sure to follow the manufacturer's instructions of the brake hydraulic pressure gauge during the connection.



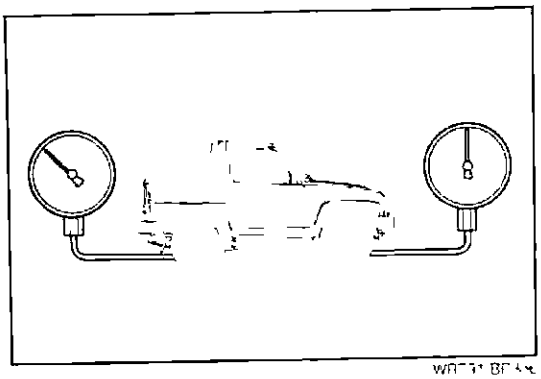
WRE91 BR-4

3 With the brake pedal depressed, set the reading of the hydraulic pressure gauge installed to the front wheel brake to 10 kgf/cm². Ensure that the hydraulic pressure gauge installed to the rear wheel brake registers almost the same hydraulic pressure as that applied to the front wheel. If not, replace the P valve.



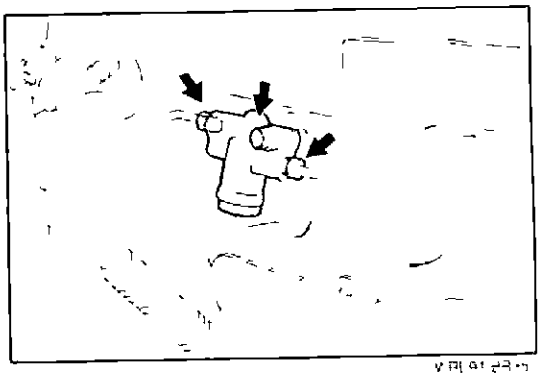
WP591 BR-5

4 Apply a hydraulic pressure of 30 kg/cm^2 or more to the front wheel brake by depressing the brake pedal Ensure that the hydraulic pressure applied to the rear wheel brake is lower than that applied to the front wheel
If not, replace the P valve
5 Remove the brake hydraulic pressure gauge Perform air bleeding



REMOVAL

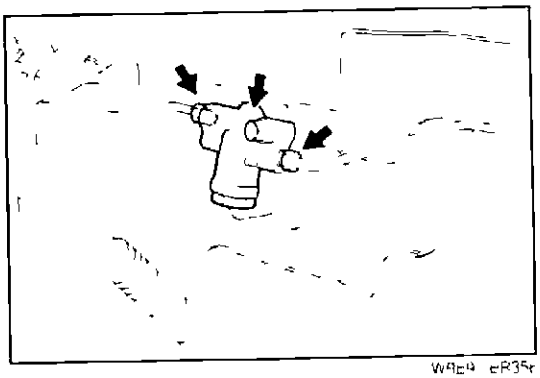
1 Drain the brake fluid from the front and rear brake bleeder plugs
2 Remove the brake pipe from the P valve, using a brake tube union nut wrench
3 Remove the P valve by removing the P valve attaching bolt



INSTALLATION

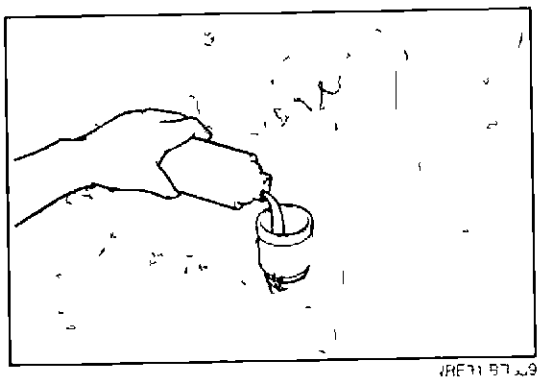
1 Install the P valve and tighten the attaching bolt
Tightening Torque: 5.9 - 9.8 N m
(0.6 - 1.0 kgf-m, 4.3 - 7.2 ft-lb)

NOTE
- On air conditioner-equipped vehicles, be sure to tighten the drain hose clamp together with the valve.

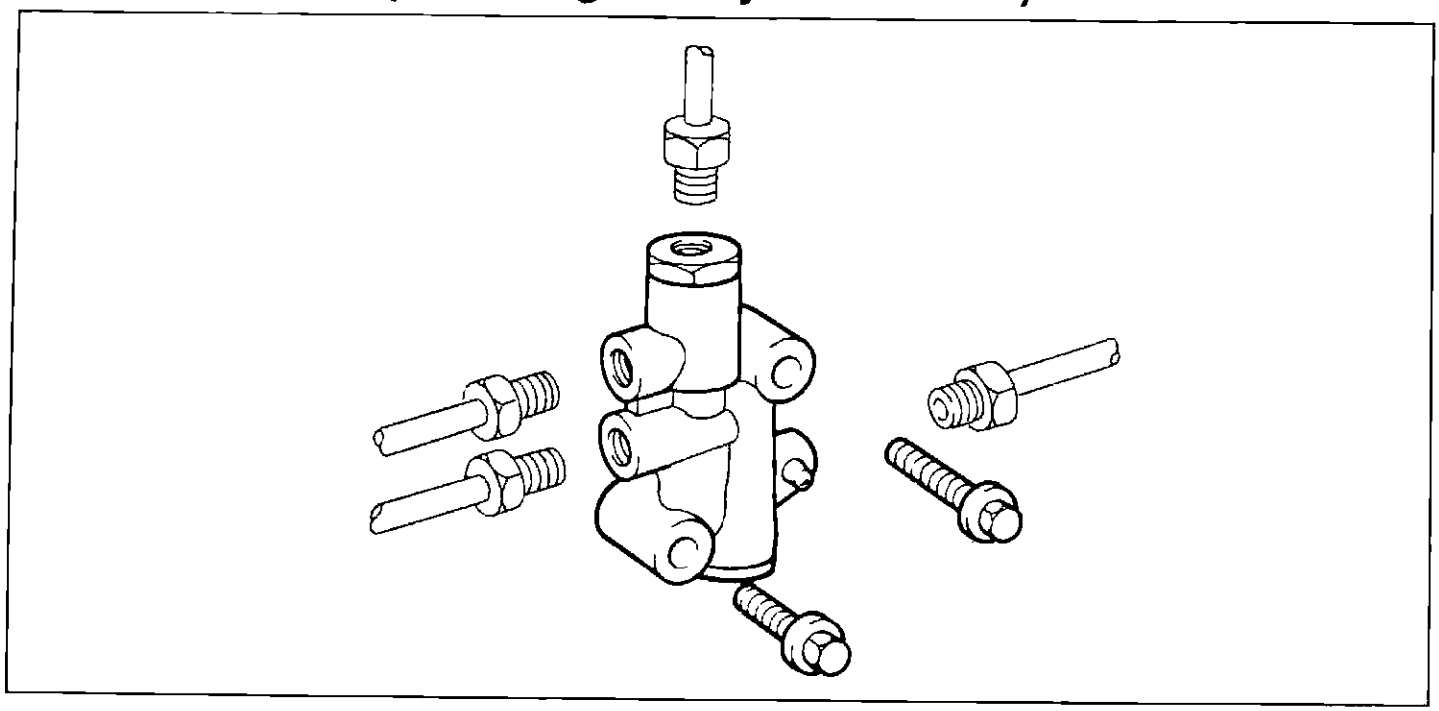


2 Connect the brake pipes to the P valve
Tightening Torque: 12.7 - 17 7 N m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)

3 Fill brake fluid to the master cylinder Perform air bleeding (See page BR-25)
4 Perform the brake fluid leakage test
5 Perform the in-vehicle inspection
6 Perform the brake test on a brake tester



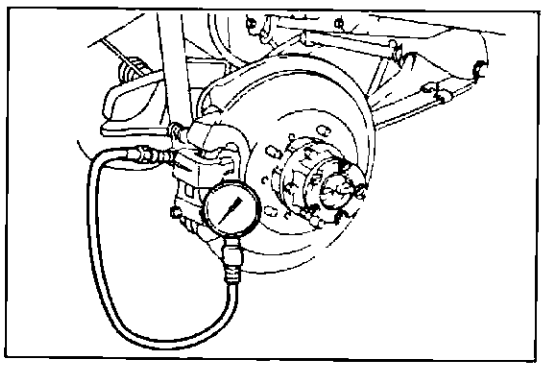
P & B VALVE (Proportioning and By-PASS Valve)



WRE91-BR360

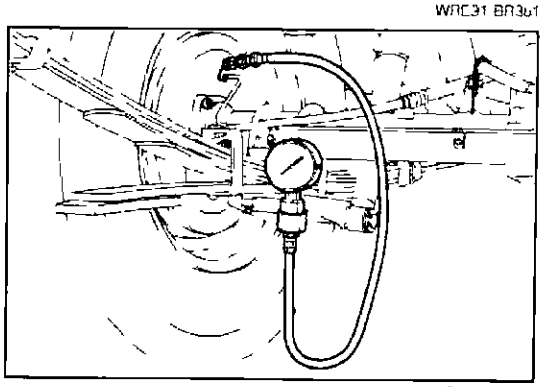
INSPECTION

1 Connect a suitable brake hydraulic pressure gauge to the front wheel brake Perform air bleeding
NOTE.
- Be sure to follow the manufacturer's instructions of the brake hydraulic pressure gauge during the connection.



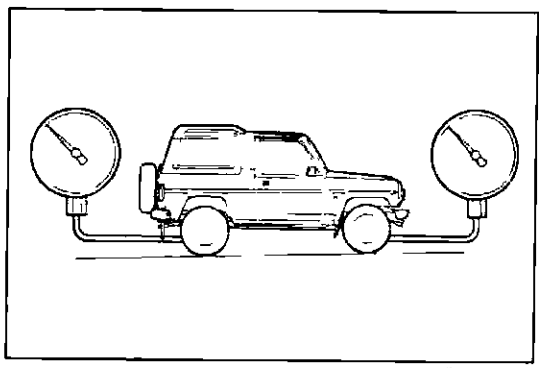
WRE91-BR361

2 Connect a suitable brake hydraulic pressure gauge to the rear wheel brake Perform air bleeding
NOTE:
- Be sure to follow the manufacturer's instructions of the brake hydraulic pressure gauge during the connection.



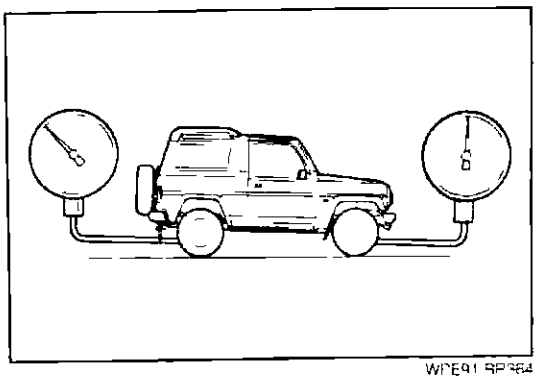
WRE91-BR362

3 With the brake pedal depressed, set the reading of the hydraulic pressure gauge installed to the front wheel brake to 10 kgf/cm^2 Ensure that the hydraulic pressure gauge installed to the rear wheel brake registers almost the same hydraulic pressure as that applied to the front wheel
If not replace the P & B valve



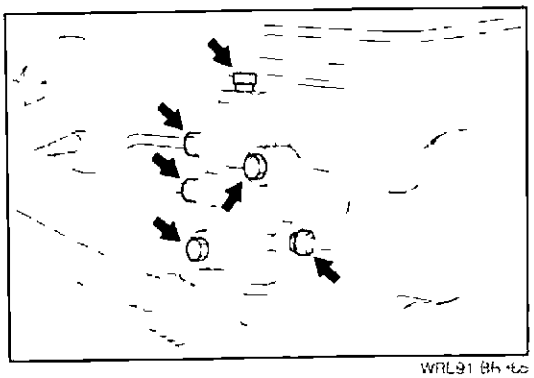
WRE91-BR363

4 Apply a hydraulic pressure of 30 kg/cm² or more to the front wheel brake by depressing the brake pedal. Ensure that the hydraulic pressure applied to the rear wheel brake is lower than that applied to the front wheel.
If not, replace the P & B valve.
5 Remove the brake hydraulic pressure gauge. Perform air bleeding.
(See page BR–25)



REMOVAL

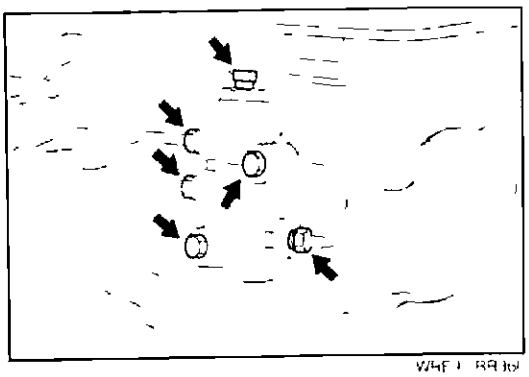
1 Drain the brake fluid from the front and rear brake bleeder plugs.
2 Remove the brake pipe from the P & B valve, using a brake tube union nut wrench.
3 Remove the P & B valve by removing the P & B valve attaching bolts.



INSTALLATION

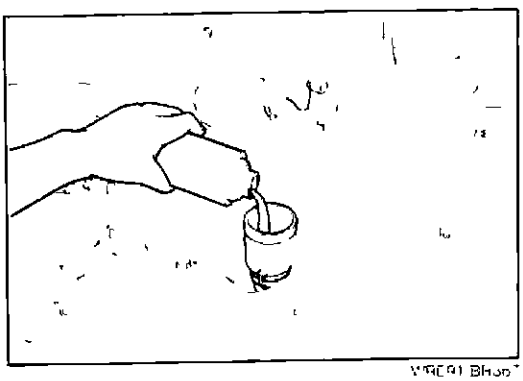
1 Install the P & B valve and tighten the attaching bolts.
Tightening Torque: 5.9 - 9.8 N·m
(0.6 - 1.0 kgf-m, 4.3 - 7.2 ft-lb)

NOTE:
- On air conditioner-equipped vehicles, be sure to tighten the drain hose clamp together with the valve.



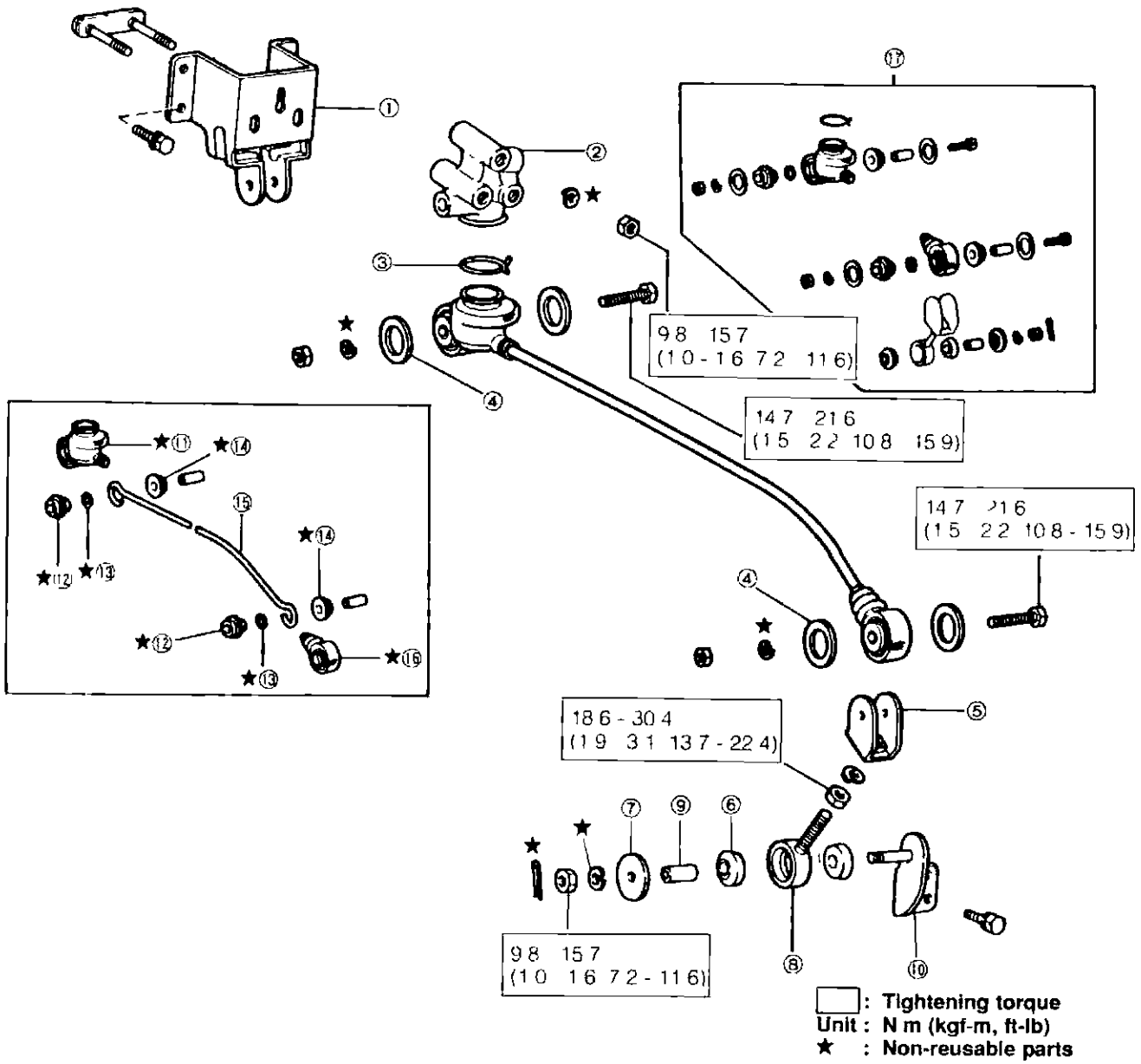
2 Connect the brake pipes to the P & B valve.
Tightening Torque: 12.7 - 17.7 N·m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)

3 Fill brake fluid to the master cylinder. Perform air bleeding.
(See page BR–25)
4 Perform the brake fluid leakage test.
5 Perform the in vehicle inspection.
6 Perform the brake test on a brake tester.



L.S.P.V. (Load Sensing Proportioning Valve)

COMPONENTS

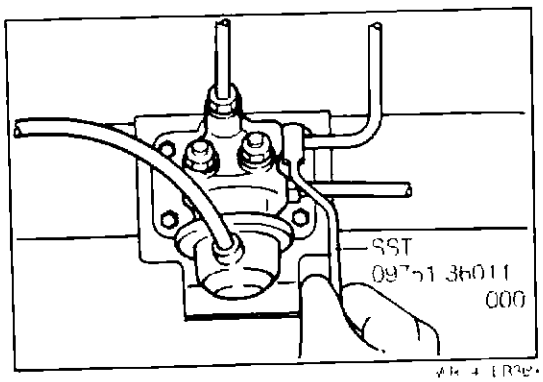


① Load sensing valve bracket
② Load sensing valve assembly
③ Clip
④ Plate washer
⑤ Load sensing spring shackle No. 1
⑥ Cushion retainer
⑦ Bush
⑧ Load sensing spring shackle No. 2
⑨ Collar
⑩ Load sensing shackle bracket No. 1
★⑪ Load sensing valve boot
★⑫ Load sensing spring bush No. 1
★⑬ Plate washer
★⑭ Load sensing spring bush No. 2
⑮ Load sensing spring
★⑯ Load sensing spring boot
⑰ Bush & boot kit

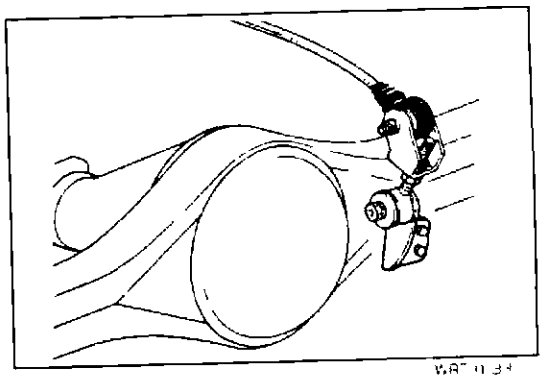
WRE31BR368

REMOVAL

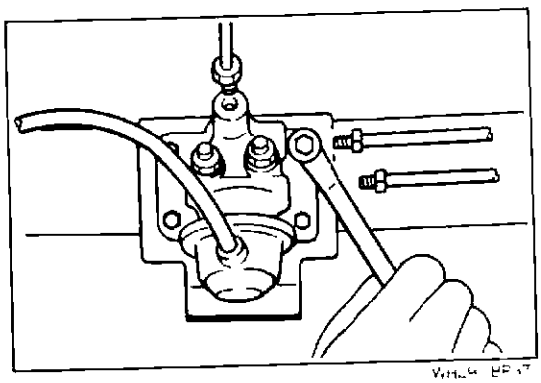
1 Remove the brake tube
SST: 09751-36011-000



2 Disconnect the shackle No 2 from the bracket

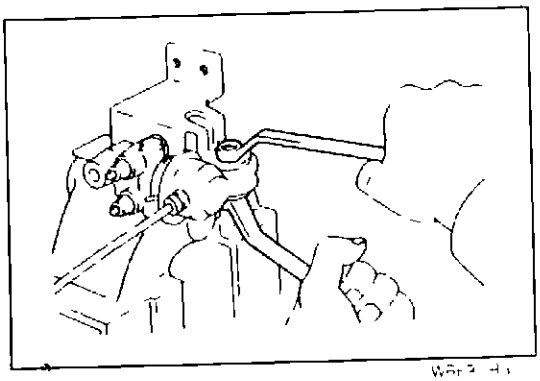


3 Removal of LSPV assembly
Rmove the valve bracket attaching bolts
Remove the LSPV assembly

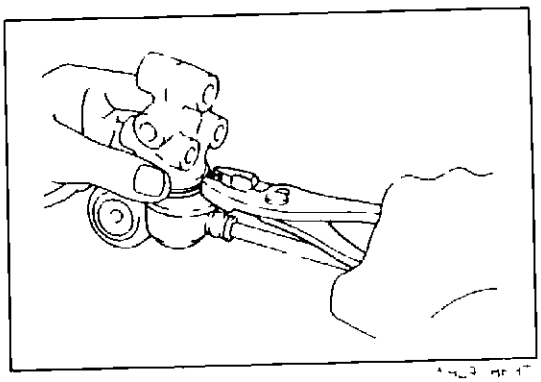


DISASSEMBLY

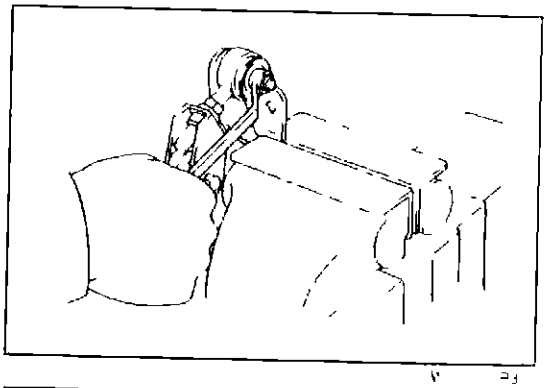
1 Removal of load valve bracket
Remove the three nuts so as to remove the load sensing valve bracket



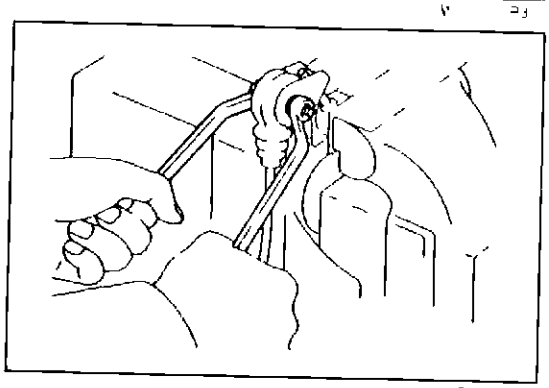
2 Removal of LSPV
Detach the clip to remove the LSPV



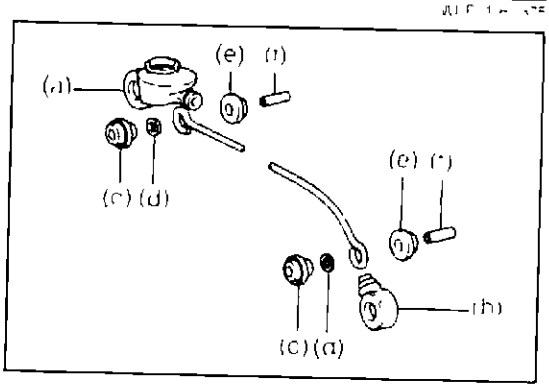
3 Removal of load sensing shackle bracket No 1
Remove the cotter pin
Remove the nut so as to remove the load sensing shackle bracket No 1, retainer, bushes (2 pieces) and collar



4 Removal of load sensing spring shackles No 1 and No 2
Remove the nut so as to remove the spring shackles No 1 and No 2 and plate washers (2 pieces)
Separate the load sensing spring shackles No 1 and No 2 from each other



5 Disassemble the following parts from the load sensing springs
(a) Load sensing valve boot
(b) Load sensing spring boot
(c) Bushings
(d) Rubber plates
(e) Bushings
(f) Collars

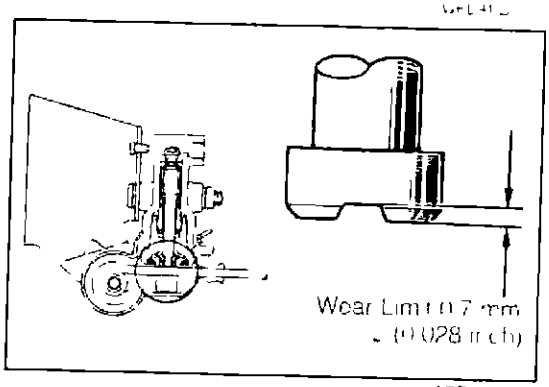


INSPECTION OF LSPV

Inspect the valve piston pin and load sensing contact surface for wear

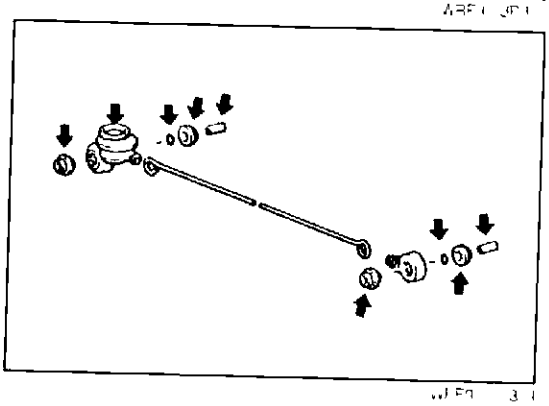
Wear Limit: 0.7 mm

NOTE
- Never attempt to disassemble the LSPV



ASSEMBLY

1 Application of rubber grease
Apply rubber grease (lithium soap base glycol grease) to the arrow-headed points in the illustration

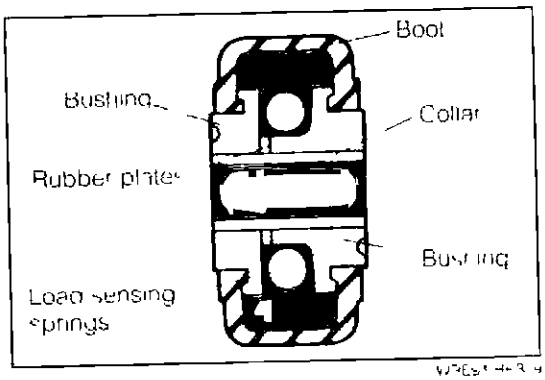


2 Assembly of load sensing spring assembly
(1) Assemble a new valve boot and a new spring boot in the load sensing spring

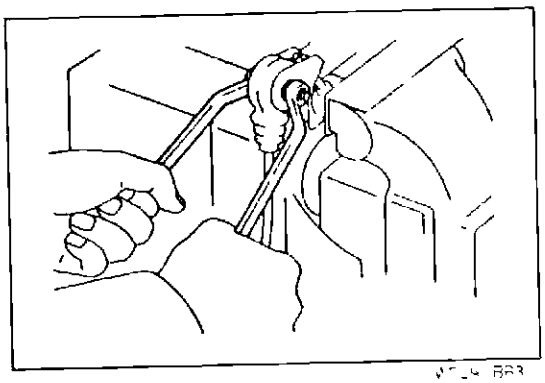
NOTE
- Do not mistake the valve side of the load sensing spring for the shackle side of the said spring.

(2) Assemble new load sensing spring bushings No 1 and No 2 collars and plate washers

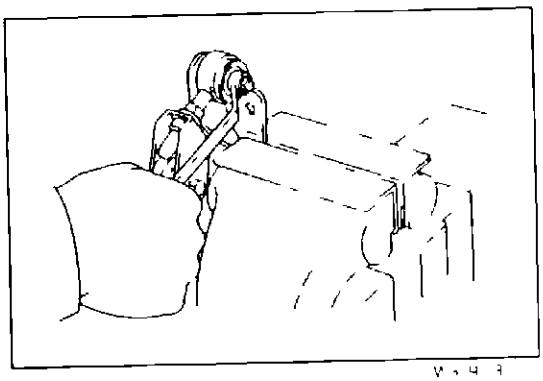
NOTE
- The plate washers (rubber) should be assembled to the bushings while these washers are in a condition assembled to the collars



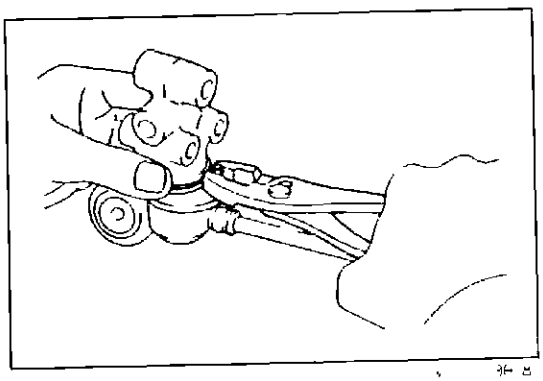
3 Assembly of Shackle No 1 and No 2
(1) Assemble the nut, washer and shackle No 1 in the load sensing spring shackle No 2
(2) Assemble the spring shackle by means of the nut with two plate washers interposed
Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)



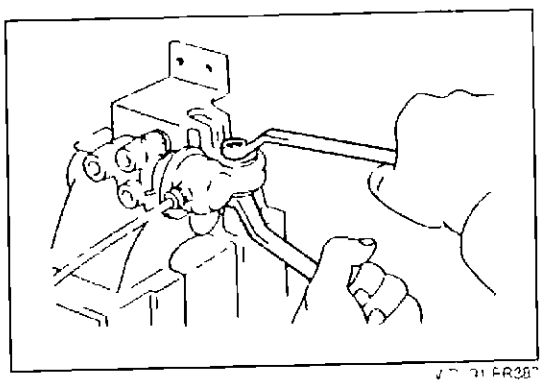
4 Assembly of load sensing shackle bracket No 1
(1) Assemble two bushings and collar in the load sensing spring shackle
(2) Assemble the load sensing spring assembly in the shackle bracket No 1 by means of the nut with two retainers interposed
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)



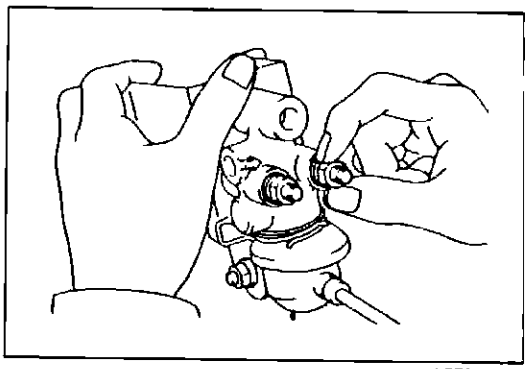
5 Assembly of LSPV
Assemble the LSPV in the load sensing spring assembly and secure them with the clip



6 Assembly of load sensing valve boot
Assemble the load sensing valve boot in the valve bracket by means of the nut and bolt with two plate washers interposed
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)

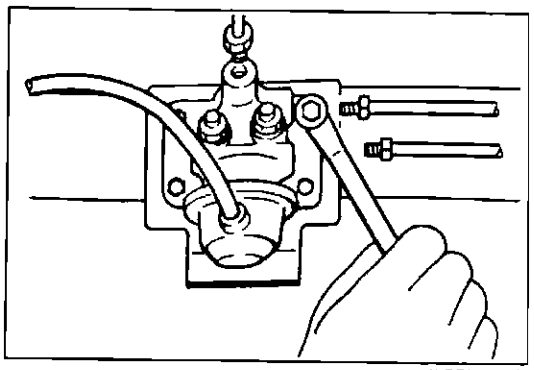


7 Assembly of load sensing valve bracket
Assemble the load sensing valve bracket and set plate in the LSPV and tighten them temporarily with two nuts.

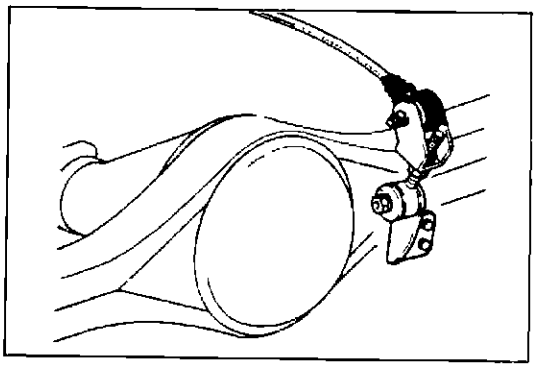


INSTALLATION

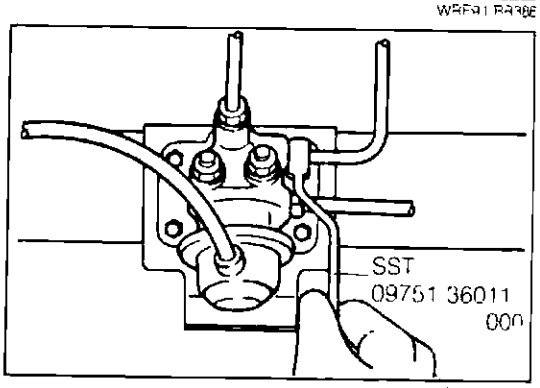
1 Installation of LSPV assembly to frame
Tightening Torque: 9.8 - 15.7 N m
(1.0- 1.6 kgf-m, 7.2 - 11.6 ft-lb)



2 Connection of shackle No 2 to bracket



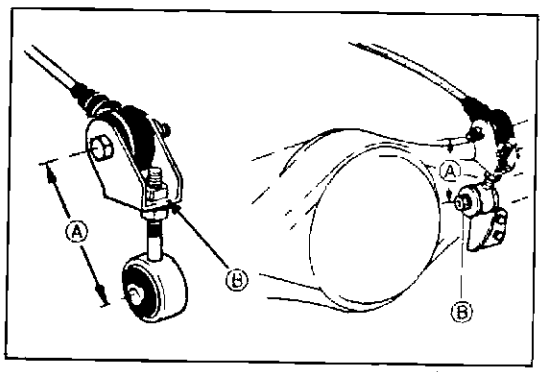
3 Connection of brake tube
Using the SST connect the brake tubes Tighten the nut
SST. 09751-36011-000



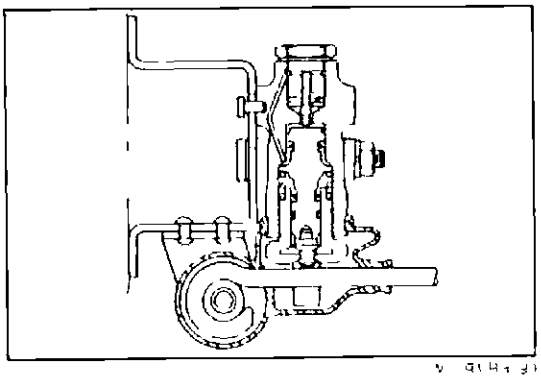
4 Checking of installation length of load sensing spring shackle
(1) Check the length of the shackle No 2 (A)
If the length fails to come within the specified dimension, adjust the shackle No 2 by turning it
Specified dimension: 78 mm

(2) Tighten the lock nut (B)
Tightening Torque: 18 6 - 30.4 N m
(1 9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)

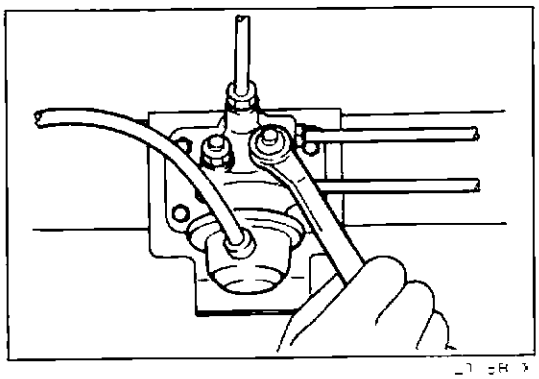
(3) Install a new cotter pin



5 Adjustment of rear axle weight
Refer to the section under "Hydraulic Pressure Adjusting Procedure".

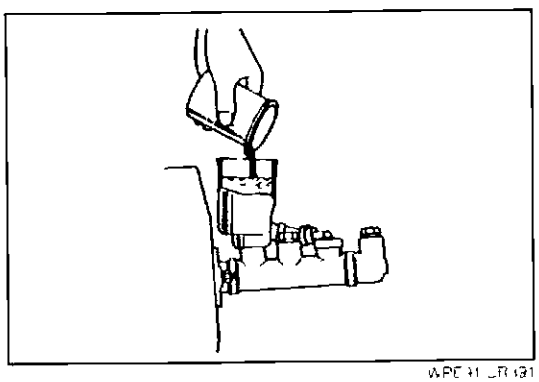


6 Tightening of LSPV attaching nut
(1) Ensure that the valve piston moves down smoothly when the load sensing spring is depressed
(2) Install the LSPV in such a way that it is brought into contact with the load sensing spring
(3) Tighten two nuts
Tightening Torque: 9.8 - 15.7 N·m (1.0- 1.6 kgf-m, 7.2 - 1 6 ft-lb)

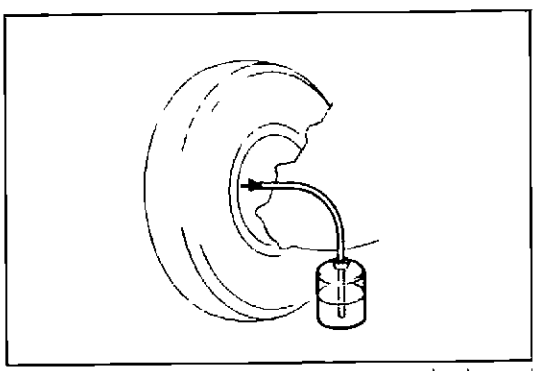


7 Air bleeding for brake system
(1) Pouring of brake fluid
NOTE:
- **If the brake fluid is spilled over the paint-finish surfaces of the motor vehicle inadvertently, quickly wipe off the brake fluid**
  Then, clean the area using white gasoline or the like.

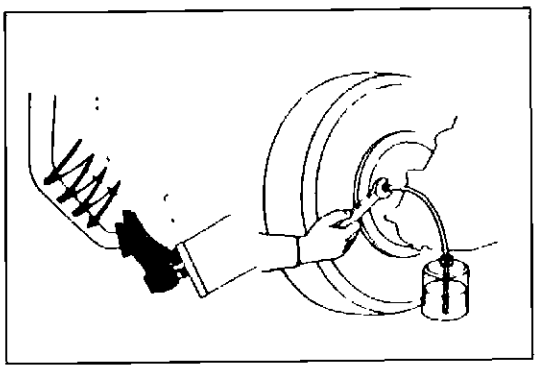
- The air bleeding operation should be started at the wheel cylinder which is located at the farthermost point from the master cylinder



(2) Connection of vinyl hose to bleeder plug of wheel cylinder
Submerge one end of the vinyl hose in a container filled with the brake fluid. Connect the other end of the vinyl hose to the wheel cylinder bleeder plug of the motor vehicle



(3) Air bleeding
The following points must be observed for the motor vehicle equipped with the LSPV
1) Perform the operation by two persons. Be sure to always keep the brake fluid tank full
2) The other worker slackens the bleeder plug 1/3 through 1/2 turn at a time. Be certain to firmly depress the pedal for each operation
3) At this time, keep the bleeder plug slackened
4) Repeat the 1) and 2) steps above, until you no longer observe bubbles in the fluid



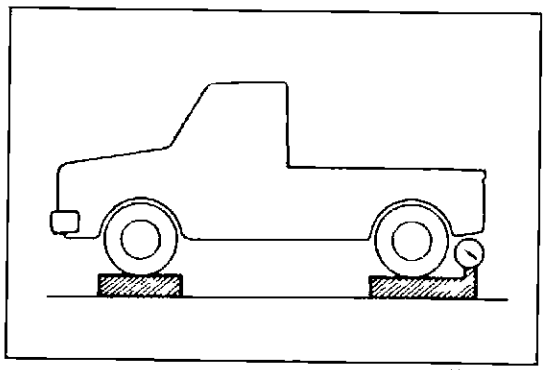
5 Checking of brake fluid leakage
Depress the brake pedal and ensure that each section of the pipe line exhibits no fluid leakage
9 Checking of rear wheel cylinder hydraulic pressure
- Refer to the section under "Hydraulic Pressure Check"

HYDRAULIC PRESSURE CHECK AND ADJUSTMENT

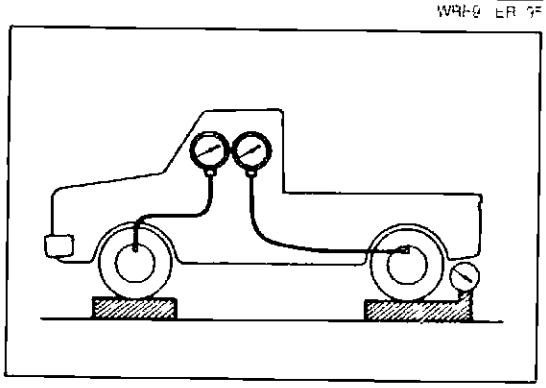
1 Adjust the rear axle weight by placing weights on the deck, with one person riding on the driver's seat
Use an axle weight meter for this adjustment
Rear Axle Load (Including Vehicle Weight)

Unit: kg

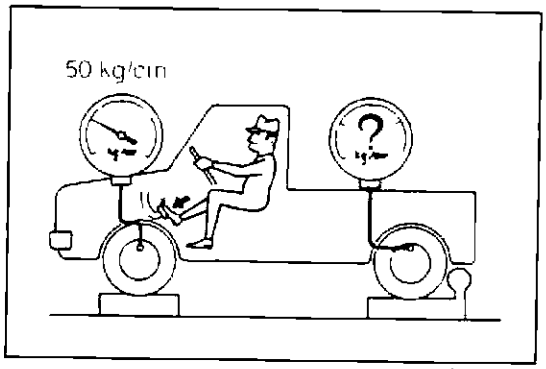
F77 MPR	718
F77-MPRW(LCL & EEC and Australian spec)	733



2 Install LSPV gauge and bleed air
BBT - 1TB



3 Raise the front brake pressure to 50 kgf/cm² ± 5 kgf/cm² or 100 kgf/cm² ± 7 kgf/cm²
Proceed to check the rear brake pressure
NOTE:
- The brake pedal should not be depressed twice and/or returned while setting to the specified pressure. Read the value of rear brake pressure two seconds after adjusting the specified fluid pressure.



Rear brake pressure

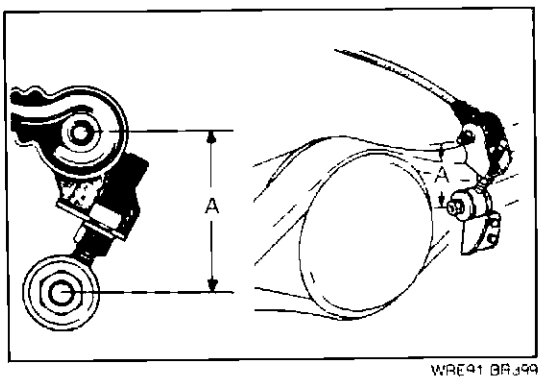
Front brake pressure	50 kg/cm² ± 5 kg/cm²	100 kg/cm² ± 7 kg/cm²
Rear brake pressure	25 kg/cm² to 35 kg/cm²	37 kg/cm² to 49 kg/cm²

4 If the brake pressure is incorrect, adjust the hydraulic pressure as follows

(1) Adjust the length of the shackle No 2

Too low pressure	Lengthen A
Too high pressure	Shorten A.

Model	Initial set
F77	78 mm (3.071 inch)

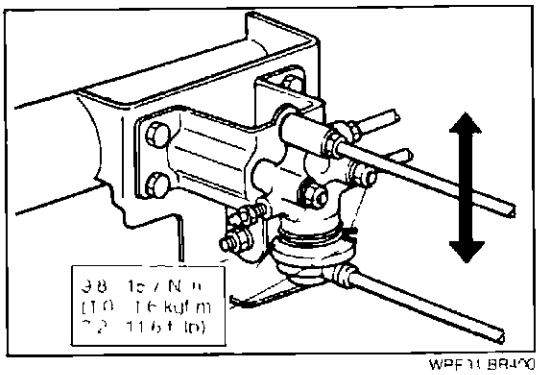


WRE91 BR499

(2) If the pressure can not be adjusted by the shackle No 2, raise or lower the valve body

Too low pressure	Lower the valve body
Too high pressure	.Raise the valve body

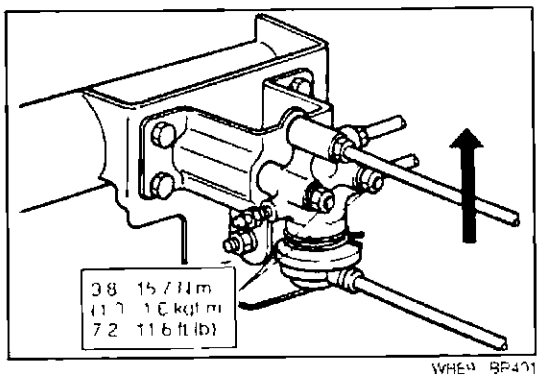
Adjust the length of the shackle No 2 again
If the specified hydraulic pressure still can not be attained, inspect the LSPV assembly.



WRE91 BR500

5 Unit inspection of LSPV assembly

(1) Slacken the valve body attaching bolts Raise the valve body as far as it will go upward Temporarily tighten the valve body at this position, where the load sensing spring remains inoperative

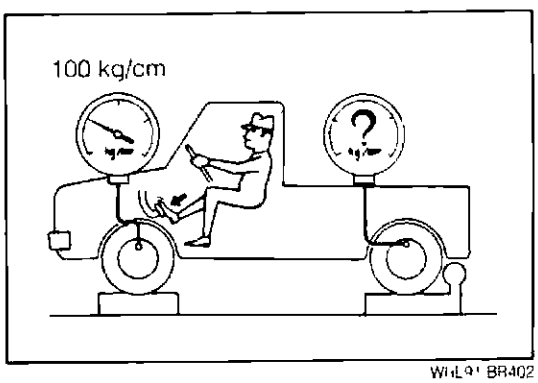


WRE91 BR501

(2) Under this condition, check the hydraulic pressure of the rear wheel cylinder and compare it against the reference value in the table below
If the hydraulic pressure fails to come within the reference value, replace the unit of LSPV

NOTE:

- Never attempt to disassemble the LSPV.



WRE91 BR502

LSPV unit hydraulic pressure reference value

Front wheel cylinder hydraulic pressure	Rear wheel cylinder hydraulic pressure
5 kgf/cm (71.12 psi)	About 5 kgf/cm² (71.12 psi)
25 kgf/cm (355.58 psi)	10 kg/cm ± 3 kg/cm² (142.2 psi ± 42.7 psi)
60 kgf/cm (853.38 psi)	10 kg/cm² ± 3.5 kg/cm² (142.2 psi ± 49.8 psi)

DAIHATSU

F70,F75,F77

Service manual

CHARGING SYSTEM

CH

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

CHARGING SYSTEM

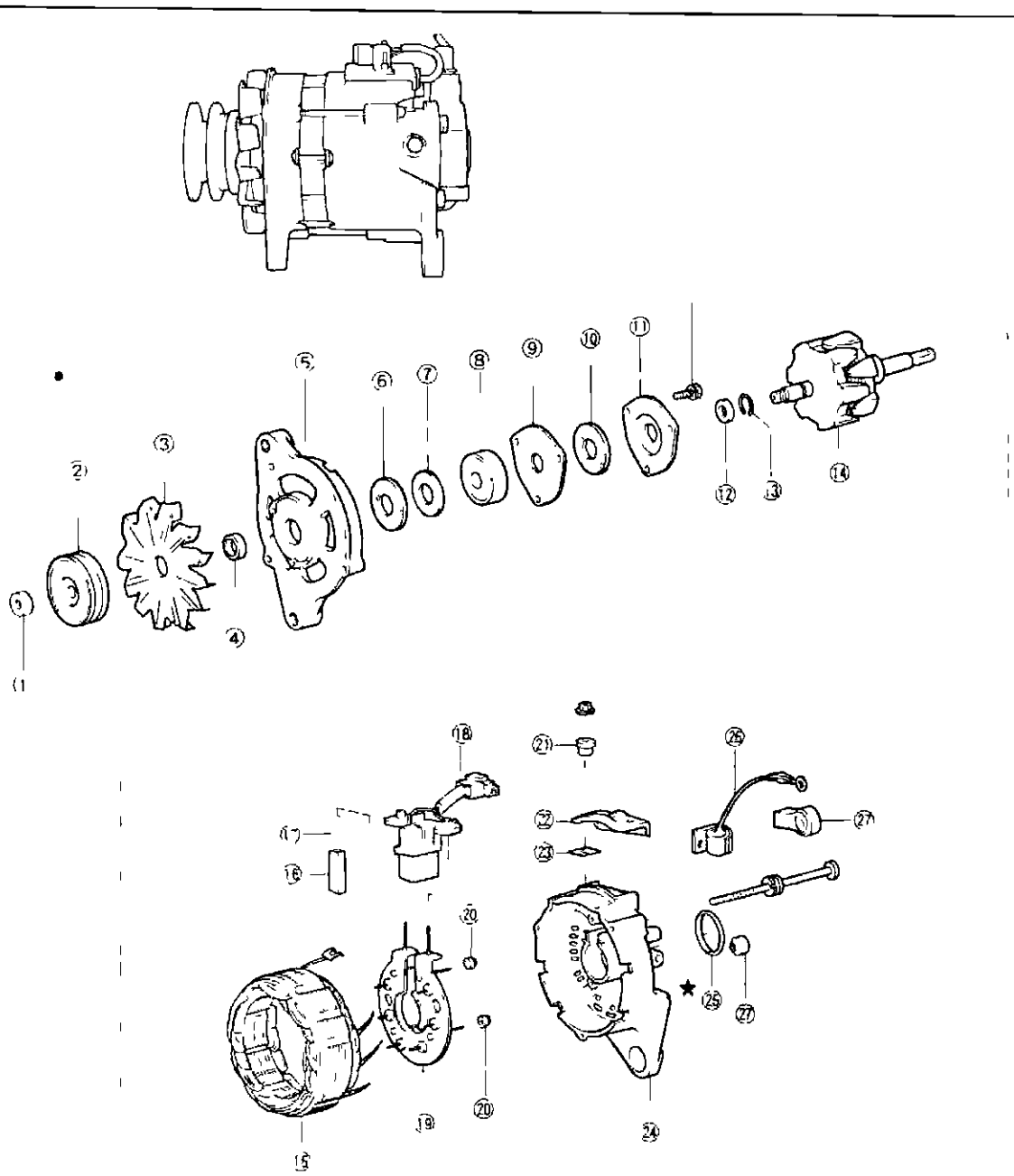
1. COMPONENTS OF ALTERNATOR .... CH– 2
2. CHARGING SYSTEM CIRCUIT ..... CH– 4
3. IN-VEHICLE INSPECTION ..... CH– 5
4. REMOVAL OF ALTERNATOR ..... CH– 7
5. DISASSEMBLY OF ALTERNATOR .... CH– 8
6. INSPECTION OF ALTERNATOR CH–10
7. ASSEMBLY OF ALTERNATOR CH–13
8. DISASSEMBLY OF VACUUM PUMP CH–16
9. INSPECTION OF VACUUM PUMP CH–16
10. ASSEMBLY OF VACUUM PUMP CH–16
11. INSTALLATION OF ALTERNATOR ... CH–17
12. INSPECTION OF REGULATOR CH–18

WRE91-CH001

1. COMPONENTS OF ALTERNATOR

This alternator is a type in which a vacuum pump for generating negative pressure is directly connected

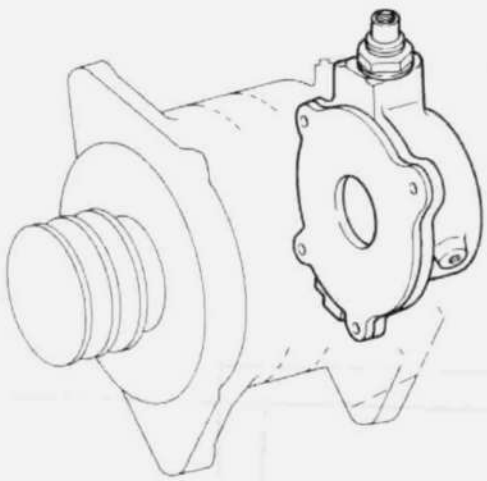
(1) Alternator

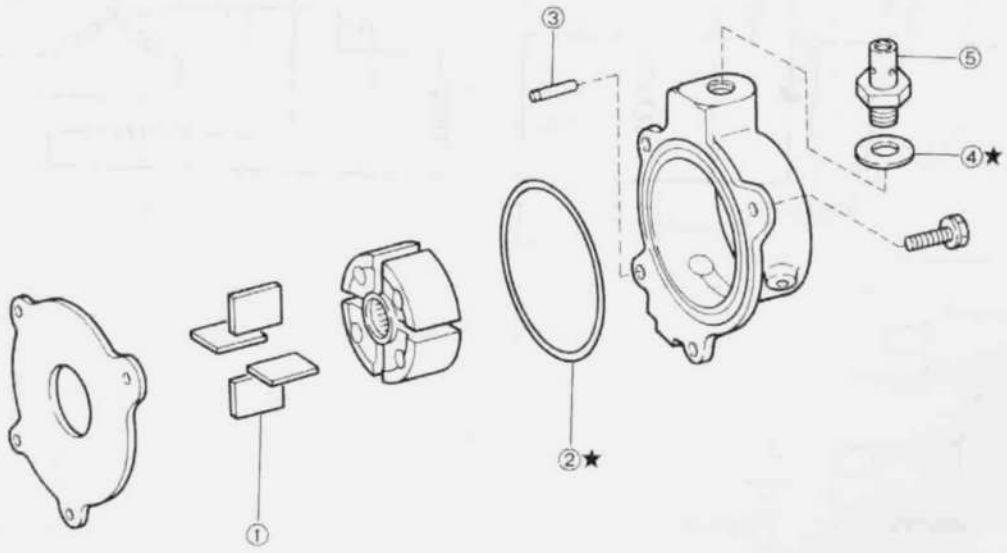


★ **Non-reusable parts**

① Pulley lock nut
② Pulley
③ Fan
④ Collar
⑤ Drive end frame
⑥ Felt washer
⑦ Felt cover
⑧ Bearing
⑨ Retainer plate
⑩ Felt washer
⑪ Felt cover
⑫ Spacer ring
⑬ Snap ring
⑭ Rotor
⑮ Stator
⑯ Brush
⑰ Spring
⑱ Holder
⑲ Rectifier holder
⑳ Insulator
㉑ Bush
㉒ Frame brush cover
㉓ Washer
㉔ Rear end frame
㉕ Vacuum pump packing
㉖ Condenser
㉗ Insulator

(2) Vacuum pump



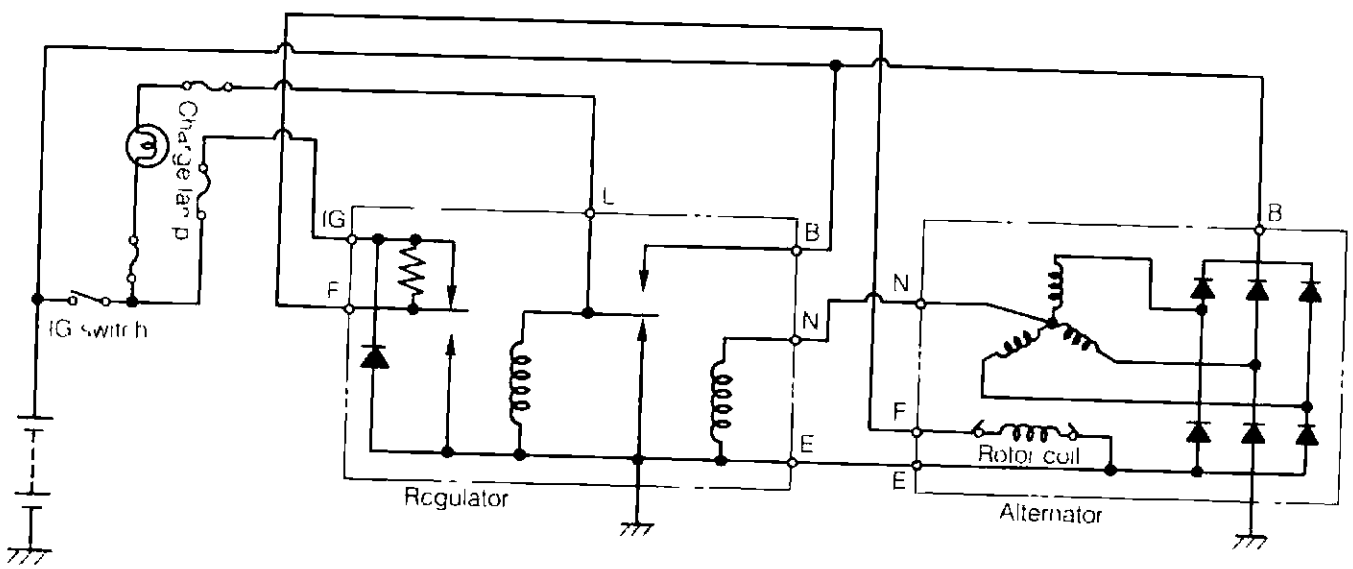


★ **Non-reusable parts**

① Vacuum pump blade
② Packing
③ Pin
④ Gasket
⑤ Check valve

WRE91-CH003

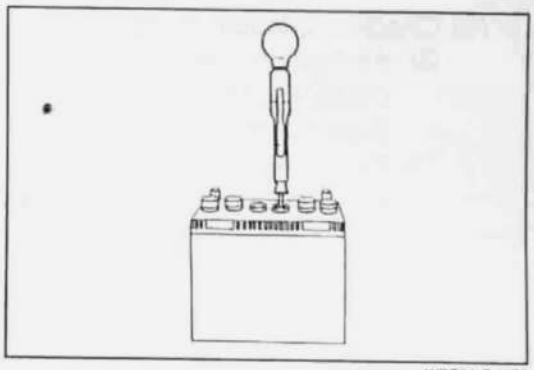
2. CHARGING SYSTEM CIRCUIT



WRC91 CH004

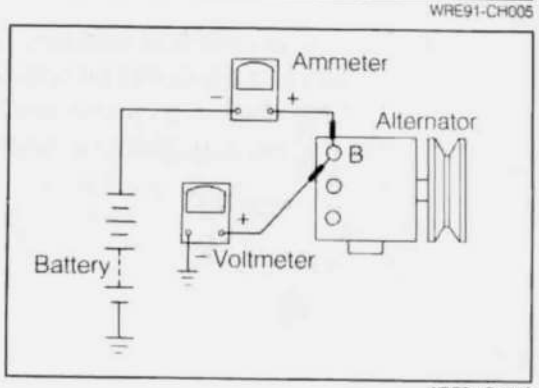
3. IN-VEHICLE INSPECTION

(1) Prior to the in-vehicle inspection, be sure to perform the following checks.
- ① Specific gravity of battery
- ② Installation of battery terminals
- ③ Tension of V-belt
- ④ Fuse
- ⑤ Wiring harness
- ⑥ Abnormal noise emitted from alternator while engine is rotating.



WRE91-CH005

(2) Output test under unloaded state
- ① Ensure that all switches are turned OFF so that no unnecessary electric load may be applied.
  - Headlamps
  - Heater blower
  - Radio
  - Rear defogger
  - Room lamp, etc.

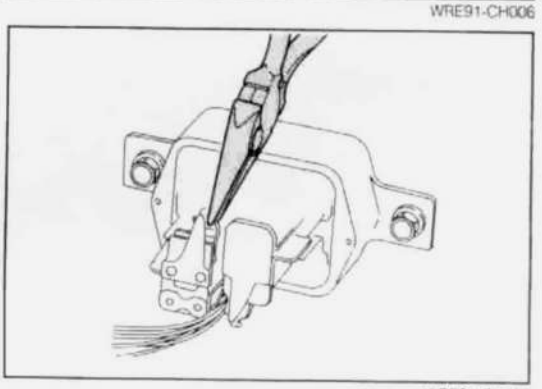


WRE91-CH006

- ② Raise the engine revolution speed gradually. Measure the current and voltage.

Specifications: Not to exceed 10 A
13.8 - 14.8 V (20 °C)

If the measured voltage is not within the specifications, adjust the regulator or replace the regulator, as required.

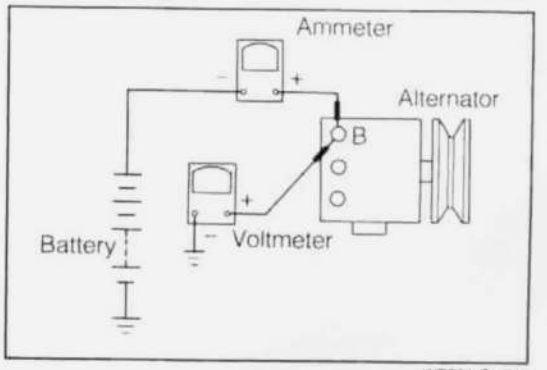


WRE91-CH007

(3) Output test under loaded state
- ① To apply electric load, perform the following operation.
  - a. Set the headlamps to the upper beam position.
  - b. Set the heater blower to the "High" position.
- ② Measure the output current at the engine speed of 1300 rpm.

Specified Value: 20 A

If the ammeter reading is less than the specified amperage, repair the alternator.



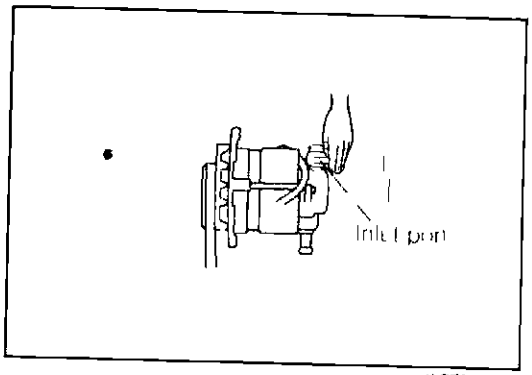
WRE91-CH008

NOTE:
- When the battery is fully charged, the measured current may be below the specified value.
- This is not an abnormal phenomenon. At this time, increase the electric load, for example, by turning ON the rear defogger. Then, check to see if the output current rises or not.

(4) Check of vacuum pump

① Air suction check of vacuum pump

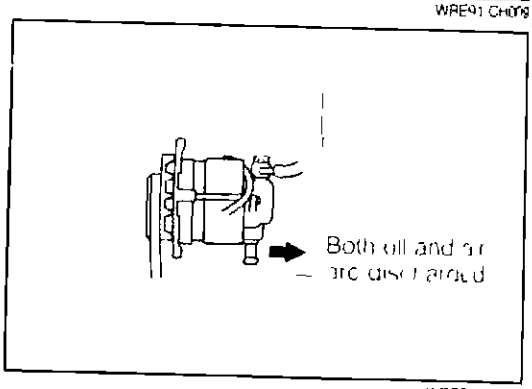
Disconnect the air inlet hose of the vacuum pump Start the engine Hold your finger at the end of the inlet hose If you can feel suction, it indicates that vacuum pump is functioning properly



WRE91CH09

② Discharge check of vacuum pump

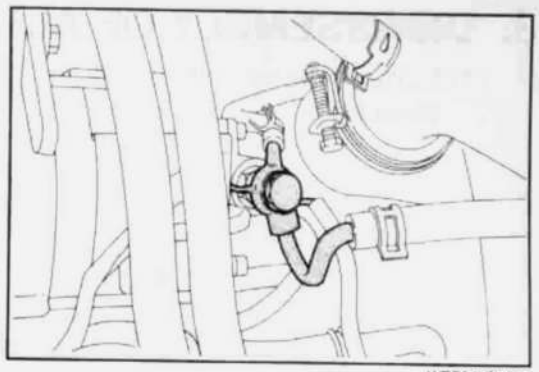
Disconnect the outlet oil hose of the vacuum pump Start the engine If oil and air are discharge, it shows that the vacuum pump is functioning properly



WRE91CH10

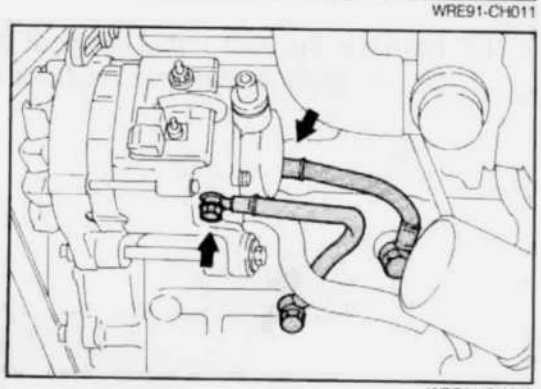
4. REMOVAL OF ALTERNATOR

(1) Disconnect the ground cable terminal from the negative (–) terminal of the battery.
(2) Remove the air cleaner and oil filter.
(3) Disconnect the (+) B wire and connector from the alternator.
(4) Remove the vacuum hose from the vacuum pump.



WRE91-CH011

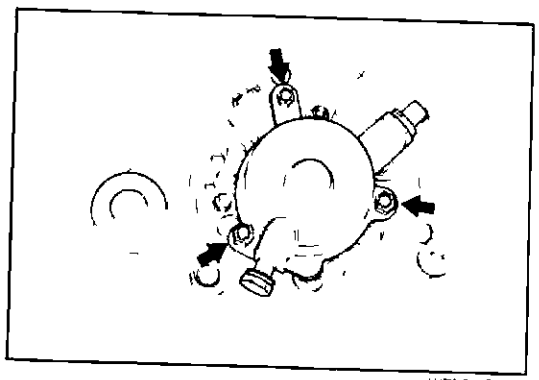
(5) Disconnect the oil hose.
(6) Remove the alternator by removing the lock bolts.



WRE91-CH012

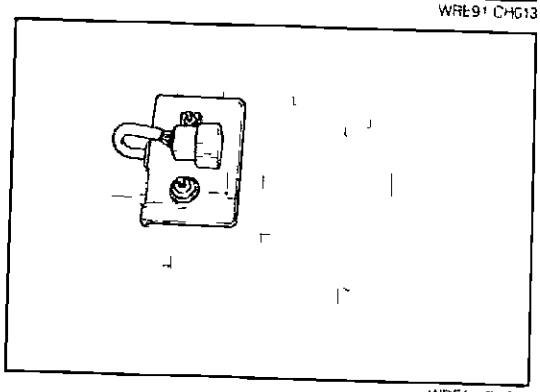
5. DISASSEMBLY OF ALTERNATOR

(1) Remove the vacuum pump and O-ring by removing the three bolts



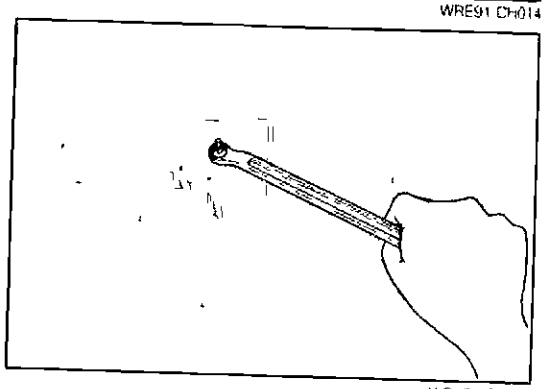
WRE91 CH013

(2) Remove the two nuts, terminal insulator, wire clamp, brush holder cover and insulator washer



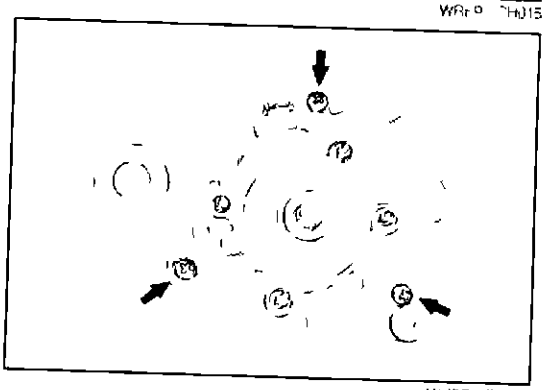
WRE91 CH014

(3) ① Disconnect the lead wire from the terminal B
② Remove the brush holder by removing the nuts



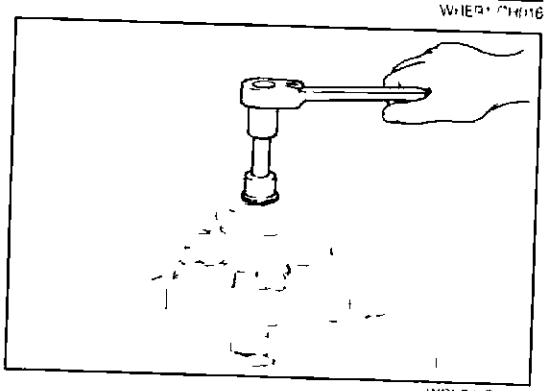
WRE91 CH015

(4) Remove the three through-bolts



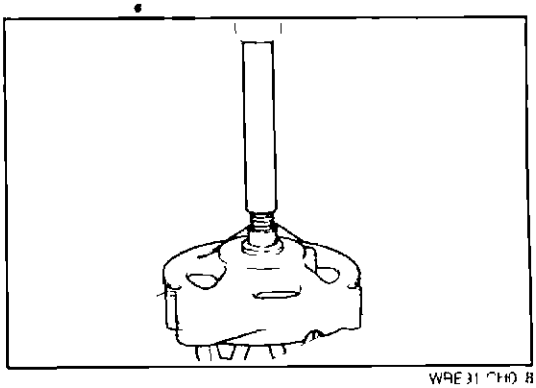
WRE91 CH016

(5) Clamp the rotor in a vise. Remove the lock nut, pulley, fan and collar

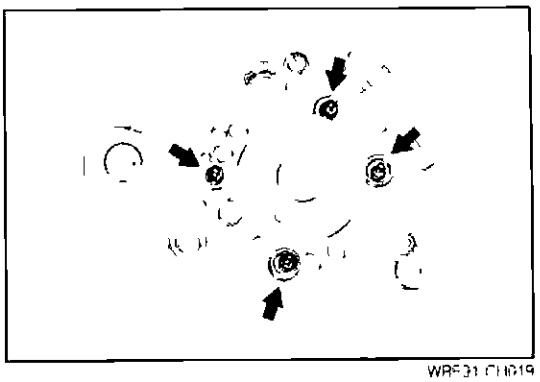


WRE91 CH017

(6) Press off the rotor by means of a press in conjunction with a suitable steel pipe



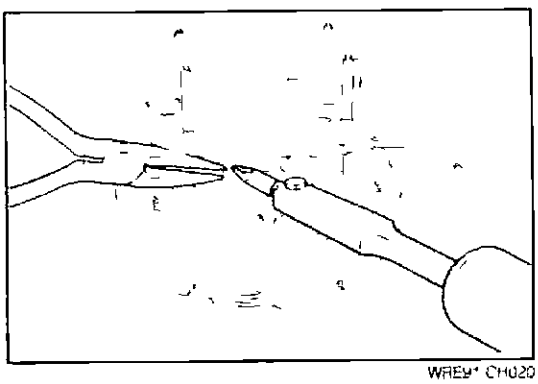
(7) Remove the rear end frame by removing the four nuts and two terminal insulators



(8) Using a soldering iron, melt the solder while clamping the stator coil by means of needle-nose pliers

NOTE:

- Protect the rectifiers from heat during the solder melting operation.

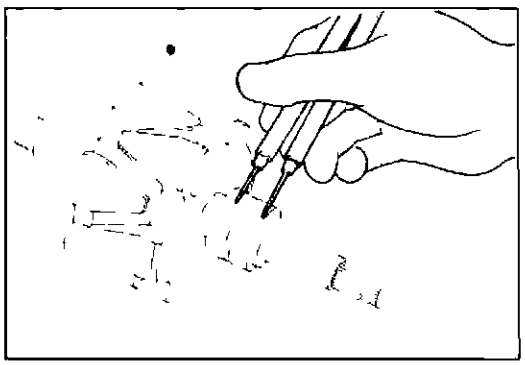


6. INSPECTION OF ALTERNATOR

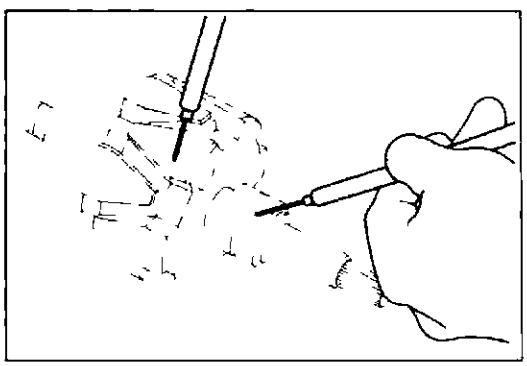
(1) Rotor

① Inspection of rotor for open circuit
Using an ohmmeter check to see if the specified resistance exists between the rotor slip rings
Specified Resistance: 4 0 Ω

If no specified resistance exists, replace the rotor

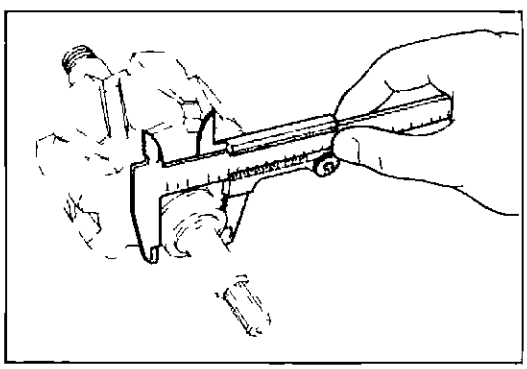


② Inspection of rotor for ground
Ensure that no continuity exists between the rotor slip rings and the rotor core
If continuity exists, replace the rotor



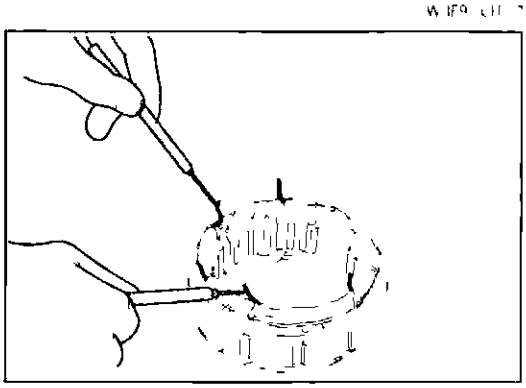
③ Inspection of slip rings
a Check that the slip rings are not rough or scored
If they are rough or scored, replace the rotor
b Measure the outer diameter of the slip ring, using vernier calipers
Specified Diameter: 32.5 mm
Minimum Diameter: 32.1 mm

If the diameter is less than the minimum diameter, replace the rotor assembly

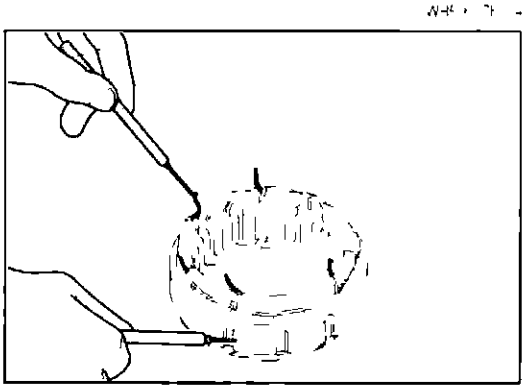


(2) Stator

① Inspection of stator for open circuit
Using an ohmmeter check that there is continuity between the coil leads
If there is no continuity replace the stator



② Inspection of stator for ground
Using an ohmmeter, check that there is no continuity between the coil leads and the stator core
If there is continuity, replace the stator



(3) Brushes

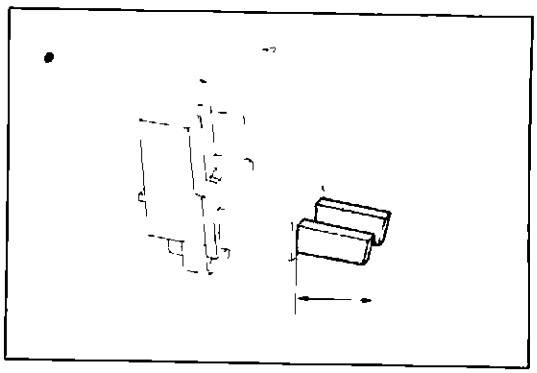
① Measurement of exposed brush length

Using a scale, measure the exposed brush length

Specified Exposed Length: 20.0 mm

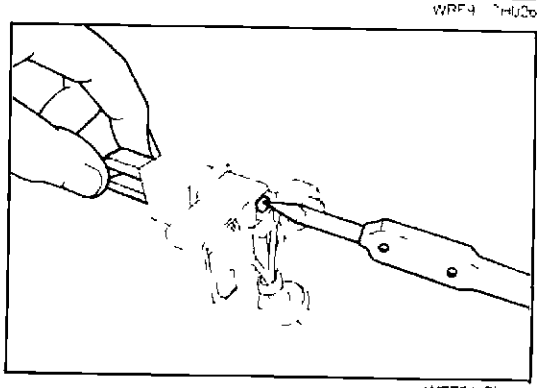
Minimum Exposed Length: 14.9 mm

If the exposed length is less than the minimum length, replace the brushes



② Replacement of brushes (If necessary)

a Remove the brush and spring from the brush holder by melting the solder by means of a soldering iron

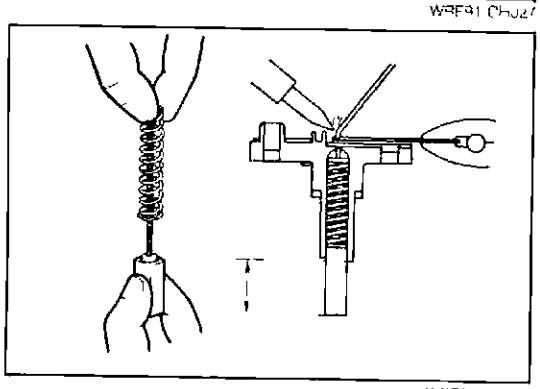


b Insert the brush wire through the spring

c Install the brush in the brush holder

d Solder the brush wire to the brush holder at the specified exposed length

Specified Exposed Length. 20.0 mm



e Check that the brush moves smoothly in the brush holder

f Cut off any excess wire

(4) Rectifier

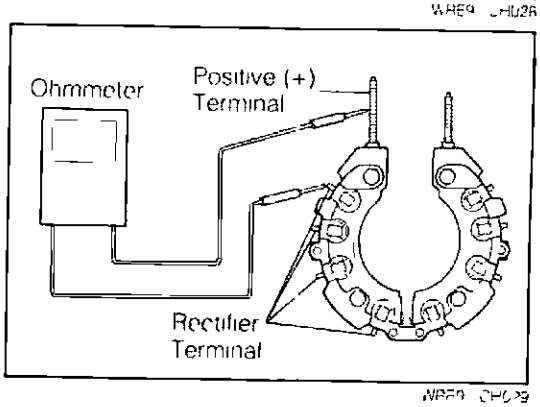
① Inspection of rectifier at positive ⊕ side

a While using an ohmmeter, connect one tester probe to the positive stud Also, connect the other probe to each of the rectifier terminals

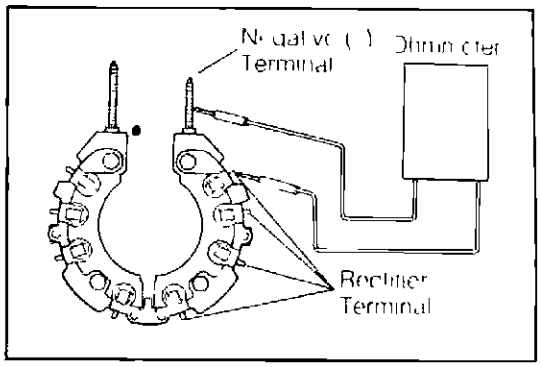
b Repeat the same steps described in a, above with the polarity of the tester probes reversed this time

c Ensure that continuity exists either in the step a, or in the step b, and no continuity exists at the other test

If not, replace the rectifier holder

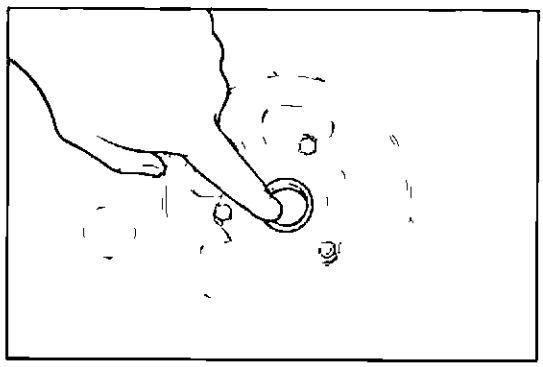


② Inspection of rectifier at positive ⊖ side
a While using an ohmmeter, connect one tester probe to each rectifier negative terminal Also, connect the other probe to each rectifier terminals
b Repeat the same steps described in a, above with the polarity of the tester probes reversed this time
c Ensure that continuity exists either in the step a, or in the step b, and no continuity exists at the other test
If not, replace the rectifier holder

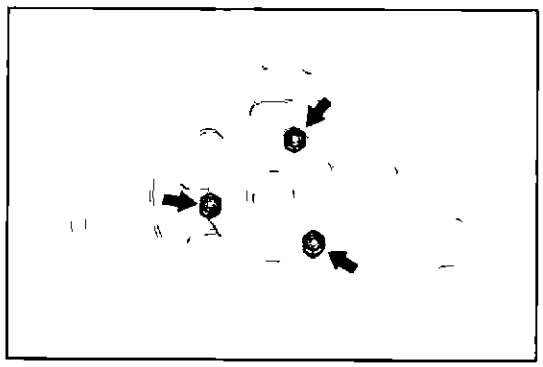


WRE91CH030

(5) Bearings
① Inspection of front bearing
Ensure that the bearing turns smoothly
Replace the bearing, if necessary

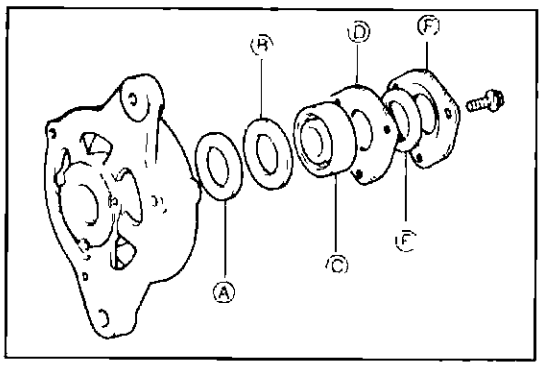

WRE91CH031

② Replacement of front bearing
a Remove the bearing by removing the three screws


WRE91CH032

b Install the following parts with the three bolts
Ⓐ Felt
Ⓑ Felt cover
Ⓒ Bearing

NOTE:
- If necessary, lightly tap the bearing with a a plastic hammer.



WRE91CH033

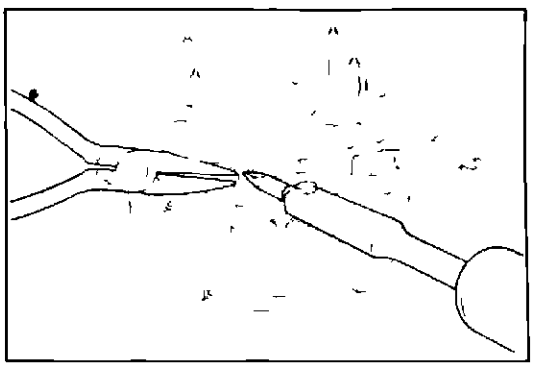
Ⓓ Retainer plate
Ⓔ Felt
Ⓕ Felt cover

7. ASSEMBLY OF ALTERNATOR

(1) Install the stator coil by melting the solder while clamping the stator coil by means of needle-nose pliers

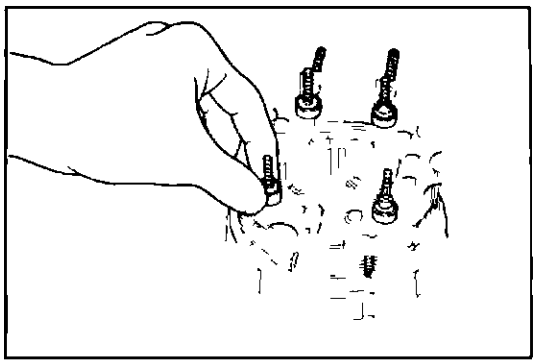
NOTE:

- **Protect the rectifiers from heat during the solder melting operation.**



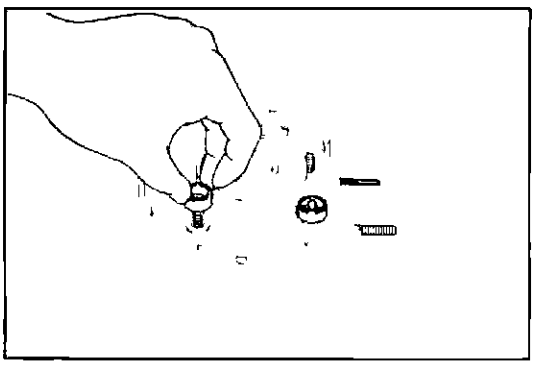
WRE91 CH034

(2) ① Place the two insulators on the positive (+) studs of the rectifier holder
② Place the two collars on the negative (–) studs of the rectifier holder



WHE91 CH035

(3) Place the rear end frame on the rectifier holder
(4) Place the two insulators on the positive (+) studs of the rectifier holder



WHE91 CH036

(5) Install the four nuts



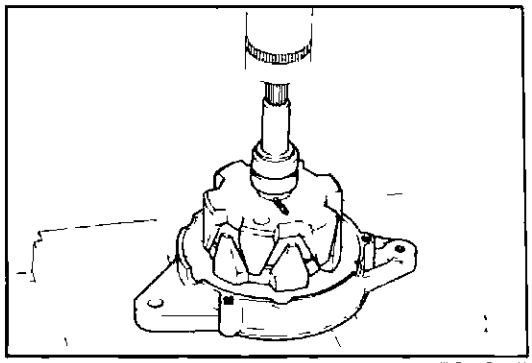
WHE91 CH037

(6) ① Install the snap ring
② Install the spacer ring

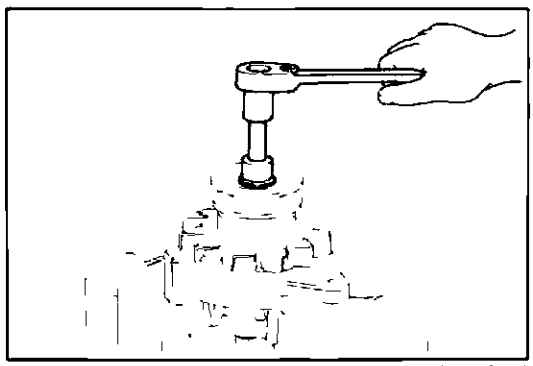


WHE91 CH038

(7) Press the rotor into the drive end frame, using a press.


WRE91 CH039

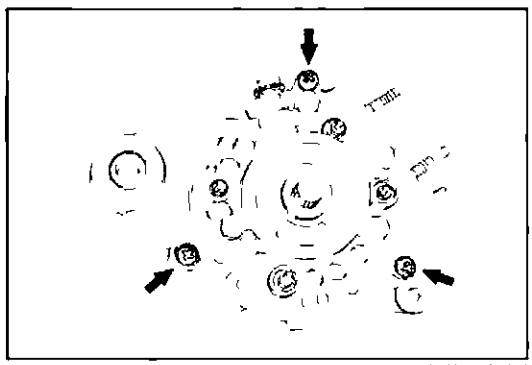
(8) Install the collar, fan, pulley onto the rotor shaft in this sequence Install and tighten the lock nut to the specified torque
Tightening Torque: 88 N·m (9 kgf-m, 65 ft-lb)


WRE91 CH040

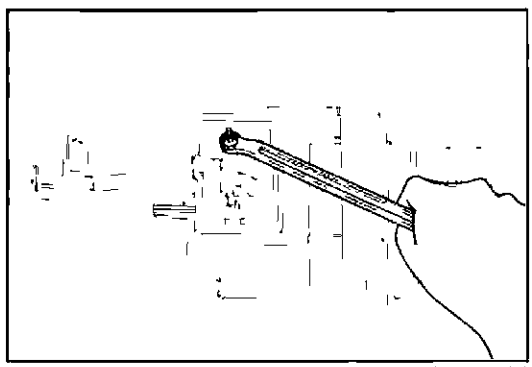
(9) Install the drive end frame and rear end frame by means of the three through-bolts.

NOTE:

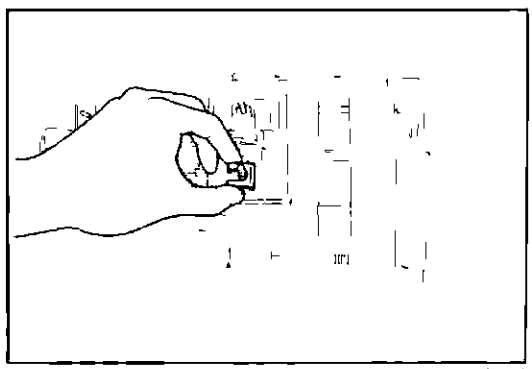
- **Make sure that the pulley can rotate smoothly.**


WRE91 CH041

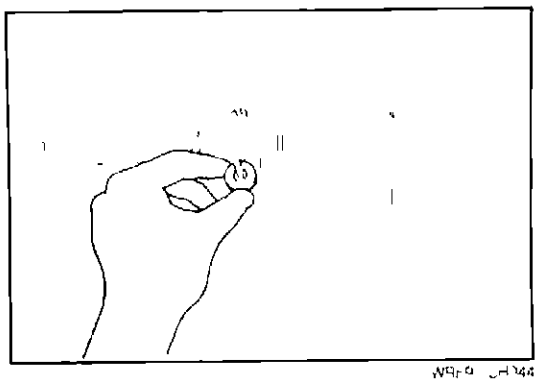
(10) Install the brush holder with the nuts


WRE91 CH042

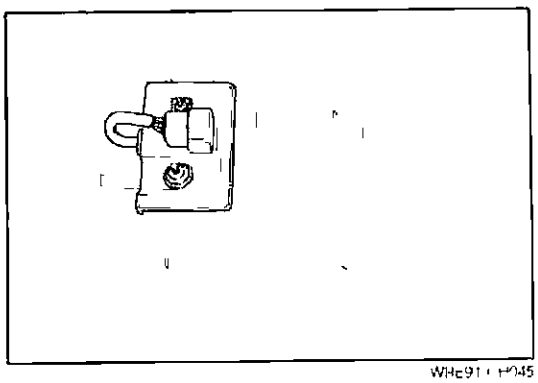
(11) Install the lead wire to the terminal B


WRE91 CH043

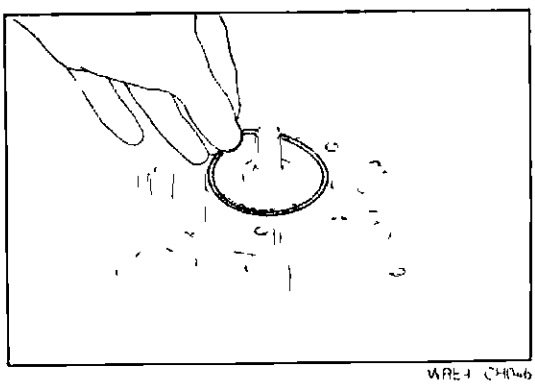
(12) Place the insulator washer to the terminal B



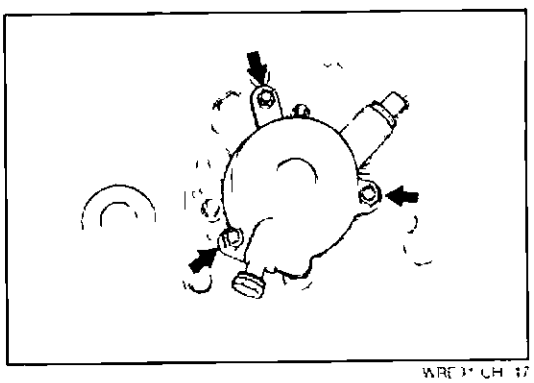
(13) ① Place the brush holder on the end frame
② Place the terminal insulator on the terminal B
③ Place the connector clamp on the other terminal. Install the nut



(14) Place a new O-ring on the rear end frame

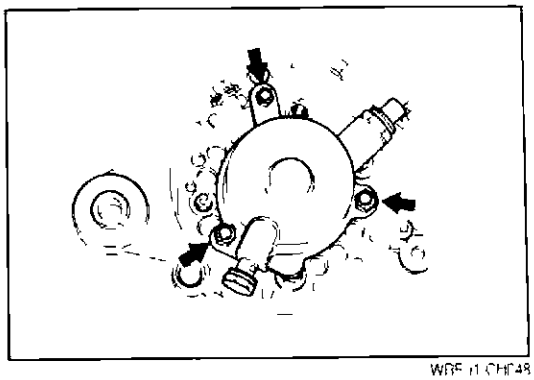


(15) Install the vacuum pump with the three bolts
Tightening Torque: 7.8 N m (0.8 kgf-m, 5.8 ft-lb)



8. DISASSEMBLY OF VACUUM PUMP

(1) Remove the alternator from the vehicle
(See page, CH–7)
(2) Remove the vacuum pump by removing the three bolts

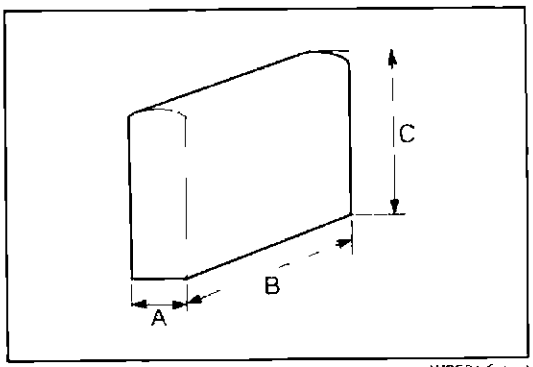


9. INSPECTION OF VACUUM PUMP

Blade
Check the worn state of each blade, using vernier calipers

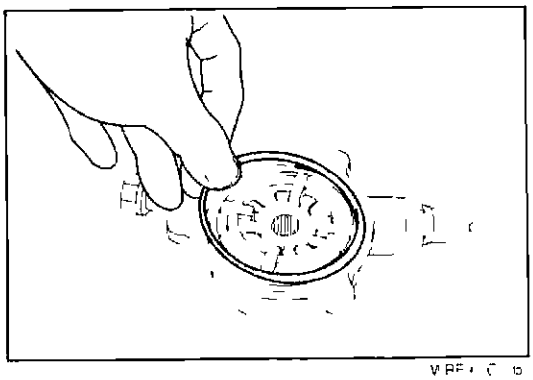
Blade Specifications mm

Item	A	B	C
Specified dimension	6	23	14.7
Wear limit	5.95	22.98	13.3

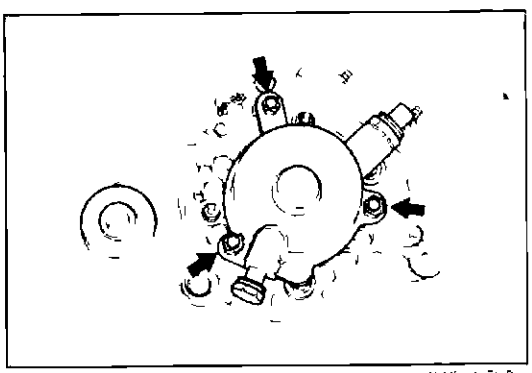


10. ASSEMBLY OF VACUUM PUMP

1 Install a new O-ring

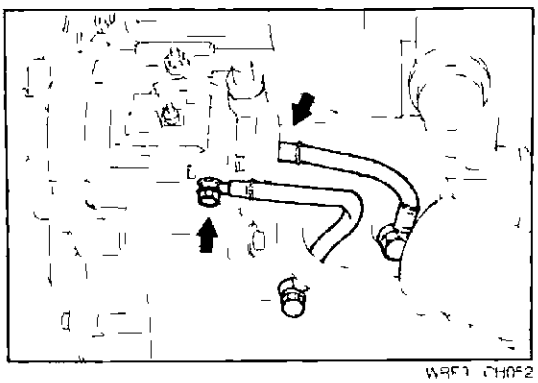


2 Install the vacuum pump to the alternator with a new 'O"-ring interposed
Tightening Torque. 7.8 N m (0.8 kgf-m, 5.8 ft-lb)

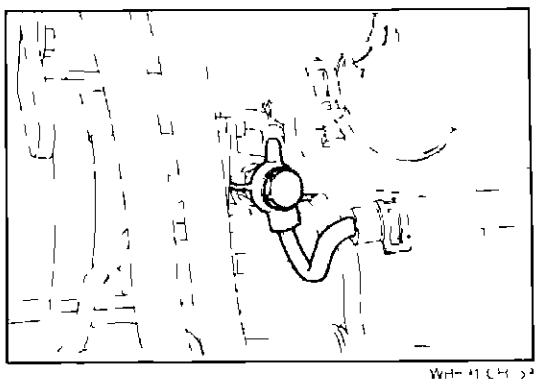


11. INSTALLATION OF ALTERNATOR

(1) Temporarily install the alternator on the engine with the two attaching bolts
(2) Install the oil hose with a new gasket interposed



(3) Install the vacuum hose, using new clips



(4) Adjust the V-belt properly and secure the alternator
Specified Belt Deflection: 10 - 13 mm/10 kgf (98 N)

(5) Install the (+) B wire and connector to the alternator
(6) Install the air cleaner and oil filter
(7) Connect the ground cable terminal to the negative (-) terminal of the battery

DAIHATSU

F70,F75,F77

Service manual

CLUTCH

CL

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

CLUTCH

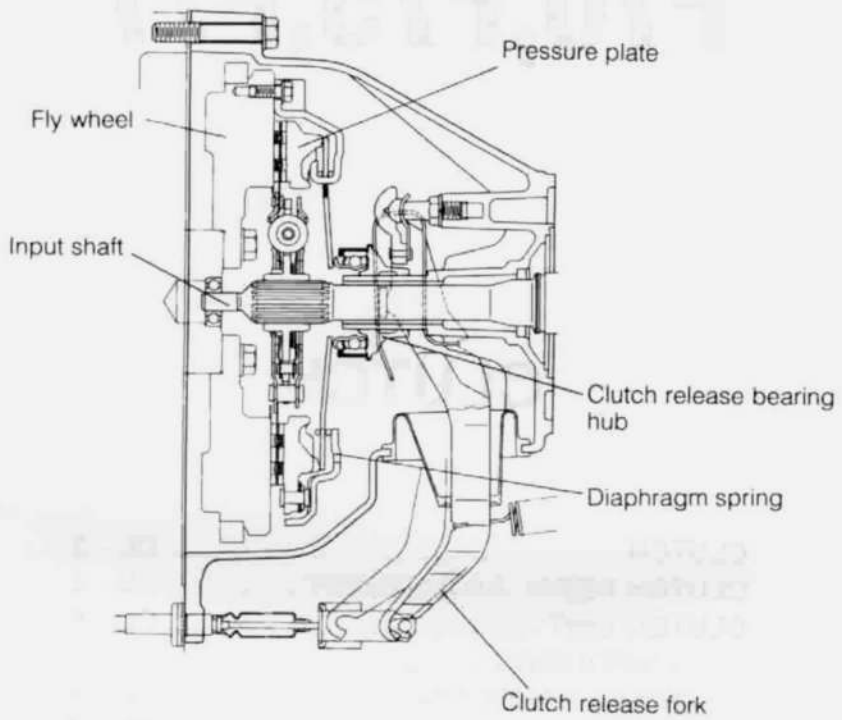
CLUTCH ..... **CL– 2**
CLUTCH PEDAL ADJUSTMENT ..... **CL– 4**
CLUTCH UNIT ..... **CL– 6**
COMPONENTS ..... **CL– 6**
TROUBLE SHOOTING ..... **CL– 6**
REMOVAL ..... **CL– 7**
INSPECTION ..... **CL– 8**
INSTALLATION ..... **CL– 9**
CLUTCH PEDAL & RELEASE CABLE **CL–12**
COMPONENTS **CL–12**
REMOVAL **CL–13**
INSPECTION (Clutch pedal & Release cable) **CL–15**
INSTALLATION **CL–16**
SSTs **CL–19**
SERVICE SPECIFICATIONS **CL–19**
TIGHTENING TORQUE **CL–19**

WRE91-CL001

CLUTCH

The clutch mechanism employs a dry, single-disc, diaphragm spring type. As for its operating method, it adopts a cable method which features positive operation and excellent serviceability.

F70, F75, F77



WRE91-CL002

Clutch disc specifications

			Natural aspiration vehicle	Turbo charger-equipped vehicle
Clutch disc outer diameter		mm	240	←
Clutch disc inner diameter		mm	160	←
Thickness	Flywheel side	mm	3.5	←
	Pressure plate side	mm	3.5	←
Lining surface area		cm^2	251.2	←

WRE91-CL003

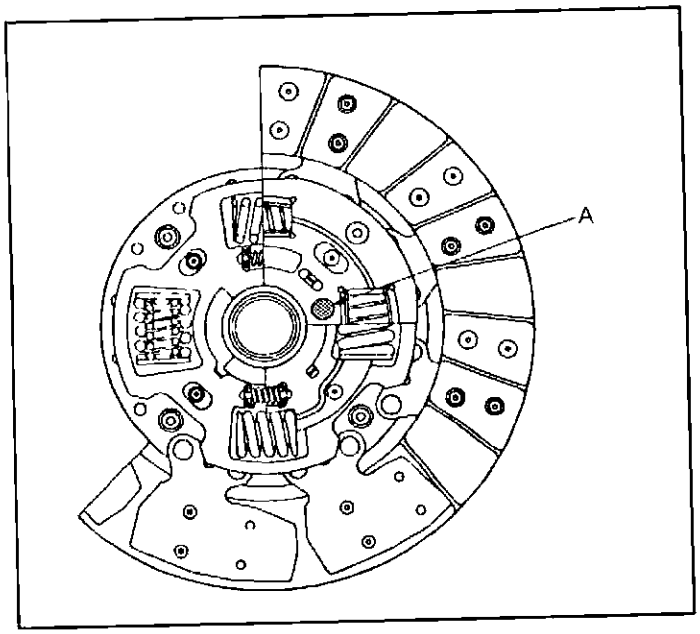
Clutch cover specifications

		Natural aspiration vehicle	Turbo charger-equipped vehicle
Clutch cover outer diameter	mm	300	294
Diaphragm spring load as assembled	kg	392	470

WRE91-CL004

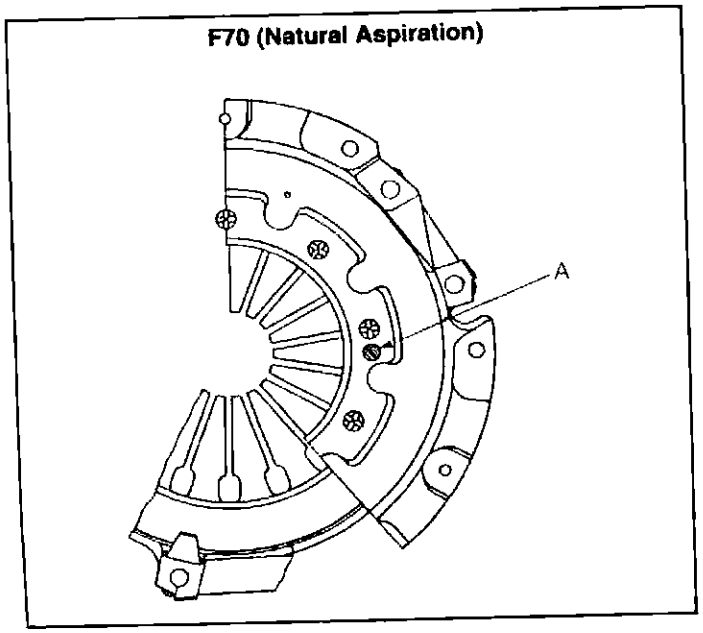
Following is the identification method for the clutch discs and clutch covers of F-70 (natural aspiration vehicles) and F-75 (turbo charger-equipped vehicles)

CLUTCH DISC

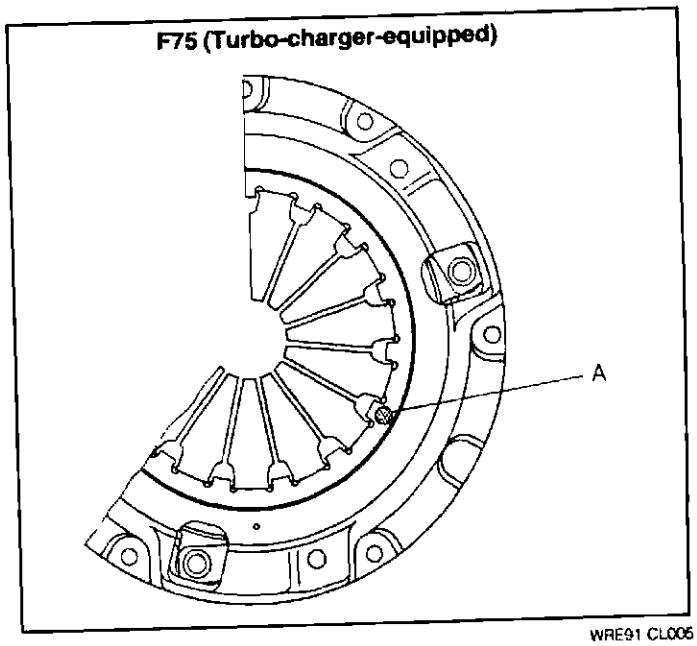


CLUTCH COVER

F70 (Natural Aspiration)



F75 (Turbo-charger-equipped)



WRE91 CL005

A Identification marking position

Engine type	Clutch cover side	Clutch disc side
Natural Aspiration	Blue paint mark or equivalent	White paint mark or equivalent
Turbo charger-equipped	Green paint mark or equivalent	Green paint mark or equivalent

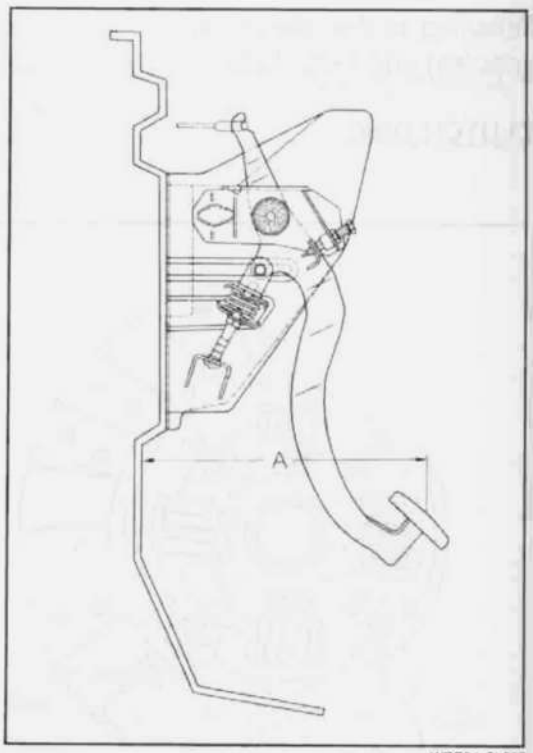
WRE91 CL006

CLUTCH PEDAL ADJUSTMENT

1. Check the clutch pedal for installation height.
   Pedal installation height
   NOTE:
   - Ensure that the clutch pedal installation height is 10.0 mm higher than the brake pedal surface. Adjust the clutch pedal installation height, as required. Then, adjust the clutch pedal installation height to the following specification.

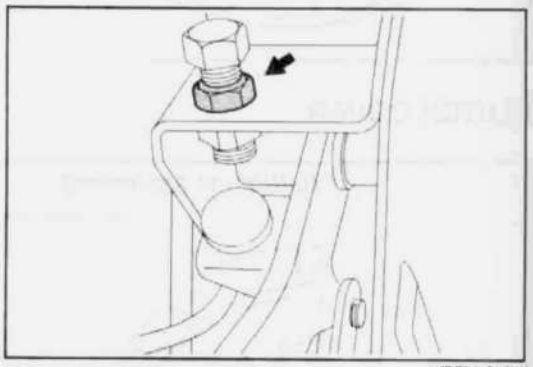
   (Distance between pedal pad upper surface's center and dash panel)
   Clutch Pedal Installation Height:
   L.H.D: 221 ± 3mm
   R.H.D: 221^{+6mm}_{-0mm}

   NOTE:
   - The figure above indicates the dimension from the body metal section to the pedal. It is, therefore, necessary to roll up the carpet and floor mat prior to the measurement.

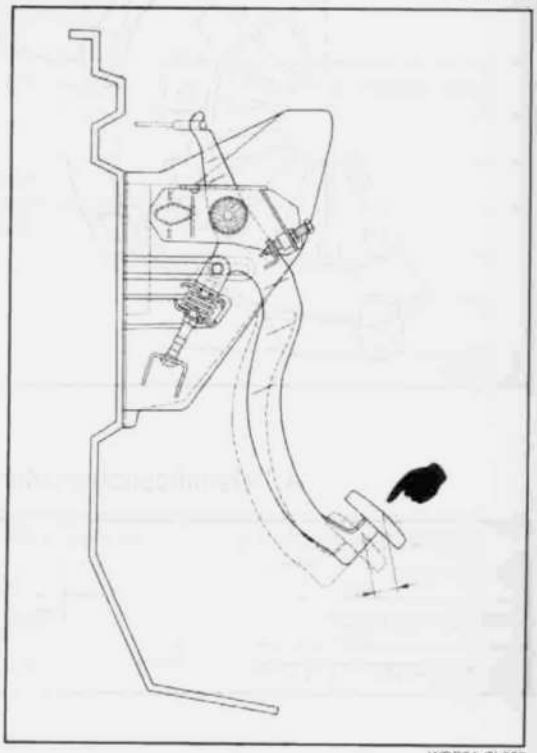


WRE91-CL007

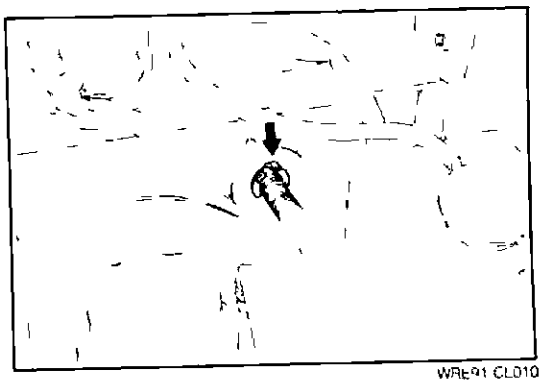
2. Adjust the pedal installation height, as required.
   (1) Slacken the lock nut. Turn the stopper bolt until the installation height conforms to the specification.
   (2) Tighten the lock nut.
   Tightening Torque:
   17.7 - 29.4 N·m (1.8 - 3.0 kgf-m, 13.0 - 21.7 ft-lb)


WRE91-CL008

3. Clutch pedal free travel
   (1) Depress the clutch pedal gradually until you feel a resistance from the clutch. Measure the depressing distance up to this point.
   Specified Clutch Pedal Free Travel: 18 - 27 mm


WRE91-CL009

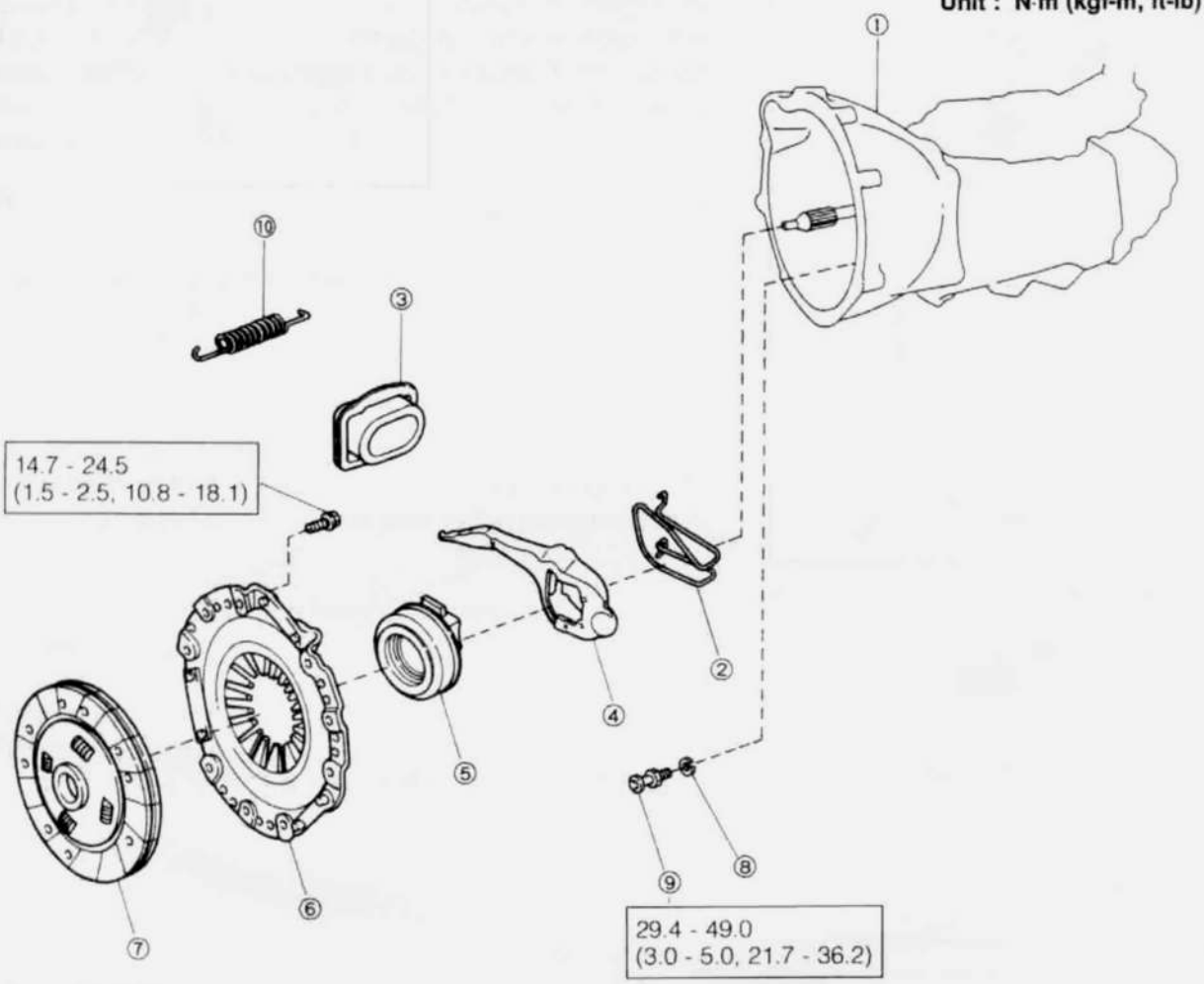
If the free travel of the clutch pedal fails to conform to the specification, adjust it to the specified value by changing the "E" ring position of the clutch cable



WRE91 CL010

CLUTCH UNIT

COMPONENTS



① Clutch housing
② Release bearing hub clip
③ Clutch release fork boot
④ Clutch release fork Ay
⑤ Clutch release bearing hub S/A
⑥ Clutch cover S/A
⑦ Clutch disc
⑧ Wave washer
⑨ Release fork support S/A
⑩ Tension spring

WRE91-CL011

TROUBLE SHOOTING

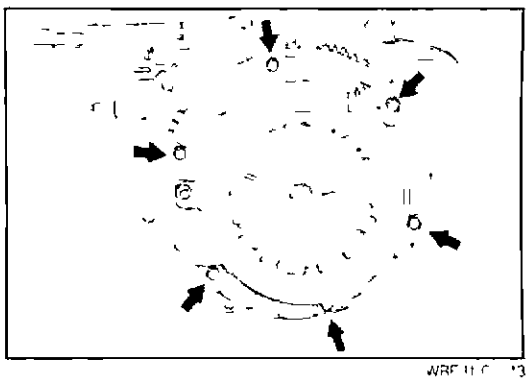
Symptom	Possible causes	Remedies
Dragging clutch	• Excessive free travel or clutch pedal travel improperly adjusted	• Adjust free travel or clutch pedal travels.
	• Deformed clutch disc	• Check clutch disc.
	• Clutch disc spline malfunctioning	• Check clutch disc.
Clutch judder	• Abnormal surface of clutch disc	• Check clutch disc.
	• Excessive runout of clutch disc	• Check clutch disc runout.
	• Unevenness of clutch cover diaphragm spring heights	• Check clutch cover.
	• Faulty clutch release bearing	• Check clutch release bearing.
Slipping clutch	• Worn clutch disc	• Check clutch disc.
	• Excessively worn clutch pressure plate	• Check pressure plate.
	• Faulty clutch cover diaphragm springs	• Check clutch cover.

WRE91-CL012

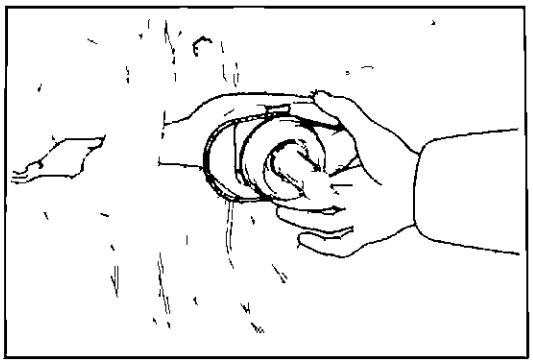
Following are the removal, inspection and installation procedures for the clutch pedal and release cable assembly.
The procedures have been described typically for Model F-75 L.H.D. unit.

REMOVAL

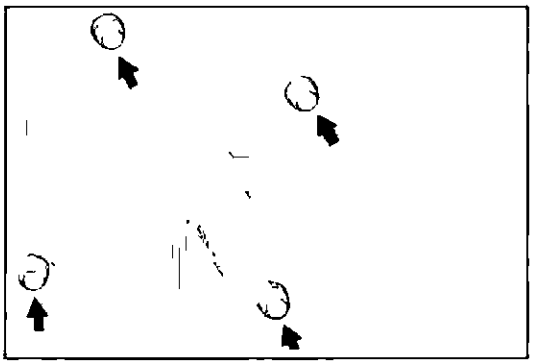
1 Remove the transmission and transfer case assemblies from the vehicle. (For the removal procedure, see the MT section.)
2 Remove the clutch cover and clutch disc by removing the six bolts.



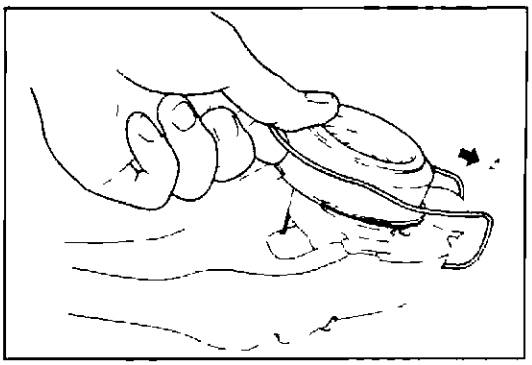
3 Detach the clutch release fork boot from the clutch housing.
4 Remove the clutch release fork, together with the clutch release bearing hub subassembly, by pulling the fork lightly toward you.



5 Remove the clutch housing with gasket by removing the four bolts.
NOTE:
- Never reuse the removed gasket

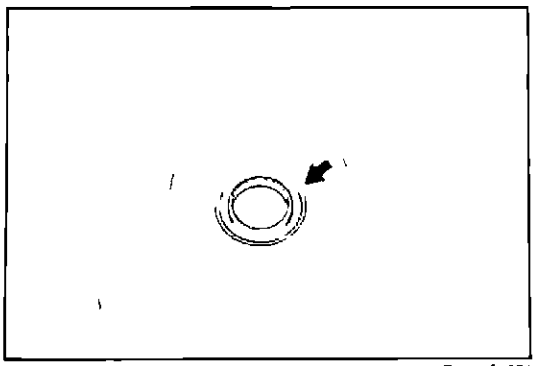


6 Slide the release bearing clip toward the section A, as indicated in the right figure. Detach the release bearing from the release fork, while lifting the hub clip lightly.

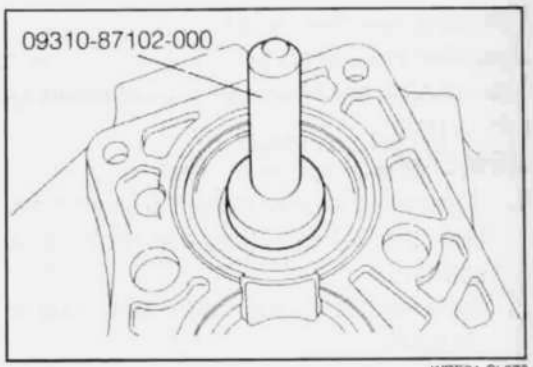


Replacement of "S" type oil seal

1 Remove the "S" type oil seal.
NOTE
- Never reuse the removed oil seal



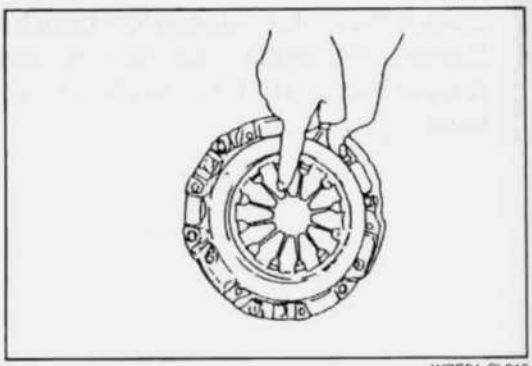
2. Install the new "S" type oil seal, using the following SST.
   SST: 09310-87102-000



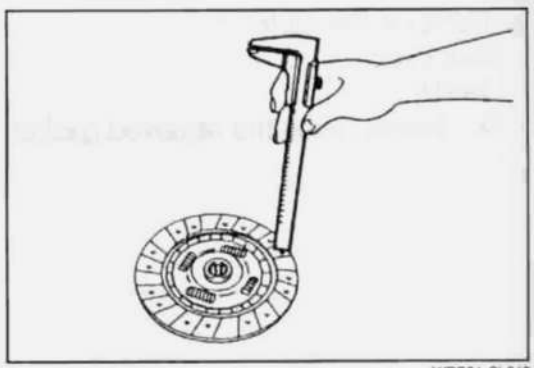
WRE91-CL072

INSPECTION

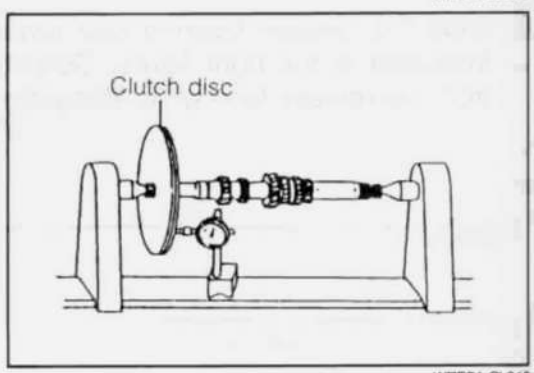
1. Check the diaphragm spring for damage or wear.


WRE91-CL016

2. Check of clutch disc for wear
   Measure the height of the clutch disc from each rivet. Compare the lowest height against the allowable use limit below.
   Allowable Use Limit: 0.3 mm

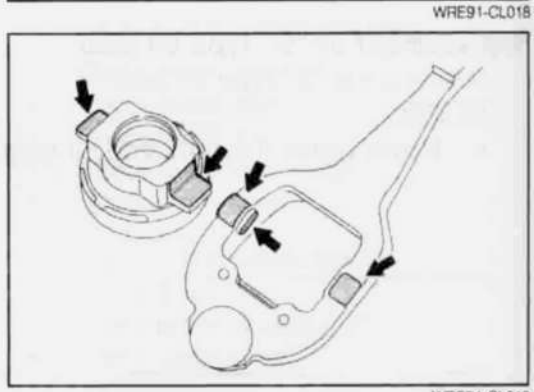

WRE91-CL017

3. Check of clutch disc for runout
   Allowable Runout Limit
   (Longitudinal Runout): 1.0 mm
   (Lateral Runout): 0.7 mm

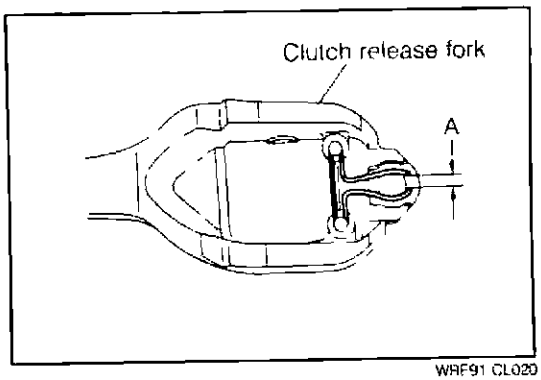


WRE91-CL018

4. Visually inspect the sliding surface of the clutch release fork with the bearing hub. Check to see if any damage or wear is present due to lack of grease.

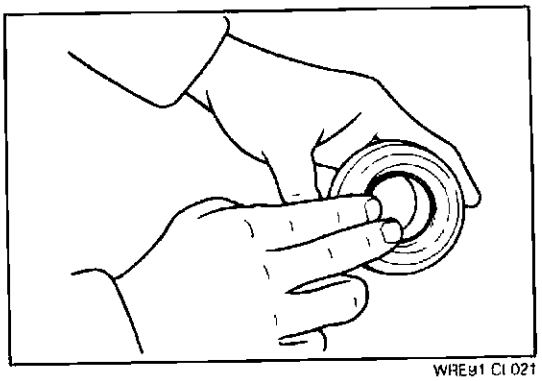

WRE91-CL019

5 Measure the section A of the clutch release fork (attaching section of the clutch release support)
Allowable Limit: 10 ± 0.4 mm



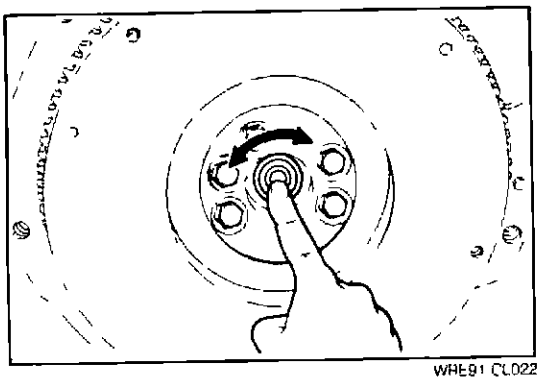
WRE91 CL020

6 Rotate the release bearing with your fingers Ensure that the release bearing rotates smoothly without any binding.
NOTE:
- Since the release bearing is packed with grease, never clean it, using oil.


WRE91 CL021

7 Rotate the pilot bearing with your fingers Prior to the installation of the clutch disc, ensure that the pilot bearing rotates smoothly without any binding

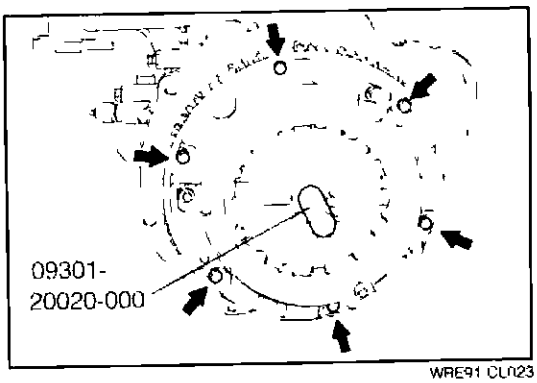
* As for the installation and removal of the pilot bearing, refer to the EM section


WRE91 CL022

INSTALLATION

1 Install the clutch disc
CAUTION:
- Do not allow oil grease to get on the rubbing face.

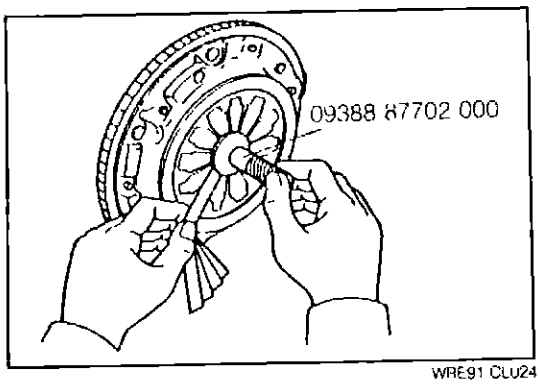
2 Install the clutch cover using the following SST
SST: 09301-20020-000
Tightening Torque:
14.7 - 24.5 N m (1.5 - 2.5 kgf-m, 10.8 - 18.1 ft-lb)



WRE91 CL023

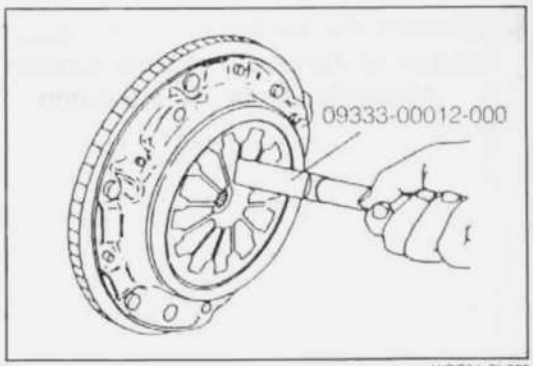
CAUTION:
- Be sure to tighten the bolts diagonally within the tightening torque range above so that the clutch cover may be tightened evenly.
(The right figure indicates a typical example of tightening sequence.)

3 Check the diapgragm spring fingers for unevenness in height, using the following SST.
Allowable Limit of Unevenness in Height: 0.8 mm
SST: 09388-87702-000



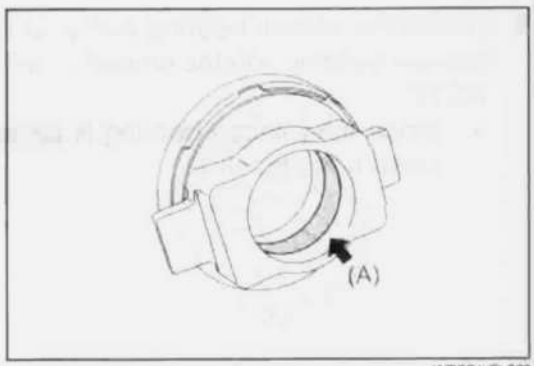
WRE91 CL024

4. If the inspection results reveal that the unevenness in height exceeds the allowable limit, correct the unevenness, using the following SST.
   SST: 09333-00012-000



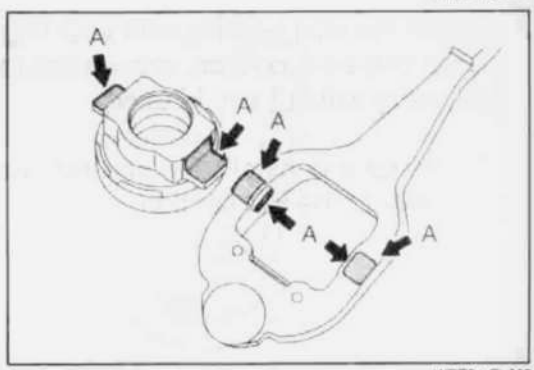
WRE91-CL025

5. Apply molybdenum disulphide lithium base grease to the section A of the clutch release bearing hub subassembly.



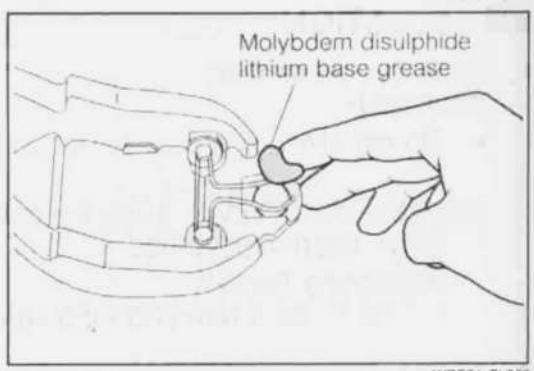
WRE91-CL026

6. Apply a thin film of molybdenum disulphide lithium base grease to the contact surface (section A) of the clutch release fork assembly with the clutch release bearing hub subassembly.
   NOTE:
   - If the applied amount of the aforesaid grease is excessive, it may cause clutch slippage.



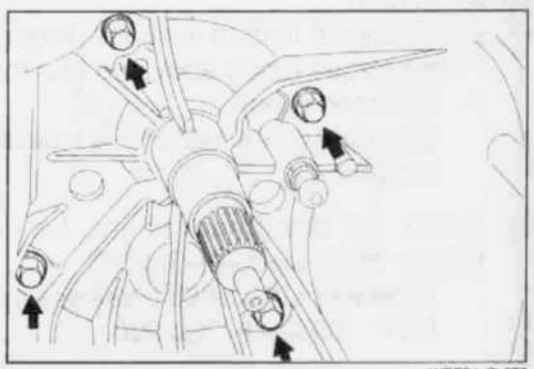
WRE91-CL027

7. Apply a suitable amount of molybdenum disulphide lithium base grease to the clutch release fork assembly (contact surface with the release fork support subassembly).

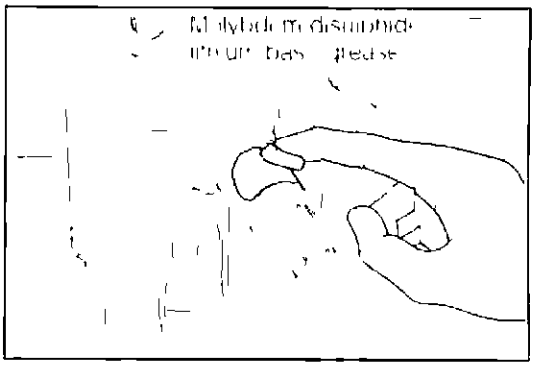


WRE91-CL028

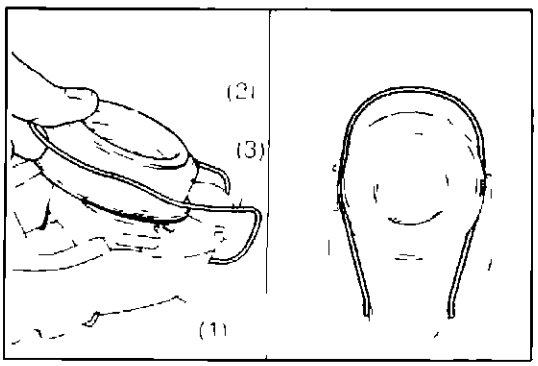
8. Apply gear oil to the oil seal lip section so that the lip section may be aboived from the turned over.
9. With the new gasket interposed, tighten the clutch housing with the four bolts.
   Tightening Torque:
   49.0 - 68.6 N·m (5.0 - 7.0 kgf-m, 36.2 - 50.6 ft-lb)


WRE91-CL073

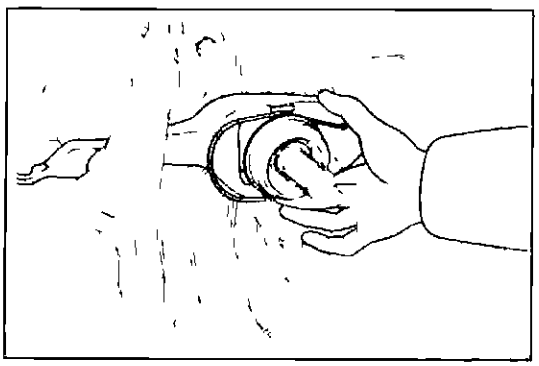
10 Apply a thin and even film of molybdenum disulphide lithium base grease to the sliding surface of the clutch release bearing subassembly (as indicated in the right figure)
NOTE:
- If the applied amount of the aforesaid grease is excessive it may cause clutch slippage.
- Failure to apply the aforesaid grease may cause heavier operation of the clutch pedal



11 Set the following parts given below
(1) Clutch release fork assembly
(2) Clutch release bearing hub subassembly
(3) Clutch release bearing hub clip
NOTE:
- Make sure that the clutch release bearing hub clip is attached positively to the clutch release bearing hub subassembly

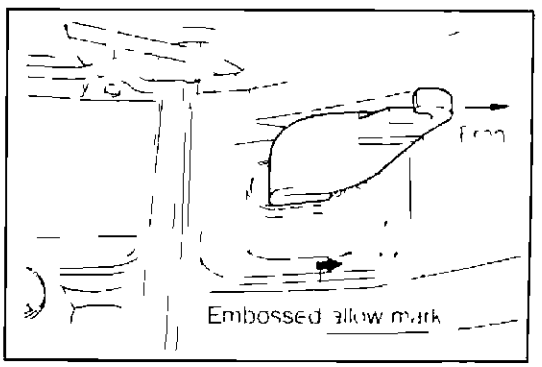


12 Install the clutch release fork assembly by pushing the release fork support subassembly lightly



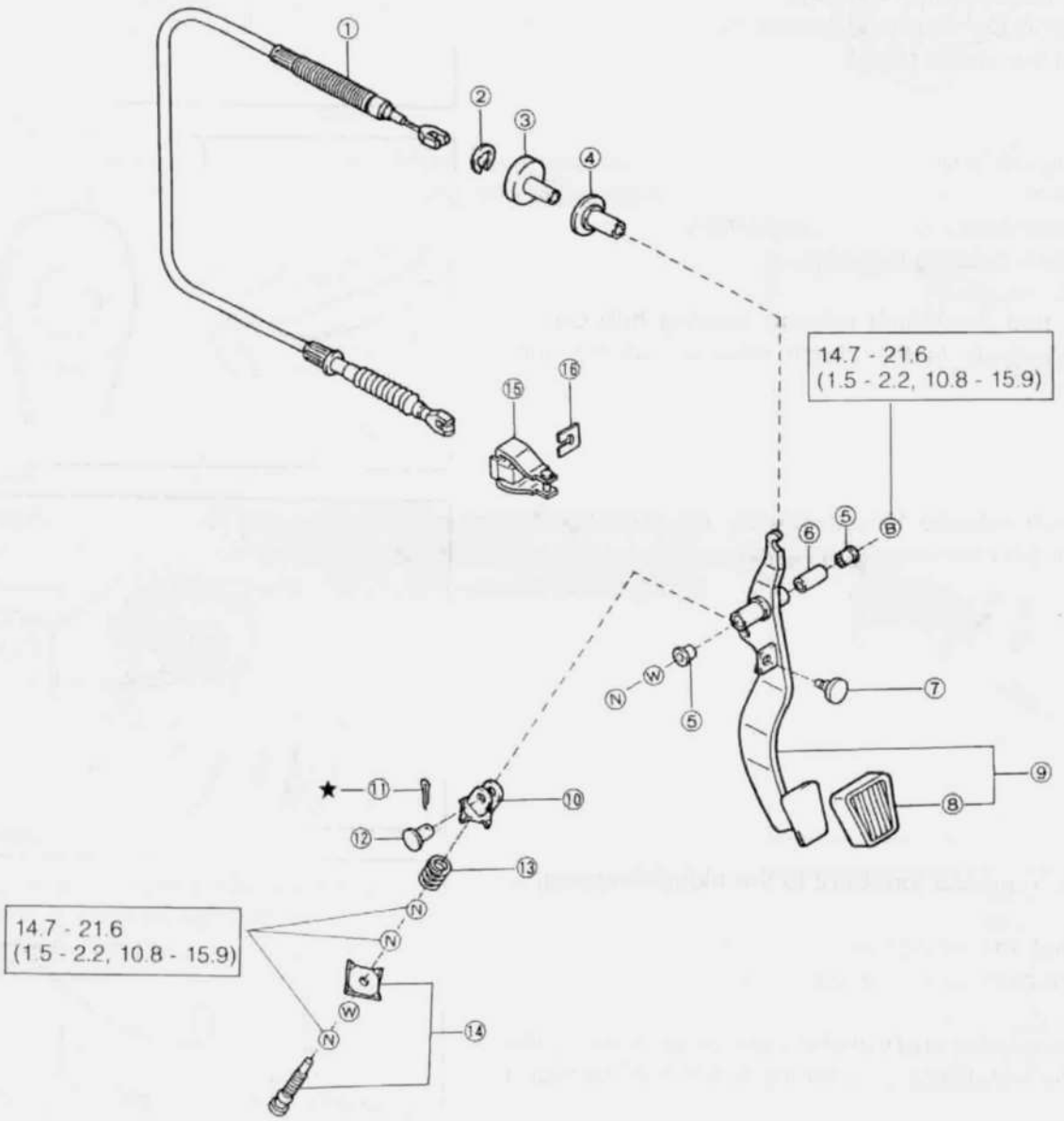
13 Install the clutch release fork boot to the clutch housing
NOTE:
- Be sure that the embossed arrow mark of the clutch release fork boot faces toward the engine side.

14 Install the transmission and transfer case assemblies to the vehicle. (For the installation procedure, see the MT section.)



CLUTCH PEDAL & RELEASE CABLE

COMPONENTS

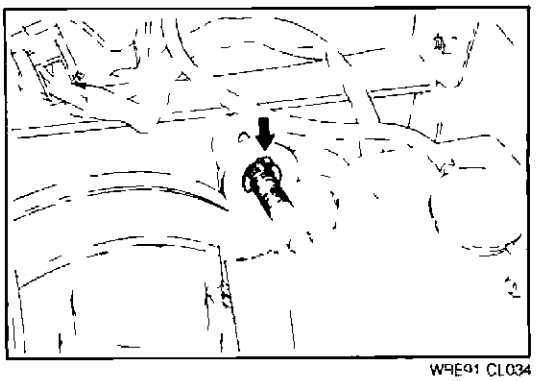


① Clutch release cable Ay
② "E"-ring
③ Bush
④ Clutch cable inner holder
⑤ Bush
⑥ Spacer
⑦ Cushion
⑧ Clutch pedal pad
⑨ Clutch pedal S/A
⑩ Clutch pedal return spring clevis
⑪ Cotter pin
⑫ Clutch pedal clevis pin
⑬ Compression spring
⑭ Clutch return spring holder
⑮ Clutch cable clevis
⑯ Clutch cable end

WRE91-CL033

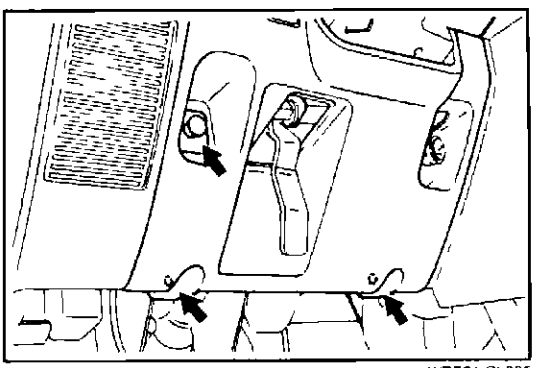
REMOVAL

1 Detach the "E" ring from the clutch release cable



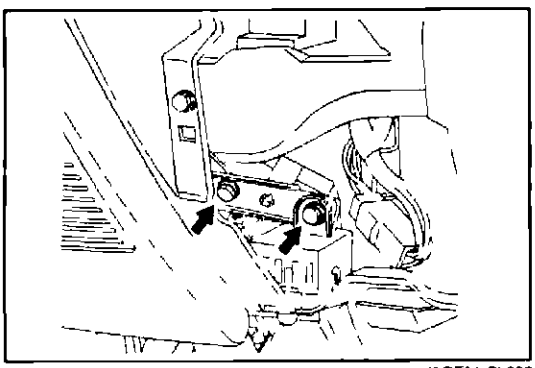
WRE91 CL034

2 Remove the headlamp leveling knob by pulling it toward you. (Headlamp leveling knob-equipped vehicle only)
3 Remove the instrument panel finish lower panel by removing the two screws
4 Disconnect the rear defogger coupler



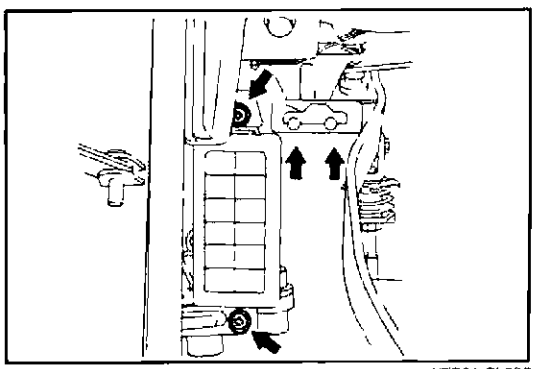
WRE91 CL035

5 Remove the sub-fuse box by removing the two bolts.



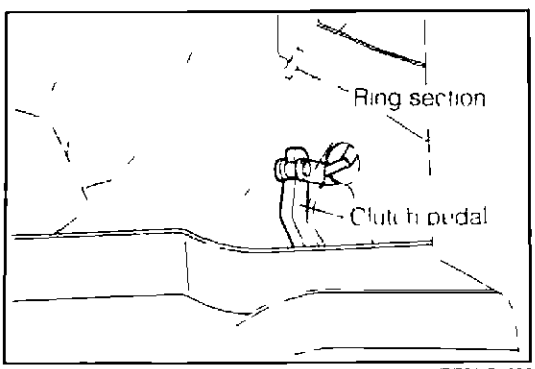
WRE91 CL036

6 Remove the hood opener lever by removing the two bolts
7 Remove the two screws attaching the fuse box.



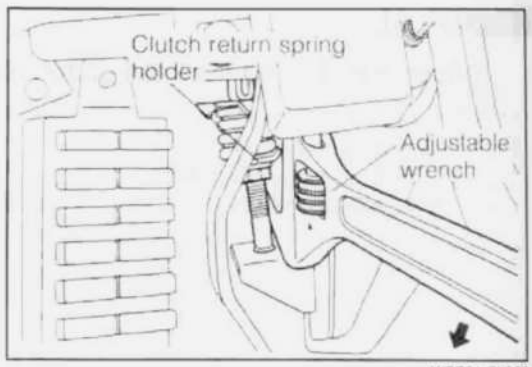
WRE91 CL037

8 Disconnect the ring section provided at the tip end of the clutch release cable from the clutch pedal subassembly.



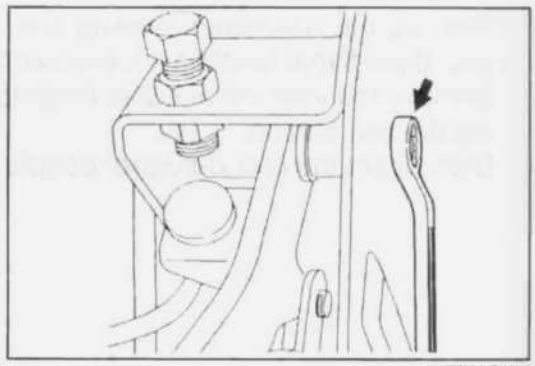
WRE91 CL038

9. Removal of clutch pedal subassembly
   (1) Fully depress the clutch pedal, until it contacts the dash panel silencer.
   (2) Insert the adjustable wrench between the clutch return spring holder and the clutch pedal bracket.
   (3) Remove the clutch return spring and holder from the clutch pedal subassembly, while holding the adjustable wrench downward, as indicated by the arrow in the right figure.



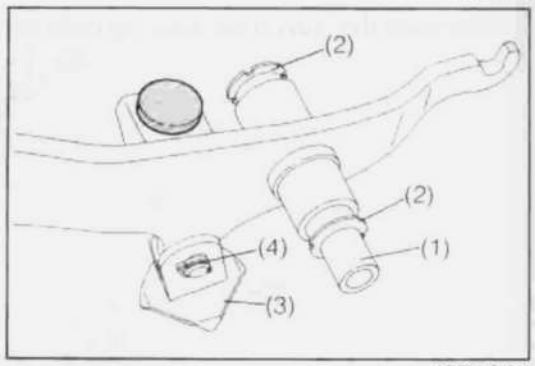
WRE91-CL039

   (4) Remove the brake pedal subassembly. (Refer to the BR section.)
   (5) Remove the nut of the clutch pedal shaft bolt.
   (6) Remove the clutch pedal shaft bolt from the brake pedal side. Proceed to remove the clutch pedal subassembly.


WRE91-CL040

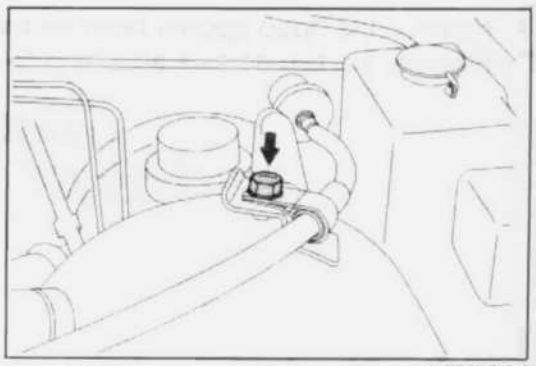
   (7) Remove the following parts from the clutch pedal subassembly.
      (1) Spacer
      (2) Bush
      (3) Clutch pedal return spring clevis
      (4) Cotter pin

   NOTE:
   - Never reuse the removed cotter pin.



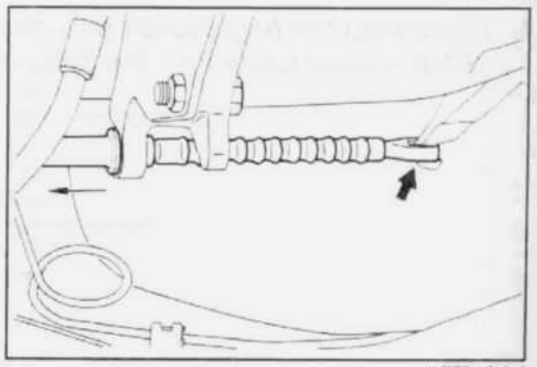
WRE91-CL041

10. Removal of clutch release cable
    (1) Remove the clamp No. 4 provided at the upper part of the air cleaner case by removing the bolt.


WRE91-CL042

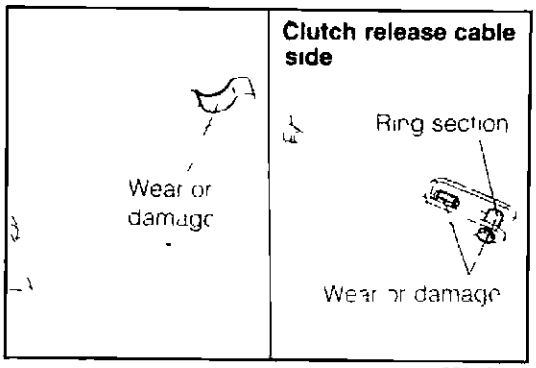
    (2) Disconnect the clutch release cable assembly from the clutch release fork assembly at the lower part of the clutch housing.

    NOTE:
    - While removing the clutch release cable assembly, care must be exercised not to damage the boot section of the clutch release cable assembly.


WRE91-CL043

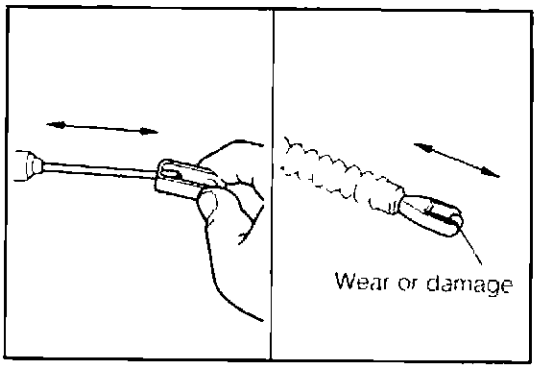
INSPECTION (Clutch pedal & Release cable)

1 Visually inspect the ring section of the clutch release cable assembly and clutch pedal assembly for wear or damage



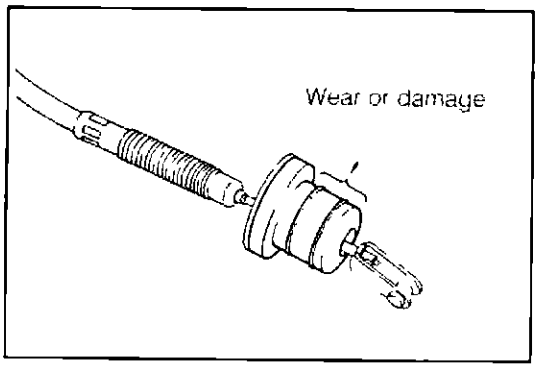
WRE91-CL044

2 Holding the eye end section of the inner cable by hands, move the inner cable in a fore-&-aft direction. Thus, check that the cable moves smoothly



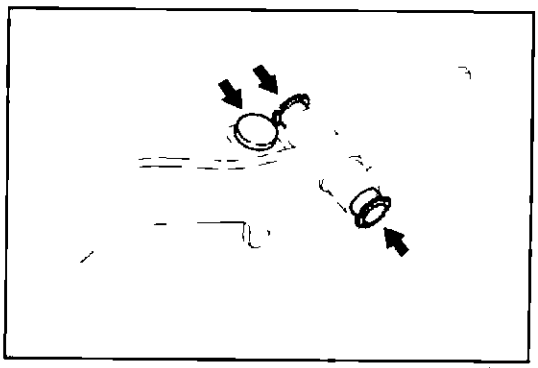
WRE91 CL045

3 Visually inspect the clutch cable inner holder for external damage and wear



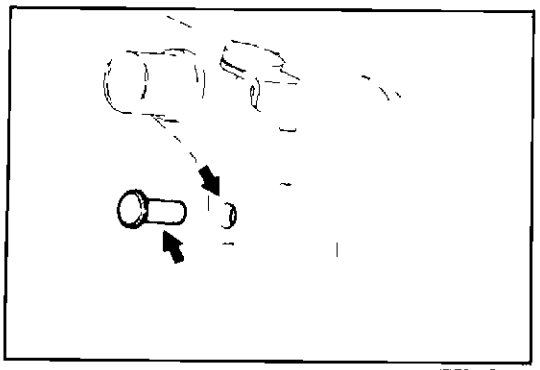
WRE91 CL046

4. Visually inspect the bush and cushion for wear due to lack of grease.



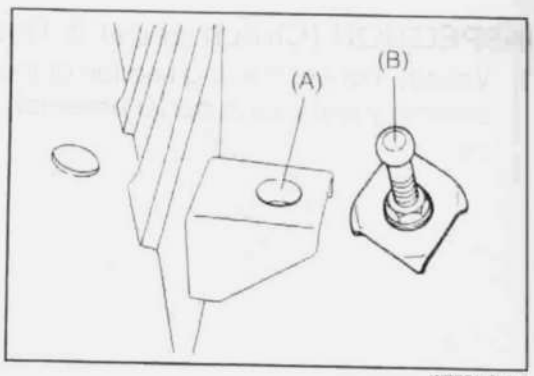
WRE91 CL047

5 Visually inspect the clutch pedal clevis pin retaining inner surface and the clevis pin outer peripheral surface for damage or wear



WRE91 CL048

6. Visually inspect the clutch pedal stopper section (A) and the forward section (B) of the clutch return spring bolt for damage or wear due to lack of grease.

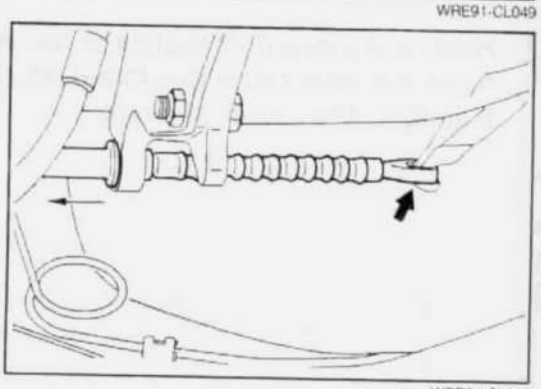


WRE91-CL049

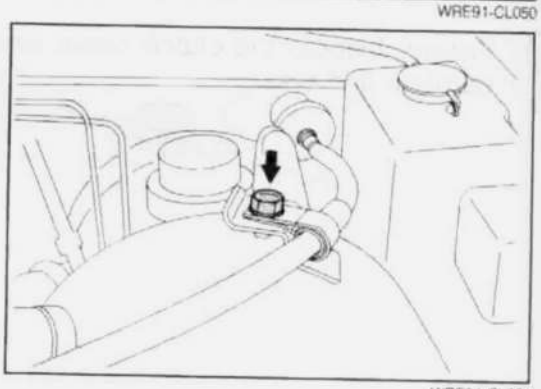
INSTALLATION

1. Installation of clutch release cable
   (1) Connect the clutch release cable assembly at the clutch housing side.

   NOTE:
   - Apply lithium base multi-purpose grease to the connecting section between the clutch release fork and the clutch release cable.

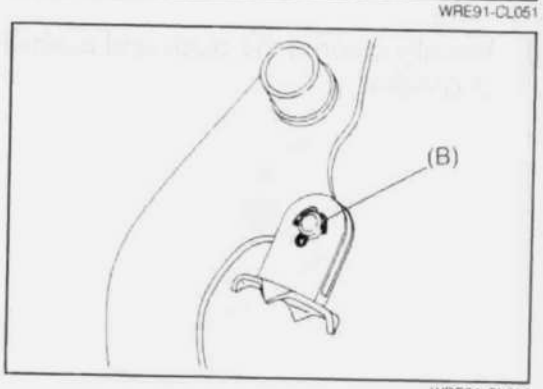

WRE91-CL050

   (2) Install the clamp No. 4 provided at the upper part of the air cleaner case by means of the bolt.


WRE91-CL051

2. Installation of clutch pedal subassembly
   (1) Install the clutch pedal return spring clevis to the clutch pedal, using a new cotter pin.

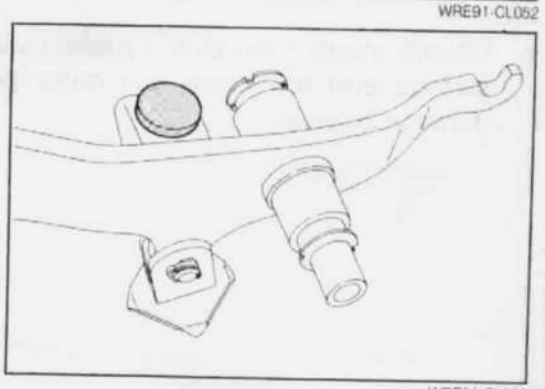
   NOTE:
   - Apply a suitable amount of lithium base multi-purpose grease to the clutch pedal and clutch return spring clevis (A).
   - Split the cotter pin legs in an anchor shape (B).



WRE91-CL052

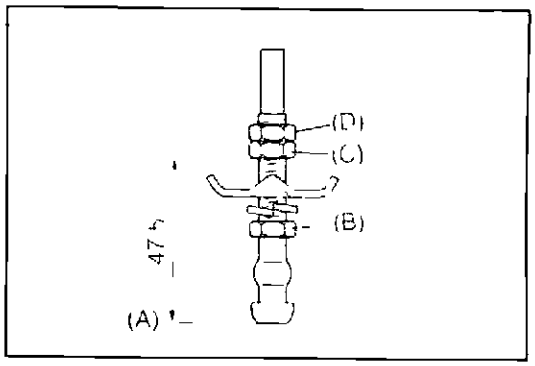
   (2) Install the two bushes and spacer to the clutch pedal.

   NOTE:
   - Before the aforesaid parts are installed, apply a suitable amount of lithium base multi-purpose grease to the section shaded in the right figure.

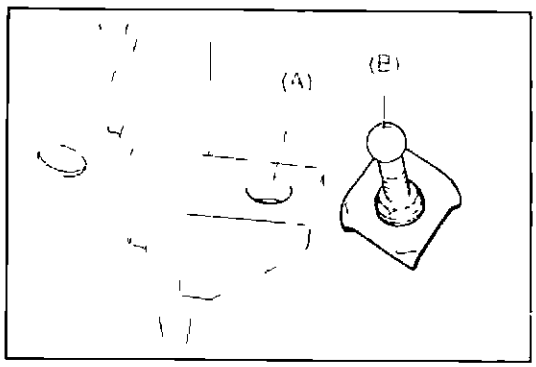

WRE91-CL053

(3) Press the nut (B), spring washer and clutch return spring holder into the pedal return spring rod, as indicated in the right figure
- Set the length from the pedal bracket surface (section A) to the lower surface of the nut (C) to 47.5 mm. Tighten the nuts (C) and (D).
- Tighten the nut (B).

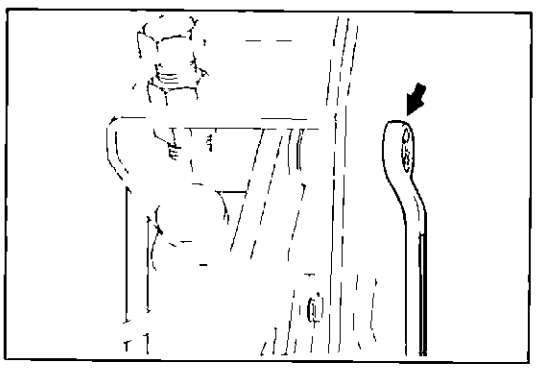
Tightening Torque for Nuts (B), (C) and (D)
14.7 - 21.6 N·m (1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)



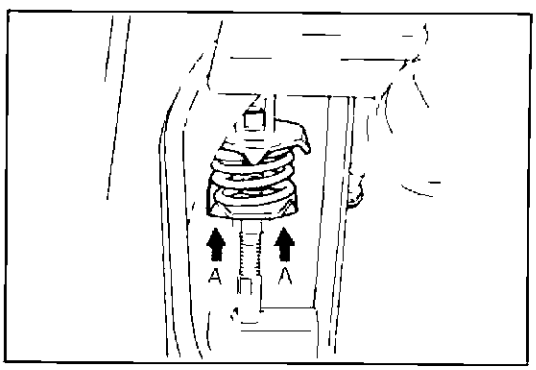
(4) Apply lithium base multi-purpose grease to the sections (A) and (B) as indicated in the right figure



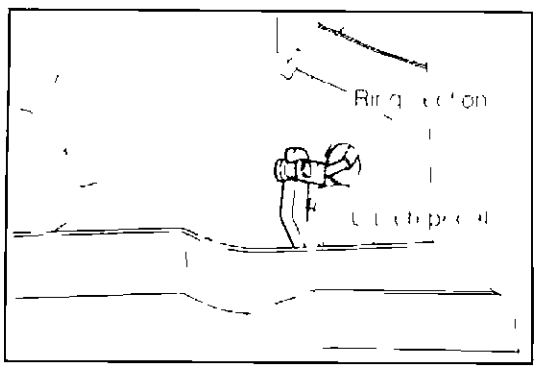
(5) Insert the clutch pedal shaft bolt from the brake pedal side. Install and tighten the spring washer and a nut.
Tightening Torque:
14.7 - 21.6 N·m (1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)



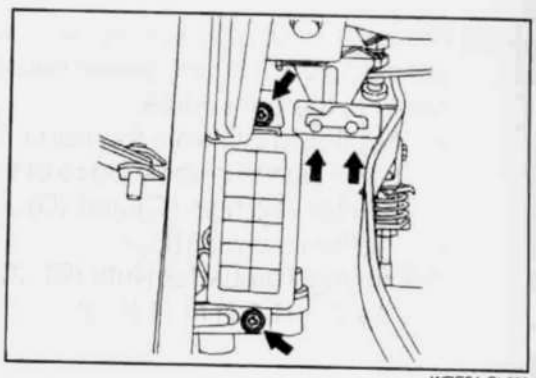
(6) Install the clutch return spring holder by pushing it upward from the underside (section (A) in the right figure)



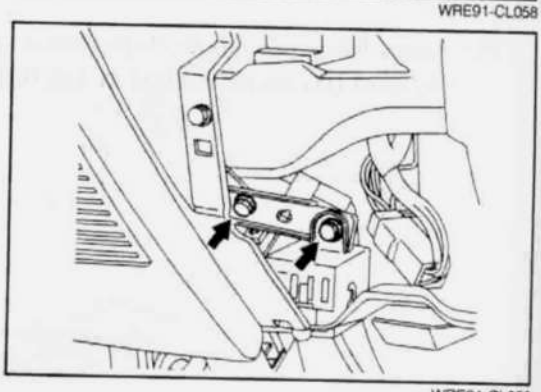
3 Connect the ring section provided at the tip end of the clutch release cable to the clutch pedal subassembly.
NOTE
- **Apply lithium base multi purpose grease to the connecting section, prior to connect.**



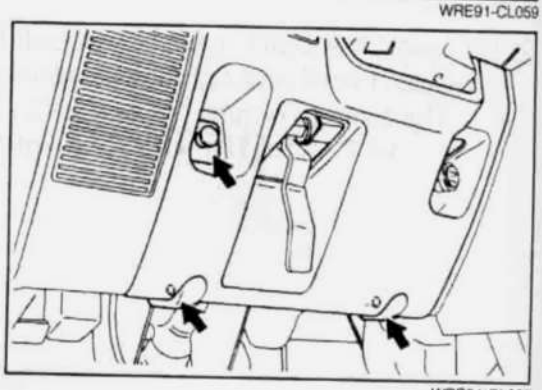
4. Install the fuse box with the two screws.
5. Tighten the hood opener lever with the two bolts.
   Tightening Torque:
   14.7 - 21.6 N·m (1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)


WRE91-CL058

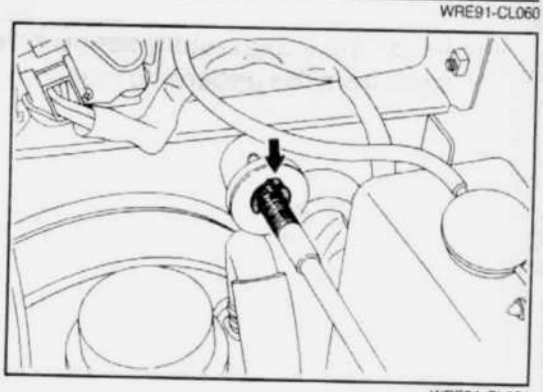
6. Tighten the sub-fuse box with the two bolts.
   Tightening Torque:
   14.7 - 21.6 N·m (1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)


WRE91-CL059

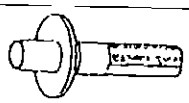
7. Connect the rear defogger coupler.
8. Install the instrument panel finish lower panel with the two screws.
9. Install the headlamp leveling knob in place.
   (Headlamp leveling knob-equipped vehicle only)


WRE91-CL060

10. Atlach the "E" ring to the clutch release cable.
11. Perform the clutch pedal height adjustment.
    For the clutch pedal height adjustment, see the CL–4 section.


WRE91-CL061

SSTs

Shape	Part No	Part Name
	09301-20020-000	Clutch guide tool
	09333-00012-000	Clutch diaphragm spring aligner
	09388-87702-000	Clutch diaphragm spring height gauge

WRE91 CL062

SERVICE SPECIFICATIONS

Unit mm

Item		Specified value	Allowable value	Remarks
Clutch disc	Rivet depth	—	0.3	Remaining lining stock
	Runout	—	1.0	Longitudinal runout
		—	0.7	Lateral runout
Clutch cover	Variation in height diaphragm spring	—	0.8	
Clutch pedal	Height	$221^{+6}_{\ 0}$ 221±3	—	RHD LHD
	Free travel	18 - 27	—	RHD, LHD

TIGHTENING TORQUE

Tightening components	Tightening torque		
	N·m	Kgf-m	ft-lb
Clutch cover × Flywheel	14.7 - 24.5	1.5 - 2.5	10.8 - 18.1
Clutch height adjusting bolt × brake pedal bracket	17.7 - 29.4	1.8 - 3.0	13.0 - 21.7
Clutch pedal × shaft bolt	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Clutch housing × Support S/A release fork	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2

WRE91-CL063

DAIHATSU

F70,F75,F77

CO

Service manual

COOLING SYSTEM

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

COOLING SYSTEM

TROUBLE SHOOTING ..... CO– 2
PRECAUTIONS ..... CO– 2
COOLING SYSTEM OUTLINE ..... CO– 3
CHECK & CHANGE
OF ENGINE COOLANT ..... CO– 7
WATER PUMP ..... CO– 9
THERMOSTAT CO–15
RADIATOR CO–17
TIGHTENING TORQUE CO–24
SERVICE SPECIFICATION CO–24

WRE91-CO001

TROUBLE SHOOTING

Problem	Possible cause	Remedies
Engine overheats	Poor quality coolant	Replenish coolant.
	Water pump drive belt loose or missing	Adjust or replace belt.
	Dirt, leaves or insects on radiator	Clean radiator.
	Leaky hoses, water pump, thermostat housing, radiator, heater, core plugs or head gasket	Repair as necessary.
	Thermostat faulty	Check thermostat.
	Ignition timing retarded	Set timing.
	Radiator hose plugged or deteriorated	Replace hose.
	Water pump faulty	Replace water pump.
	Radiator plugged or cap faulty	Check radiator.
	Cylinder head or block cracked or plugged	Repair as necessary.

PRECAUTIONS

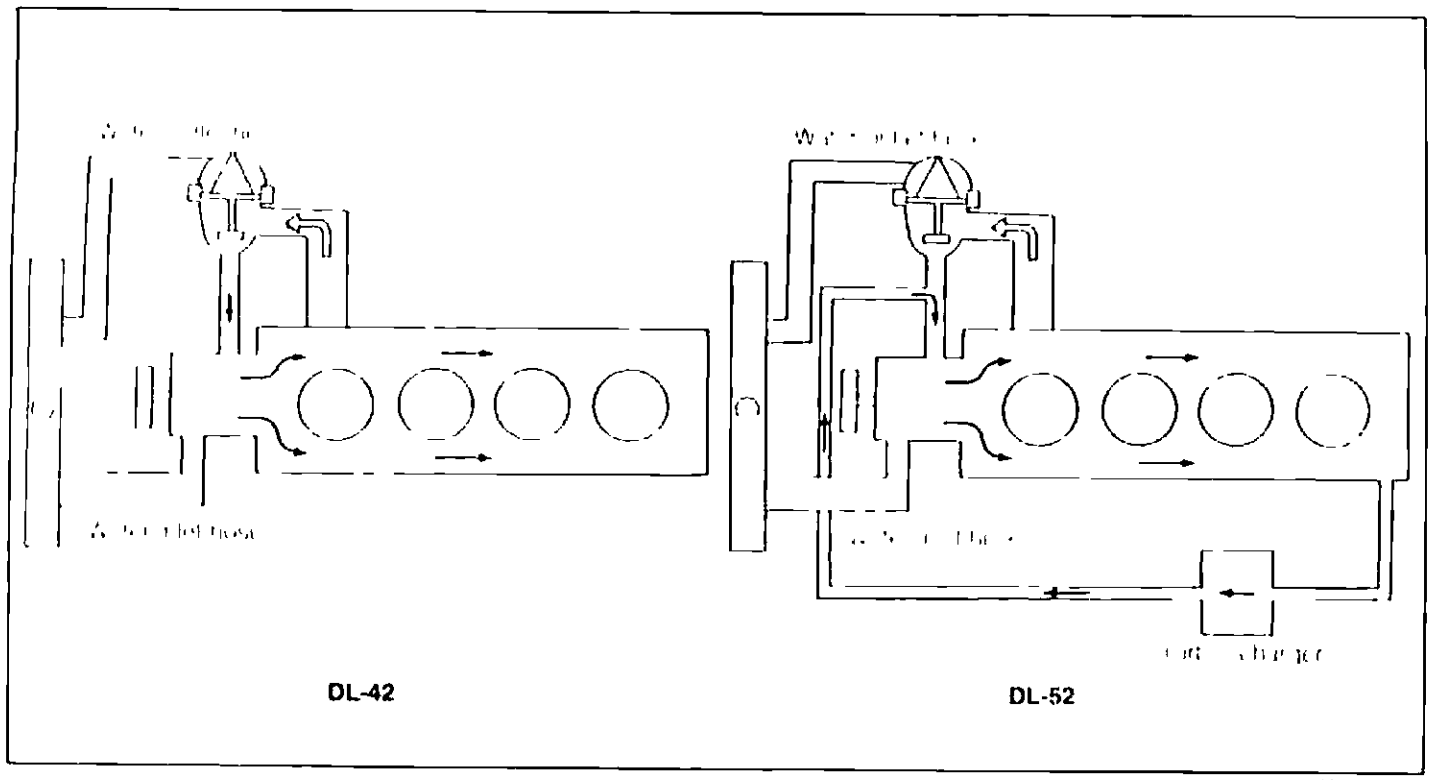
As regards water to be used as cooling water, use soft water which does not contain salts of minerals, calcium, magnesium and so forth.
If the coolant gets to the vehicle body, immediately flush away the coolant using water.
Never open the radiator cap when the cooling water is hot.

WARNING:
- The inside of the radiator is under a pressurized condition when the cooling water is hot. Therefore, if the radiator cap should be removed, the cooling water will blow off, possibly causing injuries such as scald.

WRE91-CO002

COOLING SYSTEM OUTLINE

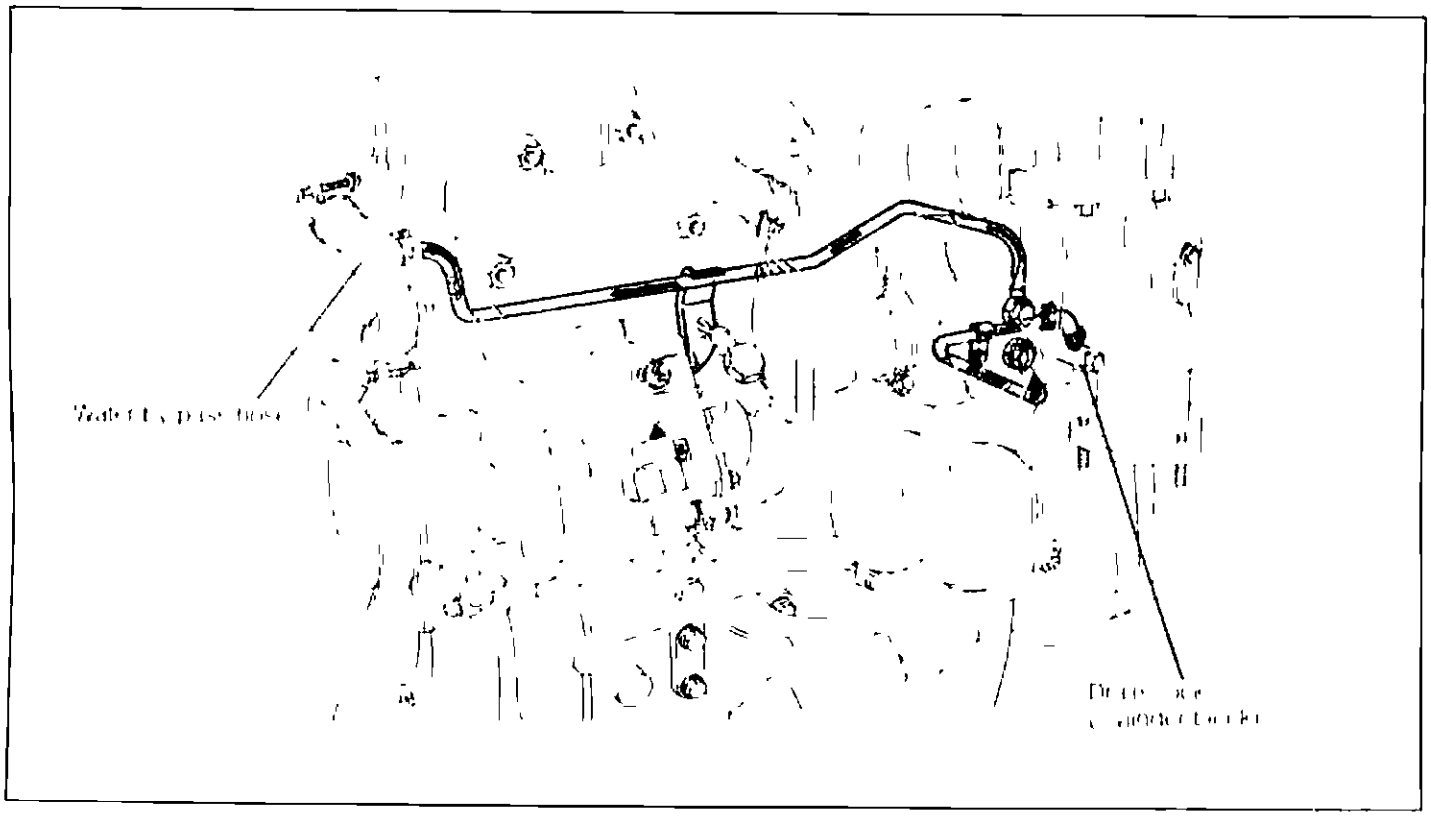
The cooling system is a water cooled forced-circulation type. The cooling system employs a bottom by-pass type in which the thermostat is equipped with a by-pass valve.
The total capacity of the cooling water is approximately 10ℓ



DL-42 DL-52

TURBO CHARGER COOLING WATER ROUTE

The turbo charger is cooled by the cooling water which flows in the following route: cylinder block - turbo charger - turbo charger water by-pass - water pump



RADIATOR

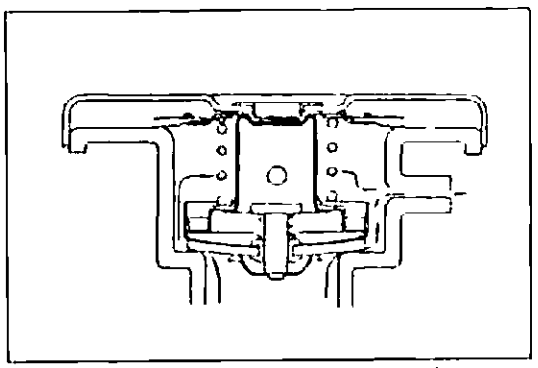
Radiator specification

Item		Specification	
		DI-42	DI-52
Radiator water capacity	dm	2.6	2.9
Heat radiating rate	KJ/h (Kcal/h)	186,279 (44500)	182,093 (43500)
Core dimension (width × height × thickness)	mm	526 × 400 × 32	526 × 400 × 27

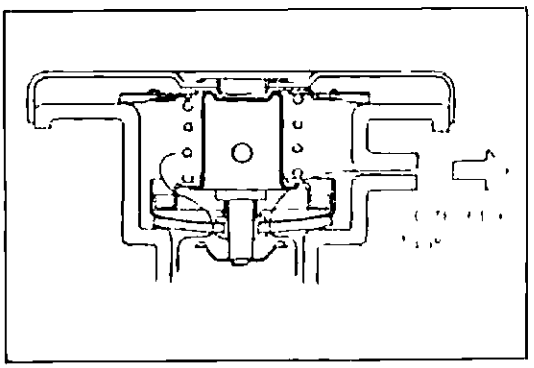
Coolant Capacity (excluding reserve tank) 10.5ℓ (Vehicle with heater)
9.8ℓ (Vehicle without heater)

RADIATOR CAP

A pressure type radiator cap is installed at the upper part of the radiator.
The radiator cap has two valves: a pressure regulating valve and a negative pressure valve.
When the pressure of the cooling system exceeds a specified limit, the rising pressure opens the pressure regulating valve of the radiator cap. As a result, the coolant in the radiator flows to the reserve tank.



On the other hand, the negative pressure valve opens when the inner pressure drops below the atmospheric pressure due to dropped water temperature after the engine has stopped. Thus, the coolant returns from the reserve tank to the radiator.



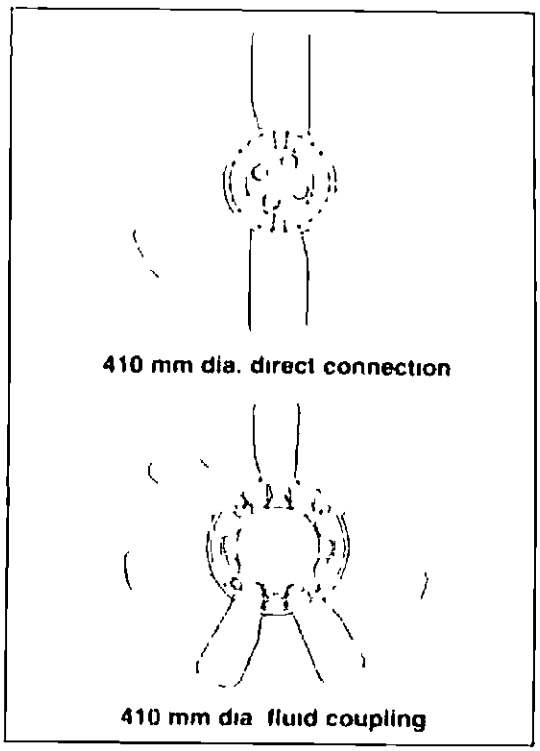
Radiator cap specifications

Item		Specifications
Radiator cap opening pressure	kPa (kgf/cm²)	88.3 (0.9)

COOLING FAN

The fan comes in two specifications. One is a type where the fan is directly connected to the water pump pulley. The other is a type where the fan is connected to the pulley through a fluid coupling.

The fan employs a fluid coupling with a temperature control device is employed in order that the noise level may be reduced.
To minimize the drop in engine output due to the installation of the cooling fan, this has been kept to a minimum level.

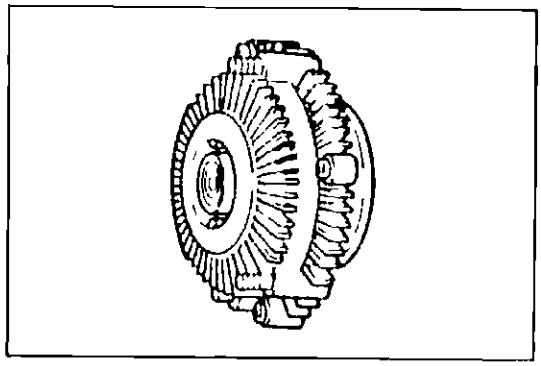


410 mm dia. direct connection

410 mm dia. fluid coupling

FLUID COUPLING WITH FAN

The fluid coupling employs a three-stage temperature control type.



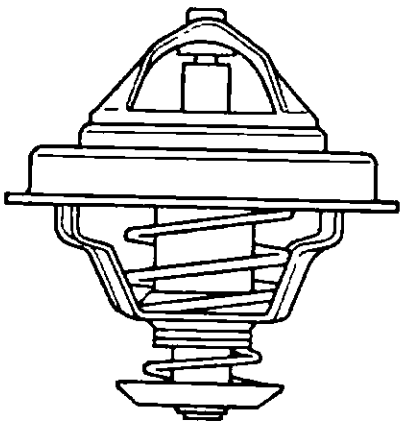
Specifications

Item		Specification	
		DL 12	DL 32
Fluid coupling diameter	mm	146	130
Fan drive ratio		0.90 at 60° C	0.90 at 60° C
Fan speed (when engine speed is 4000 rpm)	rpm	1000 at 75° C	1150 at 85° C
		3200 at 90° C	3600 at 90° C
Fan diameter x width x number of blades	mm	410 x 7	

THERMOSTAT

The thermostat is a wax type with a bypass valve. The thermostat helps the engine to warm up quickly by allowing the cooling water to be recirculated through the cylinder block and cylinder head without passing through the radiator.

Furthermore, the thermostat is equipped with a jiggle pin which performs the air bleeding while the engine is stopped. Also, the jiggle pin allows the temperature of the cooling water to rise quickly during the warming up period.



WRE91 CO011

Thermostat specifications

Item		Standard specifications	Cold area specifications
Type		Wax type	
Valve opening temperature	°C	82 ± 2	88 ± 2
Valve full opening temperature	°C	95	100

WRE91 CO012

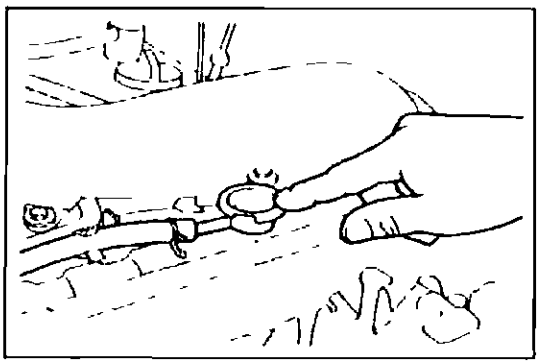
CHECK & CHANGE OF ENGINE COOLANT

1 Check of coolant level
Check to see if the coolant level is between the LOW and FULL lines of the reserve tank
If the coolant level is near the low level or below the low level, add the coolant up to the full level



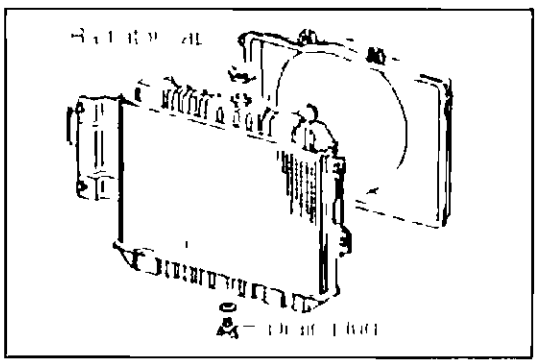
2 Check of coolant quality
There should not be any excessive deposits of rust or water scales around the radiator cap or the radiator filler hole
Also, the coolant should be free of oil
Change the coolant if it is excessively dirty or the time due to change the coolant has already arrived

WARNING:
- Never open the radiator cap when the engine is hot.



3 Change of engine coolant
(1) Remove the radiator cap

WARNING:
- Never open the radiator cap and/or the drain plug when the engine is still hot. Care must be exercised to avoid getting scalded



(2) Place an adequate container below the radiator drain plug. Drain the coolant by removing the drain plug
(3) Close the drain plug
(4) Fill the system with water
(5) Start the engine and stop it
(6) Repeat the steps (1) through (5) two to three times

NOTE:
- Replace the drain plug gasket with a new one.

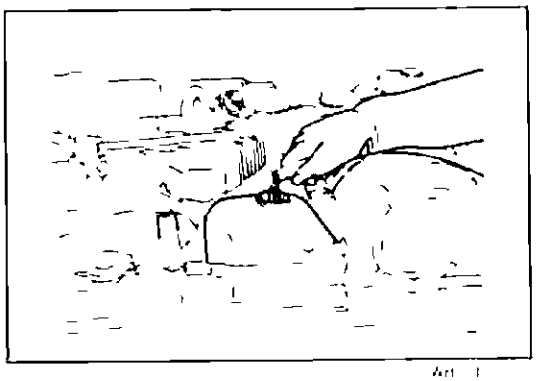
(7) Fill the radiator and reserve tank with antifreeze solution in accordance with the instructions of the manufacturer of the antifreeze solution

CAUTION:
- Use a Good brand of ethylene-glycol base antifreeze solution

Coolant Capacity (excluding reserve tank):
10.5ℓ (Vehicle with heater)
9.8ℓ (Vehicle without heater)

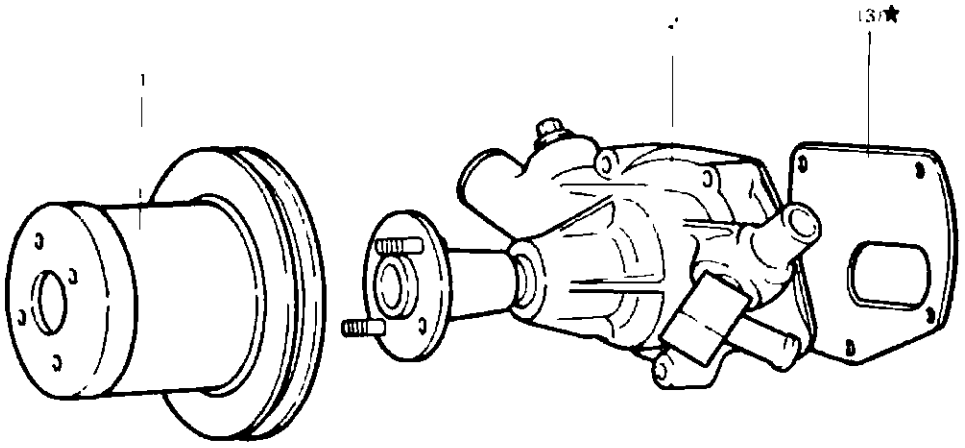


(8) Fill the system with water.
(9) Start the engine. Check the coolant level. Add water as required.
(10) Tighten the radiator cap.
(11) Warm the engine. Afterwards, allow the coolant to cool down to the atmospheric temperature. Recheck the coolant level at the reserve tank. Add coolant to the full level as required.
If no coolant remains at all in the reserve tank, recheck the coolant level in the radiator. Replenish the radiator with water as required. Replenish the reserve tank with coolant up to the full level.



NOTE
- Here, the coolant refers to the mixture of water and antifreeze that has been mixed in accordance with the instructions of the antifreeze manufacturer.

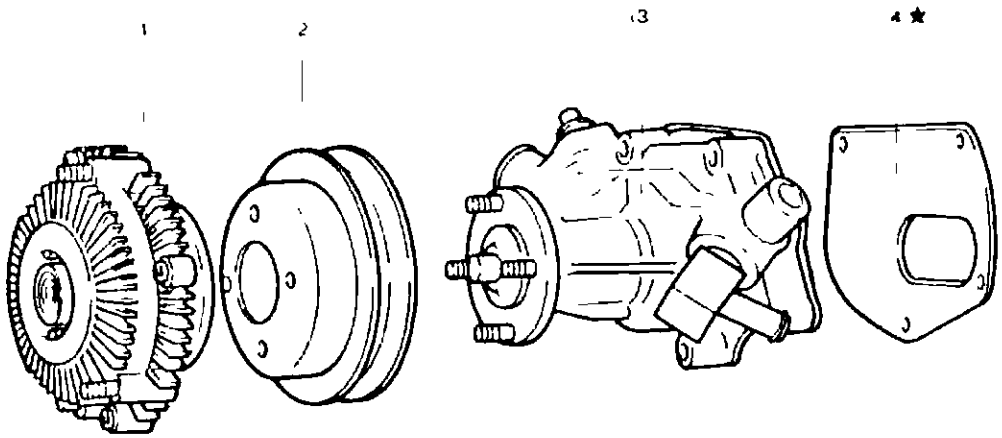
WATER PUMP



(1) Pulley
(2) Water pump
(3) Gasket

410 mm dia. direct connection type

★ : Non-reusable parts



(1) Fluid coupling
(2) Pulley
(3) Water pump
(4) Gasket

410 mm dia. fluid coupling type

★ : Non-reusable parts

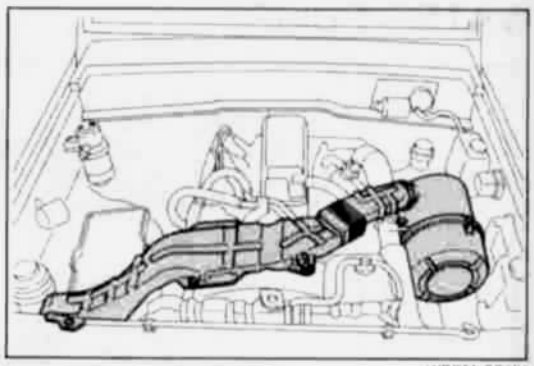
REMOVAL OF WATER PUMP

1 Disconnect the battery ground cable from the negative (-) terminal of the battery
2 Drain the coolant (See page CO-7)
Open the radiator cap and drain plug and allow the coolant to drain into a clean container

WARNING

- Never open the radiator cap and/or drain plug while the engine is hot.

3. Remove the cool air intake duct.



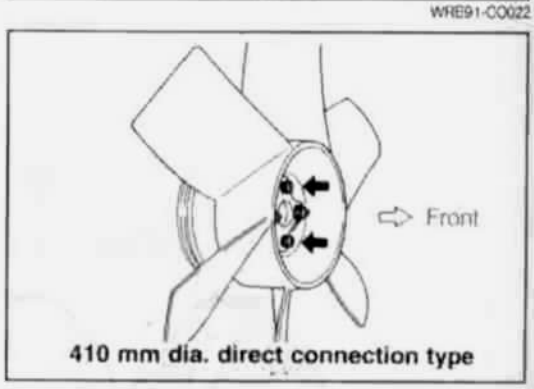
WRE91-CO021

4. Remove the reserve tank. (DL-52 only)

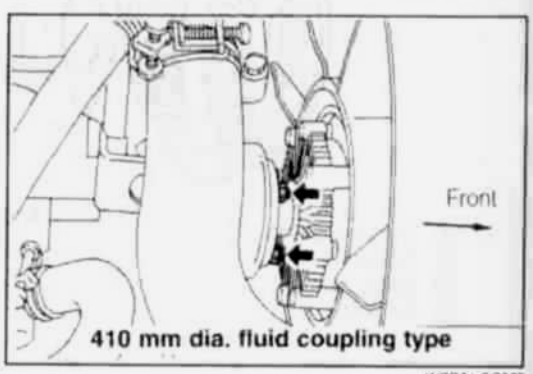


WRE91-CO022

5. Removal of fan and fan shroud
   (1) Remove the four nuts retaining the fan.



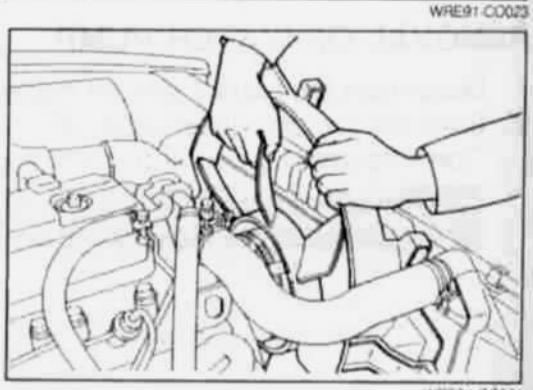
410 mm dia. direct connection type



410 mm dia. fluid coupling type

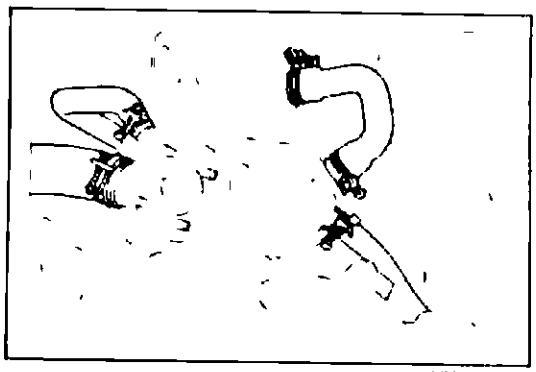
WRE91-CO023

   (2) Remove the two bolts retaining the fan shroud and radiator.
   (3) Remove the fan shroud together with the fan.

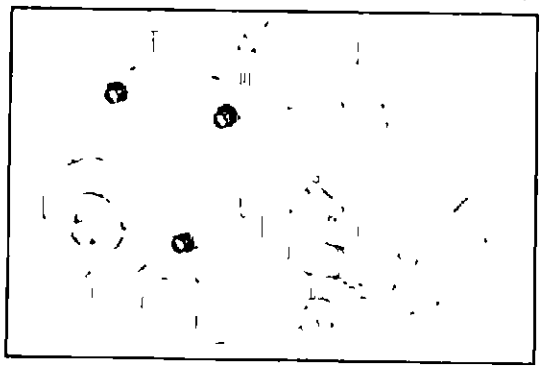


WRE91-CO024

4 Disconnect the hoses connected to the water pump

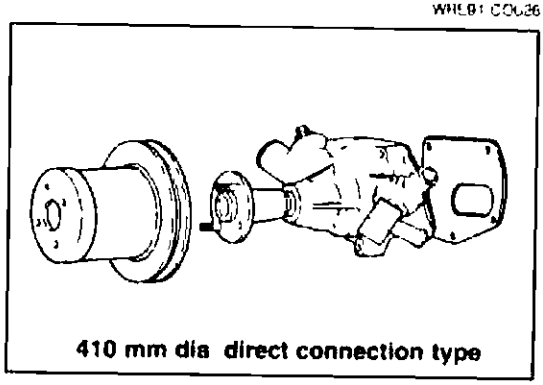


5 Remove the water pump by removing the attaching bolts of the water pump

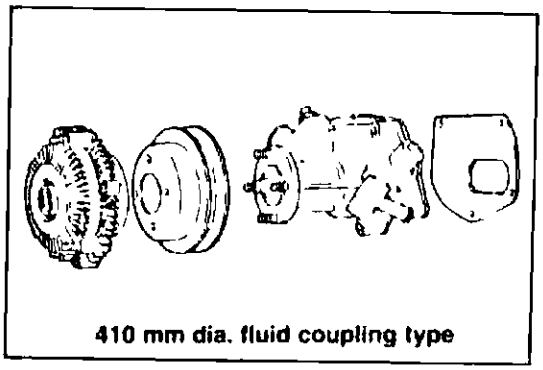


INSPECTION OF WATER PUMP-RELATED PARTS

1 Check the water pump pulley for damage or deformation Replace the water pump pulley if it exhibits damage or deformation

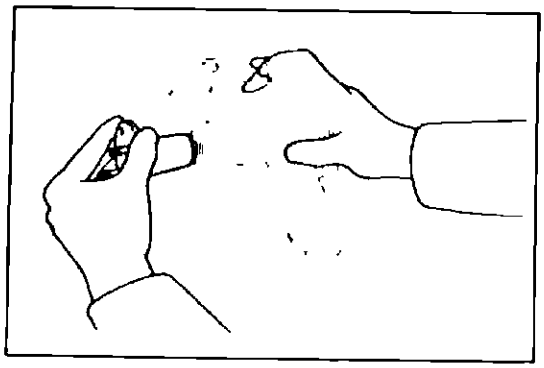


410 mm dia direct connection type

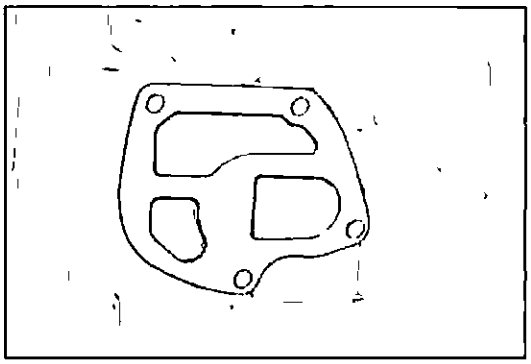


410 mm dia. fluid coupling type

2 Ensure that the water pump rotates smoothly by hand Replace the water pump if it will not rotate smoothly

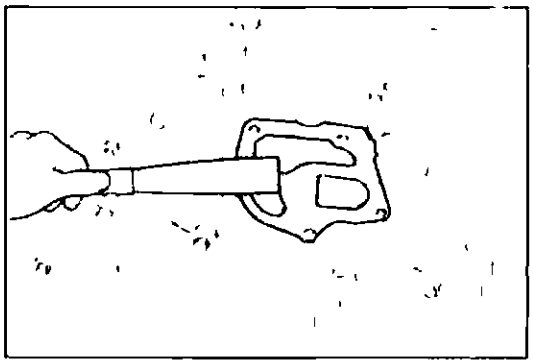


3 Check the water pump cover section of the cylinder block for damage or wear
Replace the cylinder block if the water pump cover section exhibits damage or wear

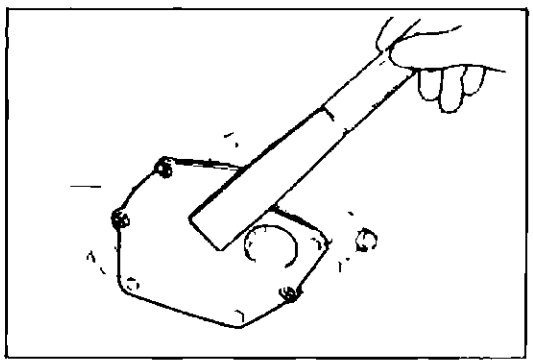


INSTALLATION OF WATER PUMP

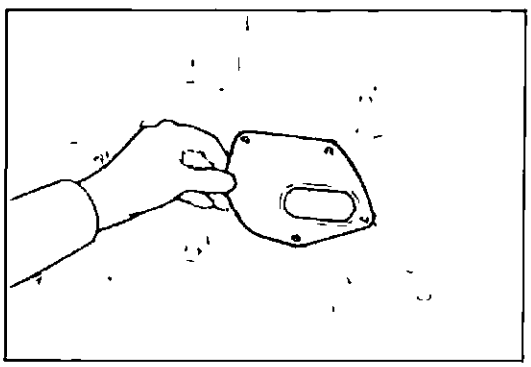
1 Remove the gasket material from the water pump installation surface of the cylinder block, using a gasket scraper



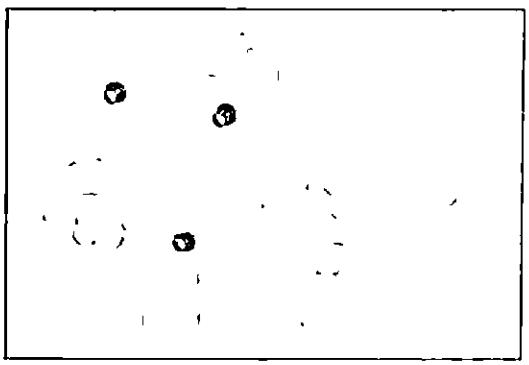
2 Remove the gasket material from the water pump using a gasket scraper



3 Install a new gasket to the cylinder block

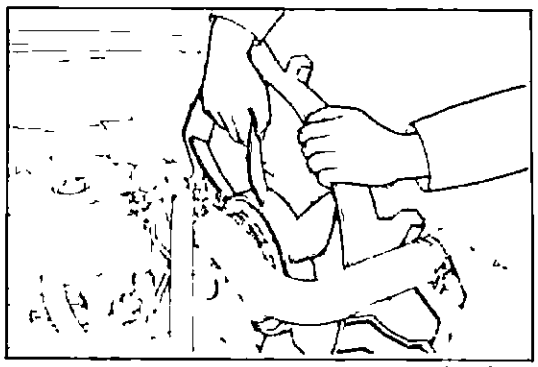


4 Install the water pump to the cylinder block Tighten the attaching bolts evenly over two or three stages to the specified torque
Tightening Torque.
18 2 ± 2 4 N m (1.85 ± 0.35 kgf-m, 13 3 ± 2.5 ft-lb)

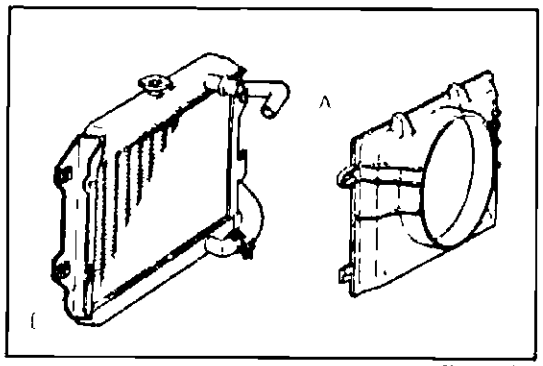


NOTE
- After tightening bolts, ensure that the water pump rotates smoothly by hand.

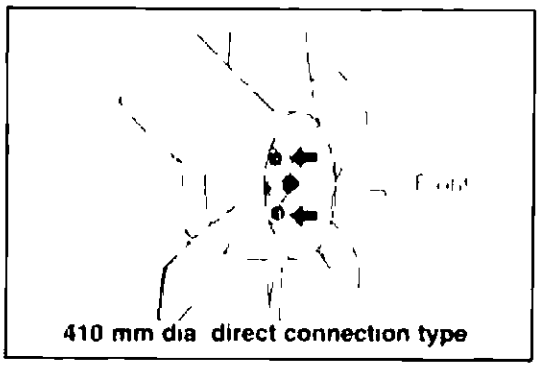
5 Installation of fan and fan shroud
(1) Install the fan together with the fan shroud



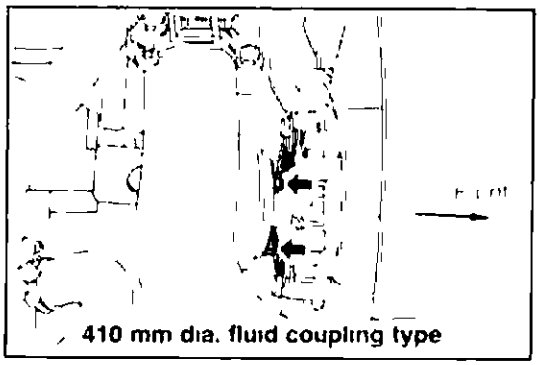
NOTE:
Insert the pawl at the right side of the fan shroud into the pawl A of the radiator. With the pawl at the right side put in, insert the pawl at the left side of the fan shroud into the pawl B of the radiator.



(2) Install the fan with the four nuts

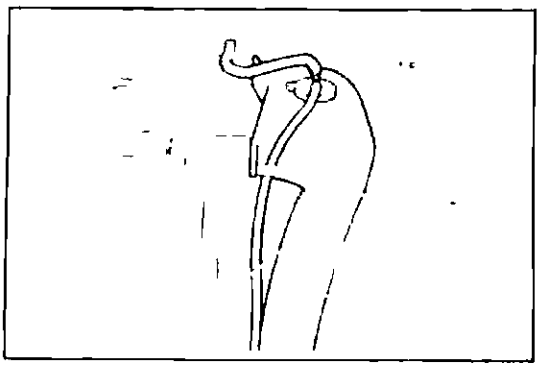


410 mm dia direct connection type

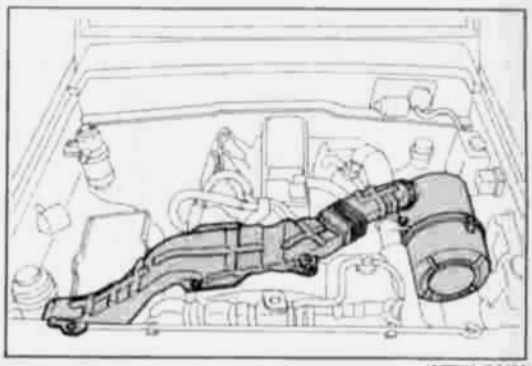


410 mm dia. fluid coupling type

6 Install the reserve tank
(DL Turbo only)



7. Install the cool air intake duct.



WRE91-CO038

8. Connect the battery.
9. Fill coolant.
   (See page CO-7.)

WRE91-CO039

THERMOSTAT

REMOVAL OF THERMOSTAT

1 Disconnect the battery ground cable from the negative (–) terminal of the battery

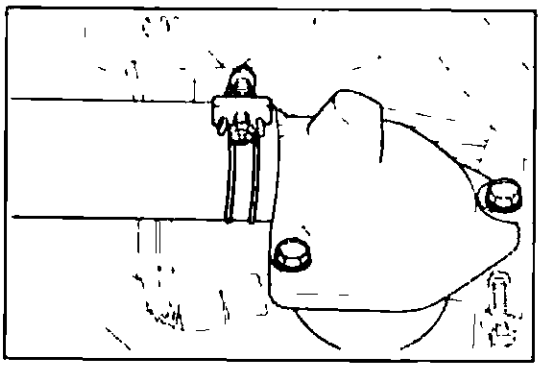
2 Drain the coolant (See page CO–7)

WARNING:

- **Never open the radiator cap and/or drain plug while the coolant is hot.**

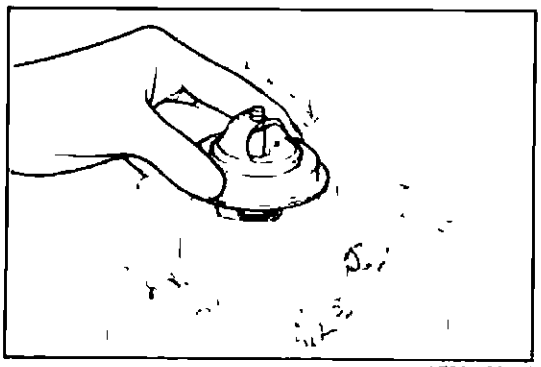
WRE91 CO040

3 Remove the radiator inlet hose and attaching bolts



WRE91 CO041

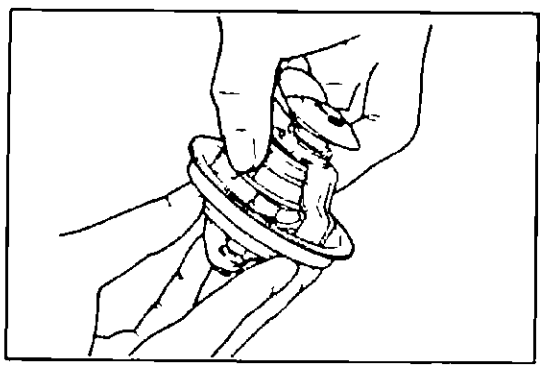
4 Remove the thermostat by removing the water outlet



WRE91 CO042

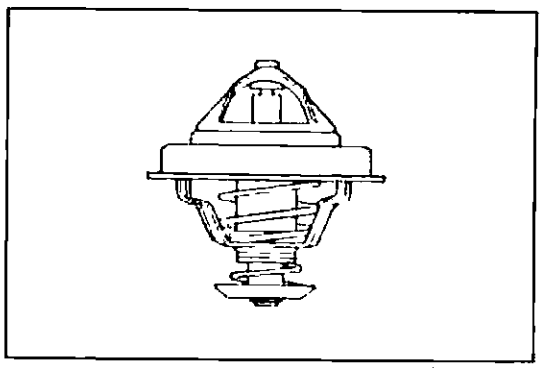
INSPECTION OF THERMOSTAT

1 Ensure that the thermostat valve is closed completely at room temperature 20°C and the spring has no play
Replace the thermostat if the valve is open or the spring has a play



WRE91 CO043

2 Check the rubber grommet of the thermostat for damage or crack
Replace the thermostat if the rubber grommet exhibits damage or crack

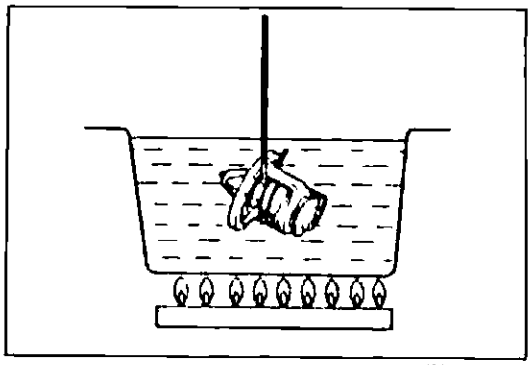


WRE91 CO044

3 Immerse the thermostat in water and check the valve opening temperature by heating the water gradually

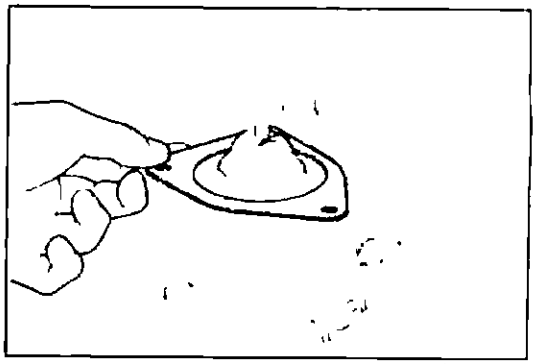
Specification	Valve opening temperature °C	Valve lift
Standard specification	80 – 84	10 mm or more at 95°C
Cold area specification	86 – 90	10 mm or more at 100°C

Replace the thermostat if the valve operation fails to conform to the specifications

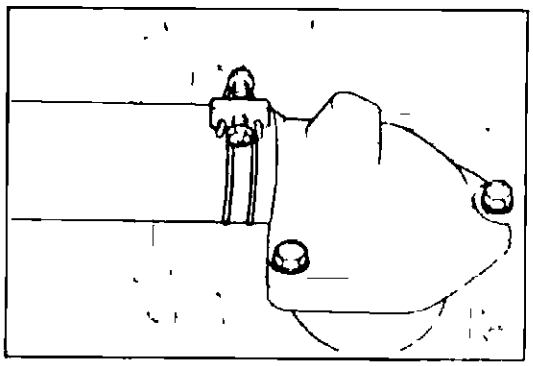


INSTALLATION OF THERMOSTAT

1 Install the thermostat and a new gasket in this sequence
NOTE
Prior to the installation, thoroughly remove the gasket material, using a gasket scraper.



2 Install the water outlet
Tightening Torque:
18.2 ± 3.4 N·m (1.85 ± 0.35 kgf-m, 13.4 ± 2.6 ft-lb)



3 Fill coolant
(See page CO-7)
4 Connect the battery ground cable to the negative (–) terminal of the battery

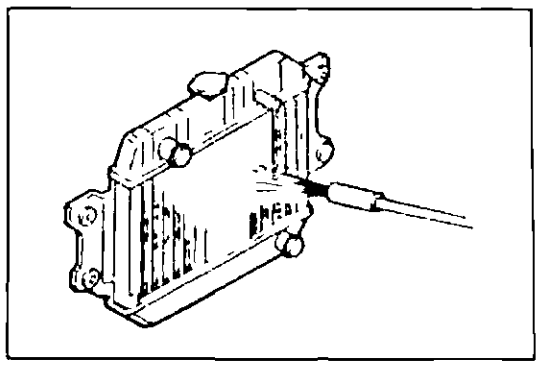
RADIATOR

CLEANING OF RADIATOR

Using water or steam cleaner, remove mud and dirt from the radiator core.

CAUTION

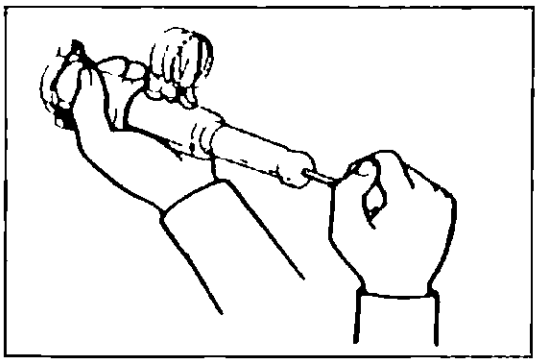
- When using a high pressure type cleaner, be careful not to deform radiator core fins.
- Keep a distance of more than 40 - 50 cm between the radiator core and cleaner nozzle when the cleaner nozzle pressure is 2942 - 3433 kPa (30 - 35 kgf/cm²). Also, the injection angle of pressurized water should be right angles to the radiator.



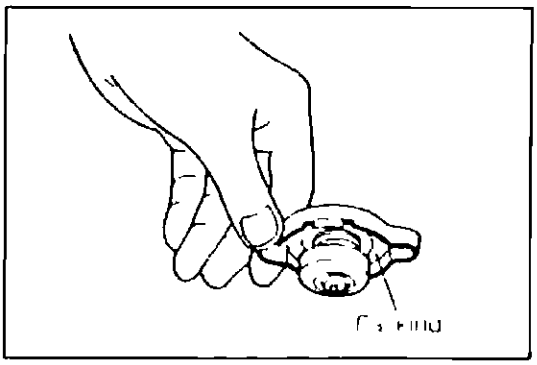
INSPECTION OF RADIATOR

1. Check of radiator cap
   (1) Check the radiator cap by means of a radiator cap tester to see if the relief valve opens at a pressure of 73.6 - 103.0 kPa (0.75 - 1.05 kgf/cm²).
   If the radiator cap does not conform to the specification, replace the radiator cap.

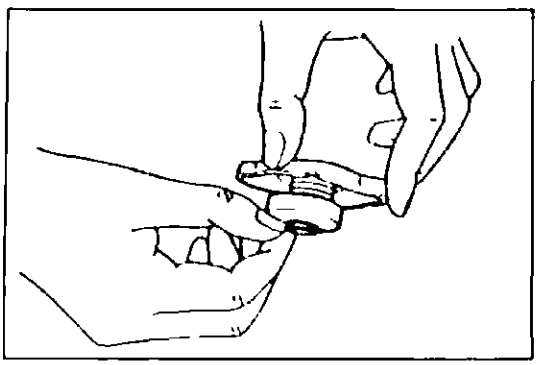
   WARNING
   - Never open the radiator cap when the engine is hot.



   (2) Check the seal packing of the radiator cap for damage. Replace the radiator cap with a new one, if any damage exists.

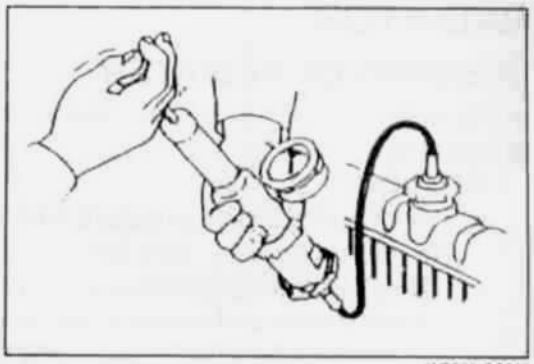


   (3) Lift the valve at the vacuum side with your fingers. Ensure that the valve is functioning properly. Replace the radiator cap with a new one, if the valve fails to function.



2. Check of cooling system for leakage
   (1) Fill the radiator with coolant. Attach a radiator cap tester.
   (2) Warm up the engine.
   (3) Apply a pressure of 117.7 kPa (1.2 kgf/cm^2) to the cooling system by means of a radiator tester.
   If the pressure drops, check the hoses, radiator, water pump and heater for evidence of leakage.
   If no external leakage is found, check the heater core, cylinder block, cylinder head, oil cooler and throttle body for evidence of leakage.
   Check the hoses for deterioration, cracks, bulge or damage.
   Replace the defective part(s) if necessary.
   (4) Remove the radiator cap tester from the radiator.

WARNING:
- **Never remove the radiator cap tester when the coolant temperature is high.**



WRE91-C0053

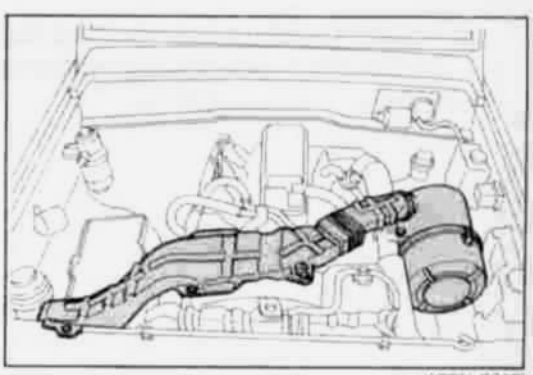
REMOVAL OF RADIATOR

1. Disconnect the ground cable terminal from the negative (–) terminal of the battery.
2. Drain the coolant. (See page CO–7.)

WARNING:
- **Never open the radiator cap and/or drain plug while the coolant is hot.**

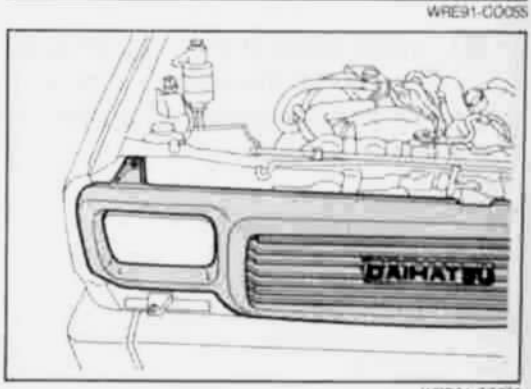
WRE91-C0054

3. Remove the cool air intake duct.



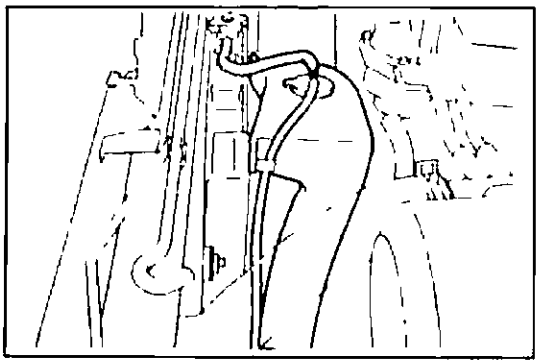
WRE91-C0055

4. Remove the front grille.

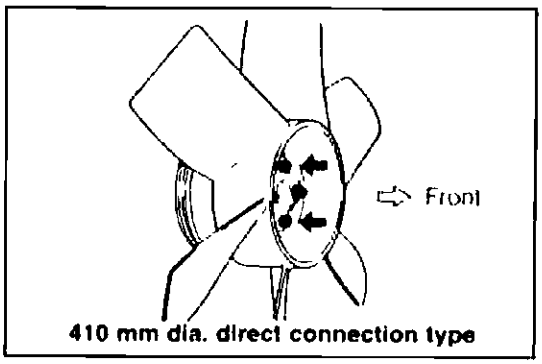


WRE91-C0056

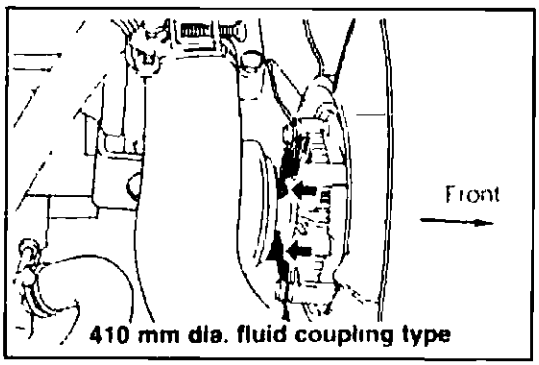
5 Remove the reserve tank (DL-52 only)



6 Removal of fan and fan shroud
(1) Remove the four nuts retaining the fan

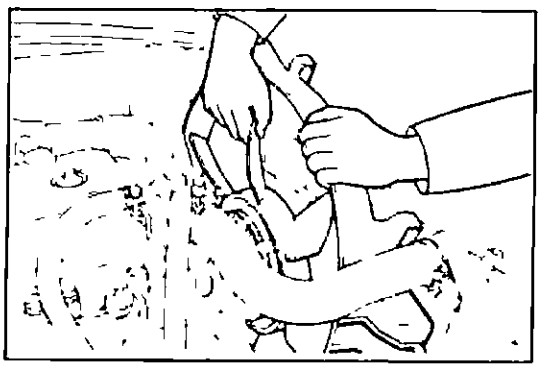


410 mm dia. direct connection type

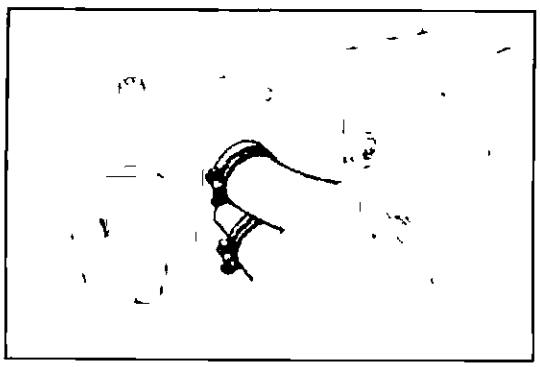


410 mm dia. fluid coupling type

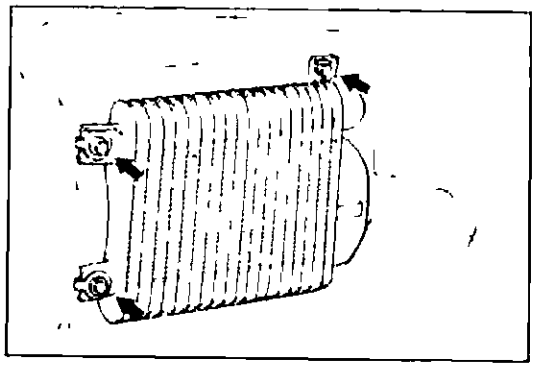
(2) Remove the two bolts retaining the fan shroud and radiator
(3) Remove the fan shroud together with the fan



7 Removal of intercooler (DL-52 only)
(1) Remove the hose connected to the intercooler

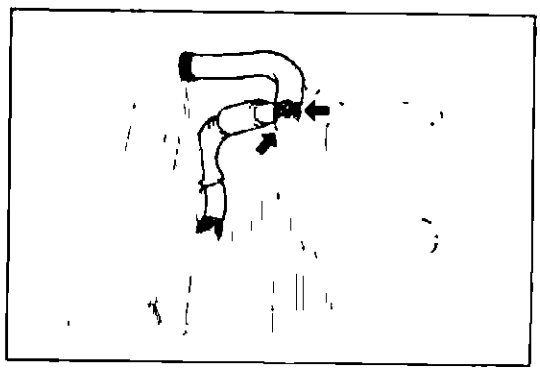


(2) Remove the intercooler

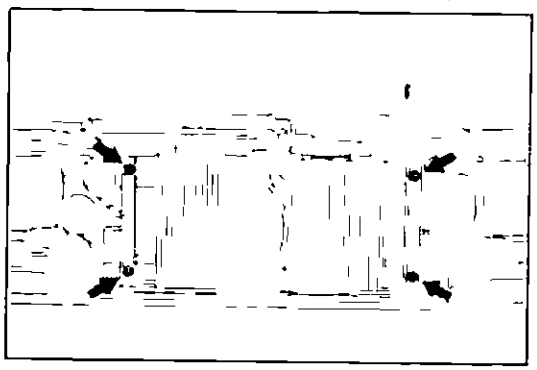


8 Removal of radiator

(1) Disconnect the radiator hoses from the radiator

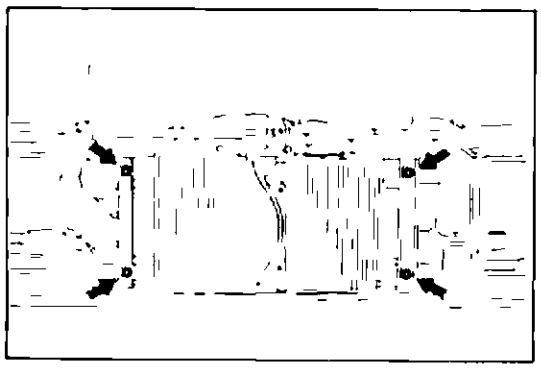


(2) Remove the radiator by removing the four bolts

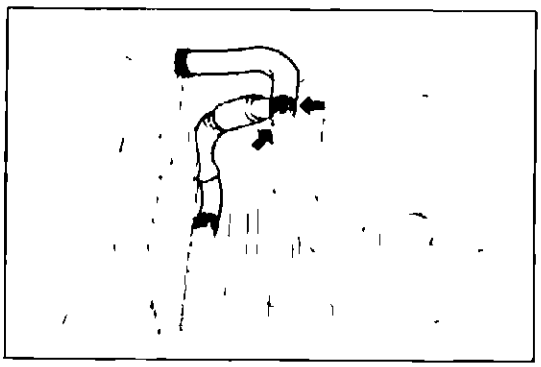


INSTALLATION OF RADIATOR

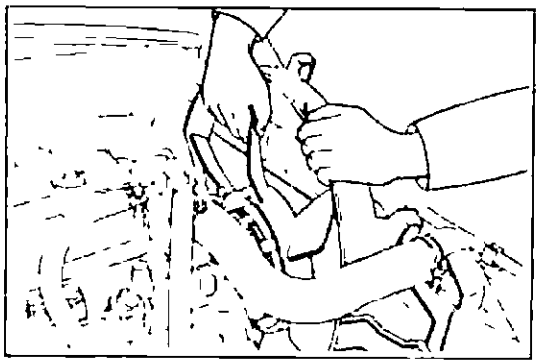
1 Installation of radiator
(1) Install the radiator



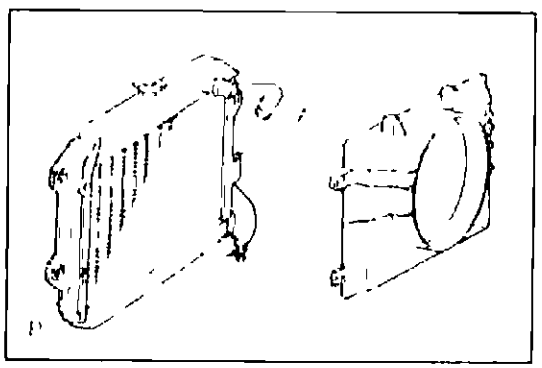
(2) Connect the radiator hoses and attach new hose bands



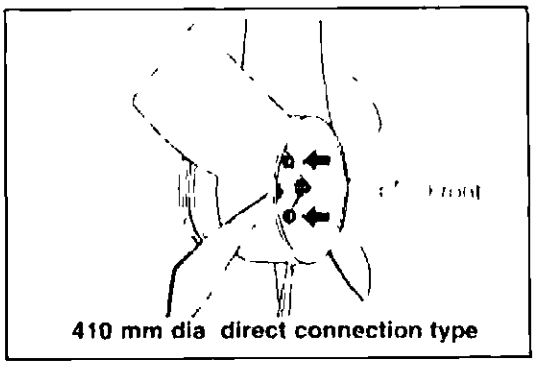
2 Installation of fan and fan shroud
(1) Install the fan together with the fan shroud

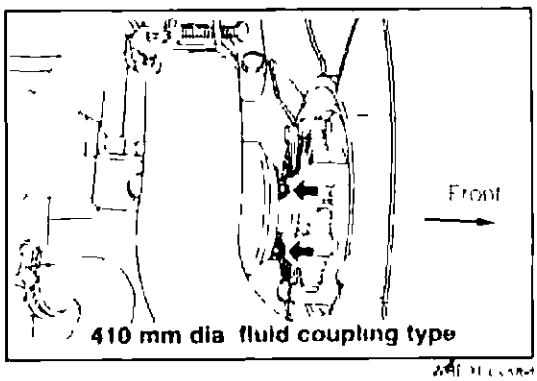


NOTE
Insert the pawl at the right side of the fan shroud into the pawl A of the radiator. With the pawl at the right side put in, insert the pawl at the left side of the fan shroud into the pawl B of the radiator

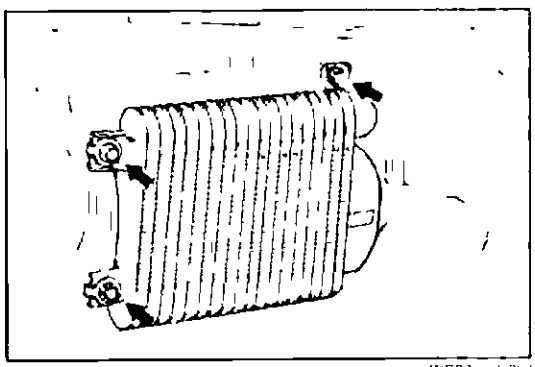


(2) Install the fan with the four nuts.

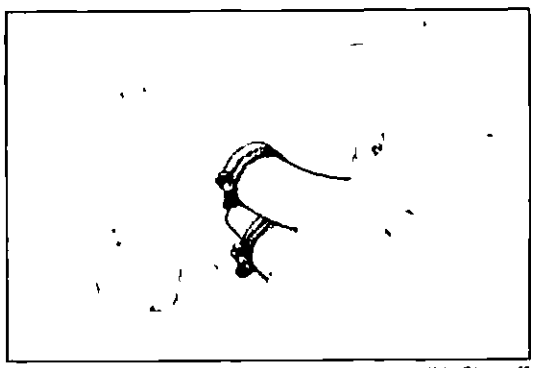




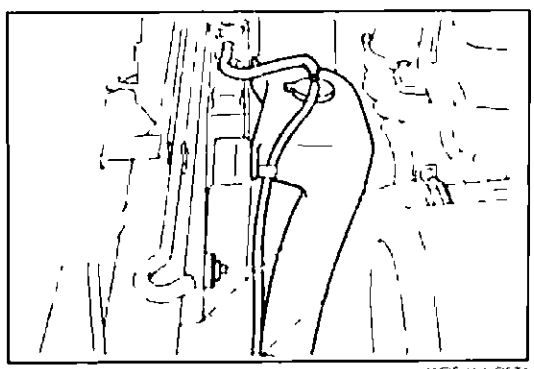
3 Installation of intercooler (DL-Turbo only)
(1) Install the intercooler



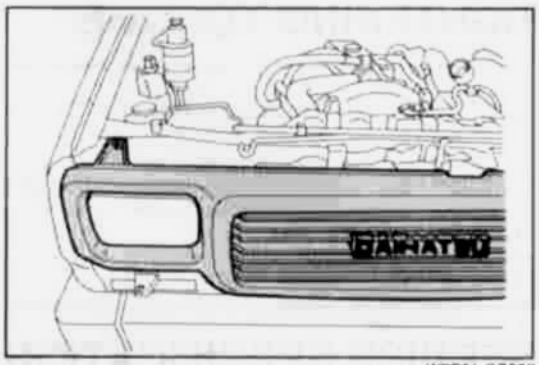
(2) Connect the hoses to the intercooler



4 Install the reservoir tank
(DL-Turbo only)

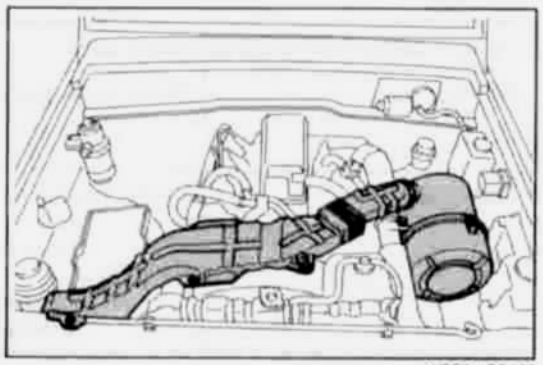


5. Install the front grille.



WRE91-CO072

6. Install the cool air intake duct.



WRE91-CO073

7. Connect the battery.
8. Fill coolant.
   (See page CO-7.)

WRE91-CO074

TIGHTENING TORQUE

[illegible]	Tightening torque			Remark
	N·m	kgf-m	ft-lb	
Cylinder head + Water temperature sender gauge	24.1 ± 2.5	2.45 ± 0.25	17.7 ± 1.8	Dry
Cylinder block + Water inlet	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5	Dry
Cylinder block + Water pump	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5	Dry

Water pump

SERVICE SPECIFICATION

Coolant capacity (If equipped) reserve tank)		10.5 ℓ (with heater) 9.8 ℓ (without heater)
Radiator cap	Relief valve opening pressure	73.5 - 103.0 kPa (0.75 - 1.05 kgf/cm²)
Thermostat	Valve opening temperature Standard specifications Cold area specifications	 82 ± 2 °C 88 ± 2 °C
	Valve lift Standard specifications Cold area specifications	 10 mm or more at 95 °C 10 mm or more at 100 °C

Water cooled

DAIHATSU

F70,F75,F77

Service manual

ENGINE MECHANICAL

EM

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

ENGINE MECHANICAL

PRECAUTIONS ..... EM– 2
TROUBLE SHOOTING ..... EM– 3
ENGINE MAIN SPECIFICATIONS ..... EM– 5
ENGINE OUTLINE ..... EM– 6
ENGINE TUNE-UP ..... EM– 8
CYLINDER HEAD EM–15
TIMING BELT COVER AND CASE EM–29
PISTON AND CONNECTING ROD EM–38
REMOVAL OF ENGINE ASSY EM–39
INSPECTION OF COMPONENTS EM–46
POSITIVE CRANKCASE VENTILATION (PCV) EM–62
TURBO CHARGER SYSTEM EM–64
POWER CONTROL SYSTEM EM–73
SST EM–75
TIGHTENING TORQUE EM–77
ENGINE SERVICE SPECIFICATION EM–79
THE ENGINE PROPER SPECIFICATIONS EM–81

WRE91 EM001

PRECAUTIONS

1. Make sure that only the specified bolts and nuts are used. Also, where specified, be sure to employ a torque wrench to tighten bolts or nuts to specifications.
2. Use only genuine parts for every replacement operation.
3. For increased working efficiency and improved accuracy, utilized SSTs (Special Service Tools) effectively.
4. When both front and rear parts of the vehicle or only the rear part thereof is jacked up, make certain to place chocks at the wheels correctly in order to assure safe operations.
5. When the motor vehicle is jacked up, make sure to support the vehicle with safety stands positions at the specified jacking points.
6. Before any repair work is make on the electrical system or the engine is removed or installed, first be sure to disconnect the negative ⊖ terminal of the battery.
7. Disassembly.
   (1) When complicated parts are disassembled, put stamped marks or marks on suitable nonfunc sections of the parts in order that the said parts may be easily assembled in the correct orig. positions.
   (2) Replacements of the cylinder block or crankshaft, etc should be carried out after the engine assembly has been removed from the motor vehicle.
8. Checks to the performed during disassembly.
   Each time a parts is removed, check conditions under which the part has been assembled. Also, check to see if the part exhibits any evidence of distortion, breakage, wear or scores, etc.
9. Arrangement of disassembled parts.
   Put disassembled parts in a good order. Moreover, divide disassembled parts into two groups: those parts to be replaced and those parts which can be reused.
10. Washing disassembled parts.
    As for those parts which can be reused, thoroughly clean or wash them.
11. Inspection and measurement.
    Those parts which are to be reused must be carefully inspected or measured, as required.
12. Assembly of parts.
    Those satisfactory parts only should be assembled in accordance with the prescribed standards (e.g. specified adjustment values., tightening torque and so forth.)
    Furthermore, seal packing or grease should be applied, as required.
    Furthermore, in respect to packings, gaskets, cotter pins and similar items, be certain to install new parts.
13. Adjustments and checking of service operations.
    Service operations must be carried out correctly by means of gauges or testers, if the use of these instruments is required.

WRE91-EM003

TROUBLE SHOOTING

Problem	Possible cases	Remedies	Page
Engine overheat	Cooling system faulty	Trouble shoot cooling system.	
	Fuel system faulty	Trouble shoot fuel system.	
	Lubrication system faulty	Trouble shoot lubrication system.	
Engine will not crank or crank slowly	Starting system	Trouble shoot starting system.	
	Charging system	Trouble shoot charging system	
Engine will not start/Hard to start (Only cases where cranking by starter motor is normal)	Preheating device problem		ST-22
	• Glow plug	Inspect glow plug.	
	• Glow plug connector	Inspect glow plug connector	
	• Glow plug current sensor	Inspect glow plug current sensor.	
	No fuel supply	Check fuel tank and fuel line.	FU-3
	• Fuel tank		
	• Fuel pipe		
	• Fuel filter		
	• Injection pump	Inspect injection pump.	
	Injection problem		FU-4
	• Injection timing	Reset injection timing.	
	• Injection nozzle	Check injection nozzle.	
	• Injection pipe		
Rough idle/Engine stalls	Incorrect valve clearance	Adjust valve clearance.	EM-10
	Incorrect idle speed	Adjust idle speed.	EM-13
	Incorrect injection timing	Reset injection timing.	EM-11
	Low compression	Check compression.	EM-13
	Fuel leakage	Check fuel line.	FU-3
	• Injection pipe		
	• Injection nozzle		
	• Delivery valve		
	Turbo charger problem	Inspect turbo charger	EM-64
	Injection pump problem	Inspect injection pump.	FU-4
Lack of power	Full leakage	Check fuel line.	FU-3
	• Injection pipe		
	• Injection nozzle		
	• Delivery valve		
	Incorrect injection timing	Reset injection timing.	EM-11
	Turbo charger problem	Check turbo charger.	EM-64
	• Waste gate		
	• Boost compensator		
	• Turbo charging pressure		
	Injection pump problem	Inspect injection pump.	FU-4

ENGINE MECHANICAL

Problem	Possible cases	Remedies	Page
Engine emits large quantity of exhaust smoke	Incorrect injection timing	Reset injection timing	EM-11
	Injection nozzle faulty	Check injection nozzle	FU-14
	Turbo charger problem • T/C lubricating oil discharge pipe • Oil leakage	Check turbo charger.	EM-64
	Injection pump problem	Inspect injection pump	FU-4
Engine will not stop (Even if switch is move to "ACC" position)	Fusible link faulty	Replace fusible link.	
	Starter switch faulty	Check starter switch.	
	Fuel control relay faulty	Replace fuel control relay	
	Injection pump problem	Inspect injection pump	

WRE91 EM004

ENGINE MAIN SPECIFICATIONS

Item \ Engine Type				DL-42	DL-52
Cylinder capacity			cm³	2765	
Kind				Diesel, 4 cycle	
Cylinder number and arrangment				4 cylinder-in-line, mounted longitudinally	
Combustion chamber type				Swirl chamber type	
Valve mechanism				Belt Drive OHV	
Bore × stroke			mm	92 × 104	
Compression ratio				21.2	
Compression pressure kPa{kgf/cm²}/rpm	SID			3150 {32}/250	
	Minimum			2150 {22}/250	
	Difference between cylinders			490 {5}/250	
Maximum Power		kW/rpm	SAE net	56/3800	75/3400
			DIN	54/3800	
Maximum Torque		Nm/rpm	SAE net	170/2200	245/1900
			DIN	170/2200	
Engine dimensions (Length × width × height)			mm	763 × 548 × 696	763 × 611 × 724
Service engine weight			kg	236	250
Valve Timing	Intake		Open	25° BTDC	
			Close	55° ABDC	
	Exhaust		Open	60° BBDC	
			Close	20° ATDC	
Valve clearance	Intake		mm	0.25 ± 0.05	
	Exhaust		mm	0.25 ± 0.05	0.35 ± 0.05
Idle speed			rpm	650 ± 25	
Firing order				1 - 3 - 4 - 2	
Injection timing				1° BTDC (High altitude speed 3°)	1° BTDC
Coolant capacity (with reserve tank)			dm³	10.6	
Oil capacity			dm³	6.4	

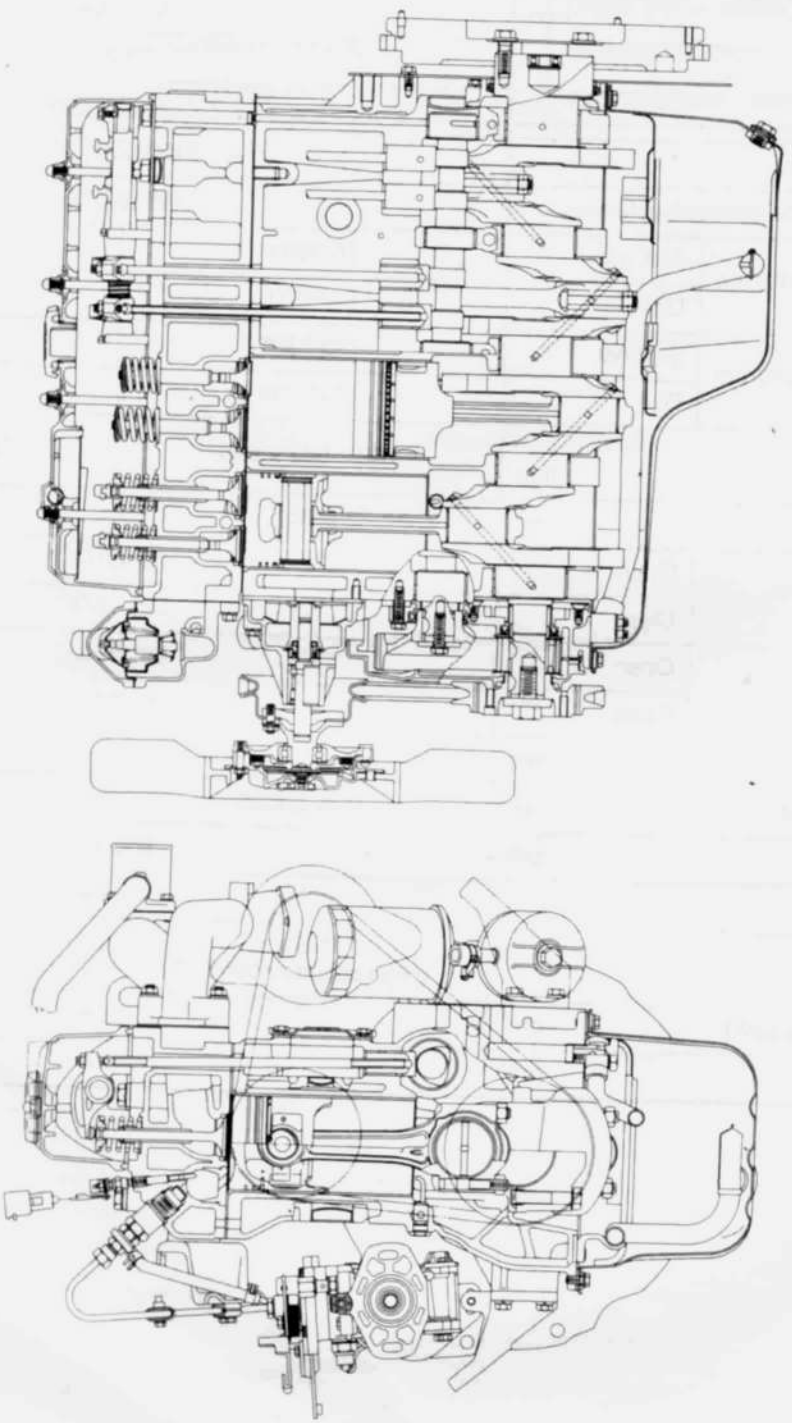
WE-91EM-00

ENGINE OUTLINE

DL Engine

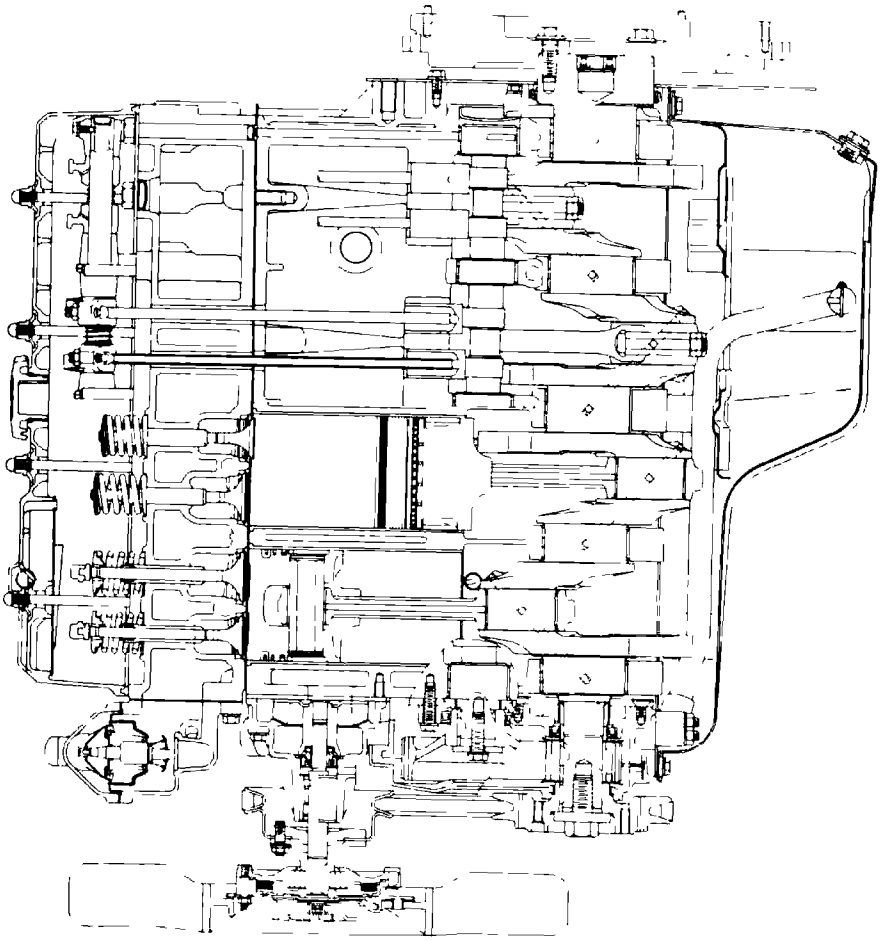
Type DL engine is a water-cooled, 4-cylinder-in-line diesel engine with a total displacement of 2765 cc.
The DL engine comes in two types: One is the DL-42 (natural aspiration engine) type and the other is the DL-52 (turbo charged engine) type. On the DL-52 engine, an air-cooled intercooler has been newly provided so as to increase the engine power.
Moreover, for improved durability and reliability, the turbo charger employs a water-cooled type.

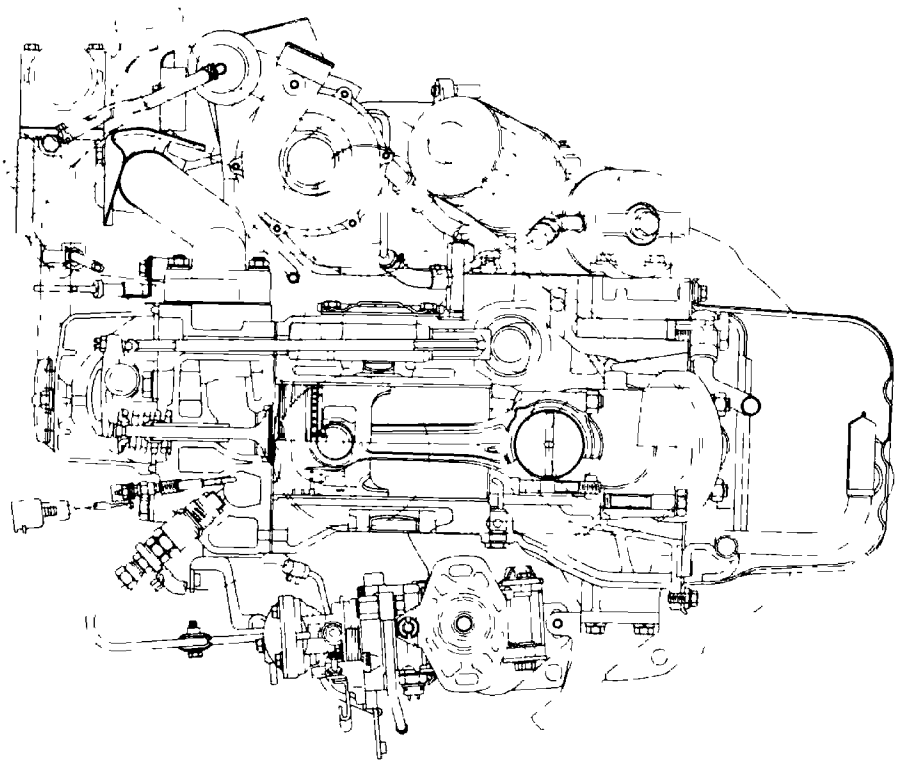
ENGINE SECTIONAL VIEW



[DL-42 Engine]

WRE91-EM005



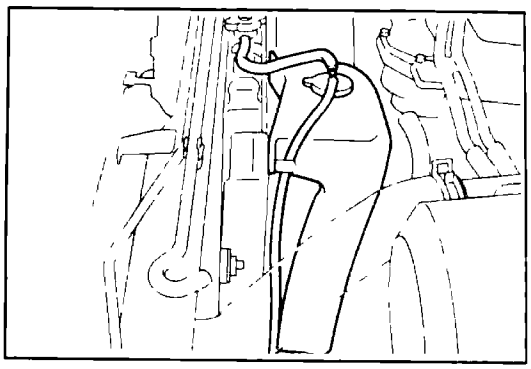


[DL-52 Engine]

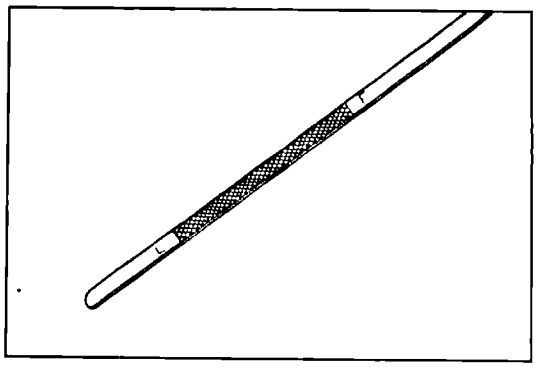
WRE91-EM006

ENGINE TUNE-UP

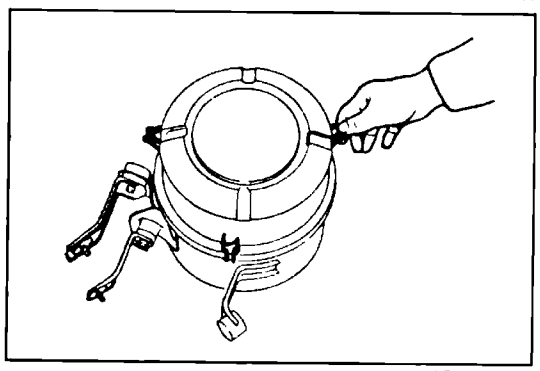
1 Inspection of engine coolant level
(See page CO-7.)


WRE91-EM007

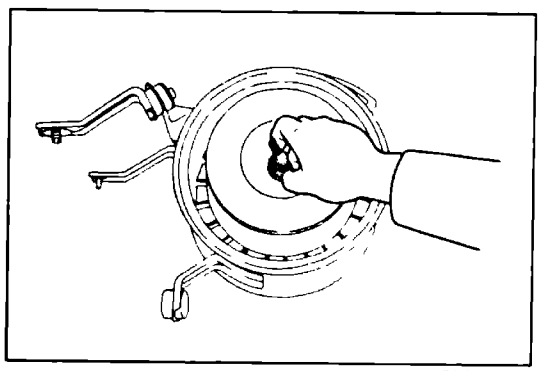
2. Inspection of engine oil level


WRE91 EM008

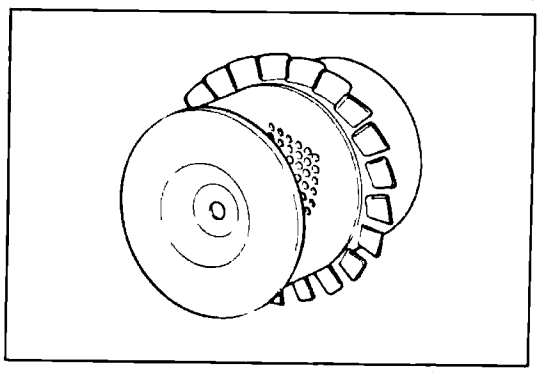
3. Inspection of air cleaner filter element
(1) Disconnect the air cleaner cap by loosen the three clamps.


WRE91 EM009

(2) Loosen the wing bolt retaining the element. Take out the elernent from the air cleaner element.


WRE91-EM010

(3) Visually inspect that the air filter element is not excessively dirty, damaged or oily.
Replace the air filter element, if necessary.

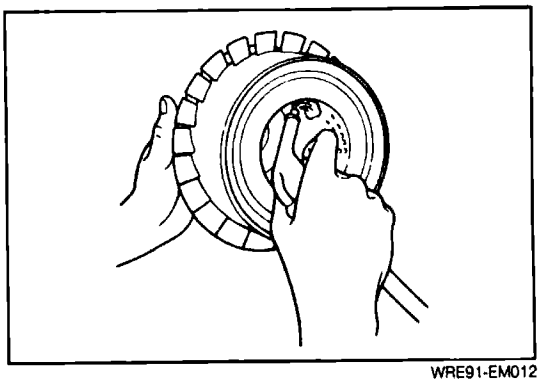

WRE91 EM011

(4) Clean the element with compressed air.
First, blow compressed air from inner side of the element thoroughly.
Then, blow off the outer side of the element.

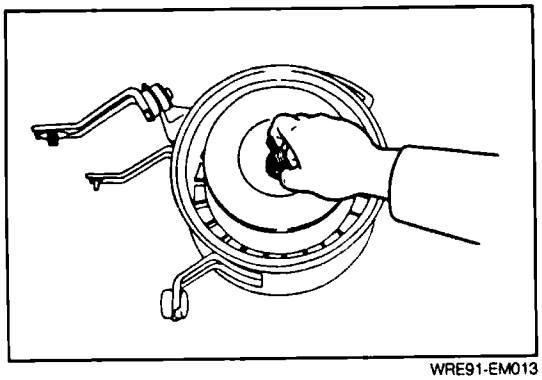
CAUTION:

- **The air pressure to be used this cleaning operation should not exceed 392. kPa (4.0 kgf/cm^2).**

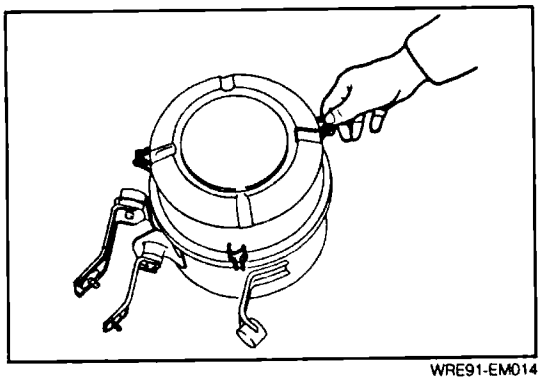
Replace the air filter element, if necessary.


WRE91-EM012

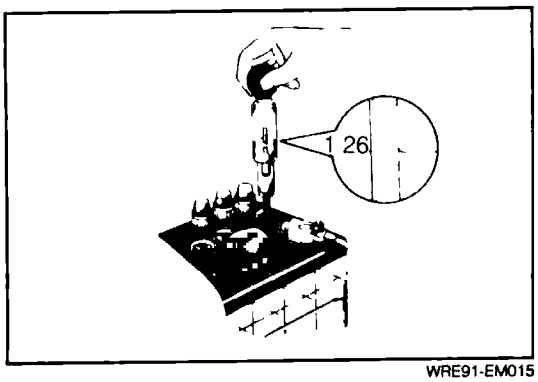
(5) Place the element in the air cleaner case.
Secure the element with the wing nut.


WRE91-EM013

(6) Install the air cleaner cap to the air cleaner case. Secure the air cleaner cap by tightening the three clamps.

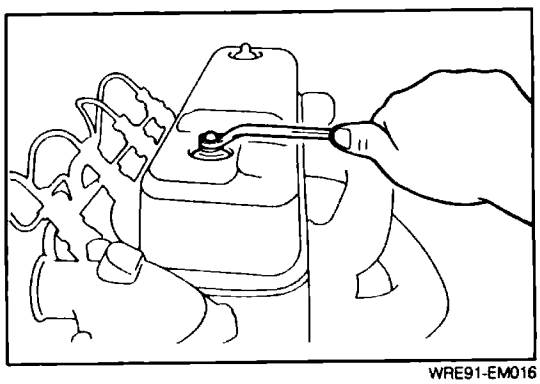

WRE91-EM014

4. Inspection of battery
(See the charging system section.)

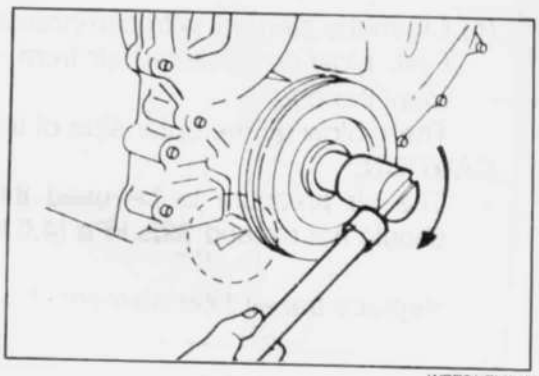


WRE91-EM015

5. Inspection of valve clearance
(1) Warm up the engine completely.
(2) Remove the cylinder head cover by loosen the four attaching nuts.

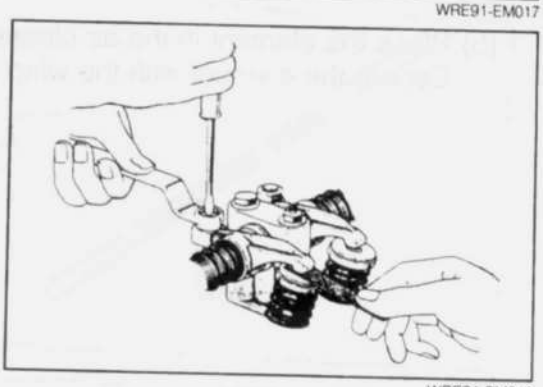

WRE91-EM016

(3) Turn the crankshaft until the recessed mark on crankshaft pulley is aligned with the indicator mark on timing gear cover.



WRE91-EM017

(4) Check to see if valve rocker arms of No. 1 cylinder are free or are being push up.
According to the flowing table, check and/or adjust the valve clearance, using a thickness gauge.



WRE91-EM018

Valve Clearances (Hot condition)

Item / Type		DL-42	DL-52
Intake	(mm)	0.25 ± 0.05	0.25 ± 0.05
Exhaust	(mm)	0.25 ± 0.05	0.25 ± 0.05

Tightening Torque: 19.6 - 24.5 N·m
(2.0 - 2.5 kgf-m)

The "○" marks denote those valves that can be adjusted under that setting.

Rocker arm condition / Cylinder No.		1	2	3	4
When valve rocker arms of No. 1 cylinder are free:	IN	○	○		
(Piston of No. 1 cylinder is at top dead center under compression stroke)	EX	○		○	
When valve rocker arms of No. 4 cylinder are free:	IN			○	○
(Piston of No.4 cylinder is at top dead center under compression stroke)	EX		○		○

WRE91-EM019

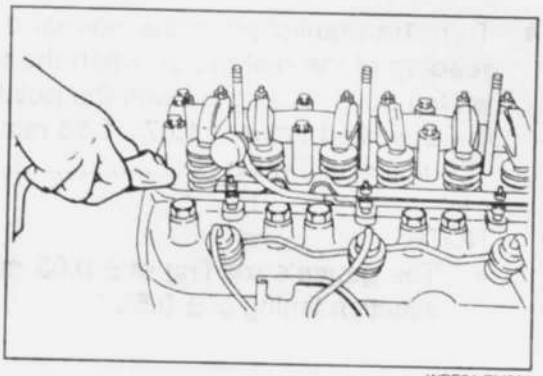
NOTE:

- Before the adjusting bolts are tightened, apply engine oil to the lock nuts and rocker arm adjusting bolts.

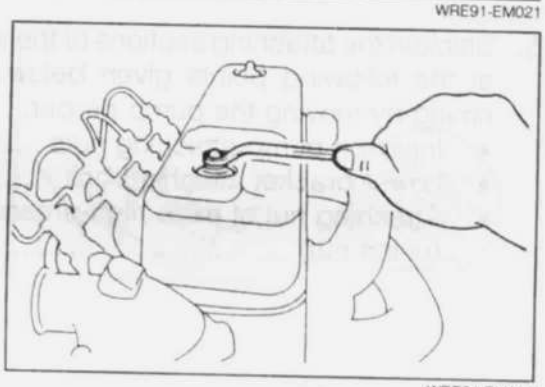
(5) Turn the crankshaft 360-degrees.
Proceed to check and/or adjust the remaining valve clearance.

WRE91-EM020

(6) Wipe off the oil or dirt from the gasket surface of the cylinder head.


WRE91-EM021

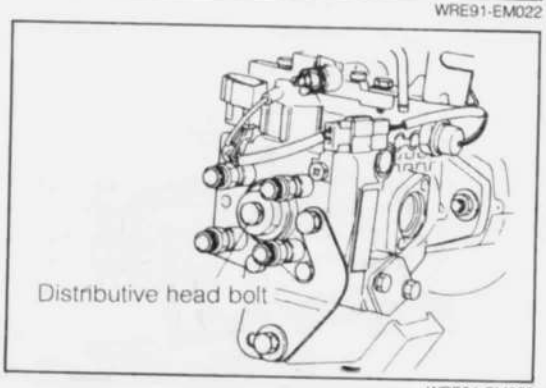
(7) Install the cylinder head cover on the cylinder head.
(8) Tighten the cylinder head cover nuts over two or three stages in sequence, until they tightened to the specified torque.
Tightening Torque: 5.4 ± 1.5 N·m
(0.55 ± 0.15 kgf-m)


WRE91-EM022

Check and adjustment of injection timing

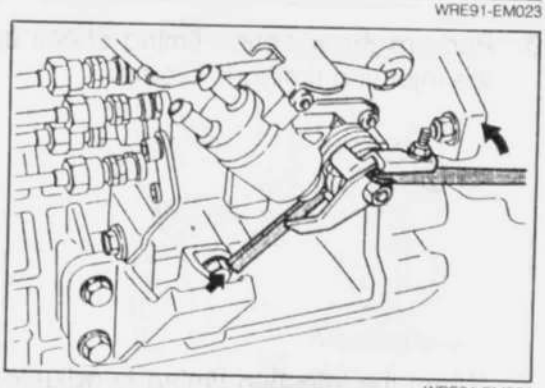
1. Remove the distributive head bolts on the injection pump. Then, install the SST and set a dial gauge.
SST: 09275-54010-000

NOTE:
- Since there is a hole-shaped notch at the end of the plunger, the measuring pin of the dial gauge must contact the flat section of the plunger.
- Make sure that no dust gets into the pump.

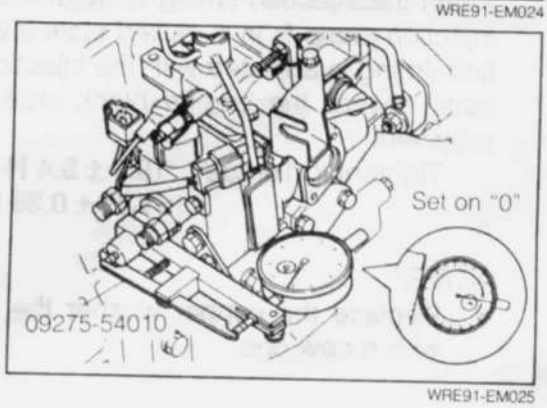


WRE91-EM023

2. Release automatic cold starting system
(ACSD equipped vehicle only)
(1) Turn the automatic cold starting lever counterclockwise about 20° degree, using a screwdriver.
(2) Put a metal plate 8.0 - 10.0 mm thick between the automatic cold starting lever and thermo wax plunger.


WRE91-EM024

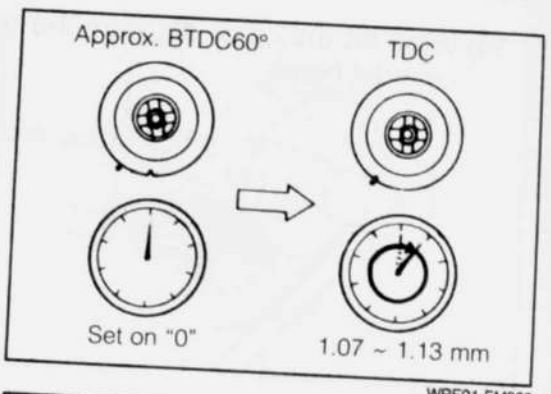
3. Align the top dead center mark on the crankshaft pulley with the top dead center of the No. 1 cylinder under the compression stroke. Then, back off crankshaft approx. 45° and align the pointer of the dial gauge with the zero position.
NOTE:
- At this time, turn slightly the crankshaft pulley to the right and left sides and make sure that the pointer is stable at the zero position.



WRE91-EM025

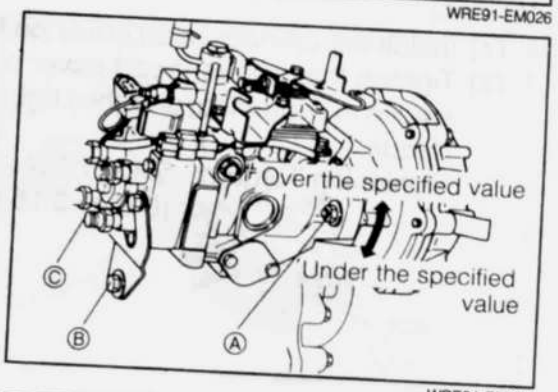
4. Turn the crankshaft in the normal direction and take the reading of the dial gauge when the top dead center mark on the pulley is aligned with the pointer.
   Specified Value: 1.07 - 1.13 mm
   (Injection Timing ..... BTDC 1°)

   NOTE:
   - The gauge's reading of ± 0.03 mm corresponds to the injection timing of ± 0.5°.

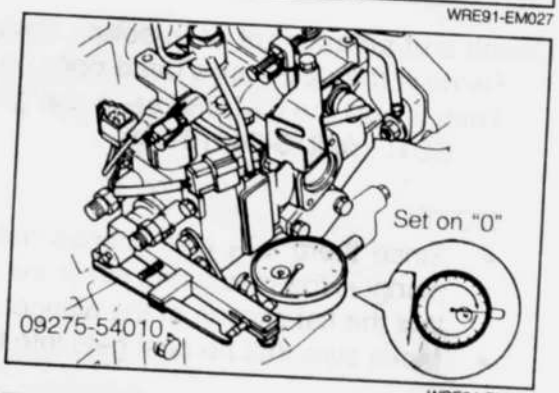


WRE91-EM026

5. Slacken the attaching sections of the injection pump proper at the following points given below. Adjust the injection timing by moving the pump proper.
   - Injection pump attaching nuts ..... Section A
   - Lower bracket attaching bolt ..... Section B
   - Attaching nut of each high-pressure pipe (union nut) ..... Section C

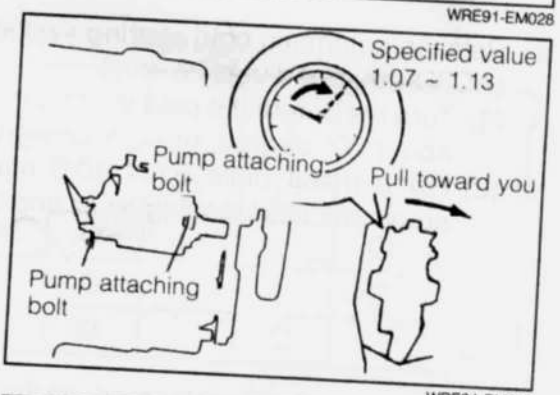


WRE91-EM027



WRE91-EM028

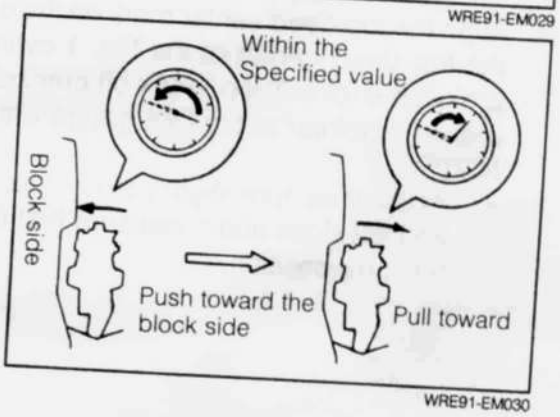
6. Perform the injection timing check again and ensure that the injection timing is proper.



WRE91-EM029

7. When the injection timing is adjusted, make sure that the injection pump is in a pulled state toward you. If the injection timing is adjusted with the injection pump in a pushed state toward the engine block side, the timing may be retarded.
   Tightening Torque: 18.1 ± 3.4 N·m
   (1.85 ± 0.35 kgf-m)

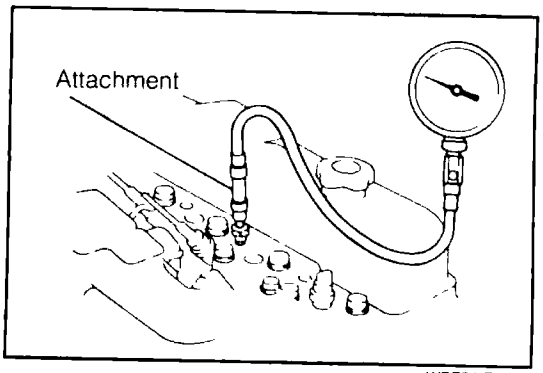
   NOTE:
   - Replace the copper washer the distributive head bolt with a new one.



WRE91-EM030

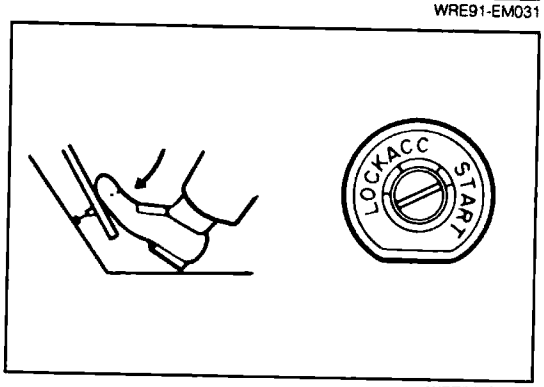
Measurement of compression pressure

1. Warm up the engine
2. Remove all the glow plugs.
3. Position the attachment into the installation hole of the glow plug.
   Set the compression gauge in place.



WRE91-EM031

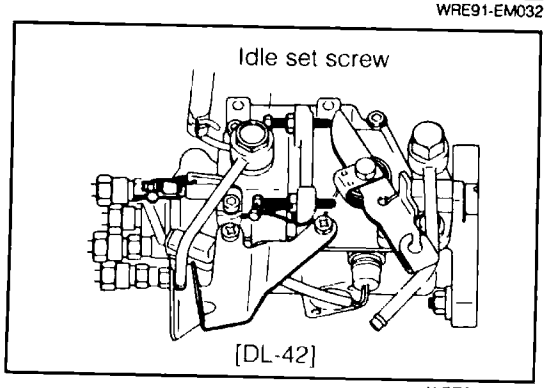
4. With the throttle valve opened fully, crank the engine, using the starter
5. Cranking speed: 250 rpm
   Compression Pressure: STD 3138 kPa (32 kgf/cm^2)
   Limit 2158 kPa (22 kgf/cm^2)
   Variation Between Cylinders: 196 kPa (2.0 kgf/cm^2)



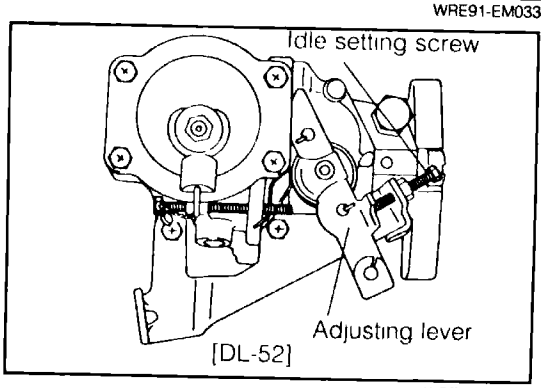
WRE91-EM032

Adjustment of idling speed

1. Warm up the engine.
2. Measure the idling speed.
3. Adjust the idling speed by turning the idling adjusting bolt.
   Specified Idling Speed: 650 ± 25 rpm



WRE91-EM033



WRE91-EM034

Adjustment of maximum no-load revolution speed

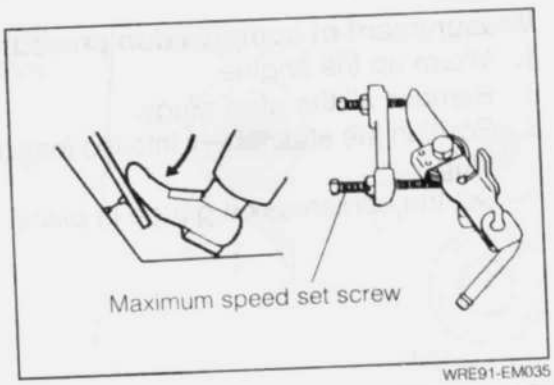
1. Fully when the accelerator pedal is depressed to the fullest extent.
2. Measure the maximum revolution speed at the time when the venturi opens fully because of the fully-depressed accelerator pedal.

   Specified Maximum Revolution Speed:

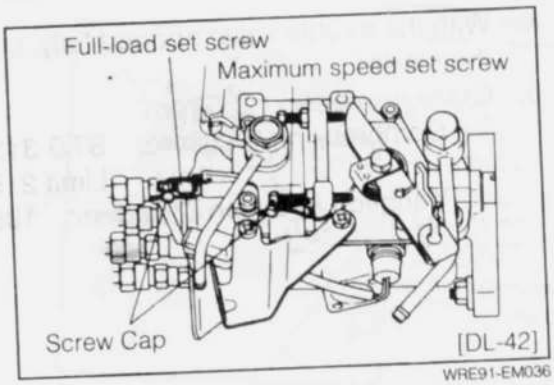
   DL-42: 4500 rpm

   DL-52: 4500 rpm

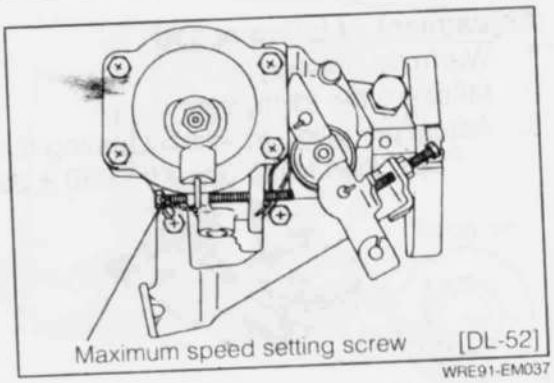
3. Adjust the maximum no-load revolution speed by turning the maximum speed set screw.



WRE91-EM035



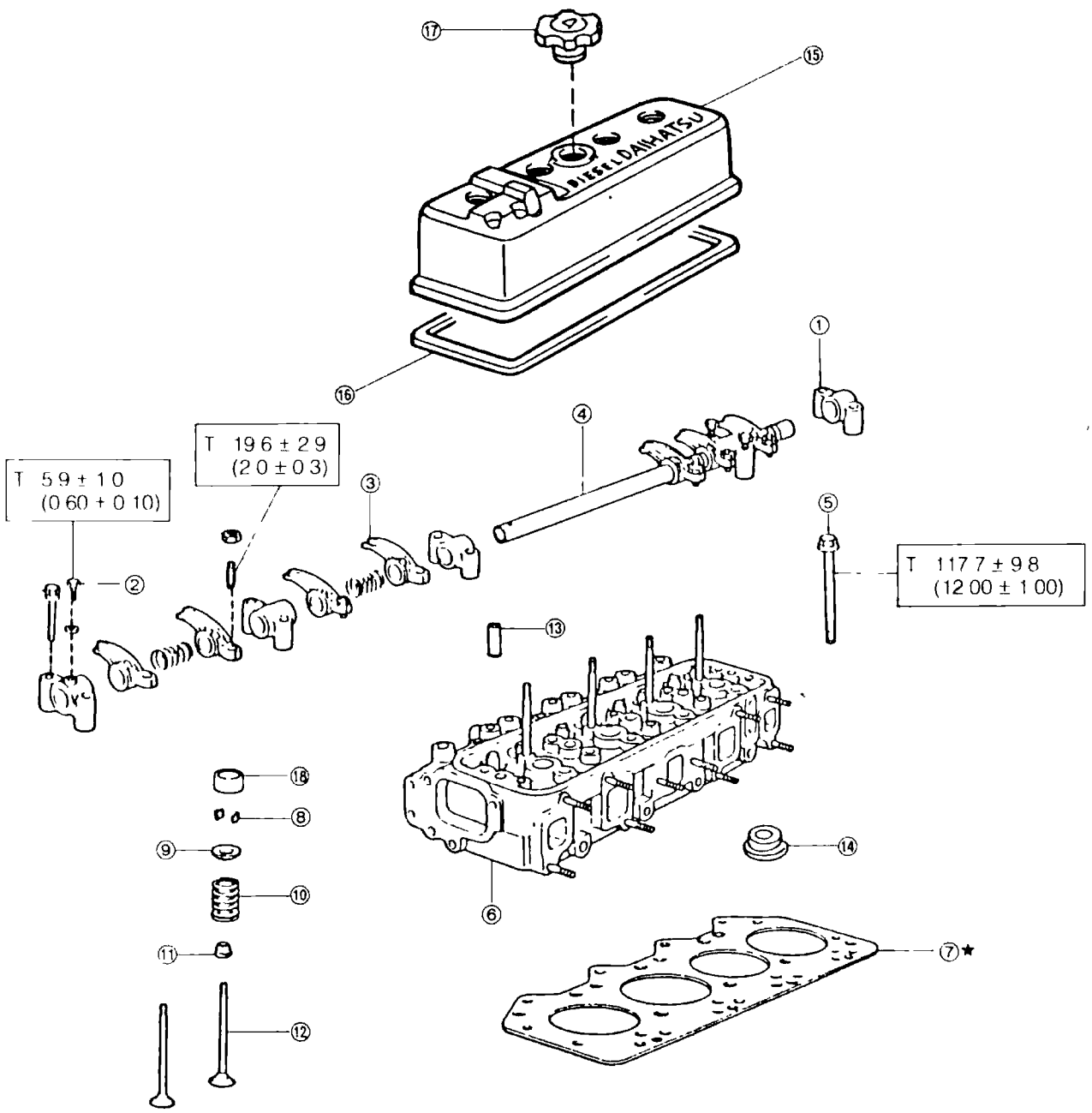
WRE91-EM036



WRE91-EM037

CYLINDER HEAD

COMPONENTS



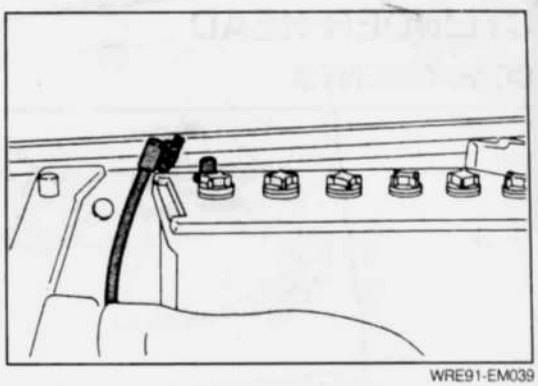
① Valve rocker support
② Screw
③ Valve rocker arm
④ Valve rocker shaft
⑤ Cylinder head bolt
⑥ Cylinder head
⑦ Cylinder head gasket
⑧ Valve spring retainer lock
⑨ Valve spring retainer
⑩ Compression spring
⑪ Valve stem oil seal
⑫ Valve (EX, IN)
⑬ Valve guide bush
⑭ Combustion chamber
⑮ Cylinder head cover
⑯ Cylinder head cover gasket
⑰ Oil filler cap
⑱ Valve stem cap

★ : **Non-reusable part**
T : **Tightening torque**
Unit : N m (kgf-m)

WRE91 EM038

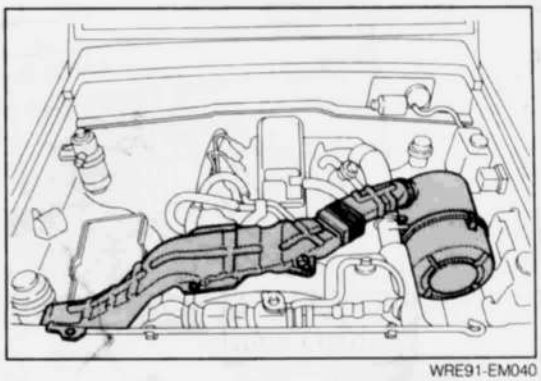
REMOVAL OF CYLINDER HEAD

1. Removal of battery
   (1) Disconnect the battery ground cable from the negative (–) terminal of battery
   (2) Remove the battery from the engine compertment by removing the battery holding clamp.



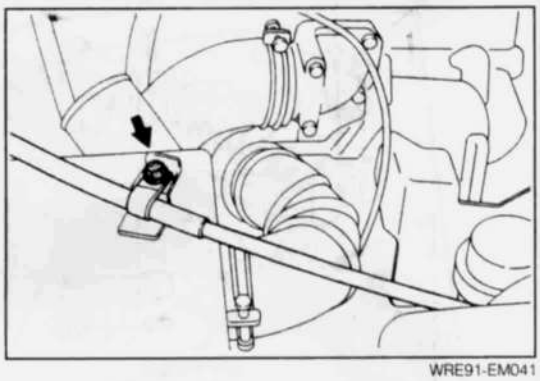
WRE91-EM039

2. Removal of air cleaner assembly
   (1) Remove the air intake duct by loosen three attaching bolt and a clamp.



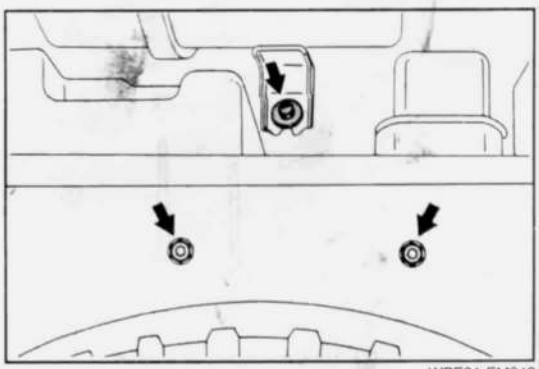
WRE91-EM040

   (2) Remove the clutch cable attaching bolt at air cleaner case.
   (3) Remove the intake air pipe attaching bolt at air cleaner case.



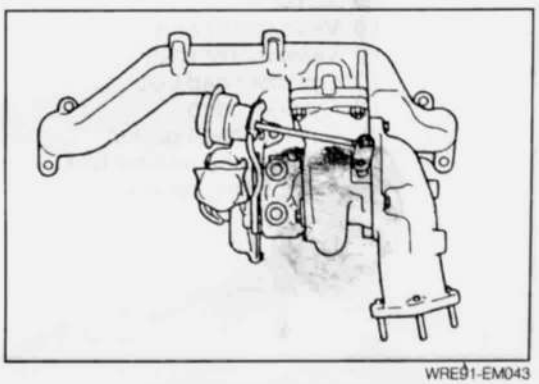
WRE91-EM041

   (4) Remove the air cleaner case by loosen two air cleaner bracket attaching nuts and the air cleaner attaching bolt.



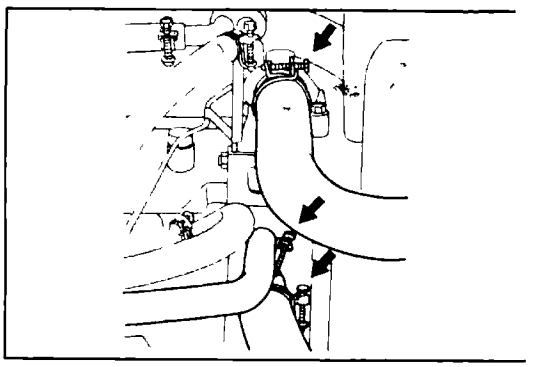
WRE91-EM042

3. Drain the coolant.
4. Removal turbo charger.
   (See Turbo Charger System section)



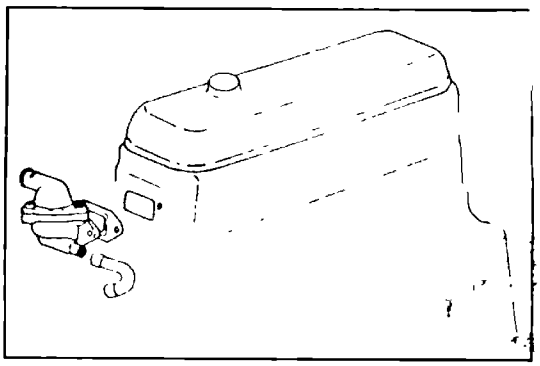
WRE91-EM043

5. Remove the water hoses.
   - Water outlet hose
   - Water by-pass hose
   - Heater hoses
   - Turbo charger cooling hose (DL-52 engine only)
   - ACSD water hose (ACSD equipped vehicle only)



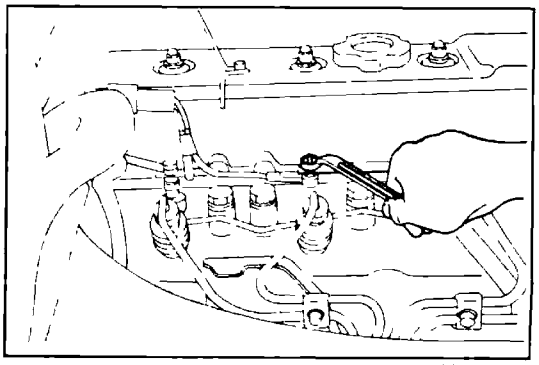
WRE91-EM044

6. Remove water outlet housing.



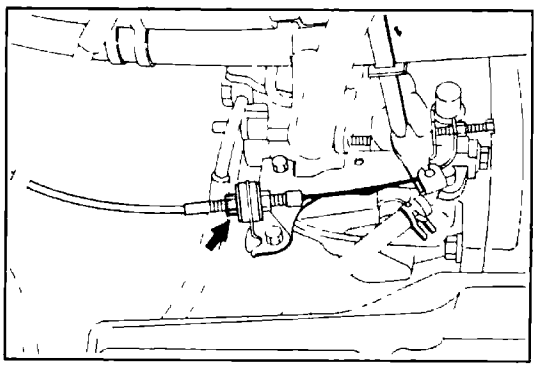
WRE91-EM045

7. Remove the glow plug connector and glow plug.



WRE91 EM046

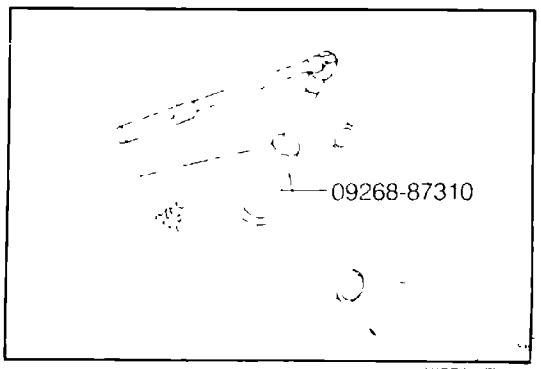
8. Remove the accelerator cable from the injection pump.



WRE91-EM047

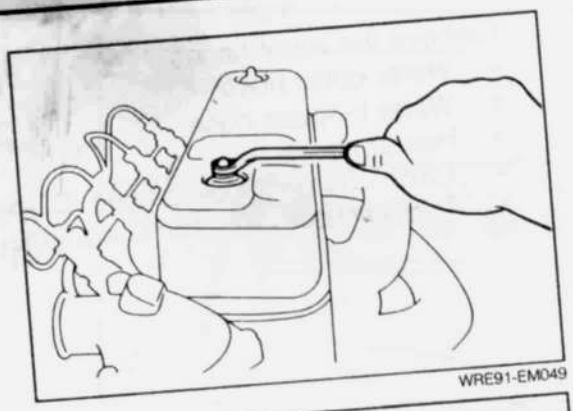
9 Removal of injection nozzle, using SST.
(See page FU–14.)
SST: 09268-87310-000

NOTE:
- Arrange the injection nozzle in order.



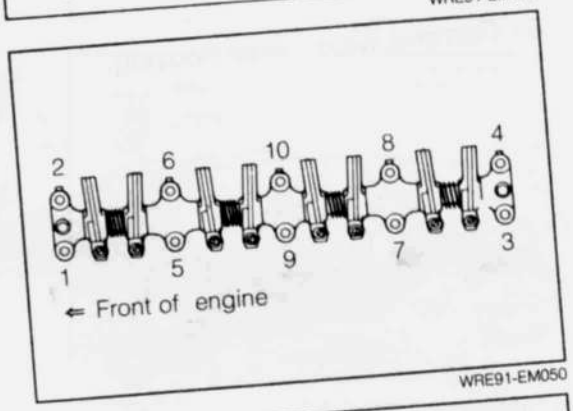
WRE91-EM048

Remove the cylinder head cover.


WRE91-EM049

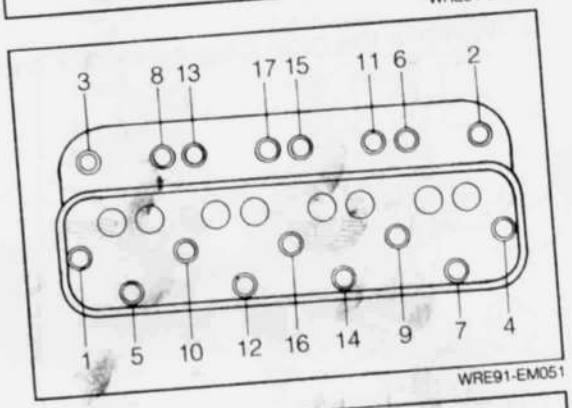
1. Remove the valve rocker-shaft with valve rocker arm by loosen valve rocker support bolts in sight figure.
2. Remove the push rods.

NOTE:
- Remove the parts in the sequence of cylinders. Store the removed parts properly so that they may not be mixed with each other.



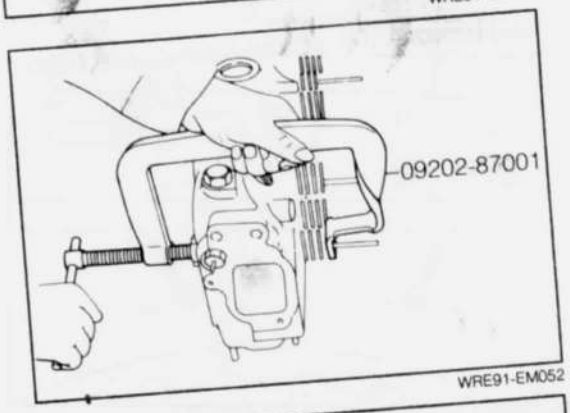
WRE91-EM050

13. Remove the cylinder head by loosen cylinder head bolts in right figure.



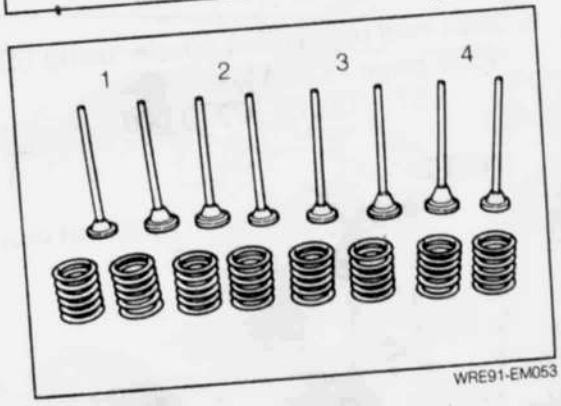
WRE91-EM051

14. Remove the valve spring retainer lock and valve spring, using SST.
    SST: 09202-87001-000
15. Pull out the valve stem oil seal using pliers.



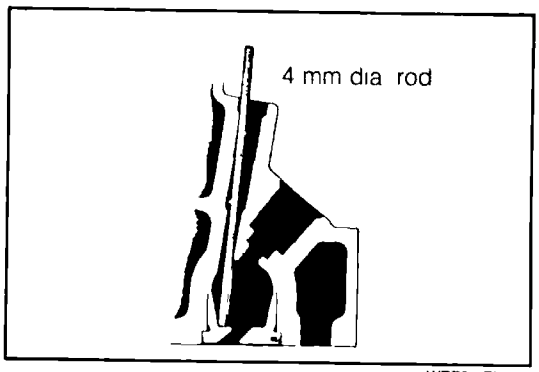
WRE91-EM052

NOTE:
- Store the removed springs and valves in correct sequence so that they may be installed in their original positions on reassembly.



WRE91-EM053

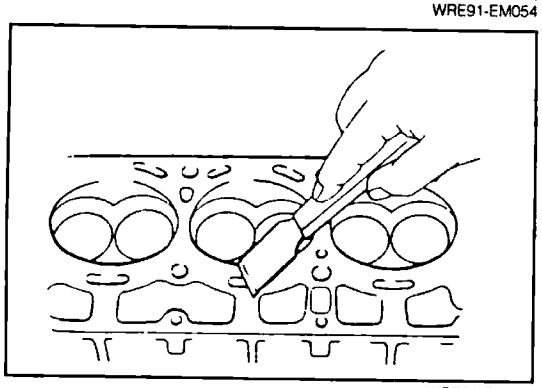
16. Removal of combustion chamber
Drive out the combustion chamber by instaring an about 4 mm dia rod through the glow plug installation hole.



WRE91-EM054

INSPECTION OF CYLINDER HEAD

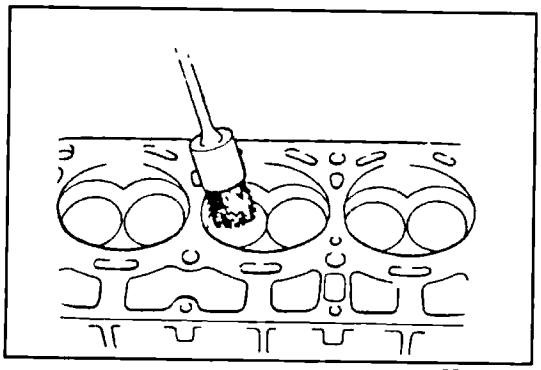
1. Cleaning of cylinder head
(1) Remove any remaining gasket material from the cylinder head and manifold surfaces by using a gasket scraper.


WRE91-EM055

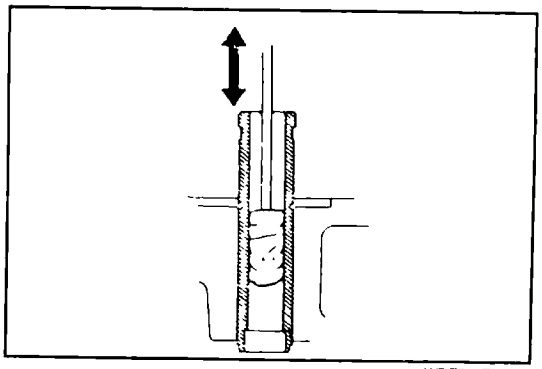
(2) Remove all carbon deposits from the combustion chambers by using a wire brush.

CAUTION:

- **Be careful not to scratch the cylinder head gasket contact surfaces.**


WRE91-EM056

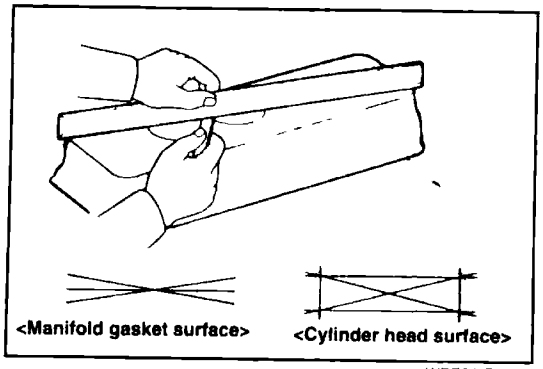
(3) Clean all valve guide bushings by using a valve guide brush and solvent.


WRE91-EM057

2. Using a precision straight eage and thickness gauge, check the gasket surfaces contacting the cylinder block and manifolds for warpage.

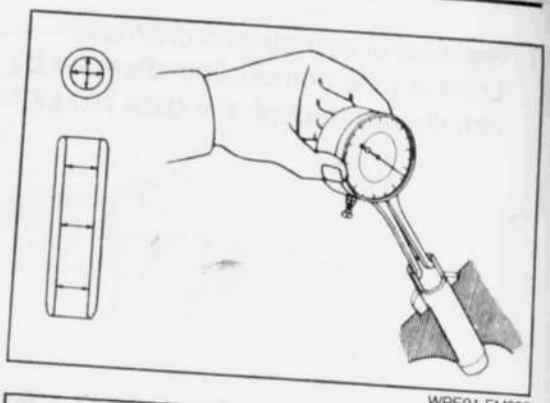
Maximum Surface Warpage:
Cylinder Block Side: 0.10 mm
Intake Exhaust Manifold Side: 0.20 mm

Replace the cylinder head, if surface warpage of the cylinder block side exceeds the maximum limit.

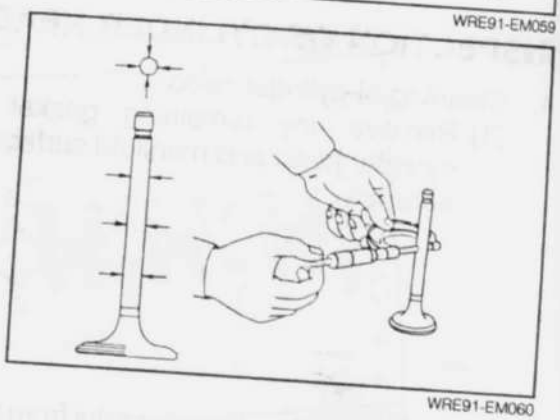


WRE91-EM058

3. Inspection of valve stem-to-guide bush oil clearance
   (1) Using a caliper gauge, measure the inner diameter of the valve guide at six points.
   Record the measured values.
   Specified Value:
   IN: 9.010 - 9.030 mm
   EX: 9.010 - 9.030 mm


WRE91-EM059

   (2) Using a micrometer, measure the diameter of the valve stem at six points.
   Record the measured values.
   Specified Value:
   IN: 8.968 - 8.984 mm
   EX: 8.934 - 8.950 mm

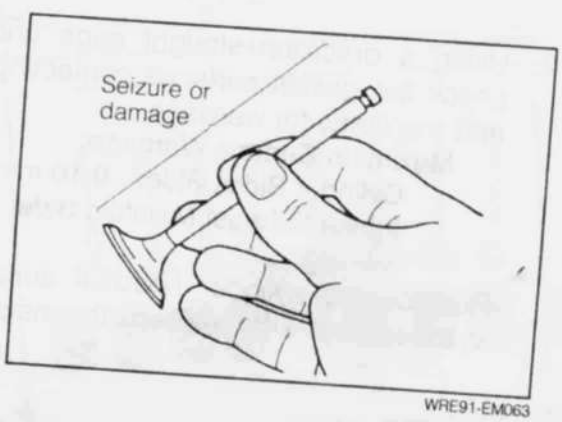

WRE91-EM060

   (3) Calculate the valve stem-to-guide bush oil clearance from the measured results in the steps (1) and (2) above.
   a: Measured maximum value of guide bush
   b: Measured minimum value of valve stem
   a - b = Oil clearance

   Oil Clearance:
   Specified Value:
   IN: 0.026 - 0.062 mm
   EX: 0.044 - 0.096 mm
   Allowable Limit:
   IN: 0.10 mm
   EX: 0.12 mm

WRE91-EM062

4. Inspection of intake and exhaust valve
   (1) Visually inspect the valve stem for seizure or damage.
   NOTE:
   • If seizure or damage is found, replace the valve and valve guide bush a set.
   However, this replacement should be performed only after the checks for the cylinder head have been finished.

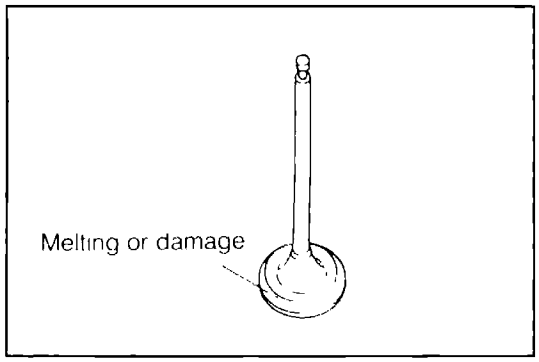


WRE91-EM063

- The valve guide bush hole must be used for refacing only valve seat.
  Hence , if the valve guide bush hole exhibits any roughness due to seizure, etc., rectify the hole with an adjustable reamer.

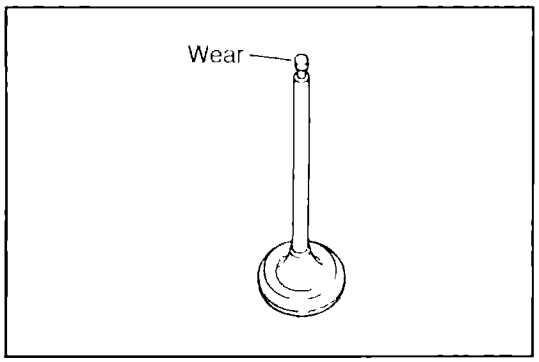
WRE91 EM064

(2) Visually inspect the valve head for melting and damage.
If the valve head exhibits any melting or damage, replace the valve.
If the roughness on the contact surface can be corrected, grind the valve seat contact surface with a valve refacer.



WRE91 EM065

(3) Visually inspect the valve stem end for abnormal wear.



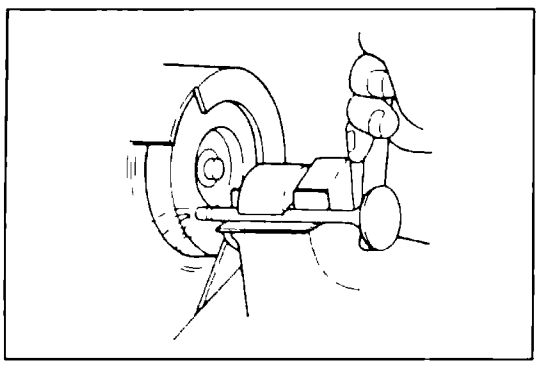
WRE91-EM066

If the valve stem end exhibits abnormal wear, correct the stem end with valve refacer.
However, this correction should be made within a limit from that of standard length.

Standard Length:

IN: 127.5 mm

EX: 127.5 mm



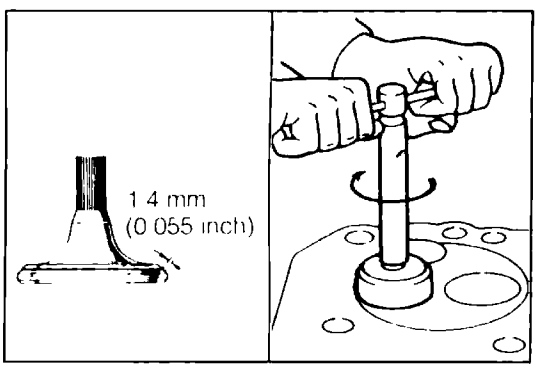
WRE91-EM067

Refacing of valve seats

① Apply a film of red lead to the valve seat.
Then, let the valve drop on to the valve seat two or three times by its own weight.
Care must be exercised not to turn the valve during this check.

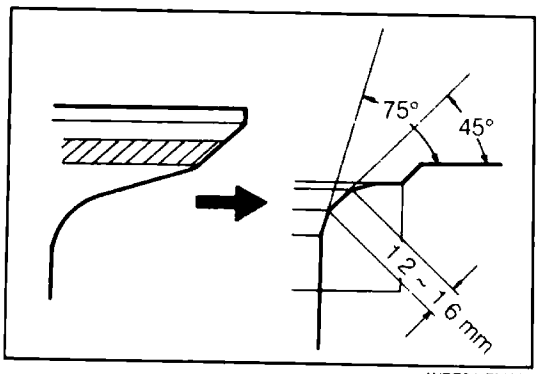
Specified Seat Width: 1.4 mm (0.055 inch)

② Cut the seat surface, using a 45-degree cutter.



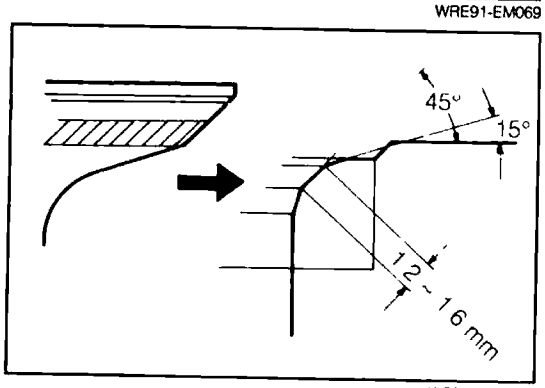
WRE91-EM068

5. Correction of seat position
   (1) If the seat position is too high, reface the valve seat, using 45-degree and 75-degree cutters.
   These valve seat cutters should be employed in the sequence as indicated by the illustration.



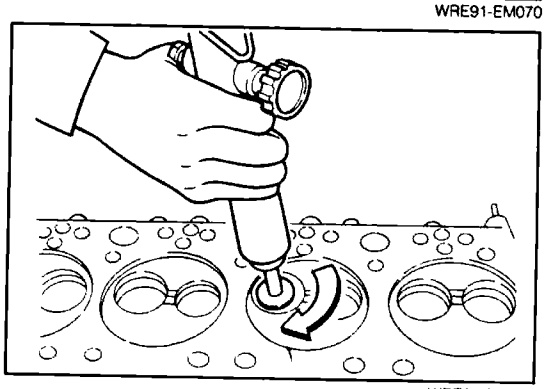
WRE91-EM069

   (2) If the seat position is to low, reface the valve seat, using 45-degree and 15-degree cutters. These valve seat cutters should be employed in the sequence as indicated by the illustration.



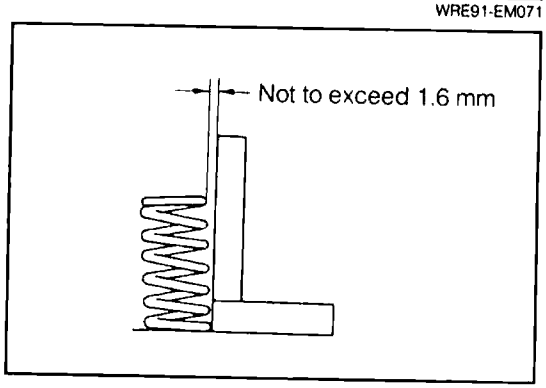
WRE91-EM070

   (3) After the valve seats have been refaced, carry out hand grinding of the valves, using valve grinding compound.


WRE91-EM071

6. Inspection of valve spring
   (1) Check the valve spring for squareness, using a steel square.
   Maximum Squareness: 1.6 mm

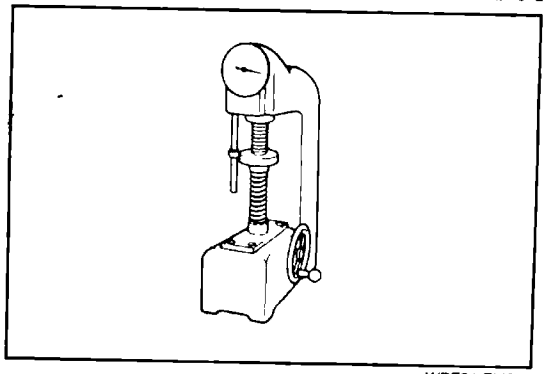
   If the squareness exceed the maximum limit, replace the valve spring.



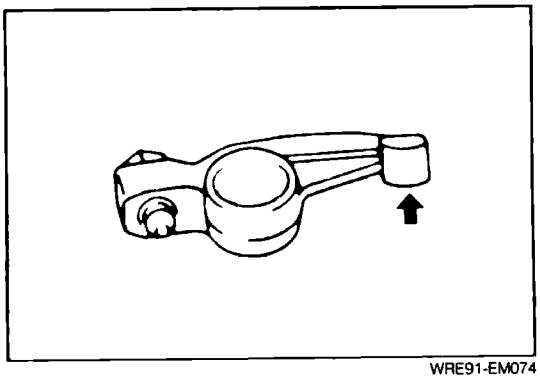
WRE91-EM072

   (2) Measure the valve spring for free length and spring tension, using a spring tester.
   Minimum Free Length: 46 mm
   Minimum Tension Installation Height:
   264.8 N (27.0 kgf)/40.1 mm

   If minimum free length and/or minimum tension is less than the minimum limit, replace the valve spring.

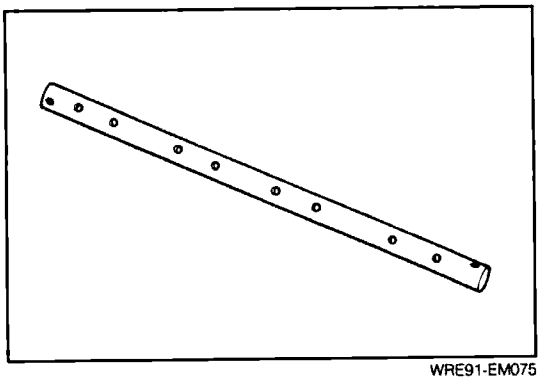

WRE91-EM073

7. Inspection of valve rocker arm and valve rocker shaft
   (1) Visually inspect the valve rocker arm for cracks, seizure or wear.
   Replace the valve rocker arm, if necessary.



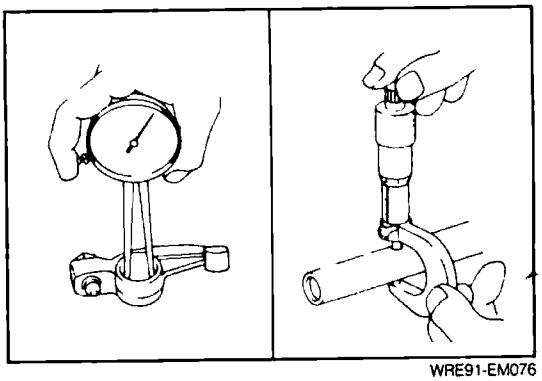
WRE91-EM074

   (2) Visually inspect the valve rocker shaft for cracks, seizure or wear.
   Replace the valve rocker shaft, if necessary.



WRE91-EM075

   (3) Check valve rocker shaft-to valve rocker arm
      ① Using a dial gauge, measure the inner diameter of the valve rocker arm in two directions, 90 degrees apart from each other
      Specified Value: 18.512 - 18.533 mm

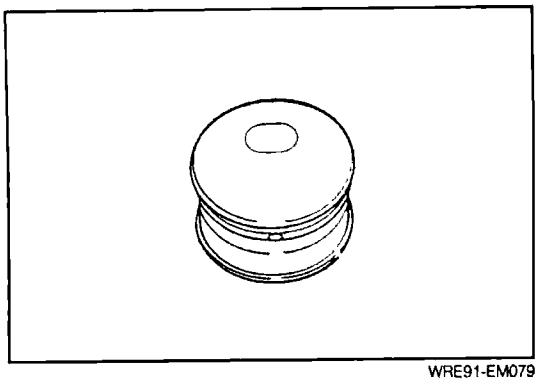


WRE91-EM076

      ② Using a micrometer, measure the outer diameter of valve rocker shaft
      Specified Value: 18.472 - 18.493 mm
      Oil Clearance: 0.022 - 0.733 mm
      Limit: 0.1 mm

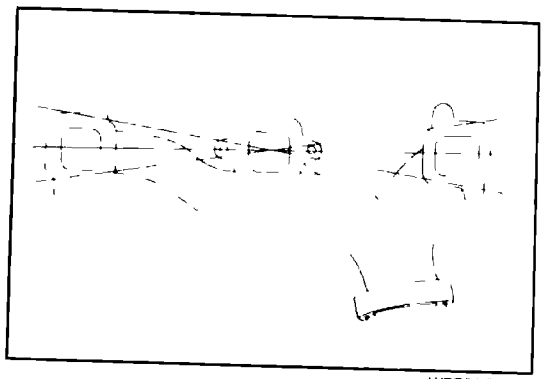
WRE91-EM078

8. Inspection of combustion chamber
   (1) Visually inspect the combustion chamber for cracks or damage



WRE91-EM079

9. Inspection of intake and exhaust manifolds
   Using a precision straight edge and thickness gauge, check the manifold gasket surface for warpage.

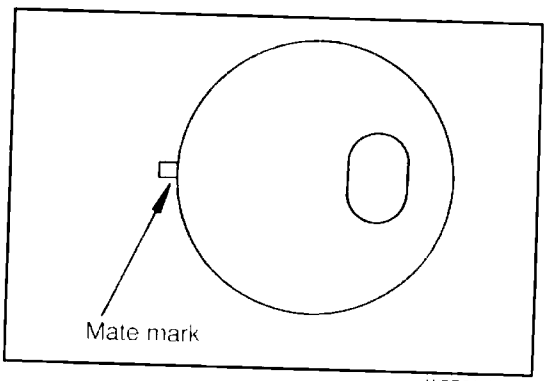

WRE91-EM080

INSTALLATION OF CYLINDER HEAD

NOTE:
- Prior to assembly, be certain to apply engine oil to the rotary sections or sliding sections of the parts.

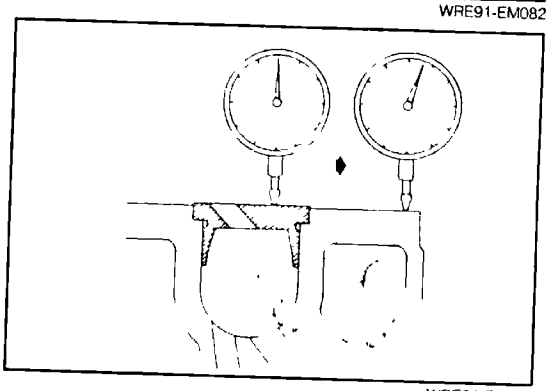
WRE91-EM081

1. Install combustion chamber into cylinder head.
   Using a plastic hammer, drive the combustion chamber into position, making sure that the mate mark of the combustion chamber is aligned with that on the cylinder head side.



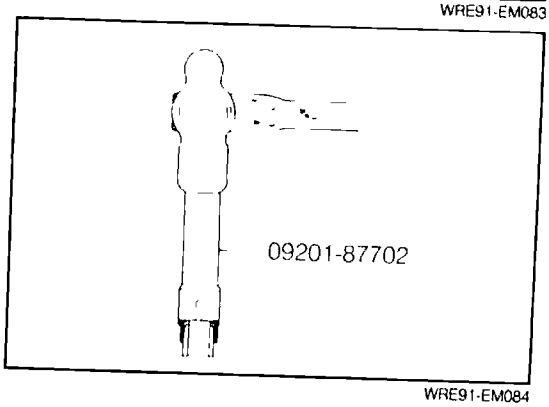
WRE91-EM082

2. Measure the chamber projection height.
   Specified Projection Height: 0 - 0.10 mm


WRE91-EM083

3. Install the oil seal, using the following SST.
   SST: 09201-87702-000

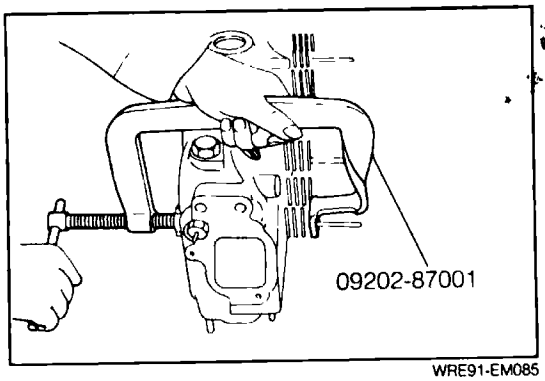
NOTE:
- Once the valve has been removed, be sure to install new valve stem oil seal.
- Be sure to apply engine oil to the lip section of the oil seal.



WRE91-EM084

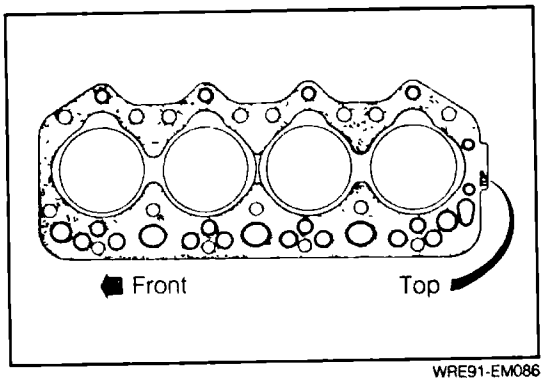
4. Assemble the parts given below, using the following SST.
   SST: 09202-87001-000

   (1) Valve
   (2) Valve spring
   (3) Valve spring retainer
   (4) Valve spring retainer lock



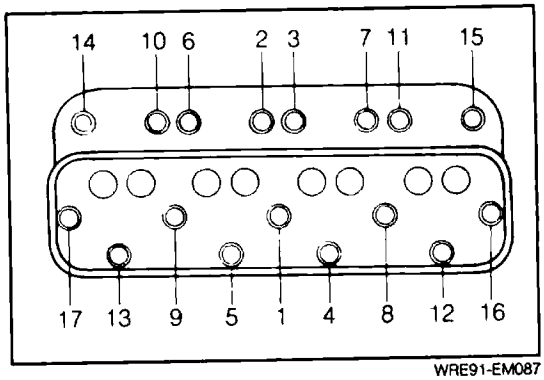
WRE91-EM085

5. Install the cylinder head gasket with its "Top" mark facing upward.
   NOTE:
   - **If the cylinder head gasket should be installed upside down, it would cause the oil passages to be clogged, thereby causing engine seizure.**
   - **Be sure to replace the gasket with a new one.**



WRE91-EM086

6. Install the cylinder head.
   (1) Apply engine oil to the threaded portion and seating surface of each bolt.
   (2) Tighten the cylinder head bolts progressively in the sequence as indicated by the illustration.
   Tightening Torque: 117.7 ± 9.8 N·m (12.0 ± 1.0 kgf-m)

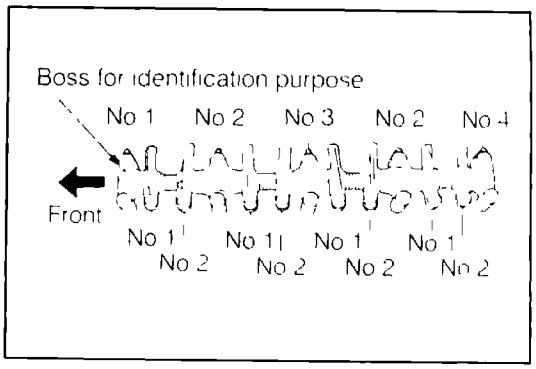


WRE91-EM087

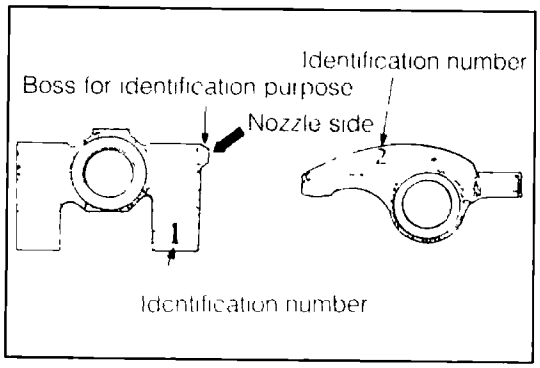
7. Install the push rods.
   NOTE:
   - **Those valve push rods which have been stored inorder should be installed as a set to the original cylinder, respectively.**

8 Installation of valve rocker shaft.

(1) Each of valve rocker arms and valve rocker supports bears an identification mark. They should be assembled as indicated in the right figure.
Every valve rocker support is provided with a boss for identification purpose. The valve rocker support should be assembled in such a way the boss comes at the left side as viewed from the engine front side.

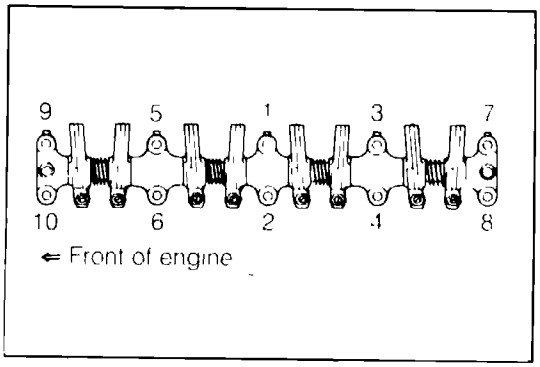


WRE91-EM088



WRE91 EM089

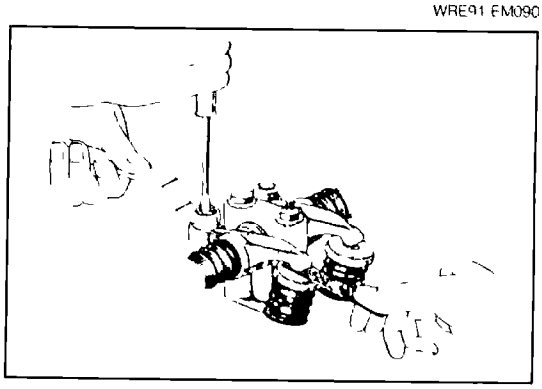
(2) As for the tightening of the valve rocker supports, first apply engine oil to the threaded portion and seating surface of each bolt. Then, tighten the attaching bolts progressively as indicated in the right figure.



WRE91 EM090

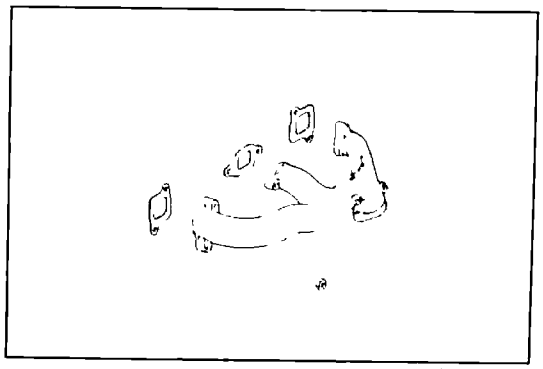
9. Initial setting of valve clearance
IN: 0.30 mm [COLD]
EX: 0.30 mm [COLD]

NOTE:
- After the engine has been assembled to the body, be sure to adjust the valve clearances again.
- As for the adjusting procedure, see the section under "Valve Clearances".

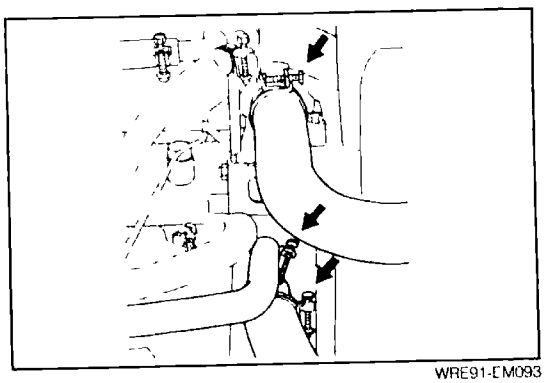

WRE91 EM091

10 Install the intake and exhaust manifolds
Tightening Torque:
Intake Manifold: 36.8 ± 7.4 N-m (3.75 ± 0.75 kgf-m)
Exhaust Manifold: 46.6 ± 7.4 N-m (4.75 ± 0.75 kgf-m)

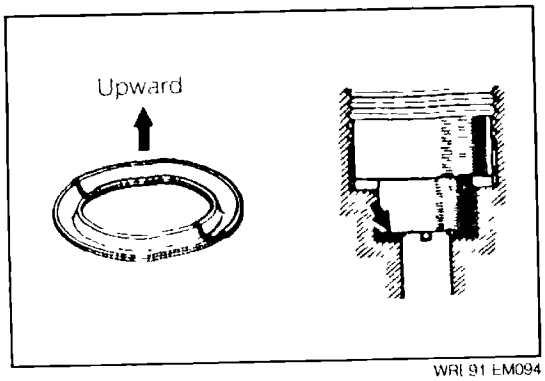
NOTE:
- Be sure to replace the gaskets with new ones.
- On the turbo charged vehicle, be sure to install the turbo charger to the exhaust manifold before installing the exhaust manifold to the cylinder head.
(See the section under "Turbo Charger system.")


WRE91 EM092

11. Install the water hoses
    - Water outlet hose
    - Water by-pass hose
    - Heater hoses
    - Turbo charger cooling hose (DL 52 engine only)
    - ACSD water hose (ACSD equiped vehicle only)

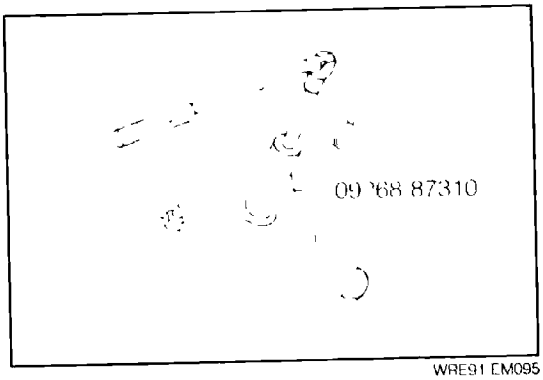

WRE91-EM093

12 Install the injection nozzle seat in the direction as indicated in the right figure
NOTE:
- Be sure to check the gasket before installing the nozzle holder.



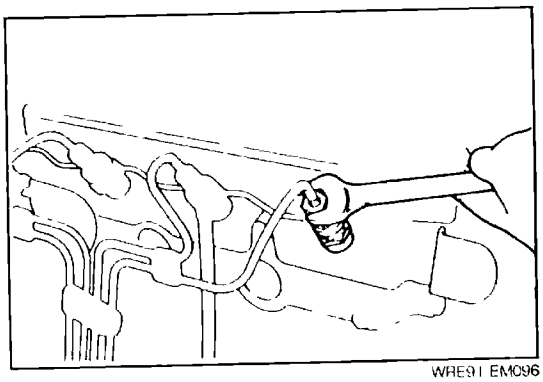
WRE91 EM094

13 Install the injection nozzle.
SST: 09268-87310-000
Tightening Torque: 68.6 ± 9.8 N·m
(7.00 ± 1.00 kgf-m)



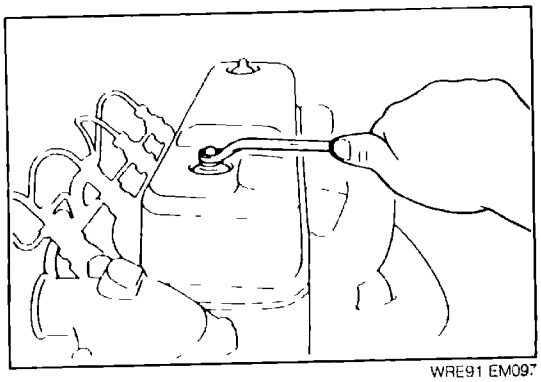
WRE91 EM095

14 Install the injection pipe.
Injection Pipe:
Tightening Torque: 24.5 ± 4.9 N·m
(2.50 ± 0.50 kgf-m)

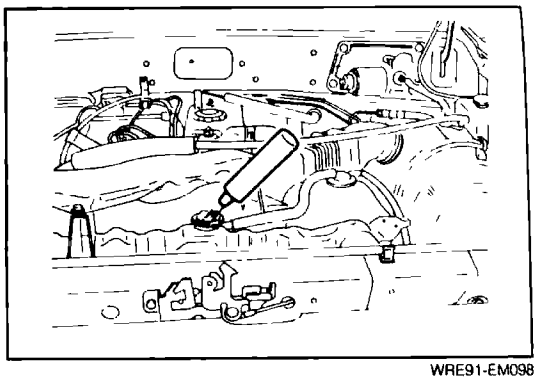

WRE91 EM096

15 Install the glow plug connector and glow plug
16 Install the cylinder head cover.
17 Install the water outlet housing.
NOTE:
- Be sure to replace the gasket with a new one.

18 Install the water by-pass hose.


WRE91 EM097

19. Fill the coolant.
20. Fill the engine oil and check it.
21. Install the battery in the engine compartment.
22. Connect the battery ground cable to negative (–) terminal of battery.



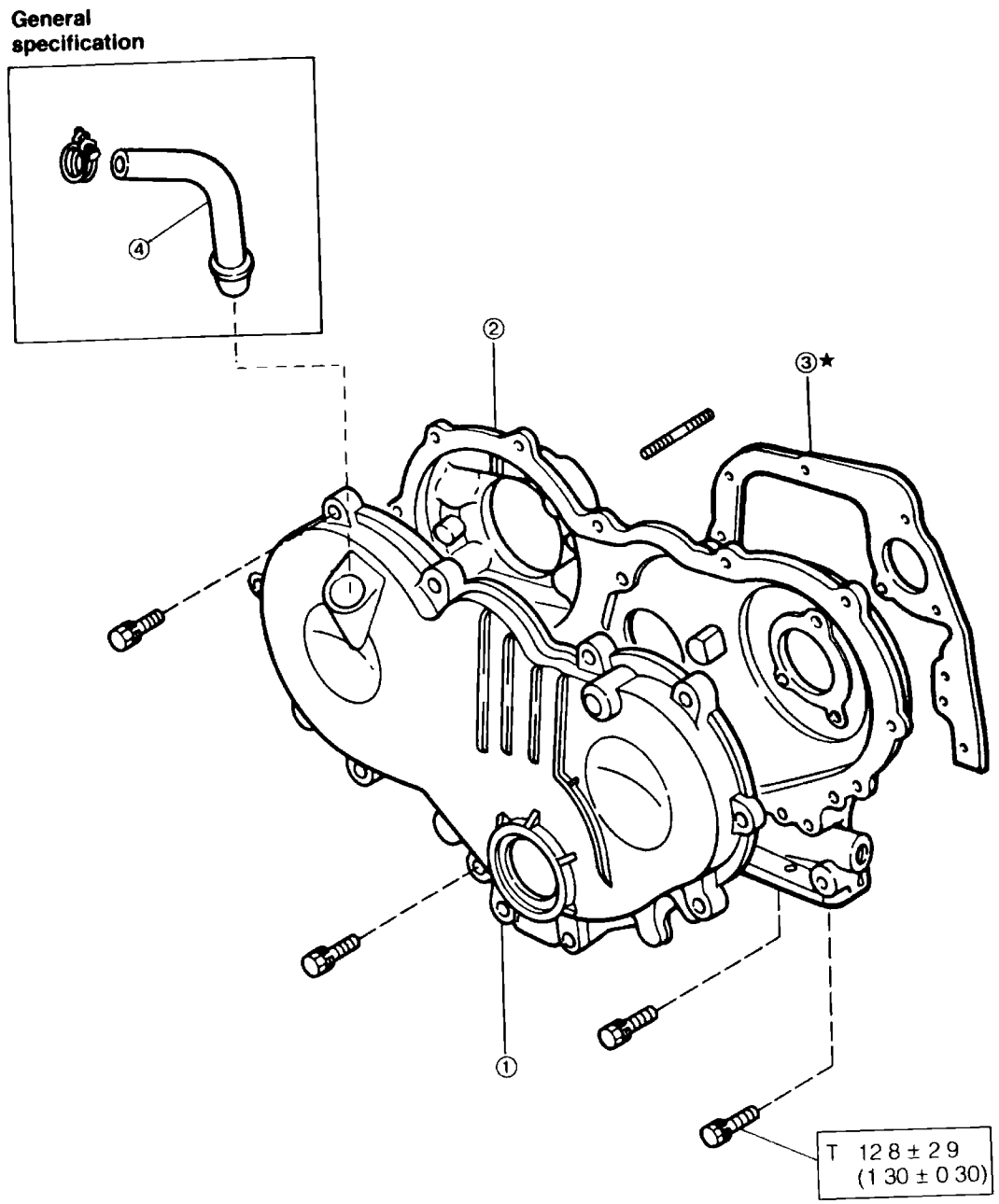
WRE91-EM098

23. Install the engine hood.
24. Start the engine.
25. Check the oil leakage and repair it.

WRE91-EM099

TIMING BELT COVER AND CASE

COMPONENTS



① Timing belt cover
② Timing belt case
③ Timing belt case gasket
④ Ventilation tube

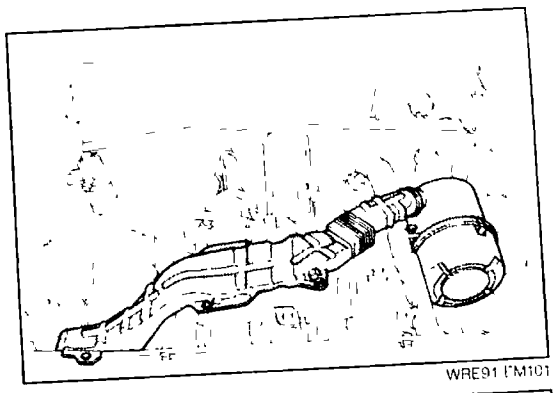
★ : Non-reusable part
T : Tightening torque
Unit : N·m (kgf-m)

WRE91-EM100

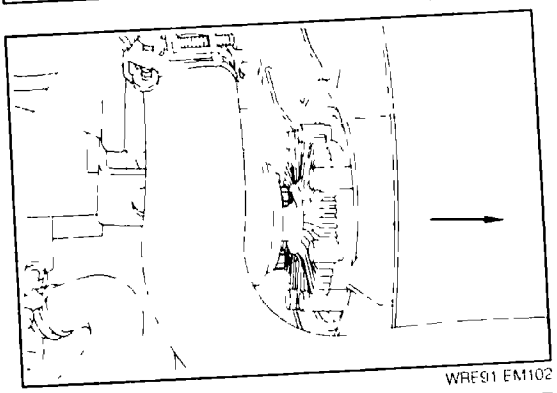
ENGINE MECHANICAL

REMOVAL OF TIMING BELT AND PULLEY

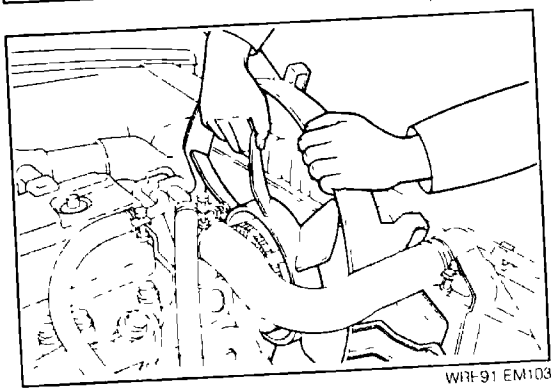
1 Remove the cool air intake duct from air cleaner.
2 Remove the reserve-tank


WRE91 EM101

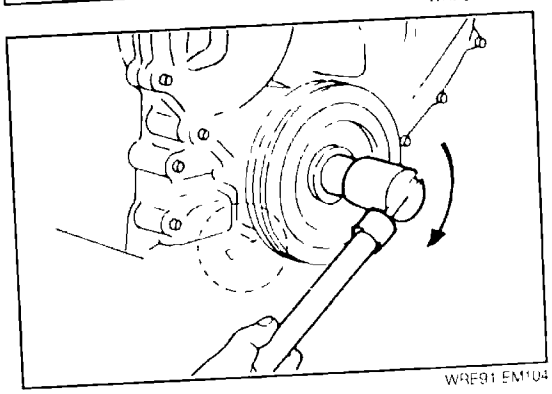
3 Temporary remove the fluid coupling with fan by loosen four nuts
4 Remove the fan shroud and the fluid coupling withe fan.


WRE91 EM102

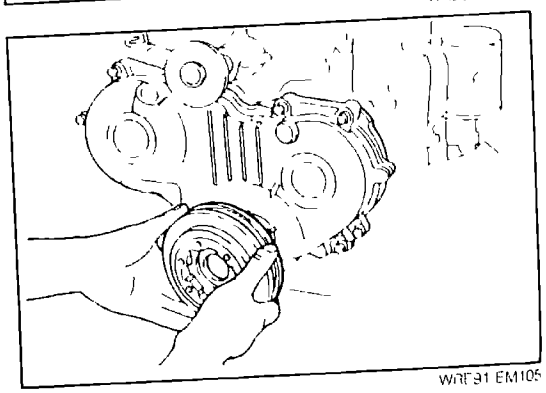
5 Loosen the alternator attaching bolt
6 Remove the fan pulley and V-belt.


WRE91 EM103

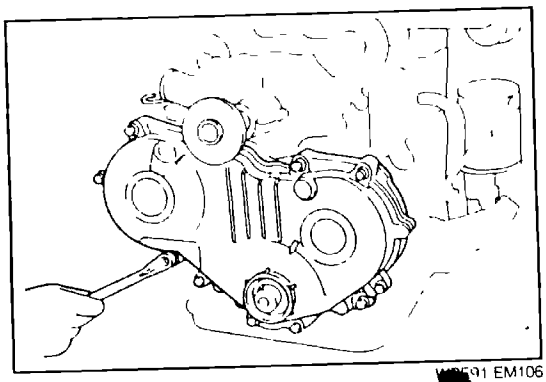
7 Remove the glow plug No. 1
8 Before pulling out the crankshaft pulley, position the piston No. 1 at the top dead center under the compression stroke.


WRE91 EM104

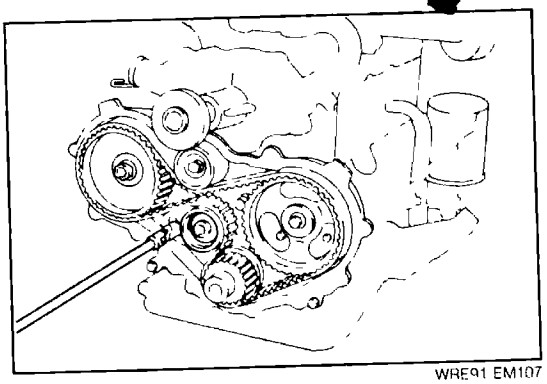
9 Remove the crankshaft pulley.
NOTE:
- Place the gear shift lever in the 5-th gear position so as to prevent the rotation of crankshaft.


WRE91 EM105

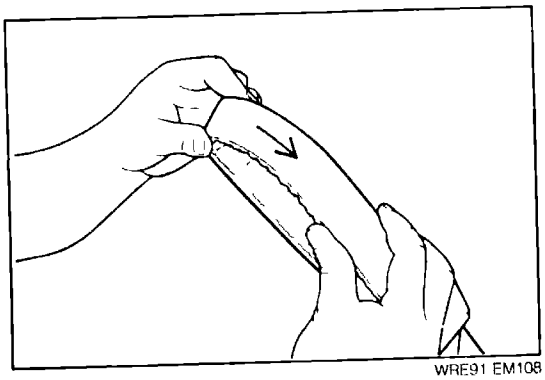
10 Remove the timing belt cover.



11 Slacken the timing belt tensioner.

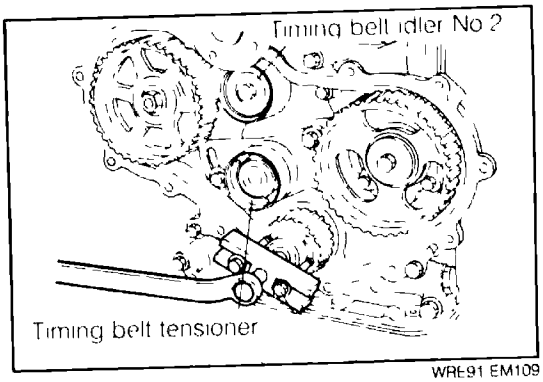


12 Mark the rotation direction on the back side of the timing belt. Then, remove the timing belt.

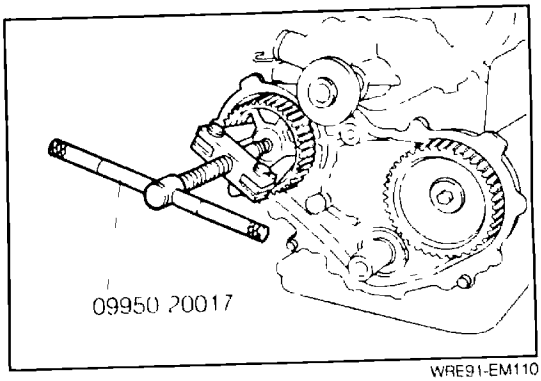


13 Remove the crankshaft timing belt pulley, using the following SST in combination with M6 bolts.
SST: 09213-31021-000 (M6 bolt)

14 Remove the timing belt tensioner and timing belt idler No 2

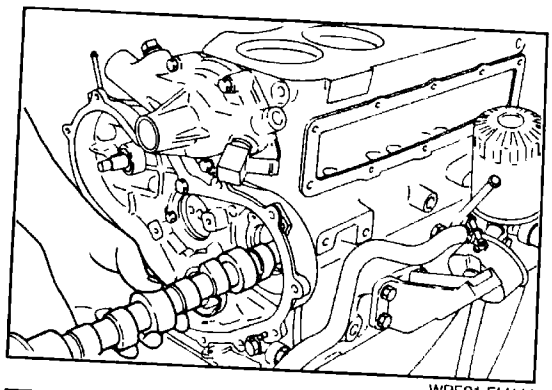


15 Remove the injection timing belt pulley.
SST: 09950-20017-000



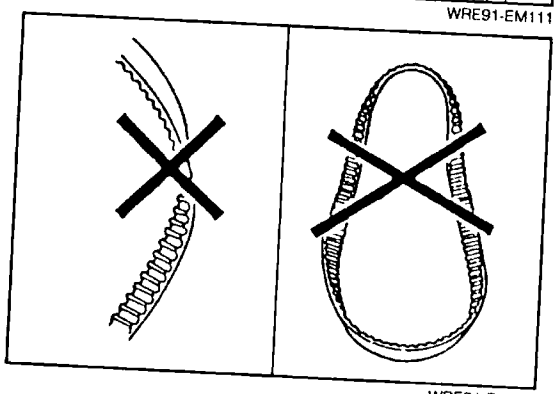
16. Remove the valve lifters.
NOTE:
- Store the valve lifters in order.

17. Remove the camshaft timing belt pulley with camshaft.

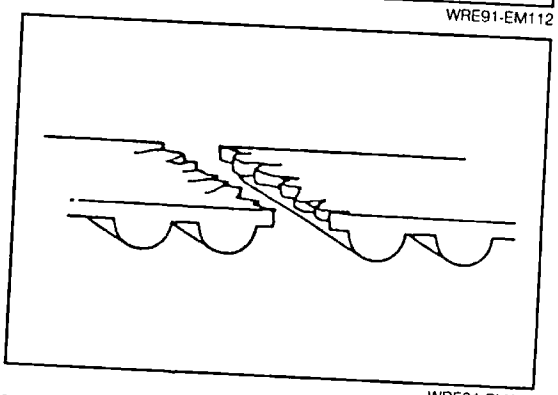

WRE91-EM111

INSPECTION OF COMPONENTS

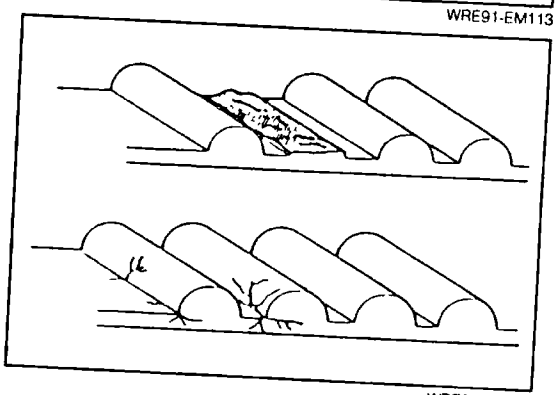
1. Timing belt inspection
CAUTION:
- Do not bend, twist or turn the belt inside out.
- Do not allow the belt to come into contact with oil, water or steam.
- Keep the belt clean.


WRE91-EM112

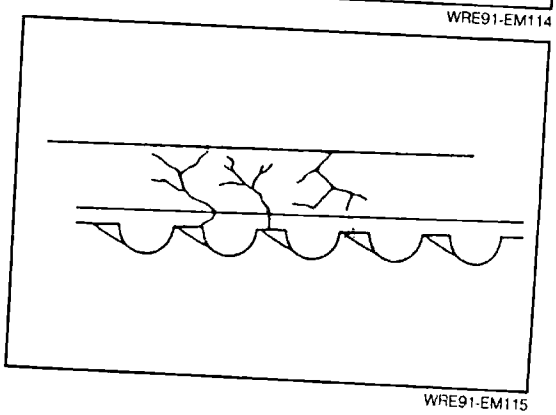
If there are defects, as shown in the figures, check the following points and replace the timing belt, if necessary.
(1) Premature separation
Check for proper installation.
Check the timing gear cover gaskets for damage and check for correct installation.


WRE91-EM113

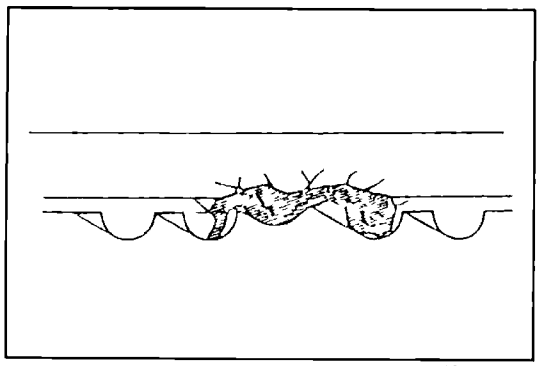
(2) If the belt teeth are cracked or damaged, check to see if the camshaft is seized.


WRE91-EM114

(3) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on one side of the idler pulley lock.

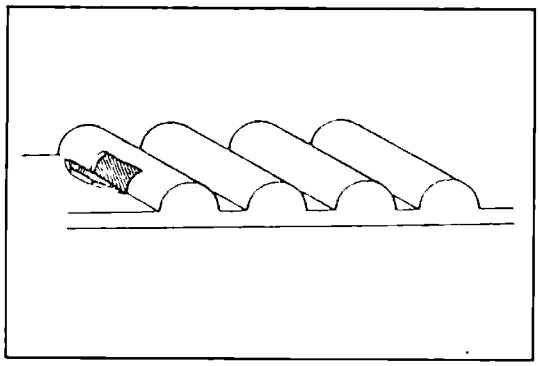

WRE91-EM115

(4) If there is wear or damage on only one side of the belt, check the pulley flange.



WRE91 EM116

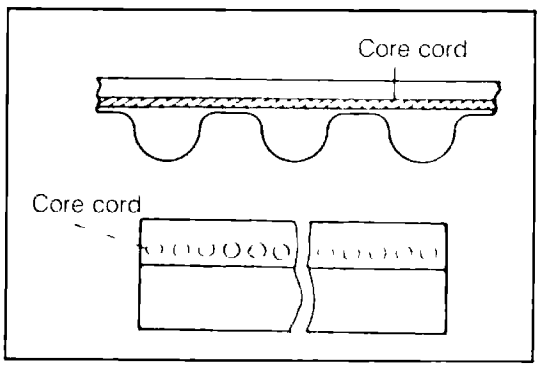
(5) If there is noticeable wear on the belt teeth, check the timing cover gasket for damage and check for correct gasket installation. Check for foreign material on the pulley teeth.



WRE91-EM117

Timing Belt Specifications:

Item \ Engine type		DL 42·52
Pitch peripheral length	(mm)	1028 7
Pitch	(mm)	9.525
Number of teeth		108
Belt width	(mm)	31 8
Belt thich	(mm)	5.4

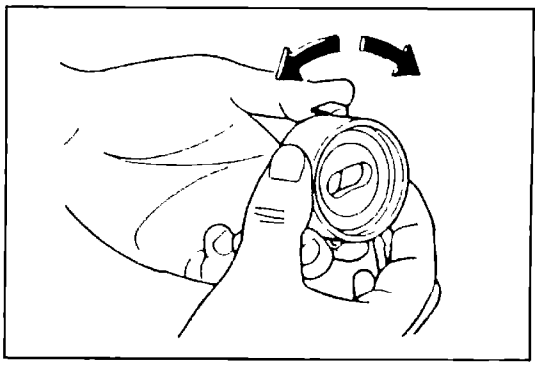


WRE91 EM118

2 Timing belt tensioner inspection
- Check the timing belt tensioner for smooth turning.
- Check the belt contact surface for damage.

If necessary, replace the timing belt tensioner.

CAUTION:
- **Never wash the timing belt tensioner.**



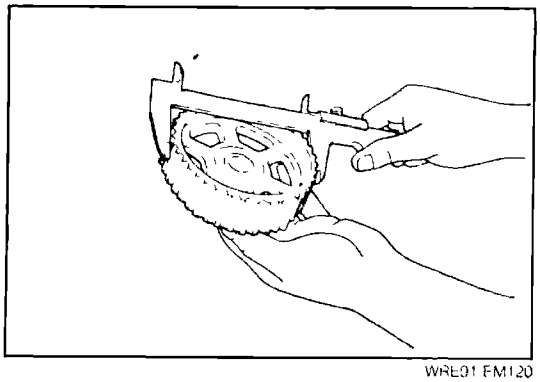
WRE91 EM119

3 Inspection of timing belt pulley

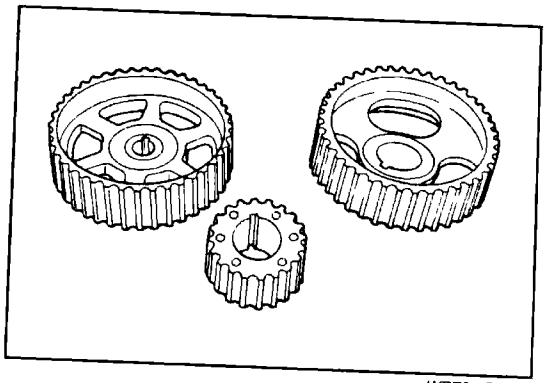
(1) Measure the maximum diameter of timing belt pulley, using vernier calipers.

Specified Value:

Component \ Item	Outer diameter (mm)	Pulley width (mm)	Number of teeth
Crankshaft timing pulley	59 37	33	20
Camshaft timing pulley	119 95	36	40
Injection pump pulley	119 904	36	40

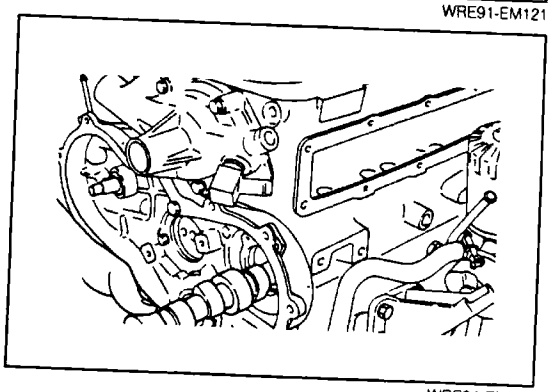


WRE91 EM120

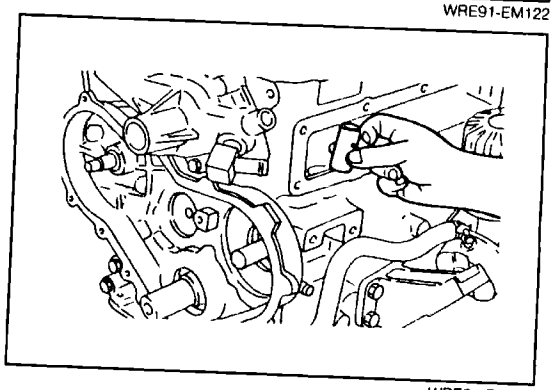

WRE91-EM121

INSTALLATION OF TIMING BELT

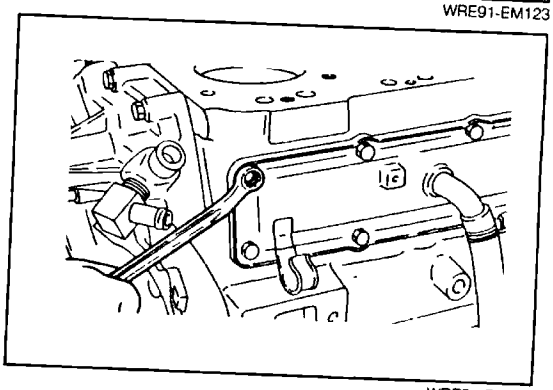
1 Installation of camshaft with the camshaft timing belt pulley.
(1) Install the camshaft, be carfull not to damage the camshaft bearings.


WRE91-EM122

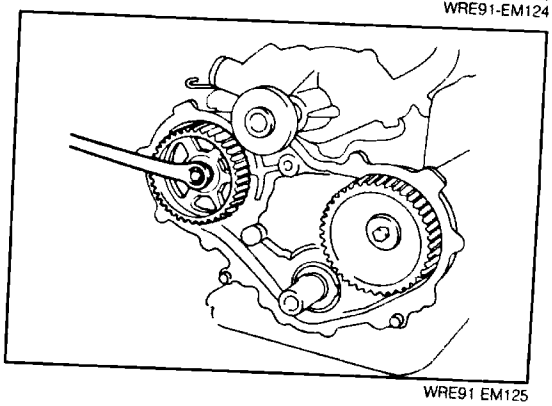
(2) Install the valve lifter.
NOTE:
- **Those valve lifters which have been stord in oder should be installed as a set to original cylinders, respectively.**


WRE91-EM123

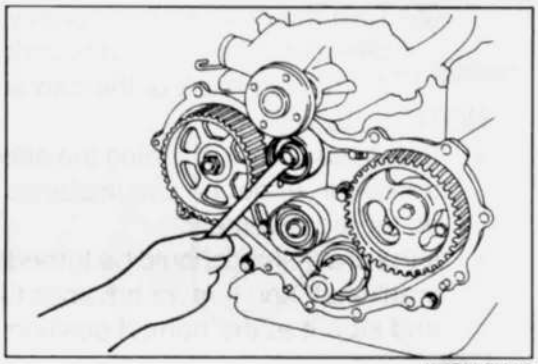
(3) Install the push rod cover.
Tightening Torque: 9.3 ± 2.5 N·m
(0.95 ± 0.25 kgf-m)


WRE91-EM124

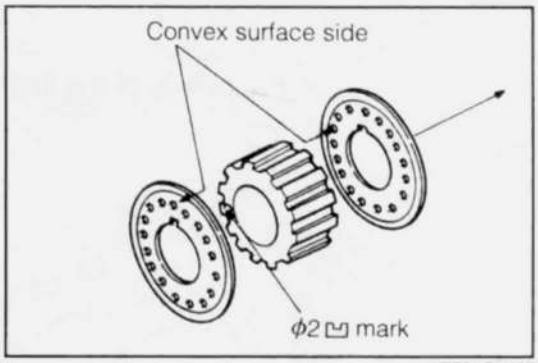
2. Install the injection pump timing belt pulley.
Tightening Torque: 83.4 ± 4.9 N·m
(8.50 ± 0.52 kgf-m)


WRE91 EM125

3. Install the timing belt idler No. 2.
4. Temporarily install the timing belt tensioner.

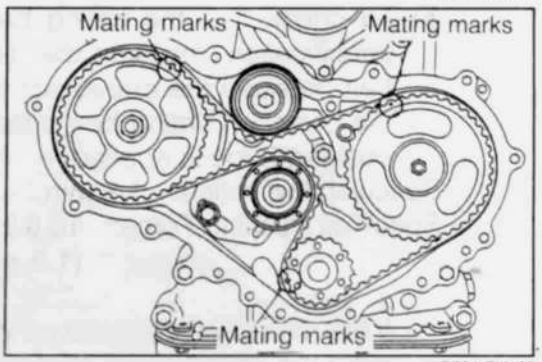

WRE91-EM126

5. Install the crankshaft timing belt pulley.
   NOTE:
   - The flange should be installed only in the correct installing direction.
   - Be sure to install the crankshaft timing belt pulley in such a direction that the recessed mark stamped on the pulley comes at the front side.



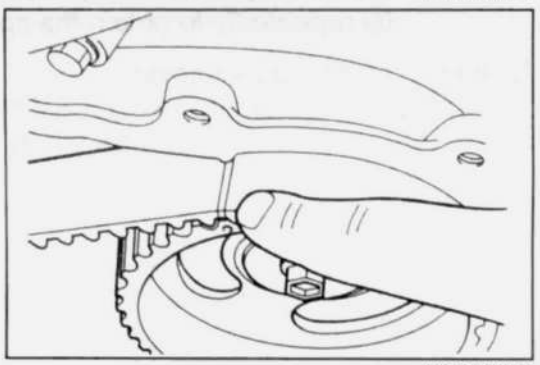
WRE91-EM127

6. Adjustment of timing belt tension
   (1) Align each of the three mating marks of the timing belt pulleys for the crankshaft, camshaft and injection pump with each corresponding mark of the three mating marks on the timing belt case.
   Under this condition, the piston No. 1 is set to about 30 degrees before the top dead center.

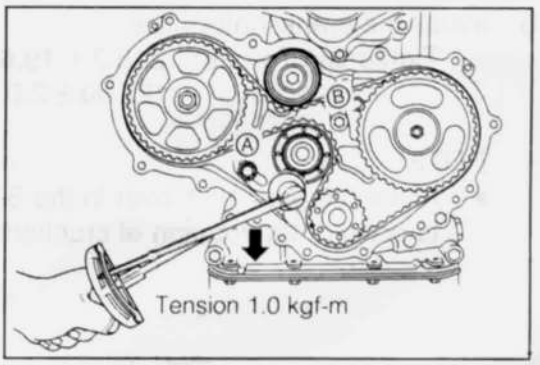


WRE91-EM128

   (2) Assembling of timing belt
   Assemble the belt in such a way that the marks (yellow lines) at the back and side of the timing belt may come at the same position on the front.
   NOTE:
   - Be sure to displace the front end surface of the timing belt about 2 mm toward the timing belt case from the front end surface of each pulley.


WRE91-EM129

   (3) Adjust timing belt tension.
   ① Insert a hexagonal wrench into the hexagonal hole of the timing tensioner. Tighten the bolt Ⓐ of the timing tensioner by applying tension to the wrench at about 90 degrees.
   Tension: 9.8 N·m (1 kgf-m)

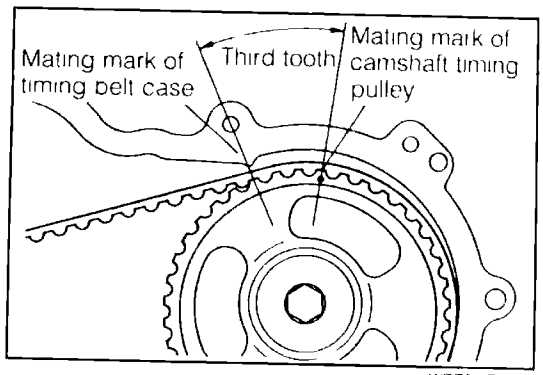


WRE91-EM130

② Turn the crankshaft smoothly in the normal rotating direction. Stop the crankshaft at the third tooth from the mating mark of the camshaft pulley.

NOTE:

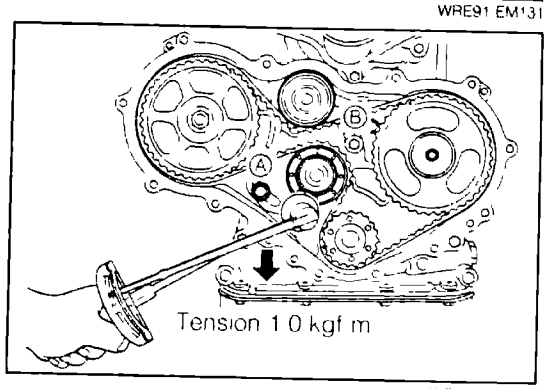
- Before securely tightening the attaching bolt of the timing tensioner, under no circumstance should the crankshaft be turned reversely.
- If the crankshaft should be turned reversely, back off the crankshaft one turn, or advance the crankshaft two turns and stop it at the normal position.



WRE91 EM131

③ Loosen the bolt Ⓐ of the timing tensioner. Perform the step (3) again.

④ Tighten the bolt Ⓑ of the timing tensioner.

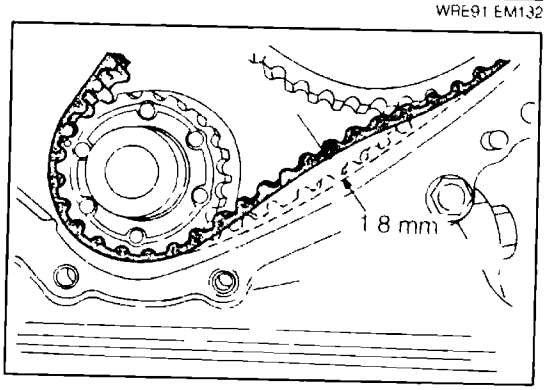


WRE91 EM132

⑤ To check that the timing belt tension meets the specification, measure the deflection of the timing belt between the crankshaft timing belt pulley and the camshaft timing belt pulley when the specified pushing force is applied.

Specified Deflection: 1.8 mm

Specified Pushing Force: 18.6 ± 6.9 N (1.9 ± 0.7 kgf)

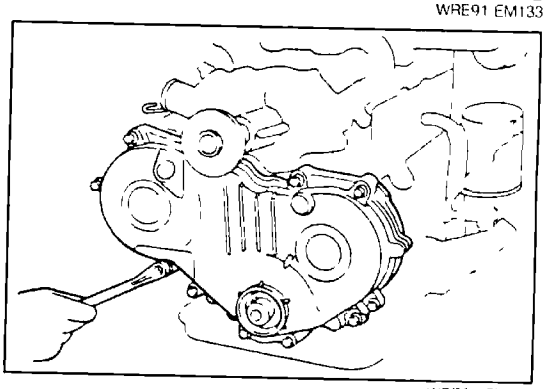


WRE91 EM133

If the measured deflection and pushing force do not meet the specification, perform the steps ① through ⑤ repeatedly to obtain the specified deflection.

7 Install the timing belt cover

Tightening Torque: 18.1 ± 3.4 N·m (1.85 ± 0.35 kgf-m)

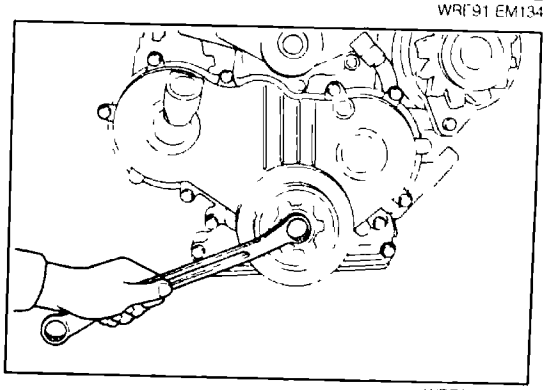

WRE91 EM134

8 Install the crankshaft pulley.

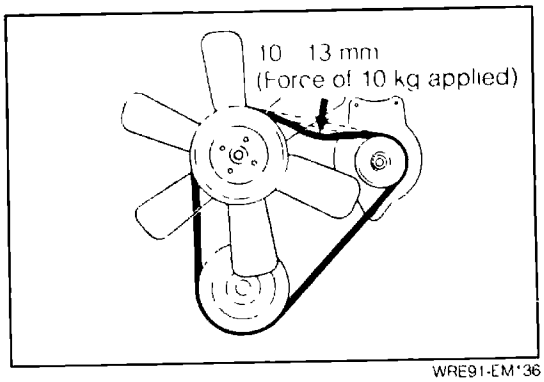
Tightening Torque: 215.7 ± 19.6 N·m (22.00 ± 2.0 kgf-m)

NOTE:

- Place the gear shift lever in the 5-th gear position so as to prevent the rotation of crankshaft.


WRE91 EM135

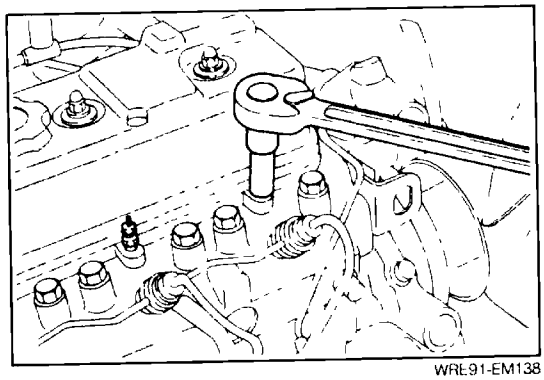
9 Install the radiator fan shroud.
10 Install the fan pulley and V-belt.
11 Install the fluid coupling with fan.
Specified V-belt Tension:
New belt: 10 - 13 mm
Used belt: 8 - 11 mm
[With a force of 98 N (10 kgf) applied]



WRE91-EM136

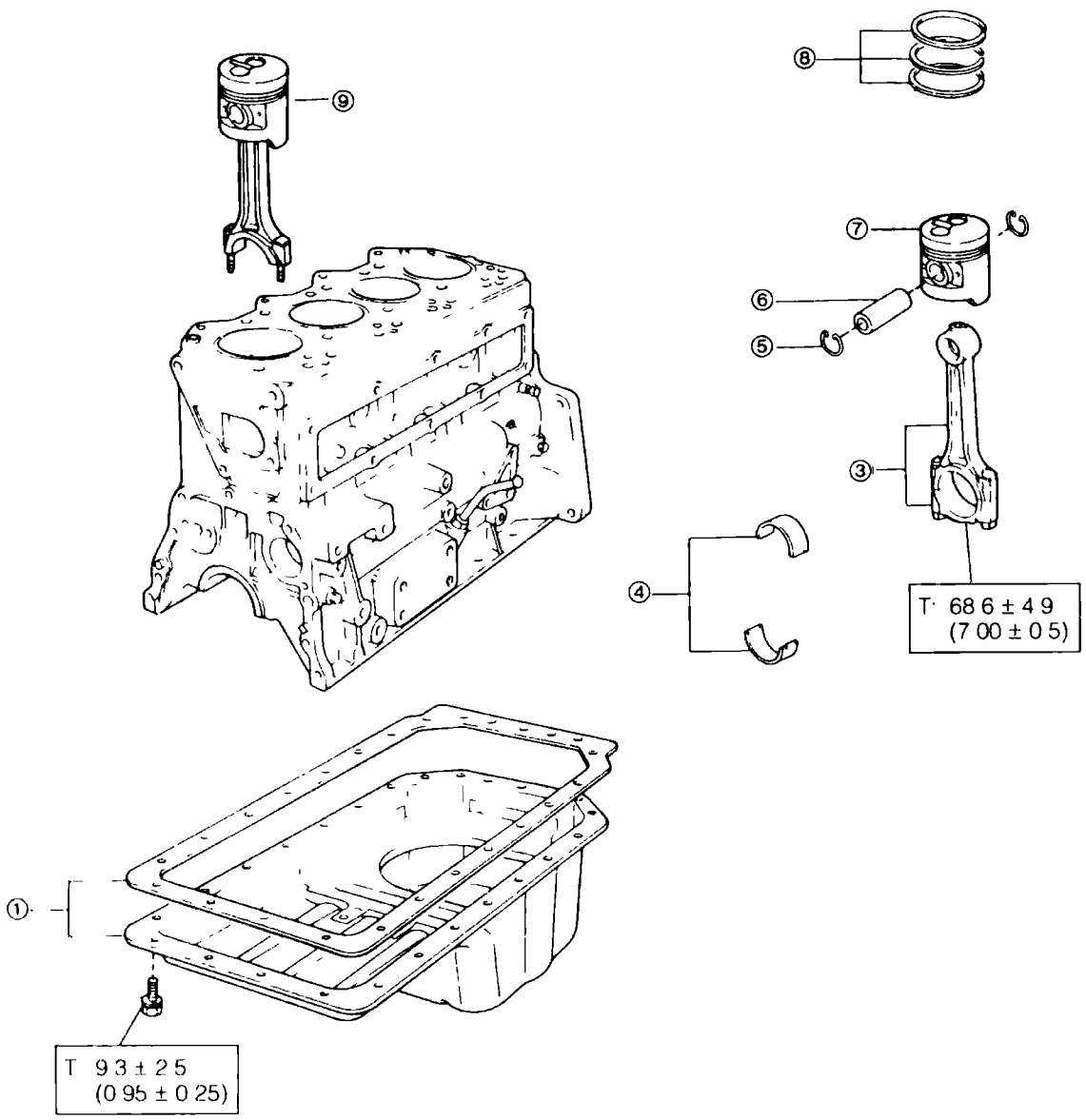
12 Install the glow plug.
Tightening Torque: 12.8 ± 2.9 N·m
(1.30 ± 0.3 kgf-m)

13 Install the cool air intake duct in the air cleaner.


WRE91-EM138

PISTON AND CONNECTING ROD

COMPONENTS



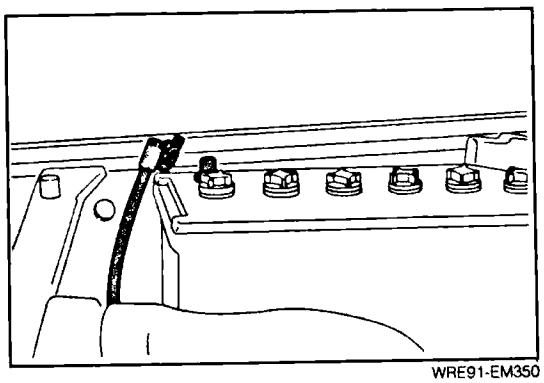
① Oil pan
② Connecting rod
③ Connecting rod bearing
④ Snap ring
⑤ Piston pin
⑥ Piston
⑦ Piston ring
⑧ Piston w/connecting rod

T : Tightening torque
Unit : N·m (kgf-m)

WRE91-EM139

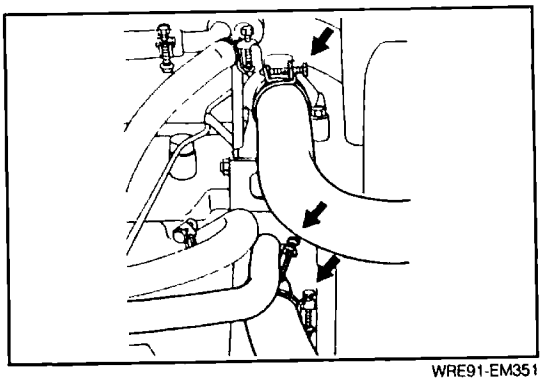
REMOVAL OF ENGINE ASSY

1. Drain the coolant and engine oil.
2. Remove the battery.



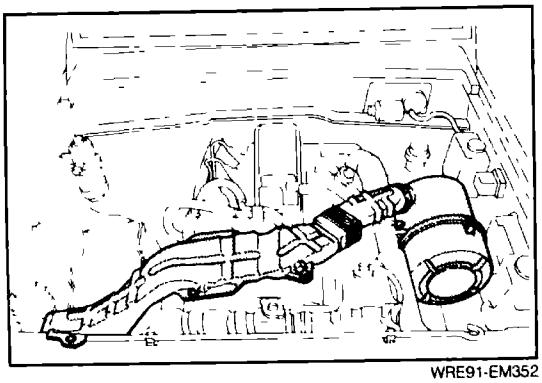
WRE91-EM350

3. Remove the engine hood.
4. Remove the air cleaner sub-assy.



WRE91-EM351

5. Remove the water hoses, radiator and cooling fan.
6. Disconnect the fuel pipes and choses.



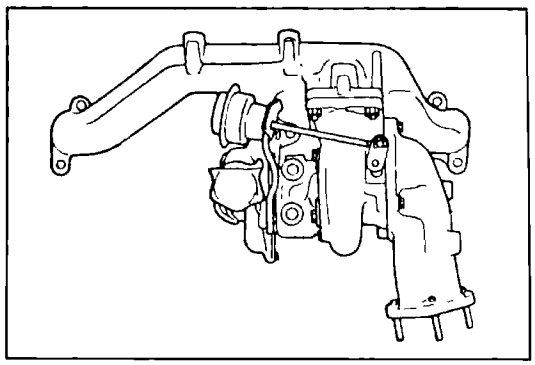
WRE91-EM352

7. Disconnect the engine harness.
8. Disconnect the exhaust pipe and temporary remove it.
9. Remove the transmission attaching bolts.
10. Disconnect the engine mounting.
11. Remove the engine assy by using chaine block.

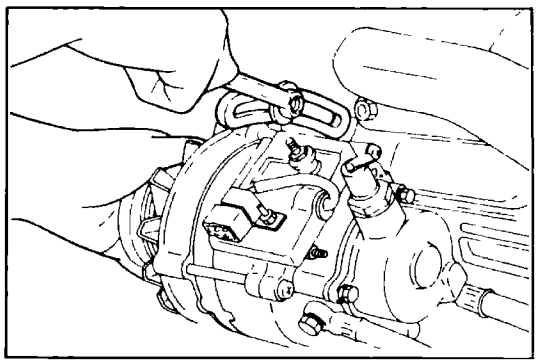
WRE91-EM353

DISASSEMBLY OF CYLINDER BLOCK

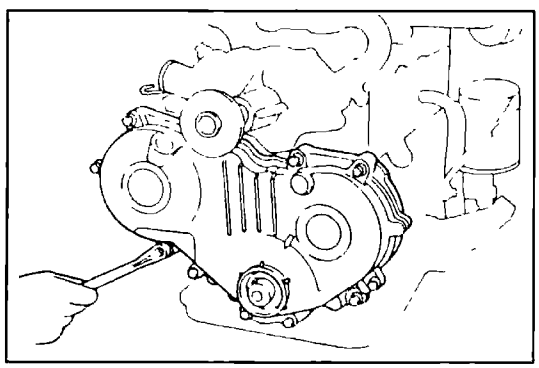
1. Remove the cylinder head with intake and exhaust manifold.
(See page EM–60.)


WRE91 EM141

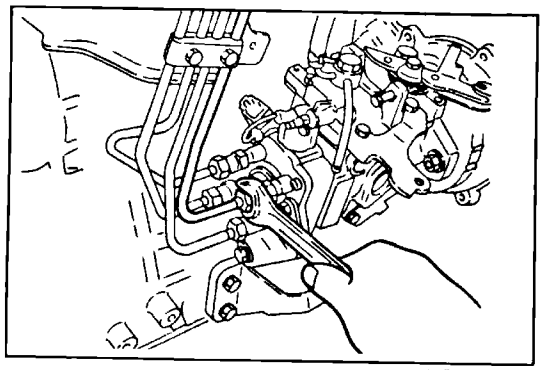
2. Remove the alternator.


WRE91-EM142

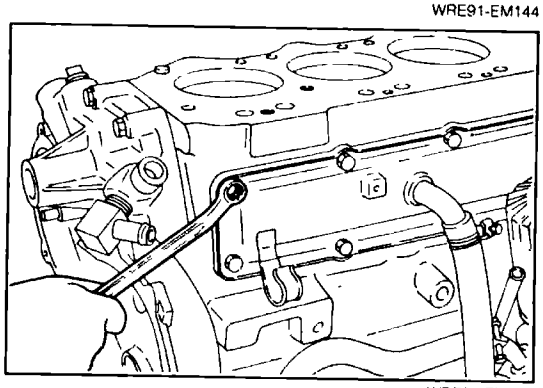
3 Remove the timing belt cover and the timing belt.
(See page EM–30.)


WRE91 EM143

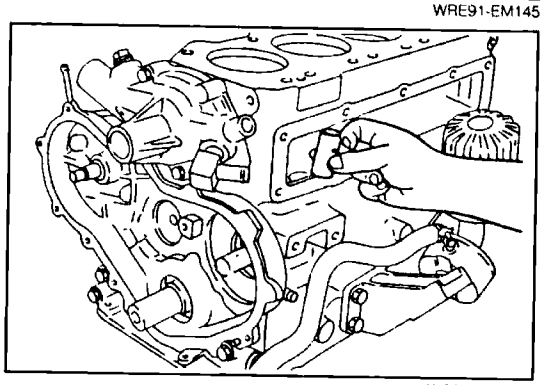
4. Remove the injection pump.
(See page FU–6.)


WRE91-EM144

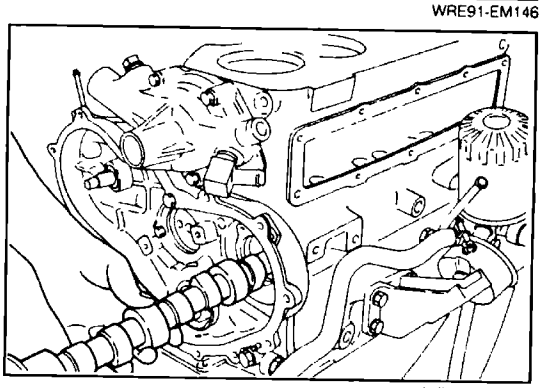
5 Removal of the camshaft.
(1) Remove the push rod cover.


WRE91-EM145

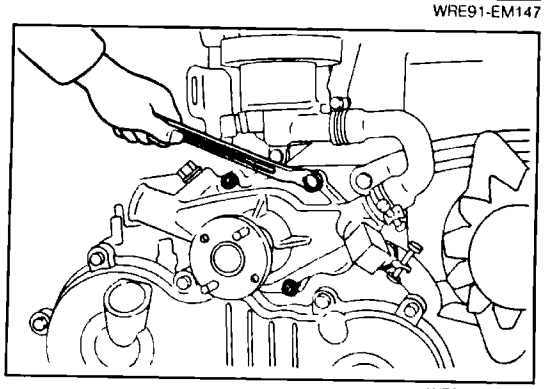
(2) Remove the push rod and the valve lifter.
NOTE:
- Remove the parts in the sequence of cylinders.
- Store the removed parts properly so that they may not to be mixed with each other.


WRE91-EM146

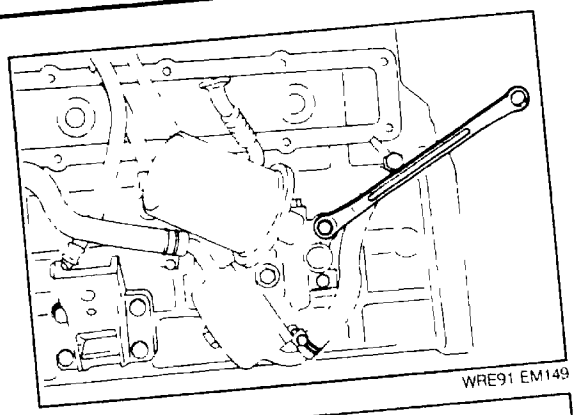
(3) Remove the thrust plate attaching bolts.
(4) Remove the camshaft with the camshaft timing belt pulley.


WRE91-EM147

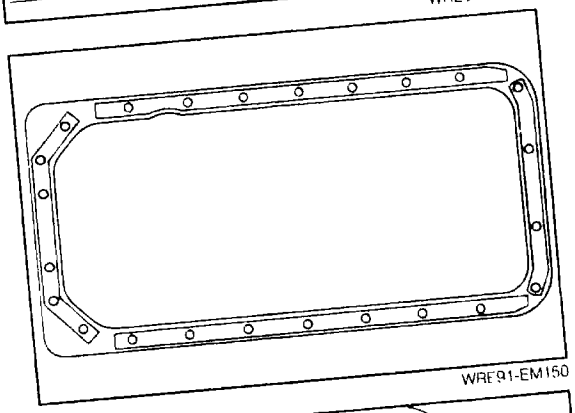
6. Remove the water pump by loosen four bolts.


WRE91-EM148

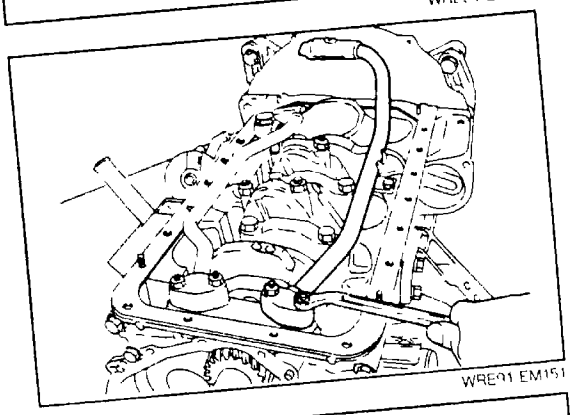
7 Remove the oil filter bracket with oil filter.


WRE91 EM149

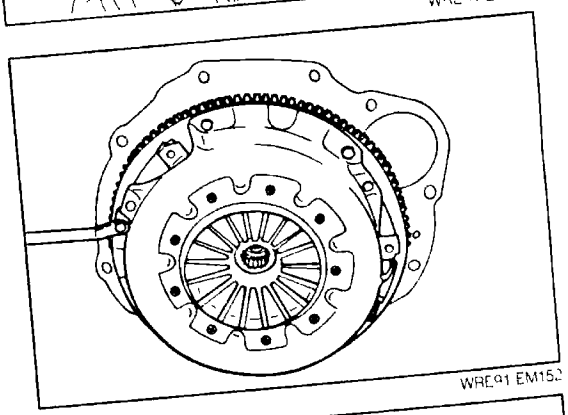
8 Remove the oil pan by loosen 20 bolts and 4 nuts


WRE91-EM150

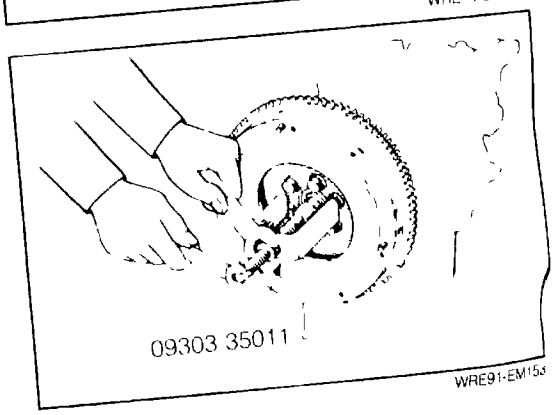
9 Remove the oil pipes.


WRE91 EM151

10 Remove the clutch cover.
11. Remove the clutch disc.

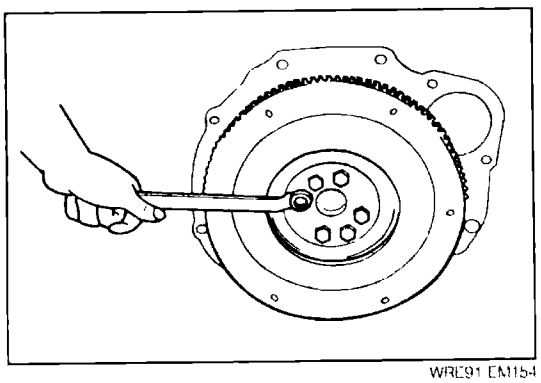

WRE91 EM152

12 Remove the bearing, using the SST.
SST: 09303-35011-000



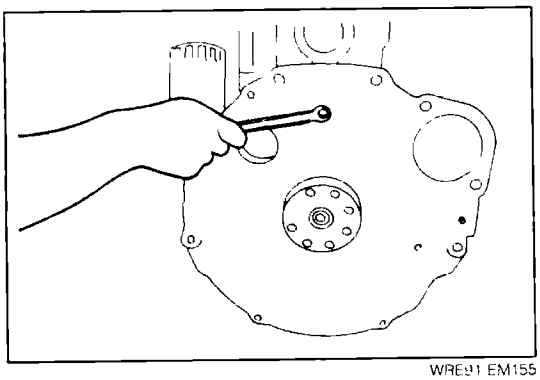
WRE91-EM153

13 Remove the flywheel



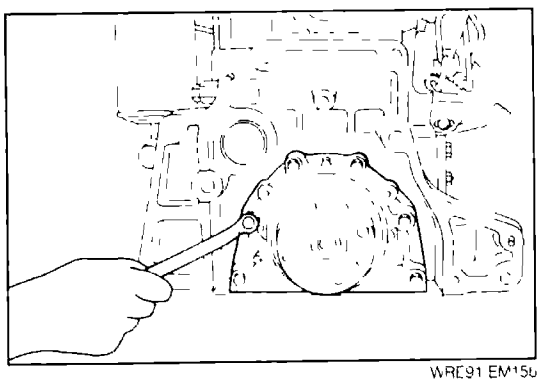
WRE91 EM154

14 Remove the rear end plate.



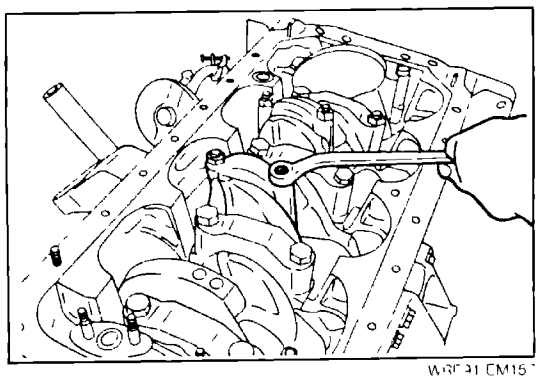
WRE91 EM155

15 Remove the rear oil seal retainer.
16 Remove the oil seal.



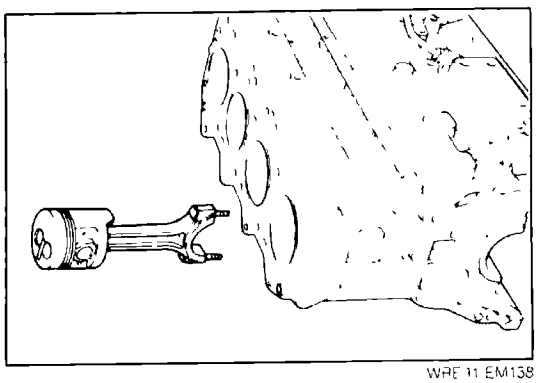
WRE91 EM156

17 Remove the connecting rod bearing cap.



WRE91 EM157

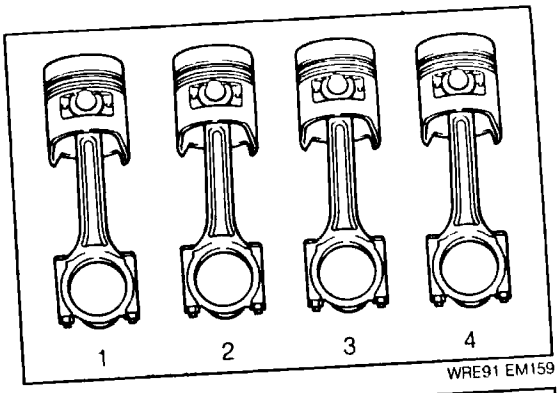
18 Pull out the piston toward the cylinder head side.
NOTE:
- When pulling out the piston, be very careful not to scratch the cylinder liner.



WRE91 EM158

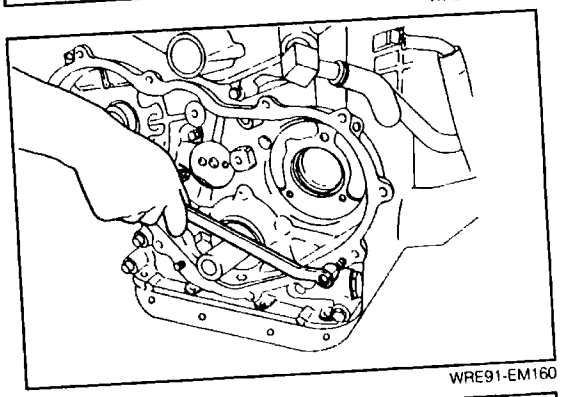
ENGINE MECHANICAL

19. Store the pistons and connecting rod caps in correct sequence without changing the correct combination of these parts.

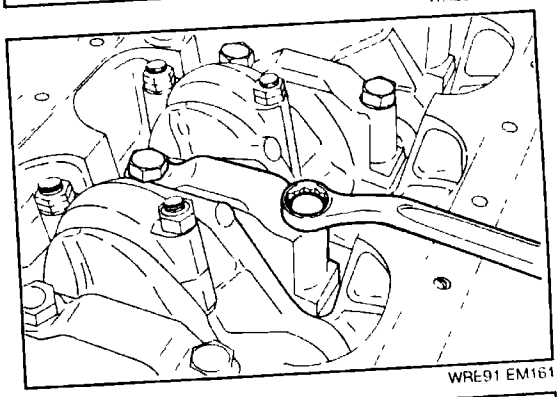


WRE91 EM159

20. Remove the timing belt case.

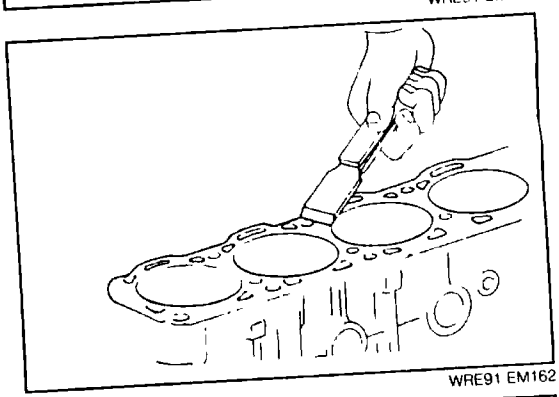

WRE91-EM160

21. Remove the crankshaft bearings. Remove the crankshaft. Place the removed crankshaft bearings in the correct sequence so that they may not be mixed with each other.

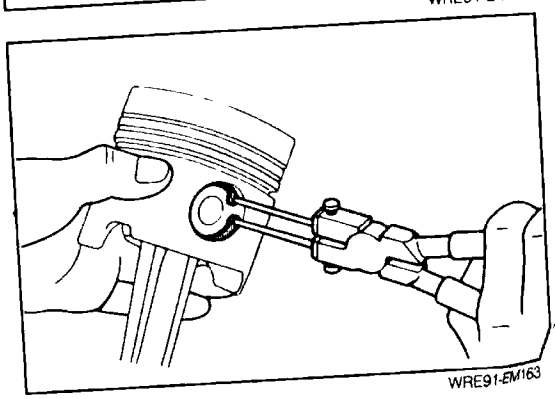

WRE91 EM161

22. Clean cylinder block.
    (1) Remove all the gasket material from the top of the block.
    (2) Blow carbon and oil from the bolt holes.

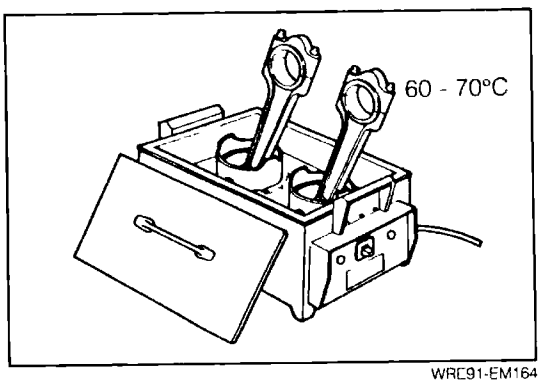
    WARNING:
    - **Protect your eyes when using compressed air.**


WRE91 EM162

23. Disconnect the connecting rod from piston.
    (1) Remove the snap ring, using needlenose pliers.

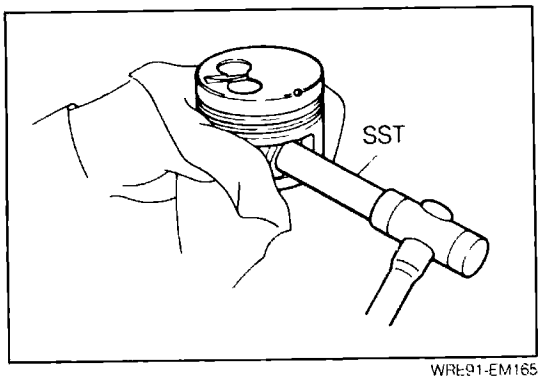

WRE91-EM163

(2) Gradually heat the piston to about 60°C to 70°C.



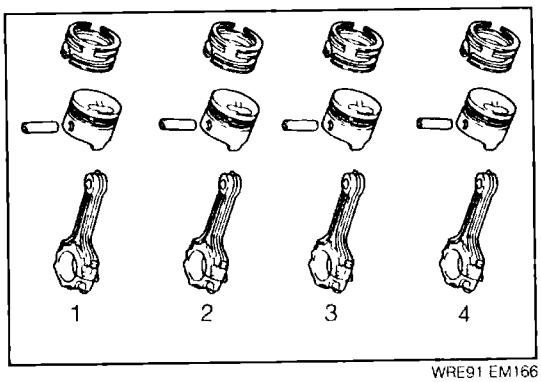
WRE91-EM164

(3) Proceed to drive the piston pin by tapping it lightly, using a plastic hummer in combination with the following SST.
SST: 09221-87601-000



WRE91-EM165

NOTE:
- The piston and pin are a matched set.
- Keep the piston, pin, rings and connecting rod together for each cylinder.

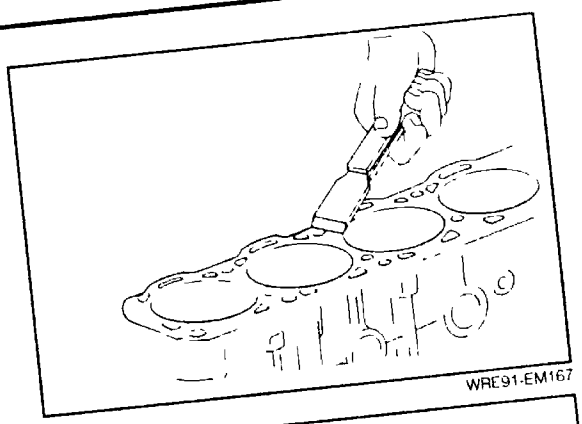


WRE91 EM166

NSPECTION OF COMPONENTS

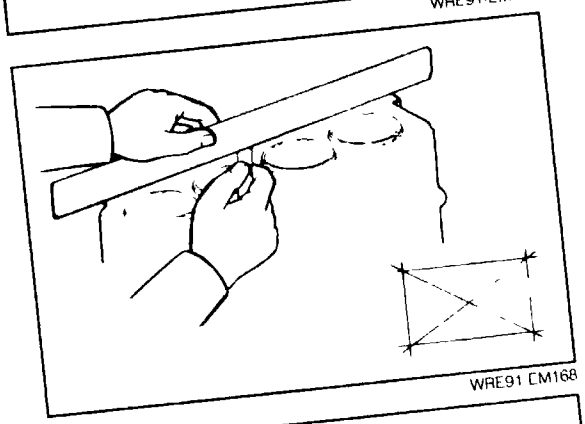
NSPECTION OF CYLINDER BLOCK

1 Remove all gasket materials from cylinder block.
2. Clean the cylinder block, using a soft brush and cleaning solvent.

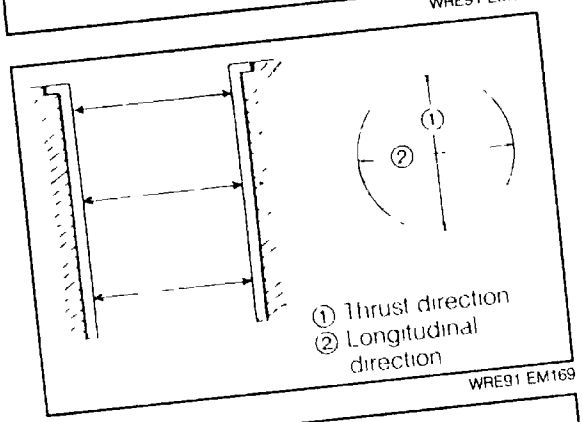

WRE91-EM167

3. Inspection of top surface of cylinder block
Using a precision straight edge and thickness gauge, check the surface contacting the cylinder head gasket for warpage in the six directions.
Allowable Wapage: 0 - 0.1 mm

If the warpage exceeds the allowable limit, replace the cylinder liner.

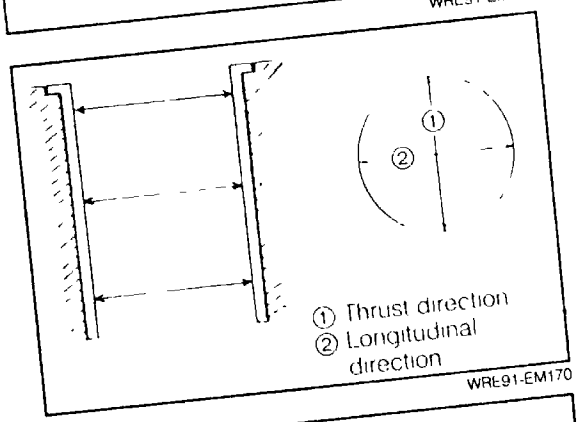

WRE91 EM168

4 Measurement of cylinder liners
(1) Measure the bore diameter of each cylinder liner at six points, shown in the right figure.
Ensure that the difference between the maximum and minimum bore diameters of each cylinder is within 0.1 mm.
If the difference between the maximum and minimum values exceeds 0.1 mm, perform boring for the cylinder liner bore or replace the cylinder liner.



WRE91 EM169

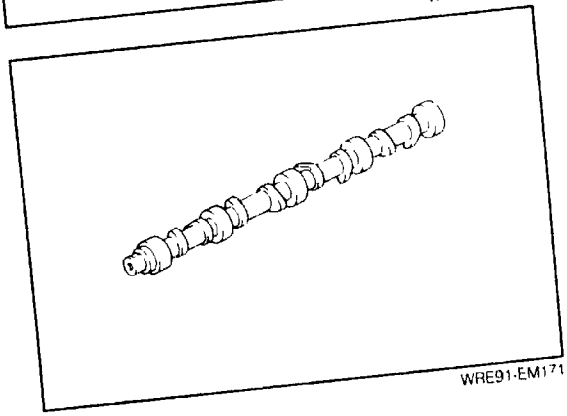
(2) Measure the bore diameter of each cylinder at a point shown in right figure. The measured value is regarded as cylinder bore diameter.
Specified Bore Diameter: 92.00 - 92.03 mm



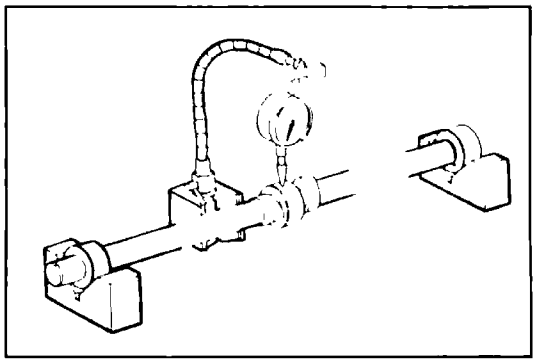
WRE91-EM170

INSPECTION OF CAMSHAFT

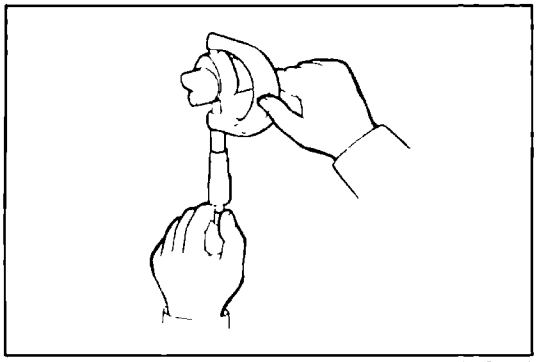
1. Visually inspect the camshaft for wear or damage.
Replace the camshaft if the cam surface and/or journal section exhibits any wear and damage.


WRE91-EM171

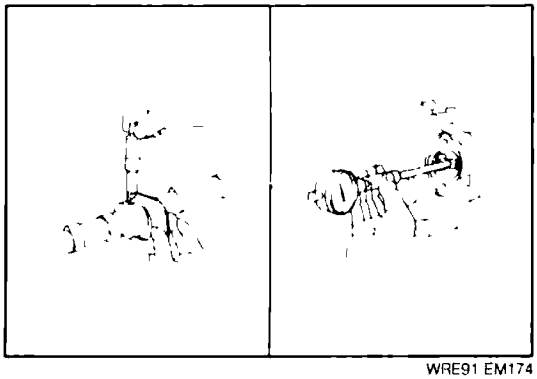
2. Inspection camshaft for runout
   Support the camshaft at its both ends with V-shaped blocks.
   Set a dial gauge to mid-point of center journal section of camshaft.
   Turn the camshaft one turn, making sure that camshaft will not move in the axial direction. Take a reading on dial gauge during the turning.
   Calculate the maximum runout, i.e. the difference between the maximum and minimum readings.
   Maximum Runout: 0.05 mm


WRE91-EM172

3. Inspection of cam lobe height
   Measure the cam lobe height, using a micrometer.
   Specified Cam Lobe Height
   IN·EX: 37.717 - 37.817 mm


WRE91-EM173

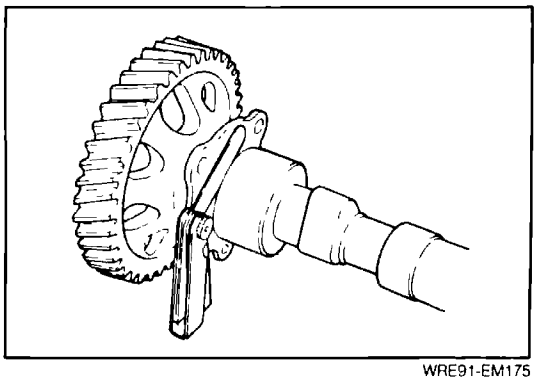
4. Inspection of journal section.
   Measure the camshaft journal section diameter, using a micrometer.
   Specified Value:
   1st journal: 46.559 - 46.575
   2nd journal: 46.259 - 46.275
   3rd journal: 45.959 - 45.975
   4th journal: 45.659 - 46.675
   5th journal: 45.359 - 45.375


WRE91 EM174

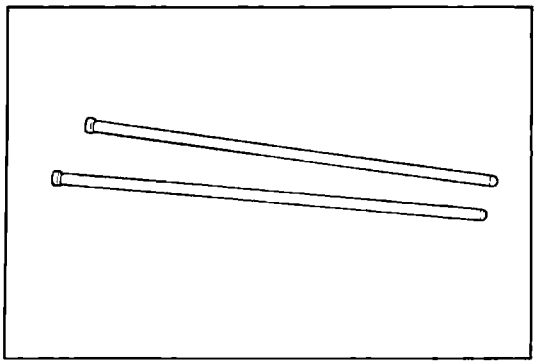
5. Inspection of camshaft thrust clearance
   (1) Measure the camshaft thrust clearance.
   Specified Value: 0.10 - 0.19 mm

   NOTE:
   - **Prior to the measurement of the camshaft thrust clearance, tighten the camshaft timing belt pulley to the camshaft to the specified torque.**

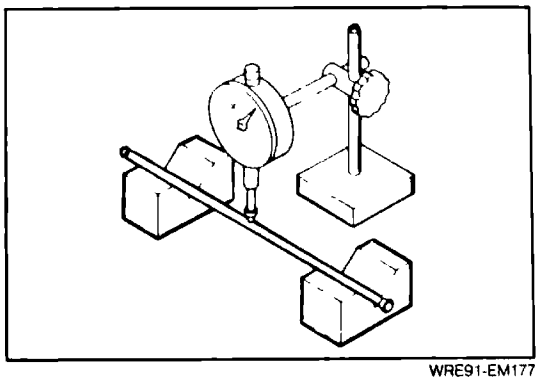
   (2) If the camshaft thrust clearance exceeds the limit, replace the camshaft thrust plate.


WRE91-EM175

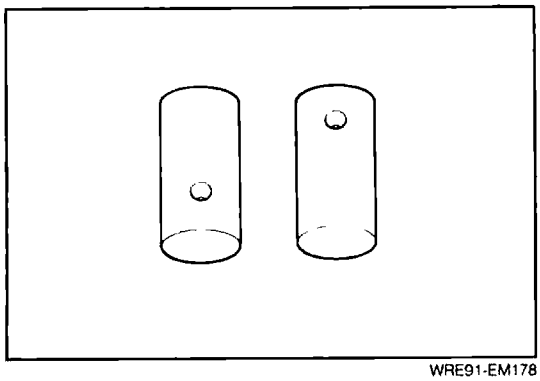
6. Inspection of valve push rod
   (1) Visually inspect the valve push rod for damage or wear.


WRE91 EM176

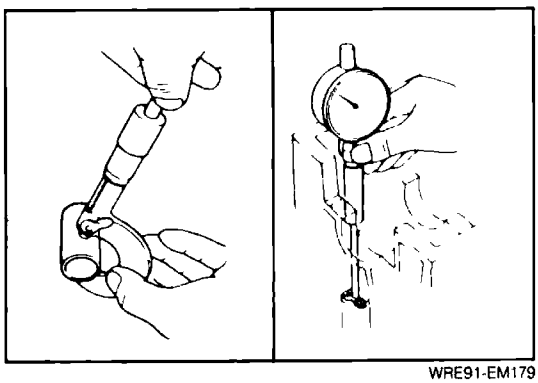
(2) Inspect the valve push rod for bend.
Bend Limit of Push Rod: 0.4 mm


WRE91-EM177

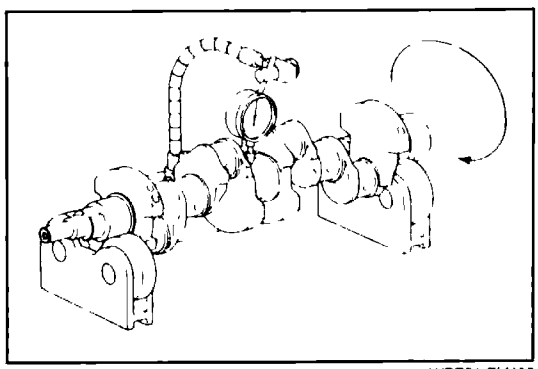
7. Inspection of value lifter
(1) Visually inspect the value lifter for wear or damage.


WRE91-EM178

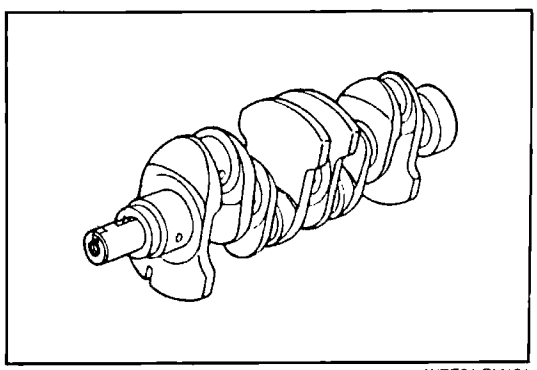
(2) Measure the oil clearance of value lifter.
Specified Oil Clearance: 0.015 - 0.049 mm
Limit: 0.1 mm


WRE91-EM179

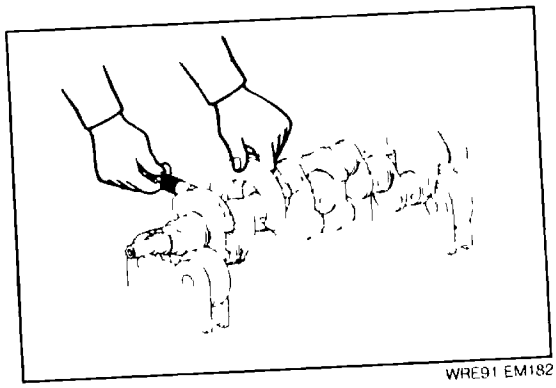
8. Inspection of crankshaft
(1) Measure the crankshaft for runout.
Take a reading on dial gauge during the turning.
Runout Limit: 0.05 mm


WPE91-EM180

(2) Visually inspect the crankshaft main journals and crankpin journals for wear or damage.

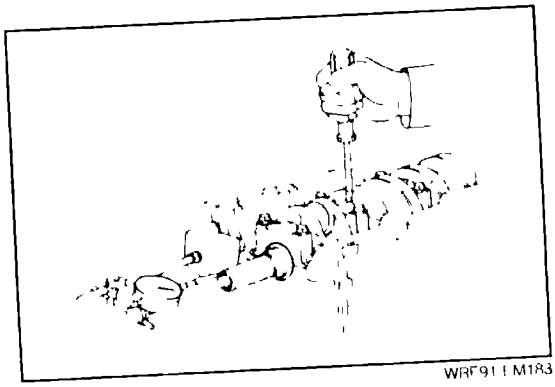

WRE91-EM181

(3) Measure the diameter of crankshaft main journal and crankpin journal.
Specified Value:
Main Journal: 67.955 - 67.970
Crankpin Journal: 55.075 - 55.990


WRE91 EM182

(4) Measure the thrust clearance of the crankshaft.
Specified Value: 0.050 - 0.159 mm
Limit: 0.25 mm

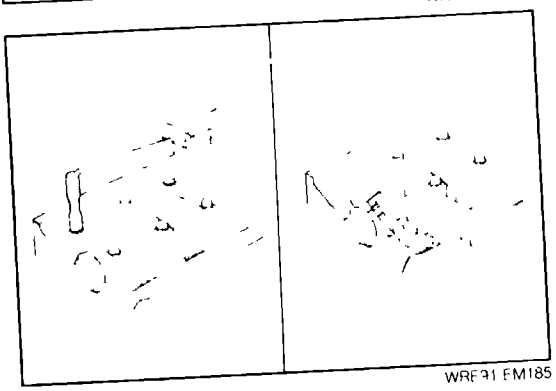
NOTE:
- Tighten the crankshaft bearing cap to the specified torque in advance.
Tightening Torque: 103.0 ± 6.9 N·m (10.50 ± 0.70 kgf-m)


WRE91 EM183

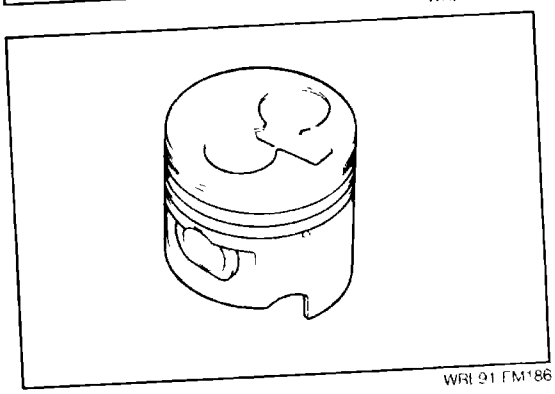
(5) Measure the oil clearance of the main journal of the crankshaft, using a plastigage.
Specified Value:
No.1 and No.5 journals: 0.025 - 0.060 mm
No.2, No.3 and No.4 journals: 0.030 - 0.065 mm
Limit: 0.12 mm

If the oil clearance exceeds the limit, replace the bearing

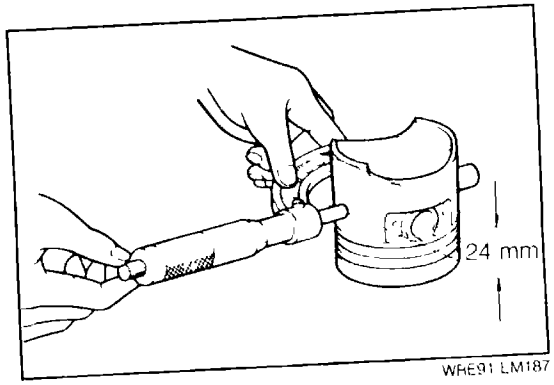
NOTE:
- Wipe off the oil or the like getting to the main journal section in advance.
- Tighten the crankshaft bearing cap to the specified torque.
Tightening Torque: 103.0 ± 6.9 N·m (10.50 ± 0.70 kgf-m)


WRE91 EM185

9 Inspection of piston
(1) Visually inspect the piston for wear or damage.


WRE91 EM186

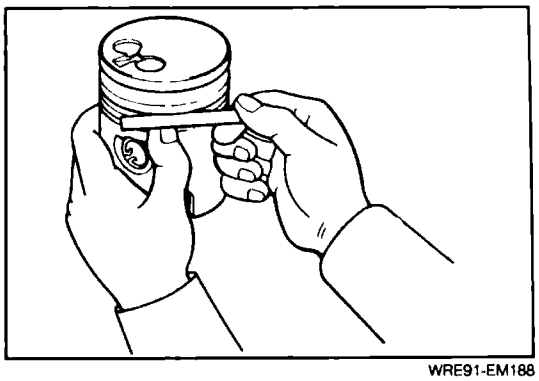
(2) Measure the piston outer diameter in thrust direction at a point about 24 mm above from lower edge of the piston skirt.
Then, calculate the piston clearance.
Specified Value:
Piston Outer Diameter:
DL-42: 91.93 - 91.96 mm
DL-52: 91.92 - 91.95 mm
Piston Clearance:
DL-42: 0.06 - 0.08 mm
DL-52: 0.07 - 0.09 mm



WRE91 EM187

(3) Measure the groove width of piston rings No. 1, No. 2, No. 3 with a thickness gauge.

	DL-42	DL-52
No. 1 piston ring groove width	2.55 - 2.57	7° key stone
No 2 piston ring groove width	2.03 - 2.05	2.06 - 2.08
No. 3 piston ring groove width	4.01 - 4.03	4.01 - 4.03



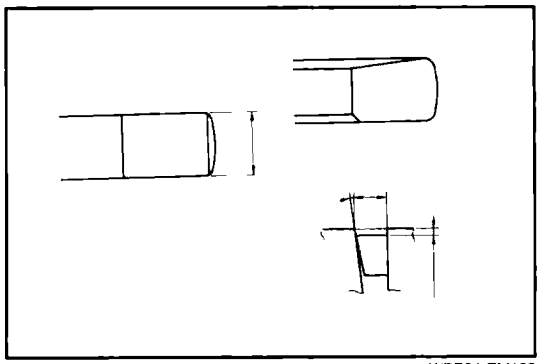
WRE91-EM188

10. Inspection of piston ring

(1) Inspect the piston ring width

Specified Value:

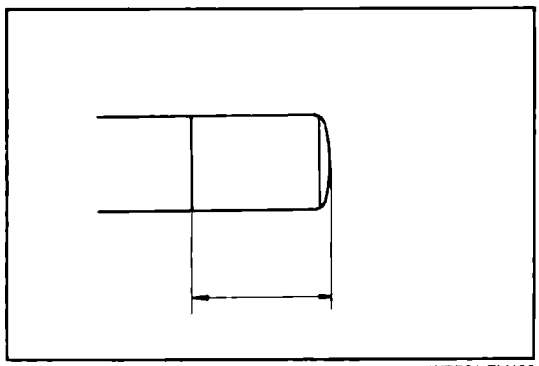
Component \ Engine	DL-42	DL-52
Compression ring No 1	2.5 $^{-0.01}_{-0.03}$	7° key stone
Compression ring No. 2	2.0 $^{-0.01}_{-0.03}$	2.0 $^{-0.01}_{-0.03}$
Oil ring	4.0 $^{-0.01}_{-0.03}$	4.0 $^{-0.01}_{-0.03}$



WRE91-EM189

(2) Inspect the piston ring thickness.

	DL-42	DL-52
Compression ring No. 1	3.8 ± 0.1	3.8 ± 0.12
Compression ring No. 2	3.8 ± 0.1	3.8 ± 0.10

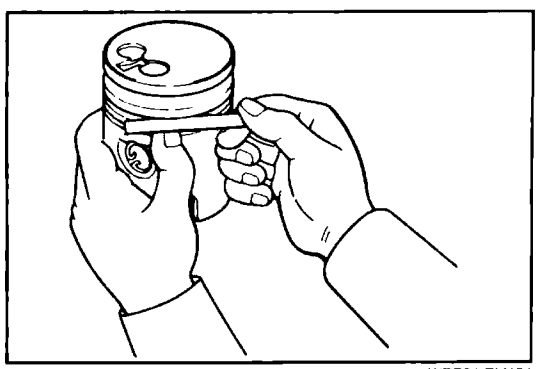


WRE91-EM190

(3) Calculate the piston ring side clearance.

Specified Value:

	DL-42	DL-52
Compression ring No. 1	0.06 - 0.10	—
Compression ring No. 2	0.04 - 0.08	0.07 - 0.11
Oil ring No 3	0.02 - 0.06	0.02 - 0.06



WRE91-EM191

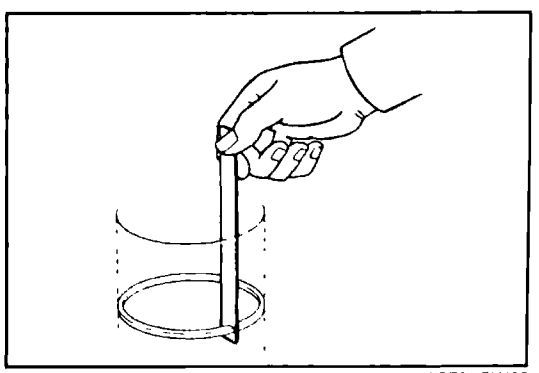
(4) Measure the piston ring end gap.

Place the piston ring in the cylinder bore at lower part where very little wear exists.

Measure the end gap of the piston ring.

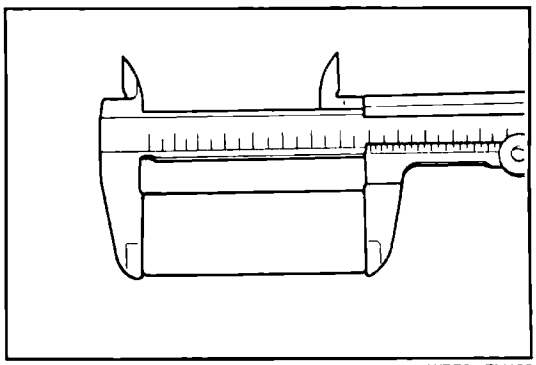
Specified Value:

	DL-42	DL-52
Compression ring No. 1	0.30 - 0.45	0.35 - 0.50
Compression ring No. 2	0.30 - 0.45	0.30 - 0.45
Oil ring No. 3	0.30 - 0.50	0.30 - 0.50

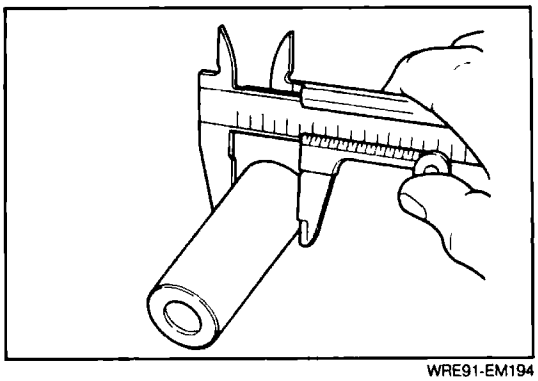


WRE91-EM192

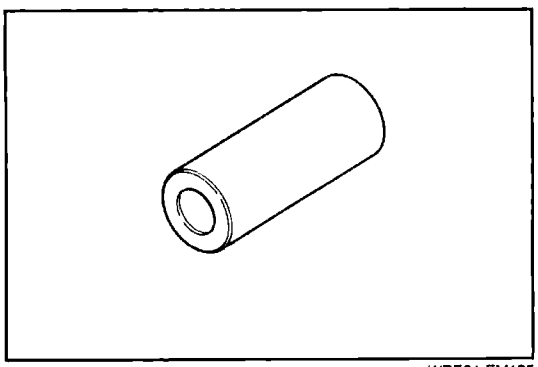
11. Inspection of piston pin
    (1) Measure the length of piston pin.
    Specified Value: L = 74.8 - 75.0


WRE91-EM193

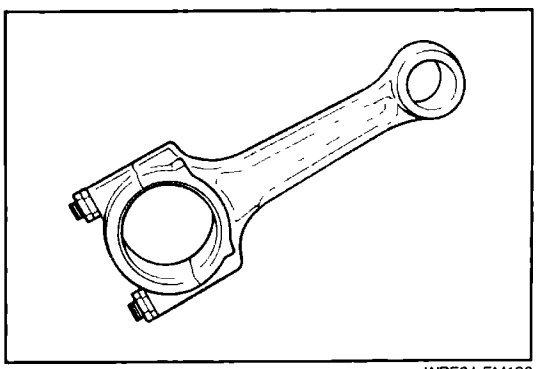
    (2) Measure the diameter of piston pin.
    Specified Value: D = 27.993 - 28.000


WRE91-EM194

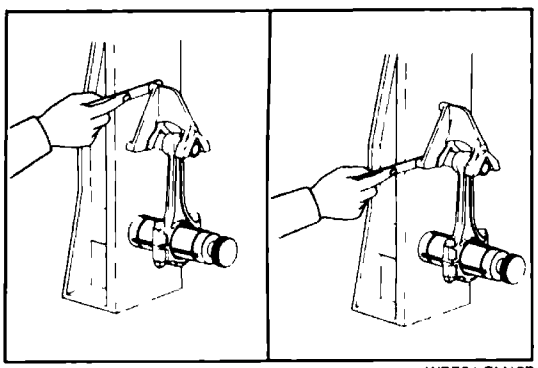
    (3) Visually inspect the piston pin for wear or damage.


WRE91-EM195

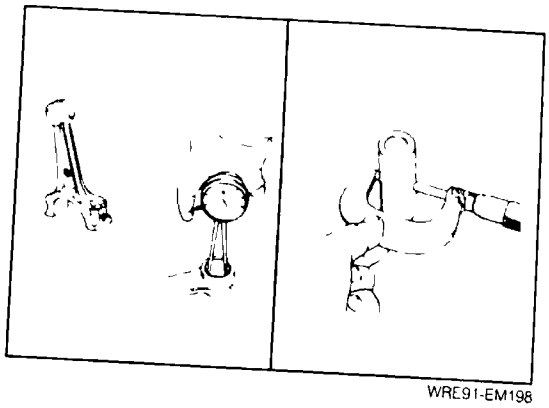
12. Inspection of connecting rod
    (1) Visually inspect the connecting rod for damage.


WRE91-EM196

    (2) Check the connecting rods alignment using a rod aligner.
    If the rod is bend or twisted, replace the connecting rod.
    Specified Value:
    Bend Limit: 0.05 mm
    Twist Limit: 0.05 mm


WRE91-EM197

(3) Measure the inner diameter of connecting rod small end.
Specified Value: D = 28.005 - 28.020



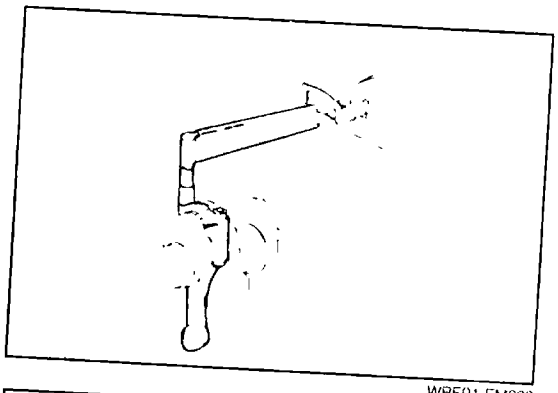
WRE91-EM198

(4) Calculate the oil clearance of piston pin to piston pin bush.
Specified Clearance: 0.005 - 0.027 mm
Limit: 0.05 mm

If the clearance is not within the specification, replace the connecting rod bush

WRE91 EM199

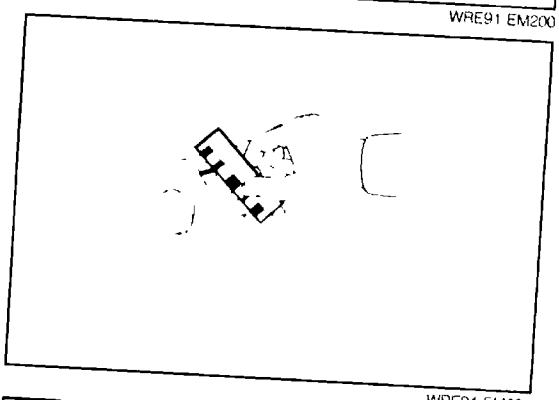
(5) Measure the crankpin journal oil clearance.
① Place plastigauge on the crankpin journal in parallel with the crankshaft.
② Tighten the bearing cap bolts to the specified torque.
Specified Torque: 68.6 ± 4.9 N·m (7.0 ± 0.5 kgf-m)



WRE91 EM200

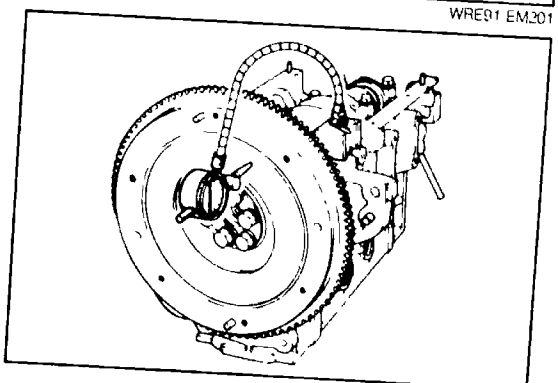
NOTE:
- Be sure not to turn the crankshaft or connecting rod during this crankpin journal oil clearance measurement.

③ Measure the largest width of flattened plastigauge.
Specified Value: 0.030 - 0.065 mm
Limit: 0.012 mm



WRE91 EM201

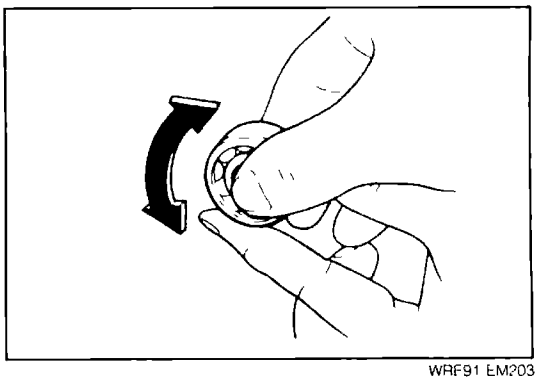
13. Inspection of flywheel
(1) Install the flywheel and measure the runout, using a dial gauge.
Tightening Torque: 11.5 - 14.0 kg-m (83 - 101 ft-lb)
Runout Limit: 0.2 mm (0.0079 inch)



WRE91 EM202

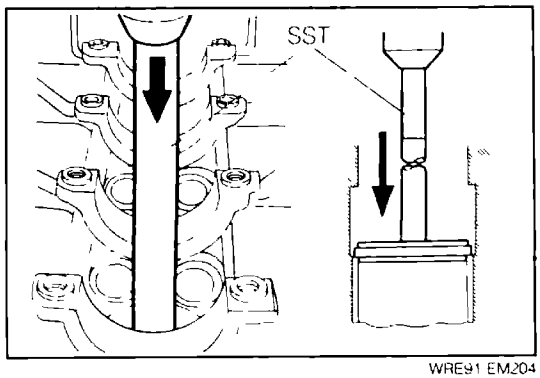
(2) Check the flat plane of the flywheel for roughness.

(3) Bearing
Rotate the bearing, while applying force to the bearing by your finger. If you do not feel any binding, it means that the bearing is satisfactory.


WRF91 EM203

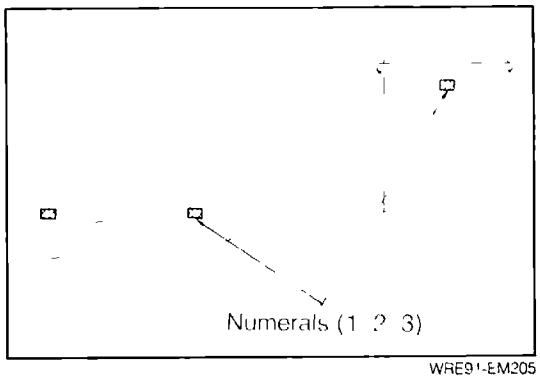
REPLACEMENT OF CYLINDER LINER

1. Remove the cylinder liner by using SST.
SST: 09221-87301-000



WRE91 EM204

2. Combination of cylinder liners and cylinder bores. Each cylinder bore bears a mate number stamped on the top surface of the cylinder block. Likewise, each liner bears a mate number stamped at the side of the liner. When a liner is press-fitted into a cylinder bore having the same number as the liner, you can get a proper combination of liner and bore



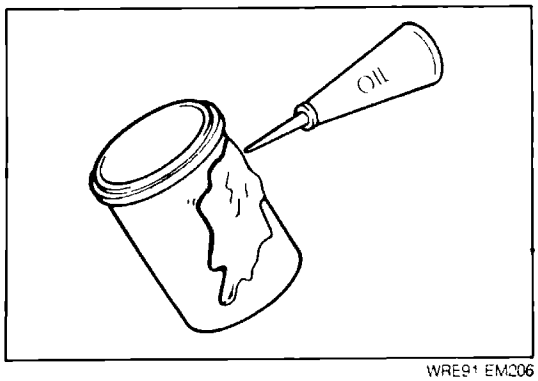
WRE91-EM205

Relationship Between Stamped Numbers and Cylinder Liner & Cylinder Block mm

Dimensions / Stamped number	Cylinder liner outer diameter	Cylinder block bore inner diameter
1	96 025 - 96 040	96 000 - 96 015
2	96 040 - 96 055	96 015 - 96 030
3	96 055 - 96 070	96 030 - 96 045

NOTE:
- After new cylinder liners have been press-fitted, boring machining and honing operation should be carried out for each bore in accordance with the STD piston outer diameter.

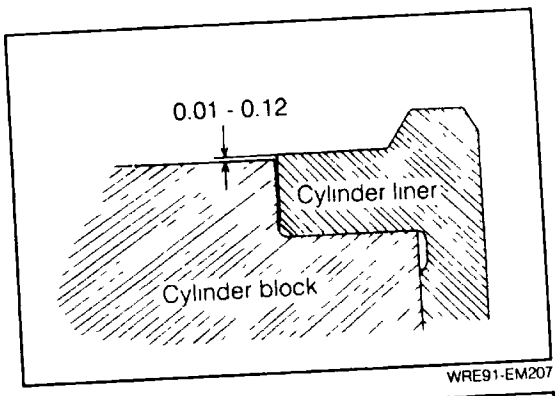
3 Apply engine oil to the outer circumference of each cylinder liner. Then, press each cylinder liner into position, using a press
Force to be applied for press-fitting: 24518 N (2500 kgf)



WRE91 EM206

ENGINE MECHANICAL

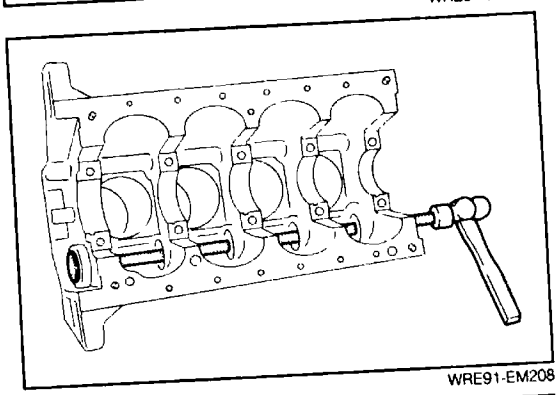
4. After new cylinder liners have been press-fitted, measure the projection height of each cylinder liner.
   Specified Projection Height: 0.01 - 0.12 mm



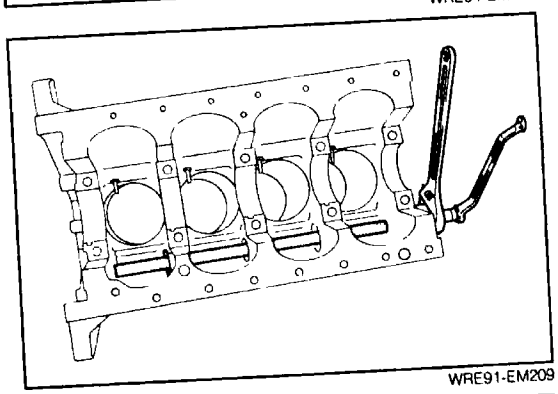
WRE91-EM207

REPLACEMENT OF CAMSHAFT BEARING

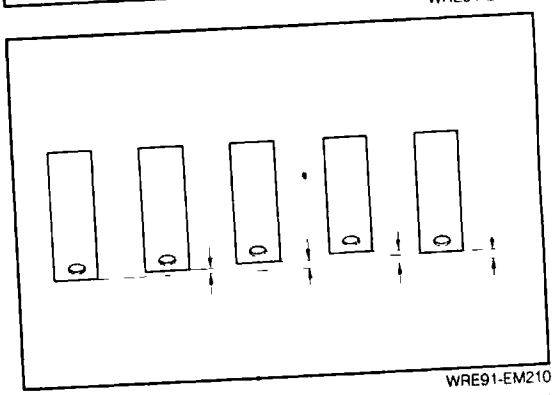
1. Removal of camshaft bearing
   (1) Remove the expansion plug by using SST and a hummer.
   SST: 09215-87601-000


WRE91-EM208

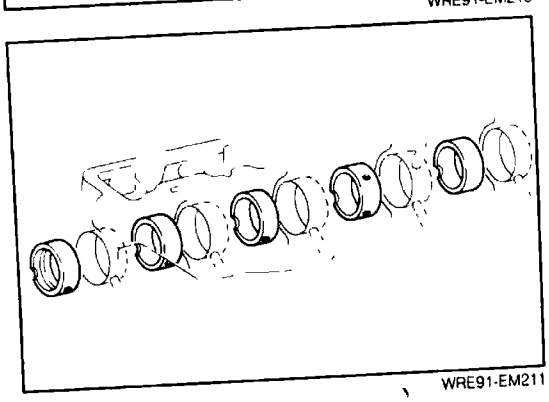
   (2) Remove the camshaft bearings by using SST.
   SST: 09215-87601-000


WRE91-EM209

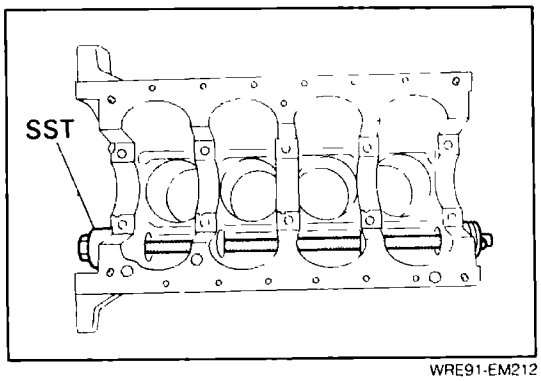
2. Installation of camshaft bearing
   (1) Install new bearings in their proper location.


WRE91-EM210

   (2) Align the oil holes of the bearing and cylinder block.

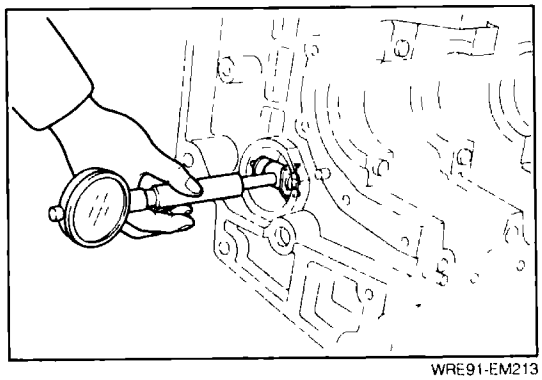

WRE91-EM211

(3) Install the camshaft bearings by using SST.
SST: 09215-87601-000

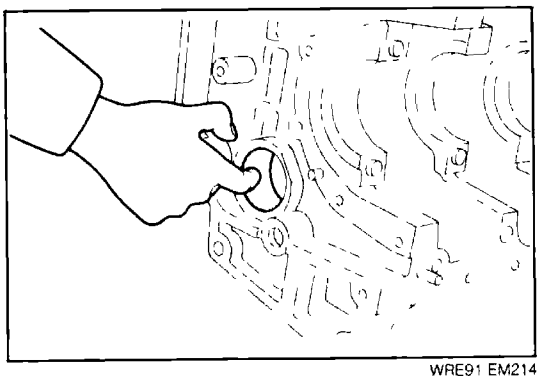


WRE91-EM212

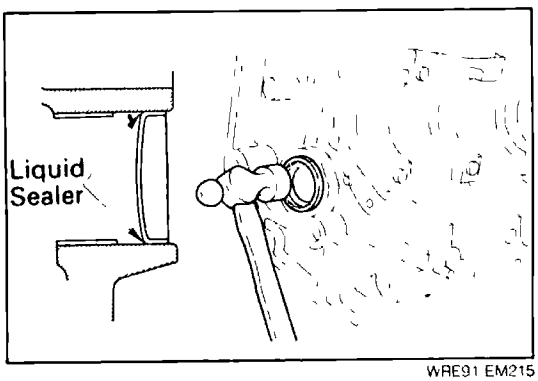
3 Check the camshaft oil clearance.


WRE91-EM213

4. Installation of the expansion plug
(1) Apply liquid sealer to expansion plug surface of the cylinder block.


WRE91 EM214

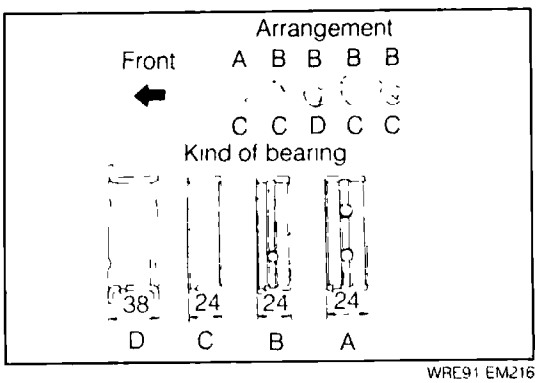
(2) Install the expansion plug into the cylinder block by using a hummer.



WRE91 EM215

ASSEMBLY OF CYLINDER BLOCK

1. Install the crankshaft bearing.
(1) Prior to the installation, thoroughly wipe the backside or each bearing so as to remove any oil.
(2) Apply a thin film of engine oil to the rotary section of each bearing.



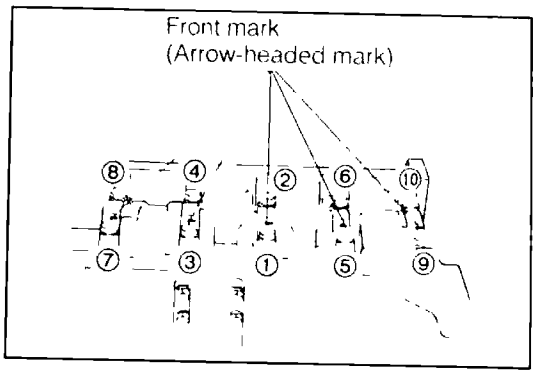
WRE91 EM216

2. Install the crankshaft

3 Install the bearing caps in the sequence of numbers with the arrow-headed mark on each bearing cap faced toward the front direction

Tighten the bearing cap bolts in the sequence as indicated in the illustration. After the bearing cap bolts have been tightened, make sure that the crankshaft can be turned lightly by hands

Cap Bolt Tightening Torque: 103.0 ± 6.9 N·m (10.50 ± 0.7 kgf-m)



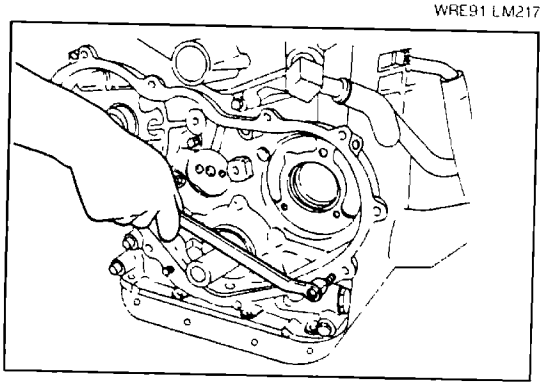
NOTE:

- Prior to the assembly, apply engine oil to the threaded portion and bearing section of each cap bolt.

4 Install the timing belt case.

Tightening Torque: 18.1 ± 3.4 N·m (1.85 ± 0.35 kgf-m)

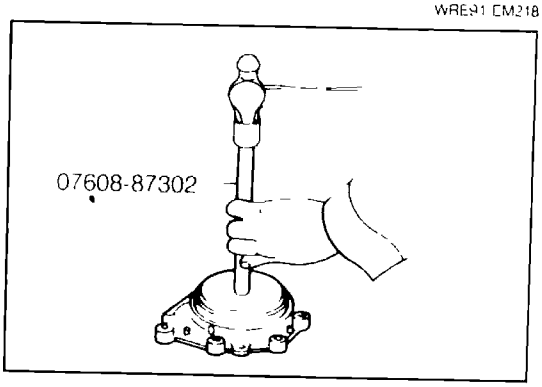
WRE91 EM217



WRE91 EM218

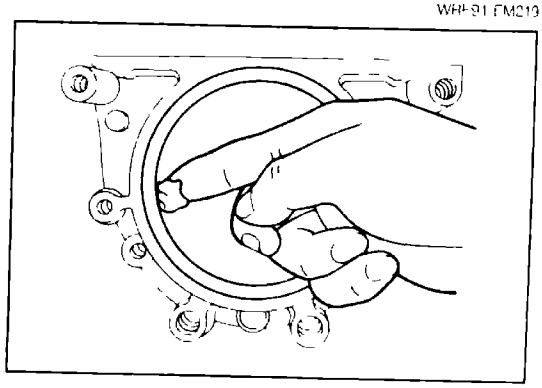
5 Drive the oil seal into position, using the SST.

SST: 09608-87302-000



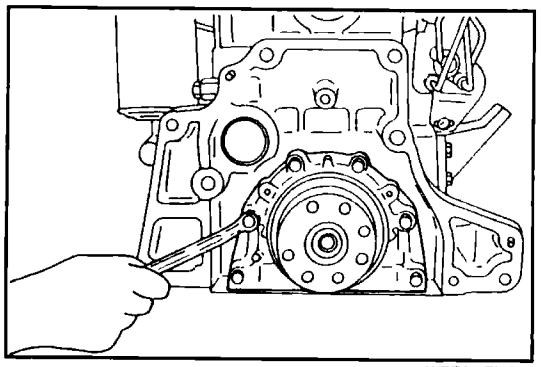
WRE91 EM219

6 Prior to the installation, apply a small amount of MP grease to the lip-section of the oil seal.



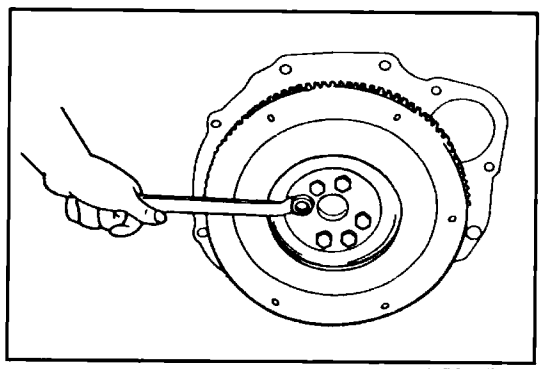
WRE91 EM220

7. Install the oil seal retainer.
8. Install the rear end plate.



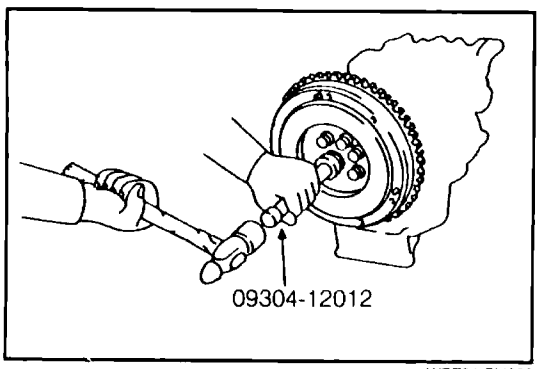
WRE91-EM221

9. Install the flywheel.
   Tightening Torque: 125.0 ± 12.3 N·m
   (12.75 ± 1.25 kgf-m)



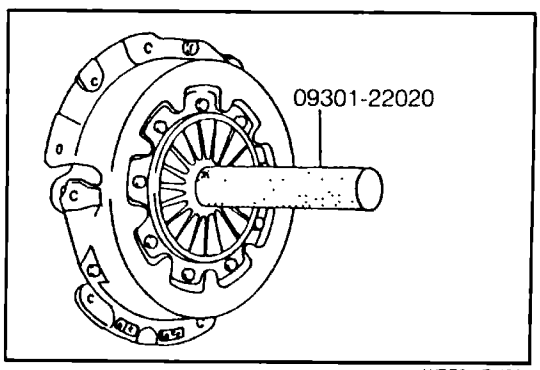
WRE91-EM222

10. Drive the bearing into position, using the SST.
    SST: 09304-12012-000



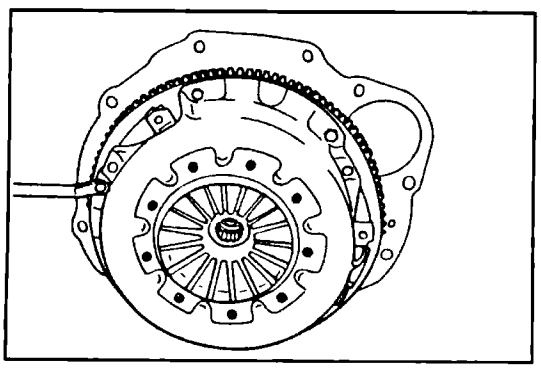
WRE91-EM223

11. Install the clutch disc and clutch cover, using the SST.
    SST: 09301-22020-000



WRE91-EM224

12. Install the clutch cover.
    Tightening Torque: 19.6 ± 4.9 N·m
    (2.00 ± 0.50 kgf-m)

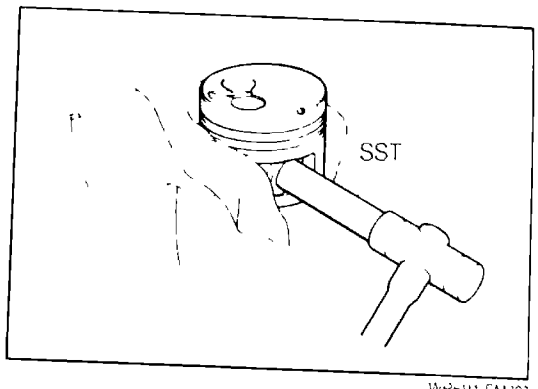


WRE91-EM225

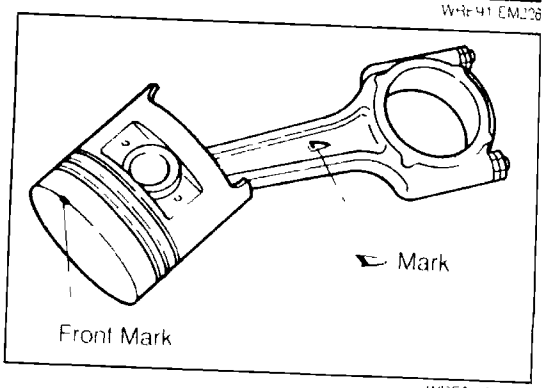
E EN ENGINE MECHANICAL

4. 2. 3. 13 Assemble the piston in the connecting rod, using the SST
SST: 09221-87601-000

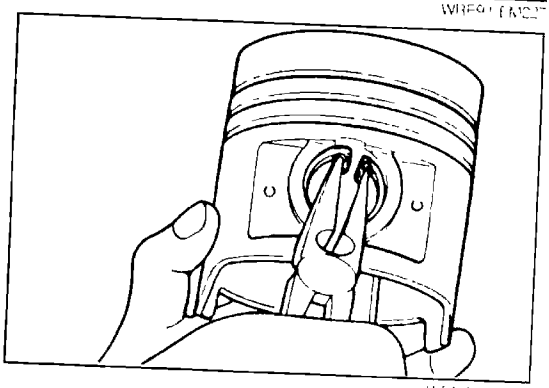
NOTE:
- Prior to the piston pin insertion, be sure to heat the piston at about 60°C, using a piston heater.



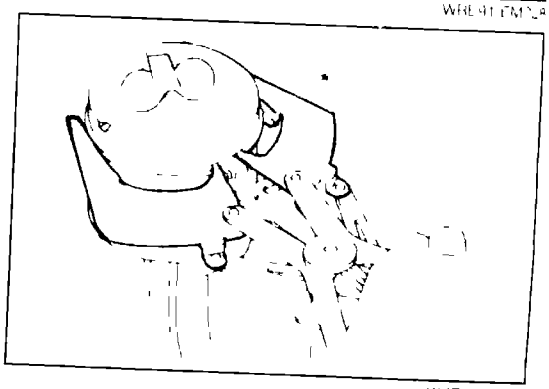
R 1 14 Make sure that the front mark in the piston and the "D" mark on the connecting rod come on the same side.



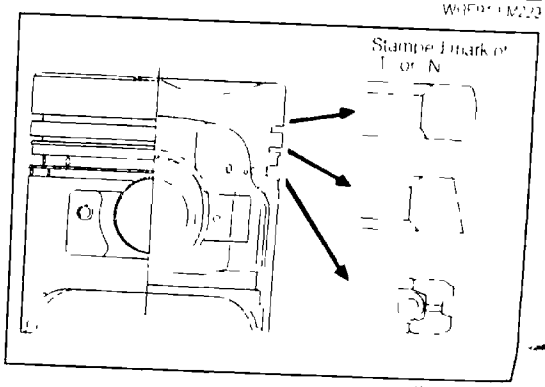
4 15 Install hole snap rings securely in position



2 5 16 Install piston rings on each piston, using a piston ring expander. The piston rings should be installed in the sequence of the oil ring, No. 2 ring and No 1 ring.

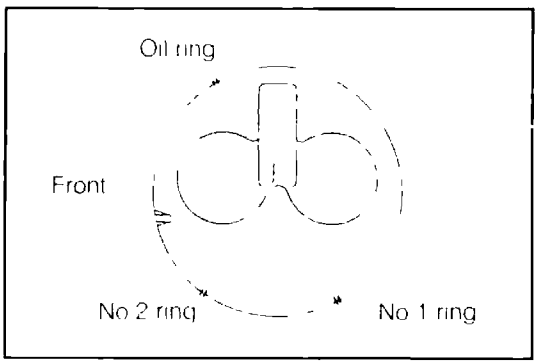


6 NOTE:
- Be certain to install piston rings in such a way that the stamped mark at the end section of each ring faces upward.



ENGINE MECHANICAL

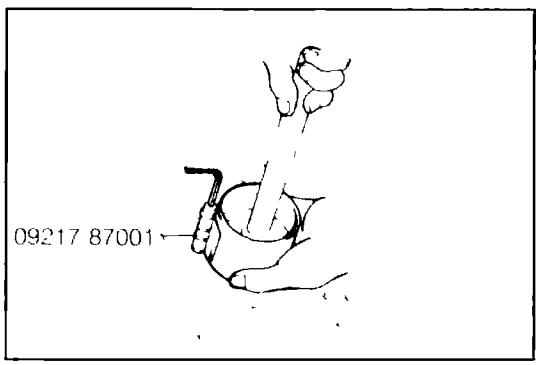
17 Set the piston rings in such a way that their end gaps assume the respective positions as shown in the illustration.



WRE91 EM231

18 Install the pistons in the cylinder block, using the SST.
SST: 09217-87001-000

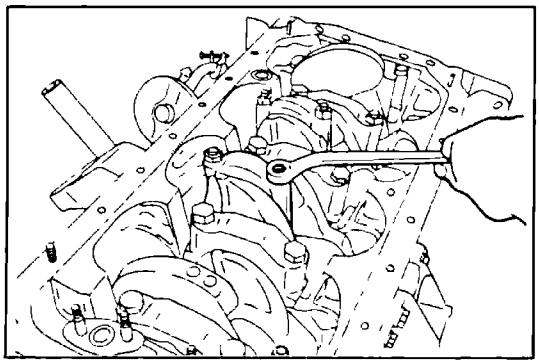
NOTE:
- When installing the pistons, make sure that the front mark of each piston faces toward the front of the engine.



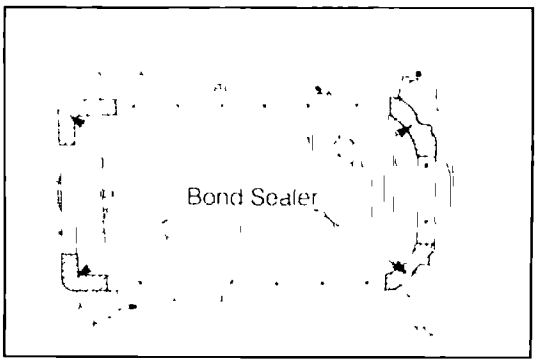
WRE91 EM232

19 Install the connecting rod bearing cap.
Tightening Torque: 68.6 ± 4.9 N·m
(7.00 ± 0.50 kgf-m)

NOTE:
- Tighten the connecting rod bearing cap with the front mark facing forward.
- Prior to the assembly, coat the inside of each bearing with a film of engine oil.
- Also, apply engine oil to the threaded portion of each bolt and the bearing section of each nut.

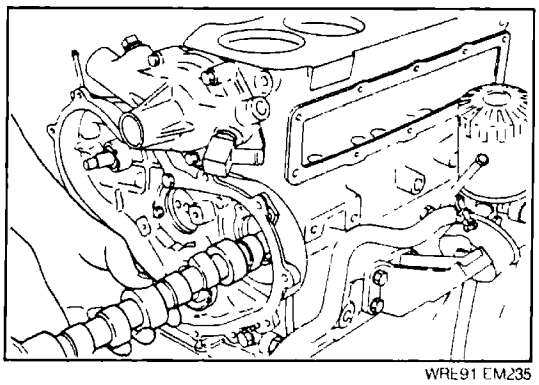

WRE91-EM233

20. Install the oil pan. When installing the oil pan, apply bond sealer to the gasket installation surface on the cylinder block side.
Tightening Torque: 9.3 ± 2.5 N·m
(0.95 ± 0.25 kgf-m)

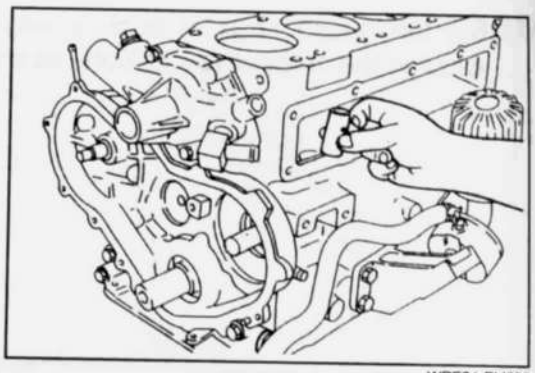


WRE91-EM234

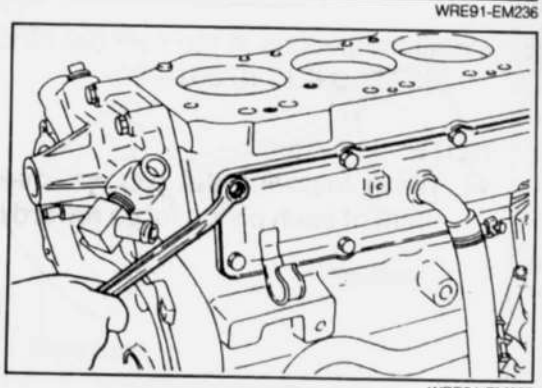
21 Install the camshaft, using care not to damage the camshaft bearings


WRE91 EM235

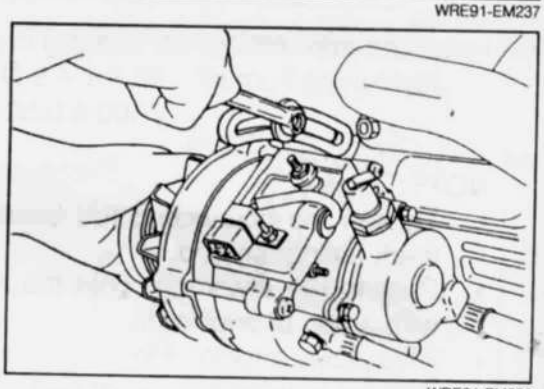
22. Install the valve lifter.
NOTE:
- Those valve lifters which have been stored in order should be installed as a set to the original cylinders, respectively.


WRE91-EM236

23. Install the push rod cover.

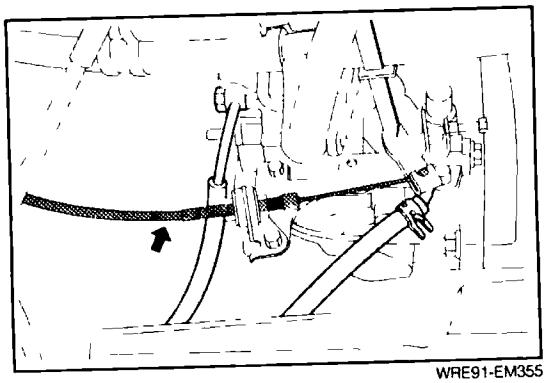

WRE91-EM237

24. Install the alternator.

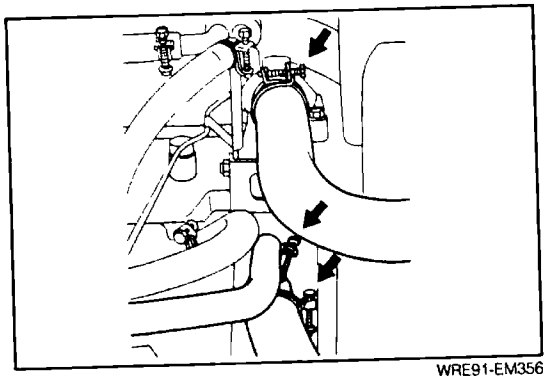

WRE91-EM230

INSTALLATION OF ENGINE ASSY

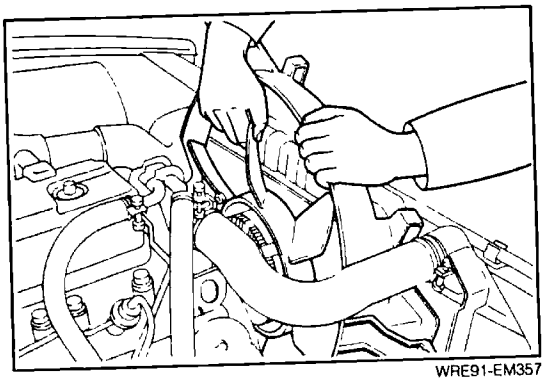
1. Place the engine assy into engine compartment by using chain block.
2. Connect the engine mounting.
3. Install the transmission into the engine installation part and tighten attaching bolts.
4. Connect the exhaust pipe.
5. Connect the engine harness.
6. Connect the fuel pipes and hoses.


WRE91-EM355

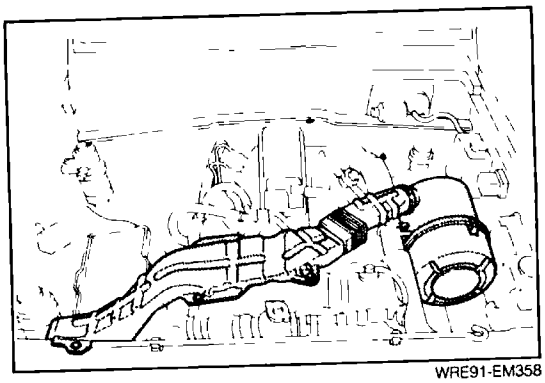
7. Connect the water hoses.


WRE91-EM356

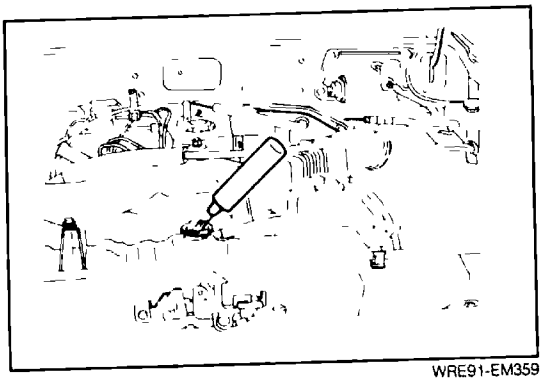
8. Install the radiator and cooling fan.


WRE91-EM357

9. Install the air cleaner sub-assy.
10. Install the battery.


WRE91-EM358

11. Fill the coolant and engine oil.
12. Install the engine hood.
13. Start the engine.
14. Check and tune up the engine.


WRE91-EM359

POSITIVE CRANKCASE VENTILATION (PCV)

To combat with air pollution problems, the engine is equipped with a sealed type PCV system in order to prevent blow-by gases generated inside the crankcase from being released into the atmosphere. Blow-by gases generated inside the crankcase pass the side of the camshaft and push rod in the cylinder block and flow into the cylinder head. The blow-by gases which entered the cylinder head is introduced into the intake manifold (the entrance of the turbo charger in the case of type DL-52 engine) through the cylinder head cover and blow-by gas hose. Then, the blow-by gases are sucked into the combustion chamber and burnt there together with intake air.

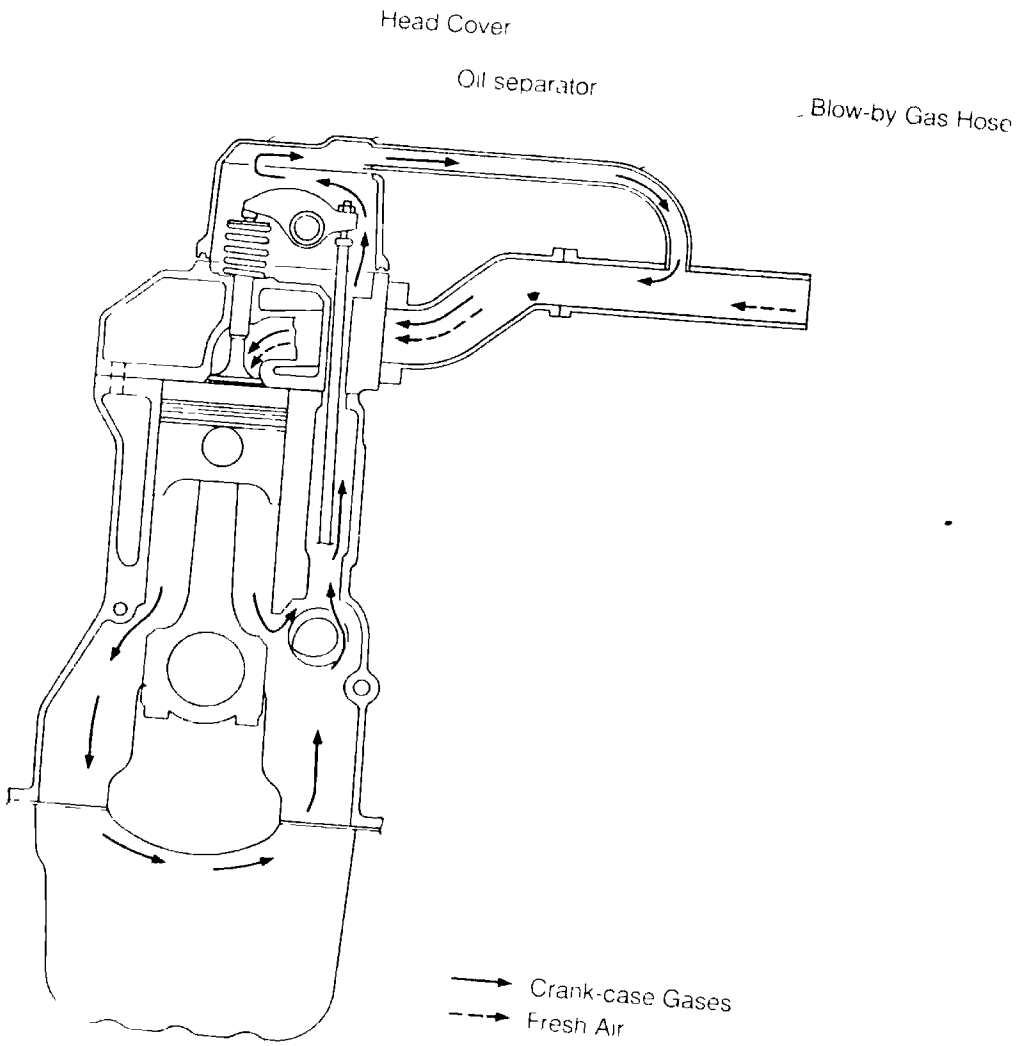
When blow-by gases pass through the cylinder head cover, oil mist component is separated at the oil separator section provided at the cylinder head cover.

In this way, the oil carrying-out is reduced and the intake manifold is prevented from being contaminated.

DL-42 Engine

DL-42 Engine

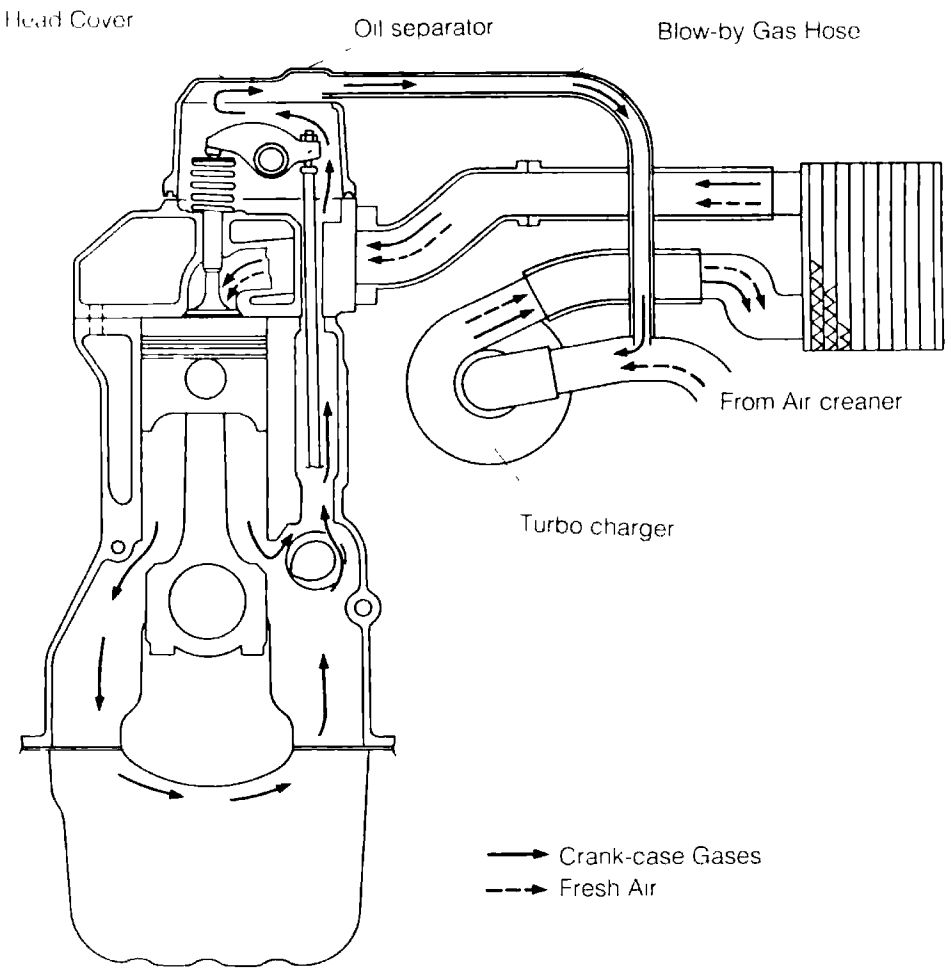
Positive crankcase ventilation system



WRE91-EM240

DL-52 Engine

Positive crankcase ventilation system



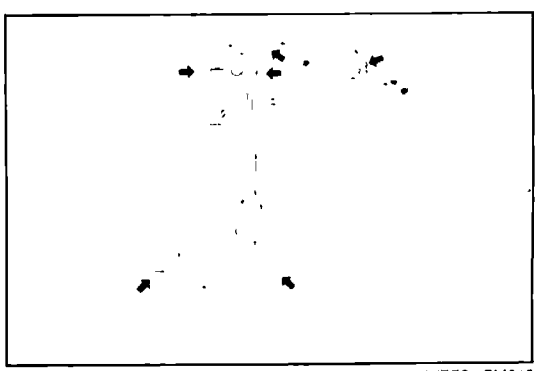
WRE91 EM241

Inspection of PCV Hose & Connection

Visual inspection of hose and connection

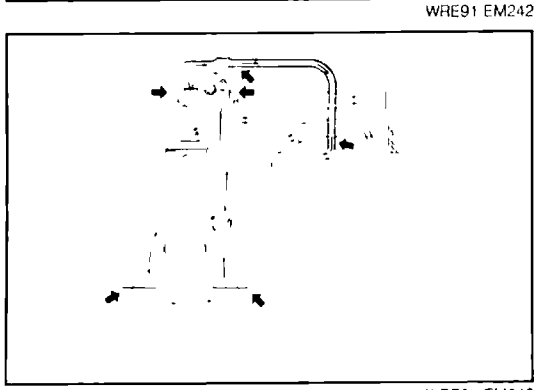
Check the hose for improper connections, cracks, leak or damage

Check the cylinder block to oil pan and cylinder head cover contact surface for leak or damage.



WRE91 EM242

Replace or repair any part which exhibits defects.

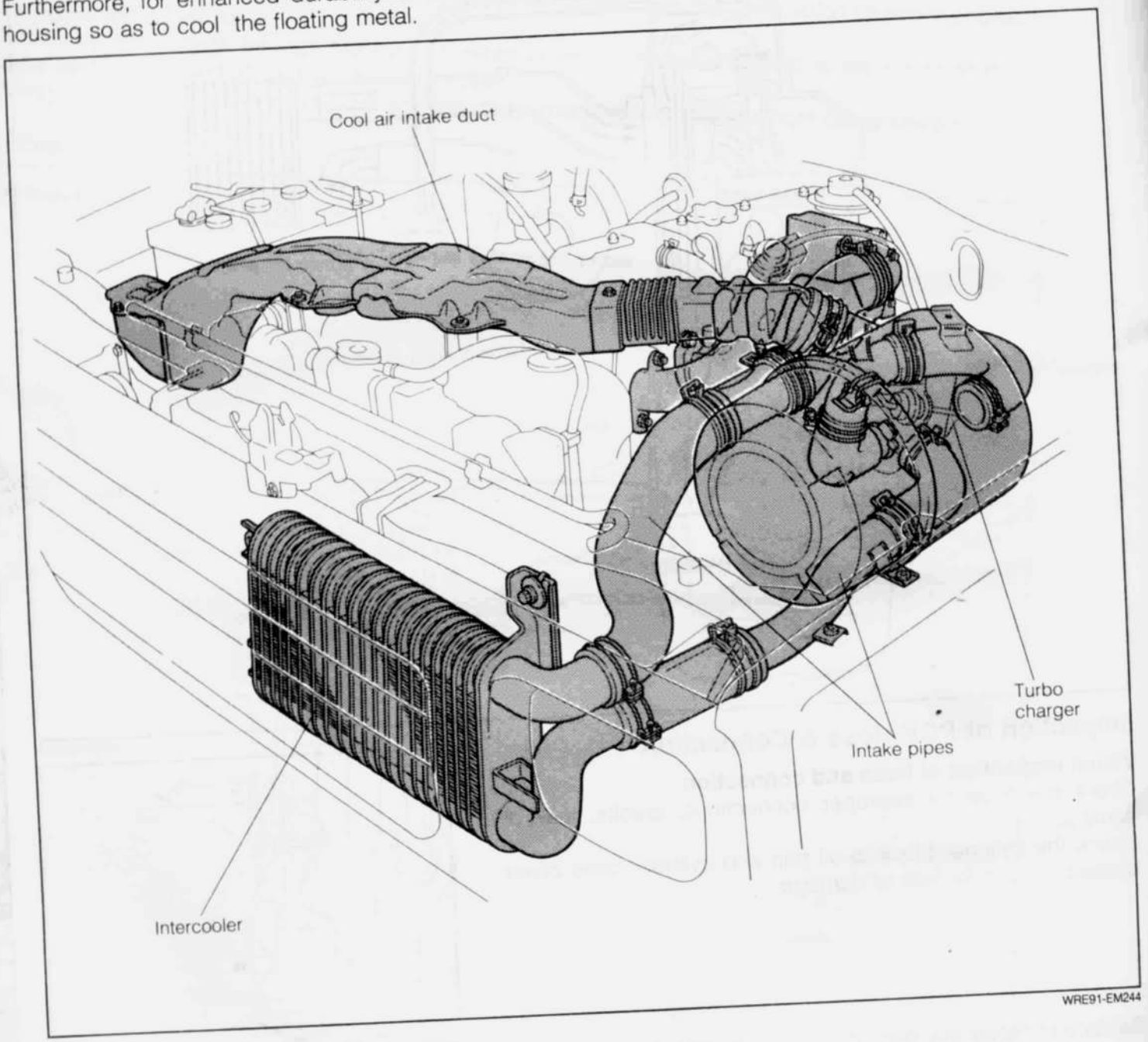


WRE91 EM243

ENGINE MECHANICAL

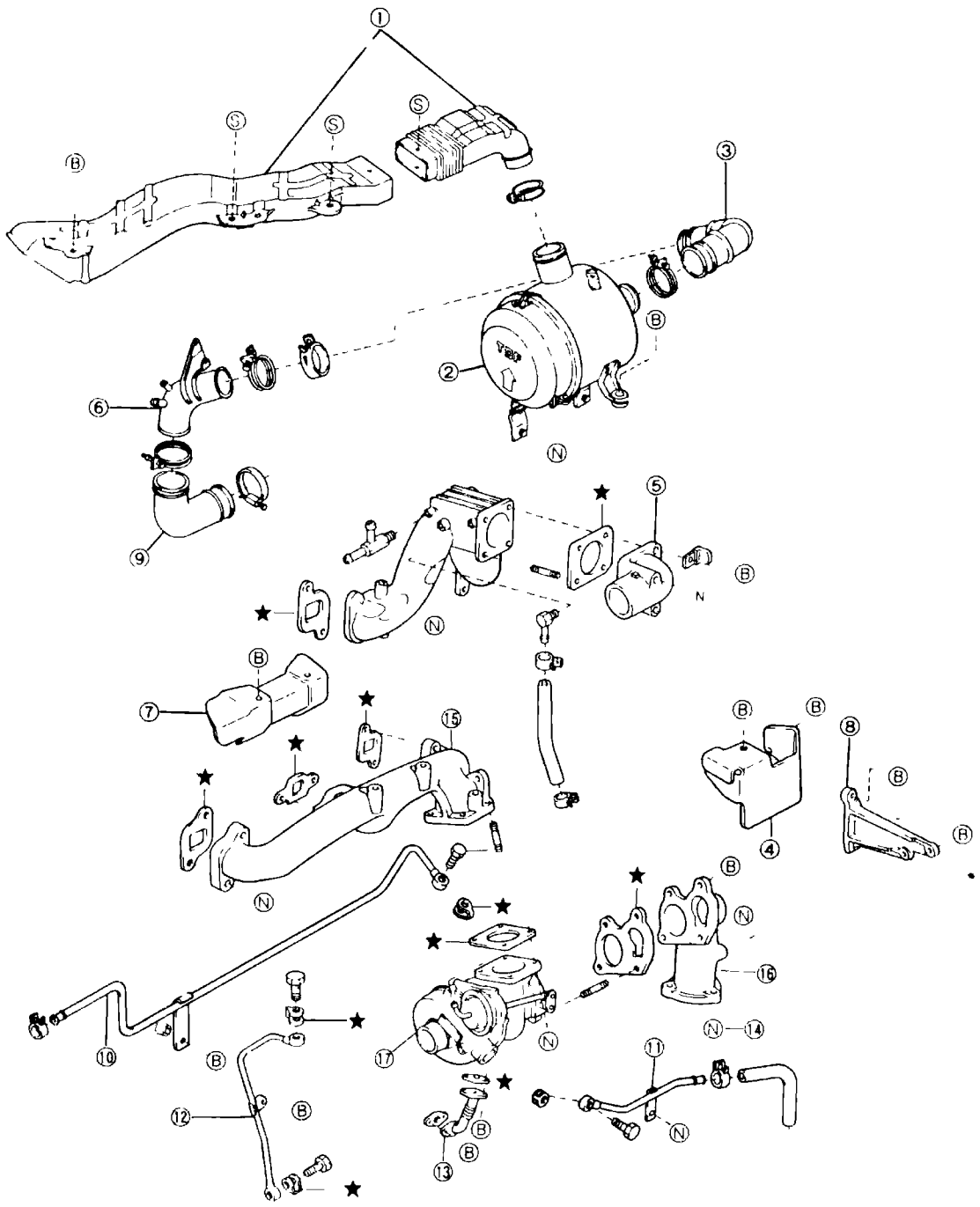
TURBO CHARGER SYSTEM

Because of the newly employment of the intercooler, intake pipes have been provided newly and the air cleaner and cool air intake duct have been changed. Consequently, volumetric efficiency has been improved and also the maximum output power has been increased from 67 kW to 75 kW.
Furthermore, for enhanced durability and reliability, the cooling water is circulated in the turbo charger housing so as to cool the floating metal.



WRE91-EM244

COMPONENTS

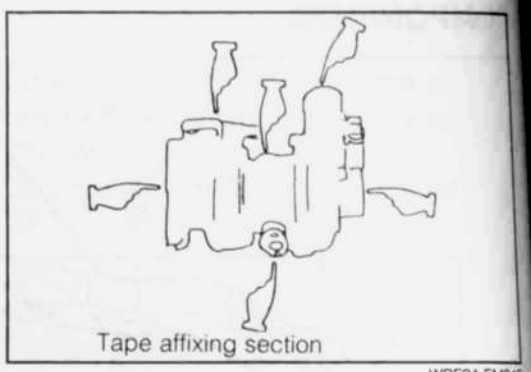


★ : **Non-reusable part**

① Cool air intake duct S/A
② Air cleaner Ay W/element
③ Air hose No 1
④ Exhaust manifold cover
⑤ Intake manifold No 2
⑥ Air intake No 1
⑦ Exhaust manifold heat insulator No 1
⑧ Turbo charger stay
⑨ Air hose No 2
⑩ Water bypass pipe No 2
⑪ Water bypass pipe No 1
⑫ Nut
⑬ Turbo charger outlet pipe S/A
⑭ Turbo charger inlet pipe S/A
⑮ Exhaust manifold
⑯ Turbine outlet elbow
⑰ Turbo charger S/A

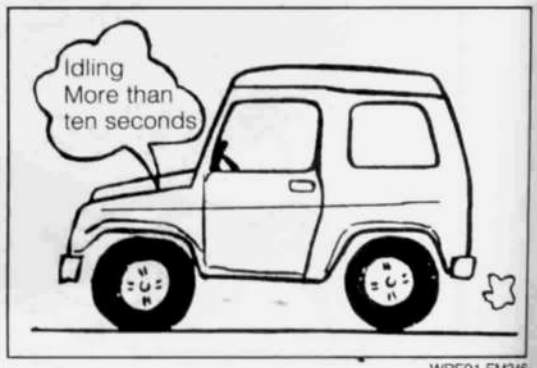
WRL91EM361

SERVICING INSTRUCTIONS FOR TURBOCHARGER



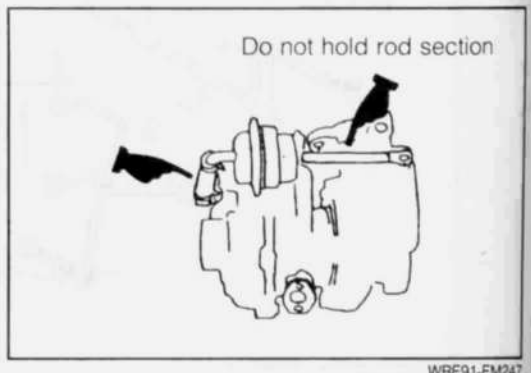
WRE91-EM245

1. Never disassemble the turbocharger, because it is a precision component whose assembly requires utmost care.
2. After the turbocharger has been removed, affix gum tapes, etc. to the inlet/outlet ports of the oil and those of the intake/exhaust gases so that no dirt or foreign matter may enter.
3. When disassembling the intake, exhaust and lubricating systems, care must be taken so that no dirt or foreign matter may enter.
4. Never rotate the engine when the intake manifold No. 2, intake air connector and turbine outlet elbow, etc. are disconnected (so as to prevent foreign matters from entering).
5. Use the specified attaching set bolts and nuts of the turbocharger since they have under-gone the heat-resistant treatment.



WRE91-EM246

6. After the turbocharger has been replaced, keep the engine idling for more than ten seconds after it starts. If the revolutional speed is increased sharply, the bearings of the turbocharger may be damaged.
   In addition, make sure that no oil leaks from the oil pipe.
7. Replace the removed gasket and seal, etc. with new ones. Moreover, tighten the section to the specified torques so that no leakage takes place.



WRE91-EM247

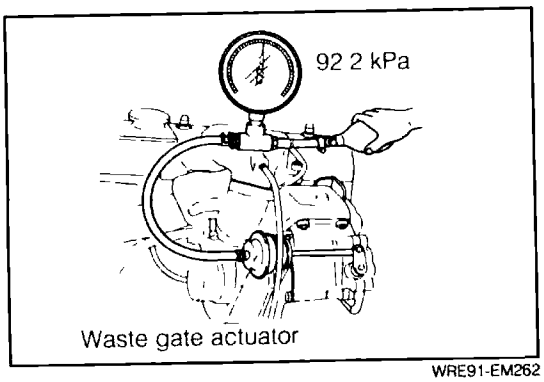
8. Do not hold the waste gate valve rod section.



WRE91-EM248

9. Since the turbocharger is a precision part, do not drop it.
10. Do not remove the residual oil completely from the bearing section. (The residual oil refers to such an amount of oil that remains on the surface after the oil has flown naturally.)
11. Do not place the turbocharger vertically.
    Under such condition, the oil in the shaft section flows to the impeller room and this may be mistakenly regarded as an oil leakage.

1. Checking operation of turbocharger waste gate valve
   (1) Remove the waste gate actuator hose at the actuator side.
   (2) Connect the turbocharger pressure gauge. Ensure that the rod and link operate when a pressure of 92.2 kPa (0.94 kgf/cm^2) is applied and that the valve returns to the original position smoothly when the pressure is released.
   Specified Value:
   Shaft Stroke: About 2 mm With a pressure of 92.2 kPa (0.94 kgf/cm^2)

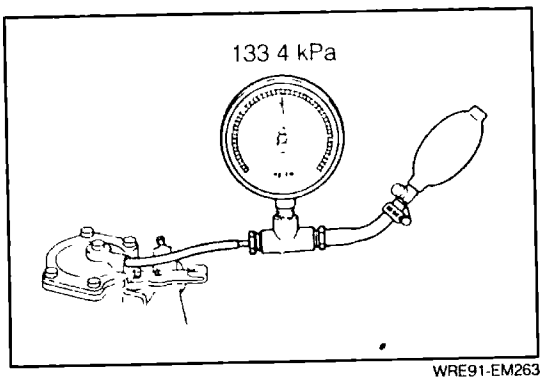


WRE91-EM262

NOTE:
- **If the pressure exceeding 117.7 kPa (1.2 kgf/cm^2) should be applied to the waste gate actuator, the diaphragm may be damaged.**

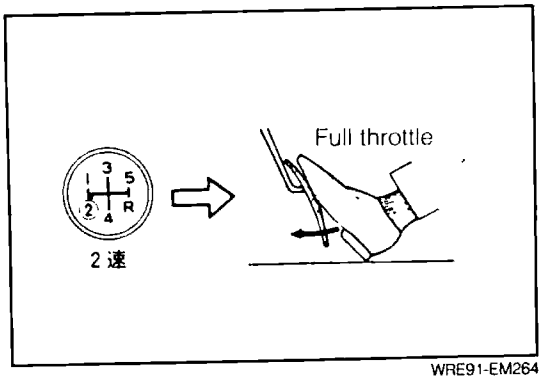
   (3) Check the hose for crack and damage.

2. Checking air-tightness of boost compensator
   (1) Connect the turbocharger to the boost compensator.
   (2) Apply a positive pressure of 133.4 kPa (1.36 kgf/cm^2) and measure the time required for the pressure to drop to 130.4 kPa (1.33 kgf/cm^2)
   Specified Value: Not less than 10 seconds



WRE91-EM263

3 . Check of supercharging pressure (running test)
   To obtain total evaluation, perform a running test and measure the supercharging pressure.
   The running test must be carried out at a place where the vehicle can be accelerated safely with full throttle of the accelerator pedal in the second gear. One person drives a vehicle and the other person performs measurement. (Two persons aboard)
   (1) Connect a turbo charger pressure gauge to the vacuum hose of the intake manifold with a three-way joint interposed. Place the gauge in the vehicle interior.
   (2) After the engine has warmed up, accelerate the vehicle at full throttle up to 3,500 rpm with the second gear.

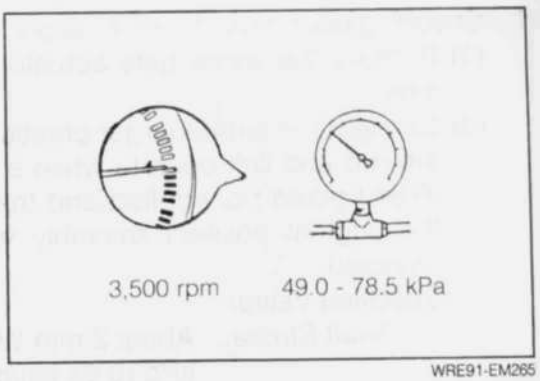


WRE91-EM264

(3) Measure the maximum supercharging pressure generated while the vehicle is accelerated up to 3,500 rpm.
Specified Value: 49.0 - 78.5 kPa (0.50 - 0.80 kgf/cm^2)

If the measured value is less than the specified value, most likely there exists the following malfunction.
① Leakage at waste gate valve
② Improper increase in injection amount of boost compensator or bent vacuum hose
③ Leakage at intake or exhaust system
④ Air cleaner, muffler, fuel filter and so forth restricted
⑤ Turbo charger malfunction
⑥ The engine proper faulty

If the measured value exceeds the specified value, most likely there exists the following malfunction.
① Malfunctioning injection pump



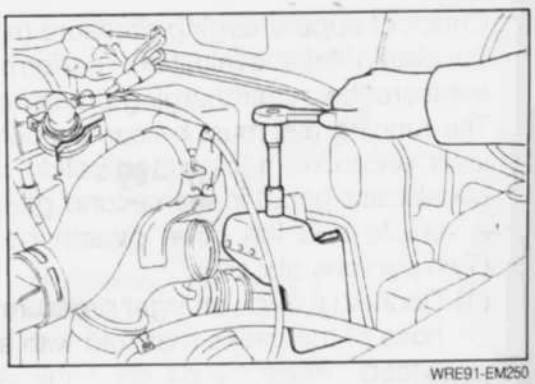
WRE91-EM265

REMOVAL OF TURBO CHARGER

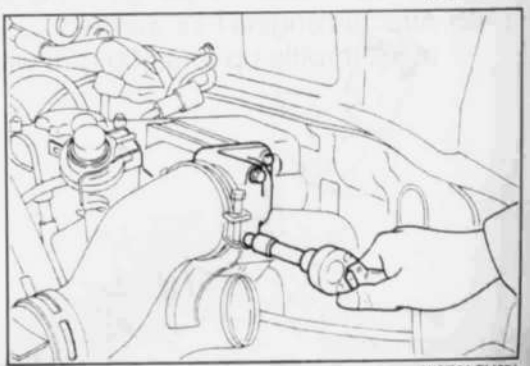
1. Disconnect the engine ground cable from the negative (–) terminal of the battery.
2. Drain the cooling water.
3. Removal of air cleaner
   (1) Remove the cool air intake duct subassembly by loosening the three screws.
   (2) Disconnect the air hose No.1.
   (3) Remove the air cleaner assembly by loosening the four air cleaner attaching bolts.


WRE91-EM249

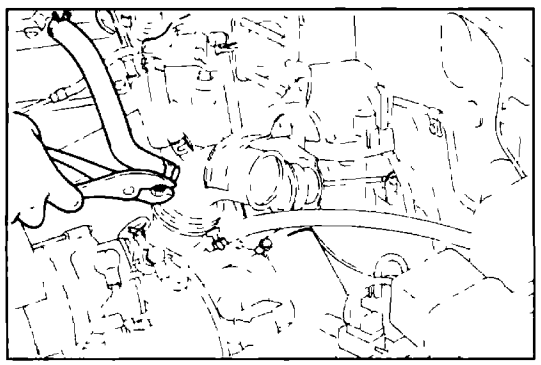
4. Remove the exhaust manifold cover by loosening the two attaching bolts.


WRE91-EM250

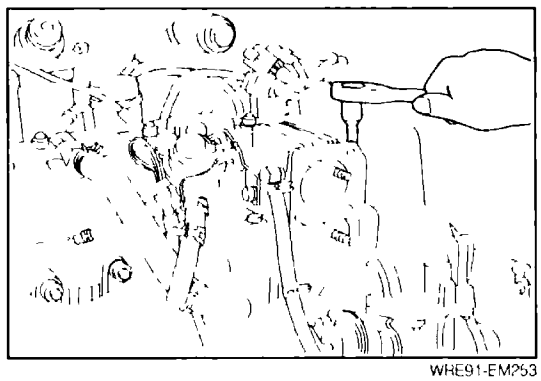
5. Remove the intake manifold No.2 by loosening the two attaching bolts and two attaching nuts.
   NOTE:
   • Never reuse the removed gasket.


WRE91-EM251

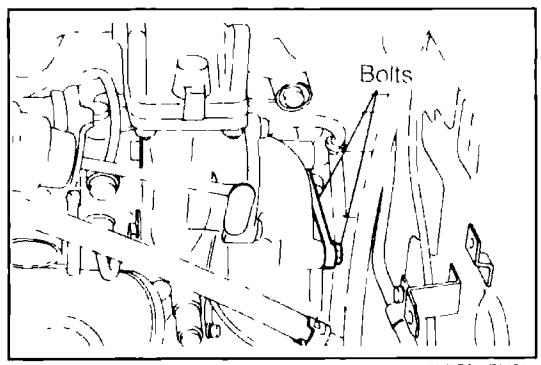
6 Disconnect the following hoses from the air intake No.1. Then, remove the air intake No.1 from the turbo charger.
- PCV hose
- PCS hose
- Turbo charger actuator hose


WRE91 EM252

7 Remove the exhaust manifold heat insulator No.1 by loosening the two bolts.

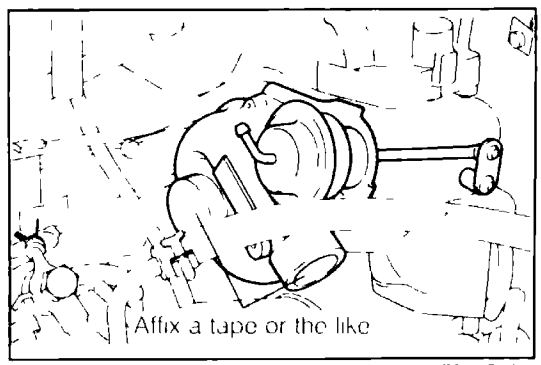

WRE91-EM253

8 Remove the two attaching bolts of the turbo charger stay and turbine outlet elbow.



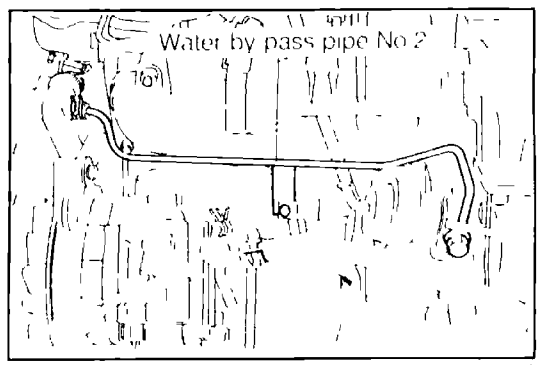
WRE91 EM254

9 Disconnect the air hose No.2 from the turbo charger
NOTE:
- Seal the suction port with a tape or like so as to prevent dust from entering the turbo charger.



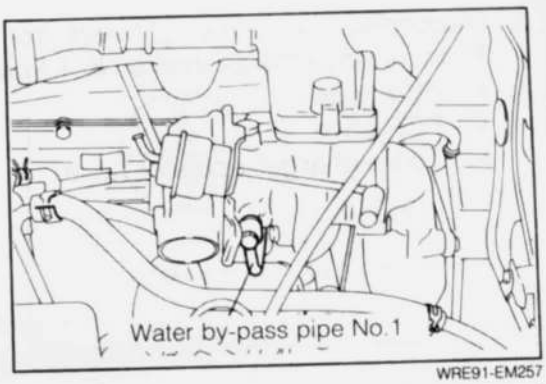
WRE91-EM255

10. Disconnect the water by-pass hose No.2.
NOTE:
- Never reuse the removed gasket.



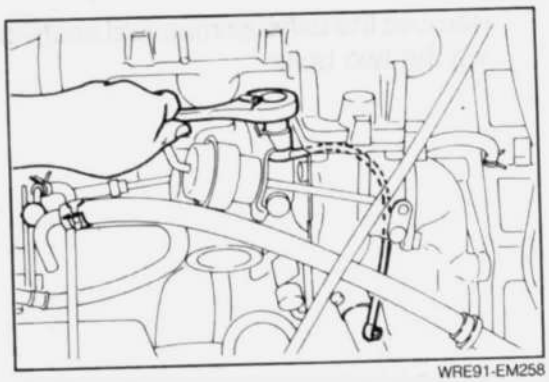
WRE91 EM256

11. Disconnect the water by-pass hose No.1.
    NOTE:
    - Never reuse the removed gasket.

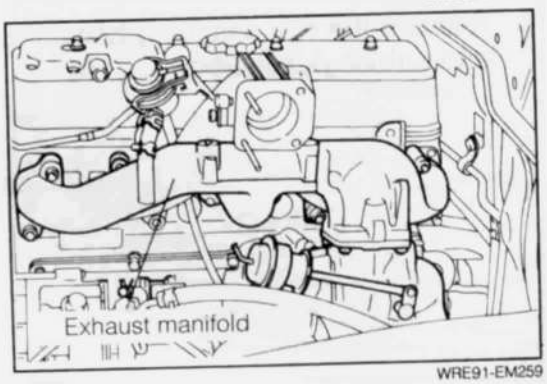


WRE91-EM257

12. Disconnect the oil inlet pipe of the turbo charger.
13. Remove the two attaching bolts of the oil outlet pipe at the turbo charger side.
    NOTE:
    - Never reuse the removed gasket.

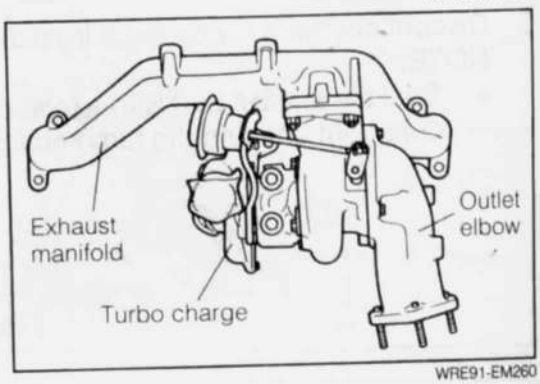

WRE91-EM258

14. Move the front exhaust pipe downward by removing the three attaching nuts of the front exhaust pipe.
15. Remove the exhaust manifold together with the turbo charger by loosening the six attaching nuts of the exhaust manifold.
    NOTE:
    - Never reuse the removed gasket.



WRE91-EM259

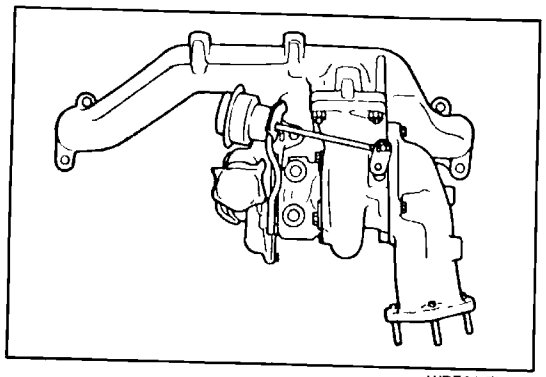
16. Removal of turbo charger
    (1) Remove the turbine outlet elbow from the turbo charger by loosening the two bolts and two nuts.
    (2) Remove the turbo charger from the exhaust manifold by loosening the four attaching nuts.
    NOTE:
    - Never reuse the removed gasket.
    - Never hold the actuator rod section during the removal of the turbo charger.
    - Affix a tape or the like so as to prevent any foreign matters from entering each of water port and oil port of the turbo charger.



WRE91-EM260

INSTALLATION OF TURBO CHARGER

1. Clean each gasket installing surface of the turbo charger.
2. Install the exhaust manifold to the turbo charger.
   Tightening Torque: 24.5 ± 4.9N·m (2.5 ± 0.5 kgf-m)



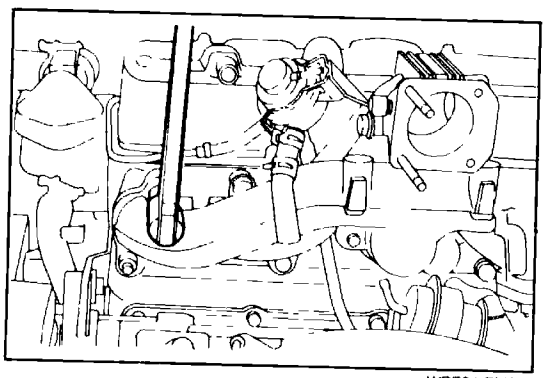
WRE91-EM266

3. Install the turbine outlet elbow to the turbo charger.
   Tightening Torque: 24.5 ± 4.9N·m (2.5 ± 0.5 kgf-m)

   NOTE:
   - Be very careful not to deform the turbo charger actuator rod.
   - Never disassemble the turbo charger or tighten the bolts further.
   - Use a new gasket.

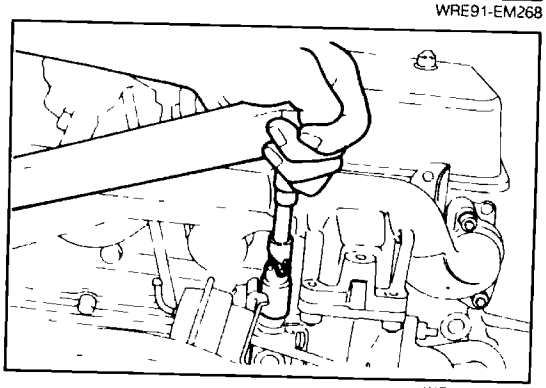
WRE91-EM267

4. Temporarily install the exhaust manifold together with the turbo charger to the engine.
   NOTE:
   - Use a new gasket.



WRE91-EM268

5. Connect the oil outlet pipe to the turbo charger.
   Tightening Torque: 7.4 ± 1.5 N·m
   (0.75 ± 0.15 kgf-m)



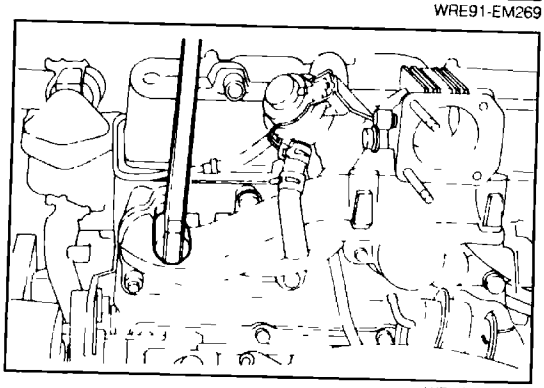
WRE91-EM269

6. Connect the oil inlet pipe of the turbo charger.
   Tightening Torque: 17.2 ± 2.5 N·m
   (1.75 ± 0.25 kgf-m)

   NOTE:
   - Use a new gasket.

7. Fully tighten the exhaust manifold.
   Tightening Torque: 46.6 ± 4.9 N·m
   (4.75 ± 0.75 kgf-m)

8. Install the front exhaust pipe.
   Tightening Torque: 49.0 ± 4.9 N·m
   (5.00 ± 0.50 kgf-m)

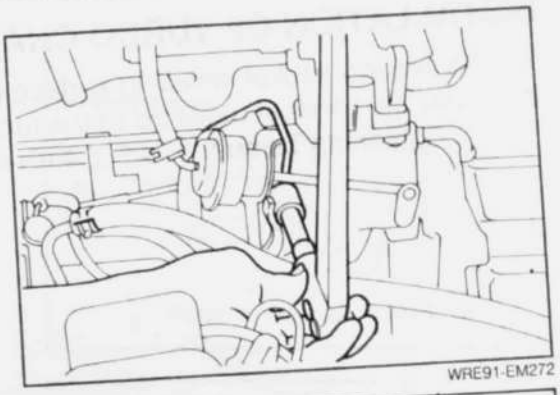


WRE91 EM271

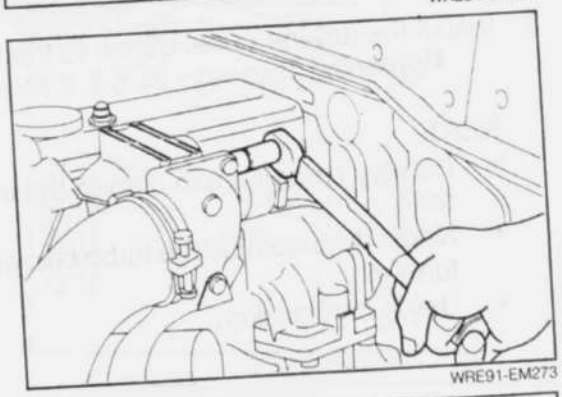
ENGINE MECHANICAL

9. Install the water by-pass valve No.1.
   Tightening Torque: 29.4 ± 4.9 N·m (3.00 ± 0.50 kgf-m)
10. Install the water by-pass valve No.2.
    Tightening Torque: 29.4 ± 4.9 N·m (3.00 ± 0.50 kgf-m)

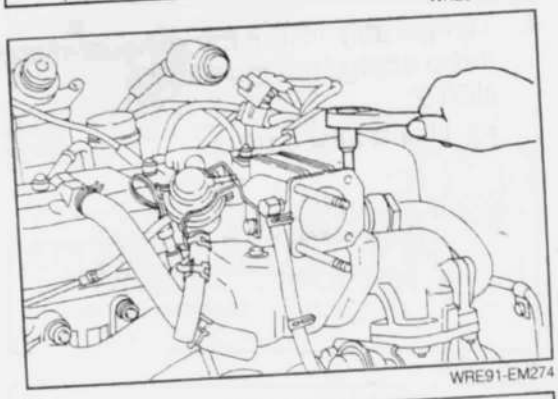
NOTE:
- Use a new gasket.


WRE91-EM272

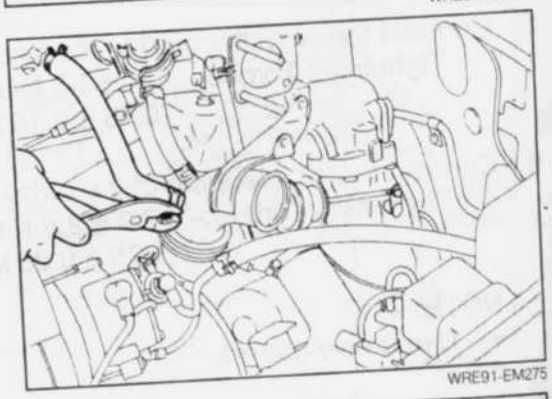
11. Connect the air hose No.2.
12. Tighten the turbo charger stay and turbine outlet elbow.
    Tightening Torque: 18.1 ± 3.4 N·m (1.85 ± 0.35 kgf-m)


WRE91-EM273

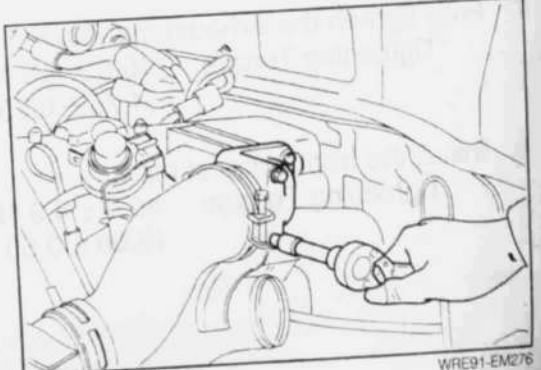
13. Install the exhaust manifold heat insulator No.1.


WRE91-EM274

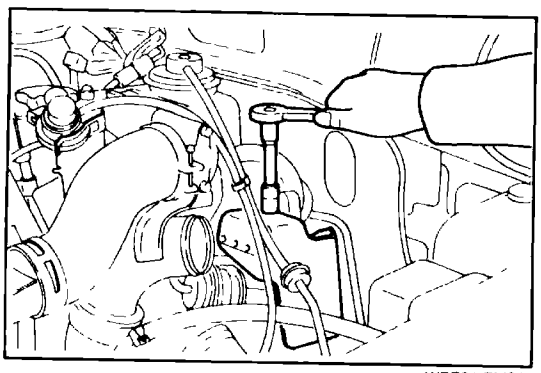
14. Install the air intake No.1 to the turbo charger.
15. Insert the following hoses into the air intake No.2. Attach clips.
    - PCV hose
    - PCS hose
    - Turbo charger actuator hose


WRE91-EM275

16. Install the intake manifold No.2.

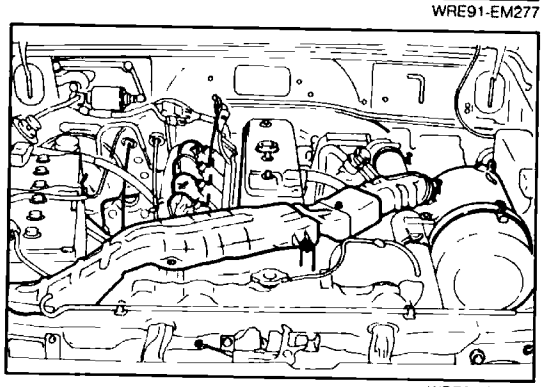

WRE91-EM276

17. Install the exhaust manifold cover.



WRE91-EM277

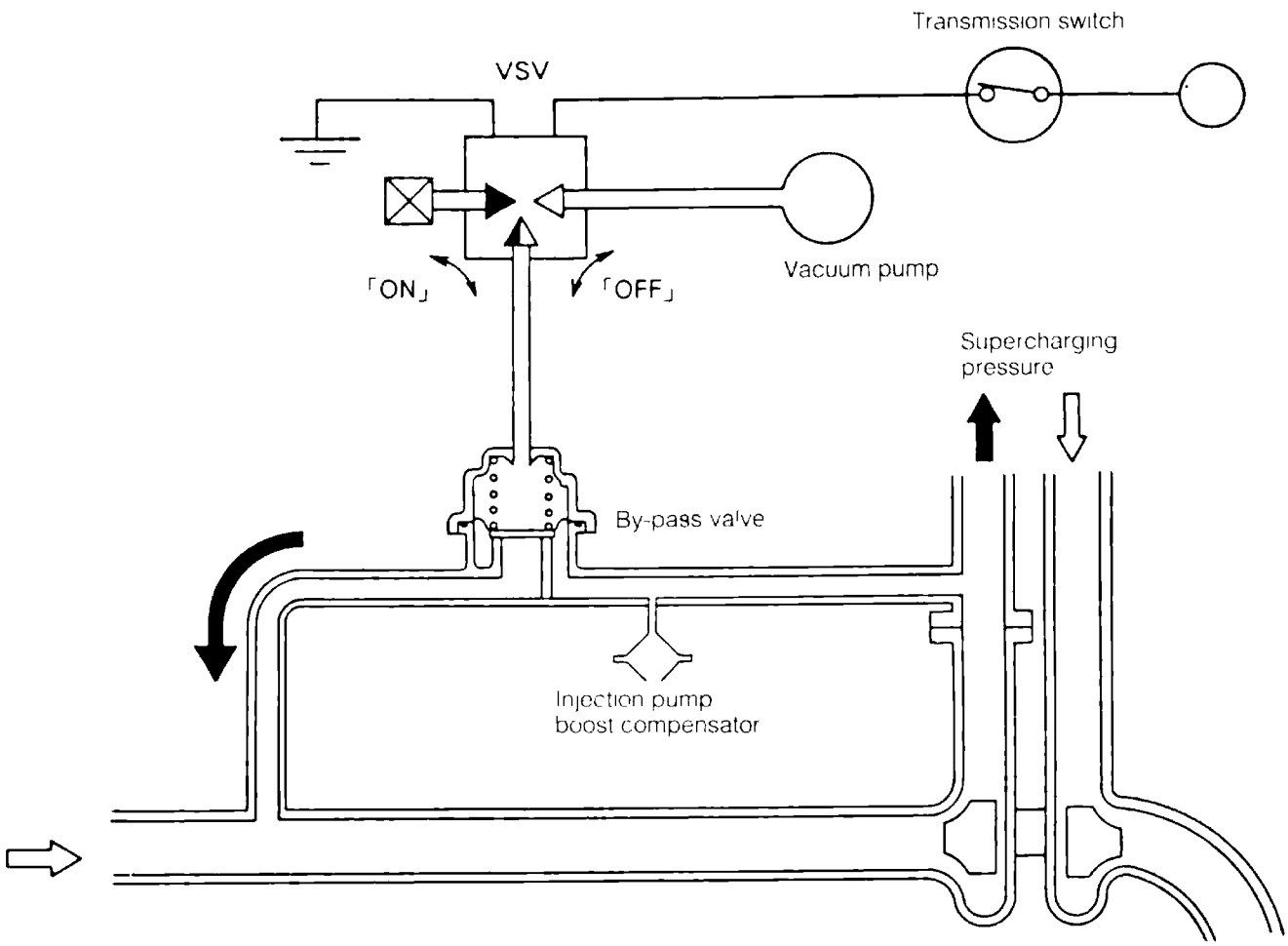
18. Installation of air cleaner
    (1) Install the air cleaner assembly.
    (2) Connect the air hose No.1 between the air cleaner and the turbo charger.
    (3) Install the cool air duct.
19. Fill cooling water.
20. Connect the ground cable to the negative (–) terminal of the battery.



WRE91-EM278

POWER CONTROL SYSTEM

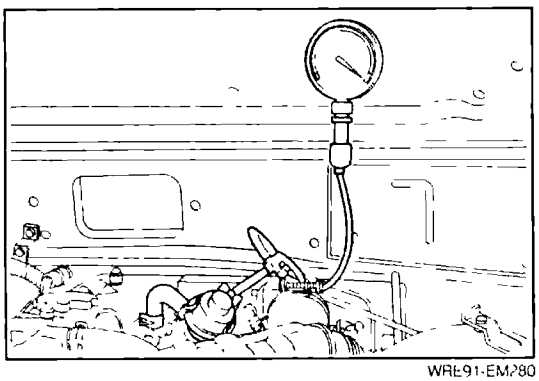
When the transmission is set to the first gear, this system controls the surge tank pressure by means of the transmission switch, VSV and by-pass valve, thereby controlling the supercharging pressure. In this easy, the power control system controls the output power by reducing the boost compensator pressure of the injection pump and by reducing the fuel injection amount.



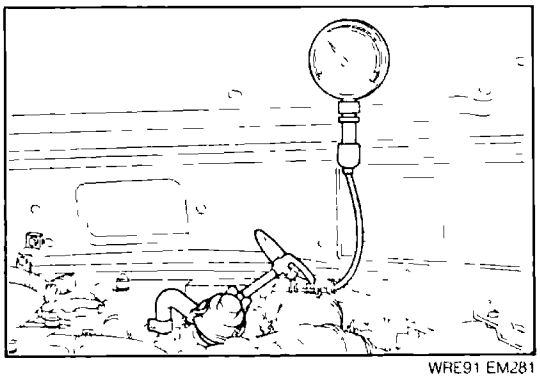
Shift position	Transmission switch	VSV	By-pass valve
First gear	OFF	OFF	Open
Reverse and second gear through fifth gear	ON	ON	Close

WRE91 EM279

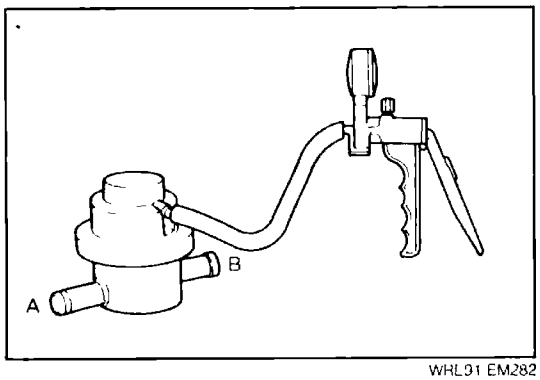
1. Inspection of power control system
   (1) Connect a vacuum gauge between the by-pass valve and the VSV with the three-way interposed.
   (2) Start the engine and depress the clutch pedal. When the shift lever is placed in R, 2, 3, 4 and 5 positions, ensure that the pointer of the vacuum gauge registers zero.


WRE91-EM280

   (3) Start the engine and depress the clutch pedal. When the shift lever is set to the 1st position, ensure that negative pressure is applied to the vacuum gauge.


WRE91 EM281

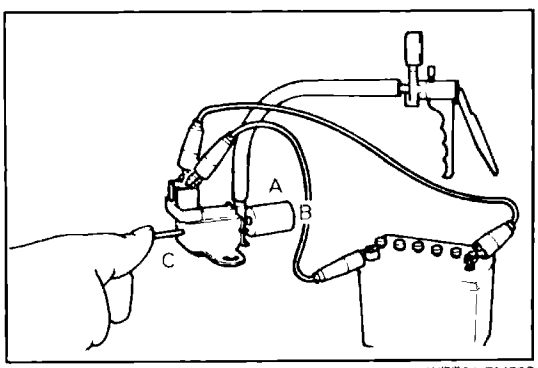
2. Check the by-pass valve.
   (1) Connect a MityVac to the by-pass valve. When a negative pressure of 56.0 kPa (420 mmHg) or more is applied, ensure that air continuity exists between the ports A and B.



WRL91 EM282

3 Check the VSV.
   (1) When the battery voltage (12V) is applied between the terminals, confirm the following items.
   Between A and B: Air continuity exists.
   Between A and C: No air continuity exists.

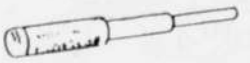
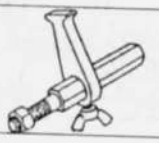
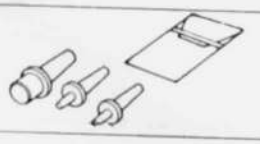
   (2) When no battery voltage (12V) is applied between the terminals, confirm the following items.
   Between A and B: No air continuity exists.
   Between A and C: Air continuity exists.

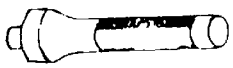
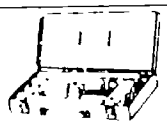
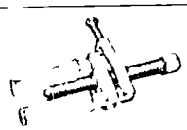


WRE91-EM283

   (3) Measure the resistance between the terminals.
   Specified Value: 37 - 40Ω (at 20°C)

SST

Shape	Part number & name	Remark
	09032-00100-000 Oil Pan Seal Cutter	Used for removing oil pan
	09201-60011-000 Valve guide bush remover & replacer	Used for removing/replace valve gu bush
	09201-87703-000 Valve stem oil seal replacer	Used for replace valve stem oil seal
	09202-87002-000 Valve cutter remover & replacer	Used for remove/replace valve sprin
	09210-87701-000 Flywheel holder	Prevent crankshaft from turning
	09213-31021-000 Crankshaft pulley puller	Used for remove crankshaft timing pulley
	09214-60010-000 Crankshaft pulley gear replacer	Used for replace crankshaft timing pulley
	09215-87601-000 Camshaft bearing remover & replacer	Used for remove/replace camshaft bearing
	09221-87301-000 Cylinder liner remover & replacer	Used for remove/replace cylinder liner
	09221-87601-000 Piston pin remover & replacer	Used for remove/replace piston pin
	09222-87303-000 Connecting rod bush remover & replacer	Used for remove/replace connecting rod bush
	09258-00030-000 Plug set	Pluged lubber hose
	09253-87201-000 Crankshaft bearing No.1 inner race replacer	Used for press fit seal set
	09268-87310-000 Nozzle holder wrench	Used for remove/replace injection nozzle

Shape	Part number & name	Remark
	09275-87701-000 Pluger stroke measuring tool	Used for adjust injection timing
	09301-20020-000 Clutch guide tool	Used for assemble clutch disc
	09303-35011-000 Input shaft front bearing puller	Used for remove flywheel bearing
	09304-12012-000 Input shaft front bearing replacer	Used for pressfit flywheel bearing
	09950-20017-000 Universal puller	Used for remove injection pump timing pulley
	09217-87001-000 Piston ring compressor	Used for guide piston inset
	09310-87302-000 Counter shaft rear bearing replacer	Used for pressfit crankshaft front oil seal
	09608-87302-000 Drive pinion bearing tool set	Used for pressfit crankshaft rear oil seal
	09308-10010-000 Oil seal puller	Used for remove crankshaft rear/front oil seal

WRE91-EM284

TIGHTENING TORQUE

Tightening component		Tightening torque			Remark
		N·m	kgf-m	ft-lb	
Cylinder head	× Cylinder head cover	5.4 ± 1.5	0.55 ± 0.15	4.0 ± 1.1	
	× Intake manifold	36.8 ± 7.4	3.75 ± 0.75	27.1 ± 5.4	
	× Exhaust manifold	46.6 ± 7.4	4.75 ± 0.75	34.4 ± 5.4	
	× Glow plug	12.8 ± 2.9	1.30 ± 030	9.4 ± 2.2	
	× Injector pipe bracket	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5	
	× Water temperature senda	22.1 ± 2.5	2.25 ± 0.25	16.3 ± 1.8	
Cylinder block	× Cylinder head	117.7 ± 9.8	12.00 ± 1.00	86.8 ± 7.2	Wet
	× Crankshaft bearing cap	103.0 ± 6.9	10.50 ± 0.70	75.9 ± 5.1	Wet
	× Push rod cover	9.3 ± 2.5	0.95 ± 0.25	6.9 ± 1.8	
	× Oil pan	9.3 ± 2.5	0.95 ± 0.25	6.9 ± 1.8	
	× Engine mounting bracket (front)	36.8 ± 7.4	3.75 ± 0.75	27.1 ± 5.4	
	× Camshaft retainer × belt case	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5	
	× Oil hose No.1	17.2 ± 2.5	1.75 ± 0.25	12.7 ± 1.8	
	× Oil hose No.2	22.1 ± 2.5	2.25 ± 0.25	16.3 ± 1.8	
	× Oil pump inlet pipe	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5	
	× Oil pump outlet pipe	44.1 ± 7.4	4.50 ± 0.75	32.5 ± 5.4	
	× Idle shaft	34.3 ± 4.9	3.50 ± 0.50	25.3 ± 3.6	Wet
	× Injection pump	18.1 ± 3.2	1.85 ± 0.35	13.4 ± 2.5	
	× Timing belt cover	12.8 ± 2.9	1.30 ± 0.30	9.4 ± 2.2	
	× Oil pump inlet pipe	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5	
	× Oil pump outlet pipe	18.1 ± 3.4	1.85 ± 0.35	13.4 ± 2.5	
	× Oil pump relief plug	39.2 ± 4.9	4.00 ± 0.50	28.9 ± 3.6	
	× Oil filter bracket	36.8 ± 7.4	3.75 ± 0.75	27.1 ± 5.4	
Connecting rod	× Connecting rod cap	68.6 ± 4.9	7.00 ± 0.50	50.6 ± 3.6	Wet
Crankshaft	× Flywheel	125.0 ± 12.3	12.75 ± 1.25	92.3 ± 9.0	Wet
Crankshaft	× Crankshaft pulley	215.7 ± 19.6	22.00 ± 2.00	159.1 ± 14.5	Wet
Camshaft	× Camshaft pulley	41.7 ± 7.4	4.25 ± 0.75	30.8 ± 5.4	
Rocker arm	× Adjusting screw	19.6 ± 2.9	2.00 ± 0.30	14.5 ± 2.2	Wet
Valve rocker shaft	× Valve rocker support	5.9 ± 1.0	0.60 ± 0.10	4.3 ± 0.7	
Oil filter bracket	× T/C oil inlet pipe	12.8 ± 2.9	1.30 ± 0.30	9.4 ± 2.2	
Oil filter bracket	× Oil cooler	49.0 ± 9.8	5.00 ± 1.00	36.2 ± 7.2	
Oil filter bracket	× Oil pressure valve	39.2 ± 4.9	4.00 ± 0.50	28.9 ± 3.6	
T/C	× T/C oil outlet pipe	7.4 ± 1.5	0.75 ± 0.15	5.4 ± 1.1	
Oil filter	× Oil filter bracket	19.6 ± 2.0	2.00 ± 0.20	14.5 ± 1.5	

Tightening component		Tightening torque			Remark
		N·m	kgf-m	ft-lb	
Injection pump	× Injection pump drive pulley	83 4 ± 4 9	8 50 ± 0.50	61 5 ± 3.6	
	× Injection pipe	24 5 ± 4 9	2 50 ± 0 50	18 1 ± 3 6	
	× Delivery valve holder	49 0 ± 4.9	5 00 ± 0.50	36 2 ± 3 6	
	× Nozzle leakage No 2	36 8 ± 2 5	3 75 ± 0 25	27 1 ± 1 8	
	× Union (fuel return)	24 5 ± 4 9	2 50 ± 0 50	18 1 ± 3 6	
	× Union	24.5 ± 4.9	2 50 ± 0.50	18 1 ± 3.6	
	× Distributive head bolt	17 2 ± 2 9	1.75 ± 0 30	12 7 ± 2.2	
	× Screw Ay overflow	7 4 ± 1 5	0 75 ± 0 15	5 4 ± 1 1	
Nozzle holder	× Cylinder head	68 6 ± 9 8	7 00 ± 1.00	50 6 ± 7.2	
	× Injection pipe	24 5 ± 4 9	2 50 ± 0 50	18.1 ± 3.6	
	× Nozzle leakage No 1	44 1 ± 4 9	4 50 ± 0 50	32 5 ± 3 6	
Alternator	× Alternator bclaket	36 8 ± 7 4	3 75 ± 0 75	27 1 ± 5 4	
Vacuum pump	× Oil hose No 1	17 2 ± 2 5	1 75 ± 0 25	12 7 ± 1 8	
	× Oil hose No 2	22 1 ± 2 5	2 25 ± 0 25	16 3 ± 1 8	
	× Union	22 1 ± 2 5	2 25 ± 0 25	16 3 ± 1 8	
Alternator	× Adjusting bar	29 4 ± 5 9	3 00 ± 0 60	21 7 ± 4 3	
Oil pan	× Drain plug	34 3 ± 4 9	3 50 ± 0 50	25 3 ± 3 6	
T/C	× Exhaust manifold	24 5 ± 4 9	2 50 ± 0 50	36 2 ± 3 6	
	× Outlet elbow	24 5 ± 4 9	2 50 ± 0 50	36 2 ± 3 6	
Glow plug	× Glow plug connector	1 5 – 2 9	0 15 – 0 30	1.1 – 2 2	
Crankshaft pulley	× Crankshaft pulley No 2	18 1 ± 3 4	1 85 ± 0 35	13 4 ± 2 5	
Radiator		9 8 ± 15 7	1 0 ± 1 6	7 2 ± 11 6	
Radiator	× Fan shroud	5 4 ± 1.5	0 55 ± 1 5	4 0 ± 1 1	
Exhaust manifold	× Exhaust manifold cover	12.7 ± 2 9	1 3 ± 0 3	9 4 ± 2 2	
Air cleaner		12 7 ± 2 9	1 3 ± 0 3	9 4 ± 2 2	
Inter cooler		18 1 ± 3 4	1 85 ± 0 35	13 4 ± 2 5	
Fuel filter flange		18.1 ± 3 4	1.85 ± 0 35	13 4 ± 2 5	
	× Fuel filter	18 1 ± 3 4	1 85 ± 0 35	13.4 ± 2 5	
	× Union	36 8 ± 7 4	3 75 ± 0 75	27 2 ± 5 4	
Glow plug connector		0 15 – 0.29	0 015 – 0 030	0 11 – 0.22	
Clamp injection pipe		24 5 ± 4 9	2 50 ± 0 50	18.1 ± 3 6	
Oil pressure switch		32 4 ± 10.8	3 30 ± 1 10	23 9 ± 8 0	

WRE91 EM285

ENGINE MECHANICAL

ENGINE SERVICE SPECIFICATION

Item				Engine type	DL-42	DL-52
Cylinder capacity				cm^3	2,765	
Engine proper	Kind				Diesel, 4 cycle	
	Cylinder number and arrangment				4 cylinder-in-line, mounted longitudinally	
	Combusion chamber type				Swirl chamber type	
	Valve mechanism				Belt Drive OHV	
	Bore × Stroke			mm	92 × 104	
	Compression ratio				21.2	
	Compression pressure kPa (kgf/cm^2)/rpm	STD			3150 (32)/250	
		Minimum			2150 (22)/250	
		Difference between cylinders			490 (5)/250	
	Maximum Power	kW/rpm	SAE net		56/3800	—
			DIN		54/3800	75/3400
	Maximum Torque	Nm/rpm	SAE net		170/2200	—
			DIN		170/2200	245/1900
	Engine dimensions (Length × width × height)			mm	763 × 548 × 696	763 × 611 × 724
	Service engine weight			kg	236	250
	Value Timing	Intake	Open		25° BTDC	
			Close		55° ABDC	
		Exhaust	Open		60° BBDC	
			Close		20° ATDC	
	Value clearance	Intake		mm	0.25 ± 0.05	
		Exhaust		mm	0.25 ± 0.05	0.35 ± 0.05
	Idle speed			rpm	650 ± 25	
	Blow-by gas recirculating				Closed Type	
Lubricating system	Lubricating method				Fully forced feed method	
	Oil pump type				Trochoid Type	
	Oil capacity			dm^3	6.4	
Cooling system	Cooling method				Water cooled, V-belt type	
	Coolant capacity (with reserve tank)			dm^3	10.6	
	Thermostat type				wax type	

Item			Engine type	DL-42	DL-52
Air cleaner type				Cyclone type, paper filter type	
Fuel system	Fuel tank capacity		dm^3	60	
	Injection pump	Injection Timing		1° BTDC (High altitude speed 3°)	1° BTDC
		Plunger diameter	mm	9.0	
		Cam lift	mm	2.2	
		Governor type		Centrifugal type	
		Timer type		Hidraulic pressure type	
	Injection nozzle or injector	Nozzle retainer type			
		Nozzle type			
		Injection pressure	kPa (kgf/cm^2)	10788 ± 1079 (110 ± 10)	(130 ± 10)
Engine electrical system	Voltage		V	12 (negative ground)	
	Firing order			1 - 3 - 4 - 2	
	Glow plug	Type		Sheathed type	
		Voltage, current	V-A	10.5 - 8.5, 7.0 - 8.5	7.0 - 8.5
	Battery Type			N100 or 95E41R	
	Alternator		Output V-A	12 - 45	
	Starter		Output V-kW	12 - 2.2	

WRE91 EM286

THE ENGINE PROPER SPECIFICATIONS

NOTE:

- The entry figures are those values at a temperature of 20°C.

Cylinder liner outer diameter × Cylinder block bore diameter

mm

Item / Combination number	Cylinder liner outer diameter	Cylinder block bore diameter	Interference
1	96 025 - 96.040	96.000 - 96.015	0.01 - 0.04
2	96.040 - 96.055	96 015 - 96.030	0.01 - 0.04
3	96.055 - 96 070	96.030 - 96.045	0.01 - 0.04

WRE91-EM287

Cylinder liner inner diameter × Piston outer diameter (DL-42)

mm

Item / Combination alphabetical letter	Cylinder liner inner diameter	Piston outer diameter
A	92.02 - 92 03	91 95 - 91 96
B	92.01 - 92 02	91 94 - 91 95
C	92 00 - 92.01	91 93 - 91.94

WRE91-EM288

Cylinder liner inner diameter × Piston outer diameter (DL-52)

mm

Item / Combination alphabetical letter	Cylinder liner inner diameter	Piston outer diameter
A	92.02 - 92 03	91 94 - 91 95
B	92.01 - 92.02	91.93 - 91.94
C	92 00 - 92 01	91 92 - 91.93

WRE91-EM289

Cylinder block × Crankshaft × Crankshaft bearing

mm

Item / Combination number / Journal No		Cylinder block main journal inner diameter	Crankshaft bearing thickness	Crankshaft main journal outer diameter
No 1, 5 Journal	1	72 000 - 72.010	1 995 - 2.000 [Brown]	67 960 - 67 975
	2	72.010 - 72 020	2.000 - 2 005 [Black]	
No 2, 3, 4 Journal	1	72.000 - 72 010	1.995 - 2 000 [Brown]	67 955 - 67 970
	2	72.010 - 72.020	2.000 - 2.005 [Black]	

WRE91-EM290

Connecting rod large end × Crankshaft × Connecting rod bearing

mm

Combination No.	Connecting rod large end inner diameter	Crankshaft crankpin diameter	Connecting rod bearing thickness
1	58 000 - 58.010	54 975 - 54 990	1.485 - 1.490 [Blown]
2	58.010 - 58.020		1.490 - 1.495 [Black]

WRE91-EM291

Piston pin × Connecting rod small end × Piston pin hole

mm

Piston pin outer diameter	Connecting rod small end inner diameter	Piston pin hole inner diameter
27 993 - 28 000	28.005 - 28.020	27.985 - 27.995

WRE91-EM292

Valve lifter × Cylinder block

mm

Valve lifter outer diameter	Cylinder block valve lifter inner diameter
23.972 - 23 985	24.000 - 24 021

WRE91-EM293

Valve stem × Valve guide bush

mm

	Valve stem outer diameter	Valve guide bush inner diameter
Intake valve	8 968 - 8 984	9.01 - 9 03
Exhaust valve	8.934 - 8.950	9 01 - 9.03

WRE91-EM294

Valve rocker shaft × Valve rocker arm

mm

Valve rocker shaft outer diameter	Valve rocker arm inner diameter
18.472 - 18 493	18 512 - 18.533

WRE91 EM295

Connecting rod × Crankshaft

mm

Connecting rod large end thickness	Crankshaft pin journal thickness
33 90 - 33 95	34 10 - 34 15

WRE91-EM296

Pre combustion chamber × Cylinder head

mm

Pre combustion chamber outer diameter	Cylinder head pre combustion chamber inner diameter	Interference
37 030 - 37 045	37.000 - 37.030	0 - 0 045

WRE91-EM297

Valve guide bush × Cylinder head

mm

Valve guide bush outer diameter	Cylinder head valve guide bush inner diameter	Interference
14 035 - 14 053	14.000 - 14.018	0.018 - 0 053

WRE91-EM298

Camshaft bearing × Cylinder block

mm

	Camshaft bearing outer diameter	Cylinder block Camshaft bearing inner diameter	Interference
No. 1	50.675 - 50.715	50.600 - 50.625	0.050 - 0.115
No. 2	50.375 - 50.415	50.300 - 50.325	0.050 - 0.115
No. 3	50.075 - 50.115	50.000 - 50.025	0.050 - 0.115
No. 4	49.775 - 49.815	49.700 - 49.725	0.050 - 0.115
No. 5	50.075 - 50.115	50.000 - 50.025	0.050 - 0.115

WRE91-EM299

Valve guide bush × Valve stem oil seal

mm

Valve guide bush outer diameter	Valve stem oil seal inner diameter	Interference
14.023 - 14.041	13.91 - 13.99	0.024 - 0.131

WRE91-EM300

Valve rocker shaft × Valve rocker support

mm

Valve rocker shaft outer diameter	Valve rocker support inner diameter No. 1, 2, 3, 4
18.472 - 18.493	18.500 - 18.521

WRE91-EM301

Camshaft × Camshaft bearing

mm

	Camshaft journal outer diameter	Camshaft bearing inner diameter
No. 1	46.559 - 46.575	46.600 - 46.625
No. 2	46.259 - 46.275	46.300 - 46.325
No. 3	45.969 - 45.975	46.000 - 45.025
No. 4	45.659 - 45.675	45.700 - 45.725
No. 5	45.359 - 45.375	45.400 - 45.425

WRE91-EM302

Piston ring × Piston (DL-42)

mm

	Piston ring thickness	Piston ring groove thickness
Compression ring No. 1	2.47 - 2.49	2.55 - 2.57
Compression ring No. 2	1.97 - 1.99	2.03 - 2.05
Oil ring	3.97 - 3.99	4.01 - 4.03

WRE91-EM303

Piston ring × Piston (DL-52)

mm

	Piston ring thickness	Piston ring groove thickness
Compression ring No. 1	7° Keystone ring	7° Keystone ring
Compression ring No. 2	1.97 - 1.99	2.06 - 2.08
Oil ring	3.97 - 3.99	4.01 - 4.03

WRE91-EM304

Connecting rod × Connecting rod small end bush

mm

Connecting rod small end inner diameter	Connecting rod small end bush outer diameter	Interference
31.070 - 31.110	31.000 - 31.025	0.045 - 0.110

WRE91 EM305

Cylinder liner × Cylinder block upper gasket surface

mm

Cylinder liner flange section thickness	Depth of cylinder block flange section	Amount of protrusion
3.01 - 3.04	2.92 - 3.00	0.01 - 0.12

WRE91 EM306

Valve × Cylinder head lower gasket surface

mm

	Valve recession amount
Intake valve	1.00 - 1.70
Exhaust valve	1.00 - 1.70

WRE91 EM307

Camshaft × Camshaft timing belt pulley

mm

Camshaft outer diameter	Camshaft timing belt pulley inner diameter	Interference
28.008 - 28.021	28.000 - 28.021	-0.013 - 0.021

WRE91 EM308

Precombusion chamber × Cylinder head lower gasket surface

mm

Precombustion chamber flange height	Depth of cylinder head section	Amount of protrusion
6.000 - 6.005	5.950 - 0	0 - 0.100

WRE91-EM308

Cylinder Head

Cylinder head lower gasket surface distortion		mm	0.1
Manifold gasket surface distortion		mm	0.2
Valve seat	Seat width mm	Intake	1.4
		Exhaust	1.4
	Correction angle °	Intake	15, 45, 75
		Exhaust	15, 45, 75
Guide bush striking temperature		°C	Normal temperature

WRE91 EM310

Valve Spring

Item		Specified value	Allowable limit
Free length	mm	46.0	43.7
Length installed	mm	40.1	—
Tension as installed	N(kgf)	264.8 (27.0)	225.6 (23 0)
Out-of-squareness	mm	—	1 6

WRE91 EM311

Valve Lifter, Push Rod

Item		Specified Value	Allowable limit
Valve lifter oil clearance	mm	0.015 - 0.049	0.1
Push rod bend	mm	—	0.4

WRE91-EM312

Valve Rocker Arm & Shaft

Item		Specified value	Allowable limit
Oil clearance	mm	0.019 - 0.061	0.1

WRE91-EM313

Valve Guid Bush

Protrusion from cylinder head (IN & EX)	mm	16.0

WRE91-EM314

Valve

Item			Specified value	Allowable limit
Stem oil clearance	mm	Intake	0.026 - 0.062	0 10
		Exhaust	0.044 - 0 096	0 12
Head stock thickness	mm	Intake	0.90 - 1 30	0.5
		Exhaust	0 90 - 1.30	0.5

WRE91-EM315

Camshaft & Bearing

Item			Specified value	Allowable limit
Run-out	mm		—	0.05
Thrust clearance	mm		0.10 - 0.19	0 30
Bearing oil clearance	mm	No. 1 to No. 5	0.025 - 0.066	0.10
Cam lobe height	mm	Intake	37 767	1.0
		Exhaust	37.767	1 0

WRE91-EM316

Valve Rocker Arm & Shaft

Item			Specified value	Allowable limit
Top gasket surface distortion		mm	—	0 1
Cylinder liner	Wear	mm	—	0 15
	Out-of roundness, taper	mm	—	0.02
	Protrusion	mm	0.01 - 0.12	—
	Pressing force	N (kgf)	24518 (2500)	—

WRE91-EM313

Connecting Rod

Item		Specified value	Allowable limit
Big end thrust clearance	mm	0 15 - 0 25	0.30
Bearing oil clearance	mm	0 030 - 0.065	0 15
Piston pin oil clearance	mm	0.005 - 0.027	0 05
Bend limit	mm	—	0.05
Twist limit	mm	—	0 05

WRE91-EM318

Crankshaft

Item			Specified value	Allowable limit
Run-out		mm	—	0 05
Thrust clearnace		mm	0.050 - 0 159	0 25
Journal uneven wear or taper		mm	—	0.015
Journal diameter [U/S finished diameter] mm	STD	No 1, 5	67.960 - 67.975	—
		No. 2, 3, 4	67 955 - 67 970	
	U/S 0 25	No. 1, 5	68.210 - 68.225	—
		No. 2, 3, 4	68 205 - 68.220	
	U/S 0.50	No 1, 5	68 460 - 68 475	—
		No. 2, 3, 4	68.455 - 68.470	
	U/S 0 75	No. 1, 5	68.710 - 68.725	—
		No. 2, 3, 4	68 705 - 68.720	
	U/S 1 00	No 1, 5	68.960 - 68.975	—
		No. 2, 3, 4	68.955 - 68.970	
Stem oil clearance		mm No 1, 5	0.025 - 0.060	0.15
		No. 2, 3, 4	0 030 - 0 065	
Crankpin diameter [U/S finished diameter] mm	STD		54.975 - 54 990	—
	U/S 0 25		54.725 - 54.740	—
	U/S 0.50		54 475 - 54.490	—
	U/S 0 75		54.225 - 54.240	—
	U/S 1 00		53 975 - 53 990	—

WRE91 EM319

ENGINE MECHANICAL

Flywheel

Item		Specified value	Allowable limit
Run-out	mm	—	0 2

WRE91 EM320

Intake, Exhaust Manifold

Item			Specified value	Allowable limit
Gasket surface distortion	mm	Intake	—	0 4
		Exhaust	—	0 4

WRE91-EM321

Piston, Piston Ring

Item				Specified value	Allowable limit
Piston	mm	STD		91 93 - 91 96	—
		O/S 1 00		92 93 - 92 96	—
Piston oil clearance	mm	DL-42		0 060 - 0 080	0 12
		DL-52		0 070 - 0 090	0 12
Piston ring end gap	mm	No 1		0.35 - 0 50	—
		No 2		0 30 - 0 45	—
		OIL		0.30 - 0 50	—
Piston ring side clearance	mm	No 1	DL-42	0 06 - 0 10	—
			DL-52	7° Keystone ring	—
		No 2	DL-42	0 04 - 0 08	—
			DL-52	0 07 - 0 11	—
		OIL		0 02 - 0 06	—
Piston pin installing temperature			°C	60 - 70	—

WRE91-EM322

Camshaft timing pulley, Crankshaft timing pulley, Injection timing pulley

Item			Specified value	Allowable limit
Timing pulley diameter	mm	Camshaft timing pulley	119 95 - 120 07	119 90
		Crankshaft timing pulley	59 37 - 59 47	59 30
		Injection pump timing pulley	119 904 - 120 044	119.85

WRE91 EM323

Oil pump

Item		Specified value	Allowable limit
Relief valve opening pressure	kPa (kgf/cm)	441 3 - 539 4 (4 5 - 5 5)	—
Side clearance	mm	0 03 - 0.085	0 15
Body clearance	mm	0 1 - 0 16	0 40

WRE91 EM324

Radiator

Item		Specified value	Allowable limit
Radiator cap relief valve opening pressure	kPa (kgf/cm^2)	73.6 - 103.0 (0.75 - 1.05)	58 8 (0.60)
Radiator leak test pressure	kPa (kgf/cm^2)	117.7 (1.2)	—

WRE91-EM325

Waterpump

Item		Specified value	Allowable limit
Bearing installing temperature	°C	80 - 90	—
Clearance between body and rotor	mm	0.5	—

WRE91-EM326

Thermostat

Item		Specified value	Allowable limit
Valve opening temperature (Start to open at)	°C	80 - 84	62
Valve full opening temperature	°C	95 (High temp type 100)	—
Valve opening travel	mm	10	6.0

WRE91-EM327

Waste gate valve, Turbo indicator lamp

Item	Specified value
Checking turbo indicator lamp	When pressure exceeds 23.5 kPa (0 34 kgf/cm^2) Turbo indicator lamp goes on. When pressure is below 19.6 kPa (0.20 kgf/cm^2) Turbo indicator lamp goes off.
Checking operation of waste gate valve	Shaft stroke: About 2 mm (With a pressure of 89.2 kPa (0.91 kgf/cm^2) applied)
Checking supercharging pressure (Running test)	58.9 - 83.4 kPa (0 55 - 0.85 kgf/cm^2)/At 3400 rpm

WRE91-EM328

Starter

Item			Specified value
Motor type			12V type
Nominal output		kW	2.2
No-load characteristics	Voltage	V	11 5
	Current	A	120
	Revolution speed	rpm	Not less than 4000

WRE91-EM329

ENGINE MECHANICAL

Alternator

Item		Specified value
Type		12V type
Maximu output	A	45
Output revolution speed	rpm	Not more than 3500

WRE91-EM330

Alternator Regulator

Item		Specified value
Regulating voltage	V	13.8 - 14.8
Voltage relay actuating voltage	V	4.0 - 5.8

WRE91-EM331

Injection Nozzle, Nozzle Holder

Item		Specified value	Allowable limit
Nozzle opening pressure	kPa (kgf/cm^2)	10297 - 11278 (105 - 115)	—
Adjusting shim thickness (For adjusting nozzle opening pressure)		20 sizes in 0.05 mm (0.002 inch) increment	

WRE91-EM332

INJECTION PUMP

			DL-42		DL-52	
			STD	OPT	General	Austria, Switzerland
Pump specifications		Plunger diameter mm	9	9	9	9
		Cam lift mm	2.2	2.2	2.2	2.2
		Suction return amount mm^3	40	40	37.5	37.5
		Injection order	A B C D	A B C D	A B C D	A B C D
		Governor specifications	All speeds	All speeds	All speeds	All speeds
Characteristics	Overflow amount l/h/rpm		21 - 47/1900	21 - 47/1900	17 - 37/1700	17 - 37/1700
	Injection amount	Increase amount during starting period mm^3/st/rpm	66 - 85/100	66 - 85/100	66 - 85/100	66 - 85/100
		End of increase effect mm^3/st/rpm	41 5 - 50.5/400	41 5 - 50.5/400	50 - 58/350	50 - 58/350
		Full load mm^3/st/rpm	42 15 - 43.65/1100 38 - 43/500 44 - 49/1450 40.5 - 44.5/1900	39.25 - 40.75/1100 35.1 - 40.1/500 41.1 - 46.1/1450 38.6 - 43.6/1900	65.75 - 67.75/1100 42.7 - 45.7/500 51 - 54/680 65 - 70/1700	65.75 - 67.75/1100 42.7 - 45.7/500 51 - 54/680 65 - 70/1700
	Governor	High-speed side mm^3/st/rpm	16.5 - 24.5/2250 24.5 - 32.5/2100 2 or less/2600	17.5 - 23.5/2250 35 - 43/2100 2 or less/2450	*1 17 75 - 27.75/2250 56.5 - 64.5/1800 2 or less/2500	*1 17.75 - 27.75/2250 56 5 - 64 5/1800 2 or less/2500
		Low-speed side	6.5 - 11.5/350 2 or less/500	6.5 - 11.5/350 2 or less/500	*2 6.5 - 11.5/350 2 or less/500	*2 6 5 - 11.5/350 2 or less/500
	Timer mm/rpm		0 - 1.0/700 2.0 - 3.0/1100 3.7 - 4.7/1450 5.7 - 6.5/2250	0 - 0.98/700 1.85 - 1.85/1100 3 5 - 4.5/1450 6.16 - 6.95/2250	*1 0.7 - 1 7/700 2.3 - 3 3/1100 4.1 - 5.1/1500 4.9 - 5.7/1750	*1 0 6 - 1 6/750 2 2 - 3 2/1100 3 4 - 4.4/1500 4 1 - 4 9/1600
	Altitude compensator (N = 1100 rpm with lever positioned at full stroke position) mm^3/st/kPa (mmHg)		— — —	38.5 - 41/94.6 (710) 33.8 - 37 8/82 7 (620) 30.3 - 33.7/70.7 (530)	— — —	— — —
	Boost compensator (Np = 1100 rpm) mm/kPa (mmHg)		— — — — —	— — — — —	42 7 - 49.7/0 51.2 - 55 2/24.0 (180) 55.6 - 59.6/33.3 (250) 65.75 - 67.25/66.7 (500) 66.5 or less/106.7 (800)	42.7 - 49.7/0 51.2 - 55.2/24 0 (180) 55 6 - 59.6/33.3 (250) 65 75 - 67 25/66 7 (500) 66.5 or less/106 7 (800)
	Load sension timer mm/mm^3/st		— —	— —	— —	1.53 - 2.53/50 3 38 - 4.38/Full
	Automatic cold start device mm/°C		— — —	— — —	— — —	2.05/--10 0.6 - 0 9/25 0/45

*1: Characteristics when Pb = 66 7 kPa (500 mmHg)
*2: Characteristics when Pb = 0 kPa (0 mmHg)

WRE91 EM333

DAIHATSU

F70,F75,F77

Service manual

FRONT & REAR DIFFERENTIAL

DF

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

FRONT & REAR DIFFERENTIAL

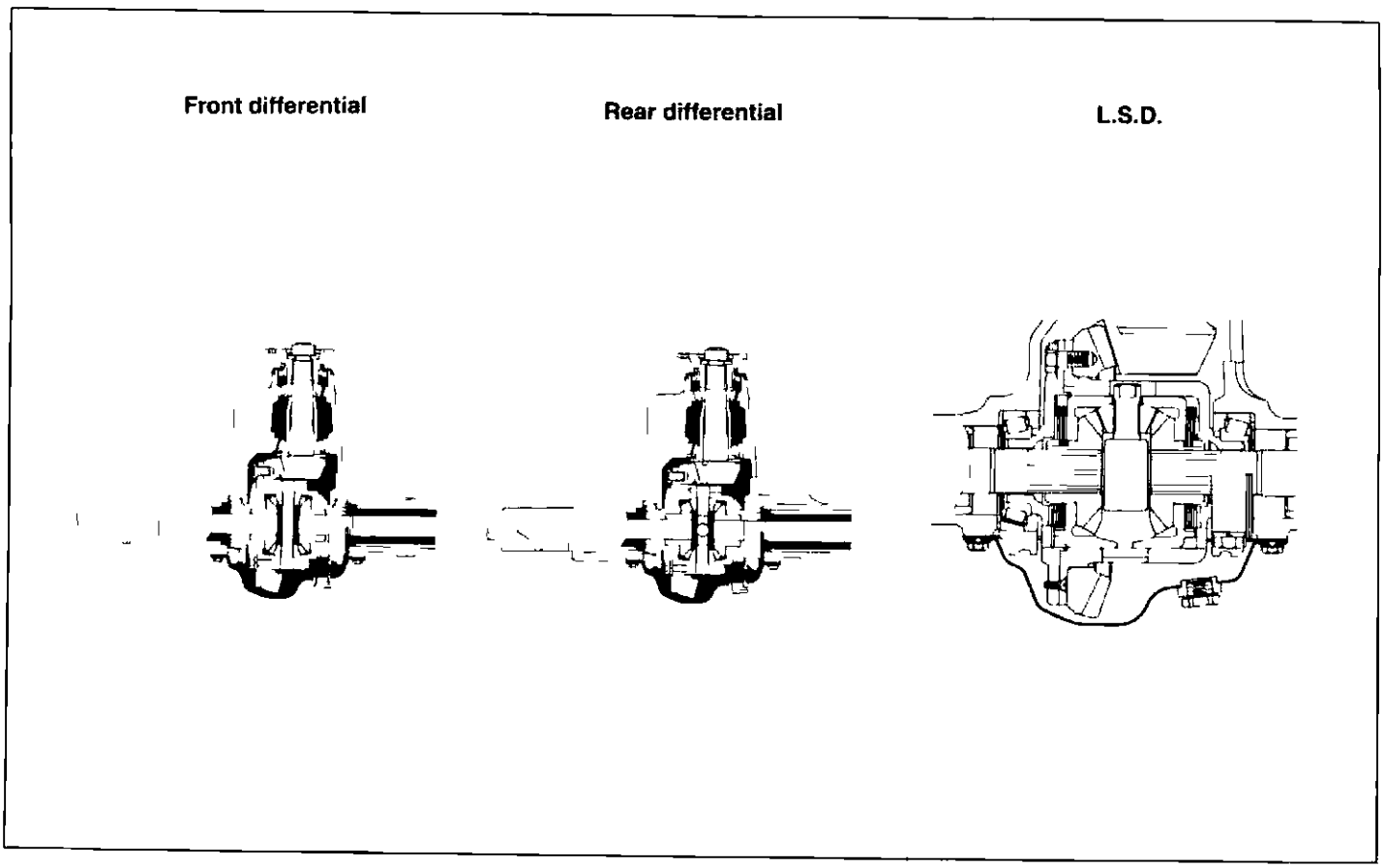
GENERAL DESCRIPTION ..... **DF– 2**
TROUBLE SHOOTING ..... **DF– 3**
IN-VEHICLE REPLACEMENT PROCEDURES FOR OIL SEAL (FRONT & REAR) ..... **DF– 4**
FRONT DIFFERENTIAL (COMPONENTS) .. **DF– 9**
REMOVAL **DF–10**
PRE-INSPECTION **DF–11**
DISASSEMBLY **DF–12**
INSPECTION **DF–16**
ASSEMBLY **DF–17**
REAR DIFFERENTIALS (COMPONENTS) .. **DF–28**
REMOVAL **DF–29**
PRE-INSPECTION **DF–30**
DISASSEMBLY **DF–31**
INSPECTION **DF–35**
ASSEMBLY **DF–36**
L.S.D. (Limited Slip Differential) **DF–46**
DISASSEMBLY **DF–47**
INSPECTION **DF–49**
ASSEMBLY **DF–49**
SSTs **DF–55**
SERVICE SPECIFICATIONS **DF–56**
TIGHTENING TORQUE **DF–57**

WRE91 DF001

GENERAL DESCRIPTION

DIFFERENTIALS

The differential at both the front and rear employs a hypoid gear type
In the case of ordinary differentials, there will be cases where the traction is lost when the wheel at one side is rotating idly on muddy roads or during a rapid cornering To solve those problems, an L S D (Limited Slip Differential) is available as optional equipment on the rear differential



WHE91 DF002

Differential specifications

Item \ Kind			Front	Rear	Rear (LSD)
Final reduction gear ratio			3.363	3.363	3.363
Differential ring gear	Number of teeth		37	37	37
	Outer diameter	mm	204	204	204
	Gear type		Hypoid gear	Hypoid gear	Hypoid gear
Final roduction gear	Number of teeth		11	11	11
	Outer diameter	mm	85	85	85
	Gear type		Hypoid pinion	Hypoid pinion	Hypoid pinion
Differential side gear	Number of teeth		18	18	18
	Number of inner spline teeth		30	30	30
Number of differential pinion toeth			10	10	10
Pinion shaft outer diameter		mm	18	18	18

WRE91 DF003

TROUBLE SHOOTING

Symptoms		Possible causes	Checking points
Abnormal noise	Differential tapping noise	Improper backlash of hypoid gear	Check backlash between drive pinion and ring gear
	Differential clank noise	The same above	The same above
	Differential clocking noise	Drive pinion improperly adjusted	Check preload Check backlash
	Differential chuckle noise	Abnormal wear in side gear and differential case	Check side gear Check differential case
	Differential noise	Improper tooth contact at hypoid gear	Check tooth contact between drive pinion and ring gear
Oil leakage		Faulty oil seal	Check each oil seal
		Oil leakage at differential carrier installation section	Check installation surface with rear axle housing

WHEG DF004

A label showing the production year, month and date of the axle housing has been affixed on each of the cover surfaces of the front and rear axle housings At its upper column, the label indicates the specifications of the axle housing in a form of alphanumeric letters (e g F-1F, F40, F3A, R20 and R10)

Label

Example

F-1F	(A)
J01091	(B)

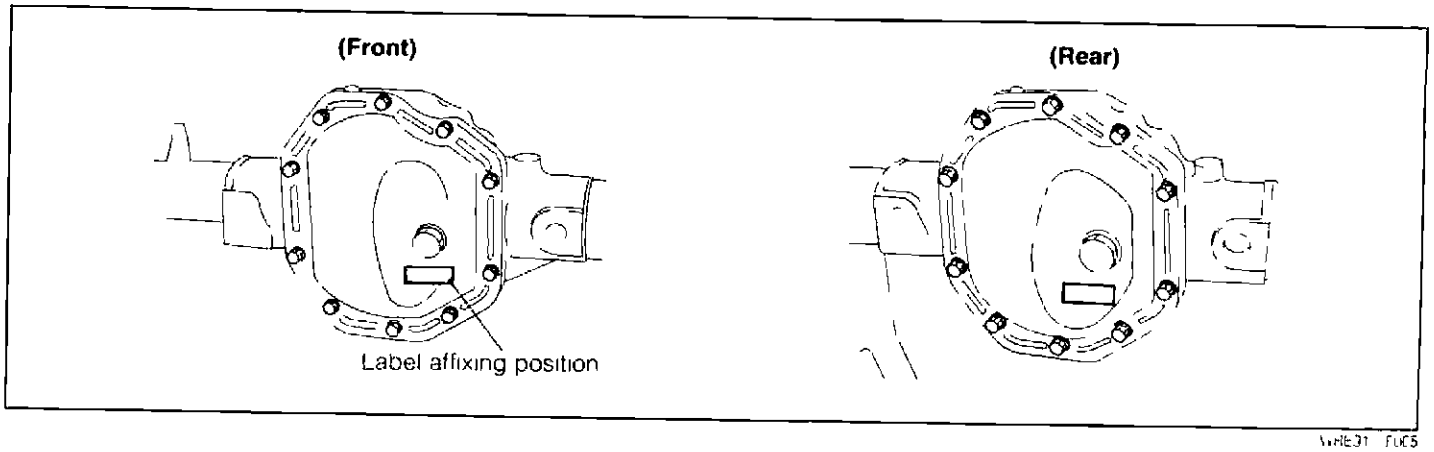
(A) Axle housing specifications
(B) Production date, month and year

Front

Model		Standard	F W H	MANUAL F W H
F70R/LV-R	RHD	F10	F1A	F1F
	LHD	F20	F2A	F2F
F70R/LV-MDTW2	RHD	F30	F3A	F3F
	LHD	F40	F4A	F4F

Rear

Model	Standard	W/L S D
F70RV-R	R10	R11
F75R-R	R20	R21
F77R-PR	R30	



WHE3T F005

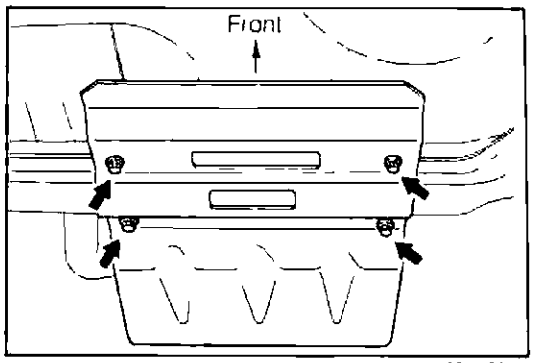
IN-VEHICLE REPLACEMENT PROCEDURES FOR OIL SEAL (FRONT)

REMOVAL

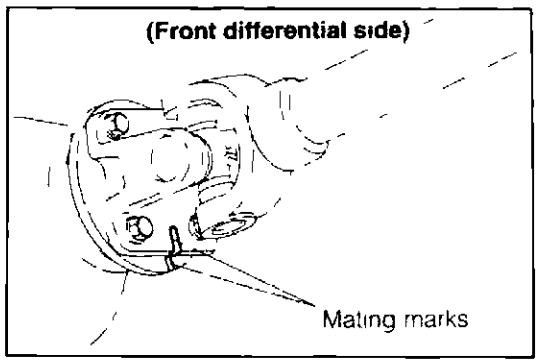
1 Jack up the vehicle
NOTE:
- Be sure to support the vehicle with safety stands. (As for the jacking up points, refer GI-section).

2 Remove the transmission undercover by removing the four bolts

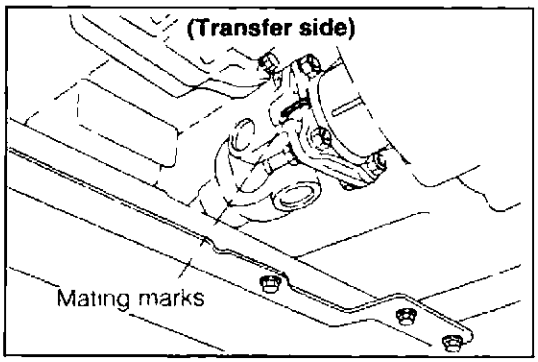
3 Remove the front propeller shaft by removing the four bolts
CAUTION:
- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.



WRE91 DF006



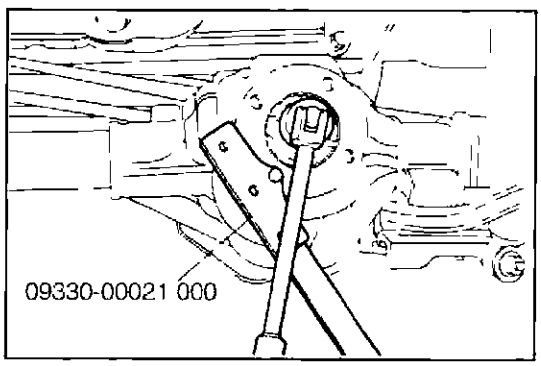
WRE91 DF007



WRE91 DF008

4 Raise the lock section of the lock washer, using the standard tool of the chiesel or the like
NOTE:
- Never reuse the removed lock washer.

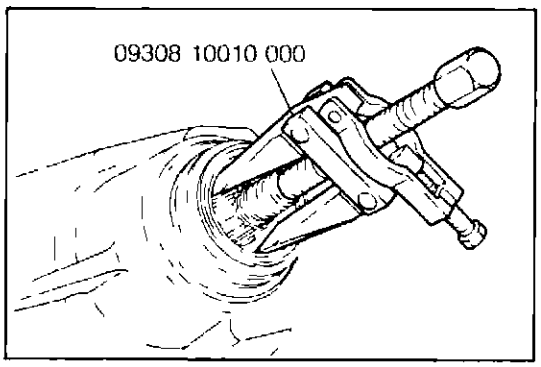
5 Remove the nut, using the following SST
SST: 09330-00021-000



WRE91 DF009

6 Pull-out the plate washer and companion flange toward you
7 Remove the "T" type oil seal, using the following SSTs
SST: 09308-10010-000

NOTE.
- Never reuse the removed "T" type oil seal.

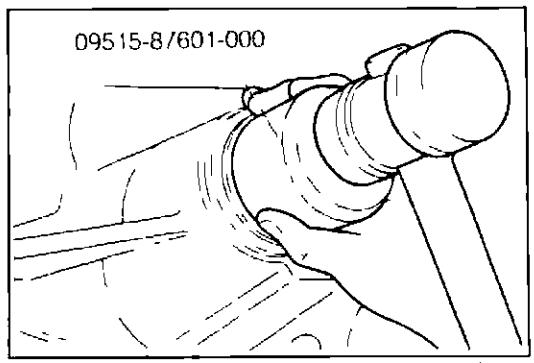


WRE91 DF010

INSTALLATION

1 Install the "T" type oil seal into position, using the following SST
SST: 09515-87601-000

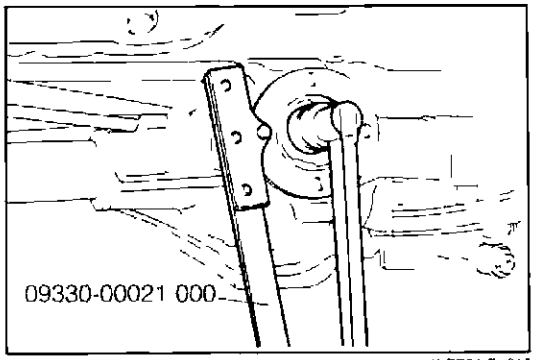
NOTE:
- Apply the lithium base multi purpose grease to the oil seal lip section, prior to install.



WRE91 DF011

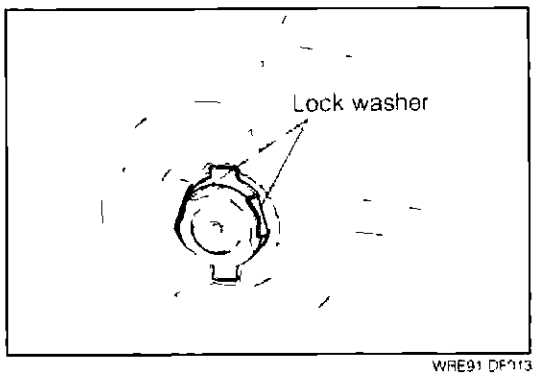
2 Place the companion flange and plate washer

3 Install the new lock washer
4 Tighten the nut, using the following SST
SST: 09330-00021-000
Tightening Torque: 196.0 - 245.0 N·m (20.0 - 25.0 kgf-m)



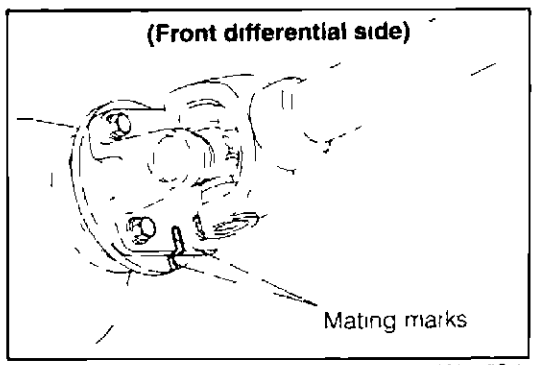
WRE91 DF012

5 Stake the lock washer, using the standard tool of the chiesel or the like securely.

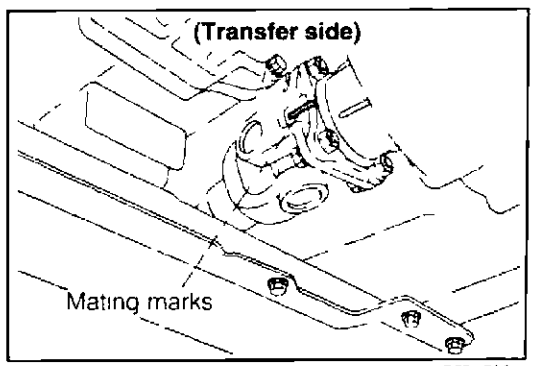


WRE91 DF013

6 Install the propeller shaft
CAUTION:
- While installing the propeller shaft, align the mating marks put during the removal with each other. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.
Tightening Torque: 58.8 - 78.5 N m (6.0 - 8.0 kgf-m)

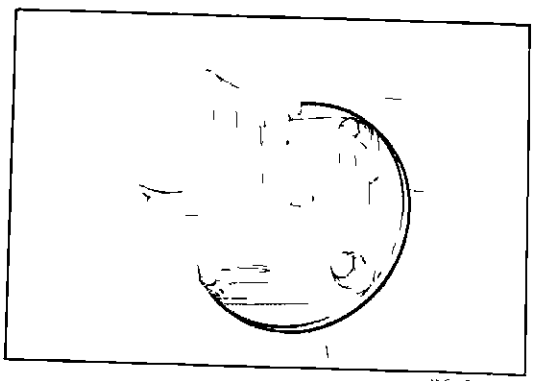


WRE91 DF014

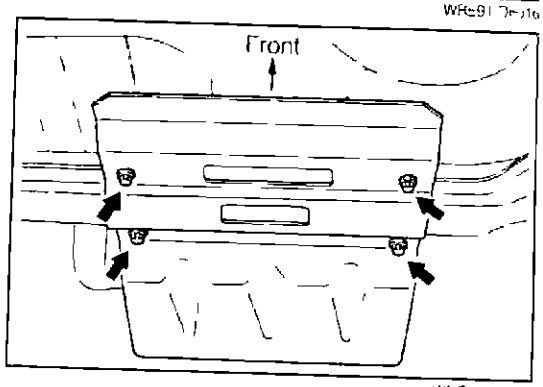


WRE91 DF015

7 After installing the propeller shaft apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure



8 Tighten the transmission under cover with the four bolts
Tightening Torque: 15.7 - 23.5 N m (1.6 - 2.4 kgf-m)



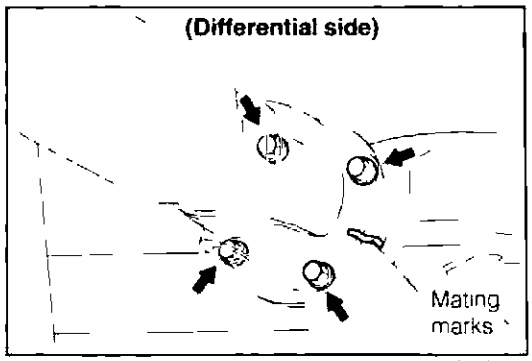
IN-VEHICLE REPLACEMENT PROCEDURES FOR OIL SEAL (REAR)

REMOVAL

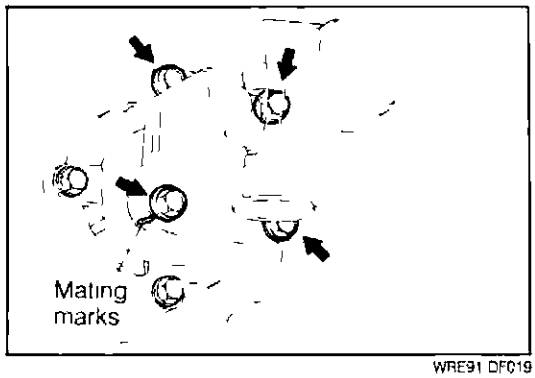
1 Remove the rear propeller shaft assemble by removing the four bolts

CAUTION:

- Prior to the removal, be sure to put a mating mark. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.



WRF91 DF018



WRE91 DF019

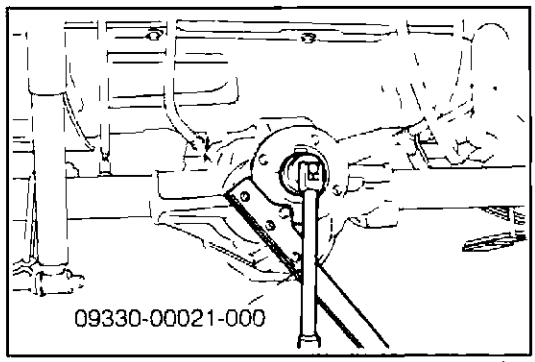
2 Raise the lock section of the lock washer, using the standard tool of chiesel or the like

NOTE:

- Never reuse the removed lock washer.

3 Remove the nut, using the following SST

SST: 09330-00021-000



WRE91-DF020

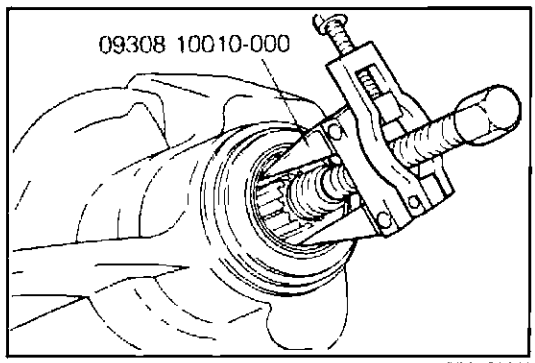
4 Pull-out the plate washer and companion flange toward you.

5 Remove the "T" type oil seal, using the following SST

SST: 09308-10010-000

NOTE:

- Never reuse the removed "T" type oil seal.



WRE91 DF021

INSTALLATION

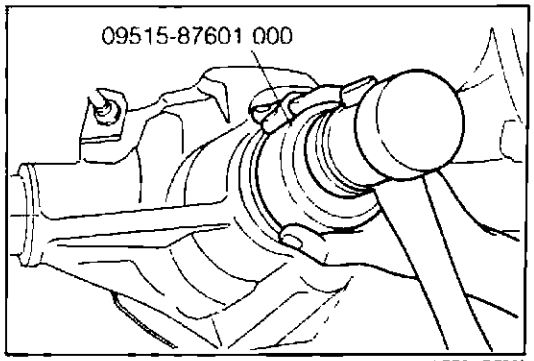
1 Install the "T" type oil seal using the following SST

SST: 09515-87601-000

NOTE:

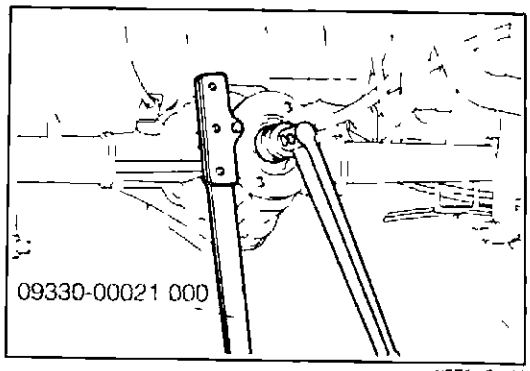
- Apply lithium base multi purpose grease to the oil seal lip section, prior to install.

2 Place the companion flange and plate washer

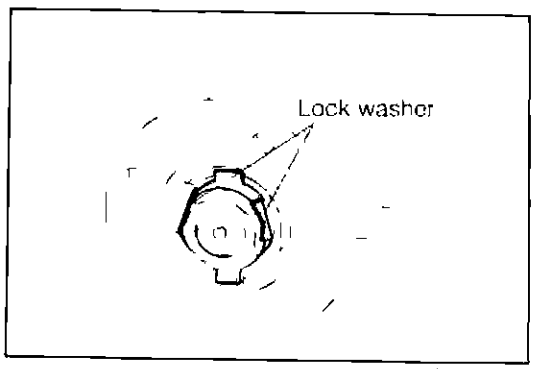


WRE91 DF022

3 Install the new lock washer
4 Tighten the nut, using the following SST
SST: 09330-00021-000
Tightening Torque: 196.0 - 245.0 N·m (20.0 - 25.0 kgf-m)

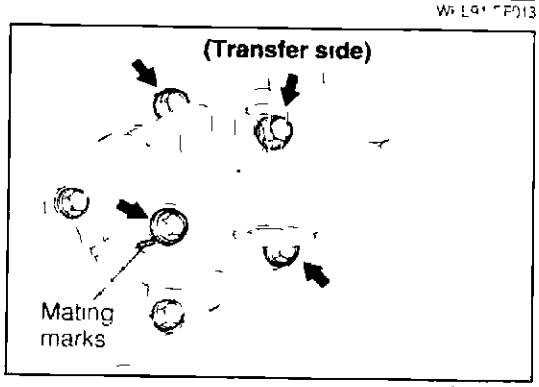


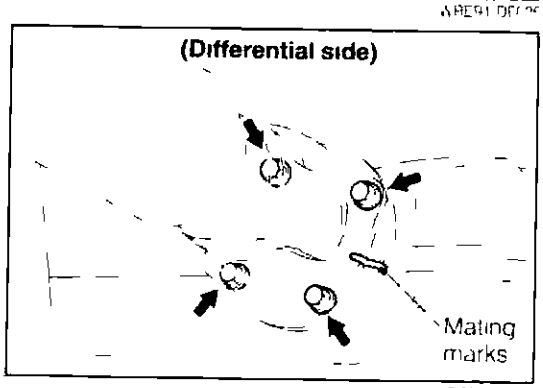
5 Stake the lock washer, using the standard tool of chiesel or the like securely



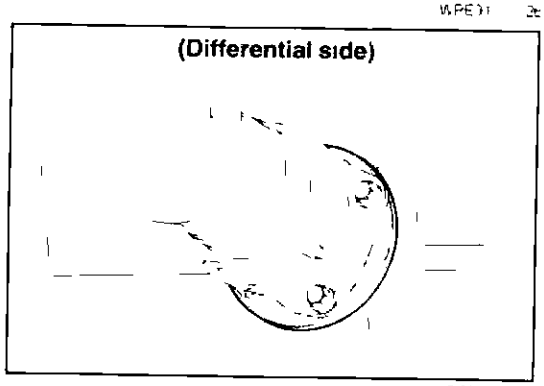
6 Install the rear propeller shaft assembly with the four bolts, four spring washers, four nuts then, tighten the nuts
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

CAUTION:
- Make sure to line up those scribing lines that were put during the removal of the rear propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration



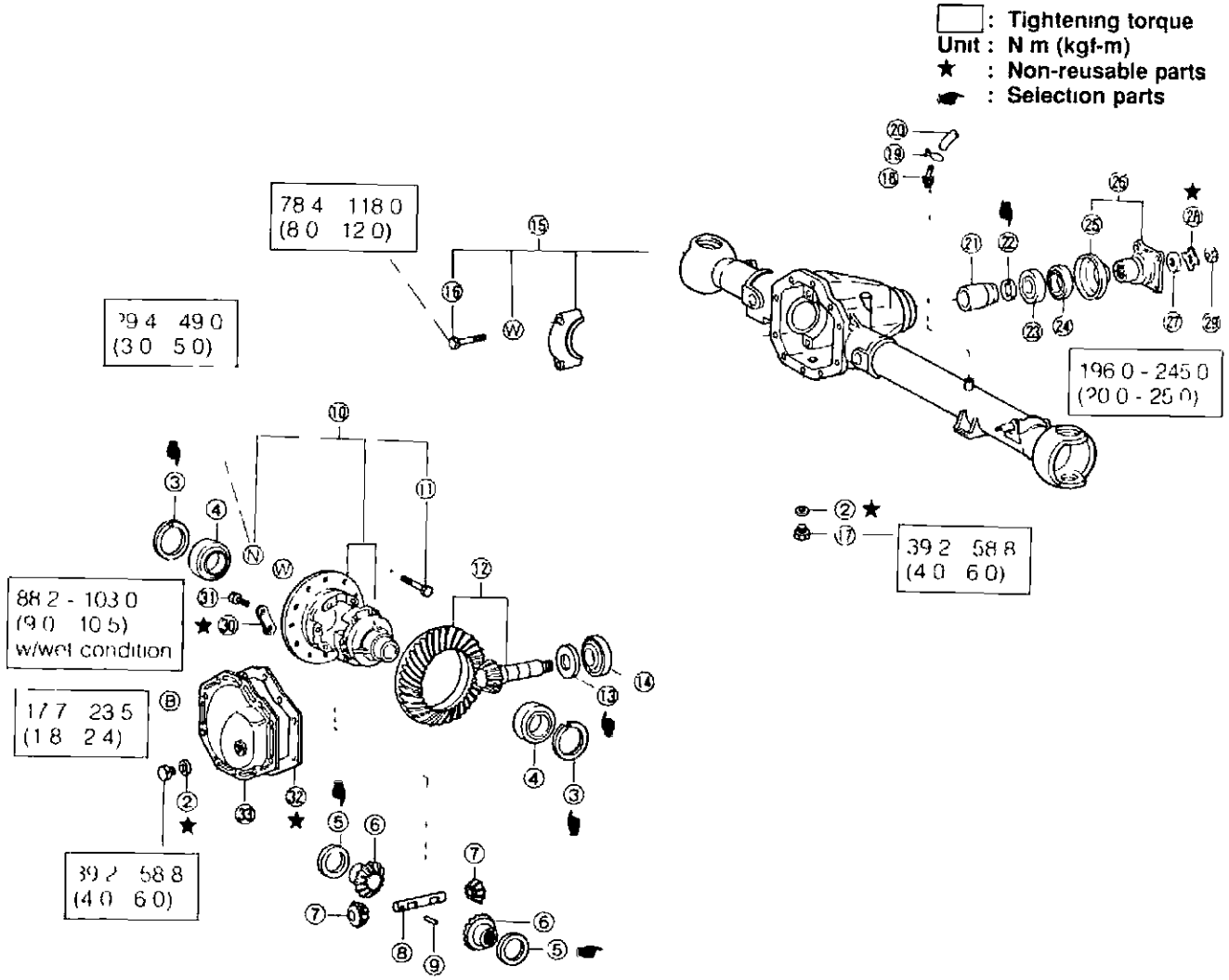


7 After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure



FRONT DIFFERENTIAL

COMPONENTS

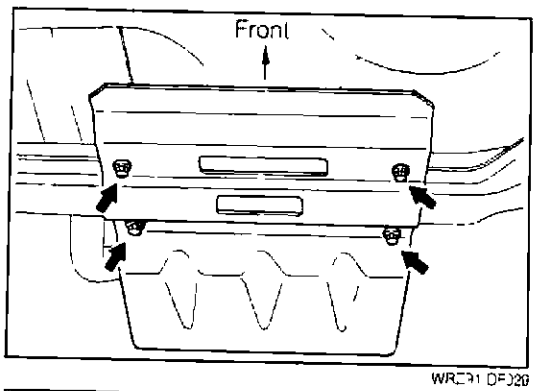


① Filler plug
② Gasket
③ Shim
④ Tapered roller bearing
⑤ Differential side gear thrust washer
⑥ Differential side gear
⑦ Differential pinion
⑧ Differential pinion shaft
⑨ Straight pin
⑩ Differential case S/A
⑪ Set bolt
⑫ Differential ring gear & drive pinion kit
⑬ Shim
⑭ Tapered roller bearing
⑮ Front axle housing Ay
⑯ Hexagon bolt
⑰ Drain plug
⑱ Union
⑲ Clip
⑳ Hose
㉑ Differential drive pinion bearing spacer
㉒ Shim
㉓ Tapered roller bearing
㉔ "T" type oil seal
㉕ Dust deflector
㉖ Drive pinion companion flange S/A
㉗ Plate washer
㉘ Lock washer
㉙ Nut
㉚ Lock washer
㉛ Hexagon bolt
㉜ Differential carrier gasket
㉝ Front axle housing cover S/A

REMOVAL

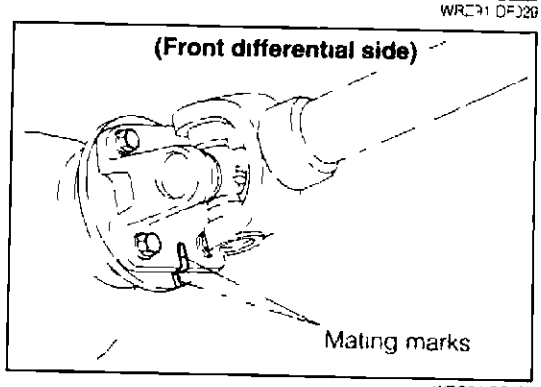
1 Jack up the vehicle
NOTE:
- Be sure to support the vehicle with safety stands. (As for the jacking up points, refer GI-section).

2 Remove the transmission undercover by removing the four bolts

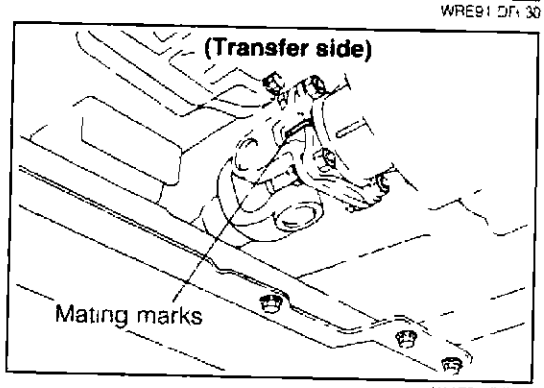


WRE91 DF020

3 Remove the front propeller shaft by removing the four bolts
CAUTION.
- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

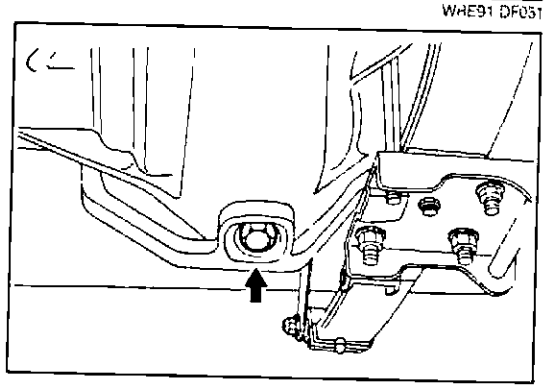


WRE91 DF030

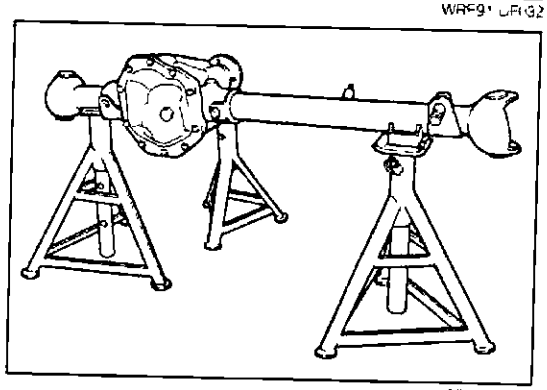


WRE91 DF031

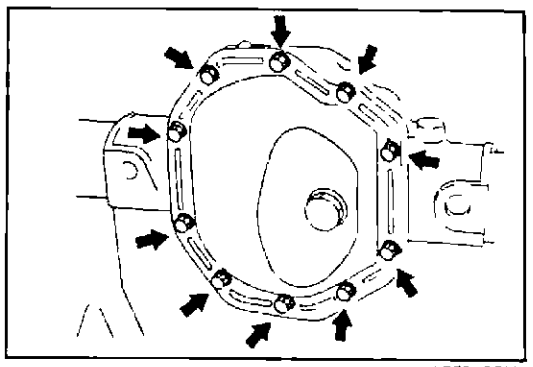
4 Drain the differential oil by removing the drain plug with gasket
NOTE.
- Never reuse the removed gasket.


WRE91 DF032

5 Remove the drive shaft related parts
(Refer FS-section)
6 Remove the front axle housing from the vehicle
7 Support the front axle housing with safety stands securely


WRE9 DF033

8 Remove the front axle housing cover S/A with gasket by removing the ten bolts
NOTE:
- Never reuse the removed gasket.

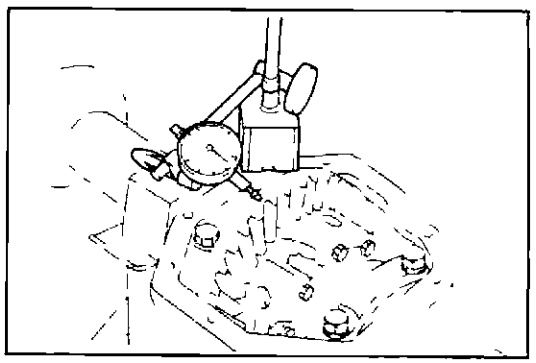

WRE91DF034

PRE-INSPECTION

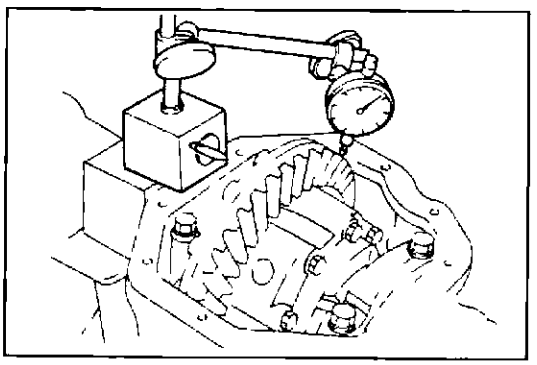
NOTE:
- Prior to the disassembling of the differential, be sure to check the following items and record the values. (These values are used as reference which assures the correct assembling.)

1 Ring gear runout check
Measure the runout at the back surface of the ring gear, using a dial gauge
Allowable Limit: 0.1 mm

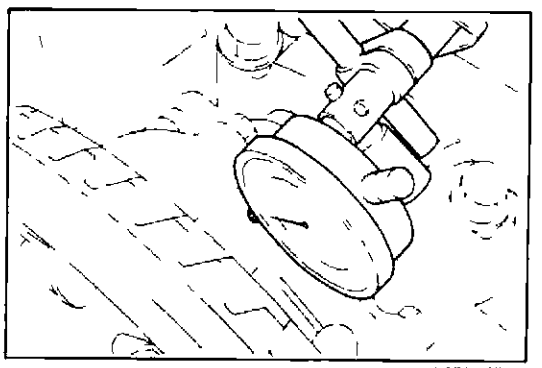
If the runout exceeds the allowable limit, replace the final gear as a set.


WRE91DF035

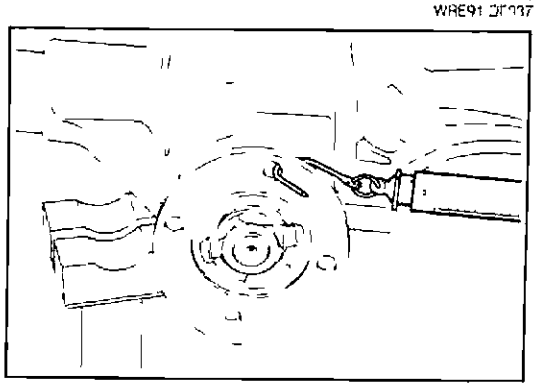
2 Ring gear backlash check
Secure the drive pinion in such a way that a dial gauge may make contact with the forward end of the tooth surface of the ring gear at right angles. Measure the backlash by moving the ring gear
Specified Value: 0.10 - 0.20 mm


WRE91DF036

3 Side gear backlash check
Measure the backlash with the pinion gear pushed against the differential case side
Specified Value: 0.05 - 0.25 mm

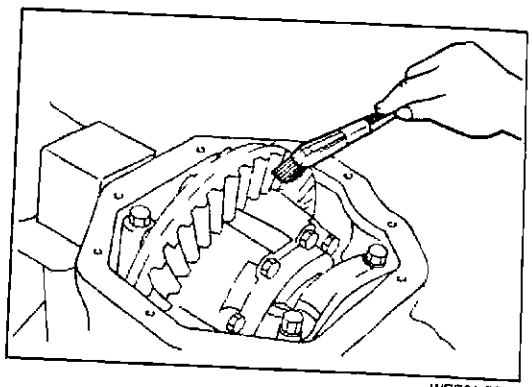

WRE91DF037

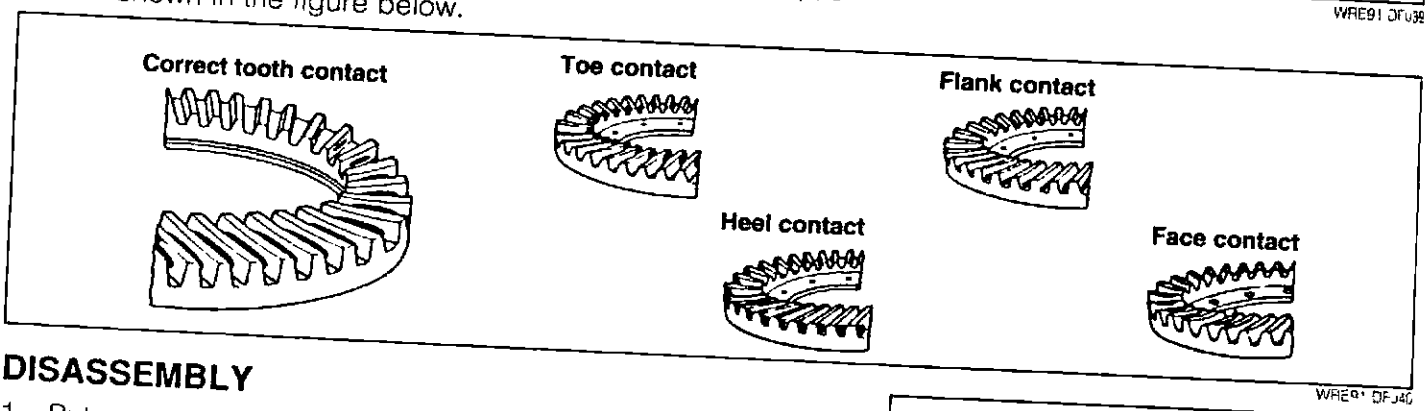
4 Total preload measurement
(Including the oil seal resistance)
Measure the starting torque with the drive pinion brought into contact with the tooth surface of the ring gear, using a torque gauge or spring scale
Specified Value: 0.01 - 2.45 N·m (1.0 - 25.0 kgf-cm)


WRE91DF038

5 Check of tooth contact between ring gear and drive pinion
Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear
NOTE:
- Perform the tooth contact check at four points of the ring gear.

Apply braking to the drive pinion and turn the ring gear several times. Check the tooth contact between the ring gear and the drive pinion
Ensure that correct tooth contact has been attained, as shown in the figure below.

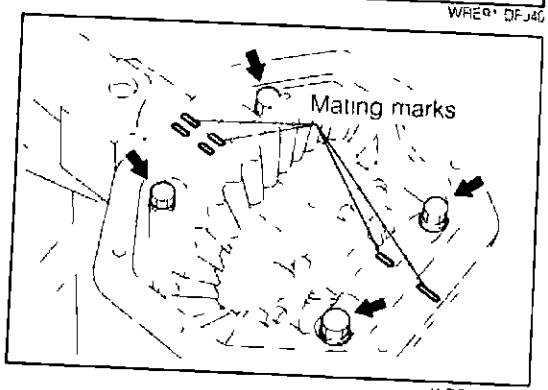

WRE91 DF039



WRE91 DF040

DISASSEMBLY

1 Put mating marks (Painted with white or the like) on the bearing cap and differential carrier
NOTE:
- Since the bearing cap has been manufactured integrally with the differential carrier, never disturb the combination of these components.

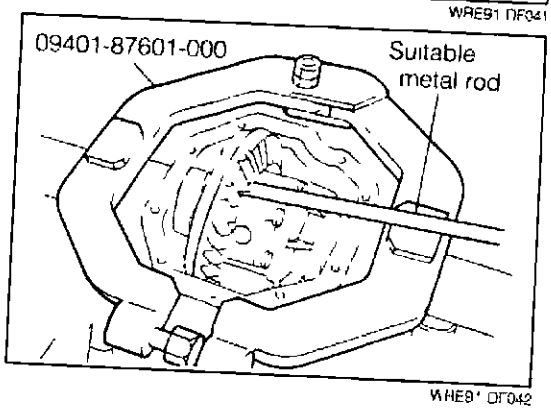


WRE91 DF041

2 Remove the bearing cap by removing the two bolts on both left and right sides
NOTE:
- Arrange the removed bearing caps in order, separating the right cap from the left cap.

3 Remove the differential case from the carrier in conjunction with the suitable metal rod and the following SST
SST: 09401-87601-000

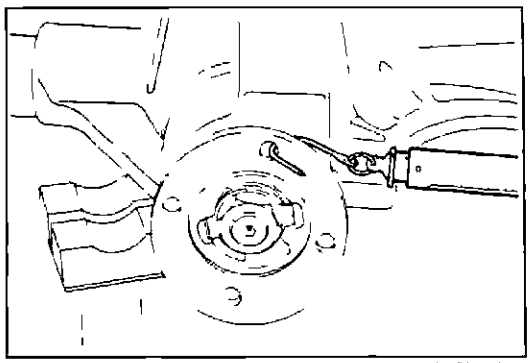
NOTE:
- The drive pinion preload should be measured after the differential case has been removed.
- After completion of measurement, perform disassembly, following the removal procedures given below.



WRE91 DF042

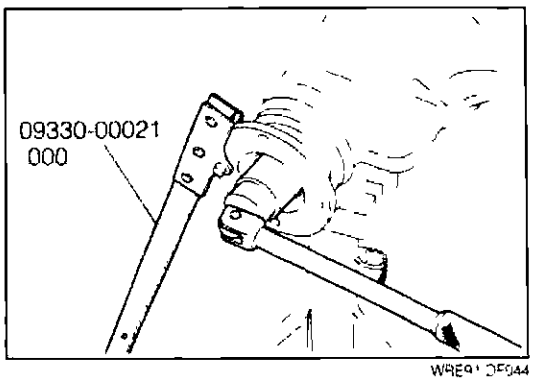
4 Drive pinion preload measurement
(Including the oil seal resistance)
Measure the starting torque within the range of the backlash between the drive pinion and the ring gear, using torque gauge or spring scale.
Specified Value: 0.78 - 2.06 N·m (8.0 - 21 kgf-cm)

NOTE:
- This step should be performed after the differential case has been removed from the carrier.


WRE91 DF043

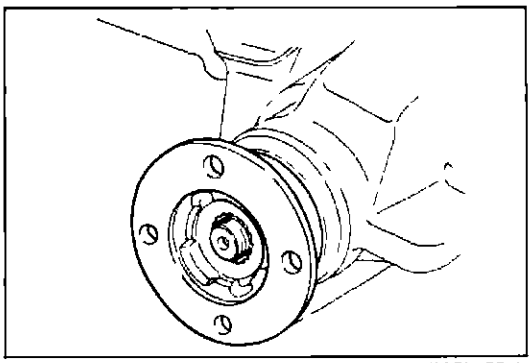
5 Raise the lock section of the lock washer, using a chisel and a hammer
NOTE:
- Never reuse the removed lock washer.

6 Remove the lock nut, using the following SST.
SST: 09330-00021-000



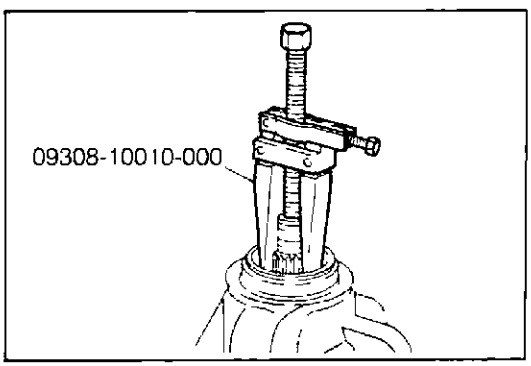
WRE91 DF044

7 Remove the companion flange


WRE9 DF45

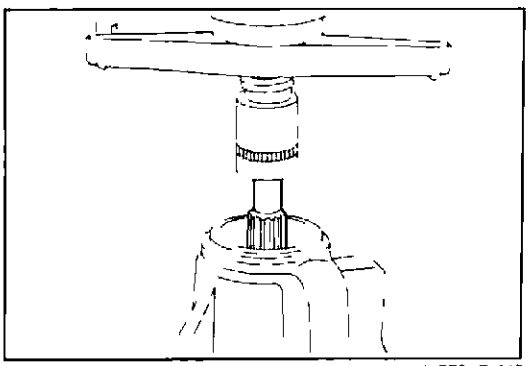
8 Remove the "T" type oil seal of the drive pinion, using the following SST
SST: 09308-10010-000

NOTE:
- Never reuse the removed oil seal.

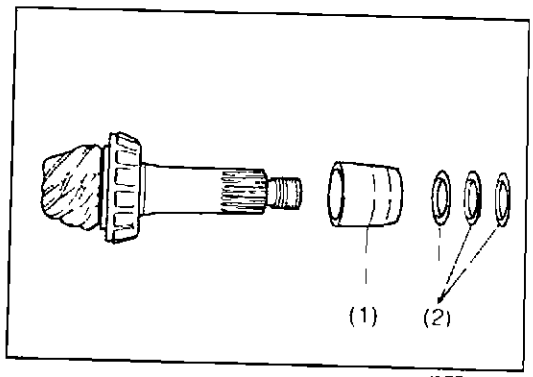


WRE91 DF046

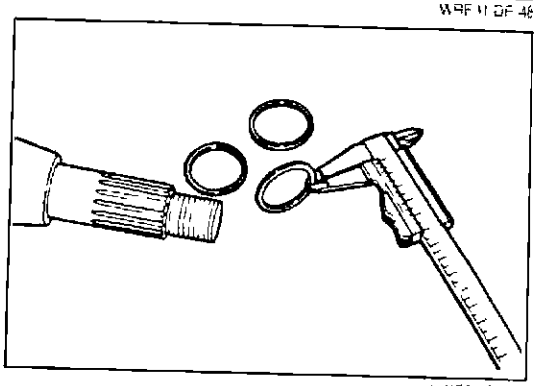
9 Remove the drive pinion by pressing the press


WRE91 DF047

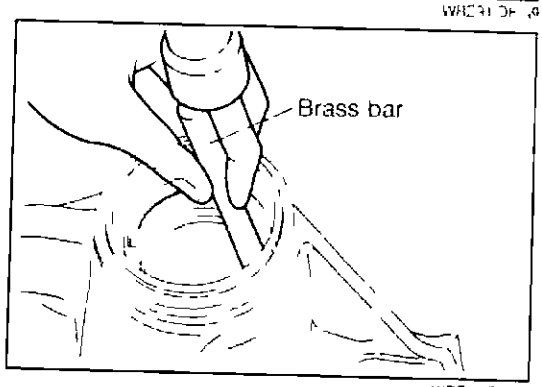
10 Remove the following parts from the drive pinion
(1) Spacer
(2) Shim for drive pinion preload



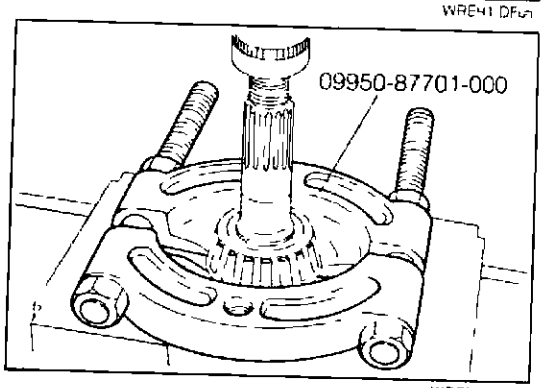
11 Measure the respective shims for preload adjustment use which have been removed Record the measurement results (for the purpose of using them as a guide during the installation of the drive pinion and ring gear)



12 Remove the front and rear bearing outer races, using a brass bar

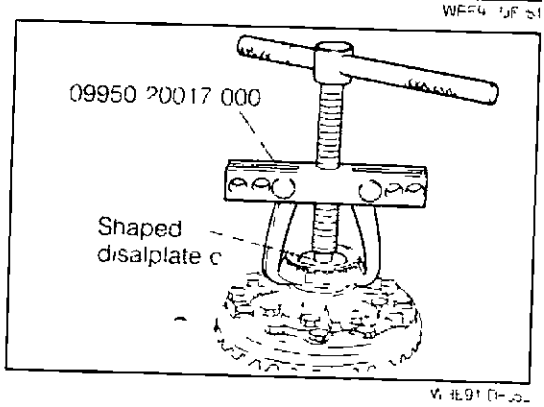


13 Remove the rear bearing and the drive pinion mounting distance adjusting shim from the drive pinion, in conjunction with a press and the following SST
SST: 09950-87701-000



14 Set the differential case into the vice
15 Remove the side bearings from the differential case, using the following SST
SST: 09950-20017-000

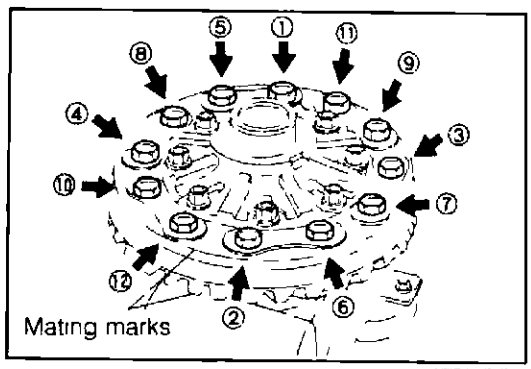
NOTE
- Insert the pawl of the SST into the groove of the differential carrier



16 Put mating marks between the differential case subassembly and the ring gear, if the ring gear is reused, for the purpose of using them as a guide during the installation

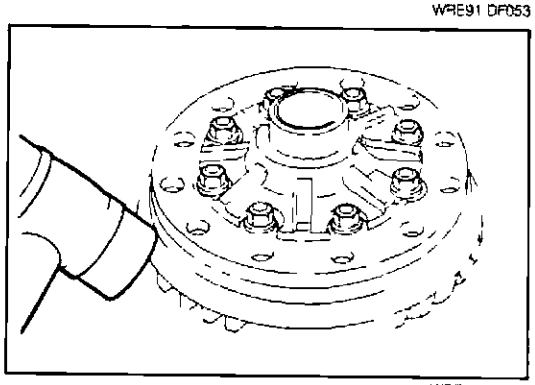
17 Raise the lock section of the lock washer
NOTE:
- Never reuse the removed lock washer.

18 Remove the twelve bolts of the ring gear

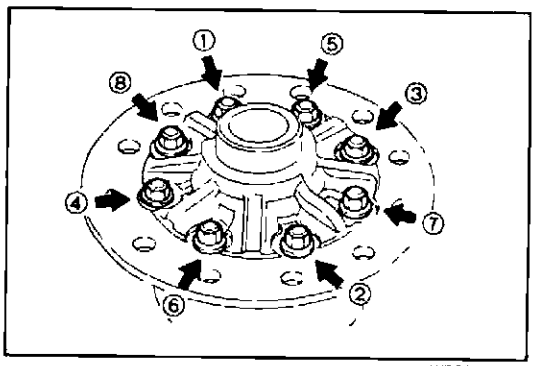


WRE91 DF053

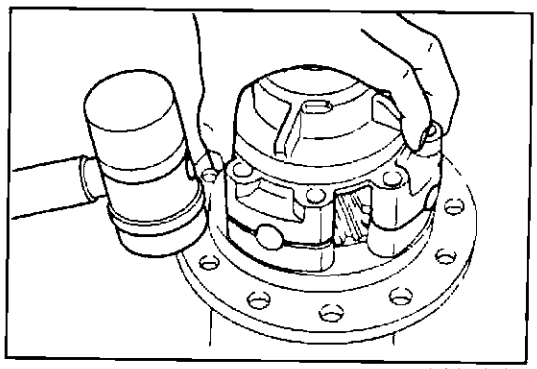
19 Separate the ring gear by tapping with a standard tool of the plastic hammer lightly


WRE91 DF054

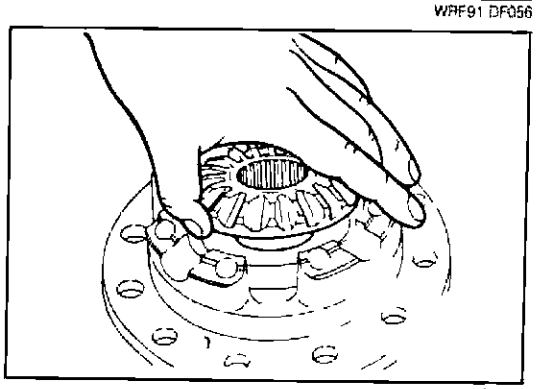
20 Remove the eight nuts and eight washers from the set bolts of the differential case


WRE91 DF055

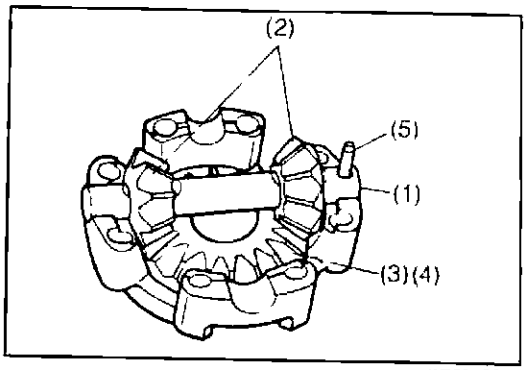
21 Separate the differential case S/A by tapping with a standard tool of the plastic hammer lightly


WRF91 DF056

22 Remove the differential side gear and differential side gear thrust washer No 1


WRF91 DF057

23 Remove the following parts from the differential case
(1) Pinion shaft
(2) Differential pinion . . . . . (2 pcs)
(3) Differential side gear
(4) Differential side gear thrust washer No 1
(5) Straight pin

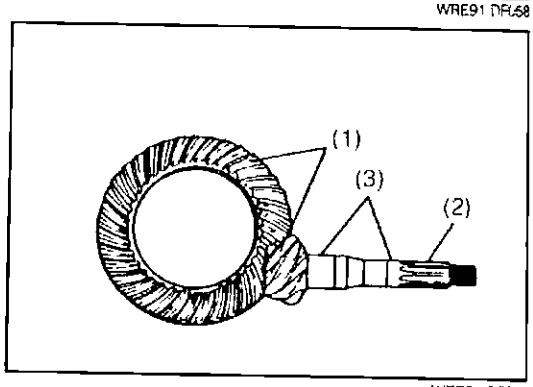


WRE91 DF058

INSPECTION

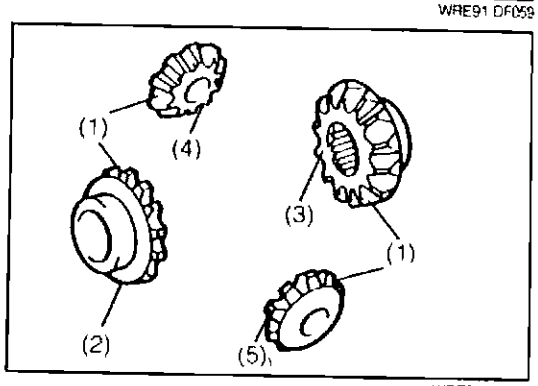
Inspect each section of the following parts for any sign of damage, wear or excessive looseness Replace any parts which exhibit defects

1 Drive pinion & ring gear
(1) Gear teeth
(2) Spline portion of drive pinion
(3) Bearing fitting section



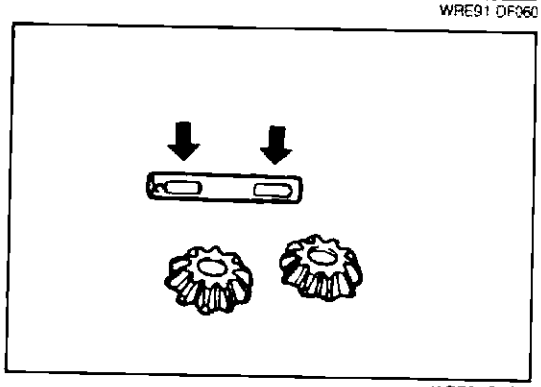
WRE91 DF059

2 Side gear & pinion
(1) Gear teeth
(2) Side gear boss section
(3) Side gear serrated section
(4) Pinion shaft fitting hole
(5) Differential case contact section

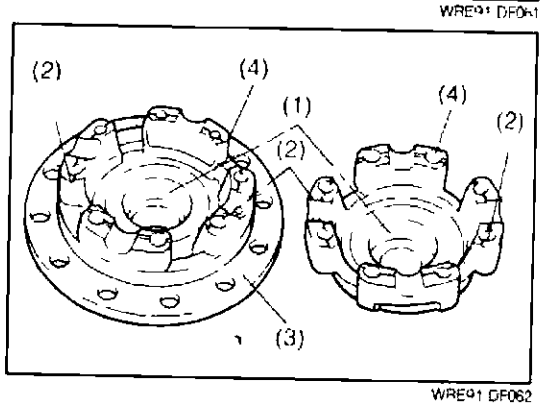


WRE91 DF060

3 Visually inspect the rotational sliding section between the differential pinion and the differential pinion shaft for damage and wear

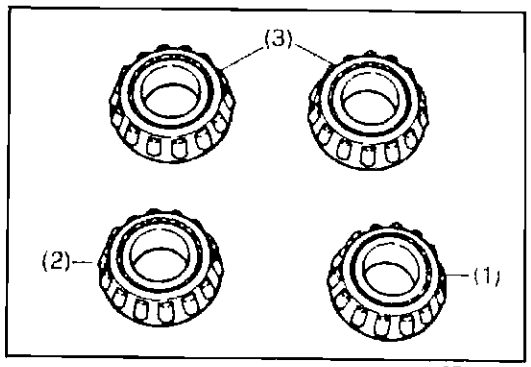

WRE91 DF061

4 Inspection of differential case for wear or damage
(1) Side gear boss contact sections
(2) Pinion contact section
(3) Ring gear attaching section
(4) The differential case proper



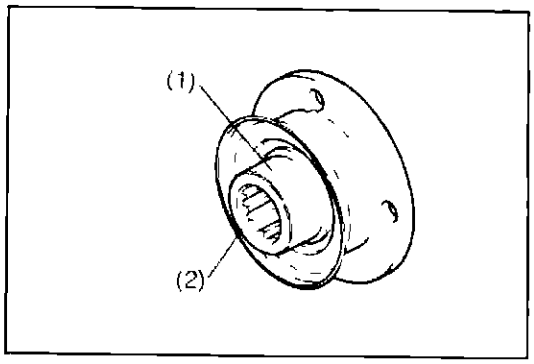
WRE91 DF062

5 Bearings
(1) Front bearing
(2) Rear bearing
(3) Side bearings
- Turn the bearings lightly. Ensure that they rotate smoothly without any binding or abnormal noise.
- While tracing the outer peripheral section of the taper roller with your nails, check to see if any binding exists there.



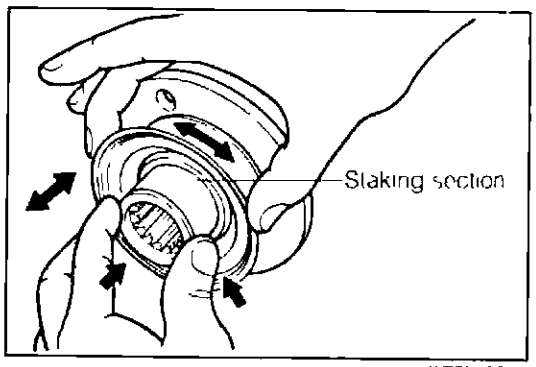
WRE91 DF

6 Companion flange
(1) Oil seal contact section
(2) Spline section



WRE9* DF

7 Check that the three dust deflector staked sections of the companion flange exhibit no excessive play by turning it in a right-&-left direction, as indicated in the right figure.

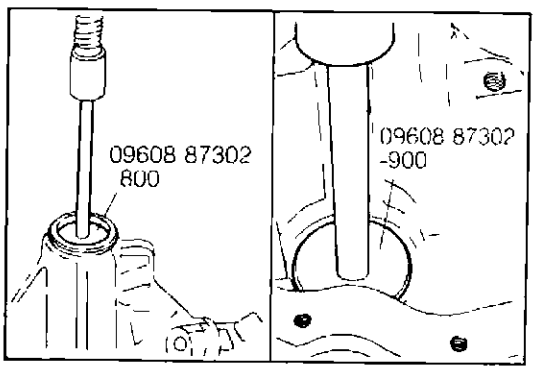


WRE91 DF

ASSEMBLY

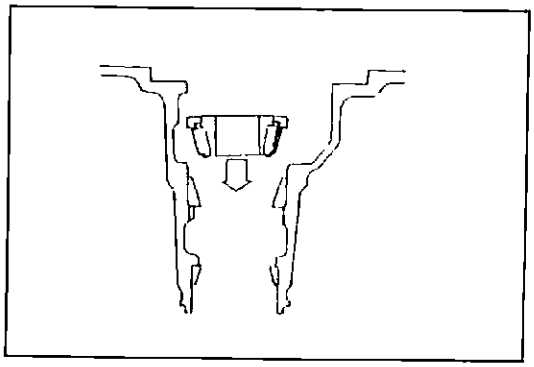
1 Press the front and rear outer races into the differential carriers, using the following SSTs.
SSTs: (1) **Front...09608-87302-800**
(2) **Rear. .09608-87302-900**

Both above SSTs are included in the 09608-87302-000.



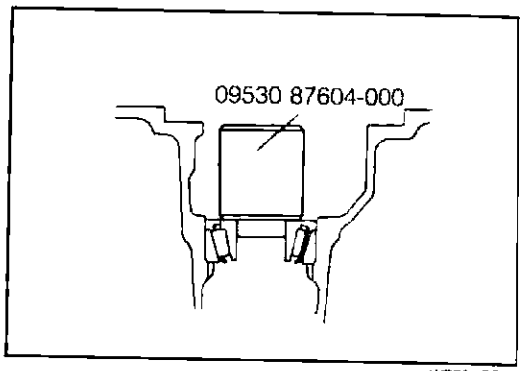
WRE91 DF

(1) Install the bearing on the outer race. To get bedding-in of the inner race, turn the bearing several times so that it may be settled.


WRE9* DF

2. Install the following SST to the front differential.
   SST: 09530-87604-000

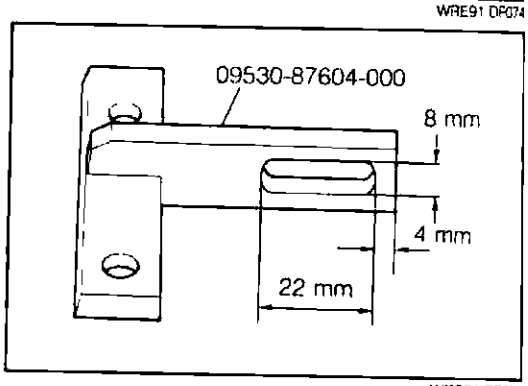
   NOTE:
   - Do not install the oil seal at this stage.



WRE91 DF074

3 As for those differential gears that were manufactured in or after September 1987, the P M D has been extended It is, therefore, necessary to modify the SST (09530-87604-000) as indicated in the right figure

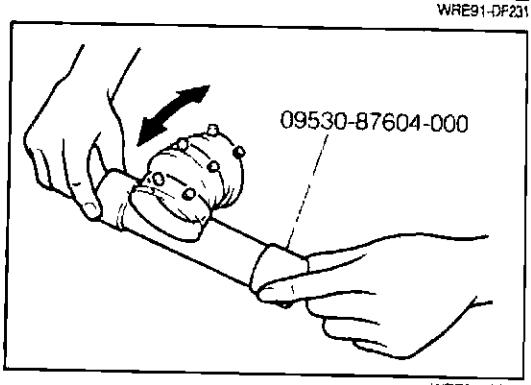
Contents of modification:
Elongate the groove where a dial gauge is installed to the dimensions as indicated in the right figure



WRE91-DF231

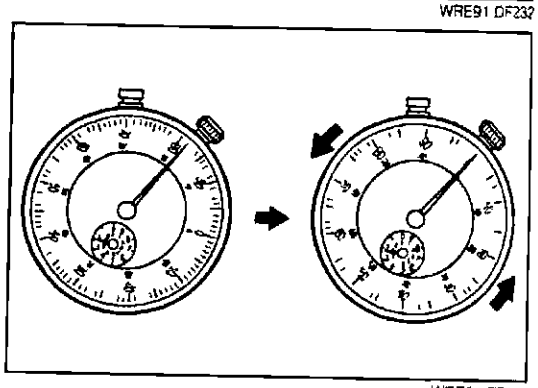
4 Secure the dial gauge to the SST
NOTE:
- Make certain to install the dial gauge securely.

(1) While turning the SST on a surface plate, as shown in the right illustration, locate the position where the spindle of the dial gauge is contracted to the shortest position (namely when the pointer's runout becomes a minimum stable level) And stop the SST at this point



WRE91 DF232

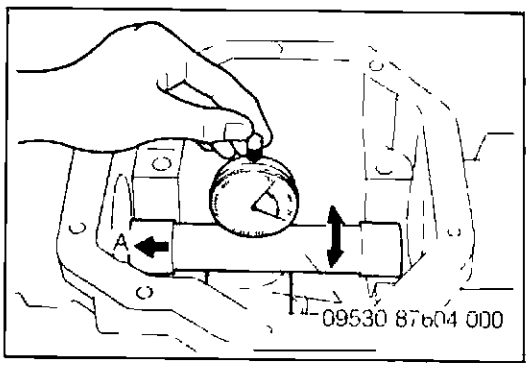
(2) Align the zero-point of the scale with the needle of the dial gauge


WRE91 DF057

(3) Place the SST in the differential carrier
(4) While turning the attaching surface of the side bearing outer race lightly by their own weights of the SST and dial gauge, as shown in the right illustration, locate the position where the pointer registers the stablest reading

NOTE:

- **During the operation above, keep one end surface of the SST in contact with the attaching surface of the side bearing outer race (in the arrowheaded direction (A)).**

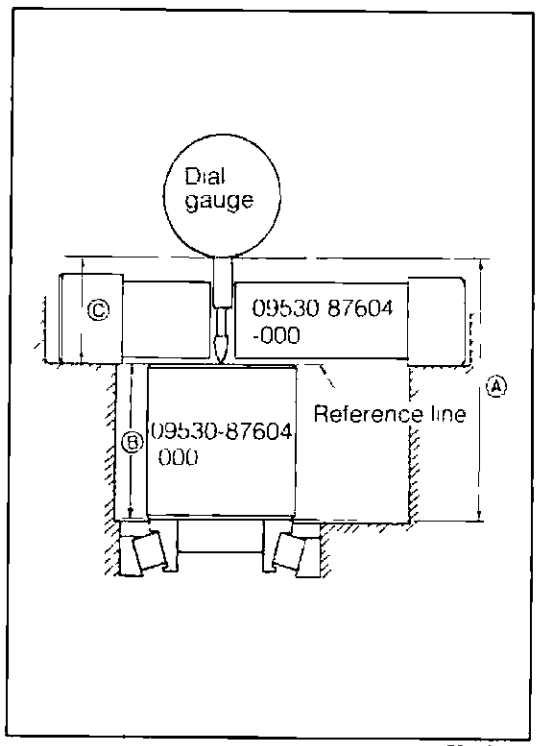


WRE91 DF068

(5) Perform the calculation, using the thickness of the following standard shim.
Thickness of standard shim = (Ⓑ + Ⓒ) – P M D
Ⓐ P M D + Thickness of standard shim (108 0 mm)
Ⓑ Height of drive pinion adjusting gauge (62 75 mm)
Ⓒ Radius of attaching surface of side bearing outer race (42 5 mm)

108 mm – (62 75 mm + 42 5 mm) = 2 75 mm

With regard to the SST mounted on the dial gauge, its zero-point adjustment has been already conducted on the surface plate
As a result, the reference line is established as indicated in the right figure Therefore, the thickness of the standard shim can be determined, using the formula given above



WRE41 DF[illegible]

Therefore, after the needle of the dial gauge has been aligned with the zero-point, subtract 2 75 mm from the displacement of the spindle section of the dial gauge The thus-calculated value becomes the installation thickness of the adjusting shim

WRE9 DF[illegible]

Calculating Formula Thickness of adjusting shim = Displacement of spindle section of dial gauge – 2 75 mm (Standard value) <Example> After the needle of the dial gauge had been set to the zero-point the spindle section of the dial gauge dropped Thus the needle of the dial gauge turned counterclockwise 5 25 mm 5 25 mm - 2 75 mm = 2 50 mm Because of availability of adjusting shims use a 2 20 mm thick shim together with a 0 30 mm thick shim

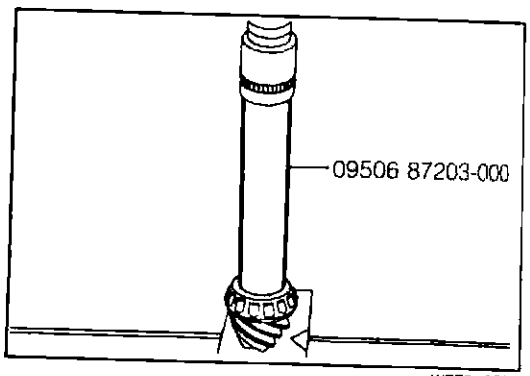
WRE91 DF07[illegible]

5 Table showing relationship between availability of replacement shims and readings of dial gauge

Thickness of adjusting shims mm	2 10	2 15	2 20	2 25	2 30	2 35	0 30 (for fine adjustment)
Reading of dial gauge mm	+0 15	+0 10	+0 05	±0	–0 05	–0 10	

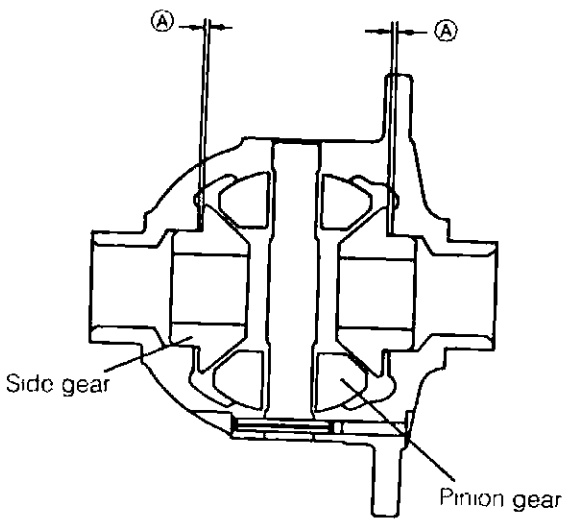
WRE91 DF0 -

6 Place the drive pinion mounting distance adjusting shim that was selected in the previous step in the drive pinion. Press the rear bearing, using the following SST
SST: 09506-87203-000



WRE91 DF076

7 Selecting procedures for differential side gear backlash thrust washer



Availability of Adjusting Thrust Washer for Section Ⓐ

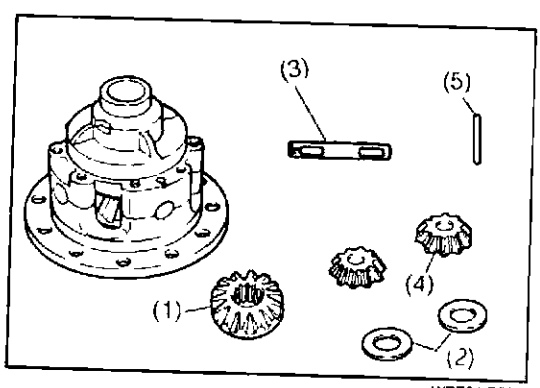
Unit mm

0 8
0 9
1 0

WRE91 DF077

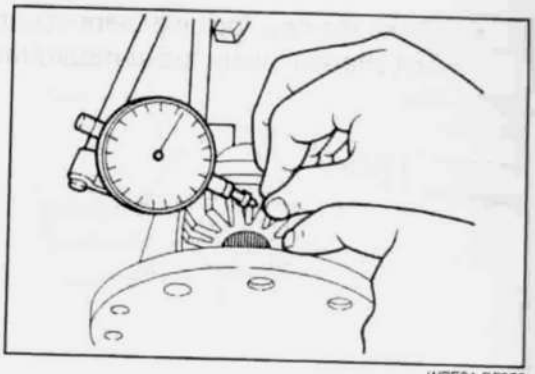
(1) Prior to assembling, apply the gear oil to the following rotating sections
— Outer periphery (side and pinion gear)
— Inner periphery of side and pinion gear in differential case

(2) Assemble the following parts in the differential case.
(1) Differential side gear
(2) Differential side gear thrust washer
(3) Differential pinion shaft
(4) Differential pinion
(5) Straight pin

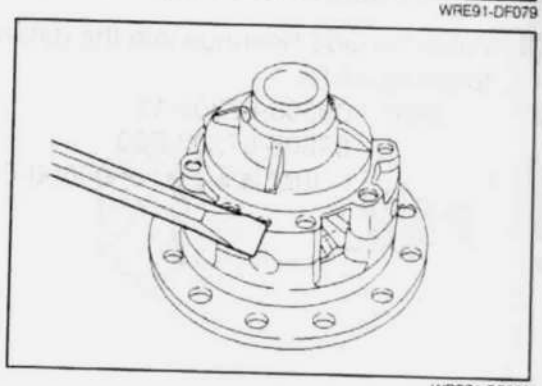


WRE91 DF078

(3) Measure the backlash with the pinion gear pushed against the differential case side. Select a thrust washer in such a way that the backlash between the differential pinion and the differential side gear may conform to the specified value given below. Here, the backlash is the mean value of measurements over four teeth. Place the selected thrust washer.
Specified Value: 0.05 - 0.25 mm

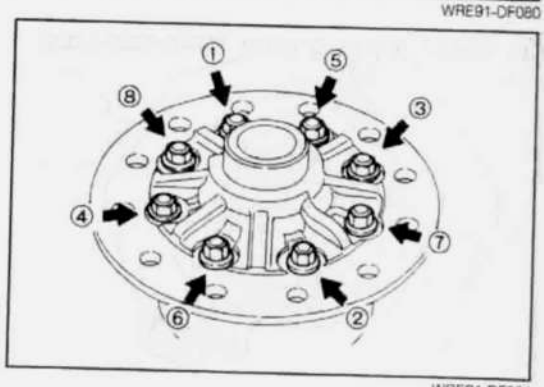

WRE91-DF079

8. Install the straight pin into position.
NOTE:
- Stake the differential case with a chisel or the like so as to secure the straight pin.


WRE91-DF080

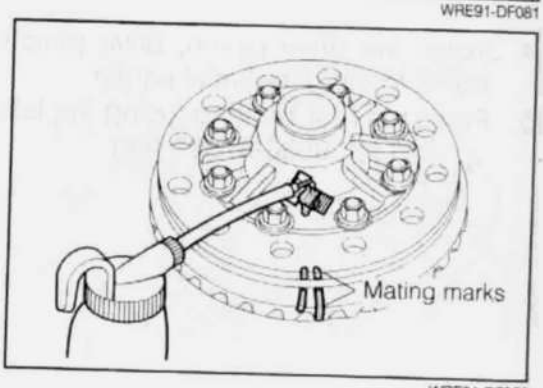
9. Tighten the differential case cover by means of the eight hexagon bolts, washers and nuts.
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The illustration at the right figure indicates a typical example of the tightening sequence.)



WRE91-DF081

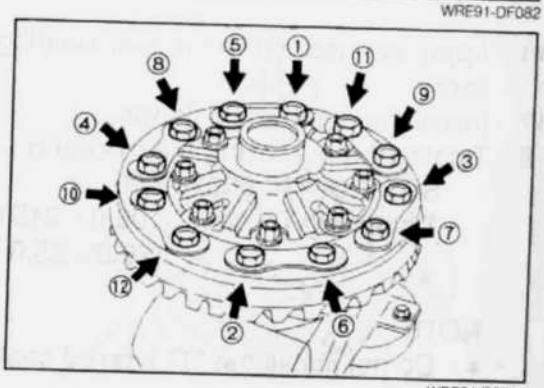
10. Align the mating marks put during the disassembly with each other.
Apply gear oil to the threaded portions of the tightening bolts and the ring gear.



WRE91-DF082

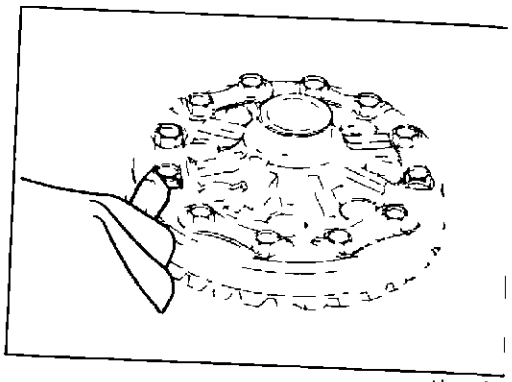
11. Install the ring gear in the differential case S/A and tighten the twelve set bolts with new lock washers.
Tightening Torque: 88.3 - 103.0 N·m
(9.0 - 10.5 kgf-m)

NOTE:
- Be sure to tighten the set bolt alternately and diagonally. (The right figure illustration indicates a typical example of the tightening sequence.)

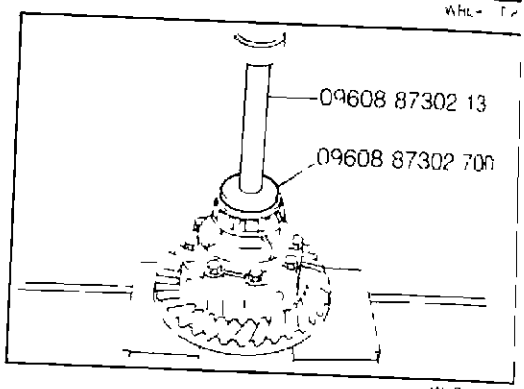


WRE91-DF083

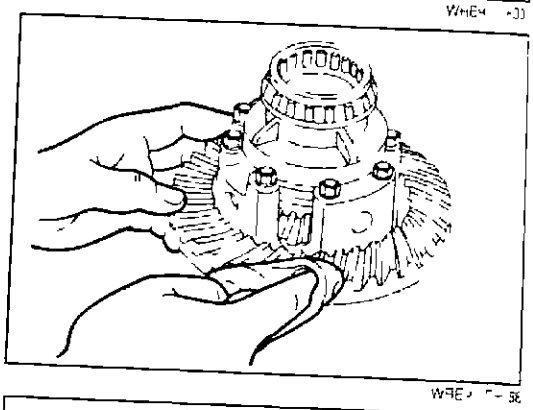
- Stake the new lock washers securely along with the set bolt shaped, using the standard tool of the chiesel or the like.



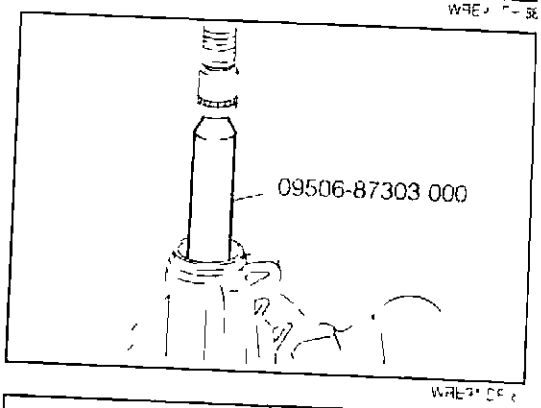
12 Press the side bearings into the differential case, using the following SSTs
SST. 09608-87302-13
09608-87302-700
that is a part of 09608-87302-000 set



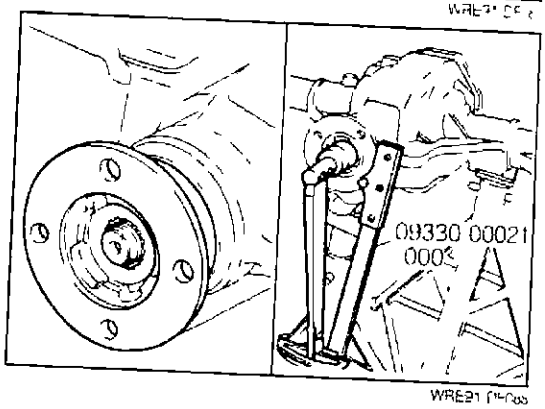
13 Clean the ring gear tooth surfaces



14 Install the drive pinion drive pinion bearing spacer and shims to the differential carrier.
15 Press the rear bearing, using the following SST
SST: 09506-87303-000

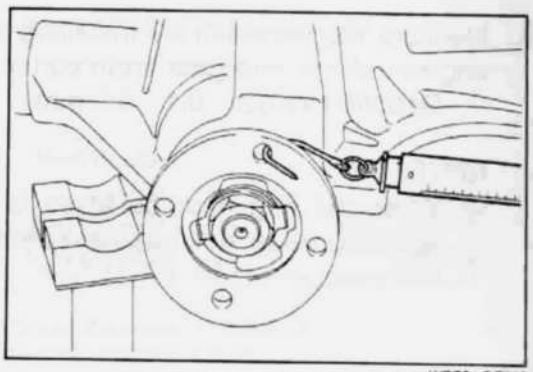


16 Apply the gear oil to the rear bearing tappared roller sections
17 Install the companion flange
18 Tighten the nut using the following SST
SST 09330-00021-000
Tightening Torque: 196.0 - 245.0 N m
(20 0 - 25.0 kgf-m)



NOTE:
- Do not install the "T" type oil seal at this stage.

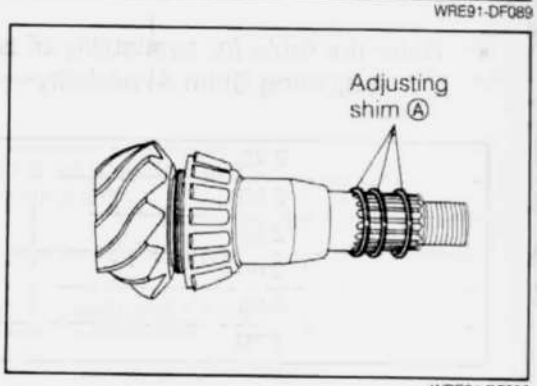
19. Apply the gear oil to the front bearing tappered roller sections.
20. Rotated the companion flange for several times in clock and counter clockwise.
21. Measure the starting torque of the drive pinion, using a torque gauge or spring scale.
    Specified Value:
    New Bearing: 0.06 - 1.96 N·m (7.0 - 20.0 kgf-cm)
    Bearing Reused:
    0.06 - 1.96 N·m (7.0 - 20.0 kgf-cm)


WRE91-DF089

22. When the preload is greater than the specified value, decrease the adjusting shim thickness. Conversely, when the preload is less than the specified value, increase the adjusting shim thickness.
    NOTE:
    - Refer the table for availability of adjusting shim Ⓐ as follows.

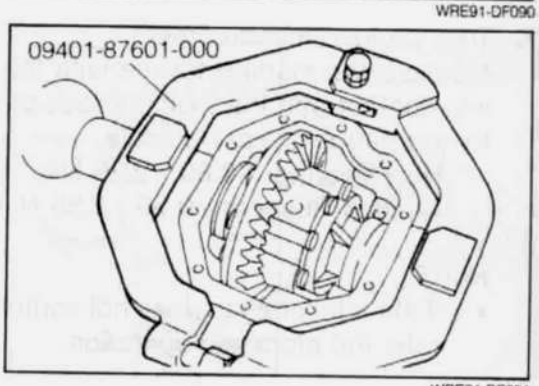
Unit: mm

Thickness	0.25	0.30	0.40
	0.50	0.08	



WRE91-DF090

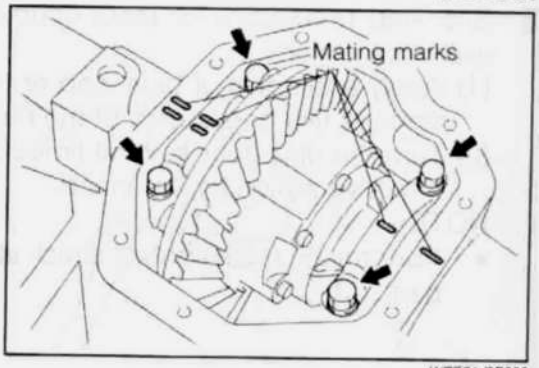
23. Install the differential case S/A to the front axle housing, using the following SST.
    SST: 09401-87601-000



WRE91-DF091

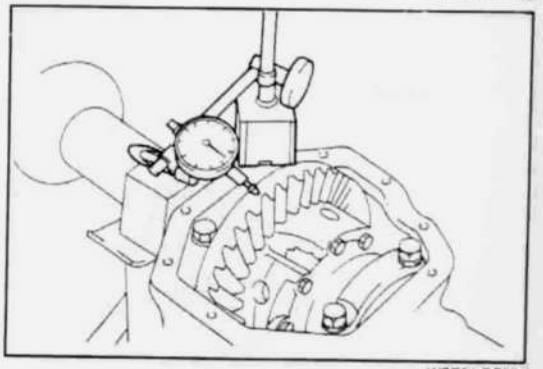
24. Tighten the bearing caps.
    Tightening Torque: 78.5 - 118.0 N·m
    (8.0 - 12.0 kgf-m)

    NOTE:
    - Ensure that the mating marks put during the disassembly should be line-uped each others.

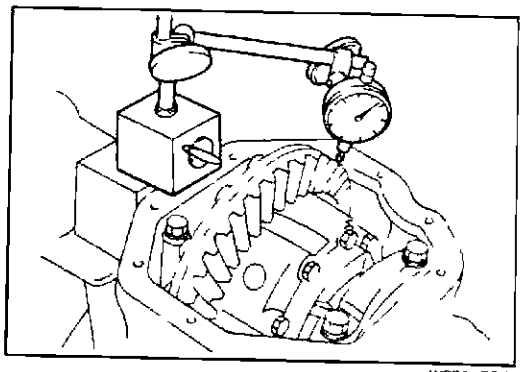


WRE91-DF093

25. Measure the run-out for ring gear by installing a dial gauge normally to the back surface of the ring gear.
    Specified Value: 0.1 mm


WRE91-DF094

26 Measure the backlash by installing a dial gauge at right angles with the ring gear tooth surface
Specified Value: 0.1 - 0.2 mm


WRE91 DF09

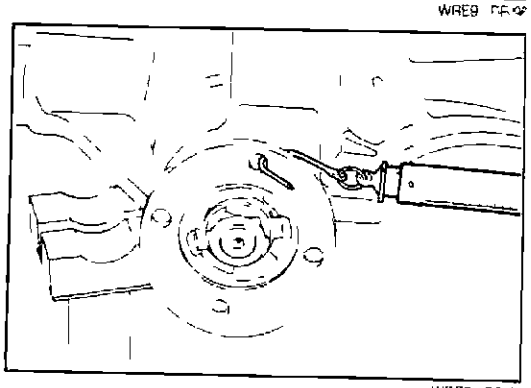
NOTE:
- When the ring gear backlash is greater or less than specified value, decrease or increase the adjusting shim thickness.
- Refer the table for availability of adjusting shims Ⓐ as follows.
  Ⓐ: Adjusting Shim Availability

Unit: mm

2.45	2.75	3.05
2.50	2.80	3.10
2.55	2.85	3.15
2.60	2.90	3.20
2.65	2.95	3.25
2.70	3.00	3.30

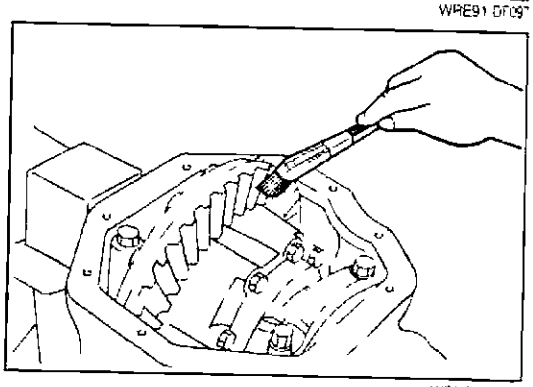
WRE9 DF-0

27 Total preload measurement
Measure the starting torque with the drive pinion brought into contact with the tooth surface of the ring gear, using a torque gauge or spring scale
New Bearing: 0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)
Bearing Reused: 0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)


WRE91 DF09

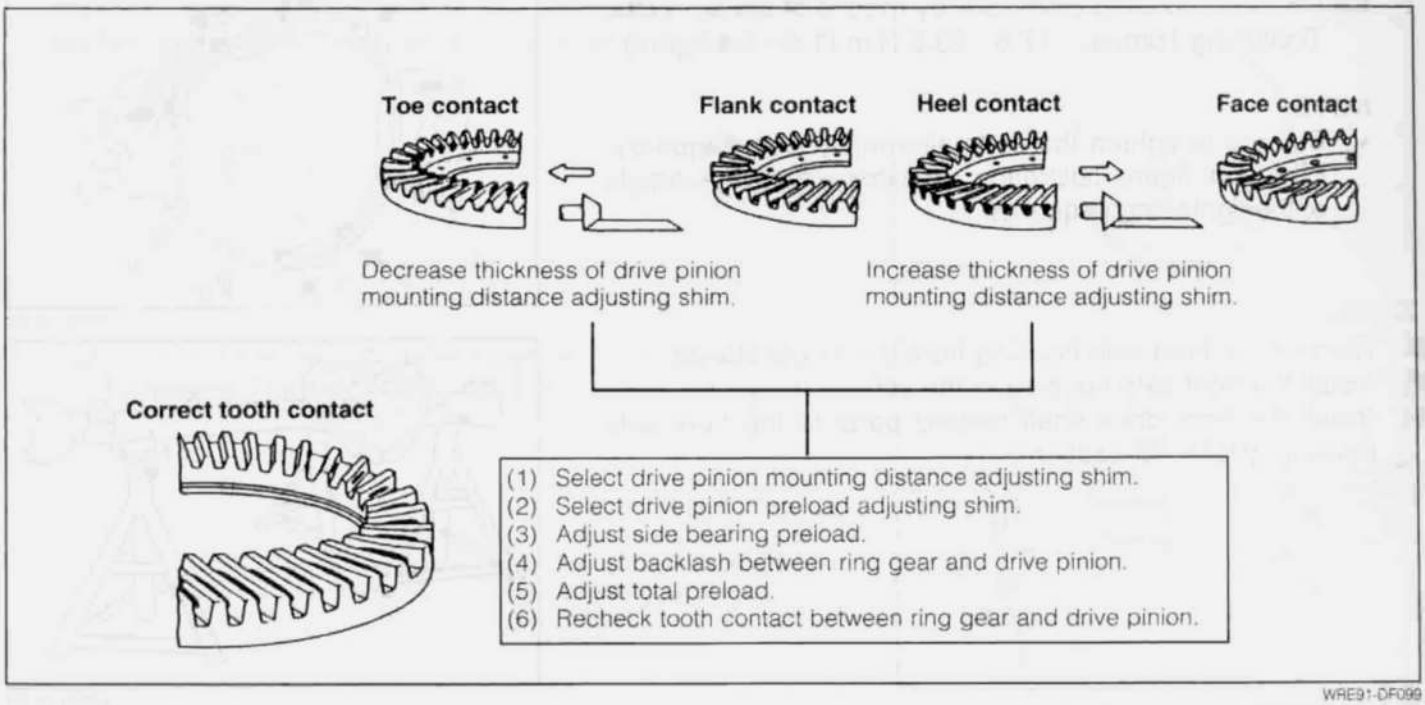
NOTE:
- If the total preload does not conform to the specification, refer the aforesaid operation.

28 Checking procedure for tooth contact between ring gear and drive pinion
(1) Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear
(2) Turn the ring gear several times by applying a load to the drive pinion by one hand


WRE9 DF006

NOTE:
- Perform the tooth contact check at four points of the ring gear.

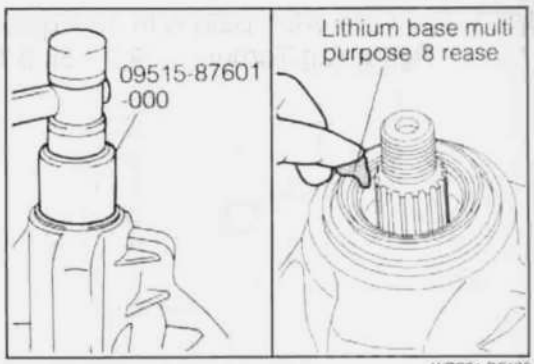
(3) Ensure that the correct tooth contact has been attained, as shown in the figure below.



WRE91-DF099

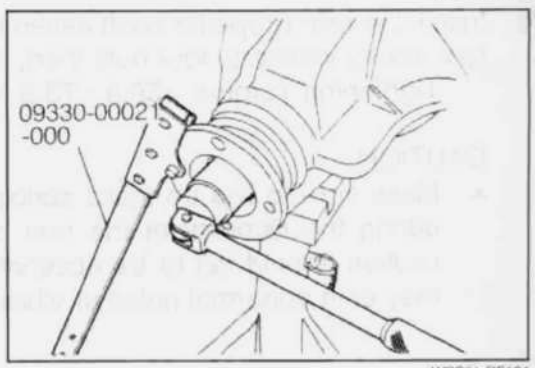
29. Remove the companion flange by removing the nut.
30. Drive a new oil seal up to the edge surface of the differential carrier, using the following SST.
    SST: 09515-87601-000

    NOTE:
    - Apply lithium base multi purpose grease to the oil seal lip section.



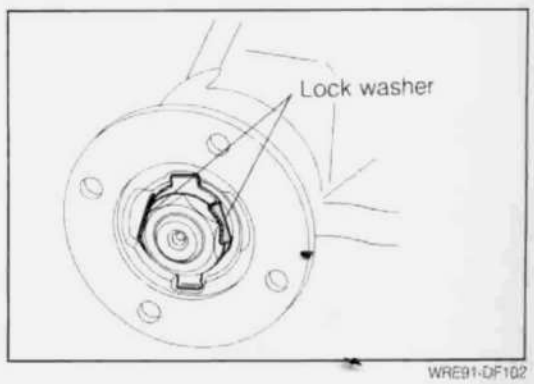
WRE91-DF100

31. Install the companion flange, lock washer, nut and tighten the companion flange by means of a new lock nut, using the following SST.
    SST: 09330-00021-000
    Tightening Torque: 196.0 - 245.0 N·m
    (22.0 - 25.0 kgf-m)



WRE91-DF101

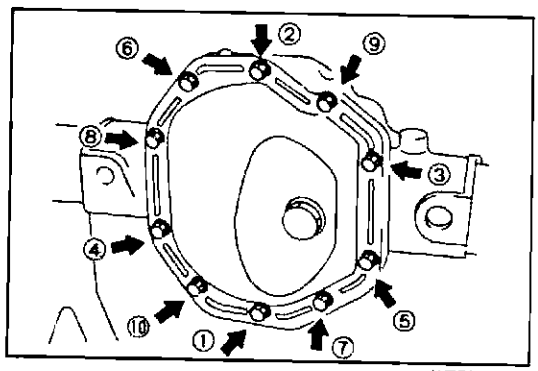
32. Stake the new lock washer to the nut securely, using a chisel or the like.



WRE91-DF102

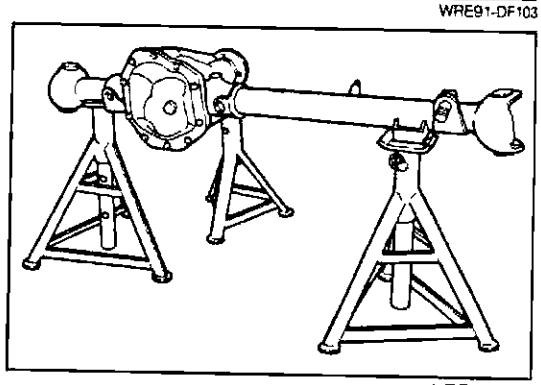
33 With the new differential carrier gasket interposed, tighten the front axle housing cover S/A by means of the ten bolts
Tightening Torque: 17.6 - 23.5 N·m (1.8 - 2.4 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The right figure illustration indicates a typical example of the tightening sequence.)

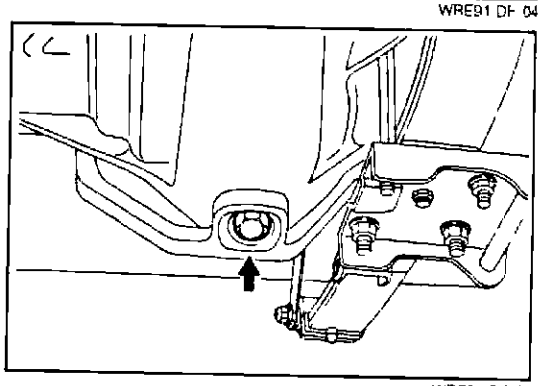


WRE91-DF103

34 Remove the front axle housing from the safety stands.
35 Install the front axle housing to the vehicle.
36 Install the front drive shaft related parts to the front axle housing (Refer FS-section)

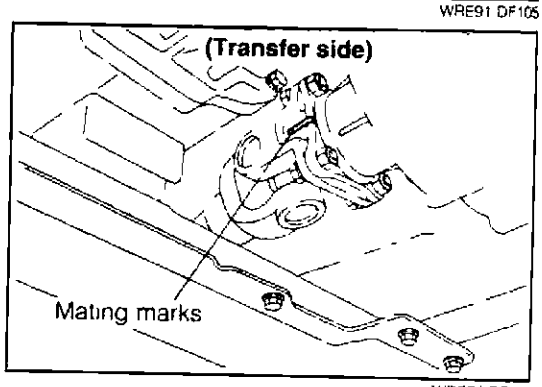

WRE91 DF 04

37 Tighten the drain plug with new gasket
Tightening Torque: 39.2 - 58.8 N·m (4.0 - 6.0 kgf-m)

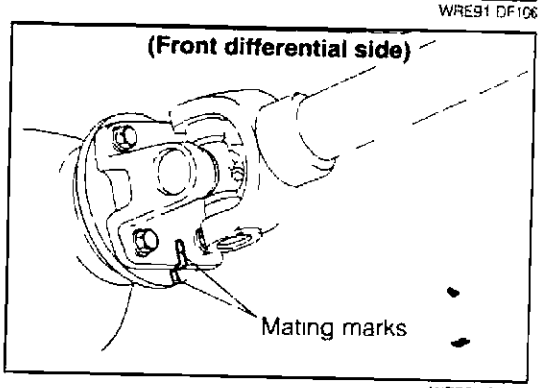

WRE91 DF105

38 Install the rear propeller shaft assembly with the four bolts, four spring washers, four nuts then, tighten the nuts
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

CAUTION:
- Make sure to line up those scribing lines that were put during the removal of the rear propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.

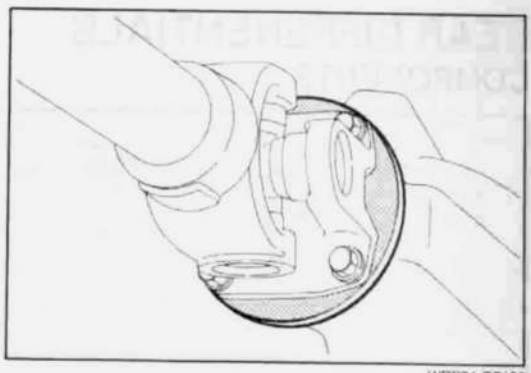


WRE91 DF106



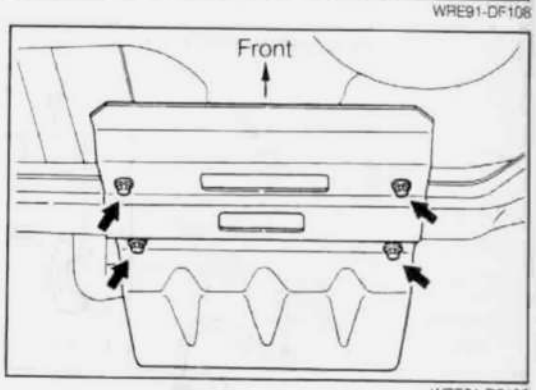
WRE91 DF10

39. After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure.



WRE91-DF108

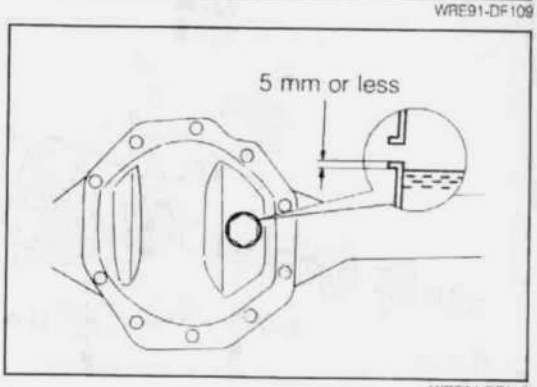
40. Tighten the transmission under cover with the four bolts.
Tightening Torque: 15.7 - 23.5 N·m (1.6 - 2.4 kgf-m)



WRE91-DF109

41. Fill the differential oil.

		Grade/Viscosity	liter
Differential	Front	API GL-5/SAE 80W-90 or 90	1.5

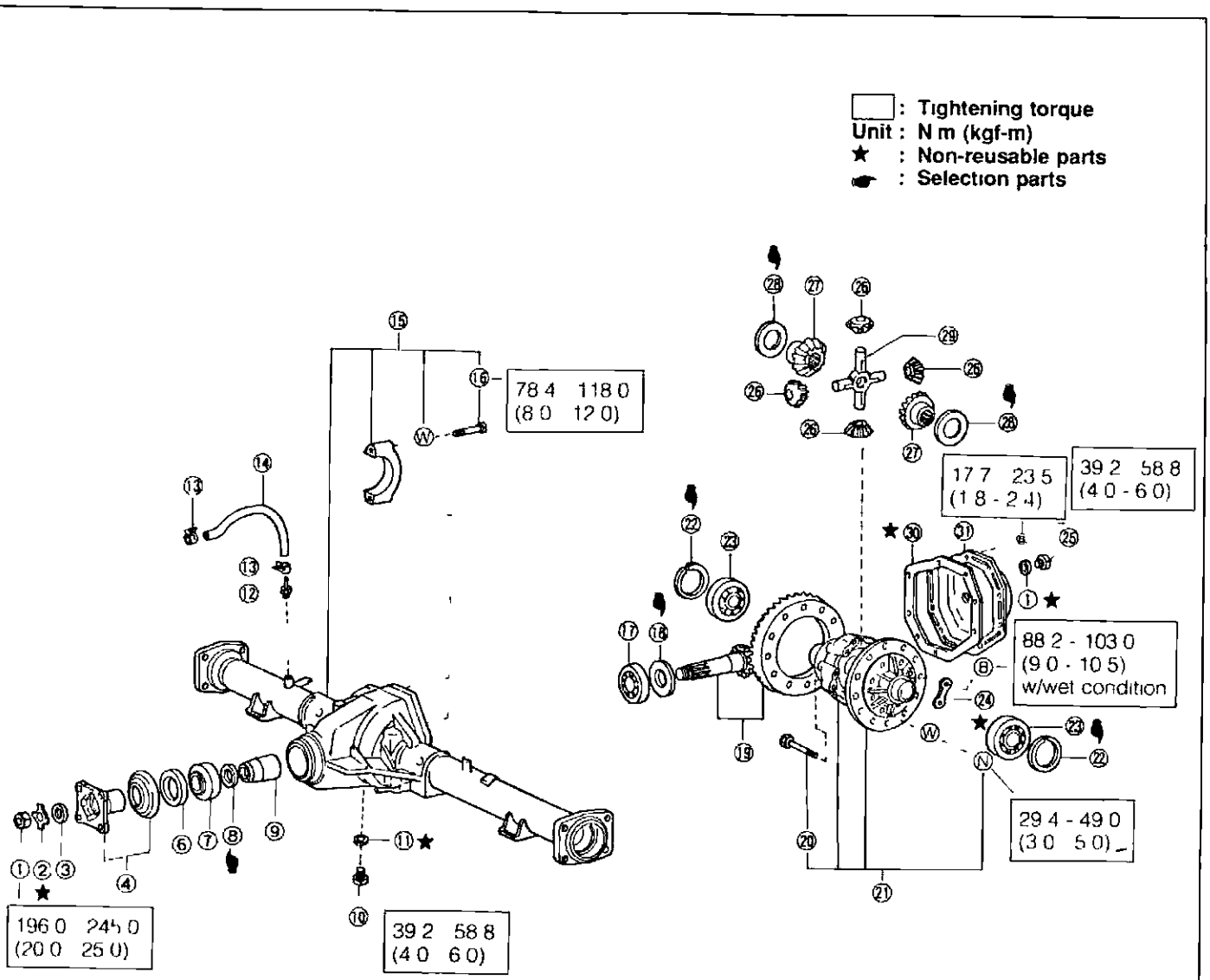


WRE91-DF110

42. Tighten the filler plug with new gasket.
Tightening Torque: 39.2 - 58.8 N·m (4.0 - 6.0 kgf-m)

43. Jack down the vehicle.

REAR DIFFERENTIALS
COMPONENTS



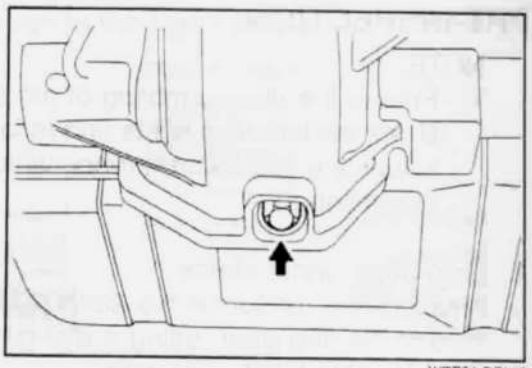
① Nut
② Lock washer
③ Plate washer
④ Drive pinion companion flange S/A
⑤ Dust deflector
⑥ "T" type oil seal
⑦ Differential drive pinion bearing (for front)
⑧ Shim
⑨ Differential drive pinion bearing spacer
⑩ Drain plug
⑪ Gasket
⑫ Union
⑬ Clip
⑭ Hose
⑮ Rear axle housing Ay
⑯ Hexagon bolt
⑰ Differential drive pinion bearing (for rear)
⑱ Shim
⑲ Differential final gear kit
⑳ Set bolt
㉑ Differential case S/A
㉒ Shim No. 3
㉓ Bearing (for side)
㉔ Lock washer
㉕ Filler plug
㉖ Differential pinion
㉗ Differential side gear
㉘ Differential side gear thrust washer No. 1
㉙ Differential spider
㉚ Differential carrier gasket
㉛ Rear axle housing cover S/A

WRE91 DF111

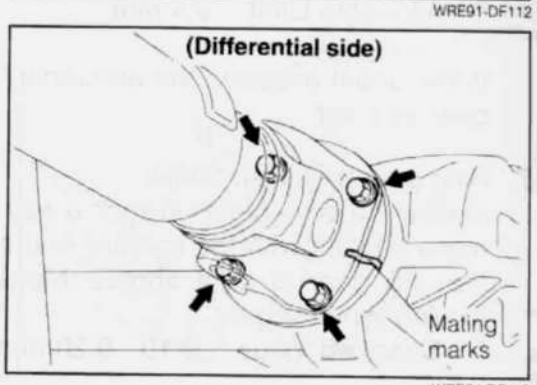
REMOVAL

1. Jack up the vehicle.
   NOTE:
   - Be sure to support the vehicle with safety stands securely. (As for the jacking up points, refer GI-section).

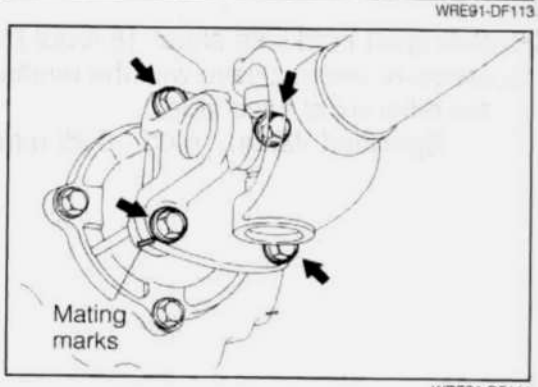
2. Drain the differential oil by removing the drain plug with gasket.
   NOTE:
   - Never reuse the removed gasket.


WRE91-DF112

3. Remove the rear propeller shaft by removing the four bolts both at the rear differential side and at the transfer side.
   CAUTION:
   - Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
   - If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

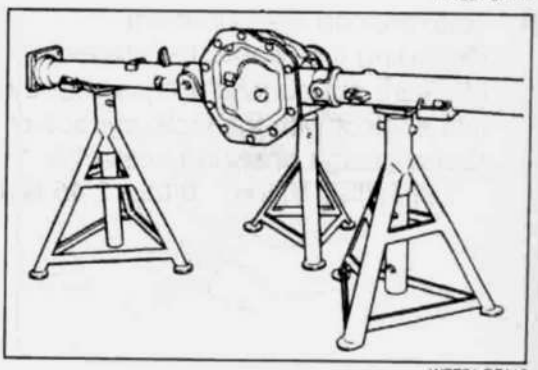


WRE91-DF113

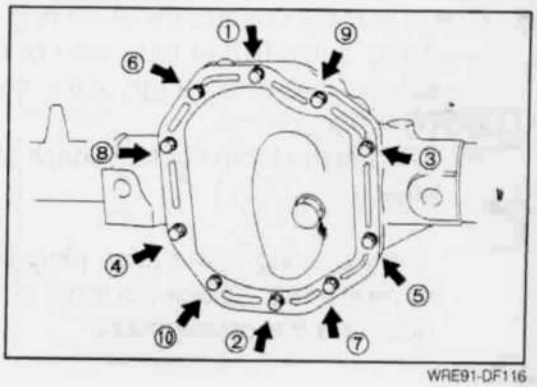


WRE91-DF114

4. Remove the L.S.P.V bracket. (only for pick up models) (Refer BR-section.)
5. Remove the rear axle shafts related parts. (Refer, BR and RS-section.)
6. Remove the rear axle housing from the vehicle.
7. Support the rear axle housing with safety stands securely.


WRE91-DF115

8. Remove the rear axle housing cover S/A with gasket by removing the ten bolts.



WRE91-DF116

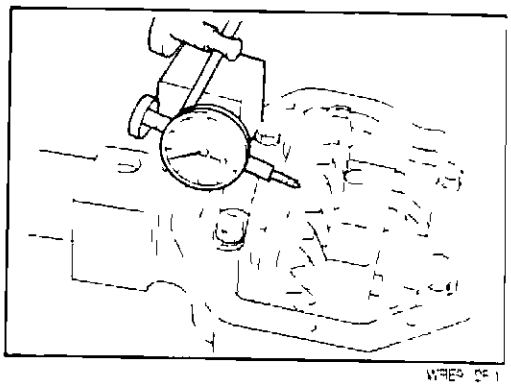
PRE-INSPECTION

NOTE.

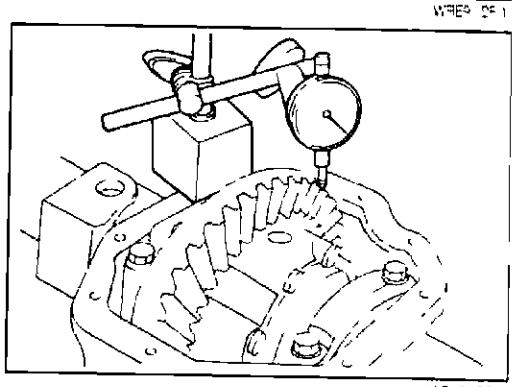
- Prior to the disassembling of the differential, be sure to check the following items and record the values. (These values are used as reference which assures the correct assembling.)

1 Ring gear runout check
Measure the runout on the several points at the back surface of the ring gear, using a dial gauge
Allowable Limit: 0.1 mm

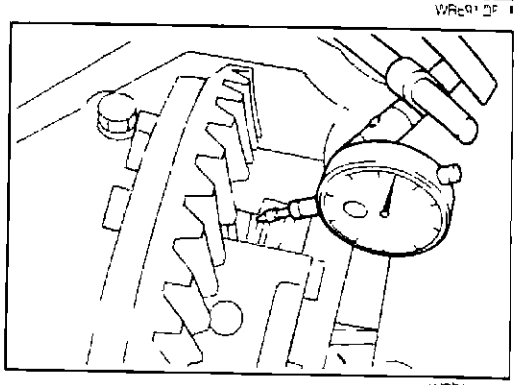
If the runout exceeds the allowable limit, replace the final gear as a set



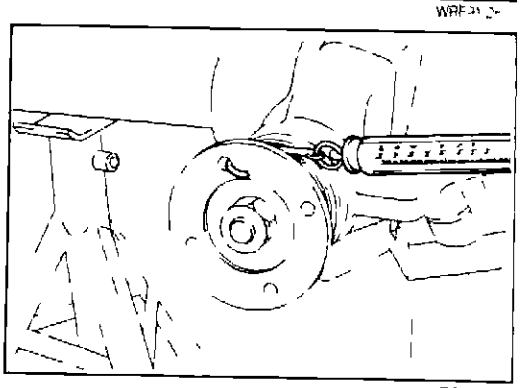
2 Ring gear backlash check
Secure the drive pinion in such a way that a dial gauge may make contact with the forward end of the tooth surface of the ring gear at right angles. Measure the backlash by moving the ring gear
Specified Value. 0.10 - 0.20 mm



3 Side gear backlash check (Except for L.S.D.)
Measure the backlash with the pinion gear pushed against the differential case side
Specified Value: 0.05 - 0.25 mm



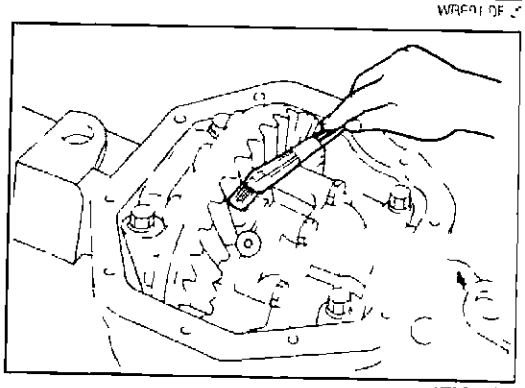
4 Total preload measurement
(Including the oil seal resistance)
Measure the starting torque with the drive pinion brought into contact with the tooth surface of the ring gear using a torque gauge or spring scale like
Specified Value: 0.09 - 2.45 N·m (1.0 - 25.0 kgf-cm)



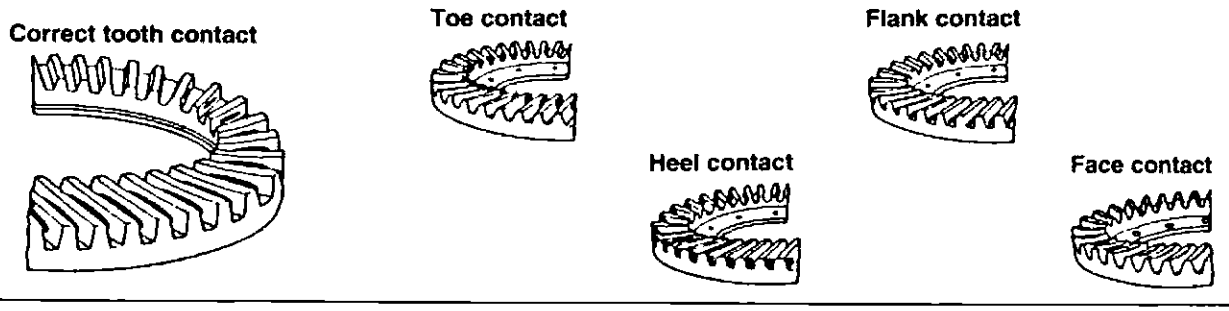
5 Check of tooth contact between ring gear and drive pinion
— Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear
NOTE:

- Perform the tooth contact check at four points of the ring gear.

— Apply braking to the drive pinion and turn the ring gear several times. Check the tooth contact between the ring gear and the drive pinion

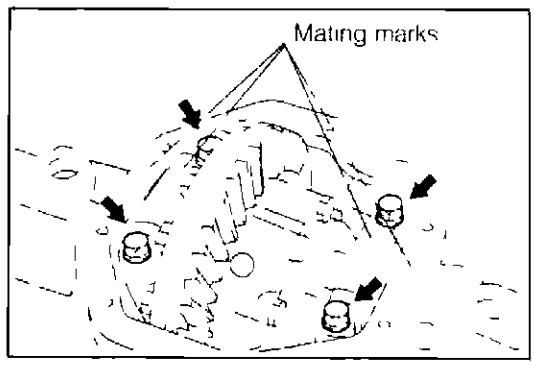


— Ensure that correct tooth contact has been attained, as shown in the figure below



DISASSEMBLY

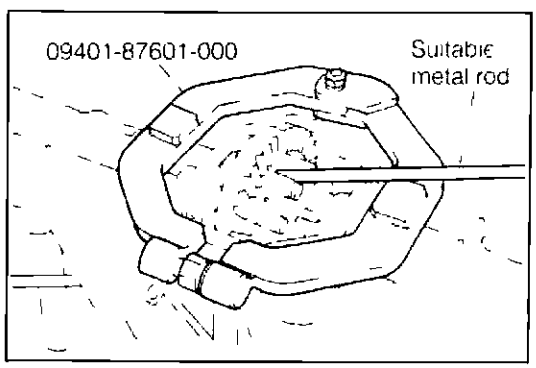
1 Put mating marks (Painted with white or the like) on the bearing cap and differential carrier
NOTE:
- Since the bearing cap has been manufactured integrally with the differential carrier, never disturb the combination of these components.



2. Remove the bearing cap by removing the two bolts on both left and right sides
NOTE.
- Arrange the removed bearing caps in order, separating the right cap from the left cap.

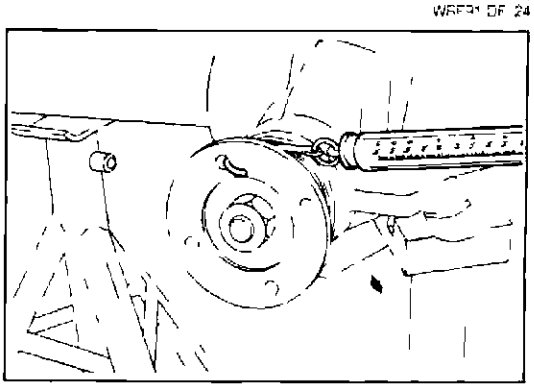
3 Remove the differential case from the carrier in conjunction with the suitable metal rod and the following SST
SST: 09401-87601-000

NOTE:
- The drive pinion preload should be measured after the differential case has been removed.
- After completion of measurement, perform disassembly, following the removal procedures given below.



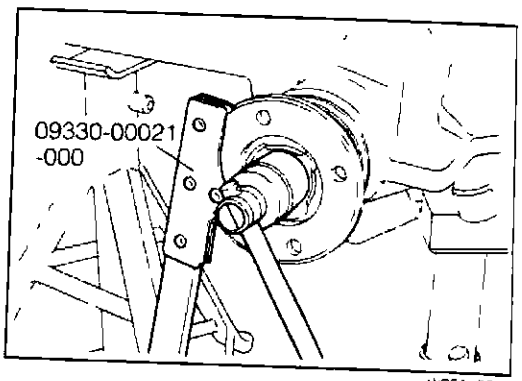
4 Drive pinion preload measurement
(Including the oil seal resistance)
Measure the starting torque within the range of the backlash between the drive pinion and the ring gear, using torque gauge or spring scale like
Specified Value: 0.78 - 2.0 N·m (8.0 - 21.0 kgf-cm)

NOTE.
- This step should be performed after the differential case has been removed from the carrier.

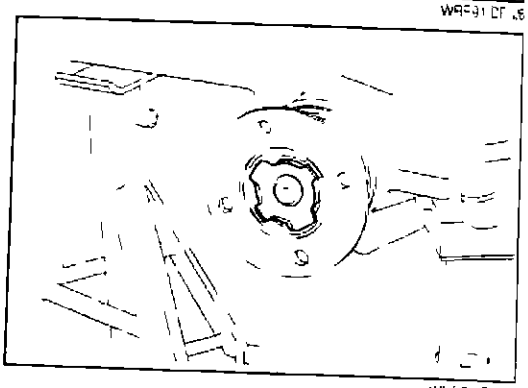


5 Raise the lock section of the lock washer, using a chisel and a hammer
NOTE:
- Never reuse the removed lock washer.

6 Remove the lock nut, using the following SST
Proceed to the remove the lock nut
SST: 09330-00021-000

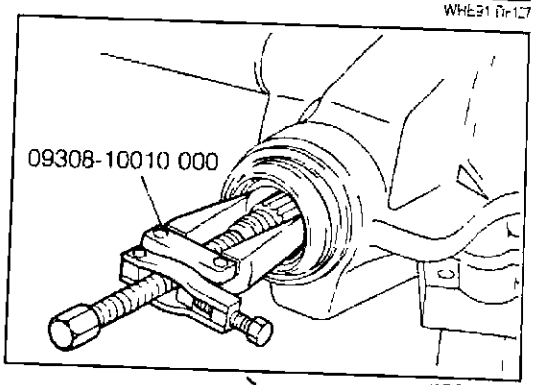


7 Remove the companion flange

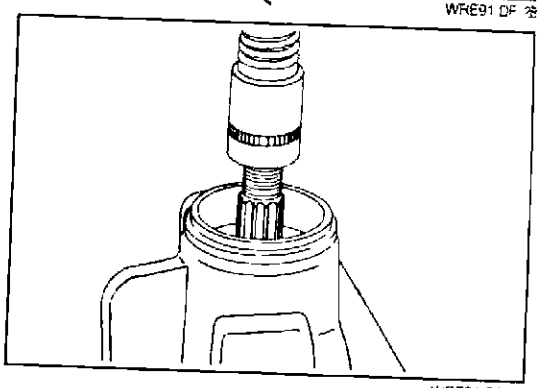


8 Remove the "T" type oil seal of the drive pinion, using the following SST
SST: 09308-10010-000

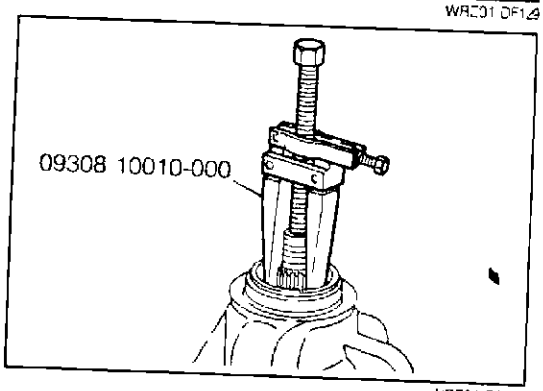
NOTE:
- Never reuse the removed oil seal.



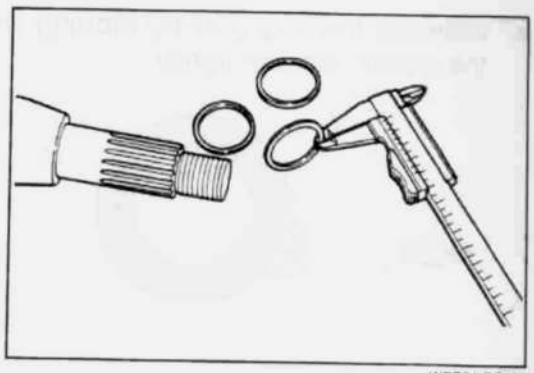
9 Remove the drive pinion by pressing the press.



10 Remove the following parts from the drive pinion.
(1) Spacer
(2) Shim for drive pinion preload

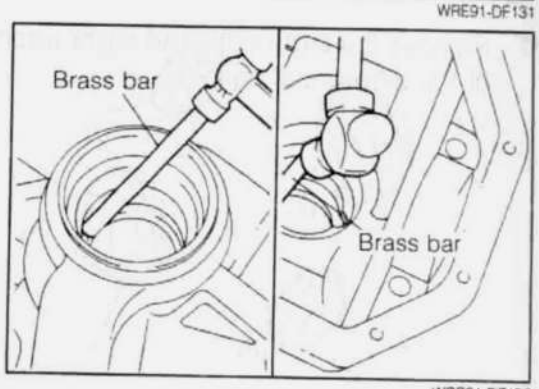


11. Measure the respective shims for preload adjustment use which have been removed. Record the measurement results (for the purpose of using them as a guide during the installation of the drive pinion and ring gear).



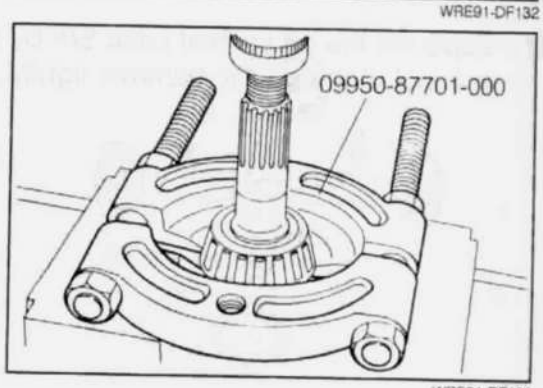
WRE91-DF131

12. Remove the front and rear bearing outer races, using a brass bar.



WRE91-DF132

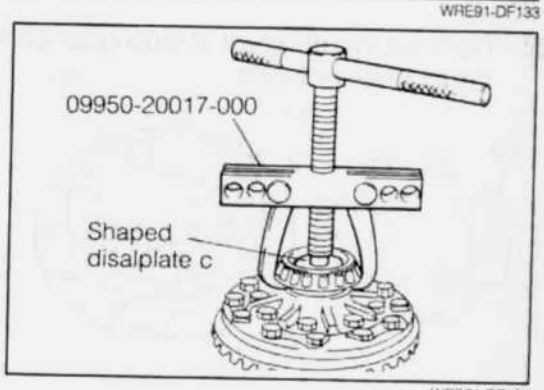
13. Remove the rear bearing and the drive pinion mounting distance adjusting shim from the drive pinion, in conjunction with a press and the following SST.
    SST: 09950-87701-000



WRE91-DF133

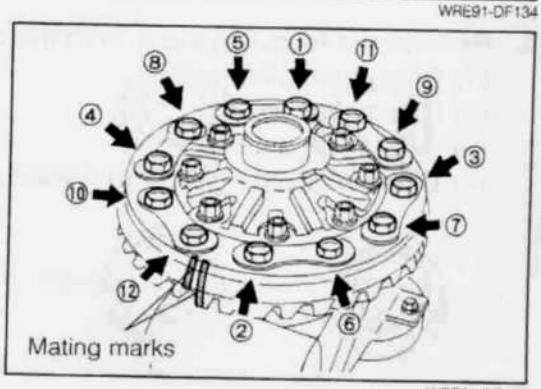
14. Set the differential case into the vice.
15. Remove the side bearings from the differential case, using the following SST.
    SST: 09950-20017-000

    NOTE:
    - Insert the pawl of the SST into the groove of the differential carrier.



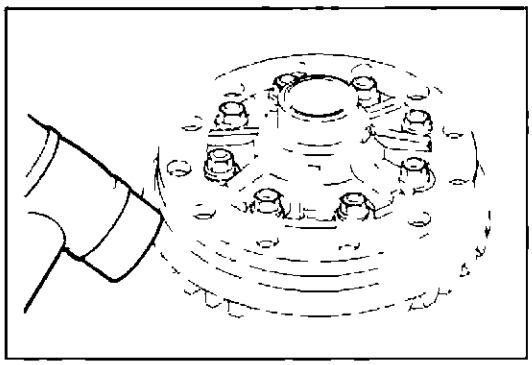
WRE91-DF134

16. Put a mating marks between differential case S/A and ring gear as guide during the installation, if the ring gear is reusing.
17. Raise the lock section of the lock plate.
    NOTE:
    - Never reuse the removed lock plate.
18. Remove the twelve bolts of the ring gear.

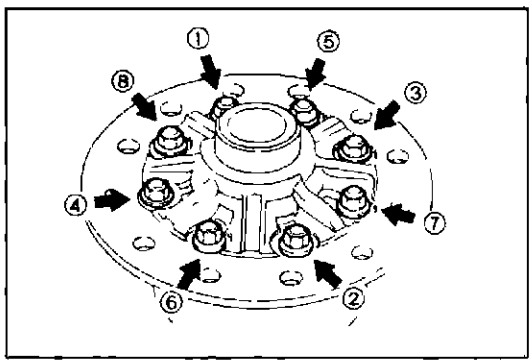


WRE91-DF135

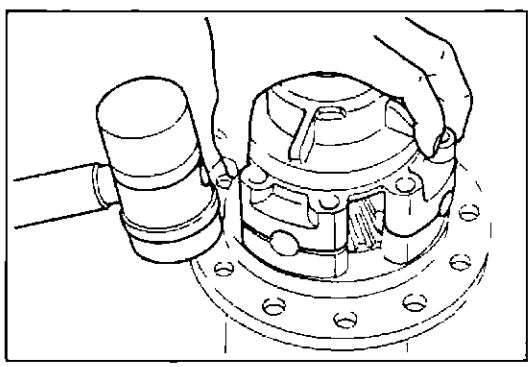
19 Separate the ring gear by tapping with a standard tool of the plastic hammer lightly



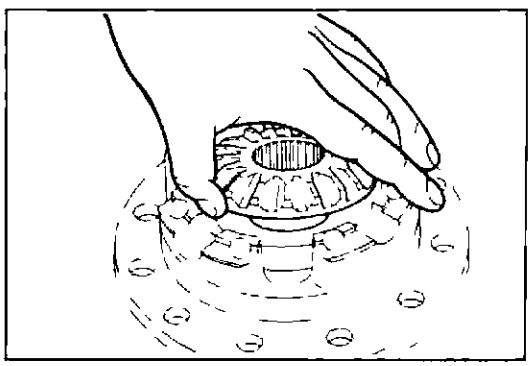
20 Remove the eight nuts and eight washers from the set bolts of the differential case



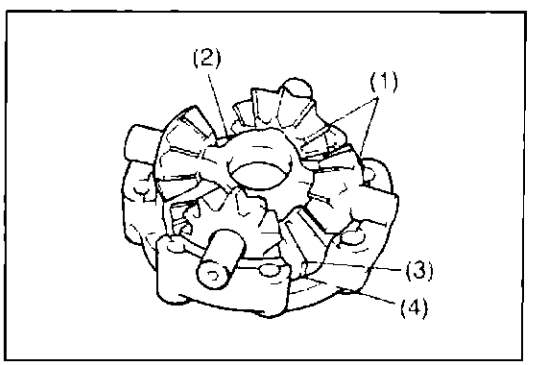
21 Separate the differential case S/A by tapping with a standard tool of the plastic hammer lightly



22 Remove the differential side gear and differential side gear thrust washer No 1



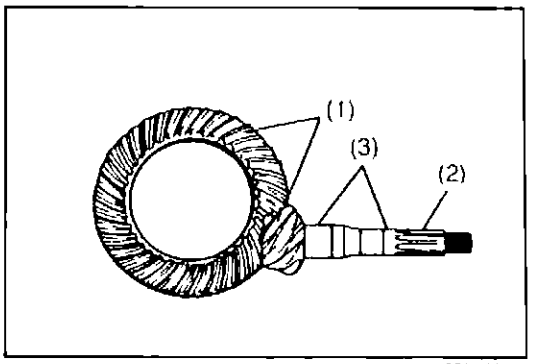
23 Remove the following parts from the differential case
(1) Differential pinion (4 pcs)
(2) Differential spider
(3) Differential side gear
(4) Differential side gear thrust washer No 1



INSPECTION

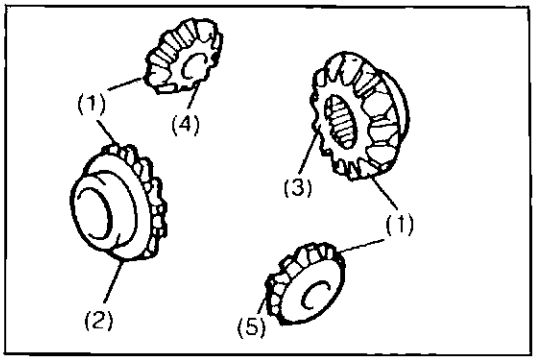
Inspect each section of the following parts for any sign of damage, wear or excessive looseness Replace any parts which exhibit defects

1 Drive pinion & ring gear
(1) Gear teeth
(2) Spline portion (2) of drive pinion
(3) Bearing fitting section



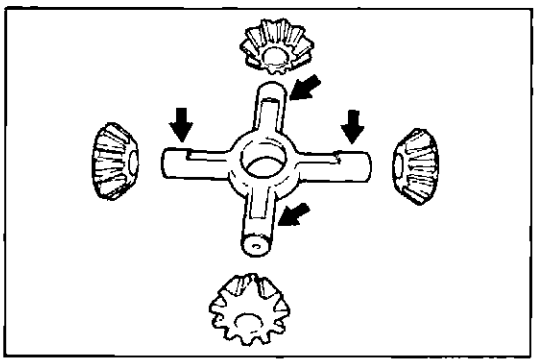
WRE01 DF141

2 Side gear & pinion
(1) Gear teeth
(2) Side gear boss section
(3) Side gear serrated section
(4) Pinion shaft fitting hole
(5) Differential case contact section

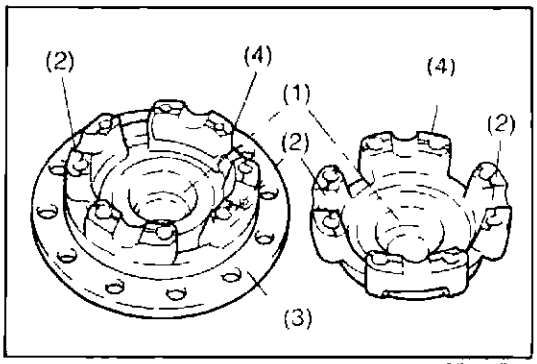


WRE01 DF 42

3 Visually inspect the rotational sliding section between the differential pinion and the differential pinion shaft for damage and wear

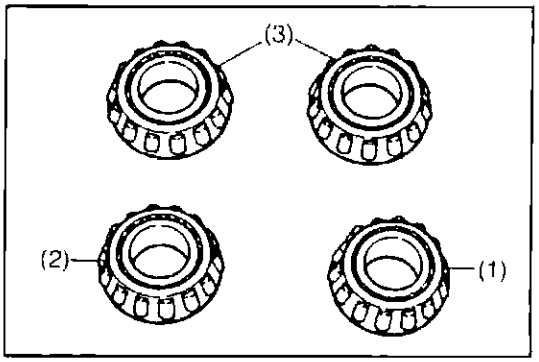

WRE01 DF 43

4 Inspection of differential case for wear or damage
(1) Side gear boss contact sections
(2) Pinion contact section
(3) Ring gear attaching section
(4) The differential case proper



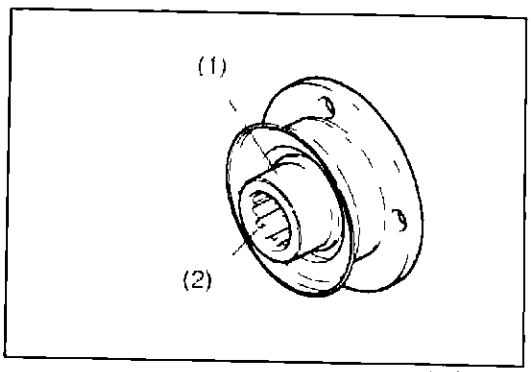
WRE01 DF144

5 Bearings
(1) Front bearing
(2) Rear bearing
(3) Side bearings
- Turn the bearings lightly Ensure that they rotate smoothly without any binding or abnormal noise
- While tracing the outer peripheral section of the taper roller with your nails, check to see if any binding exists there

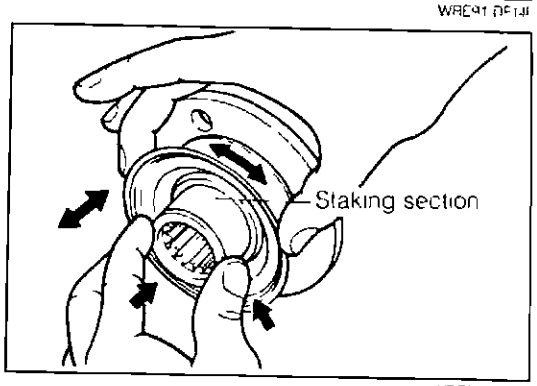


WRE01 DF145

6 Companion flange
(1) Oil seal contact section
(2) Spline section



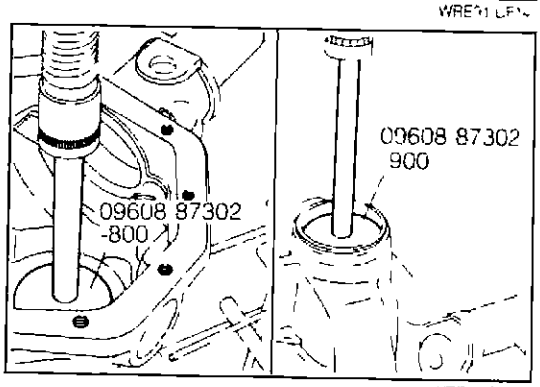
7 Check that the three dust deflector staked sections of the companion flange exhibit no excessive play by turning it in a right-&-left direction, as indicated in the right figure



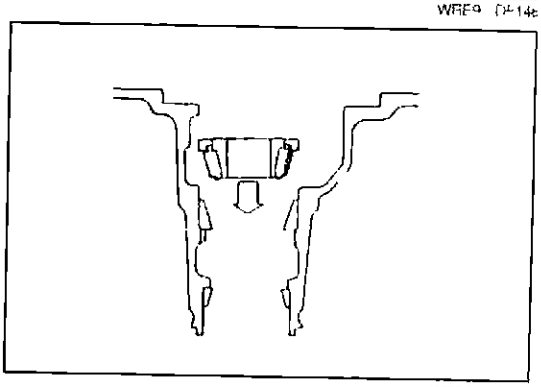
ASSEMBLY

1 Press the front and rear outer races into the differential carriers using the following SSTs
SSTs: (1) Front...09608-87302-800
(2) Rear...09608-87302-900

Both above SSTs are included in the 09608-87302-000

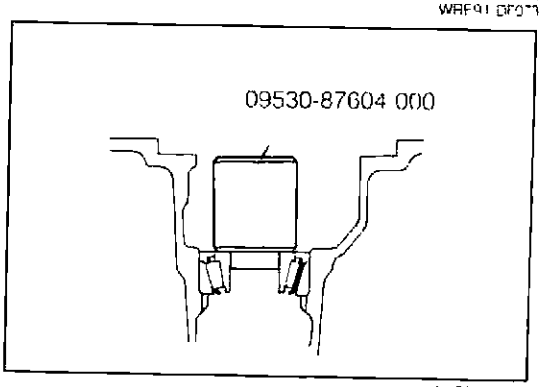


(1) Install the bearing on the outer race To get bedding-in of the inner race, turn the bearing several times so that it may be settled



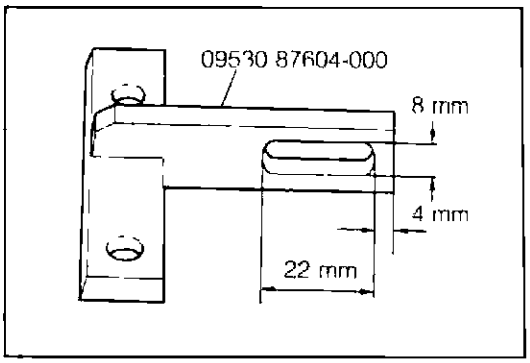
2 Install the following SST to the front differential
SST: 09530-87604-000

NOTE:
- Do not install the oil seal at this stage.



3 As for those differential gears that were manufactured in or after September 1987, the P M D has been extended It is, therefore, necessary to modify the SST (09530-87604-000) as indicated in the right figure

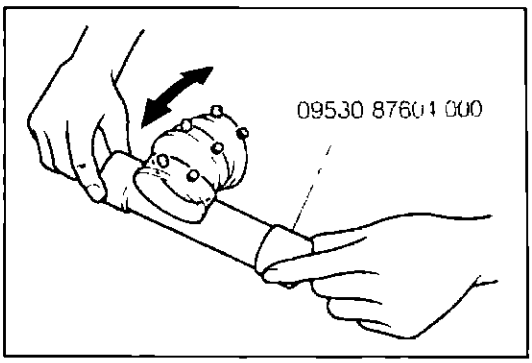
Contents of modification:
Elongate the groove where a dial gauge is installed to the dimensions as indicated in the right figure



WRE91 DF231

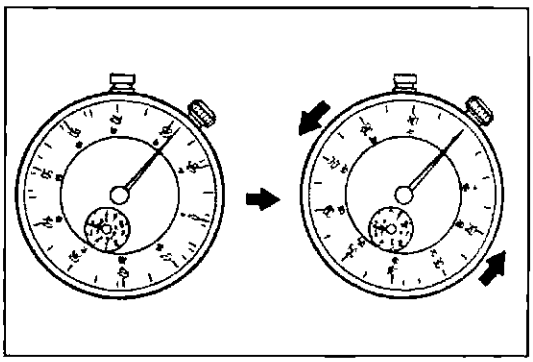
4 Secure the dial gauge to the SST
NOTE:
- **Make certain to install the dial gauge securely.**

(1) While turning the SST on a surface plate, as shown in the right illustration, locate the position where the spindle of the dial gauge is contracted to the shortest position (namely when the pointer's runout becomes a minimum stable level) And stop the SST at this point

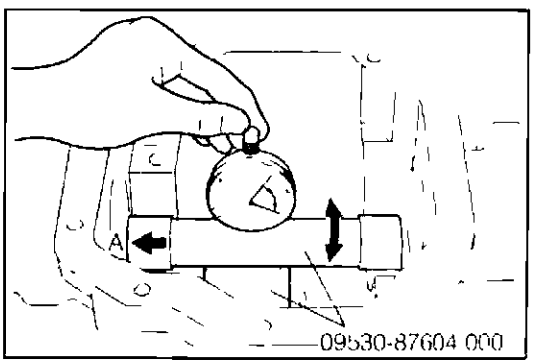


WRE91 DF232

(2) Align the zero-point of the scale with the needle of the dial gauge


WRE91 DF217

(3) Place the SST in the differential carrier
(4) While turning the attaching surface of the side bearing outer race lightly by their own weights of the SST and dial gauge, as shown in the right illustration, locate the position where the pointer registers the stablest reading
NOTE:
- **During the operation above, keep one end surface of the SST in contact with the attaching surface of the side bearing outer race (in the arrowheaded direction (A)).**

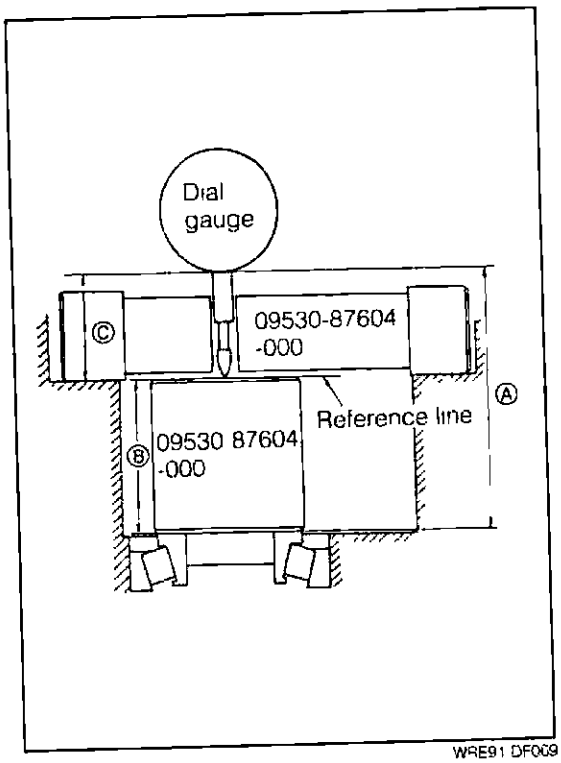


WRE91 DF068

(5) Perform the calculation, using the thickness of the following standard shim
Thickness of standard shim = (Ⓑ + Ⓒ) – P. M D
Ⓐ P M D + Thickness of standard shim (108 0 mm)
Ⓑ Height of drive pinion adjusting gauge (62.75 mm)
Ⓒ Radius of attaching surface of side bearing outer race (42 5 mm)

108 mm – (62 75 mm + 42 5 mm) = 2 75 mm

With regard to the SST mounted on the dial gauge, its zero-point adjustment has been already conducted on the surface plate
As a result, the reference line is established as indicated in the right figure Therefore, the thickness of the standard shim can be determined, using the formula given above



WRE91 DF009

Therefore, after the needle of the dial gauge has been aligned with the zero-point, subtract 2 75 mm from the displacement of the spindle section of the dial gauge The thus-calculated value becomes the installation thickness of the adjusting shim

WRE91-DF070

Calculating Formula
Thickness of adjusting shim =
Displacement of spindle section of dial gauge – 2 75 mm
(Standard value)
<Example>
After the needle of the dial gauge had been set to the zero-point the spindle section of the dial gauge dropped
Thus, the needle of the dial gauge turned counterclockwise 5 25 mm
5 25 mm – 2 75 mm = 2 50 mm
Because of availability of adjusting shims use a 2 20 mm thick shim together with a 0 30 mm thick shim

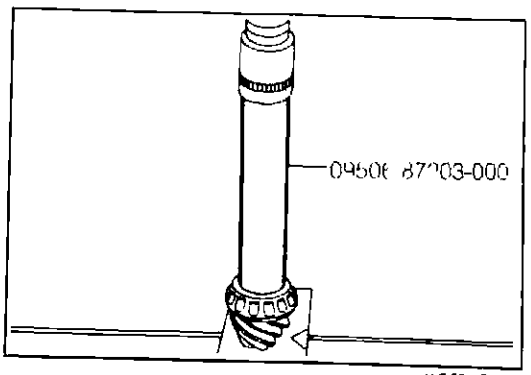
WRE91 DF071

5 Table showing relationship between availability of replacement shims and readings of dial gauge

Thickness of adjusting shims mm	2 10	2 15	2 20	2 25	2 30	2 35	0 30 (for fine adjustment)
Reading of dial gauge mm	+0 15	+0 10	+0 05	±0	–0 05	–0 10	

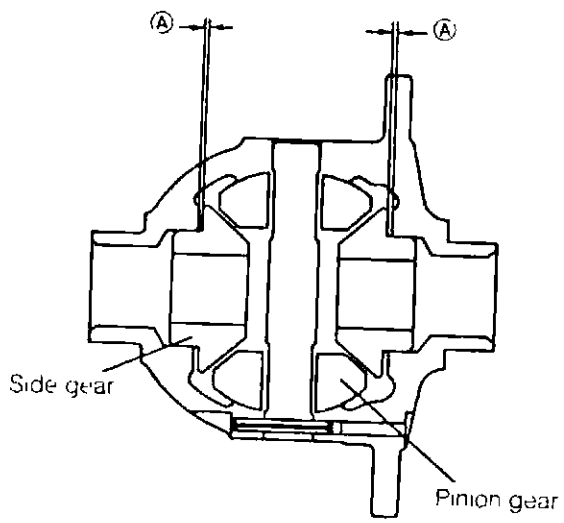
WRE91 DF1

6 Place the drive pinion mounting distance adjusting shim that was selected in the previous step in the drive pinion. Press the rear bearing, using the following SST.
SST: 09506-87203-000



WRE9 DF-58

7 Selecting procedures for differential side gear backlash thrust washer



Availability of Adjusting Thrust Washer for Section Ⓐ

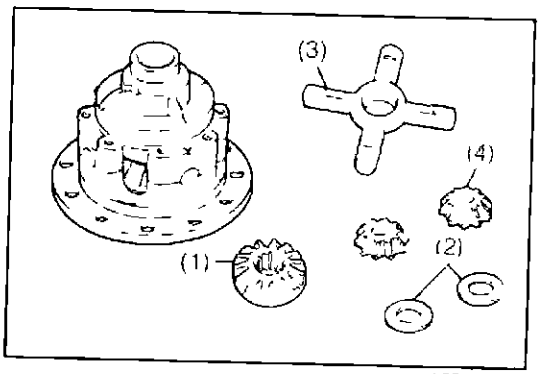
Unit: mm

0.8
0.9
1.0

WRE31 DF-59

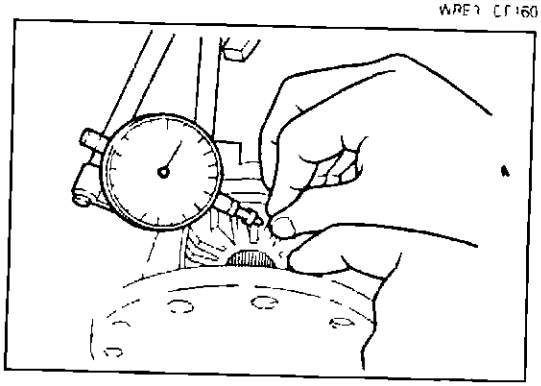
(1) Prior to assembling, apply the gear oil to the following rotating sections.
— Outer periphery (side and pinion gear)
— Inner periphery of side and pinion gear in differential case

(2) Assemble the following parts in the differential case.
(1) Differential side gear
(2) Differential side gear thrust washer
(3) Differential pinion shaft
(4) Differential pinion



WRE1 DF-160

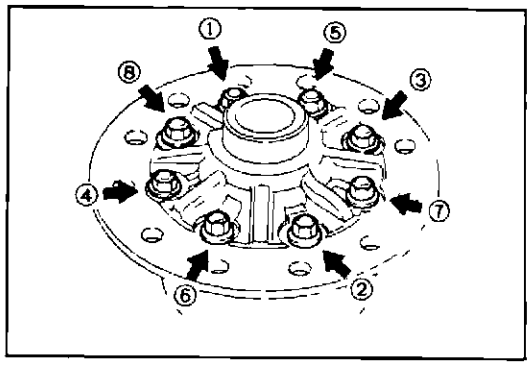
(3) Measure the backlash with the pinion gear pushed against the differential case side. Select a thrust washer in such a way that the backlash between the differential pinion and the differential side gear may conform to the specified value given below. Here, the backlash is the mean value of measurements over four teeth. Place the selected thrust washer.
Specified Value: 0.05 - 0.25 mm



WRE31 DF-161

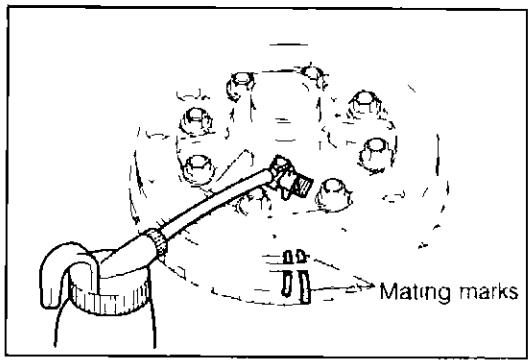
8 Tighten the differential case cover by means of the eight hexagon bolts, washers and nuts
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The illustration at the right figure indicates a typical example of the tightening sequence.)



WRE91 DF162

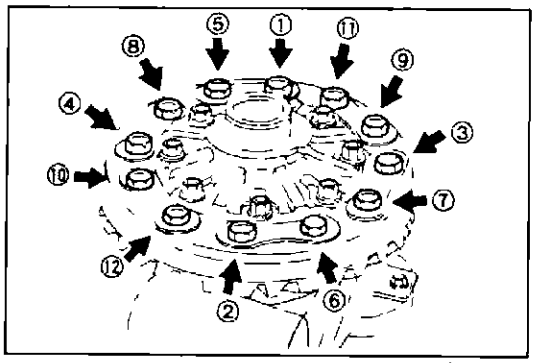
9 Align the mating marks put during the disassembly with each other
10 Apply gear oil to the threaded portions of the tightening bolts and the ring gear



WRE91 DF163

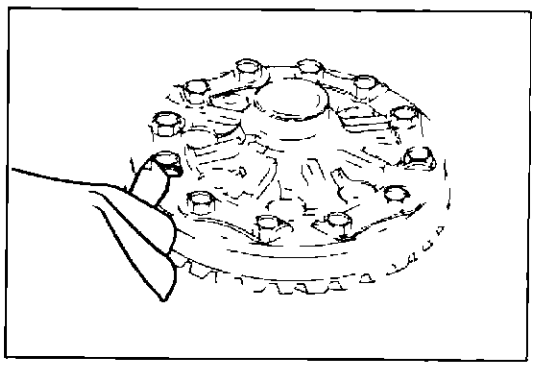
11 Install the ring gear in the differential case S/A and tighten the twelve set bolts with new lock washers
Tightening Torque: 88.3 - 103.0 N·m
(9.0 - 10.5 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The right figure illustration indicates a typical example of the tightening sequence.)

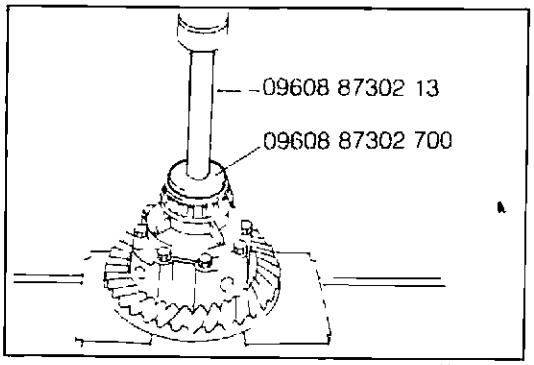


WRE91 DF164

- Stake the new lock washers securely along with the bolt shaped, using the standard tool of the chisel or the like.

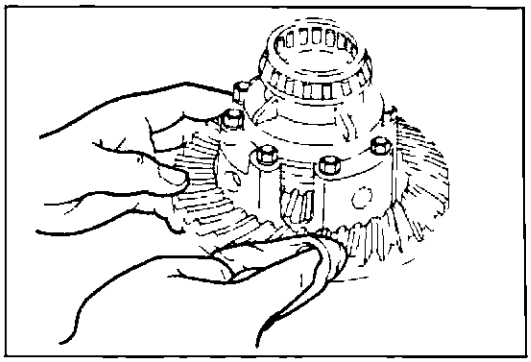

WRE91 DF165

12 Press the side bearing into the differential case, using the following SSTs
SST: 09608-87302-13
09608-87302-700
that is a part of 09608-87302-000 set



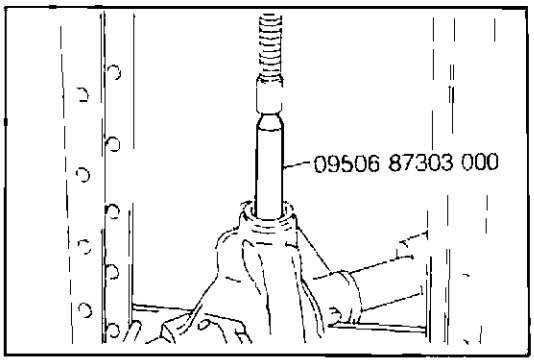
WRE91 DF166

13 Clean the ring gear tooth surfaces



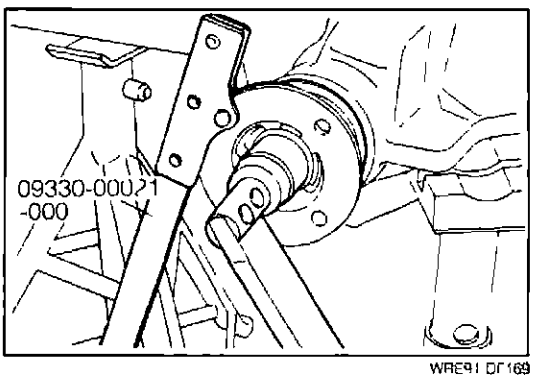
WRE91 DF167

14. Install the drive pinion, drive pinion bearing spacer and shim to the differential carrier.
15 Press the rear bearing, using the following SST.
SST: 09506-87303-000



WRE91 DF168

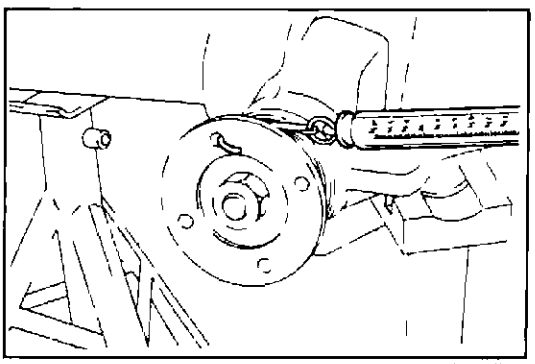
16 Apply the gear oil to the rear bearing tappared roller sections
17 Install the companion flange
18 Tighten the nut, using the following SST
SST: 09330-00021-000
Tightening Torque: 196 0 - 245.0 N·m (20.0 - 25.0 kgf-m)



WRE91 DF169

NOTE:
- Do not install the "T" type oil seal at this stage.

19 Apply the gear oil to the front bearing tappered roller sections
20 Rotated the companion flange for several times in clock and counter clockwise
21 Measure the stareing torque of the drive pinion, using a torque gauge or spring scale like.
Specified Value:
New Bearing:
0.06 - 1.96 N·m (7.0 - 20.0 kgf-cm)
Bearing Reused:
0.06 - 1.96 N m (7.0 - 20.0 kgf-cm)

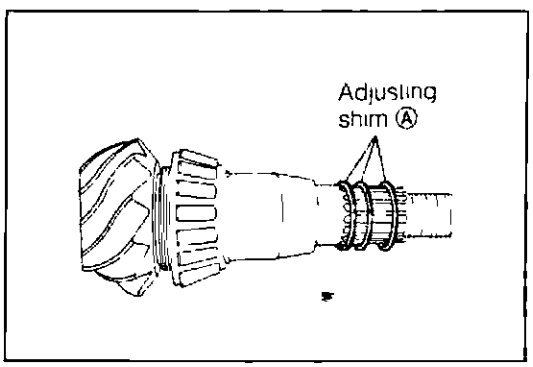


WRE91 DF170

22 When the preload is greater than the specified value, increase the adjusting shim thickness Conversely, when the preload is less than the specified value, decrease the adjusting shim thickness.
NOTE:
- Refer the table for availability of adjusting shim Ⓐ as follows

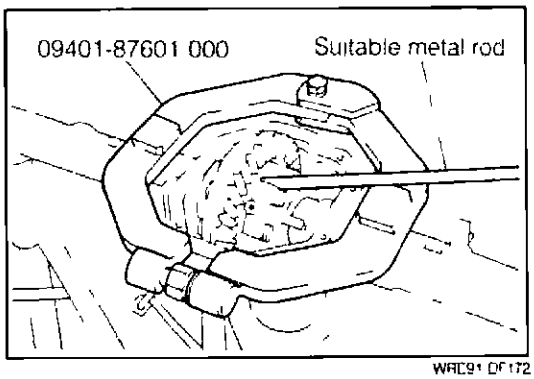
Unit mm

Thickness	0 25	0 30	0 40
	0 50	0 08	



WRE91 DF171

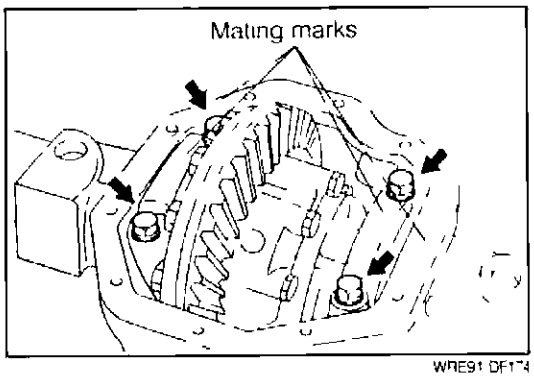
23 Install the differential case S/A to the rear axle housing, using the following SST
SST: 09401-87601-000



WRE91 DF172

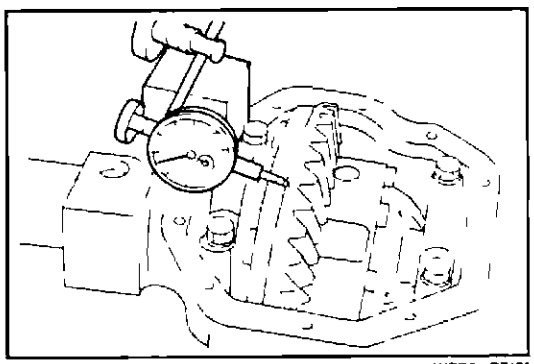
24 Tighten the bearing caps
Tightening Torque: 78.5 - 118.0 N·m
(8.0 - 12.0 kgf-m)

NOTE:
- Ensure that the mating marks put during the disassembly should be line-uped each others.



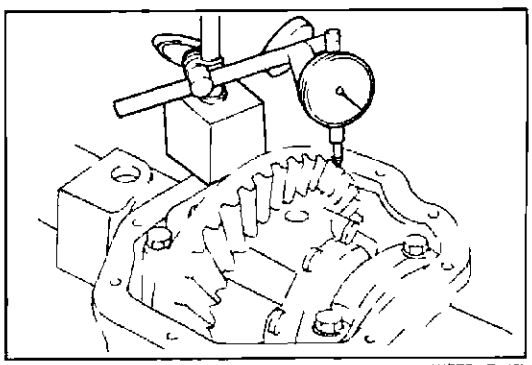
WRE91 DF174

25 Measure the run-out for ring gear by installing a dial gauge normally to the back surface of the ring gear
Specified Valve: 0.1 mm


WRE91 DF175

26 Measure the backlash by installing a dial gauge at right angles with the ring gear tooth surface
Specified Value: 0.1 - 0.2 mm

NOTE.
- When the ring gear backlash is greater or less than specified value, decrease or increase the adjusting shim thickness.


WRE91 DF176

- Refer the table for availability of adjusting shim Ⓐ.
Ⓐ: Adjusting Shim Availability

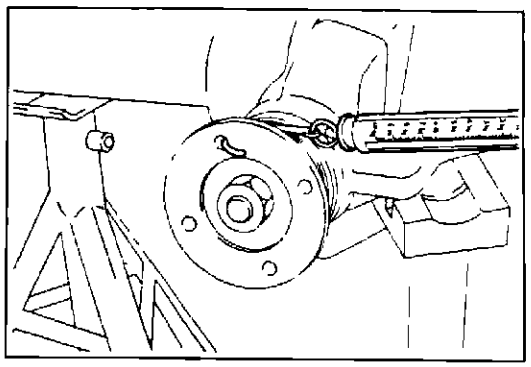
Unit: mm

2.45	2.75	3.05
2.50	2.80	3.10
2.55	2.85	3.15
2.60	2.90	3.20
2.65	2.95	3.25
2.70	3.00	3.30

WRE91 DF177

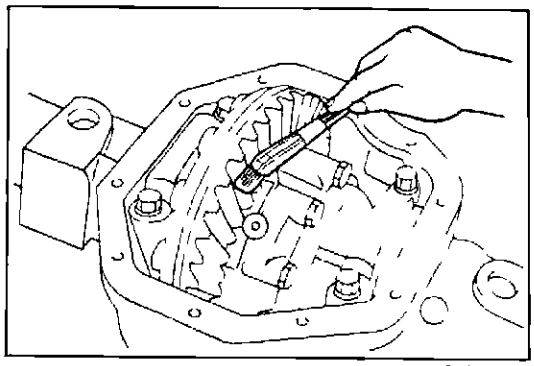
27. Total preload measurement
Measure the starting torque with the drive pinion brought into contact with the tooth surface of the ring gear, using a torque gauge or spring scale like
New Bearing: 0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)
Bearing Reused: 0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)

NOTE:
- **If the total preload does not conform to the specification, Adjust the thickness of the adjusting shim(s).**

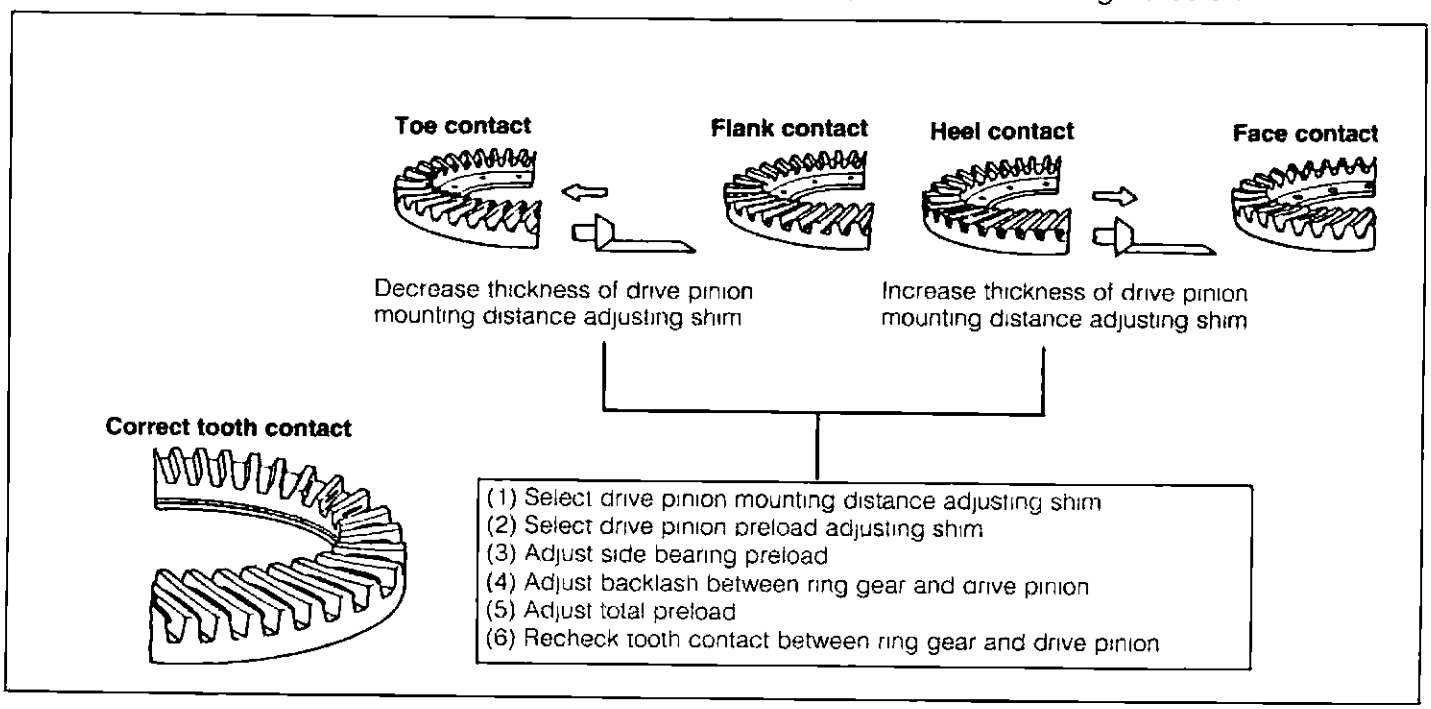

WHE91 DF178

28 Checking procedure for tooth contact between ring gear and drive pinion
(1) Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear.
(2) Turn the ring gear several times by applying a load to the drive pinion by one hand

NOTE:
- **Perform the tooth contact check at four points of the ring gear.**


WHE91 DF 79

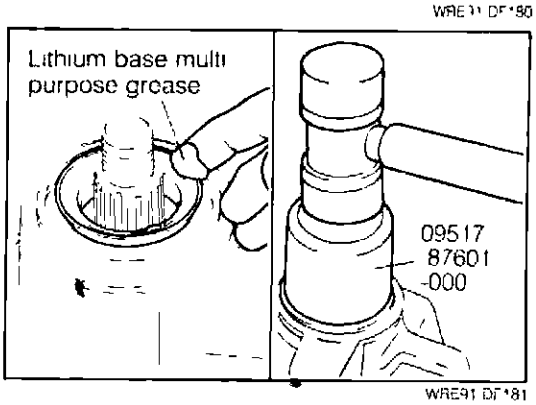
(3) Ensure that the correct tooth contact has been attained, as shown in the figure below



WHE91 DF180

29 Remove the companion flange by removing the nut
30 Drive a new oil seal up to the edge surface of the differential carrier, using the following SST
SST: 09517-87601-000

NOTE:
- **Apply lithium base multi purpose grease to the oil seal lip section.**

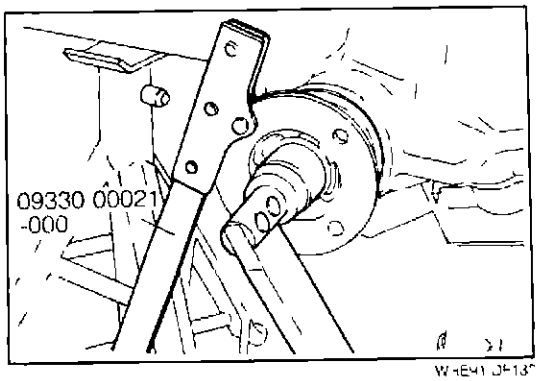


WHE91 DF181

31 Install the companion flange, plate washer and new nut and tighten the companion flange by means of a new lock nut, using the following SST

SST: 09330-00021-000

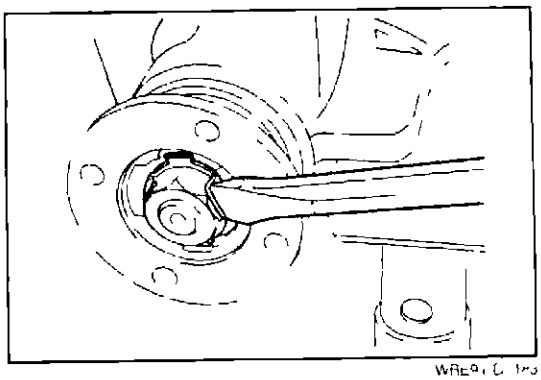
Tightening Torque: 196 0 - 245.0 N m (22.0 - 25 0 kgf-m)



32 Stake the lock washer to the securely, using a chisel or the like

NOTE:

- Be sure to stake the lock washer along with the nut side.

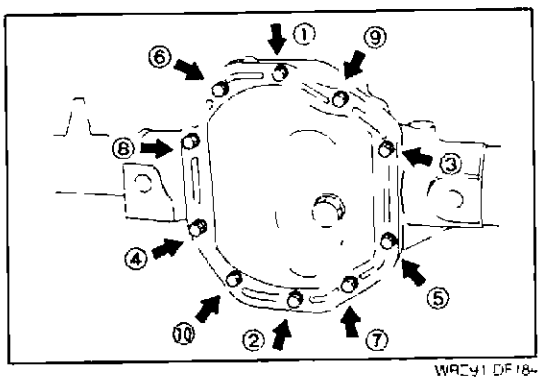


33. With the new differential carrier gasket interposed, tighten the rear axle housing cover S/A by means of the ten bolts

Tightening Torque: 17.6 - 23.5 N·m (1.8 - 2.4 kgf-m)

NOTE:

- Be sure to tighten the bolts alternately and diagonally. (The right figure illustration indicates a typical example of the tightening sequence.)



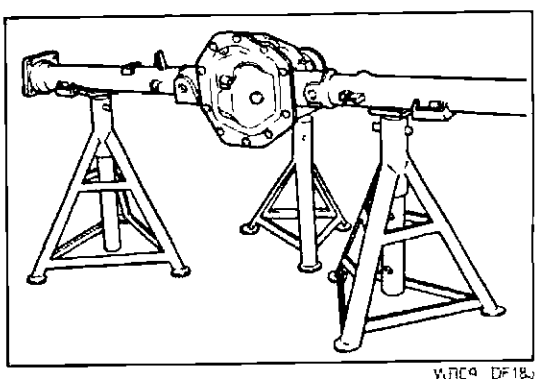
34 Remove the rear axle housing from the safety stands

35 Install the rear axle housing to the vehicle

36 Install the rear axle shafts related parts (Refer BR and RS-section)

37 Install the L S P V bracket (only for pick up models)

38 Adjust the L S P V (Refer BR-sections)

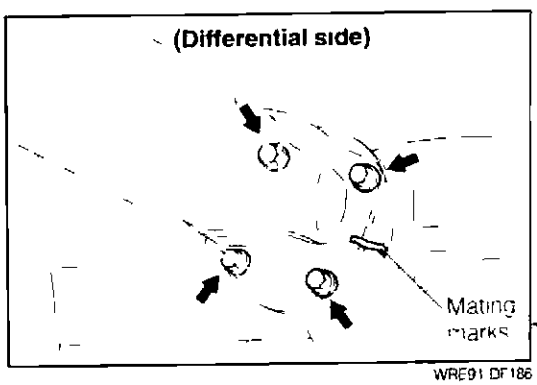


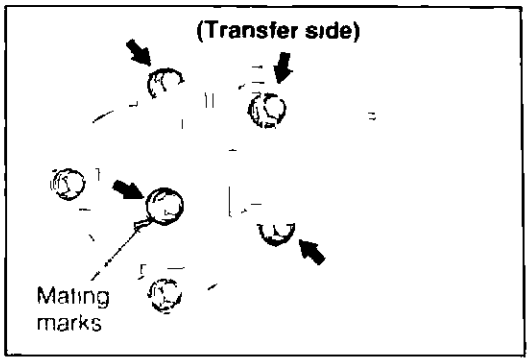
39 Install the propeller shaft

CAUTION:

- While installing the propeller shaft, align the mating marks put during the removal with each other. If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration during the running.

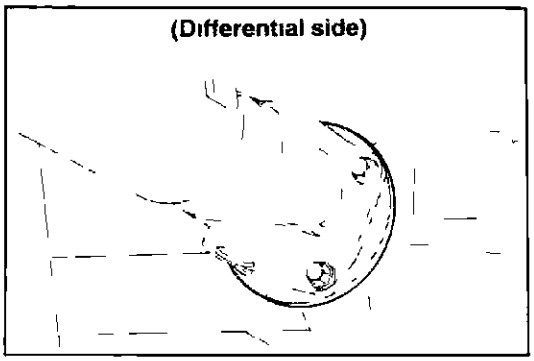
Tightening Torque: 58.8 - 78.5 N m (6.0 - 8.0 kgf-m)





WRC91 DF187

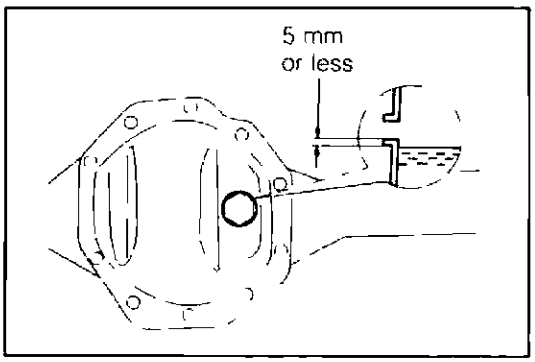
40 After the propeller shaft has been installed, apply black paint to the exposed machined surface (slant line section in the right figure) of the differential companion flange



WRE91 DF188

41 Fill the differential oil

		Grade/Viscosity	liter
Differential	Rear	API GI -5/SAE 80W-90 or 90	1.5



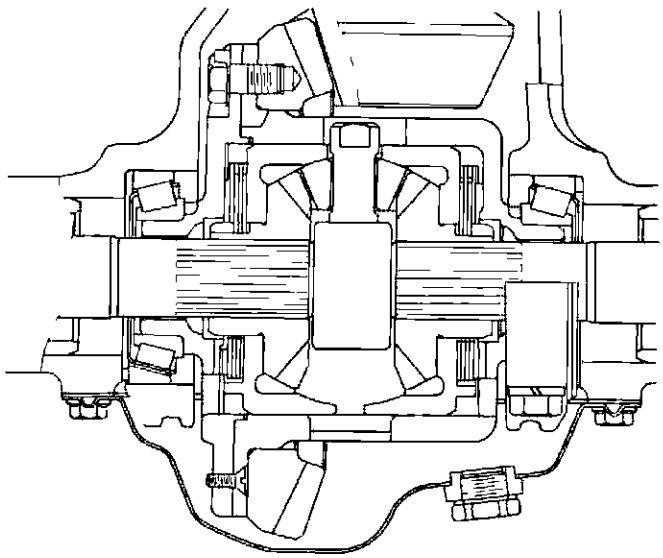
WRE91 DF189

42 Tighten the filler plug with new gasket
Tightening Torque: 39.2 - 58.8 N·m (4.0 - 6.0 kgf-m)

43 Jack down the vehicle

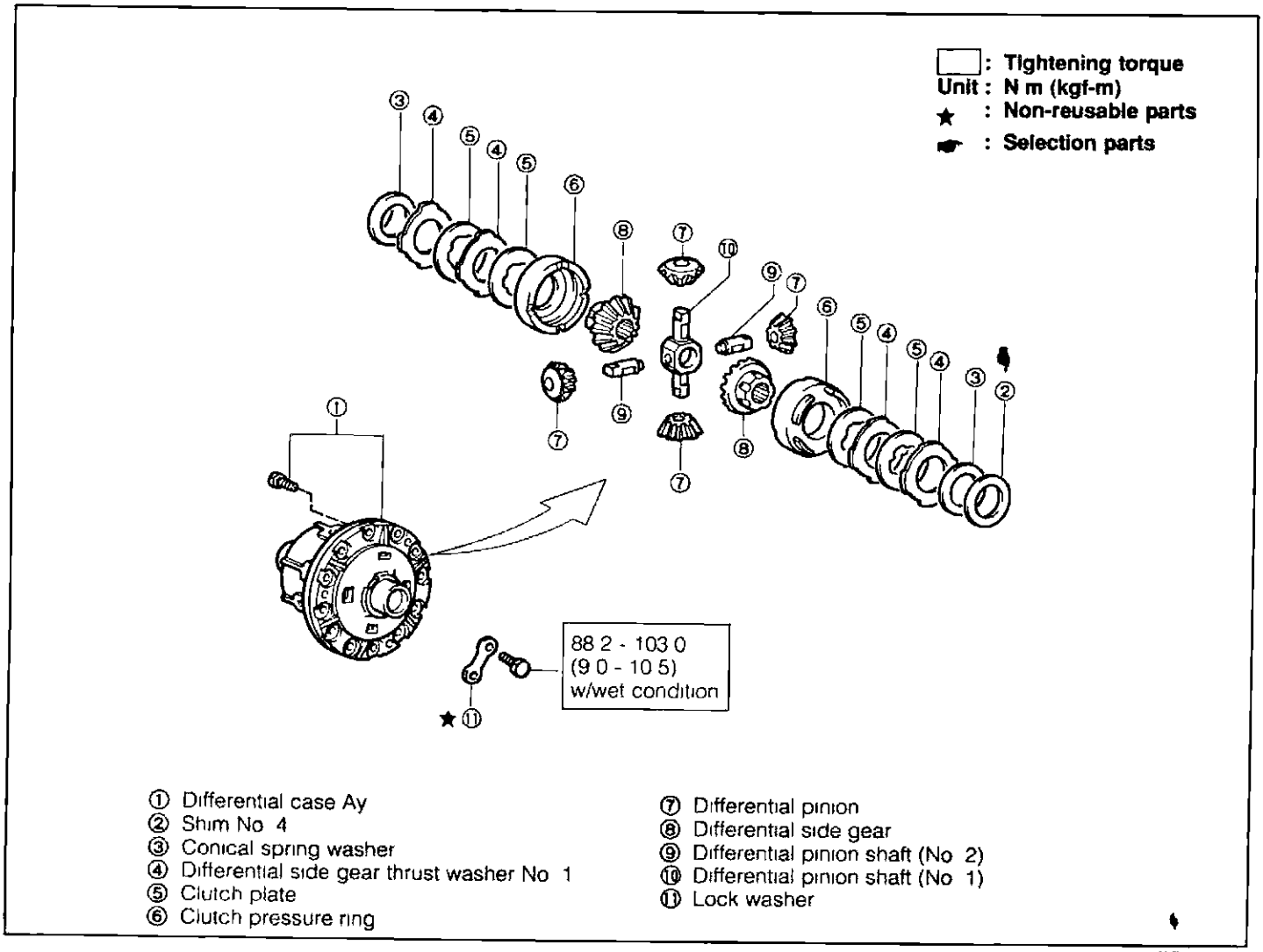
L.S.D. (Limited Slip Differential)

SECTIONAL VIEW



WRE91 DF190

COMPONENTS



① Differential case Ay
② Shim No 4
③ Conical spring washer
④ Differential side gear thrust washer No 1
⑤ Clutch plate
⑥ Clutch pressure ring
⑦ Differential pinion
⑧ Differential side gear
⑨ Differential pinion shaft (No 2)
⑩ Differential pinion shaft (No 1)
⑪ Lock washer

WRE91-DF191

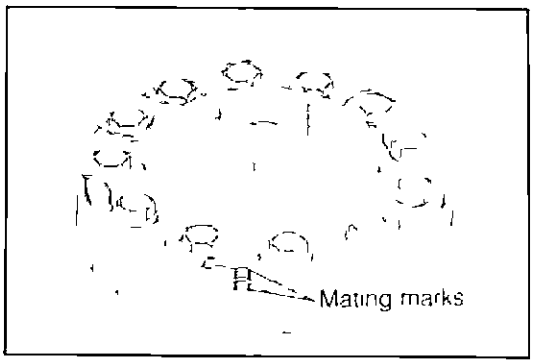
REMOVAL

1 Remove the rear differential carrier assembly
(See pages DF–28 through DF–29)
2 Remove the differential case assembly from the differential carrier
(See pages DF–30 through DF–33)

WRE91 DF193

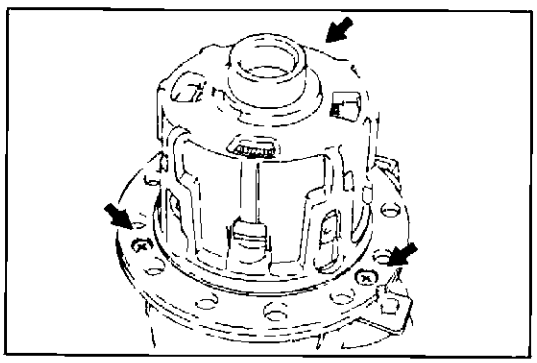
DISASSEMBLY

1 Ensure that the mating marks on the differential case subassembly and the differential case cover are aligned with each other



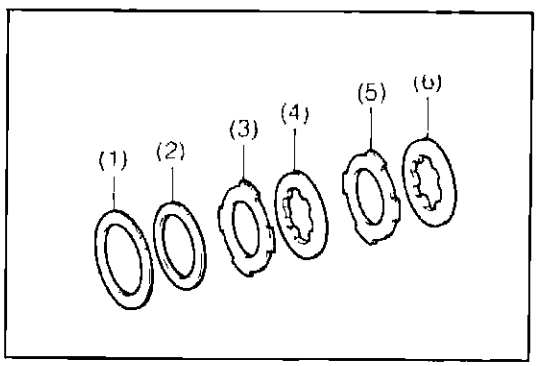
WRE9 DF193

2 Separate the differential case subassembly from the differential case cover by removing the three screws
NOTE:
- **When removing the three screws, loosen them evenly over several stages.**



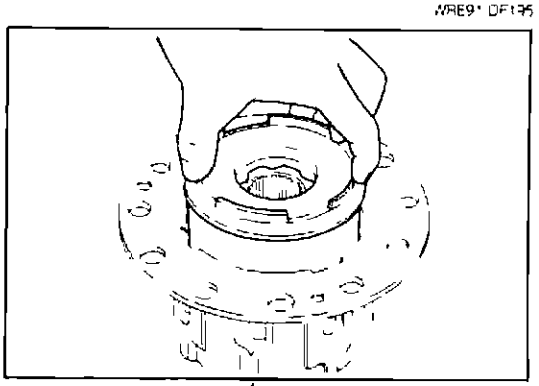
WRE91 DF194

3 Remove the following parts in this sequence from the differential case
(1) Shim No 4
(2) Conical spring washer
(3) Differential side gear thrust washer No 1
(4) Clutch plate
(5) Differential side gear thrust washer No 1
(6) Clutch plate



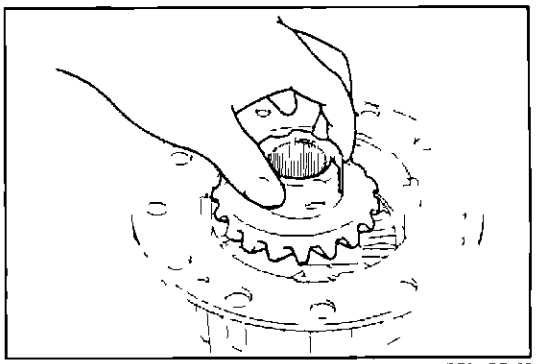
WRE9* DF195

4 Remove the clutch pressure ring

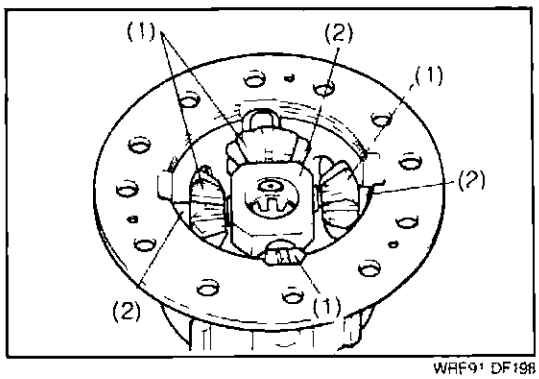


WRE9* DF196

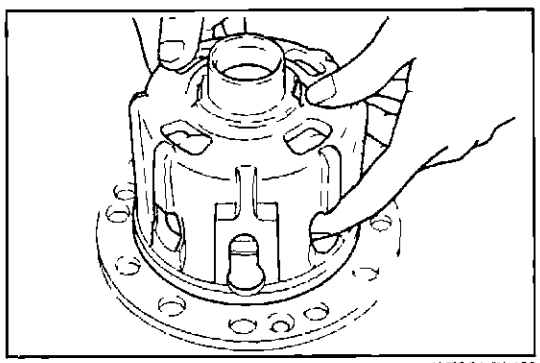
5 Remove the side gear



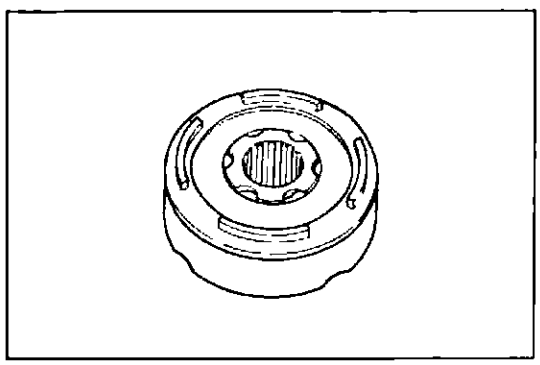
6 Remove the following parts, while floating the pinion shaft
(1) Differential pinion shaft . (3 pcs)
(2) Differential pinion . . . . (4 pcs)

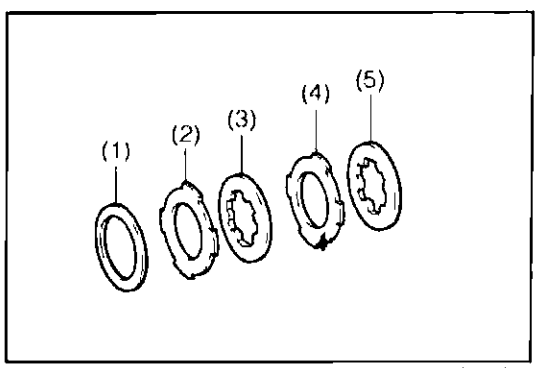


7 Remove each inner part from the differential case



8 Remove the following parts from the clutch pressure ring
(1) Conical spring washer
(2) Differential side gear thrust washer No 1
(3) Clutch plate
(4) Differential side gear thrust washer No. 1
(5) Clutch plate



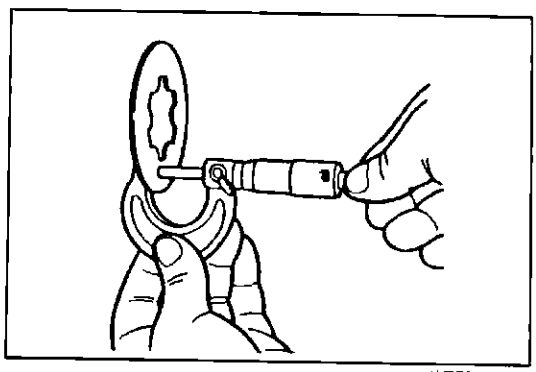


INSPECTION

NOTE:
(1) Clean each of the disassembled parts. Check each part for cracks, wear at fitting sections, damage, deformation or seizure. Replace any faulty part.
(2) When the differential side gear and clutch plate are to be replaced, also replace the differential side gear thrust washer No. 1 and shim No. 4 that are in contact with the replaced parts.

WRE91 DF202

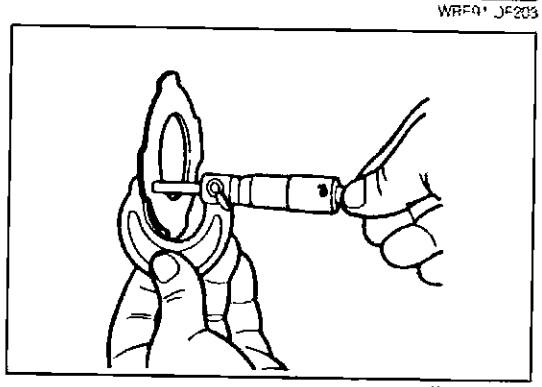
1 Check of clutch plate
(1) Ensure that the clutch plate exhibits no excessive uneven wear
(2) Measure the clutch plate thickness
Specified Value: 1.6 mm
Allowable Limit: 1.4 mm



WRE91 DF203

NOTE:
- The allowable wear limit for the clutch plate at one side is 0.1 mm.

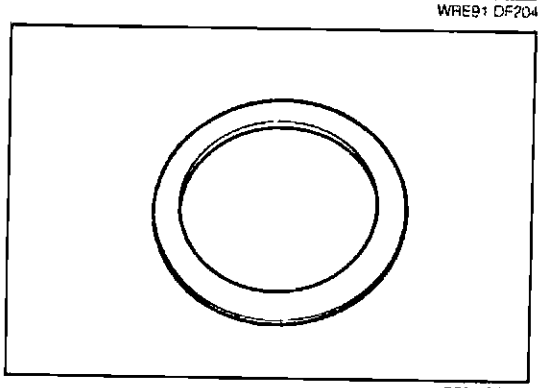
2 Check of differential side gear thrust washer No. 1
(1) Ensure that the differential side gear thrust washer No. 1 exhibits no excessive uneven wear
(2) Measure the differential side gear thrust washer No. 1 thickness.
Specified Value: 1.6 mm
Allowable Limit: 1.4 mm



WRE91 DF204

NOTE:
- The allowable wear limit for the differential side gear thrust washer No. 1 at one side is 0.1 mm.

3 Shim No. 4 check
(1) Ensure that the shim No. 4 exhibits no excessive wear.



WRE91 DF205

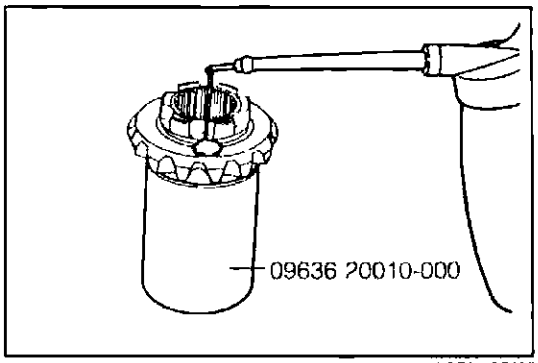
ASSEMBLY

NOTE:
(1) When assembling each part, make sure that no dust nor chip gets to the part.
(2) Liberally apply the designated oil to each of the sliding and rotating sections.
Designated Oil: SAE 90 L.S.D. Oil

WRE91 DF206

1 Install the clutch pressure ring to the differential gear, using the following SST or a cylindrical base
SST: 09636-20010-000

2 Apply the L S D oil, as shown in the right figure.

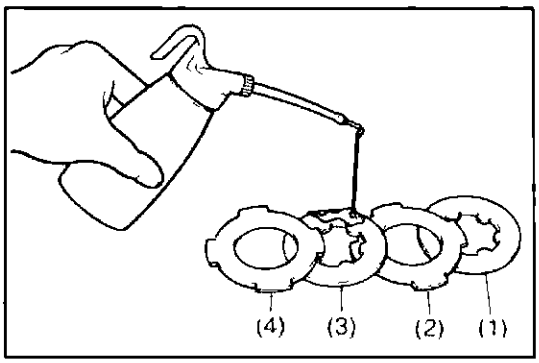


WRE91 DF207

3 Apply the L S D oil to the following parts
(1) Clutch plate
(2) Differential side gear thrust washer No 1
(3) Clutch plate
(4) Differential side gear thrust washer No 1

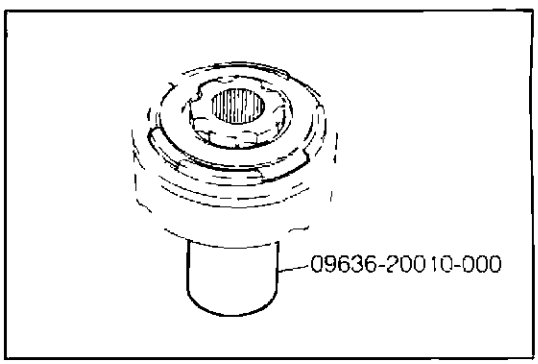
4 Install the aforesaid parts to the clutch pressure ring in this sequence
NOTE.
- There is no specific installation direction for the clutch plate

NOTE:
- Each parts plate should be aligned with the grooves of the clutch pressure ring and side gear during the assembly.



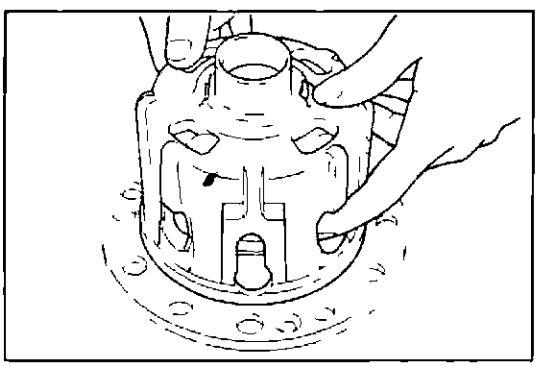
WRE91 DF208

5 Install the conical spring washer
NOTE:
- The conical spring washer should be installed in such a direction that the enlarged section of the preload spring may come at the differential side gear thrust washer No. 1 side.

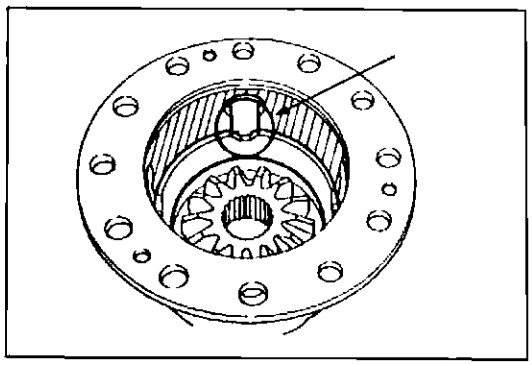


WRE91 DF209

6 Install the differential case subassembly

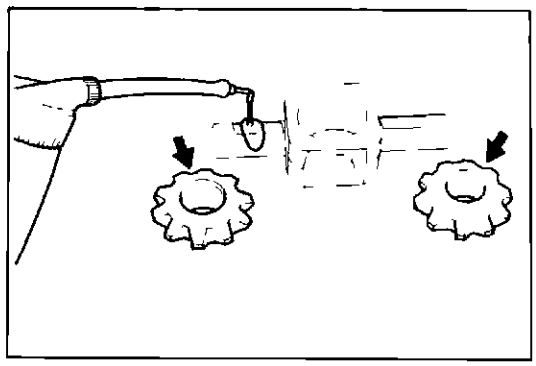

WRE91 DF211

7. Align the groove of the clutch pressure ring with that of the differential case



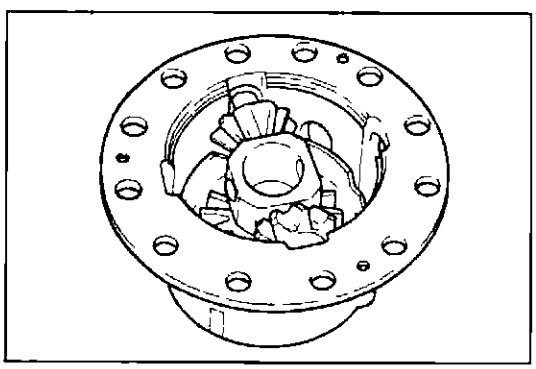
WRE3 DF212

8 Apply L S D oil to the outer periphery of the pinion shaft and the rotating sections of the pinion gear



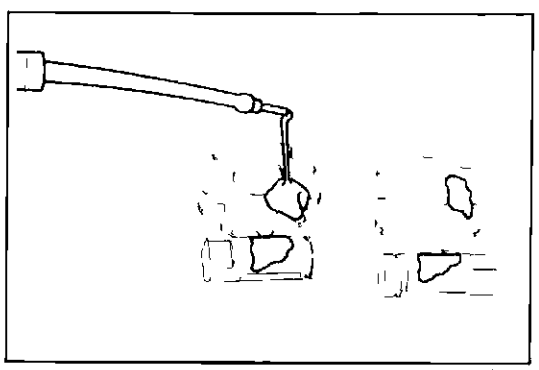
WRE91 DF213

9 Install the pinion shaft and the pinion gears to the differential case cover



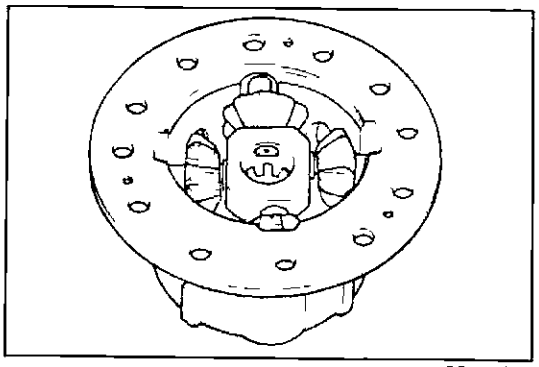
WRE91 DF214

10. Apply L S.D oil to the outer periphery of the pinion shaft and the rotating sections of the pinion gears

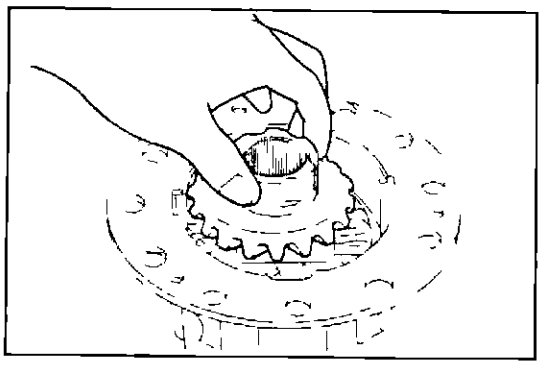


WRE91 DF215

11 While floating the pinion shaft, install the aforesaid parts on the item 10

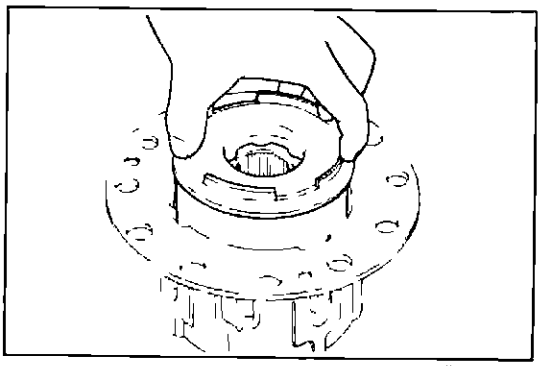


WRE91 DF216



WRE91 DF217

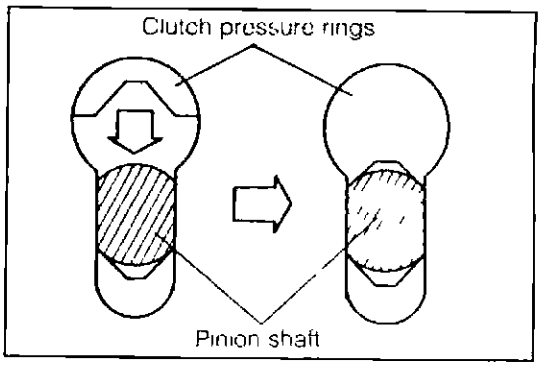
12 Assemble the clutch pressure ring in the differential case



WRE91 DF218

NOTE:

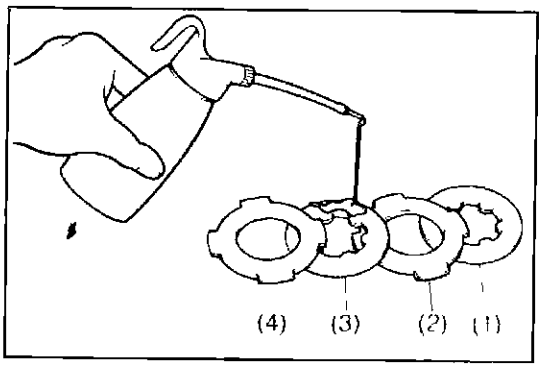
- The pinion shaft should be aligned with the groove section of the clutch pressure ring during the assembly, as shown in the right figure.



WRE91 DF219

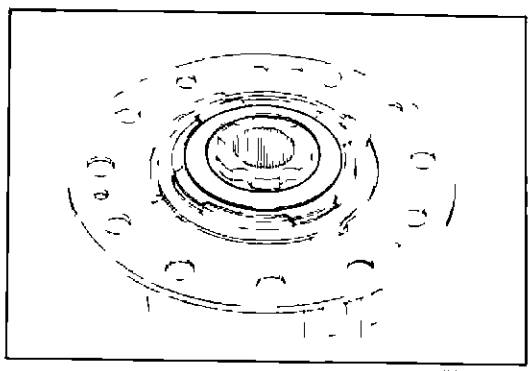
13 Apply L S D oil to the following parts
(1) Clutch plate
(2) Differential side gear thrust washer No 1
(3) Clutch plate
(4) Differential side gear thrust washer No. 1

14 Install the aforesaid parts to the clutch pressure ring in this sequence



WPE91 DF220

15 Install the conical spring washer
NOTE:
- The washer should be installed in such a direction that the enlarged section of the preload spring may come at the differential side gear thrust washer No. 1 side.

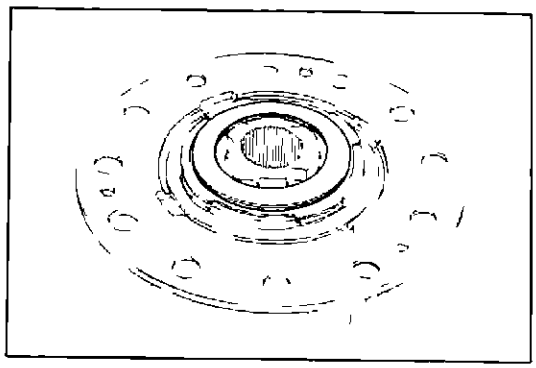


16 Install the two pieces of 0.5 mm thick shims No. 4 in the differential case

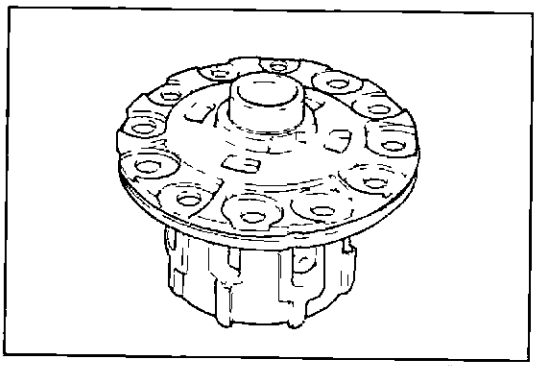
Shim No. 4 Availability:

Unit: mm

0.1
0.2
0.5

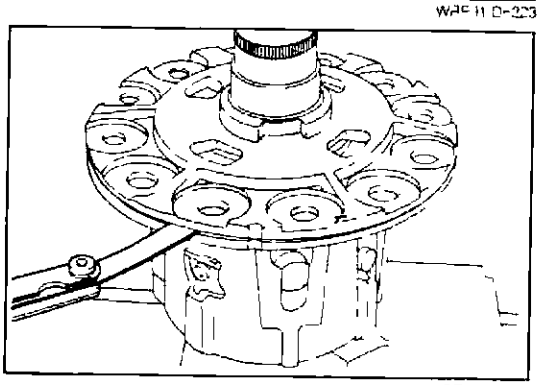


17 Install the differential case cover on the differential case subassembly
NOTE:
- Do not install the screws at this stage.



18 Apply the following specified load to the differential case cover, using a press
Specified Load: 1000 kgf

19 Measure the clearance between the differential case sub-assembly and the differential cover, using a filler gauge
NOTE:
- Perform this clearance check at three points.
- Be sure to record and keep the actually measured values.



20 Selection and calculation method of shim No 4 to be installed to section C

(1) With a load of 1000 kgf applied in the previous step 19, perform the calculation, using the following constant value and formula given below

X: Thickness of shim No.4 to be installed

C: Mean clearance measured at previous step 19 at three points

A: Thickness of two pieces of shims No.4 (T = 1.0 mm)

<Formula>

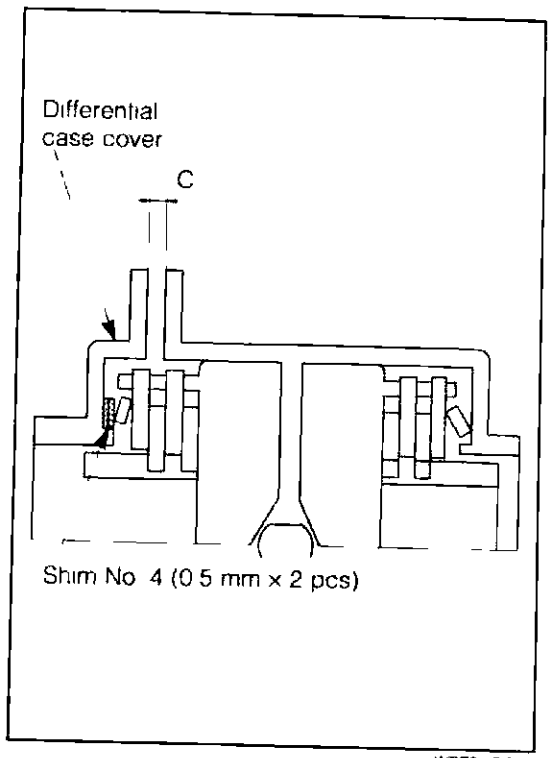
X = A - C - 0.125 (constant value)

(Example) X = 1.0 - 0.51 - 0.125

(2) If the value of X is 0 365 in the step (1) above, the upper and lower limit values can be calculated, using the tolerance (±0 075) for the constant value, as follows.

	Upper limit (0 4 mm)	Lower limit (0 3 mm)
	↑	↑
Example	0 365 + 0.075 =0.44	0 365 - 0.075 = 0.29

As a result, the upper limit or the lower limit becomes the thickness of the shim No 4



WRE9 DF225

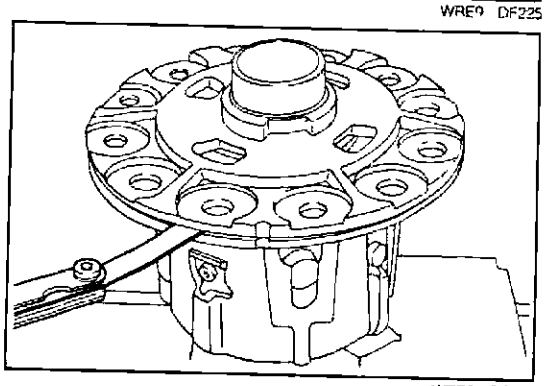
(3) Remove the differential case cover

(4) Install the shim No 4 (either the upper limit or the lower limit) selected in the step (2) above

(5) Measure the clearance between the differential case subassembly and the differential cover, using a filler gauge

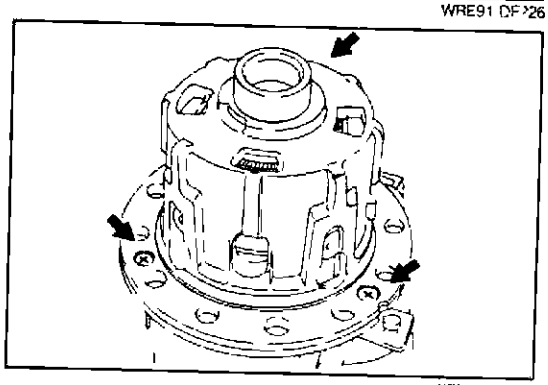
NOTE

- Perform this clearance check at three points.
  Specified Value: 0.05 - 0.2 mm



WRE91 DF226

(6) Install the differential case cover on the differential case subassembly



WRE91-DF227

21 Install the differential case cover, while aligning it with the mating mark of the differential case subassembly

NOTE:

- Tighten the screws evenly.

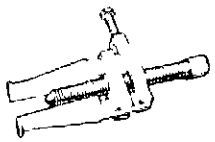
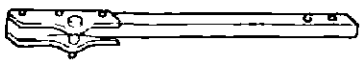
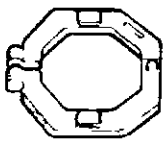
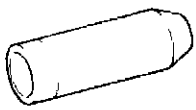
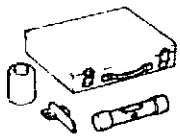
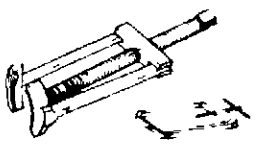
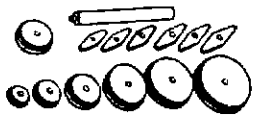
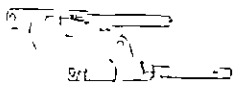
22 Assemble the differential case assembly
(See page DF–39 through DF–40)

INSTALLATION

1 Install the differential carrier to the rear axle housing
(See page DF–41 through DF–44)

WRE91 DF233

SSTs

Shape	Part Number	Part Name
	09308-10010-000	Oil seal puller
	09330-00021-000	Companion flange holding tool
	09401-87601-000	Differential gear case expander
	09506-87303-000	Differential drive pinion bearing cone front replacer
	09515-87601-000	Replacer oil seal
	09530 87604-000	Differential drive pinion adjust gauge set
	09602-87301-000	Counter gear bearing puller
	09608-87302-000	Axle hub & drive pinion bearing tool set
	09950 20017-000	Universal puller
	09950-87701-000	Bearing remover

SERVICE SPECIFICATIONS

FRONT

Unit: mm

Item			Specified value	Allowable limit	Remarks
Ring gear runout			—	0.1	
Backlash	Ring gear		0.10 - 0.20	—	
	Pinion gear × Side gear		0.05 - 0.25	—	
Preload	Total	New bearing	0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)	—	
		Bearing reused	0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)	—	
	Drive pinion	New bearing	0.06 - 1.96 N·m (7.0 - 20.0 kgf-cm)	—	
		Bearing reused	0.06 - 1.96 N·m (7.0 - 20.0 kgf-cm)	—	

WRE91 DF279

REAR

Unit: mm

Item			Specified value	Allowable limit	Remarks
Ring gear runout			—	0.1	
Backlash		Ring gear	0.10 - 0.20	—	
		Side gear	0.05 - 0.25	—	
Preload	Total	New bearing	0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)	—	
		Bearing reused	0.89 - 2.35 N·m (9.0 - 24.0 kgf-cm)	—	
	Drive pinion	New bearing	0.69 - 1.96 N·m (7.0 - 20.0 kgf-cm)	—	
		Bearing reused	0.69 - 1.96 N·m (7.0 - 20.0 kgf-cm)	—	
Clutch inner & outer plate thickness (L.S.D. only)			1.6	1.4	Allowable wear limit at one side is 0.1
Clearance (differential case S/A ↗ differential cover) (L.S.D. only)			0.05 - 0.2	—	See page DF-53, 54

WHE91 DF230

TIGHTENING TORQUE

FRONT

Tightening Components	Tightening Torque		
	N·m	kgf·m	ft·lb
Front axle housing cover S/A × Filler plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Front axle housing cover S/A × Front axle housing	17.7 - 23.5	1.8 - 2.4	13.0 - 17.4
Front axle housing × Drain plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Front axle housing × Bearing cap	78.5 - 118.0	8.0 - 12.0	57.9 - 87.0
Differential case S/A × Ring gear (w/wet condition)	88.3 - 103.0	9.0 - 10.5	65.1 - 75.9
Differential case × Differential case cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Drive pinion × Lock nut	196.0 - 245.0	20.0 - 25.0	145.0 - 180.0

WRE31DF231

REAR

Tightening Components	Tightening Torque		
	N·m	kgf-m	ft-lb
Rear axle housing cover S/A × Filler plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Rear axle housing cover S/A × Rear axle housing	17.7 - 23.5	1.8 - 2.4	13.0 - 17.4
Rear axle housing × Drain plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Rear axle housing × Bearing cap	78.5 - 118.0	8.0 - 12.0	57.9 - 87.0
Differential case S/A × Ring gear (w/wet condition)	88.3 - 103.0	9.0 - 10.5	65.1 - 75.9
Differential case × Differential case cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Drive pinion × Lock nut	196.0 - 245.0	20.0 - 25.0	145.0 - 180.0

WRE31DF232

DAIHATSU

F70,F75,F77

Service manual

FRONT AXLE & SUSPENSION

FS

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

FRONT AXLE & SUSPENSION

OUTLINE OF FRONT AXLE & SUSPENSION ..... FS– 2
FRONT WHEEL ALIGNMENT ADJUSTMENT FS–17
FRONT AXLE HUB FS–21
STEERING KNUCKLE FS–46
LATERAL CONTROL ROD FS–56
STABILIZER FS–59
FRONT SHOCK ABSORBER FS–62
FRONT SPRING FS–69
THREE-STAGE DAMPER SYSTEM FS–76
SSTs (Special Service Tools) FS–79
SERVICE SPECIFICATION FS–80
TIGHTENING TORQUE FS–82

WRE91-FS001

OUTLINE OF FRONT AXLE & SUSPENSION

Front Axle

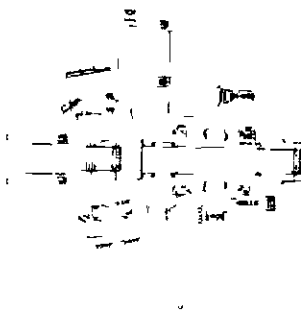
The front axle is of the full floating shaft tube type. It consists of Birfield type constant velocity ball joints which make possible simultaneous front wheel driving and steering and the steering knuckles which also serve as the ball joint cases.

The steering knuckle is connected to the front axle housing through the tapered roller bearings at the upper and lower steering knuckle bearing caps.

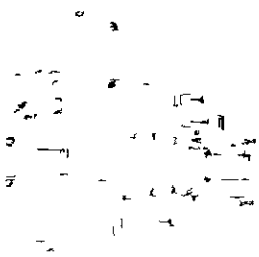
Furthermore, the driving force from the drive shaft is transmitted to the front axle hub by means of the axle outer shaft flange.

Also instead of the axle outer shaft flange, the manual locking hub and automatic locking hub are available as optional equipment.

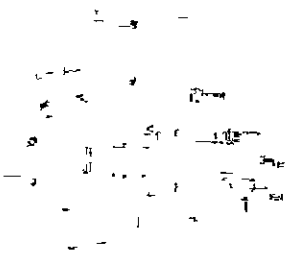
Standard



Manual locking hub



Automatic locking hub



		F70, F75	F77
Toe-in (mm)	other than those listed below	0 - 8 mm	
	215R15, 215/80R15, 255/70R15, H78-15-4	3 - 5 mm	
Camber	(degree)	1° 00'	
Caster	(degree)	1° 30'	
Kingpin angle	(degree)	9° 30'	
Turning angle (degree)	H78-15-4, 215R15, 215SR15, 225/70R15, 215/60R15	Inner 28°, Outer 26°	Inner 28°, outer 26°
	other than those listed above	Inner 30°, Outer 28°	Inner 29°, outer 27°

1. MANUAL LOCKING HUB

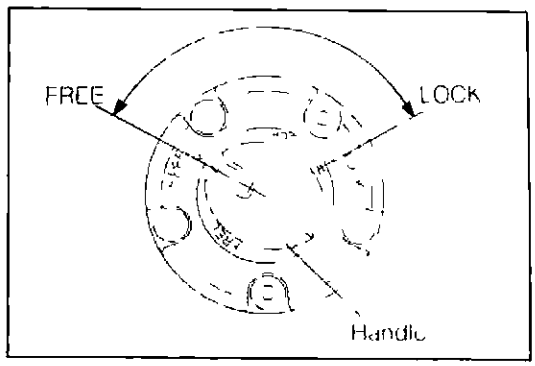
The manual locking hub is a mechanism whereby the switching of power flow is made so that the driving force from the front drive shaft can be transmitted to the front wheel or the torque from the front wheel can not be transmitted to the front drive shaft, etc and this switching is performed through the operation of the handle provided at the front wheel hub

How to operate

- When the transfer shift lever is shifted to the [2H] position, set the locking hub handle to the [FREE] position at both the right and left wheels
- When the transfer shift lever is shifted to the [4H] or [4L] position, set the locking hub handle to the [LOCK] position at both the right and left wheels

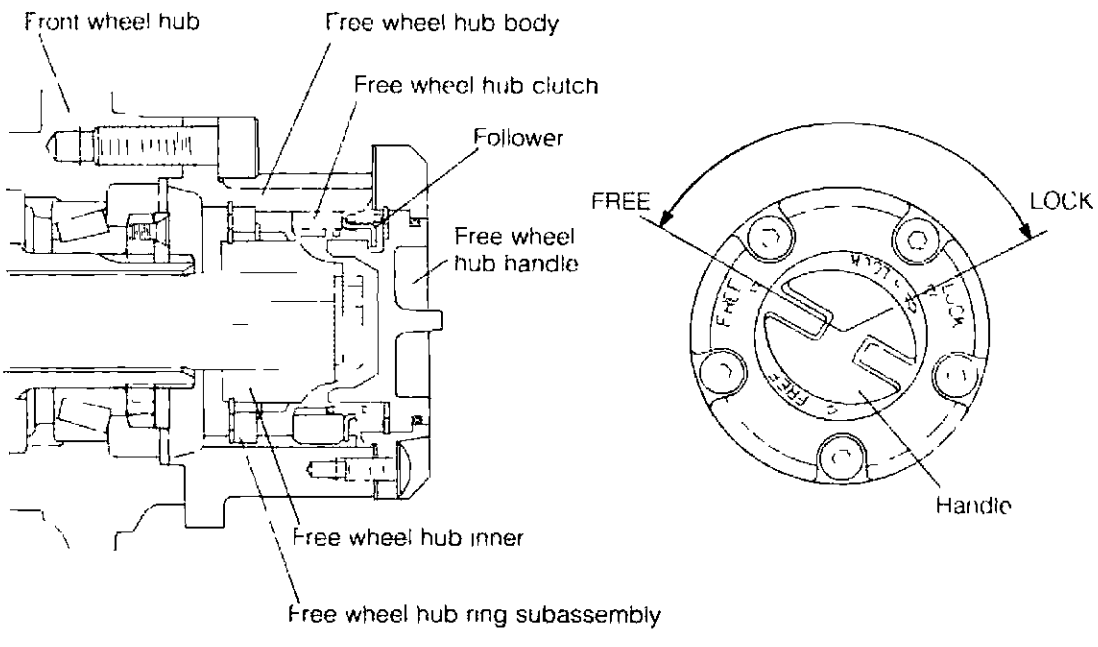
CAUTION

1. Do not move the vehicle if the handle (▽ mark) is not aligned exactly with the mark at the "Free" or "Lock" position on the cover.
2. Do not operate the vehicle in the 4L or 4H position when the hub handle is set to the "Free" position.
3. Make sure to set the handle (▽ mark) on both the right and left wheels at the same position.



Construction

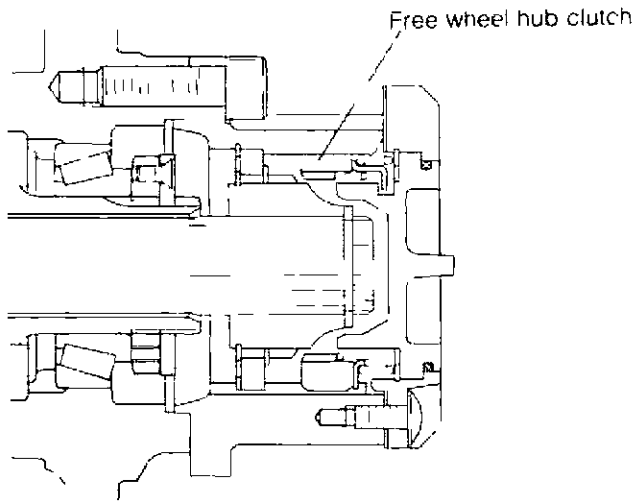
- The manual locking hub (manual free wheel hub assembly) consists of the free wheel hub body, free wheel hub inner, free wheel hub ring sub assembly, free wheel hub clutch, free wheel hub handle follower and so forth
- The free wheel hub inner is spline-connected to the drive shaft On the other hand, the free wheel hub body is mounted on the front wheel hub Furthermore, its inside is spline-connected to the free wheel hub clutch
- The free wheel hub clutch is attached to the free wheel hub handle by means of the follower and two springs



Operation

- LOCKING HUB HANDLE (FREE WHEEL HUB HANDLE) WHEN SET TO [FREE] POSITION

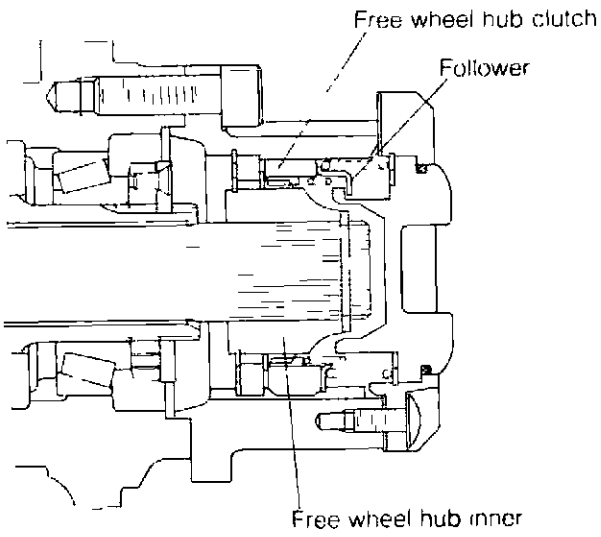
When the free wheel hub handle is set to the [FREE] position, the free wheel hub clutch comes at the outermost position on the spline of the free wheel hub body (at the extremely right position in the figure below), where no driving force from the drive shaft is transmitted to the front wheel hub



WRE91 FS006

- LOCKING HUB HANDLE (FREE WHEEL HUB HANDLE) WHEN SET TO [LOCK] POSITION

When the free wheel hub handle is turned from the [FREE] position to the [LOCK] position, the follower moves toward the inside (toward the left side in this figure) along the diagonal groove provided inside the free wheel hub handle As a result, the free wheel hub clutch which is attached to the follower by means of springs will move toward the inside along the spline of the free wheel hub body. This operation causes the free wheel hub clutch to mesh with the spline of the free wheel hub inner Consequently, the driving force from the drive shaft is transmitted to the front wheel hub



WRE91 FS007

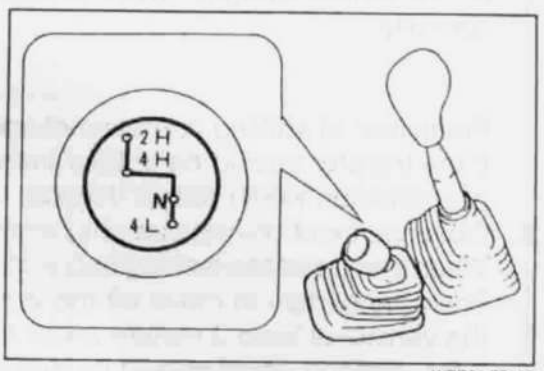
2. AUTOMATIC LOCKING HUB

The automatic locking hub is a mechanism whereby the switching of power flow is made automatically so that the driving force from the front drive shaft can be transmitted to the front wheel or no driving force can not be transmitted to the front wheel when the transfer lever is shifted from the [2H] position to the [4H] position or the [4L] position and the vehicle is run.

WRE91-FS008

How to operate

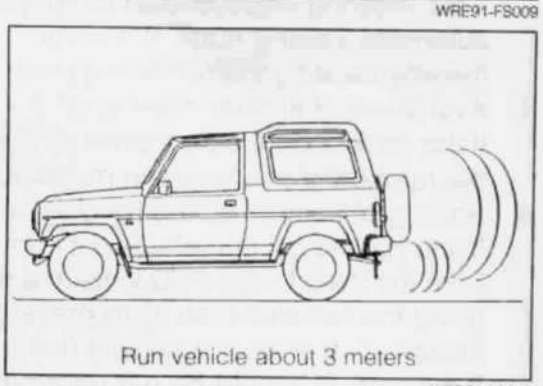
1. [FREE] STATE TO [LOCK] STATE
   (1) With the vehicle in a stationary state, shift the transfer shift lever from the [2H] position to the [4H] position or the [4L] position.
   (2) With the steering wheel set to a straight-ahead position, slowly move off the vehicle and run it approximately more than 3 meters. Then, the vehicle is put automatically under the [LOCK] condition.



WRE91-FS009

NOTE:

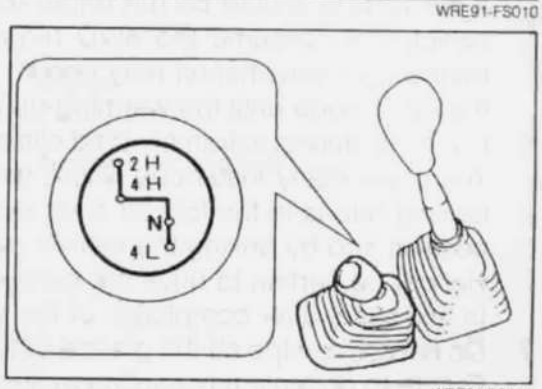
- When the vehicle runs in a direction opposite to the former direction before stopping (forward movement ↔ backward movement) after the vehicle has been run with the transfer shift lever placed in the [4H] or [4L] position and with the automatic locking hub set to the [LOCK] state and the vehicle has been stopped, the automatic locking hub will be switched from the [LOCK] state to the [FREE] state and will become the [LOCK] state again.



Run vehicle about 3 meters

WRE91-FS010

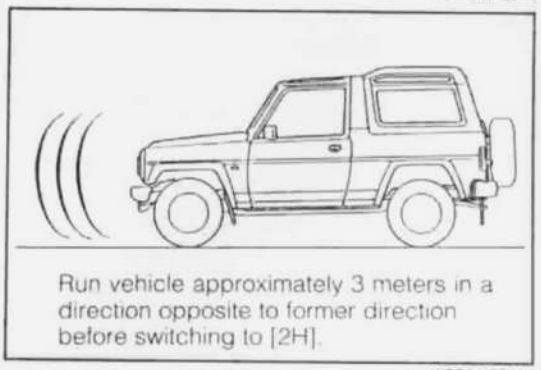
2. [LOCK] STATE TO [FREE] STATE
   (1) With the vehicle in a stationary state, shift the transfer shift lever from the [4H] or [4L] position to the [2H] position.
   (2) With the steering wheel set to a straight-ahead position, slowly move off the vehicle in a direction opposite to the former direction before the switching to [2H] position and run the vehicle approximately more than 3 meters. Then, the vehicle is put automatically under the [FREE] condition.



WRE91-FS011

NOTE:

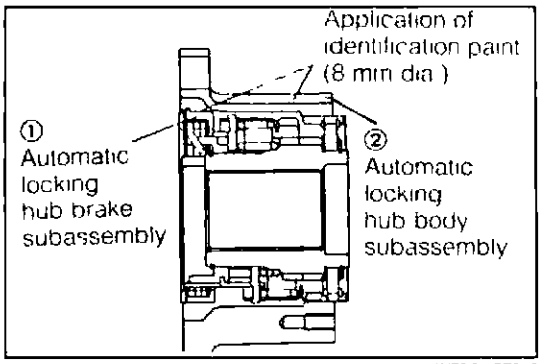
- If the vehicle is moved off in the same direction as the former direction before the switching to the [2H] position in the operation described in Step (2) above, the vehicle will run under the [LOCK] lock state continually.



Run vehicle approximately 3 meters in a direction opposite to former direction before switching to [2H].

WRE91-FS012

HANDLING INSTRUCTIONS ON AUTOMATIC LOCKING HUB



WRE91 FS013

- **Avoidance of ratcheting phenomenon**
  The ratcheting phenomenon means a gear clashing noise which occurs when the automatic locking hub clutch meshes with the automatic locking hub body if there exists a difference in revolutional speed between these two components
  When such phenomenon occurs, first stop the vehicle Again place the transfer in the 4WD position Slowly move off the vehicle straight. Then, proceed to drive the vehicle normally

1 Prohibition of shifting operation of transfer during running
If the transfer should be shifted from the 2WD to the 4WD during the running, the aforesaid ratcheting phenomenon would occur. Hence, do not shift the transfer during the running.

2 Observance of driving straight immediately after transfer shifting
When the automatic locking hub is shifted from the Free position to the Lock position, first stop the vehicle Then, be certain to move off the vehicle with the steering wheel held in a straight-ahead state and run the vehicle at least 3 meters under this state
If the steering wheel should be turned before the vehicle has been run at least 3 meters, one hub of the automatic locking hubs at the right and left sides may be locked and the other hub may become free, thereby causing the ratcheting phenomenon to occur

3 Avoidance of sudden moving off
If the vehicle should be moved off suddenly after the transfer has been shifted from the 2WD to the 4WD, the ratcheting phenomenon might occur Hence, make sure to avoid moving the vehicle suddenly

4 Shifting of transfer during running on muddy terrain
If you want to get the vehicle out from a muddy terrain or on snowy roads or the like by shifting the transfer from the 2WD to the 4WD while the rear wheels are slipping on these roads, perform the locking slowly, using the half clutch so as to prevent the occurrence of ratcheting phenomenon

5 Observance of driving vehicle under 4WD mode during extremely cold climate (below –15°C)
If the vehicle should be run under the 2WD mode with the automatic locking hub in the free state, the vehicle may assume the 4WD mode owing to high viscosity of the transfer oil. Consequently, the ratcheting phenomenon may occur Therefore, during extremely cold climate, drive the vehicle under the 4WD mode until the warming-up is completed

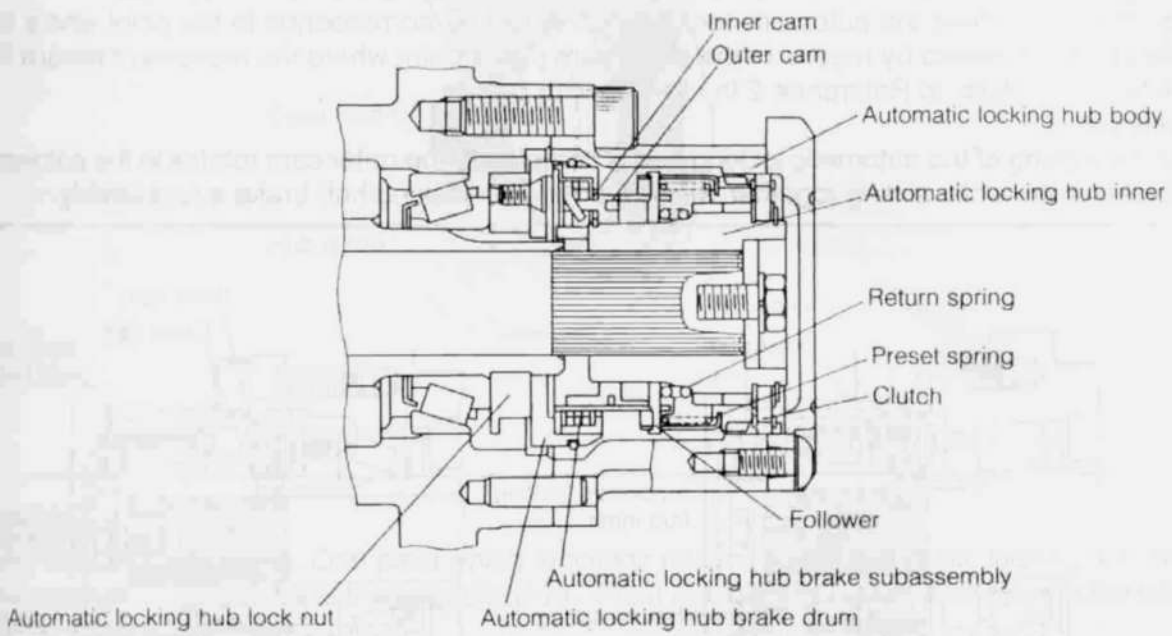
6 Handling during extremely cold climate (below –15°C)
There are many instances where the automatic locking hub fails to become free when the automatic locking hub is in the locked state and you try to unlock it by shifting the transfer shift lever to the 2WD position and by driving the vehicle reversely This is because the viscosity of the transfer oil is too high Hence be certain to drive the vehicle under the 4WD mode until the warming-up is completed
In this case, after completion of the warming-up operation, shift the transfer from the 4WD to the 2WD

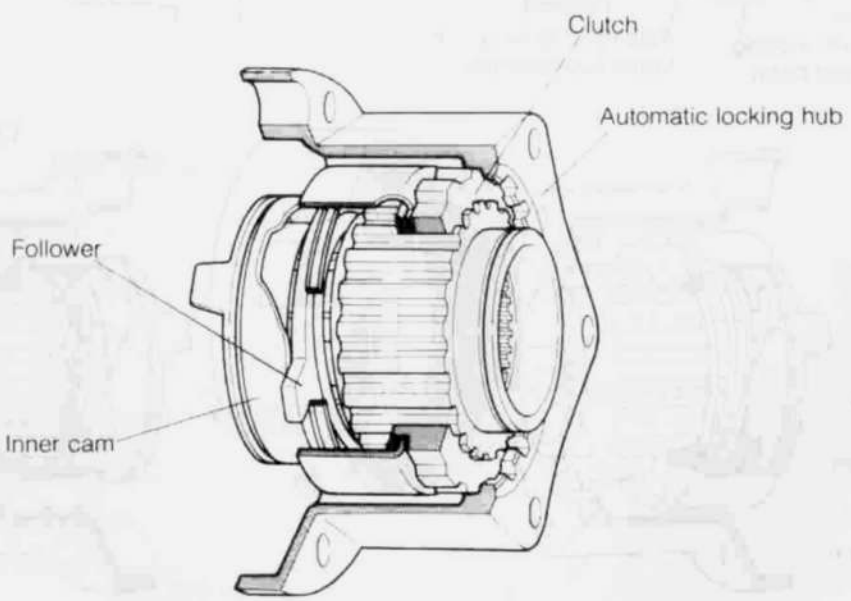
7 Do not soil or wipe off the grease that has been applied to the automatic locking hub brake subassembly
Failure to observe this caution makes it impossible to reuse the brake subassembly

WRE91 FS014

Construction

- The automatic locking hub assembly consists of the automatic locking hub lock nut, automatic locking hub brake drum. automatic locking hub brake subassembly, outer cam, inner cam, automatic locking hub body, clutch and so forth.
- The inside of the automatic locking hub inner is spline- connected to the front drive shaft. On its outside are mounted the clutch and so forth. On the other hand, the automatic locking hub body is mounted on the front wheel hub. Furthermore, the inside of the automatic locking hub body is provided with spline so that it may connected with the clutch.
- On the clutch are attached the follower, two springs, inner cam and outer cam.
- The automatic locking hub brake drum is attached to the hub lock nut with screws.





WRE91-FS015

Operation

• AUTOMATIC LOCKING HUB [FREE] STATE TO [LOCK] STATE

When the drive shaft turns after the transfer shift lever has been shifted to the [4H] or [4L] position and the vehicle has been moved off, the automatic locking hub inner and follower which are connected with each other through spline will turn as an integral unit. (The follower is connected by means of the outer spline of the automatic locking hub inner.)

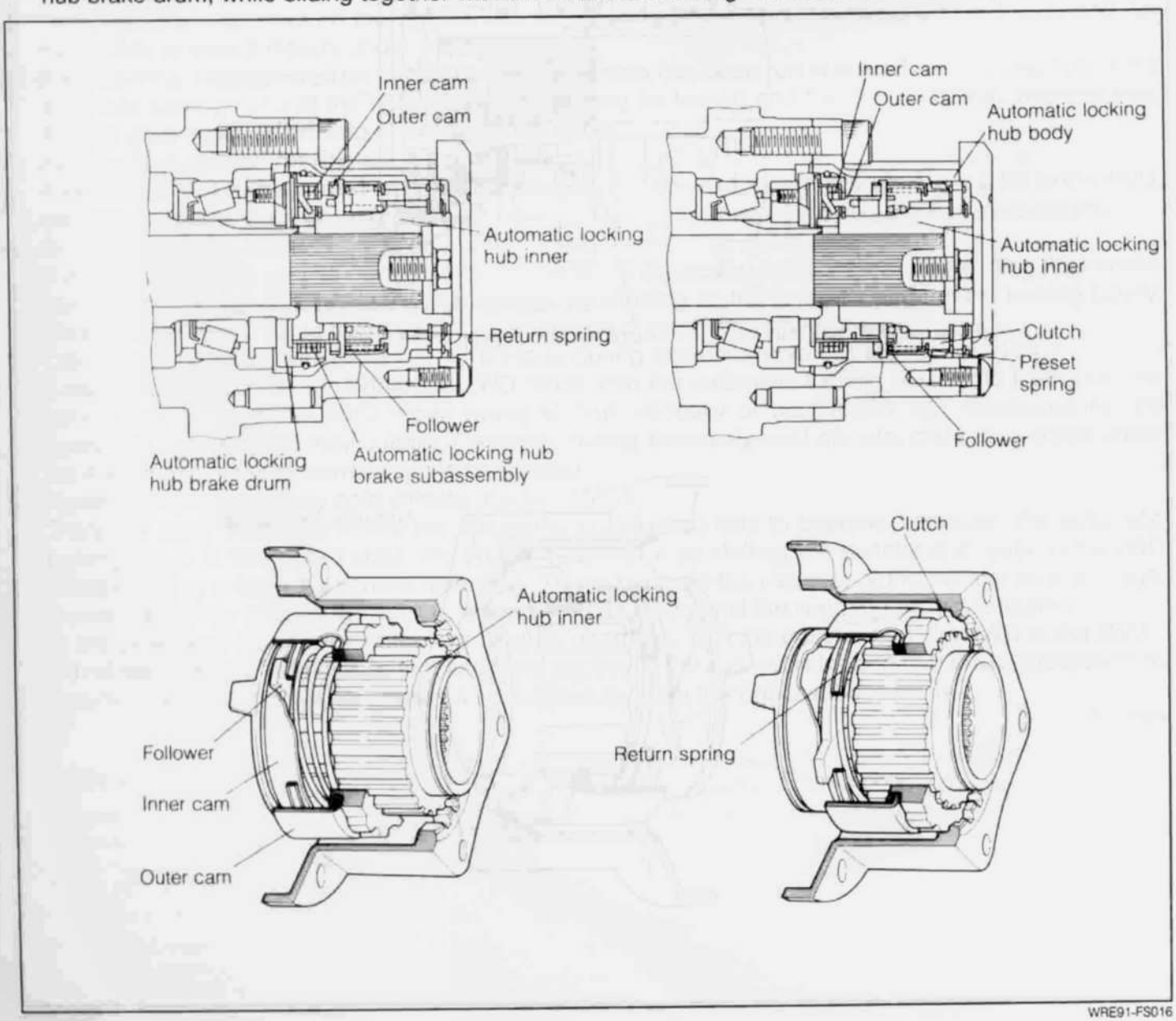
On the other hand, the inner and outer cams tend to remain in their position because of the operation of the automatic locking hub brake subassembly. As a result, the follower moves toward the outside while turning along with the diagonal surface of the inner cam. (The follower moves toward the right side in the figure below.) ..... Refer to Reference 1 in the following pages.

When the follower moves toward the outside, the clutch, too, which is pushed by the spring tension, will move toward the outside. Thus, the clutch meshes with the inner spline of the automatic locking hub body, thereby transmitting the driving force from the drive shaft to the front tire via the front wheel hub.

Moreover, the point where the automatic locking hub is locked corresponds to the point where the rotation of the follower is prevented by means of the outer cam (i.e. a point where the movement toward the outside is completed). ..... Refer to Reference 2 in the following pages.

[Reference]

When the locking of the automatic locking hub is completed, the outer cam rotates in the automatic locking hub brake drum, while sliding together with the automatic locking hub brake subassembly.

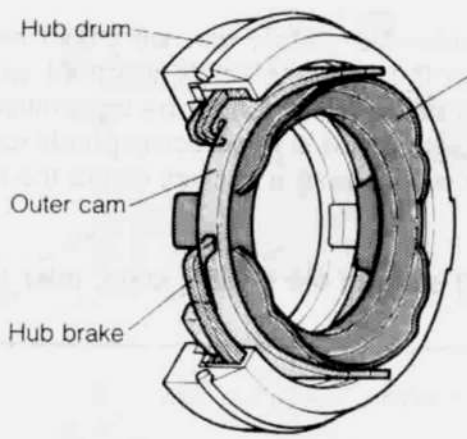


WRE91-FS016

[Reference 1]

① The inner and outer cams have a pawl, respectively. Also, the automatic locking hub brake has an involute- shaped pawl.

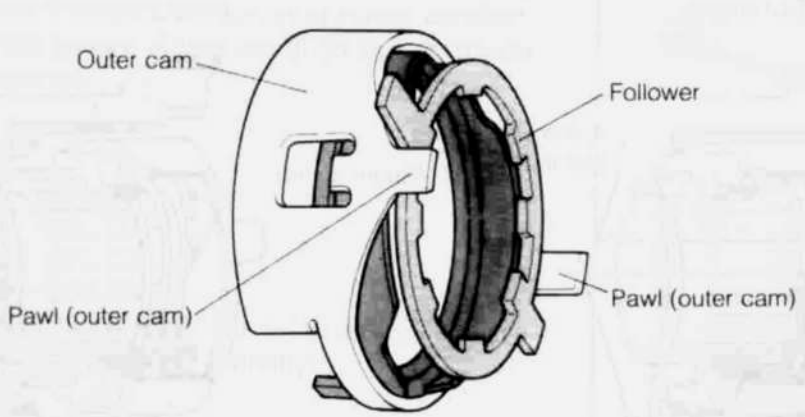
② In the beginning of the [LOCK] phase, both the inner and inner cams are turning. Thus, their respective pawls are contacting with the pawl of the automatic locking hub brake. At this stage, the hub brake expands because of its involute shape. Consequently, the friction relative to the automatic locking hub brake drum is on the increase, finally stopping the rotation of the inner and outer cams.



WRE91-FS017

[Reference 2]

The outer cam has two pawls; One pawl which functions relative to the automatic locking hub brake and the other pawl which is located at the opposite side. When the follower makes contact with the latter pawl, the rotation of the follower is stopped.



WRE91-FS018

- AUTOMATIC LOCKING HUB [LOCK] STATE TO [FREE] STATE

When the transfer shift lever is shifted to the [2H] position and the vehicle is run approximately 3 meters in a direction opposite to former direction before switching to [2H], the automatic locking hub body and the automatic locking hub inner as well as the follower start to rotate as a unit, for power is transmitted from the tires. (The drive shaft and clutch, too, rotate as as a unit, until the lock is released.)

Since the follower is connected by means of the outer spline of the automatic locking hub inner and it is pushed against the diagonal surface of the inner cam by the spring tension, the follower rotates as an integral unit as the automatic locking hub inner. As a result, the follower moves toward the inside while turning along with the diagonal surface of the inner cam. (The follower moves toward the left side in the figure below.)

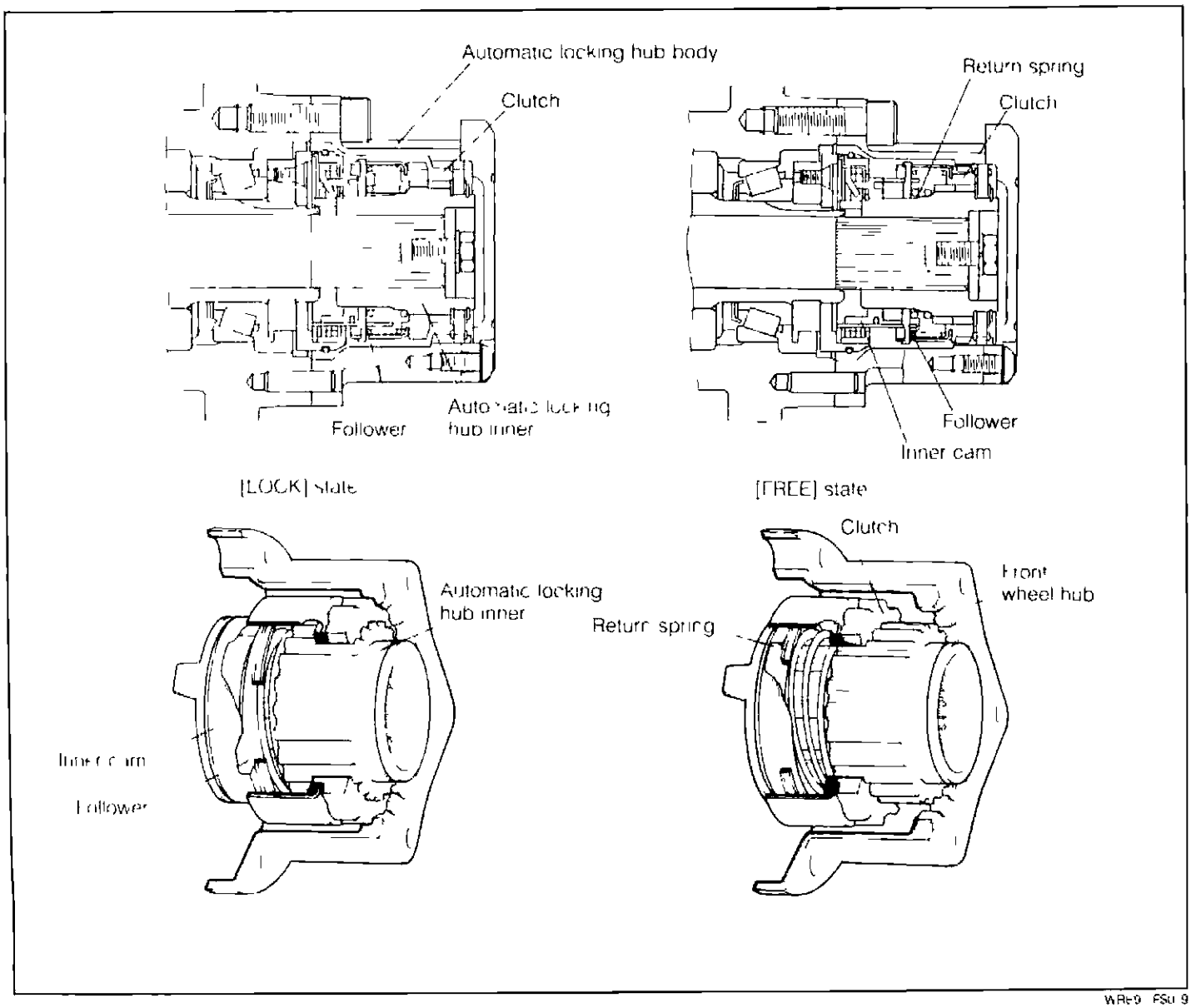
At this stage, the inner and outer cams tend to remain at their position, for their rotation is restricted by the automatic locking brake subassembly.

When the follower moves toward the inside, the clutch, too, will move because of the spring tension. Therefore, the meshing of the clutch with the inner spline of the front wheel hub will be disengaged. Consequently, the driving force from the tire side will no longer be transmitted.

Moreover, the point where the automatic locking hub is freed corresponds to the point where the rotation of the follower is prevented by means of the outer cam (i.e. a point where the movement toward the inside is completed).

[Reference]

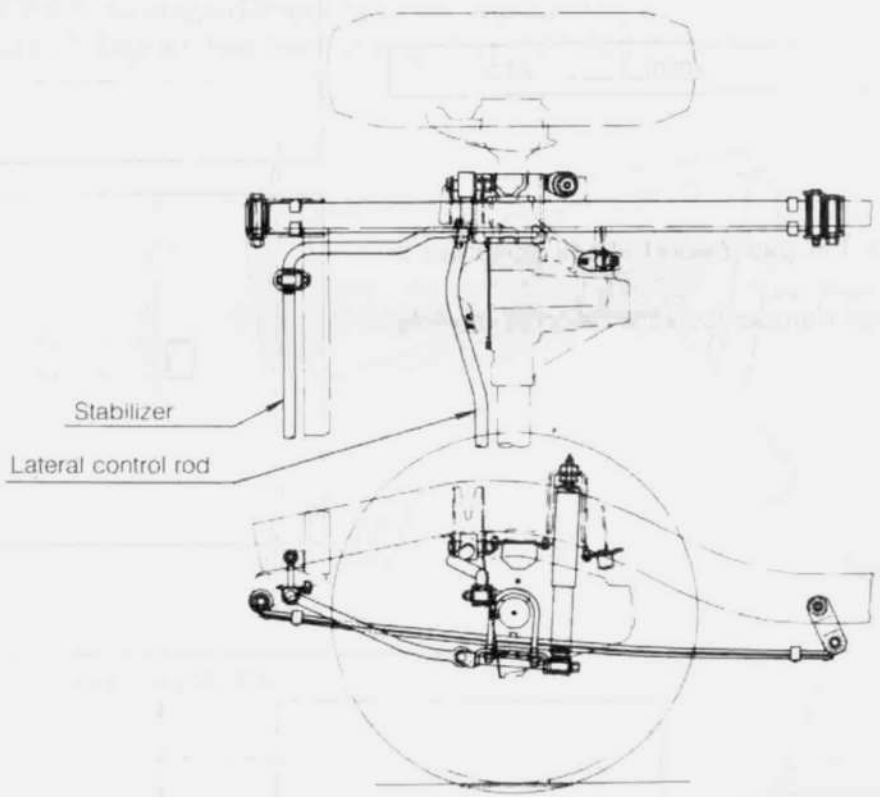
To change the mode from the [LOCK] state to the [FREE] state, refer to the "How to Operate" under Section 'Automatic Locking Hub," 2.



WRE9 FSU 9

FRONT SUSPENSION

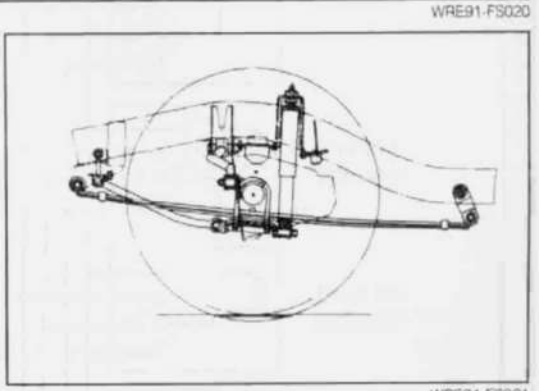
For greater riding comfort and operational safety, the front suspension features stabilizer, lateral control rods, gas-loaded shock absorbers and rear shackles.



WRE91-FS020

Front Leaf Springs

The front leaf spring consists of two long tapered leaf springs. Use of a polyethylene spacer between the springs successfully reduces friction between them, thus improving riding comfort. Further, the rear shackles assure stable travel on bumpy roads and quick steering response.



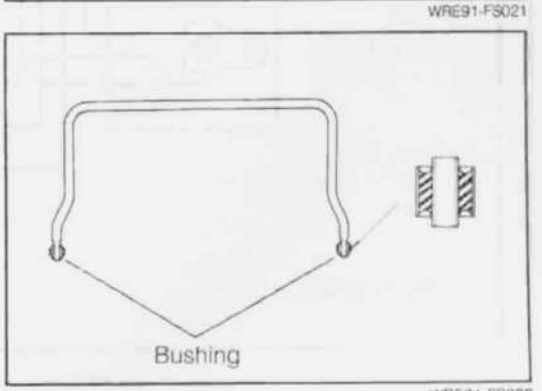
WRE91-FS021

Stabilizer

The standard-equipped front stabilizer serves to reduce vehicle body rolling and to enhance traveling stability.

Specifications

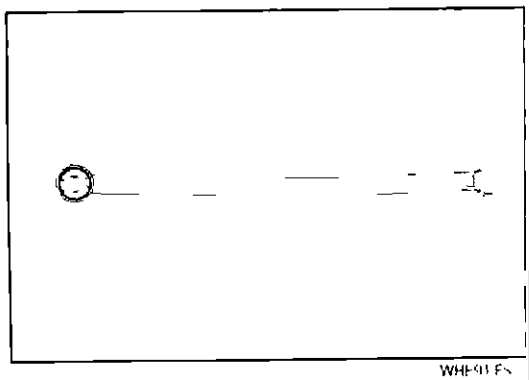
Rod diameter	(mm)	22
Constant of spring	(kgf/mm)	1.83



WRE91-FS022

Lateral Control Rod

The lateral control rod is newly installed to increase lateral stiffness, which contributes greatly to highly stable straight traveling capability and quick steering response

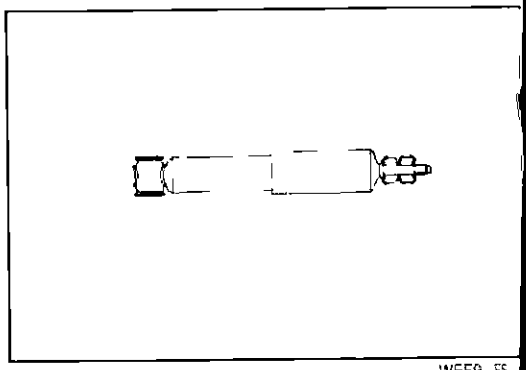


Specifications

Rod diameter	(mm)	24.5

Shock Absorbers

For greater riding comfort, the gas-loaded shock absorber is employed
Furthermore, the three-stage damper is available on all models, except for F77



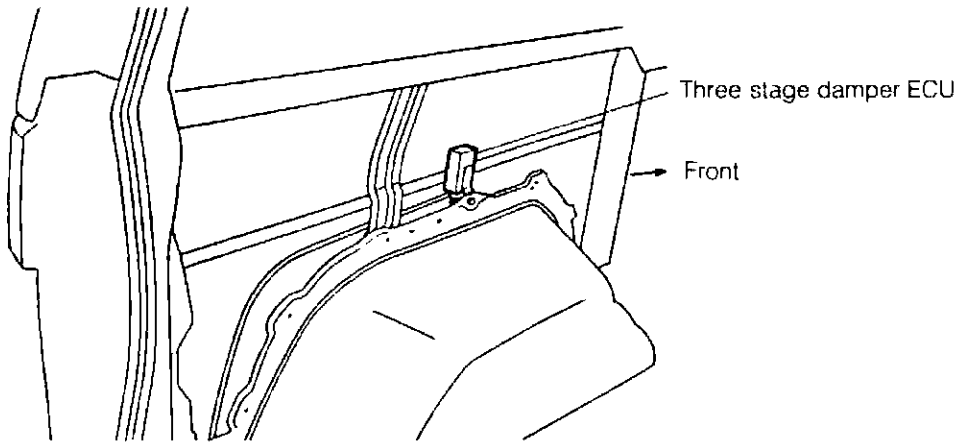
THREE-STAGE DAMPER SYSTEM

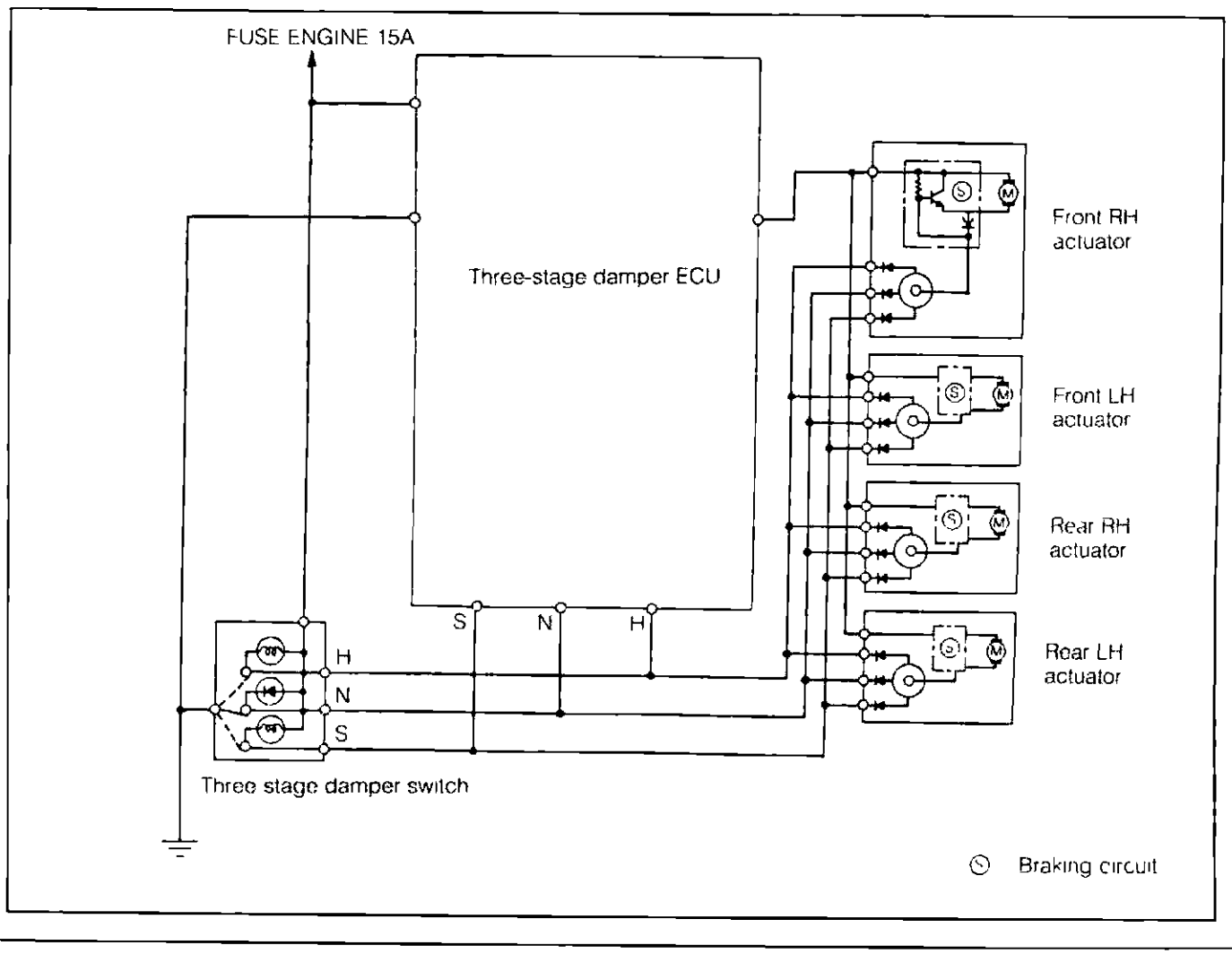
The actuator, computer and shock absorber of the three-stage damper have been modified

WRE9*-FS025

Three-stage damper ECU

The computer for the three-stage damper has been replaced by a more compact and lighter type computer As a result, the circuit diagram has been changed as indicated in the figure below





WRE9*-FS026

Damping operation of three-stag damper

The amount of the oil passing through pass-through hole provided at the control rod and shaft varies depending upon the rotation position of the control rod, thus switching the damping force

(1) Soft

The pass-through holes of the control rod and shaft are aligned with each other at two points. As a result, the oil flow rate increases, thereby weakening the damping force.

(2) Normal

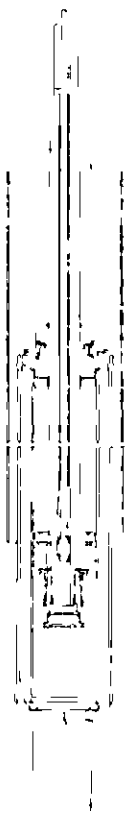
The pass through hole is formed at one point The damping force increases slightly

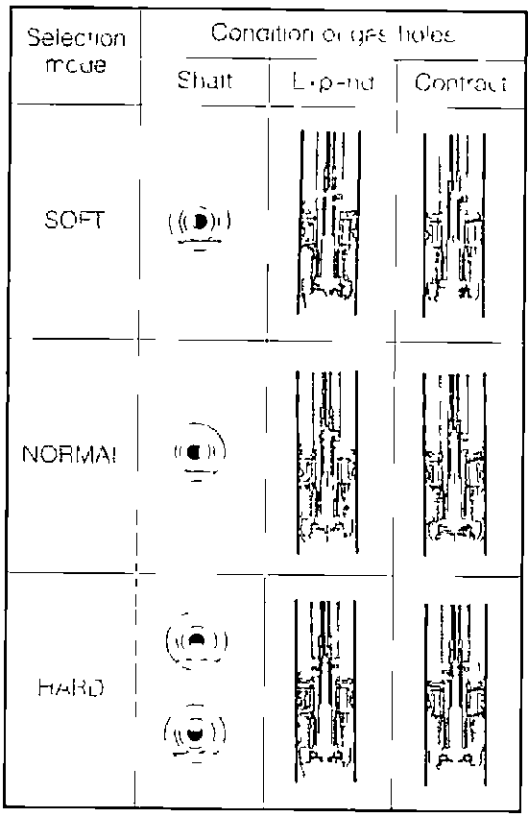
(3) Hard

All pass-through holes are shut off, resulting in further increased damping force

[Reference]

For the actuator operation and switch, see the section under "BODY ELECTRICAL SYSTEM".





Three-Stage Damper Specifications

Item	kind	Front	Rear
Damping force (at piston speed: Soft 0.3 m/s (1.0 ft/s), Hard 0.3 m/s (1.0 ft/s))	Rebound stroke kg (lb) Hard	182 ± 26 (401 ± 57)	180 ± 25 (397 ± 55)
	Rebound stroke kg (lb) Normal	140 ± 21 (309 ± 46)	135 ± 21 (298 ± 46)
	Rebound stroke kg (lb) Soft	118 ± 16 (260 ± 40)	117 ± 18 (258 ± 40)
	Compression stroke kg (lb) Hard	55 ± 11 (121 ± 24)	47 ± 10 (104 ± 22)
	Compression stroke kg (lb) Normal	41 ± 9 (90 ± 20)	40 ± 8 (88 ± 18)
	Compression stroke kg (lb) Soft	28 ± 6 (62 ± 13)	30 ± 7 (66 ± 15)

Control operation of three-stage damper

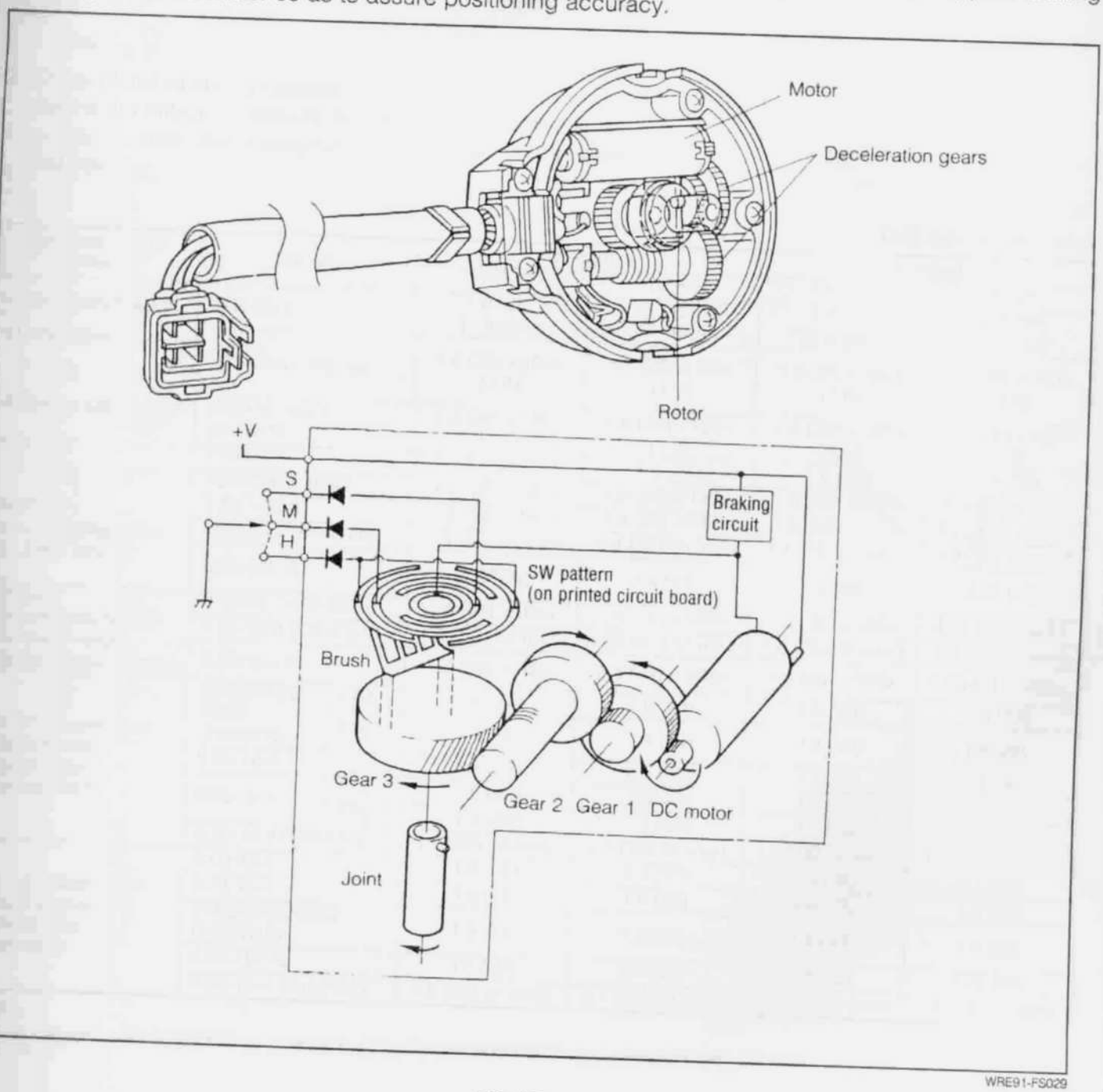
1. When the three-stage selection switch is operated, the actuator motor is energized. Then, the rotor begins its rotation, for it is interlocked with the motor by means of the gear.
2. When the rotor rotates to the specified position, the switch (contact points consisting of the pattern on the printed circuit board and the brush) is turned OFF. Consequently, the braking circuit operates and the rotation stops.
3. The rotor rotates the control rod located inside the shock absorber proper, thus switching the damping force.

If the actuator should be encountered with abnormal operation or continuous rotation, etc. should occur, the actuator energizing time is limited to four to seven seconds so as to protect the motor.

ACTUATOR

WRE91-FS028

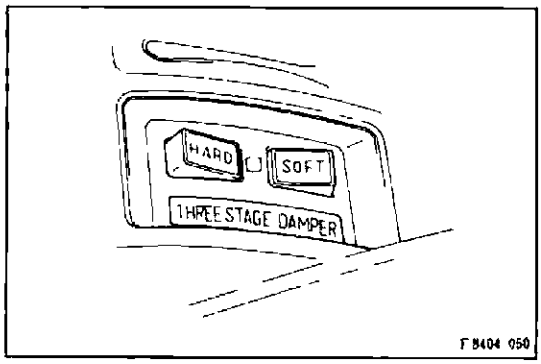
The following are components of the actuator: a DC motor, a rotation driving section consisting of three gears (final gear: worm gear), a brush which rotates as an integral part with the output shaft, a position detecting section which utilizes a switch pattern installed at the case side, a braking circuit which applies braking electrically to the DC motor so as to assure positioning accuracy.



WRE91-FS029

3-stage Damper Selector Switch

The damper selector switch is located in the center console box



WRE91 FS030

FRONT WHEEL ALIGNMENT ADJUSTMENT

PRELIMINARY CHECK ITEMS

1. Check of tire and tire wear
   - Ensure that all tires have the same, designated size and that they are made by the same manufacturer.
   - Ensure that there is no significant difference in wear between the tires at the right and left sides.

   Designated Tire Size:

6.00-16-4	215R15 100Q
6.00-16C-6	215SR15
6.50-16-4	215R15C-8
6.50-16C-8	215/80R-15 100Q
7.50-16-8	255/70R-15 108Q
215R15	H78-15-4

WRE91-FS031

2. Check of tire inflation pressure
   Set the tire inflation pressure to the specified value in accordance with the designated tires that have been mounted.

Unit: kgf/cm^2 (psi) <kPa>

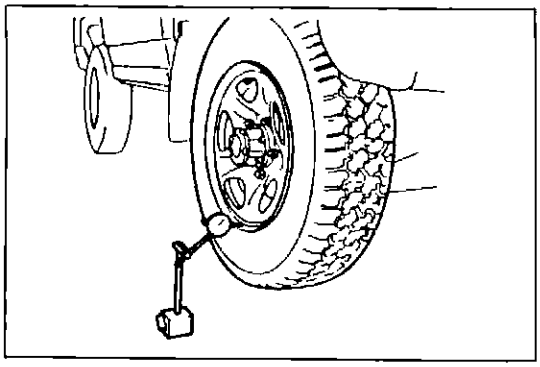
Specification and destination	Tire size		Unloaded		Loaded	
			FRONT	REAR	FRONT	REAR
General specification	6.00-16-4		1.6 (23) [1.8 (26)]	2.1 (30) [2.1 (30)]	1.6 (23) [1.8 (26)]	2.1 (30) [2.1 (30)]
EC specification	H78-15-4 (H78-15)		1.8 (26) <180> [1.8]	1.8 (26) <180> [1.8]	1.8 (26) <180> [1.8]	1.8 (26) <180> [1.8]
Australian specification	215R15 100Q (215R15)		1.8 (26) <180> [1.8]	1.8 (26) <180> [1.8]	1.8 (26) <180> [1.8]	1.8 (26) <180> [1.8]
	215SR15		1.8 (26)	1.8 (26)	1.8 (26)	1.8 (26)
	255/70R15 108Q		1.8 (26) <180>	1.8 (26) <180>	1.8 (26) <180>	1.8 (26) <180>
NOTE:	6.50-16C-8		1.8 (26) <180>	2.4 (34) <240>	1.8 (26) <180>	4.25 (61) <425>
< >: Australian spec.	6.50-16-4 (Sand tire)		1.6 (23) on road	2.1 (30) on road	1.1 (16) on sand	1.3 (18) on sand
[ ]: with winch	6.00-16C-6		1.8 (26)	2.4 (34)	1.8 (26)	3.25 (46)
Pick-up General specification EC specification Australian specification	215R15, 215R15C-8		1.8 (26) <180>	1.8 (26) <180>	1.8 (26) <180>	4.25 (61) <425>
	7.50-16-8 (Sand tire)		1.8 (26) on road	4.25 (61) on road	1.8 (26) on sand	2.4 (34) on sand
	6.50-16C-8		1.8 (26) <180>	2.4 (34) <240>	1.8 (26) <180>	4.25 (61) <425>
G.C.C. specification Saudi Arabian specification without winch	215/80R-15 100Q (215SR15)	F70	1.6 (23)	1.6 (23)	1.6 (23)	1.6 (23)
		F75	1.4 (20)	1.4 (20)	1.4 (20)	1.6 (23)
	6.00-16-4		1.6 (23)	2.1 (30)	1.6 (23)	2.1 (30)
	H78-15-4	F70	1.6 (23)	1.6 (23)	1.6 (23)	1.6 (23)
		F75	1.4 (20)	1.4 (20)	1.4 (20)	1.6 (23)
	6.50-16-4 (Sand tire)		1.6 (23) on road	2.1 (30) on road	1.1 (16) on sand	1.3 (18) on sand
G.C.C. specification Saudi Arabian specification with winch	6.00-16-4		1.8 (26)	2.1 (30)	1.8 (26)	2.1 (30)
	H78-15-4		1.6 (23)	1.6 (23)	1.6 (23)	1.6 (23)
	215/80R15 100Q (215SR15)		1.6 (23)	1.6 (23)	1.6 (23)	1.6 (23)
	6.00-16C-6		1.8 (26)	2.4 (34)	1.8 (26)	3.25 (46)
	6.50-16-4 (Sand tire)		1.6 (23) on road	2.1 (30) on road	1.1 (16) on sand	1.3 (18) on sand

NOTE:
The tire inflation pressure should be checked under the unloaded state and when the tires are cold.

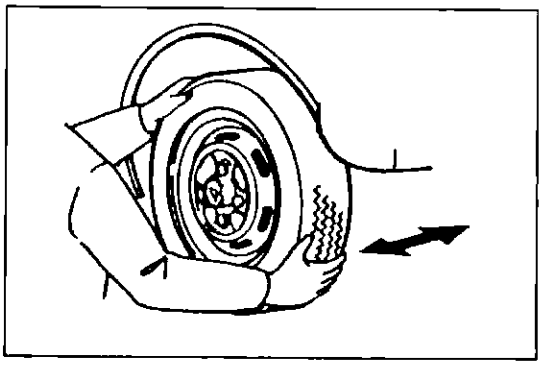
WRE91-FS032

3 Check of disc wheel and tire for runout
(1) Check the disc wheel for runout, using a dial gauge
Allowable Limit Mean value of runouts at front and rear sides not to exceed 1.0 mm.

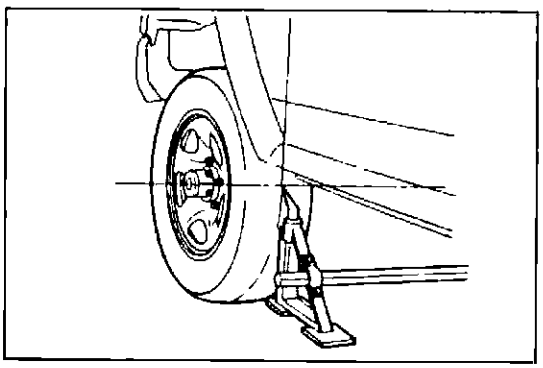
(2) Check the tire for runout using a dial gauge
Radial Runout Not to Exceed 1.4 mm.
Lateral Runout Not to Exceed 2.0 mm.



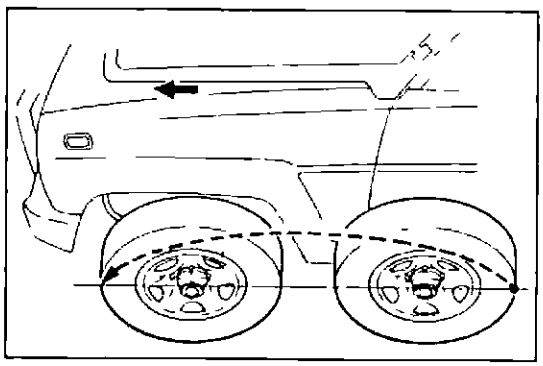
4 Check the suspension-related sections for bolt and nut tightness
5 Check that the front shock absorber operates correctly while rocking the vehicle body



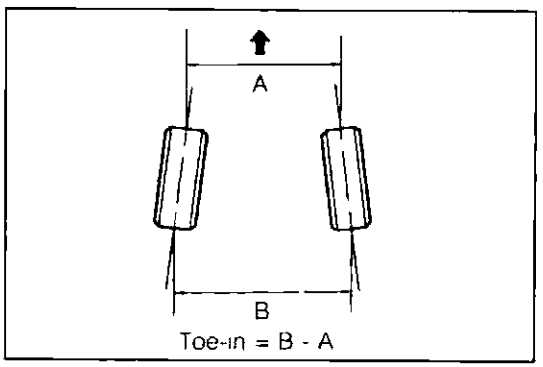
Toe-in check
1 Move the vehicle forward so that the front wheels becomes straight
2 Apply a toe-in gauge to the center point of the height at the rear side of each front wheel of the vehicle
3 Mark the tread center at the rear side of each front tire Measure the distance between the marks



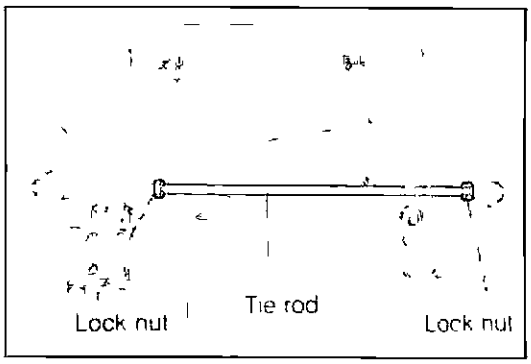
4 Move the vehicle slowly until the front wheels turn 180 degrees



5 Measure the distance between the marks at the front side of each front wheel Determine the toe-in amount by calculating the difference
Specified Value:
6.00-16, 6.50-16, 7.50-16-8: 0 - 8 mm
215R15, 215SR15, 215/80R15, 255/70R15, H78-15-4: –3 - 5 mm

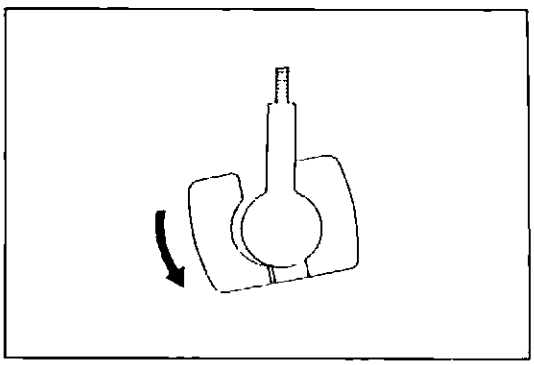


If the toe-in amount fails to conform to the specification, adjust the tie rod length by turning the tie rod tube, until the toe-in becomes within the specified value



NOTE:

- At this point, the adjustment should be conducted under the condition where the ball joint sockets at the sections "A" and "B" have been turned to such an extent that the sockets make contact with the ball stud shafts.

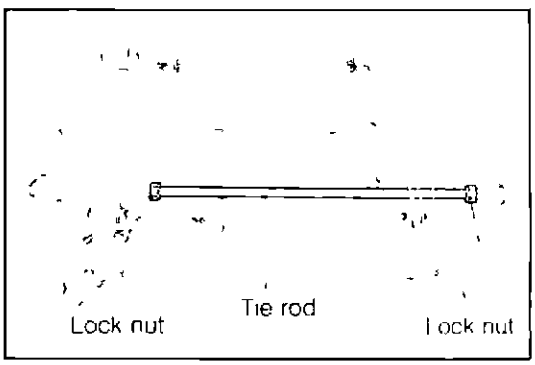


<Tie rod adjusting nut tightening procedure>

1 Turn the tie rod ends, until the ball joint sockets at the tie rod ends "A" and "B" make contact with the ball stud shafts

2 While maintaining the condition under the step 1, temporarily tighten the lock nuts at both sides to the specified tightening torque

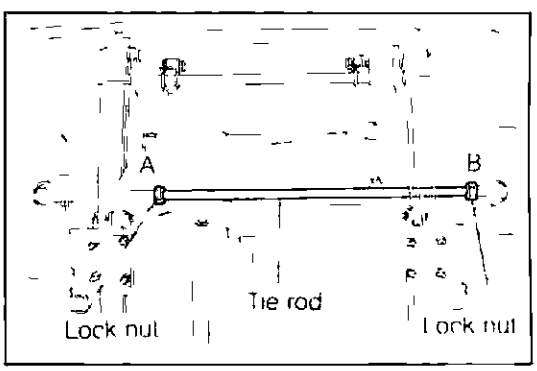
Tightening Torque:
19.6 - 29.4 N m (2.0 - 3.0 kgf-m, 14.5 - 21.7 ft-lb)



3 Alternately tighten the lock nut to the specified torque, twice each time, following the procedure given below

Tightening Sequence: A → B → A → B or
B → A → B → A

Tightening Torque:
118 - 167 N m (12 - 17 kgf-m, 87 - 123 ft-lb)



Check of sideslip

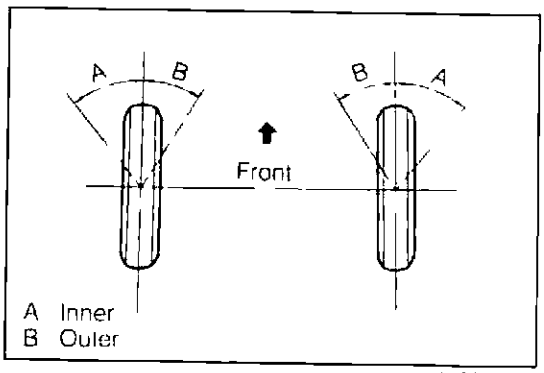
Ensure that the sideslip amount is within the specified range, using a sideslip tester

Specified Value: 0 ± 3 mm

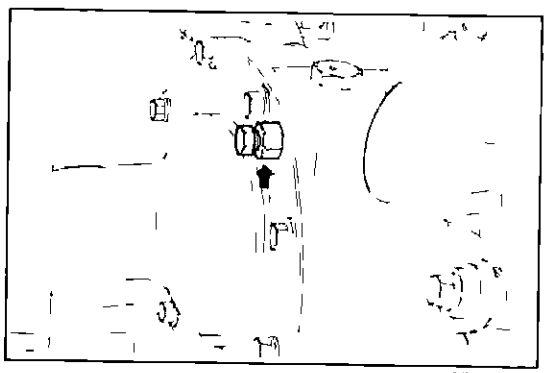
Check of wheel turning angle

1 Place the wheel on the turning radius gauge
2 Ensure that the wheel turning angle is within the specified value
Specified Value.

Mounted tire	Inner turning angle	Outer turning angle
Tires other than those listed below	30°	28°
H78 15-4PR 215SR15 255/70R15	28°	26°



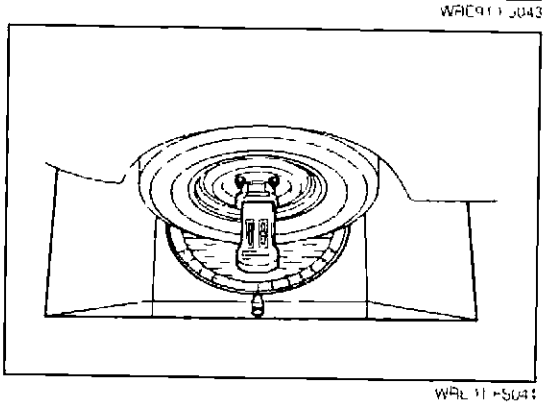
3 If the measured turning angle fails to conform to the specified value, adjust the wheel turning angle by means of the knuckle stopper bolt
Stopper Bolt Lock Nut Tightening Torque:
39.2 - 53.9 N·m (4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)



Check of camber, caster and kingpin inclination angles

The camber, caster and kingpin inclination angles are unadjustable factors. However, if they should show unusual values, carry out a total inspection on the front ends. Those front end defects, such as a bend front axle housing, defective spring seats and flattened front springs, will affect the camber and caster.

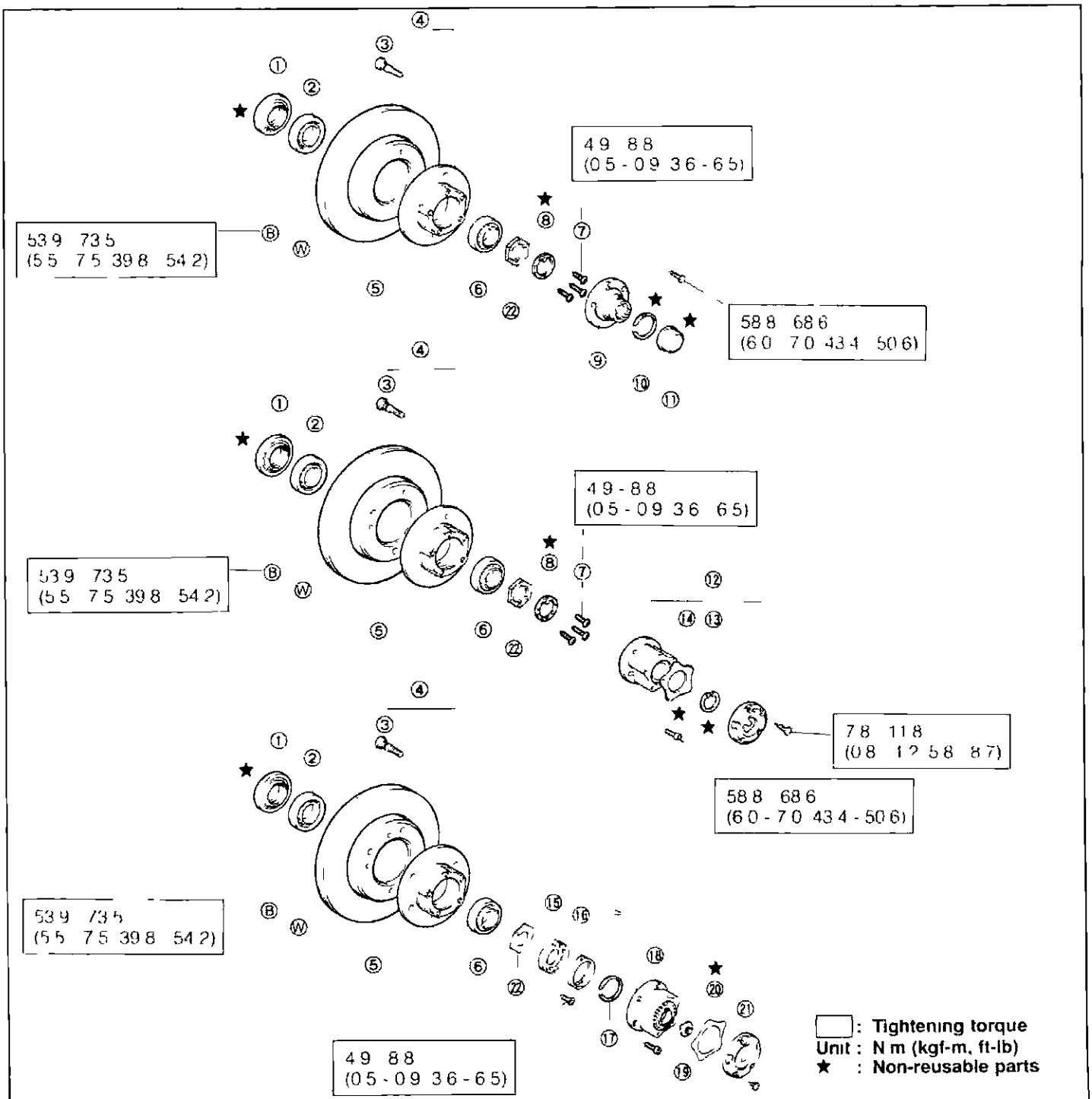
Camber	1° 00 ± 1°
Caster	1° 30 ± 1°
Kingpin inclination angle	9° 30 ± 1°



If the test vehicle exhibits some of the aforesaid defects, it may be impossible to adjust the front wheel alignment. Therefore, it is mandatory to perform the checks prior to the front wheel alignment adjustment.

FRONT AXLE HUB

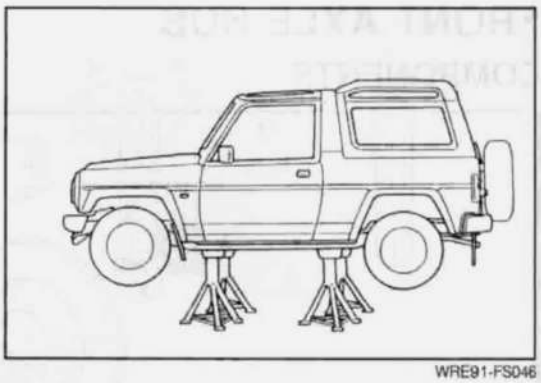
COMPONENTS



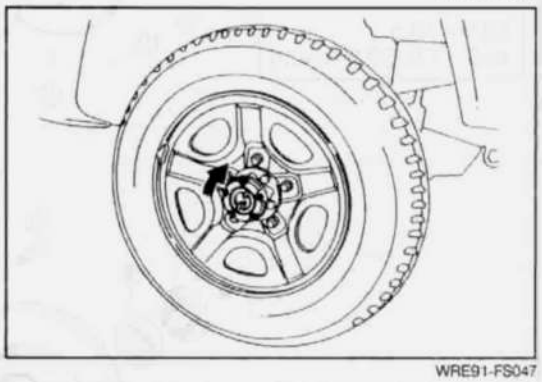
① Type "T" oil seal
② Tapered roller inner bearing
③ Hub bolt
④ Front axle hub
⑤ Front disc
⑥ Tapered roller outer bearing
⑦ Screw (Torx T20)
⑧ Front axle bearing lock nut lock
⑨ Axle outer shaft flange
⑩ Shaft snap ring
⑪ Front hub grease cap
⑫ Manual free wheel hub assembly
⑬ Shaft snap ring (for free wheel hub)
⑭ Free wheel hub gasket
⑮ Brake drum
⑯ Brake shoe sub assembly
⑰ Brake shoe snap ring
⑱ Automatic free wheel hub assembly
⑲ Bolt (with washer)
⑳ Gasket
㉑ Hub cover
㉒ Lock nut

CHECK OF FREE WHEEL HUB OPERATION

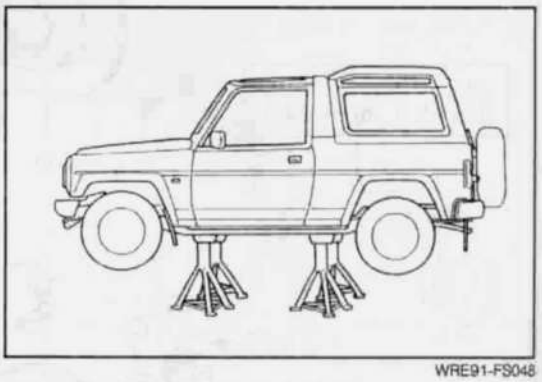
1. Check of manual free wheel hub
   (1) Jack up the vehicle and support it with safety stands. (See the GI section.)


WRE91-FS046

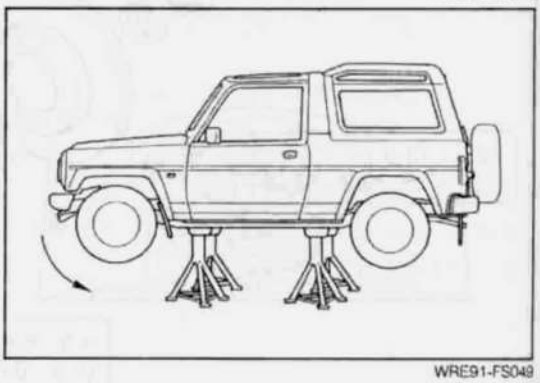
   (2) Set the handle of the free wheel hub to the "LOCK" position.
   (3) Turn the tire several times. At this time, ensure that the tire at the opposite side and/or the front propeller shaft is turning.
   If not, replace the free wheel hub.
   (4) Set the handle of the free wheel hub to the "FREE" position.
   (5) Turn the tire several times. At this time, ensure that the tire at the opposite side and/or the propeller shaft is not turning.
   (6) Jack down the vehicle.


WRE91-FS047

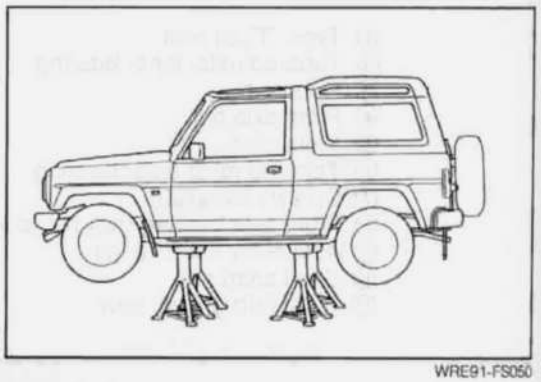
2. Check of automatic free wheel hub
   (1) Jack up the vehicle and support it with safety stands. (See the GI section.)


WRE91-FS048

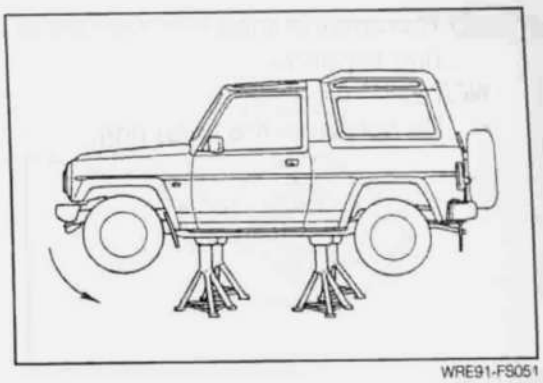
   (2) Shift the shift lever to the 4H position.
   (3) Start the engine. When the driving force is applied to the wheel, ensure that the front wheels turn.
   If not, replace the free wheel hub.


WRE91-FS049

   (4) Shift the shift lever to the 2H position.
   (5) While slightly applying the brake, apply the driving force to the wheel in a direction opposite to the former direction in the step (3). In this way, turn the wheel more than three times.

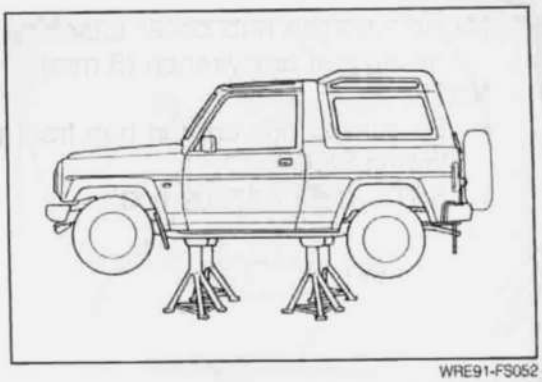

WRE91-FS050

(6) Stop the engine.
(7) While turning the wheel by hands, ensure that the tire at the opposite side and/or the propeller shaft is not turning.
If not, replace the free wheel hub.

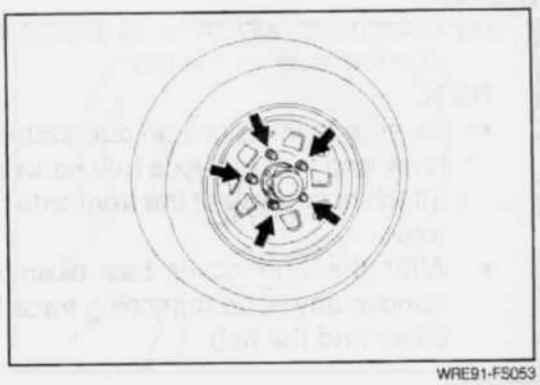

WRE91-FS051

REMOVAL/DISASSEMBLY OF FRONT AXLE HUB

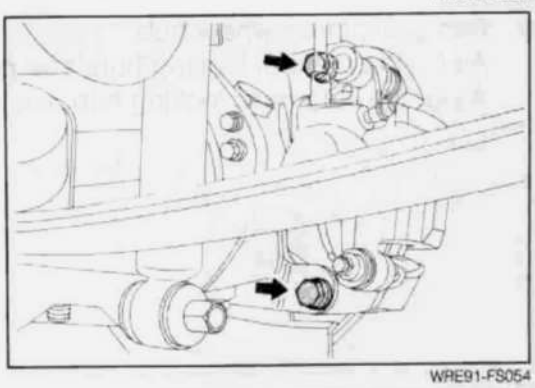
1. Jack up the vehicle and support it with safety stands. (See the GI section.)


WRE91-FS052

2. Remove the front wheel.

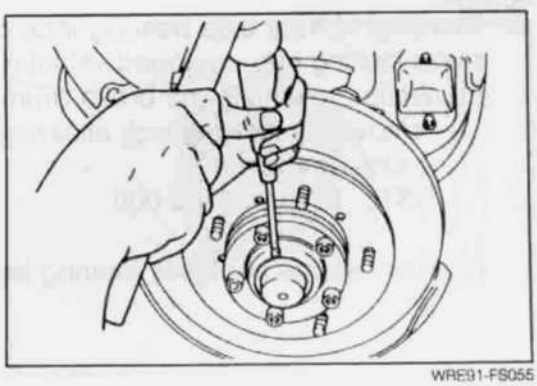

WRE91-FS053

3. Remove the brake mounting support attaching bolts. Remove the brake mounting support together with calipers. Suspend the brake mounting support from the upper frame in such a way that no undue force is applied to the brake hose.


WRE91-FS054

4. Removal of hub cap (rigid type only)
(1) Remove the hub cap by lightly and evenly driving a chisel or the like into between the hub cap and the cover.

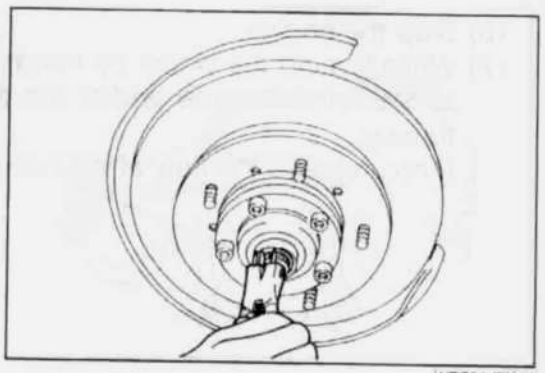
NOTE:
- Do not reuse the hub cap.
- Be very careful not to damage the hub cap during the removal.


WRE91-FS055

(2) Remove the snap ring from the drive shaft, using a snap ring expander.

NOTE:

- Do not reuse the snap ring.

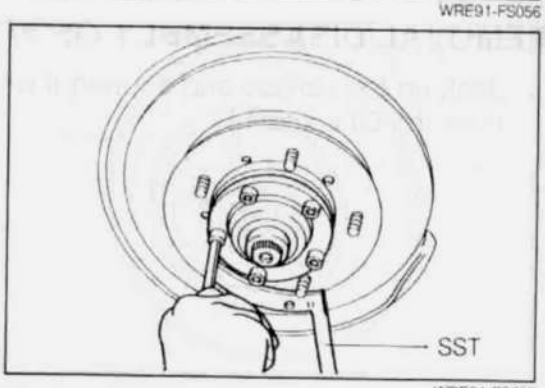


WRE91-FS056

(3) Remove the hub cover attaching bolts by means of a hexagonal box wrench (8 mm).

NOTE:

- Be sure to prevent the hub from turning, using the following SST.
  SST: 09511-87202-000

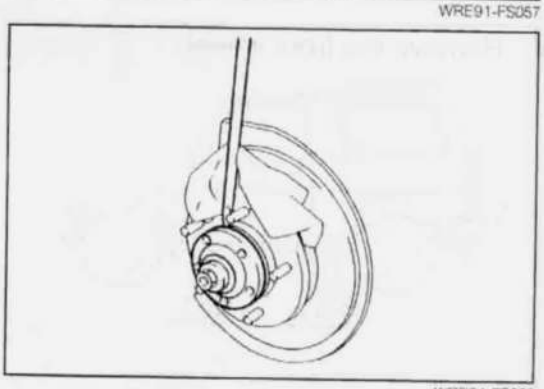


WRE91-FS057

(4) Detach the hub cover by prying it off evenly by means of a tire lever or the like.

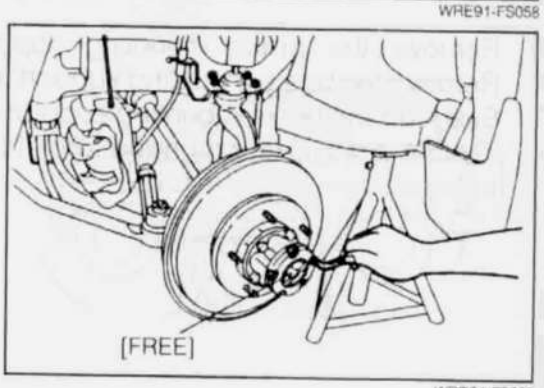
NOTE:

- Be sure to interpose an adequate cloth between the tire lever and the front axle hub so as not to damage the tire attaching surface of the front axle hub as well as the disc rotor.
- After the hub cover has been removed, completely remove any bond remaining trace from between the hub cover and the hub.



WRE91-FS058

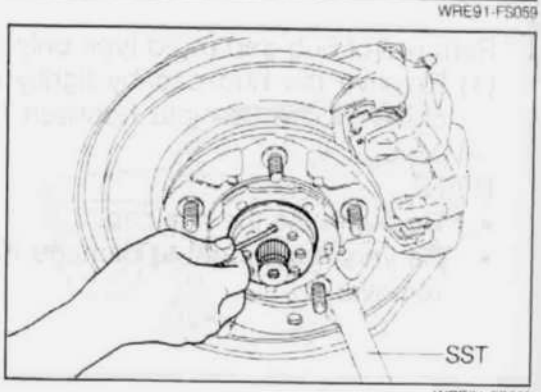
5. Removal of free wheel hub
   As for the manual locking hub, see page FS–34 to FS–36.
   As for the automatic locking hub, see page FS–39 to FS–42.



WRE91-FS059

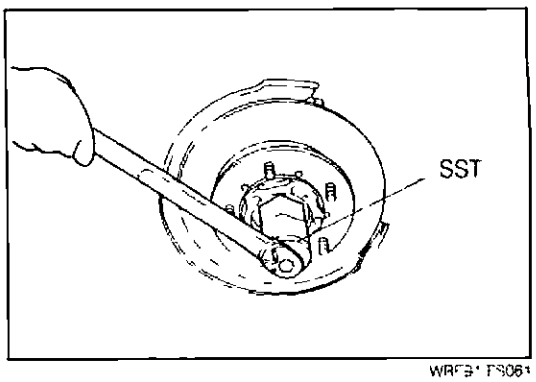
6. Removal of front axle bearing lock nut lock (except automatic locking hub-equipped vehicle)
   (1) While preventing the brake drum from turning by SST, remove the lock nut lock attaching screws by means of a torx® wrench.
   SST: 09511-87202-000

   (2) Remove the front axle bearing lock nut lock.

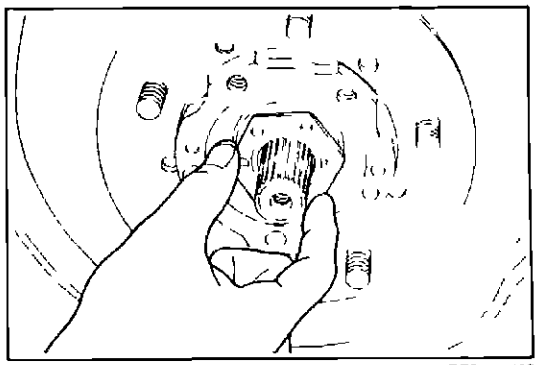


WRE91-FS060

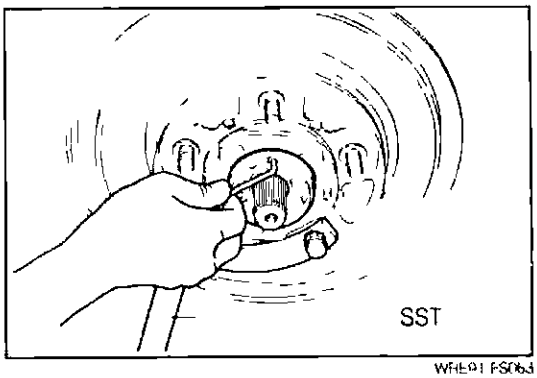
(3) Remove the lock nut, using the following SSTs
SST 09607-60020-000



WRE91 FS061

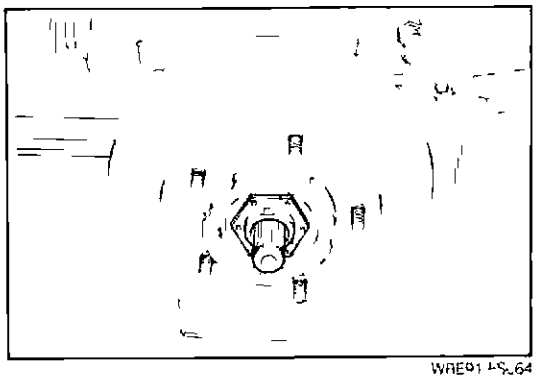

WRE91 FS062

7 Removal of lock nut (Automatic locking hub-equipped vehicle only)
(1) While preventing the brake disc from turning, remove the brake drum by means of a torx wrench For this operation, use the following SST
SST: 09511-87202-000

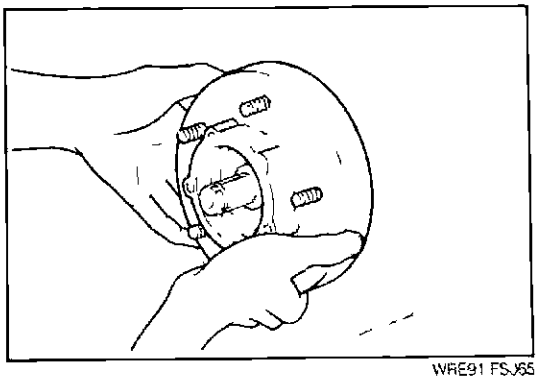


WRE91 FS063

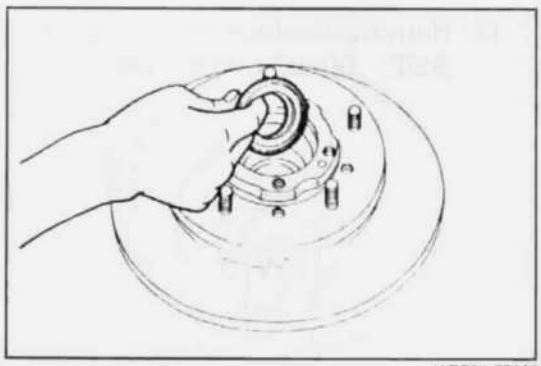
(2) Remove the lock nut, using the following SSTs.
SST: 09607-60020-000


WRE91 FS064

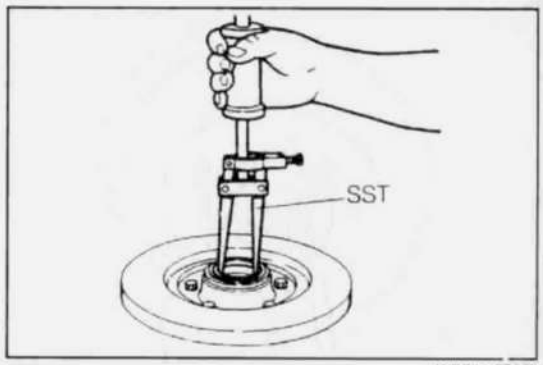
8 Remove the front axle hub
NOTE:
- Be very careful not to drop the outer bearing and hub during the removal.


WRE91 FS065

9. Remove the tapered roller outer bearing (outer side) from the hub.

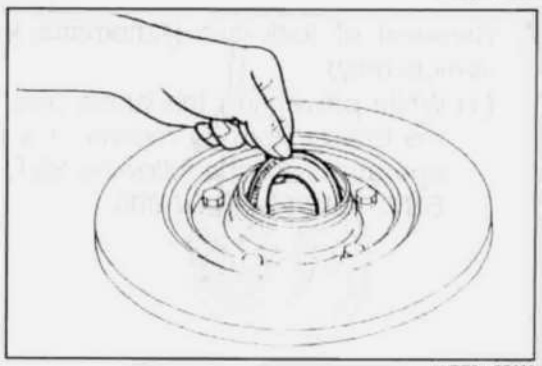

WRE91-FS066

10. Remove the type T oil seal, using the following SST.
    SST: 09308-00010-000

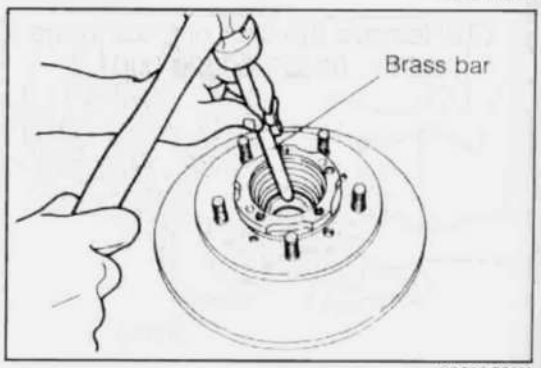


WRE91-FS067

11. Remove the tapered roller bearing (inner side).

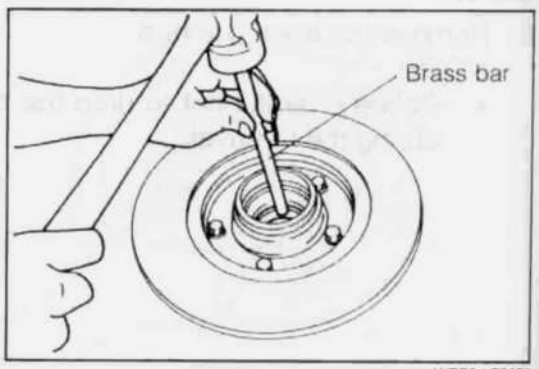

WRE91-FS068

12. Pull out the inner race (inner side) of the tapered roller bearing by evenly tapping it by means of a brass bar or the like.
    NOTE:
    - This operation is required only when the bearing is replaced.



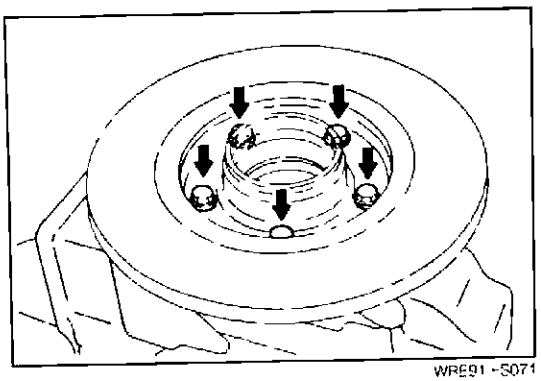
WRE91-FS069

13. Pull out the inner race (outer side) of the tapered roller bearing by evenly tapping a brass bar or the like.
    NOTE:
    - This operation is required only when the bearing is replaced.

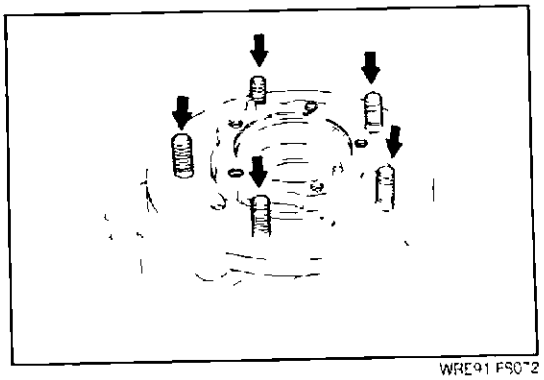


WRE91-FS070

14 Remove the brake disc by removing the brake disc attaching bolts from the front axle hub


WRE91-S071

15 Drive out the hub bolt from the front axle hub by means of a plastic hammer or the like
NOTE:
- **Attach the nut in place so that the threaded portion may not be damaged.**

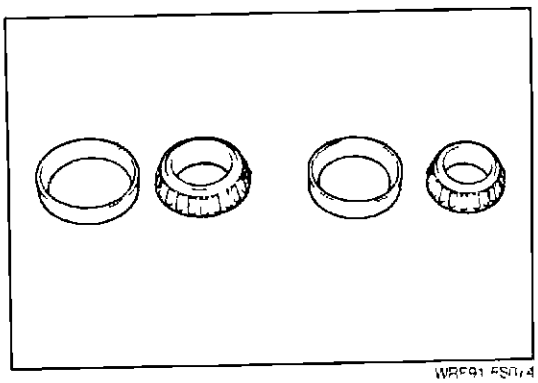

WRE91FS072

INSPECTION

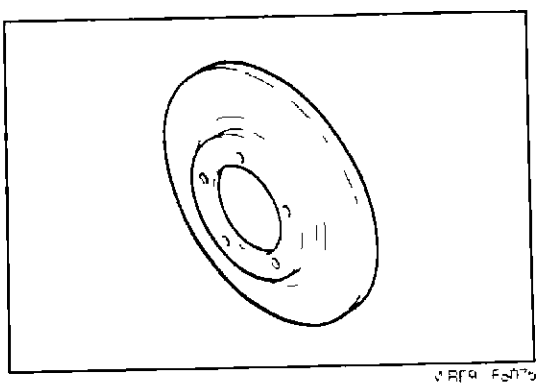
Wash the disassembled parts and dry them with compressed air, except for the free wheel hub
As for the brake discs, degrease them with cleaning solvent, such as alcohol.

WRE91FS073

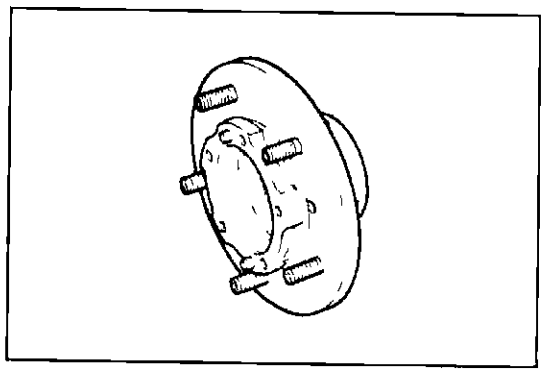
1 Ensure that the inner and outer tapered roller bearings exhibit no damage, such as wear and scratches
If they exhibit damage, replace the defective bearings
NOTE:
- **Be sure to handle the inner race and outer race as a set.**


WRE91FS074

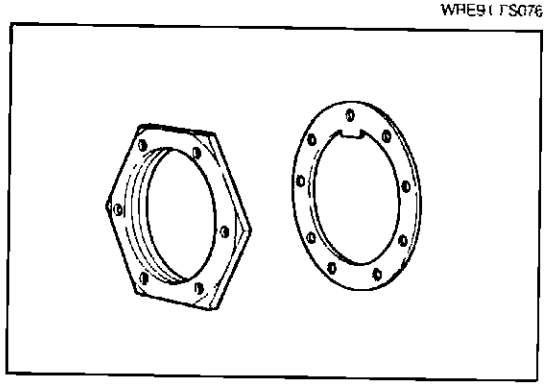
2 Ensure that the brake disc exhibits no damage, such as wear, cracks and scratches
If any damage is present, replace the brake disc


WRE91FS075

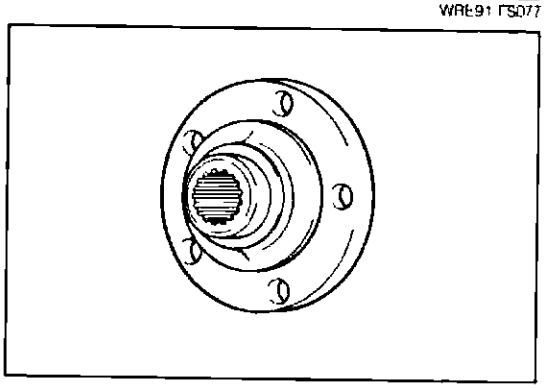
3 Ensure that the front axle hub exhibits no damage, such as wear, cracks and scratches
If any damage is present, replace the front axle hub


WRE91FS076

4 Ensure that lock nut and front axle bearing lock nut lock exhibits no damage
If any damage is present, replace the lock nut and front axle bearing lock nut lock

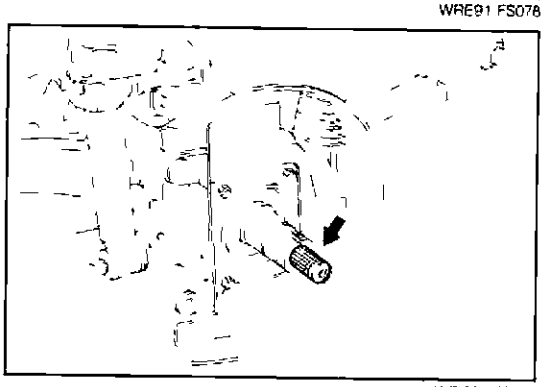

WRE91FS077

5 Ensure that the hub cover exhibits no damage, such as wear and cracks
If any damage is present, replace the hub cover
If the spline section exhibits damage, check the spline at the drive shaft side


WRE91FS078

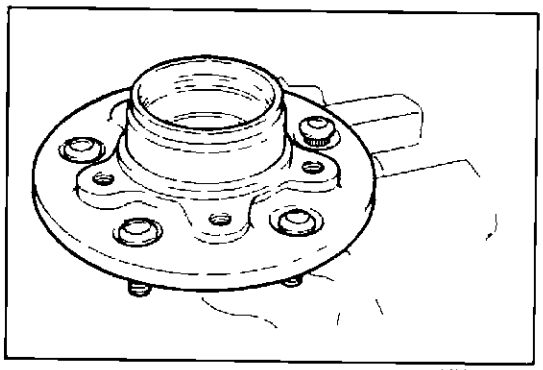
6 Ensure that the drive shaft spline section exhibits no damage, such as wear and cracks
If any damage is present, replace the drive shaft
(See page FS–46)

7 Check of free wheel hub
- As for the manual locking hub, see page FS–36
- As for the automatic locking hub, see page FS–42


WRE91FS079

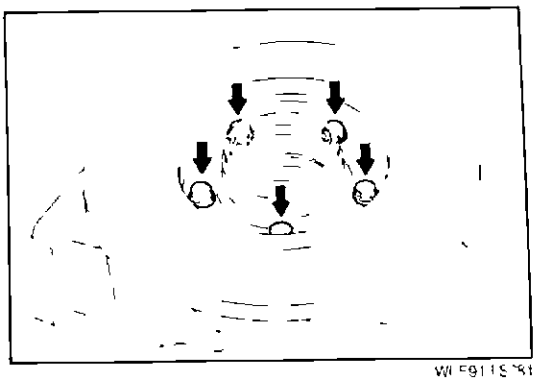
ASSEMBLY OF FRONT AXLE HUB

1 Drive the hub bolt into the front axle hub by means of a plastic hammer
NOTE:
- **Be sure to align the cut-out section of the hub bolt with the hub.**


WRE91FS080

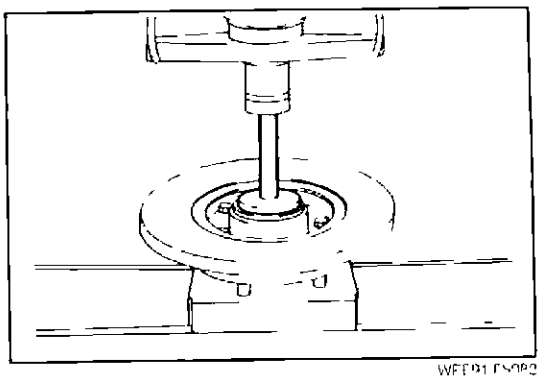
2 Install the brake disc to the front axle hub. Evenly tighten the attaching bolts to the specified torque over two or three stages.

Tightening Torque: 53.9 - 73.5 N·m (5.5 - 7.5 kgf-m, 39.8 - 54.2 ft-lb)



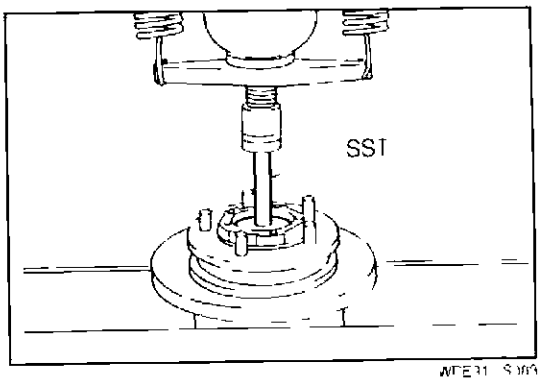
3 Install the outer race (inner side) of the tapered roller bearing, using the following SST.

SST: 09608-20011-000



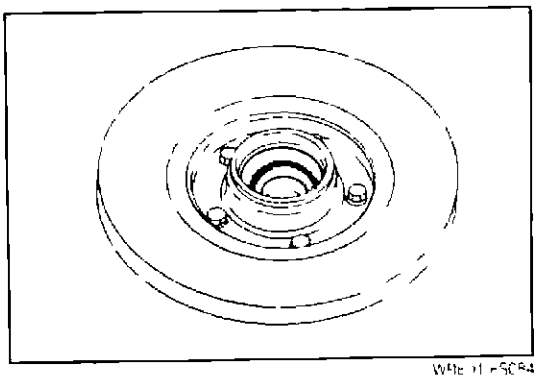
4 Install the outer race (outer side) of the tapered roller bearing, using the following SST.

SST: 09608-20011-000



5 Fill the specified amount of lithium-based MP grease to a space between the outer races of the inner and outer bearings.

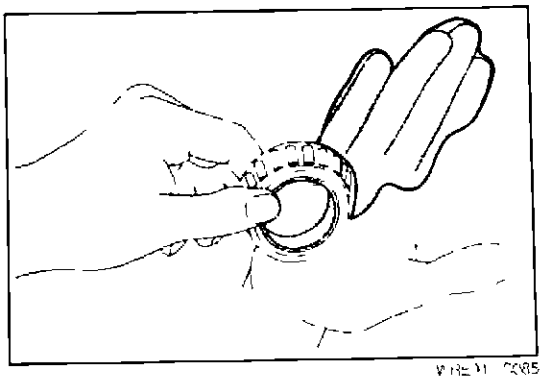
Filling Amount: 66 - 67 grams



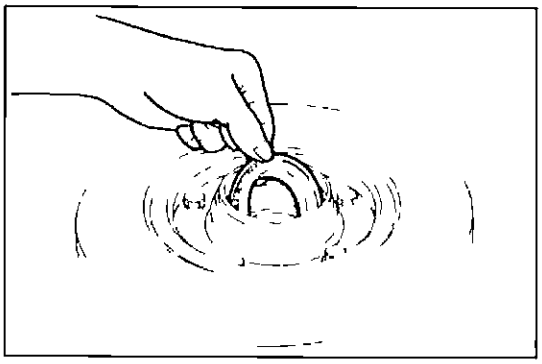
6 Fill lithium-based MP grease to the inner and outer bearings.

NOTE:

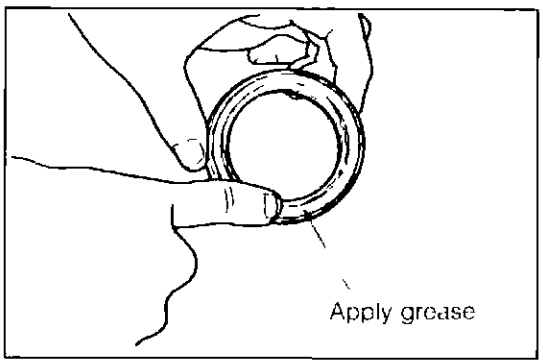
- Fill grease to a space between the inner race and the bearing guide, until the grease oozes from the inside of the bearing guide. Then, apply grease to the surface.



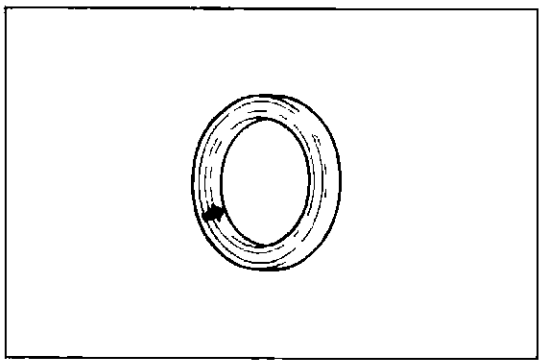
7 Install the inner bearing to the hub



8 Fill the specified amount of lithium-based MP grease to the pack cide of the oil seal lip section



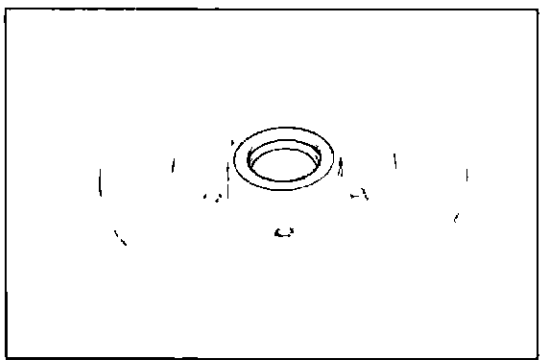
9 Apply lithium-based MP grease to the lip section of the oil seal



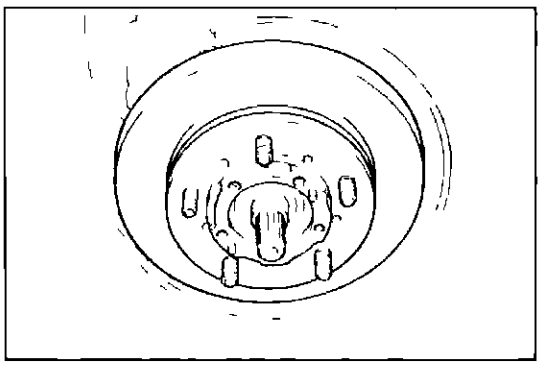
10 Press the oil seal to the hub edge surface using a plastic hammer or the like

NOTE:

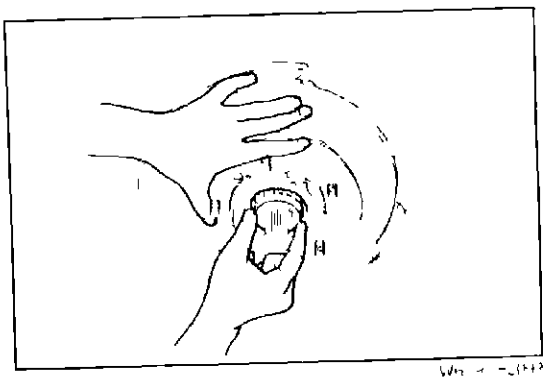
- Care must be exercised to ensure that the oil seal will not tilt during the press operation.



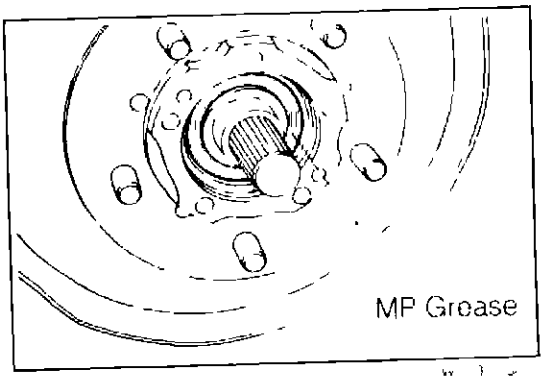
11 Install the front axle hub to the steering knuckle



12 Insert the outer bearing into the front axle hub



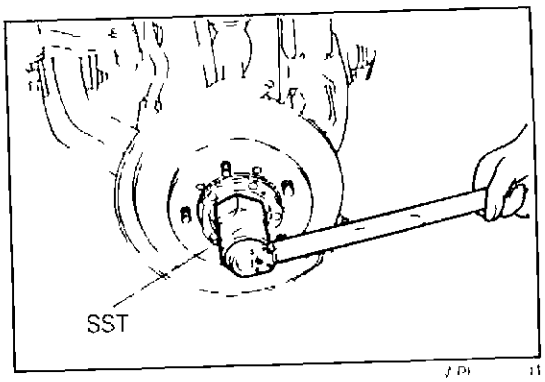
13 Fill lithium-based MP grease to the outer bearing



14 Tighten the lock nut to the specified torque, using the following SST Then back off the lock nut one sixth turn

SST 09607-60020-000

Tightening Torque. 98 0 - 147 N m
(10 - 15 kgf-m, 72 0 - 109 ft-lb)



15 Rotate the axle hub two or three turns so that the axle hub may be bedded in

16 Adjust the lock nut so that the starting torque may conform to the specified value

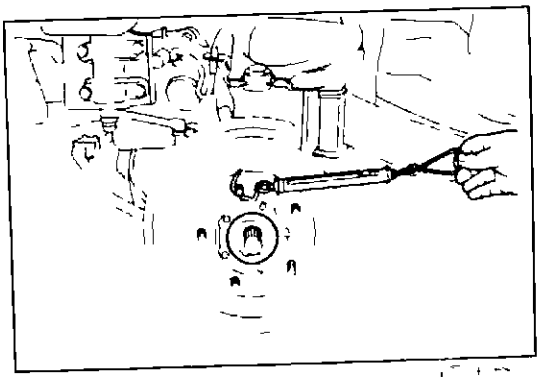
Starting Load. 1.4 - 3.6 kgf

[Reference]

Starting Torque:

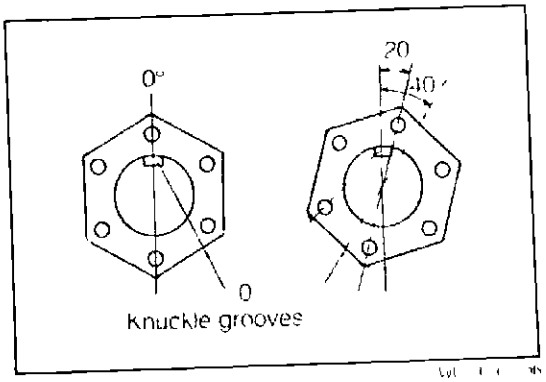
0.98 - 2.45 N m

(10 - 25 kgf-cm, 8.7 - 21.7 inch-lb)

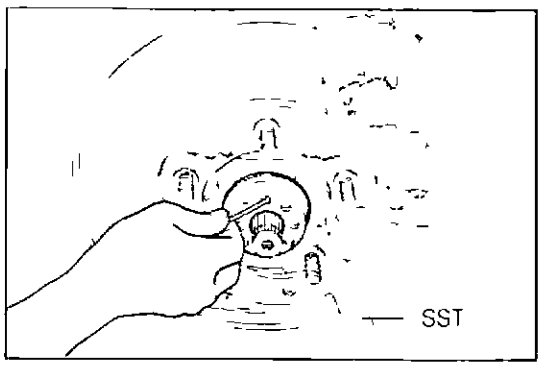


NOTE:

- Adjust the hub nut in such a way that the hub nut position comes at the position indicated in the right figure after completion of the adjustment.

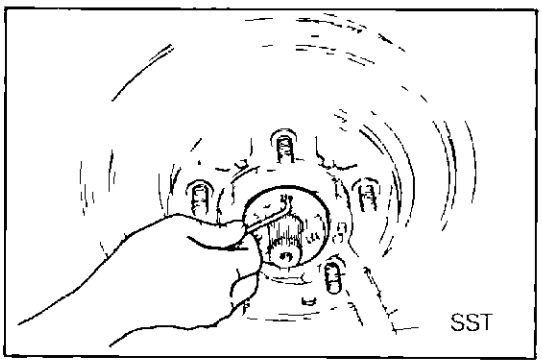


17 Installation of front axle bearing lock nut lock (except automatic locking hub equipped vehicle)
(1) Install the front axle bearing lock nut lock with three attaching screw
(2) Tighten the attaching screws to the specified torque, using the torx® wrench
Tightening Torque: 4.9 - 8.8 N·m
(0.5 - 0.9 kgf-m, 3.6 - 6.5 ft-lb)



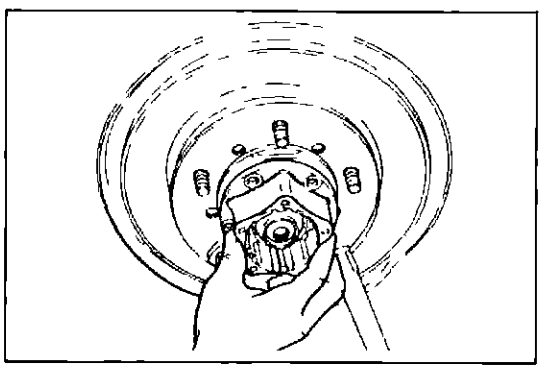
WRE91FS097

18 Install the brake drum and tighten the attaching screws (torque screws) to the specified torque using the torx® wrench (Automatic free wheel hub-equipped vehicle only)
Tightening Torque: 4.9 - 8.8 N·m
(0.5 - 0.9 kgf-m, 3.6 - 6.5 ft-lb)

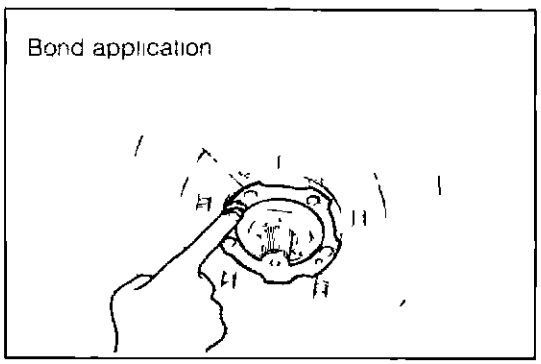


WRE91FS100

19 Installation of free wheel hub
(Free wheel hub-equipped vehicle only)
Manual locking hub
See page FS–37 to FS–39.
Automatic locking hub
See page FS–42 to FS–45.

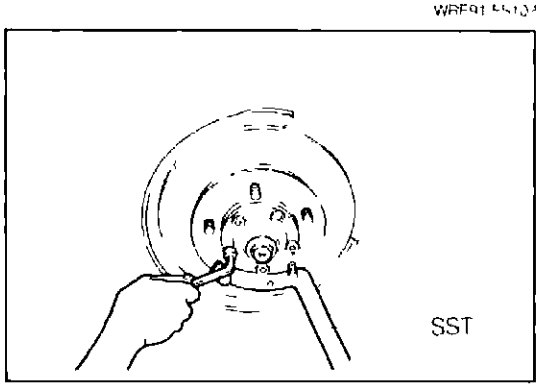

WRE91FS101

20 Installation of hub cover
Thinly and evenly apply the Daihatsu Bond No 4 to the edge surface of the hub



WRE91FS102

21 Install the hub cover. Tighten the attaching bolts evenly to the specified torque over two or three stages
Tightening Torque. 58.8 - 68.6 N·m
(6.0 - 7.0 kgf-m, 43.4 - 50.6 ft-lb)

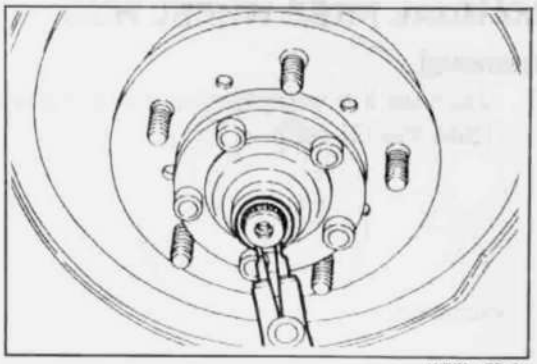


WRE91FS103

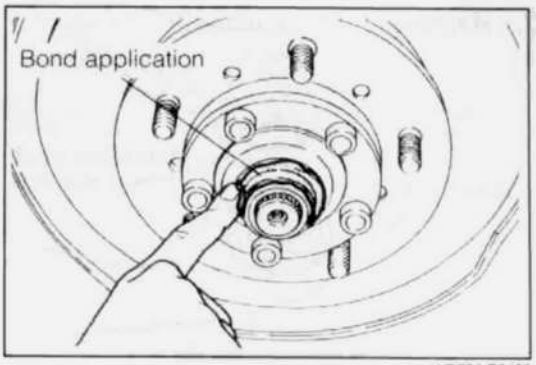
NOTE:
- Use a hexagonal box wrench for the bolt tightening.
- Wipe off any oozed bond.
- Prevent the hub from turning, using the following SST.
SST 09511-87202-000

- Prior to the bolt tightening, be sure to apply engine oil to the threaded portion of each bolt.

22. Install a new snap ring to the groove section of the drive shaft.
NOTE:
- Do not reuse the snap ring.

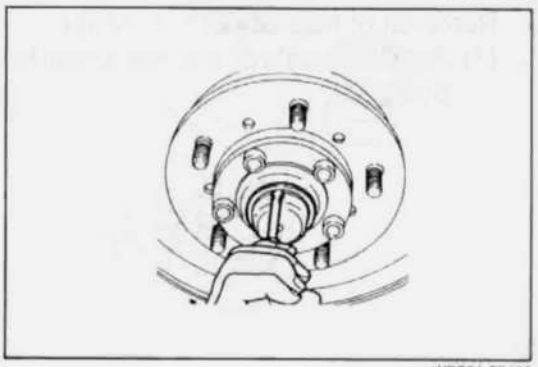

WRE91-FS104

23. Apply the Daihatsu Bond No.4 to the hub cap attaching surface of the hub cover.

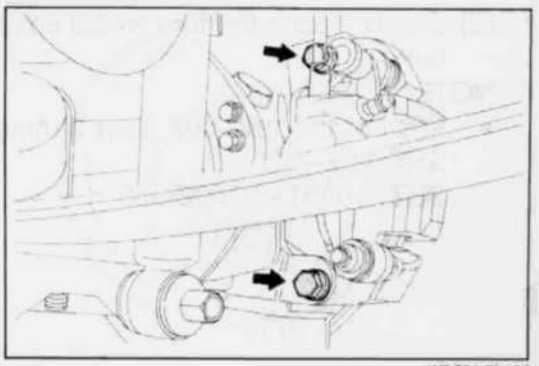


WRE91-FS105

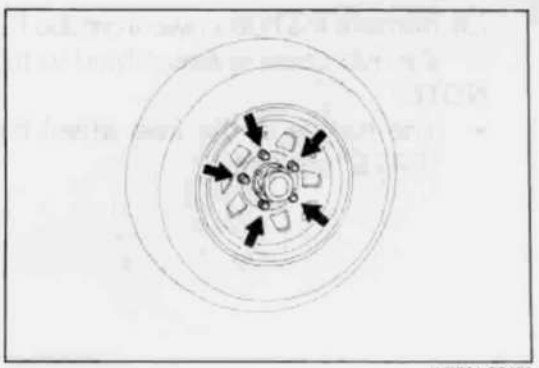
24. Press a new hub cap, using a screwdriver or the like.
NOTE:
- Do not reuse the hub cap.
- Wipe off any bond that has oozed out.


WRE91-FS106

25. Install the brake mounting support together with calipers to the steering knuckle.
Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9.0 kgf-m, 50.6 - 65.1 ft-lb)


WRE91-FS107

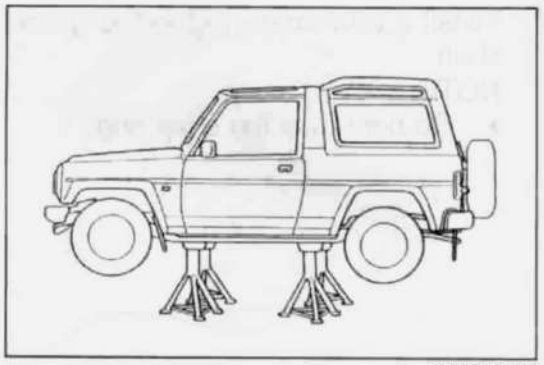
26. Install the front wheel.


WRE91-FS108

MANUAL FREE WHEEL HUB

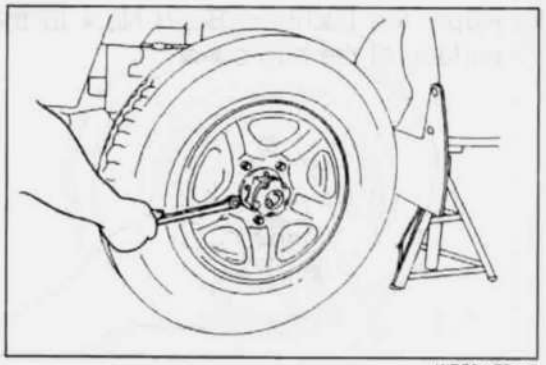
Removal

1. Jack up the vehicle and support it with safety stands. (See the GI section.)



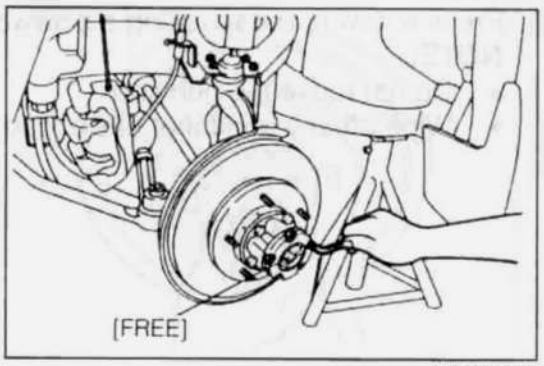
WRE91-FS109

2. Remove the front wheel.



WRE91-FS110

3. Removal of free wheel hub cover
   (1) Set the handle of the free wheel hub cover to the "FREE" position.

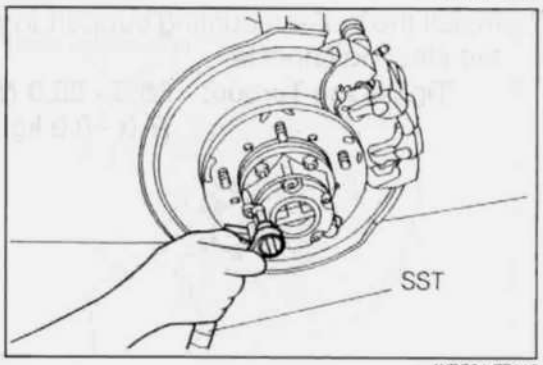


WRE91-FS111

   (2) Evenly loosen the free wheel cover attaching bolts and remove them.

   NOTE:

   - Prevent the hub bolt from turning, using the following SST.
     SST: 09511-87202-000

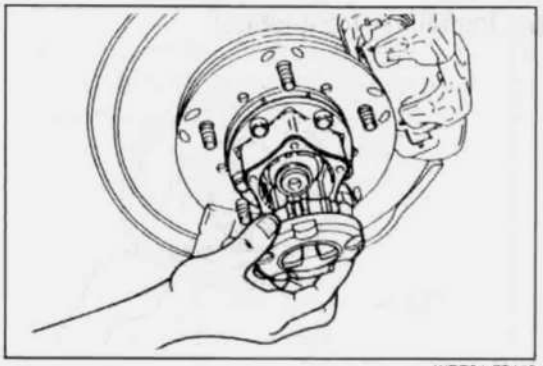


WRE91-FS112

   (3) Remove the hub cover from the hub body in a state that the hub cover is assembled to the clutch and spring.

   NOTE:

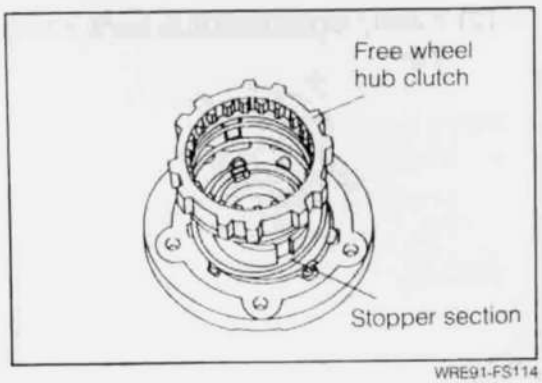
   - The handle of the free wheel cover should be at the "FREE" position.



WRE91-FS113

4. Removal of clutch subassembly
   (1) With the handle of the hub cover set to the "FREE" position, turn the clutch subassembly, until the clutch stops, while pushing the clutch subassembly against the cover side.

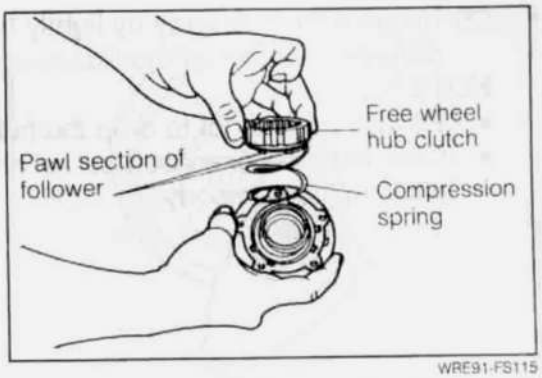
   NOTE:
   - Be very careful not to damage the compression spring and follower by applying excessive force during this operation.



WRE91-FS114

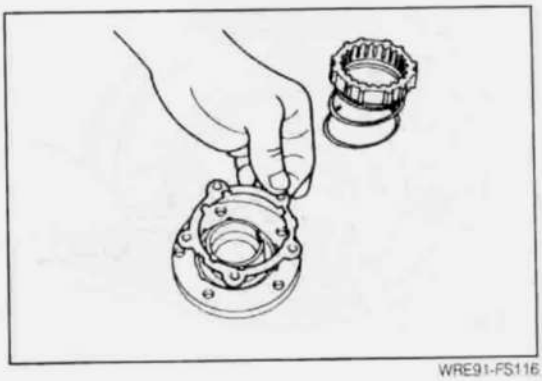
   (2) Push the clutch toward the cover side further. Remove the pawl section of the follower from the stopper section of the hub cover handle. Then, remove the clutch subassembly from the cover.

   NOTE:
   - Do not remove the compression spring from the follower.



WRE91-FS115

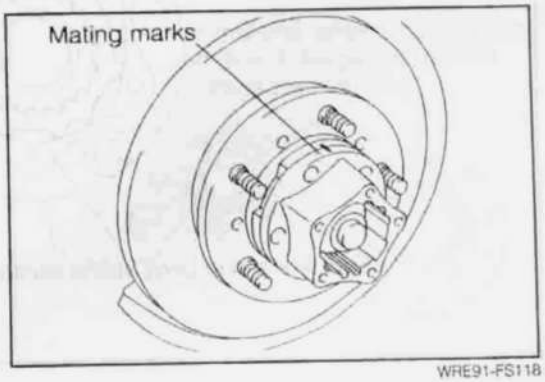
   (3) Remove the gasket.


WRE91-FS116

5. Remove the snap ring from the drive shaft.

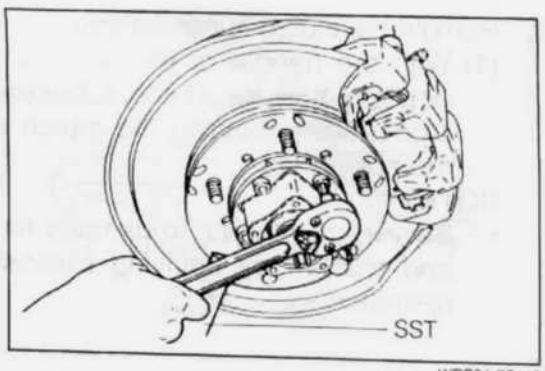

WRE91-FS117

6. Removal of hub body
   (1) Put mating marks at a point between the hub body and the hub by means of a marker pen or the like.



WRE91-FS118

(2) Evenly loosen the hub body attaching bolts and remove them.

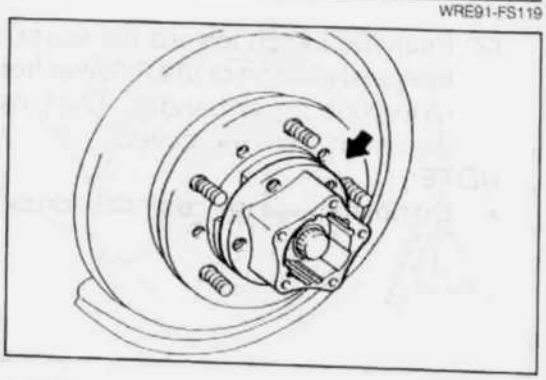


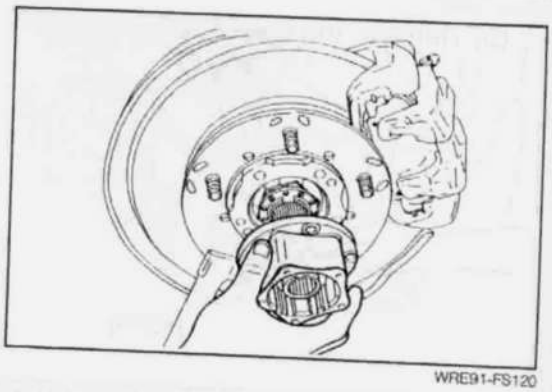
WRE91-FS119

(3) Remove the hub body by lightly tapping it by means of a plastic hammer or the like.

NOTE:

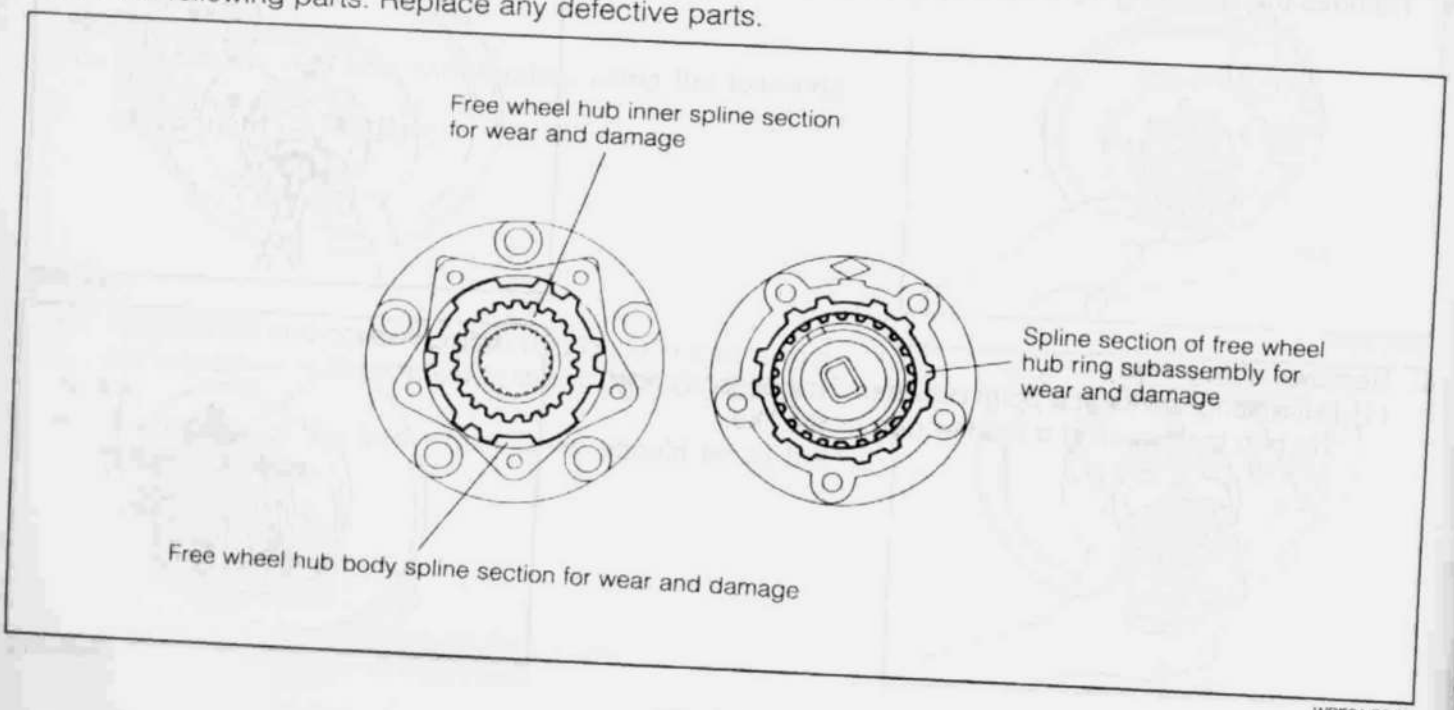
- Be very careful not to drop the hub body.
- Care must be exercised so as not to apply strong impacts to the hub body.




WRE91-FS120

Inspection

Check the following parts. Replace any defective parts.

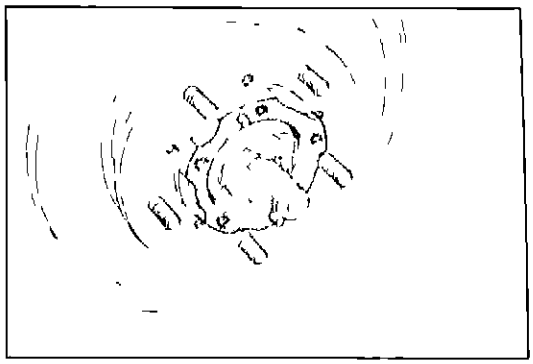


WRE91-FS121

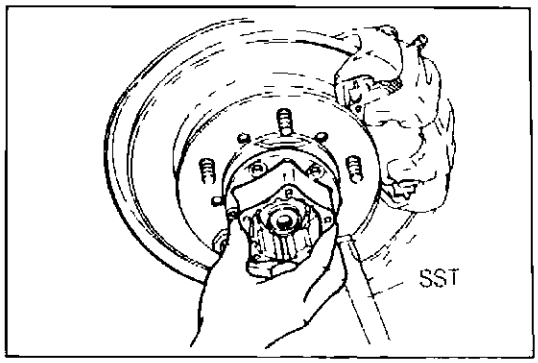
Installation

1 Installation of hub body

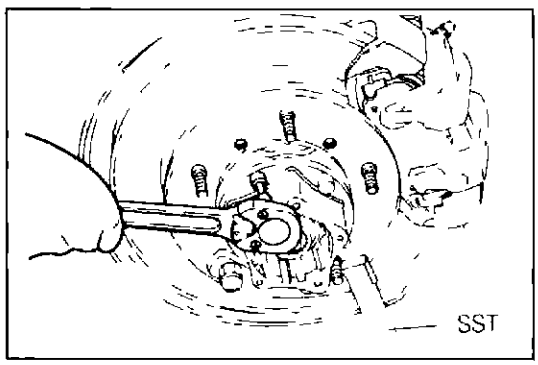
(1) Clean the mating surfaces of the hub body and axle hub Then, thinly and evenly apply the Daihatsu Bond No 4



(2) While aligning the knock pin hole of the hub body with the knock pin of the hub, install the hub body to the hub

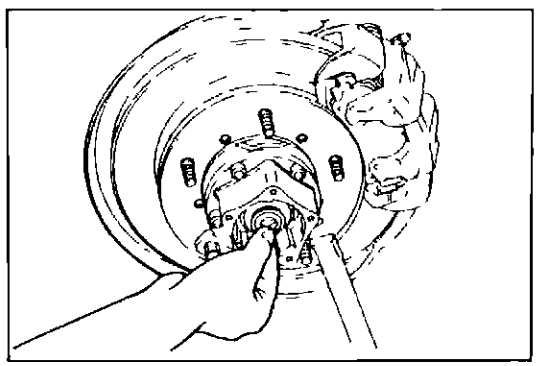


(3) Tighten the hub body attaching bolts to the specified torque over two or three stages evenly
Tightening Torque: 58.8 - 68.6 N·m
(6.0 - 7.0 kgf-m, 43.4 - 50.6 ft-lb)



NOTE:

- Prevent the axle hub from turning, using the following SST.
  SST: 09511-87202-000
- Use a hexagonal box wrench for the bolt tightening.
- Prior to the bolt tightening, be sure to apply engine oil to the threaded portion of each bolt.
- Wipe off any oozed bond.



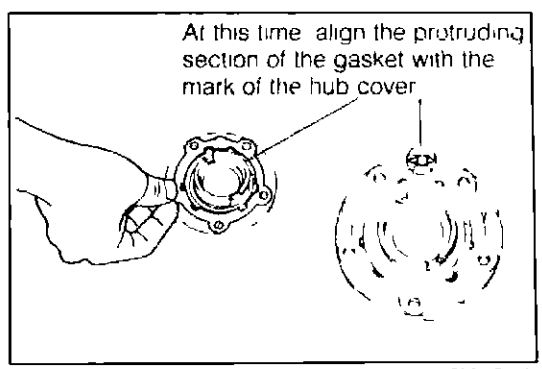
2 Assemble a new snap ring to the drive shaft

NOTE:

- Never reuse the snap ring.
- Fit the snap ring positively to the groove of the drive shaft.

3 Assembly of hub cover

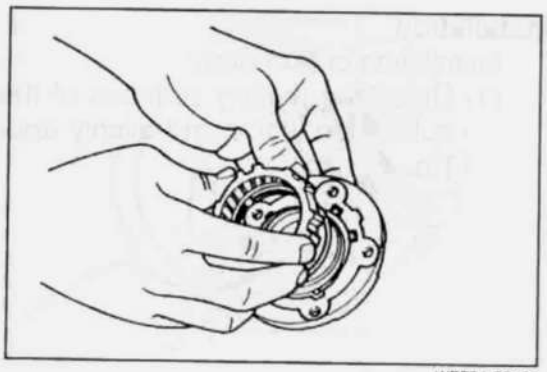
(1) Install a new gasket to the hub cover



(2) Move the handle of the hub cover to the "FREE" position. Align the pawl of the clutch subassembly with the cut- out section of the handle.

NOTE:

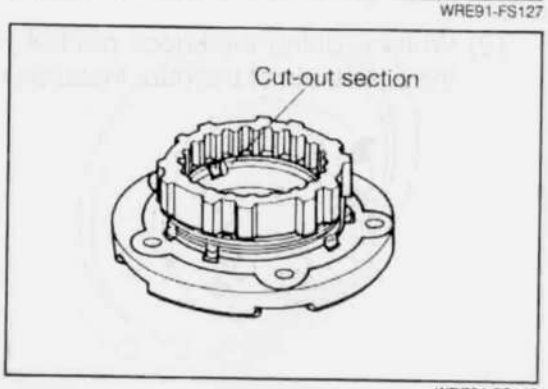
- Make sure that the compression spring is positively placed in the follower.



WRE91-FS127

(3) Turn the clutch subassembly, until the clutch stops, while pushing the clutch subassembly against the cover side.

(4) Move the handle of the hub cover several times from the "FREE" position to the "LOCK" position; from the "LOCK" position to the "FREE" position. At this time, ensure that the clutch operates smoothly.



WRE91-FS128

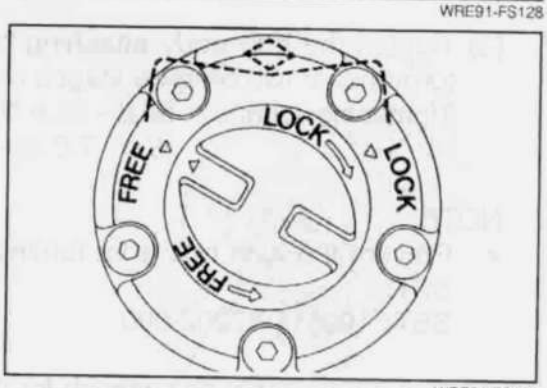
4. Installation of hub cover

(1) Set the handle of the hub cover to the "FREE" position.

(2) Install the hub cover to the hub body, while aligning the mark at the reverse side of the hub cover with the protruding section at the hub body side.

NOTE:

- Be very careful not to displace the gasket position during this operation.



WRE91-FS129

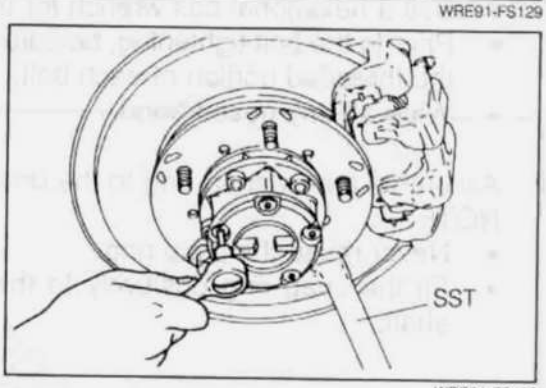
(3) Tighten the hub cover attaching bolts to the specified torque.

Tightening Torque: 7.8 - 11.8 N·m
(0.8 - 1.2 kgf-m, 5.8 - 8.7 ft-lb)

NOTE:

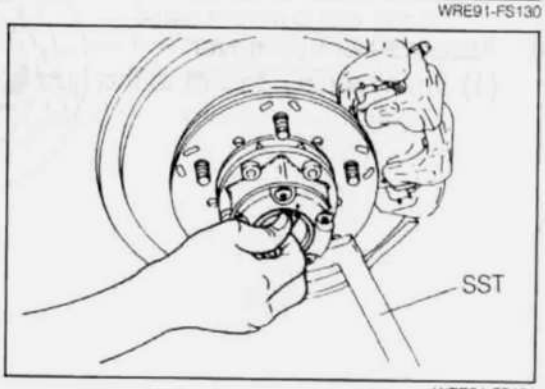
- Prevent the axle hub from turning, using the following SST.

SST: 09511-87202-000



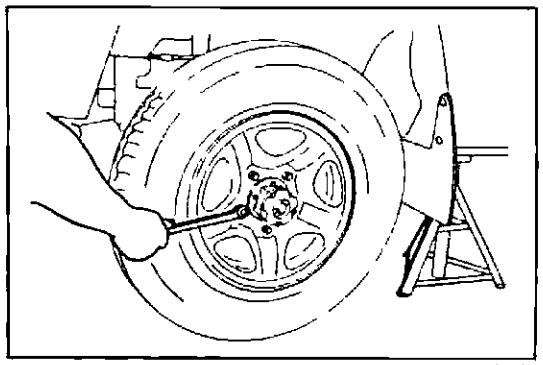
WRE91-FS130

5. Move the handle of the hub cover several times from the "FREE" position to the "LOCK" position; from the "LOCK" position to the "FREE" position. At this time, ensure that the handle operates smoothly.



WRE91-FS131

6 Install the front wheel temporarily.



WRE91 FS132

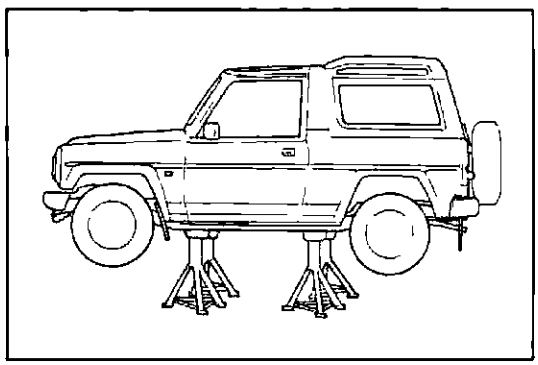
7 Perform the operation check
(See page FS–22.)
8 Jack up the vehicle and remove the safety stands
9 Tighten the front wheel attaching bolts to the specified torque

WRE91 FS133

AUTOMATIC LOCKING HUB

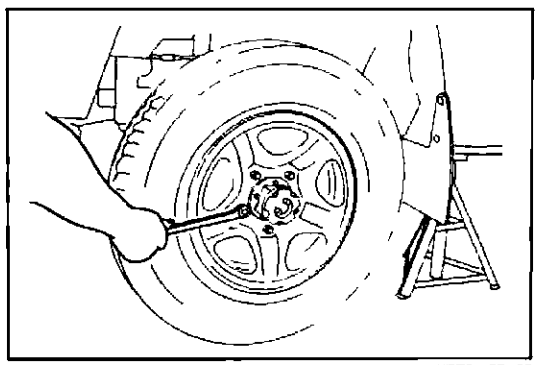
Removal

1 Jack up the vehicle and support it with safety stands
(See the GI section)



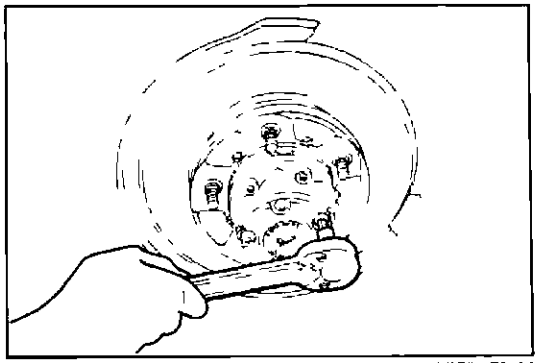
WRE91 FS134

2 Remove the front wheel



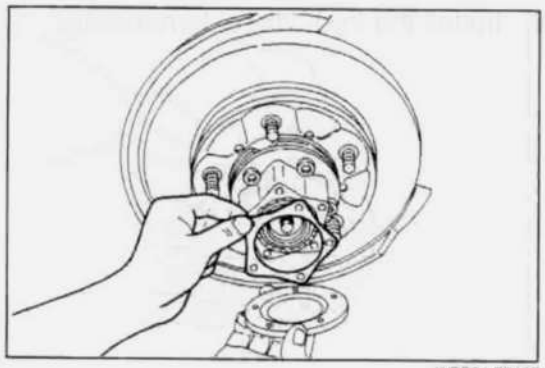
WRE91 FS135

3 Remove the hub cover



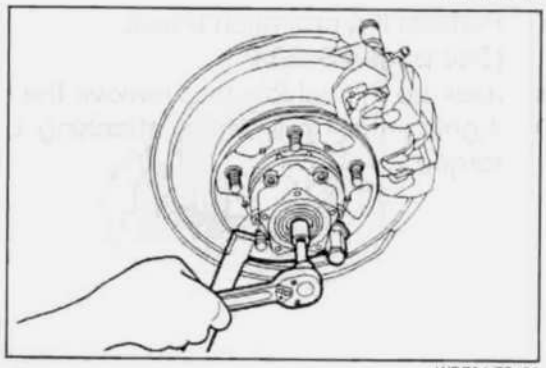
WRE91 FS136

4. Remove the gasket from the hub body.



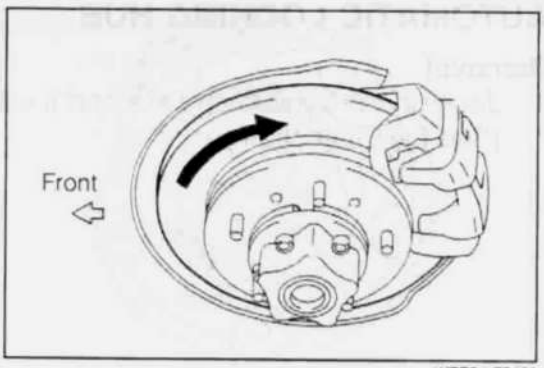
WRE91-FS137

5. Remove the lock washer attaching bolt.
   NOTE:
   - Prevent the axle hub from turning, using the following SST.
     SST: 09511-87202-000



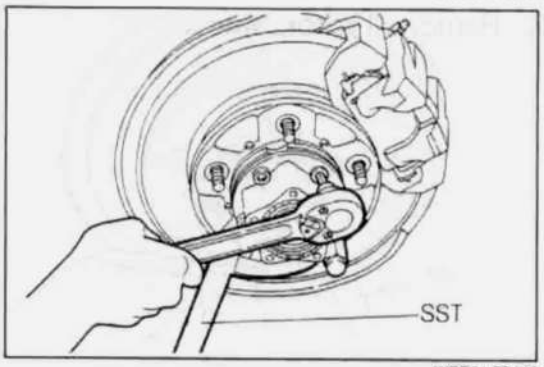
WRE91-FS138

6. Turn the hub. Ensure that the hub is set to the free wheel state.
   If the hub is not set to the free condition, turn the hub (three turns or more) reversely relative to the forward direction so that the hub may be set to the free condition.



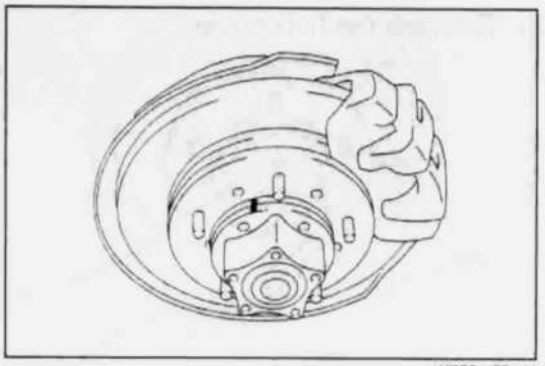
WRE91-FS139

7. Evenly loosen the hub body attaching bolts and remove them.
   NOTE:
   - Prevent the axle hub from turning, using the following SST.
     SST: 09511-87202-000



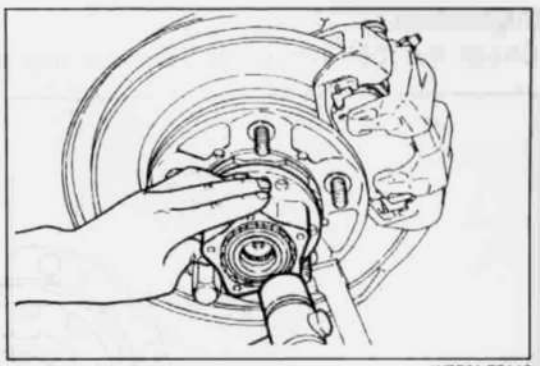
WRE91-FS140

8. Put mating marks at a point between the hub body and the axle hub by means of a marker pen or the like.

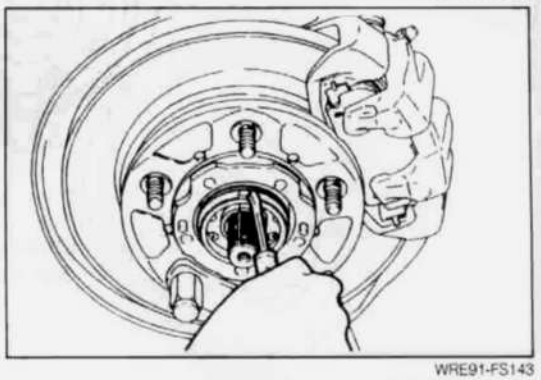


WRE91-FS141

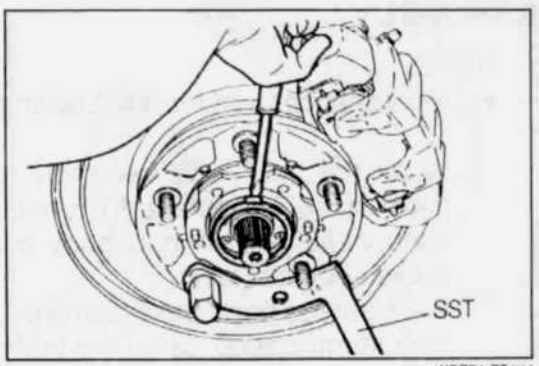
9. Remove the hub body from the axle hub by lightly tapping the hub body by means of a plastic hammer or the like.
   NOTE:
   - Be very careful not to drop the hub body.
   - Care must be exercised not to apply strong impacts to the hub body.


WRE91-FS142

10. Remove the brake shoe snap ring.

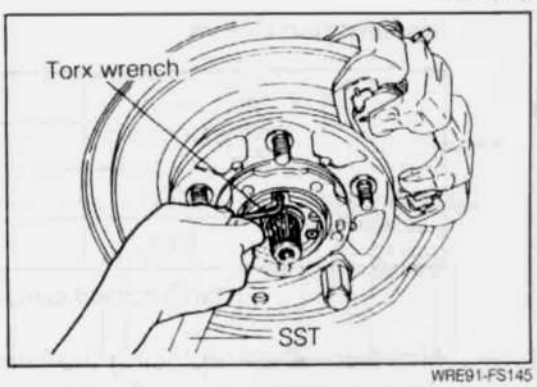

WRE91-FS143

11. Remove the brake shoe by lightly prying off the brake shoe by means of a screwdriver or the like.
    NOTE:
    - Sine the brake shoe is provided with inserting sections at its upper and lower sides, be sure to pry off the brake shoe at upper and lower sides evenly and alternately.
    - Be very careful not to scratch the brake drum and/or brake shoe.
    - Do not remove the grease that has been applied to the removed brake shoe. Leave the grease as it is.
    - Do not soil the removed brake shoe and grease.
    - Do not allow the grease of the removed brake shoe to get to other sliding parts.
    - Do not allow the grease of the removed brake shoe to get into other grease.



WRE91-FS144

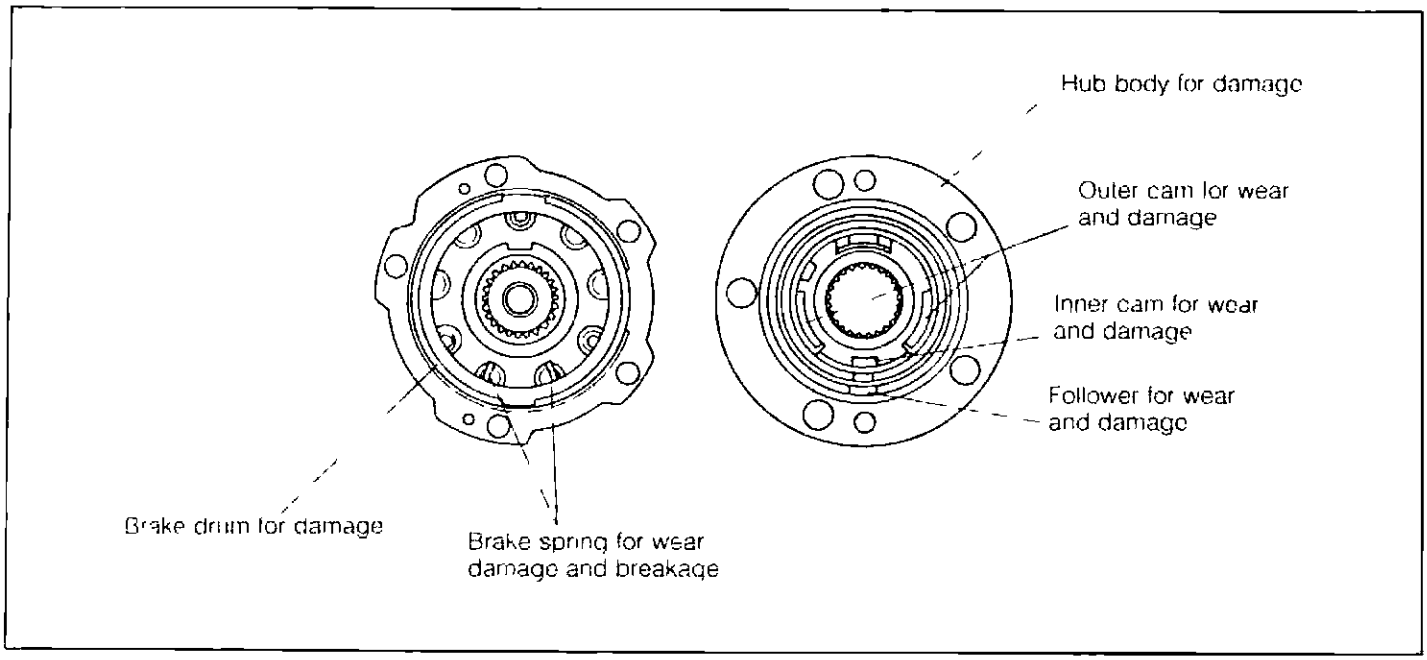
12. Remove the brake drum from the lock nut, using a torx wrench.
    NOTE:
    - Prevent the axle hub from turning, using the following SST.
      SST: 09511-87202-000



WRE91-FS145

Inspection

Check the following parts. Replace any defective parts.



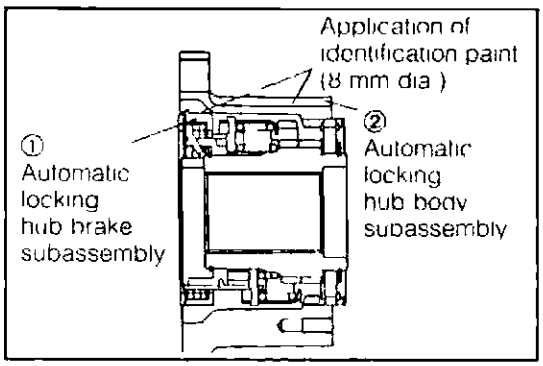
WHF91I5146

ASSEMBLY

NOTE:

- Identification of Automatic Locking Hub

When the hub body assembly and/or the hub brake subassembly is replaced, it is necessary to consider the combination of the hub body assembly and the hub brake subassembly.
Before these parts are assembled, be certain to confirm their identification, using the table below.



WHE9 FS 47

Identification Colors

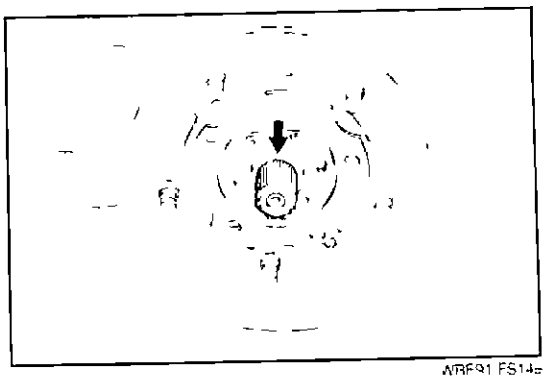
Identification color		Brake subassembly	
		Yellow	blue
Hub body assembly	Yellow	○	○
	Blue	×	○

The ○-marked combination only is acceptable.

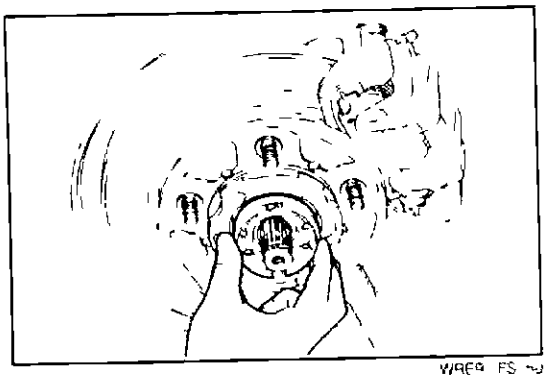
However, when replacing the hub brake subassembly, if it is impossible to confirm the identification color of the hub body assembly, be certain to employ a blue brake subassembly.

WHF91FS148

1 Clean the serration section of the drive shaft so as to remove grease or the like



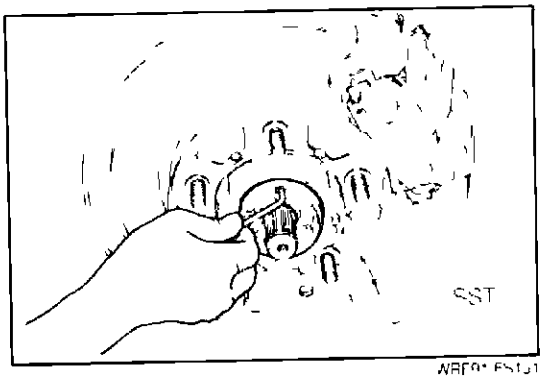
2 While aligning the brake drum with the groove of the knuckle, assemble them



3 Tighten the brake drum attaching screws (torx®) to the specified torque

Tightening Torque: 4.9 - 8.8 N·m
(0.5 - 0.9 kgf-m, 3.6 - 6.5 ft-lb)

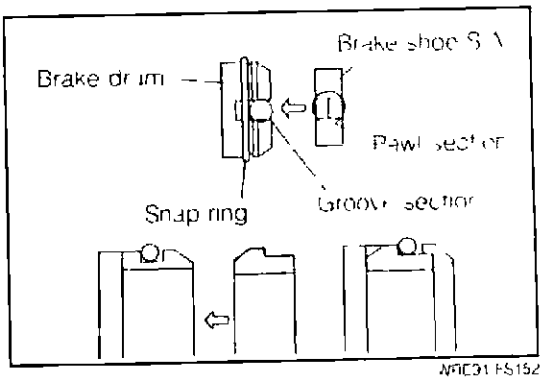
NOTE:
- Prevent the axle hub from turning, using the following SST.
  SST: 09511-87202-000



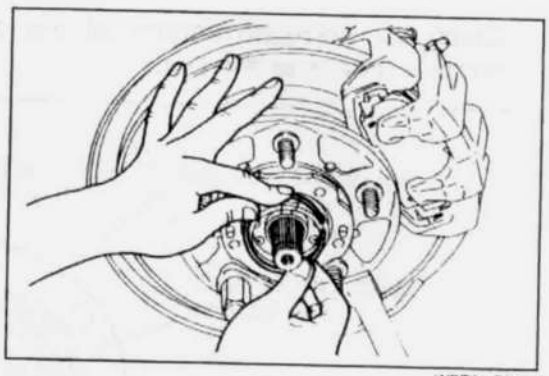
4 Install the brake shoe to the brake drum

NOTE:
- Since the width of the pawl of the brake shoe differs between the upper section and the lower section, be certain to confirm the width of the pawl before the installation.
- Make sure that the brake shoe is installed in the correct direction.
- Do not remove the grease that has been applied to the brake shoe.
- Do not soil the brake shoe and grease.
- Do not allow the grease applied to the brake shoe to get to other sliding parts.
- Do not allow the grease that has been applied to the brake shoe to get into other grease.

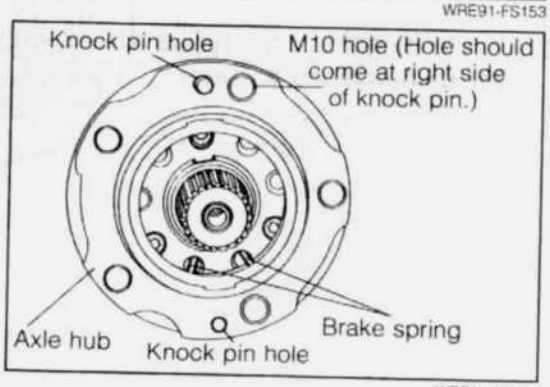
If the grease applied to the brake shoe should be soiled and/or removed, be sure to replace the brake shoe with a new one. The new brake shoe will be supplied with grease applied.



5. Install the brake shoe snap ring so as to secure the the brake shoe.
   NOTE:
   - Be sure to set the opening of the snap ring within a range of 90° ± 20 relative to the cut-out section provided at the pawl section of the brake shoe of the brake drum.

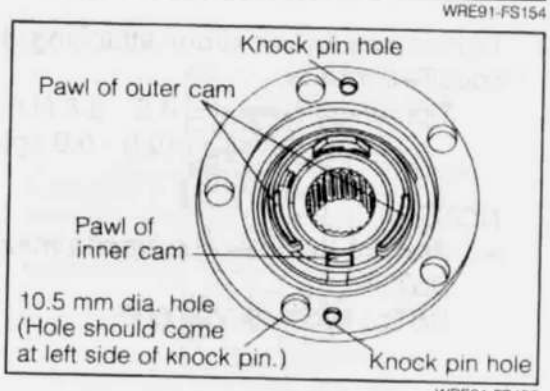

WRE91-FS153

6. Installation of hub body
   (1) Turn the axle hub so as to set it, as indicated in the right figure.
   (2) Turn the spring so that the end section of the brake spring may come at the position as indicated in the right figure.



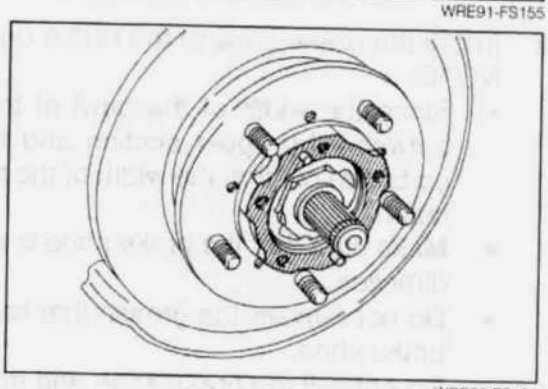
WRE91-FS154

   (3) Turn the cam so that the pawls of the inner cam and outer cam of the hub body may come at the position as indicated in the right figure.



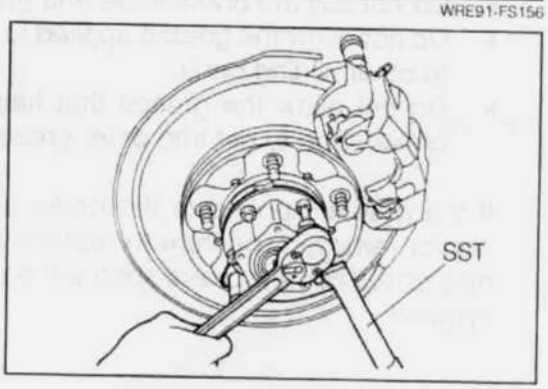
WRE91-FS155

   (4) Clean the attaching surfaces of the axle hub and hub body. Thinly and evenly apply the Three Bond® 1216 to the axle hub side.
   NOTE:
   - At this time, make sure that no grease is stuck to the serration section of the drive shaft.


WRE91-FS156

   (5) Install the hub body to the axle hub. Tighten the attaching bolts to the specified torque evenly over two or three stages.
   Tightening Torque: 58.8 - 68.6 N·m
   (6.0 - 7.0 kgf-m, 43.4 - 50.6 ft-lb)

   NOTE:
   - Prevent the axle hub from turning, using the following SST.
   SST: 09511-87202-000

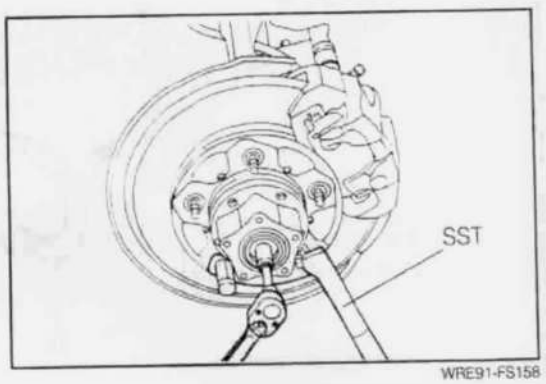


- Use a hexagonal box wrench for the bolt tightening.
- Wipe off any oozed bond.
- Be very careful not to get lithium-based MP grease to the brake shoe subassembly.
- Prior to the bolt tightening, be sure to apply engine oil to the threaded portion of each bolt.

WRE91-FS157

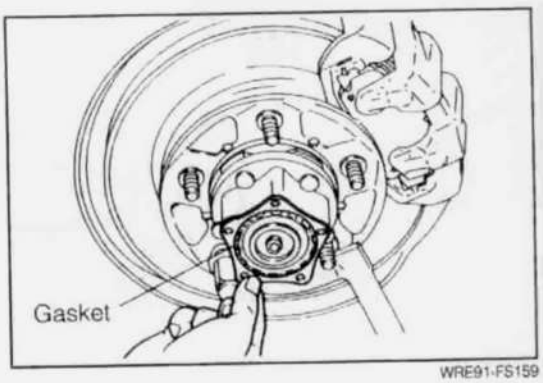
(6) Install the plate washer with the attaching bolt.
Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)

NOTE:
- Prevent the axle hub from turning, using the following SST.
SST: 09511-87202-000



WRE91-FS158

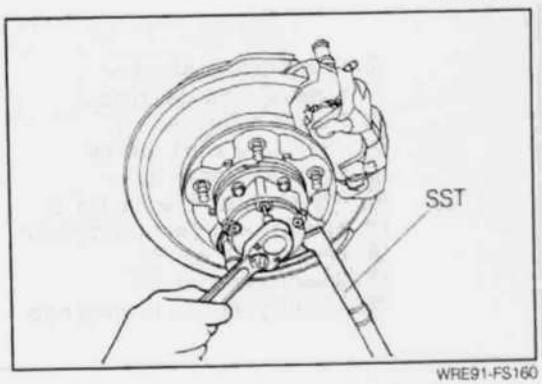
7. Installation of hub cover
(1) Install a new gasket to the hub body.



WRE91-FS159

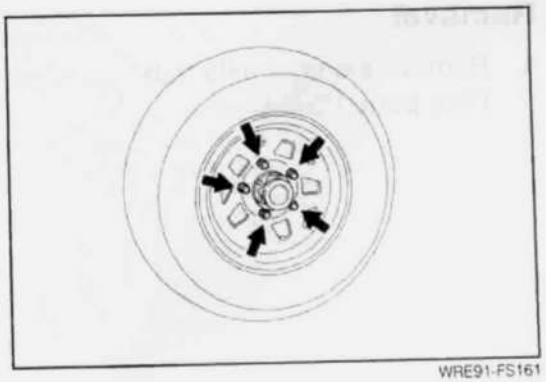
(2) Install the hub cover with the bolt.
Tightening Torque: 7.8 - 11.8 N·m
(0.8 - 1.2 kgf-m, 5.8 - 8.7 ft-lb)

NOTE:
- Prevent the axle hub from turning, using the following SST.
SST: 09511-87202-000



WRE91-FS160

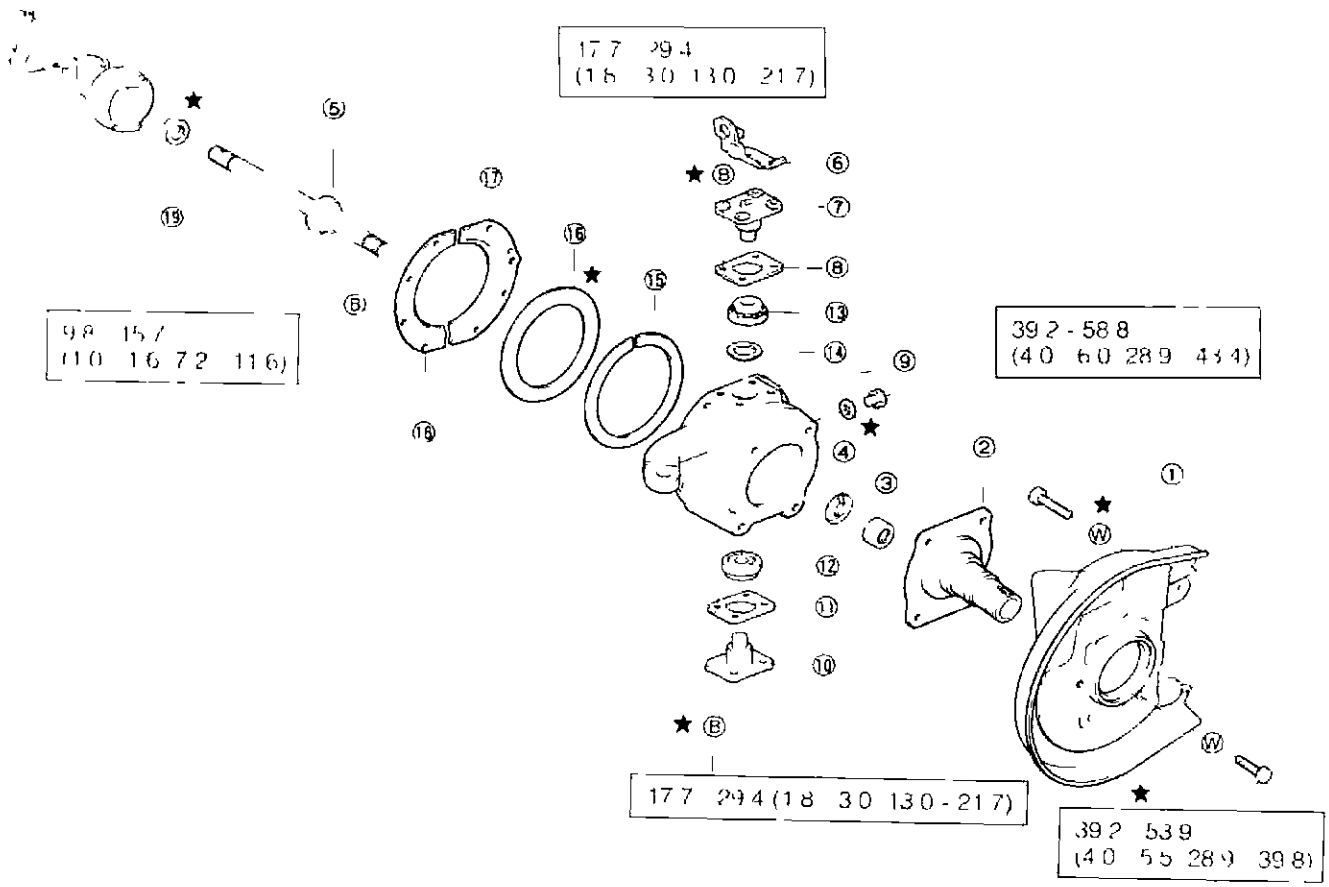
8. Install the front wheel.
9. Perform the operation check.
(See page FS–22.)
10 Jack up the vehicle and remove the safety stands. Then, jack down the vehicle.


WRE91-FS161

STEERING KNUCKLE

COMPONENTS

□ : Tightening torque
Unit : N·m (kgf-m, ft-lb)
★ : Non-reusable parts

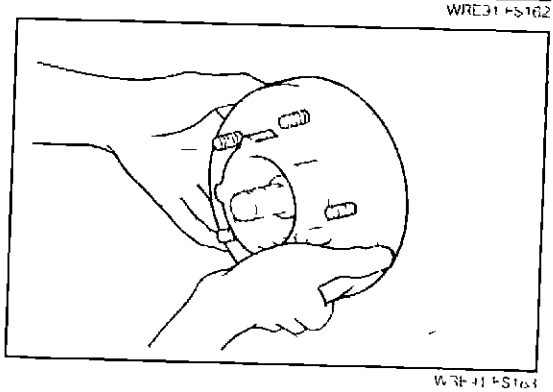


① Disc brake dust cover
② Steering knuckle spindle
③ Needle roller bearing
④ Front drive shaft washer
⑤ Front drive shaft Ay
⑥ Flexible hose bracket No. 5
⑦ Steering knuckle bearing cap
⑧ Shim
⑨ Steering knuckle
⑩ Steering knuckle bearing cap
⑪ Shim
⑫ Tapered roller bearing
⑬ Tapered roller bearing
⑭ Plate plug
⑮ Oil seal cover inner plate
⑯ Type M oil seal
⑰ Oil seal cover outer No. 2 plate
⑱ Oil seal cover inner plate
⑲ Type T oil seal

WRE31FS162

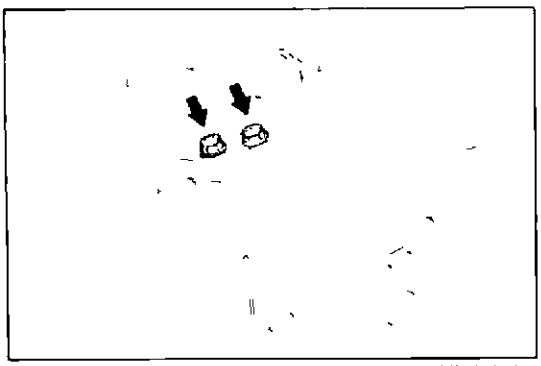
Removal

1 Remove the front axle hub
(See page FS–23)

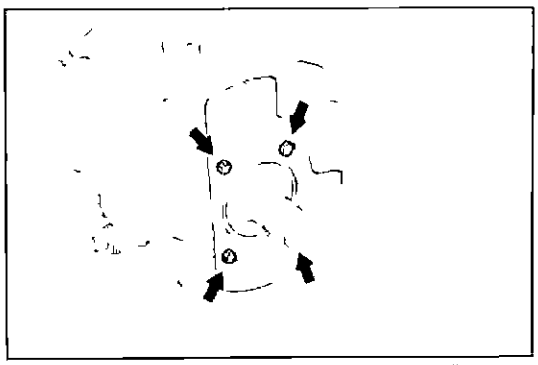


WRE31FS163

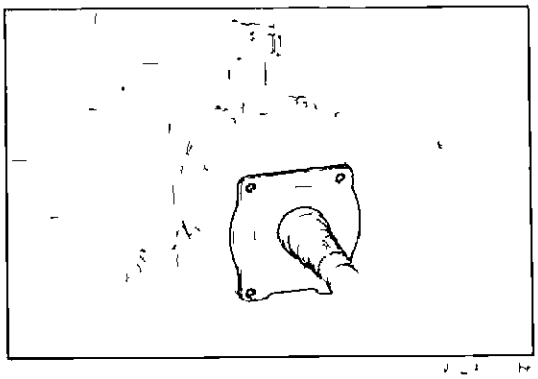
2 Remove the brake hose clamp from the steering knuckle



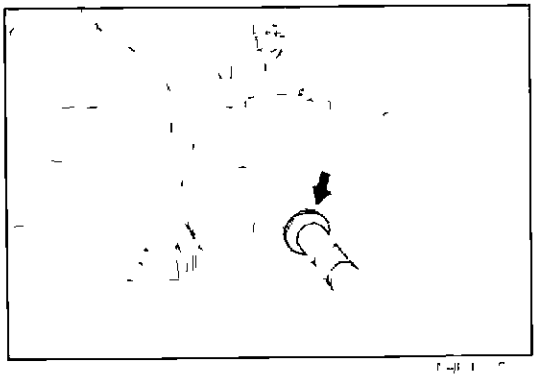
3 Remove the disc brake dust cover



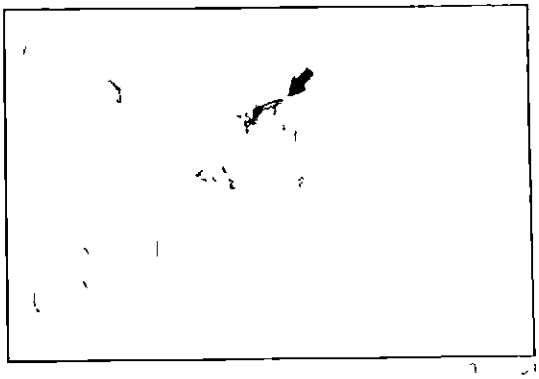
4 Remove the steering knuckle spindle



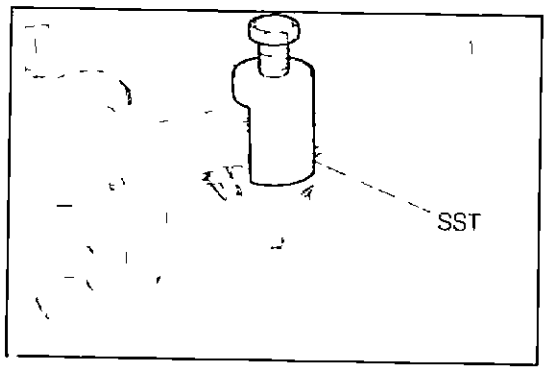
5 Remove the thrust washer



6 Remove the cotter pin Loosen the castle nut

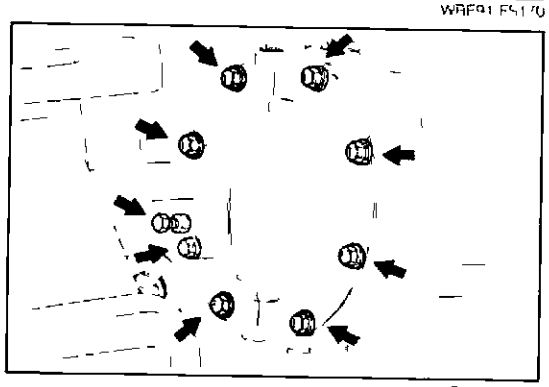


7 Disconnect the ball joint from the steering knuckle, using the following SST given below
SST: 09610-20012-000

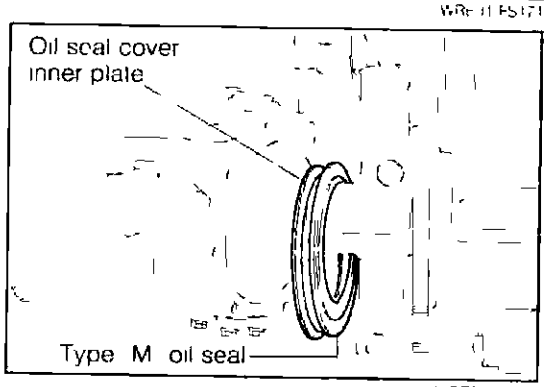


WRE91 FS170

8 Remove the attaching bolts of the oil seal cover outer plate
9 Remove the oil seal cover outer plate

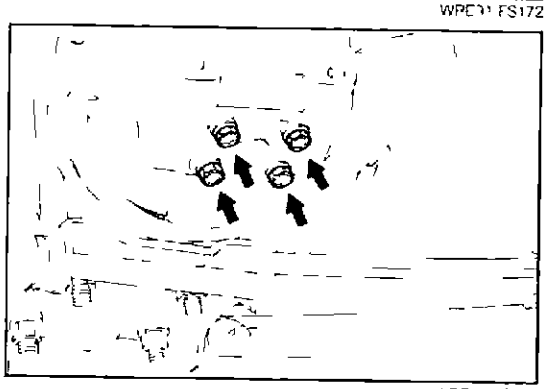

WRE91 FS171

10 Remove the type "M" oil seal from the steering knuckle
11 Remove the oil seal cover inner plate from the steering knuckle

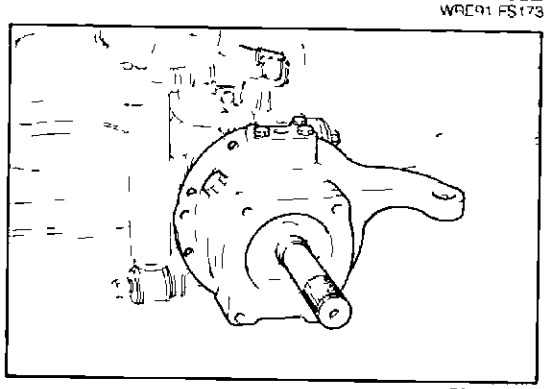


WRE91 FS172

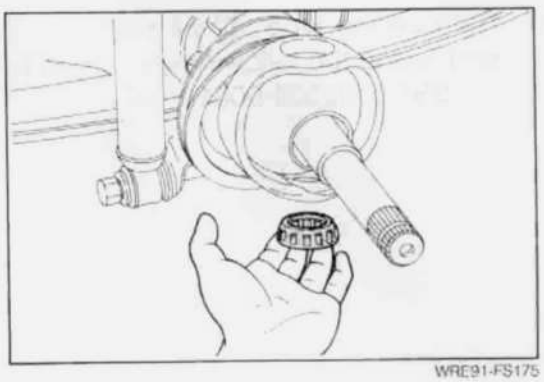
12 Remove the attaching bolts of the steering knuckle lower side bearing cap
13 Remove the lower side bearing cap and shim from the knuckle


WRE91 FS173

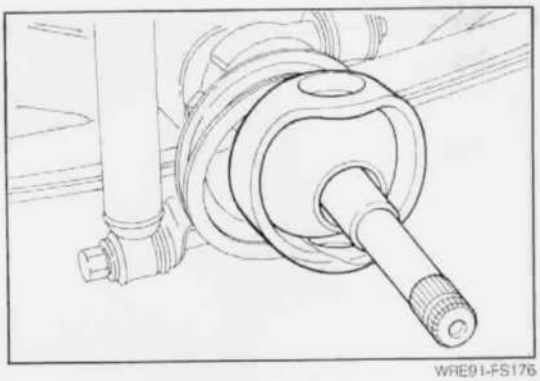
14 While raising the steering knuckle, remove it from the front axle housing
NOTE:
- Be very careful not to drop the lower knuckle bearing
- Remove the steering knuckle together with the upper knuckle bearing


WRE11 FS174

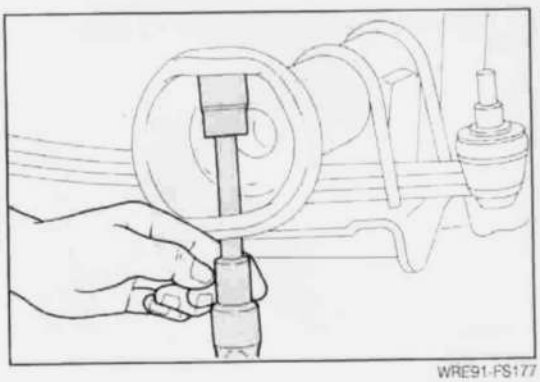
15. Remove the lower knuckle bearing.


WRE91-FS175

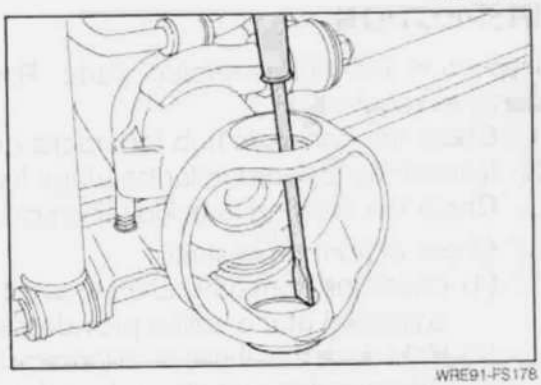
16. Remove the drive shaft from the front axle housing.


WRE91-FS176

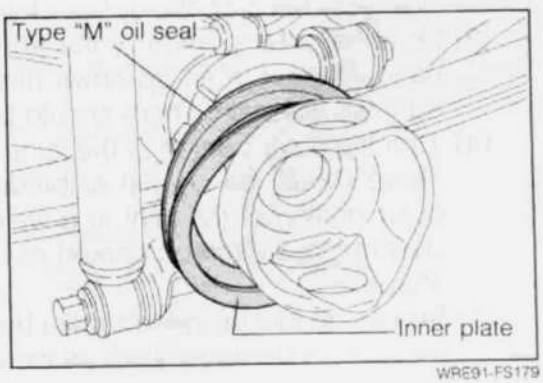
17. Drive out the upper tapered roller bearing outer race, tapping it evenly. For this removal operation, apply a suitable box wrench, a press bar or the like to the outer race.


WRE91-FS177

18. Drive out the lower tapered roller bearing outer race, tapping it evenly. For this removal operation, apply a suitable box wrench, a press bar or the like to the outer race.

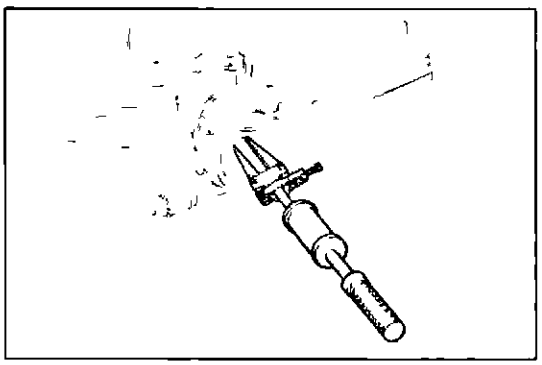

WRE91-FS178

19. Remove the type "M" oil seal cover inner plate and type "M" oil seal from the steering knuckle.

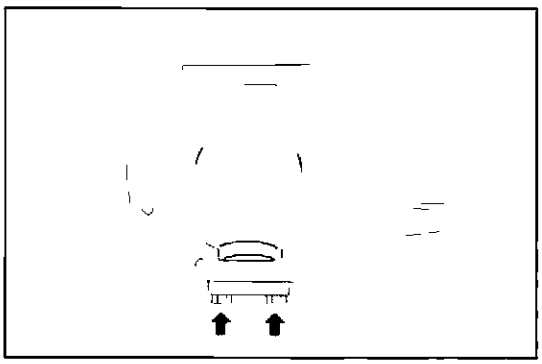


WRE91-FS179

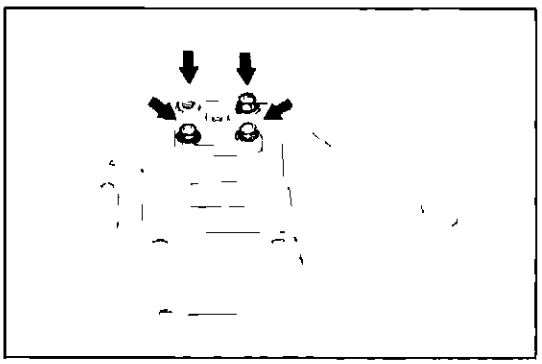
20 Remove the type "T" oil seal from the front axle housing end using the following SST given below
SST 09308 00010-000



21 Remove the tapered roller bearing from the upper bearing cap



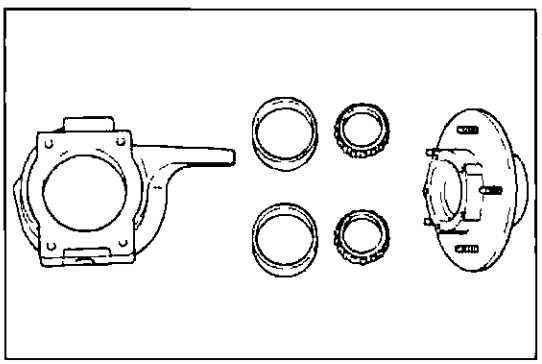
22 Remove the upper bearing cap

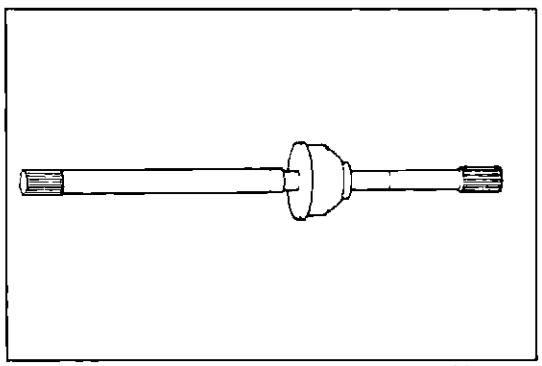


INSPECTION

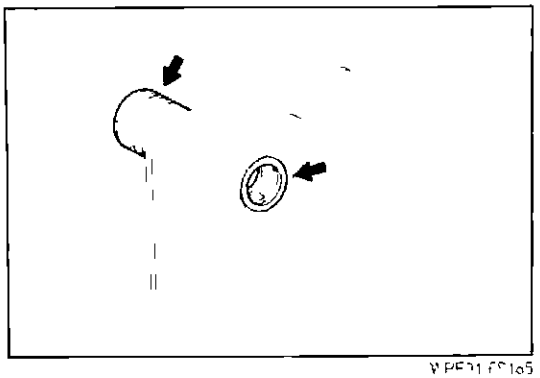
Inspection the disassembled parts Replace any defective parts as required

1 Check the front axle hub for cracks or damage
2 Inspect the tapered roller bearings for damage or wear
3 Check the steering knuckle for cracks or damage
4 Check of front drive shaft
(1) Check the front drive shaft to see if any damage or wear is present at the spline provided at its end
(2) Make sure that there is no looseness with the differential side gear fitted on the spline of the front drive shaft
(3) Hold the outer portion of the front drive shaft by your hand Move it in an up-down direction as well as in a right-left direction There should be no looseness
(4) Turn the outer portion of the joint
There should be no stiff or binding feeling Move the outer portion of the joint in a way you would do when describing a circle It should not move in a triangular shape
(5) Make sure that the needle roller bearing contact surface exhibits no damage, such as wear and seizure



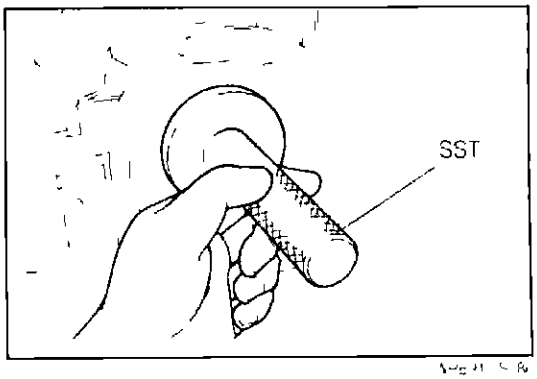


Check of steering knuckle spindle
(1) Check the bearing-fitting-area for wear or damage
(2) Inspect the needle roller bearing for damage or wear



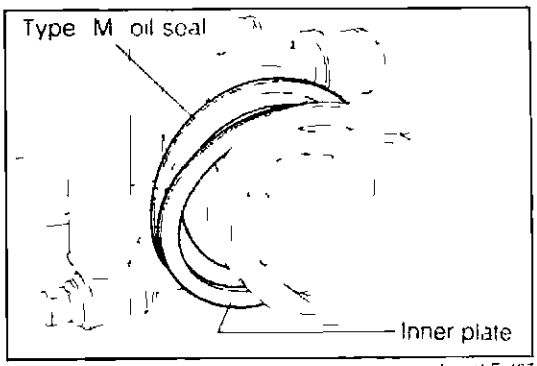
INSTALLATION

1 Install a type "T" oil seal into the front housing end, using the following SST or a suitable tool
SST: 09517-30010-000



2 Install the type "M" oil seal to the front axle
NOTE:
- Assemble the type "M" oil seal in such a direction that its dust lip section comes at the inside of the vehicle.

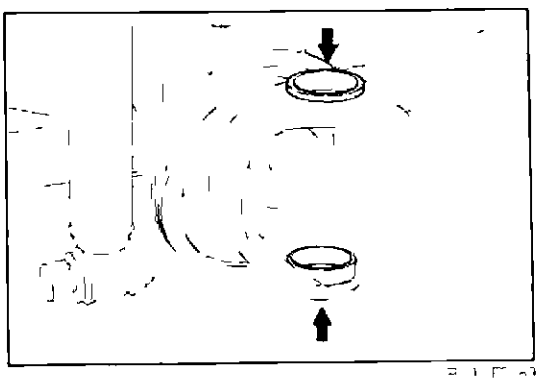
3 Install the oil seal cover inner plate to the front axle



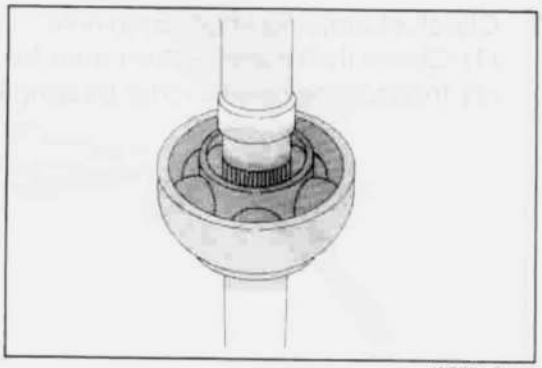
4 Installation of tapered roller bearing outer race
(1) Install the upper bearing lower cover to the front axle
NOTE.
- Install the cover in such a direction that the protruded side comes to the lower side.



(2) Place the bearing outer race to the front axle Drive the race into position by applying a force to it evenly by means of a plastic hammer or the like

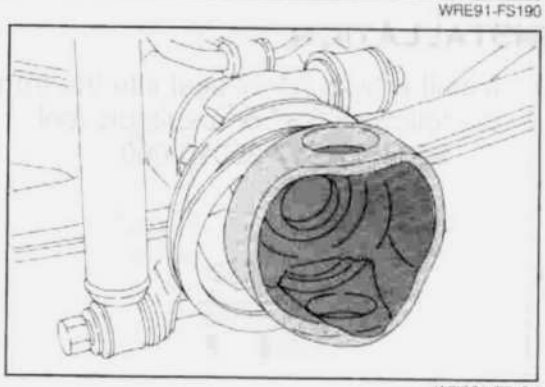


5. Fill lithium based MP grease to the joint section of the drive shaft.



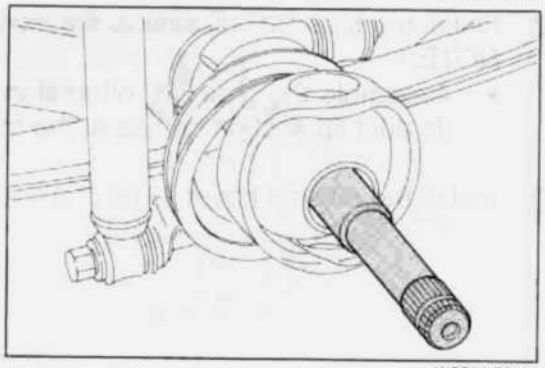
WRE91-FS190

6. Apply lithium based MP grease to the front axle end as indicated in the right figure.
7. Coat the outer spherical section with a film of MP grease of more than 10 mm thick.



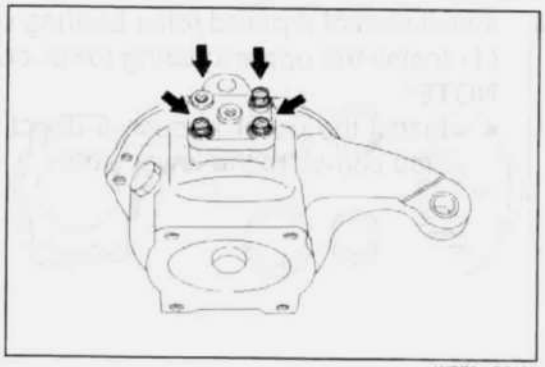
WRE91-FS191

8. Install the drive shaft to the front axle housing.



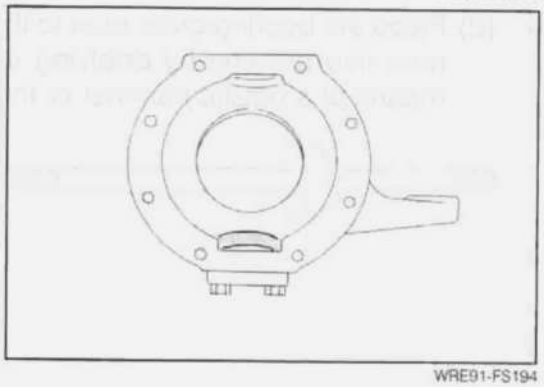
WRE91-FS192

9. Install the upper bearing cap with the shim interposed. The thickness of this shim should be the same as that of the shim which was attached at the time of disassembly.



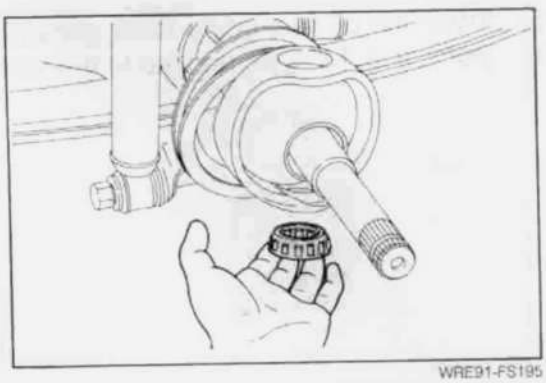
WRE91-FS193

10. Fill lithium based MP grease to the upper bearing. Then, install the bearing to the upper bearing cap.
    NOTE:
    - The upper bearing is equipped with an oil seal.

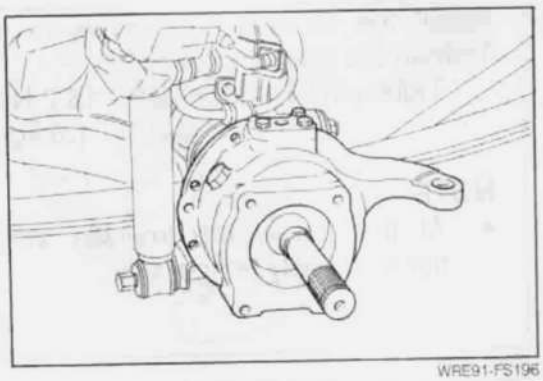


WRE91-FS194

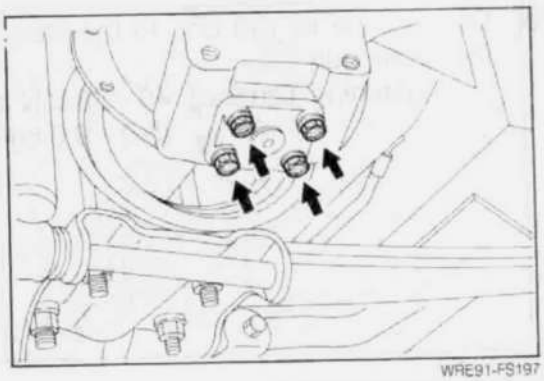
11. Fill grease to the lower bearing. Then, install the bearing to the front axle.
NOTE:
- Be very careful not to drop the bearing.


WRE91-FS195

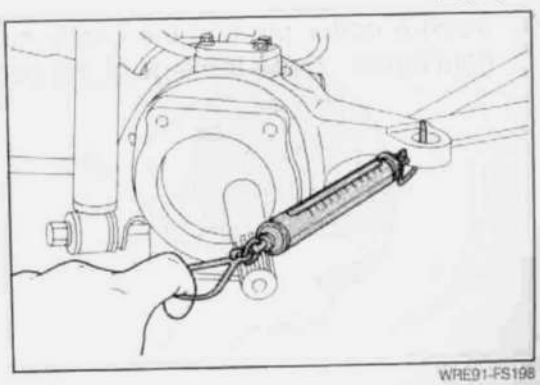
12. Assemble the steering knuckle to the front axle.


WRE91-FS196

13. Install the lower bearing cap to the steering knuckle with the shim interposed. The thickness of this shim should be the same as that of the shim which was attached at the time of disassembly.
Tightening Torque: 17.7 - 29.4 N·m
(1.8 - 3.0 kgf-m, 13 - 21.7 ft-lb)


WRE91-FS197

14. Adjust the starting torque of the tapered roller bearing (kingpin preload) as follows:
(1) Hook a spring scale at the steering knuckle's hole which accommodates the tie rod end. Gently pull the spring scale so as to measure starting torque.
Starting Torque: 16.7 - 41.2 N·cm
1.7 - 4.2 kgf-cm, 1.5 - 3.6 inch-lbs)
Starting Load: 0.1 - 0.3 kgf (0.2 - 0.7 lb)

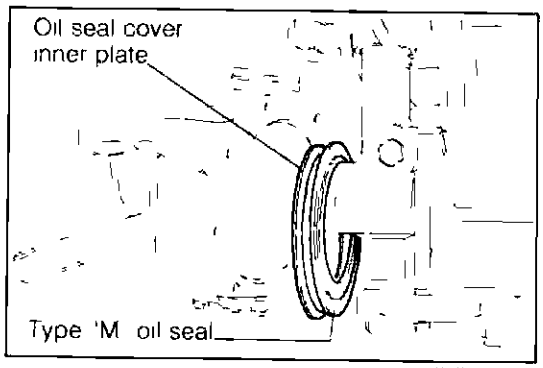

WRE91-FS198

(2) Select a shim pack from among shims shown in the right table in order that the specified starting torque may be obtained. When the shim pack thickness decreases, the starting torque will become greater. Conversely, when the shim pack thickness increases, the starting torque will become less. The thickness of the upper shim pack should be the same as that of the lower shim pack.

Part number	Thickness mm (inch)
90045-65045-000	0.1 (0.0039)
90045-65046-000	0.15 (0.0059)
90045-65047-000	0.20 (0.0079)
90045-65048-000	0.25 (0.0098)
90045-65049-000	0.30 (0.012)

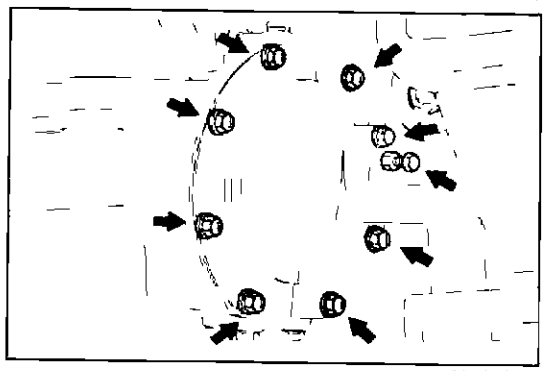
WRE91-FS199

15 Install the oil seal cover inner plate to the steering knuckle
16 Install the 'M' type oil seal to the steering knuckle

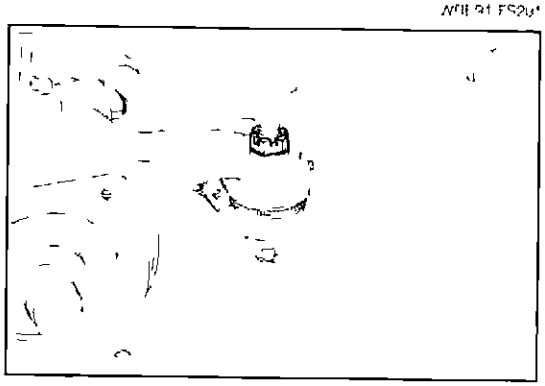


17 Install the oil seal outer plate to the steering knuckle Tighten the attaching bolts
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)

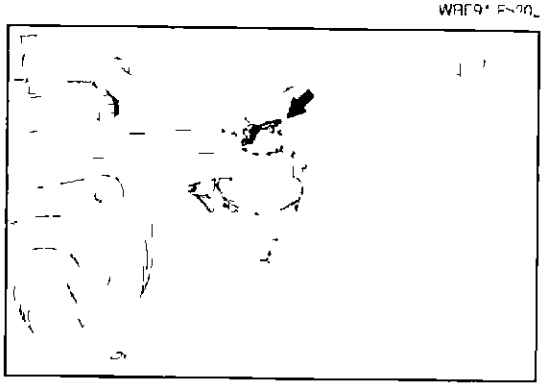
NOTE:
- At this stage, the knuckle stopper bolt should be tightened only temporarily.



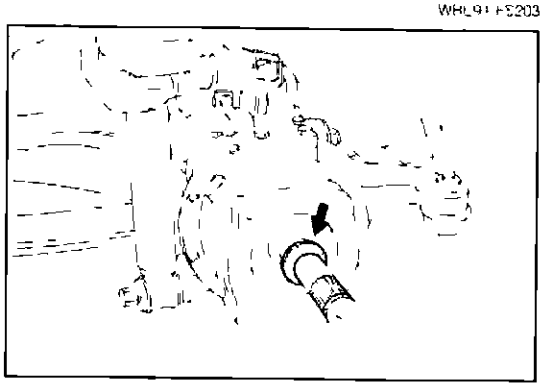
18 Connect the tie rod end to the steering knuckle Tighten the castle nut
Tightening Torque: 49 - 88.2 N·m
(5.0 - 9.0 kgf-m, 36.2 - 65.1 ft-lb)



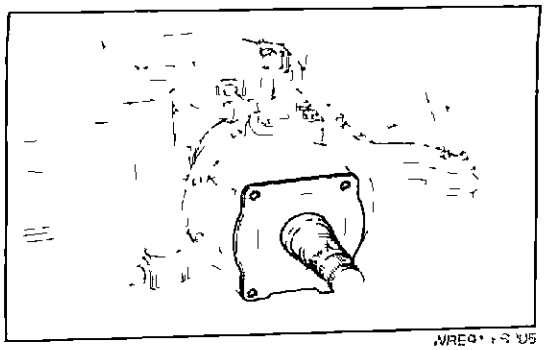
19 Insert a cotter pin into the castle nut as indicated in the right figure Bend the legs of the cotter pin



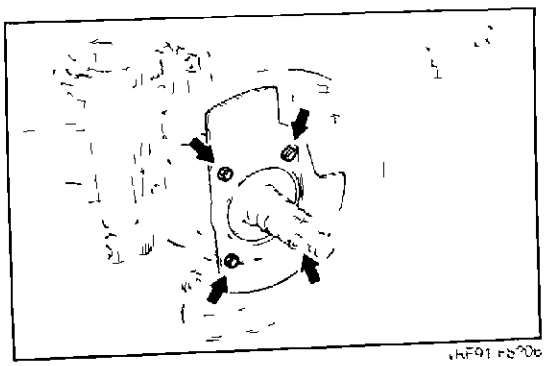
20 Apply lithium-based MP grease to the thrust washer Insert the thrust washer into the drive shaft
21 Fill 480 to 530 grams of grease into the steering knuckle



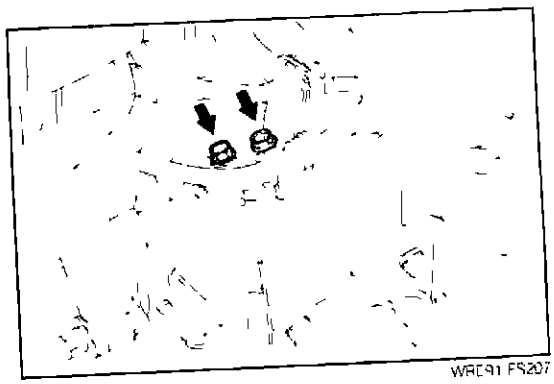
22 Install the steering knuckle spindle to the steering knuckle.
NOTE:
- Prior to the installation, apply Three Bond® 1104 to the steering knuckle attaching surface of the steering knuckle spindle.



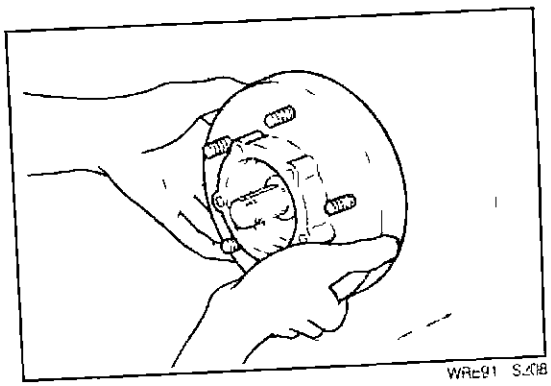
23 Install the disc brake dust cover and tighten the attaching bolts to the specified torque
Tightening Torque: 39.2 - 53.9 N·m
(4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)



24 Install the brake hose clamp to the steering knuckle
Tightening Torque: 17.6 - 29.4 N·m
(1.8 - 3.0 kgf-m, 13.0 - 21.7 ft-lb)

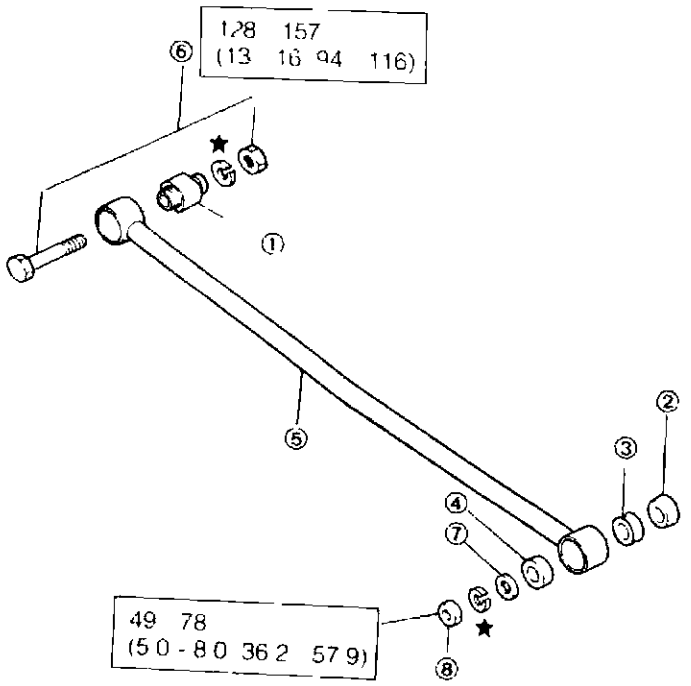


25 Install the front axle hub
(See page FS–28)
26 Adjust the wheel turning angle
(See page FS–20)



LATERAL CONTROL ROD

COMPONENTS



□ : Tightening torque
Unit : N·m (kgf-m, ft-lb)
★ : Non-reusable parts

① Bush
② Bush
③ Bush
④ Bush
⑤ Lateral control rod assembly
When removing the rod, pull out the frame side first
⑥ Hexagon bolt & hexagon nut
⑦ Plate washer
⑧ Nut

WRE31FS23

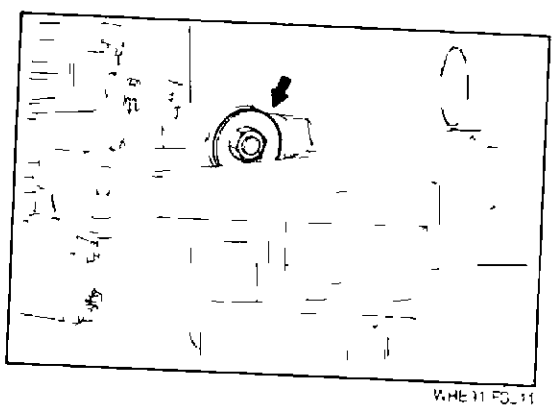
NOTE.

- Perform the removal and installation operations without jacking up the vehicle and with the vehicle under the unloaded state
  If the vehicle should be jacked up, loads will be applied to the bushes. Consequently, the removal and installation operations would become difficult.

WHL91FS10

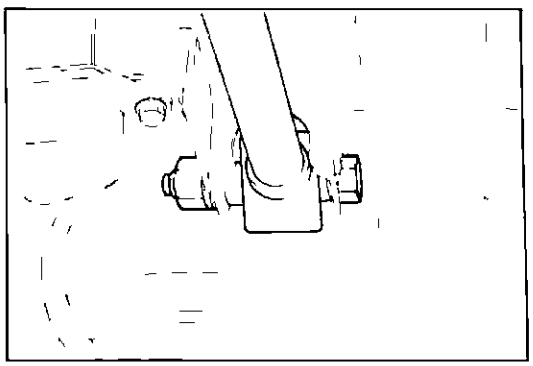
REMOVAL

1 Remove the attaching nut, spring washer, plate washer and bush of the laleral control rod at the front axle side

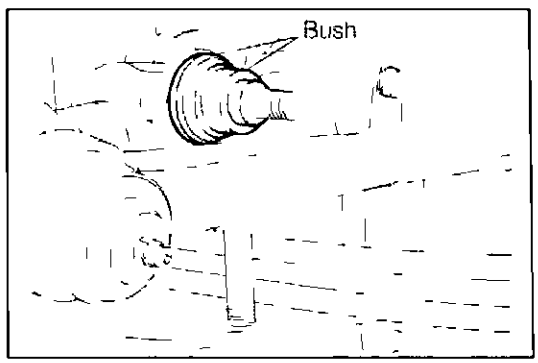


WHE11FS11

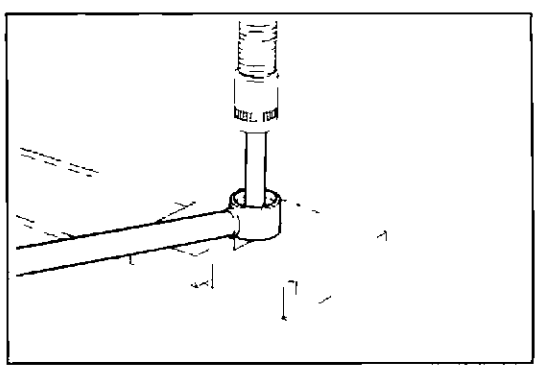
2 Remove the attaching nut at the frame side of the lateral control rod Remove the spring washer and bolt
3 Remove the lateral control rod from the vehicle



4 Remove the bushes from the front axle

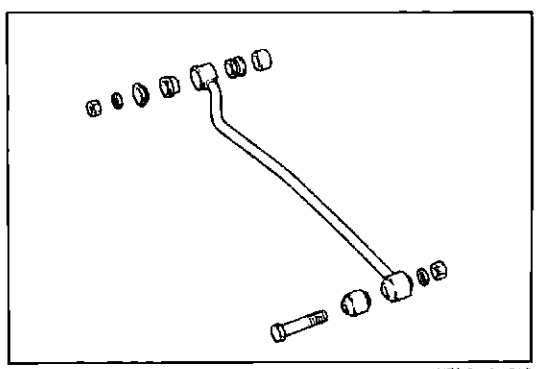


5 Press off the lateral control rod bushes by means of a hydraulic press or the like
NOTE.
- Never reuse the removed bushes.



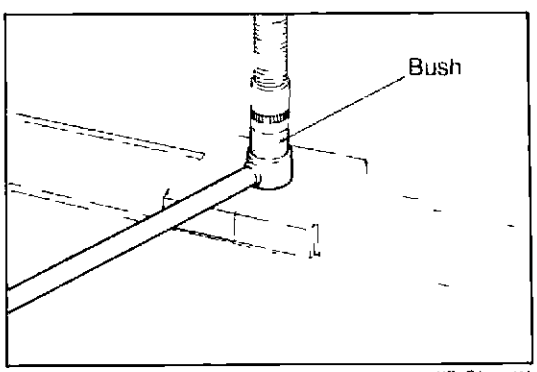
INSPECTION

1 Check that the lateral control rod exhibits no defect, such as deformation, cracks and abnormal bend
2 Check that the bolts, nuts and plate washers exhibit no damage, such as deformation and cracks
3 Check that the bushes exhibit no defect, such as wear
NOTE:
- Never reuse the pressed bushes.

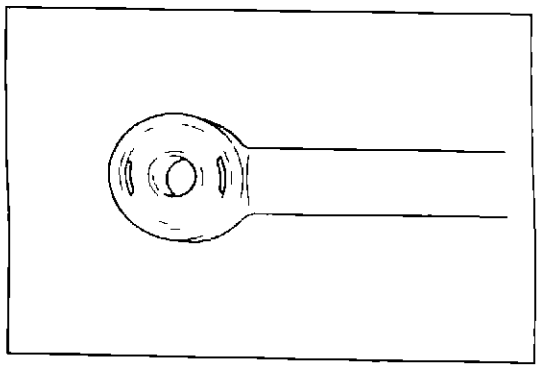


INSTALLATION

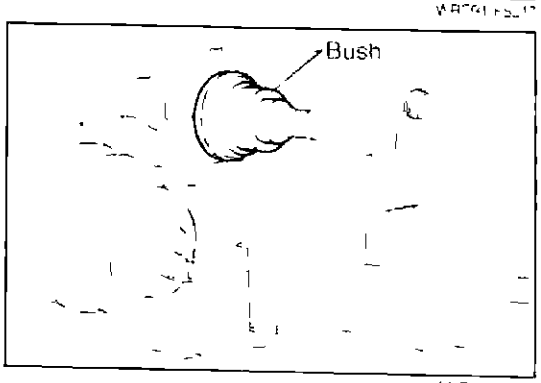
1 Press the bushes to the lateral control rod by means of a hydraulic press or the like



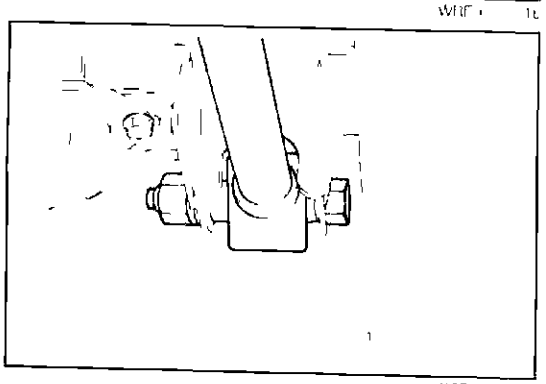
NOTE
- Be sure to press the bushes into position as indicated in the right figure



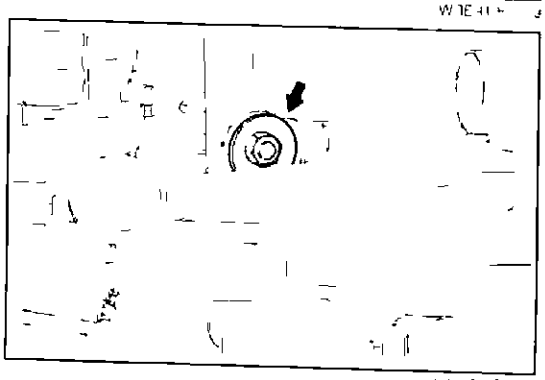
2 Install the bushes to the front axle



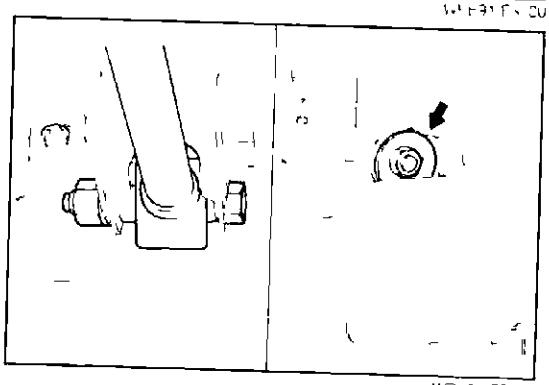
3 Install the lateral control rod. Insert the attaching bolt at the frame side
4 Temporarily tighten the nut with a new washer interposed



5 Install the bush, plate washer, new spring washer and nut. Tighten the nut temporarily
6 Rock the vehicle in a right-and-left direction in order that the vehicle may be settled

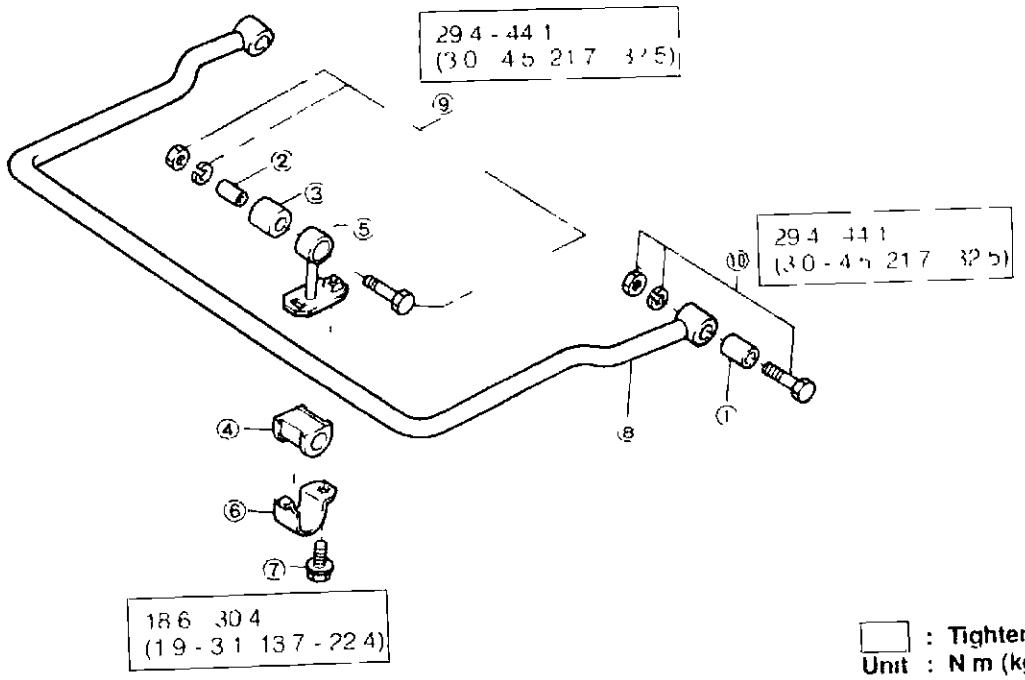


7 Tighten the attaching bolts and nuts to the specified torque
Tightening Torque:
Frame Side: 128 - 157 N·m
(13 - 16 kgf-m, 94-116 ft-lb)
Front Axle Side: 49 - 78 N·m
(5.0 - 8.0 kgf-m, 36.2 - 57.9 ft-lb)



STABILIZER

COMPONENTS



□ : Tightening torque
Unit : N·m (kgf-m, ft-lb)
★ : Non-reusable parts

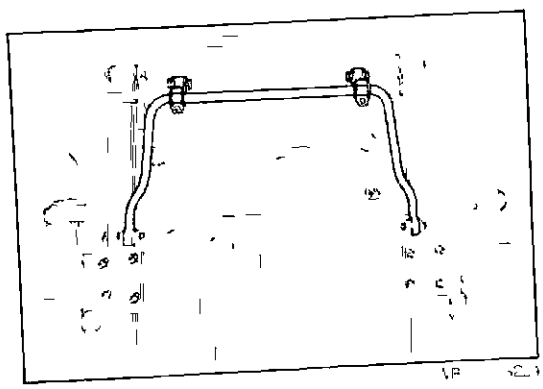
① Bush
② Spacer
③ Bush
④ Stabilizer bracket bush
⑤ Stabilizer link sub assembly
⑥ Stabilizer bracket cover
⑦ Bolt with washer
⑧ Stabilizer bar
⑨ Bolt & nut
⑩ Bolt & nut

NOTE

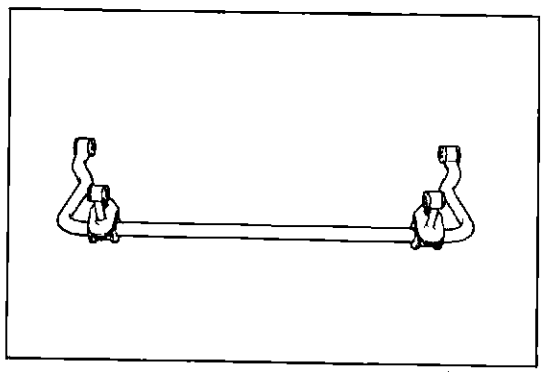
- Perform the removal and installation operations without jacking up the vehicle and with the vehicle under the unloaded state.
  If the vehicle should be jacked up, loads will be applied to the stabilizer. Consequently, the removal and installation operations would become difficult.

REMOVAL

1 Remove the stabilizer attaching nuts, spring washers and bolts

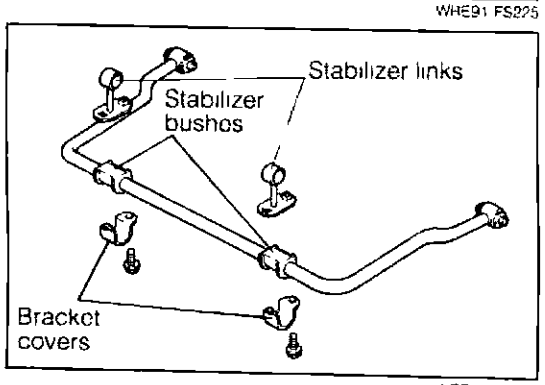


2 Remove the stabilizer assembly from the vehicle



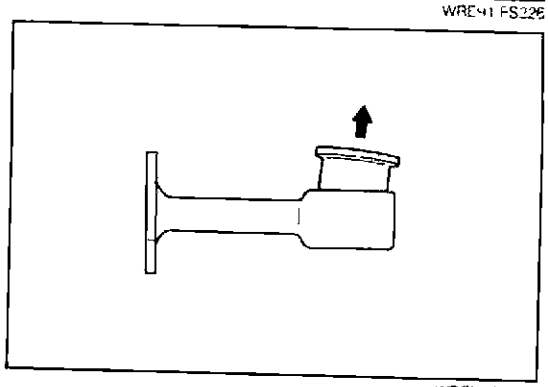
WHE91 FS225

3 Remove the stabilizer bracket cover and stabilizer link by removing the stabilizer bracket cover attaching bolts
4 Remove the stabilizer bush from the stabilizer



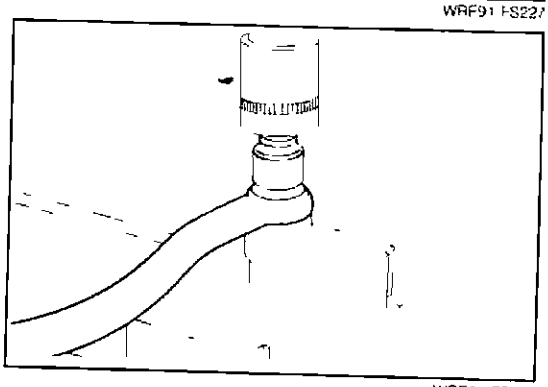
WRE91 FS226

5 Drive out the spacer from the stabilizer link with a suitable iron rod or the like applied to the spacer
6 Remove the bush from the stabilizer link



WRF91 FS227

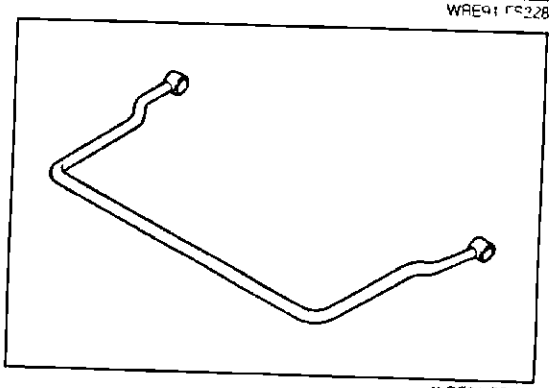
7 Drive out the bush from the stabilizer bar, using a suitable box wrench or the like, (as required)



WRE91 FS228

INSPECTION

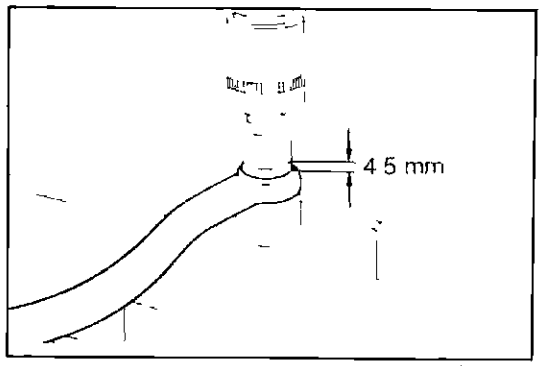
1 Check that the stabilizer bar exhibits no deformation or cracks, etc
2 Check that the stabilizer bushes exhibit no wear or cracks, etc
3 Check that the stabilizer link exhibits no deformation or cracks, etc



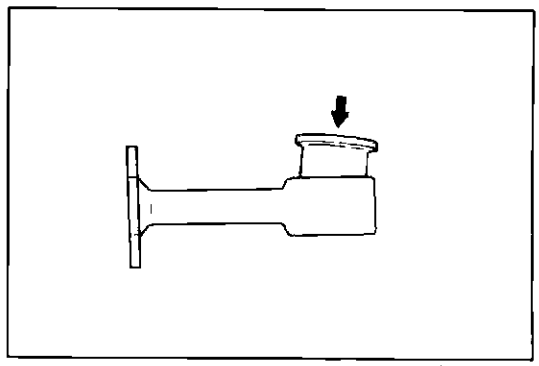
WRE91 FS229

INSTALLATION

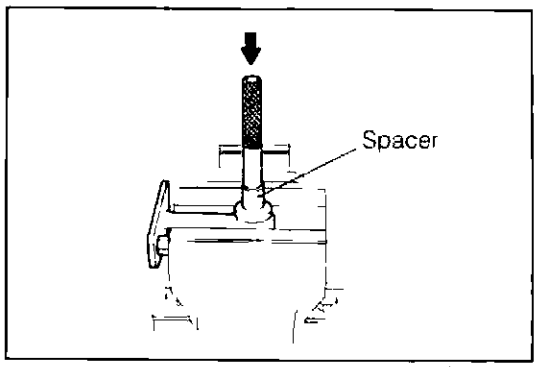
1 Press the bush into the stabilizer bar, using a suitable box wrench or the like
NOTE:
- The bush should be protruded 4.5 mm from the stabilizer edge surface.
- Care must be exercised not to tilt the bush during the press-fitting operation.



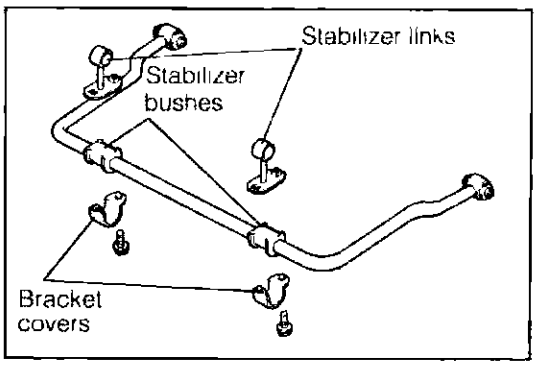
2 Assemble the bushes to the stabilizer link



3 Insert the spacer into the stabilizer link, using a suitable rod or the like

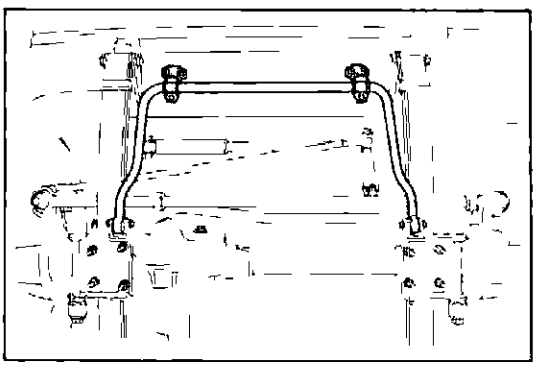


4 Install the stabilizer bushes to the stabilizer
5 Install the stabilizer links to the stabilizer bushes
6 Install the stabilizer bracket covers. Temporarily tighten the attaching bolts.
7 Install the stabilizer assembly to the vehicle with the bolts, new spring washers and nuts. Temporarily tighten the stabilizer assembly
NOTE:
- Do not reuse the spring washers.



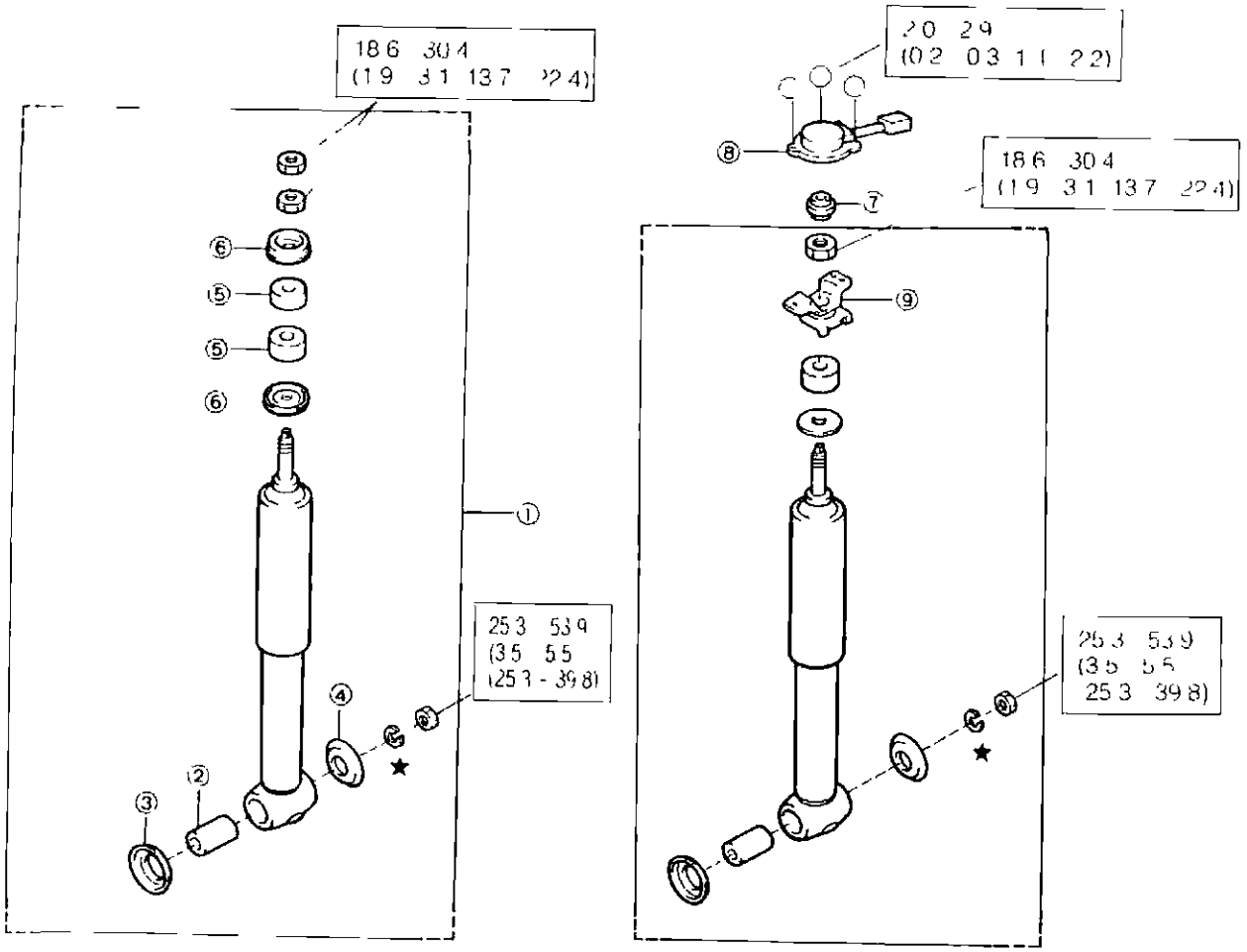
8 Rock the vehicle several times in order that the vehicle may be settled.
9 Tighten the attaching bolts and nuts of the stabilizer assembly to the specified torque

Tightening Torque:
- Frame Side: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m, 21.7 - 32.5 ft-lb)
- Front Axle Side: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m, 21.7 - 32.5 ft-lb)
- Stabilizer Bracket Cover: 18.6 - 30.4 N·m (1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)



FRONT SHOCK ABSORBER

COMPONENTS



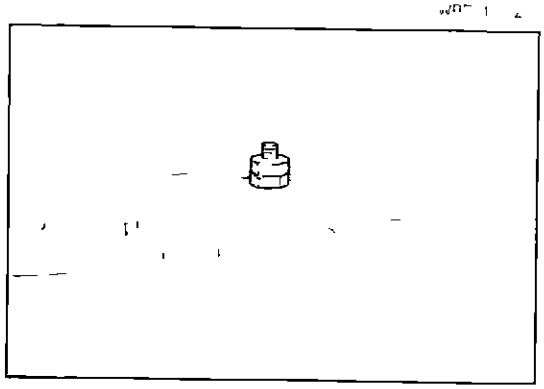
□. Tightening torque
Unit : N·m (kgf-m, ft-lb)
★ : Non-reusable parts

① Front shock absorber assembly
② Front shock absorber bush
③ Front shock absorber No. 1 washer
④ Front shock absorber No. 2 washer
⑤ Front shock absorber cushion
⑥ Front shock absorber cushion retainer
⑦ Dust seal
⑧ Absorber control actuator
⑨ Absorber control actuator bracket

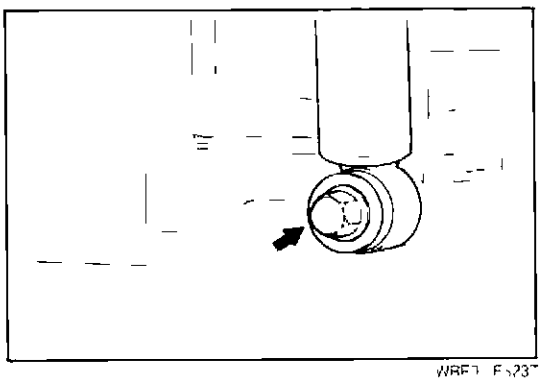
REMOVAL

<Expect three-stage damper>

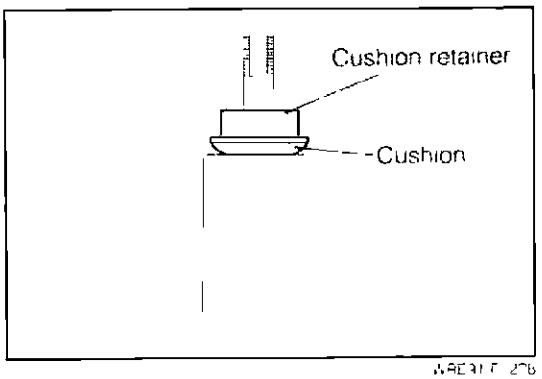
1. Remove the lock nut of the shock absorber at the connecting section of the upper frame
2. Remove the attaching nut of the shock absorber, while preventing it from turning using the section across two flats of the shock absorber
3. Remove the cushion retainer
4. Remove the cushion



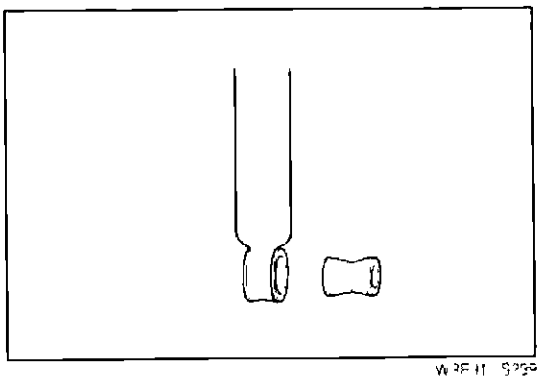
5 Remove the attaching nut at the connecting section of the U-bolt seat of the shock absorber. Remove the plate washer and spring washer
6 Remove the shock absorber from the vehicle, while contracting the shock absorber



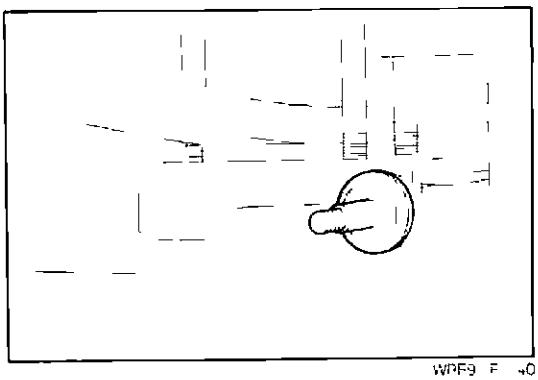
7 Remove the cushion and cushion retainer from the removed shock absorber



8 Remove the bush from the shock absorber

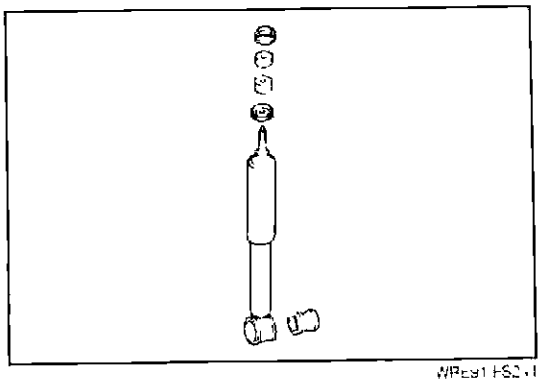


9 Remove the cushion retainer from the U-bolt seat



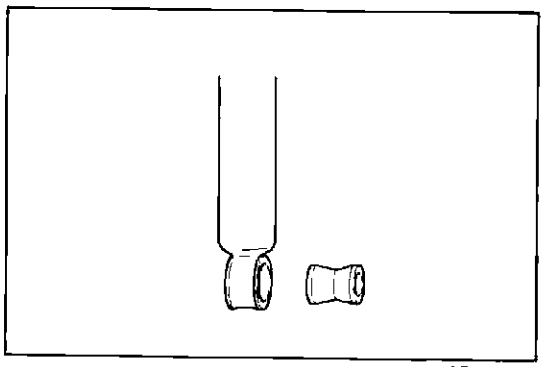
INSPECTION

1 Check that the shock absorber exhibits no defect, such as deformation or oil leakage
2 Check that the bushes and/or cushions exhibit no cracks or wear
3 Check that the damping force is not abnormal

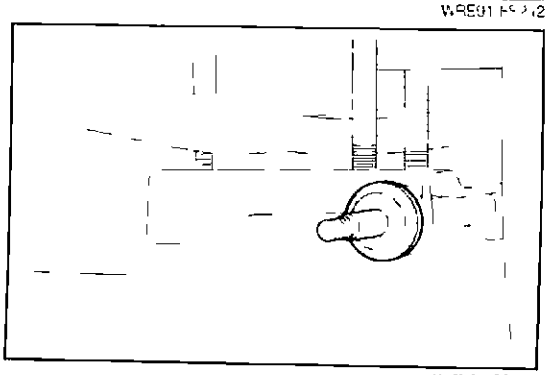


INSTALLATION

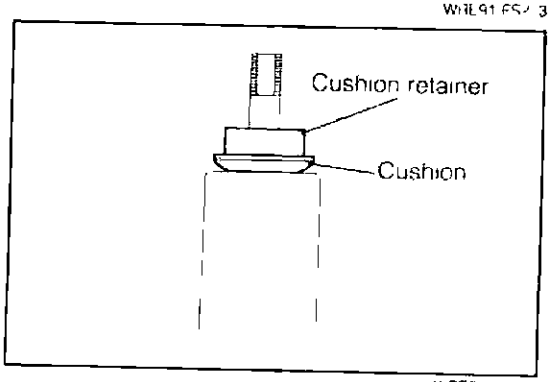
1 Install the bushes to the shock absorber



2 Install the washer to the U-bolt in such a way that the protruded side comes to the bush side

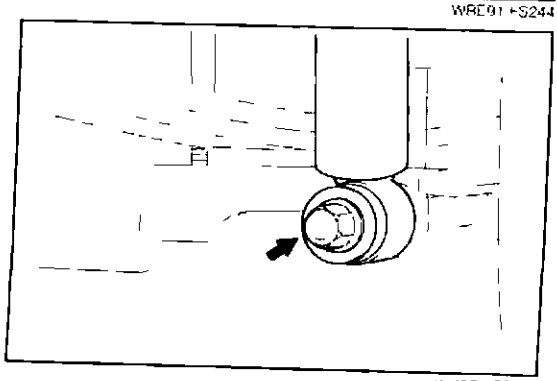


3 Install the cushion retainer to the shock absorber in such a way that the recessed side comes to the cushion side
4 Install the shock absorber to the vehicle, while contracting the shock absorber



5 Assemble the washer to the U-bolt seat side of the shock absorber in such a way that the protruded side of the washer comes to the bush side
6 Tighten the attaching nut to the specified torque with a new spring washer interposed

Tightening Torque: 25.3 - 53.9 N·m (3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)

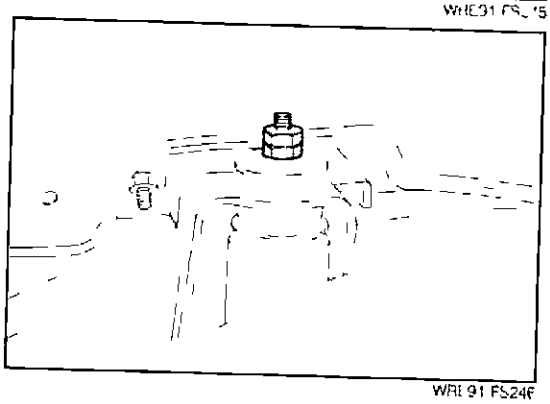


7 Install the cushion and cushion retainer to the shock absorber
8 Tighten the attaching nut of the shock absorber, while holding it at the section across two flats provided at the top of the shock absorber

Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)

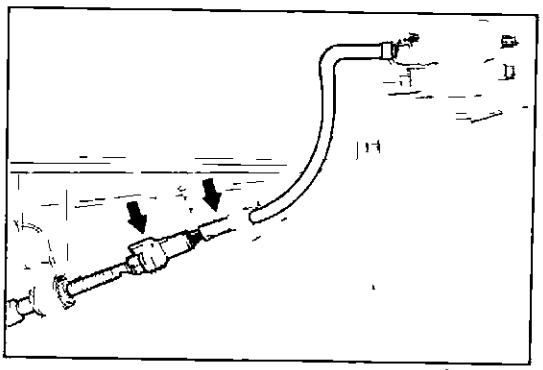
9 Install the lock nut. Tighten the lock nut to the specified torque, while holding the attaching nut

Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)

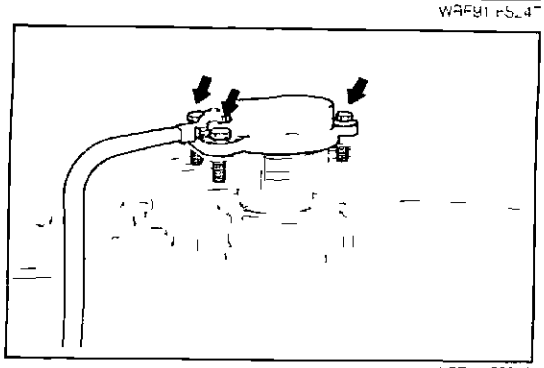


<Three-stage damper>

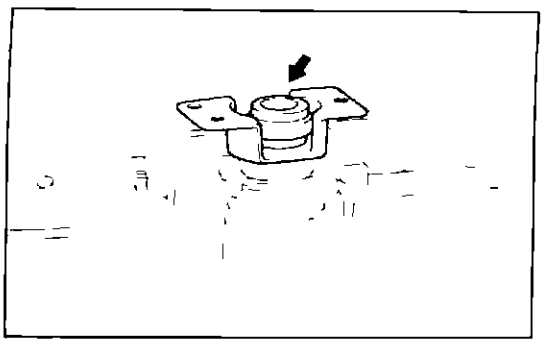
Disconnect the harness of the three-stage actuator
Remove the harness from the clamp



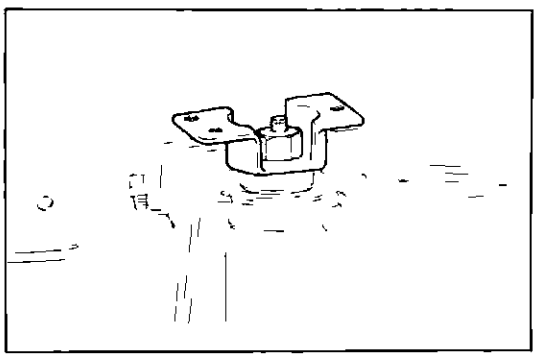
2 Remove the three-stage actuator form the bracket



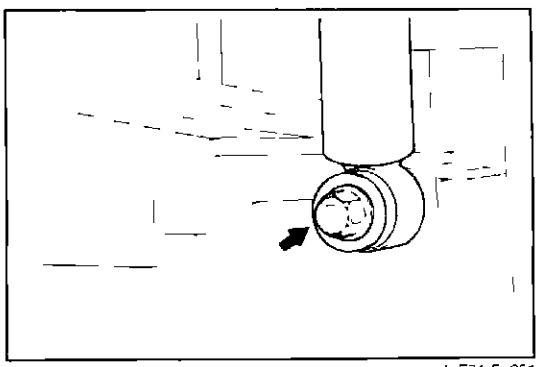
3 Remove the dust-proof cover



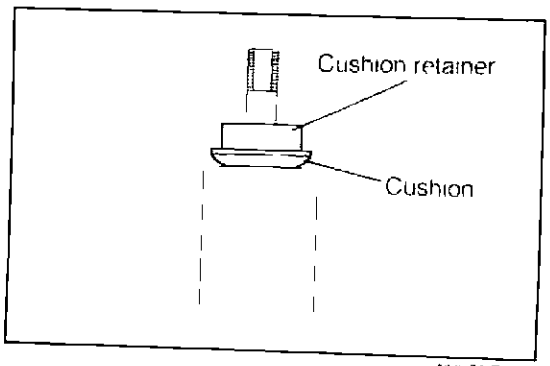
4 Remove the three-stage actuator bracket by removing the attaching nut



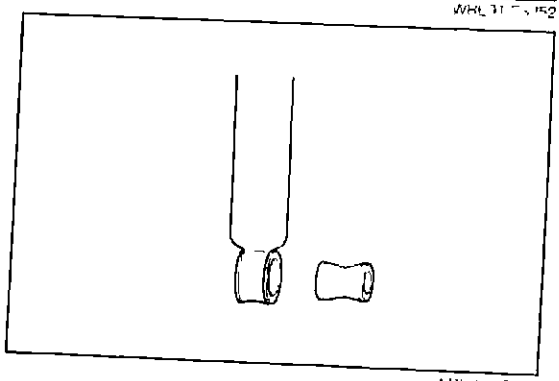
5 Remove the attaching nut at the connecting section of the U-bolt seat of the shock absorber Remove the plate washer and spring washer
6 Remove the shock absorber from the vehicle, while contracting the shock absorber



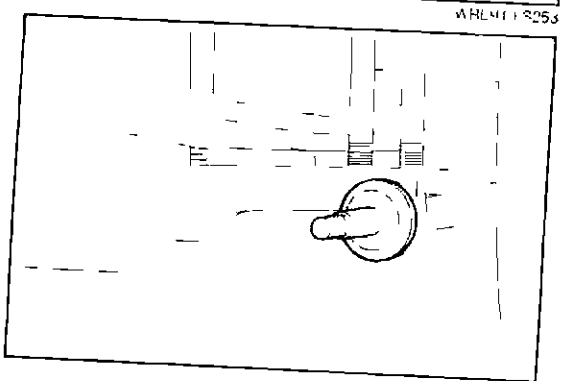
7 Remove the cushion and cushion retainer from the removed shock absorber



8 Remove the bush from the shock absorber

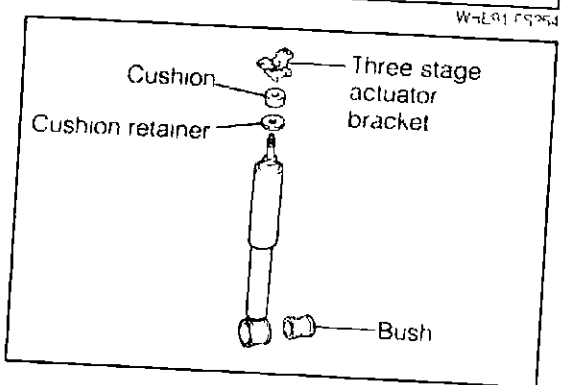


9 Remove the cushion retainer from the U-bolt seat

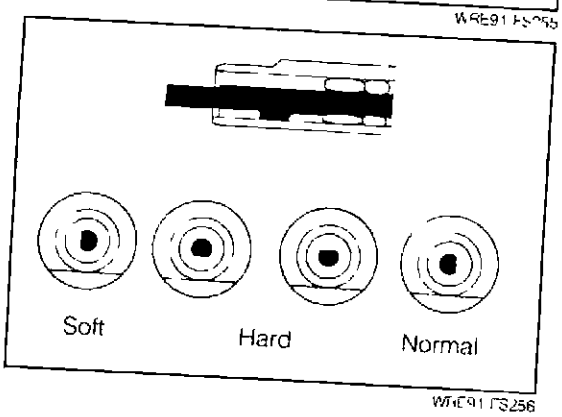


INSPECTION

1 Check that the shock absorber exhibits no defect, such as deformation or oil leakage
2 Check that the bushes, three-stage actuator bracket and/or cushions exhibit no damage, such as cracks or wear



3 Ensure that the rod provided on the upper side of the three-stage damper can be turned easily with a pliers
4 Check to see if damping force varies when the rod is turned to such positions indicated in the right figure

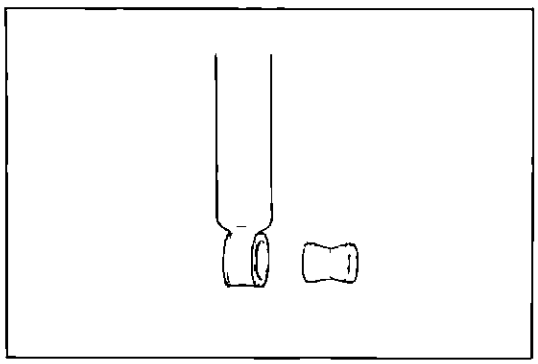


Reference

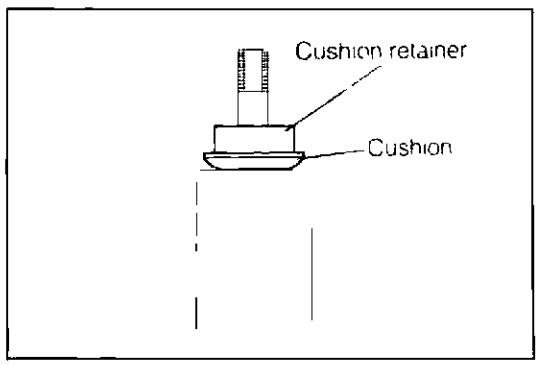
Selecting mode		Soft	Normal	Hard
Damping force kg Rebound/Compression (at a piston speed of 0.3m/s)	Front	118/28	140/41	182/55
	Rear	117/30	135/40	180/47

INSTALLATION

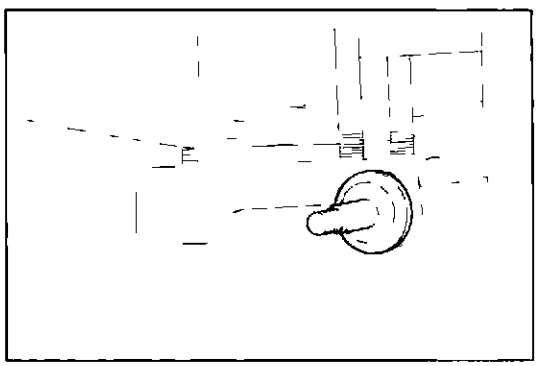
1 Install the bush to the shock absorber



2 Install the cushion retainer and cushion to the shock absorber

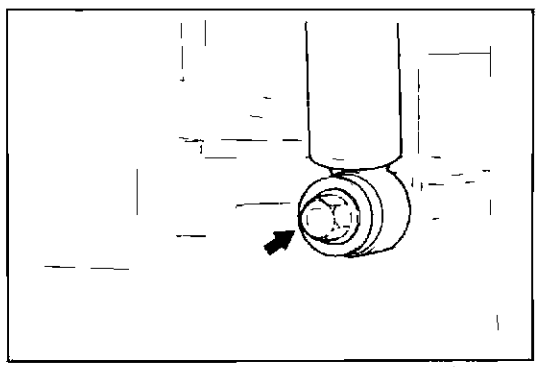


3 Assemble the washer to the U-bolt seat in such a way that the protruded side of the washer comes to the bush side
4 Install the shock absorber to the vehicle, while contracting the shock absorber



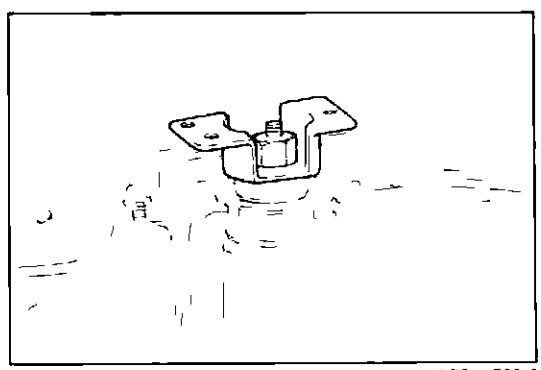
5 Assemble the washer to the U-bolt seat side of the shock absorber in such a way that the protruded side of the washer comes to the bush side
6 Install a new spring washer and nut Tighten the attaching nut to the specified torque

Tightening Torque: 25.3 - 53.9 N·m (3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)

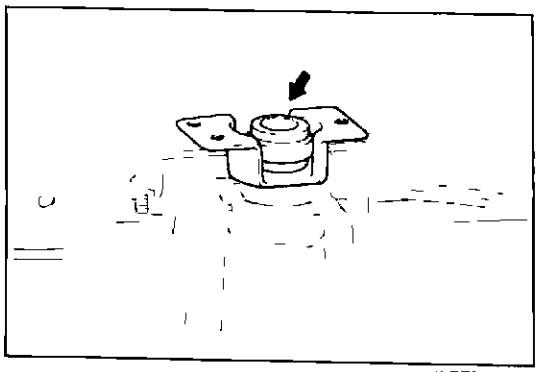


7 Install the three-stage actuator bracket Tighten the attaching nut to the specified torque

Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)

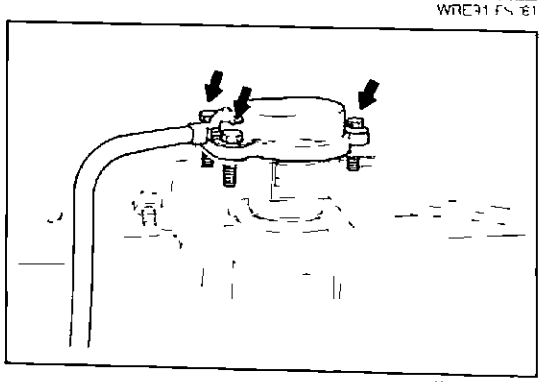


8 Install the dust-proof cover

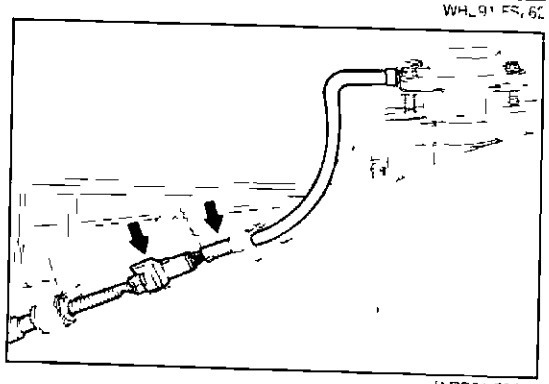


9 Assemble the three-stage actuator, aligning the direction of the rod at the shock absorber side with that of the actuator Tighten the attaching bolt to the specified torque

Tightening Torque: 2.0 - 2.9 N·m (0.2 - 0.3 kgf-m, 1.4 - 2.2 ft-lb)

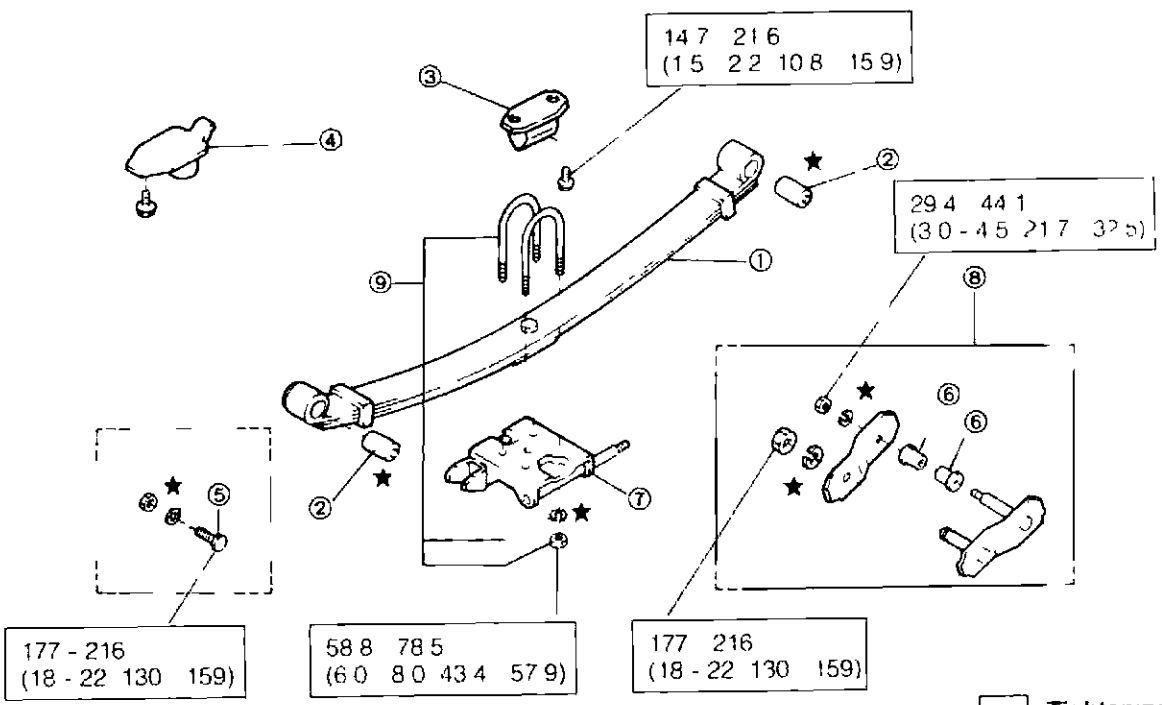


10 Connect the connector of the three-stage actuator Install the clamp in place



FRONT SPRING

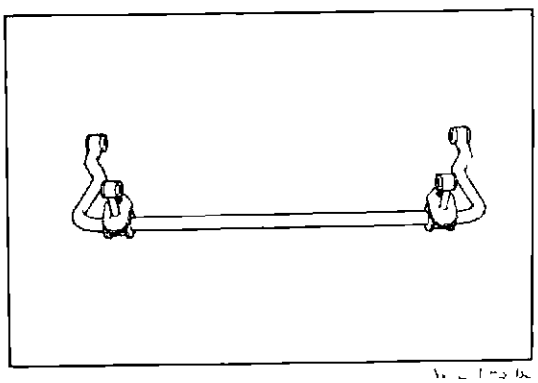
COMPONENTS



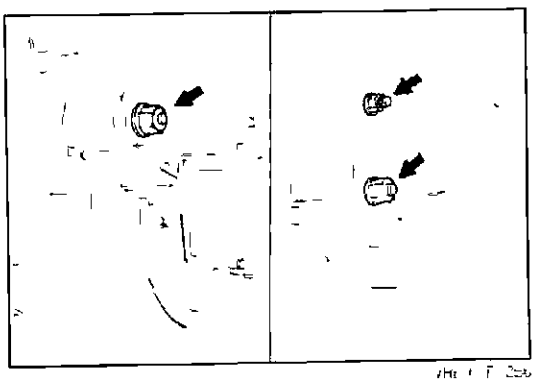
REMOVAL

1 Remove the stabilizer
(See page FS-59)

2 Remove the shock absorber
(See page FS-62)

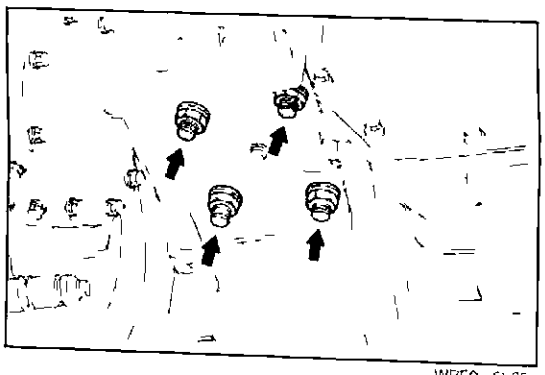


3 Loosen the leaf spring attaching nuts



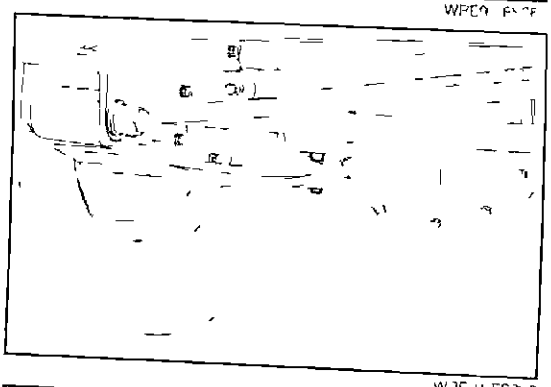
4 Jack up the vehicle at the frame

WARNING
Be sure to use the frame as the jacking-up point of the vehicle.

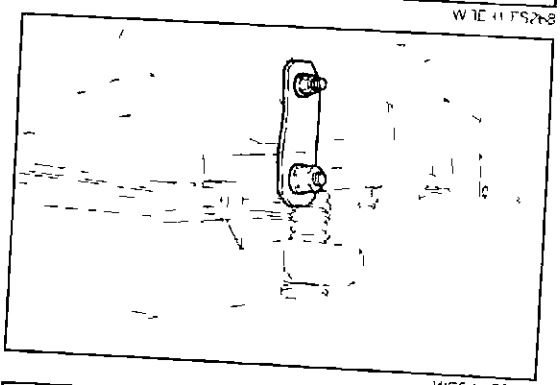


5 Remove the U-bolt nuts

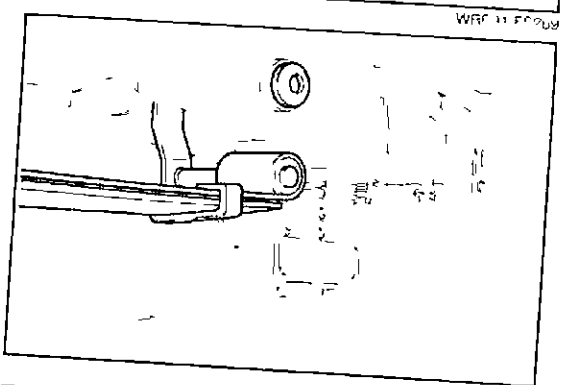
6 Jack down the vehicle, until the front axle housing clears from the leaf spring



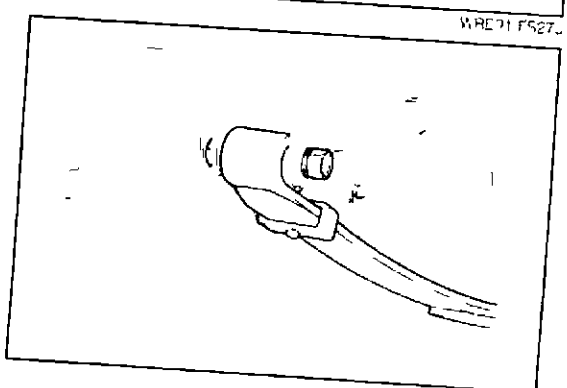
7 Remove the shackle plate



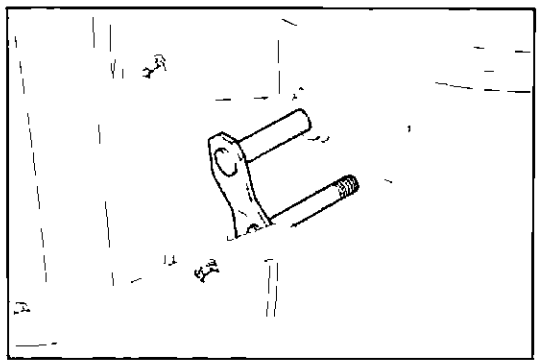
8 Pull out the shackle pin approximately halfway
9 Remove the leaf spring from the shackle pin



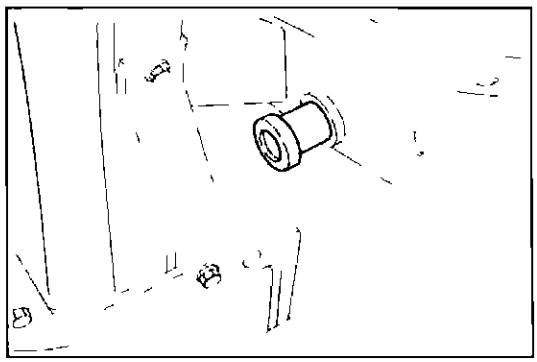
10 Remove the leaf spring connecting nut at the front side, the spring washer and the bolt Remove the leaf spring



11 Remove the shackle pin

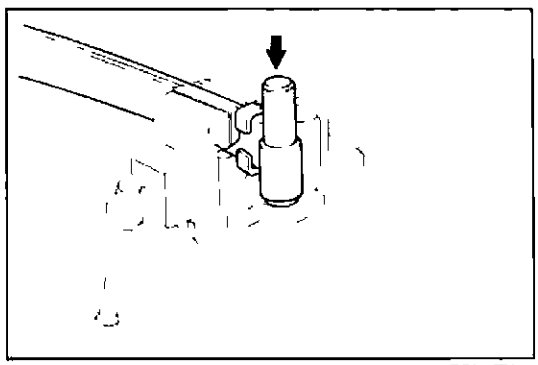


12 Remove the shackle pin bushes at the frame side

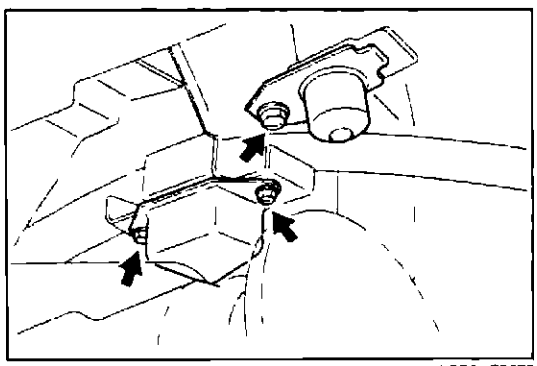


13 Drive out the bush from the leaf spring, using a suitable box wrench or the following SST given below, (as required)
SST: 09608-87608-000

NOTE:
- Do not reuse the bush.

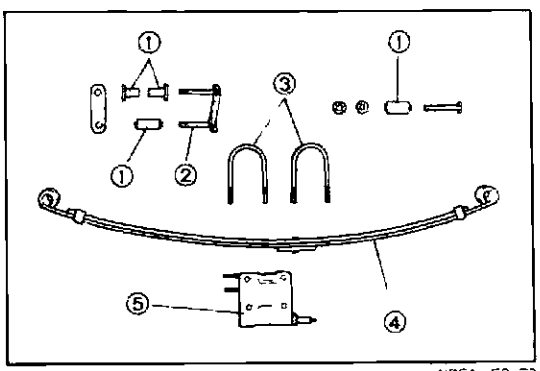


14 Remove the front spring bumper.

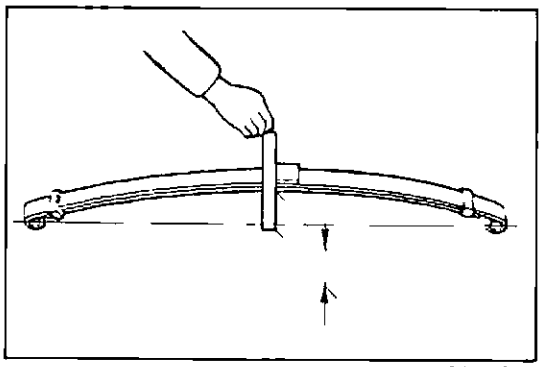


INSPECTION

1 Check of front spring
(1) Inspect the bushes ① for damage or wear
(2) Check the shackle pin ② and spring bracket pin ③ for damage, wear or rust
(3) Check the threaded section of the U-bolts ④ for damage or wear
(4) Inspect the front spring ⑤ for damage or flattened condition
(5) Inspect the U-bolt seat pin ⑥ for damage or rust



2 Measure the height of the spring in order to determine whether the spring exhibits any flattened condition
NOTE
- The numerals below represent the distance of the vertical portion of a line which is drawn vertically and downward from the surface of the leaf spring at the center bolt attaching section of the No.1 leaf spring, until it intersects with a line connecting the centers of the spring bushes.

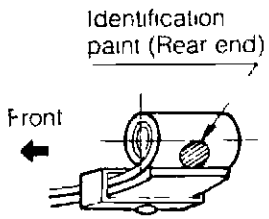


WRE41 FS277

Specified height of spring

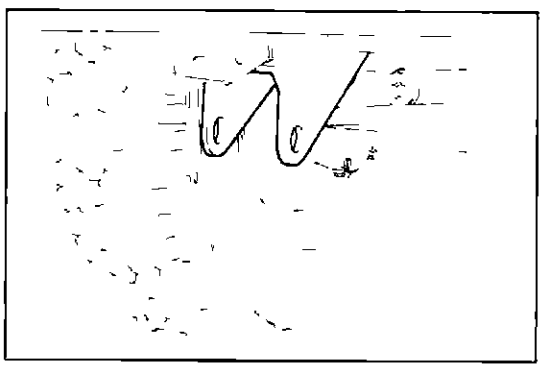
Unit: mm

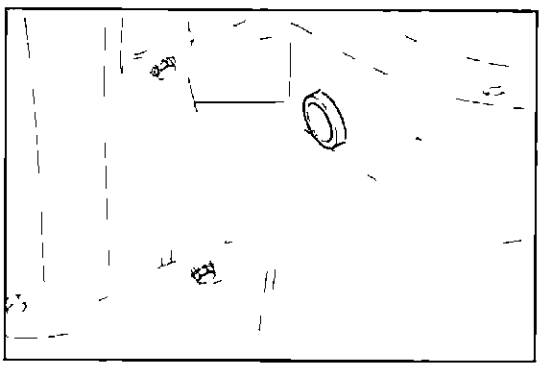
Model	Specifications		With winch	Without winch
F7U	RHD	RH	113 ± 4	102 ± 4
		LH	89 ± 4	90 ± 4
	LHD	RH	102 ± 4	102 ± 4
		LH	102 ± 4	90 ± 4
F7V	RHD	RH	105 ± 4	110 ± 4
		LH	89.5 ± 4	90 ± 4
	LHD	RH	89.5 ± 4	102 ± 4
		LH	89.5 ± 4	102 ± 4
F77	RHD	RH	102 ± 4	110 ± 4
		LH	90 ± 4	90 ± 4
	LHD	RH	90 ± 4	102 ± 4
		LH	102 ± 4	102 ± 4



WRE91 FS278

3 Check that the installation section of the leaf spring and shackle pin at the frame side exhibits no damage



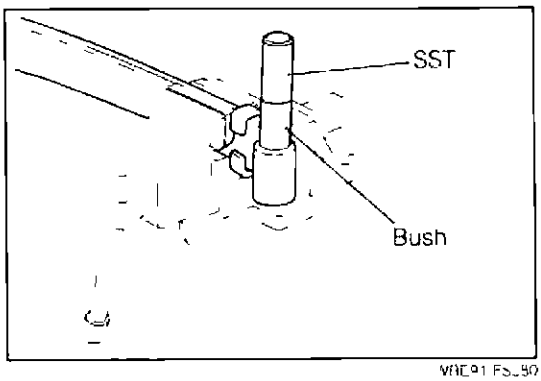


WRE91 FS279

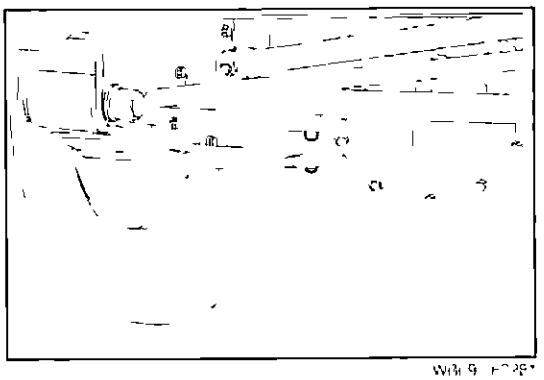
INSTALLATION

1 Press a new bush to the leaf spring, using a suitable box wrench or the following SST given below
SST: 09608-87608-000

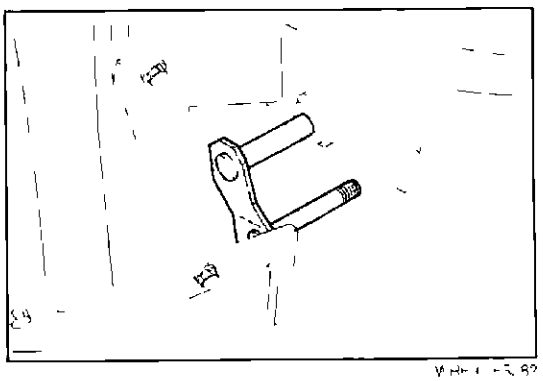
NOTE:
- The bush should be pressed up to the edge surface of the leaf spring.



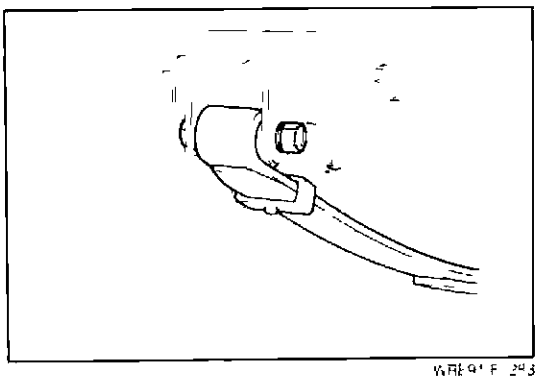
2 Install the shackle pin bushes to the frame side



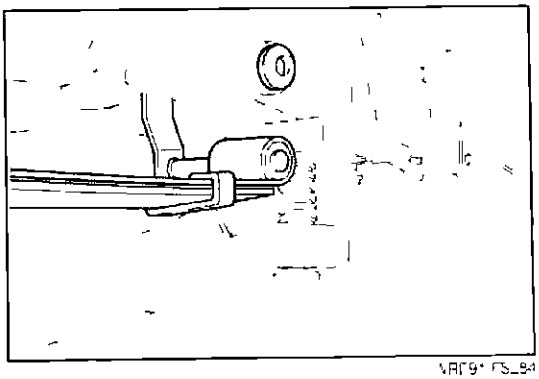
3 Insert the shackle pin approximately halfway into the shackle pin bush



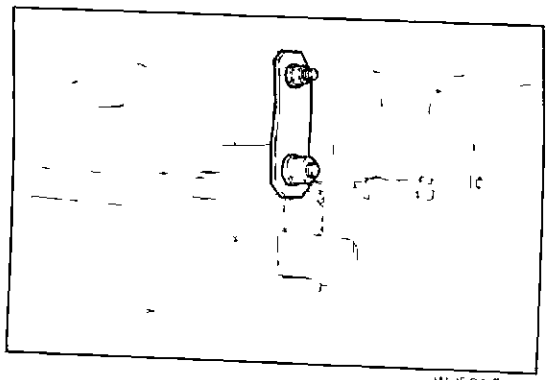
4 Connect the leaf spring to the frame front side Install the bolt, new leaf spring and nut Tighten the nut temporarily



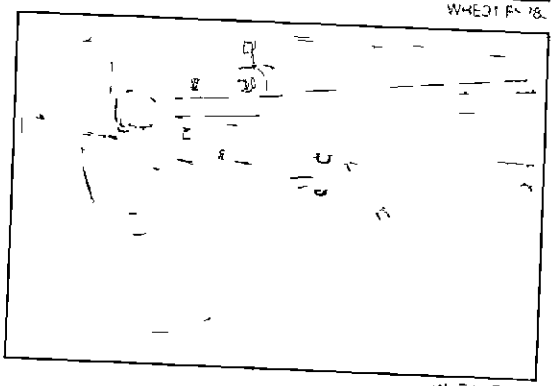
5 Install the leaf spring to the shackle pin Insert the shackle pin fully



6 Install the shackle plate. Install a new spring washer and nut. Tighten the nut temporarily.



7 Jack up the vehicle in such a way that the protruded section of the leaf spring is aligned with the recessed section of the front axle housing.

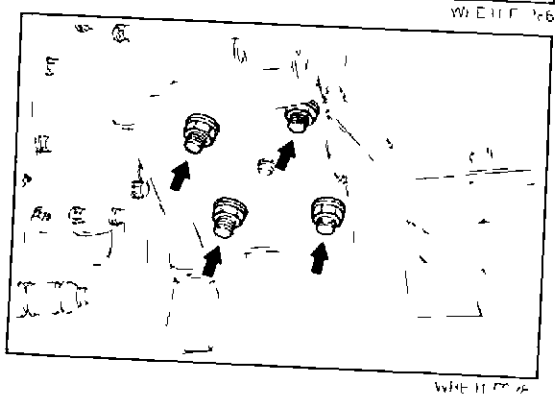


8 Install the U-bolts.
9 Install the U-bolt seat. Evenly tighten the nuts with new spring washers interposed until the specified torque is obtained.

NOTE:

- The U-bolts should be tightened so that the protruding length of each U-bolt may become the same.

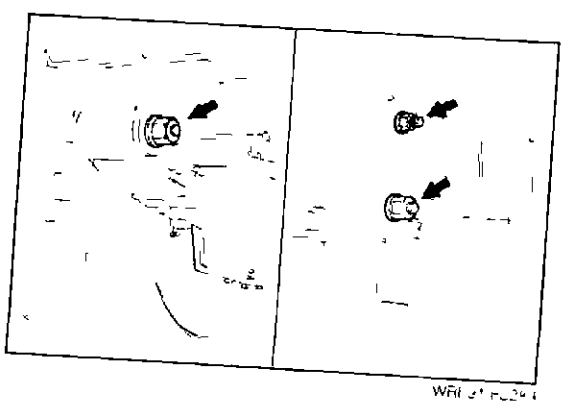
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m, 43.4 - 57.9 ft-lb)



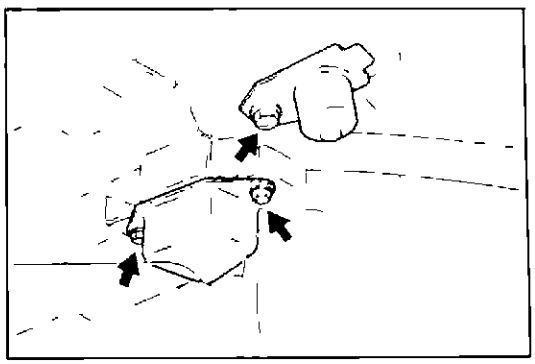
10 Jack down the vehicle.
11 Rock the vehicle in a right-and-left direction several times in order that the vehicle may be settled.

12 Tighten the attaching nuts of the leaf spring to the specified torque.

Tightening Torque:
- Front Side: 177 - 216 N·m (18.0 - 22.0 kgf-m, 130 - 159 ft-lb)
- Shackle Side:
  - 17 mm Nut: 177 - 216 N·m (18.0 - 22.0 kgf-m, 130 - 159 ft-lb)
  - 14 mm Nut: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m, 21.7 - 32.5 ft-lb)



13 Install the front spring bumper



14 Install the shock absorber
(See page FS–67)

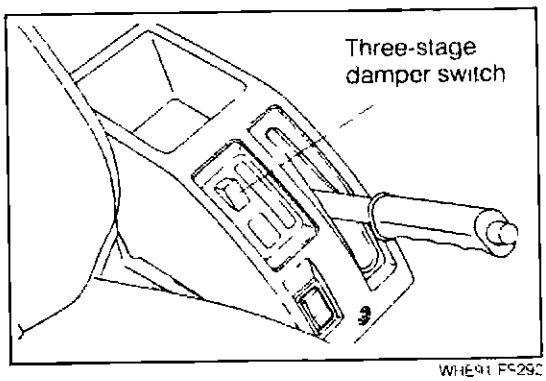
15 Install the stabilizer
(See page FS–61)

THREE-STAGE DAMPER SYSTEM

THREE-STAGE DAMPER SWITCH

REMOVAL

1 Remove the console box
2 Remove the three-stage damper switch
3 Disconnect the connector



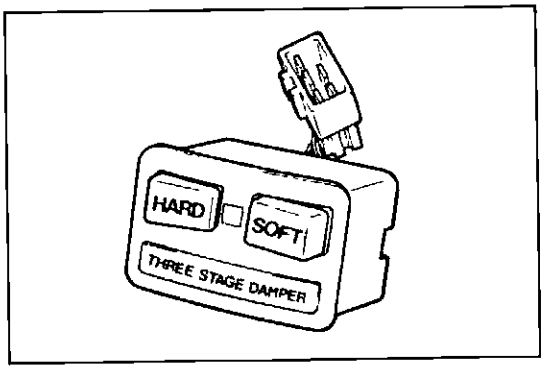
WHE91 FS292

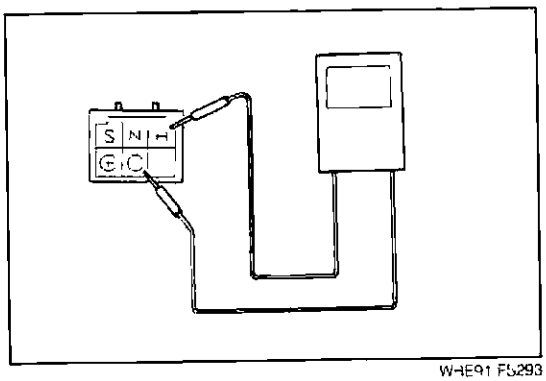
INSPECTION

Ensure that continuity exists between the respective terminals as indicated in the continuity table below, using a tester

○—○ Continuity exists

Terminal / Switch position	⊖	S	N	H	⊕
SOFT	○—○				
NORMAL	○—	—○			
HARD	○—	—	—	—○	





WHE91 FS293

INSTALLATION

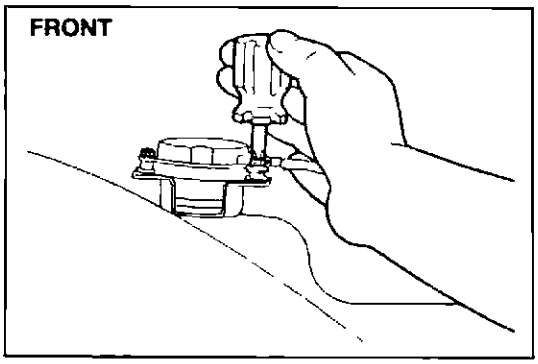
1 Install the three-stage damper switch
2 Connect the connector
3 Install the console box

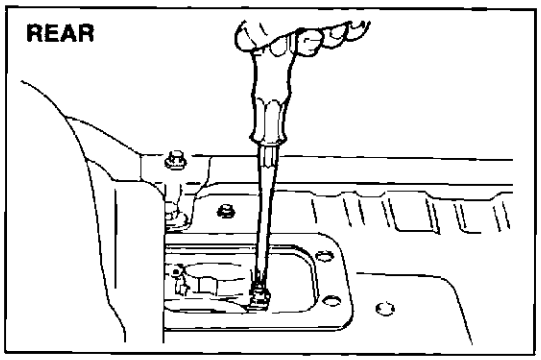
WHE91 FS294

ACTUATOR

REMOVAL

1 Remove the actuator
2 Disconnect the connector

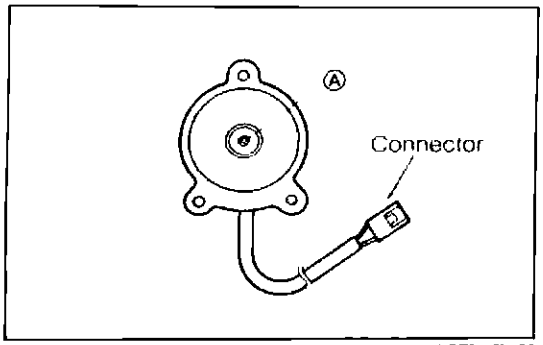




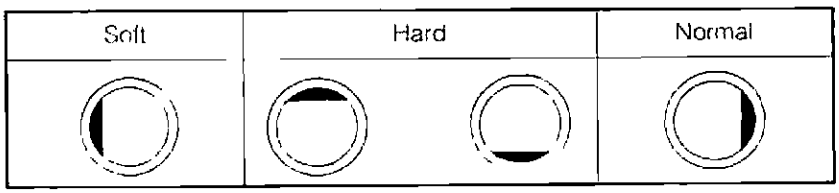
INSPECTION

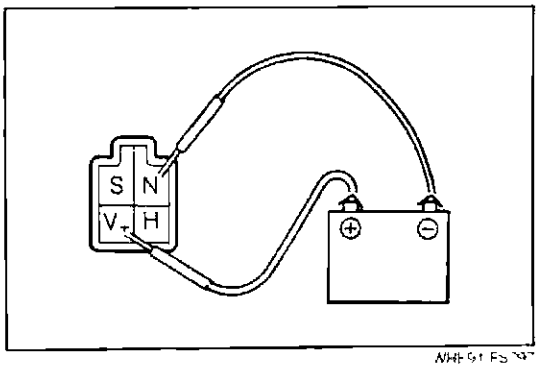
Apply a voltage of 12 V to the connector. Ensure that the center section Ⓐ of the actuator rotates in accordance with the table below

Terminal / Switch position	S	N	H	V+
SOFT	⊖			⊕
NORMAL		⊖		⊕
HARD			⊖	⊕



Position of Ⓐ at each switch position





INSTALLATION

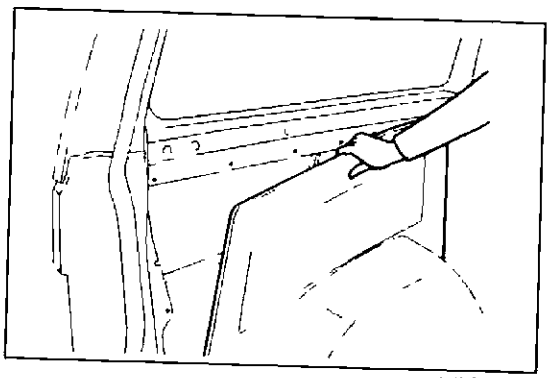
1 Install the actuator
2 Connect the connector

ECU

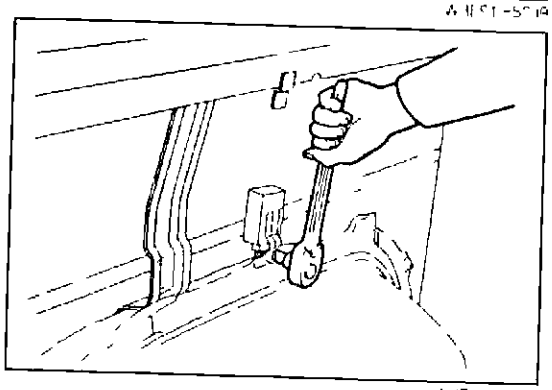
Replace the ECU if the three-stage damper switch and actuator exhibit no abnormality

REMOVAL

1 Remove the left quarter inside trim board



2 Remove the ECU
3 Remove the connector



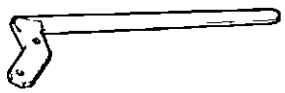
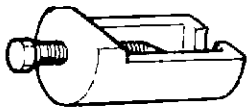
INSTALLATION

1 Install a new ECU
2 Connect the connector
3 Install the quarter inside trim board

NOTE:

- Ensure that the connector has been installed properly.

SSTs (Special Service Tools)

Shape	Parts No and Name	Purpose	Remarks
	09608-20011-000 Front hub & drive pinion bearing tool set	Replacing the outer race of rear alxe hub	
	09607-60020-000 Front hub bearing lock nut wrench	Removal/Installation of front hub bearing lock nut wrench	
	09511-87202-000 Brake drum stopper	Prevent the axle hub from turning	
	09308-00010-000 Oil seal puller	Removal of 'T" type oil seal	
	09610-20012-000 Pitman arm puller	Disconnect the ball joint from steering knuckle	
	09517-30010-000 Rear axle shaft oil seal replacer	Replacing "T" type oisl seal of front axle housing end	
	09608-87608-000 Leaf spring bush No 1 remover & replacer	Removal/Installation of leaf spring bush	

WRE91 FS302

SERVICE SPECIFICATION

Toe-in	Other than listed below	0 - 8 mm
	215R15 215/80R15 255/70R15, H78-15 4	-3 - 5 mm
Side slip		0 - 3 mm
Camber	(degree)	1°00′ ±1°
Caster	(degree)	1°30′ ±1°
King pin angle	(degree)	9°30′ ±1°
Turning angle (degree)	H78-15 4 215R15 215SR 15 225/70R-15 215/80R 15	Inner 28, Outer 26
	Other than those listed above (F77)	Inner 30 (29) Outer 28 (27)

Tire pressure

Unit kgf/cm² (psi) <kPa>

Specification and destination	Tire size		Unloaded		Loaded	
			FRONT	REAR	FRONT	REAR
General specification	6 00-16-4		1 6 (23) [1 8 (26)]	2 1 (30) [2 1 (30)]	1 6 (23) [1 8 (26)]	2 1 (30) [2 1 (30)]
EC specification	H78-15-4 (H78 15)		1 8 (26) <180> [1 8]	1 8 (26) <180> [1 8]	1 8 (26) <180> [1 8]	1 8 (26) <180> [1 8]
Australian specification	215R15 100Q (215R15)		1 8 (26) <180> [1 8]	1 8 (26) <180> [1 8]	1 8 (26) <180> [1 8]	1 8 (26) <180> [1 8]
NOTE < > Australian spec [ ] with winch	215SR15		1 8 (26)	1 8 (26)	1 8 (26)	1 8 (26)
	255/70R15 108Q		1 8 (26) <180>	1 8 (26) <180>	1 8 (26) <180>	1 8 (26) <180>
	6 50-16C-8		1 8 (26) <180>	2 4 (34) <240>	1 8 (26) <180>	4 25 (61) <425>
	6 50-16-4 (Sand tire)		1 6 (23) on road	2 1 (30) on road	1 1 (16) on sand	1 3 (18) on sand
Pick-up General specification LC specification Australian specification	6 00-16C-6		1 8 (26)	2 4 (34)	1 8 (26)	3 25 (46)
	215R15 215R15C-8		1 8 (26) <180>	1 8 (26) <180>	1 8 (26) <180>	4 25 (61) <425kPa>
	7 50-16-8 (Sand tire)		1 8 (26) on road	4 25 (61) on road	1 8 (2 6) on sand	2 4 (34) on sand
	6 50-16C-8		1 8 (26) <180>	2 4 (34) <240>	1 8 (26) <180>	4 25 (61) <425>
G C C specification Saudi Arabian specification without winch	215/80R-15 100Q (215SR15)	F70	1 6 (23)	1 6 (23)	1 6 (23)	1 6 (23)
		F75	1 4 (20)	1 4 (20)	1 4 (20)	1 6 (23)
	6 00-16-4		1 6 (23)	2 1 (30)	1 6 (23)	2 1 (30)
	H78-15-4	F70	1 6 (23)	1 6 (23)	1 6 (23)	1 6 (23)
		F75	1 4 (20)	1 4 (20)	1 4 (20)	1 6 (23)
	6 50-16-4 (Sand tire)		1 6 (23) on road	2 1 (30) on road	1 1 (16) on sand	1 3 (18) on sand
G C C specification Saudi Arabian specification with winch	6 00-16-4		1 8 (26)	2 1 (30)	1 8 (26)	2 1 (30)
	H78-15-4		1 6 (23)	1 6 (23)	1 6 (23)	1 6 (23)
	215/80R15 100Q (215SR15)		1 6 (23)	1 6 (23)	1 6 (23)	1 6 (23)
	6 00-16C-6		1 8 (26)	2 4 (34)	1 8 (26)	3 25 (46)
	6 50-16-4 (Sand tire)		1 6 (23) on road	2 1 (30) on road	1 1 (16) on sand	1 3 (18) on sand

WRE91 FS303

Disc wheel runout		Not to exceed 1 0 mm
Tire runout	Radial runout	Not to exceed 1 4 mm
	Lateral runout	Not to exceed 2 0 mm
Front axle hub grease		Lithium-based MP grease
Front axle hub	Starting torque	1 4 - 3 6 kgf
	Reference Starting torque	0 98 - 2 45 N m (10 - 25 kgf-cm, 8 7 - 21 7 inch-lb)
Steering knuckle starting torque starting load		16 7 - 41 2 N cm (1 7 - 4 2 kgf-cm, 1 5 - 3 6 inch-lb) 0 1 - 0 3 kgf

Front spring free hight

Unit mm

Model \ Specifications			With winch	Without winch
F70	RHD	RH	113 ± 4	102 ± 4
		LH	89 ± 4	90 ± 4
	LHD	RH	102 ± 4	102 ± 4
		LH	102 ± 4	90 ± 4
F75	RHD	RH	105 ± 4	110 ± 4
		LH	89 5 ± 4	90 ± 4
	LHD	RH	89 5 ± 4	102 ± 4
		LH	89 5 ± 4	102 ± 4
F77	RHD	RH	102 ± 4	110 ± 4
		LH	90 ± 4	90 ± 4
	LHD	RH	90 ± 4	102 ± 4
		LH	102 ± 4	102 ± 4

WRE91 FS305

TIGHTENING TORQUE

Tightening component		N-m	kgf-m	ft-lb
Tiered > adjusting nut	Temporarily tightening	19 6 - 29 4	2 0 - 3 0	14 5 - 21 7
	Final tightening	118 - 167	12 0 - 17 0	87 - 123
Knuckle stopper bolt lock nut		39 2 - 53 9	4 0 - 5 5	28 9 - 39 8
Front axle hub × Front disc		53 9 - 73 5	5 5 - 7 5	39 8 - 54 2
Front axle bearing lock nut, lock × Lock nut (Torx® T20)		4 9 - 8 8	0 5 - 0 9	3 6 - 6 5
Axle outer shaft flange × Front alxe hub (wet)		58 8 - 68 6	6 0 - 7 0	43 4 - 50 6
Free wheel hub assembly × Front axle hub (wet)		58 8 - 68 6	6 0 - 7 0	43 4 - 50 6
Brake drum (Automatic locking hub) × Lock nut (Torx® T20)		4 9 - 8 8	0 5 - 0 9	3 6 - 6 5
Brake mounting support × Steering knuckle		68 6 - 88 3	7 0 - 9 0	50 6 - 65 1
Free wheel hub cover × Free wheel locking hub		7 8 - 11 8	0 8 - 1 2	5 8 - 8 7
Bolt with plate washer (Automatic locking hub) × Drive shaft		14 7 - 21 6	1 5 - 2 2	10 8 - 15 9
Oil seal cover plate × Steering knucle		9 8 - 15 7	1 0 - 1 6	7 2 - 11 6
Steering knuckle bearing cap × Steering knucle		17 7 - 29 4	1 8 - 3 0	13 0 - 21 7
Disc brake dust cover × Steering nut		39 2 - 53 9	4 0 - 5 0	28 9 - 39 8
Lateral control rod × Frame		128 - 157	13 0 - 16 0	94 - 116
Lateral control rod × Front axle		49 - 78	5 0 - 8 0	36 2 - 57 9
Stabilizer × Front axle		29 4 - 44 1	3 0 - 4 5	21 7 - 32 5
Stabilizer link sub assembly × Stabilizer braket cover		18 6 - 30 4	1 9 - 3 1	13 7 - 22 4
Stabilizer link sub assembly × Frame		29 4 - 44 1	3 0 - 4 5	21 7 - 32 5
Front shock absorber × Frame		18 6 - 30 4	1 9 - 3 1	13 7 - 22 4
Front shock absorber × Front spring seat		34 3 - 53 9	3 5 - 5 5	25 3 - 39 8
Front shock absorber × Actuator braket		18 6 - 30 4	1 9 - 3 1	13 7 - 22 4
Absorber control actuator braket × Control actuator		2 0 - 2 9	0 2 - 0 3	1 4 - 2 2
Front spring bumper × Frame		14 7 - 21 6	1 5 - 2 3	10 8 - 15 9
U bolt × Spring seat		58 8 - 78 5	6 0 - 8 0	43 4 - 57 9
Front spring × Frame		177 - 216	18 0 - 22 0	130 - 159
Front spring × Shackle		177 - 216	18 0 - 22 0	130 - 159
Shackle × Frame		29 4 - 44 1	3 0 - 4 5	21 7 - 32 5

WRE91 FS304

DAIHATSU

F70,F75,F77

Service manual

FUEL SYSTEM

FU

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

FUEL SYSTEM

PRECAUTIONS ..... FU– 2
TROUBLE SHOOTING ..... FU– 2
OUTLINE OF FUEL SYSTEM ..... FU– 3
INJECTION PUMP ..... FU– 4
FUEL FILTER FU–10
INJECTION NOZZLE FU–14
SST FU–18
SPECIFICATIONS FU–19

WRE91-FU001

PRECAUTIONS

1. Before working on the fuel system, be sure to disconnect the ground cable from the negative (–) terminal of the battery.
2. When working on the fuel system, never allow any naked fire to be brought near the working site. Also, never smoke cigarette or the like.
3. Do not allow the fuel to get to any parts made of rubber or resin.
4. Do not work on the fuel system of more than one vehicle at the same time.
5. Be certain to keep each part of the fuel system from contamination.
6. Be very careful not to allow any dirt or the like be mixed into the fuel system during the servicing operation.
7. Make sure to keep the working site clean. Also, be sure not to loose any part, specifically small parts.
8. Never loose nor mix up those pins, clips and springs with each other.

TROUBLE SHOOTING

WRE91-FU002

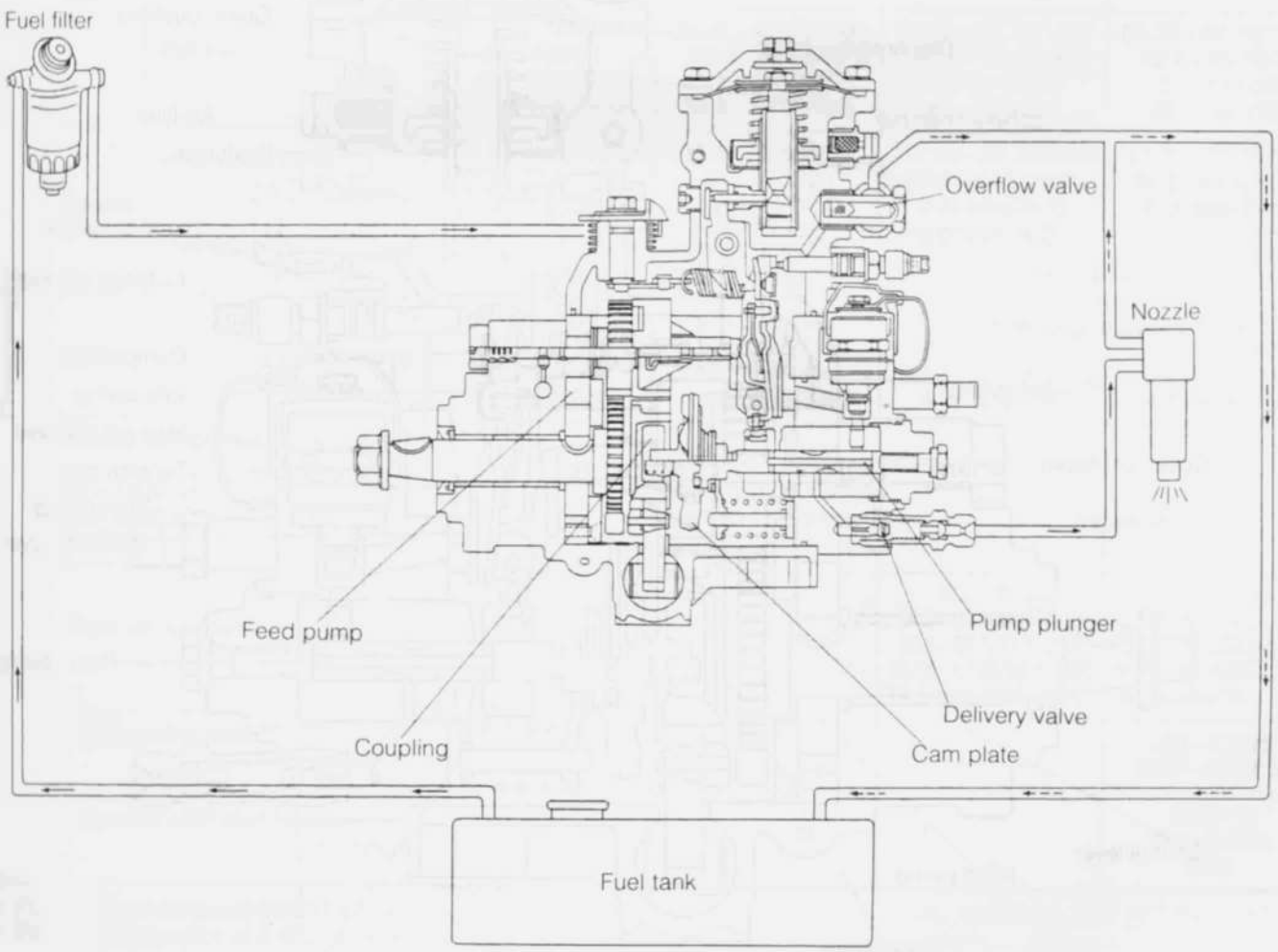
Problem	Possible cases	Remedy	Page
Engine will not start/Hard to start (Only cases where cranking by starter motor is normal)	Fuel line clogged Fuel line bent or kinked Fuel filter clogged Incorrect injection timing Injection nozzle faulty Injection pump faulty	 Reset injection timing Check injection nozzle Inspect injection pump	FU–3 EM–11
Rough idle/Engine stalls	Incorrect valve clearance Incorrect idle speed Incorrect injection timing Fuel leakage • Injection pipe • Injection nozzle • Delivery valve Injection pump faulty	Adjust valve clearance Adjust idle speed Reset injection timing Check fuel line Inspect injection pump	EM–10 EM–13 EM–11 FU–3 FU–4
Lack of power	Incorrect injection timing Fuel leakage • Injection pipe • Injection nozzle • Delivery valve Injection pump faulty	Reset injection timing Check fuel line Inspect injection pump	EM–10 FU–4
Engine emits large quantity of exhaust smoke	Incorrect injection timing Injection nozzle faulty Injection pump faulty	Reset injection timing Check injection nozzle Inspect injection pump	EM–10 FU–4

WRE91-FU003

OUTLINE OF FUEL SYSTEM

Fuel is sucked from the fuel tank by means of a feed pump through a sedimentor and a fuel filter.
The feed pump, which is built inside the injection pump, sends fuel directly to the pump housing so as to lubricate the sliding section.
Then, the pump plunger causes the fuel to be injected from the injection nozzle under a high pressure in accordance with the injection order. On the other hand, any excess fuel inside the pump housing returns to the fuel tank through an overflow pipe.
In this way, cooling and lubrication take place in the injection pump by the fuel recirculation.
On the other hand, the fuel is recirculated inside the pump during cold season.
As a result, the fuel is warmed up, thereby preventing it from becoming a wax state.

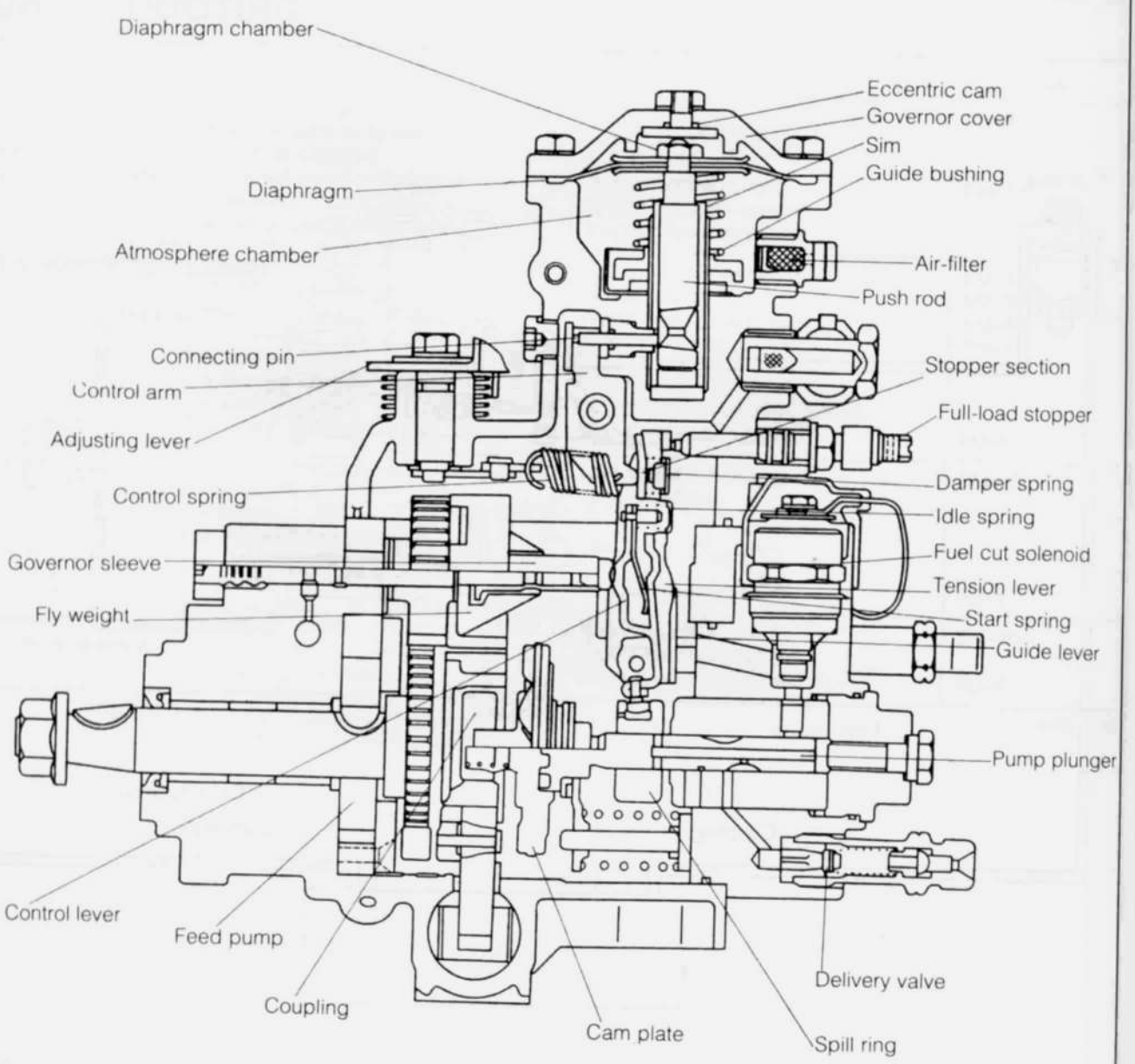
FUEL SUPPLY SYSTEM



WRE91-FU004

INJECTION PUMP

As for the injection pump, Type VE injection pump is employed.
Two types of the injection pump have been provided for each of Type DL-42 engine and Type DL-52 engine.
Consequently, an optimum fuel supply is achieved for the respective engines.



WRE90-FU005

MAIN SPECIFICATIONS OF INJECTION PUMP

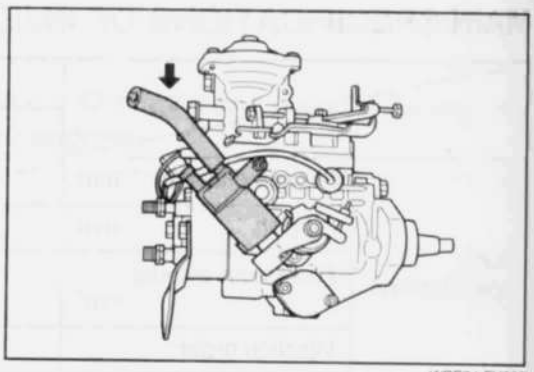
			DL-42		DL-52	
			STD	OPT	General	Austria-Switzerland
Pump specifications		Plunger diameter mm	9	9	9	9
		Cam lift mm	2.2	2.2	2.2	2.2
		Fuel return amount mm^3	40	40	37.5	37.5
		Injection order	ABCD	ABCD	ABCD	ABCD
		Governor specifications	All speed	All speed	All speed	All speed
Characteristics	Overflow amount (L/h/rpm)		21 - 47/1900	21 - 47/1900	17 - 37/1700	17 - 37/1700
	Injection amount	Fuel increase at starting (mm^3/st/rpm)	66 - 85/100	66 - 85/100	66 - 85/100	66 - 85/100
		End of fuel increase effect (mm^3/st/rpm)	41.5 - 50.5/400	41.5 - 50.5/400	50 - 58/350	50 - 58/350
		Full load (mm^3/st/rpm)	42 15 - 43.65/1100 38 - 43/500 44 - 49/1450 40.5 - 44.5/1900	39.25 - 40.75/1100 35.1 - 40.1/500 41.1 - 46.1/1450 38.6 - 43.6/1900	65.75 - 67.75/1100 42.7 - 45 7/500 51 - 54/680 65 - 70/1700	65.75 - 67 75/1100 42.7 - 45.7/500 51 - 54/680 65 - 70/1700
	Governor	High-speed side (mm^3/st/rpm)	16.5 - 24.5/2250 24 5 - 32 5/2100 2 or less/2600	17.5 - 23.5/2250 35 - 43/2100 2 or less/2450	*1 17.75 - 27.75/2250 56.5 - 64 5/1800 2 or less/2500	*1 17.75 - 27.75/2250 56.5 - 64 5/1800 2 or less/2500
		Low-speed side (mm^3/st/rpm)	6 5 - 11 5/350 2 or less/500	6.5 - 11 5/350 2 or less/500	*2 6.5 - 11.5/350 2 or less/500	*2 6.5 - 11 5/350 2 or less/500
	Timer (mm/rpm)		0 - 1.0/700 2.0 - 3.0/1100 3 7 - 4 7/1450 5.7 - 6.5/2250	0 - 0.98/700 1.85 - 2.85/1100 3.5 - 4.5/1450 6.15 - 6 95/2250	*1 0.7 - 1 7/700 2.3 - 3 3/1100 4.1 - 5.1/1500 4.9 - 5.7/1750	*1 0 6 - 1.6/750 2.2 - 3.2/1100 3 4 - 4.4/1500 4.1 - 4 9/1600
	Altitude compensation device (mm^3/st/kPa(mmHg)) (N = 1100 rpm With lever set to full stroke position)		— — —	38.5 - 41/94.6 (710) 33.8 - 37 8/82.7 (620) 30.3 - 33.7/70.7 (530)	— — —	— — —
	Boost compensator (mm/kPa (mmHg))		— — — — —	— — — — —	42 7 - 49 7/0 51 2 - 55 2/24.0 (180) 55.6 - 59 6/33.3 (250) 65.75 - 67.25/66.7 (500) 66.5 or less/106.7 (800)	42.7 - 49 7/0 51 2 - 55 2/24.0 (180) 55 6 - 59 6/33 3 (250) 65 75 - 67 25/66 7 (500) 66 5 or less/106.7 (800)
	Load sensing timer mm/mm^3/st)		— —	— —	— —	1.53 - 2.53/50 3.38 - 4 38/Full
	Automatic cold start device (mm/°C)		— — —	— — —	— — —	2.05/–10 0.6 - 0.9/25 0/45

* 1: Pb = Characteristics at 66.7 kPa (500 mmHg)
* 2 Pb = Characteristics at 0 kPa (0 mmHg)

WRE91-FU006

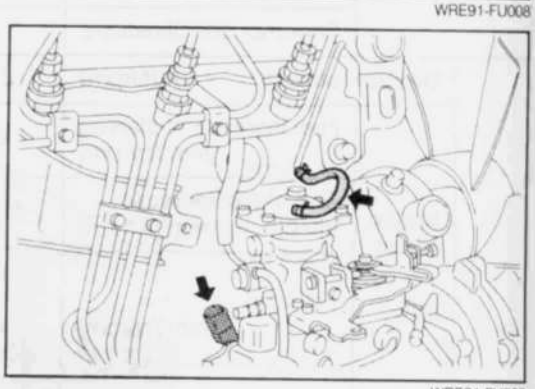
REMOVAL OF INJECTION PUMP

1. Drain the coolant.
   (ACSD equiped vehicle only)
2. Disconnect the water hose from ACSD.
   (ACSD equiped vehicle only)



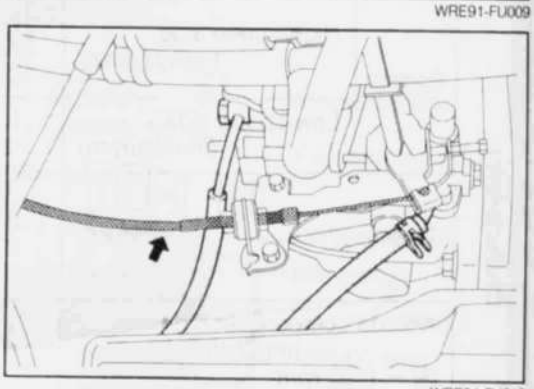
WRE91-FU008

3. Disconnect the boost compensator hose.
   (DL-52 engine only)
4. Disconnect the connector for fuel cut solenoid



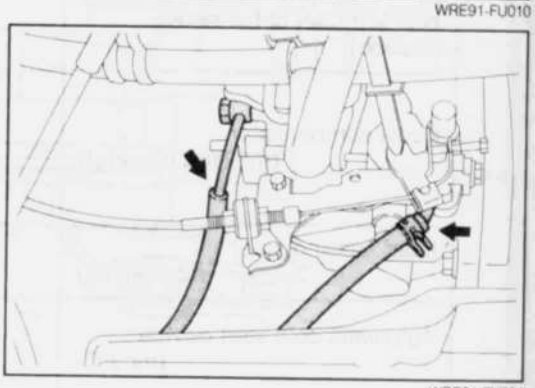
WRE91-FU009

5. Remove the accelerator cable.



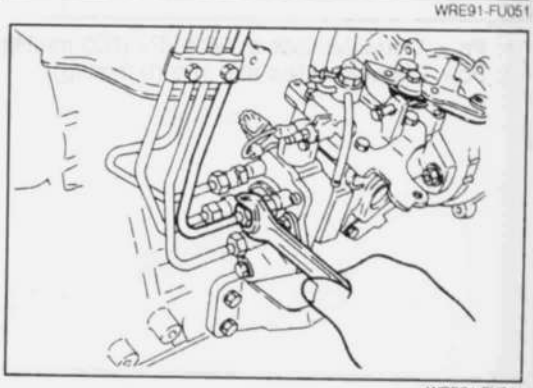
WRE91-FU010

6. Disconnect the fuel hoses from inlet and outlet fuel pipes.



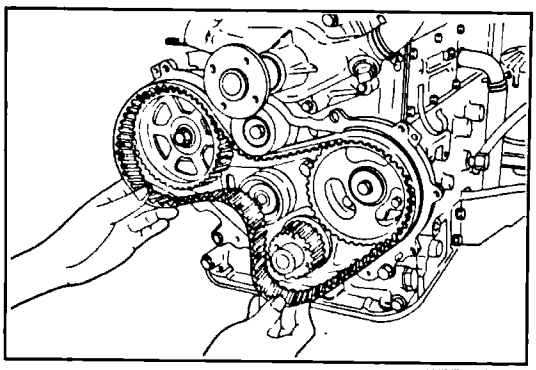
WRE91-FU051

7. Remove the four injection pipes.
   Disconnect the injection pipe from the injection pump and the injection nozzle.



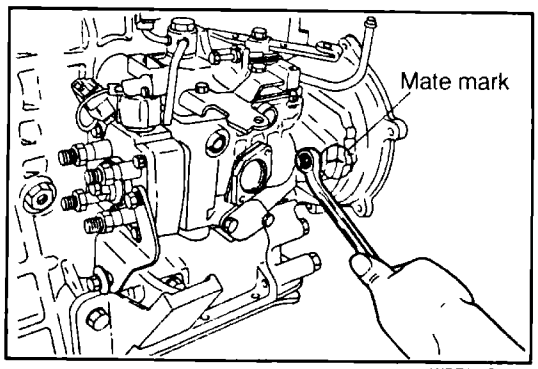
WRE91-FU011

8. Remove the timing belt.
(See page EM–30.)



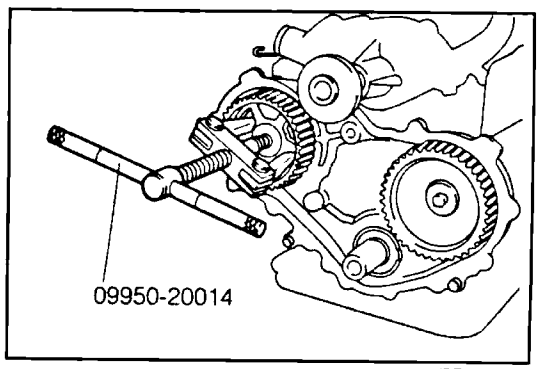
WRE91-FU012

9. Remove the injection pump timing belt pulley.



WRE91-FU052

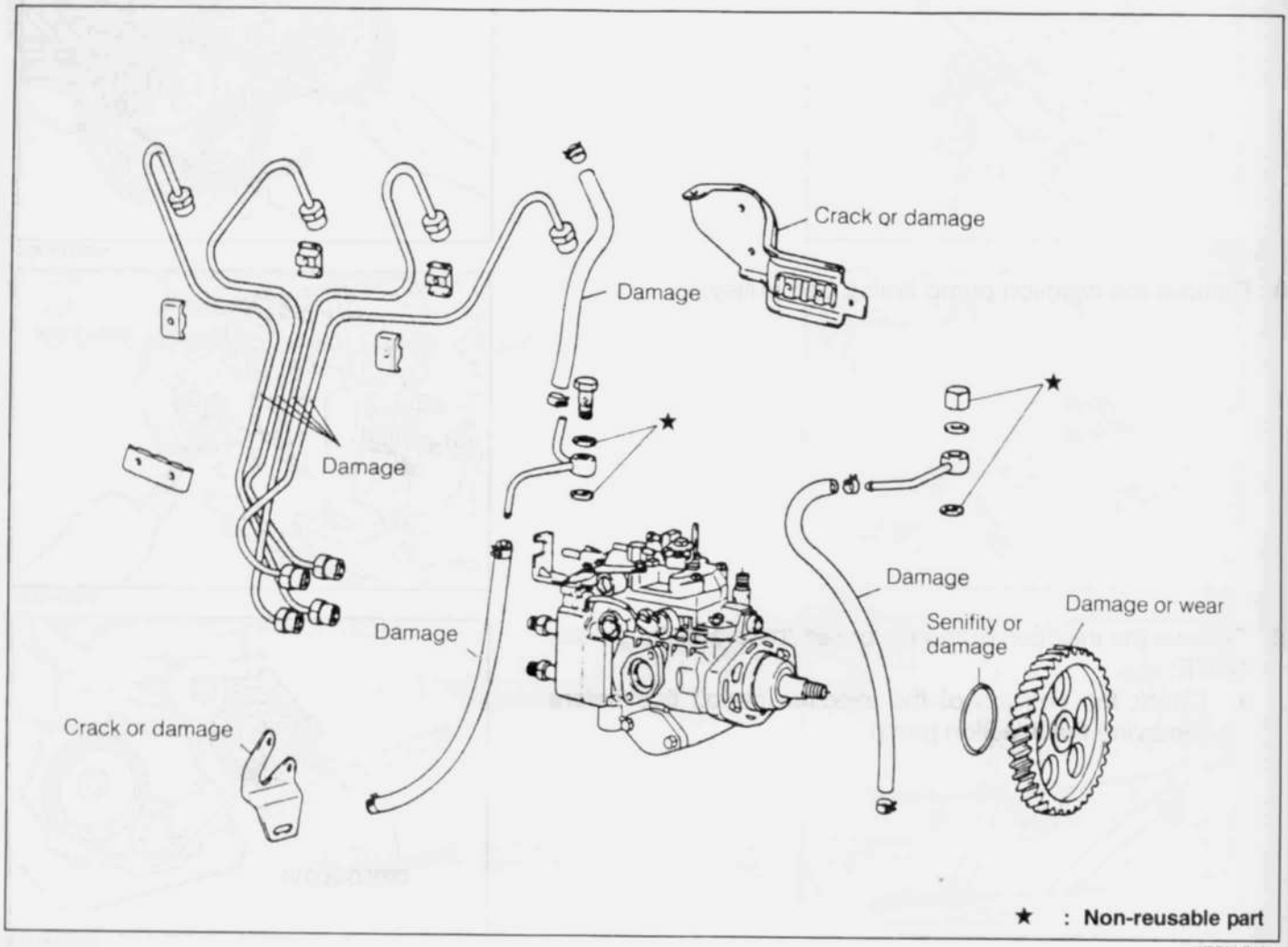
10 Remove the injection pump by loosen three attaching nuts.
NOTE:
- **Check the position of the injection period line before removing the injection pump.**



WRE91-FU013

INSPECTION

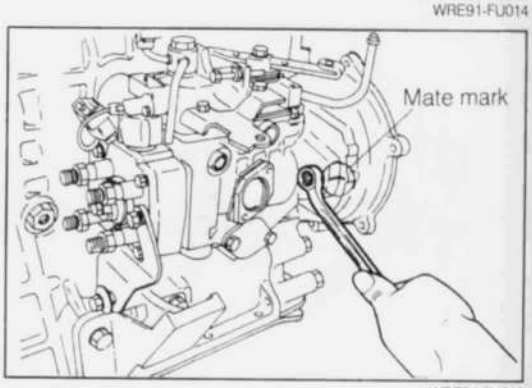
Inspect the following parts, replace any part that exhibits defects.



WRE91-FU014

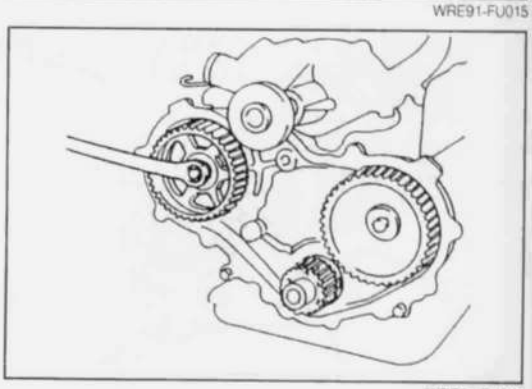
INSTALLATION OF INJECTION PUMP

1. Install the injection pump.
   Align the mate mark on the injection pump with mate mark on timing gear case side.
   Tighten the injection pump temporarily.



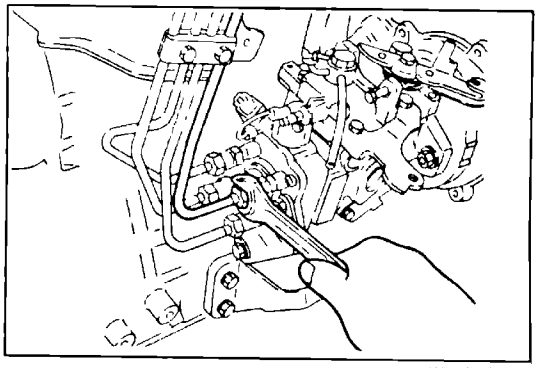
WRE91-FU015

2. Install the timing belt and the injection pump timing belt pulley.
   (See page EM–34.)
   Tightening Torque: 83.4 ± 4.9 N·m
   (8.50 ± 0.50 kgf-m)



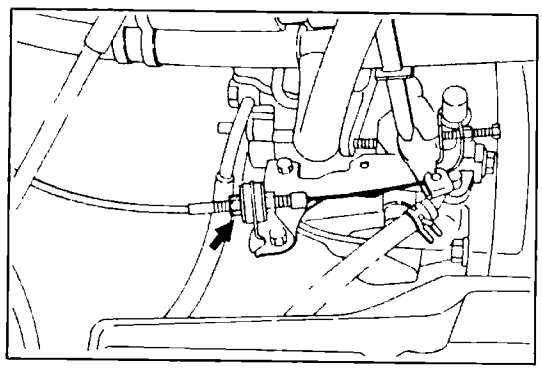
WRE91-FU016

3 Install the four injection pipes.
Connect the injection pipe to the injection pump and the injection nozzle.



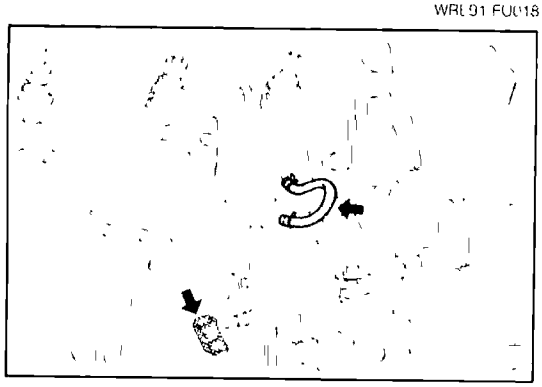
WRE91 FU017

4. Connect the fuel hoses to inlet and outlet fuel pipes.
5 Install the accelerator cable.



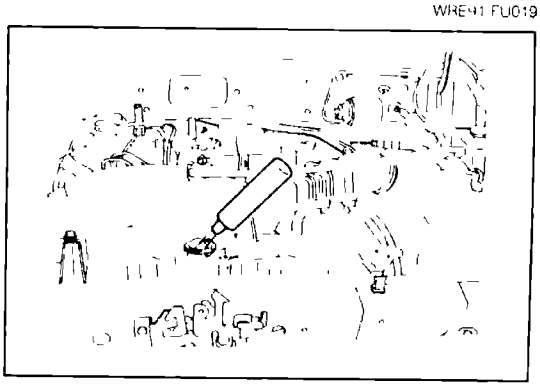
WRL91 FU018

6 Connect the connector for fuel cut solenoid valve
7 Connect the boost compensator hose
(DL-52 engine only)



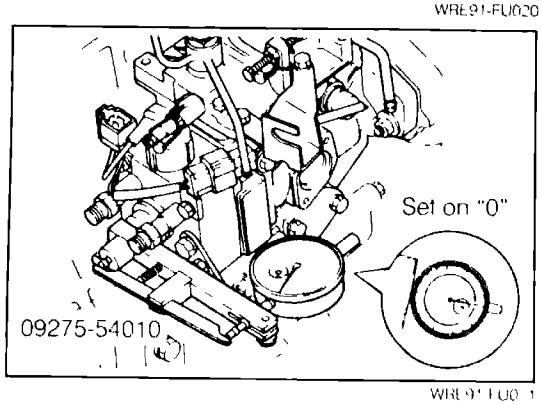
WRE91 FU019

8 Connect the water hoses for ACSD.
(ACSD equiped vehicle only)
9. Fill the coolant.



WRE91-FU020

10 Adjust the injection timing.
(See page EM–11.)
11. Start the engine
12 Check the fuel leakage and repair it.

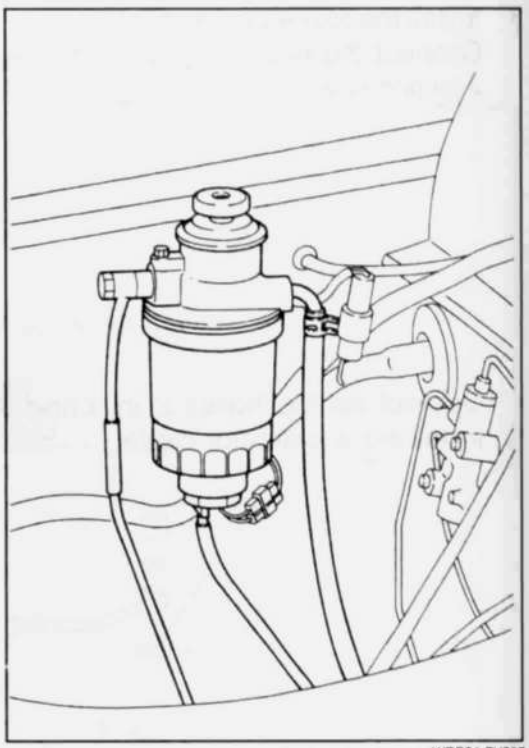


WRL91 FU0 1

FUEL FILTER

The fuel filter is a full-flow, paper filter type equipped with a water separator. The fuel filter is mounted inside the engine compartment at the right side of the vehicle.

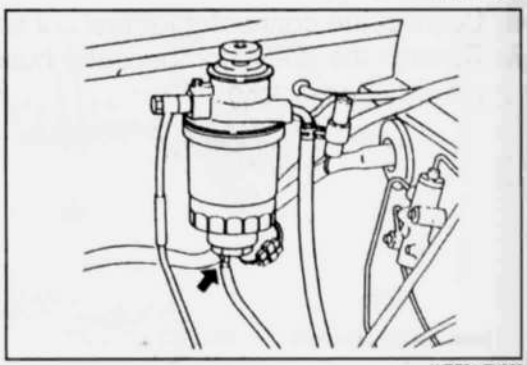
Item	Specifications
Filtering method	Filter paper
Filtering area	0.4 m^2
Rated flow rate	1.2 dm^3/min
Water separating performance	100 ppm or less
Feed pump delivery rate	15 cm^3/st
Sedimentor alarm water level capacity	80 cm^3
Sedimentor maximum capacity	150 cm^3



WRE91-FU007

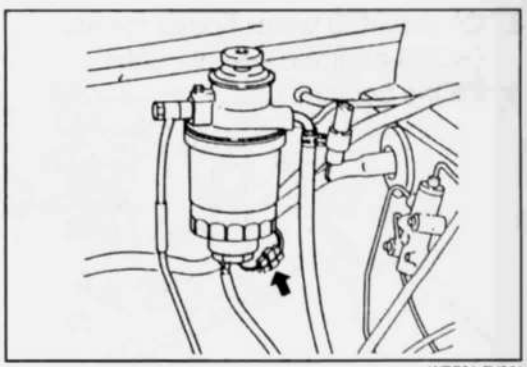
REPLACEMENT OF FUEL FILTER

1. Remove the drain plug and drain the fuel.
   NOTE:
   - **Place a suitable container or the like under the filter.**



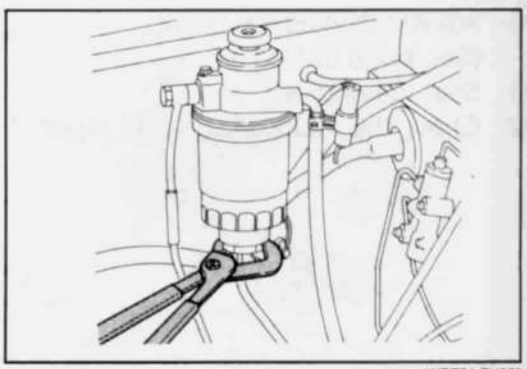
WRE91-FU023

2. Disconnect the connector of the warning switch.



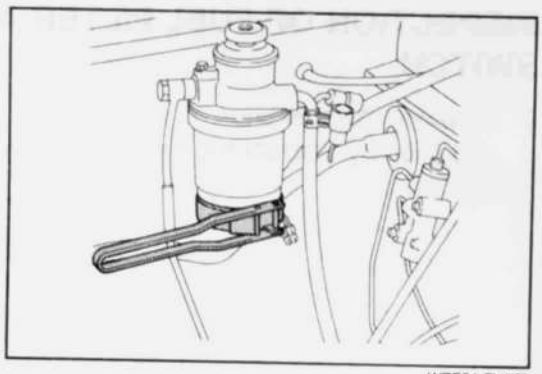
WRE91-FU024

3. Remove the warning switch and gasket, using pliers.



WRE91-FU025

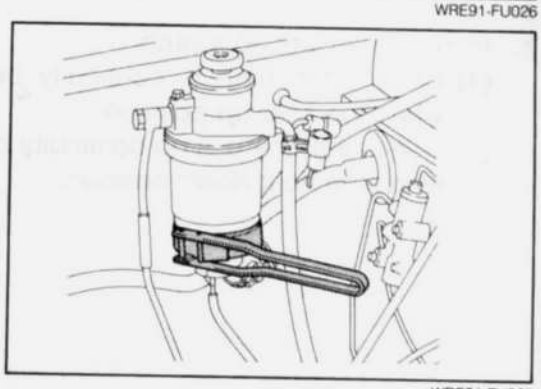
4. Remove the fuel filter and "O" ring, using a filter wrench.



WRE91-FU026

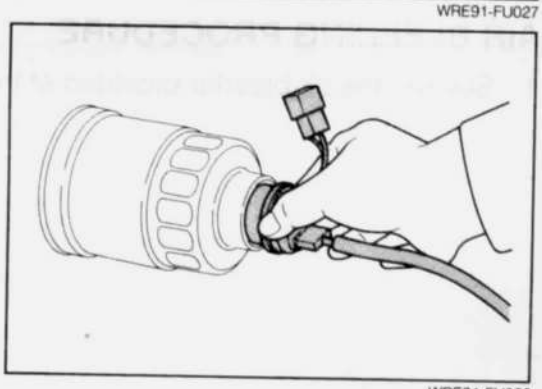
5. Install a new fuel filter with a new "O" ring.
   NOTE:
   - Apply a thin film of alcohol to the "O" ring.
   - Slowly screw-in the fuel filter by your hands, until you feel a light resistance.
   - Tighten the fuel filter to the specified torque by means of a filter wrench.

   Tightening Torque: 12.7 ± 2.0 N·m (1.30 ± 0.20 kgf-m)



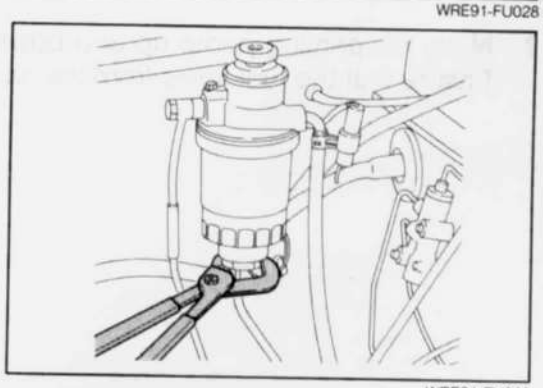
WRE91-FU027

6. Install the warning switch with a new gasket by hand.



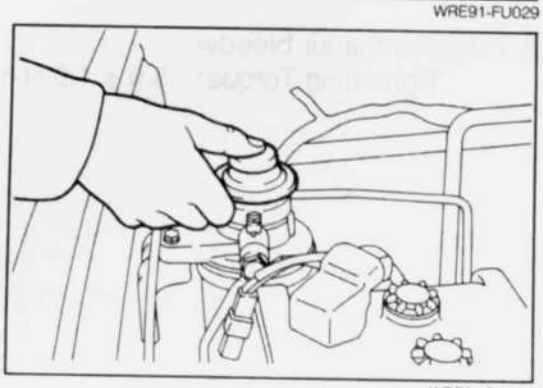
WRE91-FU028

7. Connect the connector of warning switch.
8. Install the drain plug with a new gasket.



WRE91-FU029

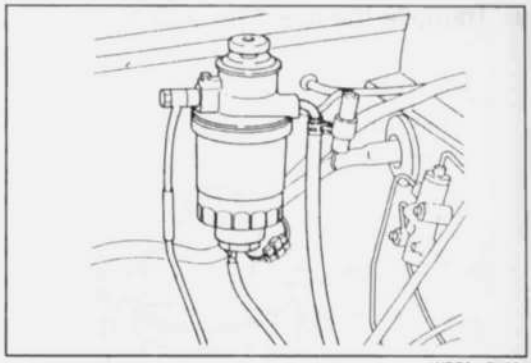
9. Fill the fuel pump with fuel.
   Operate the hand pump until you feel more resistance.
10. Start the engine.
    Check for fuel leaks.



WRE91-FU030

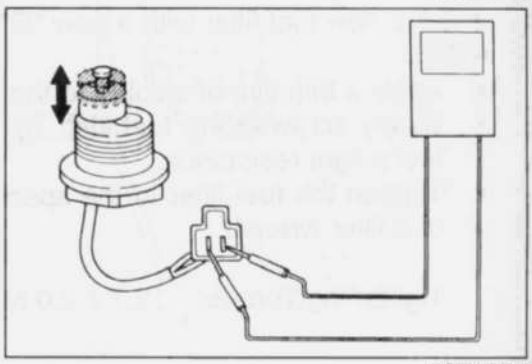
INSPECTION OF FUEL FILTER AND WARNING SWITCH

1. Inspect the fuel filter
   (1) Visualy inspect the fuel filter for fuel leaks and damage.



WRE91-FU031

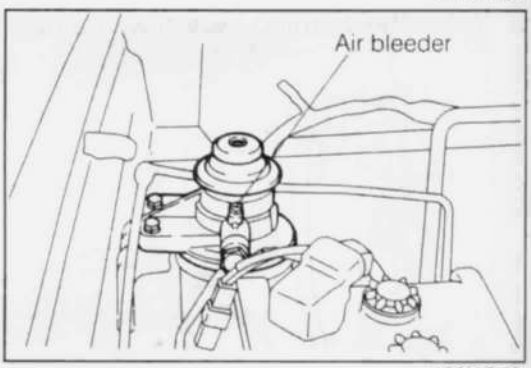
2. Inspect the warning switch
   (1) Check that there is continuity between the terminals when the float up position.
   (2) Check that there is no continuity between the terminals when the float down position.



WRE91-FU032

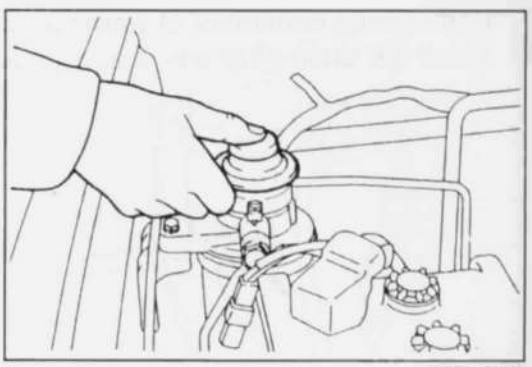
AIR BLEEDING PROCEDURE

1. Slacken the air bleeder provided at the top of the fuel filter.



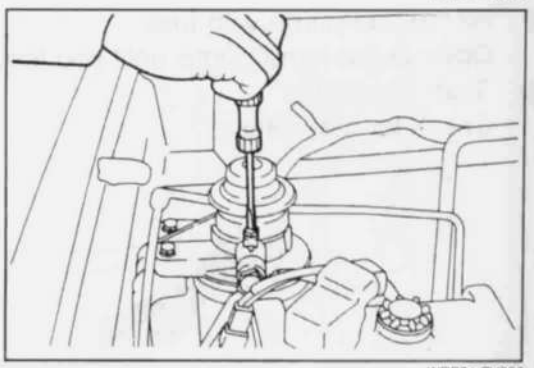
WRE91-FU034

2. Move the priming pump up and down.
   Ensure that the fuel flows from the air bleeder.



WRE91-FU035

3. Tighten the air bleeder.
   Tightening Torque: 3.9 ± 1.0 N·m (0.40 ± 0.10 kgf-m)



WRE91-FU036

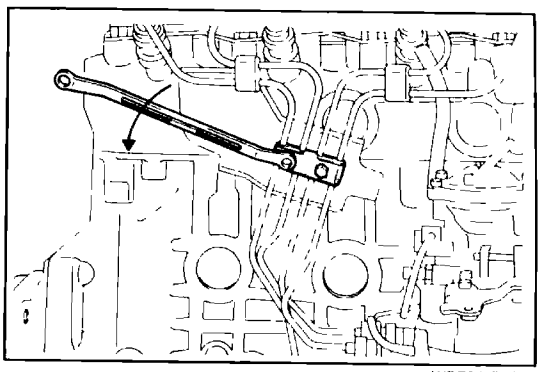
4 Move the priming pump up and down, until it becomes heavy to operate
5 Start the engine Ensure that no fuel leaks from the air bleeder section.

WRE91-FU037

INJECTION NOZZLE

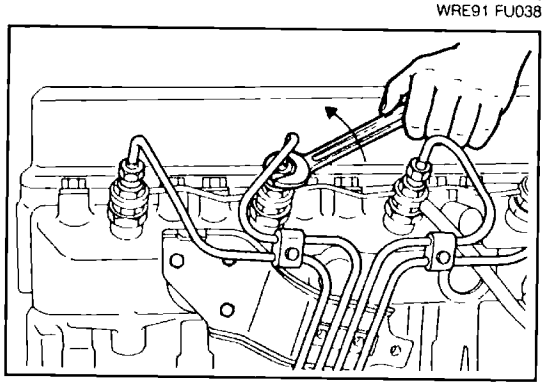
REMOVAL OF INJECTION NOZZLE

1 Remove the two bolts holding the four injection pipes to the cylinder block.



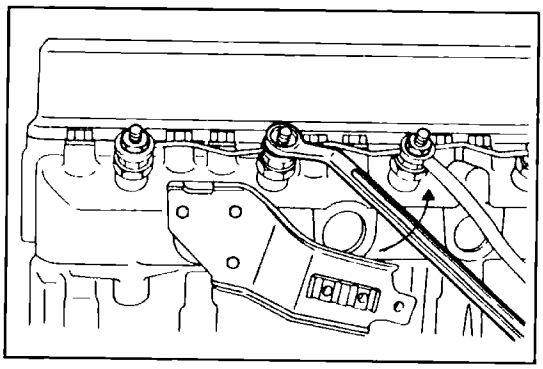
WRE91 FU038

2. Disconnect the injection pipe from the injection nozzle and the injection pump.
3. Remove the injection pipes.



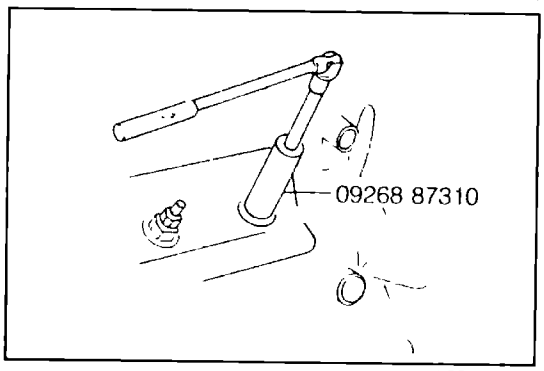
WRE91-FU039

4. Remove the nozzle leakage pipe by loosen four nuts.



WRE91-FU040

5. Remove the injection nozzle and nozzle holder.
   NOTE:
   - Arrange the nozzle in oder.



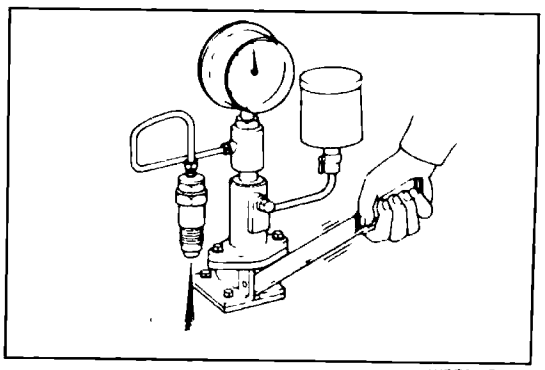
WRE91-FU041

INSPECTION

1 Checking of injection pressure
Attach the nozzle on the tester. Operate the tester lever at a rate of 15 to 20 times per minute. Take the reading of the pressure gauge at the moment when the gauge's pointer drops suddenly.

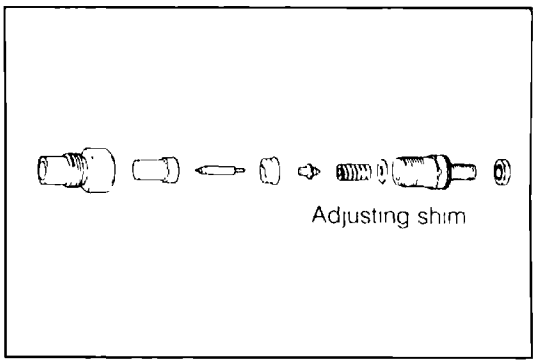
Specified Pressure:

DL-42: 10788 ± 980 kPa (110 ± 10 kgf/cm^2)
DL-52: 12749 ± 980 kPa (130 ± 10 kgf/cm^2)



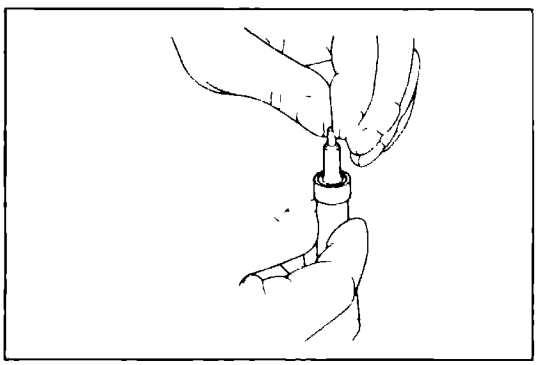
WRE91-FU042

2 Adjustment of injection pressure
To adjust the injection pressure, first disassemble the injection nozzle and increase or decrease the shim, as required.
(1) The variation of 0.05 mm in shim thickness will cause the injection pressure to change approximately 490 kPa (5 kgf/cm²)
(2) The adjusting shims are available in 20 different kinds from 1.00 mm to 1.95 mm in increments of 0.5 mm.

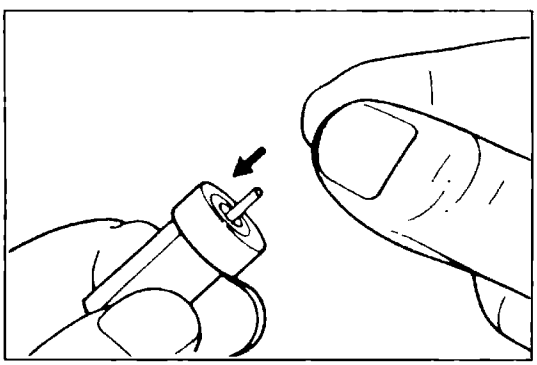


WRE91-FU043

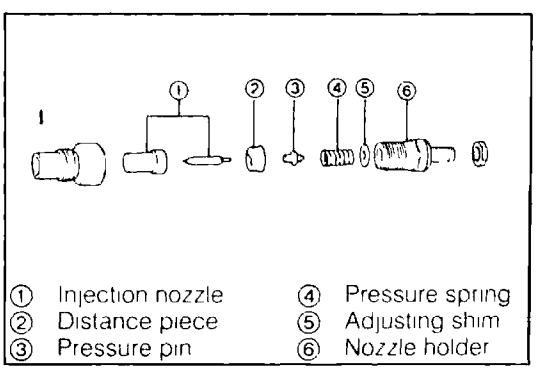
3 Sliding Test
(1) First, wash the needle and body in clean light oil. With the needle body held vertically, pull out the needle about one third of the whole stroke. Release the needle from that position


WRE91-FU044

(2) The needle should drop to the valve seat position by its own weight

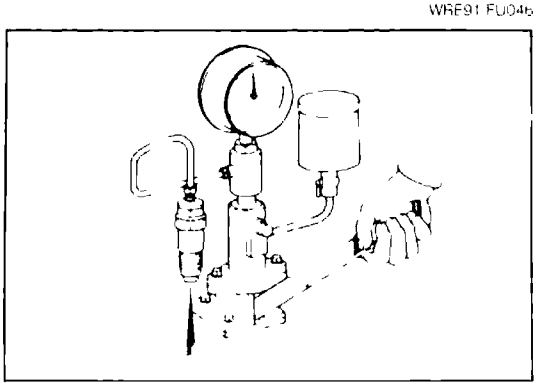

WRE91-FU045

4 Assemble the parts as shown in the right figure. Tighten them to the specified torque

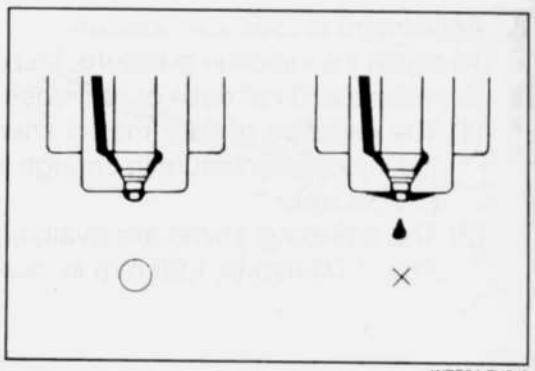


WRE91-FU046

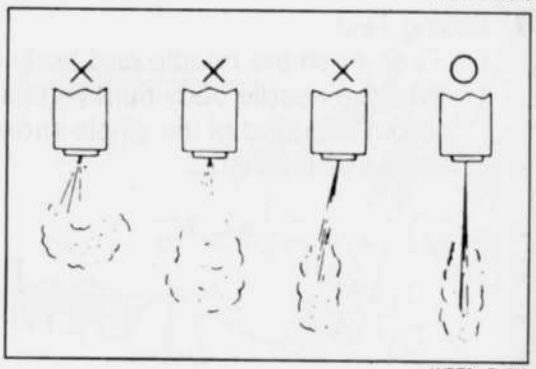
5 After the injection nozzle has been assembled, carry out the injection test. Adjust the injection nozzle, as required.


WRE91-FU047

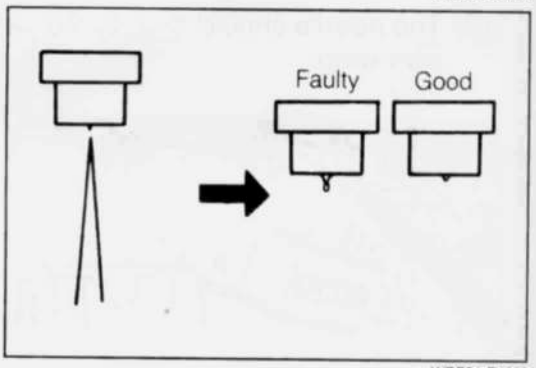
6. Oil-Tight Test
   Operate the tester lever, until the pressure rises up to about 9800 kPa (100 kgf/cm^2). Then, hold this pressure for about 10 seconds. And check to see if any fuel leakage is present at the nozzle injection port section or the retaining nut section.


WRE91-FU048

7. Spray Test
   (1) Perform the pumping (50 to 60 times/minute) by operating the tester lever.
   Check the spray conditions.


WRE91-FU049

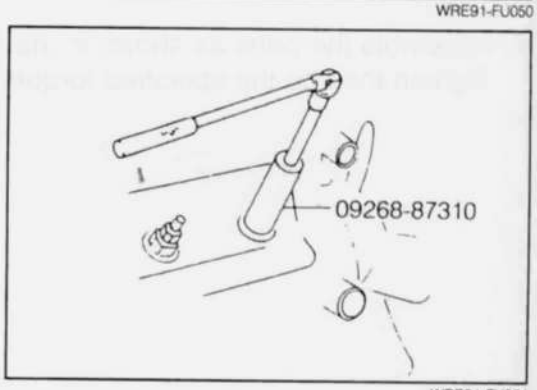
   (2) There should be no injection dripping.



WRE91-FU050

INSTALLATION OF INJECTION NOZZLE

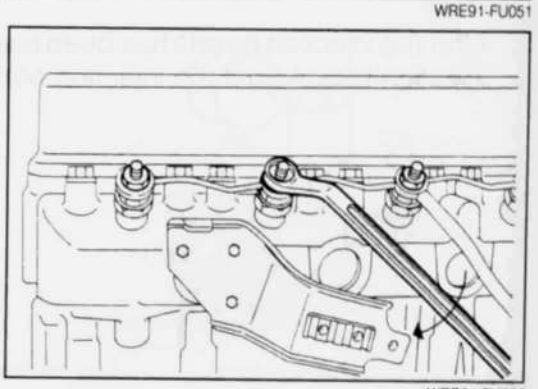
1. Install the four injection nozzles with new gasket.
   Tightening Torque: 68.6 ± 9.8 N·m
   (7.00 ± 1.00 kgf-m)



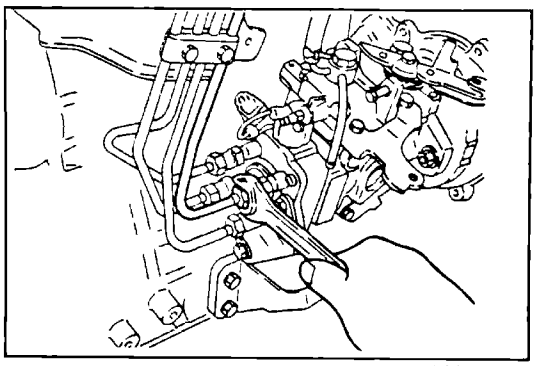
WRE91-FU051

   CAUTION:
   - Over tightening could cause the injection nozzle deformation and needle adhesion or other defects.

2. Install the nozzle leakage pipe with new gasket.
   Tightening Torque: 44.1 ± 4.9 N·m
   (4.5 ± 0.5 kgf-m)

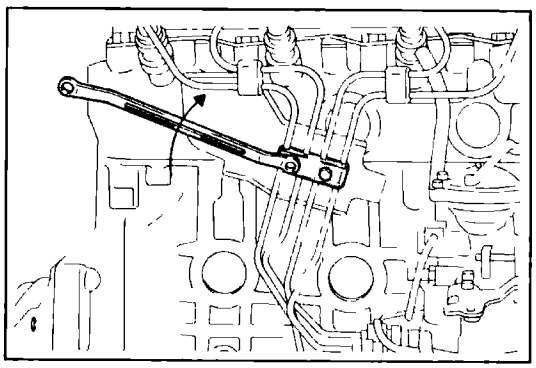

WRE91-FU052

3. Installation of injection pipes.
   (1) Install the four injection pipe to the injection nozzle and injection pump.
   Tightening Torque: 24.5 ± 4.9 N·m (2.5 ± 0.5 kgf-m)



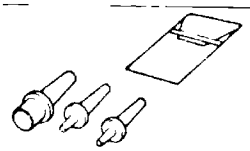
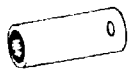
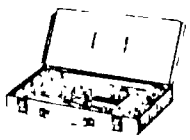
WRE91 FU053

   (2) Place the clamp and tighten the two attaching bolts.



WRE91-FU054

SST

Shape	Part number & name	Remark
	09258-00030-000 Plug set	Plugging rubber hose
	09268-87310-000 Nozzle holder wrench	Used for removing/installing injection nozzle
	09275-87701-000 Plunger stroke measuring tool	Used for injection timing
	09950-20017-000 Universal puller	Used for removing crankshaft gear

WRE91-FU055

TIGHTENING TORQUE

Tightening component	Tightening torque			Remark
	N·m	kgf-m	ft-lb	
Cylinder head × Nozzle holder	68 6 ± 9 8	7 00 ± 1.00	50 6 ± 7 2	
Cylinder head × Injection pipe bracket	18 1 ± 3 4	1 85 ± 0 35	13 4 ± 2 5	
Cylinder brock × Injection pump	18 1 ± 3 4	1 85 ± 0 35	13.4 ± 2 5	
Injection pump × Injection pump drive pulley	83 4 ± 4 9	8 50 ± 0 50	61 5 ± 3 6	
Injection pump × Injection pipe	24 5 ± 4 9	2.5 ± 0 50	18 1 ± 3.6	
Injection pump × Delivery valve holder	49.0 ± 4 9	5 00 ± 0 50	36 2 ± 3 6	
Injection pump × Nozzle leakage No 2	36 8 ± 2 5	3 75 ± 0 25	27 1 ± 1 8	
Injection pump × Union fuel return	24 5 ± 4 9	2 50 ± 0 50	18 1 ± 3 6	
Injection pump × Union fuel return	24 5 ± 4 9	2.50 ± 0 50	18 1 ± 3 6	
Injection pump × Distributive head bolt	17 2 ± 2 9	1 75 ± 0 3	12.7 ± 2 2	
Injection pump × Screw Ay over flow	7 4 ± 1 5	0 75 ± 0 15	5 4 ± 1 1	
Nozzle holder × Injection pipe	24 5 ± 4 9	2 50 ± 0 5	18 1 ± 3 6	
Nozzle holder × Nozzle leakage No 1	44 1 ± 4.9	4 50 ± 0 50	32 5 ± 3 6	

WRE91-FU056

SPECIFICATIONS

		DL-42	DL-52
Fuel tank capacity	dm^3	60	60
Injection pump	Type	Bosch VE type	←
	Injection timing	1° BTDC (High altitude compensator: 3° BTDC)	1° BTDC
	Plunger diameter mm	9.0	9.0
	Cam lift	2 2	2.2
	Governor type	Centrifugal type	Centrifugal type
	Timer type	Hydraulic pressure type	Hydraulic pressure type
Injection Nozzle or injector	Nozzle retainer type	Screwed type	Screwed type
	Nozzle type	Throttle type	Throttle type
	Injection pressure kPa (kgf/cm^2)	10,788 ± 980 (110 ± 10)	12,749 ± 980 (130 ± 10)
Fuel filter	Type	Paper filter type	Paper filter type
	Filtering area m^2	0.4	0.4
	Rated flow rate dm^3/min	1.2	1.2
	Sedimentor alarm water level capacity	80	80
	Sedimentor maximum capacity	150	150

WRE91-FU057

INJECTION PUMP

			DL-42		DL-52	
			STD	OPT	General	Austria-Switzerland
Pump specifications		Plunger diameter mm	9	9	9	9
		Cam lift mm	2.2	2.2	2.2	2.2
		Fuel return amount mm^3	40	40	37.5	37.5
		Injection order	ABCD	ABCD	ABCD	ABCD
		Governor specifications	All speed	All speed	All speed	All speed
Characteristics	Overflow amount (L/h/rpm)		21 - 47/1900	21 - 47/1900	17 - 37/1700	17 - 37/1700
	Injection amount	Fuel increase at starting (mm^3/st/rpm)	66 - 85/100	66 - 85/100	66 - 85/100	66 - 85/100
		End of fuel increase effect (mm^3/st/rpm)	41.5 - 50.5/400	41.5 - 50.5/400	50 - 58/350	50 - 58/350
		Full load (mm^3/st/rpm)	42.15 - 43.65/1100 38 - 43/500 44 - 49/1450 40.5 - 44.5/1900	39.25 - 40.75/1100 35.1 - 40.1/500 41.1 - 46.1/1450 38.6 - 43.6/1900	65.75 - 67.75/1100 42.7 - 45.7/500 51 - 54/680 65 - 70/1700	65.75 - 67.75/1100 42.7 - 45.7/500 51 - 54/680 65 - 70/1700
	Governor	High-speed side (mm^3/st/rpm)	16.5 - 24.5/2250 24.5 - 32.5/2100 2 or less/2600	17.5 - 23.5/2250 35 - 43/2100 2 or less/2450	*1 17.75 - 27.75/2250 56.5 - 64.5/1800 2 or less/2500	*1 17.75 - 27.75/2250 56.5 - 64.5/1800 2 or less/2500
		Low-speed side (mm^3/st/rpm)	6.5 - 11.5/350 2 or less/500	6.5 - 11.5/350 2 or less/500	*2 6.5 - 11.5/350 2 or less/500	*2 6.5 - 11.5/350 2 or less/500
	Timer (mm/rpm)		0 - 1.0/700 2.0 - 3.0/1100 3.7 - 4.7/1450 5.7 - 6.5/2250	0 - 0.98/700 1.85 - 2.85/1100 3.5 - 4.5/1450 6.15 - 6.95/2250	*1 0.7 - 1.7/700 2.3 - 3.3/1100 4.1 - 5.1/1500 4.9 - 5.7/1750	*1 0.6 - 1.6/750 2.2 - 3.2/1100 3.4 - 4.4/1500 4.1 - 4.9/1600
	Altitude compensation device (mm^3/st/kPa(mmHg)) (N = 1100 rpm With lever set to full stroke position)		— — —	38.5 - 41/94.6 (710) 33.8 - 37.8/82.7 (620) 30.3 - 33.7/70.7 (530)	— — —	— — —
	Boost compensator (mm/kPa (mmHg))		— — — — —	— — — — —	42.7 - 49.7/0 51.2 - 55.2/24.0 (180) 55.6 - 59.6/33.3 (250) 65.75 - 67.25/66.7 (500) 66.5 or less/106.7 (800)	42.7 - 49.7/0 51.2 - 55.2/24.0 (180) 55.6 - 59.6/33.3 (250) 65.75 - 67.25/66.7 (500) 66.5 or less/106.7 (800)
	Load sensing timer mm/mm^3/st)		— —	— —	— —	1.53 - 2.53/50 3.38 - 4.38/Full
	Automatic cold start device (mm/°C)		— — —	— — —	— — —	2.05/–10 0.6 - 0.9/25 0/45

* 1: Pb = Characteristics at 66.7 kPa (500 mmHg)
* 2: Pb = Characteristics at 0 kPa (0 mmHg)

WRE91-EM333

GI

DAIHATSU

F70,F75,F77

Service manual

GENERAL INFORMATION

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

GENERAL INFORMATION

1. MODEL VARIATION ..... GI– 4
2. CHASSIS SERIAL NUMBER STAMPED POSITION ..... GI– 5
3. MANUFACTURER'S PLATE POSITION ..... GI– 5
4. ENGINE NUMBER AND ENGINE TYPE STAMPED POSITIONS ..... GI– 6
5. BODY COLOR INFORMATION ..... GI– 6
6. VEHICLE 4-PLANE DIAGRAMS ..... GI– 8
7. PERFORMANCE DIAGRAMS GI–13
8. SPECIFICATIONS GI–16
9. SUMMARY OF ENGINE CONSTRUCTION GI–19
10. SUMMARY OF BODY AND OTHER CONSTRUCTIONS GI–23
11. SUMMARY OF POWER TRAIN CONSTRUCTION GI–33
12. SUMMARY OF CHASSIS CONSTRUCTION GI–39
13. SUMMARY OF BODY ELECTRICAL GI–46

This service manual applies to those vehicles with the following chassis numbers onward and with the owner's manual F215-9011-E1, FG1, S1 or A1 furnished.

JDA00F70000645700
JDA00F75000647032
JDA00F77000500689 or 000003789

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WRE91-GI001

DAIHATSU

F70,F75,F77

GENERAL INFORMATION

1. MODEL VARIATION ..... GI– 4
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WRE91-GI001

IMPORTANT SAFETY NOTICE

The vehicle is a machine comprising a great number of parts. Basically speaking, the vehicle is potentially hazard. However, one can handle it safely if he has the required knowledge.

Correct service methods and repair procedures are very vital for assuring not only the safety and reliability of a vehicle, but also the safety of service personnel concerned.

The methods and procedures contained in this manual describe in a general way the techniques which the manufacturer has recommended. Thus, they will contribute to ensuring the reliability of the products. The contents of the servicing operations come in a wide variety of ways. Moreover, techniques, tools and parts necessary for each operation are different widely from each other.

This manual does not cover all details of techniques, procedures, parts, tools and handling instructions which are necessary for these operations, for such coverage is impossible. Hence, any one who obtains this manual is expected first to make his responsible selection as to techniques, tools and parts which are necessary for servicing the vehicle concerned properly. Furthermore, he must assume responsibility for his actions in connection with his own safety.

Therefore, one should not perform any service if he is not capable of making responsible selection and/or if he can not understand the contents herein described, for this manual has been prepared for experienced service personnel.

WARNINGS, CAUTIONS AND NOTES

All these symbols have their specific purposes, respectively.

WARNING:

- This symbol means that there is a possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual.

CAUTION:

- This symbol means that there is a possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual.

NOTE:

- To accomplish the operation in an efficient manner, additional instructions concerning the operation are given in this section.

The following list describes general WARNINGS:

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires you to be under the vehicle.
- Be sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on the vehicle.
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.
- Keep yourself and your clothing away moving parts, when the engine is running, especially from the fan and belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
- Do not smoke while working on a vehicle.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle.
- Keep hands and other objects clear of radiator fan blades! The electric cooling fan is mounted on the radiator and can start to operate at any time by an increase in underhood temperature. The electric cooling fan is also mounted on the condenser for air conditioner and start to operate in anytime during air conditioner switch "ON". For this reason care should be taken to ensure that the electric cooling fan motor is completely disconnected when working under the hood.

WRE91-GI002

YOU SHOULD OBSERVE THE FOLLOWING WARNING WHEN WORKING ON THE VEHICLE AS LAID DOWN BY THE HEALTH AND SAFETY EXECUTIVE.

THE DANGER

Some vehicle parts contain asbestos. Working with them can create dust. Breathing this dust is harmful. Cases of asbestos related cancer have been reported in garage workers.

The dangerous jobs are:

- cleaning brake assemblies
- cleaning clutch housings
- grinding brake linings
- drilling brake linings
- sweeping floors

Brake and clutch linings and disc pads may contain asbestos. If in doubt assume that they do.

WHO IS AT RISK?

Anyone in the garage could be at risk. There is no known safe level of asbestos dust. But the more dust you breath, the greater the chance of lung damage.

The problem is that the dust particles are too small to be seen by the naked eye. And the diseases caused can take years to develop.

Don't put the brakes on your life. Avoid breathing asbestos dust. Prevent dust getting into the air. Follow the WARNING.

WARNING

1. DON'T blow dust out of brake drums or clutch housings with an air line.
2. DO use properly designed drum cleaning equipment which prevents dust escaping
   or
   use clean wet rags to clean out drums or housings.
   Put used rags in a plastic waste bag while still wet.
3. DON'T grind or drill linings unless the machine has exhaust ventilation or there is a ventilated booth to do the work in.
4. DON'T use brushes to sweep up dust.
5. DO use a special vacuum cleaner to remove dust.
6. DO wet dust *thoroughly* and scrape it up if you haven't got a vacuum.
7. DO wear the protective clothing, such as overalls, provided by your employer.
8. DON'T take the protective clothing home. It should be cleaned by your employer.
9. DON'T use equipment if it is not maintained and checked. Ask to see the examination reports for ventilation systems.

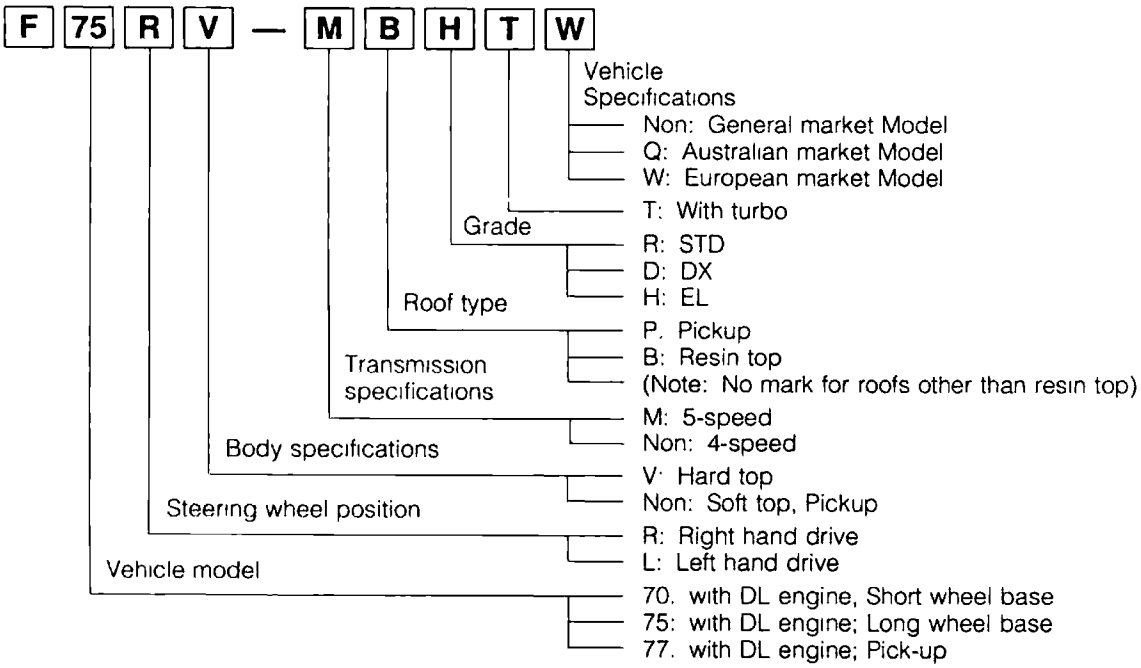
WRE91-GI003

1. MODEL VARIATION

Model			Market / Grade	General			Australia			Europe		
				STD	DX	EL	STD	DX	EL	STD	DX	EL
Short Wheelbase	Hard Top	DL-42	RHD	F70RV-R	F70RV-D		F70RV-MRQ	F70RV-MDQ			F70RV-MDW	
			LHD	F70LV-R	F70LV-D						F70LV-MDW	
		DL-52 (TURBO)	RHD		F70RV-MDT						F70RV-MDTW	
			LHD		F70LV-MDT						F70LV-MDTW	F70LV-MHTW
	Soft Top	DL-42	RHD							F70R-MRW		
			LHD	F70L-R						F70L-MRW		
		DL-52 (TURBO)	LHD								F70L-MDTW	
Long Wheelbase	Wagon	DL	RHD		F75RV-BD				F75RV-MBHQ		F75RV-MBDW	
			LHD		F75LV-BD	F75LV-BH					F75LV-MBDW	F70LV-MBHW
		DL-52 (TURBO)	RHD		F75RV-MBDT				F75RV-MBHTQ		F75RV-MBDTW	F75RV-MBHTW
			LHD		F75LV-MBDT						F75LV-MBDTW	F75LV-MBHTW
	Soft Top	DL-42	RHD	F75R-R								
			LHD	F75L-R						F75L-MRW		
	Pickup	DL-42	RHD	F77R-PR						F77R-MPRW		
			LHD	F77L-PR						F77L-MPRW		
	Chassis	DL-42	RHD	F77R-PRC			F77R-MPRQC					
			LHD	F77L-PRC								

WRE91-GI004

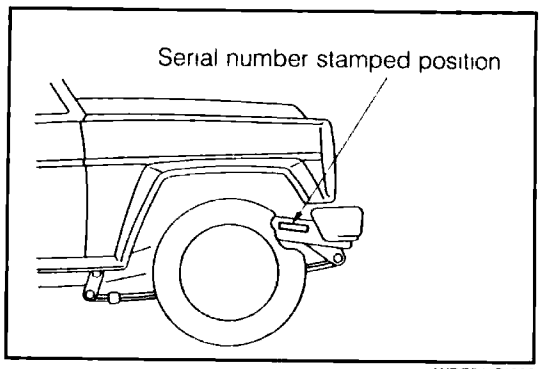
DESCRIPTION OF VEHICLE MODEL CODE



WRE91-GI005

2. CHASSIS SERIAL NUMBER STAMPED POSITION

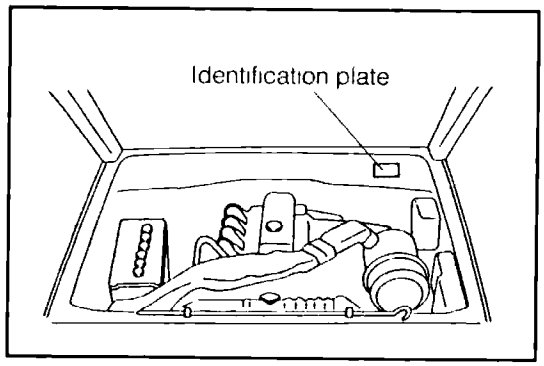
The chassis number is stamped on the right side member of the frame at its front side.



WRE91-GI006

3. MANUFACTURER'S PLATE POSITION

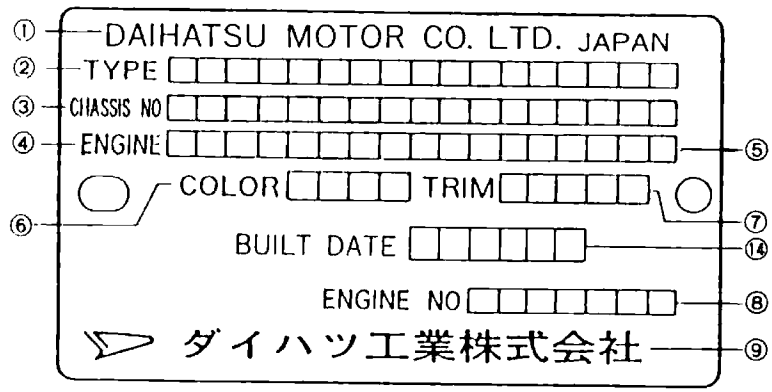
The manufacturer's plate is attached on the cowl panel.



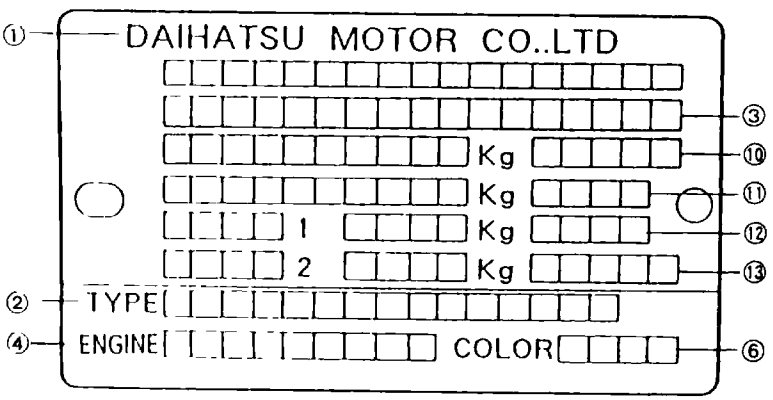
WRE91-GI007

CONTENTS OF MANUFACTURER'S PLATE

(1) General & Australian Specification



(2) European Specification

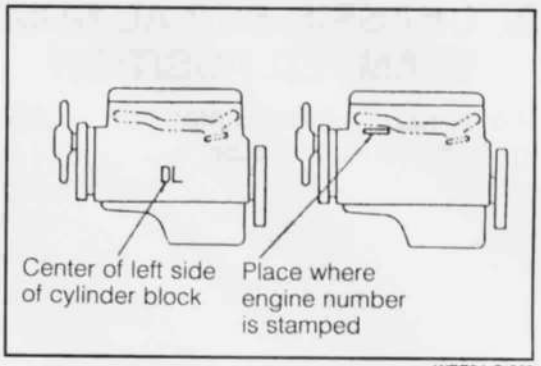


① Manufacturer's name, Country
② Vehicle model
③ Chassis No.
④ Engine type
⑤ Engine displacement
⑥ Body colors
⑦ Trim code
⑧ Engine number
⑨ Manufacturer's name in Japanese
⑩ Gross vehicle weight
⑪ Gross combination weight
⑫ Maximum permissible front axle weight
⑬ Maximum permissible rear axle weight
⑭ Production month-year. (Only for AUS spec.)

WRE91-GI008

4. ENGINE NUMBER AND ENGINE TYPE STAMPED POSITIONS

The engine number and serial number is stamped on the place as shown in the illustration.



WRE91-GI009

5. BODY COLOR INFORMATION

Mono. color	Code
White	045
Red	3E7
Green	G05
Dark Blue Metallic	8G4
Grey Metallic	168
Black Metallic	6A6

Two tone color	Code
Black Metallic/Grey Metallic	NA5 (6A5/168)
Dark Blue Metallic/Grey Metallic	26L (8G4/168)
Red Mica Metallic/Grey Metallic	25L (3H1/168)

WRE91-GI010

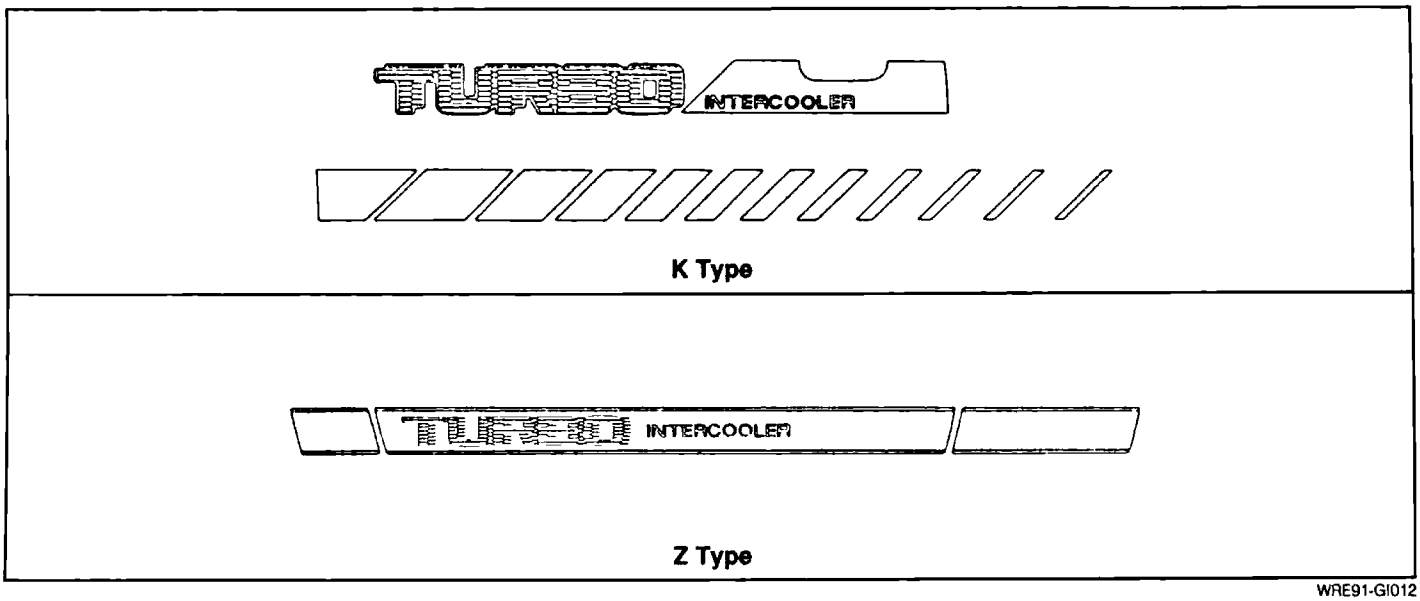
5-1. COLOR CODE IN THE WORLD

COLOR	CODE					
	DAIHATSU	AXZO	DUPONT	ICI	SPIES HECKER	STANDOX
WHITE	045	DAH045	L8997	NW80	16067	045
RED	3E7	DAH3E7	G8690	KK26	38299	3E7
GREEN	G05	DAHG05	G8691	KV77	68470	G05
DARK BLUE METALLIC	8G4	DAH8G4	K9131	C247B	97909	8G4
GREY METALLIC	168	DAH168	N8832	B936B	97728	168
BLACK METALLIC	6A5	DAH6A5	G8742	A403B	97806	6A5
TWO TONE	NA5	DAHNA5	G8742/N8832	A403B/B936B	97806/97728	NA5
TWO TONE	26L	DAH26L	K9131/N8832	C247B/B936B	97909/97728	26L
TWO TONE	25L	DAH25L	G8730/N8832	PC86B/B936B	97840/97728	25L

WRE91-GI011

5-2. BODY STRIPE INFORMATION

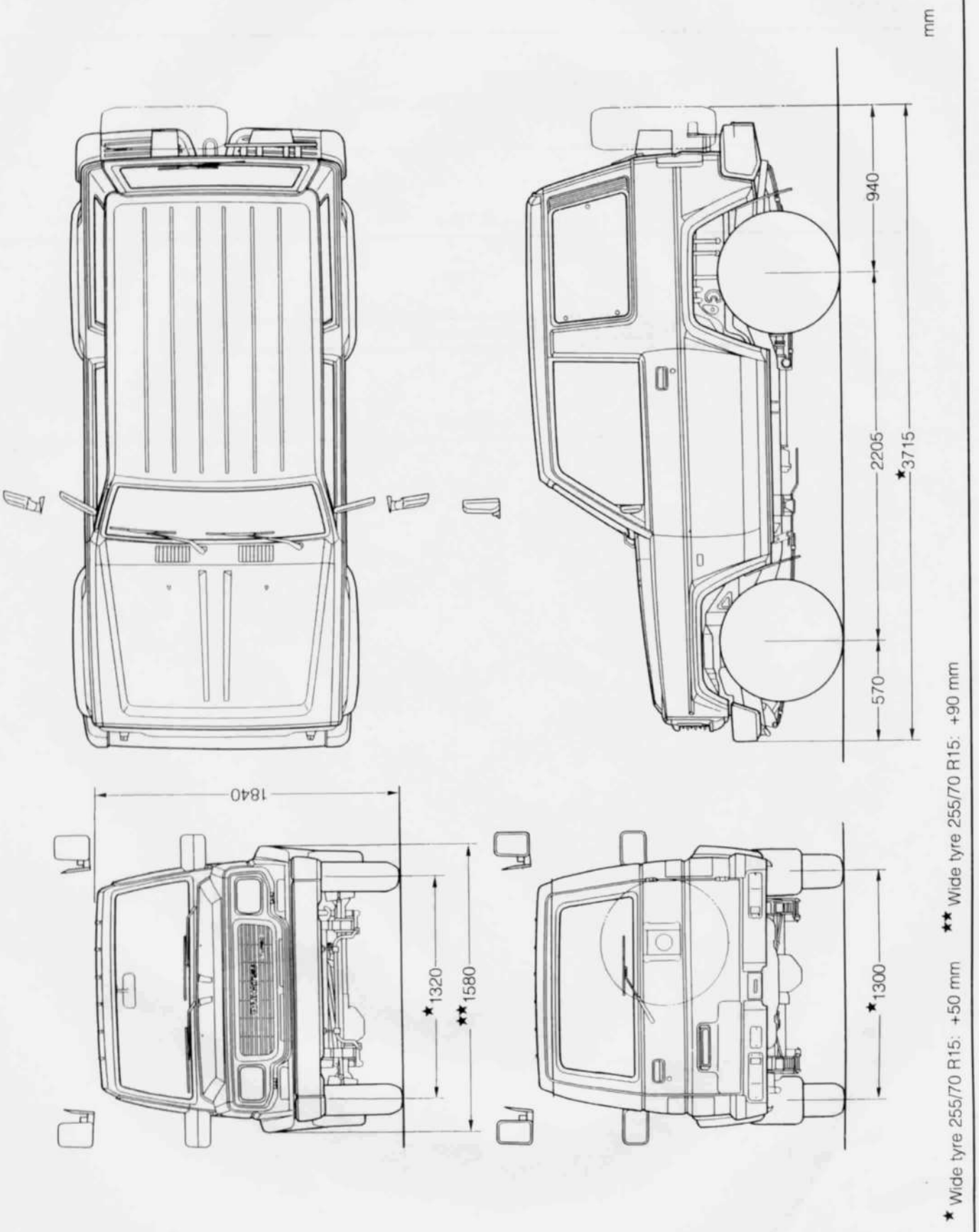
Along with the change to the intercooler turbo, an INTERCOOLER TURBO decal has been added to accentuate the stripes. The present M type was changed to Z type as shown below. K type comes only with the gold stripes.



WRE91-GI012

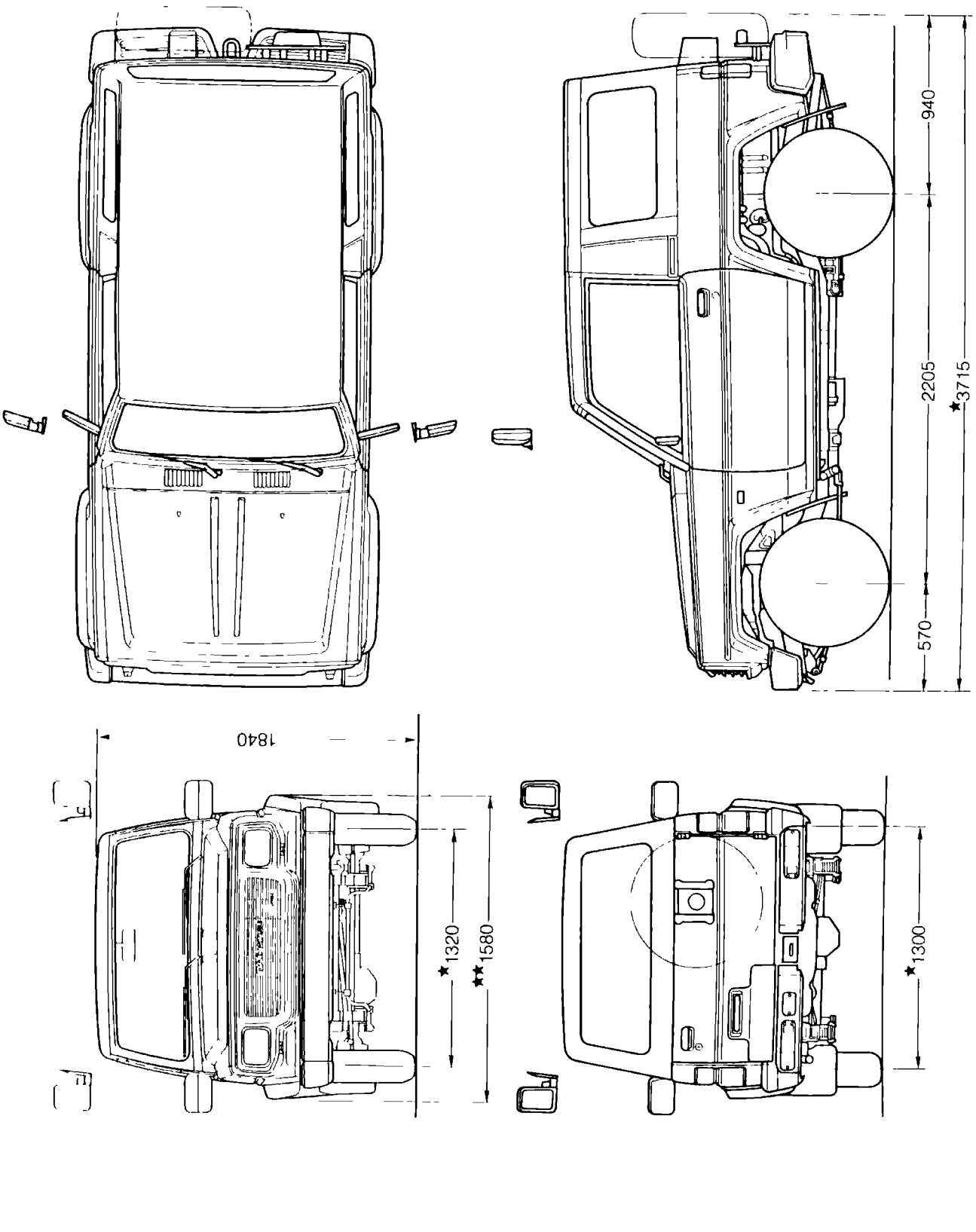
6. VEHICLE 4-PLANE DIAGRAMS

Version: A (F70V-Hard top)



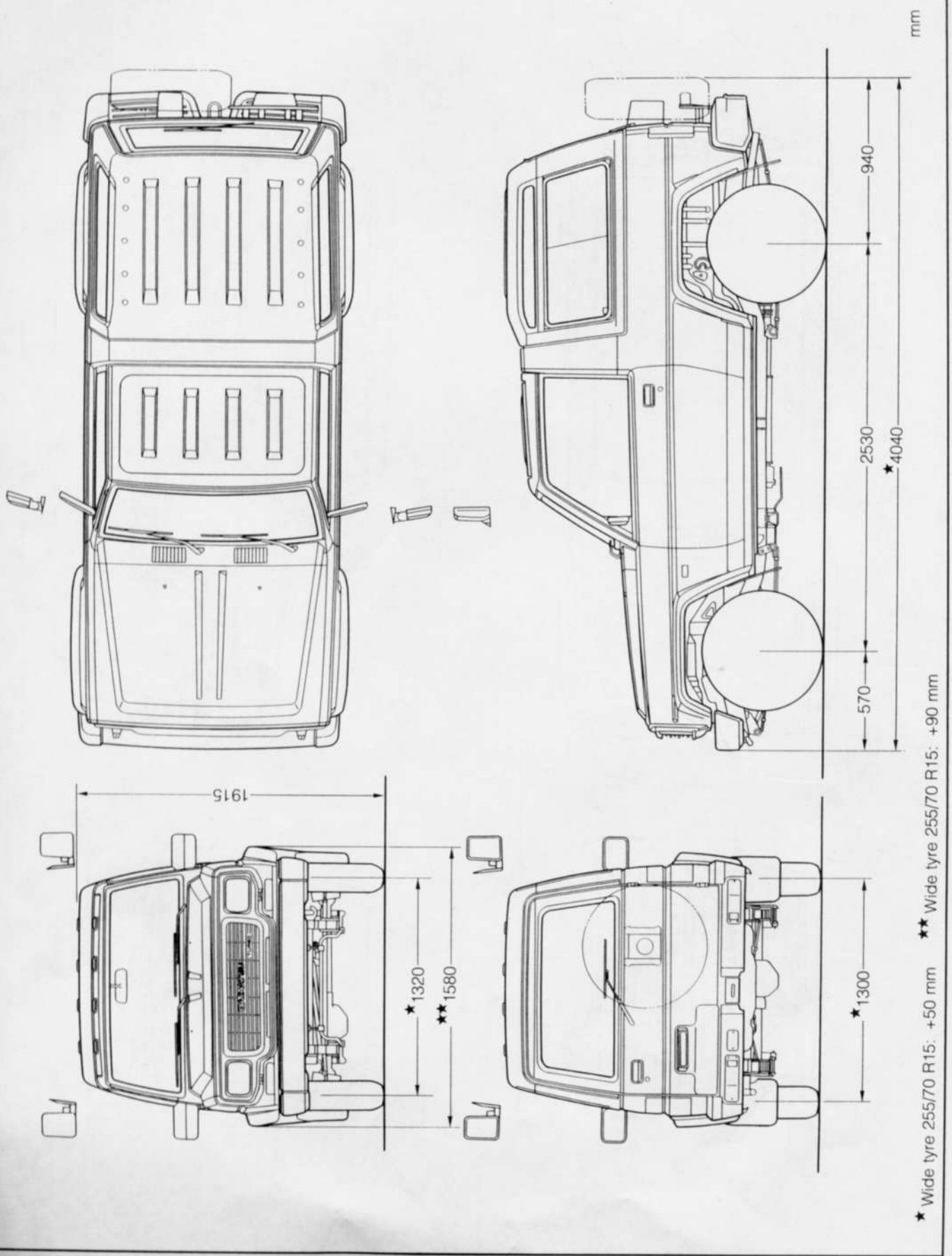
WRE91-GI013

Version: B (F70-Soft top)



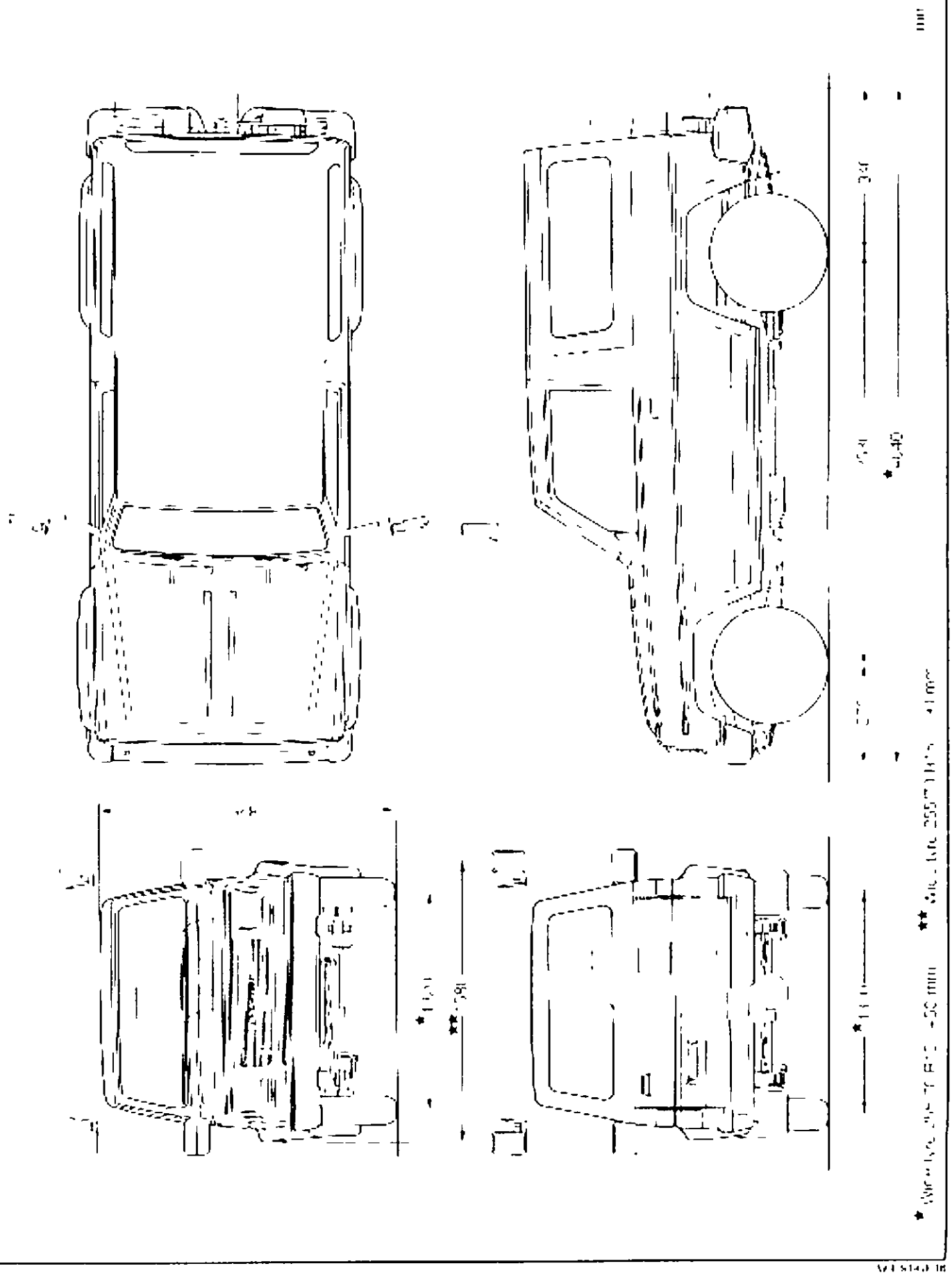
WRE91-GI014

Version: C (F75V-Wagon)

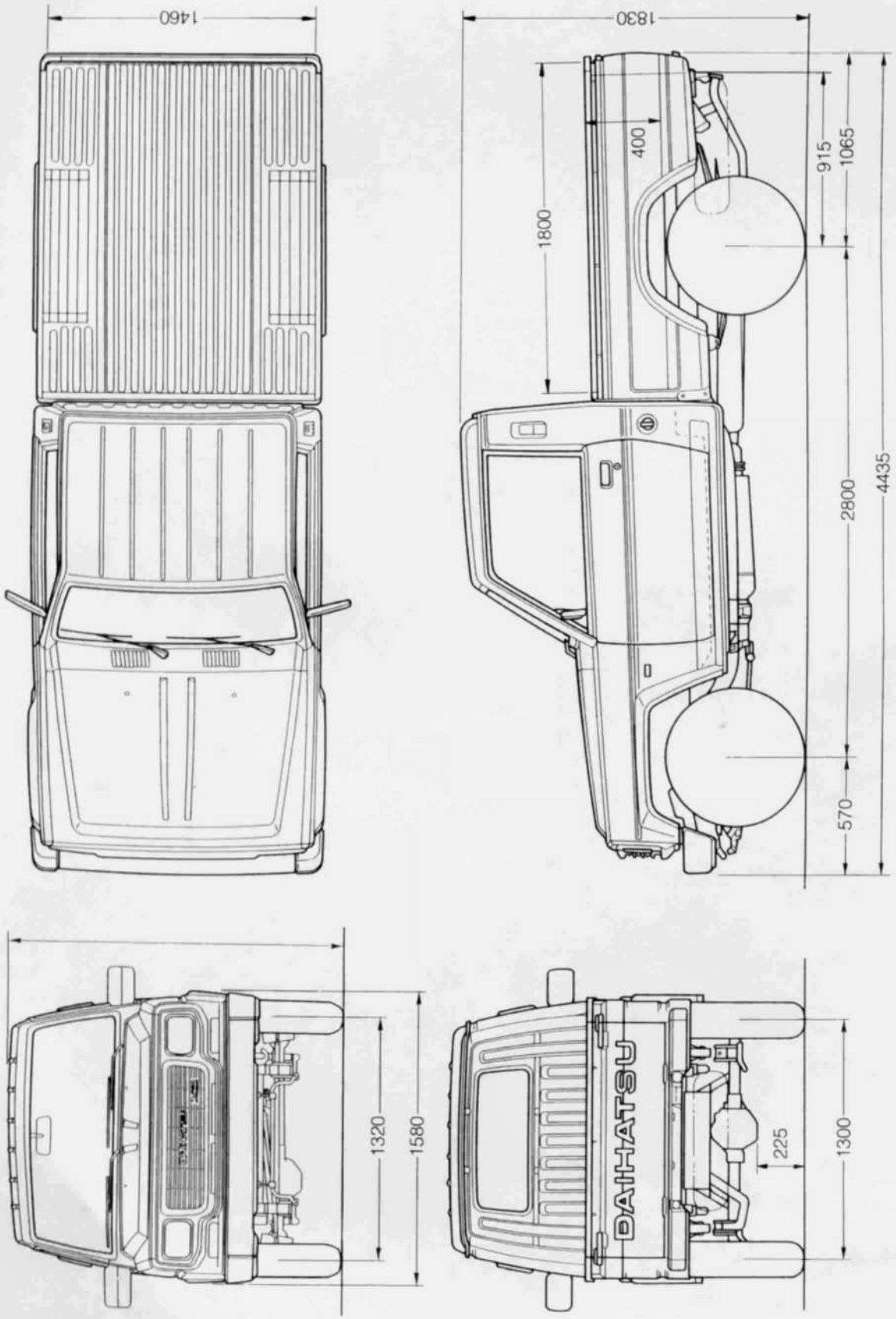


WRE91-GI015

Version: D (F75-Soft top)



Version: E (F77-Pick-up)

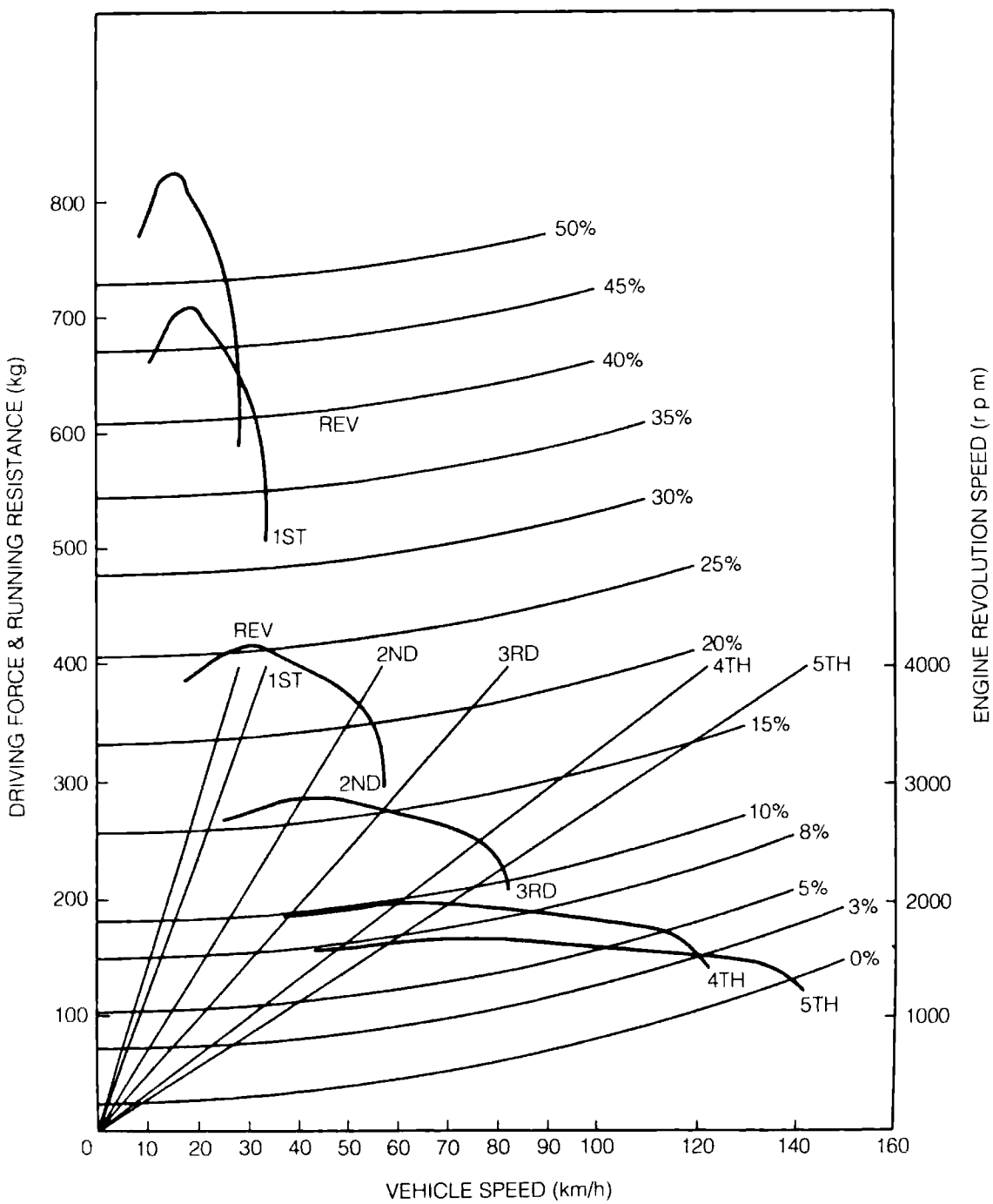


WRE91-GI017

7. PERFORMANCE DIAGRAMS

F70V

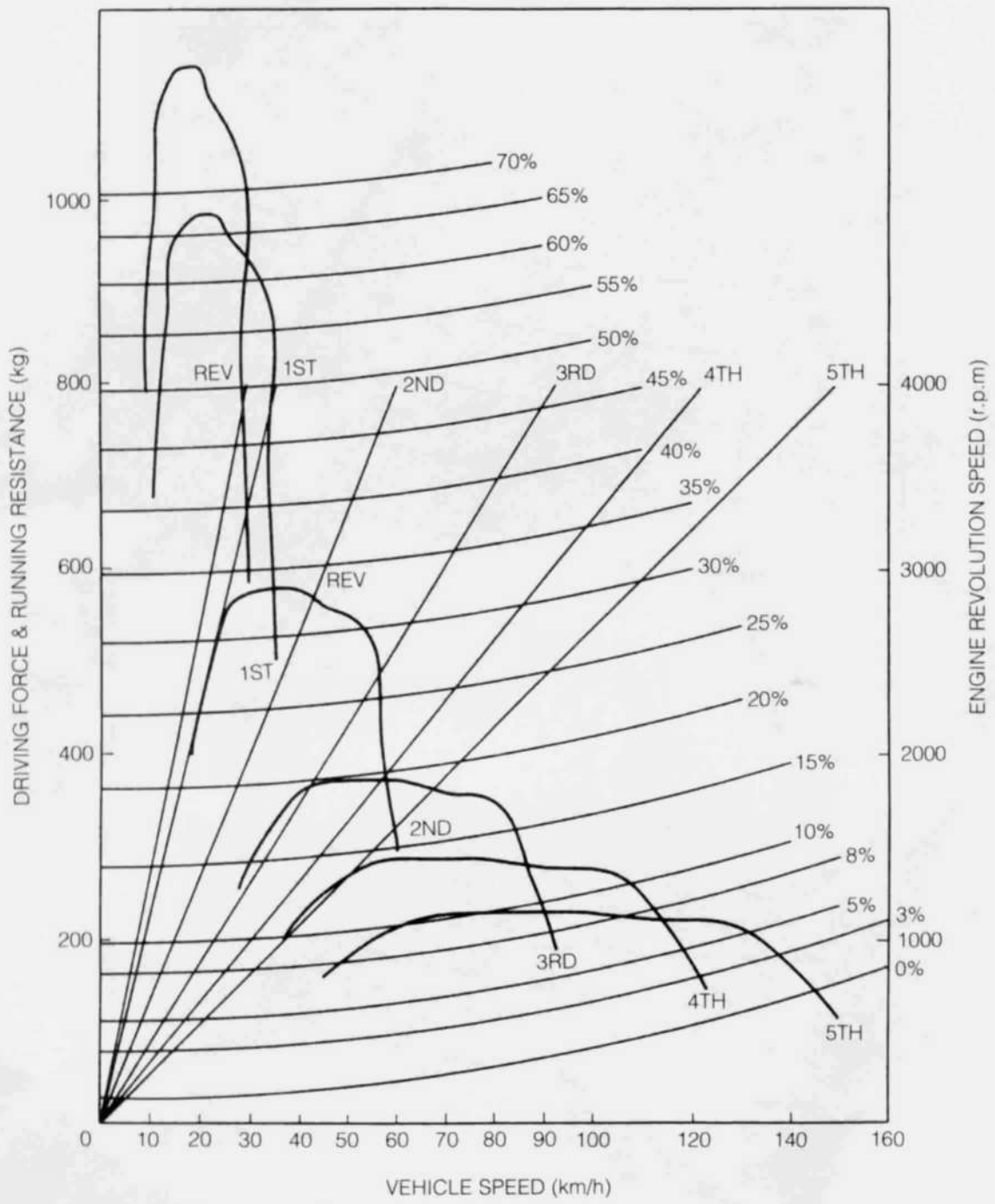
F70RV-MRQ 255/70-15



WRE91-GI018

F75V

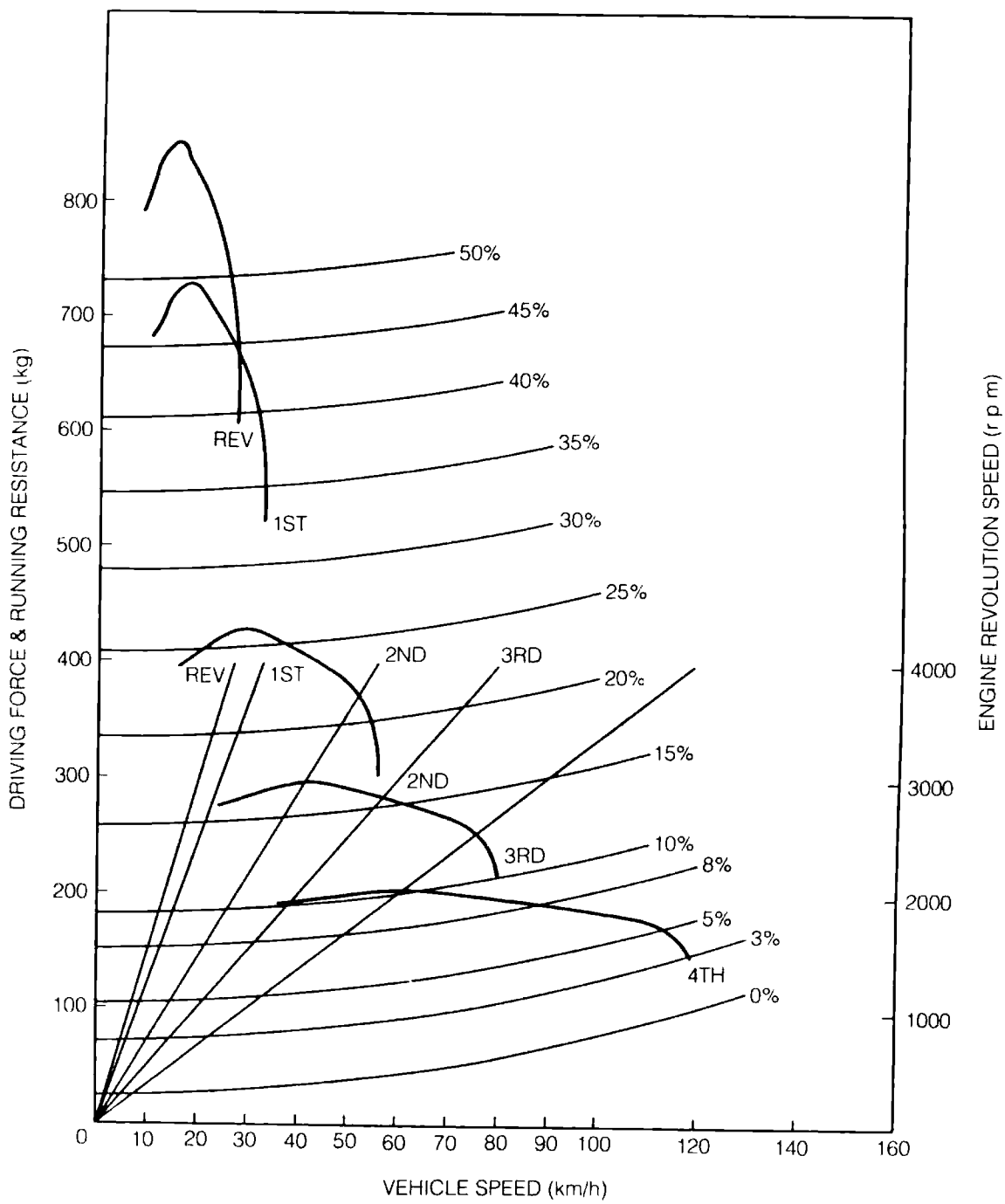
F75LV-MBHTW 255/70R15



WRE91-GI019

F77

F77L-PR 215/R15



WRE91-GI020

8. SPECIFICATIONS

8-1. PRE-DELIVERY INSPECTION SPECIFICATIONS

Items		Specifications	
Tire inflation pressure Front/Rear bar	6.00-16-4 (LUG)	STD: 1.6/2.1	Detail shows as follows. AUS market: The pressure lavel is on the glove compartment door. OTHERS market: The pressure lavel is on the lower part of the door pillar.
	6.00-16-6 (RIBLUG)	STD: 1.8/2.4	
	6.50-16-4 (SAND)	STD: 1.6/2.1	
	6.50-16-8	STD: 1.8/2.4	
	7.50-16-8 (SAND)	STD: 1.8/4.25	
	215/SR15	STD: 1.4/1.4	
	215/80R15	STD: 1.8/1.8	
	255/70R15	STD: 1.8/1.8	
	H78-15-4	STD: 1.4/1.4	
Spare tire inflation pressure		Sam as above full load max. pressure.	
Wheel nut tightening torque N·m (kgf-m)		88.2 - 117.6 (9 - 12)	
Accelerator cable free play mm		1 - 5	
Engine idling speed rpm	DL-42	650 ± 25	
	DL-52 (Turbo)	650 ± 25	
Engine oil	Capacity ℓ	5.5	
	Grade	DL-42: CC or CD, DL-52: CD	
Transmission oil	Capacity ℓ	4M/T: 2.0, 5M/T: 2.7	
	Grade	API GL-3	
	Viscosity	80W, 85W, 90	
Transfer oil	Capacity ℓ	1.4	
	Grade	API GL-3	
	Viscosity	75W-85	
Differential oil	Capacity ℓ	Front: 1.5	
		Rear: 1.5	
	Grade	API GL-5	
	Viscosity	80W, 85W, 90	
Brake fluid	Grade	FMVSS 116DOT3 or SAE J1703	
Brake pedal (While engine is running)	Free travel mm	2 - 4 (Engine off, with out vacuum)	
	Reserve travel mm	Not less than 80 mm (Engine is running)	
Parking brake working travel		Should "set" within 5 - 8 notches when apply 25 kgf by hand	
Clutch pedal free travel mm		18 - 27	
Steering wheel play mm		0 - 30	

WRE91-GI021

8-2. VEHICLE SPECIFICATIONS

Items				Specifications
ENGINE	Type		DL-42	Diesel, 4 cycle, in-line 4
			DL-52	Diesel, Turbo charged, 4 cycle, in-line 4
	Displacement (Bore × Stroke)	ℓ		2.765 (92.0 × 104.0 mm)
	Compression ratio			21.2
	Firing order			1-3-4-2
	Combustion chamber type			Swirl chamber type
	Injection timing		DL-42	1° B.T.D.C
			DL-52	1° B.T.D.C
	Valve mechanism			Belt driven, OHV
	Valve clearance	mm	Intake	0.25 (Hot)
			Exhaust	DL-42: 0.25 (Hot), DL-52: 0.35 (Hot)
	Valve timing	Intake	Open	25° B.T.D.C
			Close	55° A.B.D.C
		Exhaust	Open	60° B.B.D.C
			Close	20° A.T.D.C
	Injection pump			BOSCH VE Type
	Cold start system			Glow plug
	Coolant capacity	ℓ		10.6
	Max. output power (net/gross), *DIN		DL-42	54/58(A), (ECE), 56/3600 (AUS. GENE.)
			DL-52	75/3400 (ECE)
	Max. output torque N·m/rpm		DL-42	170/2200
			DL-52	245/1900
	Fuel tank capacity	ℓ		60
CLUTCH	Type			Dry, Single plate, Diaphragm
	Operation			Mechanical
TRANSMISSION	Type			Manual, 4 or 5 forward speed, Synchromesh
	Gear ratio	DL-42	1st	3.647
			2nd	2.136
			3rd	1.464
			4th	1.000
			5th	0.860
			Reverse	4.357
		DL-52	1st	3.477
			2nd	2.037
			3rd	1.317
			4th	1.000
			5th	0.820
			Reverse	4.148

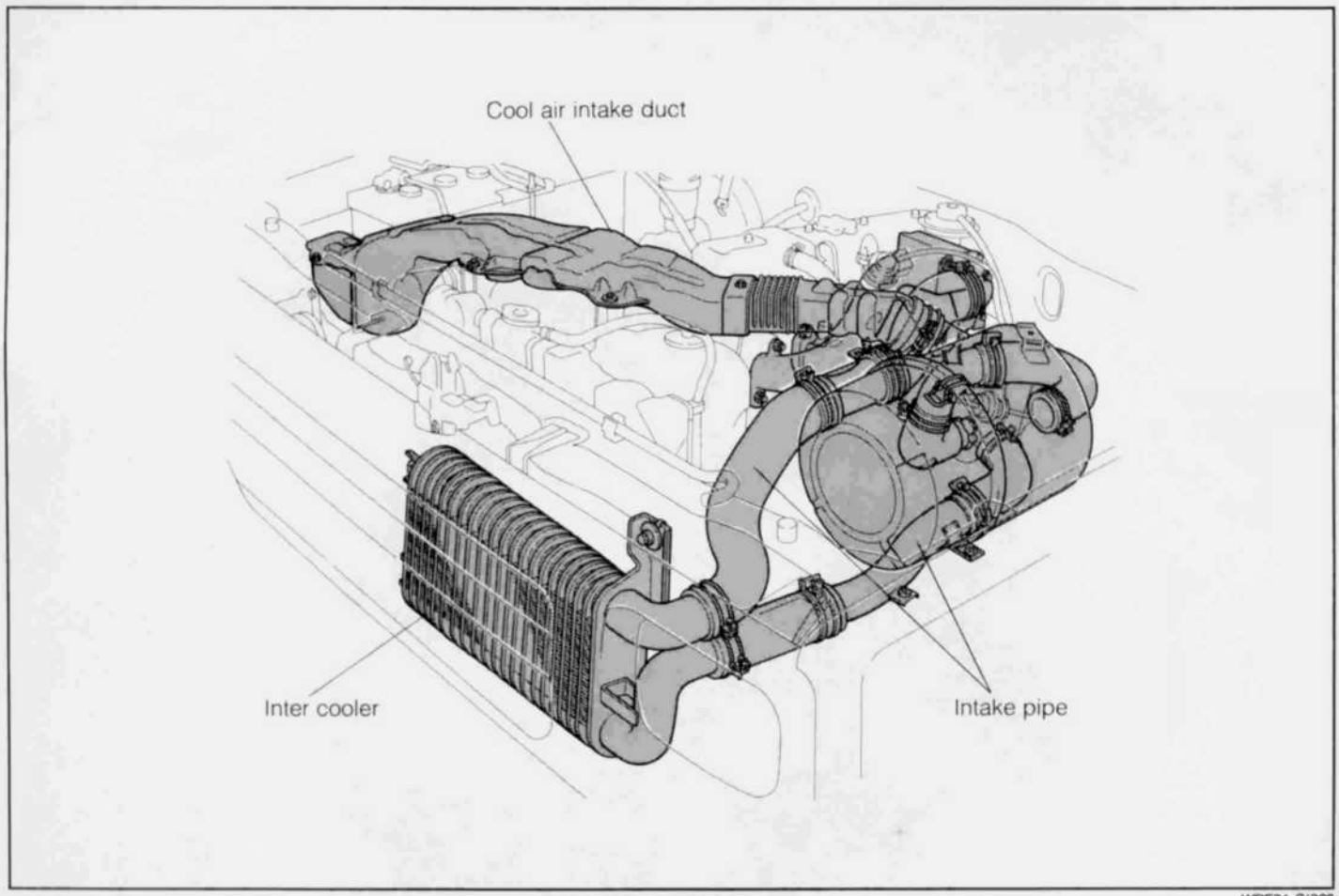
Items				Specifications	
TRANSFER	Type			Part-time, Manual, Constant mesh	
	Gear ratio		High	1.297	
			Low	2.370	
DIFFERENTIAL	Gear ratio			3.363	
AXLE & SUSPENSION	Axle	Front	Type	Full-floating axle tube	
			Toe-in mm	(–3) –5 (H78, 215SR15 or 255/70R15)	0 - 8 (Other tires)
			Camber	1° ± 60′	
			Caster	1°30′ ± 60′	
			King-pin angle	9°30′ ± 60′	
		Rear	Type	Semi-floating axle tube	
			Toe-in mm	0	
			Camber	0°	
	Spring	Front		Semi-elliptical leaf spring	
		Rear		Semi-elliptical leaf spring	
	Shock absorber	Front		Double-acting telescopic, 3 stage: option	
		Rear		Double-acting telescopic, 3 stage: option	
STEERING	Type			Ball-recirculation and nut	
	Over all gear ratio			24 - 28	
	Power assist			Integral, Hydraulic power	
BRAKES	Type		Front	Disc, ventilated disc: option	
			Rear	Drum, leading and trailing	
	Service brake system			Hydraulic tandem master cylinder	
	Power assist			Vacuum booster with vacuum pump	
	Emergency brake system			Dual hydraulic circuits	
	Parking brake system			Mechanical hand operation, which applies to rear wheels	
DISC WHEEL	Off-set mm		16 × 4.50 E	10 (6.00-16C-6)	
			16 × 5.00 E	9 (6.50-16C-6, 6.50-16C-8)	
			15 × 6 JJ	10 (H78-15-4, 215SR15, 215R15)	
			15 × 7 JJ	–15 (255/70R15)	
BULB	Head lights W		Candescent	45/40	
			Halogen	60/55	
			Yellow	45/40	
	Front combination W		Clearance lights	5 (White)	
			Turn signal lights	21 (Amber)	
	Rear combination W		Stop/Tail lights	21/5 (Red)	
			Turn signal lights	21 (Amber)	
	Back up light W			21	
	License plate light W			5	
	Rear fog light W			21 (Red)	
	Interior light W			10	
	Luggage room light W			8	

WRE91-GI022

9. SUMMARY OF ENGINE CONSTRUCTION

9-1. INTERCOOLER TURBOCHARGER (DL-52 Engine)

The turbocharger is equipped with an air-cooled intercooler, thereby increasing the maximum horsepower and torque output.



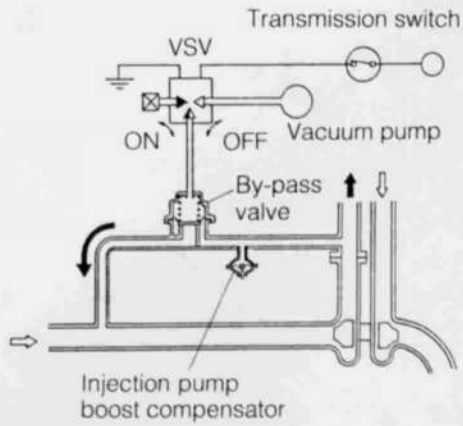
WRE91-GI023

P.C.S. (Power Control System)

(1) Transmission shift position: 1st gear
When the pressure of the air pressurized from the turbocharger exceeds 300 mmHg, part of the air is by-passed to the air cleaner side.

(2) Transmission shift position: 2nd gear to 5th gear
The by-pass port is closed.
NOTE:

- If the supercharging in excess of the specified level is likely to take place, the waste gate valve opens to release the pressure so as to prevent excessively high supercharging.

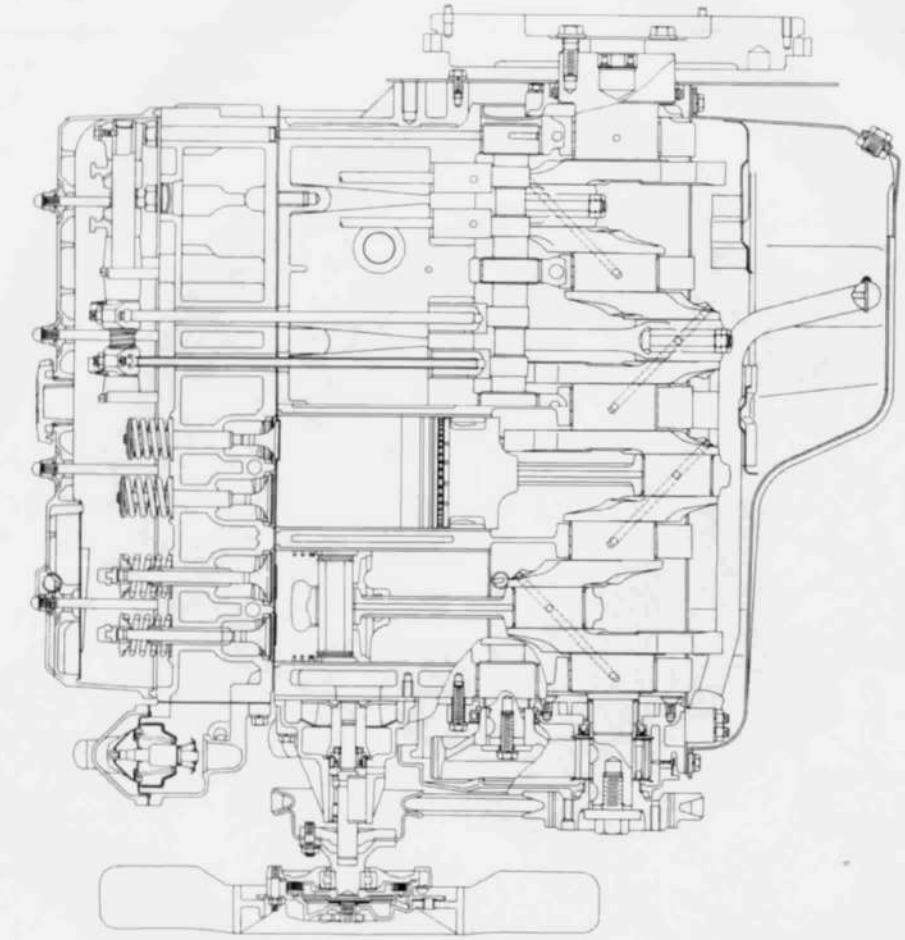


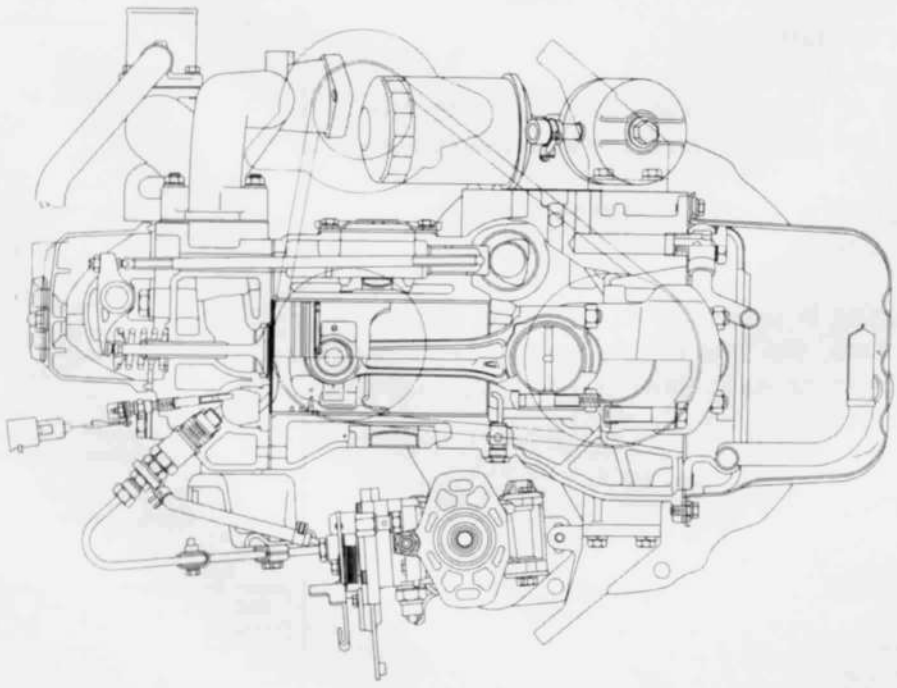
Shift position	Transmission switch	VSV	By-pass valve
1st	OFF	OFF	Open
Reverse & 2nd - 5th	ON	ON	Close

WRE91-GI024

9-2. ENGINE SECTIONAL VIEWS

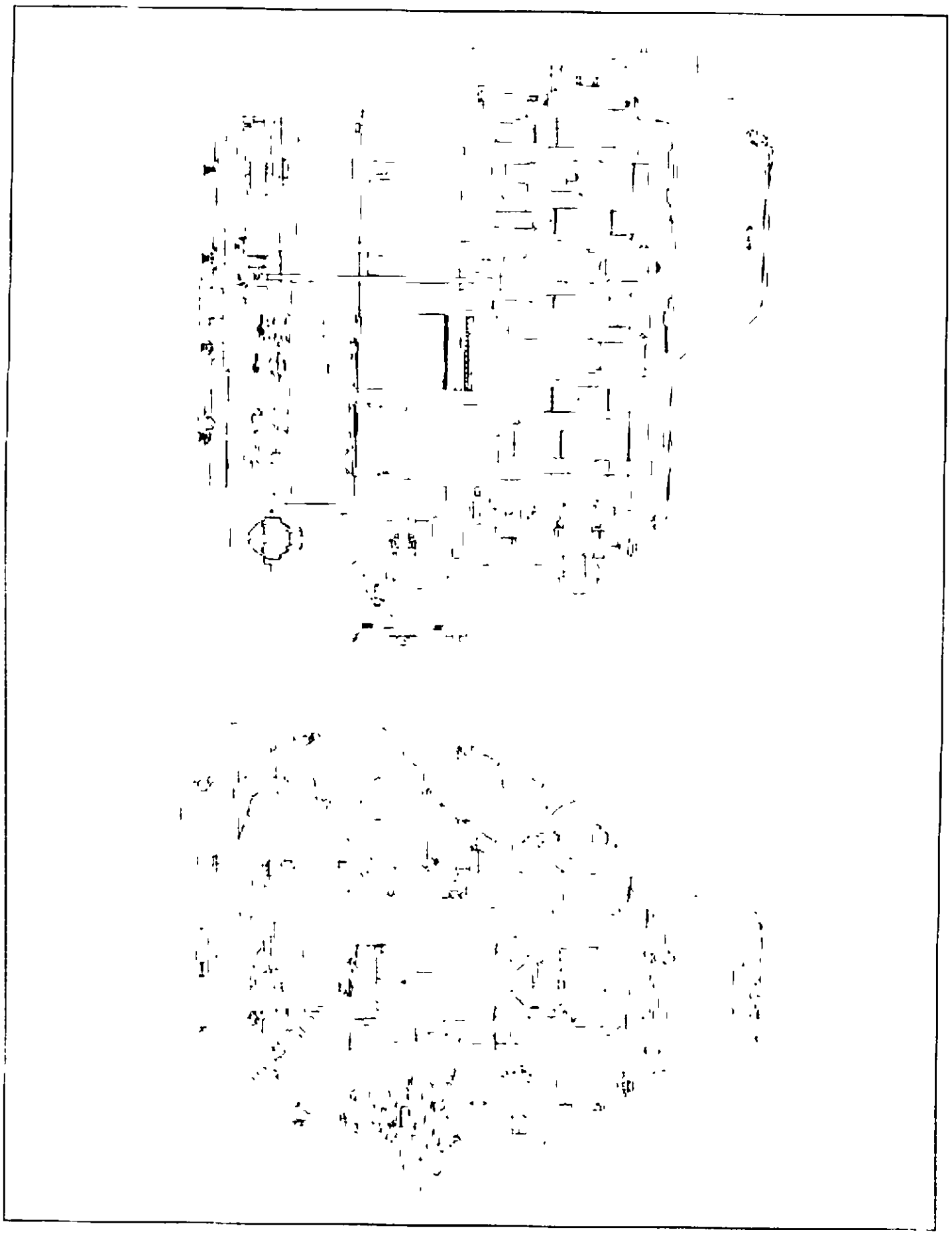
Type DL-42 engine





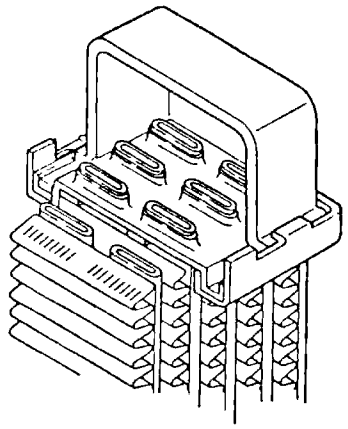
WRE91-GI025

Type DL-52 engine



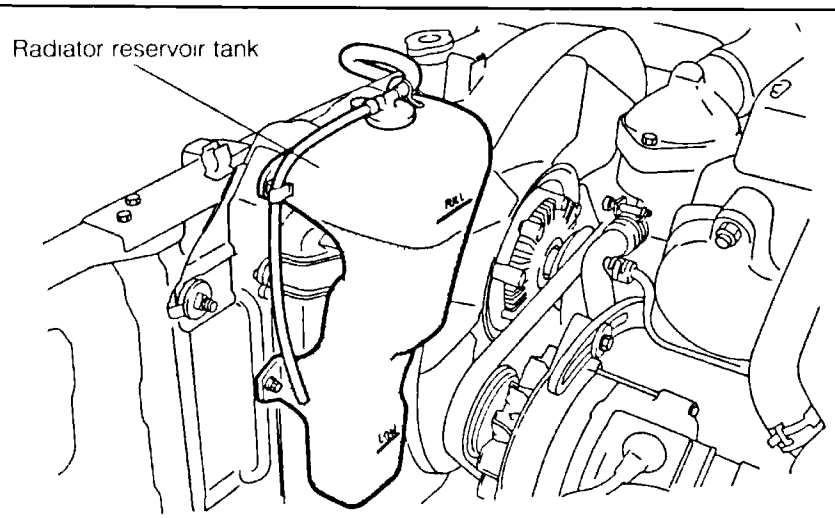
9-3. COOLING SYSTEM

In accordance with the employment of the water-cooled turbocharger, the radiator construction has been changed.



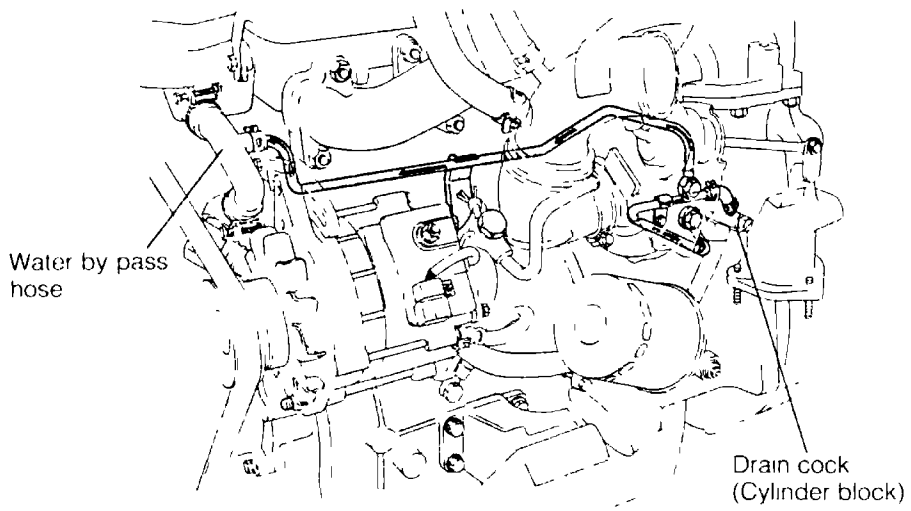
WRE91-GI027

The radiator reservoir tank has been modified in its shape. Furthermore, the reservoir tank is now attached to the radiator. (DL-52 Only)



WRE91-GI028

Modification has been made so that the bearing of the turbocharger is now cooled by the engine cooling water.



WRE91-GI029

10. SUMMARY OF BODY AND OTHER CONSTRUCTIONS

10-1. BASIC DESIGN

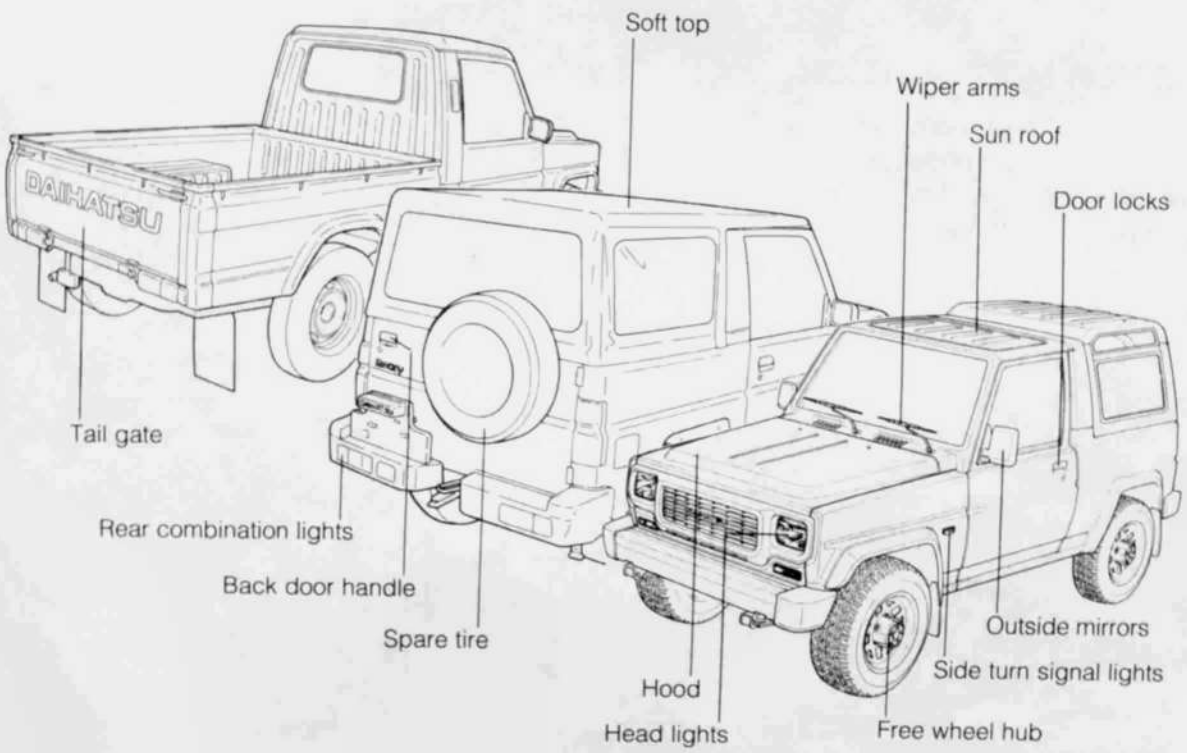
SOFT TOP
(Short & Long)



PICKUP



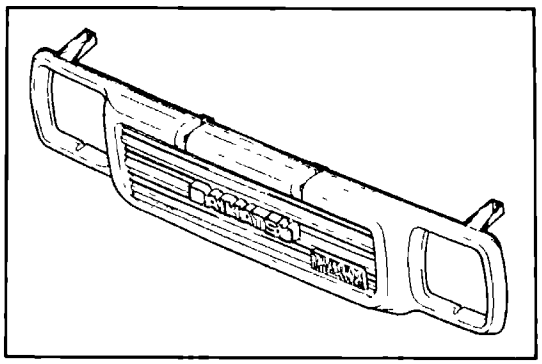
Exterior view



WRE91-GI030

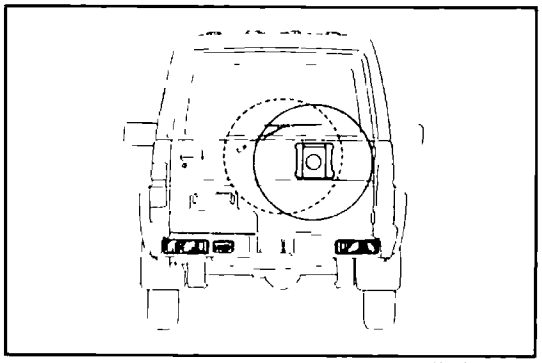
10-2. EXTERIOR MODIFICATION

(1) Front grille
A new front grille design with a wider top-to-bottom width has been adapted to give the Rocky a "tough" look.



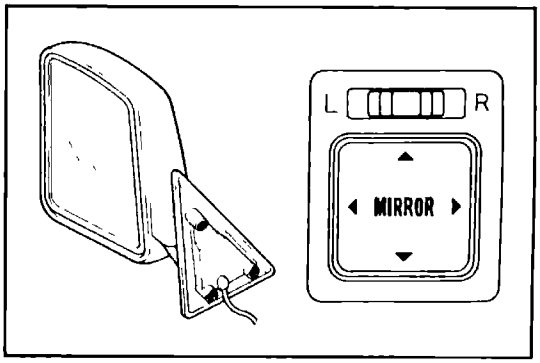
WRE91-GI031

(2) The spare tyre position has been shifted 190 mm to the right and 30 mm lower to improve the rear view.
(3) The new rear combination lamps built into the rear bumper enhance visibility and can be seen even when the backdoor is fully open. This modification is for the European and Australian markets, and pickup model excepted.



WRE91-GI032

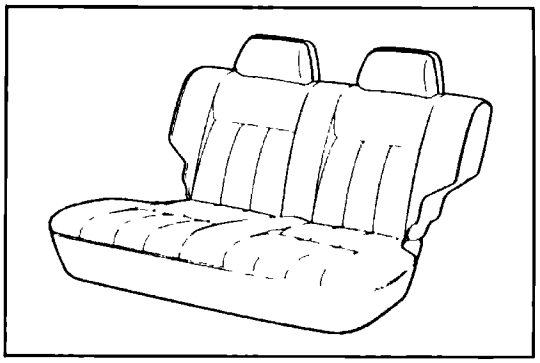
(4) Electrically operated outer mirror is available for optional equipment. (except AUS). A switch located on the dash-board below the instrument cluster.



WRE91-GI033

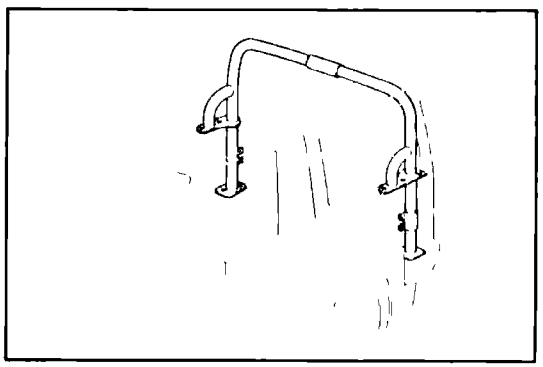
10-3. INTERIOR MODIFICATION

(1) 3-point ELR rear seat belts are available for the Wagon model (F75L(R)V) for optional. When the seat belts are installed, the seat back with armrests will be replaced with a large seat back without armrests.



WRE91-GI034

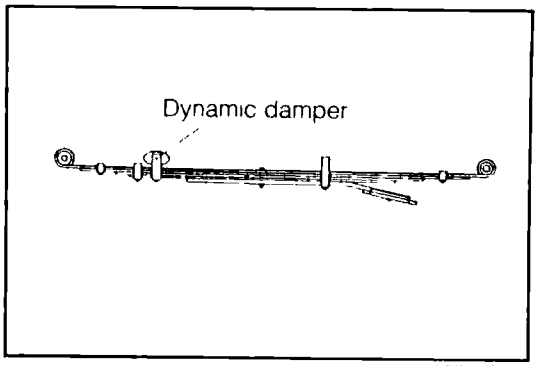
(2) 3-point ELR rear seat belts are also available for the Soft top model (F70L(R)) as a set option with a rear roll bar.



WRE91-GI035

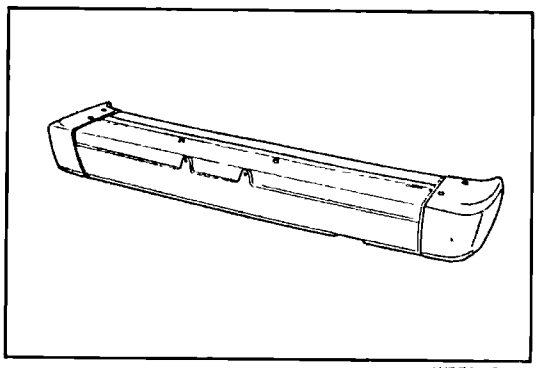
10-4. OTHER MAJOR CHANGES

(1) The mass dampers for the rear springs have been replaced with new dynamic dampers for reduced noise.



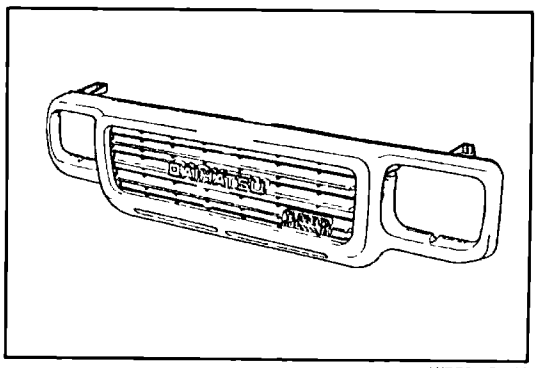
WRE91-GI036

(2) The large front bumper formerly standard in the European markets except on the pickup models in now standard on all models.



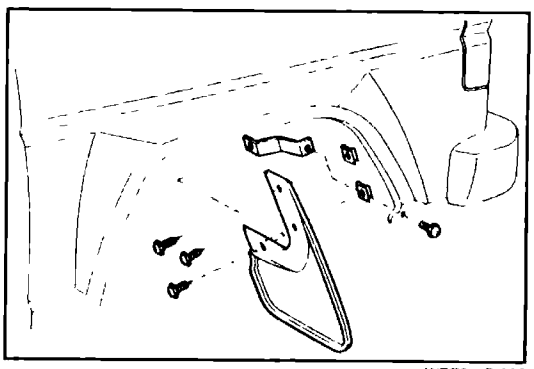
WRE91-GI037

(3) In keeping with the change to the intercooler turbocharger, the front grille has been modified to include an INTER-COOLER TURBO mark.



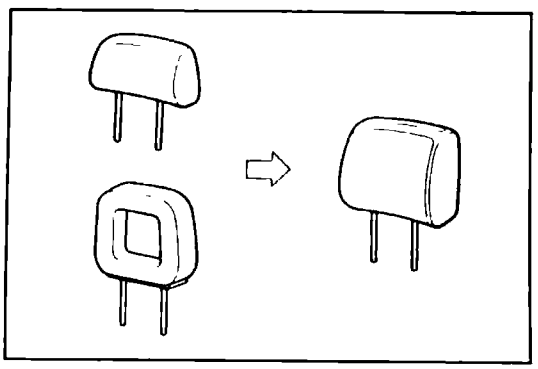
WRE91-GI038

(4) The rear mudguards have been moved to the rear wheel arches. (Except for pickup model).



WRE91-GI039

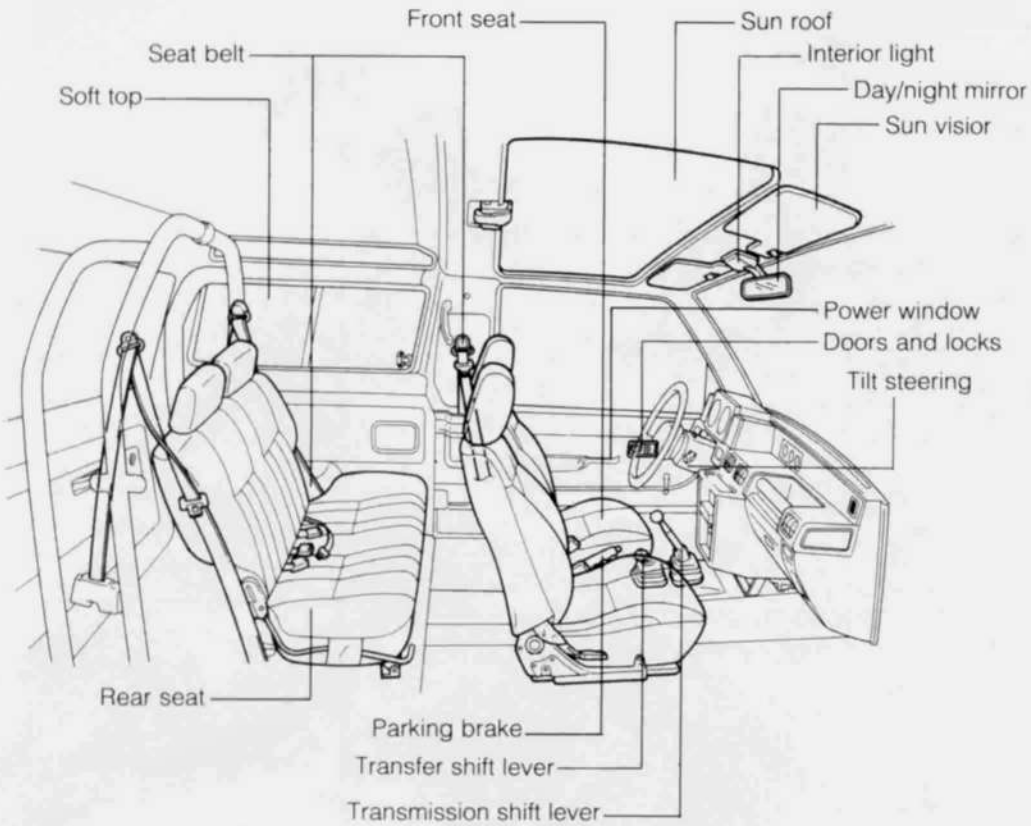
(5) The skeleton-type head restraints have been replaced by the fabric-covered, full form type.



WRE91-GI040

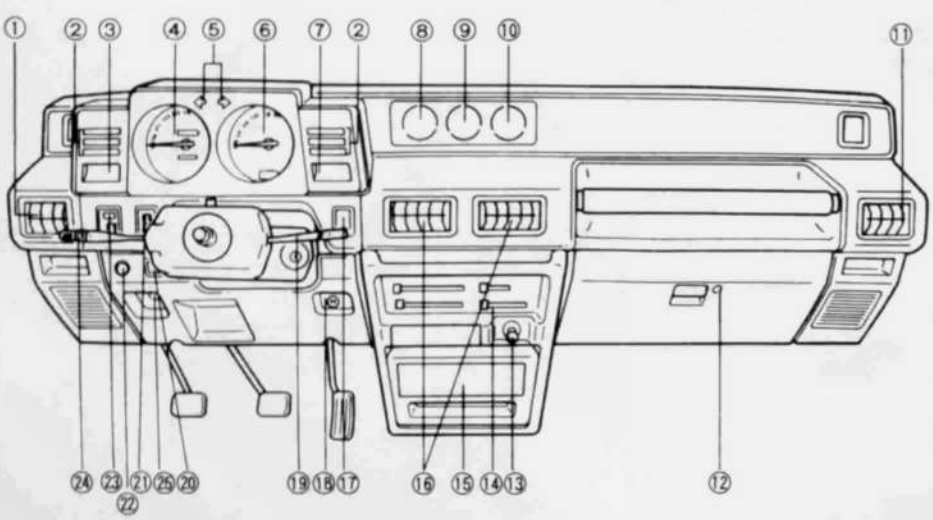
10-5. INTERIOR VIEW

Interior View



WRE91-GI041

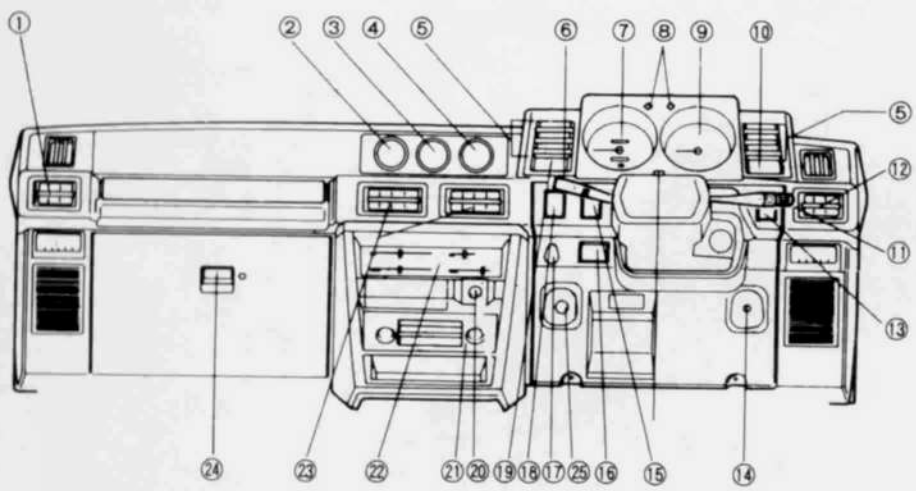
For L.H. Drive Vehicle



① Ventilator
② Warning panel
③ Water temperature gauge
④ Speedometer
⑤ Turn signal indicator lamp
⑥ Tachometer
⑦ Fuel gauge
⑧ Voltmeter
⑨ Clinometer
⑩ Digital clock
⑪ Ventilator
⑫ Glove compartment box
⑬ Cigarette lighter
⑭ Heater control panel
⑮ Radio
⑯ Ventilator
⑰ Rear window defogger switch
⑱ Throttle knob (Diesel engine)
⑲ Front wiper switch
⑳ Rear heater switch
㉑ Power shift switch
㉒ Fog lamp switch
㉓ Rear wiper switch
㉔ Multi-use switch
㉕ Choke knob (Gasoline engine)
㉖ Headlamp leveling control switch (For Germany)

WRE91-GI042

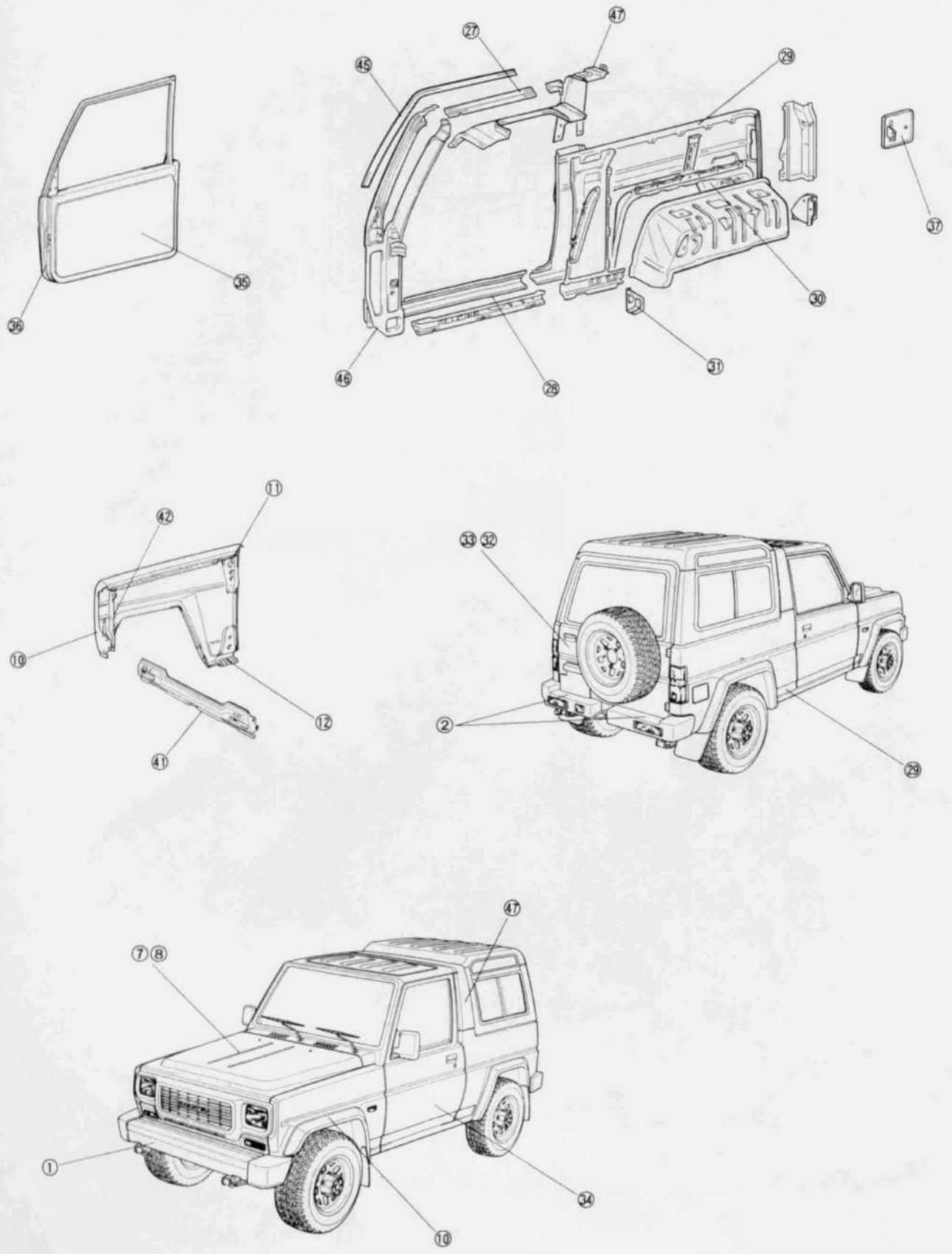
For R.H. Drive Vehicle



① Ventilator
② Digital clock
③ Clinometer
④ Voltmeter
⑤ Warning panel
⑥ Front wiper switch
⑦ Speedometer
⑧ Turn signal indicator lamp
⑨ Tachometer
⑩ Fuel gauge
⑪ Multi-use switch
⑫ Ventilator
⑬ Rear window defogger switch
⑭ Throttle knob (Diesel engine)
⑮ Rear wiper switch
⑯ Rear heater switch
⑰ Fog lamp switch
⑱ Power shift switch
⑲ Water temperature gauge
⑳ Cigarette lighter
㉑ Radio
㉒ Heater control panel
㉓ Ventilator
㉔ Glove box
㉕ Choke knob (Gasoline engine)

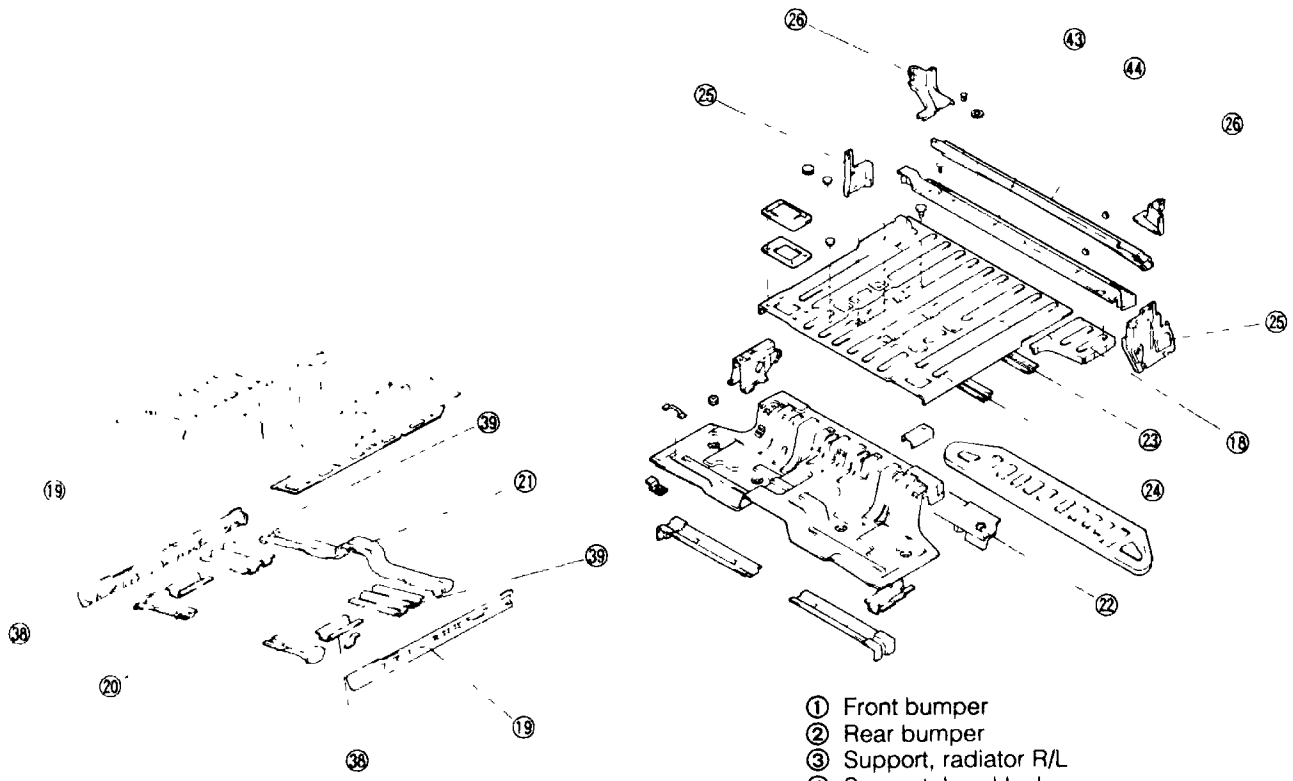
WRE91-GI043

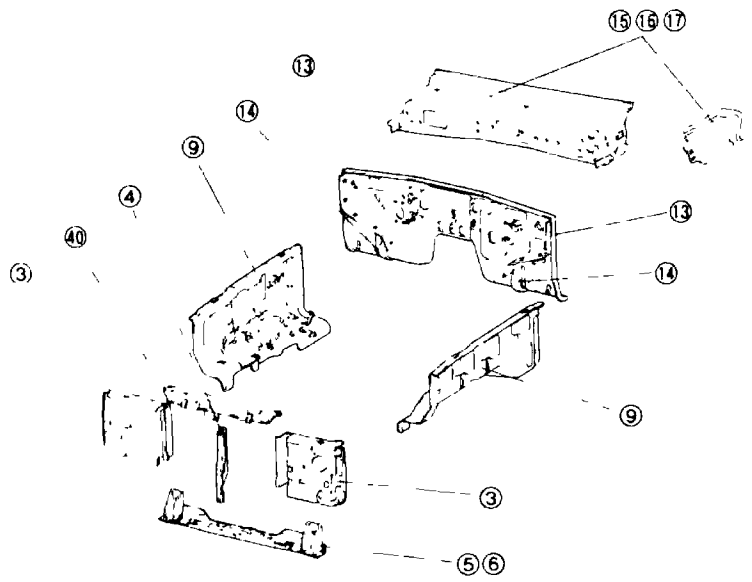
10-6. PARTS WHERE GALVANIZED STEEL SHEETS ARE USED



WRE91-GI044

(Continued)

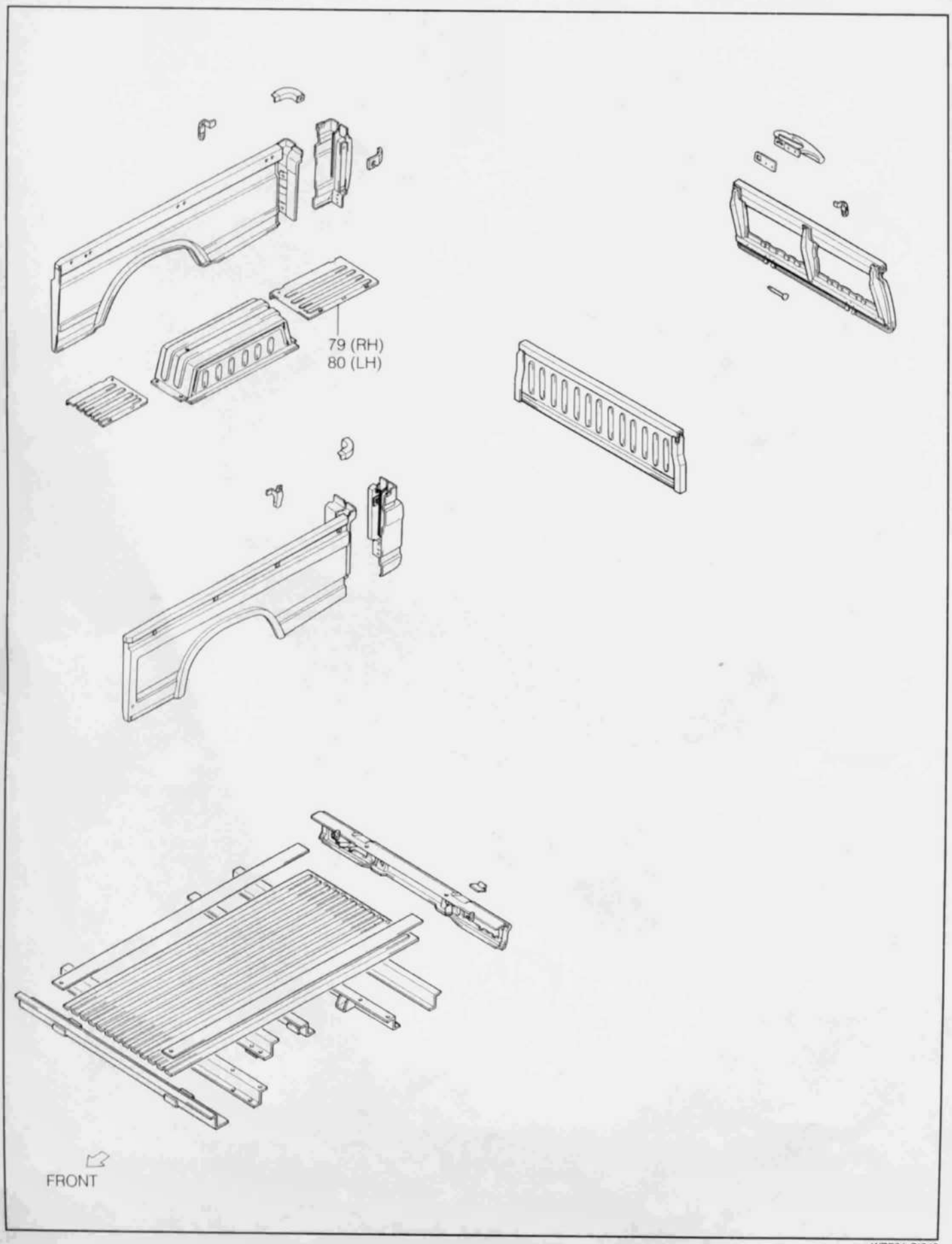




① Front bumper
② Rear bumper
③ Support, radiator R/L
④ Support, hood lock
⑤ Member, front cross outer
⑥ Member, front cross inner
⑦ Panel, hood outer
⑧ Panel, hood inner
⑨ Apron, front fender R/L
⑩ Panel, front fender R/L
⑪ Bracket, front fender rear upper R/L
⑫ Bracket, front fender rear lower R/L
⑬ Support, apron fender to dash R/L
⑭ Reinforcement, dash to floor
⑮ Panel, cowl top outer
⑯ Panel, cowl top inner
⑰ Panel, cowl top outside corner R/L
⑱ Panel, rear floor side, LH
⑲ Member, floor side inner R/L
⑳ Member, front floor cross No. 1
㉑ Member, front floor cross No. 2
㉒ Member, center floor cross
㉓ Member, rear floor cross No. 1
㉔ Member, rear floor cross No. 2
㉕ Panel, rear floor side rear R/L
㉖ Brace, rear floor panel R/L
㉗ Rail, roof side outer R/L
㉘ Panel, rocker outer R/L
㉙ Panel, quarter outer R/L
㉚ Panel, quarter wheel house outer R/L
㉛ Extension wheel house R/L
㉜ Panel, back door outside
㉝ Panel, back door inside
㉞ Panel, front door outside R/L
㉟ Panel, front door inside R/L
㊱ Panel, front door hinge side R/L
㊲ Lid, fuel filler opening
㊳ Reinforcement, front floor under
㊴ Reinforcement sub assy, front floor

WRE91-GI045

(Continued — Pickup model)

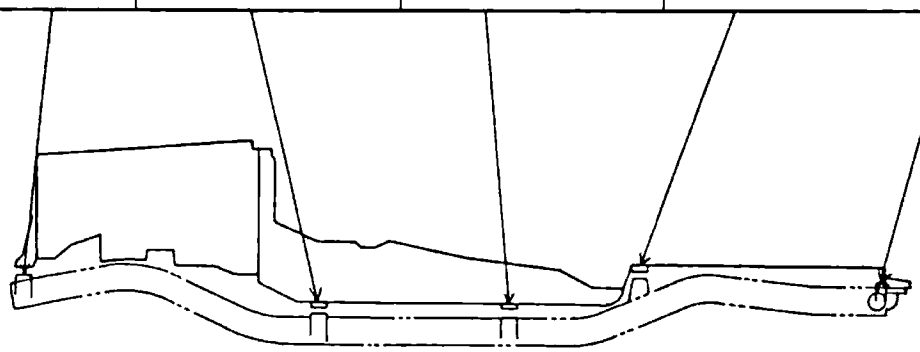


WRE91-GI046

10-7. BODY MOUNTS

The mounts where vehicle body and frame are coupled is fitted in such a manner as effectively reduce the vibration from the suspension and drive system.

No	1	2	*3	4	5
Hardness	46°	60°	42°	46°	60°
Color code	Yellow	White	Two lines	Yellow	White
Configuration			(Except for hard top)		

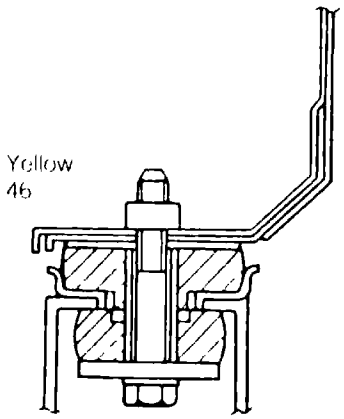
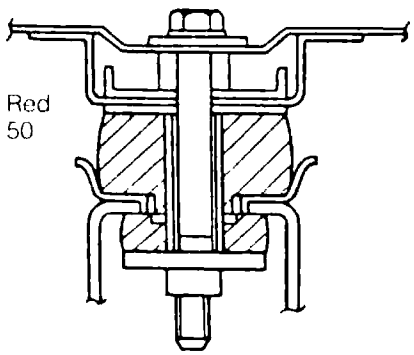
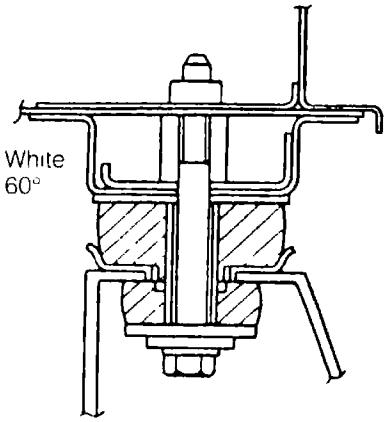


*Hard top (F70V and F80V) are free mount.

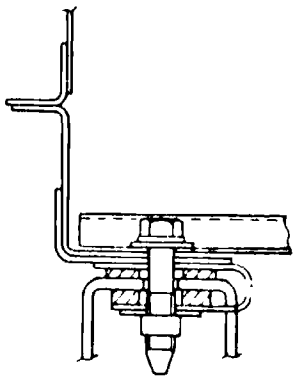
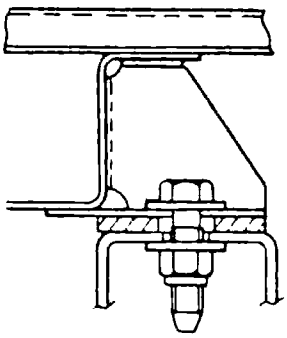
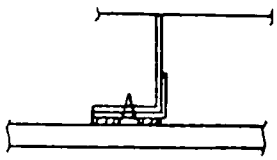
WRE91-GI047

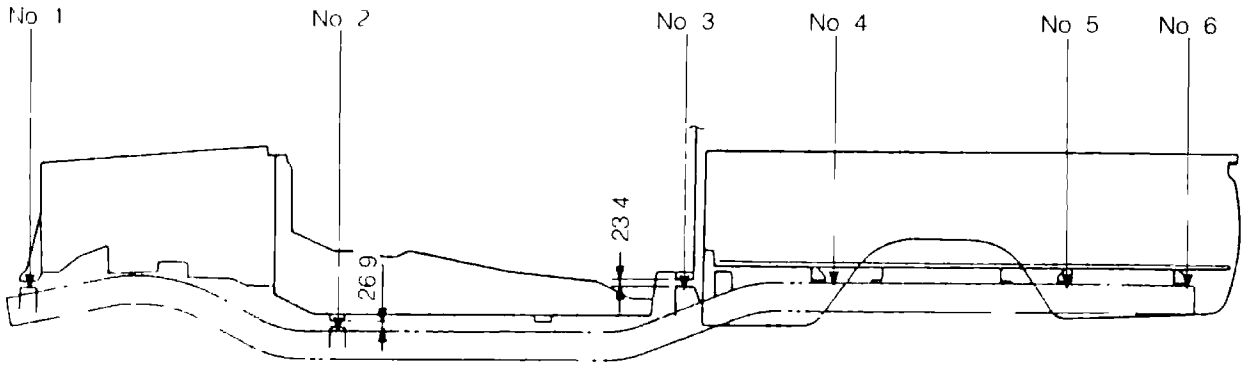
(Continued — Pickup model)

Front Body

No. 1	No. 2	No. 4
		

Rear Body

No. 1	No. 2 No. 5 No. 6	No. 3 No. 4
		



Unit: mm

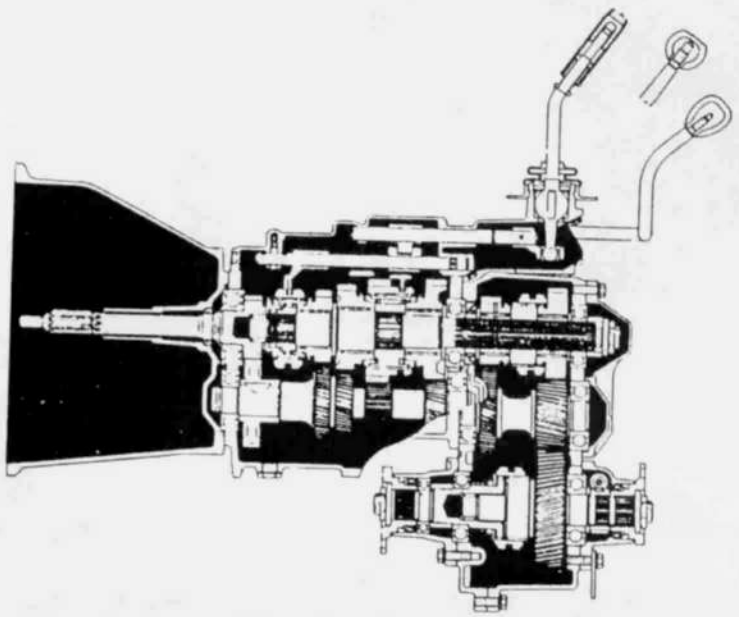
Unit: mm

WRE91-GI048

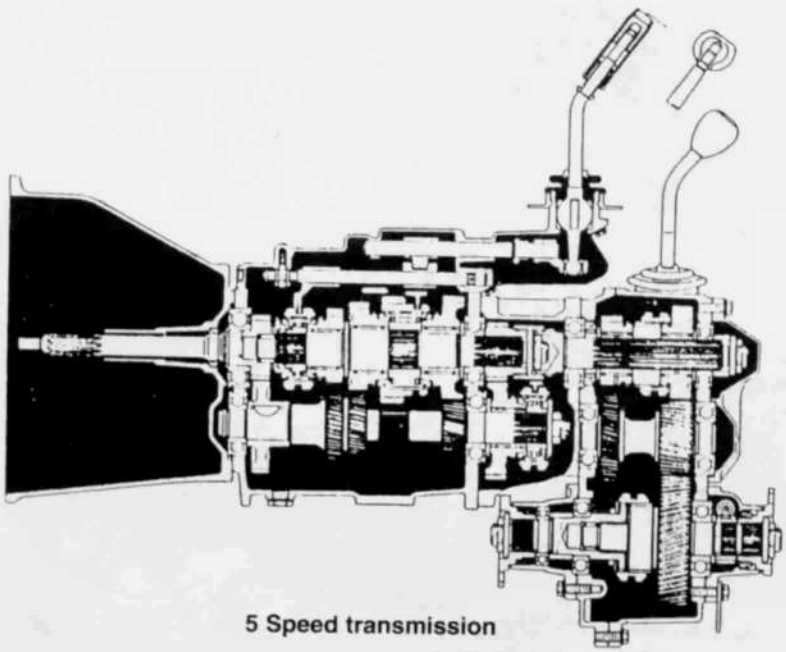
11. SUMMARY OF POWER TRAIN CONSTRUCTION

11-1. TRANSMISSION & TRANSFER

There are two transmission types, 4 speed and 5 speed.
The shift lever incorporating vibration-proof system provides smoother and more quiet shifting. The 5 speeds transmission is equipped with a mis-shift preventive mechanism to prevent direct shifting from the 5th to Reverse.
On the transfer, there are two speeds gear ratio, high and low with mechanical shifting or power shifting (optional equipment).



4 Speed transmission

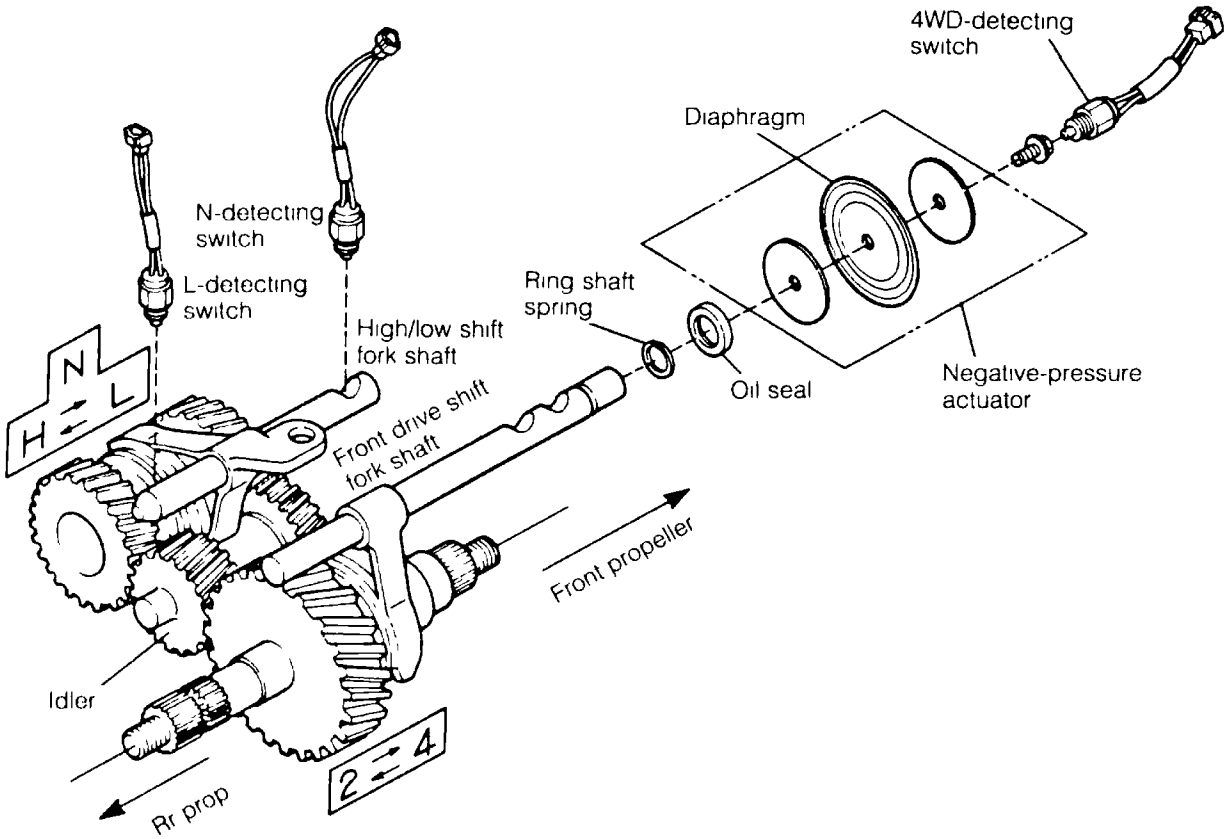


5 Speed transmission

WRE91-049

11-2. POWER SHIFT MECHANISM

The shift from the two-wheel drive to the four-wheel drive and vice versa can be performed by means of power shift switch which utilizes a negative pressure actuator.
The negative pressure which has been generated by the vacuum pump is transmitted to a diaphragm actuator provided inside the transfer case. Consequently, the thrust generated by the actuator is transmitted directly to the drive shift fork shaft. In this way, the shift from the two-wheel drive to the four-wheel drive and vice versa is performed.
This device is available as optional equipment with 5-speed transmission.



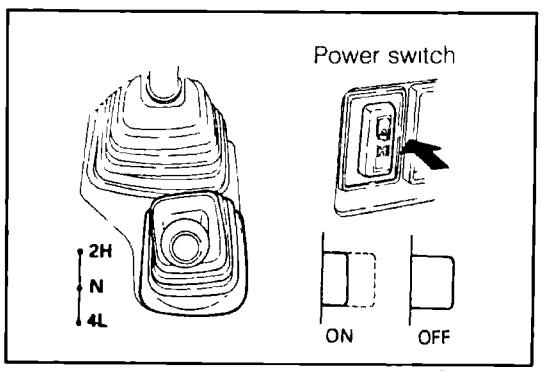
WRE91-GI050

(1) Power switch operation

2H: 2-wheel drive, high speed range.
Shift the transfer shift lever into 2H position and turn OFF the power switch.

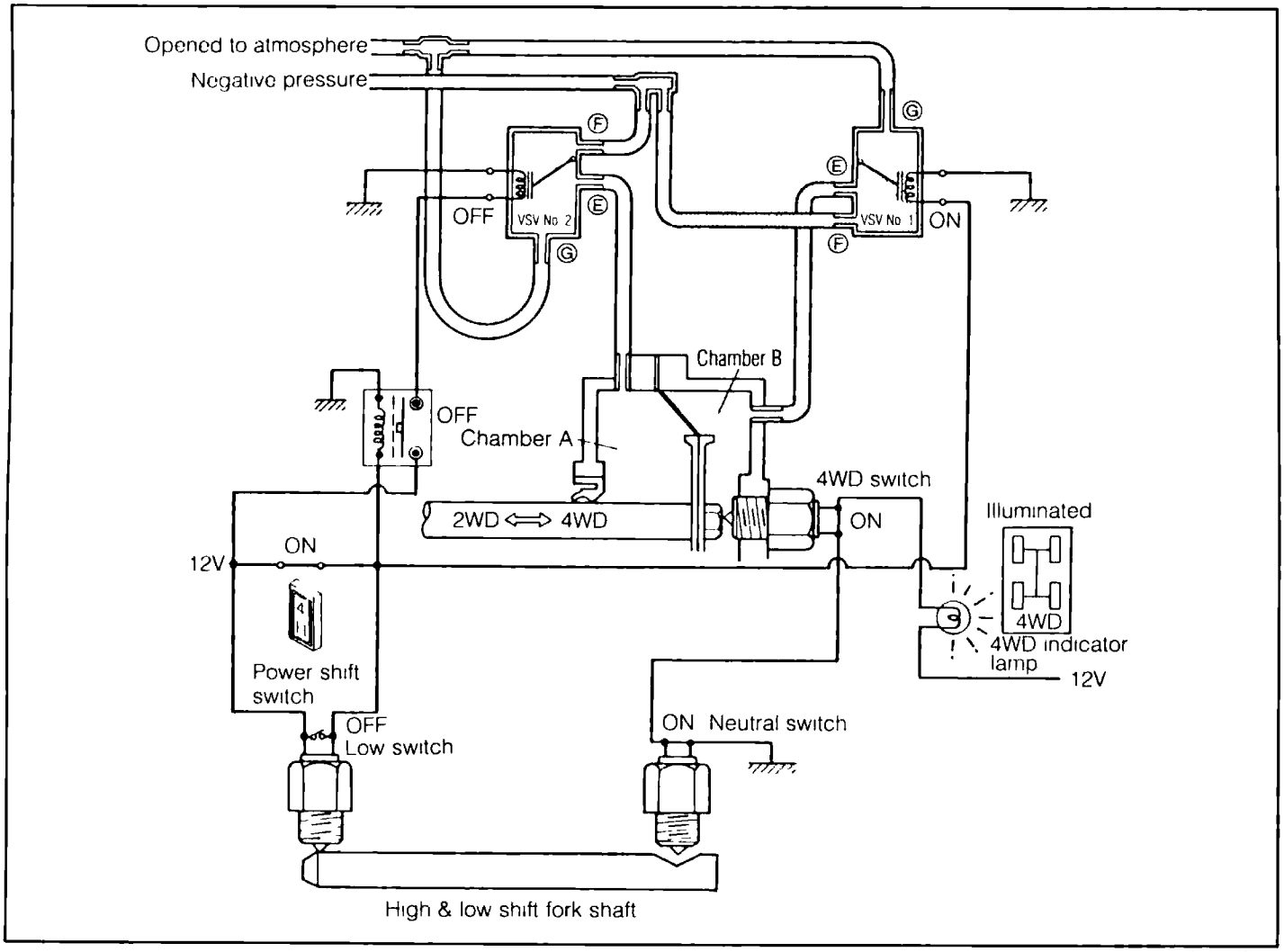
4H: 4-wheel drive, high speed range.
Shift the transfer shift lever into 2H position and turn ON the power switch.

4L: 4-wheel drive, low speed range.
Shift the transfer shift lever into 4L position. even if the turn ON the power switch, do not operate to shift 4H.



ORE91-GI051

(2) Operation diagram



WRE91-GI052

(3) Operating conditions of each switch

	2H		N		4L
Power switch	ON	OFF	ON	OFF	ON/OFF
VSV No. 1	ON	OFF	ON	OFF	ON
VSV No. 2	OFF	ON	OFF	ON	OFF
Low SW	OFF	OFF	OFF	OFF	ON
Neutral SW	ON	ON	OFF	OFF	ON
4WD SW	ON	OFF	ON	OFF	ON

WRE91-GI053

(4) Description

- High speed range (2H)
  A negative pressure is applied to the chamber B of the actuator through the VSV No. 1. At this stage, the atmospheric pressure is applied to the chamber A of the actuator from the VSV No. 2.
  Consequently, because of the difference in pressure being applied to the diaphragm, the front drive shift fork which is connected directly to the diaphragm will be shifted to the four-wheel drive side.
- Low speed range (4L)
  The negative pressure is transmitted in the same way as with cases where transfer shift lever is in the 2H position with the power switch turned ON. Since the low switch is turned ON, the VSV No. 2 is OFF regardless of the state of the power shift switch. As a result, the vehicle is driven on the four-wheel drive.

WRE91-054

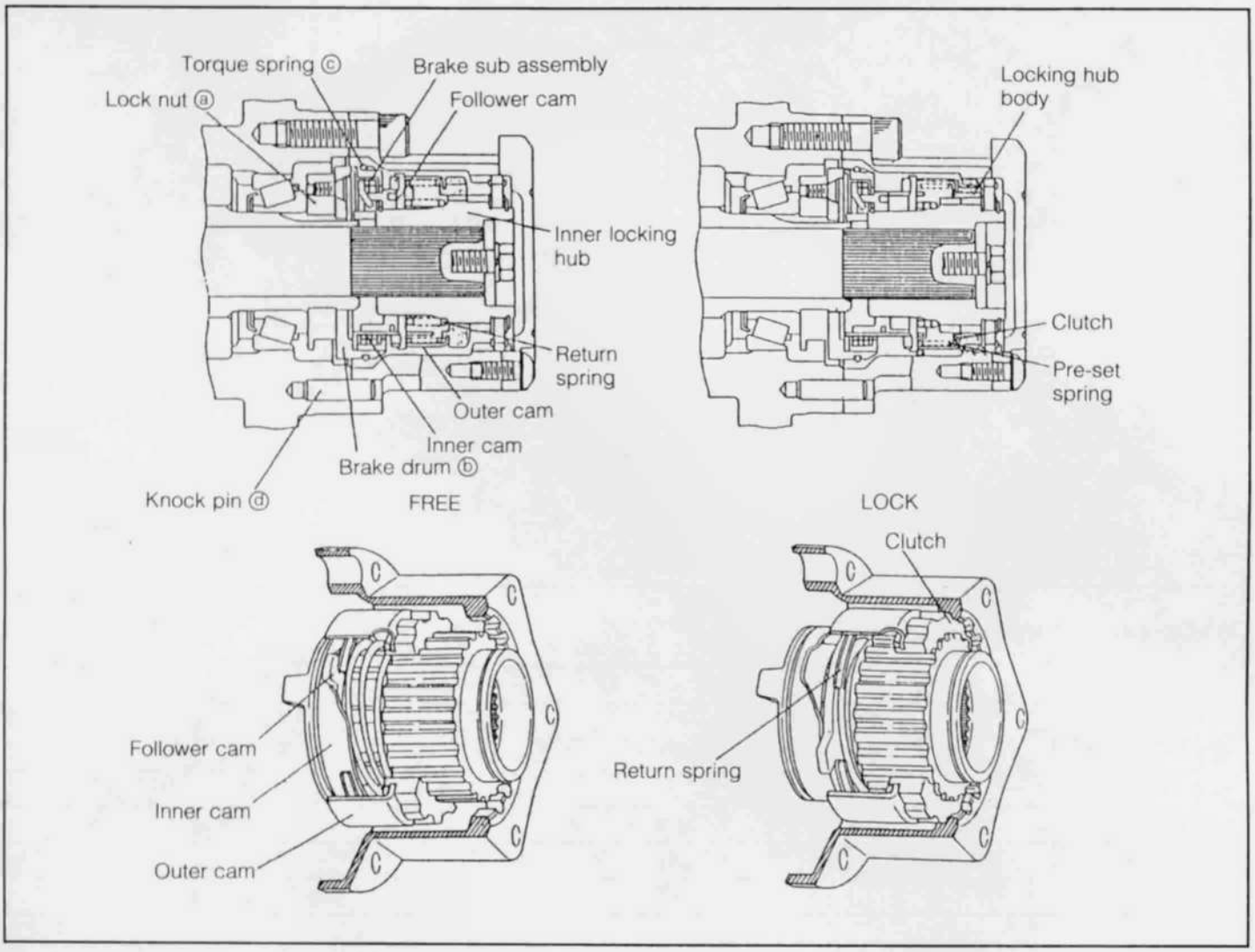
11-3. AUTOMATIC LOCKING HUB (ALH)

(1) Objective of setting

The ALH is set for improving the free ↔ lock switching operability from the conventional manual free wheel hub.
Namely, the ALH is capable of automatic switching by just starting the car while the free ↔ lock switching is to be done manually in the manual free wheel hub.
The ALH is mounted at the same position as the manual free wheel hub.

WRE91-GI055

(2) Outline of structure



Major differences with manual free wheel hub (Assembly parts)

(i) A bearing lock nut ⓐis provided. (The existing bearing nut is not required.)
(ii) A brake drum ⓑis provided to also replace the claw washer. (A claw washer is not required.)
(iii) ⓐand ⓑare tightened and fixed by the torque spring ⓒ.
(iv) A knock pin ⓓis set instead of the axle hub and ALH socket joint.
All of ⓐ- ⓓare ALH-dedicated parts.
(V) Drive shaft is also reguired for automatic locking hub, when modification from manual to auto locking hub.

WRE91-GI056

(3) Operation method

FREE → LOCK

1. Stop the car and change the T/F to 4WD.
2. Start the car slowly holding the steering wheel in a straight forward travelling condition. (Note 1)
3. Run about 3 m or more, and the system will lock automatically.

LOCK → FREE

1. Stop the car and change the T/F to 2WD.
2. Back up the car slowly holding the steering wheel in a straight forward travelling condition. (Note 2)
3. Run about 3 m or more, and the system become free automatically.

Notes

1. **It doesn't matter whether forward or backward.**
2. **Strictly speaking, start the car in the opposite direction to the direction of travelling just before changing the T/F to 2WD.**

WRE91-GI057

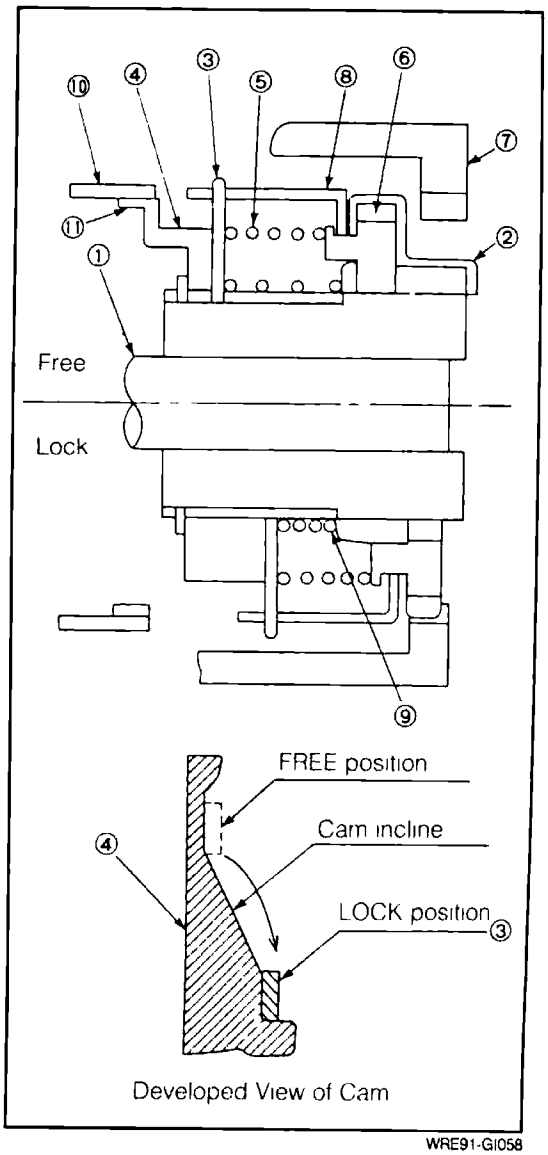
(4) Operating principle

FREE → LOCK

1. When the car is started after changing the T/F to 4WD, the drive shaft ① turns to turn the inner ② and the cam follower ③ as one.
2. The brake drum ⑩, which is fixed to another part (bearing lock nut), does not turn. The brake sub-assembly ⑪ is suppressed from turning by the frictional force with ⑩. ④, which is engaged with the claw of ⑪, is also suppressed from turning. (Note 1)
3. As a result, ③ climbs the cam incline of ④ while turning to move to the right-hand side of the diagram. (See the developed view of the cam.)
4. As ③ moves to the right-hand side, the clutch ⑥ attached to the preset spring ⑤ also moves to engage the hub body's ⑦ inner teeth to lock.

Note 1.

- **When locked, ⑪ starts turning to slide along the frictional face of ⑩.**



Developed View of Cam

WRE91-GI058

LOCK → FREE

1. When the car is backed up after changing the T/F to 2WD, the system is driven backward from the wheel side to turn ⑦, ⑥ and the hub joint ⑧, ③ backward as one.
   (② and ① also turn as one until unlocked.)
2. ③, which is pressed onto the cam incline of ④ by the return spring ⑨, goes down the cam incline of ④ to move to the left-hand side of the diagram.
3. As ③ moves to the left-hand side, ⑥ is pulled to the left-hand side by ⑧ to free the system.

WRE91-GI059

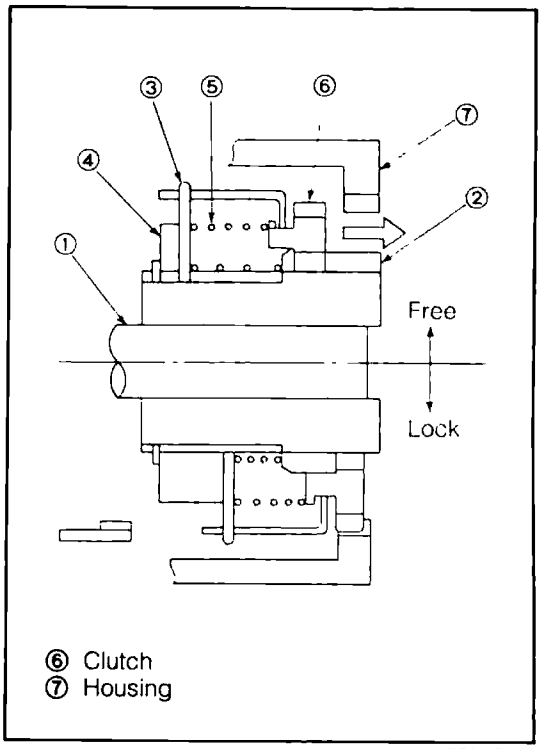
Cautions on user handling

In the event of ratcheting, stop the car once, change the T/F to 4WD, and then start the car.

1. Avoidance of Ratcheting
   The gear noise that occurs when the clutch and the housing are about to lock while there is a difference between the speeds of the two.

2. Prevention of T/F Operation during Travelling Ratcheting occurs if the T/F is shifted 2WD → 4WD by mistake while travelling with the T/F at 2WD and the ALH free.
   In that case, take the disposition of 1.

3. Observance of Straight Forward Starting at ALH Change when changing the ALH free ↔ lock, hold the steering wheel in a straight forward travelling condition and run about 3 m or more. (If the steering wheel is turned before running a minimum of 3 m, one of the ALH's on both sides locks while the other becomes free to cause ratcheting.)

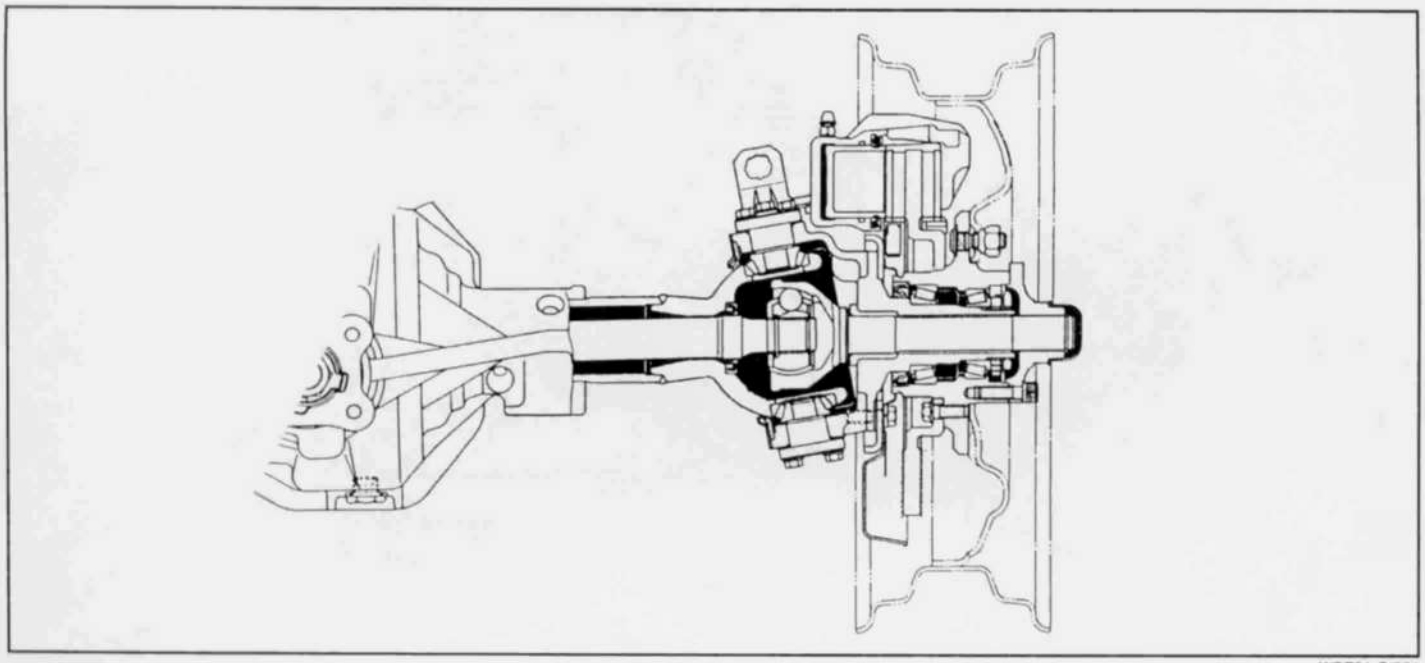


WRE91-GI060

12. SUMMARY OF CHASSIS CONSTRUCTION

12-1. FRONT AXLE

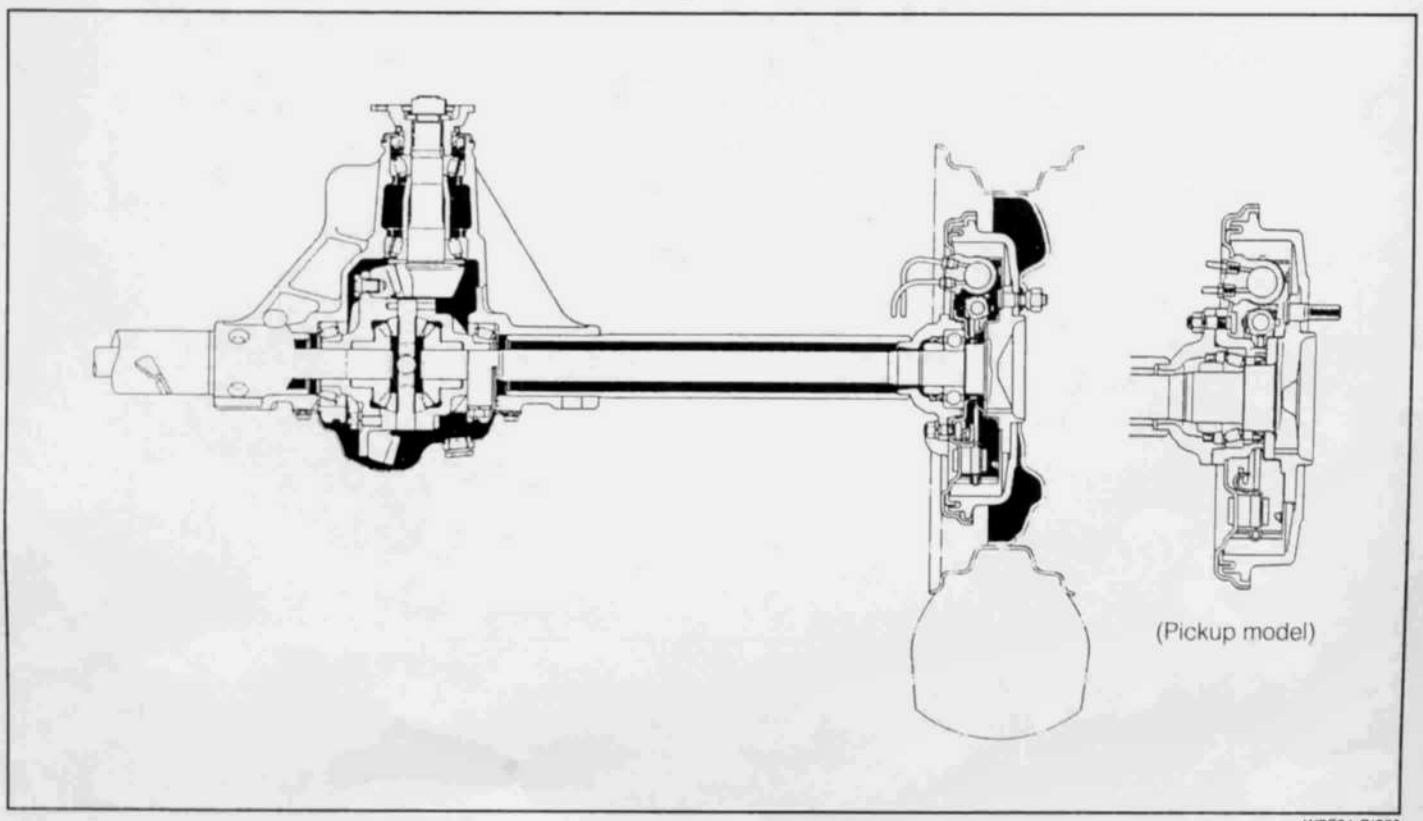
The front axle is of the full floating shaft tube type. It consists of Birfield type constant velocity ball joints, which make possible simultaneous front wheel driving and steering simultaneously and the steering knuckles, which also serve as the ball joint cases.
The steering knuckle is connected to the front axle housing through the tapered roller bearings at the upper and lower steering knuckle bearing caps.



WRE91-GI061

12-2. REAR AXLE

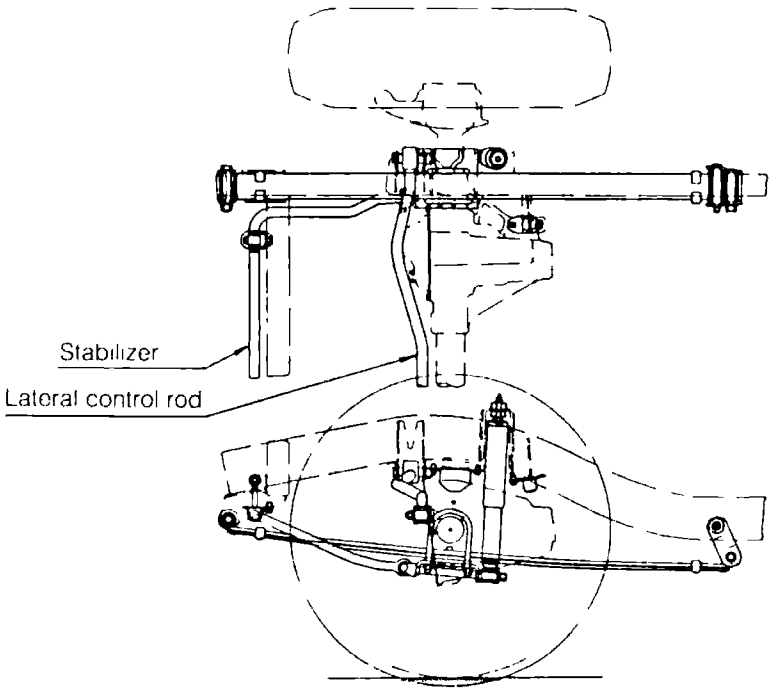
The rear axle is of the semi-floating type with a built-up type housing. The differential has been mounted off-center toward the right side in relation to the longitudinal center of the vehicle.



WRE91-GI062

12-3. FRONT SUSPENSION

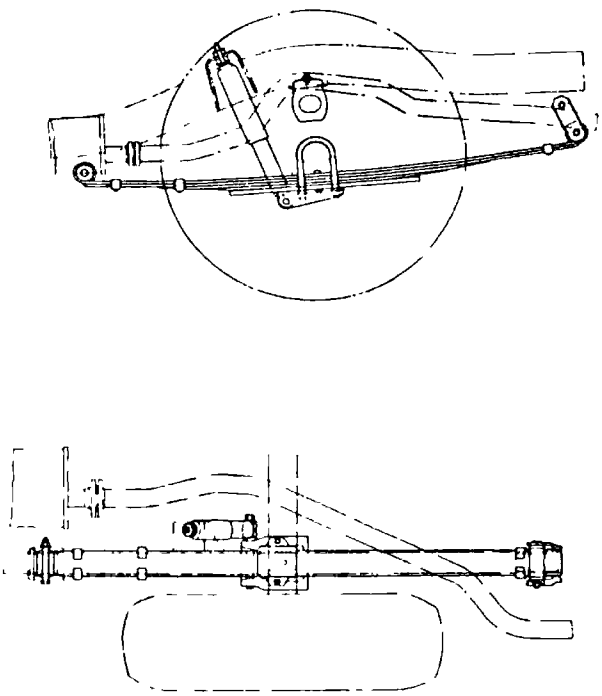
For greater riding comfort and operational safety, the front suspension features stabilizer, lateral control rods, gas-loaded shock absorbers and rear shackles.



WRE91-GI063

12-4. REAR SUSPENSION

The rear suspension features large-size gas-loaded shock absorbers and spring dumpers, both fabricated of rubber for greater riding comfort.



WRE91-GI064

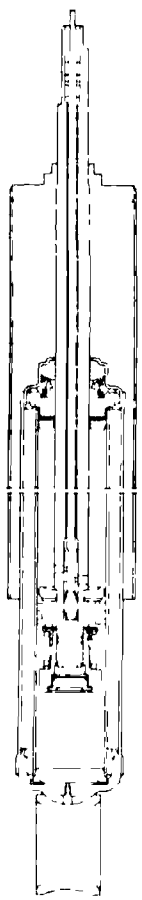
12-5. THREE-STAGE DAMPERS

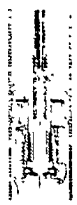
The three-stage dampers allows switching the damping force of the shock absorbers in three steps depending on the road and traveling conditions. It is used in the F70 and F75 as optional equipment.
The dampers are operated from the switch in the center console box.

(1) SOFT
Both of the two holes provided in the control rod and the shaft align with each other. This increases the amount of gas which is passed, decreasing the damping force.

(2) NORMAL
Only one of the two hole align, increasing the damping force to the medium level.

(3) HARD
Both of the holes are out of alignment, maximizing the damping force. The damping force is generated by these holes and the piston valve section.

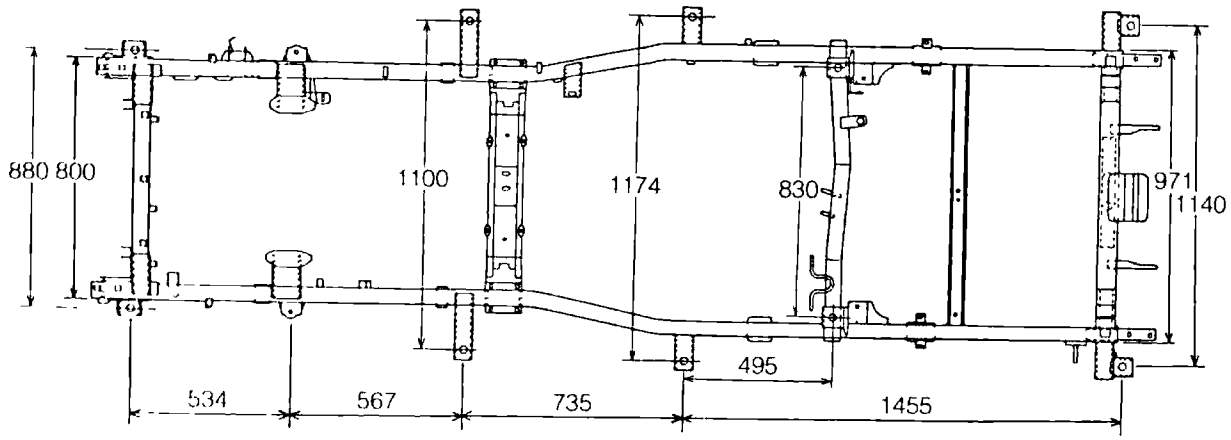


Selection Mode	Condition of gas holes		
	Shaft	Expand	Contact
SOFT			
NORMAL			
HARD			

WRE91-GI065

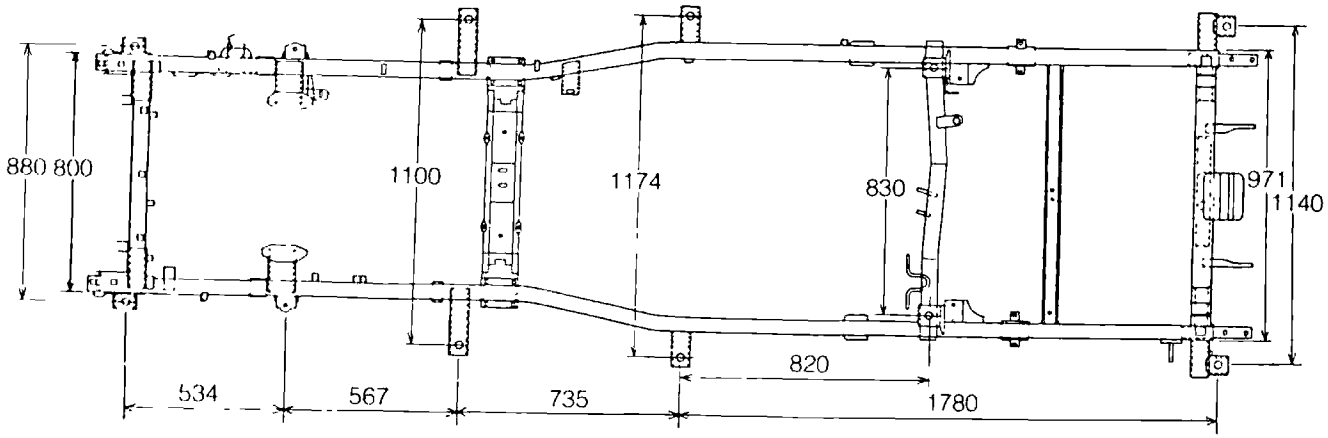
12-6. FRAME

F70



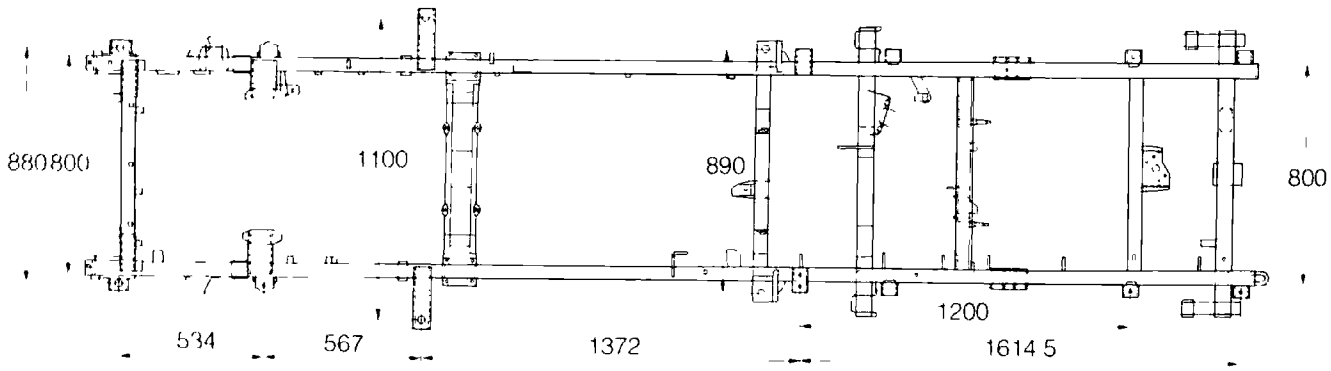
WRE91-GI066

F75



WRE91-GI067

F77

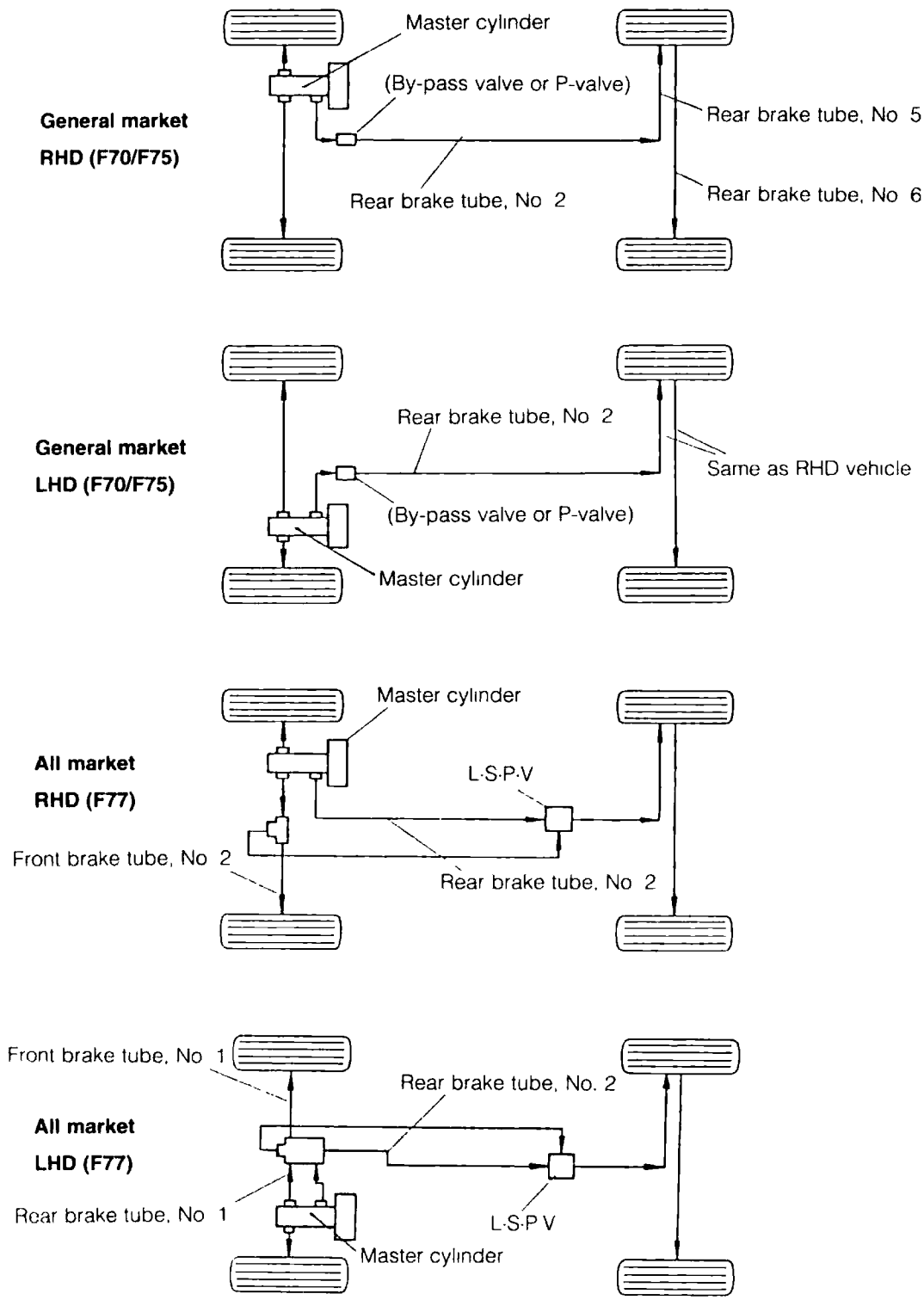


WRE91-GI068

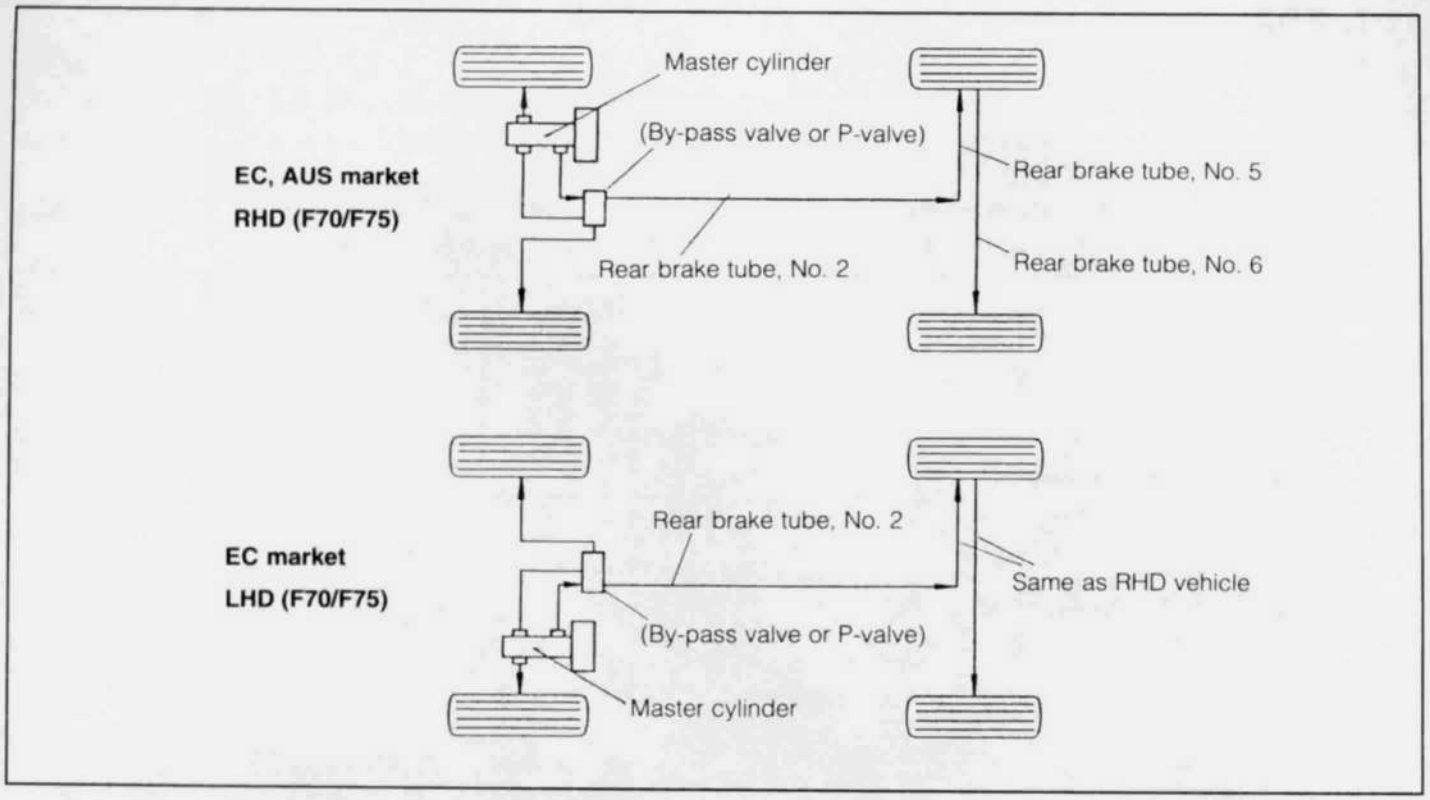
12-7. BRAKE

(1) Brake line

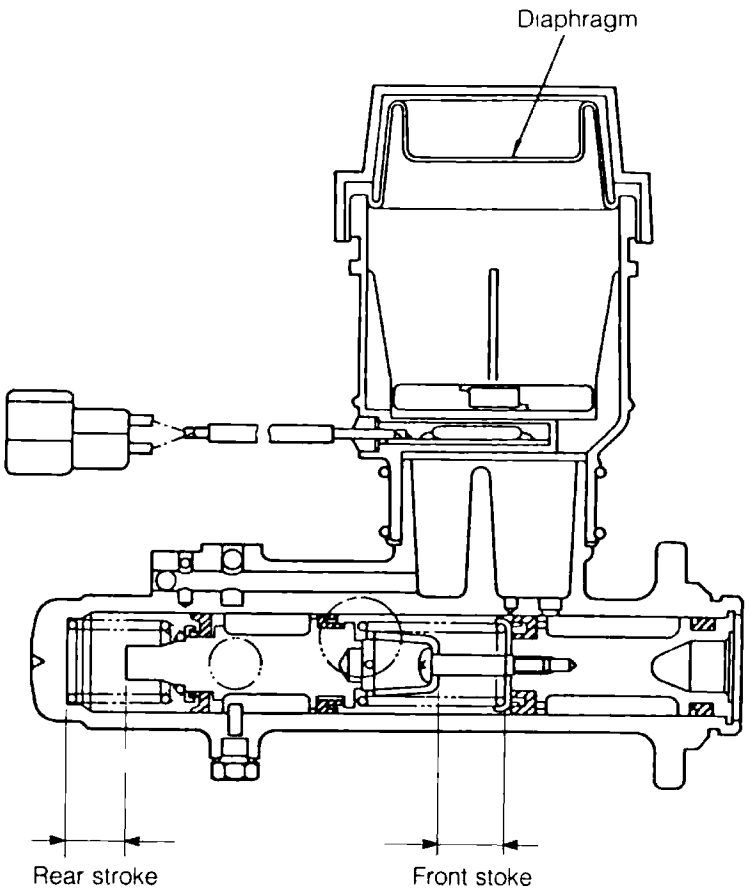
The brake line comes in two kinds; one for the R.H.D. vehicles and the other for the L.H.D. vehicles.
On all models, the disc brake is provided at the front wheels, while the drum brake is installed at the rear wheels.
The rear brake systems are operated through a proportioning valve on General market, a by-pass valve on AUS and EC market, and a load sensing proportioning valve for F77 model.



WRE91-GI069


EC, AUS market
RHD (F70/F75)
Master cylinder
(By-pass valve or P-valve)
Rear brake tube, No. 5
Rear brake tube, No. 2
Rear brake tube, No. 6
EC market
LHD (F70/F75)
Rear brake tube, No. 2
Same as RHD vehicle
(By-pass valve or P-valve)
Master cylinder

(2) Master cylinder and reservoir
The master cylinder is an aluminum casting. The reservoir is a sealed type which shuts off the brake fluid from the atmosphere with the diaphragm, thus preventing the fluid from deteriorating and maintaining high braking capacity for long periods of time.



Master cylinder specifications

Cylinder bore mm		22.22	
Stroke mm	Front	18.5	
	Rear	11.5	
Reserve tank capacity cc	Front	16	114
	Rear	12	(Common use as front and rear)

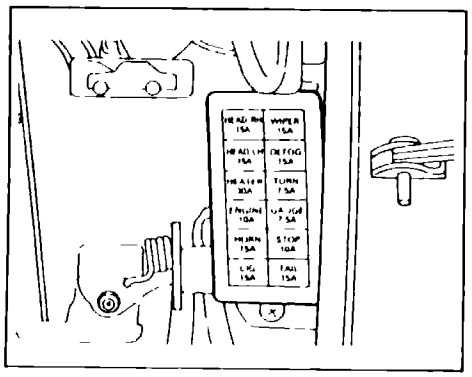
WRE91-GI070

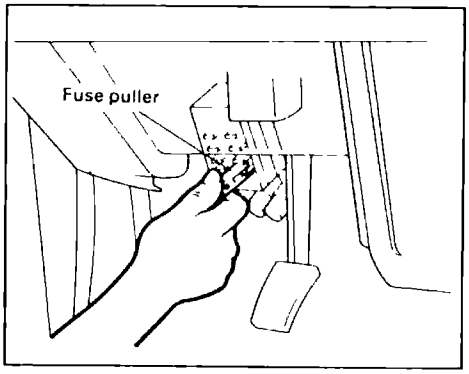
13. SUMMARY OF BODY ELECTRICAL

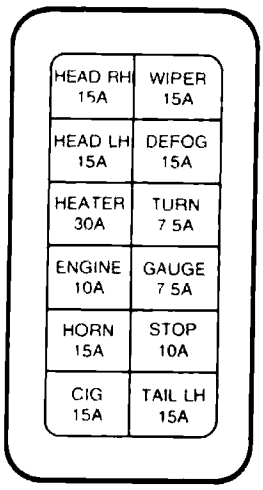
13-1. FUSE BLOCK & FUSIBLE LINK

The fuse block is located at the cowl side of the driver's side. Blade type fuses have been employed. A fuse is provided independently for each of the right and left headlamps in order that the load for each circuit may be reduced.

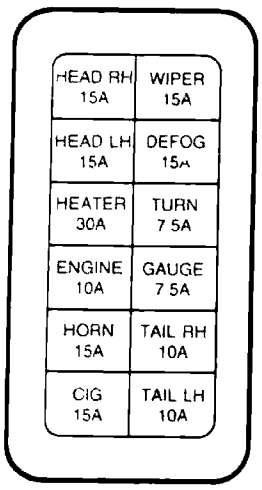
A sub-fuse block is installed below the instrument panel at the driver's seat side.



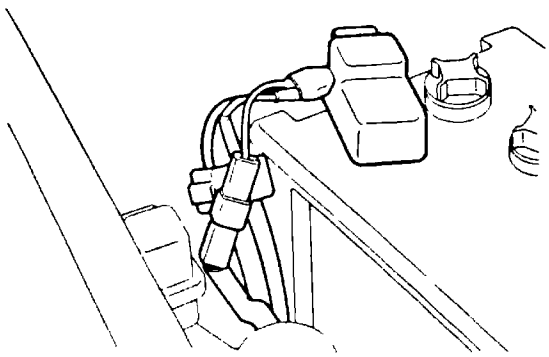


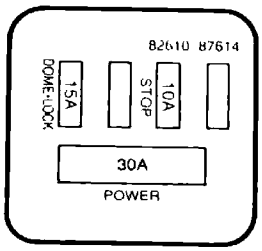


Other than LHD/European



LHD/European spec.

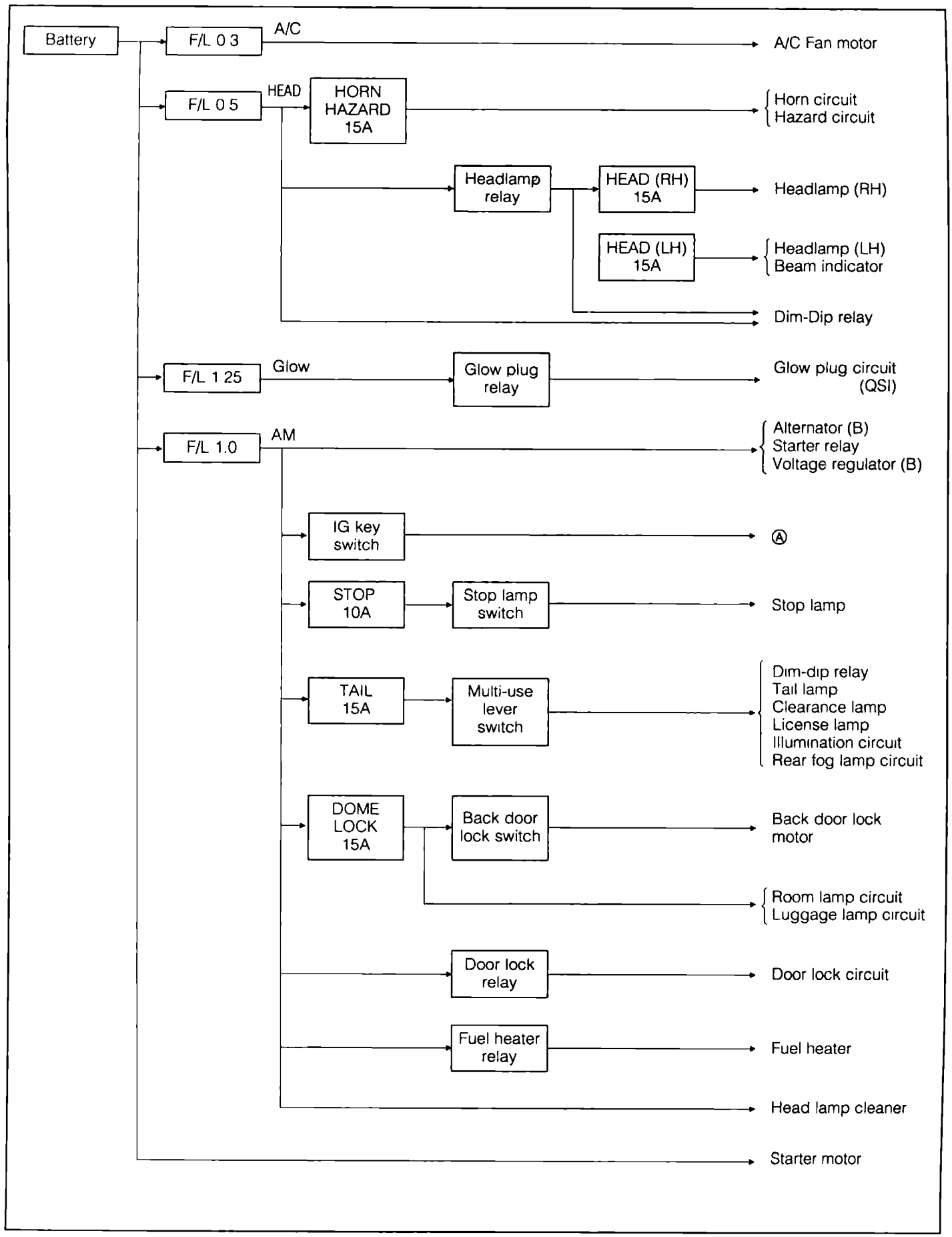




Sub fuse block

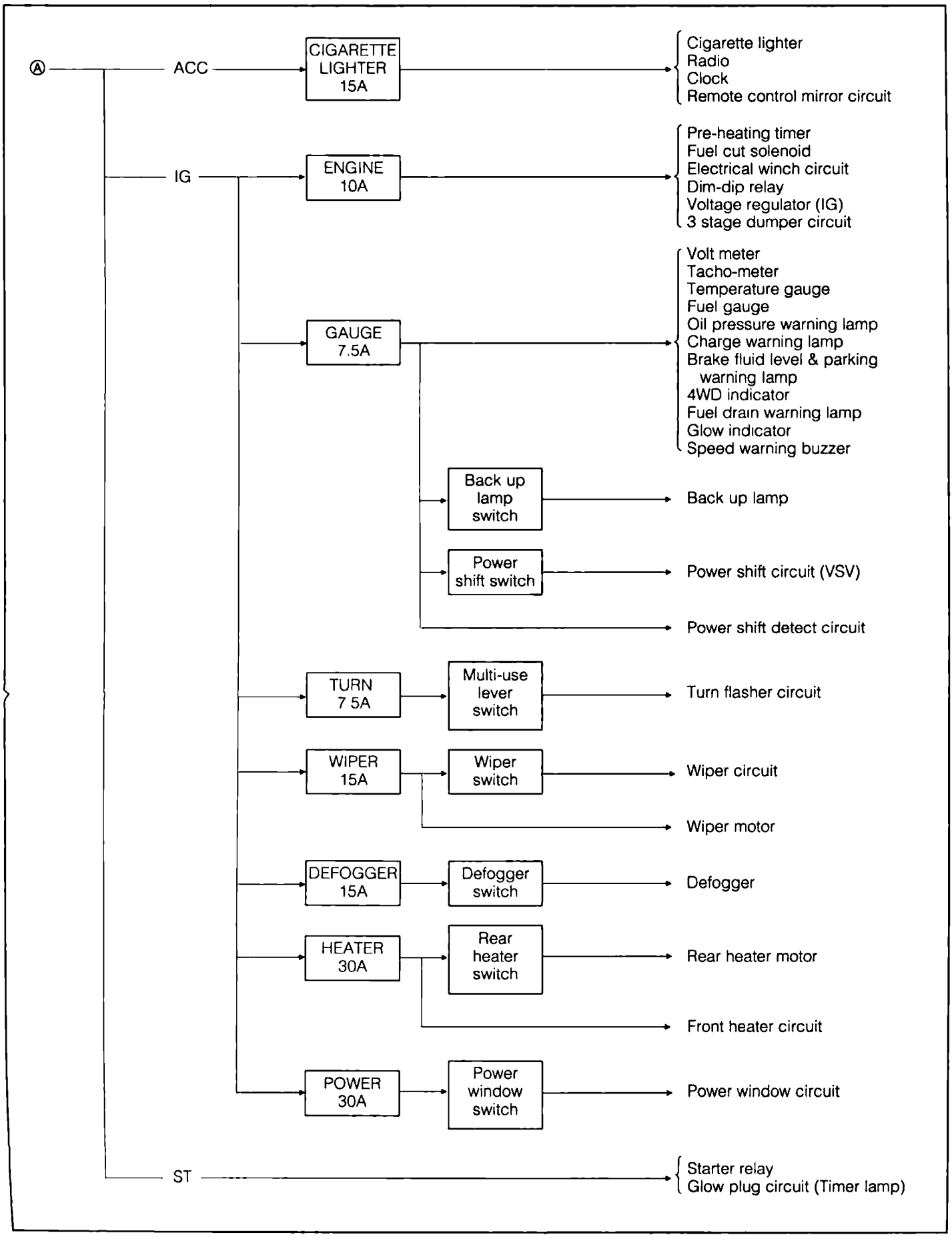
WRE91-GI071

13-2. FUSE CIRCUIT (1)



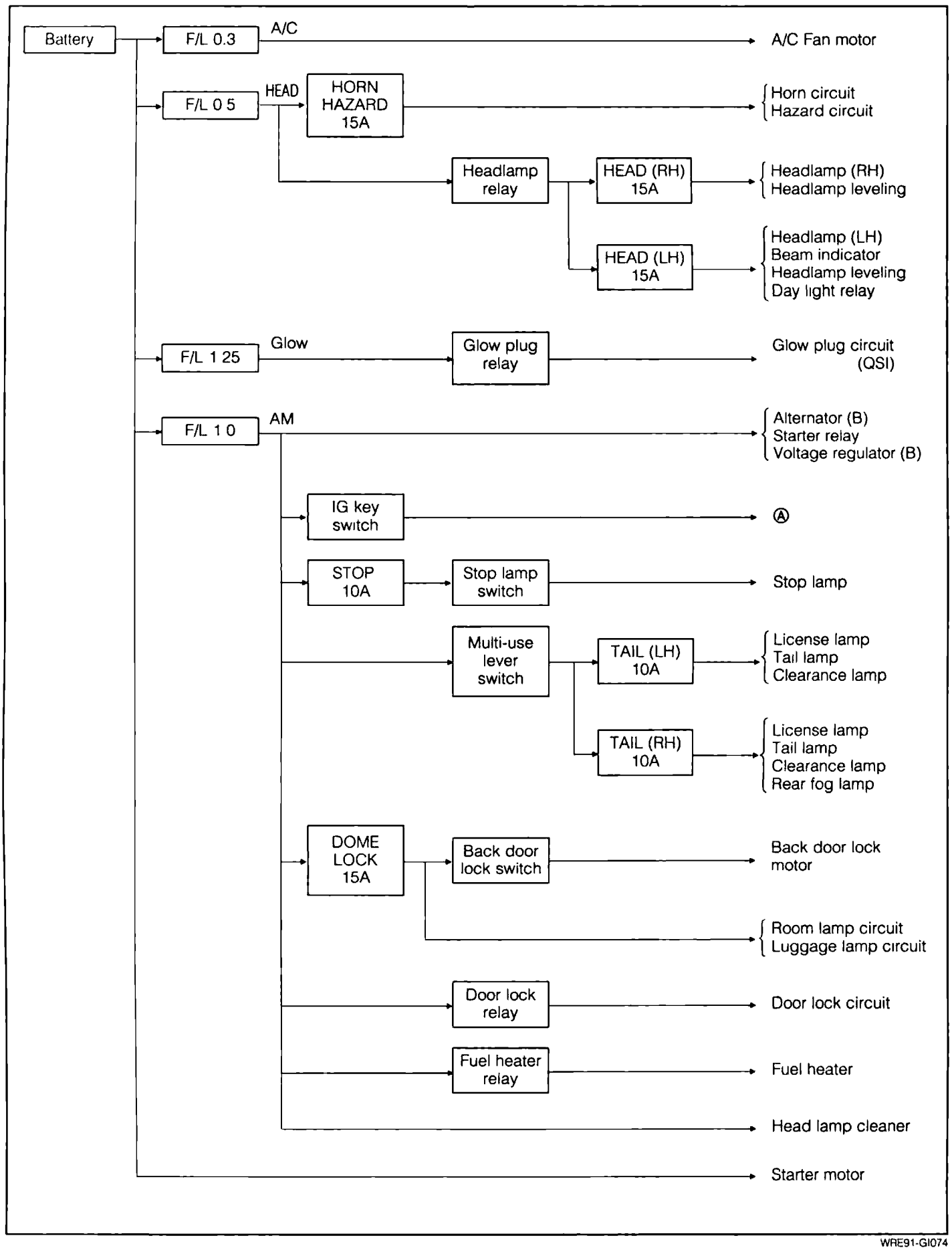
WRE91-GI072

FUSE CIRCUIT (2)



WRE91-GI073

FUSE CIRCUIT (3) (Only for LHD European spec.)



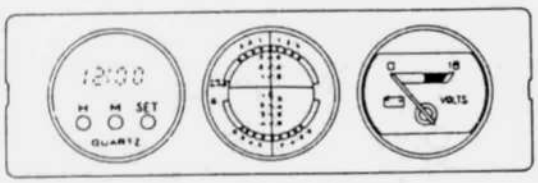
WRE91-GI074

13-3. INSTRUMENT PANEL

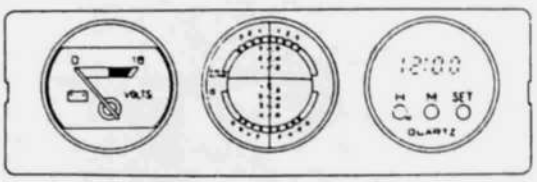
A speedometer, warning lamp and indicators are incorporated in a combination meter, and voltmeter, clinometer and clock are combined into one triple meter.

(1) Meter panel over view

Triple meter

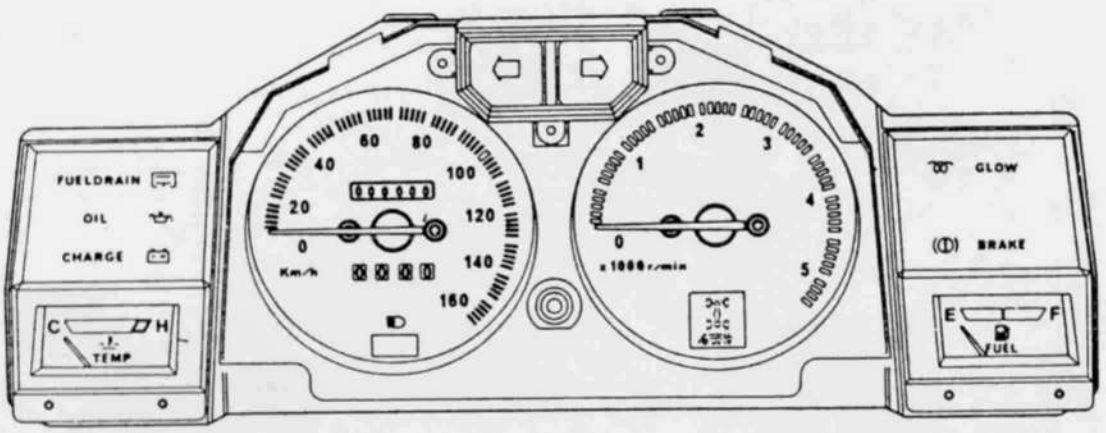


(Right-hand vehicle)



(Left-hand vehicle)

Combination meter



WRE91-GI075

(2) Warning & Indicator lamps

Kind		Indication	Function
Warning lamp	Hazard warning	HAZARD	Flashes when hazard switch is turned ON. Indicating color: Red
	Brake warning	BRAKE	Glows when brake fluid becomes too low or empty, or when parking brake is a pplies. Indicating color: Red
	Parking brake warning	PARK BRAKE	Glow when parking brake is applied while the engine is running. Indicating color: Red
	Oil pressure warning	OIL	Glows when engine oil pressure system is encountered with abnormality while engine is running. Indicating color: Red
	Charge warning	CHARGE	Glow when engine charging system is encountered with abnormality while engine is running. Indicating color: Red
	Seat belt warning	FASTEN BELTS	Glows for about six seconds when driver fails to buckle up seat belt at driver's seat after ignition switch has been turned ON or engine has started. Indicating color: Red
	Fuel drain warning	FUEL DRAIN	Glows when the water in fuel is accumulated in the fuel filter in excess of the stipulated amount. Indicating color: Red
Indicator lamp	High beam indicator		Glows when upper beams of headlamps are turned ON. Indicating color: Amber
	Turn signal indicator		Flashes when turn signal switch or hazard warning switch is turned ON. Indicating color: Green
	4WD indicator		Glows when the transfer shift lever is moved to the 4H or 4L position with the engine switch turned ON. Indicating color: Green
	Glow plug indicator	GLOW	Glows when ignition key holds at the G position or ON position. Indicating color: Red

WRE91-GI076

DAIHATSU

F70,F75,F77

Service manual

HARNESS & WIRING DIAGRAM

HW

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

HARNESS & WIRING DIAGRAM

GENERAL HANDLING
INSTRUCTIONS ..... HW– 2
FUSE BLOCK & FUSIBLE LINK ..... HW– 7
FUSE CIRCUIT (1) ..... HW– 8
FUSE CIRCUIT (2) ..... HW– 9
FUSE CIRCUIT (3) (ONLY FOR LHD
EUROPEAN SPEC.) HW–10
WIRING HARNESS (1) HW–11
WIRING HARNESS (2) HW–12
WIRING HARNESS (3) HW–13
WIRING HARNESS (4) HW–14
WIRE, COWL/RHD HW–15
WIRE, COWL/LHD HW–16
WIRE, INPANE (RHD) HW–17
WIRE, INPANE (LHD) HW–18
WIRE, FLOOR (F70, F75) HW–19
WIRE, FLOOR (F77) HW–20
WIRE, FLOOR No. 2 ..... HW–21
WIRE, TRANSMISSION HW–22
WIRE, FRONT DOOR (RH) HW–23
WIRE, FRONT DOOR (LH) HW–24
WIRE, BACK DOOR No. 1 ..... HW–25
WIRE, ROOF HW–26
WIRE, FRAME HW–27
WIRE, FRAME No. 2 ..... HW–28

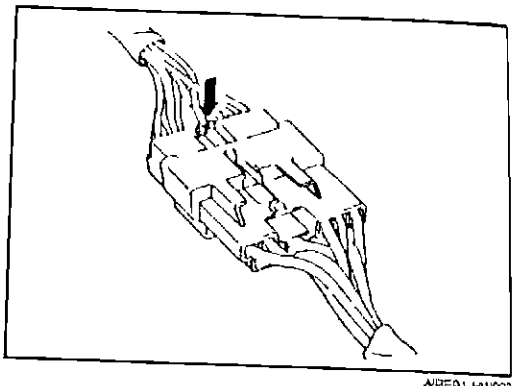
WRE91-HW001

GENERAL HANDLING INSTRUCTIONS

HANDLING AND INSPECTION

REMOVAL

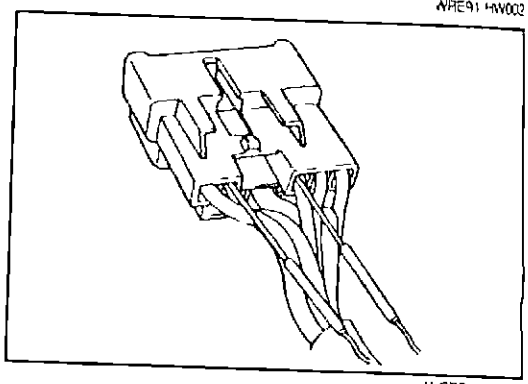
To disconnect the connector, simply pull out the connector while the lock lever is being pressed down, as indicated in the right figure



WRE91 HW002

INSPECTION

When you conduct continuity checks or voltage checks using a circuit tester, if you insert a test probe from the connector side, it is impossible to get an adequate fitting Hence, be sure to positively insert the test probe from the harness side, as indicated in the right figure

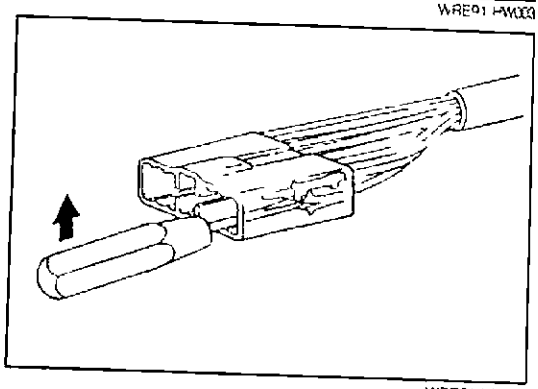


WRE91 HW003

REPLACEMENT

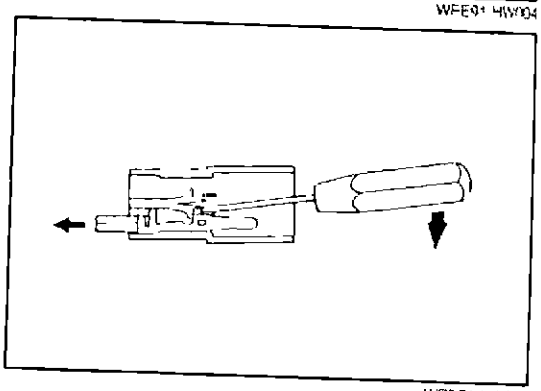
REMOVAL

(1) From the aperture, insert a miniature type common screwdriver into between the locking lug and the terminal



WRE91 HW004

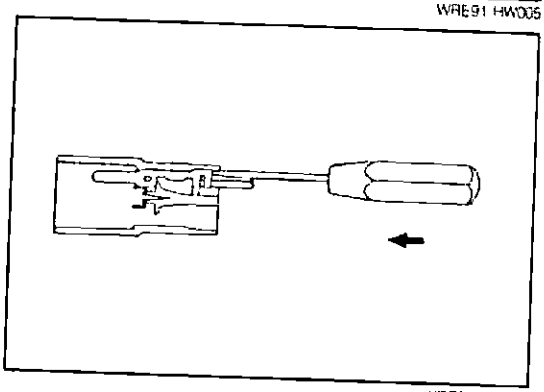
(2) While the locking lug is being pried upward by means of a screwdriver, pull out the terminal from the backside



WRE91 HW005

INSTALLATION

(1) Insert the terminal, until the locking lug is locked positively
(2) Ensure that the locking lug is locked positively by raising the wire

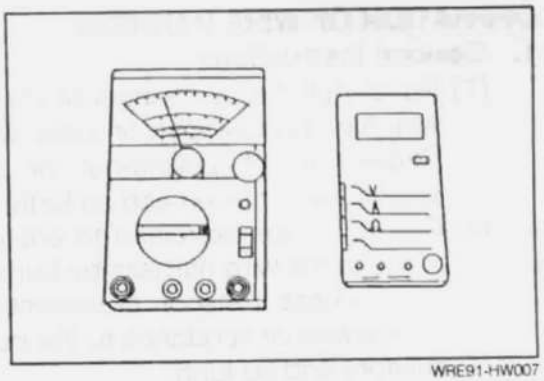


WRE91 HW006

INSPECTION

Tester (Volt/ohmmeter)

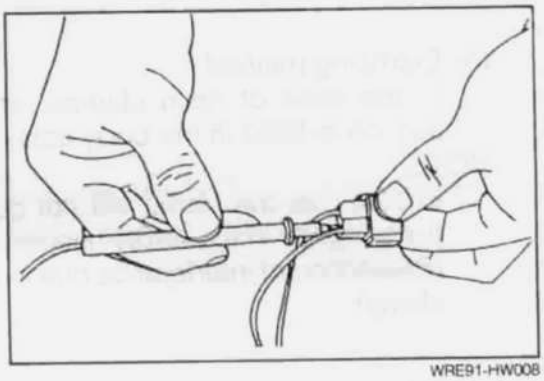
For the inspection, use a tester having an internal resistance of more than 10 kΩ/V.
Use of a tester with a low internal resistance may cause wrong measurement or secondary troubles.



WRE91-HW007

Conventional type connector

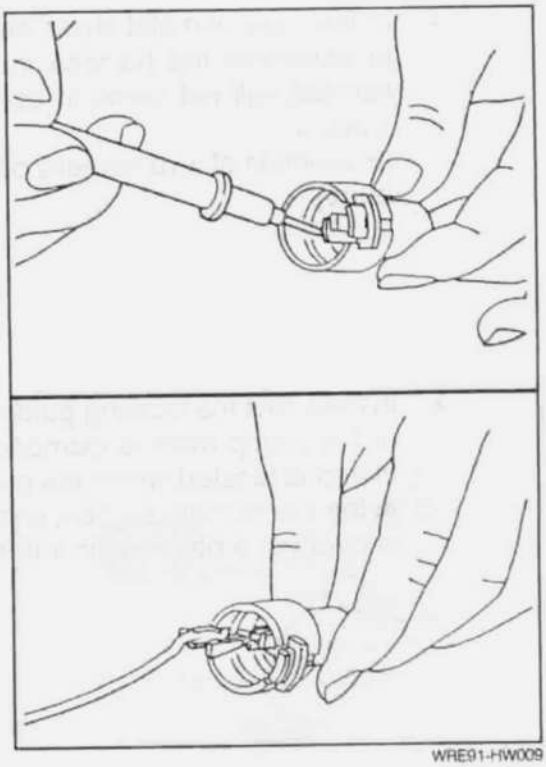
When resistance measurement and/or voltage measurement is conducted at the connector section, insert the measuring probe from the back of the connector, being very careful not to damage the harness-to-terminal connections.



WRE91-HW008

Water-proof type connector

When resistance measurement and/or voltage measurement is conducted at the connector section, bring the measuring probe into contact with the terminal at the connection side of the connector.
Be very careful not to apply excessive force to the terminal at the connector side. Failure to observe this caution may deform the terminal, causing poor continuity.
As an alternative method, insert a male or female terminal into the connector terminal or connect an adequate attachment. Then, connect the measuring probe.



WRE91-HW009

CONNECTION

Perform the connection, until the lock is completely engaged.

NOTE:

- To confirm whether the lock type connector has been locked or not, lightly pull the connector. Make sure that the connector will not be disconnected.
- Be sure to press the connector again before finishing the confirmation.

WRE91-HW010

OPERATION OF WIRE HARNESS

1. General Instructions

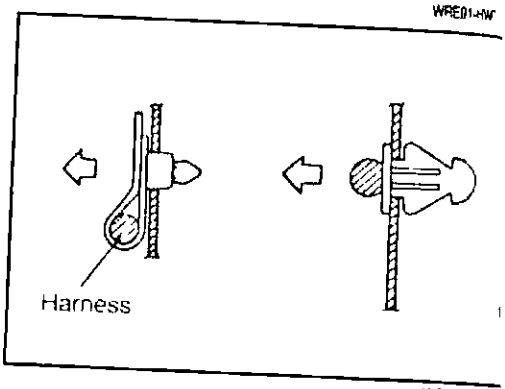
(1) Never pull the connectors or step on them during the wire harness transport or assembly.
(Prevention of pulling-out of terminals, connector cracks, deformation and so forth)

(2) Care must be exercised to ensure that no scratch is made to the wire harness by burrs or edges during the wire harness transport or assembly.
(Prevention of scratches to the outer trim, electrical insulators and so forth)

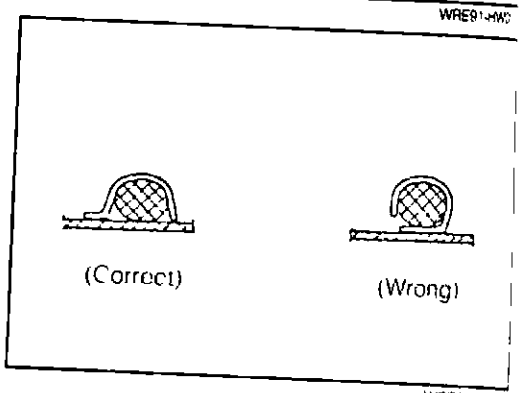
(3) Clamping method
In the case of resin clamps, ensure that the clamp section is fitted in the body hole

NOTE:

- **Ensure that the clamp will not be detached when it is pulled lightly in the arrow-headed direction.**
(Prevention of interference due to the detachment of the clamp)

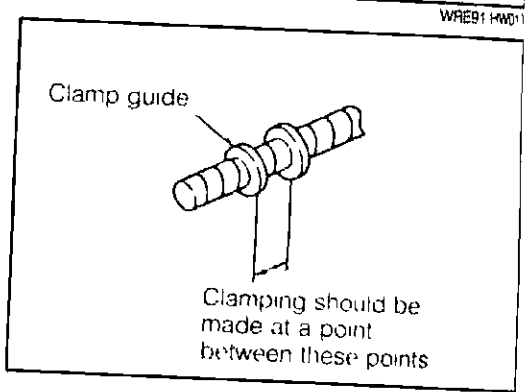


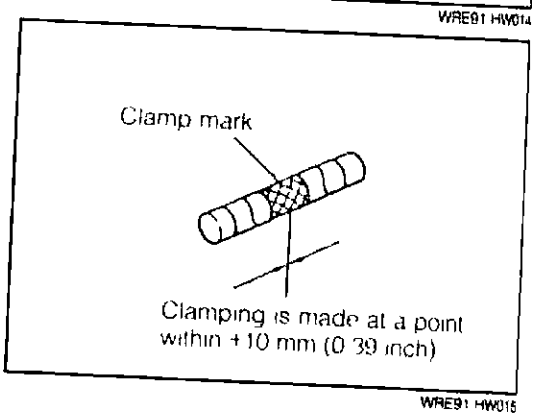
- In the case of metal sheet welded clamps, be sure to assemble the harness in such a way that the harness will not come in contact with the welded surface
(Prevention of wire harness damage due to welding burrs)



- In case that the locating guide of the clamp position or the clamp mark is clamped, make sure that the clamp is located within the guide. As for the clamp at the clamp mark section, ensure that the clamping is made at a point within ±10 mm (0.39 inch).

(Prevention of slackness or interference)

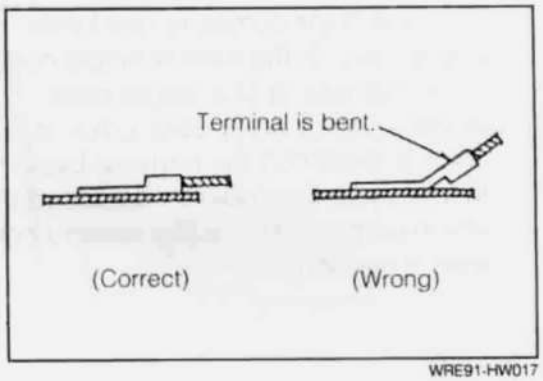




(4) Terminals and connectors
- Perform the connection of connectors positively.
  - Connector with lock ..... Ensure that the locking is made.
  - Connector without lock ..... Connect the connector positively until it stops.

WRE91-HW016

- Retention by screws
  - When the tightening torque is specified, be sure to observe the specification strictly. (The tightening torque is posted in the table separately.)
  - Ensure that the staked section may not come on the assembling surface.
  - After completion of the tightening operation, lightly pull out the terminal. Ensure that there is no slackness.



WRE91-HW017

- When performing other operations, care must be exercised to ensure that no connected connector is detached by pulling out the wire harness forcibly.

WRE91-HW018

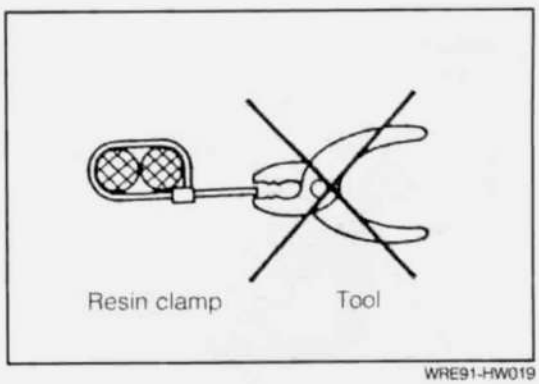
2. Work procedure for tightening-up type resin clamps

<Work procedure>

When the tightening-up type resin clamps are employed, do not use any pliers, cutting pliers or the like.

<Reason>

Prevention of clamps being cut or scratched



WRE91-HW019

WIRING HARNESSES

WARNING:
- The wire diameter and capacity of each harness have been determined to assure the normal operation of the electrical system.
- Hence, do not take power for accessories carelessly through the original wiring harness. Failure to observe this caution may cause system malfunction or fire.

WRE91-HW020

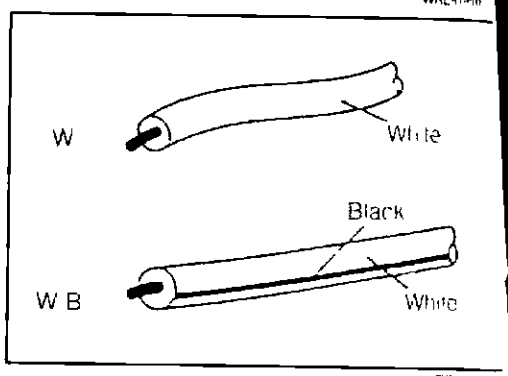
Wiring color code

- For identification purpose, each wire has its own color. Each color bears a code as described in the right table. These codes are used in the wiring diagram and will be helpful during trouble shooting

Code	Gr	Br	B
Color	Gray	Brown	Black
Code	W	R	G
Color	White	Red	Green
Code	Y	L	O
Color	Yellow	Blue	Orange
Code	P	Lg	V
Color	Pink	Light green	Violet

WRE91-HW

- The wire color comes in two kinds single color and composite color. In the case of single color, the whole outer coat of the harness is of a single color
  In the case of composite color, a fine line of the second color is drawn on the harness basic color
  In this case, the code is composed of the basic color code which comes first and the second color code which comes after a hyphen.



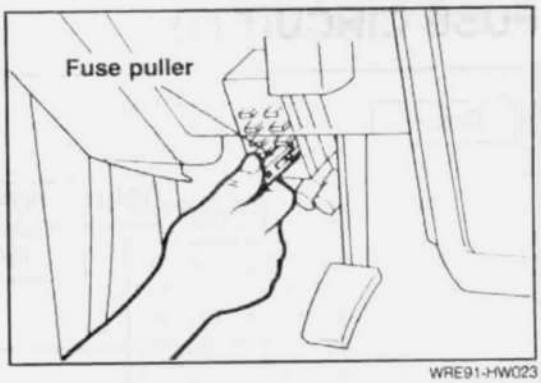
WRE91-HW

FUSE BLOCK & FUSIBLE LINK

Installing position

The fuse block is located at the cowl side of the driver's side. Blade type fuses have been employed.

A sub-fuse block is installed below the instrument panel at the driver's seat side.



WRE91-HW023

REPLACEMENT OF FUSES & FUSIBLE LINK PRECAUTION

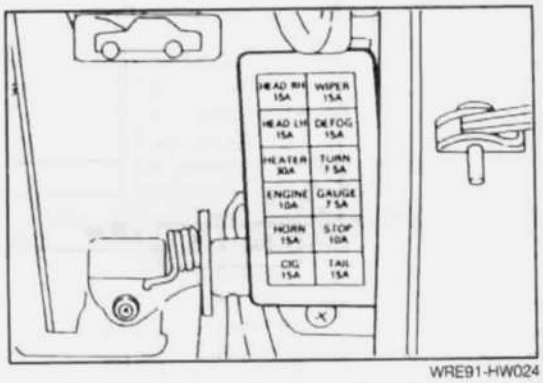
The fuse replacement must be made at all times by using a new fuse with the correct amperage.

NOTE:

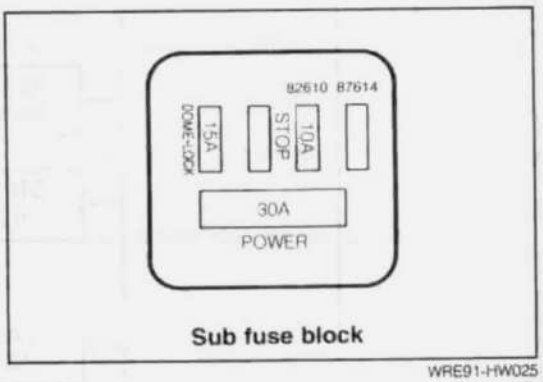
(1) Before any fuse is replaced, be certain to turn OFF all electrical equipment and ignition switch. Never use any fuse in excess of the designated rating.

(2) Be sure to employ a puller for removing/installing fuses. Also, the removal/installation of fuses must be performed straight.
If the fuse is removed or installed in a twisted condition, the terminal will be expanded unduly, resulting in poor contact.

If any fuse is blown out repeatedly, the likelihood is that there exists a short in the relevant system. Hence, perform checks for possible systems, referring to Page and Section under "Wiring Diagram."



WRE91-HW024

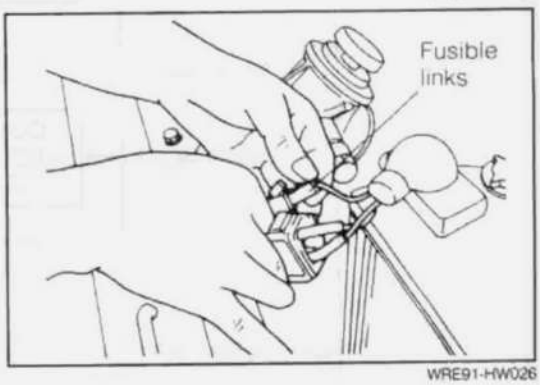


Sub fuse block

WRE91-HW025

FUSIBLE LINK BLOCK

If the fusible link is blown out repeatedly, the likelihood is that there exists a short in the relevant system. Hence, perform checks for possible systems, referring to the wiring diagram.



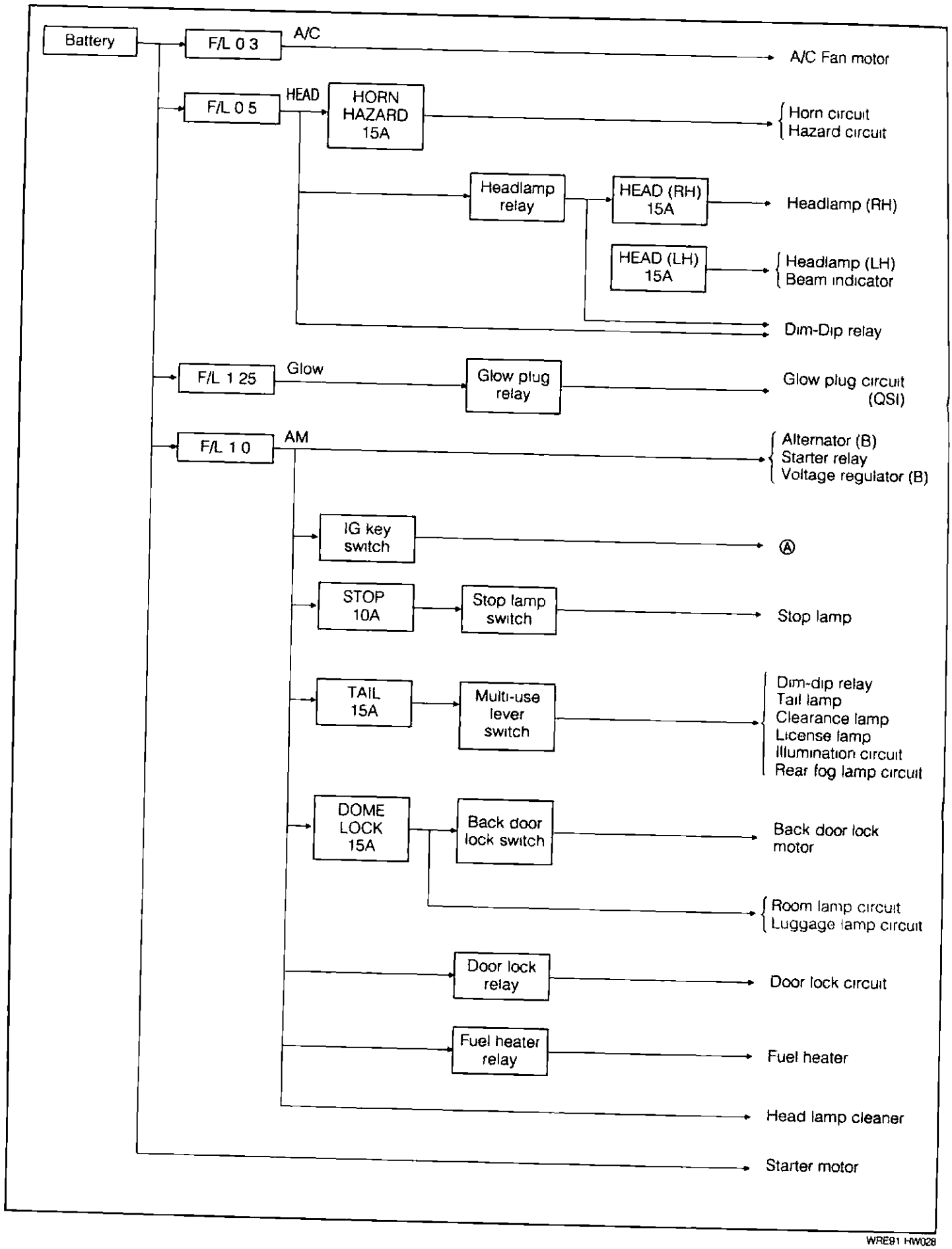
WRE91-HW026

Replacement

1. If visual inspection reveals that the fusible link is blown out, replace it with a new fusible link with the designated rating.
   NOTE:
   1. Before the fusible link is replaced, be sure to turn OFF the ignition key.
   2. Care must be exercised to ensure that the fusible link is not twisted during the removal/installation. If the fusible link is replaced forcibly, it will cause breakage or poor contact.

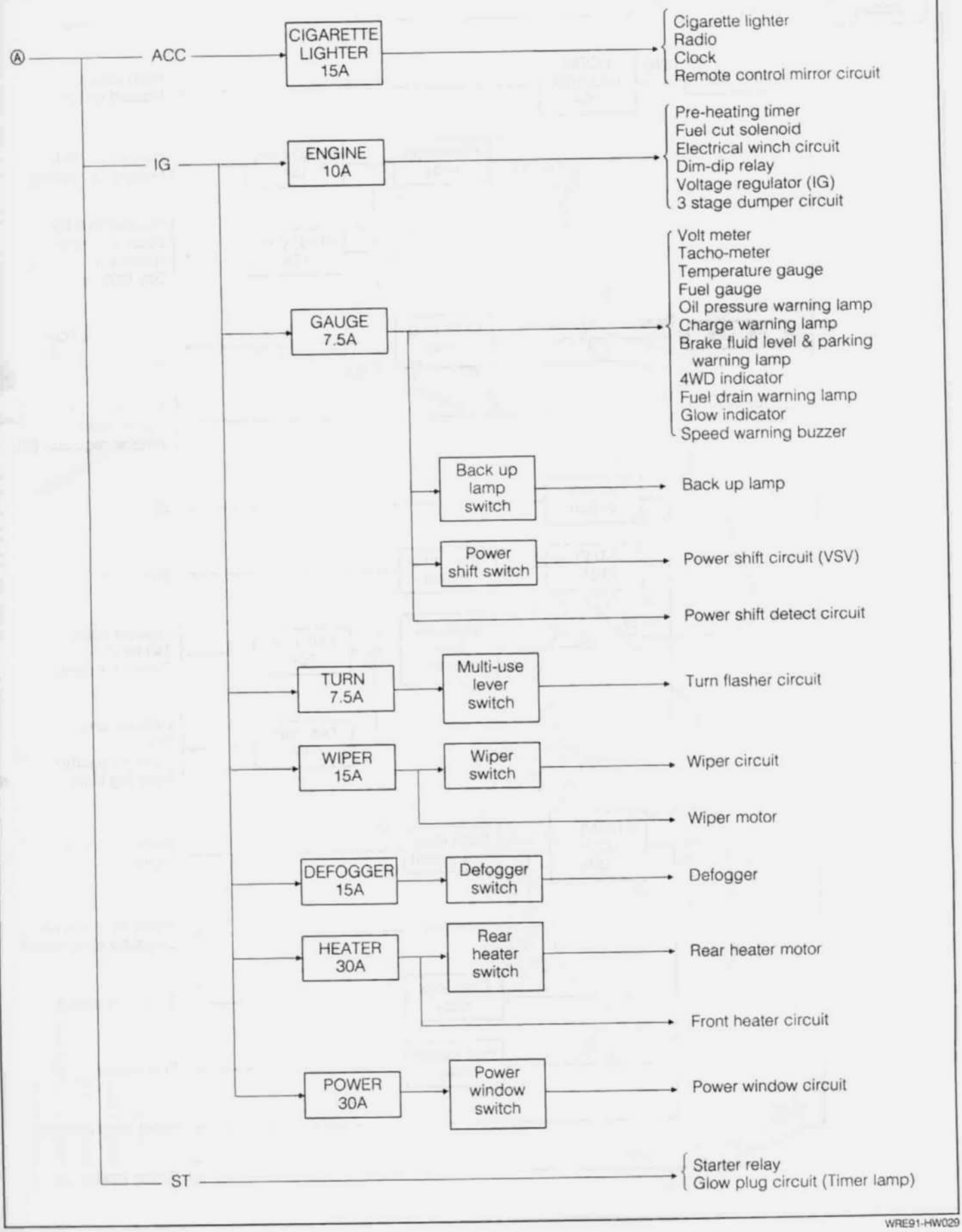
WRE91-HW027

FUSE CIRCUIT (1)



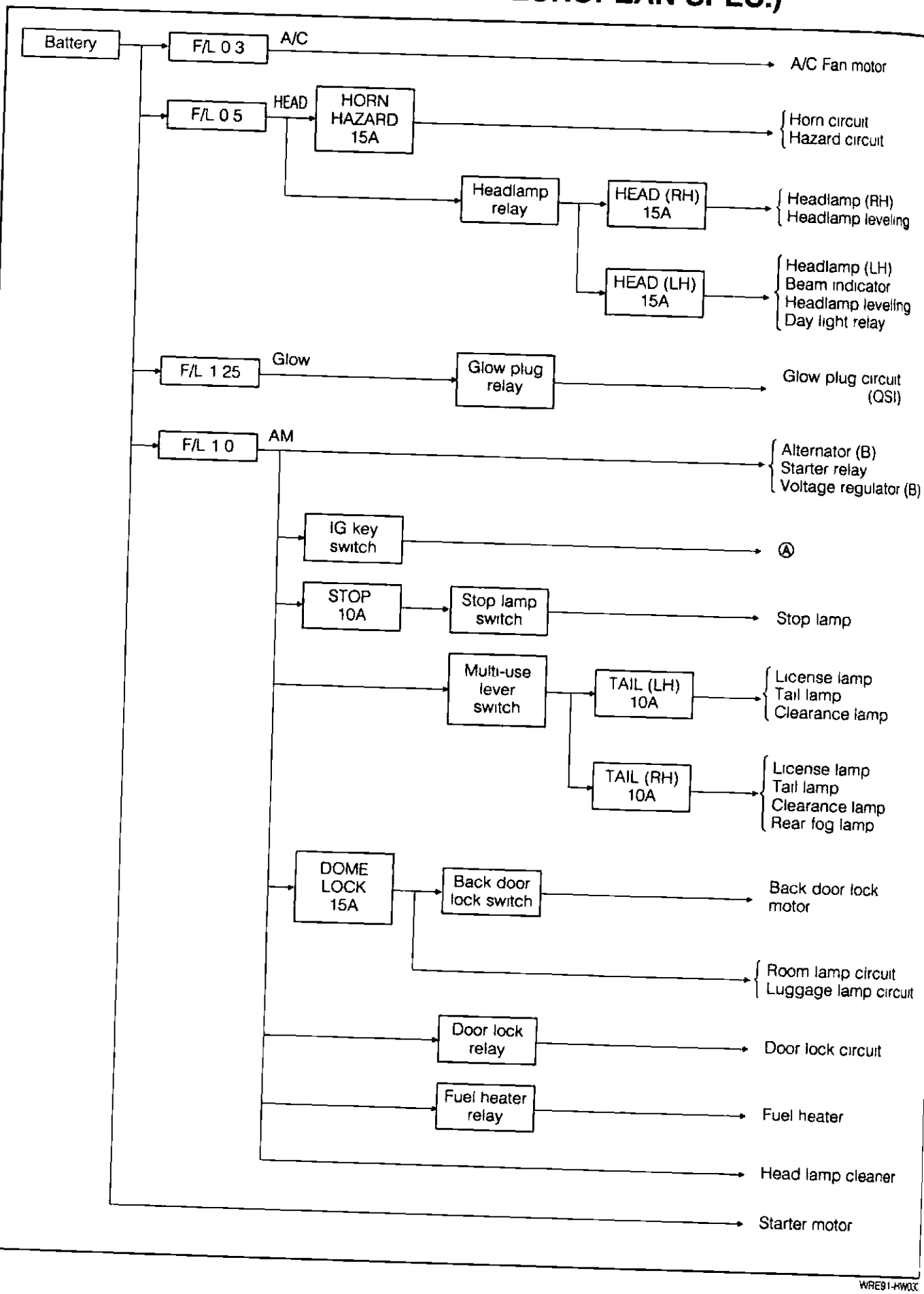
WRE91 HW028

FUSE CIRCUIT (2)



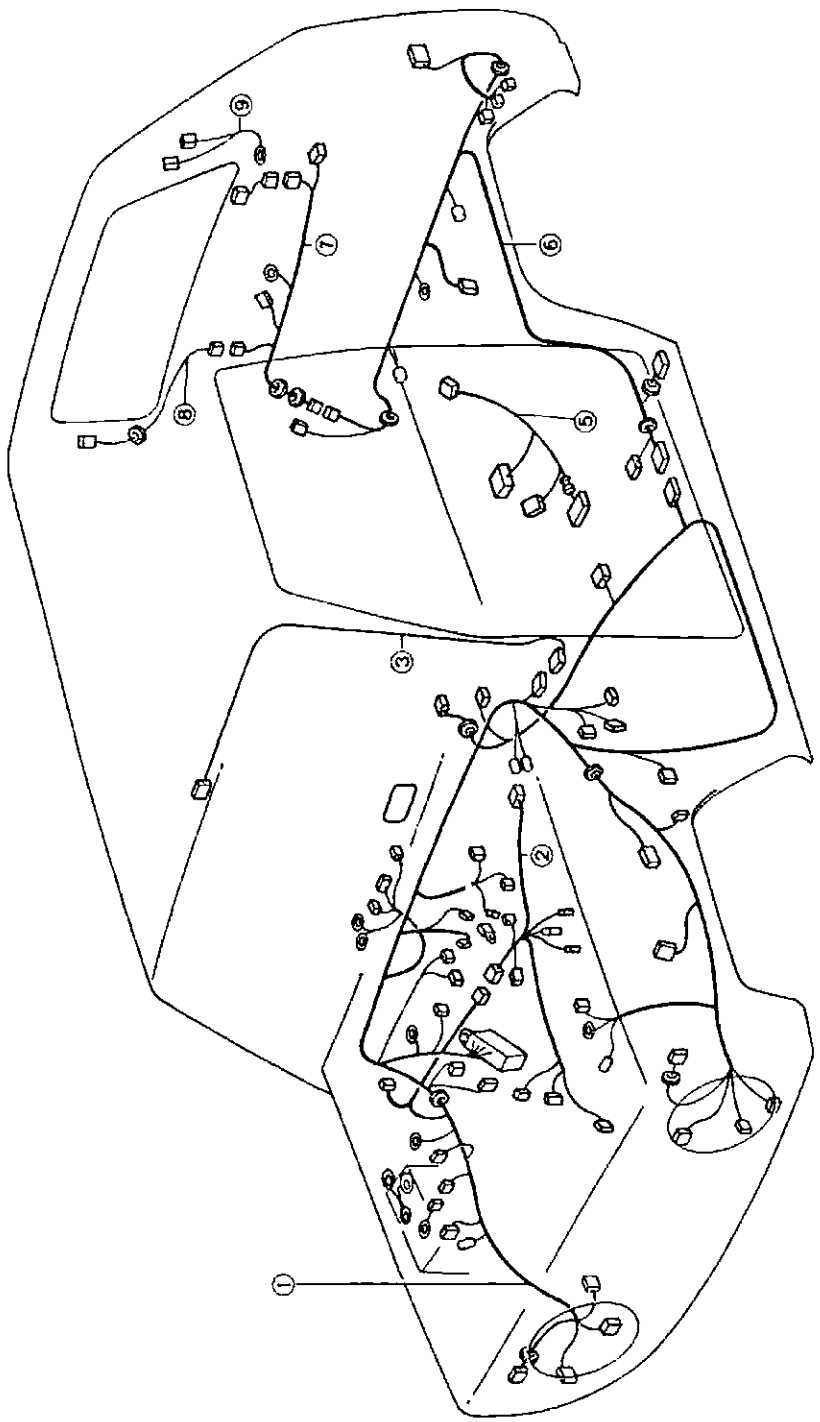
WRE91-HW029

FUSE CIRCUIT (3) (ONLY FOR LHD EUROPEAN SPEC.)



WRE91-HW03

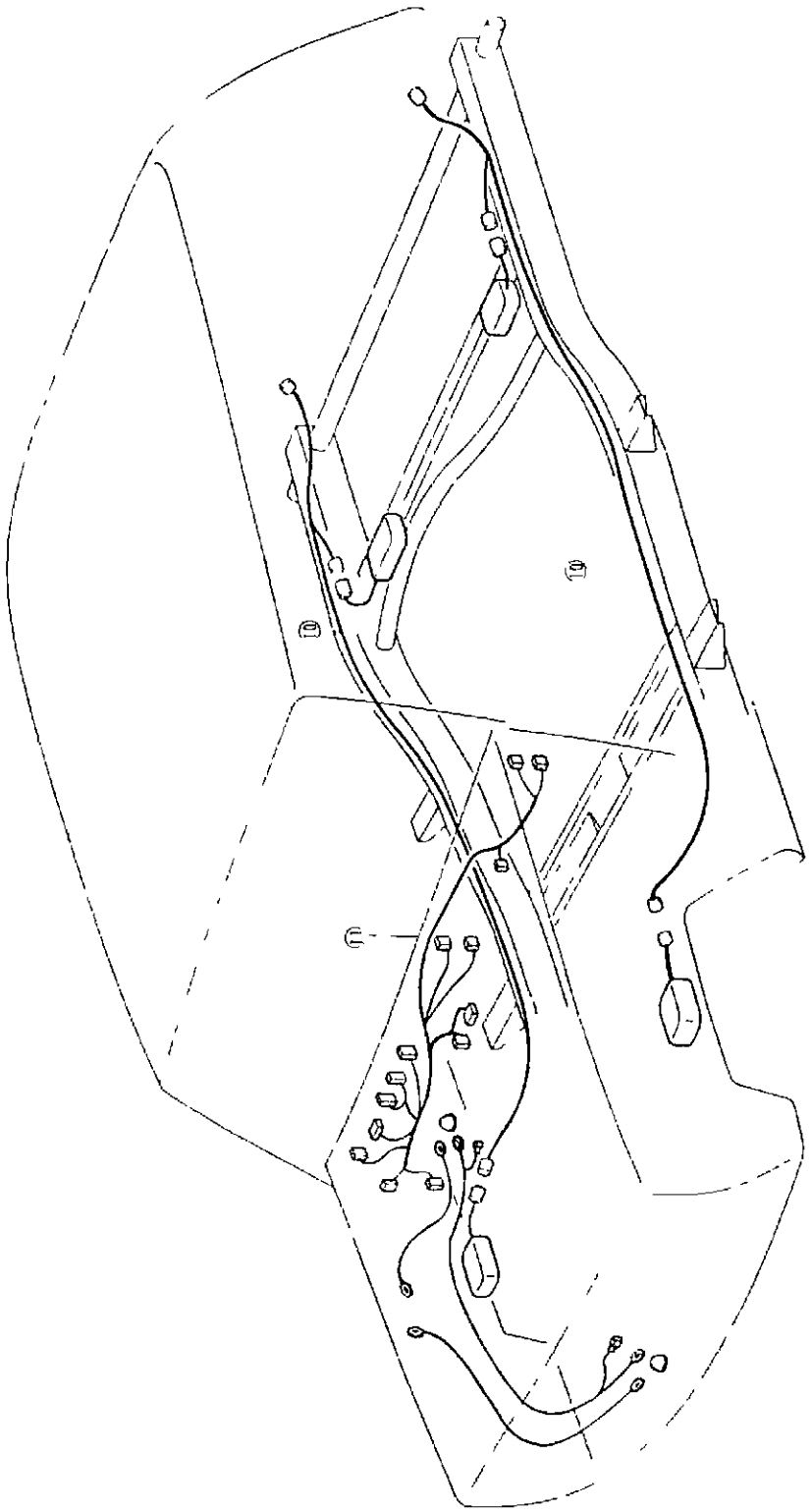
WIRING HARNESS (1)



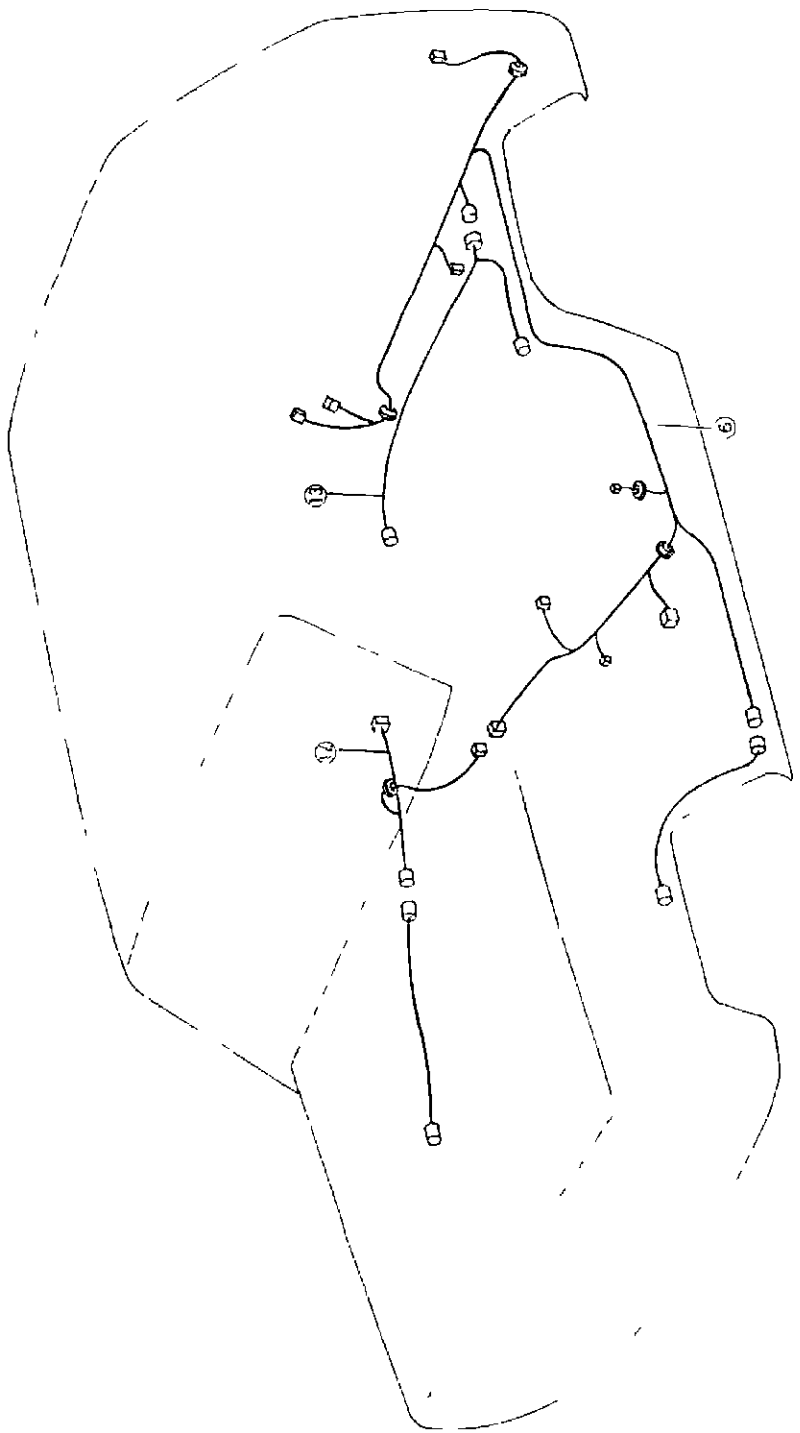
① WIRE COWL
② WIRE TRANSMISSION
③ WIRE ROOF
⑤ WIRE FRONT DOOR
⑥ WIRE FLOOR
⑦ WIRE BACK DOOR NO. 1
⑧ WIRE REAR WINDOW NO. 1
⑨ WIRE REAR WINDOW NO. 2

WRE91 HW031

WIRING HARNESS (2)



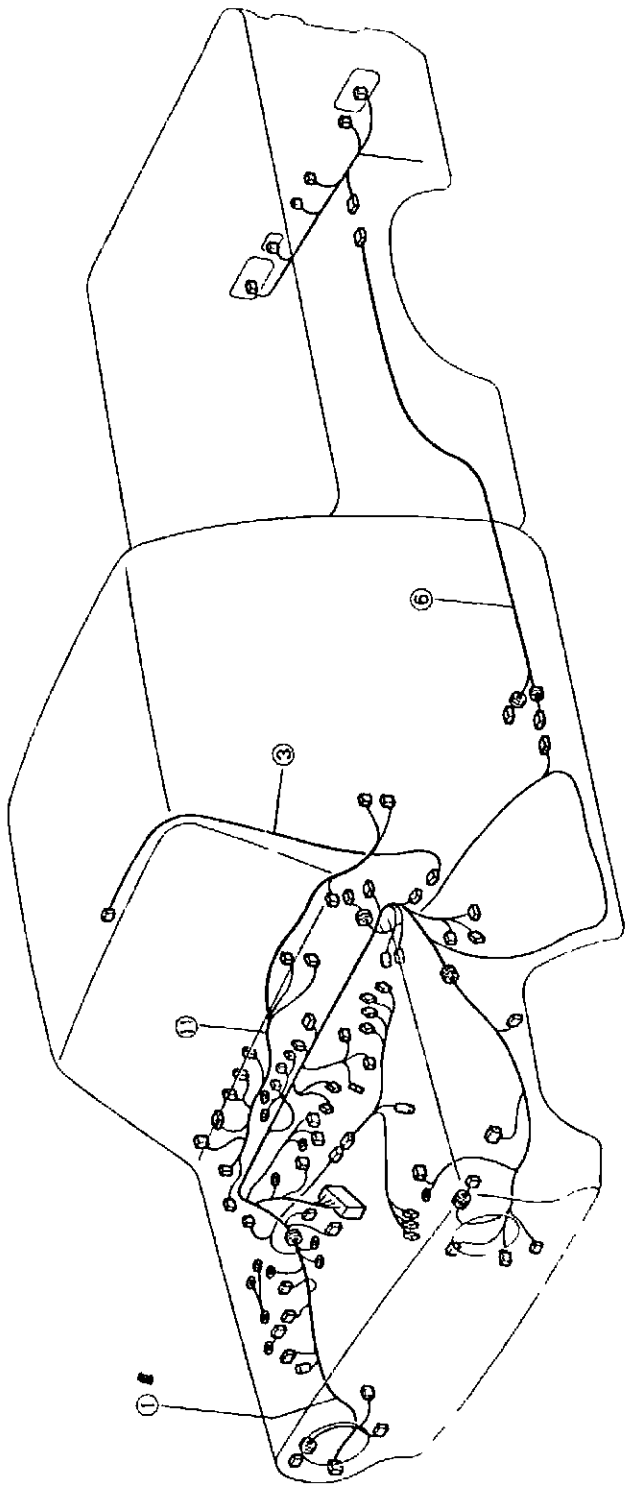
WIRING HARNESS (3)



⑥ WIRE FLOOR
⑫ WIRE FLOOR NO.2
⑬ WIRE FRAME NO.2

WHE91HW033

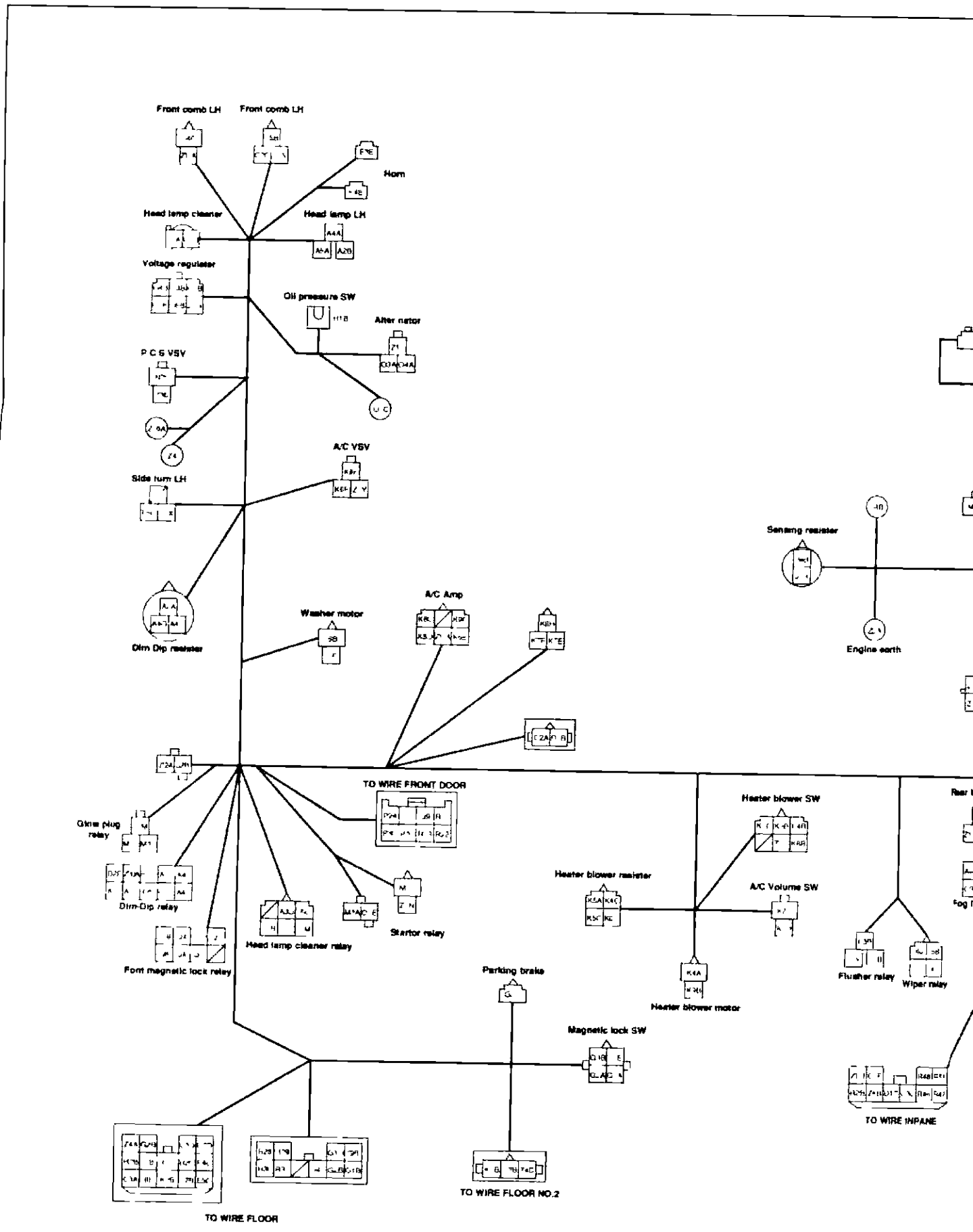
WIRING HARNESS (4)

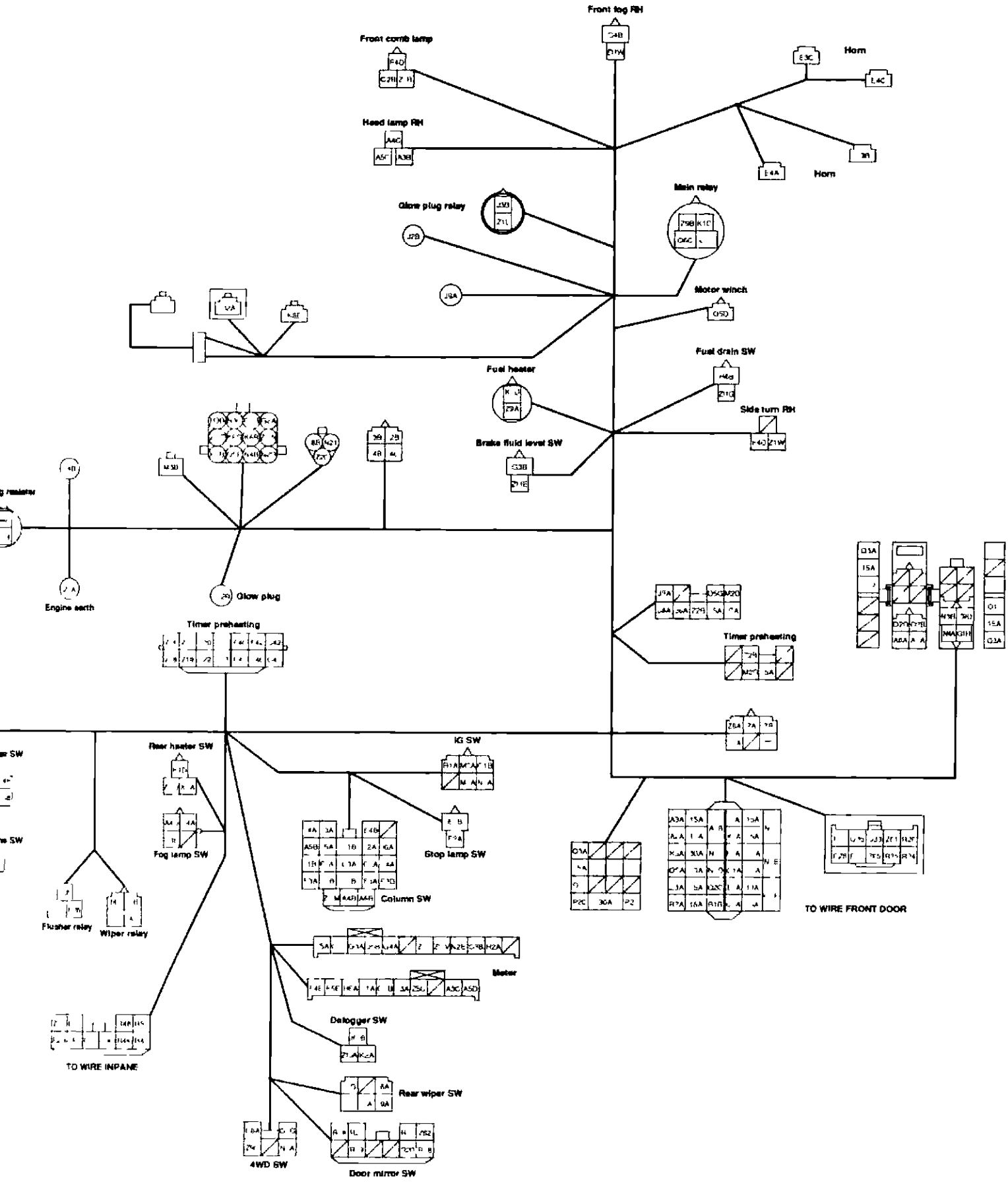


① WIRE COWL
③ WIRE ROOF
⑥ WIRE FLOOR
① WIRE INSTRUMENT PANEL

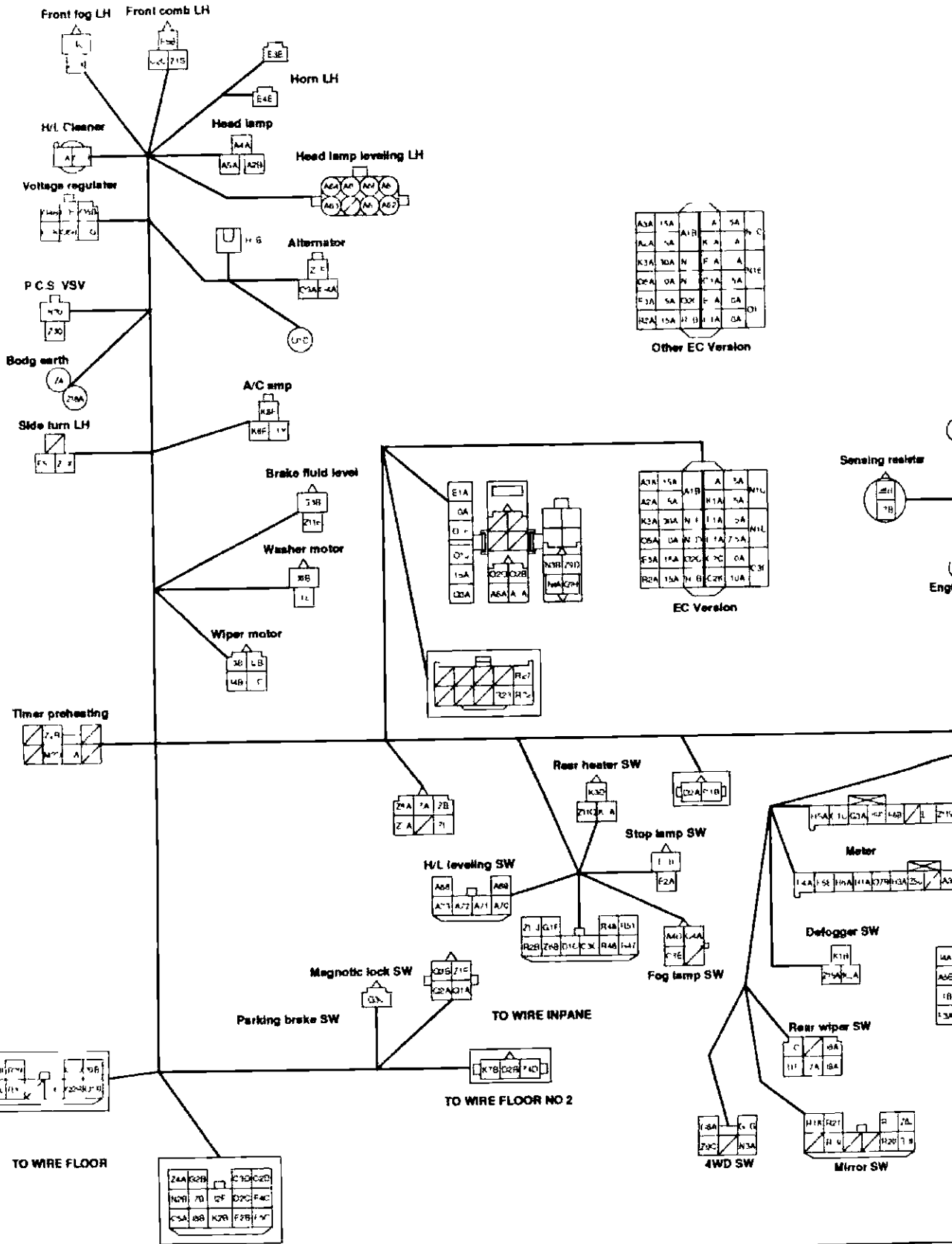
WRE91 HW034

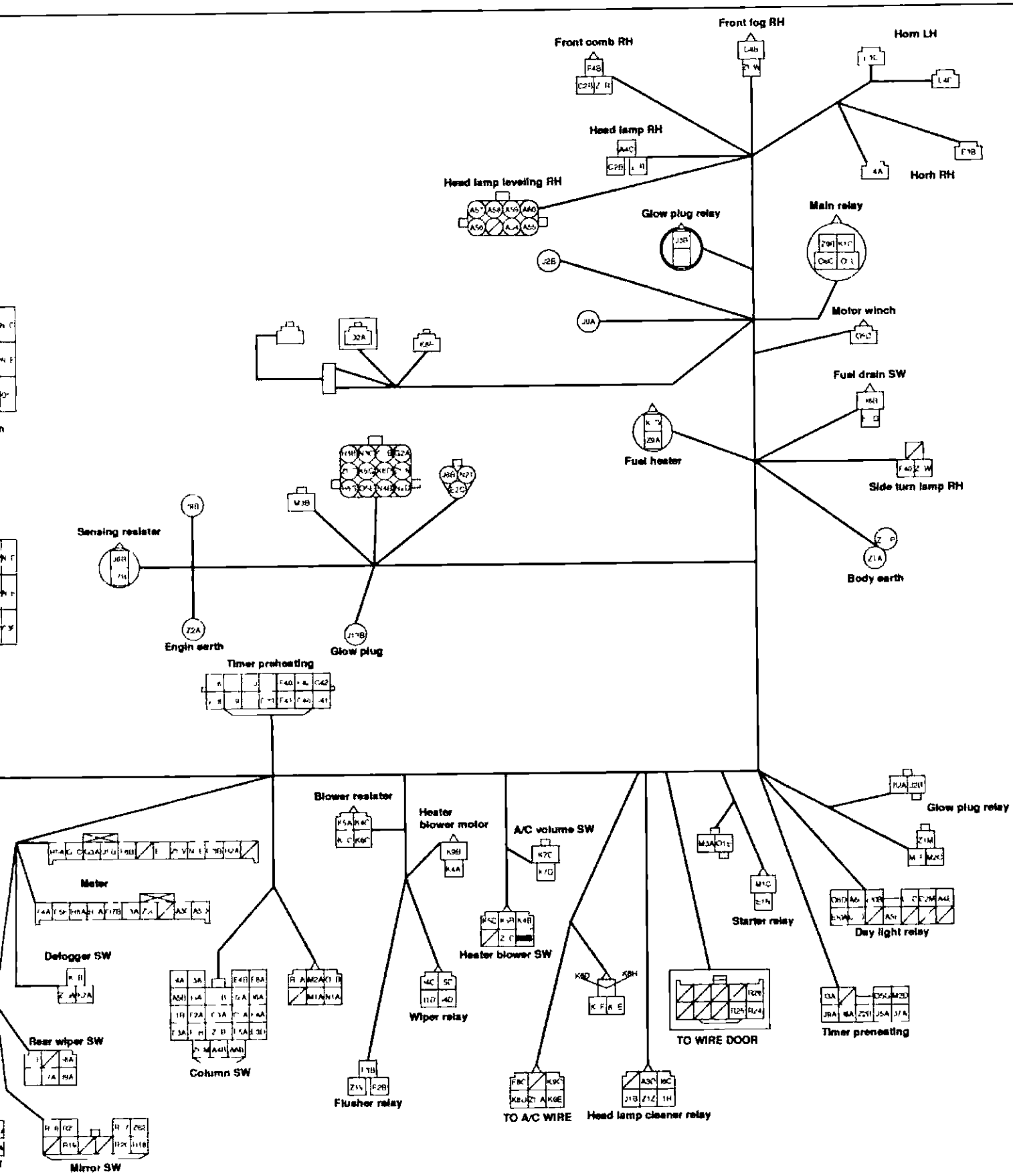
WIRE, COWL (RHD)



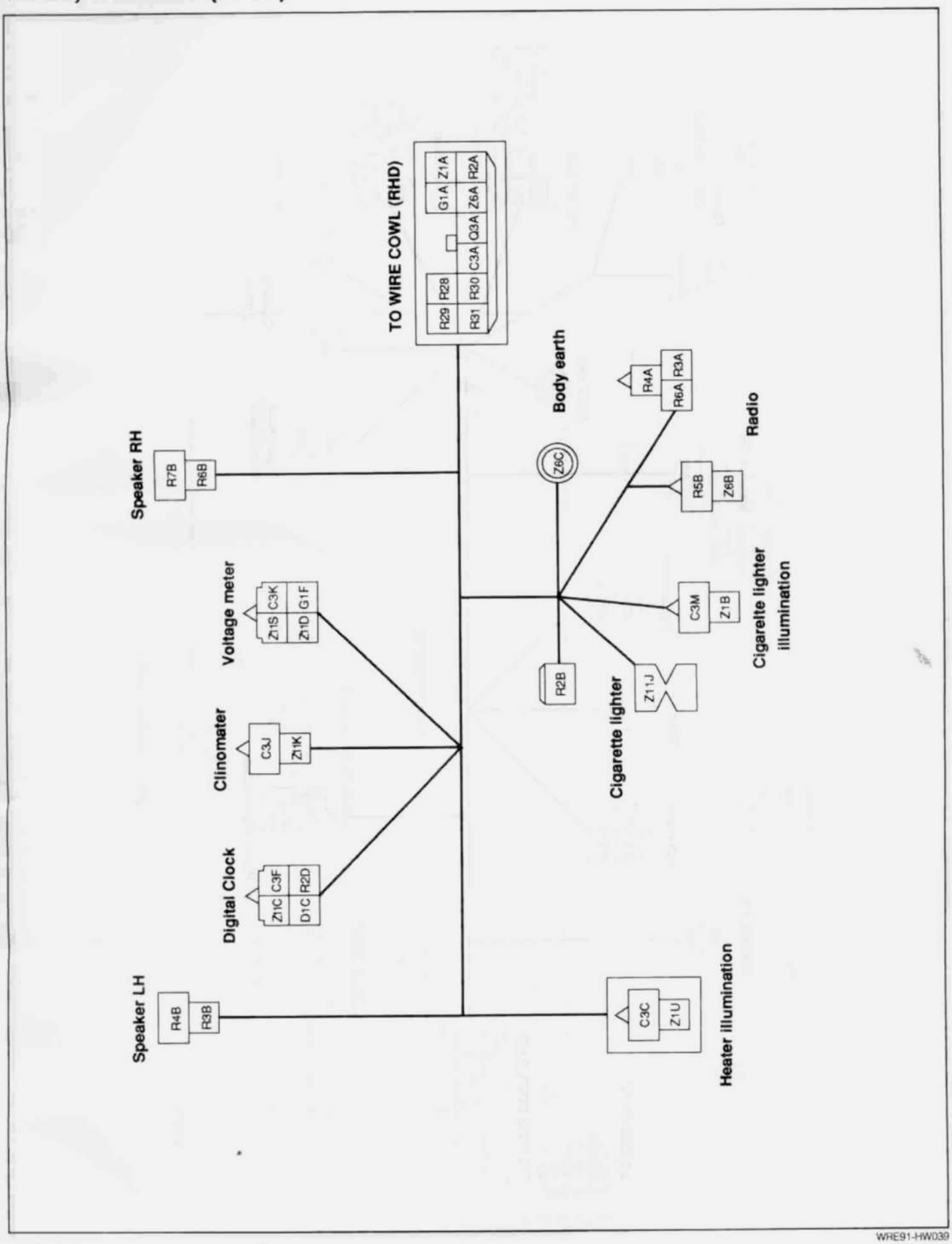

Front fog RH
Front comb lamp
Horn
Horn
Head lamp RH
Main relay
Glow plug relay
Motor winch
Fuel drain SW
Fuel heater
Side turn RH
Brake fluid level SW
Engine earth
Glow plug
Timer preheating
Timer preheating
IG SW
Rear heater SW
Fog lamp SW
Stop lamp SW
Column SW
Flasher relay
Wiper relay
Meter
Delogger SW
TO WIRE INPANE
Rear wiper SW
4WD SW
Door mirror SW
TO WIRE FRONT DOOR

WIRE, COWL/LHD




Front fog RH
Front comb RH
Horn LH
Head lamp RH
Horn RH
Head lamp leveling RH
Glow plug relay
Main relay
Motor winch
Fuel drain SW
Fuel heater
Side turn lamp RH
Body earth
Sensing resistor
Engin earth
Glow plug
Timer preheating
Blower resistor
Heater blower motor
A/C volume SW
Glow plug relay
Meter
Starter relay
Day light relay
Defogger SW
Heater blower SW
Wiper relay
TO WIRE DOOR
Timer preheating
Rear wiper SW
Column SW
Flusher relay
TO A/C WIRE
Head lamp cleaner relay
Mirror SW

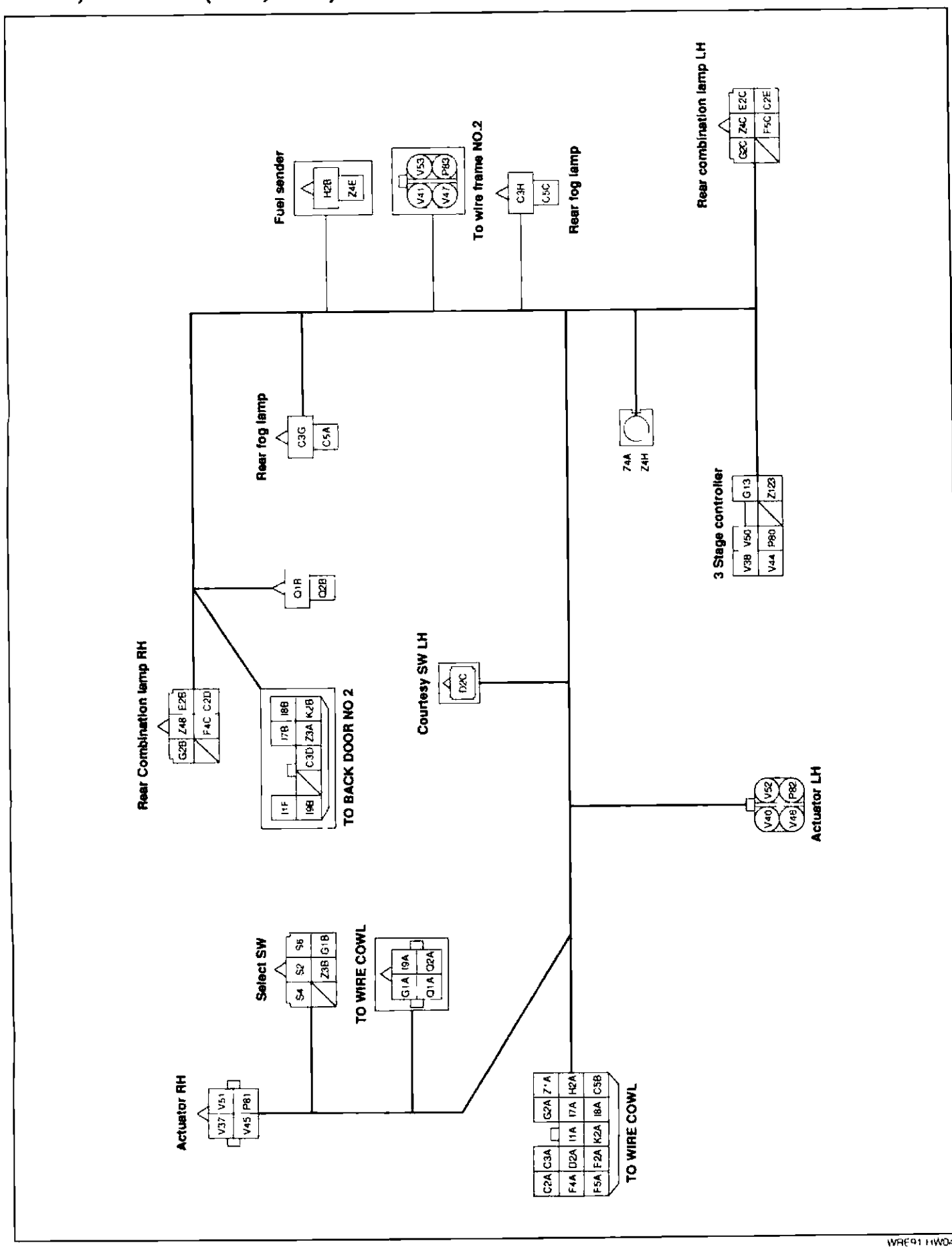
WIRE, INPANE (RHD)



WRE91-HW039

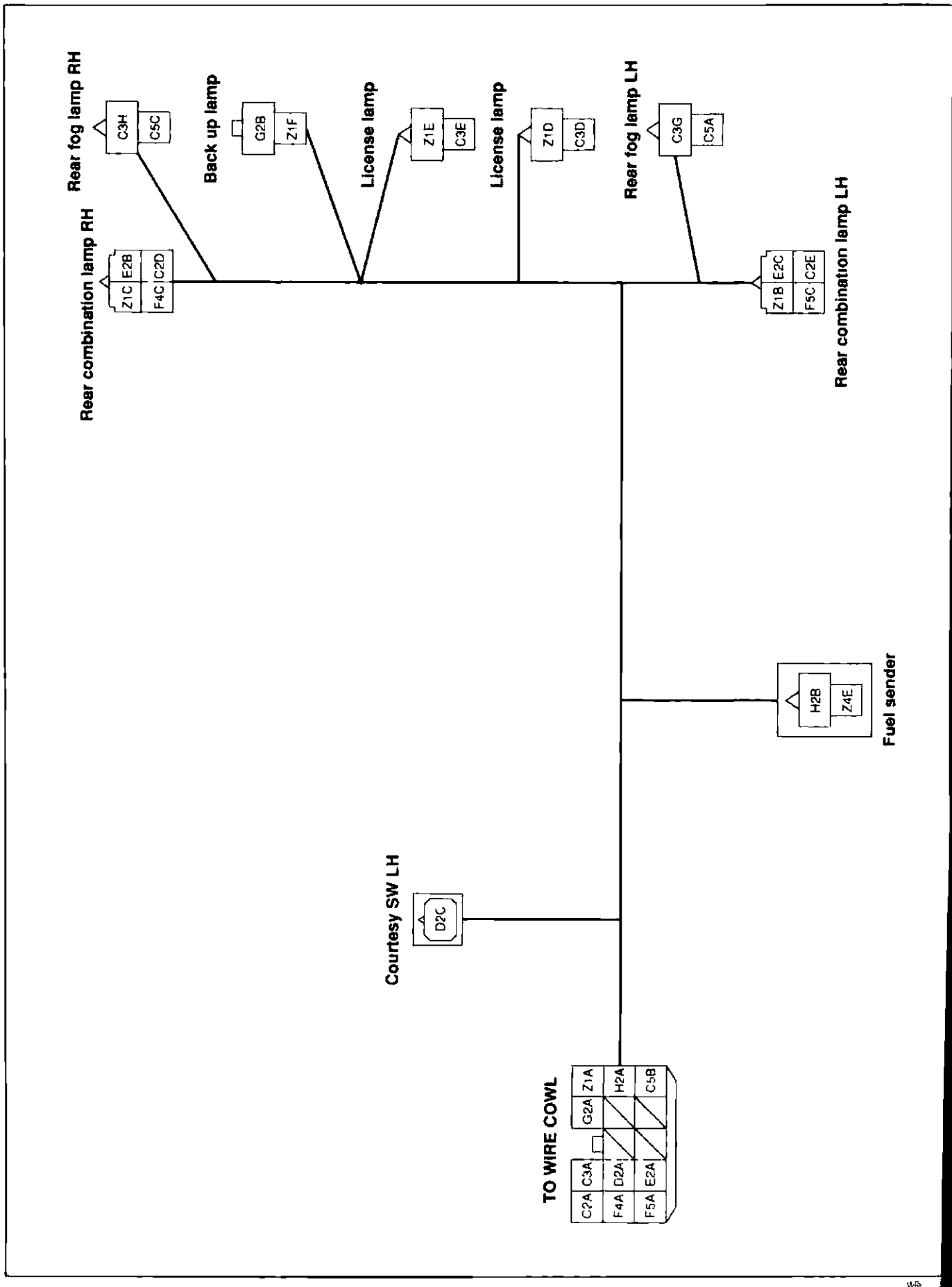
V WIRE, INPANE (LHD)

WIRE, FLOOR (F70, F75)



WRE91HW043

WIRE, FLOOR (F77)



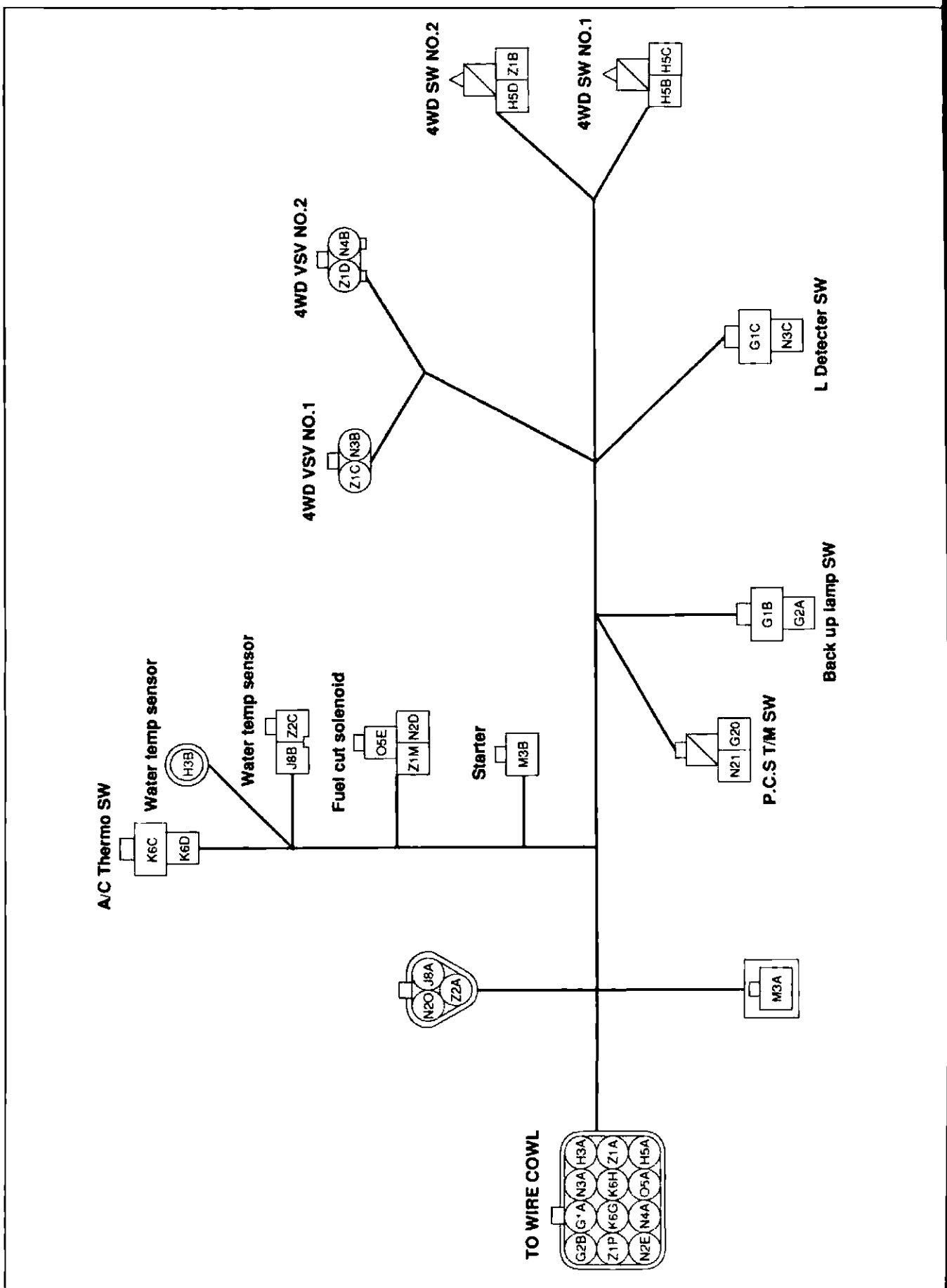
WIRE, FLOOR No. 2

Terminal		Connection
D2A	D2B	Room lamp (–)
K7A	K7B	Rear heater relay (L)
Z4A	Z4D	Rear body earth
P81	P80	ACT. FR. RH (+)
V51	S6	ACT. FR RH (S)
V39	S2	ACT. FR. RH (N)
V45	S4	ACT. FR. RH (H)

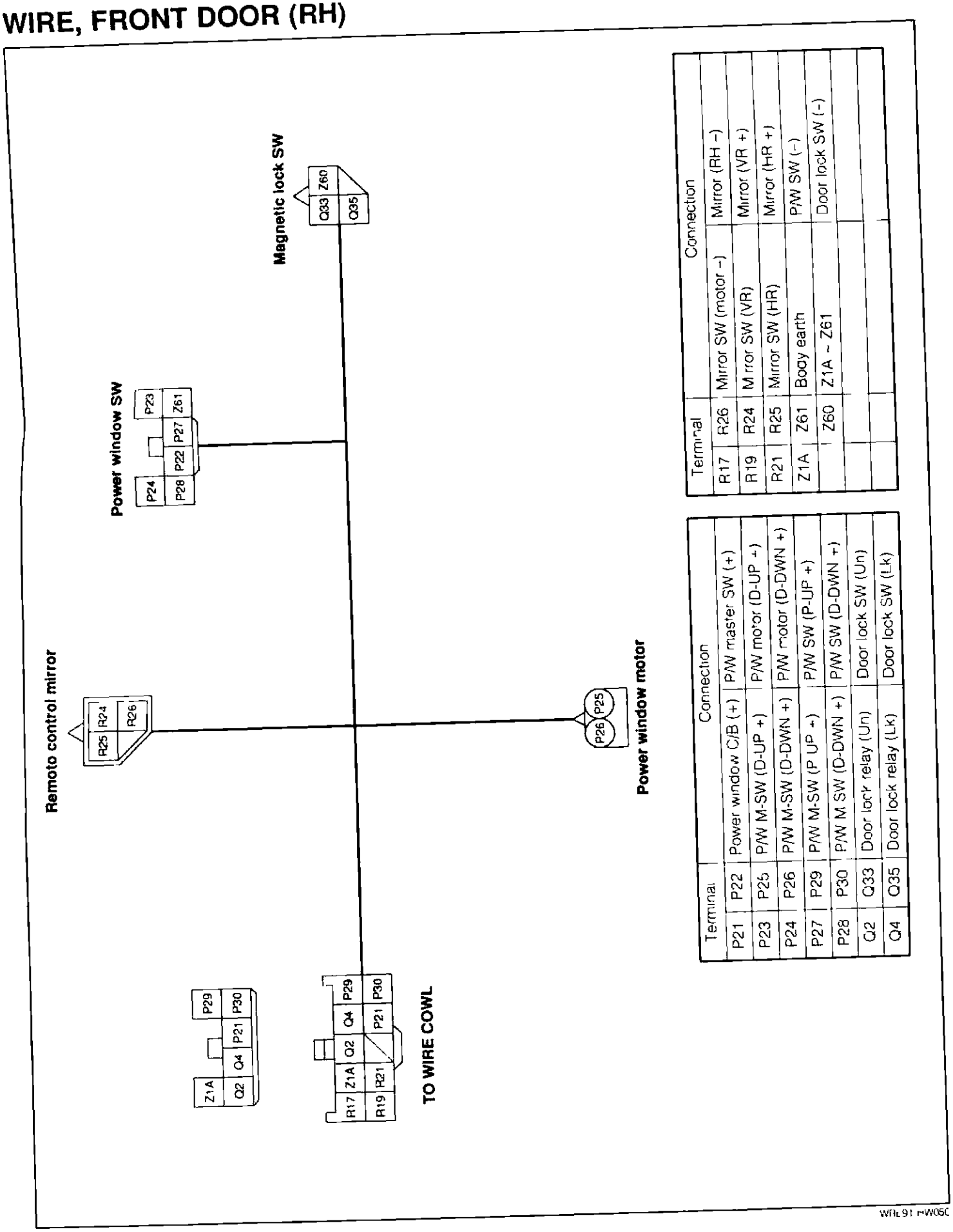
Terminal		Connection
D2A	D2B	Door SW RH (+)
K7A	K7B	Rear heater motor (+)
Z4A	Z4D	Rear heater motor (–)
P81	P80	Controller (+)
V51	S6	Select SW (S)
V39	S2	Select SW (N)
V45	S4	Select SW (H)

WRE91-HW047

WIRE, TRANSMISSION



WIRE, FRONT DOOR (RH)

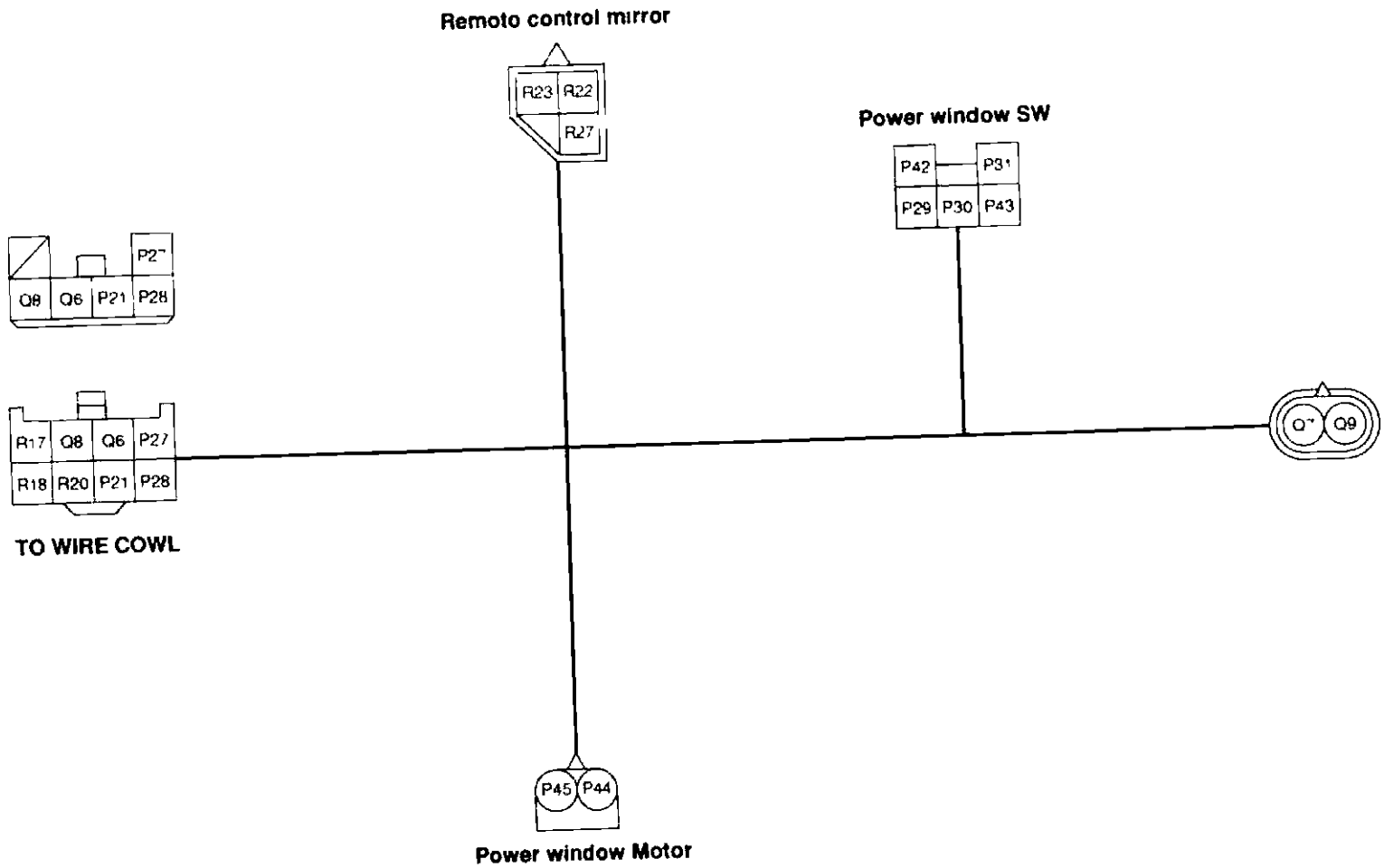


Terminal	Connection
R17	Mirror SW (motor –)
R26	Mirror (RH –)
R19	Mirror SW (VR)
R24	Mirror (VR +)
R21	Mirror SW (HR)
R25	Mirror (HR +)
Z1A	Body earth
Z61	P/W SW (–)
Z60	Z1A – Z61
	Door lock SW (–)

Terminal	Connection
P21	Power window C/B (+)
P22	P/W master SW (+)
P23	P/W M-SW (D-UP +)
P25	P/W motor (D-UP +)
P24	P/W M-SW (D-DWN +)
P26	P/W motor (D-DWN +)
P27	P/W M-SW (P UP +)
P29	P/W SW (P-UP +)
P28	P/W M SW (D-DWN +)
P30	P/W SW (D-DWN +)
Q2	Door lock relay (Un)
Q33	Door lock SW (Un)
Q4	Door lock relay (Lk)
Q35	Door lock SW (Lk)

WRE91HW05C

WIRE, FRONT DOOR (LH)



Terminal		Connection	
P27	P29	P/W M SW (P-UP +)	P/W SW (P-UP +)
P28	P30	P/W M-SW (P-DWN +)	P/W SW (P DWN +)
P42	P44	P/W SW (P UP (+) M)	P/W motor (P UP +)
P43	P45	P/W SW (P DWN (-) M)	P/W motor (P DWN +)
P21	P31	Power window C/B ( )	P/W SW (P +)
Q6	Q7	Door lock relay (Lk)	Solenoid (P Lk)
Q8	Q9	Door lock relay (Ulk)	Solenoid (P Ulk)

Terminal		Connection	
R17	R27	Mirror SW (motor -)	Mirror (LH -)
R18	R22	Mirror SW (VL)	Mirror (VL +)
R20	R23	Mirror SW (HL)	Mirror SW (LH -)

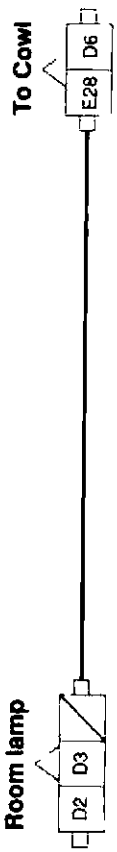
WIRE, BACK DOOR No. 1

Terminal		Connection
Q1A	Q1B	Lock motor (Lock)
Q2A	Q2B	Lock motor (Unlock)
Z3A	Z4A	Body earth
	Z3B	License lamp (–)
	Z1E	Rear washer (–)

Terminal		Connection
C3A	C3D	License lamp (+)
I1A	I1F	Rear wiper (+)
I7A	I7B	Rear wiper (+1)
I8A	I8B	Rear washer (B)
I9A	I9B	Rear wiper (S)
K2A	K2B	Rear defogger

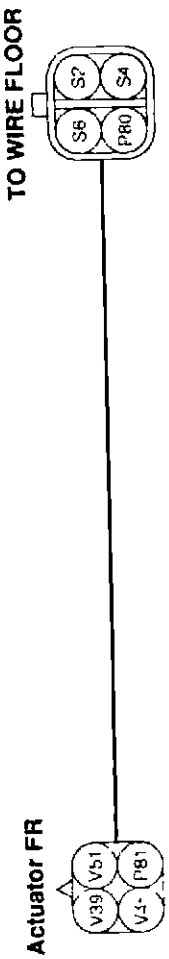
WRE91-HW052

WIRE, ROOF



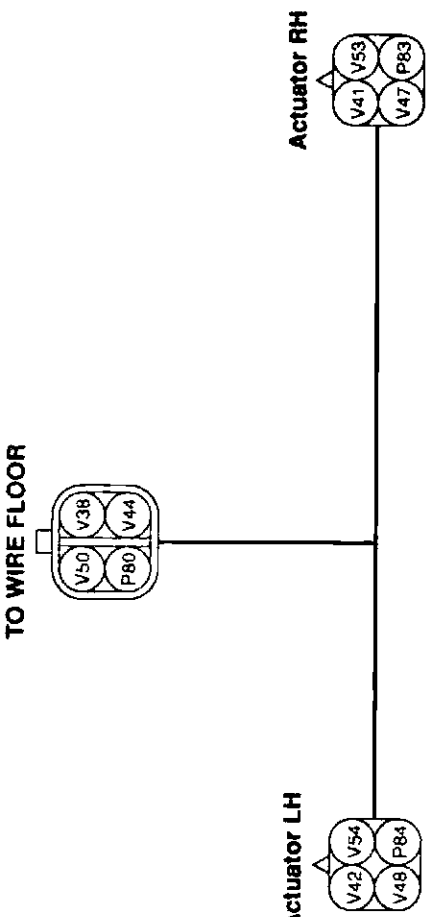
Terminal	Connection
E28	D2 Fuse stop
D3	D6 Room lamp door (-)
	Room lamp (+)
	Courtesy SW (RH)

WIRE, FRAME



Terminal		Connection
P81	P-0	Actuator FR (+) — Controller (+)
V51	S6	Actuator FR (3) — Select SW (S)
V39	S2	Actuator FR (1) — Select SW (1)
V15	S4	Actuator FR (H) — Select SW (H)

WIRE, FRAME No. 2



Terminal		Connection	
V38	V41	Controller (N)	ACT RR RH (N)
	V42	V38 ~ V41	ACT RR LH (N)
V44	V47	Controller (H)	ACT RR RH (H)
	V48	V44 ~ V47	ACT RR LH (H)
V50	V53	Controller (S)	ACT RR RH (S)
	V54	V50 ~ V53	ACT RR LH (S)
P80	P83	Controller (+)	ACT RR RH (+)
	P84	P80 ~ P83	ACT RR LH (+)

WIRE, COWL/RHD-(1)

Tarminal		Connection	
A1A	A1B	Headlamp relay (L)	F/B (HEAD)
A1C	A1C	A1A ~ A1B	Dim-Dip relay
A2A	A2B	Fuse head LH (L)	Headlamp LH (B)
A3A	A3B	Fuse, head RH (L)	Headlamp RH (B)
	A3C	A2A ~ A2B	High beam indi lamp (+)
	A3D	A3A ~ A3B	Headlamp cleaner relay
A4A	A4B	Headlamp LH (Lo)	Passing SW (Hs)
	A4C	A4A ~ A4B	Headlamp RH (Lo)
	A4G	~ A4E	Dim Dip resistor
	A4H	A4A ~ A4F	
A5A	A5B	Headlamp LH (Hi)	Passing SW (Hm)
	A5C	A5A ~ A5B	Headlamp RH (Hi)
	A5D	A5A ~ A5B	High beam indi lamp (-)
	A5E	A5A ~ A5B	Dim-Dip relay (H/L Hi)
A6A	A6B	Headlamp relay coil (-)	Passing SW (H)
	A4D	C3A ~ C3C	Fog lamp SW (+)
	A4E	A4C ~ A4B	Dim-Dip relay RH (Lo)
A4A	A4F	Headlamp LH (Lo)	Dim-Dip relay LH (Lo)
A7A	A7B	Dim Dip resistor (-)	Dim-Dip relay (resistor)
C1A	C1B	Fuse, tail 15A (L)	Tail lamp SW (TB)
C2E	C2F	C20 ~ C2C	Dim-Dip relay (Tail)
C3A	C3C	Tail lamp SW (S)	Heater illumi (+)
	C3B	C3A ~ C3C or C22	Heater illumi (+)
	C3D	~ C2D	License lamp (+)
C42	C4B	J/C	Front fog lamp RH (+)
C40	C4C	J/C	Front fog lamp LH (+)
	C3F	C21 ~ C3C	Rear fog lamp SW
C2A	C4A	Passing SW (LP)	Rear fog lamp SW (L)
C5A	A4D	Rear fog lamp (-)	Rear fog lamp SW (+)
C23	C2B	J/C	Clearance lamp RH (+)
C20	C2C	J/C	Clearance lamp LH (+)
	C2D	C20 ~ C2C	Tail lamp RH (+)
	C6A	C3A ~ C3C or C22	Power shift illumi (+)
	D4I	Q3A ~ Q3B	Luggage lamp (+)
	D1B	Q3A ~ Q3B	Room lamp (+)
	D1C	Q3A ~ Q3B	D gital clock (B)
	D2B	D2A ~ D2C	Door SW RH (+)
D2A	D2C	Room lamp SW ( )	Door SW LH (+)
C41	C4A	J/C	Front fog SW
	F4A	F42 ~ F4B	Turn SW (R)
F1A	E1B	Fuse stop 10A (L)	Stop lamp SW (+)
E2A	E2B	Stop lamp SW (-)	Stop lamp RH (+)
	E3B	E3A ~ E3D	Horn RH 2 (+)
	E3C	E3A ~ E3D	Horn RH 1 (+)
E3A	E3D	Fuse horn 15A (L)	Hazard SW (B2)

Tarminal		Connection	
E4C	E4B	Horn RH (-)	Horn SW (+)
	E4A	E4C ~ E4B	Horn RH (-)
	E4E	E4C ~ E4B	Horn LH ( )
	E3E	E3A ~ E3D	Horn LH (+)
F1A	F1B	Fuse turn 7 5 A (L)	Hazard SW (B1)
F2A	F2B	Hazard SW (F1)	Turn relay (B)
F3A	F3B	Hazard SW (F)	Turn relay (F)
F42	F4B	J/C	Front turn lamp (+)
F40	F4C	J/C	Rear turn lamp (+)
	F4D	F42 ~ F4B	Side turn lamp (+)
F41	F4E	J/C	Turn indicator lamp (+)
F5A	F5B	Turn hazard SW (L)	Front turn lamp (+)
	F5C	F5A ~ F5B	Rear turn lamp (+)
	F5D	F5A ~ F5B	Side turn lamp (+)
	F5E	F5A ~ F5B	Turn indicator lamp (+)
	G1G	~ G1C	Power shift SW (+)
	G1H	G1A ~ G1B	Power shift relay (+)
G1A	G1B	Fuse, gauge 7 5A (L)	Back-up lamp SW (+)
	G1C	G1A ~ G1B	Meter (+)
	G1D	~ G1C	3 stage controller (+)
	G1F	~ G1C	Voltage meter (+)
G2A	G2B	Back-up lamp SW (-)	Back-up lamp RH (+)
G3A	G3C	Brake fluide level lamp	Parking brake SW (+)
	G3B	G3A ~ G3C	Brake fluide level SW (+)
G4A	G3C	Parking brake lamp	Parking brake SW (+)
C22	C3A	J/C	Tail SW (S)
C21	C3C	J/C	Heater illumi
H1A	H1B	Oil pressure lamp	Oil pressure SW (+)
H2A	H2B	Fuel gauge	Fuel sender
H3A	H3B	Water temp gauge	Water temp sensor
H5A	H5B	4WD indicator	4WD SW (+)
H6A	H6B	Fuel drain lamp	Fuel drain SW (+)
C22	C2A	J/C	Tail SW (Lp)
I1A	I1B	Fuse, wiper 15A (L)	Wiper SW (+)
	I1C	I1A ~ I1B	Wiper motor (B)
	I1D	I1A ~ I1B	Int wiper relay (B)
	I1E	~ I1D	Washer motor (B)
	I1F	~ I1D	Rear wiper SW
I1F	I1G	Rear wiper SW	Rear wiper SW
	I1H	~ I1E	Headlamp cleaner (R)
	I2F	~ I1F	Rear wiper motor (+)
I2A	I2B	Wiper SW (+1)	Wiper motor (+1)
I3A	I3B	Wiper SW (+2)	Wiper motor (+2)
I4A	I4C	Wiper SW (WS)	Int wiper relay (S)
I4B	I4D	Wiper motor (WS)	Int wiper relay (WM)
I5A	I5B	Wiper SW (INT)	Int wiper relay (INT)
I6A	I6B	Wiper SW (W)	Washer motor (W)
	I6C	I6A ~ I6B	Headlamp cleaner relay

WIRE COWL/RHD-(2)

Terminal		Connection	
I7A	I7B	Rear wiper SW (WIP)	Rear wiper motor (L)
I8A	I8B	Rear wiper SW (WAS)	Rear washer motor (L)
I9A	I9E	Rear wiper SW (S)	Rear wiper motor (S)
J1A	J1B	Headlamp cleaner (L)	Headlamp cleaner relay
J2A	J2B	F/L glow	Glow plug relay (B)
J3A	J3B	Pre-heating timer (2)	Glow relay (coil +)
J4A	J4B	Pre-heating timer (7)	Glow lamp (–)
J5A	J5B	Pre-heating timer (3)	Sensing resistor (F/L)
J7A	J7B	Pre-heating timer (9)	Sensing resistor (F/L)
J8A	J8B	Pre-heating timer (1)	Water temp. sensor (+)
J12A	J12B	Glow plug relay (F)	Glow plug (+)
K1C	K1D	Main relay (L)	Fuse (Cover IB)
K1A	K1B	Rear defogger (L)	Defogger SW (+)
K2A	K2B	Defogger SW (L)	Rear defogger (+)
K3A	K3B	Fuse heater (L)	Blower motor (B)
K3C	K3B	Blower resistor (HL)	Heater blower SW (HI)
K4A	K4B	Blower motor (L)	Heater blower SW (HI)
K4B	K4C	Heater blower SW (HI)	Blower resistor (HI)
K5A	K5B	Blower resistor (MH)	Heater blower SW (MH)
K6C	K6B	Blower resistor (LO)	Heater blower SW (LO)
L2A	L2B	Rear heater SW (L)	Rear heater motor (+)
	K3D	K3A – K4G	Rear heater motor (W+)
	K4D	E1C – K6B	A/C amp. A/C thermo SW (–)
K6E	K6F	A/C amp. (comp.)	Compressor
K7C	K7B	A/C volume SW (+)	A/C amp. (volume)
	K8F	K8A – K8B	Cooler amp. (+)
K7D	K7E	A/C volume SW (–)	Thermister
K8C	K8E	Fan motor relay (B)	F/L A/C
K8D	K8B	Fan motor relay (L)	Fan motor (+)
K8G	K8H	Thermo SW (+)	A/C amp.
	K8H	K8C – K8B	A/C amp.
M1A	M1B	IG SW (ST1)	Starter relay (coil +)
	M2A	– M2D	IG SW (ST2)
	M2B	– M2A	Pre-heating timer (10)
M3A	M3B	Starter relay (L)	Starter
	M1E	M1A – M1C	Glow plug relay (ST)
M4A	M2C	IG SW (E)	Glow plug relay (g)
	M2D	M2A – M2C	Pre-heating timer (10)
	N1C	N1A – N1E	F/B (Wiper, defogger)
	N1D	N1A – N1E	F/B (Engine)
N1A	N1E	IG SW (IG)	F/B (Turn, gauge)
	N1F	N1A – N1E	F/B (Heater)
N2D	N2E	Pick-up coil	Tachometer
	O1L	O1A – O1C	Main relay (B)

Terminal		Connection	
N20	N21	P.C.S. VSV	P.C.S. timer SW (+)
	O1B	O1A – O1C	IG SW (AM1)
O1A	O1C	F/L AM1	Alternator (B)
	O1J	O1A – O1C	F/B magnetic lock
	O1L	O1A – O1C	Starter relay (B)
	O1F	O1A – O1C	F/B (Tail stop)
	O1H	O1A – O1C	Headlamp cleaner (B)
O1A	O1K	F/L AM1	Voltage regulator (B)
O2A	O2B	F/L Head	Headlamp relay (B)
	O2C	O2A – O2B	F/B Horn
O2B	O2D	Headlamp relay (B)	Headlamp relay (coil +)
O3A	O3B	Alternator (N)	Voltage regulator (N)
O4A	O4B	Alternator (F)	Voltage regulator (F)
O5A	O5B	Fuse engine (L)	Voltage regulator (L)
	O5D	– O5E	Motor winch
	O5E	O5A – O5B	Timer pre-heating (L)
	O6C	– O6B	Main relay
	O6B	– O7B	Voltage regulator (L)
	O7B	O6B	Charge lamp (–)
	O5I	A5A – O5B	Dim-Dip relay (C)
P21	P22	Power window C/B (–)	Power window M SW (+)
	P31	P21 – P22	Power window SW (+)
P27	P29	P/W M SW P-UP (+)	P/W SW P-UP (+)
P28	P30	P/W M SW P-DN (+)	P/W SW P-DN (+)
	P20	N1A – N1L	Power window C/B (+)
Q2	Q33	Door lock relay (Un)	Door lock SW (Un)
Q3A	Q3B	Fuse Magnetic lock (L)	Magnetic lock SW (B)
Q4	Q35	Door lock relay (Lk)	Door lock SW (Lk)
Q6	Q7	Door lock relay (Lk)	Solenoide F.P Lock
Q8	Q9	Door lock relay (Un)	Solenoide F.P Un
	Q1	O1A – O1C	Door lock relay (+)
Q1A	Q1B	Magnetic lock SW (Lk)	Magnetic solenoide (Lk)
Q2A	Q3B	Magnetic lock SW (Un)	Magnetic solenoide (Un)
	Q2E	– Q2C	Dim-Dip relay (HEAD)
R18	R22	Mirror SW (VL)	Mirror (VL +)
R19	R24	Mirror SW (VR)	Mirror (VR +)
R20	R23	Mirror SW (HL)	Mirror (HL +)
R21	R25	Mirror SW (HR)	Mirror (HR +)
R17	R27	Mirror SW (motor +)	Mirror (LH –)
	R26	R17 – R27	Mirror (RH –)
	R16	R2A – R2B	Mirror SW (+)
	Z62	Z15A	Mirror SW (E)
P28	R48	Rear speaker RH (+)	Radio Rr. sp. RH (+)
R29	R51	Rear speaker RH (–)	Radio Rr. sp. RH (–)
R30	R46	Rear speaker LH (+)	Radio Rr. sp. LH (+)
R31	R47	Rear speaker LH (–)	Radio Rr. sp. LH (–)

WIRE COWL/RHD-(3)

Terminal		Connection	
R1A	R1B	IG. SW (ACC)	F/B ciger lighter (+)
R2A	R2B	Fuse, cigar lighter	Cigar lighter (–)
Z11P	Z9A	Body earth	Fuel heater (–)
Z16A	Z30	Body earth	P.C.S. VSV
ZB	Z1A	Body earth	Body earth
Z16	Z1B	J/C	Passing SW (–)
Z11A	Z1C	Fan relay	Heater blower SW (–)
Z1G	Z1F	Voltage regulator	Alternator (E)
ZA	Z4	Body earth	Body earth
	Z1M	ZA – Z4	Glow plug relay (E)
	Z1N	Z11A – Z11C	Starter relay coil (–)
	Z1E	– Z4A	Magnet lock SW (–)
Z6A	Z1T	Body earth	Meter (–)
	Z1V	Z16 – Z1B	Flusher relay (E)
	Z1X	ZA – Z4	Side turn lamp LH (–)
	Z1Y	ZA – Z4	Fan motor (–)
	Z1Z	ZA – Z4	Headlamp cleaner relay (E)
	Z4A	ZA – Z4	Read body earth
	J11J	Z17	Gigar lighter (–)
	Z11Q	Z1W	Rear heater SW (–)
	Z11X	Z16A – Z1S	Fog lamp LH (–)
	Z15A	– Z17	Defogger SW (–)
	Z1S	Body earth	Clearance lamp LH (–)
	Z4D	Z1E	Rear heater motor (–)
Z1B	Z11M	Passing SW (–)	Washer SW (–)
Z2A	Z2B	Engine earth	Timer, pre-heating (5)
	Z2C	Z2A – Z2B	Water temp. sensor (–)
Z7A	Z6B	Body earth	Radio earth (–)
Z6A	Z5C	Body earth (cowl side)	Meter, speed sensor (–)
	Z11W	Z18 – Z1K	Fog lamp RH (–)
	Z11E	Z18 – Z1R	Brake fluide level SW (–)
	Z11F	ZB – Z1A	4WD SW (–)
	Z11G	ZB – Z1A	Fuel drain SW (–)
Z11P	Z1L	Body earth	Glow plug relay coil (–)
Z18	Z1R	J/C	Clearance lamp RH (–)
	Z1W	Z18 – Z1R	Side turn lamp RH (–)
	Z7A	Z11V – Z11N	Body earth
Z11V	Z11N	Tachometer (–)	Pickup coil (–)
	Z9B	Z11P – Z1L	Main relay coil (–)
	Z19	ZA – Z4	J/C
	Z20A	ZA – Z4	Dim-Dip relay (earth)

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WIRE, COWL/LHD-(1)

Terminal		Connection	
A1A	A1B	Headlamp relay (L)	F/L (Head)
A2A	A2B	Fuse head LH (L)	Headlamp LH (B)
A3A	A3B	Fuse head RH (L)	Headlamp RH (B)
	A3C	A3A ~ A3B	High beam indicator (+)
	A3D	A3A ~ A3B	Headlamp cleaner relay (5)
A4A	A4B	Headlamp LH (Lo)	Passing SW (Hs)
	A4C	A4A ~ A4B	Headlamp RH (Lo)
A5A	A5B	Headlamp LH (Hi)	Passing SW (HM)
	A5C	A5A ~ A5B	Headlamp RH (Hi)
	A5D	A5A ~ A5B	High beam indicator (-)
A6A	A6B	Headlamp relay coil ( )	Passing SW (H)
	A4D	C20 ~ C3C	Fog lamp SW (+)
A56	A63	H/L leveling RH (0)	H/L leveling LH (0)
	A69	A56 ~ A63	H/L leveling SW (0)
A57	A64	H/L leveling RH (1)	H/L leveling LH (1)
	A61	A1A ~ A2B	H/L leveling LH (+)
	A70	A57 ~ A64	H/L leveling SW (1)
A58	A65	H/L leveling RH (2)	H/L leveling LH (2)
	A71	A58 ~ A65	H/L leveling SW (2)
A59	A66	H/L leveling RH (3)	H/L leveling LH (3)
	A72	A59 ~ A66	H/L leveling SW (3)
A60	A67	H/L leveling RH (4)	H/L leveling LH (4)
	A73	A60 ~ A67	H/L leveling SW (4)
	A54	A3A ~ A3B	H/L leveling RH (+)
	A55	Z18 ~ Z1R	H/L leveling RH (E)
	A62	Z16A ~ Z1S	H/L leveling LH (E)
	A68	ZA ~ Z11J	H/L leveling SW (E)
C22	C3B	J/C	Meter, illum
	C6A	C22 ~ C3B	Power shift SW
C1A	C1B	Fuse tail 15A (L)	Tail SW (TB)
C23	C2B	J/C	Clearance lamp (RH)
	C2C	C20 ~ C3C	Clearance lamp (LH)
C21	C2D	J/C	Tail lamp RH (+)
	C3A	Z1B ~ Z1C	Tail lamp SW (S)
	C3D	C21 ~ C2D	License lamp (+)
	C1B	C1A ~ C1C	Tail SW (TB)
C2A	C4A	Passing SW	Rear fog lamp SW (L)
C2K	C2C	Fuse, tail LH (10A)	Clearance lamp LH (+)
	C2L	C20 ~ C3C	Fuse
	C3A	C23 ~ C2B	Tail SW
	C3D	C2R ~ C2C	License lamp (+)
	C3L	C20 ~ C3C	Rear fog lamp SW
C3A	C3F	Tail SW	Fuse tail (B)
C5A	A4D	Rear fog lamp ( )	Rear fog amp SW (+)
C20	C3C	J/C	Heater illumi (+)
C40	C4B	J/C	Front fog lamp RH (+)
C40	C4C	J/C	Front fog lamp LH (+)

Terminal		Connection	
C41	C4A	J/C	Front fog SW
	D1B	Q3A ~ Q3B	Room lamp (+)
	D1C	Q3A ~ Q3B	Digital clock (+B)
	D41	Q3A ~ Q3B	Luggage lamp (+)
	D2B	D2A ~ D2C	Door SW RH (+)
D2A	D2C	Room lamp SW (-)	Door SW LH (+)
	A6C	A6A ~ A6B	Day light relay
	A4E	~ A4C	Day light relay
	A5E	~ A5C	Day light relay
E1A	E1B	Fuse, stop	Stop lamp SW (+)
E2A	E2B	Stop lamp SW (-)	Stop lamp RH (+)
E3A	E3D	Fuse Horn (L)	Hazard SW (B2)
	E3B	E3A ~ E3D	Horn RH2 (+)
	E3C	E3A ~ E3D	Horn RH1 (+)
	E3E	E3A ~ E3D	Horn LH (-)
E4C	E4B	Horn RH (-)	Horn SW (+)
	E4A	E4C ~ E4B	Horn, RH2 ( )
	E4E	E4C ~ E4B	Horn LH ( )
C1A	C1C	Fuse tail 15A (L)	Day light relay (4)
C1B	C1D	Tail SW (TB)	Day light relay (8)
	C2M	C23	Day light relay (5)
F1A	F1B	Fuse, turn 7.5A (L)	Hazard SW (B1)
F2A	F2B	Hazard SW	Flusher relay (R)
F3A	F3B	Hazard SW (E)	Flusher relay (F)
F42	F4B	J/C	Front turn lamp RH (+)
F40	F4C	J/C	Rear turn lamp RH (+)
	F4D	F42 ~ F4B	Side turn lamp RH (+)
F41	F4E	J/C	Turn indicator RH (+)
F5A	F5B	Hazard SW (L)	Front turn lamp LH (+)
	F5C	F5A ~ F5B	Rear turn lamp LH (+)
	F5D	F5A ~ F5B	Side turn lamp LH (+)
	F5E	F5A ~ F5B	Turn indicator LH (+)
F6A	F6B	Hazard SW	Hazard indicator (+)
G1A	G1B	Fuse, gauge 7.5A (L)	Back-up lamp SW (-)
	G1C	G1A ~ G1B	Meter (+)
	G1D	~ G1C	3 stage controller (+)
	G1F	~ G1C	Voltage meter (+)
G2A	G2B	Back-up lamp SW (-)	Back up lamp RH (-)
G3A	G3C	Brake fluid level lamp	Parking brake SW (+)
	G3B	G3A ~ G3C	Brake fluid level SW (+)
	G1E	G1A ~ G1B	Seat belt warning relay
K1D	K1C	Fuel heater (B)	Main relay (L)
H1A	H1B	Oil pressure lamp	Oil pressure SW (+)
H2A	H2B	Fuel gauge	Fuel sender
H3A	H3B	Water temp gauge	Water temp sender
H5A	H5B	4WD indicator lamp	4WD SW (+)
A6A	H6B	Fuel drain lamp	Fuel drain SW (+)

WIRE, COWL/LHD-(2)

Terminal		Connection	
H7A	H7B	Seat belt warning lamp	Seat belt SW (+)
H8A	H8B	Seat belt SW (-)	Seat belt warning relay
	F4A	F42 - F4B	Turn SW (L)
I1A	I1B	Fuse wiper 15A (I)	Wiper washer SW (B)
	I1C	I1A - I1B	Wiper motor (B)
	I1D	I1A - I1B	INT wiper relay (B)
	I1F	I1C	Washer motor (B)
	I1I	I1A - I1B	Rear wiper washer SW
I1I	I1G	Rear wiper washer SW	Rear wiper SW
	I1H	I1A - I1B	H/L cleaner relay (B)
I2A	I2B	Wiper SW (+1)	Wiper motor (+1)
	I2F	- I1F	Rear wiper motor (+)
I3A	I3B	Wiper SW (+2)	Wiper motor (+2)
I4A	I4C	Wiper SW (WS)	INT wiper relay (WS)
I4B	I4D	Wiper motor (WS)	INT wiper relay (WM)
I5A	I5B	Wiper washer SW (INT)	INT wiper relay (INT)
I6A	I6B	Wiper SW (W)	Washer motor (W)
	I6C	I6A - I6B	Headlamp cleaner relay
I7A	I7B	Rear wiper SW (WIP)	Rear wiper motor (L)
I8A	I8B	Rear wiper SW (WAS)	Rear washer motor (L)
I9A	I9B	Rear wiper SW	Rear wiper motor (S)
J1A	J1B	H/L cleaner motor	H/L cleaner relay
	O1I	O1A - O1C	Main relay (B)
J2A	J2B	F/L glow 12F	Glow plug relay (B)
J3A	J3B	Pre-heating timer (2)	Glow plug relay coil (+)
J5A	J5B	Pre-heating timer (7)	Glow plug (-)
J6A	J6B	Pre-heating timer (3)	Sensing resistor (+)
J7A	J7B	Pre-heating timer (9)	Sensing resistor (-)
J8A	J8B	Pre-heating timer (1)	Water temp. sensor (+)
J9A	J9B	Glow plug relay (L)	Sensing resistor (+)
J12A	J12B	Glow plug relay (S)	Glow plug (+)
K1A	K1B	Fuse defogger 15A (I)	Defogger SW (+)
K2A	K2B	Defogger SW (L)	Rear window defogger (+)
K3A	K3B	Fuse heater 30A (I)	Heater blower motor (B)
	K3D	K4A - K9B	Rear heater blower SW (+)
K4A	K4B	Heater blower motor (L)	Heater blower SW (HI)
	K4C	K4A - K1B	Heater blower resistor (HI)
K5A	K5B	Heater blower resistor (M)	Heater blower SW (M)
K5C	K5D	Heater blower resistor (MI)	Heater blower SW (MI)

Terminal		Connection	
K6C	K6B	Heater resistor (Lo)	Heater blower SW (Lo)
K6E	K6F	A/C amp. (Comp.)	Compressor
	K6D	K6C - K6B	A/C amp. A/C Thermo. SW (-)
K7A	K7B	Rear heater blower SW (-)	Rear heater blower motor (+)
K7C	K7E	A/C volume SW (+)	A/C amp. (Volume)
K7D	K7F	A/C volume SW	Thermister
K8D	K8F	Motor fan relay (L)	Fan motor (+)
	K9C	K3A - K9B	Cooler amp. (+)
K6G	K6H	A/C thermo. SW (+)	A/C amp.
M1A	M1C	IG SW (ST 1)	Starter relay coil (+)
M2A	M2C	IG SW (g)	Glow plug relay (g)
	M2D	- M2A	Pre-heating timer
M3A	M3B	Starter relay (L)	Starter (ST)
N1A	N1E	IG SW (IG)	F/B (Turn, Gauge)
	N1C	N1A - N1F	F/B (Wiper, Defogger)
	N1D	N1A - N1E	F/B (Engine)
	N1F	N1A - N1E	F/B (Heater)
N2A	N2E	Pickup coil	Tacho meter
N3A	N3B	Power shift SW (L)	Power shift relay coil (+)
	G1H	G1A - G1B	Power shift relay (+)
N20	N21	P.C.S. VSV (+)	P.C.S. SW (+)
	Z30	Z1 - Z4	P.C.S. VSV (-)
	G1G	- G1C	Power shift SW (+)
N4A	N4B	Power shift relay (L)	VSV No. 2 (+)
	N3C	N3A - N3B	VSV No. 1 (+)
O1A	O1C	F/L AM1	Alternator (B)
	O1B	O1A - O1C	IG SW (AM1)
	O1E	O1A - O1C	Starter relay (B)
	O1F	O1A - O1C	F/B (Tail stop)
	O1H	O1A - O1C	H/L cleaner motor (B)
	O1J	- O1H	F/B Magnetic lock
O2A	O2B	F/L head	Headlamp relay (B)
	O2C	O2A - O2B	F/B Horn
O2B	O2D	Headlamp relay (B)	H/L relay coil (+)
O3A	O3B	Alternator (N)	Voltage regulator (N)
O4A	O4B	Alternator (F)	Voltage regulator (F)
O5A	O5B	Fuse engine 10A (L)	Voltage regulator (IG)
	O5E	O5A - O5B	Fuel cut solenoid
	O5D	O5A - O5B	Motor winch
	O5G	O5A - O5B	Timer pre heating (6)
	O6B	- O7B	Voltage regulator (I)
	O6D	- O7B	Day light relay coil (+)
	O7B	- O6B	Charge lamp (+)
	O1K	- O1A	Voltage regulator
	O6C	- O6B	Main relay
Q1A	Q1B	Magnetic lock SW (lock)	Lock solenoid (lock)
Q2A	Q2B	Magnetic lock SW (unlock)	Lock solenoid (unlock)

WIRE, COWL/LHD-(3)

Terminal		Connection	
Q3A	Q3B	Fuse lock doom	Lock SW (B)
Q2	Q33	Door lock relay (unlock)	Door lock SW (unlock)
Q4	Q35	Door lock relay (lock)	Door lock SW (lock)
Q6	Q7	Door lock relay (solenoid)	Solenoid (Fr P-lock)
Q8	Q9	Door lock relay (solenoid)	Solenoid (Fr P unlock)
	Q1	Q1A ~ Q1C	Door lock relay (+)
P21	P22	Power window C/A (–)	Power window M-SW (+)
	P31	P21 ~ P22	Power window SW-P (–)
P27	P29	P/W master SW	P/W SW P-up (+)
P28	P30	P/W master SW	P/W SW P-DN (+)
	P20	N1A ~ N1E	Power window C/B (+)
R1A	R1B	Fuse c gar lighter	Cigar lighter (+)
R28	R18	Rear speaker RH (+)	Radio (Rr sp RH +)
R29	R51	Rear speaker RH ( )	Radio (Rr sp RH –)
R18	R22	Door mirror SW (VL)	Mirror (VL +)
R19	R24	Door mirror SW (VR)	Mirror (VR +)
R20	R23	Door mirror SW (HL)	Mirror (HL +)
R21	R25	Door mirror SW (HR)	Mirror (HR +)
R17	R27	Door mirror SW (motor –)	Mirror (LH –)
	R26	R17 ~ R27	Mirror (RH –)
	R16	R2A ~ R2B	Mirror SW (+)
R30	R46	Rear speaker LH (+)	Radio (Rr sp LH +)
R31	R47	Rear speaker LH ( )	Radio (Rr sp LH –)
Z11P	Z9A	Earth	Fuel heater (–)
	Z9C	Z16 ~ Z15A	Power shift SW illumi (–)
	Z11H	ZB ~ Z1A	Seat belt warning relay (–)
Z1B	Z1C	Passing SW	Heater blower SW (–)
	Z1N	Z1B ~ Z1R	Starter relay coil (–)
	Z1V	Z1B ~ Z1C	Flusher relay (E)
	Z1Z	ZB ~ Z1A	H/L cleaner relay (E)
ZA	Z4	Body earth	Body earth
	Z11A	ZB ~ Z1A	Fan motor relay coil (–)
ZA	Z11J	Body earth	Cigar lighter ( )
	Z11Q	ZA ~ Z11J	Rear heater SW (–)
Z6A	Z1T	Body earth	Meter (–)
Z16	Z15A	J/C	Defogger SW ( )
Z16A	Z15	Body earth	Clearance lamp LH (–)
	Z1X	Z16A ~ Z1Y	Side turn lamp LH ( )
	Z11M	Z1P	Washer SW (–)
Z2A	Z2B	Engine earth	Timer type heating (+)
	Z2C	Z2A ~ Z2B	Water temp sensor (–)
	Z1D	Z1E	Rear heater motor (–)
	Z1M	ZB ~ Z1A	Glow plug relay (E)

Terminal		Connection	
Z7A	Z6B	Body earth	Radio earth ( )
Z6A	Z5C	Body earth (cowl side)	Meter speed sens (–)
	Z11G	Z1B ~ Z1R	Fuel drain SW ( )
Z11P	Z1L	Earth	Glow plug relay coil ( )
	Z11F	Z1B ~ Z1R	4WD SW (–)
Z1B	Z1R	Body earth	Clearance lamp RH ( )
	Z1W	Z1B ~ Z1R	Side turn lamp RH
	Z7A	Z11V ~ Z11N	Body earth
Z11V	Z11N	Tachometer ( )	Pickup coil (–)
ZB	Z1A	Body earth	Body earth
Z1G	Z1F	Voltage regulator	Alternator (E)
ZC	Z9D	Earth	Power shift relay ( )
Z16C	Z1Y	Body earth	Fan motor (–)
	Z4A	ZA ~ Z4	Rear body earth
	Z11E	Z16A ~ Z1Y	Brake fluid leve SW (–)
	Z1E	Z4A	Magnetic lock SW
	C3A	Z1B ~ Z1C	Tail SW (S)
	Z10A	ZB ~ Z1A	Day light relay (RY3)
	Z10B	ZB ~ Z1A	Day light relay (RY2 –)
	Z11W	Z1B ~ Z1R	Fog lamp RH (–)
	Z11X	Z16A ~ Z1S	Fog lamp LH ( )
	Z9B	Z11P ~ Z1L	Main relay (Coil)
	Z17	Z1B ~ Z1C	J/C
	Z19	ZB ~ Z1A	J/C
	Z65	ZC ~ Z61	Door lock SW (F)
ZC	Z61	Earth	Power window SW
Z1A	Z59	Earth	Door lock relay ( )

WIRE, INSTRUMENT PANEL (INPANE)/RHD

Terminal		Connection	
C3A	C3C	TAil SW (S)	Heater illumi. (+)
	C3F	C3A ~ C3C	Digital clock (TAIL +)
	C3J	C3A ~ C3C	Clinometer illumi. (+)
	C3K	C3A ~ C3C	Voltmeter illumi. (+)
	C3M	C3A ~ C3C	Cigar lighter illumi. (+)
Q3A	D1C	Fuse, doom lock	Digital clock (+)
G1A	G1F	Fuse, gauge	Voltmeter (+)
R2A	R2B	Fuse, cigar lighter	Cigar lighter (+)
	R2D	R2A ~ R2B	Digital clock (ACC)
	R5B	R2A ~ R2B	Radio (+)
R3A	R3B	Radio (Speaker LH +)	Speaker LH (+)
R4A	R4B	Radio (Speaker LH –)	Speaker LH (–)
R6A	R6B	Radio (Speaker RH +)	Speaker RH (+)
	R7B	R4A ~ R4B	Speaker RH (–)
Z1A	Z11J	Body earth	Cigar lighter (–)
	Z11C	Z1A ~ Z11J	Digital clock (–)
	Z11D	Z1A ~ Z11J	Voltmeter (–)
	Z11K	Z1A ~ Z11J	Clinometer illumi. (–)
	Z11S	Z1A ~ Z11J	Voltmeter illumi. (–)
	Z1U	Z1A ~ Z11J	Heater illumi. (–)
	Z1B	Z1A ~ Z11J	Cigar lighter illumi. (–)
Z6B	Z6C	Radio (–)	Body earth
	Z6A	Z6B ~ Z6C	Body earth

WRE91-HW040

V

WIRE, INSTRUMENT PANEL (INPANE)/LHD

Terminal		Connection	
C3A	C3C	Tail SW (S)	Heater illumi (+)
	C3F	C3A – C3C	Digital clock (TAIL +)
	C3J	C3A – C3C	Clinometer illumi (+)
	C3K	C3A – C3C	Voltmeter illumi (+)
	C3L	C3A – C3C	Radio illumi (+)
	C3M	C3A – C3C	Cigar lighter illumi (+)
Q3A	D1C	Fuse door lock	Digital clock (+)
	D1D	Q3A – D1C	Radio (Back-up +)
G1A	G1F	Fuse gauge	Volt meter (+)
R2A	R2B	Fuse cigar lighter	Cigar lighter (+)
	R2D	R2A – R2B	Digital clock (ACC)
	R5	R2A – R2B	Radio (+)
R3A	R3B	Radio (Speaker LH +)	Speaker LH (+)
R4A	R4B	Radio (Speaker LH –)	Speaker LH (–)
R6A	R6B	Radio (Speaker RH +)	Speaker RH (+)
R7A	R7B	Radio (Speaker RH –)	Speaker RH (–)
	R7B	R4A – R4B	Speaker RH (–)
R28	R48	Rear speaker RH (+)	Radio (Rear speaker RH +)
R29	R51	Rear speaker RH (–)	Radio (Rear speaker RH –)
R30	R46	Rear speaker LH (+)	Radio (Rear speaker LH +)
R31	R47	Rear speaker LH (–)	Radio (Rear speaker LH +)
Z1A	Z11J	Body earth	Cigar lighter (–)
	Z11L	Z1A – Z11J	Digital clock (–)
	Z11U	Z1A – Z11J	Volt meter (–)
	Z11k	Z1A – Z11J	Clinometer illumi (–)
	Z11S	Z1A – Z11J	Voltmeter illumi (–)
	Z1U	Z1A – Z11J	Heater illumi (–)
	Z1B	Z1A – Z11J	Cigar lighter (–)
Z6B	Z6C	Radio (–)	Body earth
	Z6A	Z6B – Z6C	Body earth

WIRE, FLOOR (F70, F75)

Terminal		Connection	
C2A	C2D	Tail SW (LP)	Tail RH (+)
	C2F	C2A – C2D	Tail LH (+)
C3A	C3D	Tail SW (S)	License lamp (+)
	C2F	C3A – C3D	Tail LH (+)
	C3G	C3A – C3D	Rear fog lamp (+)
	C3H	C3A – C3D	Rear fog lamp (+)
C5A	C5B	Rear fog lamp (–)	Rear fog SW (+)
	C5C	C5A – C5B	Rear fog lamp (–)
D2A	F2C	Room lamp SW ( )	Courtesy SW (LH)
E2A	E2B	Stop lamp SW (–)	Stop lamp RH
	F2C	F2A – F2B	Stop lamp LH
F4A	F4C	Turn signal SW (R)	Rear combi lamp (R)
F5A	F5C	Turn signal SW (L)	Rear combi lamp (L)
G1A	G1B	Fuse gauge	Select SW (+)
	G1J	G1A – G1B	Controller (B)
G2A	G2B	Fuse gauge	Back-up lamp RH
	G2C	G2A – G2B	Back up lamp LH
M2A	H2B	Meter Fuel gauge	Fue sender
I1A	I1F	Fuse wiper	Rear wiper motor (+)
I7A	I7B	Rear wiper SW (WIP)	Rear wiper motor (+)
I8A	I8B	Rear wiper SW (WAS)	Rear washer motor (B)
I9A	I9B	Rear wiper SW (WIP)	Rear wiper motor (S)
K2A	K2B	Defogger SW	Defogger
Q1A	Q1B	Lock SW (lock)	Solenoid (lock)
Q2A	Q2B	Lock SW (unlock)	Solenoid (unlock)
P80	P81	Controller (+)	ACT FR RH (+)
	P82	P80 – P81	ACT FR LH (+)
	P83	P80 – P81	ACT RR RH (–)
V50	S6	Controller (S)	Select SW (S)
	V51	V50 – S6	ACT FR RH (S)
	V52	V50 – S6	ACT FR LH (S)
	V53	V50 – S6	ACT RR RH (S)
V38	S2	Controller (N)	Select SW (N)
	V39	V38 – S2	ACT FR RH (N)
	V40	V38 – S2	ACT FR LH (N)
	V41	V38 – S2	ACT RR RH (N)
V44	S4	Controller (H)	Select SW (H)
	V45	V14 – S4	ACT FR RH (H)
	V46	V44 – S4	ACT FR LH (H)
	V47	V14 – S4	ACT RR RH (H)
Z4H	Z1A	Body earth	Body earth
	Z1B	Z4H – Z1A	Select SW ( )
Z4H	Z4C	Body earth	Rear combi LH (–)
	Z123	Z4H – Z4C	Controller (E)
Z1A	Z3A	Body earth	Body earth
	Z4B	Z4A – Z4B	Rear combi RH ( )
Z4A	Z1F	Body earth	Fuel sender (–)

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WIRE, FLOOR (F77)

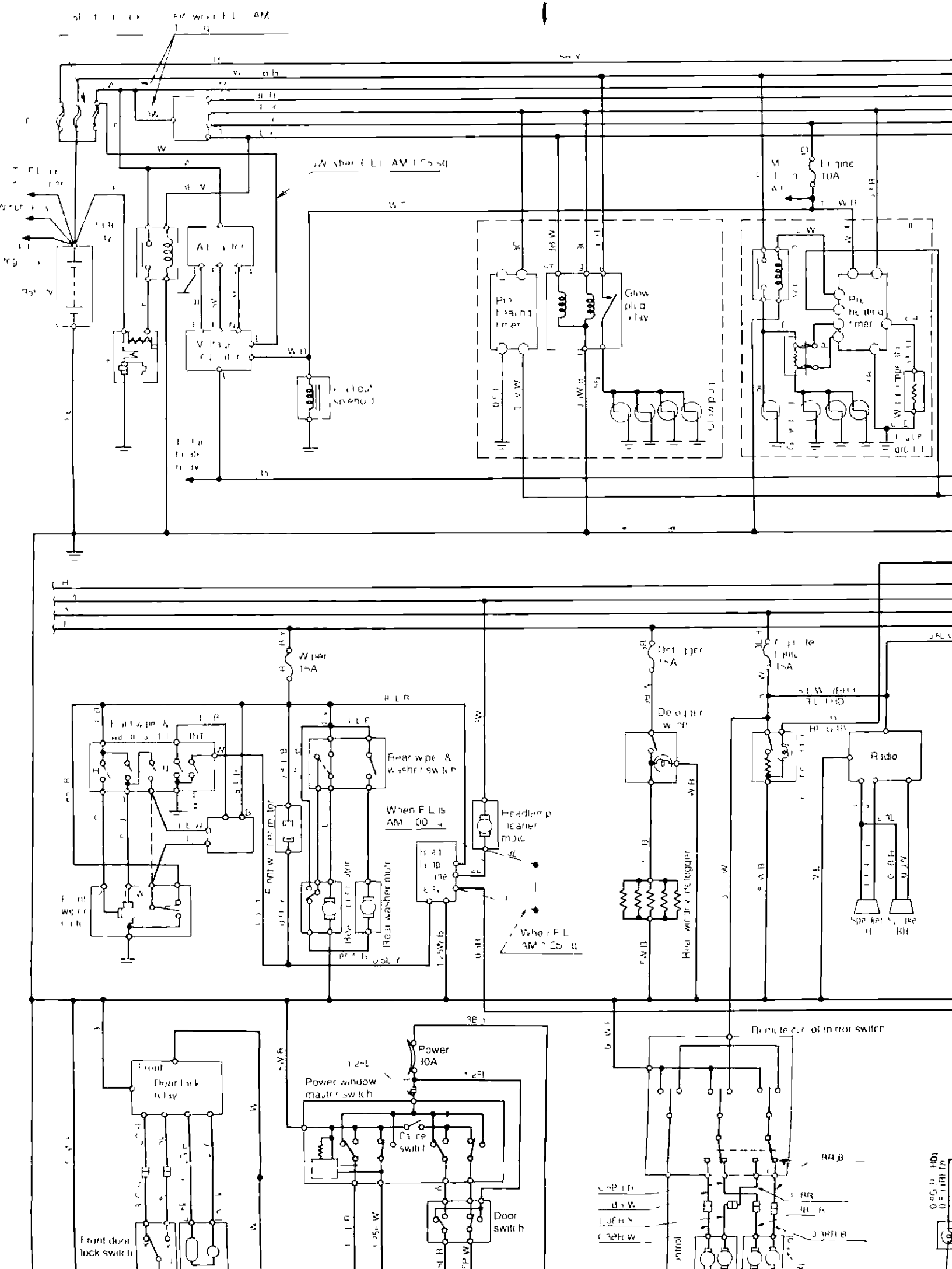
Terminal		Connection	
C2A	C2D	Turn signal SW (RF)	Tail (R)
C3A	C3D	Turn signal SW (S)	License lamp (L)
	C2E	C3A ~ C3D	Tail (L)
	C3E	C3A ~ C3D	License lamp (R)
	C3G	C3A ~ C3D	Rear fog lamp LH (+)
C5A	C5B	Rear fog lamp LH (-)	Rear fog SW (+)
D2A	D2C	Room lamp SW (-)	Door courtesy SW (LH)
E2A	E2B	Stop lamp SW	Stop lamp (R)
	E2C	E2A ~ E2B	Stop lamp (L)
F4A	F4C	Turn signal SW	Rear combi (turn R)
F5A	F5C	Turn signal SW	Rear combi (turn L)
G2A	G2B	Back-up lamp SW (-)	Back-up lamp (+)
H2A	H2B	Fuel gauge	Fuel sender
Z1A	Z4A	Front body earth	Rear body earth
	Z1B	Z1A ~ Z4A	Rear combi LH (-)
	Z1C	Z1A ~ Z4A	Rear combi RH (-)
	Z1D	Z1A ~ Z4A	License lamp (L)
	Z1E	~ Z1C	License lamp (R)
	Z1F	~ Z1C	Back-up lamp (-)
Z4A	Z4E	Rear body earth	Fuel sender (-)
	C3H	C3A ~ C3D	Rear fog lamp RH (+)
	C5C	C5A ~ C5B	Rear fog lamp RH (-)

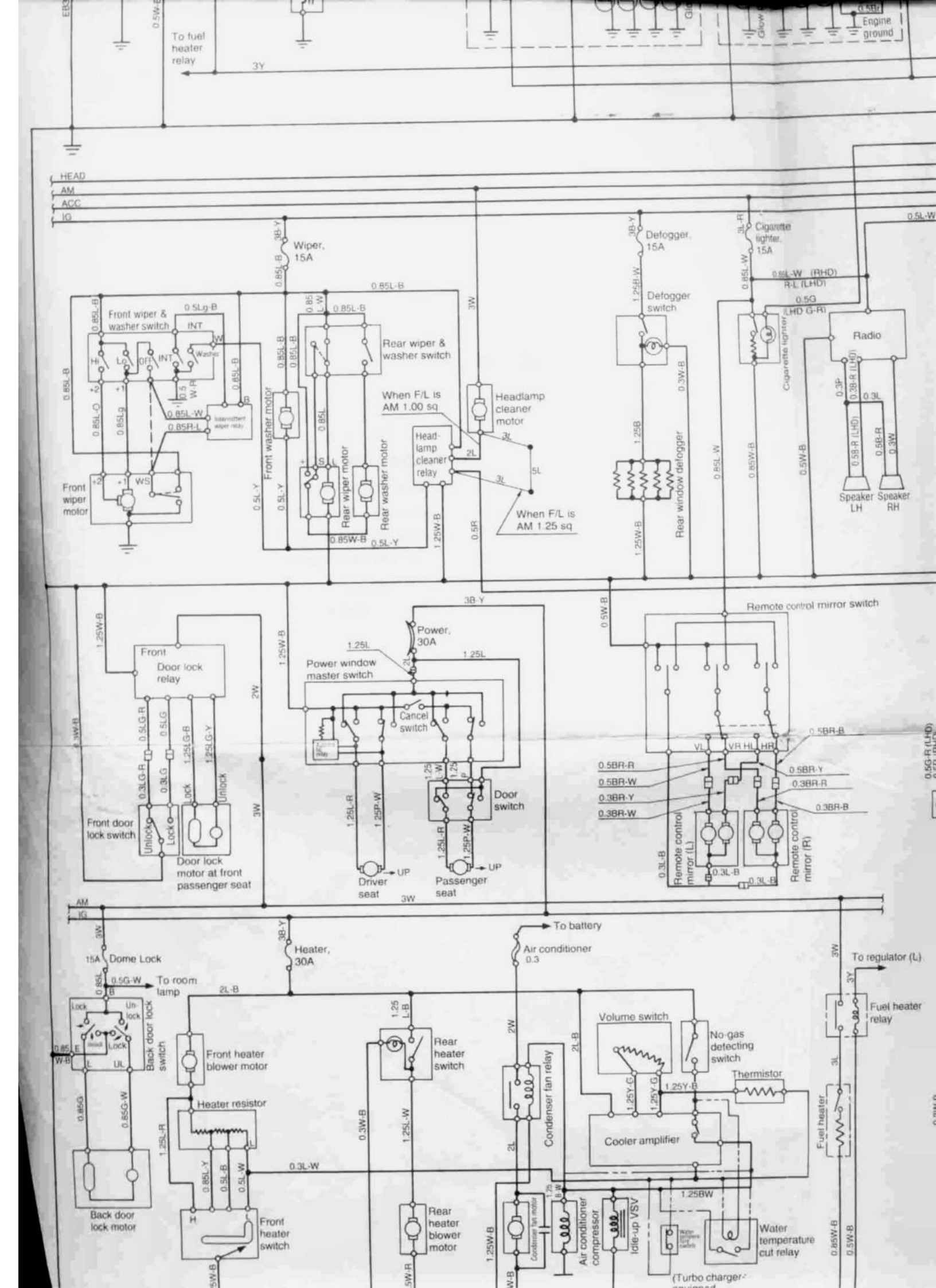
WRE91-046

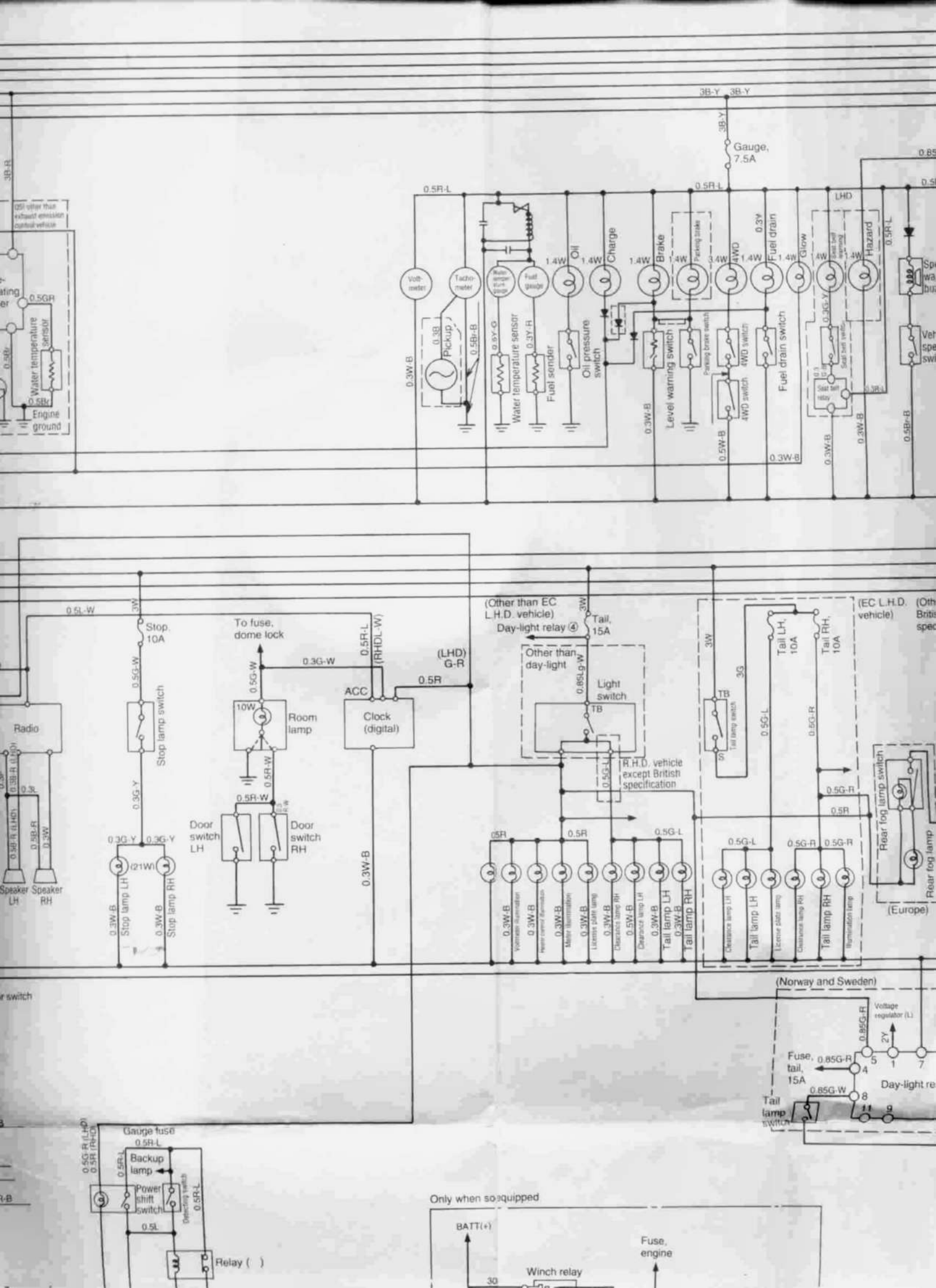
WIRE, TRANSMISSION

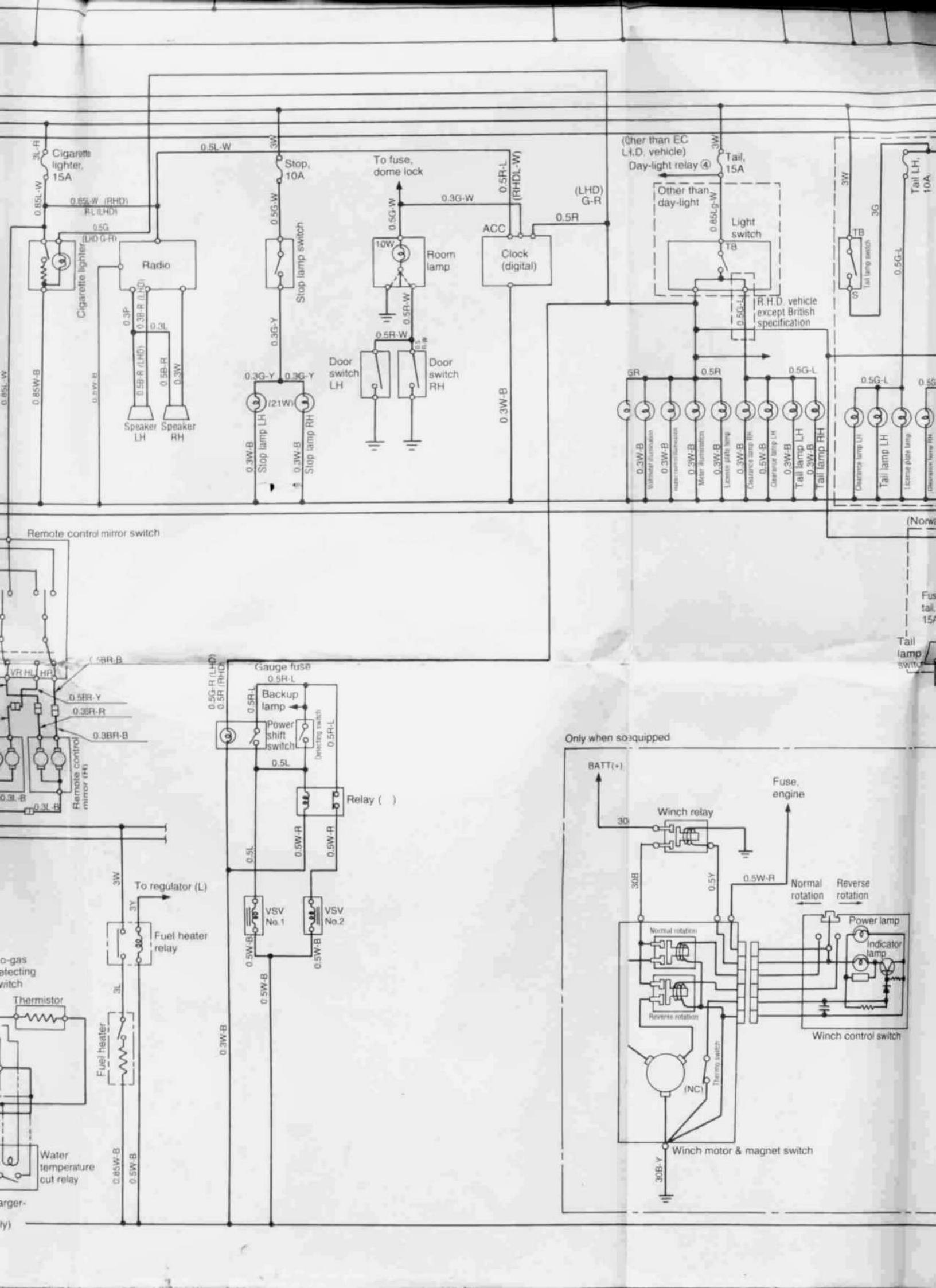
Terminal		Connection	
G1A	G1B	Fuse, gauge	Back lamp SW (B)
	G1C	G1A ~ G1B	L Detecter SW (+)
	G20	G1A ~ G1B	P.C.S. T/M SW (+)
G2A	G2B	Back lamp SW (–)	Back lamp RH
H3A	H3B	Meter water temp. gauge	Water temp. sensor
H5A	H5B	Meter 4WD indicator	4WD SW No. 1 (+)
H5C	H5D	4WD SW No. 1 (–)	4WD SW No. 2 (+)
J8A	J8B	Pre-heating timer (+)	Water temp. sensor (+)
K6C	K6H	A/C thermo. SW (+)	A/C amp.
K6G	K6D	Heater blower SW (Lo)	A/C thermo. SW (–)
K6G	K6H	Heater blower SW (Lo)	A/C amp.
M3A	M3B	Starter relay (L)	Starter (ST)
N2E	N2D	Meter, tachometer	Pickup coil (+)
N20	N21	P.C.S. VSV (+)	P.C.S. T/M SW (–)
N3A	N3B	Power shift SW (L)	VSV No. 1 (+)
	N3C	N3A ~ N3B	L detector SW (–)
N4A	N4B	Power shift relay (L)	VSV No. 2 (+)
O5A	O5E	Fuse, engine	Fuel cut solenoid (+)
Z1A	Z1B	Body earth	4WD SW No. 2 (–)
	Z1C	Z1A ~ Z1B	VSV No. 1 (–)
	Z1D	Z1A ~ Z1B	VSV No. 2 (–)
Z2A	Z2C	Engine earth	Water temp. sensor (–)
Z1P	Z1M	Body earth	Pickup coil (–)

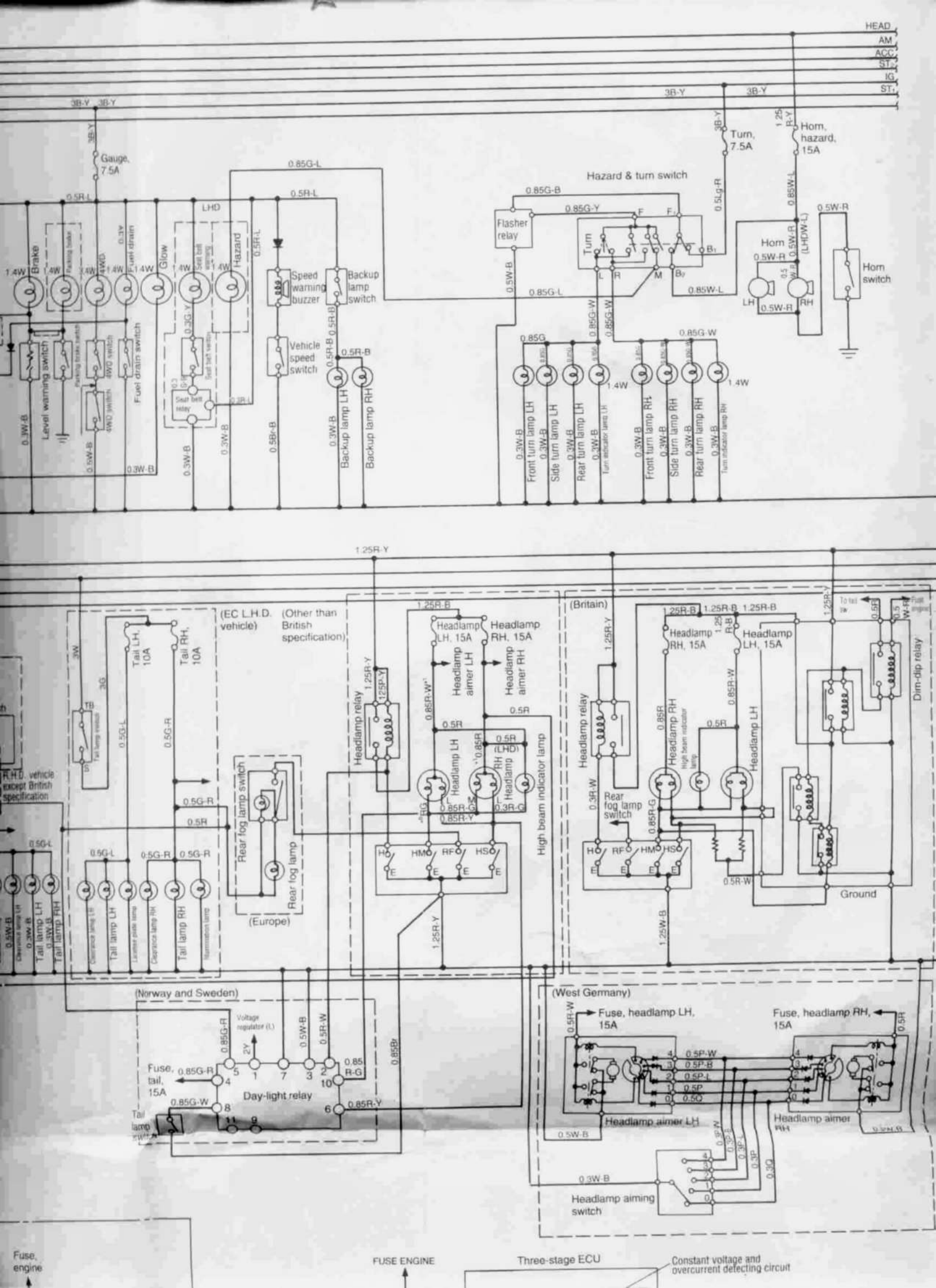
WRE91-HW049

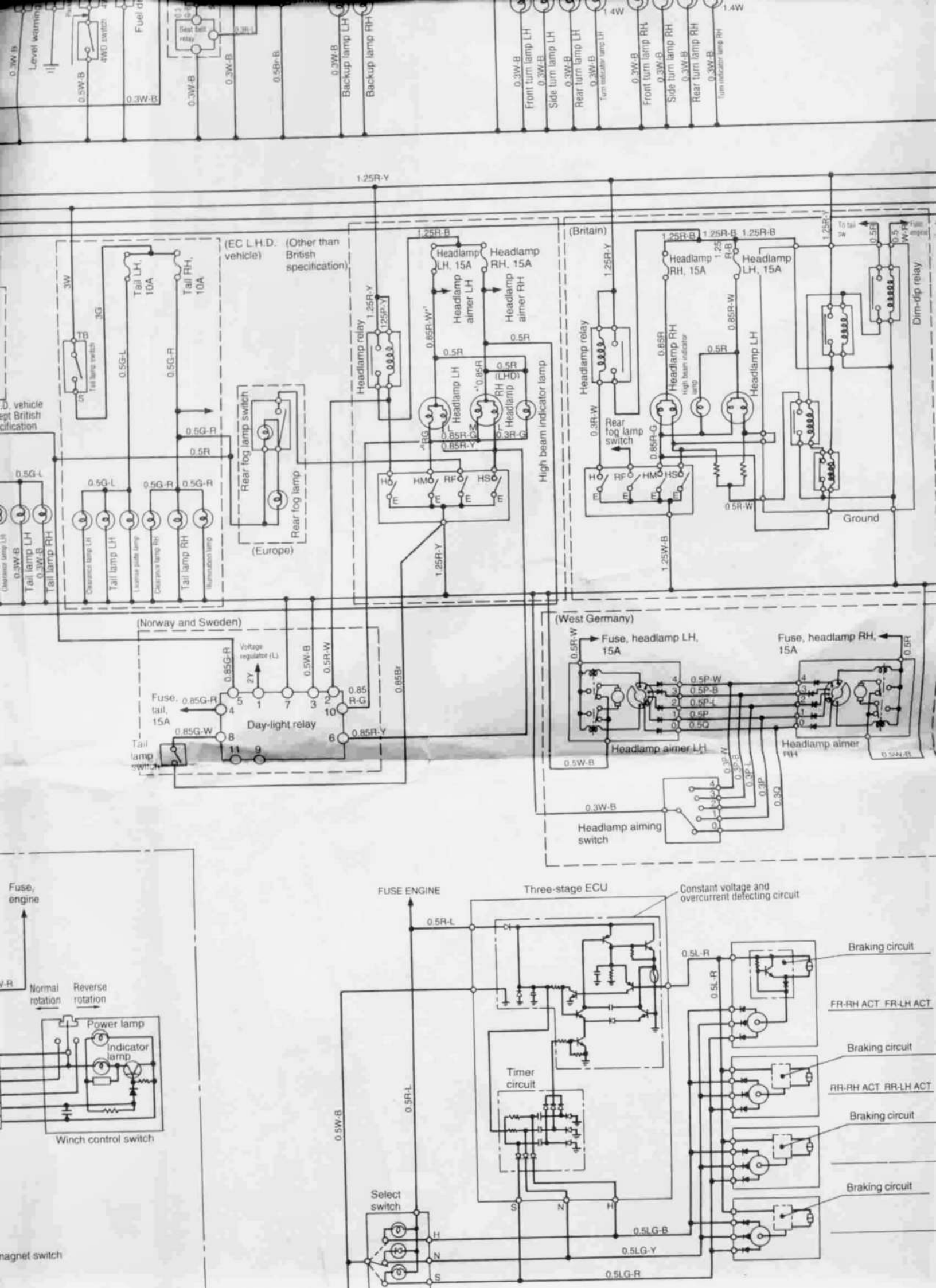

Glow plug relay
Engine 10A
Wiper 15A
Rear wiper & washer switch
Headlamp leveler motor
Heater 15A
Defogger switch
Defogger
Heater control
Cigarette lighter 15A
Radio
Power 30A
Power window master switch
Door switch
Front door lock switch
Front Door lock relay
Remote control mirror switch


To fuel heater relay
3Y
Engine ground
HEAD
AM
ACC
IG
Wiper, 15A
Front wiper & washer switch
INT
Front wiper motor
Front washer motor
Rear wiper & washer switch
Rear wiper motor
Rear washer motor
When F/L is AM 1.00 sq
When F/L is AM 1.25 sq
Headlamp cleaner motor
Headlamp cleaner relay
Defogger, 15A
Defogger switch
Rear window defogger
Cigarette lighter, 15A
Radio
Speaker LH
Speaker RH
Front Door lock relay
Front door lock switch
Door lock motor at front passenger seat
Power, 30A
Power window master switch
Cancel switch
Door switch
Driver seat
Passenger seat
Remote control mirror switch
Remote control mirror (L)
Remote control mirror (R)
Dome Lock
To room lamp
Heater, 30A
To battery
Air conditioner
Back door lock switch
Back door lock motor
Front heater blower motor
Heater resistor
Front heater switch
Rear heater switch
Rear heater blower motor
Condenser fan relay
Air conditioner compressor
Idle-up VSV
Volume switch
No-gas detecting switch
Thermistor
Cooler amplifier
Water temperature cut relay
(Turbo charger-
To regulator (L)
Fuel heater relay
Fuel heater


3B-Y
Gauge, 7.5A
0.5R-L
LHD
Volt-meter
Tacho-meter
Pickup
Water temperature sensor
Fuel sender
Oil pressure switch
Level warning switch
Parking brake switch
4WD switch
Fuel drain switch
Seat belt relay
Seat belt warning
Hazard
Oil
Charge
Brake
4WD
Fuel drain
Glow
Water temperature sensor
Engine ground
Stop, 10A
Stop lamp switch
Radio
Speaker LH
Speaker RH
To fuse, dome lock
Room lamp
Door switch LH
Door switch RH
Clock (digital)
ACC
(LHD) G-R
(Other than EC L.H.D. vehicle) Day-light relay ④
Tail, 15A
Other than day-light
Light switch
R.H.D. vehicle except British specification
Tail LH, 10A
Tail RH, 10A
(EC L.H.D. vehicle)
Rear fog lamp switch
Rear fog lamp
(Europe)
(Norway and Sweden)
Voltage regulator (L)
Fuse, tail, 15A
Day-light re
Tail lamp switch
Gauge fuse
Backup lamp
Power shift switch
Relay ( )
Only when so equipped
BATT(+)
Fuse, engine
Winch relay
Clearance lamp LH
Tail lamp LH
License plate lamp
Clearance lamp RH
Tail lamp RH
Illumination lamp


Cigarette lighter, 15A
Radio
Cigarette lighter
Speaker LH
Speaker RH
Stop, 10A
Stop lamp switch
Stop lamp LH
Stop lamp RH
To fuse, dome lock
Room lamp
Door switch LH
Door switch RH
Clock (digital)
ACC
(LHD) G-R
(Other than EC L.H.D. vehicle) Day-light relay ④
Tail, 15A
Other than day-light
Light switch
R.H.D. vehicle except British specification
Tail LH, 10A
Tail lamp LH
Tail lamp RH
Clearance lamp LH
Clearance lamp RH
License plate lamp
Remote control mirror switch
Remote control mirror (LH)
Gauge fuse
Backup lamp
Power shift switch
Relay ( )
VSV No.1
VSV No.2
To regulator (L)
Fuel heater relay
Fuel heater
Thermistor
Water temperature cut relay
Only when so equipped
BATT(+)
Fuse, engine
Winch relay
Normal rotation
Reverse rotation
Power lamp
Indicator lamp
Winch control switch
Winch motor & magnet switch
(NC)
Thermo switch


HEAD
AM
ACC
ST
IG
ST
Gauge, 7.5A
Turn, 7.5A
Horn, hazard, 15A
Hazard & turn switch
Flasher relay
Turn
Horn
Horn switch
LHD
Brake
Level warning switch
Fuel drain switch
Glow
Hazard
Speed warning buzzer
Vehicle speed switch
Backup lamp switch
Backup lamp LH
Backup lamp RH
Front turn lamp LH
Side turn lamp LH
Rear turn lamp LH
Front turn lamp RH
Side turn lamp RH
Rear turn lamp RH
(EC L.H.D. vehicle)
(Other than British specification)
(Britain)
Tail LH, 10A
Tail RH, 10A
Headlamp relay
Headlamp LH, 15A
Headlamp RH, 15A
Headlamp aimer LH
Headlamp aimer RH
Headlamp LH
Headlamp RH
High beam indicator lamp
Rear fog lamp switch
Rear fog lamp
(Europe)
Dim-dip relay
Ground
(Norway and Sweden)
Voltage regulator (L)
Fuse, tail, 15A
Day-light relay
Tail lamp
(West Germany)
Fuse, headlamp LH, 15A
Fuse, headlamp RH, 15A
Headlamp aimer LH
Headlamp aimer RH
Headlamp aiming switch
Fuse, engine
FUSE ENGINE
Three-stage ECU
Constant voltage and overcurrent detecting circuit


Level warning
4WD switch
Fuel
Seat belt relay
Backup lamp LH
Backup lamp RH
Front turn lamp LH
Side turn lamp LH
Rear turn lamp LH
Front turn lamp RH
Side turn lamp RH
Rear turn lamp RH
1.4W
1.4W
(EC L.H.D. vehicle)
(Other than British specification)
(Britain)
Tail LH, 10A
Tail RH, 10A
Headlamp LH, 15A
Headlamp RH, 15A
Headlamp aimer LH
Headlamp aimer RH
Headlamp relay
Rear fog lamp switch
Rear fog lamp
(Europe)
High beam indicator lamp
Dim-dip relay
Ground
(Norway and Sweden)
(West Germany)
Fuse, tail, 15A
Day-light relay
Tail lamp switch
Fuse, headlamp LH, 15A
Fuse, headlamp RH, 15A
Headlamp aimer LH
Headlamp aimer RH
Headlamp aiming switch
Fuse, engine
Normal rotation
Reverse rotation
Power lamp
Indicator lamp
Winch control switch
FUSE ENGINE
Three-stage ECU
Constant voltage and overcurrent detecting circuit
Timer circuit
Select switch
Braking circuit
FR-RH ACT FR-LH ACT
RR-RH ACT RR-LH ACT

DAIHATSU

F70,F75,F77

LU

Service manual

LUBRICATION SYSTEM

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

LUBRICATION SYSTEM

TROUBLE SHOOTING ..... LU– 2
LUBRICATION SYSTEM OUTLINE ..... LU– 3
OIL PRESSURE CHECK ..... LU– 5
ENGINE OIL CHANGE & OIL FILTER REPLACEMENT ..... LU– 7
OIL PUMP ..... LU– 9
OIL FILTER & OIL FILTER BRACKET LU–13
SST (Special Service Tools) LU–17
TIGHTENING TORQUE LU–17
SERVICE SPECIFICATION LU–18

WRE91-LU001

TROUBLE SHOOTING

Problem	Possible causes	Remedies	Page
Oil leakage	Cylinder head, Cylinder block, oil cooler, oil pump body damaged or cracked	Repair if necessary	LU-3
	Oil seal faulty	Replace oil seal	
	Gasket faulty	Replace gasket	
Low oil pressure	Oil leakage	Repair as necessary	LU-3
	Relief valve faulty	Replace relief valve	
	Oil pump faulty	Repair oil pump	LU-9
	Poor quality engine oil	Change engine oil	LU-5
	Crankshaft bearing faulty	Replace bearing	
	Connecting rod bearing faulty	Replace bearing	
	Oil filter clogged	Replace oil filter	LU-7
	Low oil level	Check oil level	
High oil pressure	Relief valve faulty	Replace relief valve	LU-10
Poor engine oil Consumption	Oil leakage	Repair as necessary	LU-3
	Relief valve faulty	Replace relief valve	

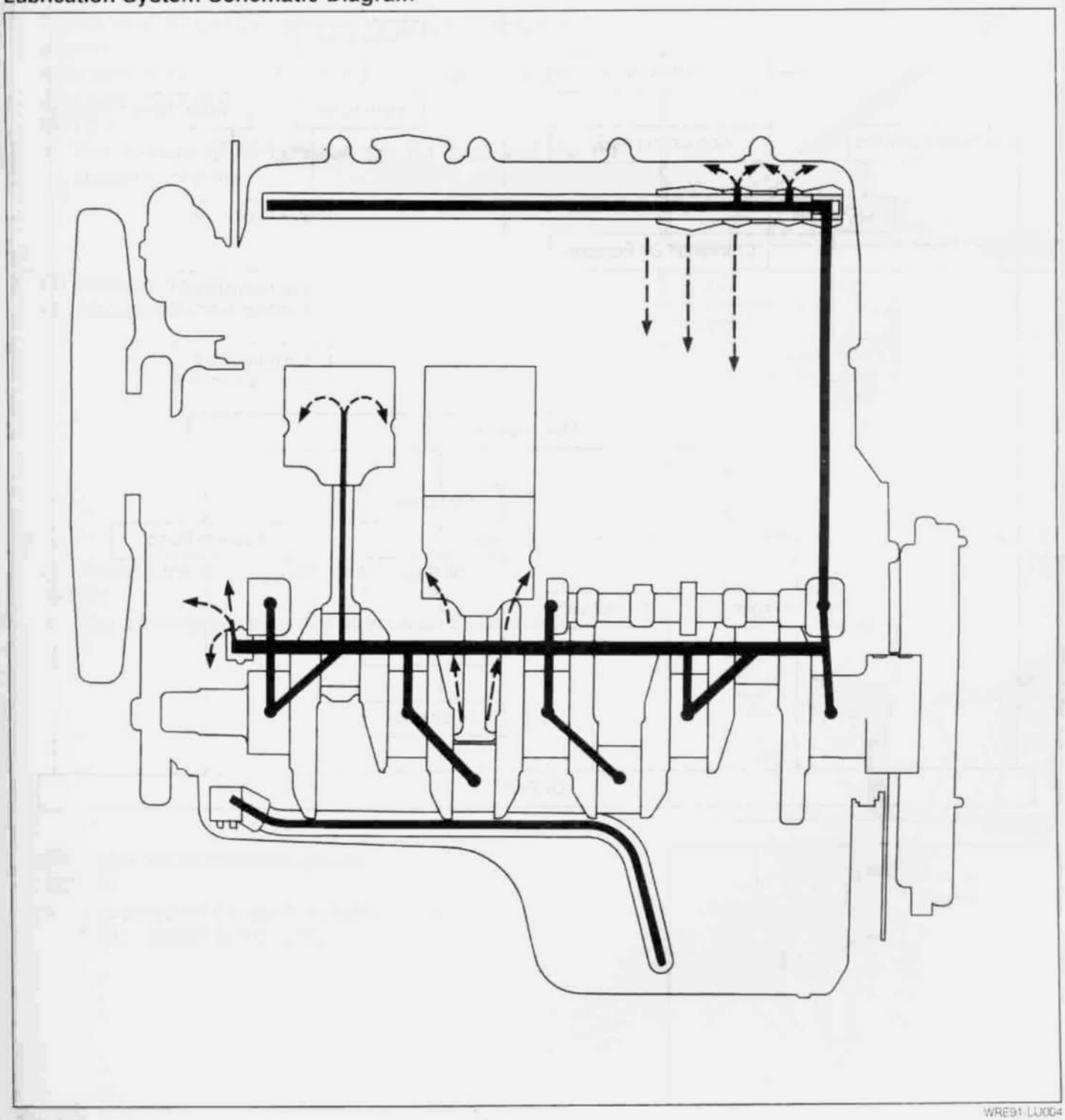
WR59-00A-1

LUBRICATION SYSTEM OUTLINE

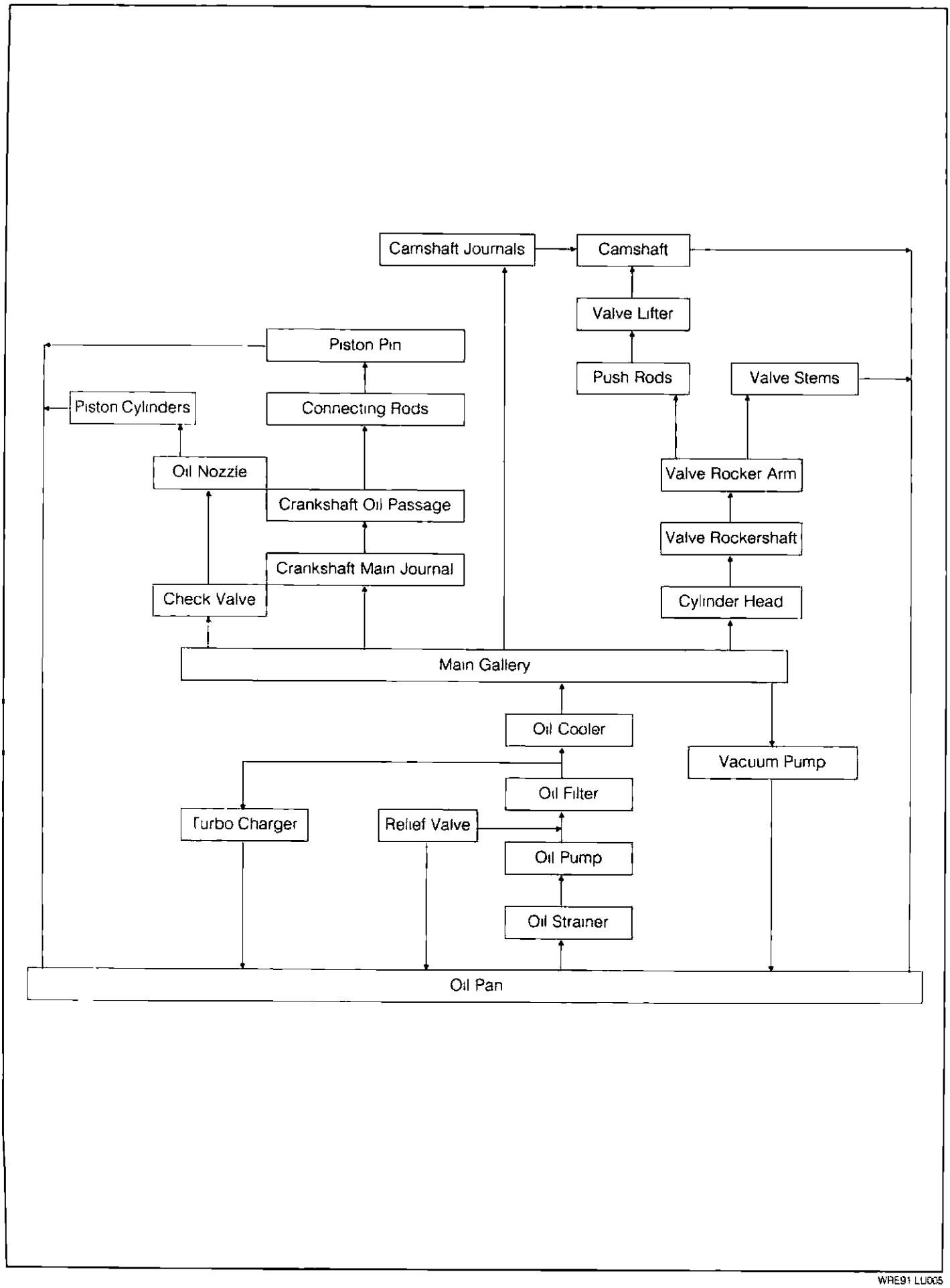
The lubrication system employs a fully-forced feed, filtering method.
The oil stored in the oil pan is sucked by an oil pump which is directly driven by the crankshaft. Then, the thus-sucked oil flows through an oil pump strainer and is filtered at an oil filter. After having passed through the passages of the cylinder block, it will be divided into two streams so as to lubricate various sections.
One stream of the lubrication oil performs lubrication of various sections of the crankshaft and connecting rod- and piston-related parts. The other stream of the lubrication, oil rises to the cylinder head section. Then, it performs lubrication of valve rocker shaft-related parts.

WRE91-LU003

Lubrication System Schematic Diagram



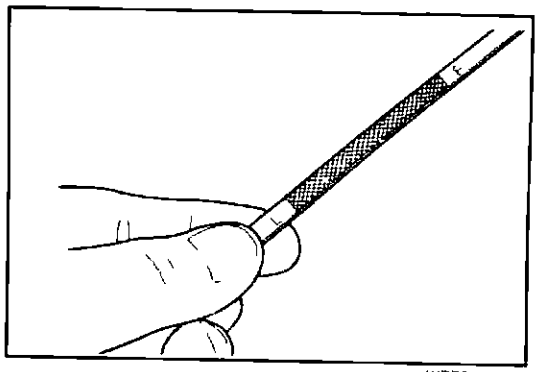
WRE91-LU004


Camshaft Journals
Camshaft
Valve Lifter
Piston Pin
Push Rods
Valve Stems
Piston Cylinders
Connecting Rods
Oil Nozzle
Valve Rocker Arm
Crankshaft Oil Passage
Valve Rockershaft
Crankshaft Main Journal
Check Valve
Cylinder Head
Main Gallery
Oil Cooler
Vacuum Pump
Oil Filter
Turbo Charger
Relief Valve
Oil Pump
Oil Strainer
Oil Pan

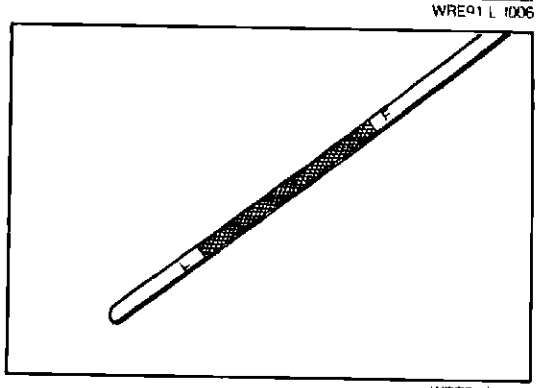
WRE91 LU005

OIL PRESSURE CHECK

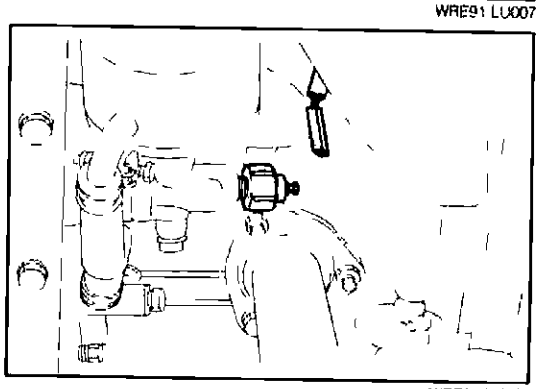
1 Oil quality check
Check the oil for deterioration, ingress of water, discoloring or dilution
If oil quality is poor, change the oil.
Use API grade CC, CD multigrade viscosity, fuel-efficient oil (See page LU–8.)


WRE91 LU006

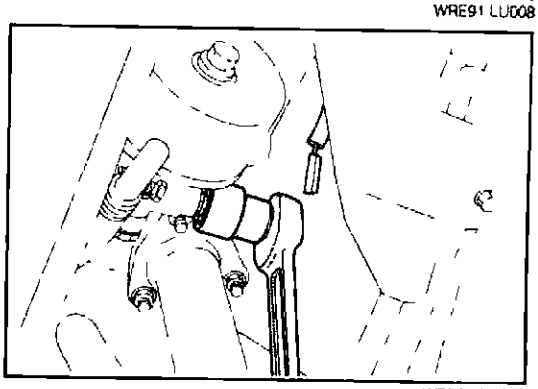
2 Oil level check
The oil level should be between the L and F levels on the dipstick
If the level is low, check to see if any oil leakage is present.
Add oil to the F level
NOTE:
- **The amount of oil between the [L] level and the [F] equals to one liter.**


WRE91 LU007

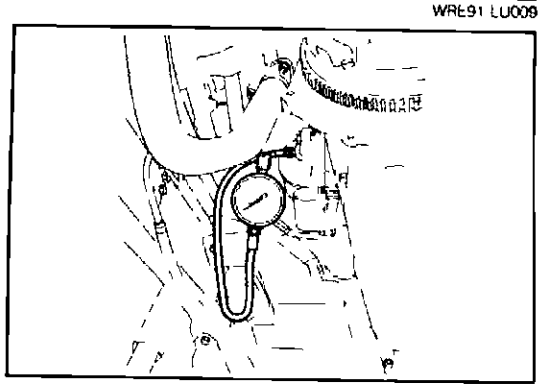
3 Oil pressure check
(1) Disconnect the connector of oil pressure switch


WRE91 LU008

(2) Remove the oil pressure switch
NOTE:
- **Use a hexagonal long box wrench for the removal.**

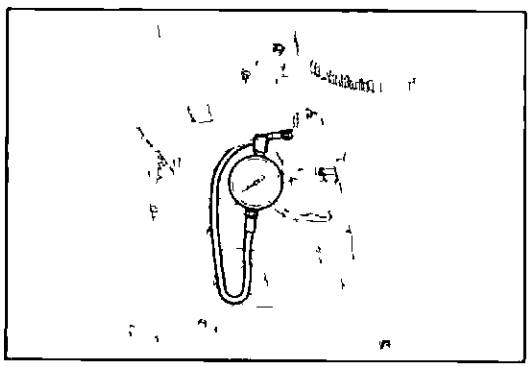

WRE91 LU009

(3) Install the oil pressure gauge.
NOTE:
- **The pressure gauge is available as a SST.**
  SST: 09268-87701-000

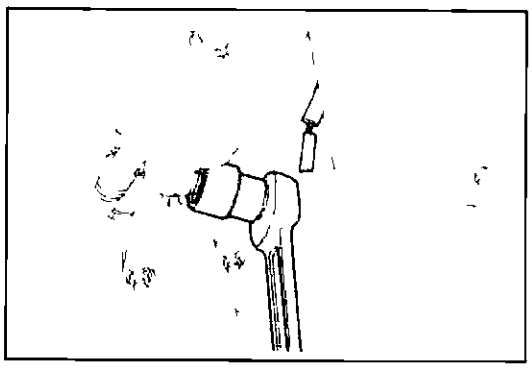

WRE91 LU010

(4) Starting engine
Start the engine and warm it to the normal operating temperature
At Idle Speed: More than 19 6 kPa (0.2 kgf/cm²)
At 2200 rpm: 294.2 - 392.3 kPa (3.0 - 4.0 kgf/cm²)

If the measured value fails to conform to the specified value check and repair the oil pump
(See page LU 9)
(5) Stop the engine.

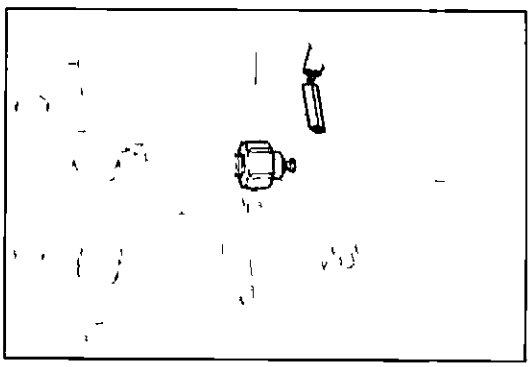

WRE91LU01

(6) Remove the oil pressure gauge
(7) Clean the threaded portion of the oil pressure switch Wind seal tape around the threaded portion Install the oil pressure switch in the oil pump
Tightening Torque: 39 2 ± 4.9 N m (4 0 ± 0.5 kgf-m)


WRE91LU02

NOTE:
- **Use a hexagonal long box wrench for the installation.**
- **The new oil pressure switch is coated with sealing materials.**

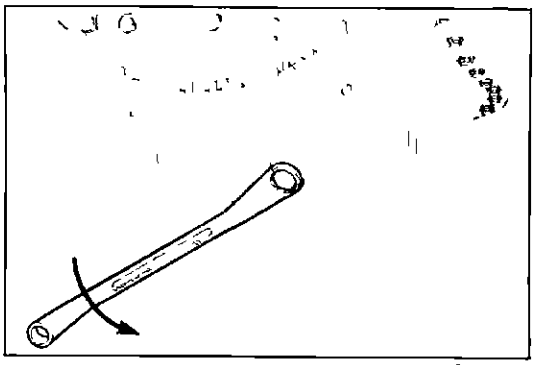
(8) Connect the connector of the oil pressure switch
(9) Start the engine and check it for oil leakage
Repair the leaky point if oil leakage exists


WRE91LU03

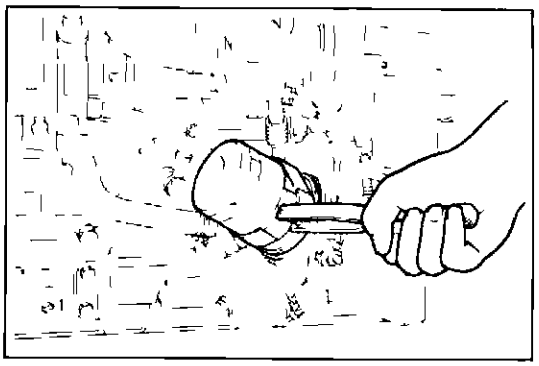
ENGINE OIL CHANGE & OIL FILTER REPLACEMENT

1 Drain the engine oil as follows
(1) Place a suitable container under the oil drain plug
(2) Remove the engine under cover
(3) Drain the oil by removing the oil drain plug

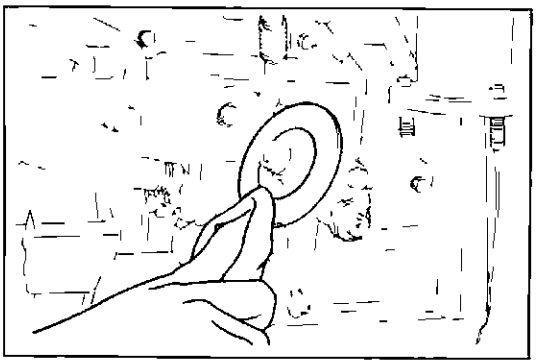
WARNING:
- When the oil is still hot, care must be exercised to avoid getting scalded.



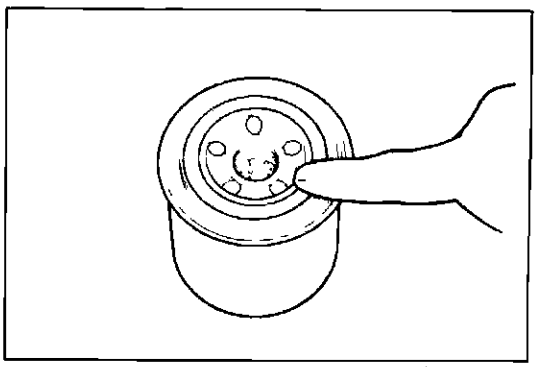
2 Oil filter replacement
(1) Remove the oil filter element, using the filter wrench
NOTE.
- Place a suitable container under the oil filter because the engine oil flows out.



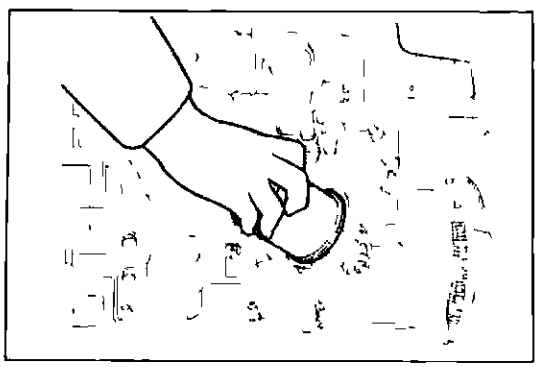
(2) Inspect and clean the oil filter installation surface



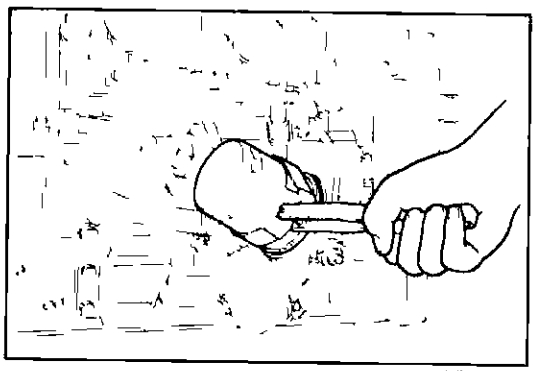
(3) Thinly apply engine oil to the "O" ring of a new oil filter



(4) Screw in the oil filter by hand, until the "O" ring of the oil filter contacts the oil filter installing surface



(5) Tighten the oil filter three fourths to one complete turn, using the filter wrench



WRE91 LU019

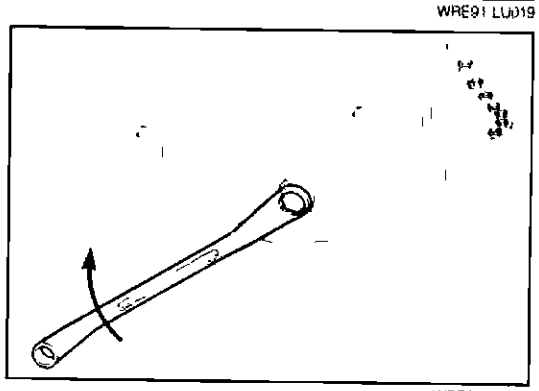
3 Filling engine oil

(1) Clean the oil drain plug. Install it with a new gasket interposed

NOTE:

- Remove any remaining gasket material from the oil pan, using a gasket scraper.

Tightening Torque: 34.3 ± 4.9 N·m (3.5 ± 0.5 kgf-m)



WRE91 LU020

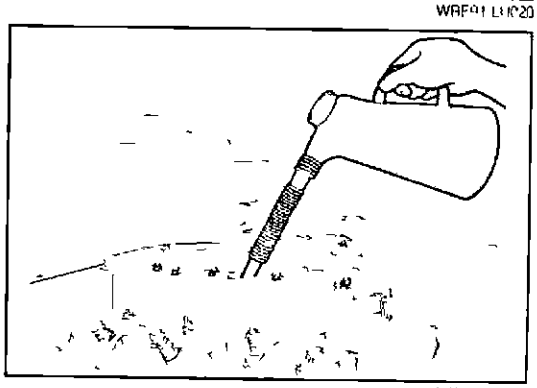
(2) Fill the engine with engine oil

The oil should be API grade CC or CD multigrade viscosity, fuel-efficient oil

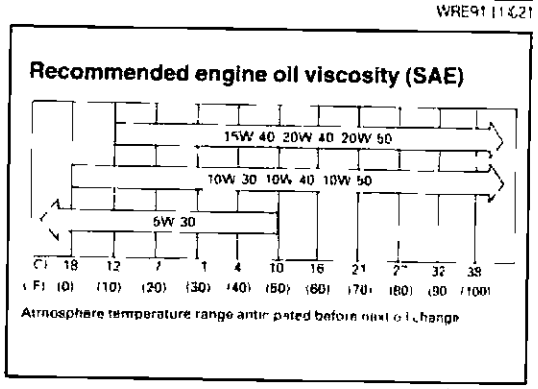
Oil Capacity:

When only engine oil is changed: 5.8 dm^3

When engine oil is changed and oil filter is replaced: 6.4 dm^3



WRE91 LU021



WRE91 LU022

(3) Start the engine and check it for leakage

Repair the leaky point if oil leakage exists

(4) Stop the engine After a lapse of two or three minutes, check the oil level

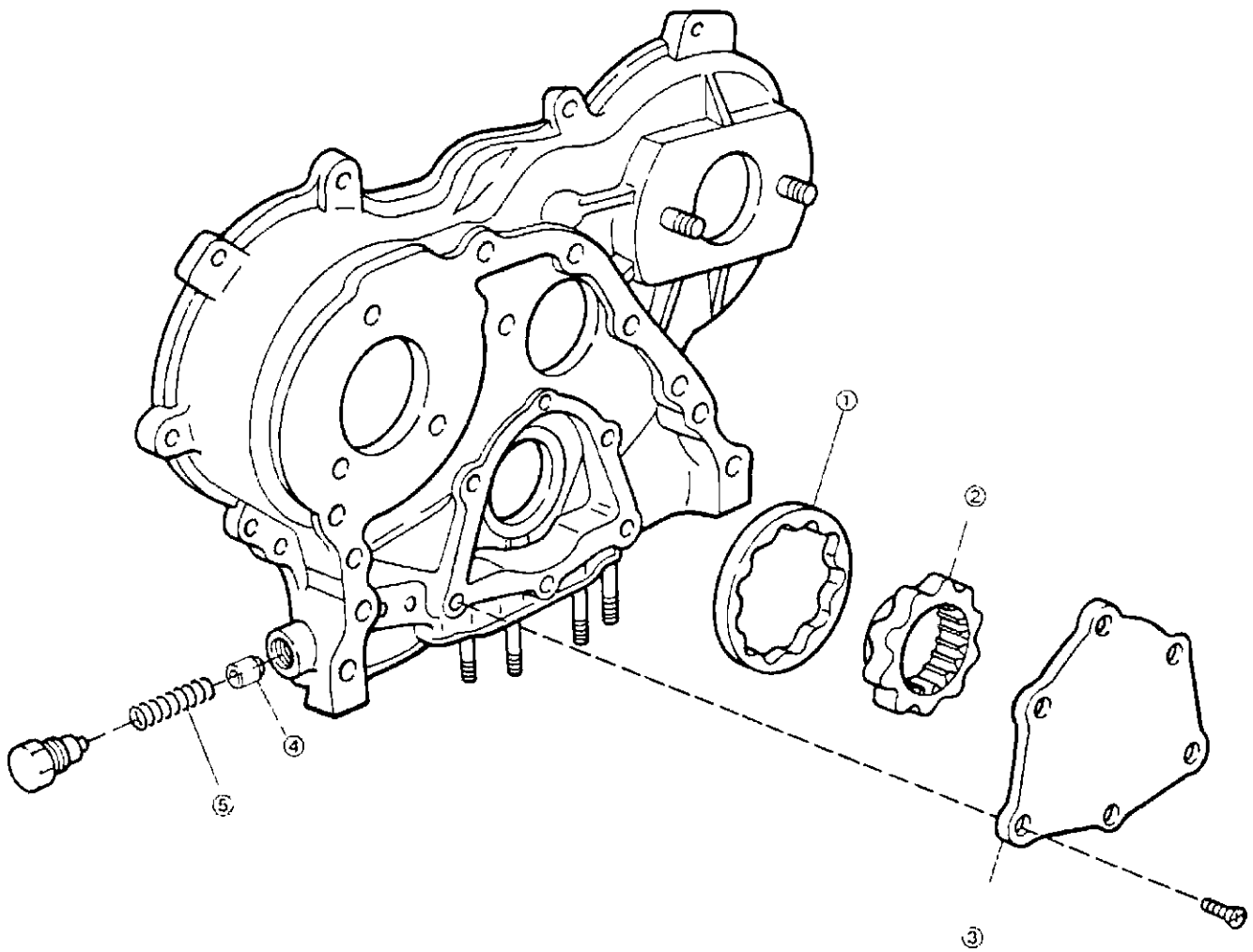
If oil level is less than the full level, replenish the oil to the full level

(5) Install the engine under cover

WRE91 LU023

OIL PUMP

COMPONENTS

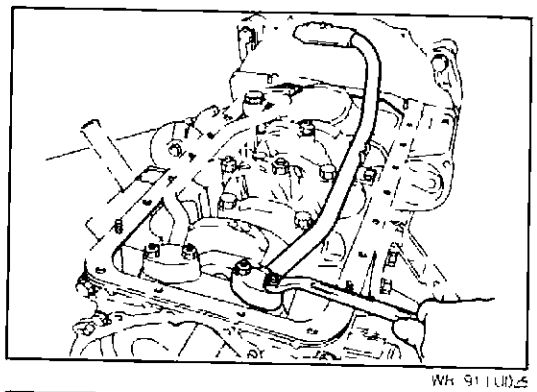


① Driven gear
② Drive gear
③ Oil pump shaft
④ Relief valve
⑤ Spring

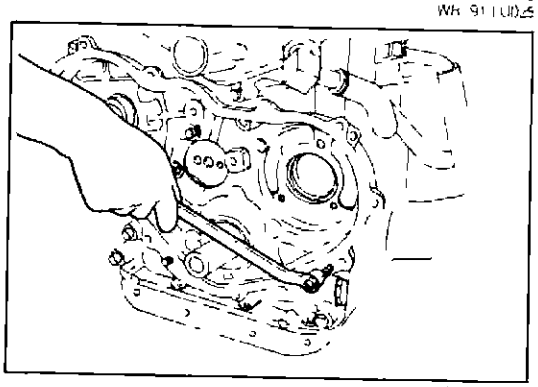
REMOVAL OF OIL PUMP

- After the timing belt cover and case have been removed, proceed to the following operation

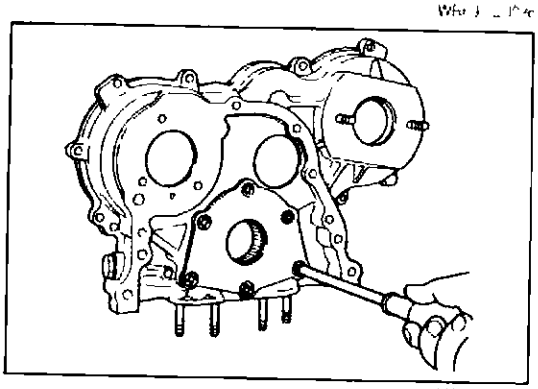
1 Remove the oil pan
2 Remove the oil pump pipe



3 Remove the timing belt case
4 Remove the timing belt case gasket

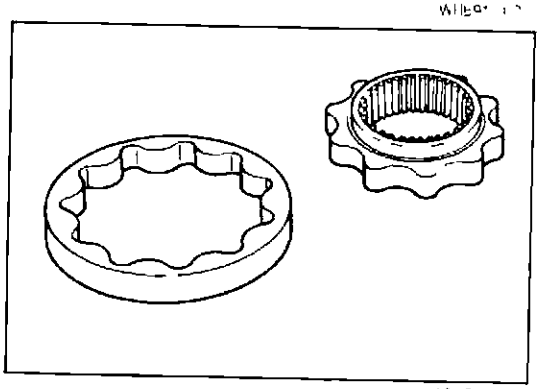


5 Remove the oil pump plate

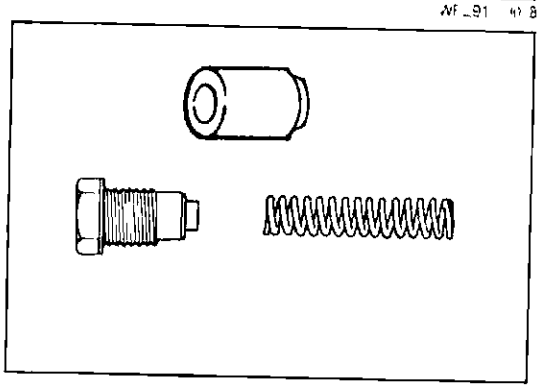


INSPECTION OF OIL PUMP

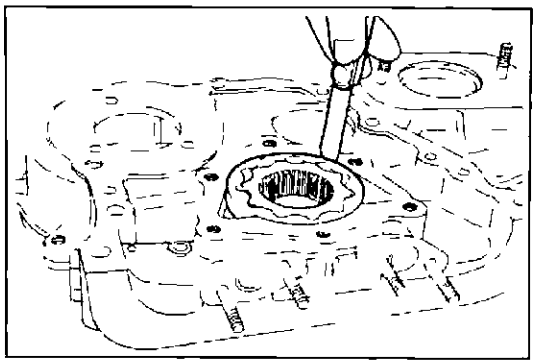
1 Check disassembled parts for wear or damage



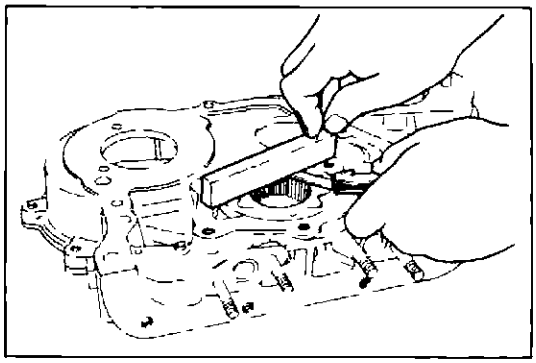
2 Check the relief valve for wear or damage



3 Measure the body clearance
Body Clearance: Limit 0.4 mm

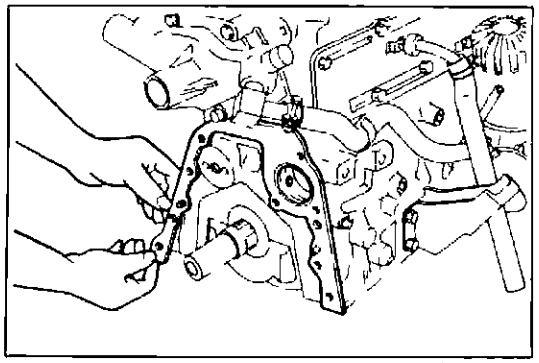


4 Measure the side clearance
Side Clearance: Limit 0.15 mm

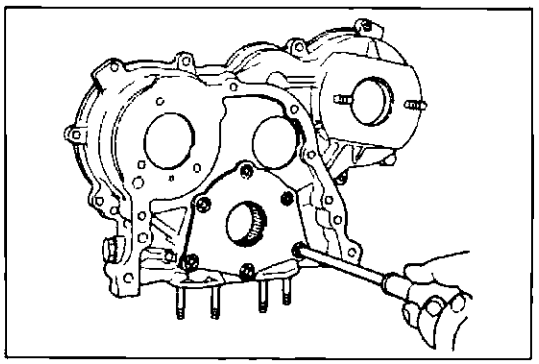


INSTALLATION OF OIL PUMP

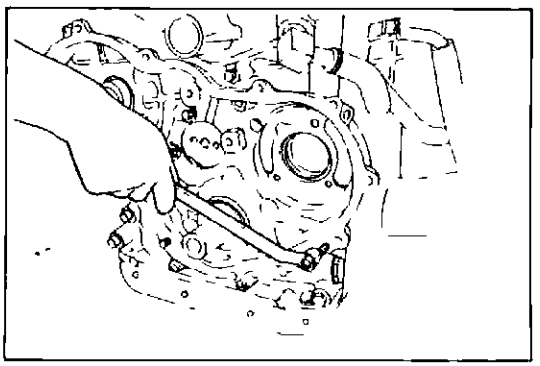
1 Install the timing belt case gasket
NOTE
- Replace the gasket with a new one.



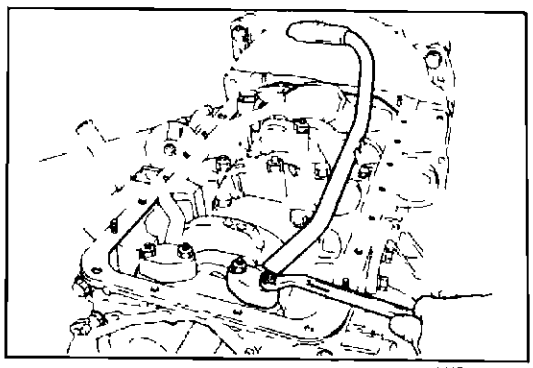
2 Install the oil pump plate



3 Install the timing belt case



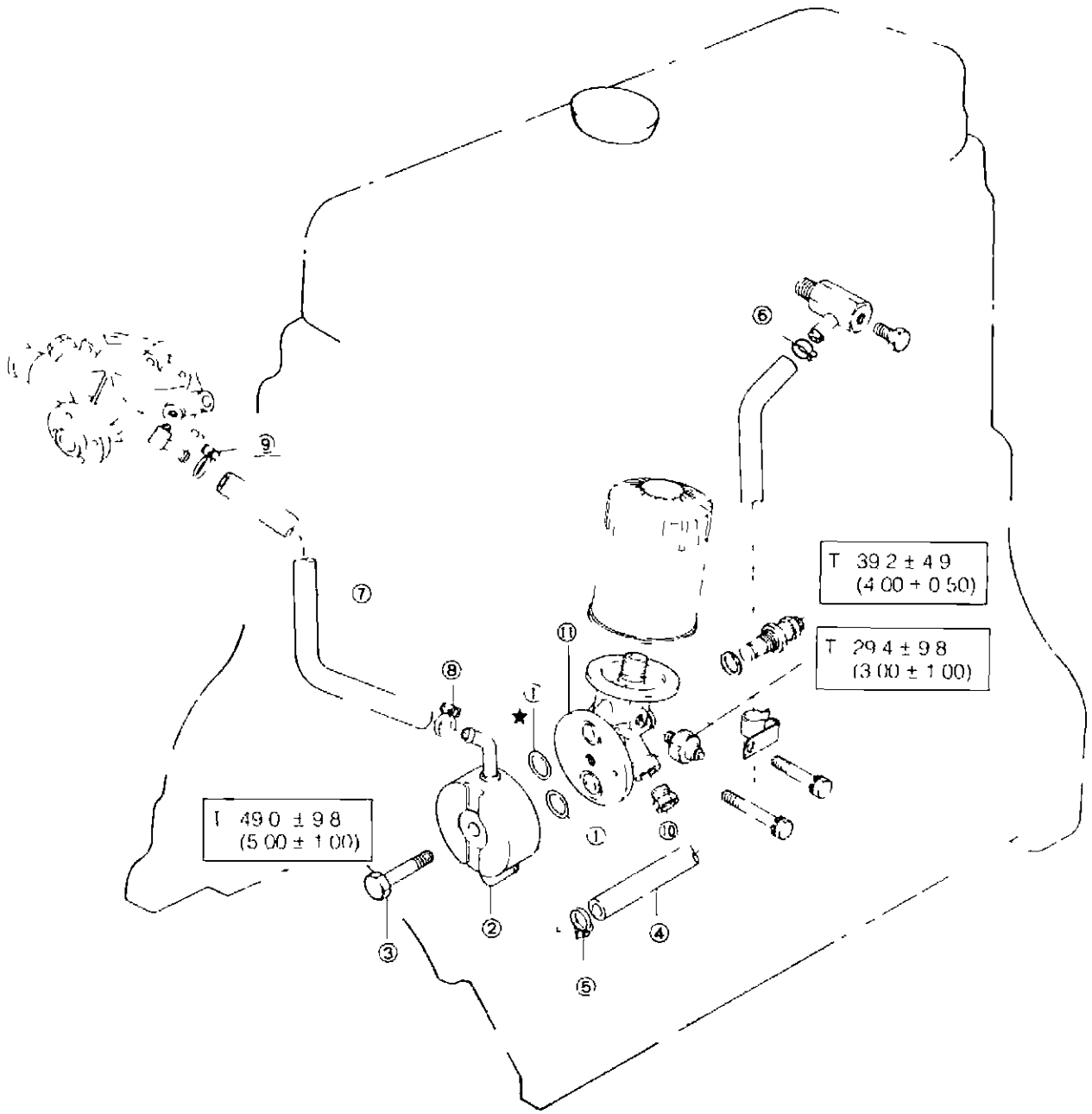
4 Install the oil pump pipe
5 Install the oil pan
* Proceed to the installation of the timing belt case, crankshaft and camshaft.



WHE91 LU035

OIL FILTER & OIL FILTER BRACKET

COMPONENTS

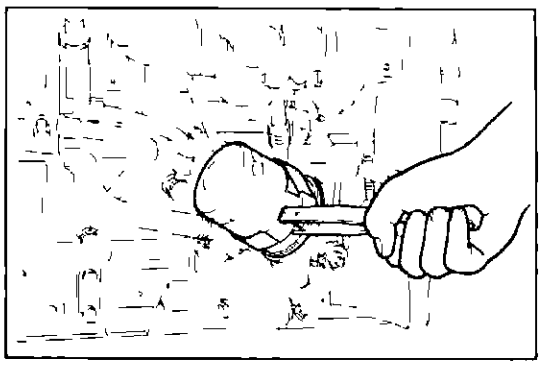


① O Ring
② Cooler Ay oil
③ Bolt
④ Hose oil cooler No 1
⑤ Clamp Hose
⑥ Clamp Hose
⑦ Hose oil cooler No 2
⑧ Clamp Hose
⑨ Clamp Hose
⑩ Plug
⑪ Oil filter bracket

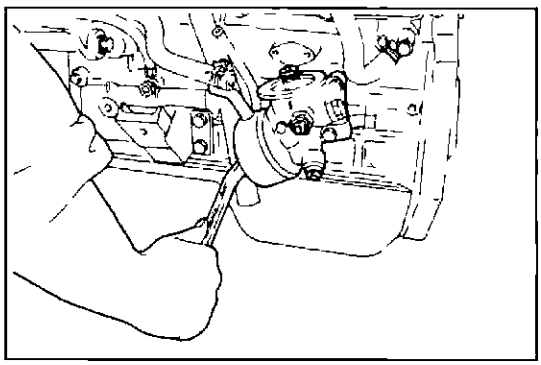
★ : **Non-reusable part**
T : **Tightening torque**
Unit : N m (kgf-m)

REMOVAL OF OIL FILTER AND OIL FILTER BRACKET

1 Remove the oil filter

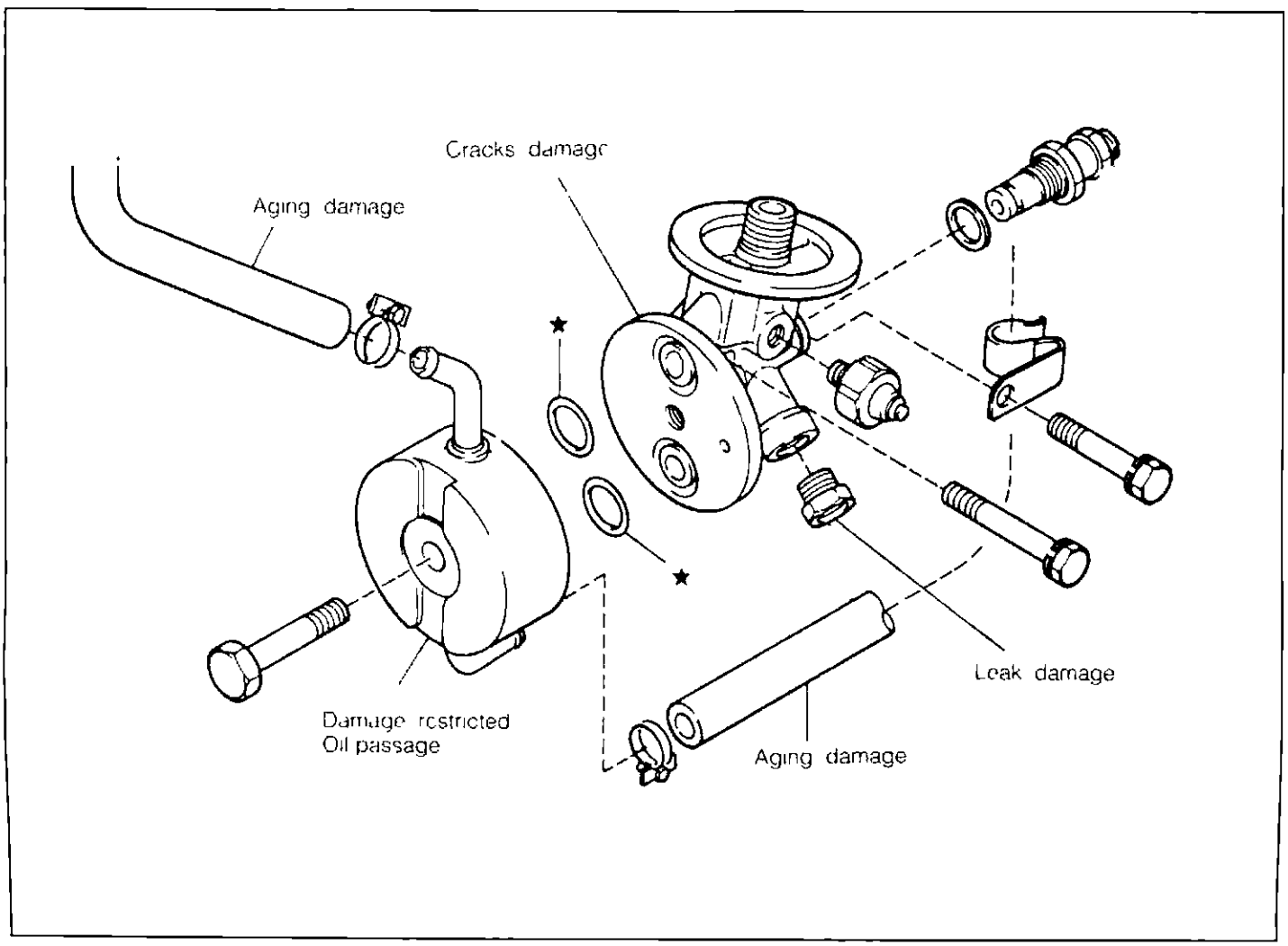


2 Remove the oil cooler hose and oil cooler assy
3 Remove the oil filter bracket



INSPECTION OF OIL FILTER AND OIL FILTER BRACKET

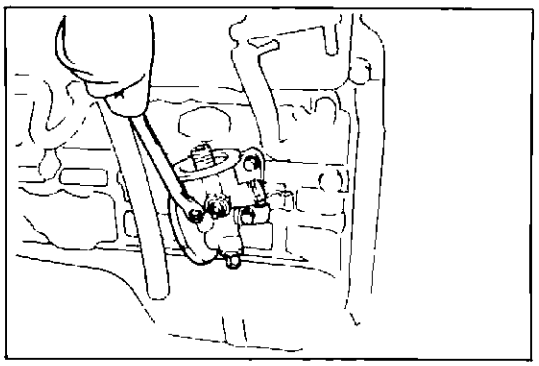
Check each section of the oil cooler and oil filter bracket



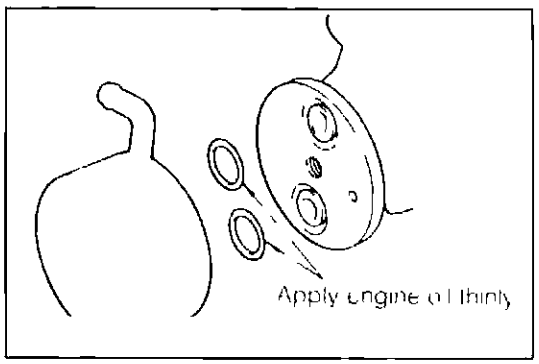
INSTALLATION OF OIL FILTER AND OIL FILTER BRACKET

1 Install the oil filter bracket
Tightening Torque. 36.8 ± 7.4 N·m
(3.75 ± 0.75 kgf-m)

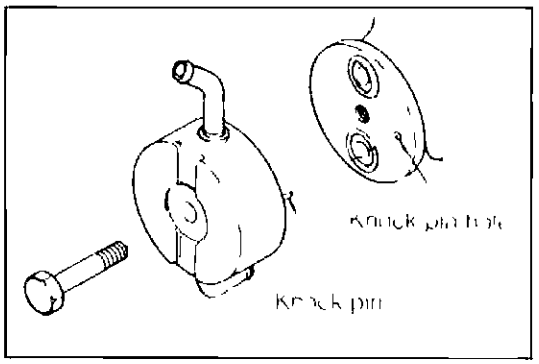
NOTE:
- Replace the gasket with a new one.



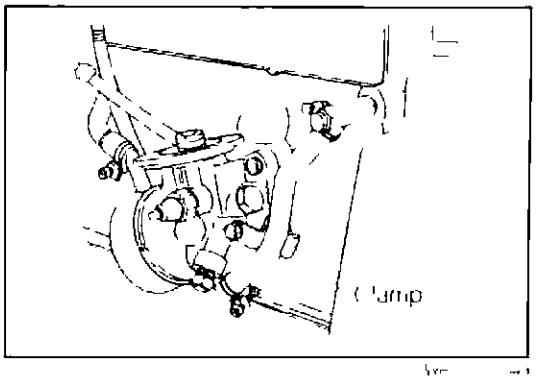
2 Install the oil cooler to the oil filter bracket
NOTE
- Prior to the installation, apply engine oil to the "O" ring thinly.



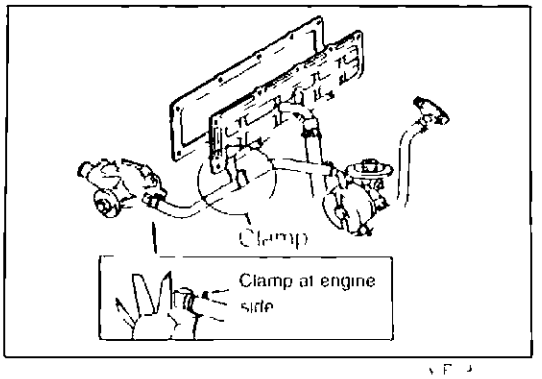
3 Install the oil cooler assembly with the knock pin aligned with its knock pin hole
Tightening Torque: 49.0 ± 9.8 N·m
(5.00 ± 1.00 kgf-m)



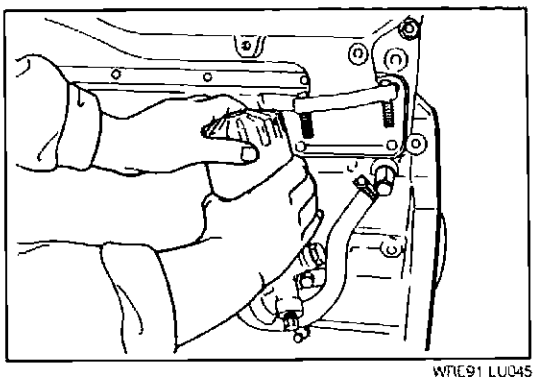
4 Install the oil cooler hose No. 1 and clamp it



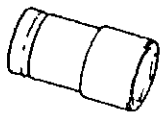
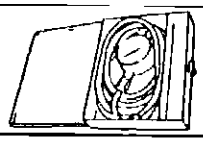
5 Install the oil cooler hose No. 2 and clamp it
NOTE
- Attach the clamp in such a direction that it may not interfere with the fan pulley



6 Prior to the installation, apply engine oil to the "O" ring Then turn the oil filter fully by hands
Tightening Torque: 19.6 ± 2.0 N m
(2.00 ± 0.20 kgf-m)


WTE91 LU045

SST (Special Service Tools)

Shape	Parts No and Name	Purpose	Remarks
	09032-00100-000 Oil pan seal cutter	Removal of oil pan	
	09268-87704-000 Oil cooler set bolt box wrench	Removal and installation of oil cooler (only for oil cooler-equipped vehicle)	Only for oil cooler equipped vehicle
	09990-87702-000 Engine oil pressure gauge	Measurement of engine oil pressure	

WHL91 LL046

TIGHTENING TORQUE

Tightening component	Tightening torque			Remark
	N·m	kgf-m	ft-lb	
Cylinder Block × Oil pan	9 3 ± 2 5	0 95 ± 0 25	6 9 ± 1 8	
Cylinder Block × Oil hose No 1	17 2 ± 2 5	1 75 ± 0 25	12 7 ± 1 8	
Cylinder Block × Oil hose No 2	22 1 ± 2 5	2 25 ± 0 25	16 3 ± 1 8	
Cylinder Block × Oil pump inlet pipe	18 1 ± 3 4	1 85 ± 0 35	13 4 ± 2 5	
Cylinder Block × Oil pump outlet pipe	44 1 ± 7 4	4 50 ± 0 75	32 5 ± 5 4	
Cylinder Block × Oil pump relief plug	39 2 ± 4 9	4 00 ± 0 50	28 9 ± 3 6	
Oil filter bracket × Oil cooler	49 0 ± 9 8	5 00 ± 1 00	36 2 ± 7 2	
Oil filter bracket × Oil pressure valve	39 2 ± 4 9	4 00 ± 0 50	28 9 ± 3 6	
Oil filter bracket × Oil filter	19 6 ± 2 0	2 00 ± 0 20	14 5 ± 1 5	
Oil filter bracket × T/C oil inlet pipe	12 8 ± 2 9	1 30 ± 0 30	9 4 ± 2 2	
T/C × T/C oil outlet pipe	7 4 ± 1 5	0 75 ± 0 15	5 4 ± 1 1	
Vacuum pump × Oil hose No 1	17 2 ± 2 5	1 75 ± 0 25	12 7 ± 1 8	
Vacuum pump × Oil hose No 2	22 1 ± 2 5	2 25 ± 0 25	16 3 ± 1 8	
Oil pan × Drain plug	34 3 ± 4 9	3 50 ± 0 50	25 3 ± 3 6	

WRE91 LU047

SERVICE SPECIFICATION

Engine oil capacity			
When disassembled			
When oil is changed		Full level	5.8 dm³
		Low level	1.8 dm³
When oil and filter are changed			6.4 dm³
Oil pump	Compression spring free length		57 mm
	Body clearance		0.20 - 0.28 mm
	Tip clearance		0.16 - 0.24 mm
	Side clearance		0.035 - 0.085 mm
	Oil pressure	Idling	147 - 196 kPa (1.5 - 2.0 kgf/cm²)
		2200 rpm	294 - 392 kPa (3.0 - 4.0 kgf/cm²)

MA

DAIHATSU

F70,F75,F77

Service manual

MAINTENANCE

DAIHATSU MOTOR CO., LTD. NO.9703-FE

MA

DAIHATSU

F70,F75,F77

Service manual

MAINTENANCE

DAIHATSU MOTOR CO., LTD. NO.9703-FE

MAINTENANCE SCHEDULE

SCHEDULE SELECTION

Daihatsu provides two kinds of maintenance schedules, one for NORMAL driving conditions and one for SEVERE driving conditions.

How to select schedule for SEVERE driving

Please follow the schedule for SEVERE driving if the vehicle is operated under one or more of the conditions below.

- Towing a trailer
- Operating when outside temperature remains below freezing.
- Repeated short trips less than 8 km (5 miles)
- Idling for extended periods and/or low speed operation for long distance such as police, taxi, door-to-door delivery or daily rental service.
- Operating in dusty, rough, muddy or salt sprayed roads
- Operating daily for a maximum of 25 km (15 miles) or less, or continuously for 30 minutes or less.

⇓

Follow schedule for SEVERE driving in addition to schedule for NORMAL driving.

Schedule for NORMAL driving

Follow the distance and the period the vehicle has been driven whichever comes first, if without any notice. Continue periodic maintenance service after 100,000 km, following the schedule.

WRE91-MA002

SCHEDULE FOR NORMAL DRIVING

Follow the distance and the period the vehicle has been driven whichever comes first, if without any notice. Continue periodic maintenance service after 100,000 km, following the schedule.

○... Check ● . Change or replacement

Section	Inspection		× 1,000 km	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	Refer to see page
			× 1,000 miles	0.6	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
			(Months) Years	—	(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4	(3)	(6)	(9)	5	
Engine	• Cylinder head, manifold and other	• Tightness		○				○				○				○				○				○	MA–7
	* • Air cleaner element	• Cleaning			○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	MA–7
	• Valve clearance	• Clearance		○				○				○				○				○				○	MA–7
	* • Engine oil	• Leakage • Level • Change	DL-42 (API CC or CD) DL-52 (API CD)	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	MA–7
	* • Oil filter	• Change				●		●		●		●		●		●		●		●		●		●	MA–8
	• Fuel filter	• Change										●								●					MA–8
	• Fuel lines & connections	• Damage • Crack • Tightness • Leakage		○				○				○				○				○				○	MA–9
		• Fuel hose replacement		Every 4 years																					FU section
	• Coolant (LLC)	• Quantity • Leakage • Change		○		○		○		○		●		○		○		○		●		○		○	MA–9
	• V-belt	• Tension • Crack • Damage		○		○		○		○		○		○		○		○		○		○		○	MA–10
	• Timing belt	•Replacement		Every 100,000 km (60,000 miles)																					EM section
	• Glow plug	• Function		○		○		○		○		○		○		○		○		○		○		○	MA–10
	• Injection nozzle & injection timing	• Injection pressure • Timing						○				○				○				○				○	MA–11
Exhaust emission control system	• Blow-by gas ventilation hose	• Connection • Damage						○				○				○				○				○	MA–12
Power transmitting system	• Clutch	• Free play				○		○		○		○		○		○		○		○		○		○	MA–12
	• Transmission & differential	• Oil level • Oil leakage • Oil change		○		○		○		●		○		○		●		○		○		●		○	MA–13
	• Propeller shaft	• Tightness • Rattle • Damage						○				○				○				○				○	MA–14

* In case of severe driving, see page MA–6.

○....Check ●....Change or replacement

Section	Inspection		× 1,000 km	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	Refer to see page
			× 1,000 miles	0.6	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
			(Months) Years	—	(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4	(3)	(6)	(9)	5	
Suspension system	• Suspension arm, control arm, dust cover	• Tightness • Damage						○				○				○				○				○	MA–14
	• Shock absorber	• Function • Oil leakage • Damage						○				○				○				○				○	MA–14
Running system	• Tire	• Pressure • Damage • Wear		○		○		○		○		○		○		○		○		○		○		○	MA–14
	• Front, rear wheel bearing	• Rattle						○				○				○				○				○	MA–15
	• Front wheel bearing	• Grease change										●								●					FS section
	• Rear wheel bearing	• Grease change										●								●					RS section
Steering system	• Steering wheel	• Tightness • Free play						○				○				○				○				○	MA–15
	• Linkage, dust cover	• Tightness • Rattle						○				○				○				○				○	MA–16
	• Wheel alignment	• Side slip test						○				○				○				○				○	MA–16
	• Knuckles	• Rattle						○				○				○				○				○	MA–15
	• Ball joint dust seal	• Damage				○		○		○		○		○		○		○		○		○		○	MA–16
	• Steering knuckles	• Grease apply						○				○				○				○				○	MA–16
	• Gear box	• Oil check		○				○				○				○				○				○	MA–17
	• Gear box	• Tightness						○				○				○				○				○	MA–17
	• Power steering belt	• Tightness • Damage				○		○		○		○		○		○		○		○		○		○	MA–17
	• Power steering fluid	• Check		○		○		○		○		○		○		○		○		○		○		○	MA–17
		• Fluid hose change		Every 4 years																					SR section

○ . Check ● . Change or replacement

Section	Inspection		× 1,000 km	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	Refer to see page
			× 1,000 miles	0.6	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
			(Months) Years	—	(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4	(3)	(6)	(9)	5	
Braking system	• Brake pedal & parking brake	• Free play • Reserved working travel		○		○		○		○		○		○		○		○		○		○		○	MA-17
	• Disc pad	• Clearance • Wear • Damage						○				○				○				○				○	MA-18
	• Brake hose, tube	• Leakage • Damage • Loose clamps		○		○		○		○		○		○		○		○		○		○		○	MA-18
		• Hose, caliper piston seal and boot change		Every 4 years																					BR section
	• Brake fluid	• Level		○		○		○		○		○		○		○		○		○		○		○	MA-19
		• Fluid change		Every 1 year																					BR section
	• Brake drum, lining	• Wear • Damage						○				○				○				○				○	MA-19
	• Brake booster	• Function						○				○				○				○				○	MA-19
		• Vacuum hose replacement		Every 4 years																					BR section
	• Master & wheel cylinder	• Cup and dust seal replacement		Every 2 years																					BR section
	• Proportioning valve	• Replacement		Every 4 years																					BR section
Chassis & body	* • Muffler, exhaust pipe, mountings	• Tightness • Damage						○				○				○				○				○	MA-19
	• All doors, hood	• Rock operation • Tightness						○				○				○				○				○	MA-20
	• Seat belt	• Operation • Tightness						○				○				○				○				○	MA-20
	• Chassis grease	• Condition • Apply		○		○		○		○		○		○		○		○		○		○		○	MA-20
	• Other bolts, nuts & wheel hub nuts	• Tightness		○		○		○		○		○		○		○		○		○		○		○	MA-20
Electrical system	• Battery	• Electrolyte level			○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MA-20
	• Wire harness	• Tightness clamps • Damage		○		○		○		○		○		○		○		○		○		○		○	MA-21
	• Lighting system, meter & gauge	• Function		○		○		○		○		○		○		○		○		○		○		○	MA-21
	• Heater	• Heater hose replacement		Every 4 years																					BE section

* In case of severe driving condition, see page MA-6.

WRE91-MA073

SCHEDULE FOR SEVERE DRIVING

Maintenance item			Interval	Condition
Engine oil	DL-42	API CC, CD	Change every 2,500 km (1,500 miles)	A.D F
	DL-52	API CD		
Engine oil filter			Change every 2,500 km (1,500 miles)	
Air cleaner element			Clean every 2,500 km (1,500 miles) and replace every 20,000 km (12,000 miles)	D
Exhaust pipe and mountings			Inspect every 5,000 km (3,000 miles)	A B C E

Severe driving conditions
A – Pulling a trailer
B – Repeated short trips
C – Driving on rough roads
D – Driving on dusty roads
E – Driving in extremely cold weather and/or on salted roads
F – Repeated short trips in extremely cold weather

WRE91 MA003

MAINTENANCE OPERATIONS

ENGINE

CYLINDER HEAD, MANIFOLD

Check of cylinder head bolts & manifold bolts tightening torque.

Tightening Torque:

Cylinder Head: 117.6 ± 9.8 N·m
(12.0 ± 1.0 kgf-m, 86.8 ± 7.2 ft-lb)

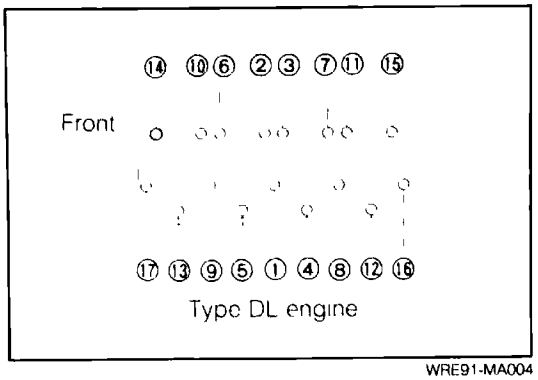
Manifold:

IN ... 36.75 ± 7.35 N·m
(3.75 ± 0.75 kgf-m, 27.15 ± 5.45 ft-lb)

EX ... 46.55 ± 7.35 N·m
(4.75 ± 0.75 kgf-m, 34.35 ± 5.45 ft-lb)

NOTE:

- This tightening torque means the torque check of the head bolts, not retightening. Therefore, if you find any looseness during the torque check, retighten the bolt to the torque specified in this table.



WRE91-MA004

WRE91-MA005

AIR CLEANER ELEMENT

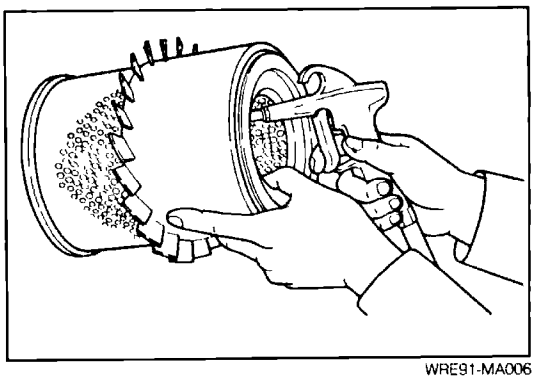
Cleaning of air cleaner element

(1) Remove the air cleaner element from the air cleaner case.

(2) Clean the element with compressed air. First blow from the back side thoroughly. Then, blow off the front side of the element.

CAUTION:

- The air pressure to be used for this cleaning operation should not exceed 392 kPa (4.0 kgf/cm^2).



WRE91-MA006

(3) Install the air cleaner element in the air cleaner.

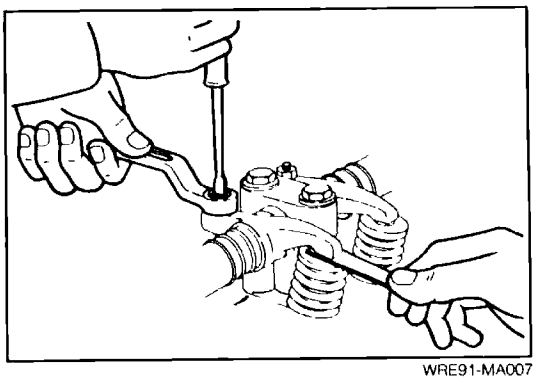
VALVE CLEARANCE (Hot condition).

Adjustment of valve clearance

NOTE:

- Check and adjust the valve clearance while the engine is hot.

Model		DL-42	DL-52
Intake	mm	0 25	
Exhaust	mm	0 25	0 35



WRE91-MA007

REFERENCE:

For the valve clearance while the engine is cold, add 0.05 mm to the value for hot engine.

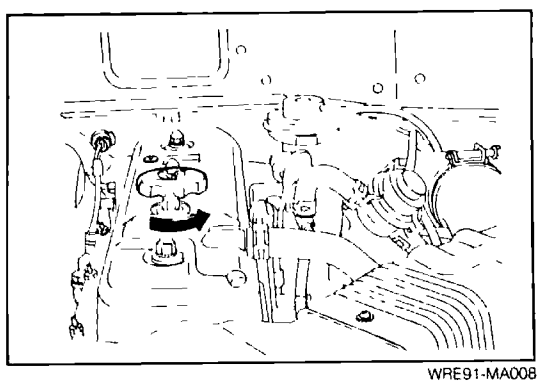
ENGINE OIL AND FILTER

1. Engine oil change

Recommended Oil Grade:

DL-42: API CC or CD

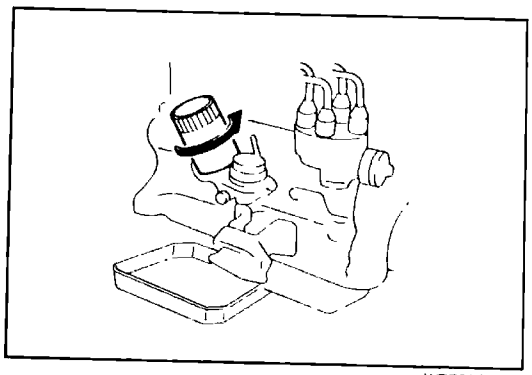
DL-52: API CD



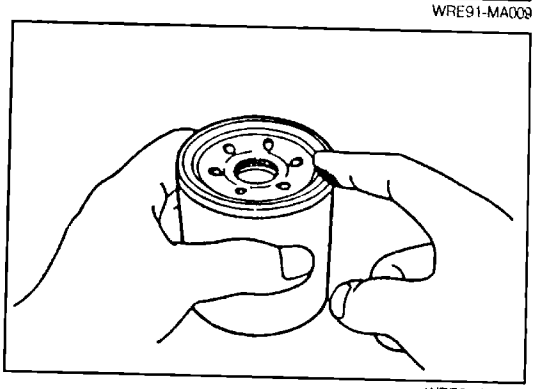
WRE91-MA008

2. Replacement of engine oil filter
   (1) Remove the oil filter with an oil filter wrench.
   NOTE:
   - **Since the oil flows out during the replacement, receive the oil with an adequate container.**

   (2) Inspect and clean the oil filter installation surface.


WRE91-MA009

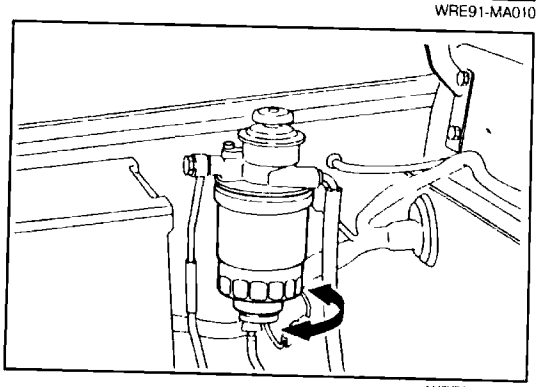
   (3) Apply clean engine oil to the gasket of a new oil filter.
   (4) Installation of oil filter
   Screw a new filter into place and tighten it until the gasket contacts the seat. Then, make about one additional turn to seat the filter.


WRE91-MA010

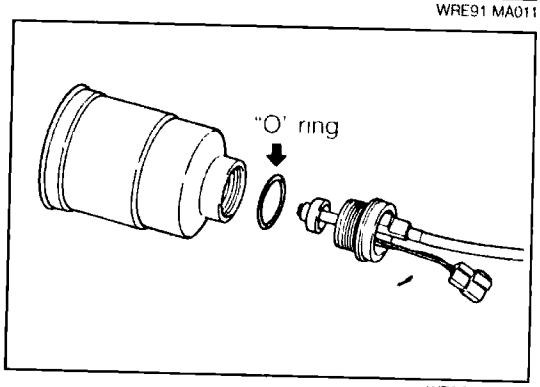
FUEL FILTER

Replacement of fuel filter

Removal
(1) Disconnect the connector from the fuel filter.
(2) Remove the fuel filter, using a suitable oil wrench.


WRE91 MA011

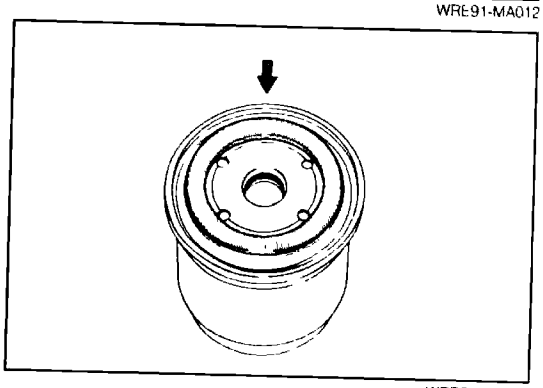
Installation
(3) With a new "O" ring interposed, install the sensor assembly to the fuel filter.



WRE91-MA012

(4) Apply a thin film of engine oil to the rubber gasket. Install the gasket with an oil wrench.
   Specified Torque: 12.7 ± 2 N·m
   (1.30 ± 0.2 kgf-m, 9.4 ± 1.4 ft-lb)

(5) Install the connector.
(6) Perform air bleeding, using a priming pump.


WRE91 MA013

FUEL LINES & CONNECTION

Inspection of fuel lines and connections

Visually inspect the fuel lines for cracks, leakage, loose connections or deformation.

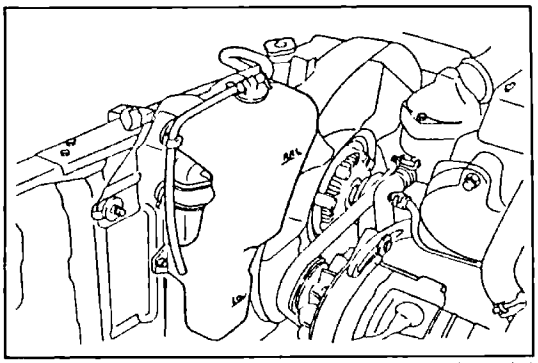
WRE91-MA014

ENGINE COOLANT

1. Check of coolant level

   Check to see if the coolant level is between the LOW and FULL lines of the reserve tank.

   If the coolant level is near the low level or below the low level, add the coolant up to the full level.

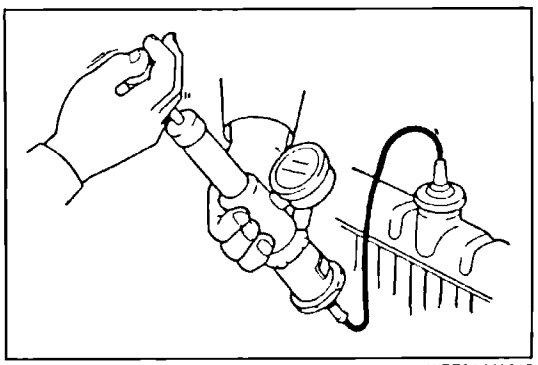


WRE91 MA015

2 Check of cooling system for leakage

Radiator

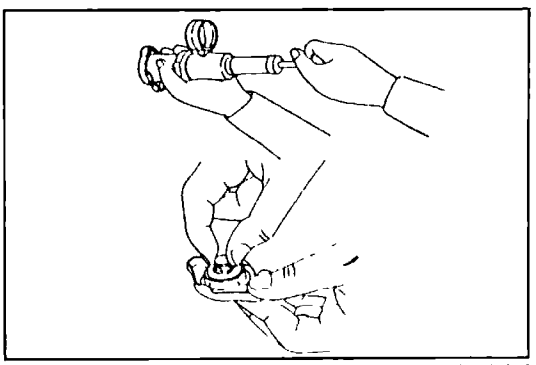
(1) Fill the radiator with coolant. Attach a radiator cap tester.
(2) Warm up the engine.
(3) Apply a pressure of 117.2 kPa (1.2 kgf/cm^2, 17 psi) to the cooling system by means of the radiator cap tester.
(4) Ensure that no leakage is present.



WRE91-MA016

Radiator cap

(1) Check the pressure of the radiator cap valve with the radiator cap tester.
(2) Check to see if the valve opens or closes by pulling and releasing it by hand.
(3) Check the sealed section for damage.



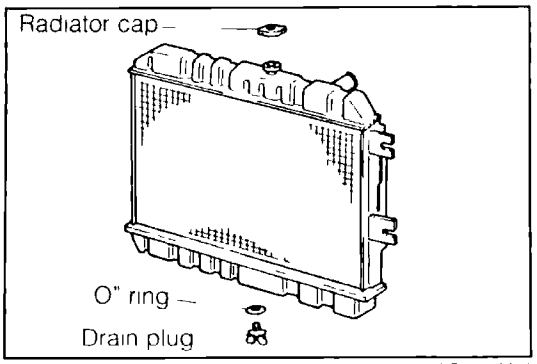
WRE91 MA017

3. Coolant change

   (1) Open the radiator cap and drain plug and allow the coolant to drain into a suitable container.

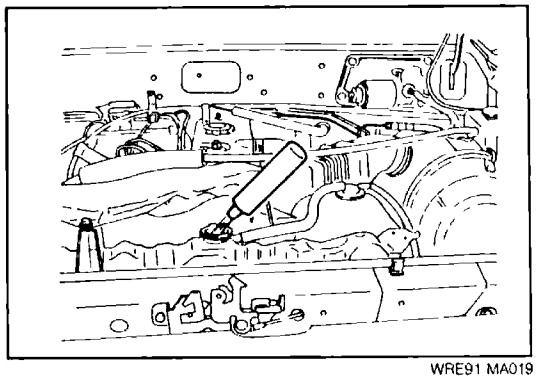
   WARNING:

   Never open the radiator cap and/or drain plug when the engine is still hot.



WRE91 MA018

(2) Close the drain plug.
(3) Fill the system with water.
(4) Start the engine for two or three minutes and stop it.
(5) Repeat the steps 1 through 4 two or three times.
(6) Drain the coolant.
(7) Close the drain plug with a new "O" ring interposed.
(8) Drain the coolant from the reserve tank.



WRE91 MA019

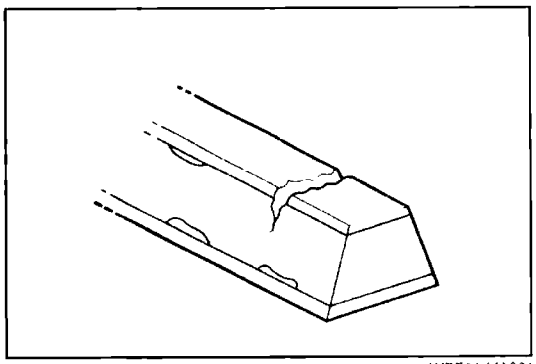
(9) Pour antifreeze solution into the radiator and reserve tank in accordance with the instructions of the manufacturer of the antifreeze solution.
(10) Fill the system with water.
(11) Start the engine. Check to see if the coolant level in the radiator drops. If the coolant level drops, replenish water.
(12) Install the radiator cap and reserve tank cap.
(13) Warm up the engine, until the radiator cooling fan motor starts to rotate. Afterwards, allow the coolant to cool down to the atmospheric temperature. Recheck the coolant level at the reserve tank. Add the coolant to the full level, as required.

WRE91 MA020

V-BELT

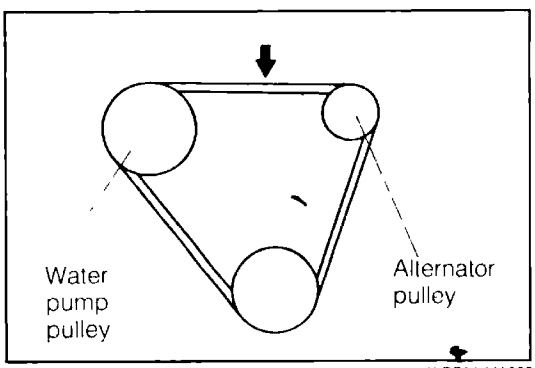
Inspection of drive belt

(1) Visually check the V belt for separation of the adhesive rubber above and below the core, core separation from the belt side, severed core, separation of the rib from the adhesive rubber, cracks or separation of the ribs, torn or worn ribs or cracks in the inner ridges of the ribs.



WRE91 MA021

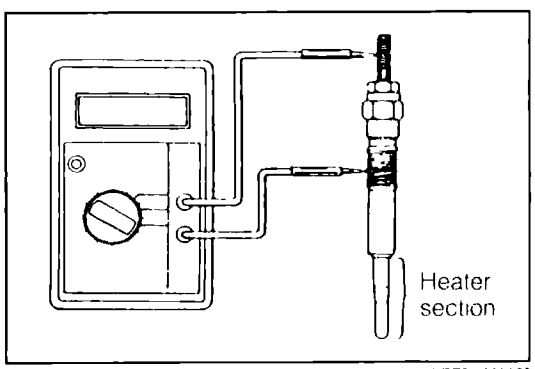
(2) Measure the amount of the drive belt deflection when the midpoint of the drive belt between the alternator and the water pump pulley is pushed with a force of 98 N (10 kgf).
Specified Belt Deflection: 10 - 13 mm



WRE91 MA022

GLOW PLUG

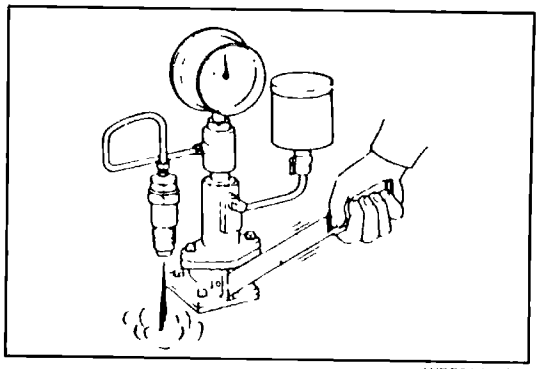
(1) Remove the glow plug.
(2) Check to see if continuity exists, using an ohmmeter as shown in the figure.
Specified Torque: 12.7 ± 3 N·m (1.3 ± 0.3 kgf-m, 9.4 ± 2.2 ft-lb)



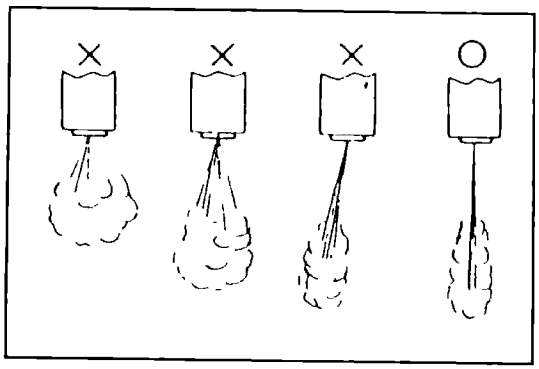
WRE91 MA023

INJECTION NOZZLE

1. Measurement of injection pressure of injection nozzle
   (1) Remove the injection nozzle.
   (2) Install the nozzle to the nozzle tester. Inject the nozzle two or three times by moving the tester lever quickly so that any carbon will be blown from nozzle end.
   (3) Gradually increase the pressure by pushing the tester lever slowly. Measure the pressure at which the pointer of the pressure gauge makes a sharp drop.
   Specified Value: 12748 kPa (130 kgf/cm^2)


WRE91-MA024

2. Check of spray condition
   Operate the pump lever at a rate of 50 to 60 times per minute.



WRE91-MA025

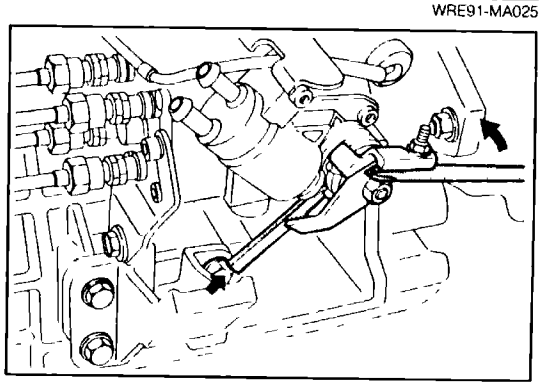
INJECTION TIMING

Releasing procedure for automatic cold start device

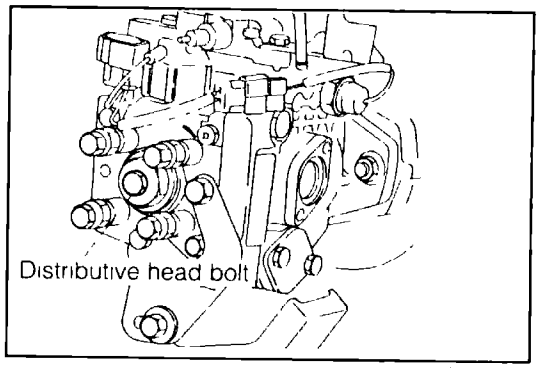
When the engine water temperature is below 60°C, release the automatic cold start device, following the procedures given below.

① Make rotation in the arrowheaded direction by inserting a screwdriver or the like having a diameter of 8 mm into the lever as shown in the figure.

② Insert a block of 8.5 - 10 mm thickness into between the lever and thermo wax plunger.


WRE91-MA026

(1) Remove the distributive head bolt on the injection pump. Then, install the following SST and set a dial gauge.
SST: 09275-87701-000

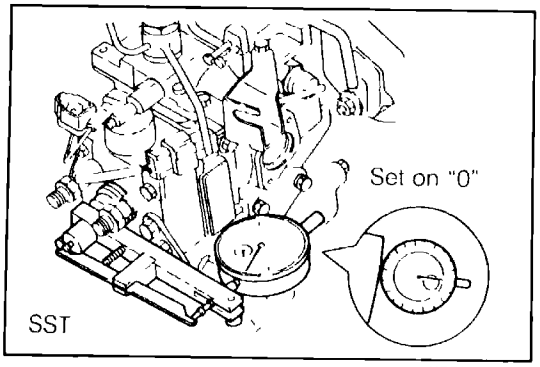


WRE91-MA027

NOTE:
- Ensure that the measuring pin of the dial gauge contacts the flat section of the plunger.
- Ensure that no dust gets into the pump.

(2) Set the dial gauge pointer to the "O" position when the crankshaft is set to 60° before the top dead center.

NOTE:
- At this time, turn slightly the crankshaft pulley to the right and left sides and make sure that the pointer is stable at the "O" position.

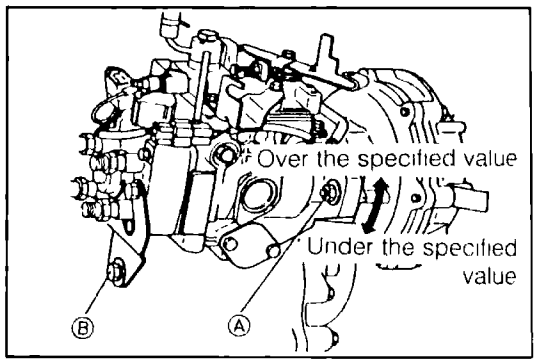


WRE91-MA028

(3) Turn the crankshaft in the normal direction, until the pointer is aligned with the 1° BTDC (3° in the case of high altitude specifications). At this setting, note the reading of the dial gauge.
Specified Value: 0.97 - 1.03 mm

WRE91 MA029

(4) Adjust the injection timing as follows:
Slacken the attaching sections of the injection pump proper at the following points given below. Adjust the injection timing by moving the pump proper.
- Injection pump attaching nuts ..... Ⓐ
- Lower bracket attaching bolt ..... Ⓑ



WRE91 MA030

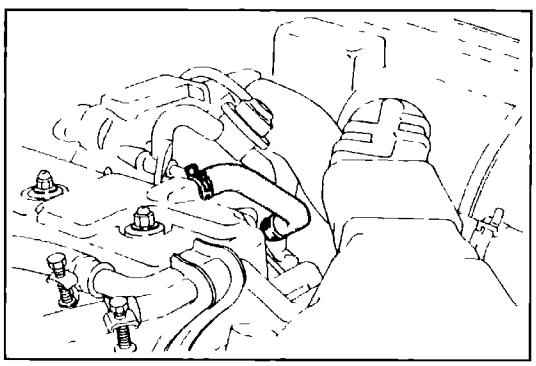
(5) Perform the injection timing check again and ensure that the injection timing is proper.
(6) Remove the SST. Install the distributive head bolt with the new copper washer interposed.
Tightening Torque: 16.7 ± 2.9 N·m (1.7 ± 0.3 kgf-m, 12.3 ± 2.2 ft-lb)

WRE91-MA031

EXHAUST EMISSION CONTROL SYSTEM

BLOW-BY GAS SYSTEM

Inspection of blow-by gas recirculating system.
Check the hose, connections for cracks, leaks or damage.



WRE91 MA032

POWER TRANSMITTING SYSTEM

CLUTCH

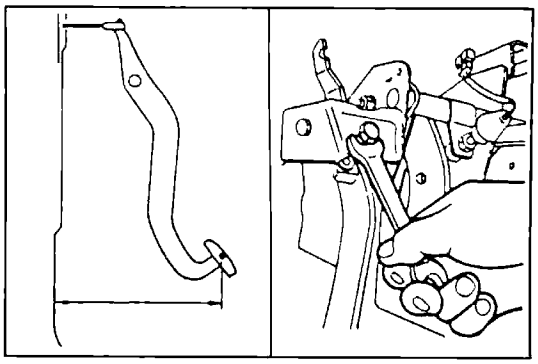
Check of clutch

(1) Adjust the clutch pedal height by means of the set bolt.

Clutch Pedal Installation Height:

L.H.D: 221 ± 3 mm

R.H.D: 221 + 6 mm



WRE91 MA034

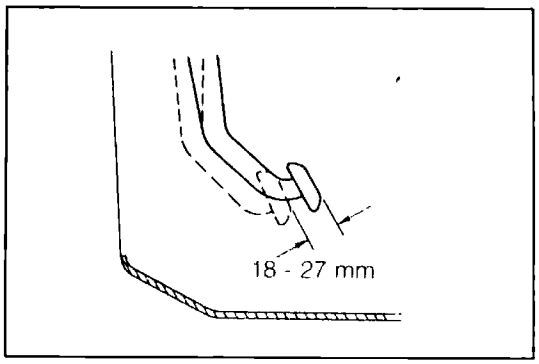
NOTE:

- The clutch pedal height should be measured from the body metal by rolling up the carpet and floor mat.

(2) Connect the clutch cable to the clutch pedal. Adjust the clutch free travel.

Adjust the clutch free travel by moving the "E" ring of the clutch cable.

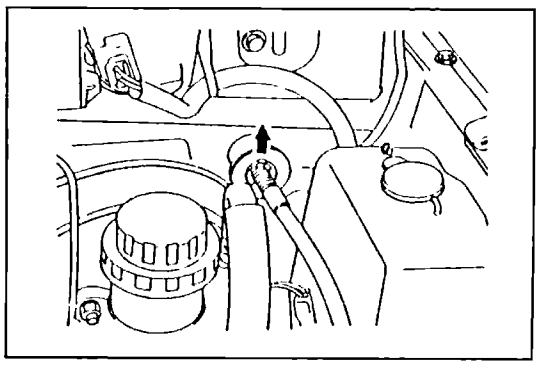
Specified Clutch Free Travel: 18 - 27 mm



WRE91 MA035

NOTE:

- Apply grease to the clutch cable and the installation section of the pedal.



WRE91-MA036

TRANSMISSION & DIFFERENTIAL

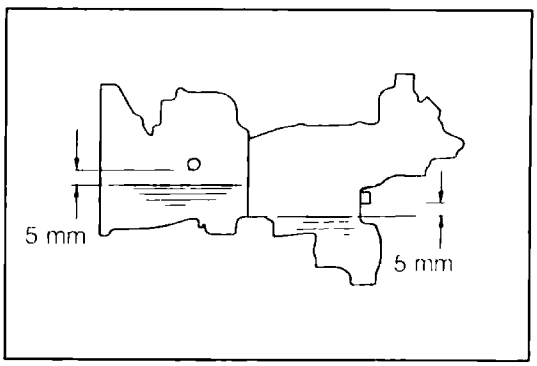
Checking of oil level and leakage

(1) Checking of oil level and leakage

Oil should be up to the filler plug hole.

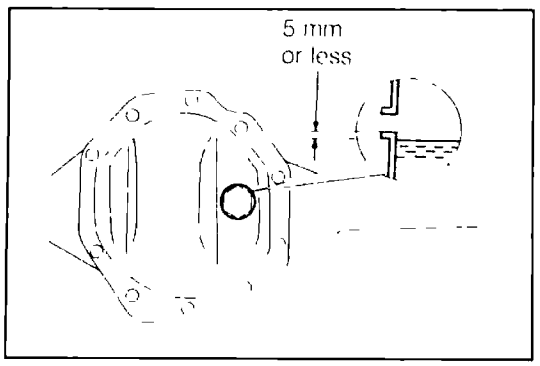
Add oil if low and inspect for oil leakage.

(2) Oil change



WRE91 MA037

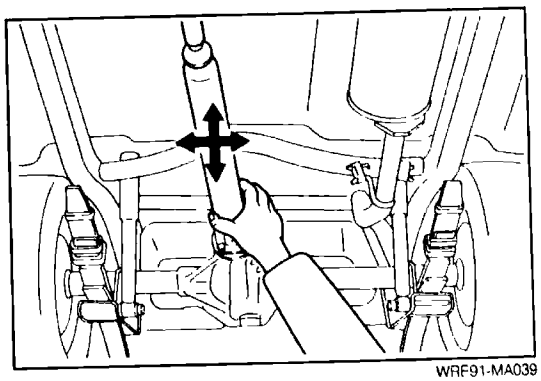
		Grade/Viscosity	liter
Transmission		API GL-3/SAE 80W, 85W, 90	2 0/4 speed 2 7/5 speed
Transfer		API GL-3/SAE 75W-85	1.4
Differential	Front	API GL-5/SAE 80W, 85W, 90	1 5
	Rear	↑	↑



WRE91-MA038

PROPELLER SHAFT

Check propeller shaft for rattle and damage.

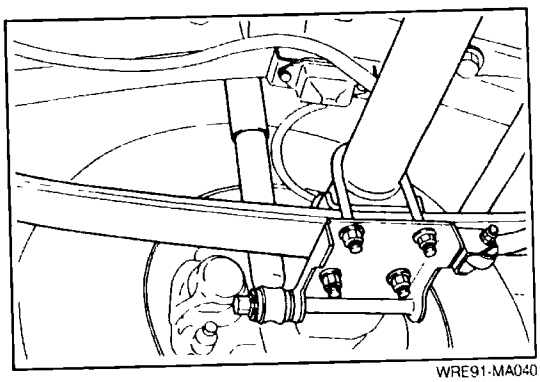

WRF91-MA039

SUSPENSION SYSTEM

SUSPENSION ARM, CONTROL ARM AND DUST COVER

Check of following parts

(1) Check the suspension arm for damage.
(2) Check the control arm, rod for damage.
(3) Check the dust cover for cracking, damage or tears.
(4) Check all parts of suspension for tightness.
(5) Check the arm connecting section for excessive play.


WRE91-MA040

SHOCK ABSORBER

Check of performance

Bounce the front end of the vehicle and check that the bound and rebound action should be quickly damped.

Check of leakage and damage

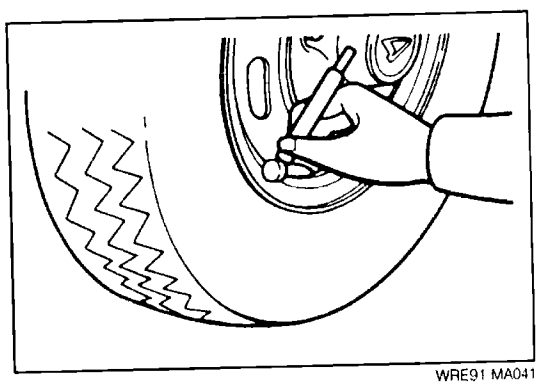
Check fluid leakage and damage.

RUNNING SYSTEM

TIRES

1. Air pressure
   (1) Check to see if the tire air pressure conforms to the specification, using a tire gauge.
   (2) Ensure that no air leaks from the tire valve and that the valve cap is attached.

   NOTE:
   - **For the specified air inflation pressure, see the caution plate attached to the vehicle. Be very careful not to overinflate the tires excessively.**

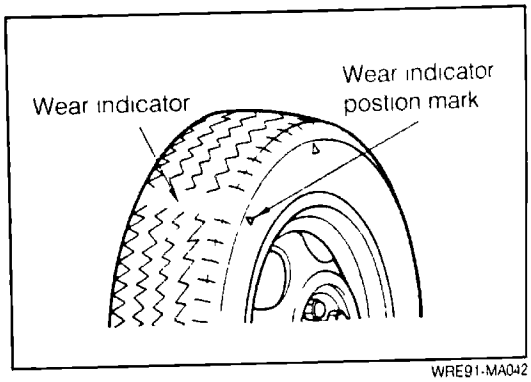

WRE91 MA041

2. Wear
   (1) Inspect the tread section for wear. Ensure that the groove depth is at least 1.6 mm.

   NOTE:
   - **Care must be exercised as to the wear indicator mark. (When the remaining groove depth is reduced to less than 1.6 mm (0.063 in.), the wear indicator mark will become visible.)**

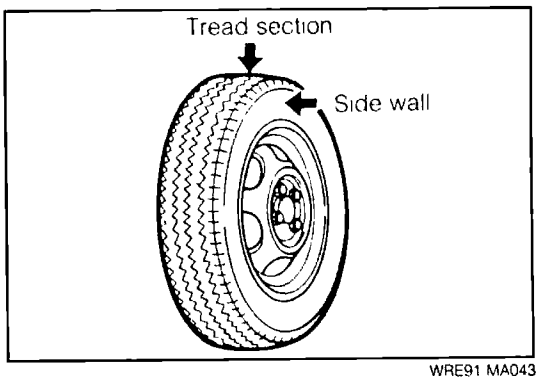
   (2) Inspect the tire for uneven wear, ridge and other abnormal wear.

   NOTE:
   - **If the tires exhibit an uneven wear pattern, check the wheel balancing and front wheel alignment.**



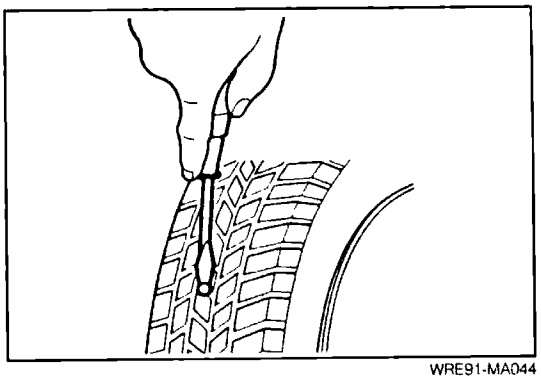
WRE91-MA042

3. Crack and damage
   Check that the tread section and side wall section are free from cracks and damage.



WRE91 MA043

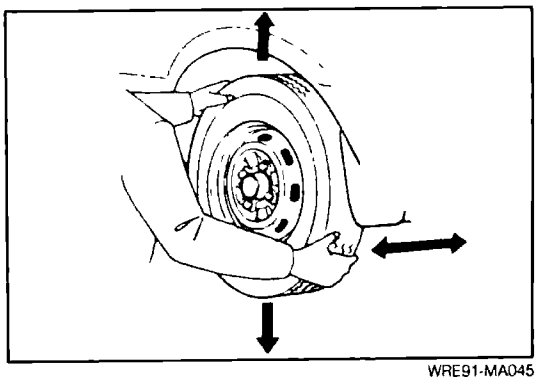
4. Objects caught in tire pattern
   Ensure that no nail, metal chip, gravel or other foreign matters lodge at the grooves of each tire, or none of them sticks into the tire.


WRE91-MA044

WHEEL BEARING

1. Check of front and rear wheel for rattle
   (1) Jack up the vehicle.
   (2) Alternatively push and pull upper and lower parts of the tire.
   (3) If excessive play is found, perform the check while the brake pedal is being depressed.

   If not loose: Wheel bearing is loose.
   If still loose: Knuckle section or other suspension parts are loose.


WRE91-MA045

2 Grease change
   Refer to the FS, RS section.

WRE91-MA046

STEERING SYSTEM

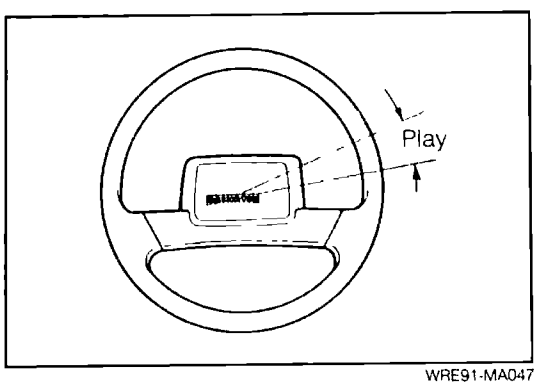
STEERING WHEEL

Set the vehicle in a straight-ahead condition. Check the steering wheel play by turning it lightly with your fingers.

Specified Value: 25^{+5}_{-10} mm

Check of steering wheel tightness.

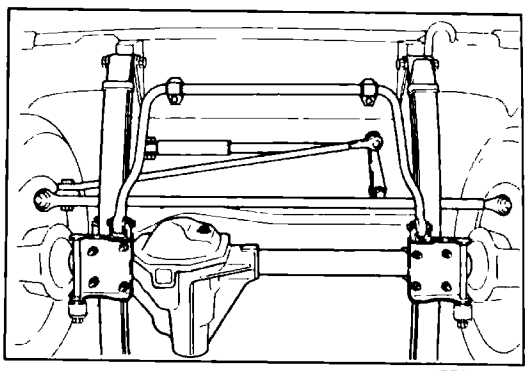
Tightening Torque: 29.4 - 49.0 N·m
(3.0 - 5.0 kgf-m, 21.7 - 36.2 ft-lb)



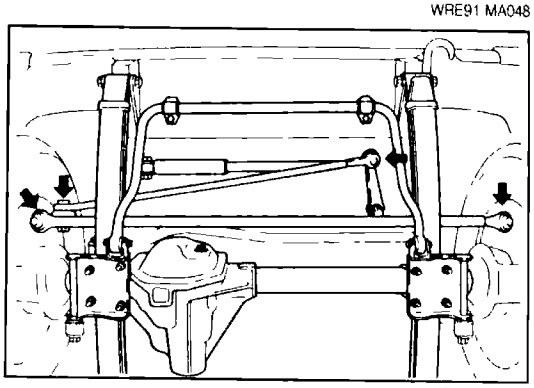
WRE91-MA047

LINKAGE & DUST COVER

1 Check of steering linkage and dust cover.
① Tightness
② Rattle
③ Damage


WRE91 MA048

2. Grease apply
Apply chassis grease to the points, as shown in the illustration.

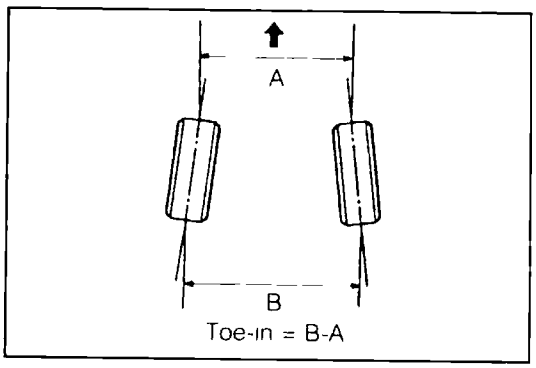

WRE91-MA049

WHEEL ALIGNMENT

Check of wheel alignment

(1) Toe-in measurement
Measure the distance between the marks at the front side of each front wheel. Determine the toe-in amount by calculating the difference.

Specified Value: 0 - 8 mm (Bias tire)
−3 - 5 mm (Radial tire)

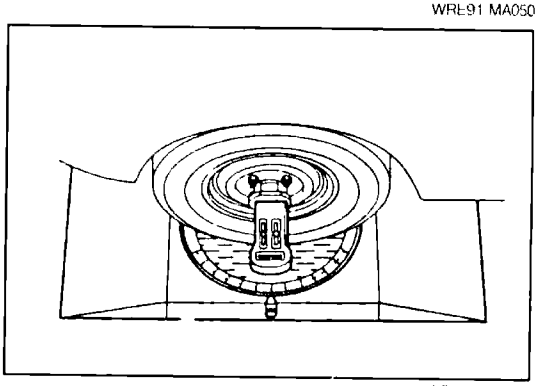


WRE91 MA050

(2) Chamber measurement

Specified Chamber Amount: 1° ± 1°

NOTE:
- The measurement should be performed in the same way at the right and left wheels.


WRE91-MA051

(3) Caster measurement

Specified Caster Amount: 1°30′ ± 1°
Specified Kingpin Angle: 9°30′ ± 1°

(4) Side slip test

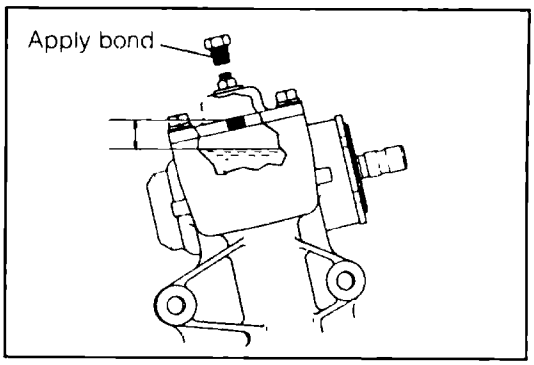
Specified Value: 0 ± 3 mm

NOTE:
- For the alignment checks, turn the steering wheel until the reading of the turning radius gauge becomes 20 degrees at the right wheel or the left wheel, respectively.

GEAR BOX

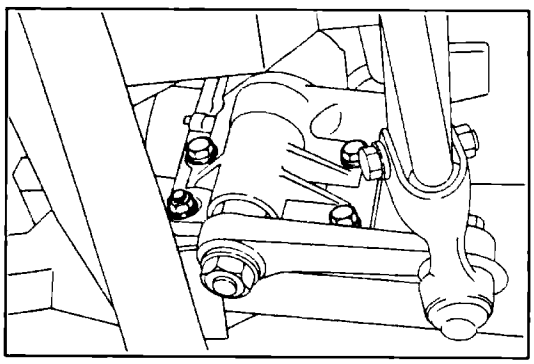
Check of oil level of steering gear box
Check the steering gear box for oil level.
Specified Value: 13 - 23 mm

NOTE:
- Apply the following bond to the attaching bolt.
  Bond: Daihatsu genuine sealer (999-0480-8U90-00)



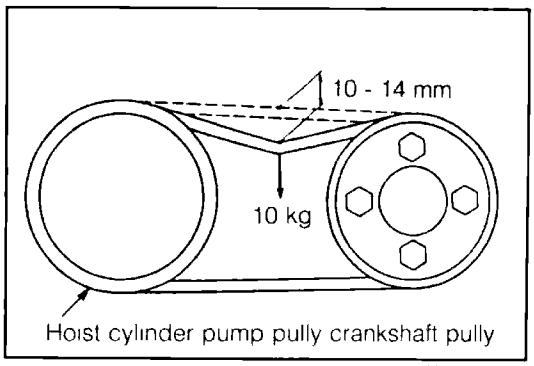
WRE91-MA052

Check of steering gear box tightness
Tightening Torque: 73.5 - 102.9 N·m
(7.5 - 10.5 kgf-m)


WRE91-MA053

POWER STEERING

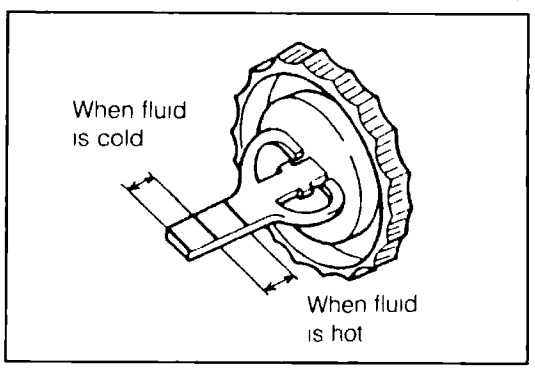
Check of damage.
Check of V-belt tension.
Check the belt tension by measuring the deflection amount of the V-belt.
Specified Belt Deflection: 10 - 14 mm



WRE91-MA054

Power steering fluid

Checking of fluid level. If the fluid level is too low, add the fluid up to the full level.



WRE91-MA055

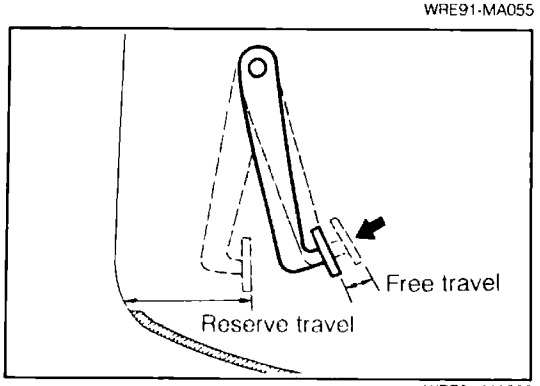
BRAKING SYSTEM

BRAKE PEDAL

Check of brake pedal and parking brake
(1) Pedal free travel check
Pedal Free Play: 2 - 4 mm

(2) Pedal reserve travel check
Pedal Reserve Travel: More than 80 mm

NOTE:
- The brake pedal reserve travel should be measured from the body metal by rolling up the carpet and floor mat.

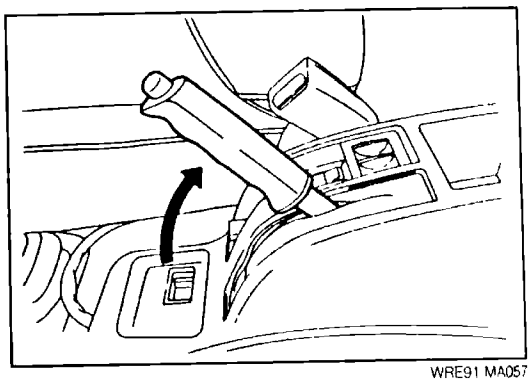


WRE91-MA056

PARKING BRAKE

With a force of 245 N (25 kgf), pull up the parking brake lever slowly and count the notches.

Specified Working Travel: 4 - 6 notches



WRE91 MA057

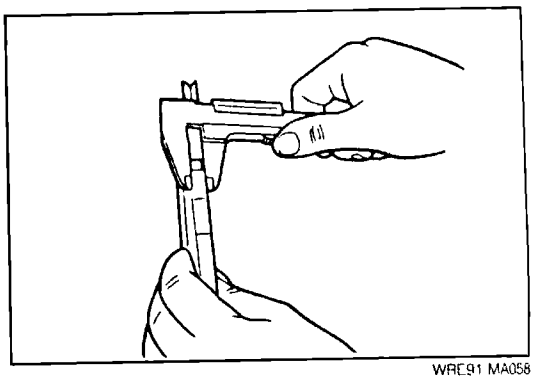
DISC PAD

Check of disc pad

(1) Checking of brake disc pad for thickness, wear and damage

① Measure brake pad thickness.
If the pads thickness is less than 1.0 mm (0.04 inch), replace the pad.

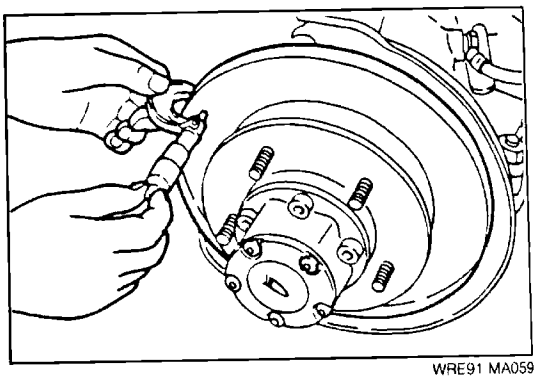
② Inspect uneven wear and damage.



WRE91 MA058

(2) Checking of brake disc for wear, damage

① Clean the brake disc surface and measure the disc thickness.



WRE91 MA059

mm (inch)

	Standard	Ventilation
Specified thickness	12 5 (0.49)	18 0 (0 71)
Minimum limit	11 5 (0 45)	17 0 (0 67)

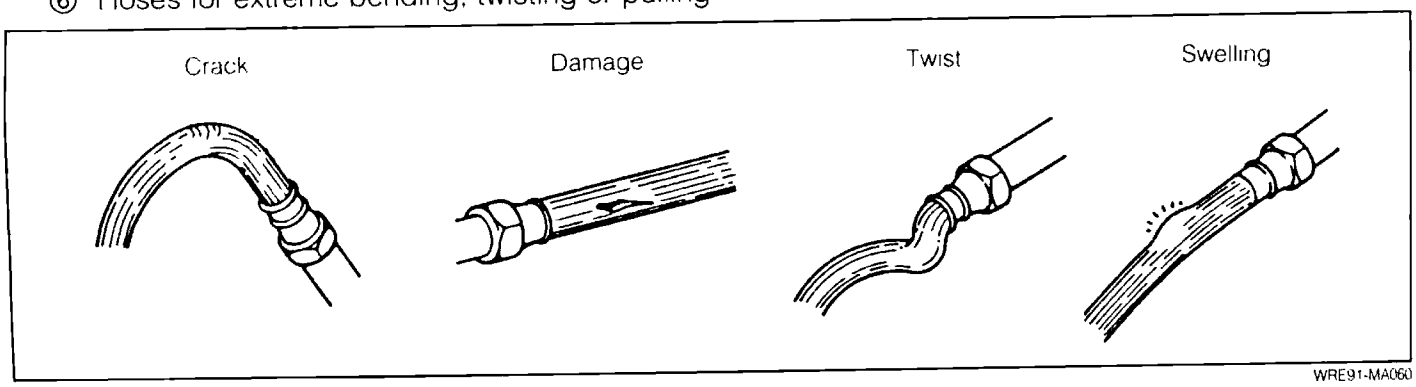
Difference in Stock Thickness on The Same Circumference:
Not to exceed 0.015 mm (0.0006 inch)

BRAKE HOSE & TUBE

Check of brake hose and tube

Checking of following parts

① Hoses and tubes for damage, cracks
② Hoses for deformation or swelling
③ Tubes for corrosion or rust
④ Connection of fluid leakage
⑤ Tube clamps for tightness
⑥ Hoses for extreme bending, twisting or pulling

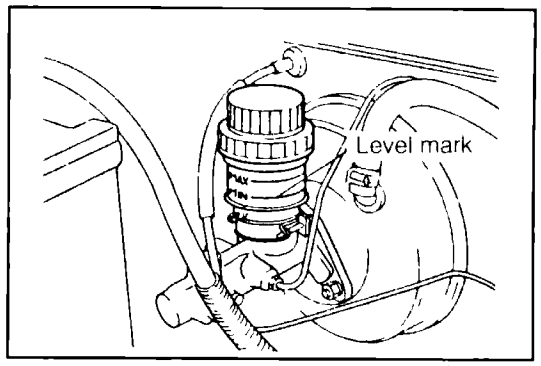


WRE91-MA060

BRAKE FLUID

Check of brake fluid

If the fluid level is below of the MIN line, check for leak in the hydraulic system and add fluid up to the MAX line.



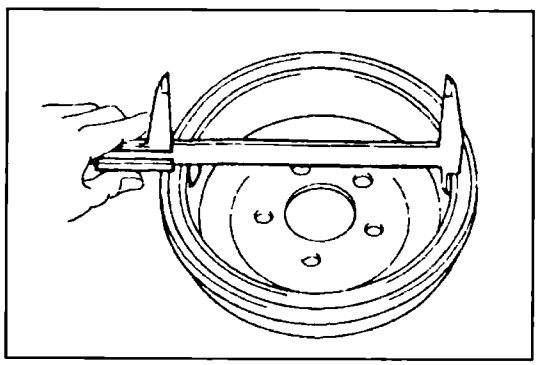
WRE91-MA061

BRAKE DRUM & LINING

Check of brake drum and lining

(1) Inspect the brake drum for damage, inner surface wear, scores, or uneven wear.

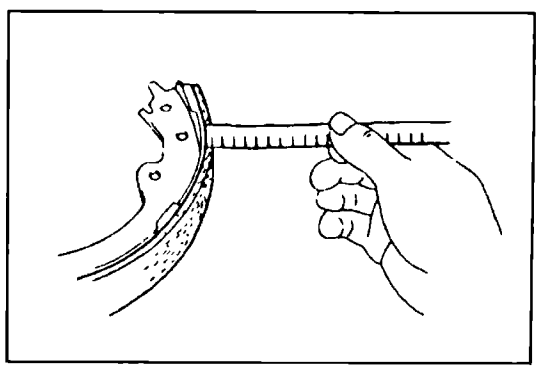
Specified Diameter: 254.0 mm (10.00 inch)
Allowable Limit: 256.0 mm (10.08 inch)



WRE91-MA062

(2) Inspect the brake linings for wear.

Specified Value: 5.0 mm (0.197 inch)
Allowable Limit: 1.0 mm (0.0393 inch)



WRE91 MA063

BRAKE BOOSTER

Check the operation of the brake booster following the procedure given below.

(1) With the engine stopped, depress the brake pedal several times. The travel distance should not change.
(2) With the brake pedal slightly depressed, start the engine. The pedal should move down slightly when the engine starts.
(3) Depress the brake pedal, stop the engine and hold the pedal, stop the engine and hold the pedal for about 30 seconds. The pedal should neither sink nor rise.
(4) Restart the engine, run it for about a minute and turn it off. Then depress the brake pedal firmly several times. the pedal travel distance should decrease with each application.

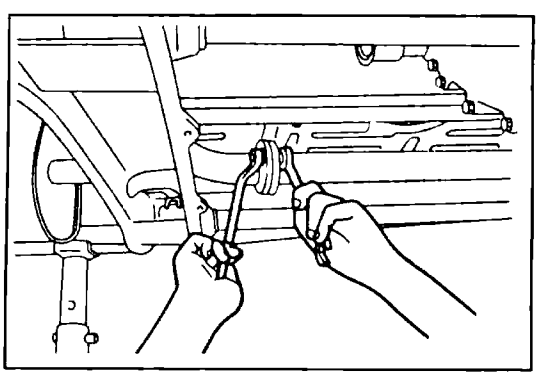
WRE91 MA064

CHASSIS & BODY

EXHAUST PIPE & MUFFLER

Check muffler, exhaust pipe, mountings

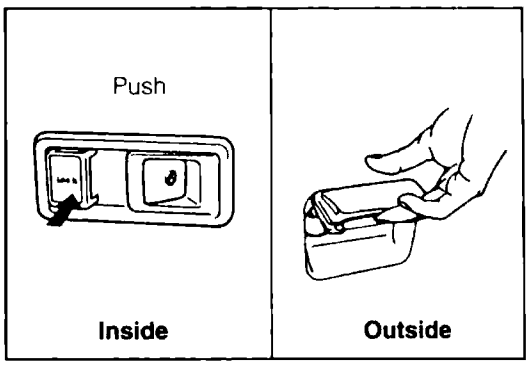
(1) Checking of exhaust pipe for tightness.
(2) Checking of muffler, exhaust pipe, mountings for damage.



WRE91 MA065

ALL DOORS & HOOD

Check all doors, hood
Door
(1) Doors locks should operate properly.
(2) Door locks should not hit striker.
Hood
(1) Auxiliary catch should operate properly.
(2) Hood should be locked securely when closed.



WRE91-MA066

SEAT BELT

Check of seat belt
Checking of seat belts for operation and looseness
(1) Check that the belt components are free from damage.
(2) Check that the tongue plate can be released smoothly when the buckle button is pressed.
(3) Check that the tongue plate can be locked securely when inserted into the buckle.

WRE91 MA067

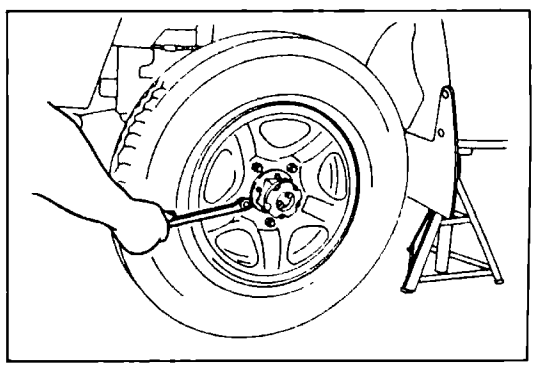
CHASSIS GREASE

Check of chassis grease
Apply grease to grease fittings of chassis.
(1) Check the each grease fittings of chassis for grease condition.
(2) Apply lithium grease to the grease fittings given bellow.
    (1) Steering related parts
    (2) Propeller shaft
    (3) Suspension related parts

WRE91 MA068

Check of other bolts, nuts & wheel hub nuts

Retightening of bolts and nuts on chassis and body.
(1) Front suspension parts
(2) Power train parts
(3) Rear suspension parts
(4) Steering system parts


WRE91 MA069

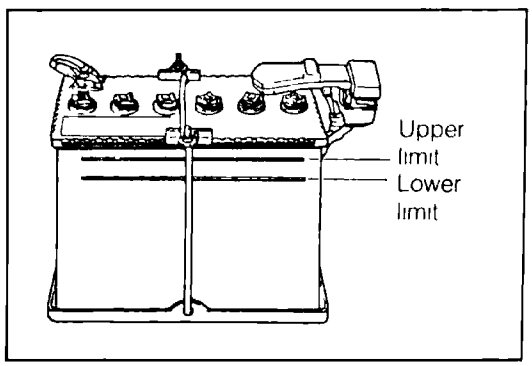
Check of wheel hub nuts
Retighten the hub nuts.

Tightening Torque: 88.3 - 117.7 N·m
(9.0 - 12.0 kgf-m, 65.1 - 88 ft-lb)

ELECTRICAL SYSTEM

BATTERY

Check of following parts
Check the battery electrolyte level.
The electrolyte level must be between upper and lower levels.



WRE91-MA070

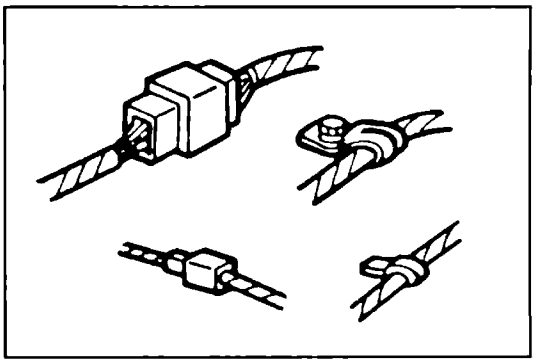
WIRE HARNESS

Check of wire harness

Check of wire harness for damage

(1) Check the wiring for damage or looseness.

(2) Check each clamp and connection for looseness.



WRE91-MA071

LIGHTING SYSTEM METER & GAUGE

Check of lighting system, meter & gauges

Check of lighting system, meter & gauges for function

(1) Check headlamps, turn signal lamps, stop lamps, back-up lamps, tail lamps, licence plate lamps, hazard warning lamps and meter illumination lamps for function.

(2) Check fuel gauge, water temperature gauge, charge warning lamp, oil pressure warning lamp, parking brake warning lamp, stop lamp warning lamp, brake fluid warning lamp and speedometer for function.

WRE91-MA072

DAIHATSU

F70,F75,F77

Service manual

MANUAL TRANSMISSION

MT

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

MANUAL TRANSMISSION

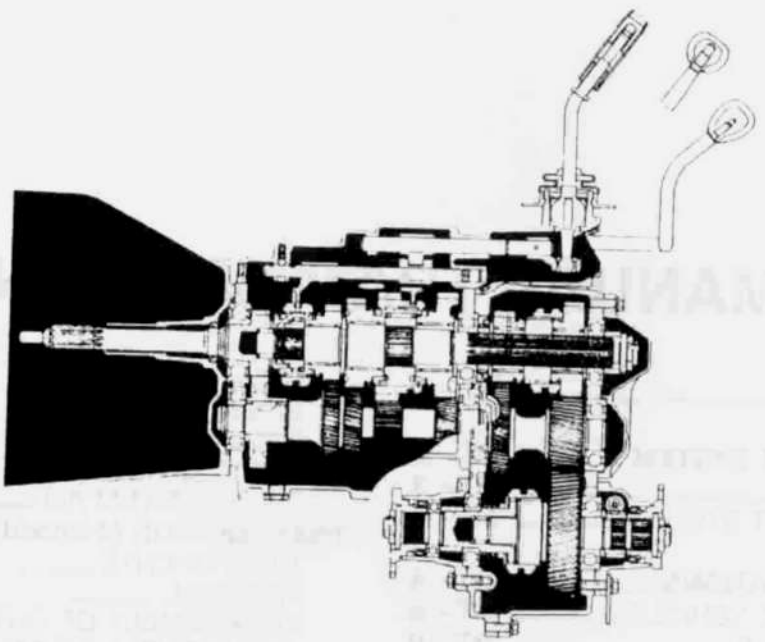
OUTLINES ..... MT– 2
SHIFT LEVER & TRANSMISSION SHIFT SYSTEM ..... MT– 3
SHIFT LEVER ..... MT– 3
TRANSMISSION SHIFT SYSTEM ..... MT– 3
TRANSMISSION & TRANSFER SPECIFICATIONS ..... MT– 4
REMOVAL FROM THE VEHICLE ..... MT– 5
TRANSMISSION (5-Speed) MT–10
COMPONENTS MT–10
REMOVAL MT–14
DISASSEMBLY OF OUTPUT SHAFT MT–18
DISASSEMBLY OF INPUT SHAFT MT–20
DISASSEMBLY OF COUNTER GEAR SHAFT MT–20
REVERSE IDLER GEAR BIMETAL FORMED BUSH REMOVAL MT–20
REMOVAL OF CLUTCH HOUSING OIL SEAL MT–20
INSPECTION MT–21
ASSEMBLY OF REVERSE IDLER GEAR BIMETAL FORMED BUSH MT–24
ASSEMBLY OF COUNTER GEAR SHAFT MT–25
INSTALLATION OF CLUTCH HOUSING OIL SEAL MT–25
ASSEMBLY OF INPUT SHAFT MT–25
ASSEMBLY OF OUTPUT SHAFT MT–26
INSTALLATION MT–28
TRANSMISSION CASE COVER (5-Speed) .. MT–34
COMPONENTS MT–34
REMOVAL MT–36
INSPECTION MT–39
INSTALLATION MT–41
SHIFT LEVER RELATED PARTS (4-Speed & 5-Speed) MT–47
COMPONENTS MT–47
REMOVAL MT–48
INSPECTION MT–48
INSTALLATION MT–49
INSTALLATION TO THE VEHICLE (T/M Ay) MT–50
TRANSMISSION (4-Speed) MT–55
COMPONENTS MT–55
REMOVAL MT–59
DISASSEMBLY OF OUTPUT SHAFT MT–61
DISASSEMBLY OF INPUT SHAFT MT–62
DISASSEMBLY OF COUNTER GEAR SHAFT MT–63
REVERSE IDLER GEAR FORMED BUSH REMOVAL MT–63
REMOVAL OF CLUTCH HOUSING OIL SEAL MT–63
INSPECTION MT–63
ASSEMBLY OF COUNTER GEAR SHAFT MT–66
INSTALLATION OF REVERSE IDLER GEAR BIMETAL FORMED BUSH MT–67
ASSEMBLY OF COUNTER GEAR SHAFT MT–67
INSTALLATION OF CLUTCH HOUSING OIL SEAL MT–67
ASSEMBLY OF INPUT SHAFT MT–68
ASSEMBLY OF OUTPUT SHAFT MT–68
INSTALLATION MT–71
TRANSMISSION CASE COVER (4-Speed) .. MT–74
COMPONENTS MT–74
REMOVAL MT–76
INSPECTION MT–79
INSTALLATION MT–81
SSTs MT–86
SERVICE SPECIFICATIONS MT–87
TIGHTENING TORQUE MT–89

WRE91-MT001

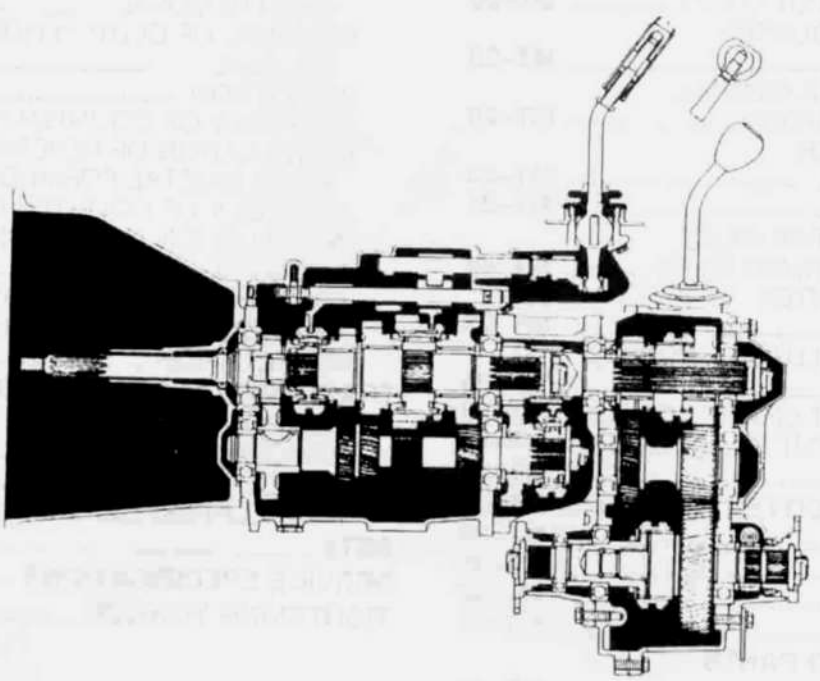
OUTLINES

There are two transmission types, 4VH (4 speeds) and 5VH (5 speeds).
The shift lever incorporating vibration-proof system provides smoother and more quiet steering. Th
type is equipped with a mis-shift preventive mechanism to prevent direct shifting from the 5th sp
Reverse.
On the transfer, two rows of front output bearings are mounted to provide operational quietness.
Further, the adoption of the transfer delay mechanism enables easier operation.

4VH (Model: F70, F75)



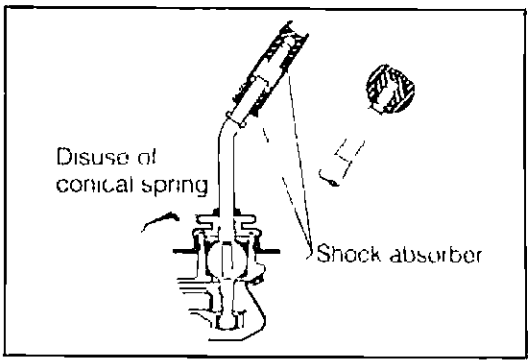
5VH (Model: F70, F75, F77)



SHIFT LEVER & TRANSMISSION SHIFT SYSTEM

SHIFT LEVER

The shift lever is composed of two levers, No 1 and No 2, and a shock absorber between them to provide smooth action.

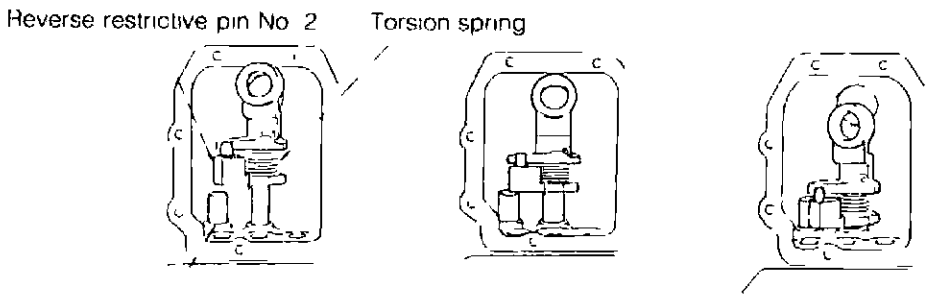


AREJ1 MT003

TRANSMISSION SHIFT SYSTEM

1. 5th–Reverse mis-shift preventive mechanism

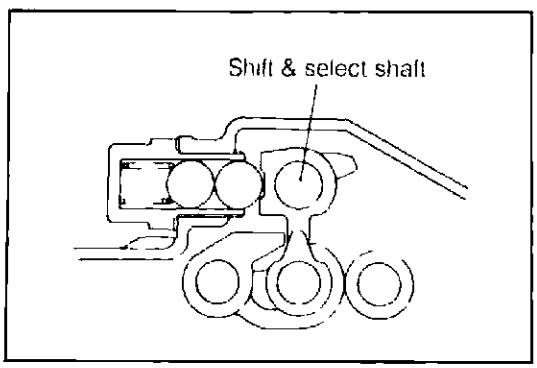
Shifting into the 5th speed causes the torsion spring to turn the reverse restrictive pin No 2 to hit the pin No 1, thus making the attempt to move the lever continuously into the Reverse position impossible This can be released by returning the shift lever once to the neutral, which brings the reverse restrictive pin No 2 back to the home position Then, operate the lever to the Reverse.



WRF91 MT004

2. Select-return method

The lock ball method is adopted to stabilize transmission operation



WR_91 MT005

TRANSMISSION & TRANSFER SPECIFICATIONS

1. Specifications

[ ] Turbo-charger equipped

Model			F70, F75, F77	
			4VH	5VH
Transmission	Type		Constant mesh type	←
	Gear ratio	1st	3.647	3.647 [3.477]
		2nd	2.136	2.136 [2.037]
		3rd	1.484	1.484 [1.317]
		4th	1.000	←
		5th	—	0.860 [0.820]
		Reverse	4.351	4.351 [4.148]
	Gear oil capacity	L	2.2	2.9
Transfer	Type		Constant-mesh type	←
	Gear ratio	High	1.297	←
		Low	2.370	←
	Gear oil capacity	L	1.3	←

WRE91M1

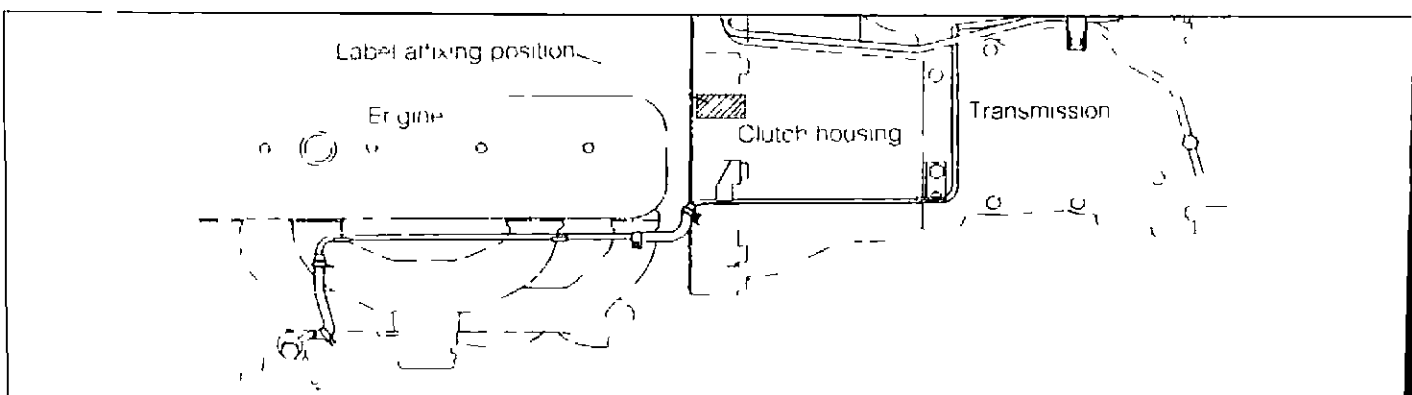
2. A label showing the production year, month and date of the transmission and transfer assembly has been affixed to the upper surface of the clutch housing case. At its upper column the label indicates the specifications of the transmission and transfer assembly in a form of alphanumeric letters (e.g. F31, 03B, 03C and 01B).

Label

F70	(A)
F70MDW	(B)
[illegible]	(C)

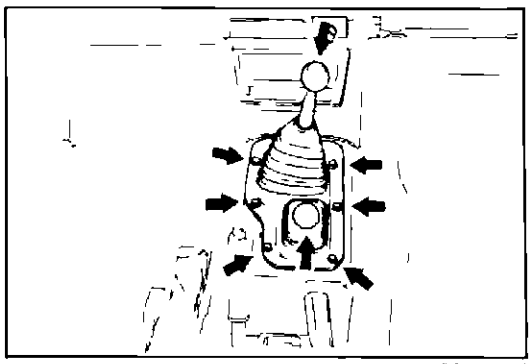
(A) Transmission & transfer assembly specifications
(B) Model
(C) Production year, month, date

Model		Standard		Option: 3rd gear ratio (1.481)		Option: England specifications	
F70	RHD	MDT	F65			MDT	F6F
	LHD	MDW	F03			MDW	F08
F75	RHD						
	LHD	MBHW	3A3			MBHW	08A
F77	RHD	PR	01B	PR	03B	PR	03C



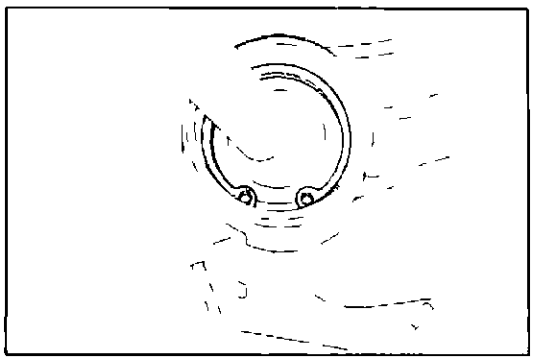
WRE91M1

REMOVAL FROM THE VEHICLE



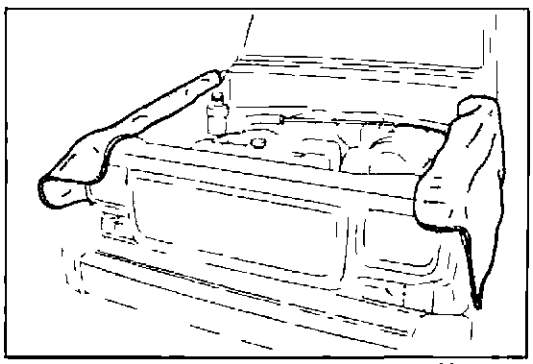
1. Working from the vehicle interior

(1) Remove the transmission and transfer control lever knobs
(2) Remove the console box (Refer BO-section)
(3) Turn over the floor carpet
(4) Remove the shift lever boot by removing the six bolts
(5) Shift the transfer control lever in 2H position

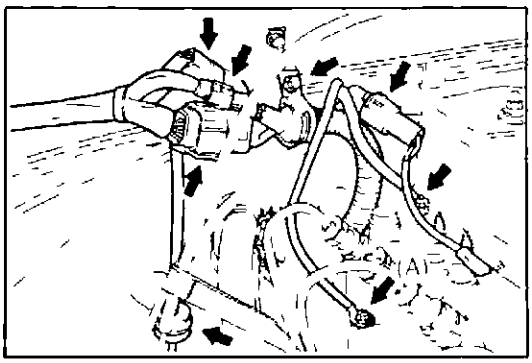


(6) Remove the transmission control lever by detaching the hole snap ring, using the standard tool of snap ring plier

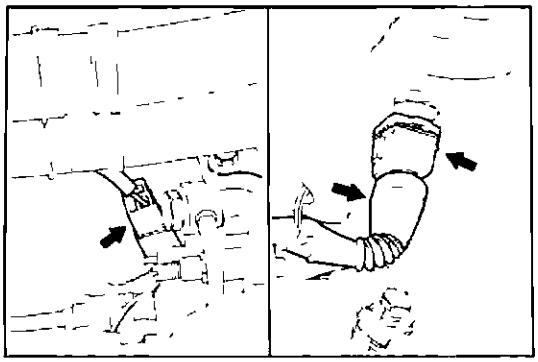
2. Working from the engine compartment room



(1) Install the fender cover to the fender on both left and right sides so that no scratch may be made



(2) Remove the grand earth cable from the negative terminal of the battery
(3) Disconnect the atmosphere hose and breather tube on the dash panel clamp

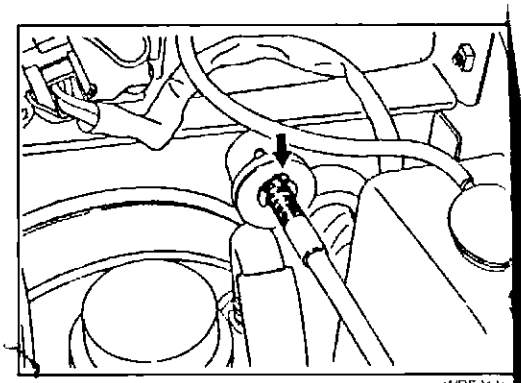


(4) Remove the bolt on the clamp
(5) Remove the earth bolt (A)
(6) Disconnect the couplers

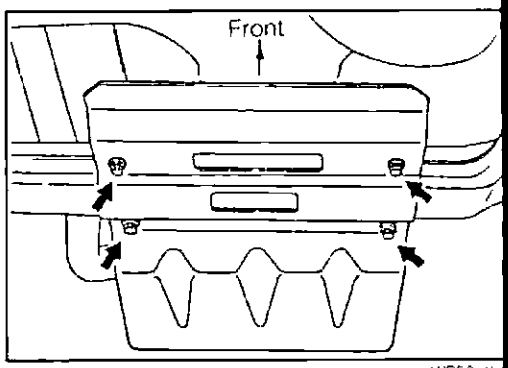
WARNING:

- Be sure to carefully disconnect the couplers because the engine may be still hot while after the engine has stopped.

(7) Detach the "E" ring from the clutch release cable
(8) Detach the vacuum hose clip on the upper side of the clutch housing (Only for the equipped with power shift vehicles)

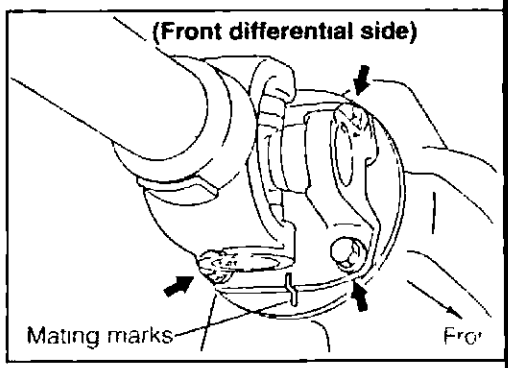


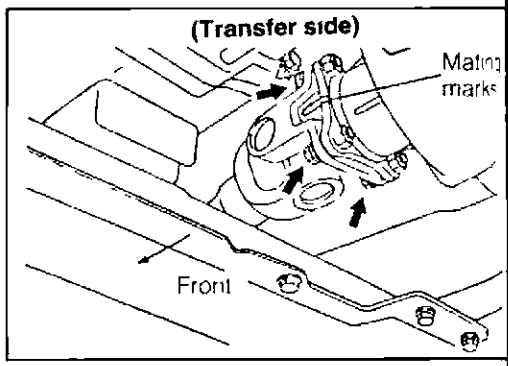
3. Working from the outside vehicle
(1) Jack or lift up the vehicle
NOTE:
- Be sure to support the vehicle with safety stands securely. (As for the jacking up points, refer GI-section.)

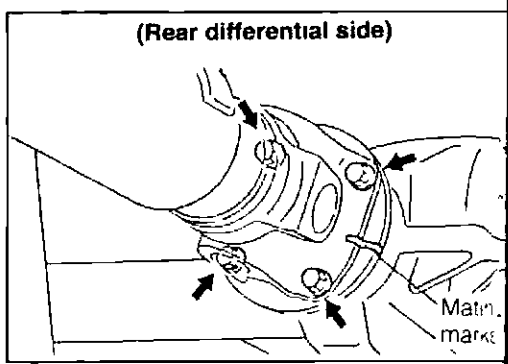


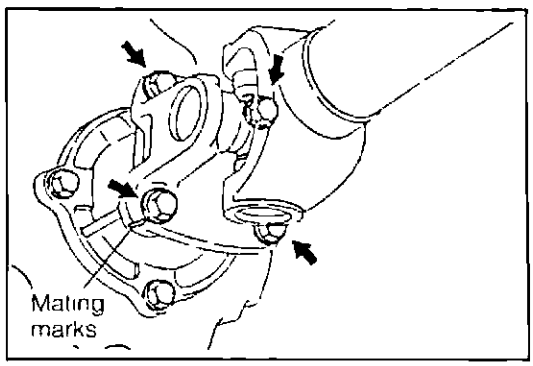
4. Working from the under vehicle
(1) Remove the transmission under cover by removing the four bolts

(2) Remove the both front and rear propeller shafts assembly by removing the four bolts
CAUTION:
- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.







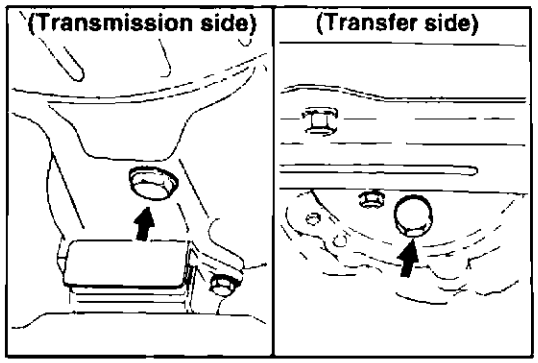


WRE91 MT015

(3) Drain the transmission and transfer oil by removing the drain plugs with gasket.

NOTE:

- Never reuse the removed gasket.
- After drain the oil completely, temporarily tighten the drain plugs with your fingers.

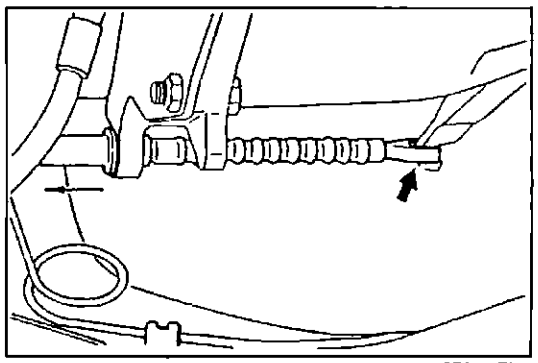


WRE91 MT016

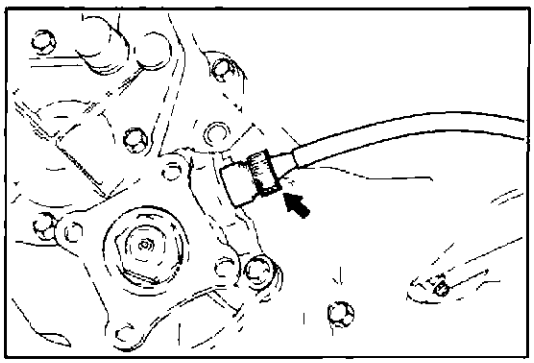
(4) Disconnect the clutch release cable assembly from the clutch release fork assembly at the lower part of the clutch housing

NOTE:

- While removing the clutch release cable assembly, care must be exercised not to damage the boot section of the clutch release cable assembly.


WRE91 MT017

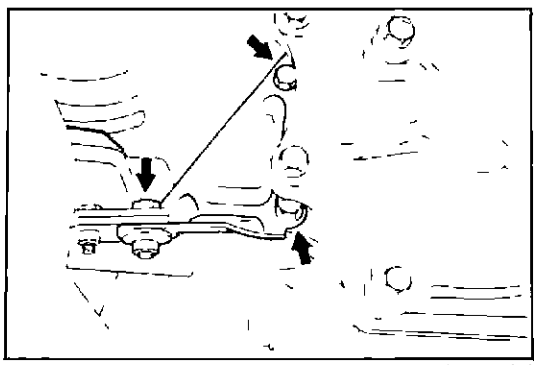
(5) Remove the speedometer cable, using the standard tool of plier


WRE91 MT018

(6) Remove exhaust support pipe bracket by removing the three bolts

WARNING:

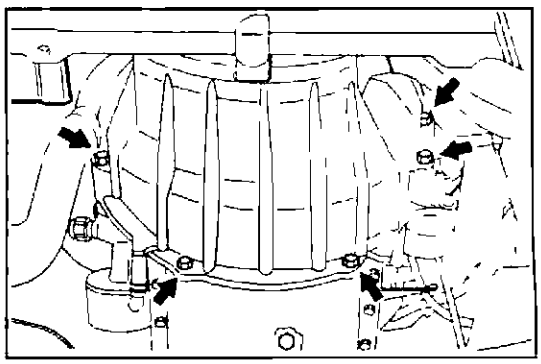
- Be sure to not touch the exhaust pipe because it may be still hot while after the engine has stopped.


WRE91 MT019

(7) Remove the seven transmission direct-connecting bolts. Also, remove the two bolts and two nuts of the rear end plate.

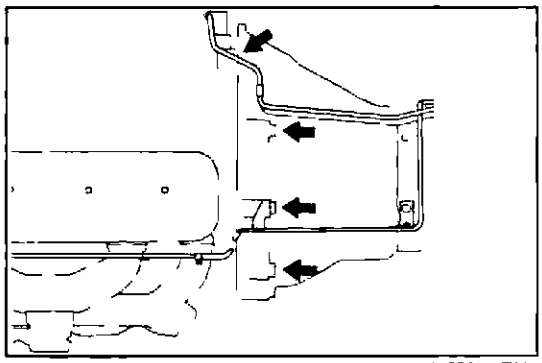
WARNING:

- Never touch the exhaust pipe because it may be still hot for a while after the engine stopped.

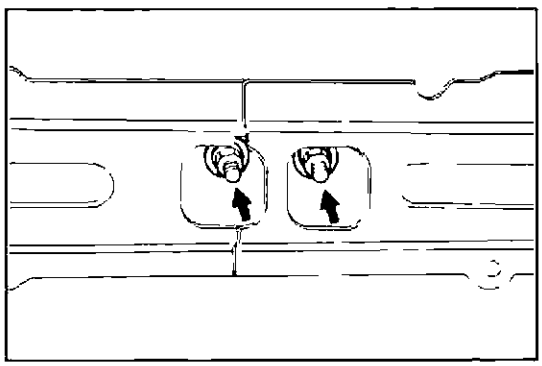


NOTE:

- When removing the five direct-connecting bolts at the upper section of the clutch housing, it is recommended to remove the bolts, using standard extension bars or the like that are joined to a length of approximately 650 to 700 mm.



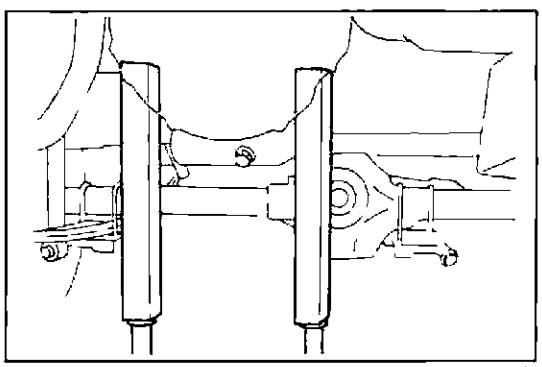
(8) Temporarily slacken the two nuts at the cross member No. 2.



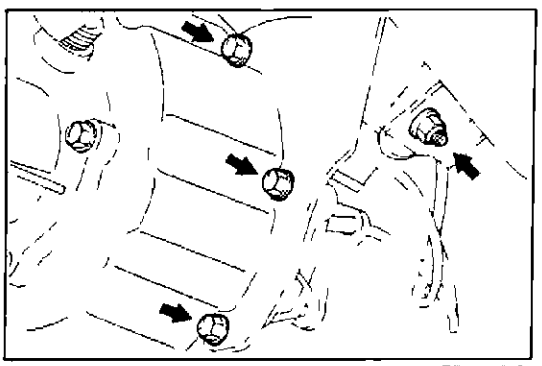
(9) Support the engine, using a jack, with suitable wooden pieces interposed.

CAUTION:

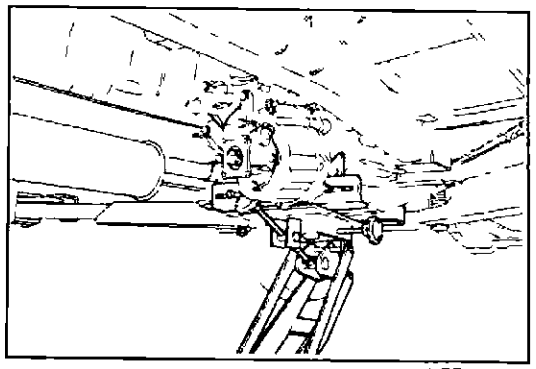
- Failure to observe this caution may deform the engine mounting rubber.



(10) Remove the transmission rear mounting bracket by removing the three bolts and nut.



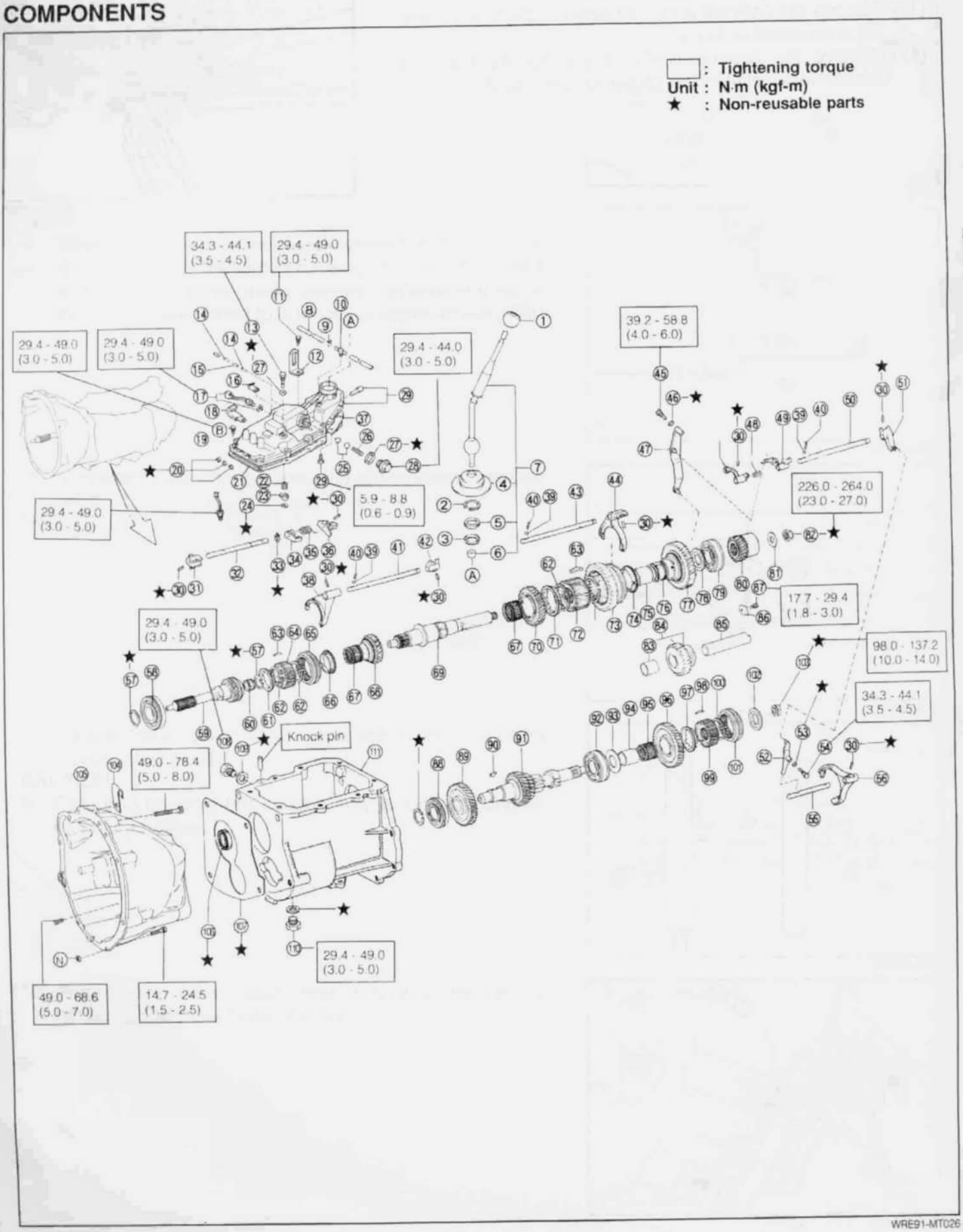
(11) Support the transmission and transfer Ay with the suitable transmission jack or the like
(12) Remove the both left and right sides of the four bolts at the crossmember No 2
(13) Remove the transmission and transfer Ay from the vehicle with installed the crossmember No. 2.



WPE91 MT025

TRANSMISSION (5-Speed)

COMPONENTS

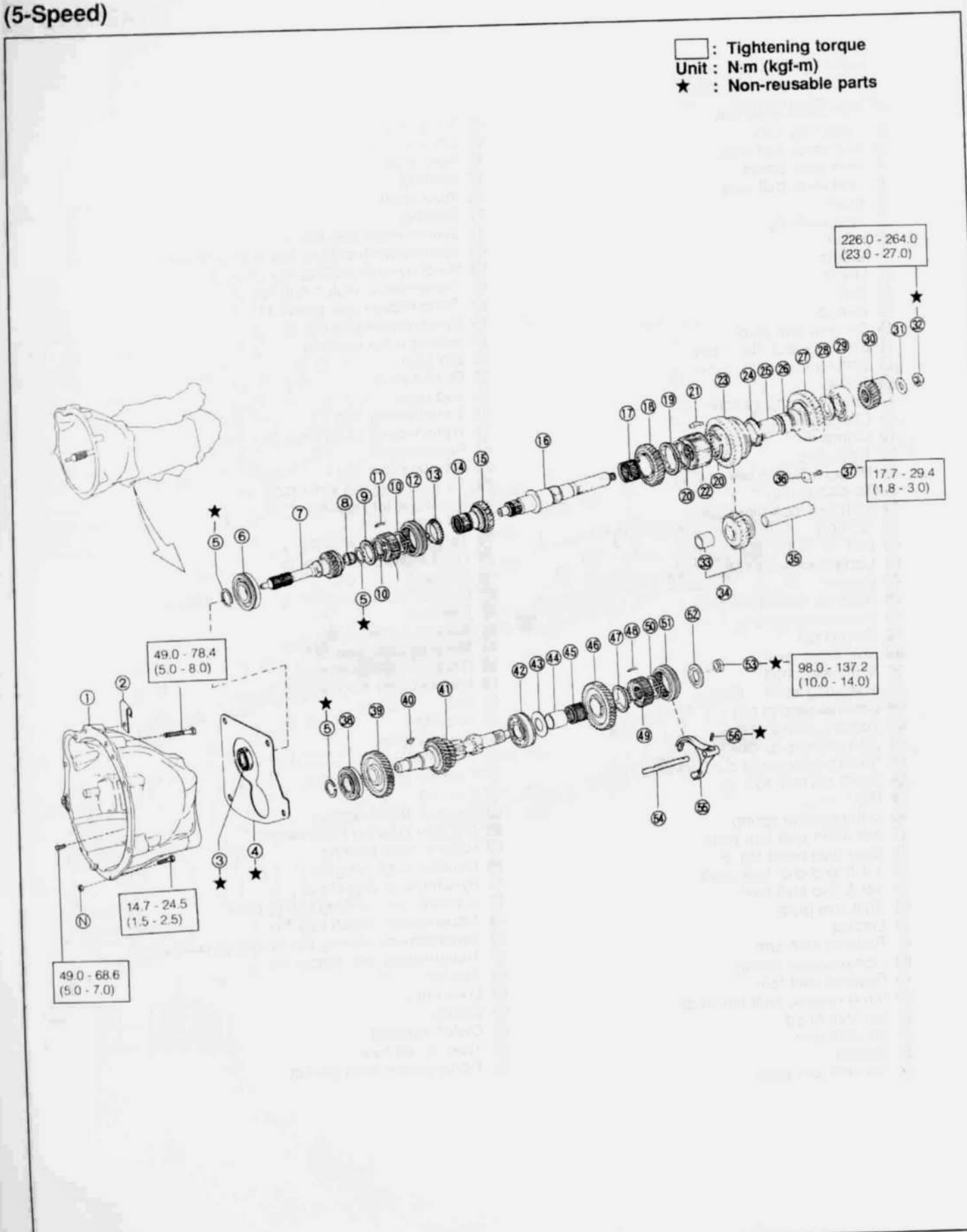


WRE91-MT026

① Shift lever knob S/A
② Snap ring hole
③ Shift lever ball seat
④ Shift lever boots
⑤ Shift lever ball seat
⑥ Bush
⑦ Shift lever Ay
⑧ Hose
⑨ Clamp
⑩ Union
⑪ Bolt
⑫ Hanger
⑬ 5th shift arm pivot
⑭ Shift interlock No. 1 pin
⑮ Shift interlock No. 2 pin
⑯ Clamp
⑰ Back-up lamp switch
⑱ Clamp
⑲ Clamp
⑳ Tight plug
㉑ Mission case cover gasket
㉒ Torsion spring
㉓ Shift fork lock plate S/A
㉔ "E"-ring
㉕ Ball
㉖ Compression spring
㉗ Gasket
㉘ Reverse restrict pin holder
㉙ Transmission case cover
㉚ Slotted pin
㉛ Shift inner lever
㉜ Shift lever shaft
㉝ Snap ring shaft
㉞ Reverse restrict pin
㉟ Torsion spring
㊱ Shift outer lever No. 1
㊲ Shift lever housing dust cover
㊳ 3rd & 4th shift fork
㊴ Ball
㊵ Compression spring
㊶ 3rd & 4th shift fork shaft
㊷ Gear shift head No. 2
㊸ 1st & 2nd shift fork shaft
㊹ 1st & 2nd shift fork
㊺ Shift arm pivot
㊻ Gasket
㊼ Reverse shift arm
㊽ Compression spring
㊾ Reverse shift fork
㊿ 5th & reverse shift fork shaft
(51) 5th shift head
(52) 5th shift arm
(53) Gasket
(54) 5th shift arm pivot
(55) 5th shift arm shaft
(56) 5th shift fork
(57) Hole snap ring
(58) Bearing
(59) Input shaft
(60) Bearing
(61) Synchronizer ring No. 3
(62) Synchromesh shifting key spring (2 pcs)
(63) Synchromesh shifting key (3 pcs)
(64) Transmission clutch hub No. 2
(65) Transmission hub sleeve No. 1
(66) Synchronizer ring No. 3
(67) Needle roller bearing
(68) 3rd gear
(69) Output shaft
(70) 2nd gear
(71) Synchronizer ring
(72) Transmission clutch hub No. 1
(73) Reverse gear
(74) Synchronizer ring
(75) 1st gear bearing inner race
(76) Needle roller bearing
(77) 1st gear
(78) 1st gear thrust washer
(79) Output shaft rear bearing
(80) 5th gear
(81) Conical spring washer
(82) Lock nut
(83) Bimetal formed bush
(84) Reverse idler gear S/A
(85) Reverse idler gear shaft
(86) Reverse idler stopper
(87) Bolt
(88) Bearing
(89) Counter gear
(90) Woodruff key
(91) Counter gear shaft
(92) Bearing
(93) 1st gear thrust washer
(94) 5th gear bearing inner race
(95) Needle roller bearing
(96) Counter shaft 5th gear
(97) Synchronizer ring No. 3
(98) Synchromesh shifting key (3 pcs)
(99) Transmission clutch hub No. 2
(100) Synchromesh shifting key spring (2 pcs)
(101) Transmission hub sleeve No. 1
(102) Spacer
(103) Lock nut
(104) Clamp
(105) Clutch housing
(106) Type "S" oil seal
(107) Transmission case gasket

WRE91-MT027

COMPONENTS OF INPUT SHAFT & COUNTER GEAR SHAFT RELATED PARTS (5-Speed)

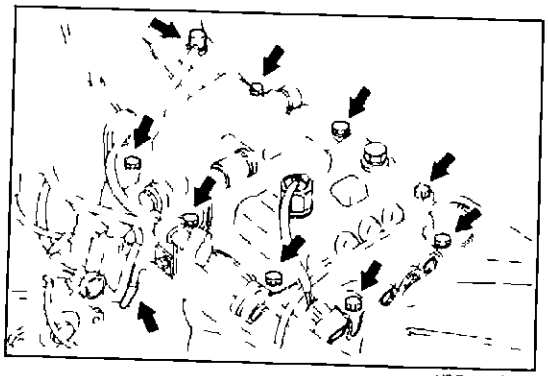


① Clutch housing
② Clamp
③ Type "S" oil seal
④ Transmission case gasket
⑤ Snap ring hole
⑥ Bearing
⑦ Input shaft
⑧ Needle roller bearing
⑨ Synchronizer ring No. 3
⑩ Synchromesh shifting key spring (2 pcs)
⑪ Synchromesh shifting key (3 pcs)
⑫ Transmission hub sleeve No. 1
⑬ Synchronizer ring No. 3
⑭ Needle roller bearing
⑮ 3rd gear
⑯ Output shaft
⑰ Needle roller bearing
⑱ 2nd gear
⑲ Synchronizer ring
⑳ Synchromesh shifting key spring (2 pcs)
㉑ Synchromesh shifting key (3 pcs)
㉒ Transmission clutch hub No. 1
㉓ Reverse gear
㉔ Synchronizer ring
㉕ 1st gear bearing inner race
㉖ Needle roller bearing
㉗ 1st gear
㉘ 1st gear thrust washer
㉙ Output shaft rear bearing
㉚ 5th gear
㉛ Conical spring washer
㉜ Lock nut
㉝ Bimetal formed bush
㉞ Reverse idler gear S/A
㉟ Reverse idler gear shaft
㊱ Reverse idler stopper
㊲ Bolt
㊳ Bearing
㊴ Counter gear
㊵ Woodruff key
㊶ Counter gear shaft
㊷ Bearing
㊸ 1st gear thrust washer
㊹ 5th gear bearing inner race
㊺ Needle roller bearing
㊻ Counter shaft 5th gear
㊼ Synchronizer ring No. 3
㊽ Synchromesh shifting key (3 pcs)
㊾ Transmission clutch hub No. 2
㊿ Synchromesh shifting key spring (1 piece)
(51) Transmission hub sleeve No. 1
(52) Spacer
(53) Lock nut
(54) 5th shift arm shaft
(55) 5th shift fork
(56) Slotted pin

WRE91 MT029

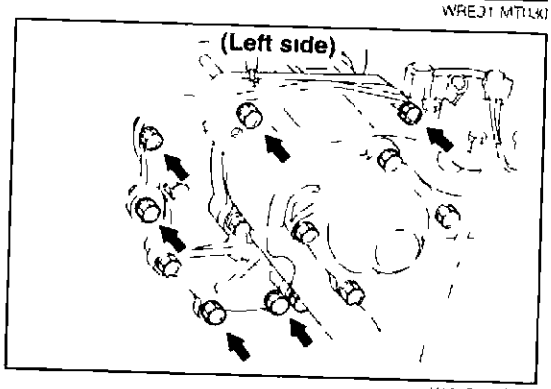
REMOVAL

1 Remove the clutch related parts
(Refer CL–section)
2 Separate the bleether hose and atmosphere tube
3 Remove the transmission case cover by removing the eight bolts
4 Remove the mission case cover gasket, using the standard tool of scraper
NOTE
- Never reuse the removed gasket.



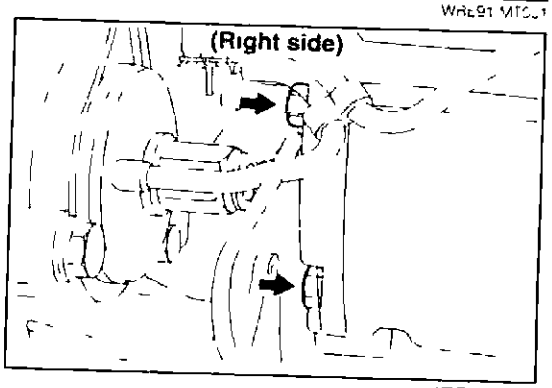
WRE91 MT040

5 Remove the eight bolts at the transfer connecting to the transmission case assembly



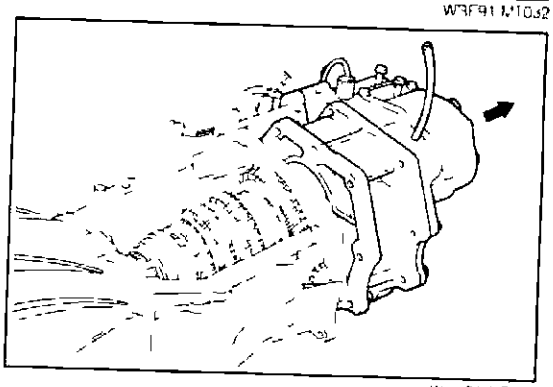
WRE91 MT041

NOTE·
- The right figure illustration indicates a power shift transmission



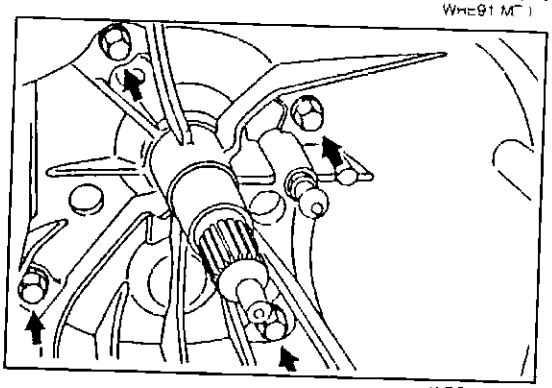
WRE91 MT042

6 Support the transfer assembly with the suitable jack
7 Pull out the transfer assembly toward you



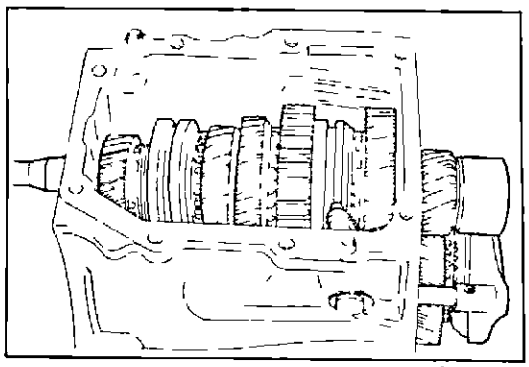
WRE91 MT043

8 Remove the clutch housing case by removing the four bolts
9 Remove the transmission gasket, using the standard tool of scraper
NOTE:
- Never reuse the removed gasket.



WRE91 MT034

10 Make sure to measure and record the observed backlash and thrust clearance of the each gears for later reference at time of installation, prior to remove the gears
(1) Backlash (use a dial gauge)



Unit: mm

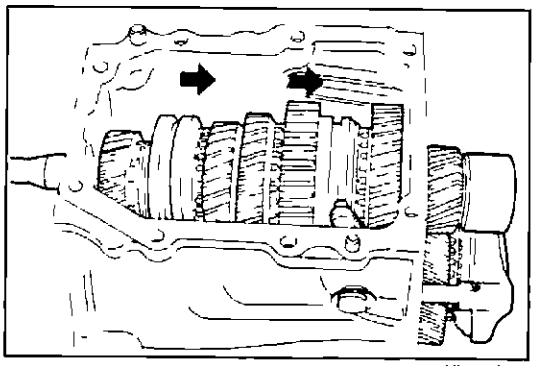
	1st	2nd	3rd	4th	5th
Specified value	0.06 – 0.20	0.06 – 0.20	0.06 – 0.20	0.06 – 0.20	0.06 – 0.20
Allowable limit	0.25	0.25	0.25	0.25	0.25

(2) Thrust clearance (use the filler gauge)

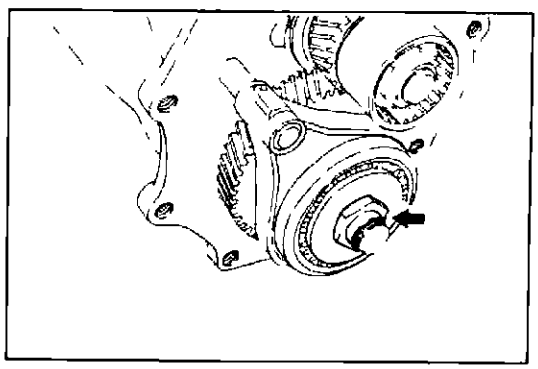
Unit: mm

	1st	2nd	3rd	5th
Specified value	0.11 – 0.29	0.10 – 0.30	0.13 – 0.57	0.12 – 0.28
Allowable limit	0.35	0.35	0.6	0.35

11 Interlock the 1st and 3rd gears

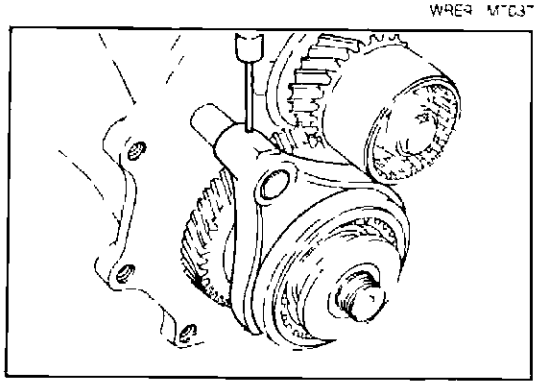


12 Remove the transfer case front gasket
NOTE:
- **Never reuse the removed gasket.**

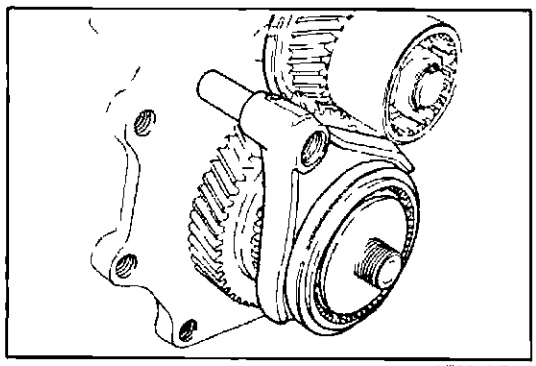


13 Raise the lock section of the lock nut
14 Remove the lock nut of the counter gear shaft
NOTE:
- **Never reuse the removed lock nut.**

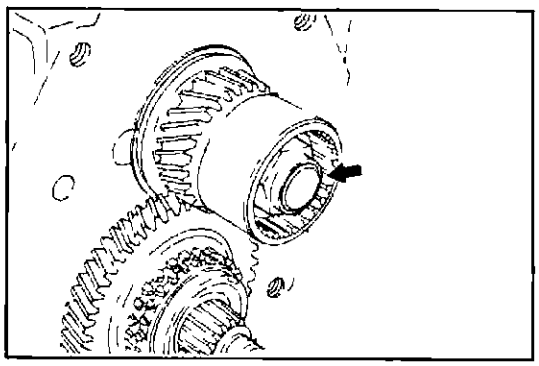
15 Drive off the slotted pin of the 5th shift fork
NOTE:
- **Never reuse the removed slotted pin.**



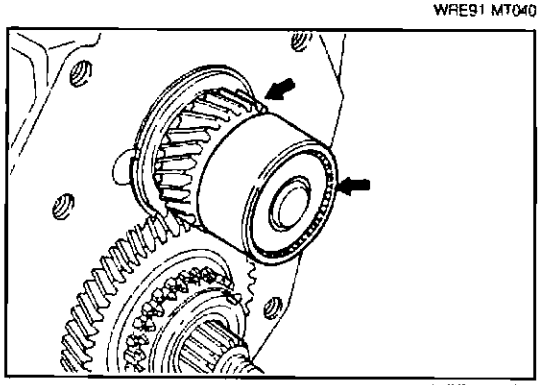
16 Remove the following parts in a set, while the 5th shift arm is pulled toward the inside transmission
(1) 5th shift arm shaft
(2) 5th shift fork
(3) Transmission hub sleeve No 1
(4) Synchromesh shifting key spring ... . 1 piece
(5) Synchromesh shifting key . .. . 3 pcs
(6) Transmission clutch hub No 2
(7) 1st gear thrust washer


WRE91 MT039

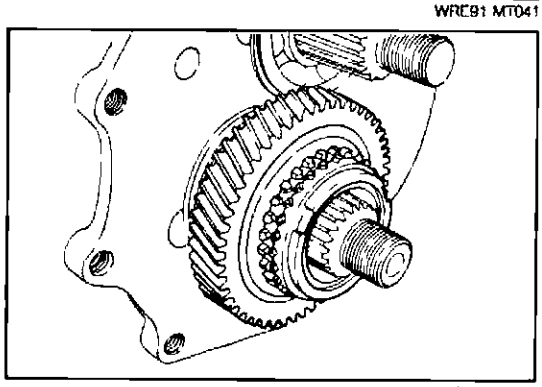
17 Raise the lock section of the lock nut
18 Remove the lock nut of the output shaft
NOTE:
- **Never reuse the removed lock nut.**


WRE91 MT040

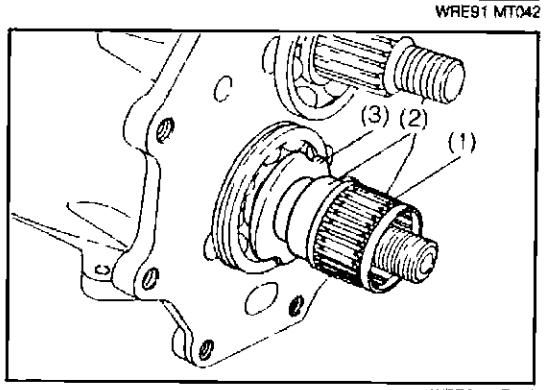
19 Remove the conical spring plate washer and 5th gear from the output shaft


WRE91 MT041

20 Remove the 5th gear and synchronizer ring NO. 3 from the counter gear shaft.

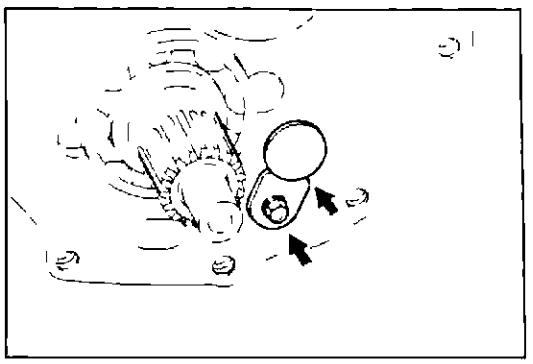

WRE91 MT042

21 Remove the following parts.
(1) Needle roller bearing
(2) 5th gear bearing inner race
(3) 5th gear thrust washer

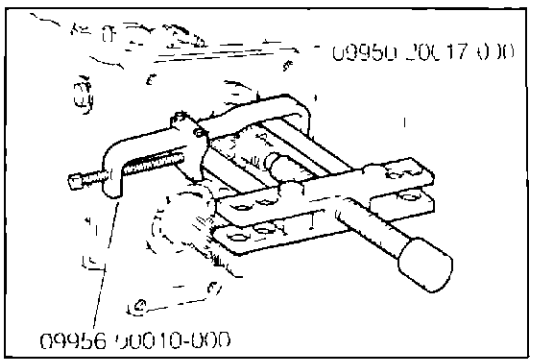


WRE91 MT043

22 Remove the reverse idler gear stopper by removing a bolt
23 Pull-out the reverse idler gear shaft toward you

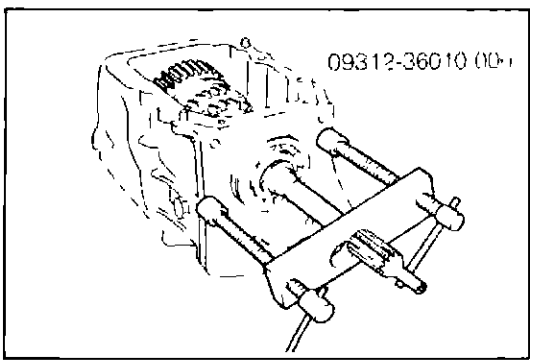


24 Detach the stop ring of the output shaft rear bearing.
25 Remove the output shaft rear bearing, using the following SSTs
SSTs: 09950-20017-000
09956-00010-000

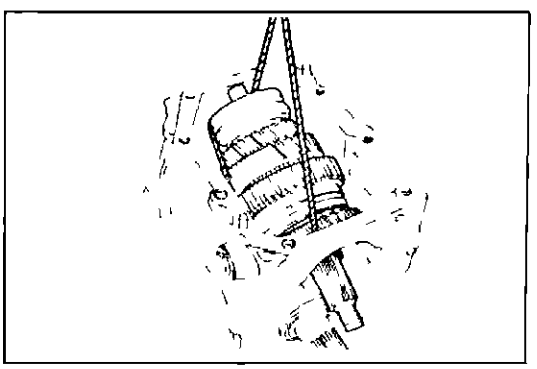


26 Remove the input shaft with the snap ring shaft and bearing installed, using the following SST
SST: 09312-36010-000

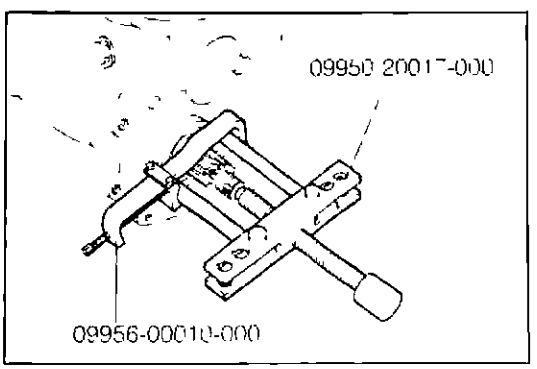
NOTE:
- **Ensure that the input shaft gear cut-out section faces toward the bottom side of transmission case, prior to remove.**



27 Using an operation rope (outer diameter about 3 mm), remove the output shaft assembly from the transmission case



28 Remove the reverse idler gear S/A from the transmission case
29 Counter gear shaft bearings removal
(1) Remove the rear bearing, using the following SSTs
SSTs: 09950-20017-000
09956-00010-000



(2) Remove the snap ring shaft of the front bearing, using the standard tool of snap ring plier.

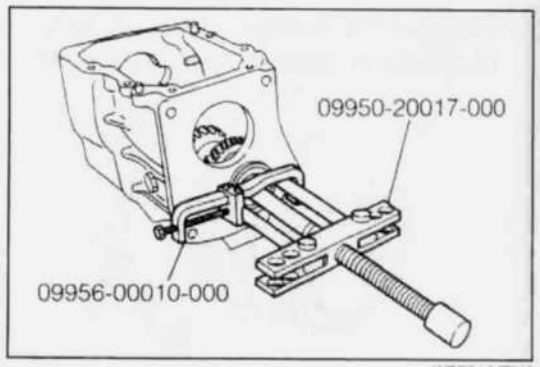
NOTE:

- Never reuse the removed snap ring shaft.

(3) Detach the stop ring.

(4) Remove the front bearing, using the following SSTs.

SSTs: 09950-20017-000
09956-00010-000

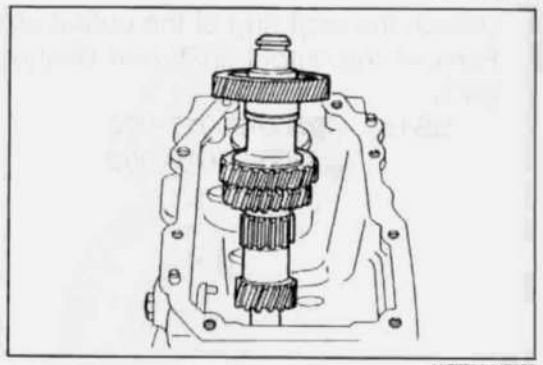


WRE91-MT049

30. Remove the counter gear shaft from the transmission case.
31. Raise the lock sections of the 5th shift arm pivot.
32. Remove the 5th shift arm pivot with the gasket.

NOTE:

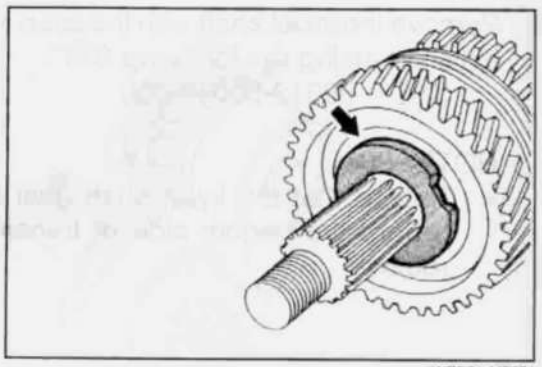
- Never reuse the removed gasket.



WRE91-MT050

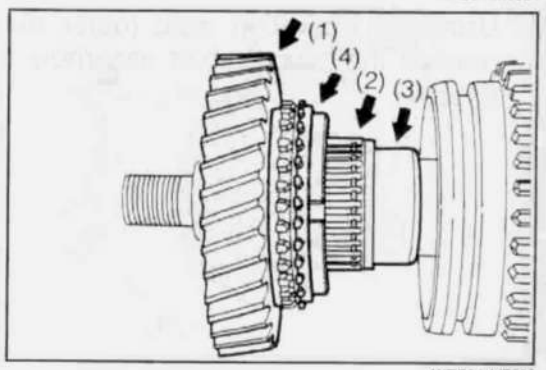
DISASSEMBLY OF OUTPUT SHAFT

1. Remove the 1st gear thrust washer.



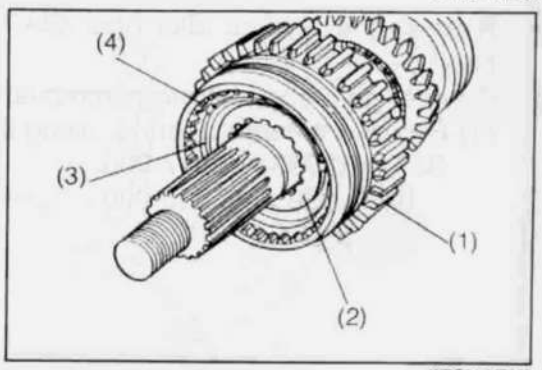
WRE91-MT051

2. Remove the following parts.
   (1) 1st gear
   (2) Needle roller bearing
   (3) 1st gear bearing inner race
   (4) Synchronizer ring



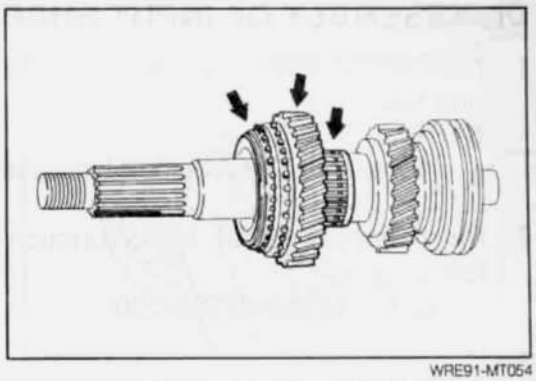
WRE91-MT052

3. Remove the following parts in a set.
   (1) Reverse gear
   (2) Transmission clutch hub No. 1
   (3) Synchromesh shifting key spring ..... 2 pcs
   (4) Synchromesh shifting key ..... 3 pcs



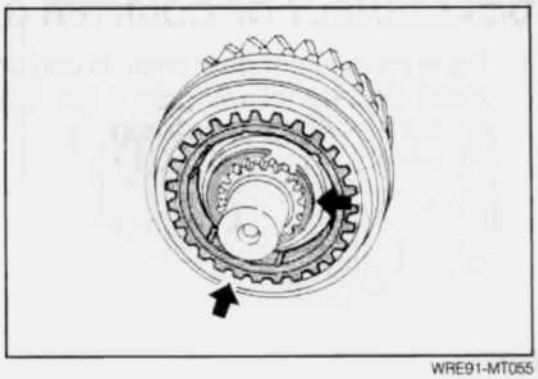
WRE91-MT053

4. Remove the synchronizer ring.
5. Remove the 2nd gear.
6. Remove the needle roller bearing.



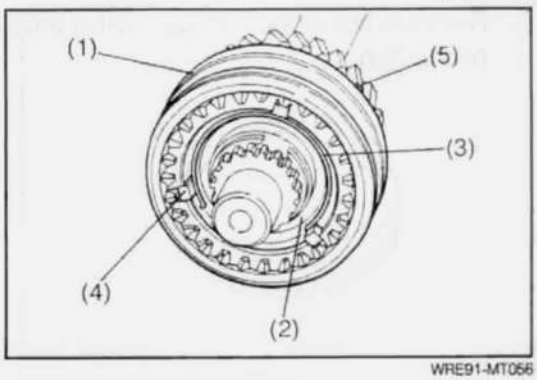
WRE91-MT054

7. Remove the synchronizer ring and the snap ring shaft, using the standard tool of snap ring plier.
   NOTE:
   - **Never reuse the removed snap ring shaft.**



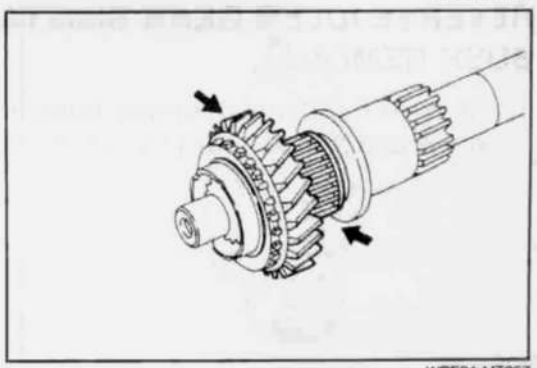
WRE91-MT055

8. Remove the following parts in a set.
   (1) Transmission hub sleeve No. 1
   (2) Transmission clutch hub No. 2
   (3) Synchromesh shifting key spring ..... 2 pcs
   (4) Synchromesh shifting key ..... 3 pcs
   (5) Synchronizer ring



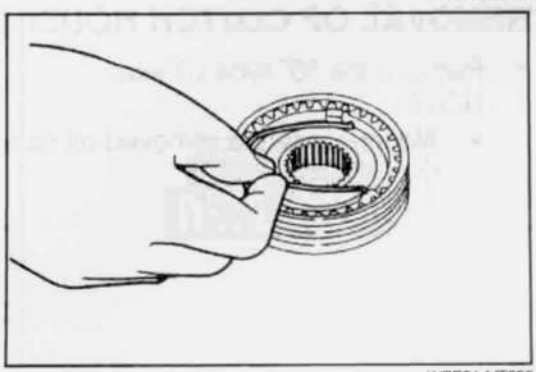
WRE91-MT056

9. Remove the 3rd gear.
10. Remove the needle roller bearing.



WRE91-MT057

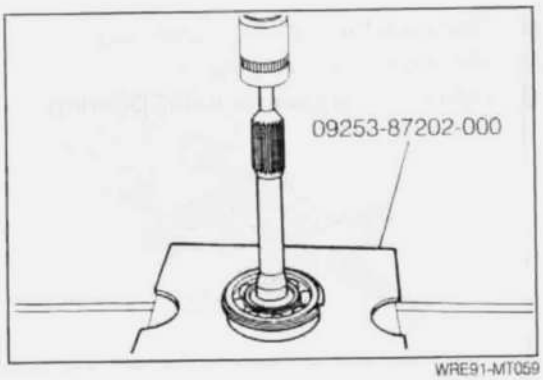
11. Remove the synchromesh shifting key spring and synchromesh shifting key from the following parts.
    (1) T/M clutch hub No. 1 ..... 1st & 2nd gear
    (2) T/M clutch hub No. 2 ..... 3rd, 4th & 5th gear



WRE91-MT058

DISASSEMBLY OF INPUT SHAFT

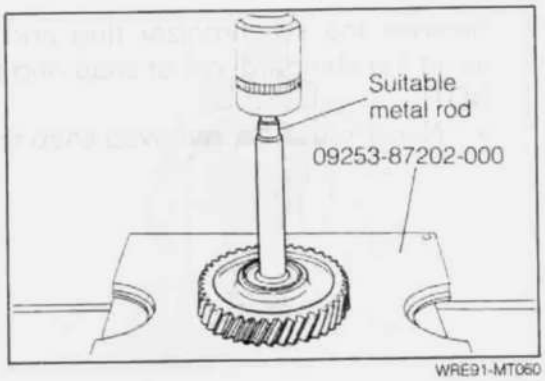
1. Remove the snap ring shaft, using the standard tool of snap ring plier.
   NOTE:
   - Never reuse the removed snap ring shaft.
2. Remove the bearing, in conjunction with a press and the following SST.
   SST: 09253-87202-000



WRE91-MT059

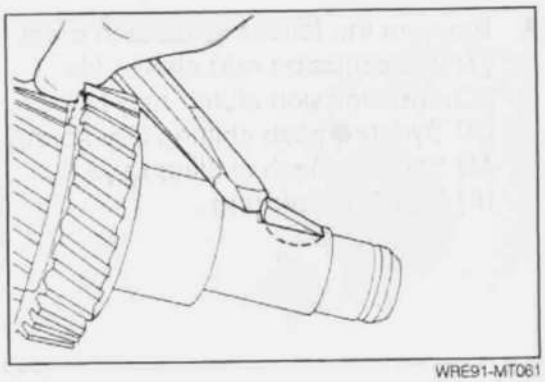
DISASSEMBLY OF COUNTER GEAR SHAFT

1. Press the counter gear shaft, in conjunction with the suitable metal rod and following SST.
   SST: 09253-87202-000



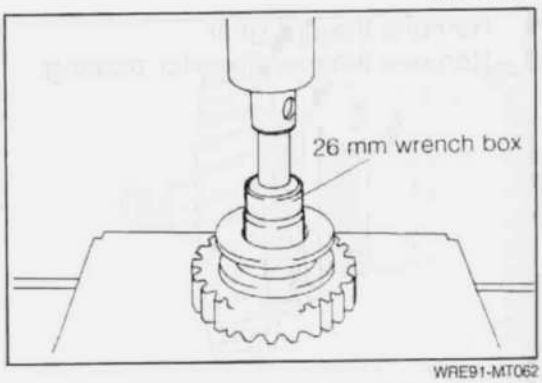
WRE91-MT060

2. Remove the woodruff key, using the standard tool of chiesel or the like.


WRE91-MT061

REVERSE IDLER GEAR BIMETAL FORMED BUSH REMOVAL

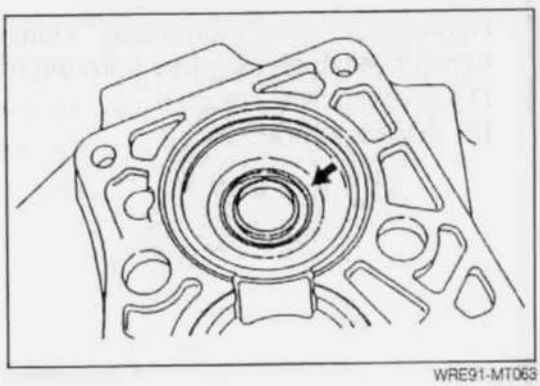
1. Remove the bimetal formed bush, in conjunction with the press and the standard tool of 26 mm wrench box.



WRE91-MT062

REMOVAL OF CLUTCH HOUSING OIL SEAL

1. Remove the "S" type oil seal.
   NOTE:
   - Never reuse the removed oil seal.


WRE91-MT063

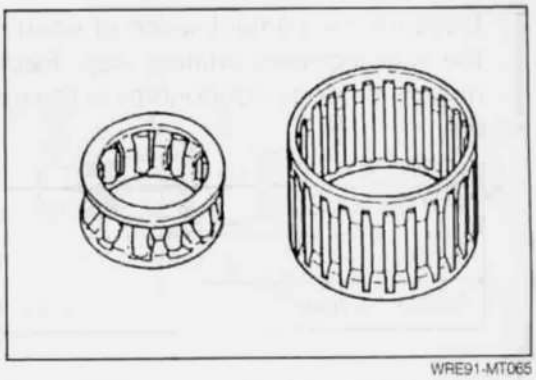
INSPECTION

1. Each ball bearings.
   Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any sticking.



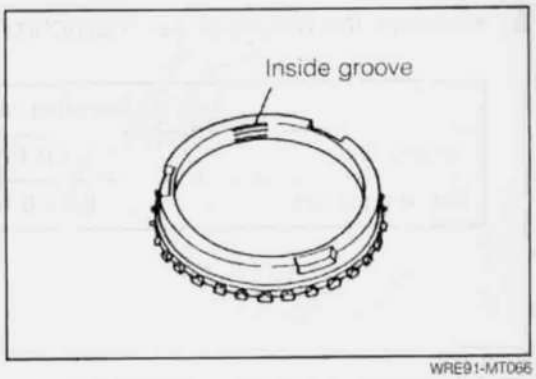
WRE91-MT064

2. Each needle roller bearings.
   Check each needle roller bearing for wear or damage.



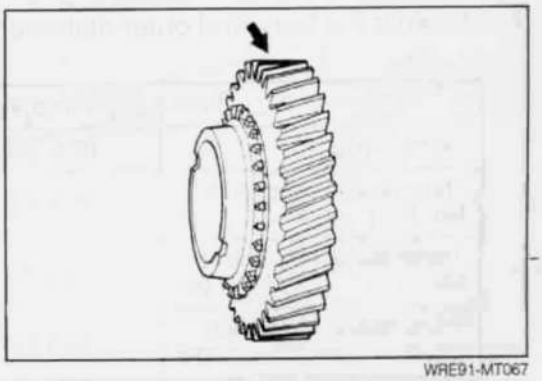
WRE91-MT065

3. Check the inside groove of the synchronizer ring for wear or damage.



WRE91-MT066

4. Check each gears for wear or damage.

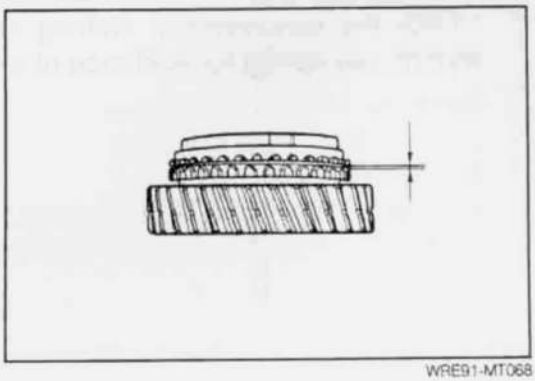


WRE91-MT067

5. Measure the clearance between each gear and the synchronizer rings, using the standard tool of filler gauge.

Unit: mm

Item	Specified value	Allowable limit
All gears	1.3 - 1.7	0.8



WRE91-MT068

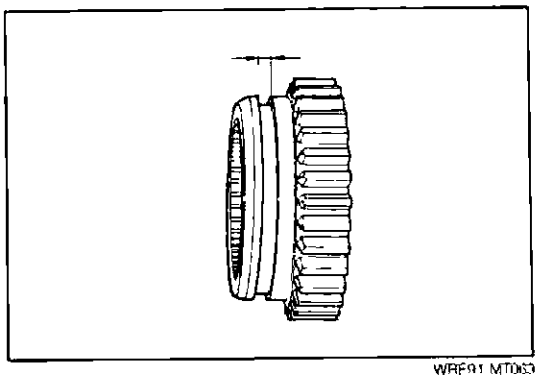
NOTE:

- The measurement should be performed at several points for each gears. The minimum value is regarded as the clearance for the said gear.

6 Measure the contact width (A) of the following parts with the shift fork

Unit: mm

Item / Measuring point	Specified value	Allowable limit
Reverse gear	7 [illegible]	7.3
Transmission hub sleeve No. 1, No. 2	7 [illegible]	7.3

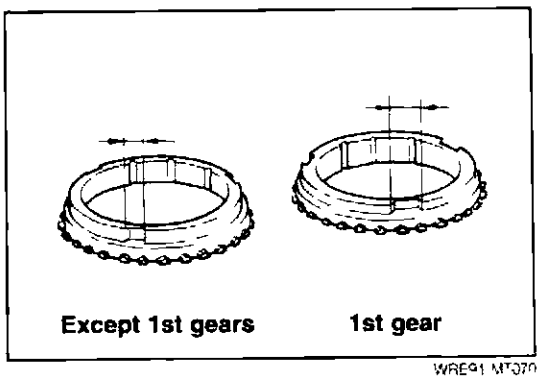


WRE91 MT069

7 Measure the contact width of each synchronizer ring with the synchromesh shifting key. Replace the synchronizer ring which does not confirm to the specifications with new one

Unit: mm

Item	Specified value	Allowable limit
1st gear	8.4 ± 0.1	8.5
Except 1st gear	11.0 ± 0.1	11.1

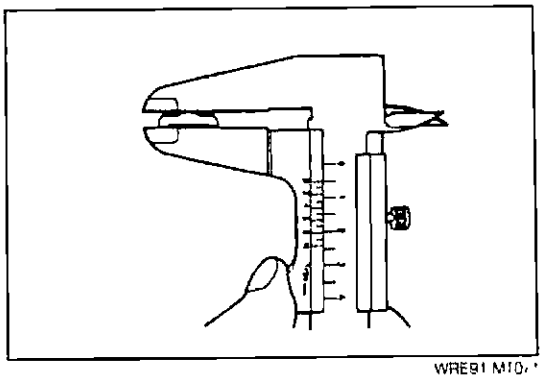


WRE91 MT070

8 Measure the height of each synchromesh shifting key

Unit: mm

Item	Specified value	Allowable limit
1st and 2nd	6 ± 0.15	5.6
3rd, 4th and 5th	5.8 ± 0.15	5.4

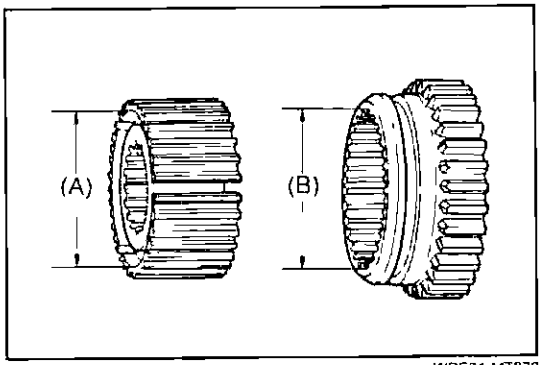


WRE91 MT0[illegible]

9 Measure the bore and outer diameter of the following parts

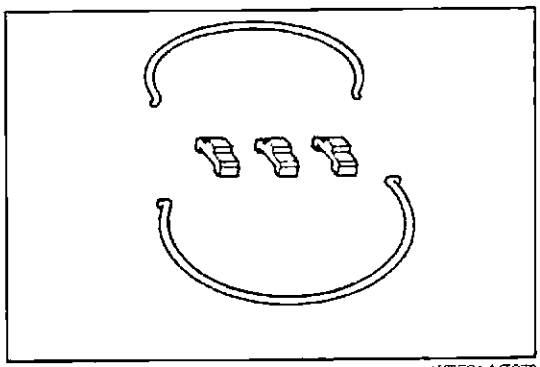
Unit: mm

Item	Specified value	Allowable limit
Reverse gear (B)	87.5 [illegible]	87.5
Transmission clutch hub No. 1 (A)	87.5 [illegible]	87.3
Transmission hub sleeve No. 1 (B)	72.5 [illegible]	72.7
Transmission clutch hub No. 2 (A)	72.5 [illegible]	72.3



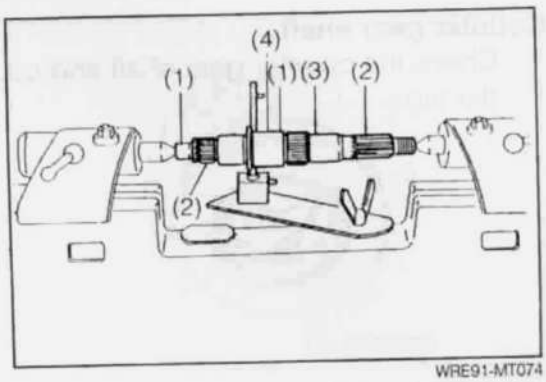
WRE91 MT072

10 Check the synchromesh shifting key and synchromesh shifting key spring for evidence of wear or damage



WRE91 MT073

11. Check the output shaft for the following items.
    (1) Needle roller bearing race section for wear or damage
    (2) Spline section for damage
    (3) Fitting section of bearing inner race for wear
    (4) Measure the runout of the output shaft at the 2nd gear section
    Allowable Limit: 0.05 mm

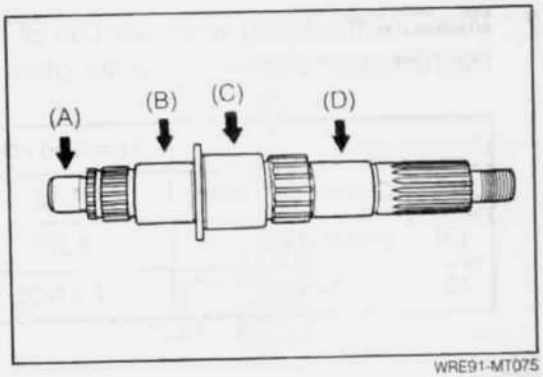


WRE91-MT074

12. Measure the following section of the output shaft.

Unit: mm

Item / Measuring point	Specified value	Allowable limit
(A) Section	$23.0^{-0.007}_{-0.020}$	22.98
(B) Section	$40.0^{-0.015}_{-0.030}$	39.97
(C) Section	$48.0^{-0.015}_{-0.030}$	47.97
(D) Section	$38.0^{-0.005}_{-0.021}$	37.98

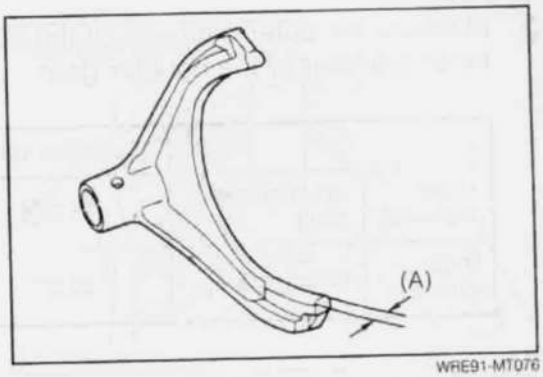


WRE91-MT075

13. Measure the contact width 5th shift fork (A) with the transmission hub sleeve No. 1.

Unit: mm

Item / Measuring point	Specified value	Allowable limit
(A) Section	$7^{-0.1}_{-0.2}$	6.3

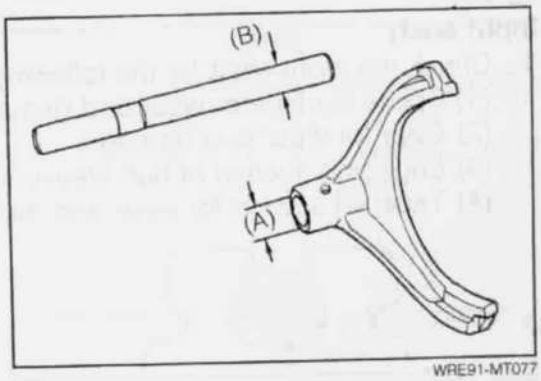


WRE91-MT076

14. Measure the following sections.

Unit: mm

Item	Specified value	Allowable limit
5th shift fork (A)	$14^{+0}_{+0.027}$	13.97
5th shift arm shaft (B)	$14^{+0.027}_{+0}$	14.03

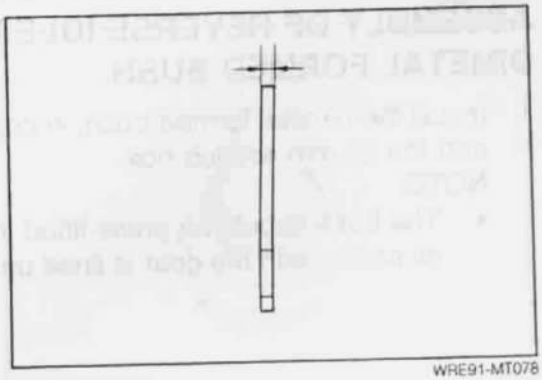


WRE91-MT077

15. Measure the thickness of 1st gear thrust washer.

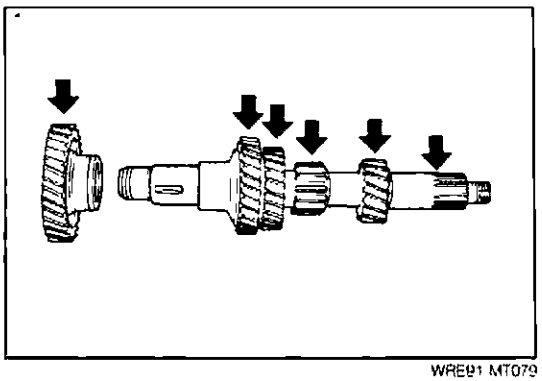
Unit: mm

Item	Specified value	Allowable limit
Thickness	4 ± 0.1	3.85


WRE91-MT078

Counter gear shaft

1 Check the counter gear shaft and counter gear for wear or damage

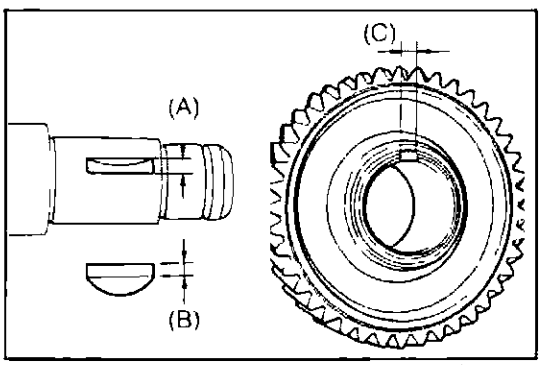


WRE91 MT079

2 Measure the fitting width section of the woodruff key with counter gear shaft and counter gear

Unit: mm

		Specified value	Allowable limit
(A)	Counter gear shaft	$7^{0.02}_{-0.05}$	7.02
(B)	Woodruff key	$7^{+0.015}_{0}$	7.0
(C)	Counter gear	7 ± 0.02	7.02

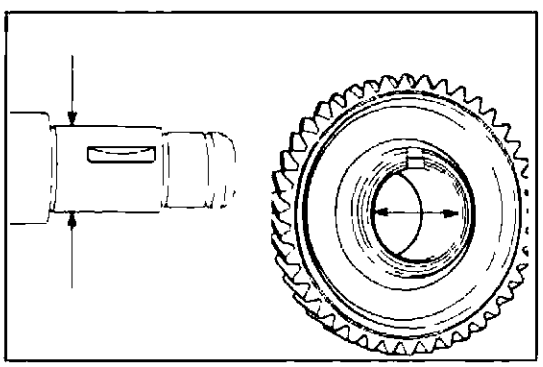


WRE91 MT080

3 Measure the outer diameter of the counter gear shaft and inner diameter of the counter gear

Unit: mm

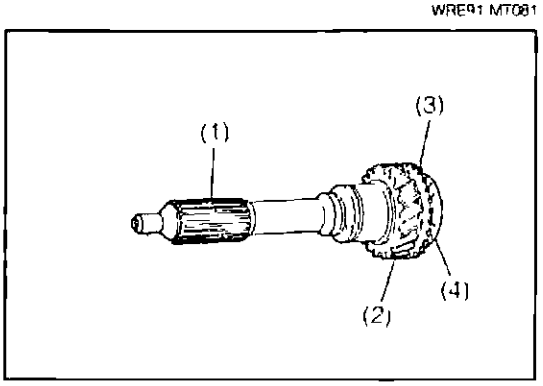
		Specified value	Allowable limit
Outer diameter	Counter gear shaft	$35^{-0.050}_{-0.084}$	35.05
Inner diameter	Counter gear	$35^{+0.025}_{0}$	35.0



WRE91 MT081

Input shaft

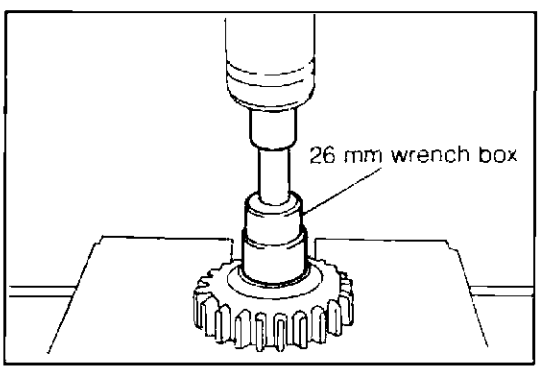
1 Check the input shaft for the following items
(1) Spline section for wear and damage
(2) Gear for wear and damage
(3) Engaging section of hub sleeve for wear and damage
(4) Tapered section for wear and damage



WRE91 MT082

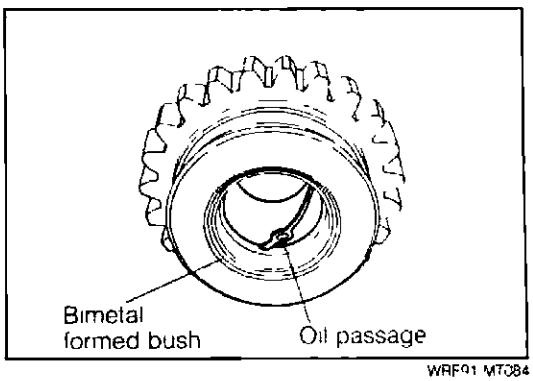
ASSEMBLY OF REVERSE IDLER GEAR BIMETAL FORMED BUSH

1 Install the bimetal formed bush, in conjunction with a press and the 26 mm wrench box
NOTE:
- The bush should be press-fitted in such a way that the oil passage in the gear is lined up with that in bush.



WRE91 MT083

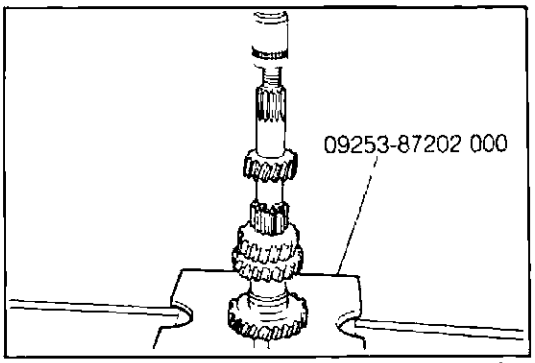
- After the bush has press-fitted securely, each edge of the bush should be recessed 1 mm from the edge of gear, respectively.
- If the above operation should fail to be performed, failure to observe this notice causes emanating of noise or seizure of bimetal formed bush.



WRE91 MT084

ASSEMBLY OF COUNTER GEAR SHAFT

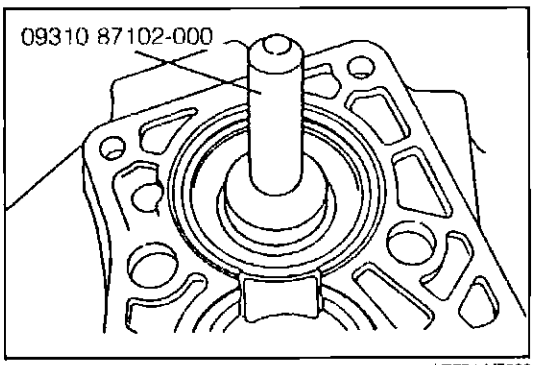
1 Install the woodruff key into place
2 Press the counter gear to the counter gear shaft, using the following SST
SST: 09253-87202-000



WRE91 MT085

INSTALLATION OF CLUTCH HOUSING OIL SEAL

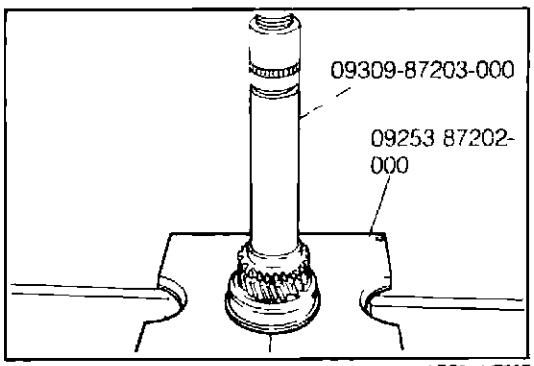
1 Install the new "S" type oil seal, using the following SST.
SST: 09310-87102-000



WRE91 MT086

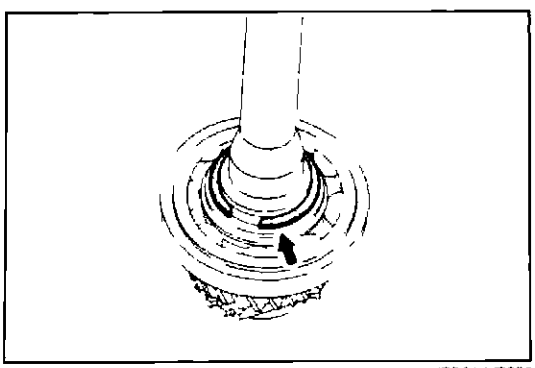
ASSEMBLY OF INPUT SHAFT

1 Press the bearing, using the following SSTs.
SSTs: 09253-87202-000
09309-87203-000



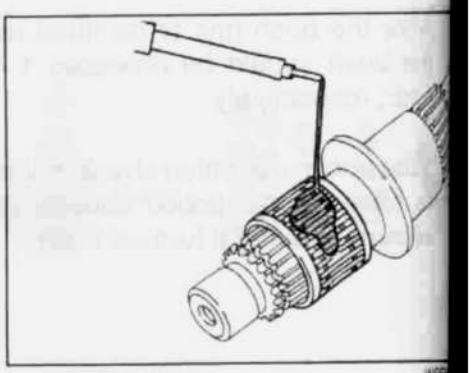
WRE91 MT087

2 Install the new shaft snap ring
NOTE:
- Ensure that the shaft snap ring should be installed to the groove section of the input shaft securely.

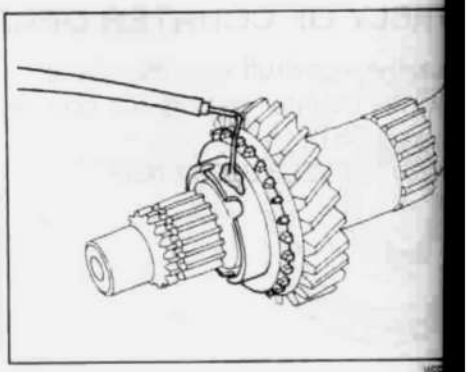

WRE91 MT088

ASSEMBLY OF OUTPUT SHAFT

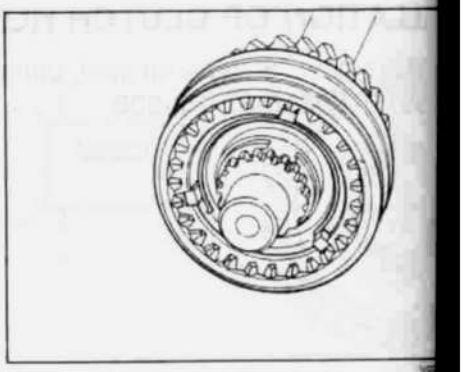
1. Apply gear oil to the outer periphery of needle roller bearing and output shaft.



2. Install the 3rd gear.
3. Apply gear oil to the tapered section of 3rd gear.

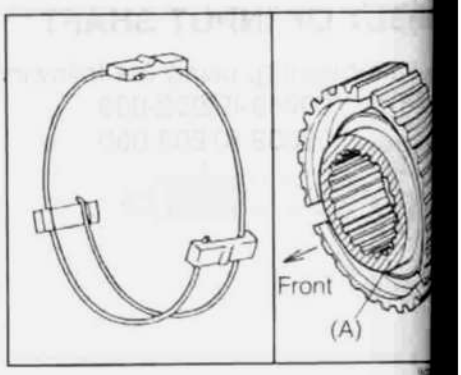


4. Install the following parts in this sequence.
   (1) Synchronizer ring No. 3
   (2) Transmission clutch hub No. 2
   (3) Synchromesh shifting key spring ..... 2 pcs
   (4) Synchromesh shifting key ..... 3 pcs
   (5) Transmission hub sleeve No. 1

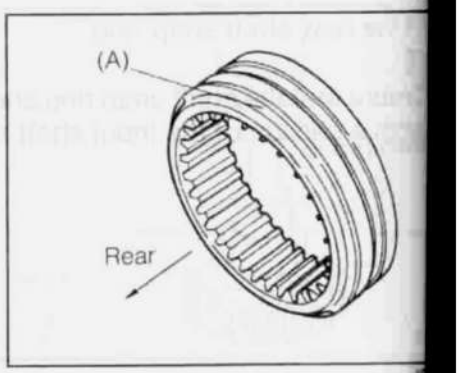


CAUTION:
- Transmission clutch hub No. 2 (A) section faces toward the front side. If this operation should fail to be performed, Failure to observe this caution may causes emanating of noise.

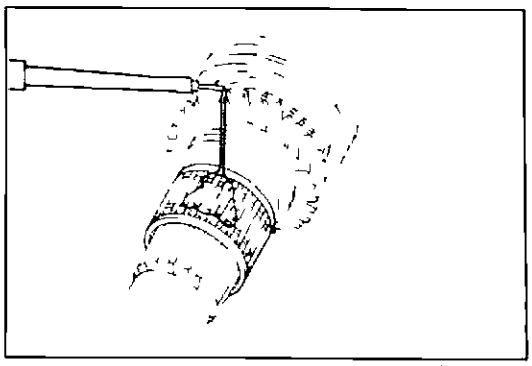
NOTE:
- As for the synchromesh shifting key spring, the bent sections at the front and rear should not come at the same direction, as shown in the right figure illustration.



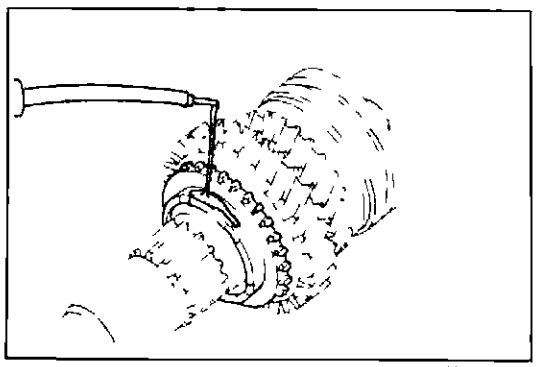
NOTE:
- Ensure that the transmission clutch hub No. 2 (A) section facer toward rear side.



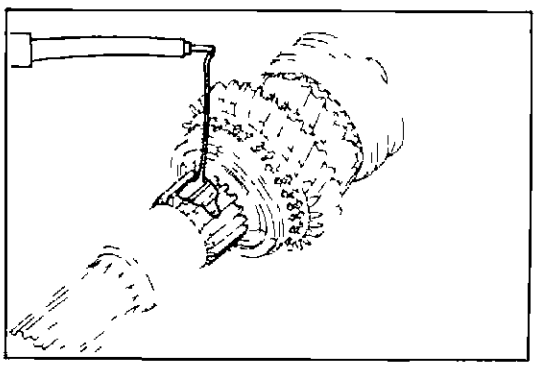
5 Apply gear oil to the outer periphery of needle roller bearing and output shaft



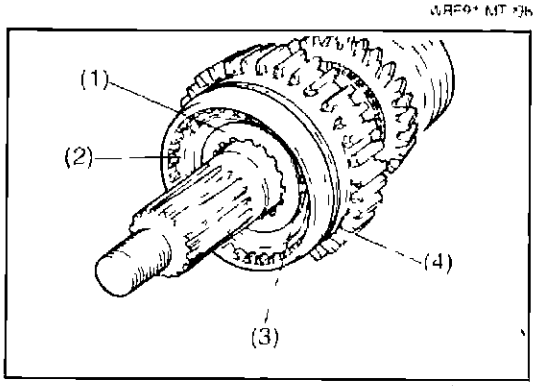
6 Install the 2nd gear
7 Apply gear oil to the tapered section of the 2nd gear



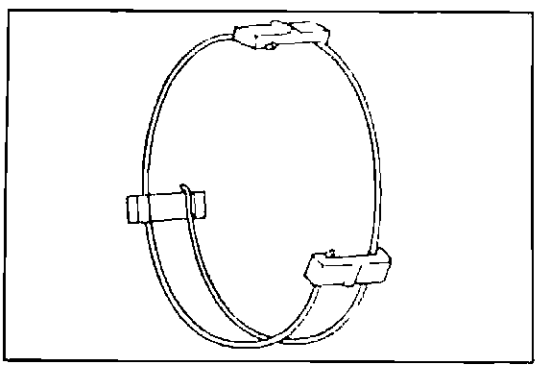
8 Install the synchronizer ring
9 Apply gear oil to the spline section of the output shaft



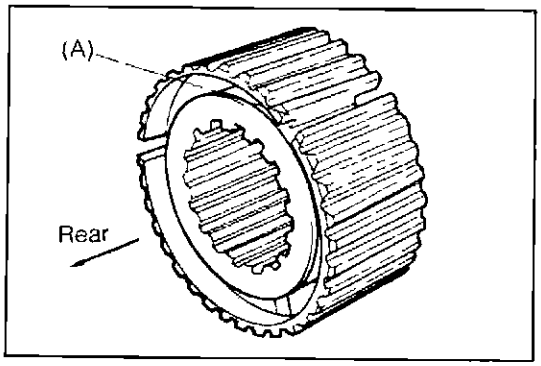
10 Install the following parts in this sequence
(1) Transmission clutch hub No. 1
(2) Synchromesh shifting key spring — 2 pcs
(3) Synchromesh shifting key — 3 pcs
(4) Reverse gear



NOTE:
- As for the synchromesh shifting key spring, the bent sections at the front and rear should not come at the same direction, as shown in the right figure.

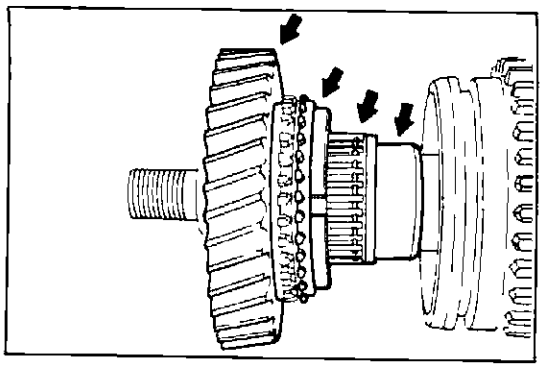


NOTE:
- Ensure that the transmission clutch hub No. 1 (A) section faces toward rear side.

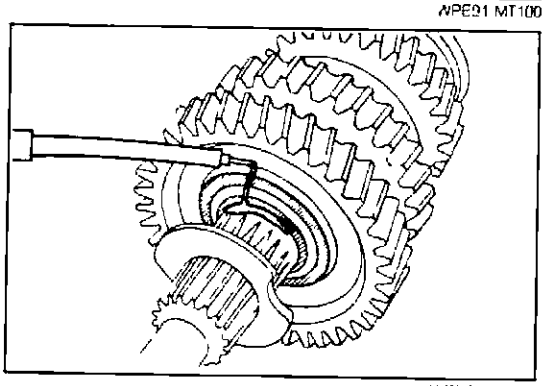


WRE9 MT099

11 Apply gear oil to the tapered section of the 1st gear
12. Install the synchronizer ring.
13 Apply gear oil to the outer periphery of the following parts.
(1) Output shaft
(2) 1st gear bearing inner race
(3) Needle roller bearing


WRE91 MT100

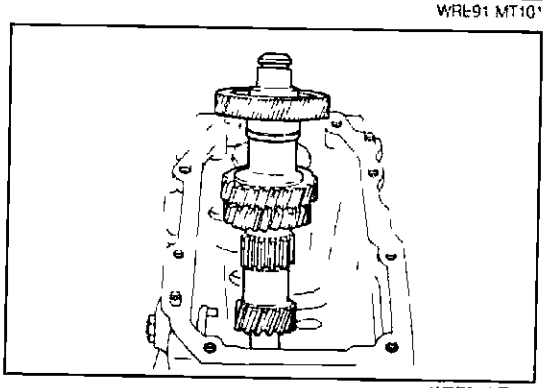
14 Apply gear oil to the A (slant line section in the right figure) section
15 Install the 1st gear thrust washer.


WRE91 MT101

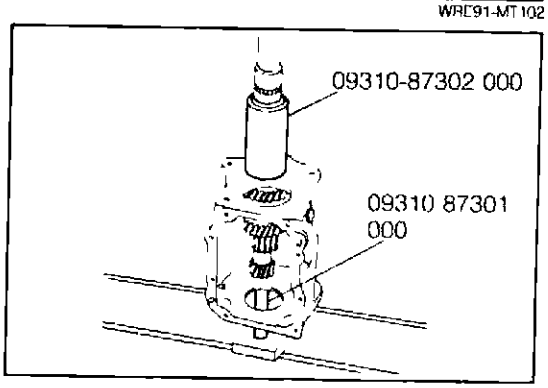
INSTALLATION

NOTE:
- Clearn the transmission case by removing any dirt, gasket materials or the like, prior to install the gears etc..

1 Place the counter gear shaft to the transmission case.

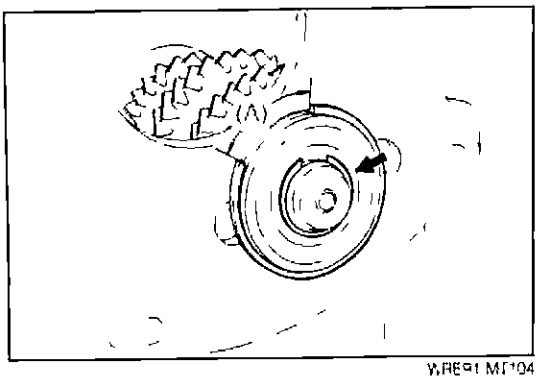

WRE91-MT102

2 Press the bearings of counter gear shaft provided at the front and rear, using the following SSTs
SSTs: 09310-87301-000
09310-87302-000



WRE91-MT103

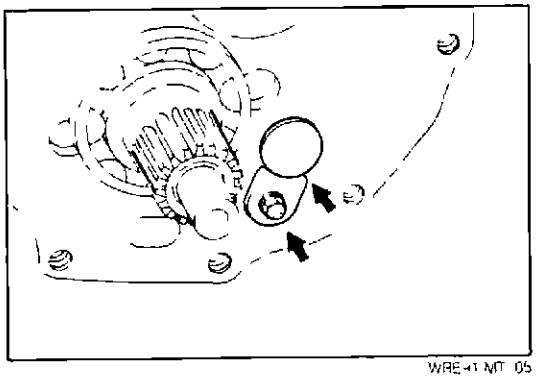
3 Install the new snap ring shaft on the front end of counter gear shaft
NOTE:
- Ensure that the snap ring shaft should be installed to the groove section of the counter gear shaft securely.



WRE91 MT104

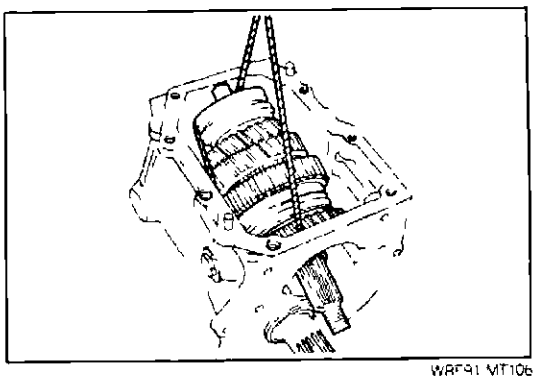
4 Attach the stop ring
NOTE:
- Ensure that the end gap (A) section of the stop ring faces toward the installation hole of input shaft bearing as right figure illustration.

5 Install the reverse idler gear S/A by instarting the reverse idler gear shaft.
NOTE:
- Apply gear oil to the outer periphery of reverse idler gear shaft, prior to insert.

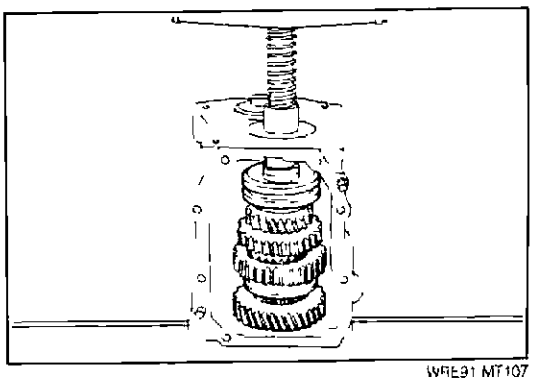

WRE91 MT105

6 Tighten the idler gear stopper with a bolt
Tightening Torque: 9.8 - 15.6 N·m (1.0 - 1.6 kgf-m)

7 Using an operation rope, install the output shaft assembly to the transmission case

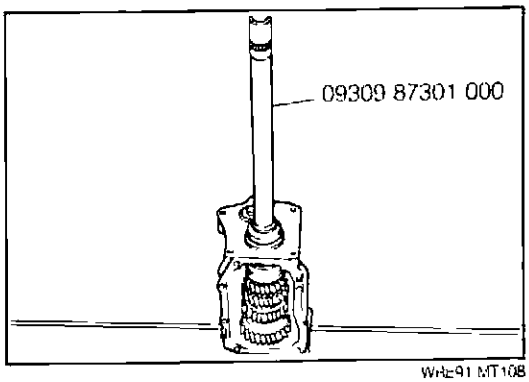

WRE91 MT106

8 Press the rear bearing of the output shaft


WRE91 MT107

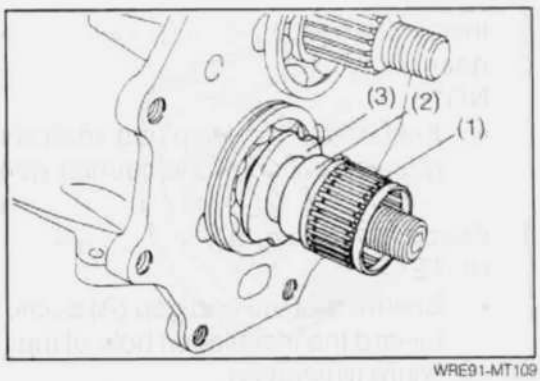
9 Apply gear oil to the following parts.
(1) Outer periphery of needle roller bearing
(2) Tapered section of input gear

10 Press the input shaft with the bearing and snap ring shaft installed, using the following SST
SST: 09309-87301-000



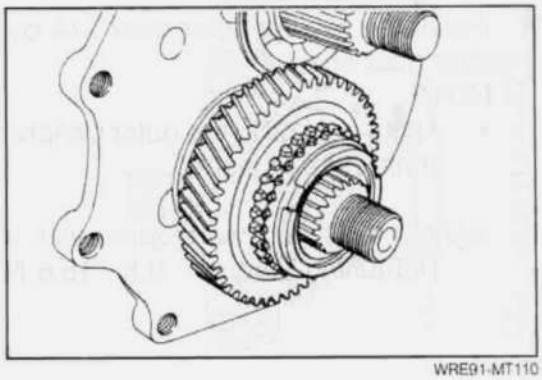
WRE91 MT108

11. Install the following parts to the counter gear shaft.
    (1) Needle roller bearing
    (2) 5th gear bearing inner race
    (3) 5th gear thrust washer
    NOTE:
    - Apply gear oil to the outer periphery of the parts (1) and (2) above prior to the installation.

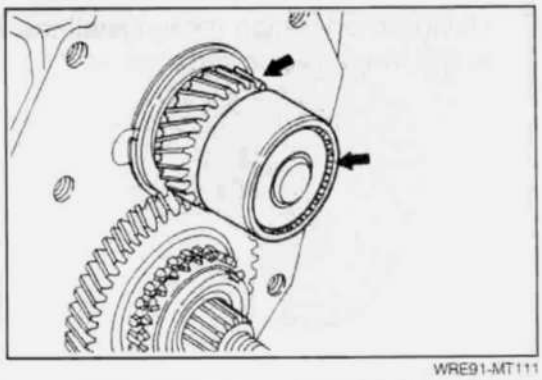


WRE91-MT109

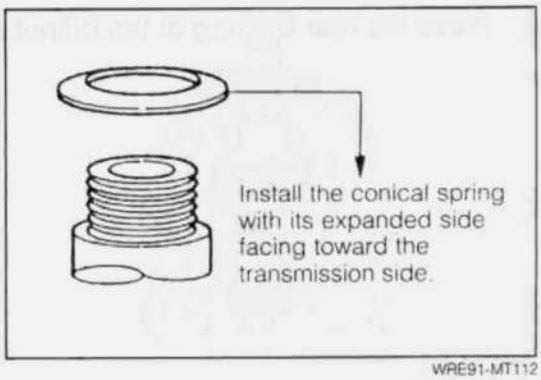
12. Apply gear oil to the rear bearing of the counter gear shaft.
13. Install the 5th gear and synchronizer ring No. 3 to the counter gear shaft.


WRE91-MT110

14. Install the 5th gear and plate washer to the output shaft.
    NOTE:
    - Apply gear oil to the spline section of the output shaft prior to the installation of the 5th gear.

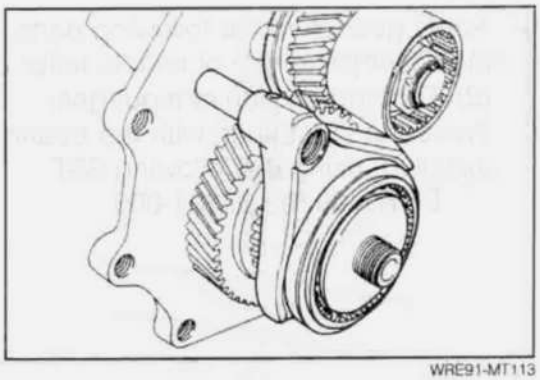

WRE91-MT111

    - Make sure that the conical spring's surface entirely applied with white paint faces toward the lock nut side.

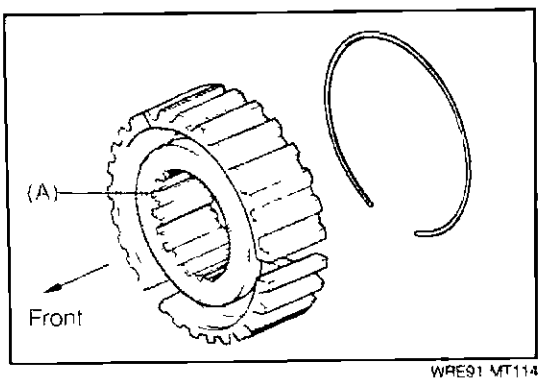


WRE91-MT112

15. Install the following parts in a set.
    (1) 1st gear thrust washer
    (2) Transmission clutch hub No. 2
    (3) Synchromesh shifting key ..... 3 pcs
    (4) Synchromesh shifting key spring ..... 1 piece
    (5) Transmission hub sleeve No. 1
    (6) 5th shift fork
    (7) 5th shift arm shaft


WRE91-MT113

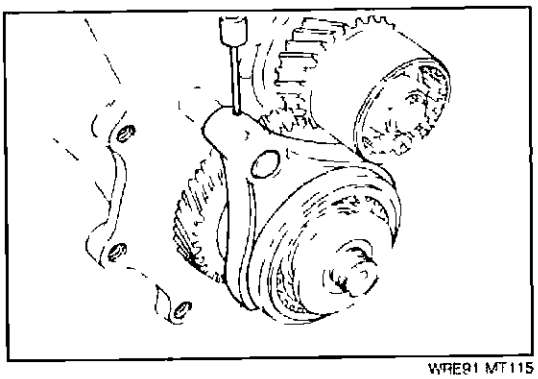
NOTE:
- Ensure that the wider (A) section of transmission hub sleeve No. 1 faces toward the front side.
- Make sure that the location of synchromesh shifting key spring faces toward the lock nut side.



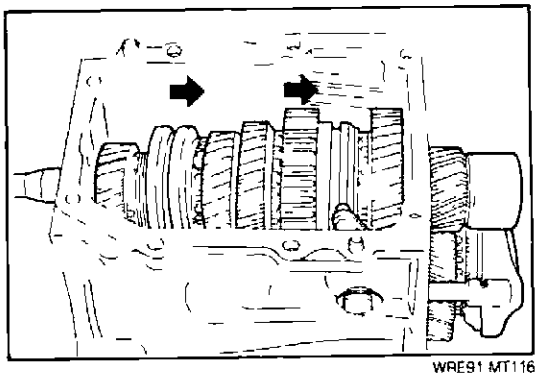
WRE91 MT114

17 Drive the new slotted pin to the 5th shift fork
18 Tighten the 5th shift arm (use new gasket) with the shift arm pivot
Tightening Torque: 39.2 - 58.8 N·m (4.0 - 6.0 kgf-m)

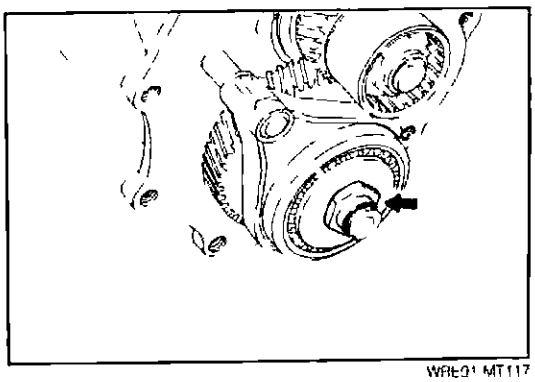
NOTE:
- Be sure to stake the gasket sucerely.


WRE91 MT115

19 Interlock the 1st and 3rd gears

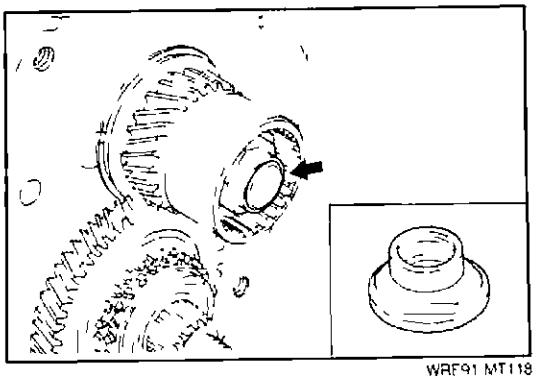

WRE91 MT116

20 Tighten a new lock nut of the counter gear shaft
Tighening Torque: 98.0 - 137.2 N·m
(10.0 - 14.0 kgf-m)

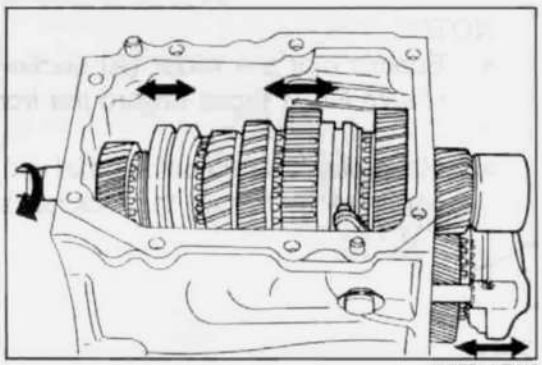

WRE91 MT117

21 Tighten a new lock nut of the output shaft
Tightening Torque: 226.0 - 264.0 N·m
(23.0 - 27.0 kgf-m)

NOTE.
- When installing the lock nut for the output shaft, it should be noted that the lock nut is integrated with the collar. (As indicated in the right figure)


WRE91 MT118

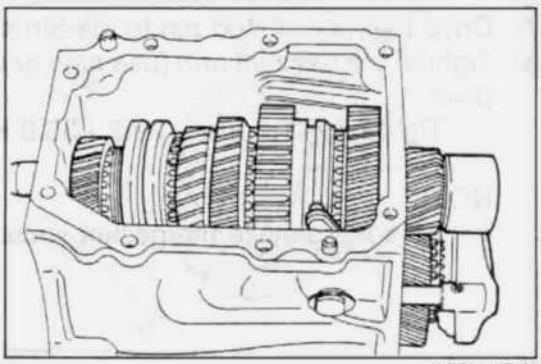
22. Operation check
Tighten the lock nut to the specified torque. While turning the input shaft clockwise, manually check to see if each gear is engaged smoothly.


WRE91-MT119

23. Measure the backlash and thrust clearance.

Unit: mm

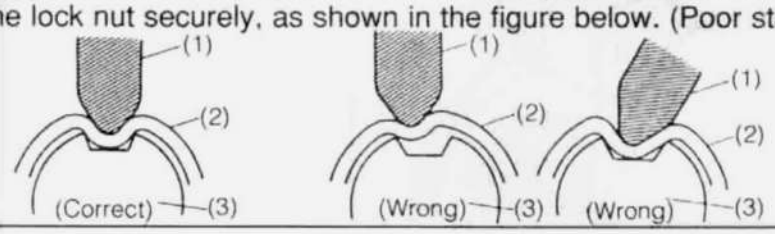
		1st	2nd	3rd	4th	5th
Backlash	Specified value	0.06 - 0.20	0.06 - 0.20	0.06 - 0.20	0.06 - 0.20	0.06 - 0.20
	Allowable limit	0.25	←	←	←	←
Thrust clearance	Specified value	0.11 - 0.29	0.10 - 0.30	0.13 - 0.57		0.12 - 0.28
	Allowable limit	0.35	0.35	0.6		0.35


WRE91-MT120

24. Stake a new lock nut securely.

NOTE:
- When staking the lock nut, point a suitable staking tool toward the output shaft, counter gear shaft axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

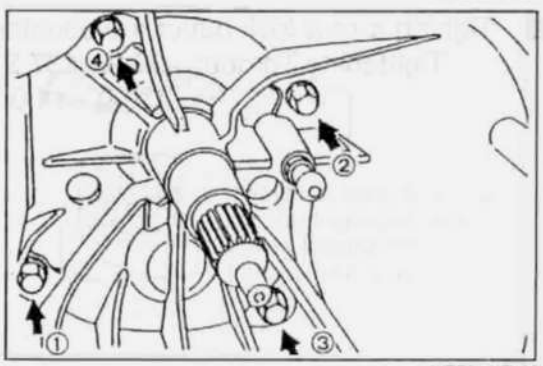
(1) Suitable staking tool
(2) New nut
(3) Shaft



WRE91-MT121

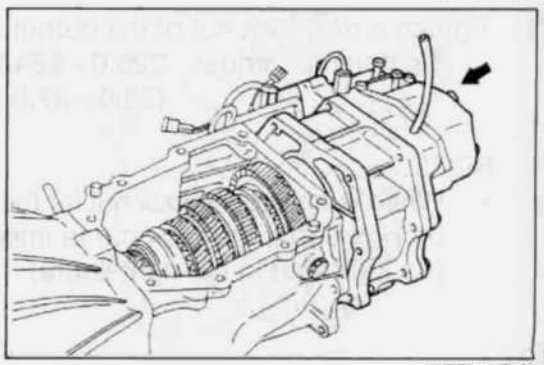
25. Apply gear oil to both type "S" oil seal lip section and outer periphery of the input shaft prior to the installation of the clutch housing case.
26. With a new transmission gasket interposed, tighten the clutch housing case with the four bolts.
Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The right figure indicates a typical example of the tightening sequence.)



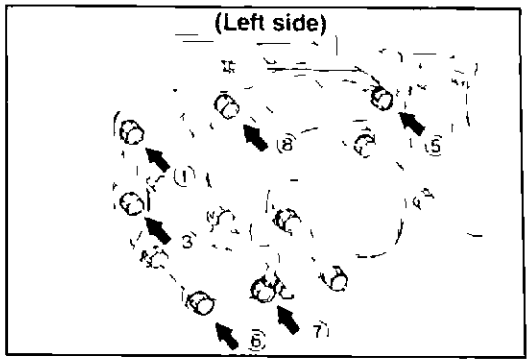
WRE91-MT122

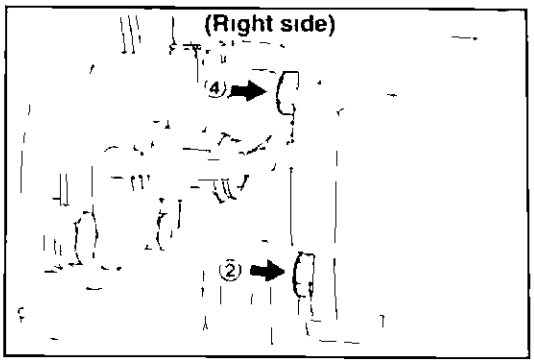
27. Place the shift lever in the 1st gear.
28. Install a new transfer front case gasket.
29. Support the transfer assembly with suitable transmission jacks. While slowly turning the input shaft to the right or left, push the transfer assembly to the transmission side.


WRE91-MT123

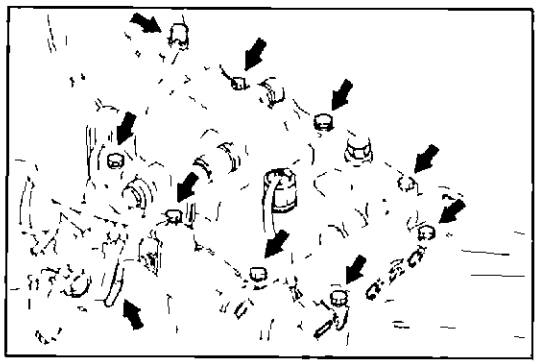
30 Tighten the transmission and transfer assembly with the eight bolts
Tightening Torque: 24.4 - 44.0 N m (3.0 - 5.0 kgf-m)

NOTE:
- Be sure to tighten the bolts diagonally and evenly. (The right figure indicates a typical example of the tightening sequence.)

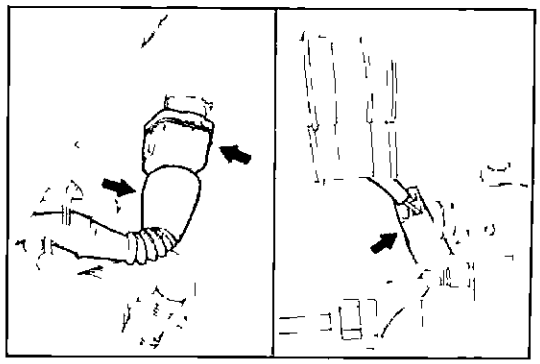




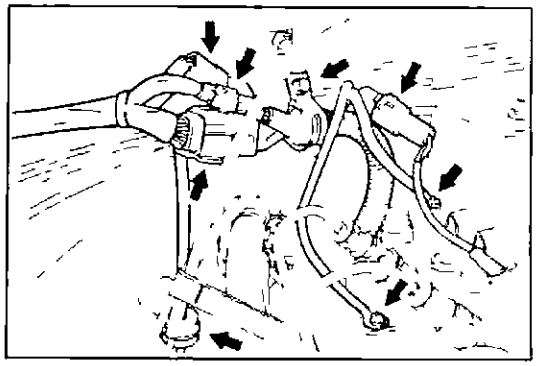
31 With a new transmission case cover gasket interposed, tighten the transmission case cover with the eight bolts
Tightening Torque: 9.8 - 15.6 N m (1.0 - 1.6 kgf-m)



32 Connect the bleether hose and atmosphere tube
33 Connect the couplers and the bolts
(one is earth bolt)

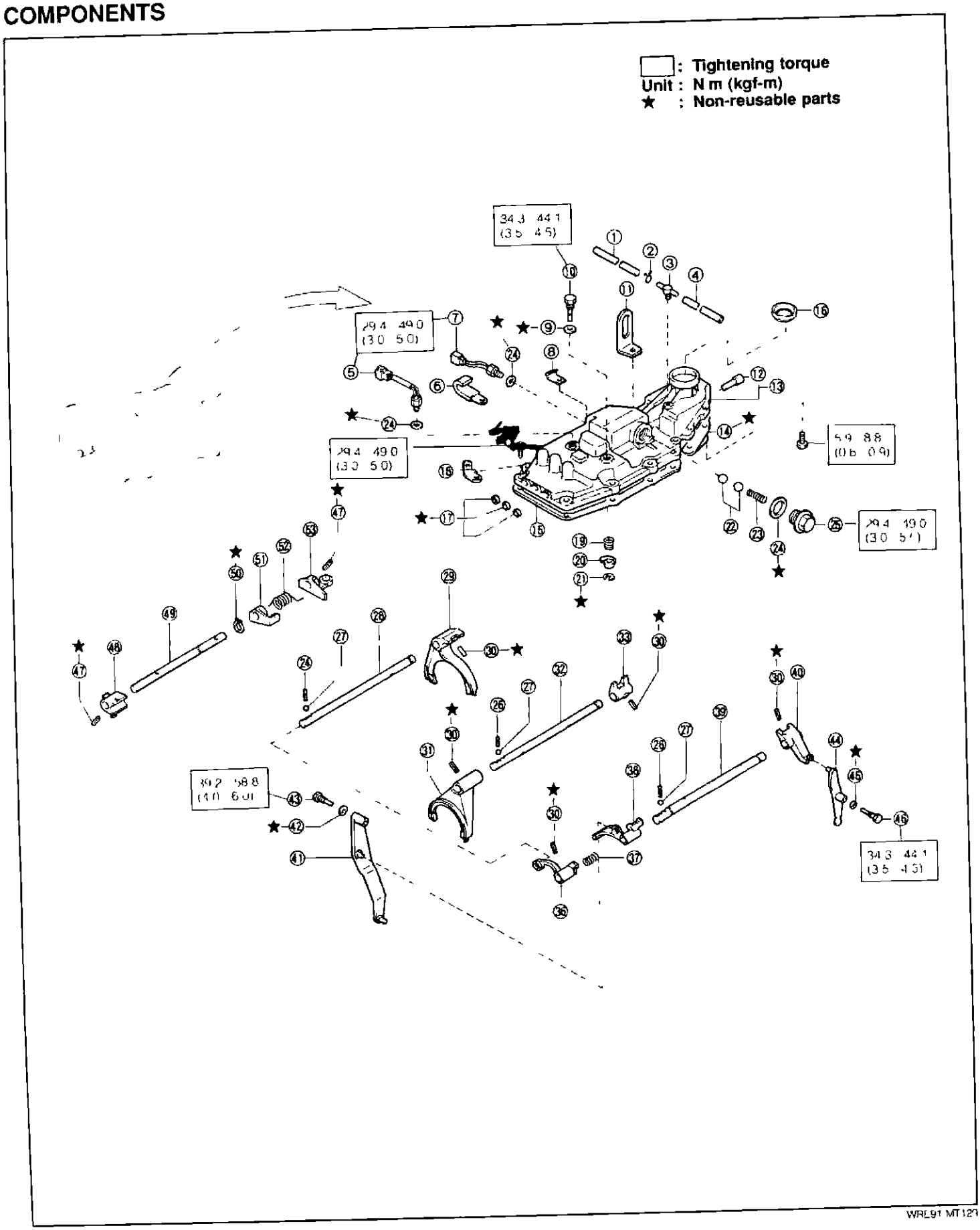


34 Install the clutch related pares
(Refer CL-section)
35 Install the transmission and transfer Ay to the vehicle body
(See page MT-50 to MT-54)
36 Fill the transmission and transfer oil
(See page MT-53)



TRANSMISSION CASE COVER (5-Speed)

COMPONENTS

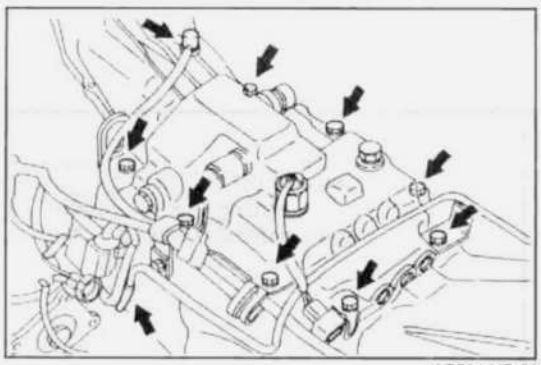


① Hose
② Clip
③ Union
④ Hose No. 1
⑤ Transmission position detect switch
⑥ Clamp (for breather hose)
⑦ Back-up lamp switch
⑧ Clamp (for breather hose)
⑨ Gasket
⑩ 5th shift arm pivot
⑪ Hanger
⑫ Reverse restrict pin
⑬ Transmission case cover
⑭ Shift lever housing dust cover
⑮ Mission case cover gasket
⑯ Shift lever ball seat
⑰ Tight plug
⑱ Clamp
⑲ Torsion spring
⑳ Shift fork lock plate S/A
㉑ "E"-ring
㉒ Ball (for reverse restrict 2 pcs)
㉓ Compression spring
㉔ Gasket
㉕ Reverse restrict pin holder
㉖ Compression spring
㉗ Ball
㉘ 1st & 2nd shift fork shaft
㉙ 1st & 2nd shift fork
㉚ Slotted spring pin
㉛ 3rd & 4th shift fork
㉜ 3rd & 4th shift fork shaft
㉝ Gear shift head No. 2
㉞ Shift inter lock pin No. 2
㉟ Shift inter lock pin No. 1
㊱ Gear shift head No. 3
㊲ Compression spring
㊳ Reverse shift fork
㊴ 5th & reverse shift fork shaft
㊵ 5th shift head
㊶ Reverse shift arm
㊷ Gasket
㊸ Shift arm pivot
㊹ 5th shift arm
㊺ Gasket
㊻ Shift arm pivot
㊼ Slotted spring pin (longer)
㊽ Shift inner lever
㊾ Shift lever shaft
㊿ Shaft snap ring
(51) Reverse restrict pin
(52) Torsion spring
(53) Shift outer lever No. 1

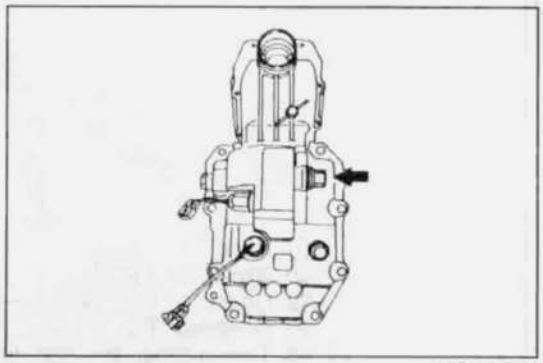
WRE91 MT130

REMOVAL

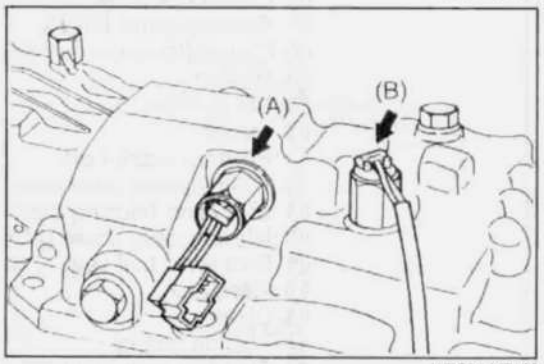
1. Remove the transmission and transfer assembly from the vehicle. (See page MT-5 to MT-9.)
2. Remove the transmission case cover with the gasket by removing the eight bolts.
   NOTE:
   - Never reuse the removed gasket.


WRE91-MT131

3. Remove the reverse restrict pin holder, gasket, compression spring and two balls.
   NOTE:
   - Never reuse the removed gaskets.

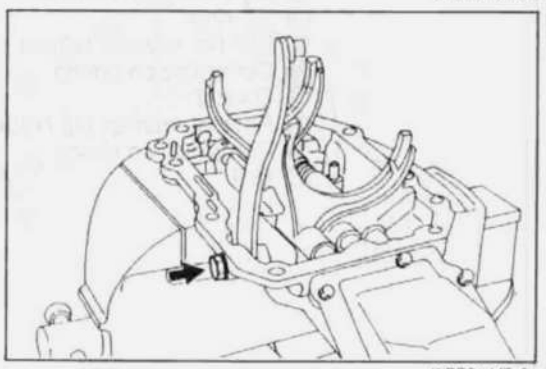

WRE91-MT132

4. Remove the backup lamp (A) and transmission position detect switch (B) with gasket.
   NOTE:
   - Never reuse the removed gasket.

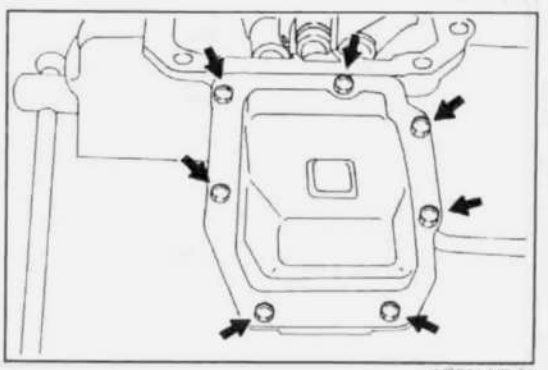


WRE91-MT133

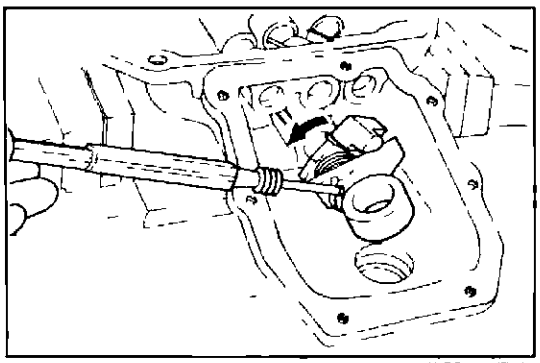
5. Remove the reverse shift arm by removing the shift arm pivot with the gasket.
   NOTE:
   - Never reuse the removed gasket.


WRE91-MT134

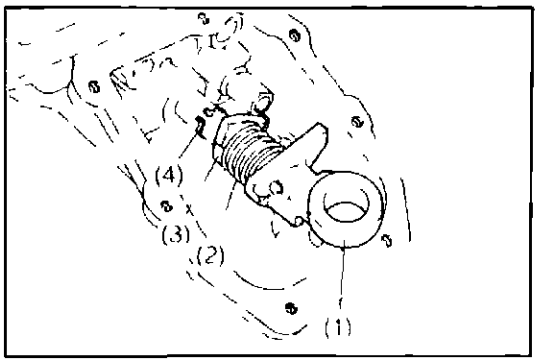
6. Remove the shift lever housing dust cover by removing the seven bolts.
   NOTE:
   - The shift lever housing dust cover is adhered to the transmission case cover with adhesive agent. Therefore, after removing the seven bolts, use a standard gasket scraper or the like to remove the shift lever housing dust cover.


WRE91-MT135

7 Drive off the slotted spring pin of the shift outer lever No 1, using a standard pin punch or the like, while tilting the shift outer lever No 1 at the largest possible angle
NOTE:
- **Never reuse the removed slotted spring pin.**


WRF91 MT136

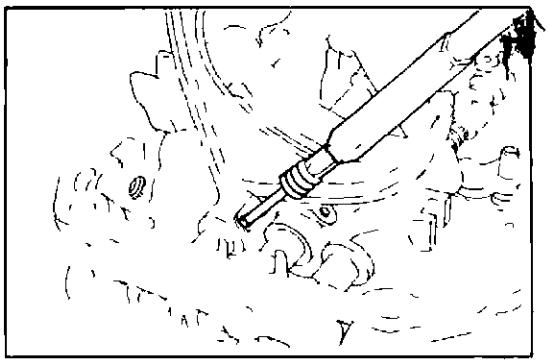
8 Remove the following parts from the shift lever shaft.
(1) Shift outer lever No 1
(2) Torsion spring
(3) Reverse restrict pin
(4) "E" ring
NOTE:
- **Never reuse the removed "E" ring.**



WRF91 MT137

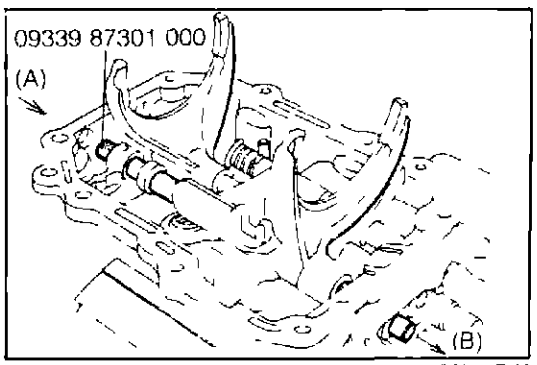
9 Remove the all tight plugs
NOTE:
- **Never reuse the removed tight plugs.**

10 Drive off the slotted spring pin of the 1st & 2nd shift fork, using a standard pin punch or the like
NOTE:
- **Never reuse the removed slotted spring pin.**


WRF91 MT138

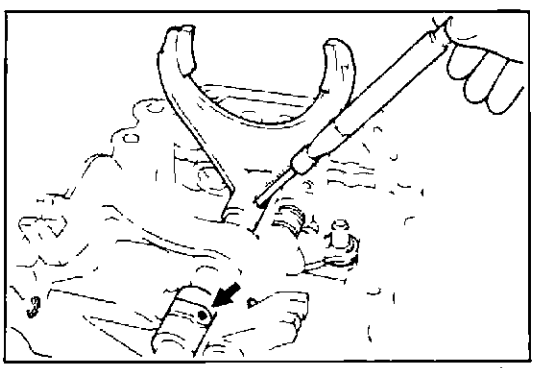
11 Insert the following SST into the 1st & 2nd shift fork shaft guide in the direction (A)
SST: 09339-87301-000

12 Remove the 1st & 2nd shift fork shaft by pulling it out toward your side in the direction (B)
NOTE:
- **The SST above is used for preventing the ball and compression spring from being lost during the removal of the shift fork shaft.**

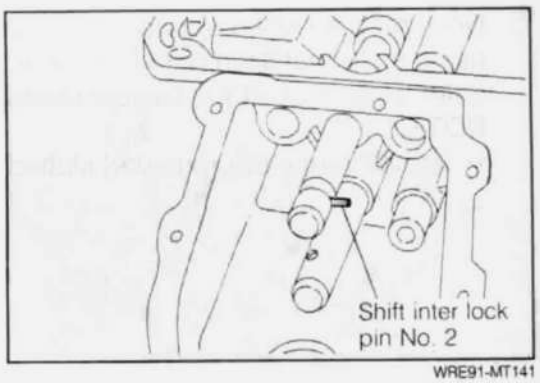


WRF91 MT139

13 Remove the 1st & 2nd shift fork
14 Drive off the slotted spring pin of the gear shift head No 2 and 3rd & 4th shift fork, using a standard pin punch or the like
NOTE:
- **Never reuse the removed slotted spring pin.**

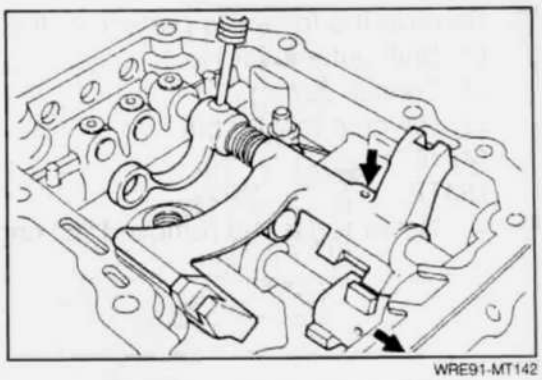

WRF91 MT140

15. Insert the SST (09339-87301-000) to the 3rd & shift fork shaft guide as well as the same manner of 1st & 2nd shift fork.
16. Remove the shift inter lock pin No. 2 by pulling out the 3rd & shift fork shaft toward you slightly.
17. Remove the gear shift head No. 2 and 3rd & 4th shift fork by pulling out the 3rd & 4th shift fork shaft toward you.

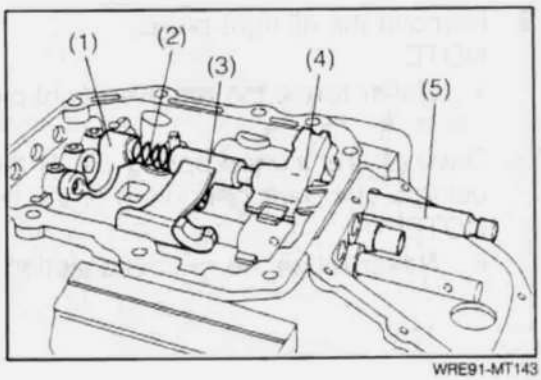


WRE91-MT141

18. Drive off the slotted spring pin of the reverse shift fork and 5th shift arm, using the standard tool of pin punch or the like.
    NOTE:
    - **Never reuse the removed slotted spring pin.**

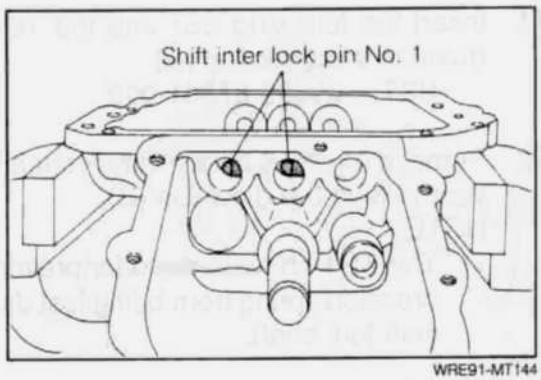

WRE91-MT142

19. Remove the following parts from the transmission case cover by pulling out the 5th & reverse shift fork shaft toward you.
    (1) Gear shift head No. 3
    (2) Compression spring
    (3) Reverse shift fork
    (4) 5th shift head
    (5) 5th & reverse shift fork shaft



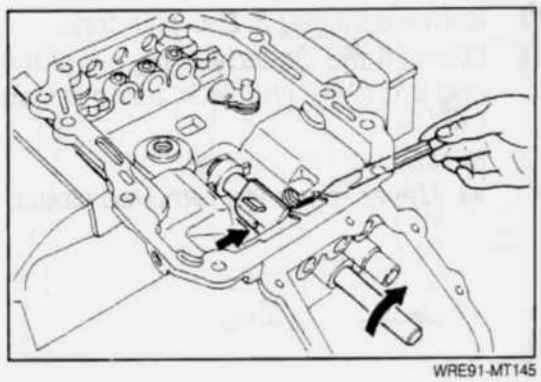
WRE91-MT143

20. Remove the two piecies of shift inter lock pin No. 1 from the transmission case cover, using the standard tool of magnet hand.

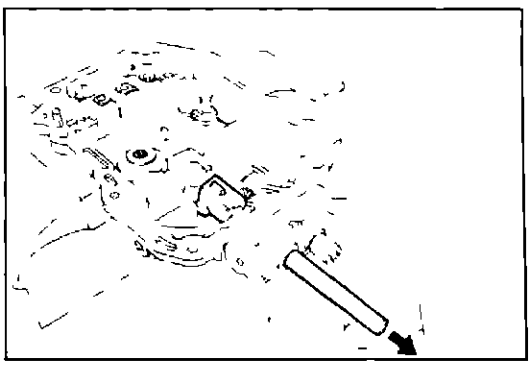


WRE91-MT144

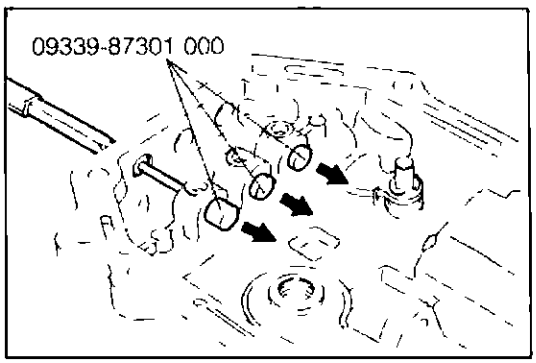
21. Rotates the shift lever shaft to the clock wise until shift inner lever touched to the transmission case cover.
22. Drive off the slotted spring pin of the shift inner lever by inserting the standard tool of pin punch or the like through the installation hole of the reverse restrict pin holder.
    NOTE:
    - **Never reuse the removed slotted spring pin.**


WRE91-MT145

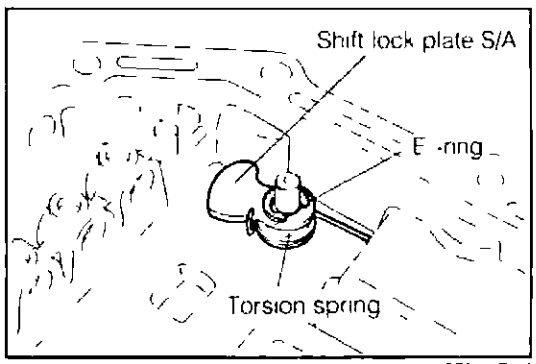
23 Remove the shift inner lever by pulling out the shift lever shaft toward you



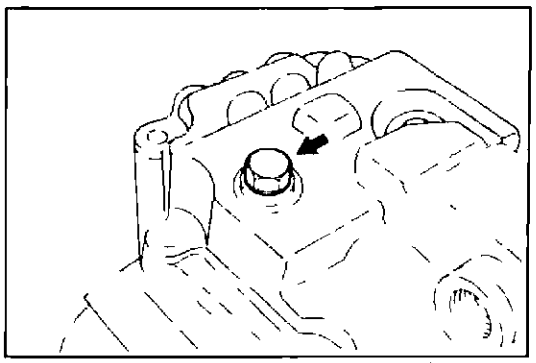
24 Remove the ball and compression spring from the transmission case cover in the following shift fork shaft guide by pushing the SST (09339-87301-000), using the pin punch or the suitable metal rod
(1) 1st & 2nd shift fork shaft guide
(2) 3rd & 4th shift fork shaft guide
(3) 5th & reverse shift for shaft guide



25 Remove the shift lock plate S/A and torsion spring by removing the "E"-ring
NOTE:
- **Never reuse the removed "E"-ring.**



26 Remove the 5th shift arm pivot with gasket
NOTE:
- **Never reuse the removed gasket.**

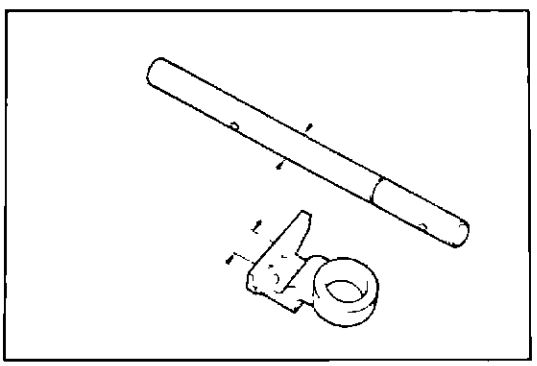


INSPECTION

1 Measure the outer and inner diameter of the following parts

Unit: mm

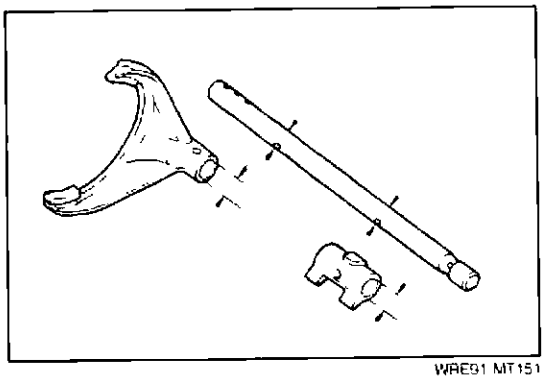
		Specified value	Allowable limit
Outer diameter	Shift lever shaft	16 $^{0}_{-0.\ldots}$	15.97
Inner diameter	Shift outer lever	16 $^{+0.\ldots}_{0}$	16.03



2 Measure the outer and inner diameter of the following parts

Unit: mm

		Specified value	Allowable limit
Outer diameter	3rd & 4th shift fork shaft	14 [illegible]	13.97
Inner diameter	3rd & 4th shift fork	14 $^{0.033}_{+0.006}$	14.03
	Gear shift head No. 2		

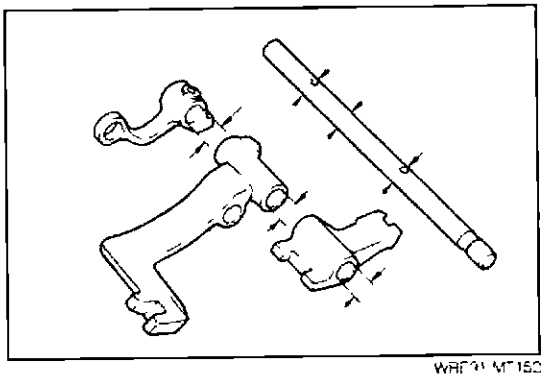


WRE91 MT151

3 Measure the outer and inner diameter of the following parts

Unit: mm

		Specified value	Allowable limit
Outer diameter	5th & reverse shift fork shaft	14 [illegible]	13.97
Inner diameter	5th & reverse shift fork	14 [illegible]	14.06
	Gear shift head No. 3	14 [illegible]	14.03
	5th shift head	14 [illegible]	↑

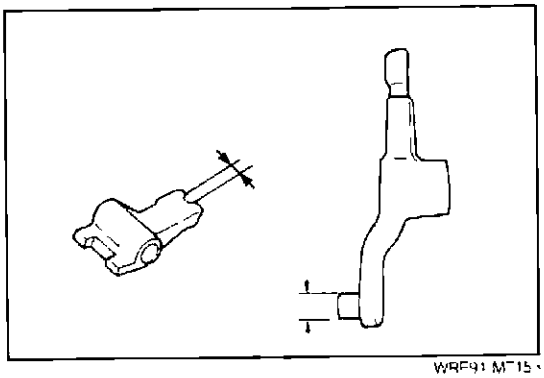


WRE91 MT152

4 Measure the outer and inner diameter of the following parts

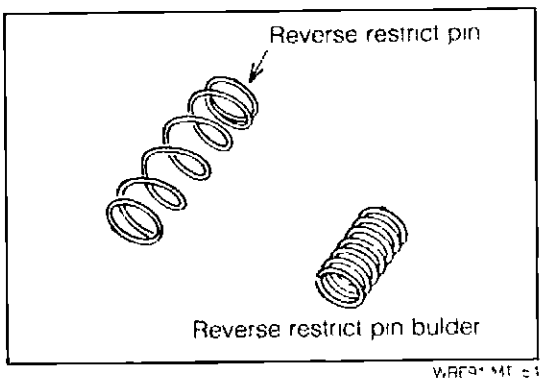
Unit: mm

		Specified value	Allowable limit
Outer diameter	5th shift arm	8 [illegible]	7.9
Inner diameter	5th shift head	8 [illegible]	8.2



WRE91 MT153

5 Visually inspect the compression springs (Reverse restric pin and Reverse restrict pin holder) for wear or damage

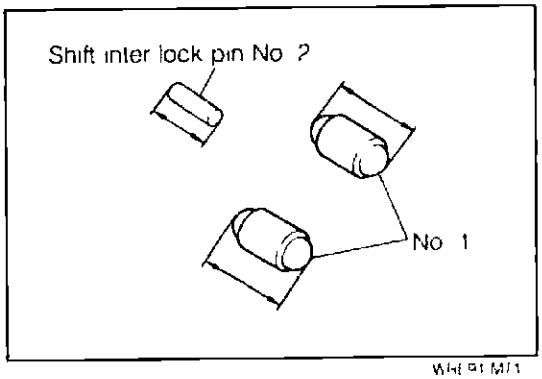


WRE91 MT154

6 Measure the length of the following parts

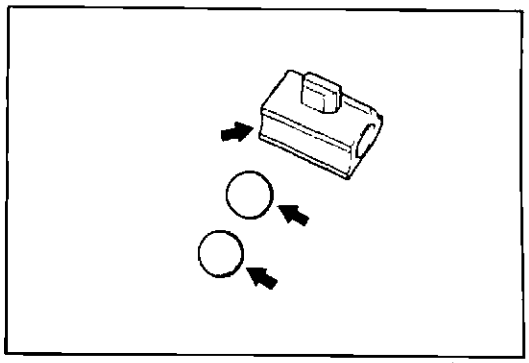
Unit: mm

	Specified value	Allowable limit
Shift inter lock pin No. 1	13.9 [illegible]	13.7
Shift inter lock pin No. 2	11.8 [illegible]	11.6



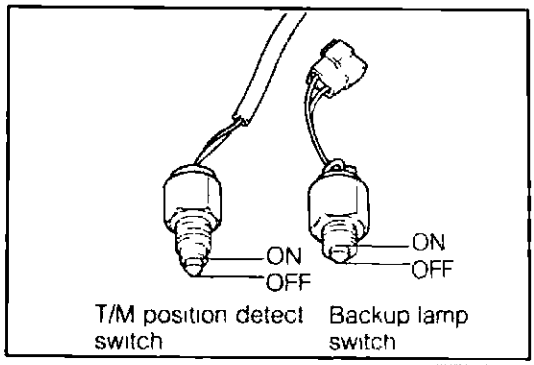
WRE91 MT155

7 Visually inspect the contact sections of the shift inner lever and ball with the reverse restrict pin holder for wear and damage


WRF91 MT156

8 Check to see if continuity exists as to each of the following parts, using a tester.

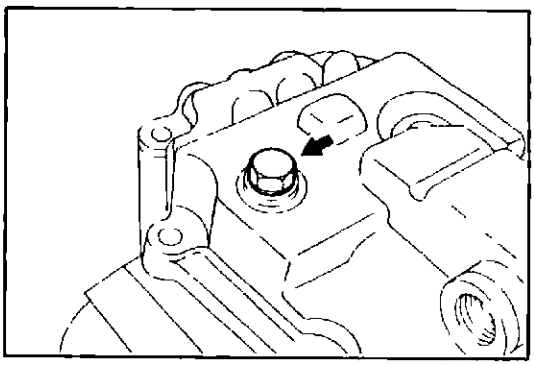
Turn switch /	ON	OFF
Backup lamp switch	Continuity exists	No continuity exists
Transmission position detect switch	↑	↑



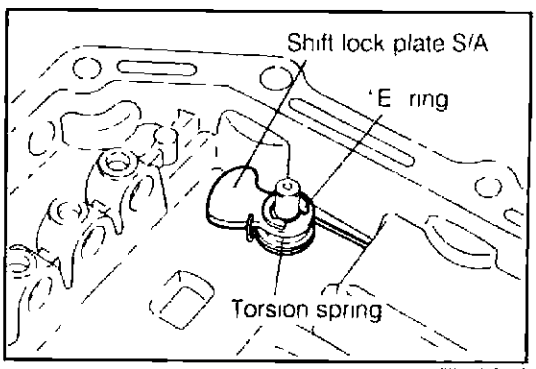
WRE91 MT157

INSTALLATION

1 Tighten the 5th shift arm pivot with a new gasket interposed.
Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf-m)

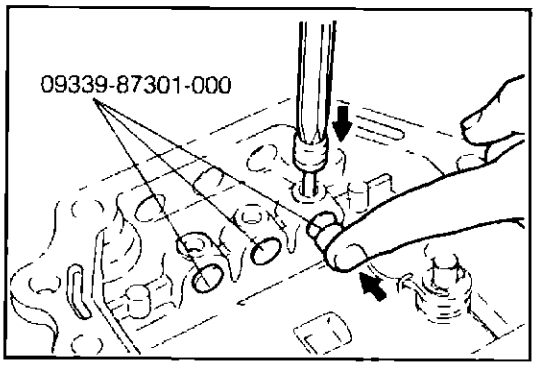

WRE91 MT158

2 Install the torsion spring and shift lock plate subassembly.
3 Install a new "E" ring



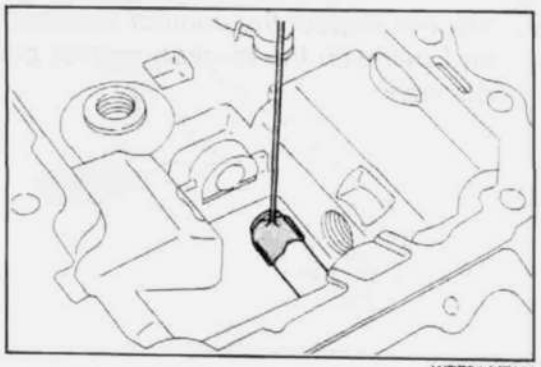
WRE91-MT159

4 Insert the following SST with your fingers while pushing down the ball and compression spring, using a standard pin punch or the like.
SST: 09339-87301-000

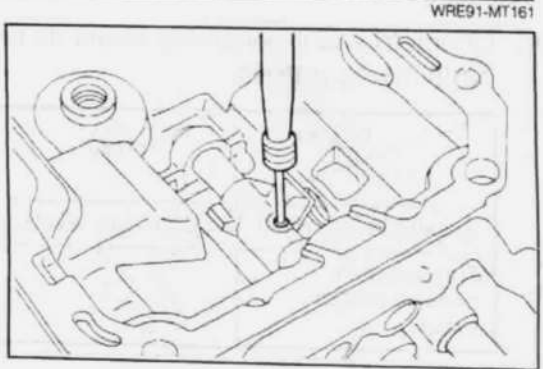


WRE91 MT160

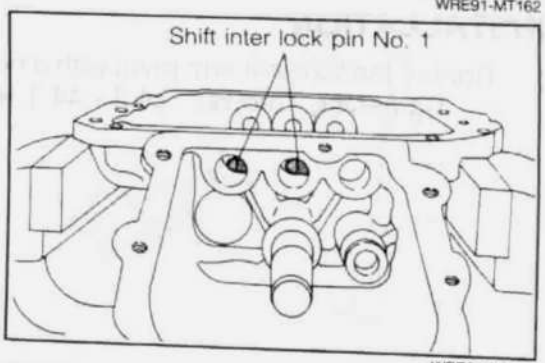
5. Apply gear oil to the outer periphery of the shift lever shaft.


WRE91-MT161

6. Drive a new slotted spring pin of the shift inner lever, using a standard pin punch or the like.
   NOTE:
   - **Make sure that the slotted spring pin for the shift inner lever is 2 mm longer than those for the 1st & 2nd, 3rd & 4th and 5th & reverse shift forks.**

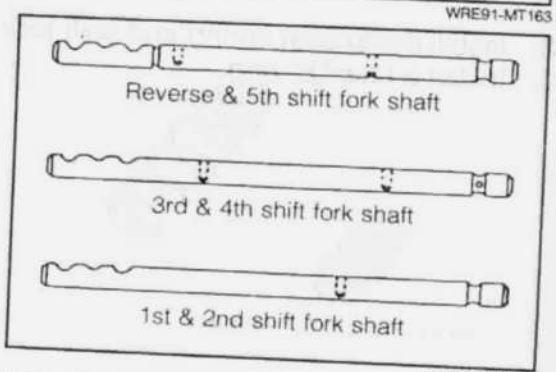

WRE91-MT162

7. Install two pieces of the shift interlocking pin No. 1 to the transmission case cover, using a standard magnet hand tool.



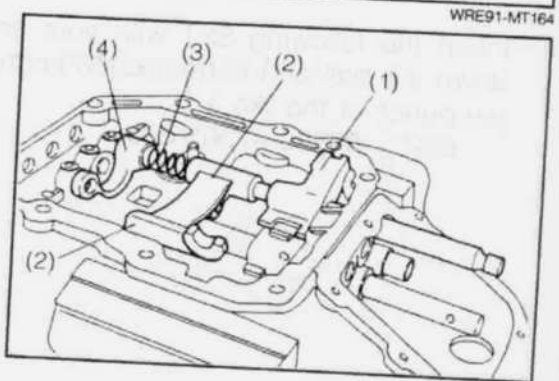
WRE91-MT163

8. The shift fork shaft differs from each other in shape as indicated in the right figure. It is, therefore, recommended to arrange each shift fork shaft together with the corresponding shift fork so that they may be identified readily during the installation of the shafts to the transmission case cover.



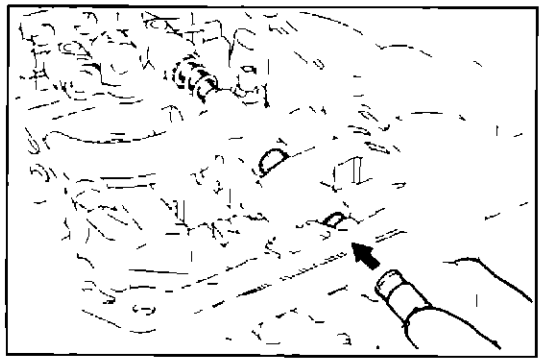
WRE91-MT164

9. Install the following parts to the shift lever shaft.
   (1) 5th shift head
   (2) Reverse shift fork
   (3) Compression spring
   (4) Gear shift head No. 3



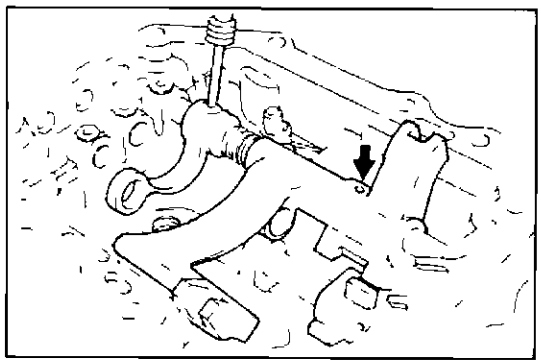
WRE91-MT165

10 Remove the SST (09339-87301-000) by pushing the 5th & reverse shift fork shaft toward front side with your fingers



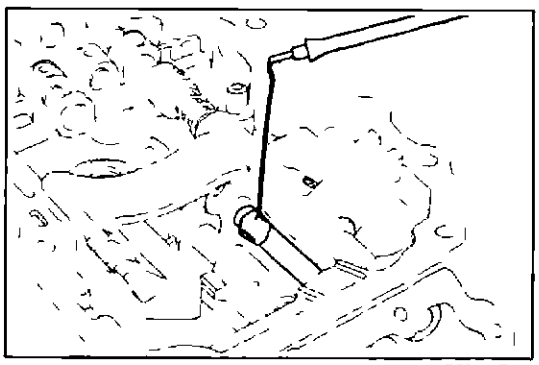
WRE91 MT166

11 Drive the new slotted spring pin of the 5th shift head and gear shift head No 3 to the 5th & reverse shift fork shaft, using the standard tool of pin punch or the like



WRE91 MT 67

12 Apply gear oil to the outer periphery of the 3rd & 4th shift fork shaft

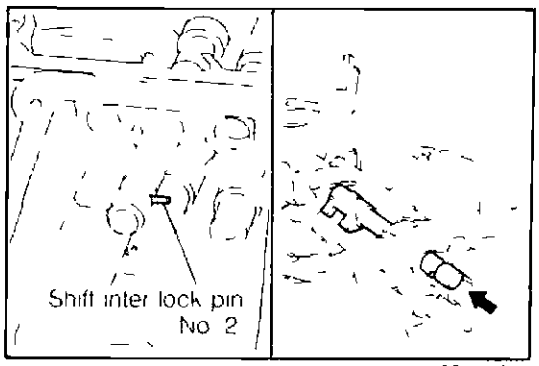


WRE91 MT168

13 Insert the shift inter lock pin No 2 to the 3rd & 4th shift fork shaft

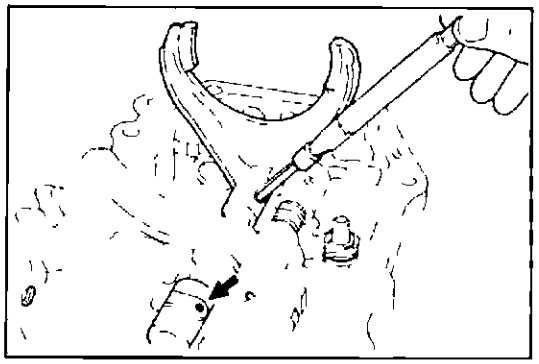
14 Install the 3rd & 4th shift fork and gear shift head No 2 to the 3rd & 4th shift fork shaft

15 Remove the SST (09339-87301-000) by pushing the 3rd & 4th shift fork shaft toward front side with your fingers.



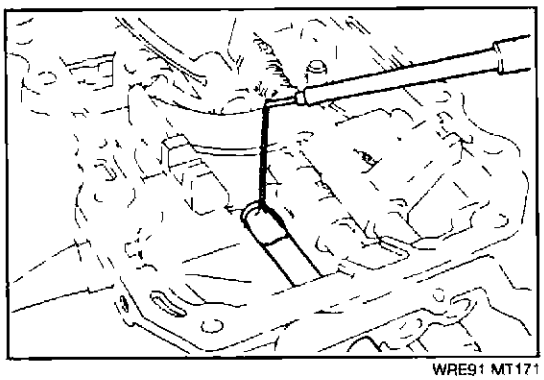
WRE91 MT169

16 Drive the new slotted spring pin of the 3rd & 4th shift fork and gear shift head No. 2 to the 3rd & 4th shift fork shaft.



WRE91 MT 70

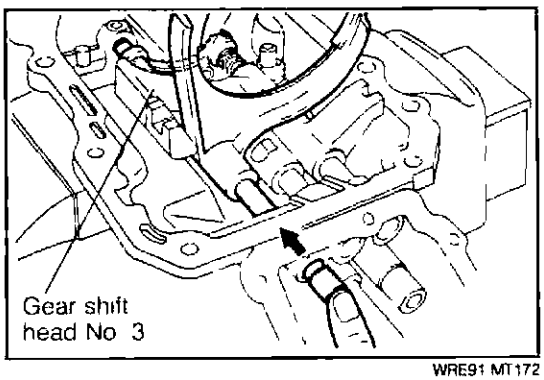
17 Apply gear oil to the outer periphery of the 1st & 2nd shift fork shaft



WRE91 MT171

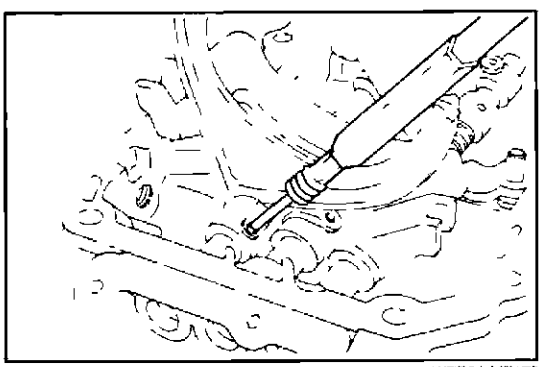
18 Install the gear shift head No. 3 and 1st & 2nd gear shift fork to the 1st & 2nd gear shift fork shaft

19 Remove the SST (09339-87301-000) by pushing the 1st & 2nd gear shift fork shaft toward front side with your fingers



WRE91 MT172

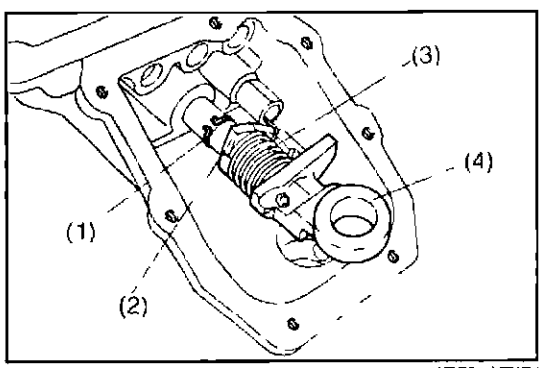
20 Drive the new slotted spring pin of the gear shift head No 3 and 1st & 2nd gear shift fork to the 1st & 2nd gear shift fork shaft



WRE91 MT173

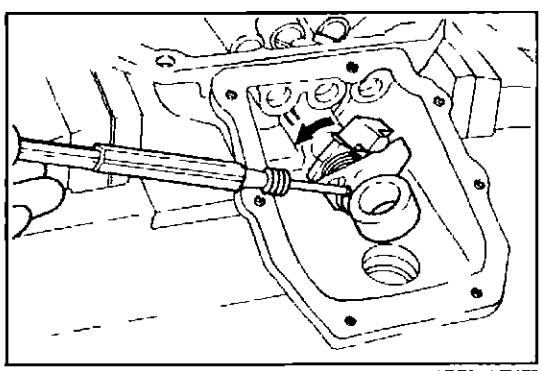
21 Apply gear oil to the outer periphery of the shift lever shaft.

22 Install the following parts to the shift lever shaft.
(1) New "E"-ring
(2) Reverse restrict pin
(3) Torsion spring
(4) Shift outer lever No. 1



WRE91 MT174

23 Drive the new slotted spring pin while rotating the shift outer lever counterclockwise, using the standard tool of pin punch or the like
NOTE:
- **Ensure that the slotted spring pin for shift outer lever No. 1 is 2 mm longer length than other slotted spring pin for 1st & 2nd, 3rd & 4th and 5th & reverse shift fork.**

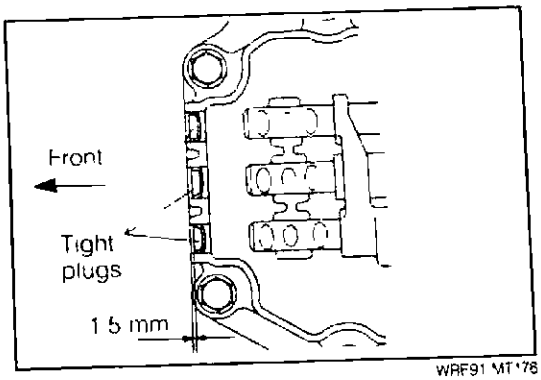


WRE91 MT175

24 Install new tight plugs

NOTE:

- Make sure that the tight plugs has been driven to a point 1.5 mm deep from the edge surface of the transmission case cover.

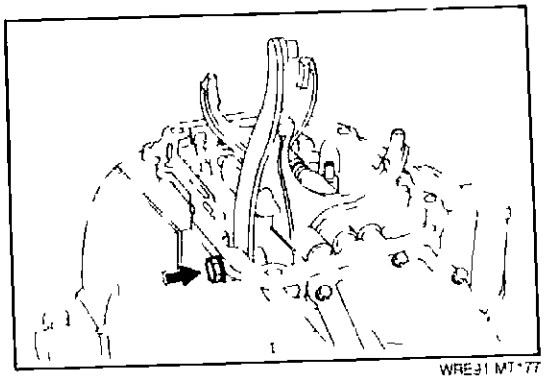


WRF91 MT178

25 Install the reverse shift arm

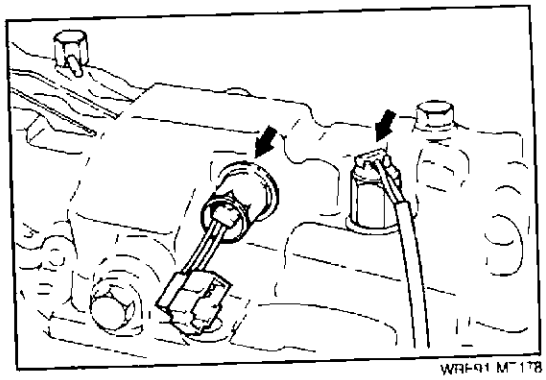
26 Tighten the shift arm pivot with a new gasket interposed.

Tightening Torque: 39.2 - 58.8 N·m (4.0 - 6.0 kgf-m)


WRF91 MT177

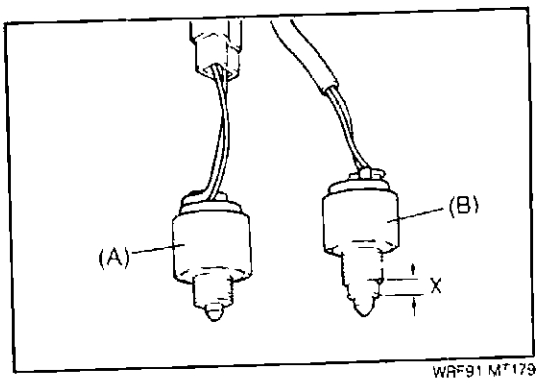
27 Tighten the backup lamp switch and transmission position detect switch with new gaskets interposed

Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)


WRF91 MT178

NOTE:

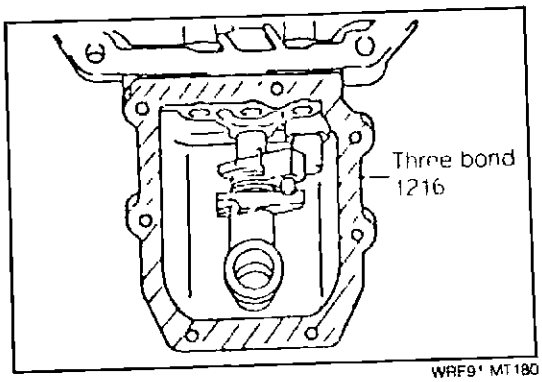
- The backup lamp switch (A) and the transmission position detect switch (B) differ in shape from each other as to the length of the section X, as indicated in the right figure. Make sure that these parts are installed correctly.



WRF91 MT179

28 Apply the following liquid gasket to the seal surface of the shift lever housing dust cover in the transmission case cover (Slant line section in the right figure)

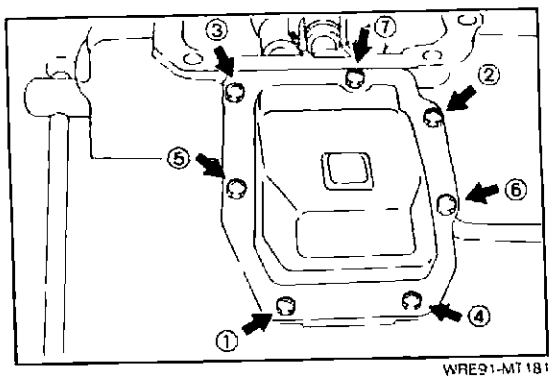
Three Bond 1216 (made by Three Bond)



WRF91 MT180

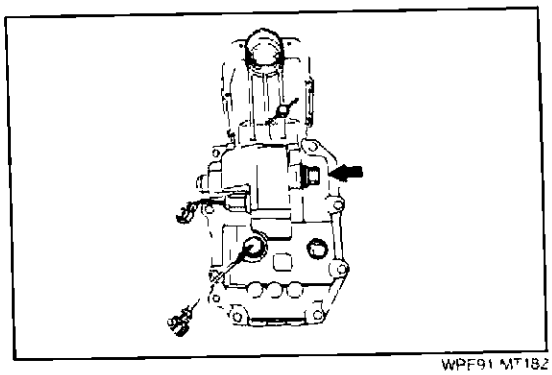
29 Tighten the shift lever housing dust cover with the seven bolts
Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The right figure illustration indicates a typical example of tightening sequence.)



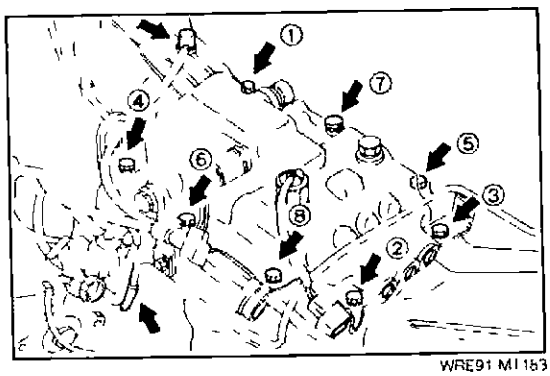
WRE91-MT181

30 With the new gasket used, tighten the reverse restrict pin holder with the following parts
(1) Ball (two pieces)
(2) Compression spring
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)


WRE91-MT182

31 With the new gasket interposed, tighten the transmission case cover by means of the eight bolts.
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)

NOTE
- Be sure to tighten the bolts alternately and diagonally. (The right figure illustration indicates a typical example of tightening sequence.)



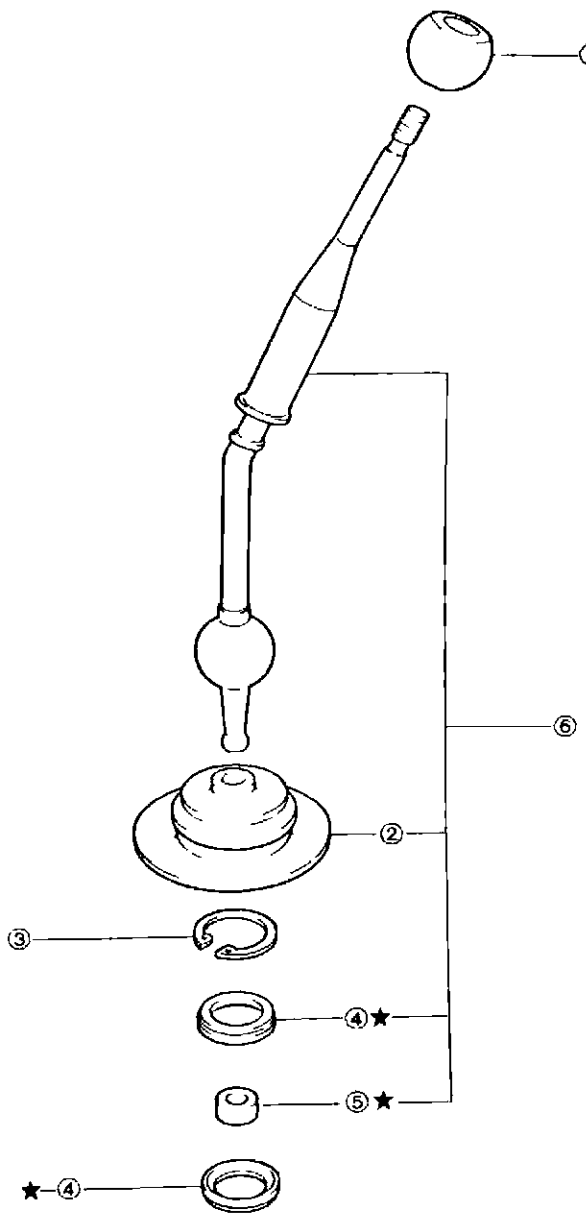
WRE91-MT183

32 Install the transmission and transfer assembly to the vehicle (See page MT-50 to MT-54)

SHIFT LEVER RELATED PARTS (4-Speed & 5-Speed)

COMPONENTS

★ : Non-reusable parts

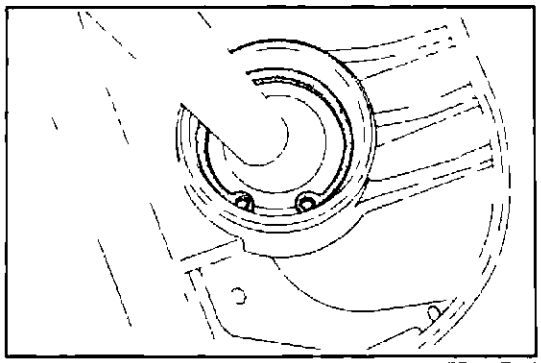


① Shift lever knob S/A
② Shift lever boot
③ Hole snap ring
④ Shift lever ball seat
⑤ Bush (for control shift lever retainer support)
⑥ Shift lever Ay

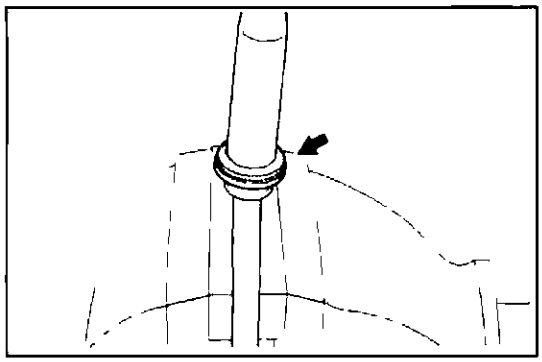
WRE91 MT184

REMOVAL

1 Remove the hole snap ring, using standard snap ring pliers


WRE91 MT185

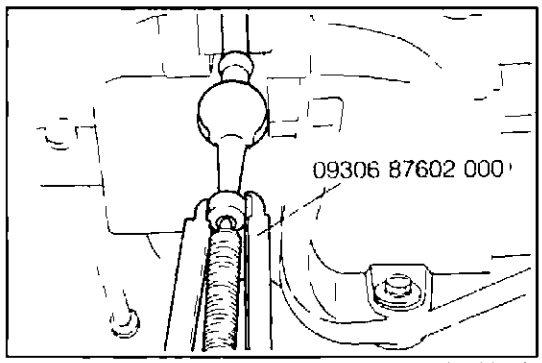
2 Remove the shift lever boot, using standard flat screwdrivers
NOTE:
- **Prior to the removal, apply a suitable amount of lithium-base multi-purpose grease to the shift lever assembly.**


WRE91 MT186

3 Remove the shift lever ball seat
NOTE:
- **Never reuse the removed shift lever ball seat.**

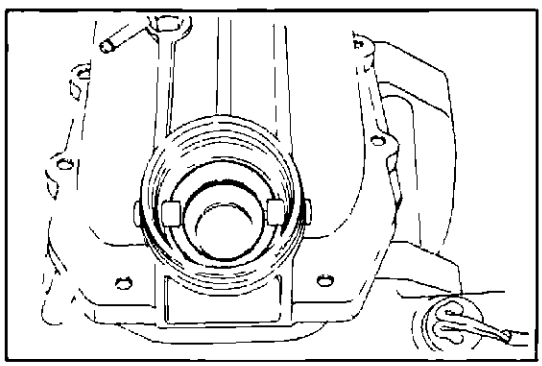
4 Remove the bush, using the following SST.
SST: 09306-87602-000

NOTE:
- **Never reuse the removed bush.**



WRE91 MT187

5 Remove the shift lever ball seat at the transmission case cover
NOTE:
- **Never reuse the removed ball seat.**

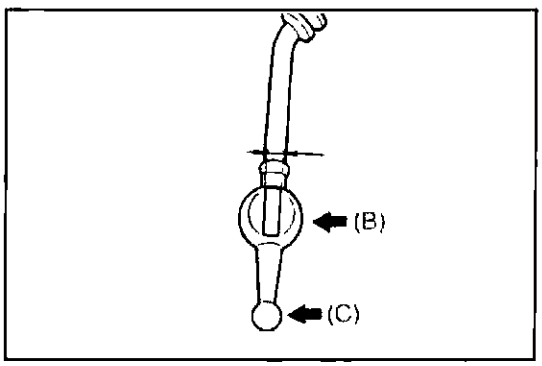

WRE91 MT188

INSPECTION

1 Measure the section (A) of the shift lever assembly.

Unit: mm

Section (A)	Specified value	Allowable limit
For 5 speed	9.8 ± 0.05	9.85
For 4-speed	↑	↑



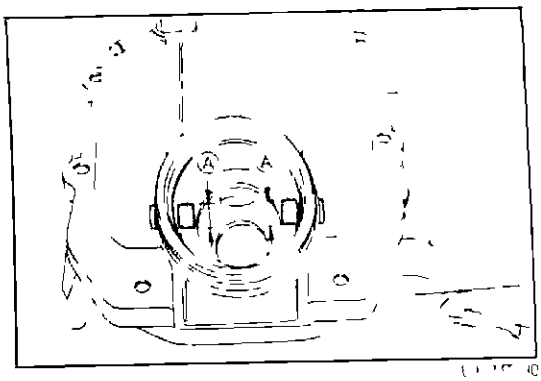
WRE91-MT189

2 Visually inspect the sections (B) and (C) of the shift lever retainer assembly for damage or wear due to lack of grease

3 Measure the outer diameter (section A) of the shift lever retainer pin

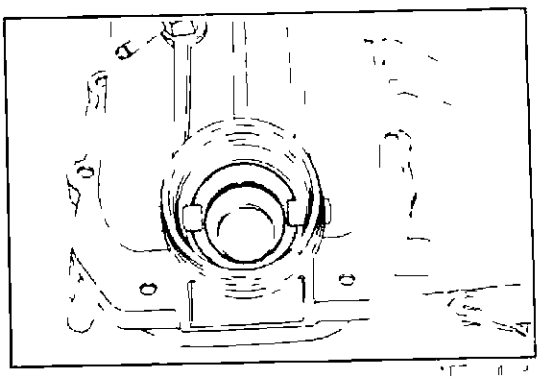
Unit: mm

Section (A)	Specified value	Allowable limit
For 5-speed	9	8.7
For 4-speed	↑	↑

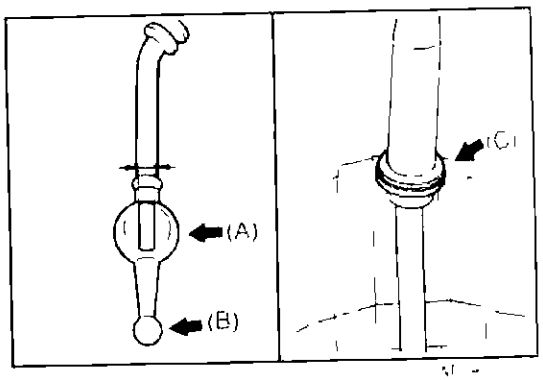


INSTALLATION

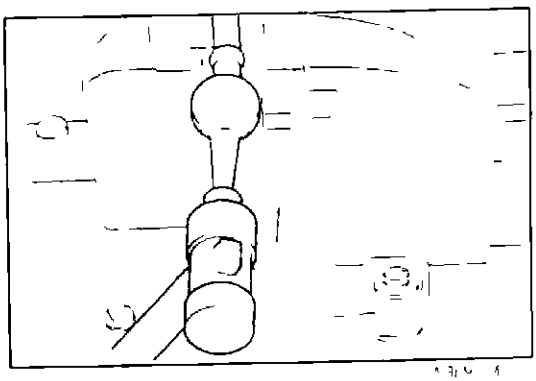
1 Apply a suitable amount of lithium-base multi-purpose grease to the inner and outer peripheries of new shift lever ball seats
2 Place a new shift ball seat on the transmission case cover



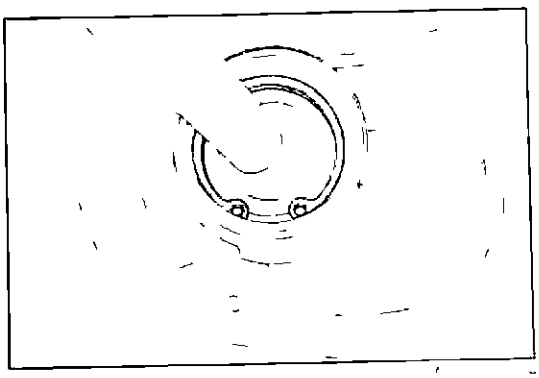
3 Apply a suitable amount of lithium-base multi-purpose grease to the sections (A), (B) and (C) of the shift lever assembly
4 Install a new shift lever ball seat
5 Install the shift lever boot



6 Install a new bush by lightly tapping it with a standard plastic hammer or the like
7 Apply a suitable amount of lithium-base multi-purpose grease to the outer periphery of the bush

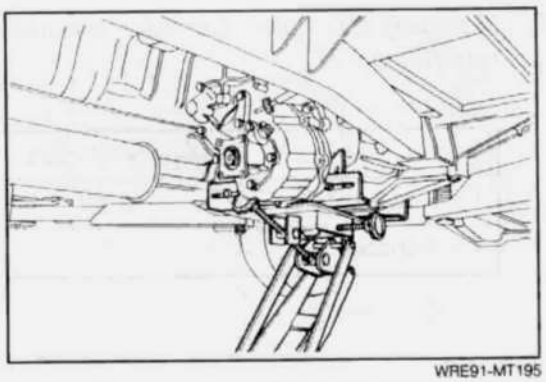


8 Install the shift lever assembly with the hole snap ring, using standard snap ring pliers
NOTE:
- Make sure that the hole snap ring is installed to the groove section of the transmission case cover.

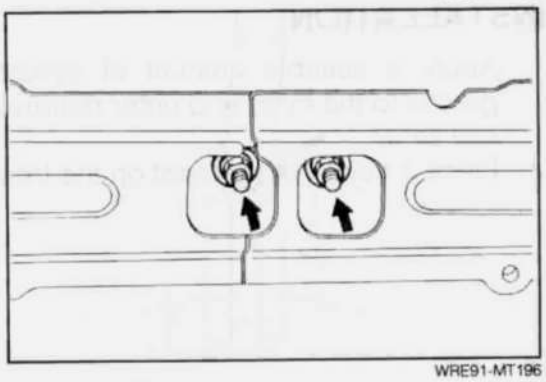


INSTALLATION

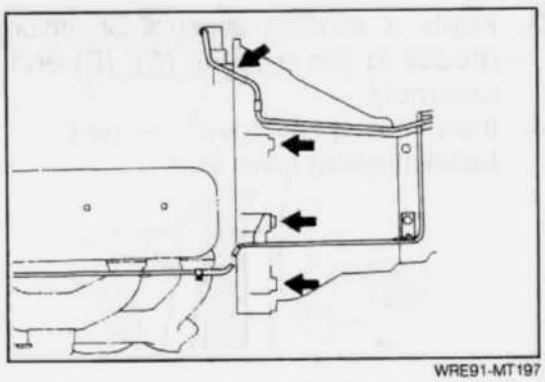
1. Working from the under vehicle
   (1) Tighten the crossmember No. 2 to the chassis frame with the four bolts on both right and left sides, while supporting the transmission and transfer assembly with the suitable transmission jack or the like.
   Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf-m)


WRE91-MT195

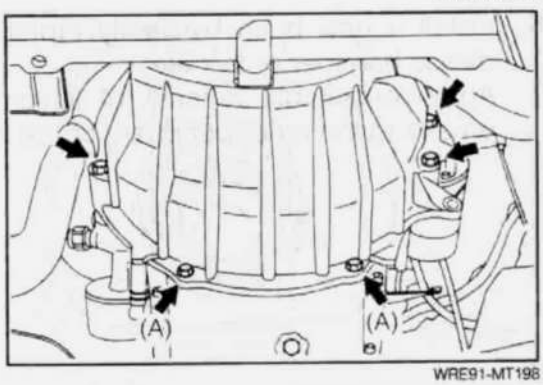
   (2) Tighten the crossmember No. 2 with the two nuts.
   Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf-m)


WRE91-MT196

   (3) Tighten the transmission direct-connecting bolts.
   Tightening Torque: 49.0 - 78.4 N·m (5.0 - 8.0 kgf-m)
   (A) section: 14.7 - 24.5 N·m (1.5 - 2.5 kgf-m)

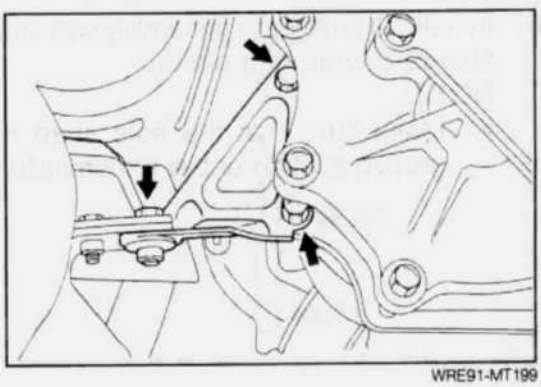

WRE91-MT197

   (4) After tighten the transmission direct-connecting bolts securely, remove the wooden piecies.

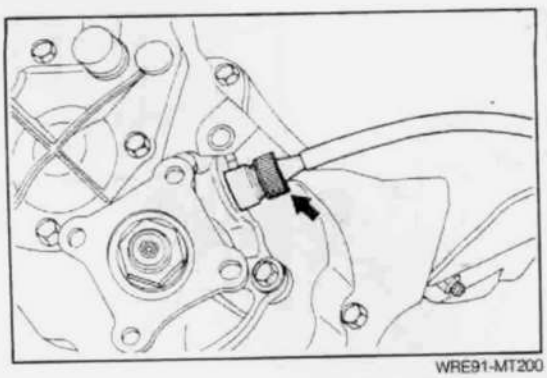


WRE91-MT198

   (5) Tighten the exhaust support pipe bracket with the three bolts.
   Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)


WRE91-MT199

(6) Install the speedometer cable, using the standard tool of plier.

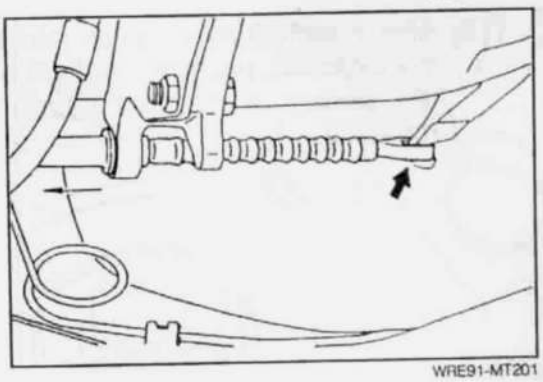


WRE91-MT200

(7) Apply lithium base multi-purpose grease to the connecting section between the clutch release fork and the clutch release cable.
(8) Connect the clutch release cable assembly at the clutch housing side.

NOTE:

- **While installing the clutch release cable assembly, care must be exercised not to damage the boot section of the clutch release cable assembly.**

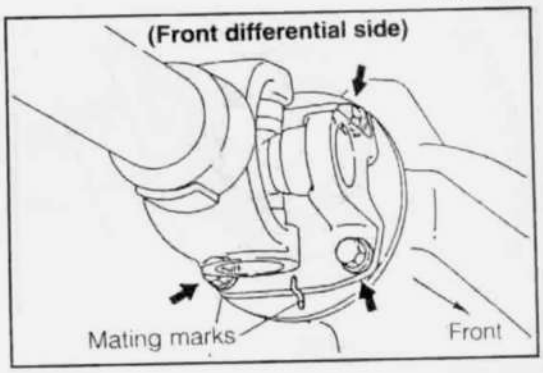


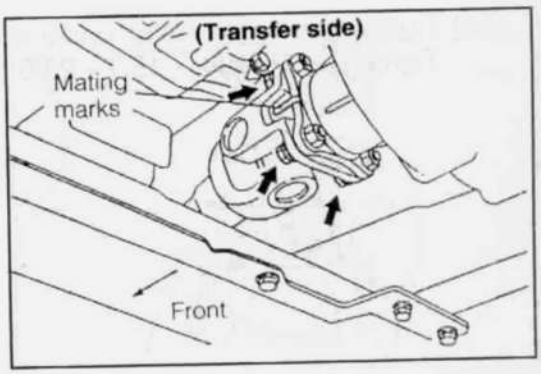
WRE91-MT201

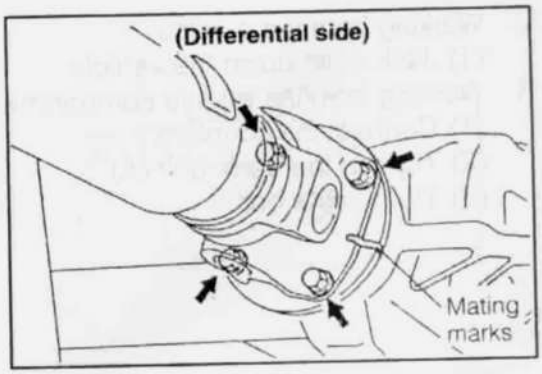
(9) Install the both front and rear propeller shafts with the mating marks that were put during the removal of the propeller shaft aligned with each other.
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

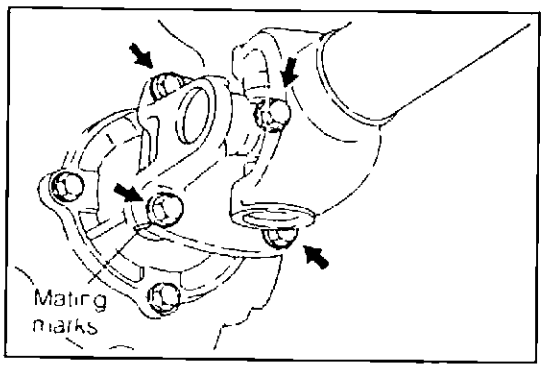
CAUTION:

- **Make sure to line up those mating marks that were put during the removal of the front propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.**



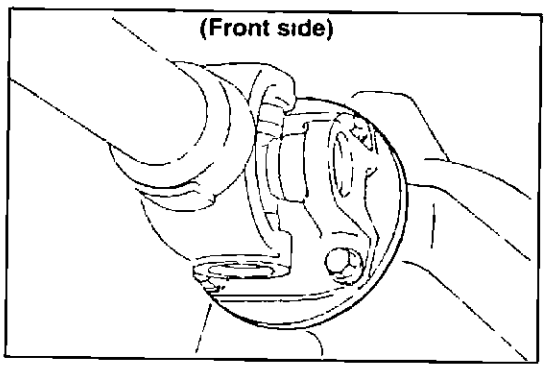


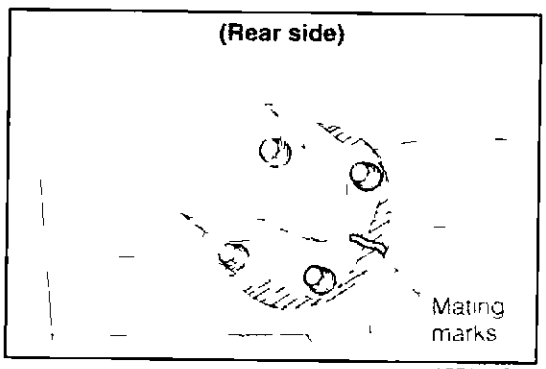




WRE91 MT200

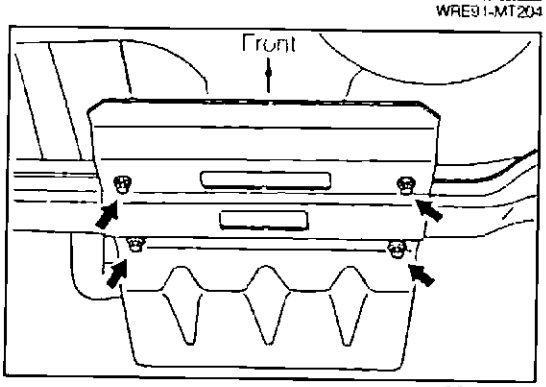
(10) After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure





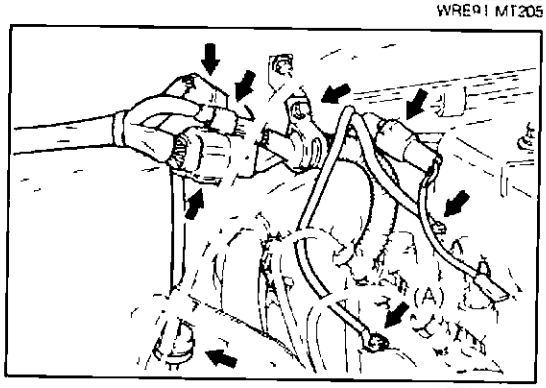
WRE91-MT204

(11) Tighten the transmission under cover with the four bolts
Tightening Torque: 15.7 - 23.5 N·m (1.6 - 2.4 kgf-m)



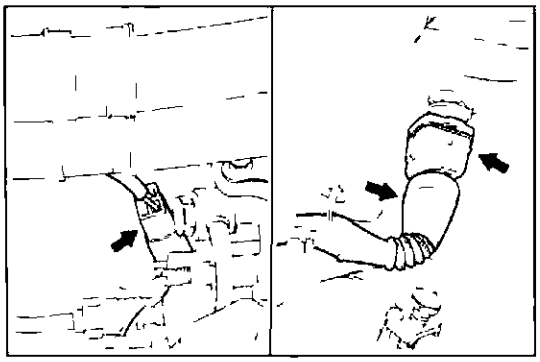
WRE91 MT205

2 Working from the outside
(1) Jack or lift down the vehicle
3 Working from the engine compartment room
(1) Connect the couplers
(2) Tighten the earth bolt (A)
(3) Tighten the bolt

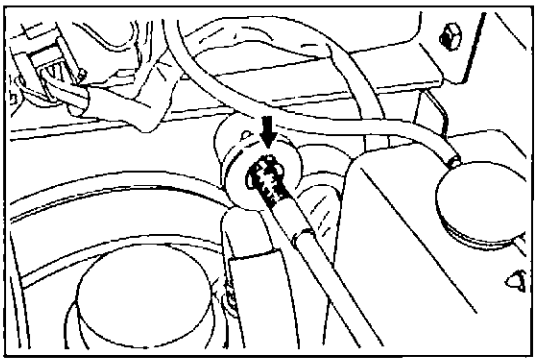


WRE91 MT206

(4) Connect the atmosphere hose and breather tube
(5) Connect the battery minus terminal

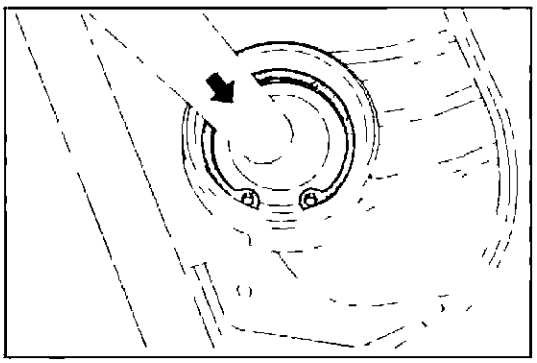


(6) Attach the "E" ring to the clutch release cable
(As for the clutch height and adjustment, Refer to CL-section)



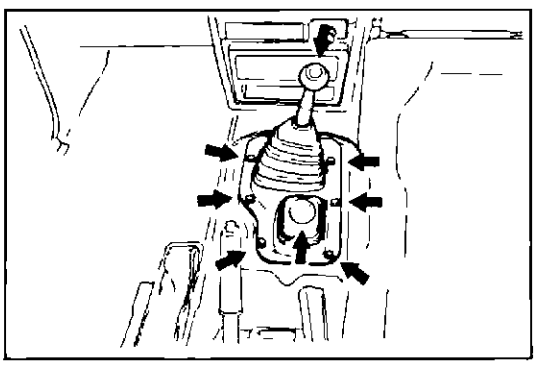
4 Working from the vehicle interior
(1) Install the hole snap ring while the pushing down of the transmission control lever

NOTE:
Make sure that the hole snap ring should be installed to the groove section of the transmission case cover.



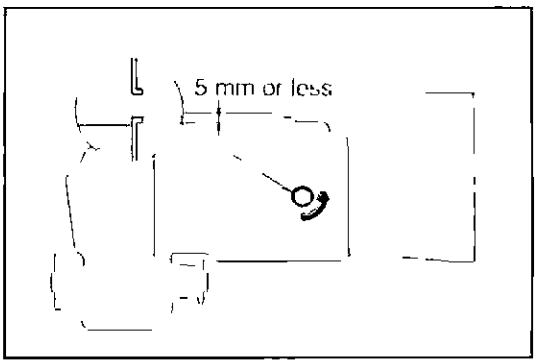
(2) Tighten the shift lever boot with the six bolts
Tightening Torque: 9.8 - 15.6 N·m (1.0 - 1.6 kgf-m)

(3) Place the floor carpet
(4) Install the console box (Refer BO-section)
(5) Install the transmission and transfer control lever knobs

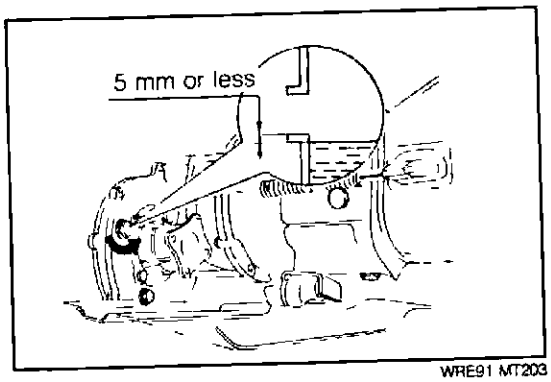


(6) Fill the transmission and transfer oil

	Oil capacity	API	SAE
T/M	2.9L	GL-3	90
T/F	1.3L	GL-3	75W-90 or 75W-85



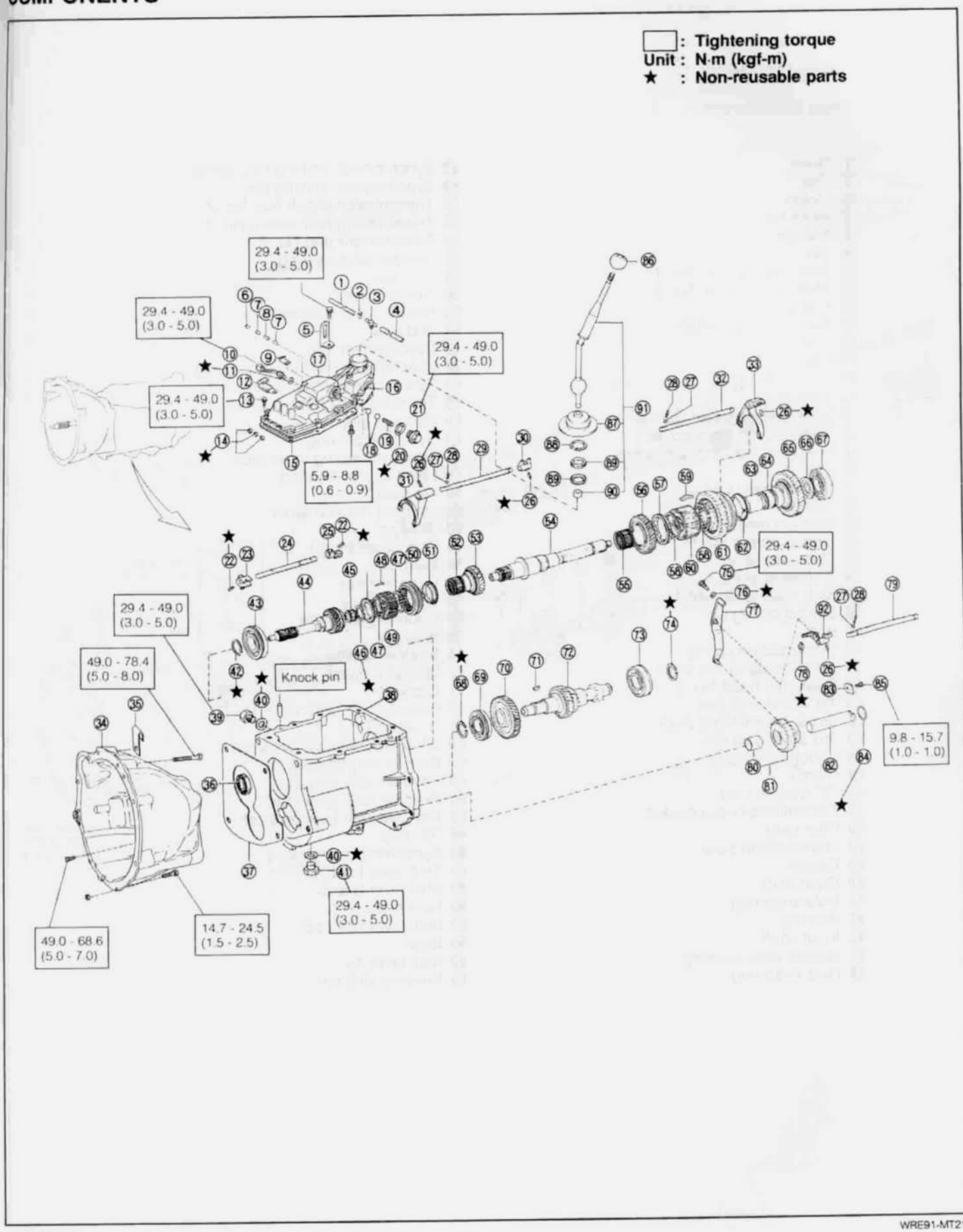
Tighten the both transmission and transfer filler plugs with new gasket
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)



WRE91 MT203

TRANSMISSION (4-Speed)

COMPONENTS



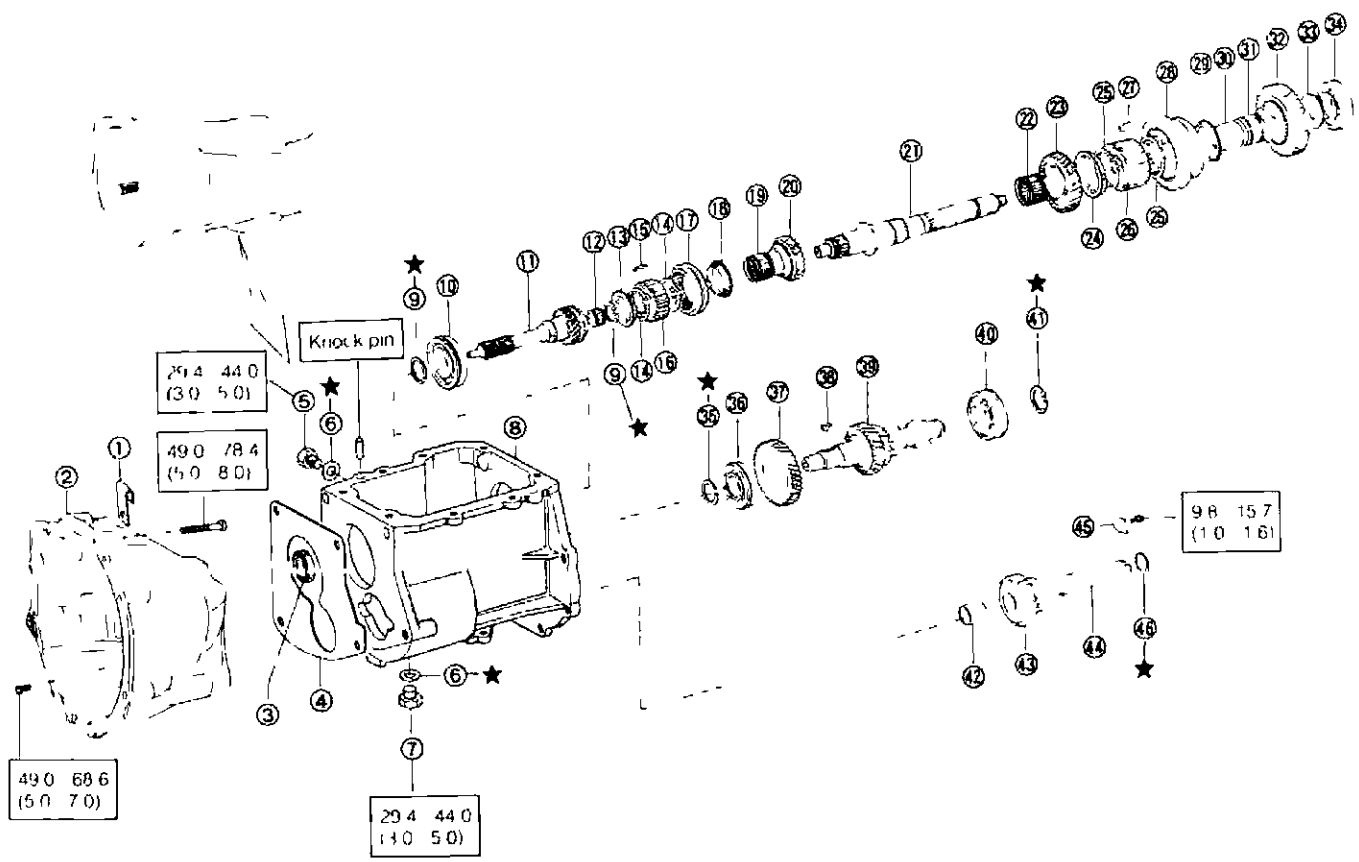
WRE91-MT212

① Hose
② Clip
③ Union
④ Hose No. 1
⑤ Hanger
⑥ Pin
⑦ Shift inter lock pin No. 1
⑧ Shift inter lock pin No. 2
⑨ Clamp
⑩ Back-up lamp switch
⑪ Gasket
⑫ Clamp
⑬ Bolt
⑭ Tight plug
⑮ Mission case cover gasket
⑯ Transmission case cover
⑰ Shift lever housing dust cover
⑱ Ball
⑲ Compression spring
⑳ Gasket
㉑ Reverse restrict pin holder
㉒ Slotted spring pin
㉓ Shift inner lever
㉔ Shift lever shaft
㉕ Shift outer lever No. 1
㉖ Slotted spring pin
㉗ Ball
㉘ Compression spring
㉙ 1st & 2nd shift fork shaft
㉚ Gear shift head No. 2
㉛ 1st & 2nd shift fork
㉜ 3rd & 4th shift fork shaft
㉝ 3rd & 4th shift fork
㉞ Clutch housing
㉟ Clamp
㊱ S. type oil seal
㊲ Transmission case gasket
㊳ Filler plug
㊴ Transmission case
㊵ Gasket
㊶ Drain plug
㊷ Hole snap ring
㊸ Bearing
㊹ Input shaft
㊺ Needle roller bearing
㊻ Hole snap ring
㊼ Synchromesh shifting key spring
㊽ Synchromesh shifting key
㊾ Transmission clutch hub No. 2
㊿ Transmission hub sleeve No. 1
(51) Synchronizer ring No. 3
(52) Needle roller bearing
(53) 3rd gear
(54) Output shaft
(55) Needle roller bearing
(56) 2nd gear
(57) Synchronizer ring
(58) Synchromesh shifting key spring
(59) Synchromesh shifting key
(60) Transmission clutch hub No. 1
(61) Reverse gear
(62) Synchronizer ring
(63) 1st gear bearing inner race
(64) Needle roller bearing
(65) 1st gear
(66) 1st gear thrust washer
(67) Bearing
(68) Shaft snap ring
(69) Bearing
(70) Counter gear
(71) Woodruff key
(72) Counter gear shaft
(73) Bearing
(74) Shaft snap ring
(75) Shift arm pivot
(76) Gasket
(77) Reverse shift arm
(78) E-ring
(79) 5th & reverse shift fork shaft
(80) Bimetal formed bush
(81) Reverse idler gear S/A
(82) Reverse idler gear shaft
(83) Reverse idler gear stopper
(84) O-ring
(85) Synchronizer ring No. 3
(86) Shift lever knob S/A
(87) Shift lever boots
(88) Hole snap ring
(89) Shift lever ball seat
(90) Bush
(91) Shift lever Ay
(92) Reverse shift fork

INPUT SHAFT & COUNTER GEAR SHAFT RELATED PARTS

COMPONENTS

□ : Tightening torque
Unit : N·m (kgf-m)
★ : Non-reusable parts



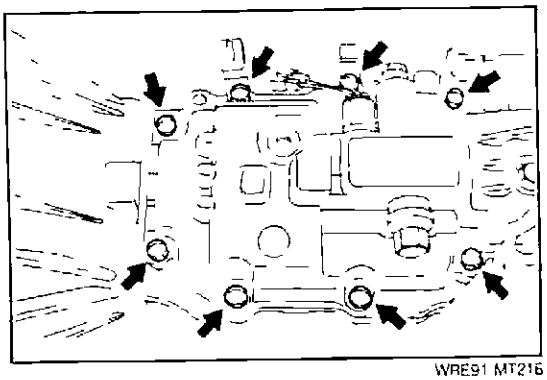
WRE91 MT214

① Clamp
② Clutch housing
③ Type "S" oil seal
④ Transmission case gasket
⑤ Filler plug
⑥ Gasket
⑦ Drain plug
⑧ Transmission case
⑨ Hole snap ring
⑩ Bearing
⑪ Input shaft
⑫ Needle roller bearing
⑬ Synchronizer ring No. 3
⑭ Synchromesh shifting key spring
⑮ Synchromesh shifting key
⑯ Transmission clutch hub No. 2
⑰ Transmission hub sleeve No. 1
⑱ Synchronizer ring No. 3
⑲ Needle roller bearing
⑳ 3rd gear
㉑ Output shaft
㉒ Needle roller bearing
㉓ 2nd gear
㉔ Synchronizer ring
㉕ Synchromesh shifting key spring
㉖ Transmission clutch hub No. 1
㉗ Synchromesh shifting key
㉘ Reverse gear
㉙ Synchronizer ring
㉚ 1st gear bearing inner race
㉛ Needle roller bearing
㉜ 1st gear
㉝ 1st gear thrust washer
㉞ Bearing
㉟ Hole snap ring
㊱ Bearing
㊲ Counter gear
㊳ Woodruff key
㊴ Counter gear shaft
㊵ Bearing
㊶ Hole snap ring
㊷ Bimetal formed bush
㊸ Reverse idler gear S/A
㊹ Reverse idler gear shaft
㊺ Reverse idler stopper
㊻ O -ring

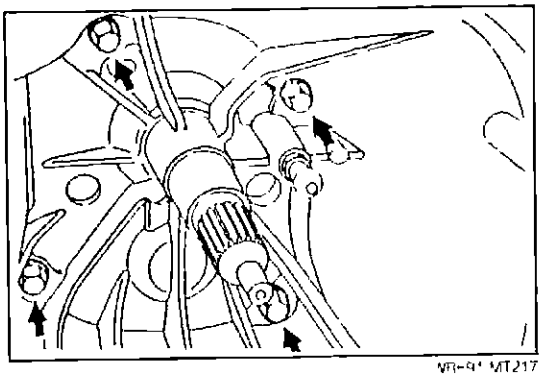
WRE31 MT218

REMOVAL

1 Remove the transmission and transfer assembly from the vehicle
2 Remove the transfer-related parts (Refer to the TR section)
3 Remove the transmission case cover with the transmission case cover gasket by removing the eight bolts
NOTE:
- Never reuse the removed gasket.

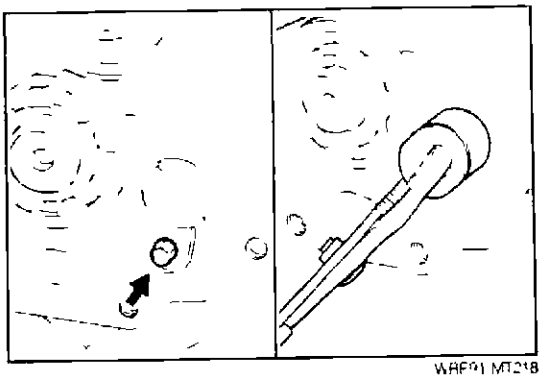

WRE91 MT215

4 Remove the clutch-related parts (Refer to the CL section.)
5 Remove the clutch housing, with the type "S" oil seal installed, and transmission case gasket by removing the four bolts
NOTE:
- Never reuse the removed transmission case gasket.

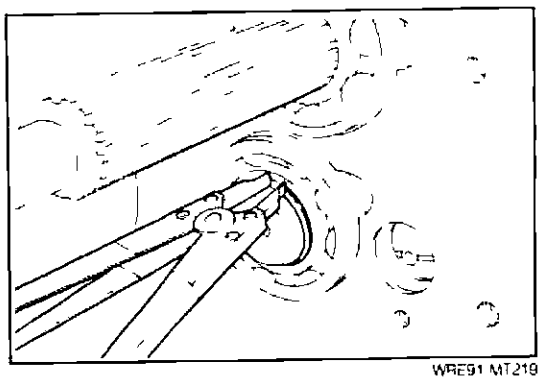

WRE91 MT217

6 Remove the reverse idler gear stopper by removing the bolt
NOTE:
- Since the threaded portion of this bolt has been coated with resin, thoroughly wash and wipe off the resin of the threaded portion in advance if the removed bolt is reused or a new bolt of the replacement parts is used.

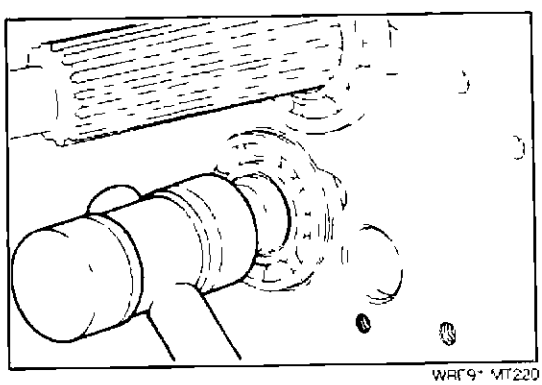
7 Pull out the reverse idler gear shaft toward your side, using standard pliers or the like


WRE91 MT218

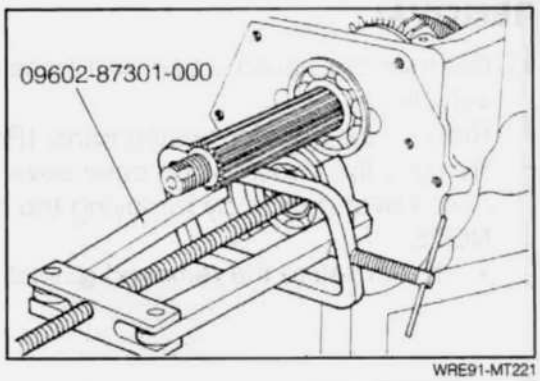
8 Detach the stop ring of the output shaft rear bearing
9 Remove the shaft snap ring of the counter gear rear bearing, using standard snap ring pliers
NOTE:
- Never reuse the removed shaft snap ring.


WRE91 MT219

10 Lightly tap the counter gear shaft surface with a plastic hammer, facing toward the front side
11 Lightly tap the counter gear shaft surface from the front side with a plastic hammer so that the position of the counter gear shaft rear bearing may slightly move toward the rear side to hook the SST

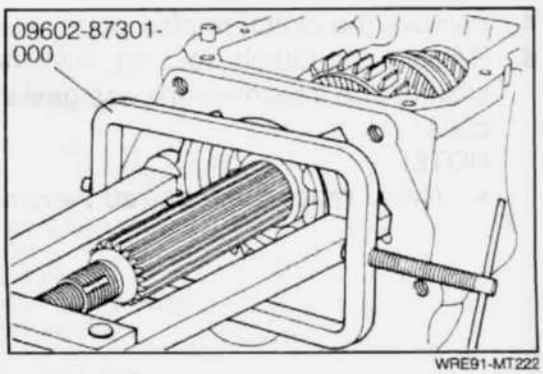

WRE91 MT220

12. Remove the counter gear shaft rear bearing, using the following SST.
    SST: 09602-87301-000



WRE91-MT221

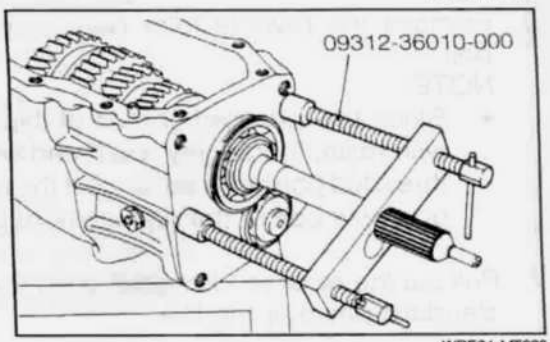
13. Remove the output shaft rear bearing, using the following SST.
    SST: 09602-87301-000



WRE91-MT222

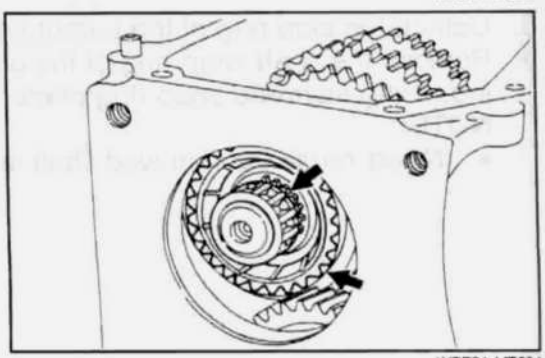
14. Remove the input shaft with the following parts installed, using the following SST.
    SST: 09312-36010-000

    (1) Shaft snap ring
    (2) Bearing

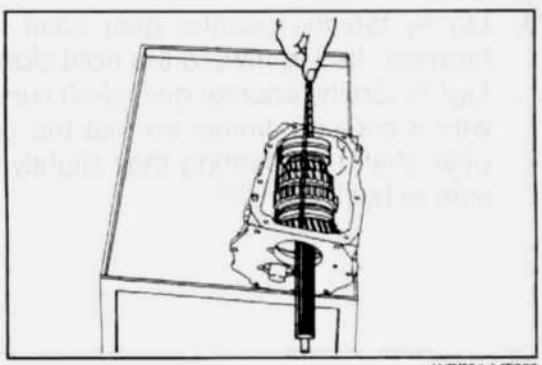


WRE91-MT223

15. Remove the needle roller bearing and synchronizer ring No. 3.

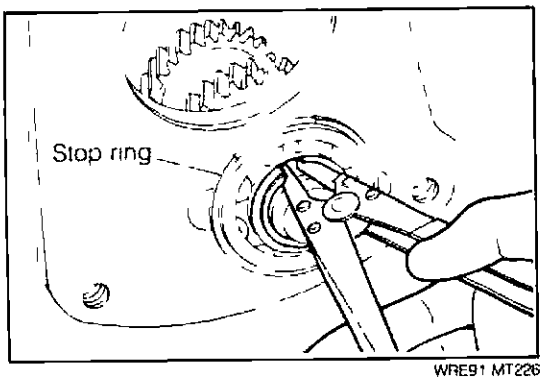

WRE91-MT224

16. Using an operation rope (ounter diameter about 3 mm), remove the output shaft assembly from the transmission case.


WRE91-MT225

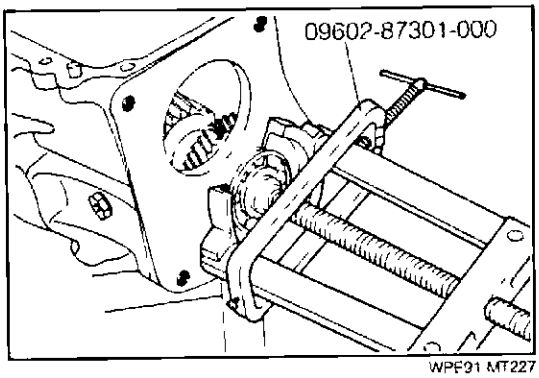
17 Remove the shaft snap ring of the counter gear bearing, using the standard tool of snap ring plier
NOTE:
- **Never reuse the removed shaft snap ring.**

18 Detach the stop ring of the counter gear bearing



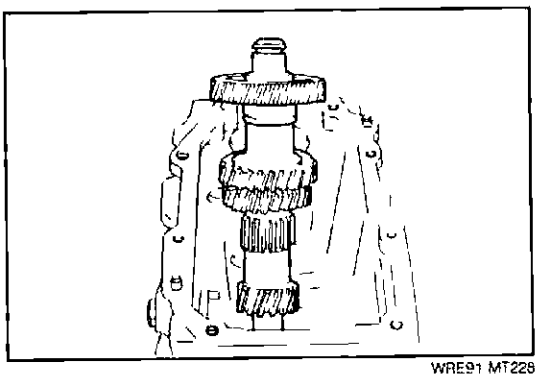
WRE91 MT226

19 Lightly tap the counter gear shaft with a plastic hammer faces toward the rear
20 Remove the counter gear bearing, using the following SST.
SST: 09602-87301-000



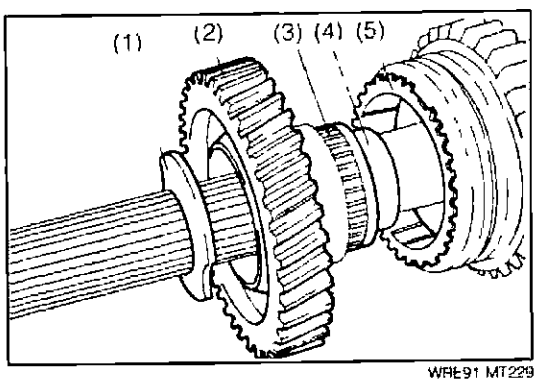
WPE91 MT227

21 Remove the counter gear shaft from the transmission case


WRE91 MT228

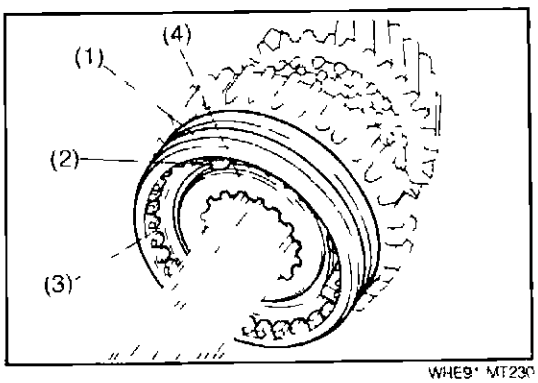
DISASSEMBLY OF OUTPUT SHAFT

1 Remove the following parts
(1) 1st gear thrust washer
(2) 1st gear
(3) Needle roller bearing
(4) 1st gear bearing inner race
(5) Synchronizer ring



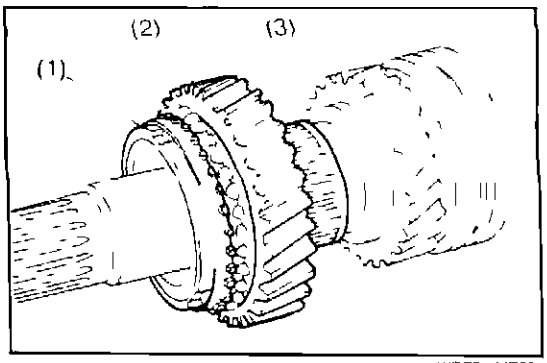
WRE91 MT229

2 Remove the following parts in a set
(1) Reverse gear
(2) Synchromesh shifting key . . . . (3 pcs)
(3) Synchromesh shifting key spring . . . (2 pcs)
(4) Transmission clutch hub No 1



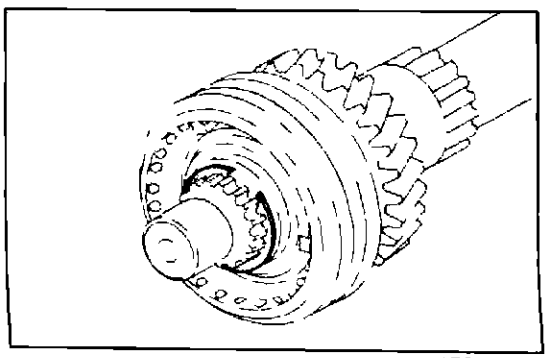
WRE91 MT230

3 Remove the following parts
(1) Synchronizer ring
(2) 2nd gear
(3) Needle roller bearing

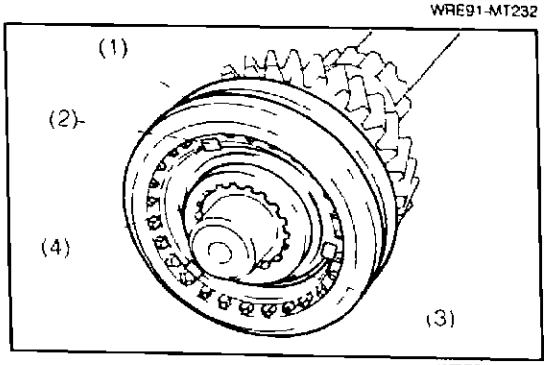


WRE91 MT231

4 Remove the shaft snap ring, using the standard tool of snap ring plier
NOTE:
- **Never reuse the removed shaft snap ring.**

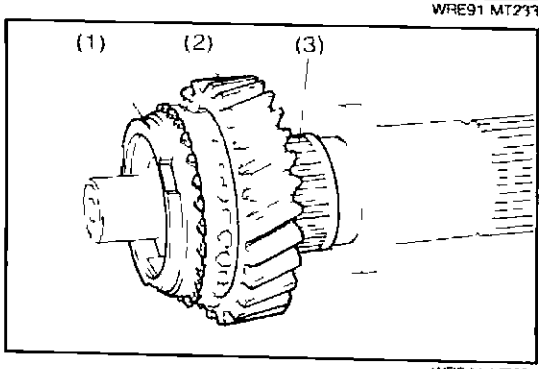

WRE91-MT232

5 Remove the following parts in a set
(1) Transmission hub sleeve No 1
(2) Synchromesh shifting key (3 pcs)
(3) Synchromesh shifting key spring (2 pcs)
(4) Transmission clutch hub No 2



WRE91 MT233

6 Remove the following parts
(1) Synchronizer ring No 3
(2) 3rd gear
(3) Needle roller bearing

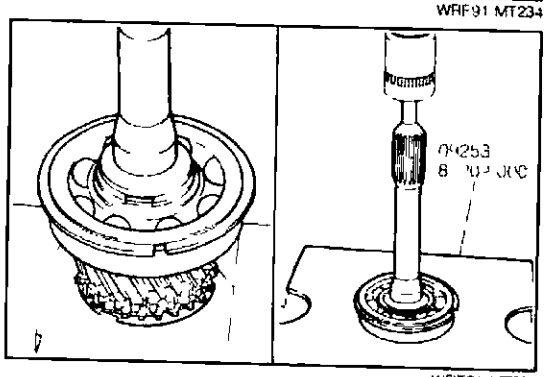


WRF91 MT234

DISASSEMBLY OF INPUT SHAFT

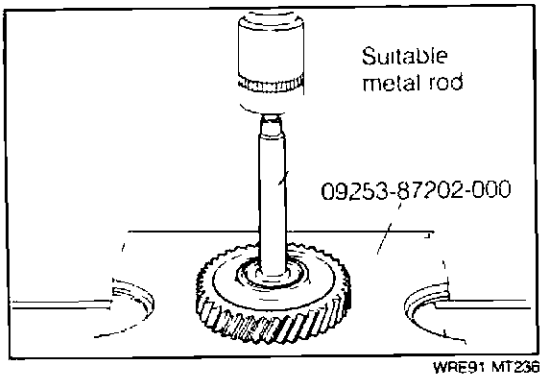
1 Remove the shaft snap ring, using the standard tool of snap ring plier
NOTE:
- **Never reuse the removed shaft snap ring**

2 Remove the bearing, in conjunction with a press and the following SST
SST: 09253-87202-000


WRE91 MT235

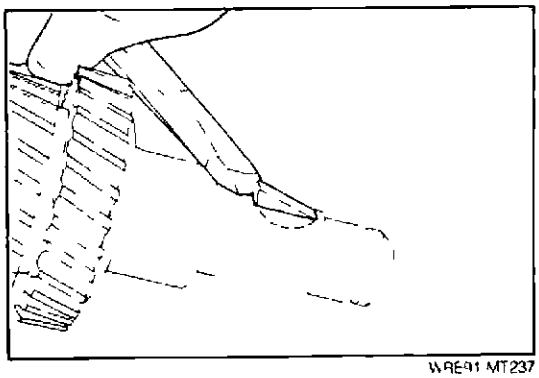
DISASSEMBLY OF COUNTER GEAR SHAFT

1 Press the counter gear shaft, in conjunction with the suitable metal rod and the following SST
SST: 09253-87202-000



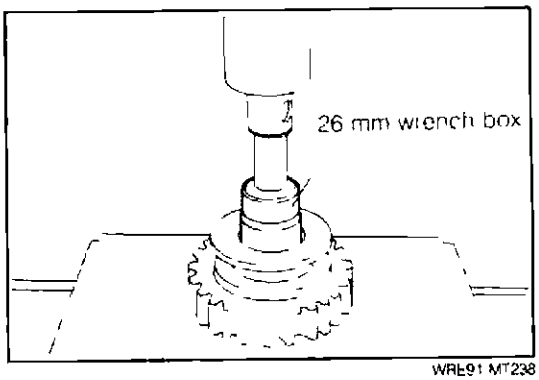
WRE91 MT236

2 Remove the woodruff key, using the standard tool of chisel or the like


WRE91 MT237

REVERSE IDLER GEAR FORMED BUSH REMOVAL

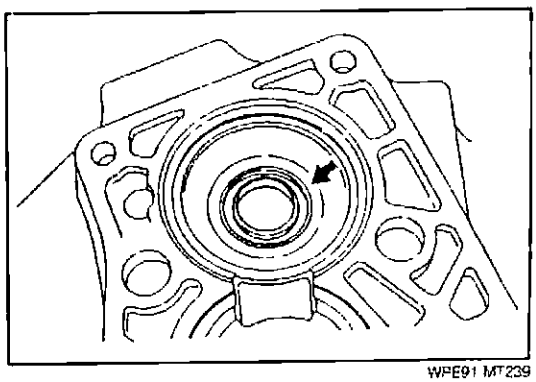
1 Remove the bimetal formed bush, in conjunction with the press and the standard tool of 26 mm wrench box.



WRE91 MT238

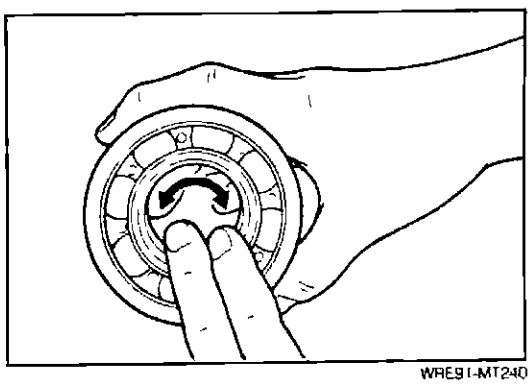
REMOVAL OF CLUTCH HOUSING OIL SEAL

1 Remove the "S" type oil seal
NOTE:
- **Never reuse the removed oil seal.**

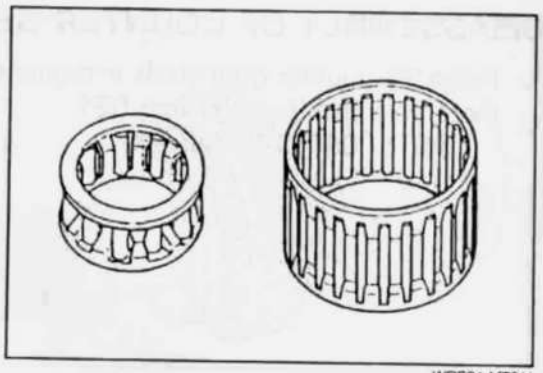

WRE91 MT239

INSPECTION

1 Each ball bearings
Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any sticking

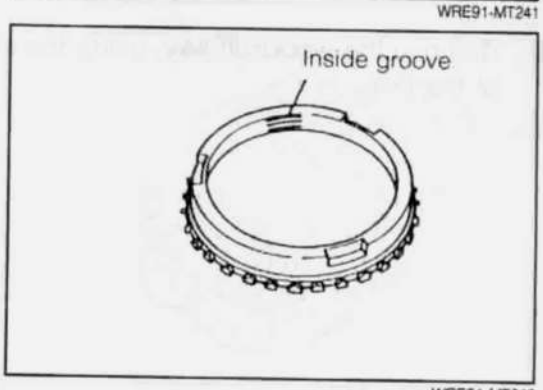

WRE91-MT240

2. Each needle roller bearings.
   Check each needle roller bearing for wear or damage.



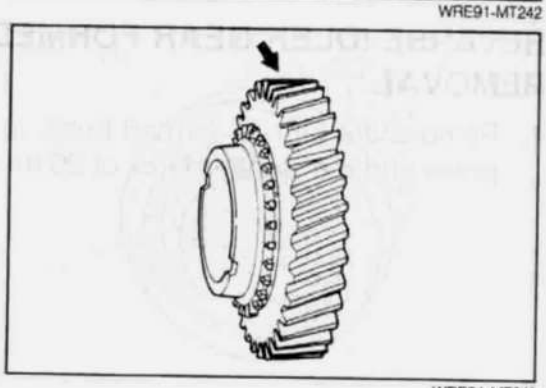
WRE91-MT241

3. Check the inside groove of the synchronizer rings for wear or damage.



WRE91-MT242

4. Check each gear for wear or damage.

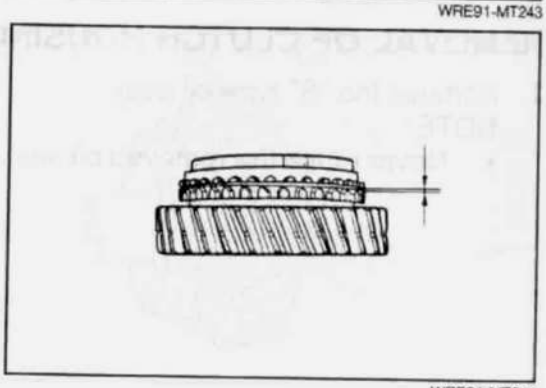


WRE91-MT243

5. Measure the clearance between each gear and synchronizer rings, using the standard tool of filler gauge.

Unit: mm

	Specified value	Allowable limit
All gears	1.3 - 1.7	0.8

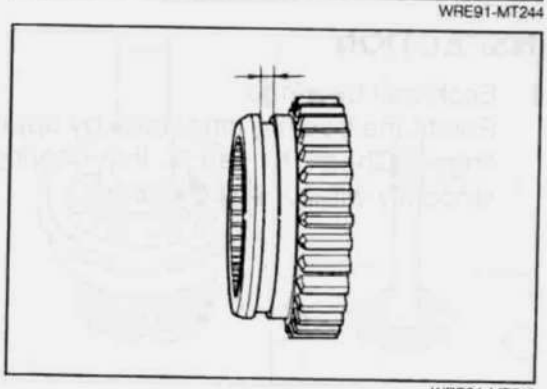


WRE91-MT244

6. Measure the contact width (A) of the following parts with the shift fork.

Unit: mm

	Specified value	Allowable limit
Reverse gear	$7^{+0}_{+0.058}$	7.3
Transmission hub sleeve No. 1	$7^{+0}_{+0.058}$	7.3

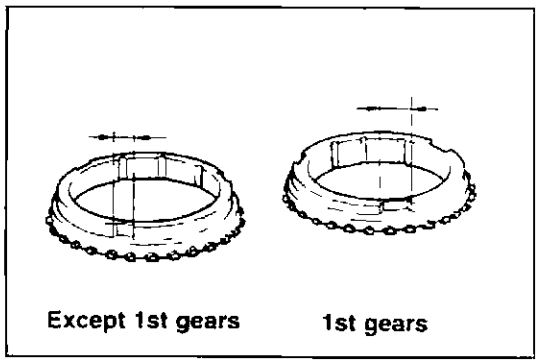


WRE91-MT245

7 Measure the contact width of each synchronizer ring with the synchromesh shifting key Replace the synchronizer ring which does not confirm to the specifications with new-one

Unit mm

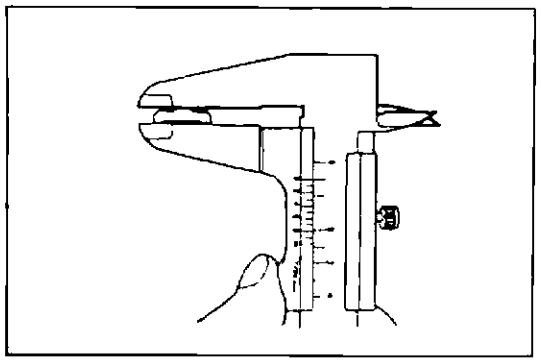
	Specified value	Allowable limit
1st gear	8 4 ± 0 1	8 5
Except 1st gear	11 0 ± 0 1	11 1



8 Measure the height of each synchromesh shifting key

Unit mm

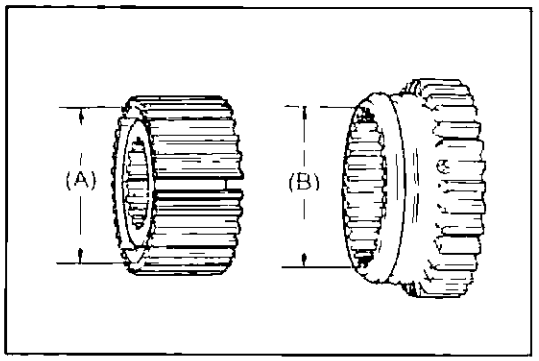
	Specified value	Allowable limit
1st & 2nd	6 ± 0 15	5 6
3rd & 4th	5 8 ± 0 15	5 4



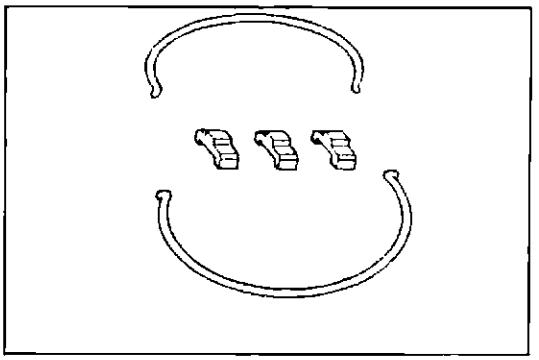
9 Measure the bore and outer diameter of the following parts

Unit mm

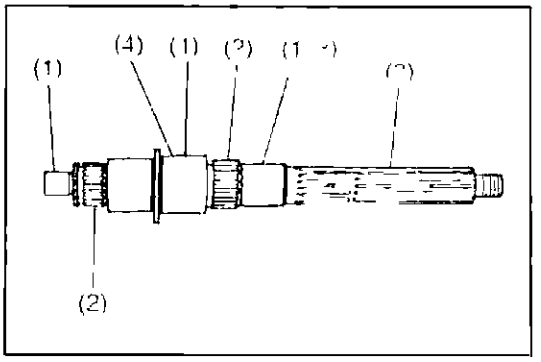
	Specified value	Allowable limit
Reverse gear	87 5	87 5
Transmission clutch hub No 1	87 5	87 3
Transmission hub sleeve No 1	72 5	72 7
Transmission clutch hub No 2	72 5	72 3



10 Check the synchromesh shifting key and synchromesh shifting key spring for evidence of wear or damage



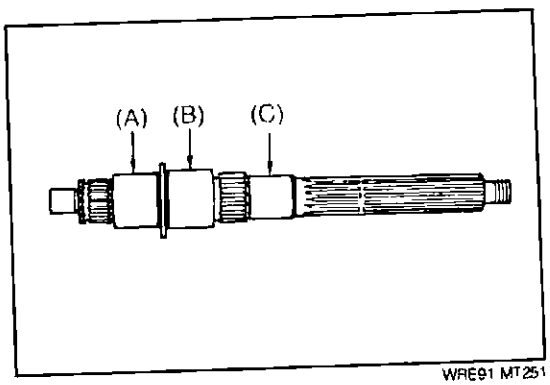
11 Check the output shaft for the following items
(1) Needle roller bearing race section for wear or damage
(2) Spline section for damage
(3) Fitting section of bearing inner race for wear
(4) Measure the runout of the output shaft at the 2nd gear section
Allowable Limit: 0 05 mm



12 Measure the following section of the output shaft

Unit mm

	Specified value	Allowable limit
(A) section	40 $^{0.015}_{0.030}$	39 97
(B) section	48 $^{0.015}_{-0.032}$	47 97
(C) section	38 $^{0.025}_{0.041}$	37 98

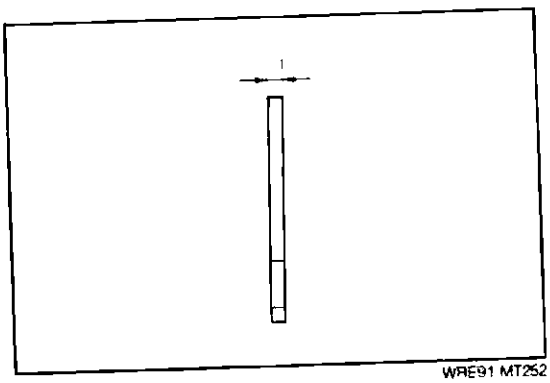


WRE91 MT251

13 Measure the thickness of 1st gear thrust washer

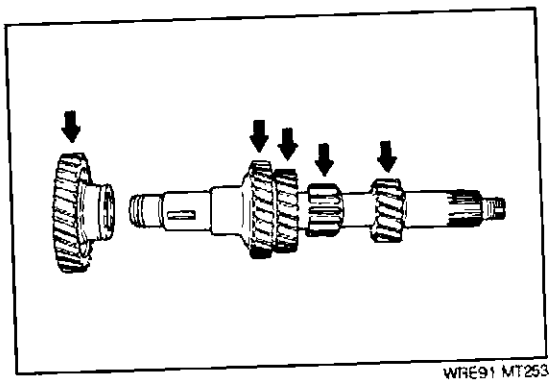
Unit mm

	Specified value	Allowable limit
Thickness	4 ± 0 1	3 85


WRE91 MT252

COUNTER GEAR SHAFT

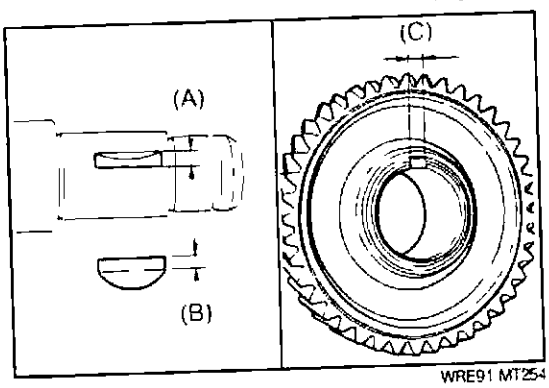
1 Check the counter gear shaft and counter gear for wear and damage.


WRE91 MT253

2 Measure the fitting width section of the woodruff key with counter gear shaft and counter gear

Unit mm

		Specified value	Allowable limit
(A)	Counter gear shaft	7 $^{0.02}_{-0.05}$	7 02
(B)	Woodruff key	7 $^{+0.015}_{-0}$	7 0
(C)	Counter gear	7 ± 0 02	7 02

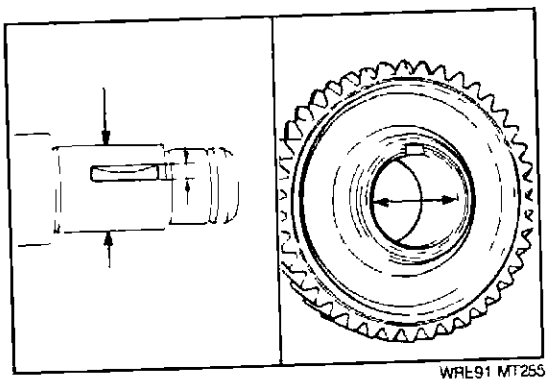


WRE91 MT254

3 Measure the outer diameter of the counter gear shaft and inner diameter of the counter gear.

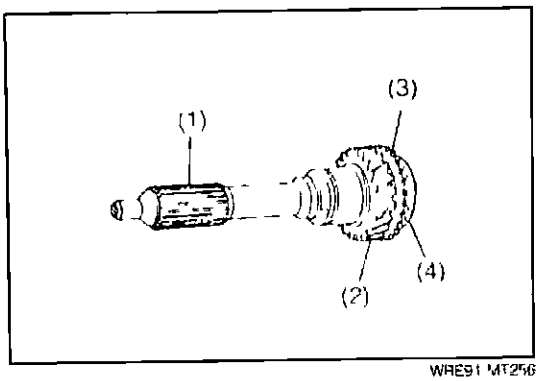
Unit mm

		Specified value	Allowable limit
Outer diameter	Counter gear shaft	35 $^{+0.050}_{+0.034}$	35 0
Inner diameter	Counter gear	35 $^{+0.025}_{-0}$	35 05


WRE91 MT255

INPUT SHAFT

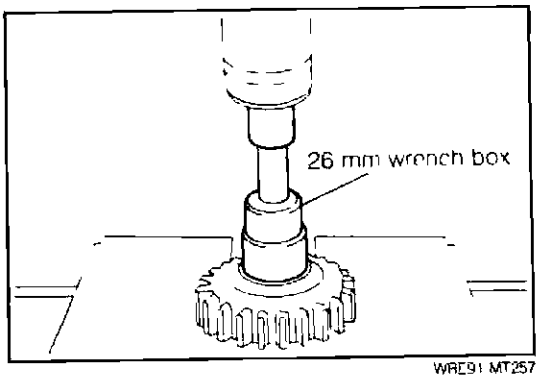
1 Check the input shaft for the following items
(1) Spline section for wear and damage
(2) Gear for wear and damage
(3) Engaging section of hub sleeve for wear and damage
(4) Tappered section for wear and damage



WRE91 MT256

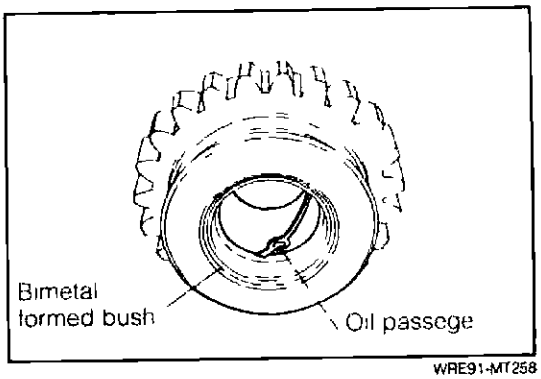
INSTALLATION OF REVERSE IDLER GEAR BIMETAL FORMED BUSH

1 Install the bimetal formed bush, in conjunction with a press and the 26 mm wren box
NOTE:
- The bush should be press-fitted in such a way that the oil passage in the gear is lined up with that in bush.



WRE91 MT257

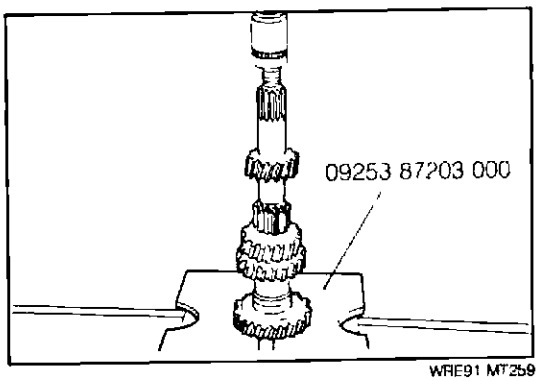
- After the bush has press fitted securely, each edge of the bush should be recessed 1 mm from the edge of gear, respectively.
- If the above operation should fail to be performed, Failure to observe this notice causes emanating of noise or seizure of bimetal formed bush.



WRE91-MT258

ASSEMBLY OF COUNTER GEAR SHAFT

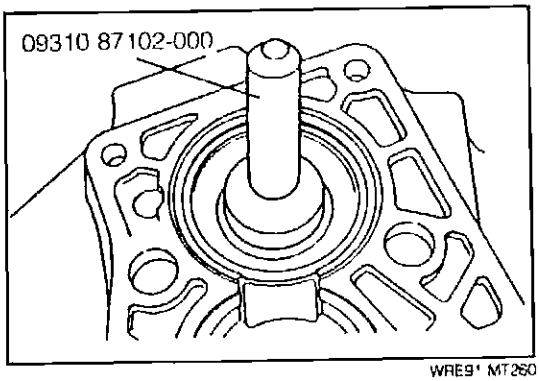
1 Install the woodruff key into place
2 Press the counter gear to the counter gear shaft, using the following SST
SST: 09253-87202-000



WRE91 MT259

INSTALLATION OF CLUTCH HOUSING OIL SEAL

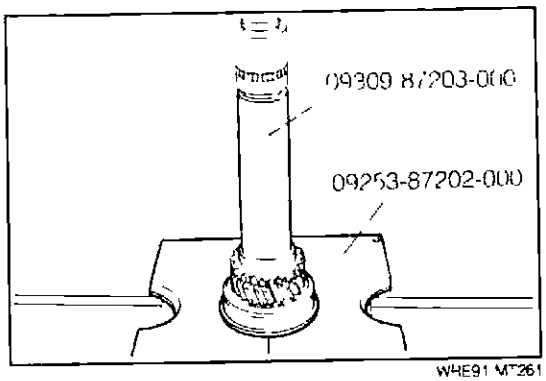
Install the new "T" type oil seal, using the following SST
SST: 09310-87102-000



WRE91 MT260

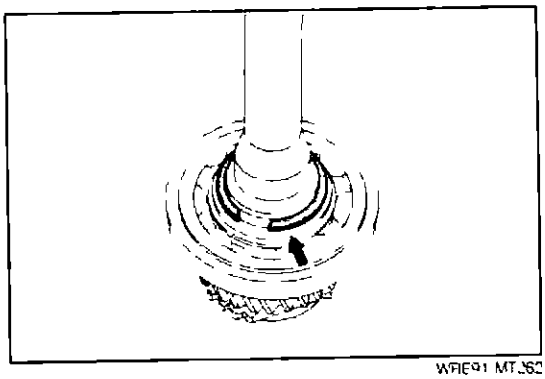
ASSEMBLY OF INPUT SHAFT

1 Press the bearing using the following SSTs
SSTs 09253-87202-000
09309-87203-000



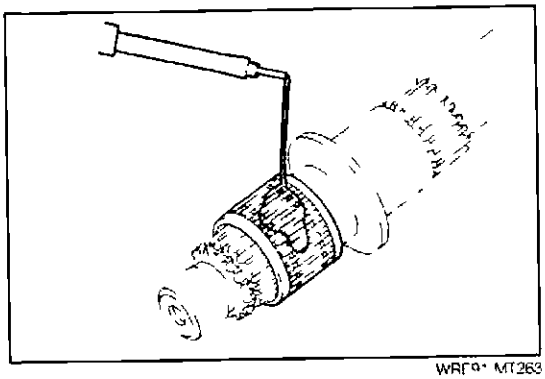
W4E91 MT261

2 Install the new shaft snap ring
NOTE
- Ensure that the shaft snap ring should be installed to the groove section of the input shaft securely.

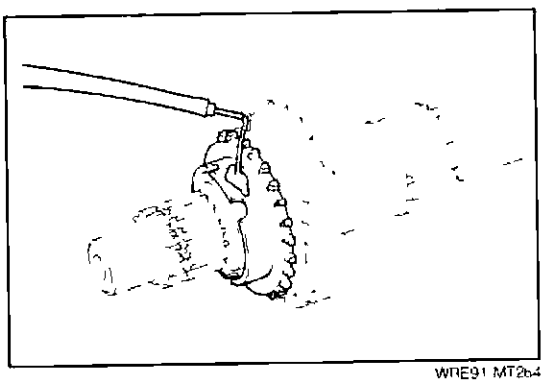

WRE91 MT262

ASSEMBLY OF OUTPUT SHAFT

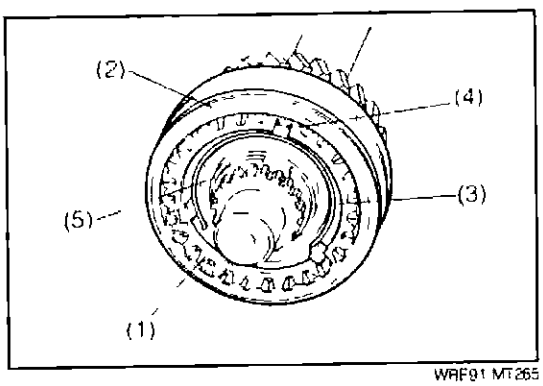
1 Apply gear oil to the outer periphery of needle roller bearing and output shaft


WRE91 MT263

2 Install the 3rd gear
3 Apply gear oil to the tapered section of 3rd gear


WRE91 MT264

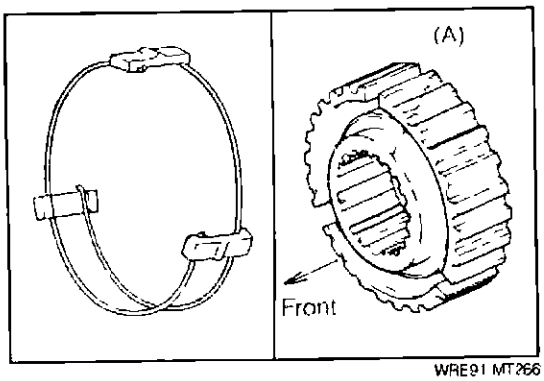
4 Install the following parts in this sequence
(1) Synchronizer ring No. 3
(2) Transmission clutch hub No. 2
(3) Synchromesh shifting key spring (2 pcs)
(4) Synchromesh shifting key (3 pcs)
(5) Transmission hub sleeve No. 1



WRE91 MT265

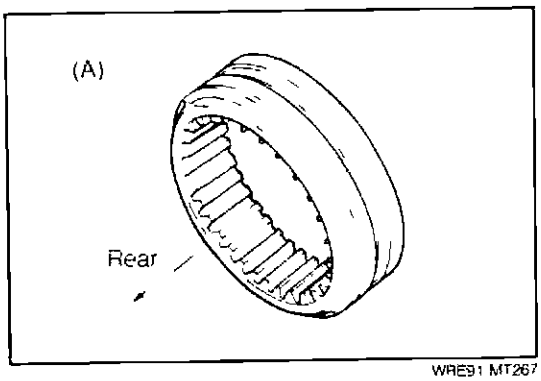
CAUTION:
- Ensure that the transmission clutch hub No. 2 (A) section faces toward the front side. If this operation should fail to be performed, Failure to observe this caution may causes emanating of noise.

NOTE:
- As for the synchromesh shifting key spring, the bent sections at the front and rear should not come at the same direction, as shown in the right figure.



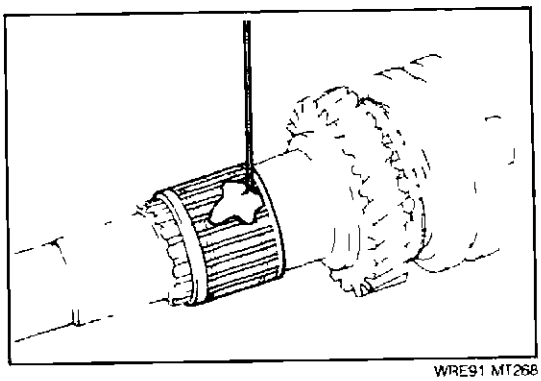
WRE91 MT266

NOTE:
- Ensure that the transmission clutch hub No. 2 (A) section faces toward the rear side.

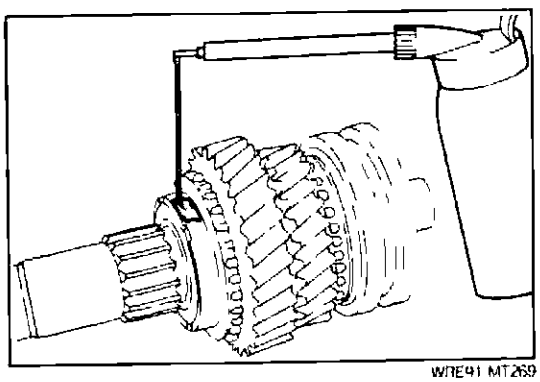


WRE91 MT267

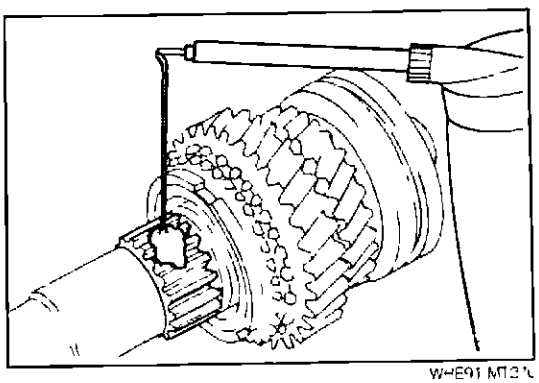
5 Apply gear oil to the outer periphery of needle roller bearing and the output shaft


WRE91 MT268

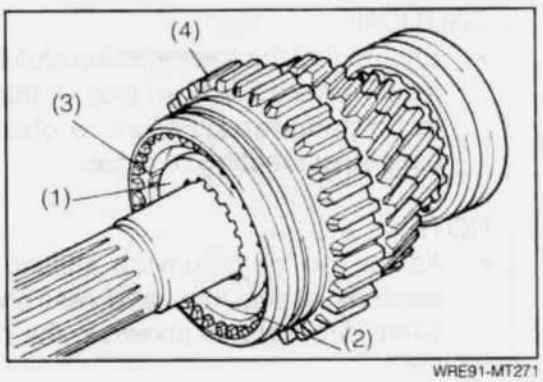
6 Install the 2nd gear
7 Apply gear oil to the tapered section of the 2nd gear


WRE91 MT269

8 Install the synchronizer ring
9 Apply gear oil to the spline section of the output shaft

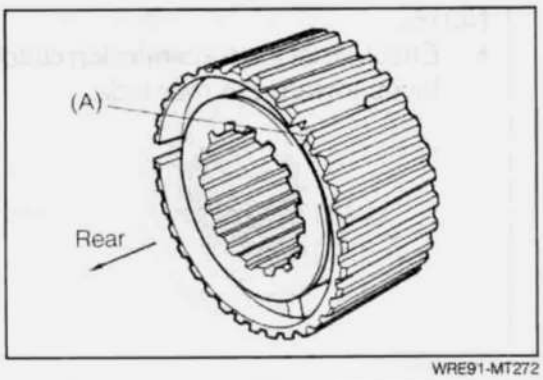

WRE91 MT270

10. Install the following parts in this sequence.
    (1) Transmission clutch hub No. 1
    (2) Synchromesh shifting key spring ..... (2 pcs)
    (3) Synchromesh shifting key ..... (3 pcs)
    (4) Reverse gear



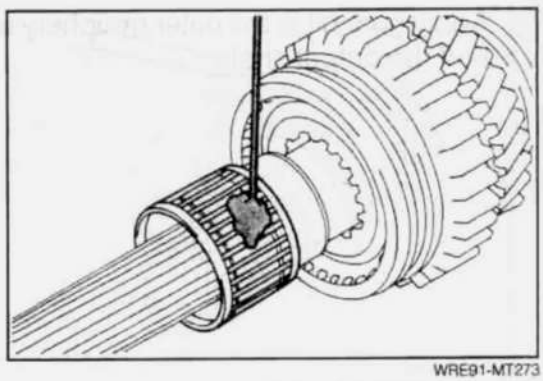
WRE91-MT271

NOTE:
- Ensure that the transmission clutch hub No. 1 (A) section faces toward rear side.

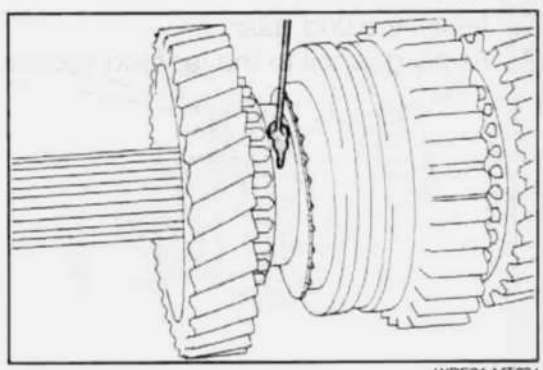


WRE91-MT272

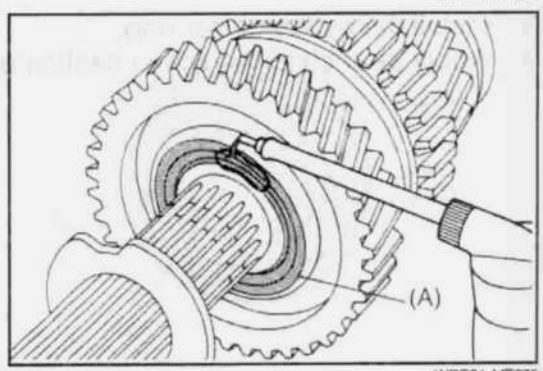
11. Apply gear oil to the outer periphery of needle roller bearing and 1st gear bearing inner race.


WRE91-MT273

12. Install the synchronizer ring.
13. Apply gear oil to the tapered section of the 1st gear.


WRE91-MT274

14. Apply gear oil to the A (slant line section in the right figure) section.
15. Install the 1st gear thrust washer.

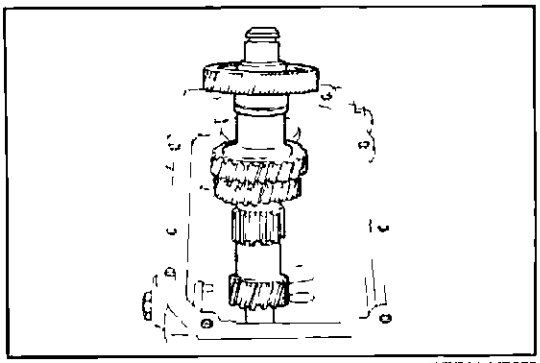


WRE91-MT275

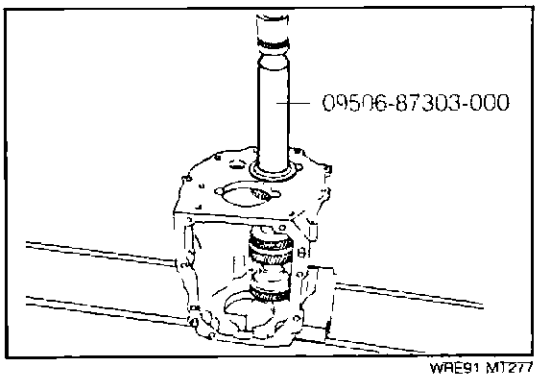
INSTALLATION

NOTE:
- Clean the transmission case by removing any dirt, gasket metarials or the like, prior to install the gears etc..

1 Place the counter gear shaft to the transmission case

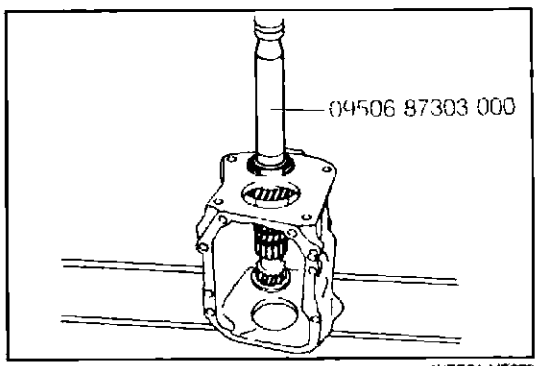

WRE91 MT276

2. Press the counter gear rear bearing, using the following SST
   SST: 09506-87303-000



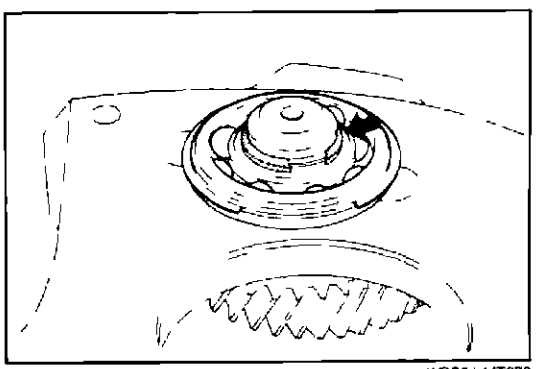
WRE91 MT277

3 Attach the stop ring of the counter gear bearing.
4 Press the counter gear bearing, using the following SST
   SST: 09506-87303-000

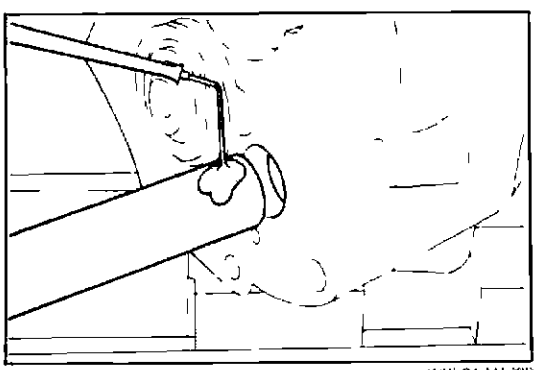


WRE91 MT278

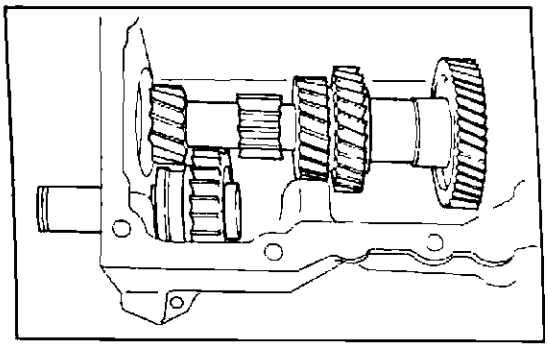
5 Install the new shaft snap ring, using the standard tool of snap ring plier or the like
NOTE:
- Ensure that the shaft snap ring should be installed to the groove section of the counter gear shaft securely.


WRE91 MT279

6 Apply gear oil to the outer periphery of the reverse idler gear shaft.

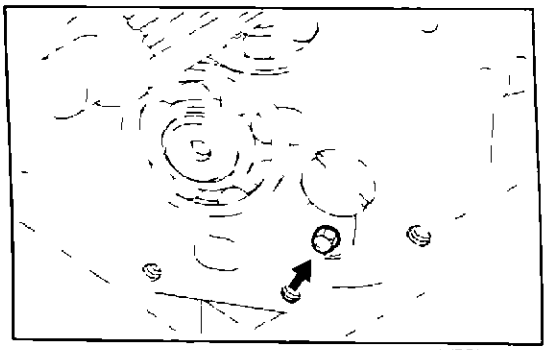

WRE91 MT280

7 Install the rever idler gear S/A
NOTE.
- Ensure that the gear chambered section of the reverse idler gear S/A faces toward the front side.

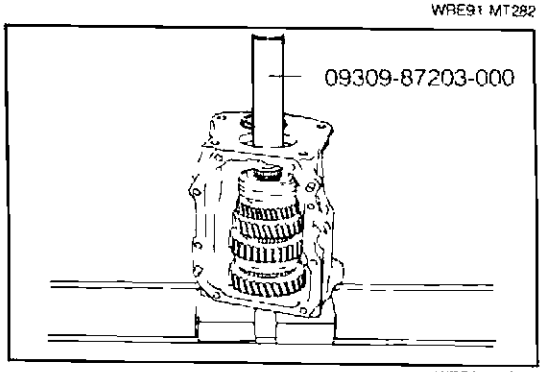

WRF91 MT281

8 Tighten the reverse idler gear stopper with a bolt
Tightening Torque: 9.8 - 15.7 N·m (1.0 - 1.6 kgf-m)

NOTE·
- Apply the three bond 1326 (Three bond made) to the threaded section of the bolt, prior to use them.

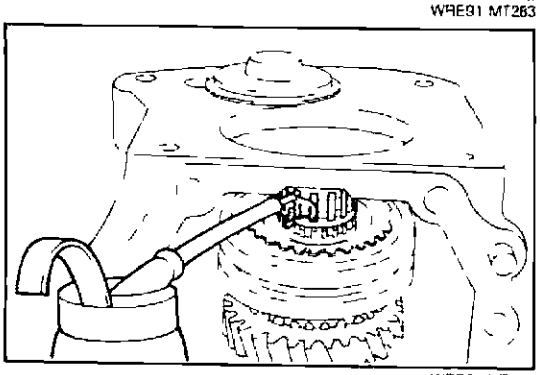

WRE91 MT282

9 Install the output shaft assembly to the transmission case
10 Install the output shaft rear bearing, in conjunction with a press and the following SST
SST: 09309-87203-000

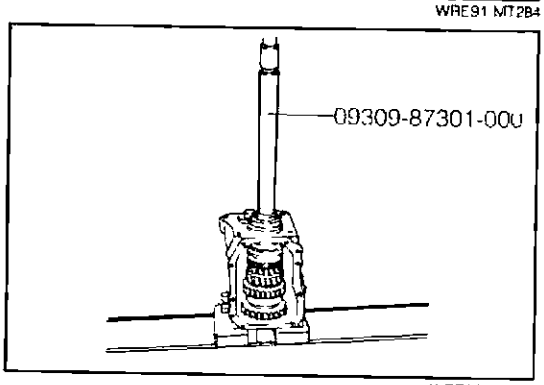


WRE91 MT283

11. Install the needle roller bearing and the synchronizer ring No 3
12 Apply gear oil to the outer periphery of the needle roller bearing

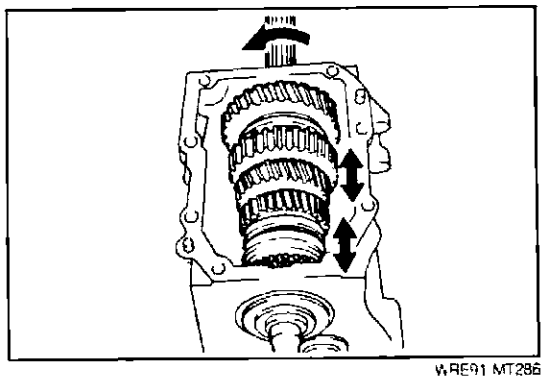

WRE91 MT284

13 Install the input shaft to the transmission case in conjunction with a press and the following SST
SST: 09309-87301-000

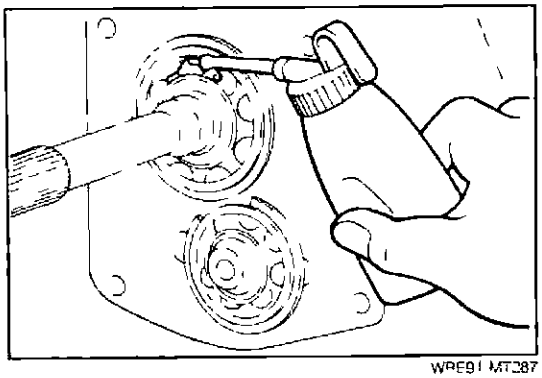


WRE91 MT285

14 While turning the input shaft clockwise, manually place the shift lever in each of the gears from 1st to 4th and reverse gear. Ensure that each gear is engaged smoothly

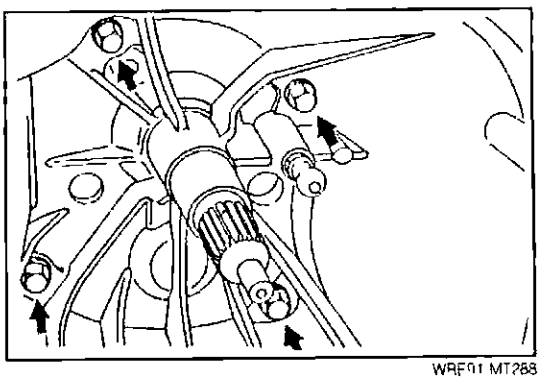

WRE91 MT286

15 Apply gear oil to the roller section of the rear bearing for the output shaft and counter gear shaft


WRE91 MT287

16 With a new gasket interposed, tighten the clutch housing by means of the four bolts

Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf-m)

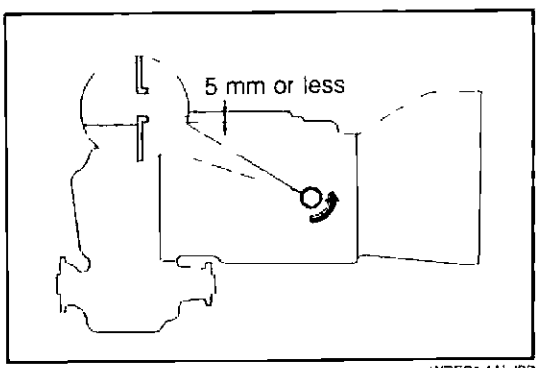

WRE91 MT288

17 Install the clutch-related parts (Refer to the CL section)
18 Install the transfer-related parts (Refer to the TR section)
19 Install the transmission and transfer assembly to the vehicle
20 Fill the transmission and transfer with oil

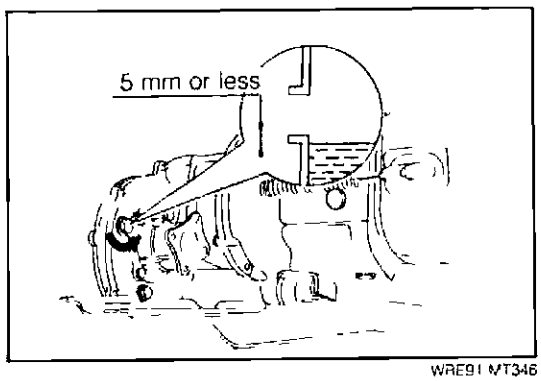
	Oil capacity	API	SAE
T/M	2.2L	GL-3	90
T/F	1.3L	GL-3	75W-90 or 75W-85

Tighten the both transmission and transfer filler plugs with new gasket

Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)



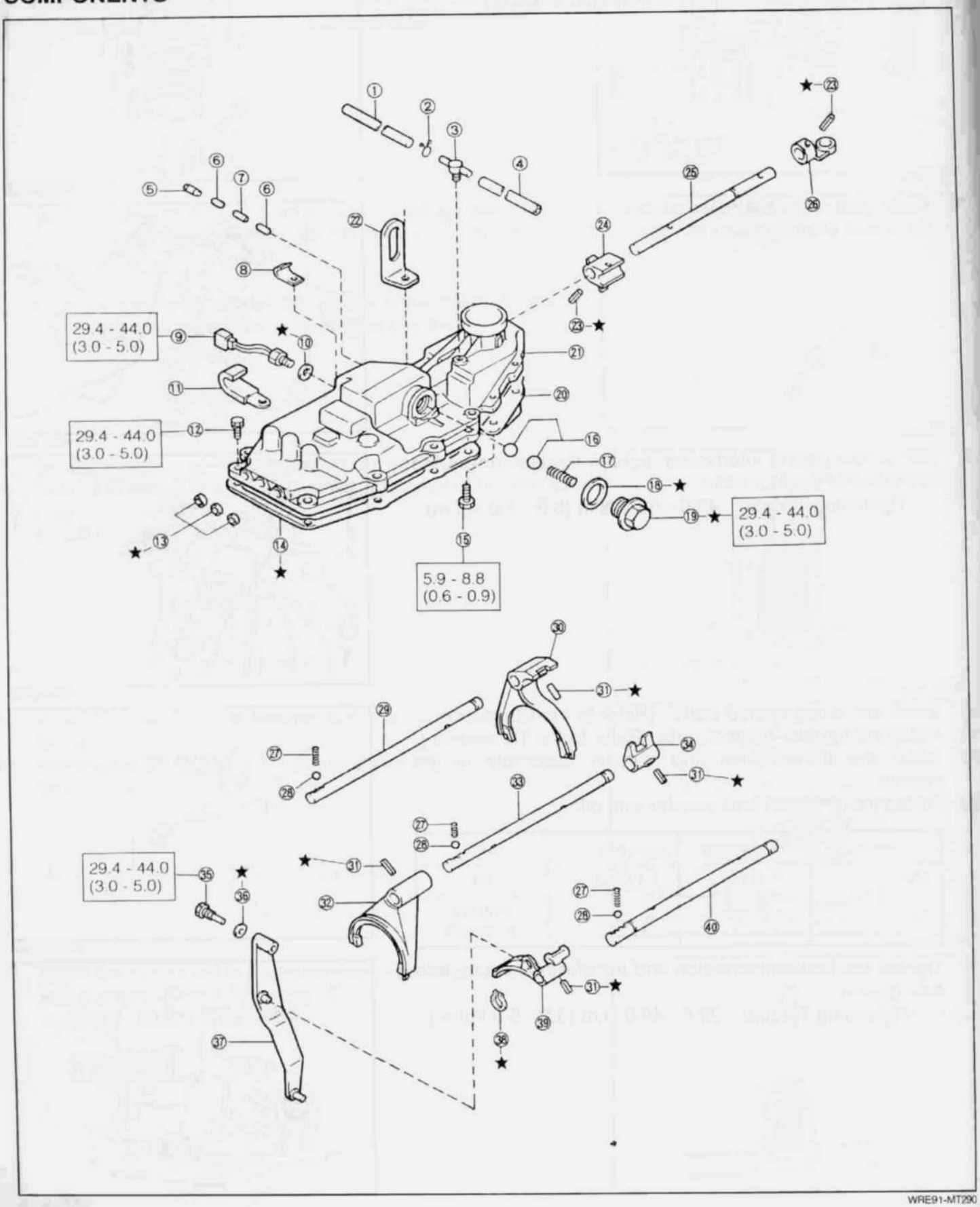
WRE91 MT289



WRE91 MT346

TRANSMISSION CASE COVER (4-Speed)

COMPONENTS



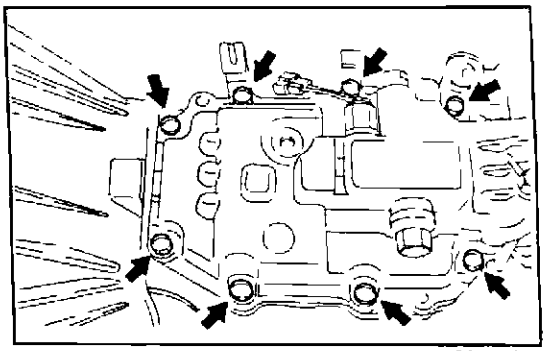
WRE91-MT290

① Hose
② Clip
③ Union
④ Hose No 1
⑤ Pin (only for N A engine)
⑥ Shift inter lock pin No 1
⑦ Shift inter lock pin No 2
⑧ Clamp (for breather hose)
⑨ Back-up lamp switch A/y
⑩ Gasket
⑪ Clamp
⑫ Bolt
⑬ Tight plug
⑭ Mission case cover gasket
⑮ Bolt
⑯ Ball
⑰ Compression spring
⑱ Gasket
⑲ Reverse restrict pin holder
⑳ Shift lever housing dust cover
㉑ Transmission case cover
㉒ Hanger
㉓ Slotted spring pin (longer)
㉔ Shift inner lever
㉕ Shift lever shaft
㉖ Shift outer lever No 1
㉗ Compression spring
㉘ Ball
㉙ 1st & 2nd shift fork shaft
㉚ 1st & 2nd shift fork
㉛ Slotted spring pin
㉜ 3rd & 4th shift fork
㉝ 3rd & 4th shift fork shaft
㉞ Gear shift head No 2
㉟ Shift arm pivot
㊱ Gasket
㊲ Reverse shift arm
㊳ E -ring
㊴ Reverse shift fork
㊵ 5th & reverse shift fork shaft

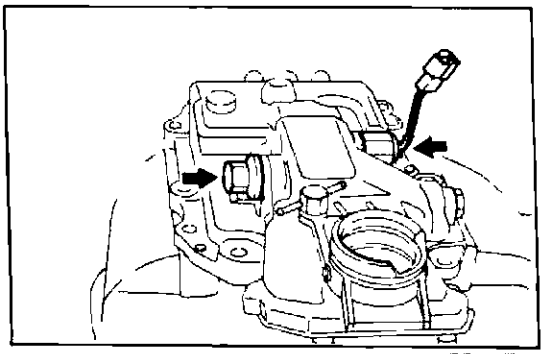
WRF21 MT291

REMOVAL

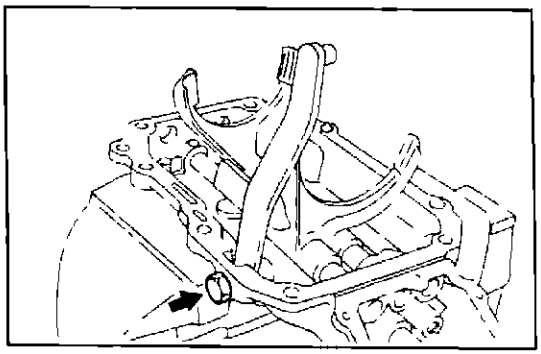
1 Remove the transmission and transfer assembly from the vehicle.
2 Remove the transmission case cover with gasket by removing the eight bolts


WRE91 MT292

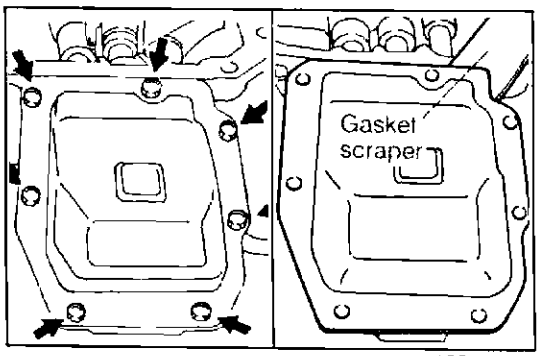
3 Remove the back-up lamp switch A/y and reverse restrict pin holder (compression spring and two balls) with gaskets
NOTE:
- **Never reuse the removed gasket.**


WRE91 MT293

4. Remove the reverse shift arm by removing the shift arm pivot with gasket
NOTE:
- **Never reuse the removed gasket.**

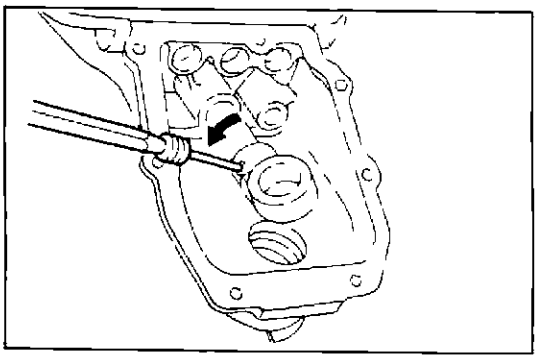

WRE91 MT294

5 Remove the shift lever housing dust cover by removing the seven bolts
6 Using the standard tool of gasket scraper, remove the seal contacting surface of the shift lever housing dust cover.



WRE91 MT295

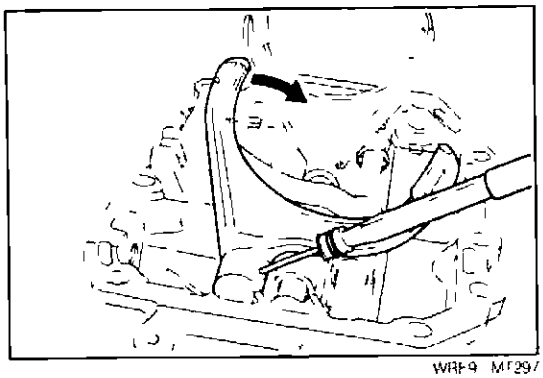
7 While the shift outer lever No. 1 is being tilted as wide as possible, drive off the the slotted spring pin using the standard tool of pin pounch or the like.
NOTE:
- **Never reuse the removed slotted spring pin.**


WRE91 MT296

8 While tilting the 1st & 2nd shift at the largest possible angle drive off the slotted sprig pin, using a standard pin punch or the like

NOTE:

- **Never reuse the removed slotted spring pin.**



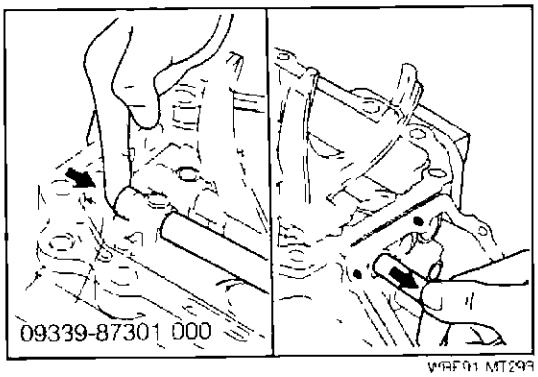
9 Remove the three tight plugs

NOTE:

- **Never reuse the removed tight plugs.**

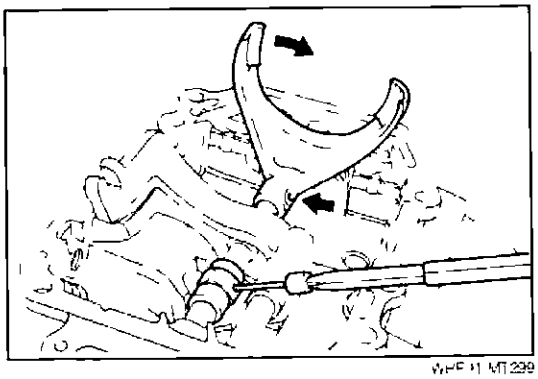
10 Insert the following SST into the hole of the 1st & 2nd shift fork shaft guide so as to prevent the ball and compression spring from jumping out

SST: 09339-87301-000



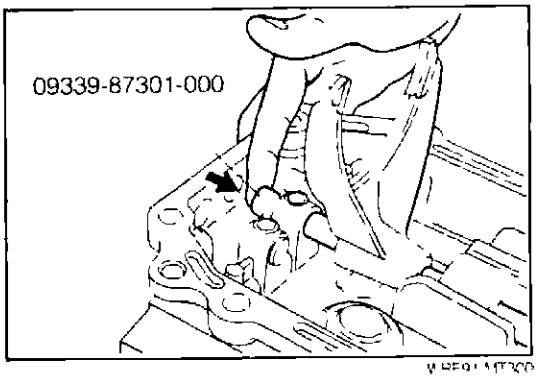
11 Remove the 1st & 2nd shift fork by pulling the 1st & 2nd shift fork shaft toward your side

12 With the 3rd & 4th shift fork tilted at the largest possible angle in the arrowheaded direction, drive off the slotted spring pin of the 3rd & 4th shift fork and gear shift head No 2



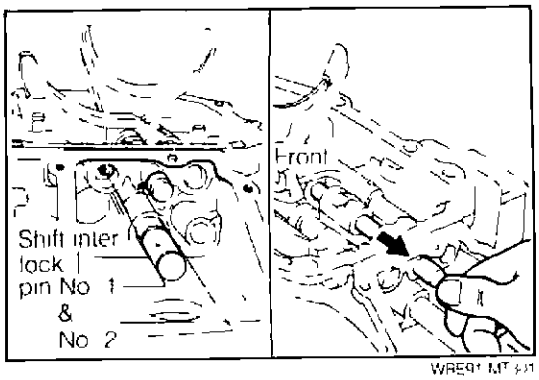
13 Insert the following SST into the hole of the 3rd & 4th shift fork shaft guide so as to prevent the ball and compression spring from jumping out

SST: 09339-87301-000

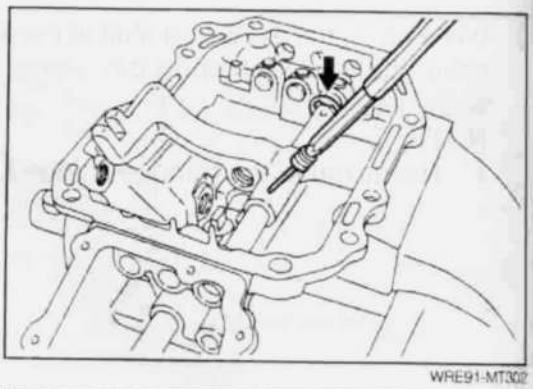


14 Remove the shift interlocking pins No 1 and No 2 by slightly pulling the 3rd & 4th shift fork shaft toward your side

15 Remove the 3rd & 4th shift fork and gear shift head No 2 by pulling the 3rd & 4th shift fork shaft toward your side

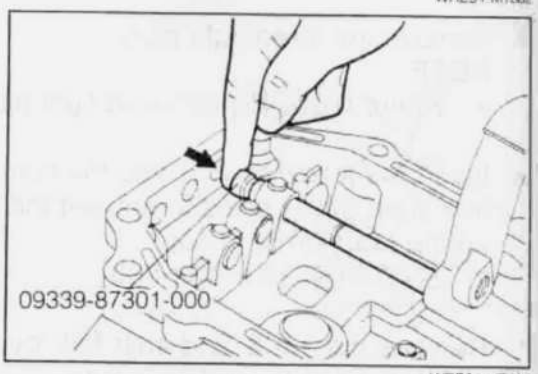


16. Remove the "E" ring.
NOTE:
- Never reuse the removed "E" ring.


WRE91-MT302

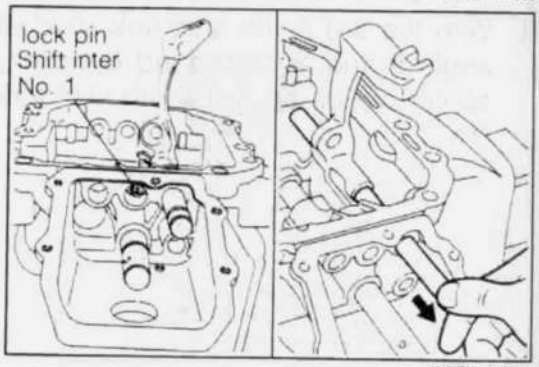
17. Drive off the slotted spring pin of the reverse shift fork.
NOTE:
- Never reuse the removed slotted spring pin.

18. Insert the following SST into the hole of the 5th & reverse shift fork shaft guide so as to prevent the ball and compression spring from jumping out.
SST: 09339-87301-000



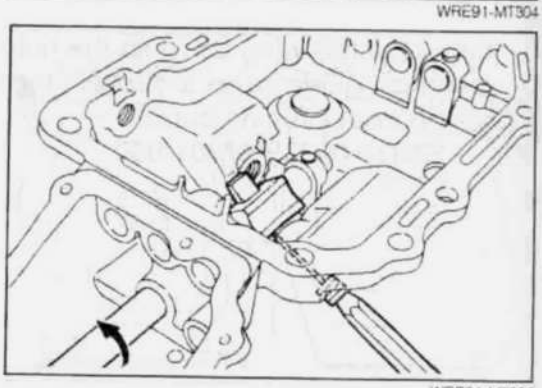
WRE91-MT303

19. Remove the shift interlocking pin No.1 by slightly pulling the 5th & reverse shift fork shaft toward your side.
20. Remove the reverse shift fork and 5th & reverse shift fork shaft by pulling the 5th & reverse shift fork shaft toward your side.

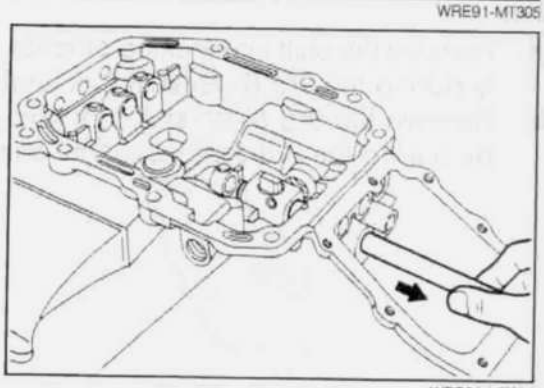


WRE91-MT304

21. Turn the shift lever shaft counterclockwise and insert a standard pin punch through the reverse restrict pin holder attaching hole. Drive off the slotted spring pin of the shift inner lever.
NOTE:
- Never reuse the removed slotted spring pin.

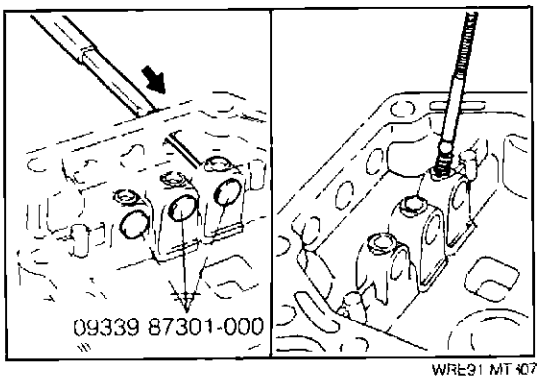

WRE91-MT305

22. Remove the shift inner lever and shift lever shaft by pulling the shift lever shaft toward your side.


WRE91-MT306

23 Remove the following SST, using a standard pin punch or the like
SST: 09339-87301-000

24 Remove the ball and compression spring by means of a standard magnet hand tool



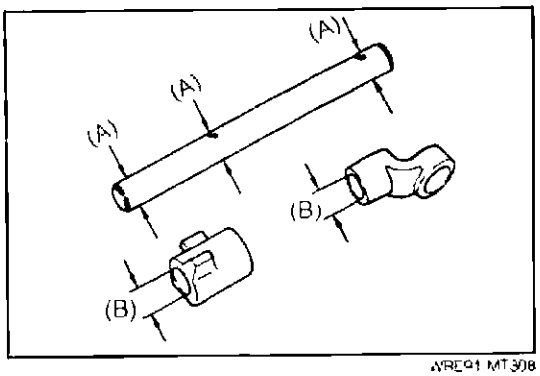
WRE91 MT307

INSPECTION

1 Measure the outer (section A) and inner diameters (B) of the following parts

Unit: mm

		Specified value	Allowable limit
Outer diameter	Shift lever shaft	16 $^{0}_{-0.02}$	15.97
Inner diameter	Shift inner lever	16 $^{+0.18}_{0}$	16.03
	Shift outer lever No. 1	↑	↑

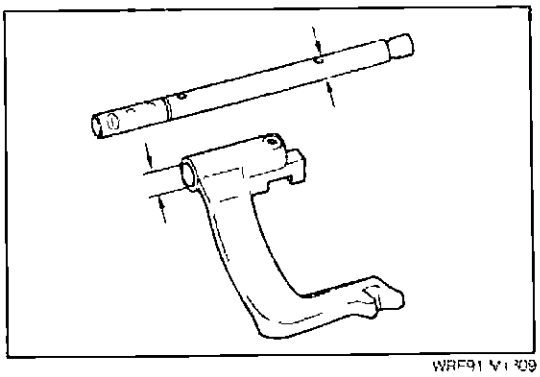


WRE91 MT308

2 Measure the outer and inner diameters of the following parts

Unit: mm

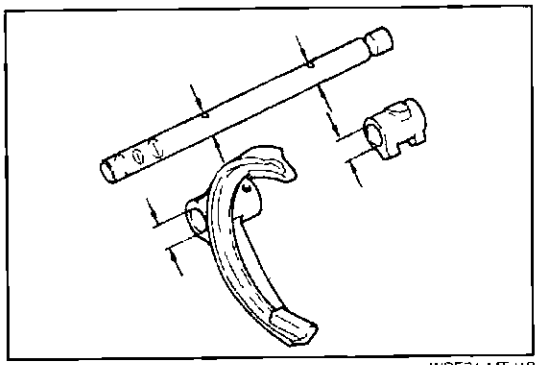
		Specified value	Allowable limit
Out diameter	5th & reverse shift fork shaft	14 $^{-0.05}_{-0.07}$	13.97
Inner diameter	Reverse shift fork	14 $^{+0.18}_{0}$	14.03


WRE91 MT309

3 Measure the outer and inner diameters of the following parts

Unit: mm

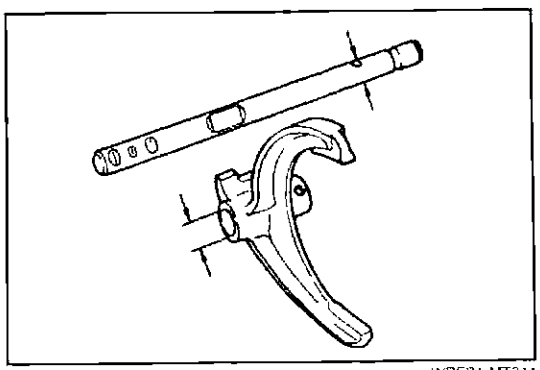
		Specified value	Allowable limit
Outer diameter	3rd & 4th shift fork shaft	14 $^{-0.05}_{-0.07}$	13.97
Inner diameter	3rd & 4th shift fork	14 $^{+0.18}_{0}$	14.03
	Gear shift head No. 2	↑	↑


WRE91 MT310

4 Measure the outer and inner diameters of the following parts

Unit: mm

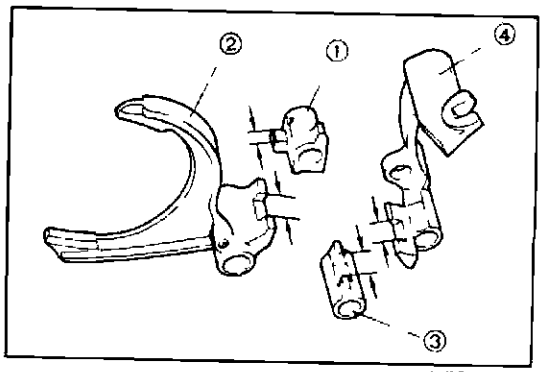
		Specified value	Allowable limit
Outer diameter	1st & 2nd shift fork shaft	14 $^{-0.05}_{-0.07}$	13.97
Inner diameter	1st & 2nd shift fork	14 $^{+0.18}_{0}$	14.03


WRE91-MT311

5 Measure the contacting sections of the following parts

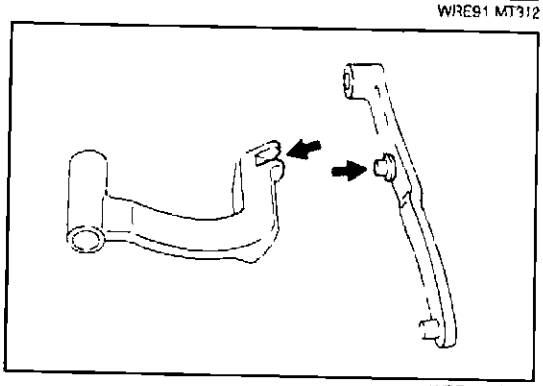
Unit mm

		Specified value	Allowable limit
①	Shift inner lever	16 $^{+0.10}_{0}$	15.7
②	1st & 2nd shift fork	16 $^{+0.1}_{-0.7}$	16.3
③	Gear shift head No. 2	↑	↑
④	Reverse shift fork	↑	↑

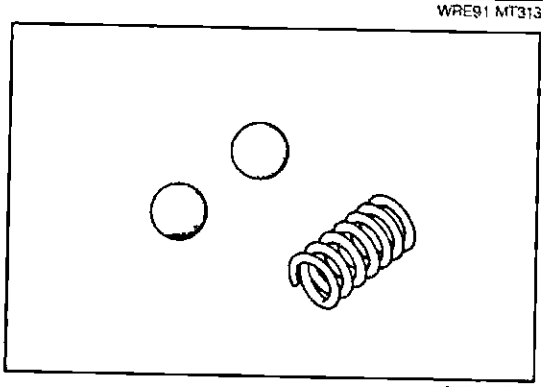


WRE91 MT312

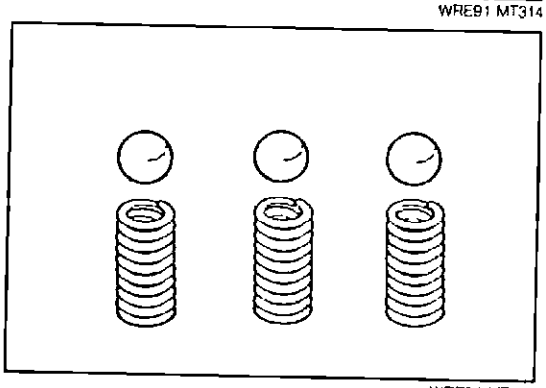
6 Visual inspect the contacting sections of the reverse shift fork and reverse shift arm for wear or damage


WRE91 MT313

7 Visually inspect the ball and compression spring of the reverse restrict pin holder for wear or damage.


WRE91 MT314

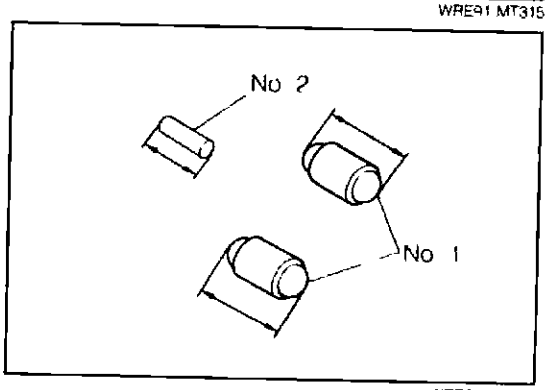
8 Visual inspect the balls and compression springs of the each shift fork shaft for wear or damage


WRE91 MT315

9 Measure the length of the shift inter lock pin No. 1 and No. 2

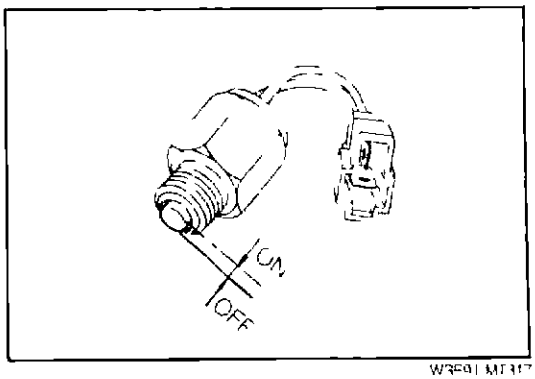
Unit mm

	Specified value	Allowable limit
Shift inter lock pin No. 1	13.9 $^{0}_{-0.2}$	13.7
No. 2	11.8 $^{0}_{-0.2}$	11.6



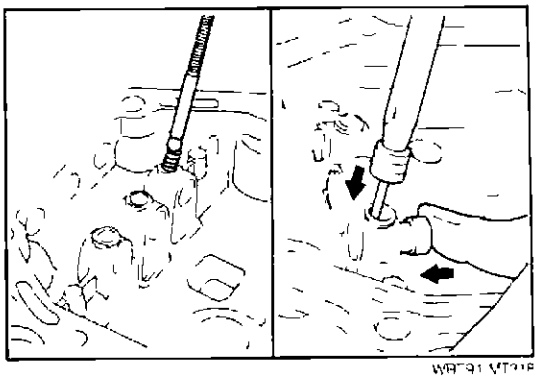
WRE91 MT316

10 Check the backup lamp for continuity

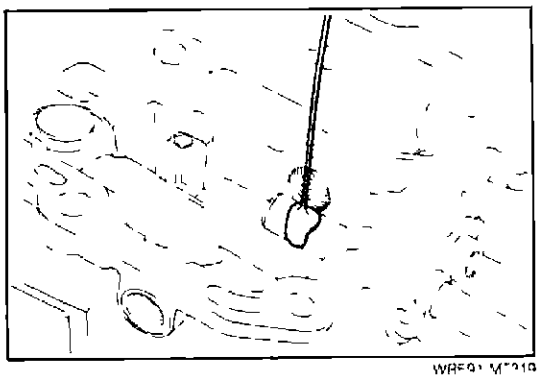


INSTALLATION

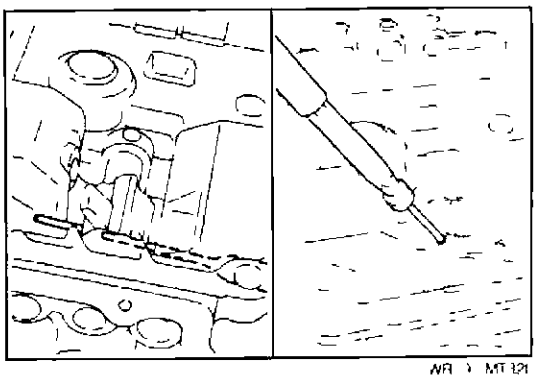
1 Place the compression spring and ball of each shift fork shaft guide, using a standard magnet hand tool
2 Push the following SST, while lowering the ball and compression spring with a standard pin punch or the like
SST: 09339-87301-000



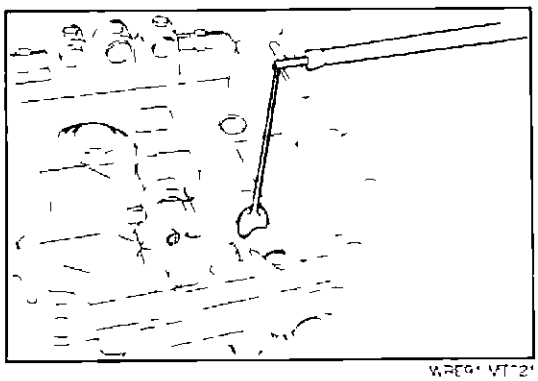
3 Apply gear oil to the outer periphery of the shift lever shaft



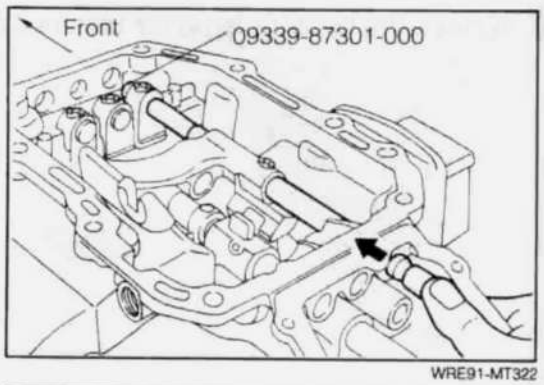
4 Temporarily install a new slotted spring pin to the shift inner lever
5 Insert a standard pin punch through the reverse restrict pin holder hole, until the new slotted spring pin installation holes of the shift lever shaft and shift inner lever meet with each other
6 Drive a new slotted spring pin.
NOTE:
- **For the shift inner lever, be sure to use a slotted spring pin 2 mm longer than that for each shift fork.**



7 Insert the 5th & reverse shift fork shaft into the transmission case cover
8 Apply gear oil to the outer periphery of the 5th & reverse shift fork shaft

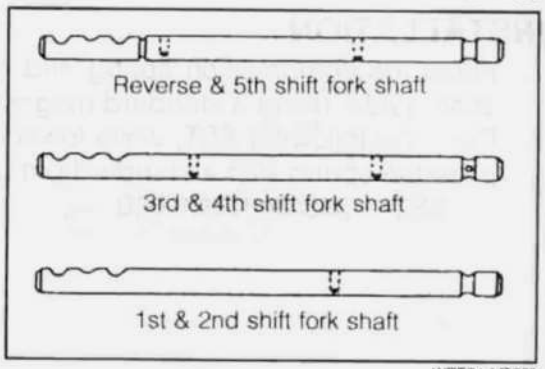


9. Install the 5th & reverse shift fork.
10. Push the 5th & reverse shift fork shaft to the front side, until the following SST comes out.
    SST: 09339-87301-000



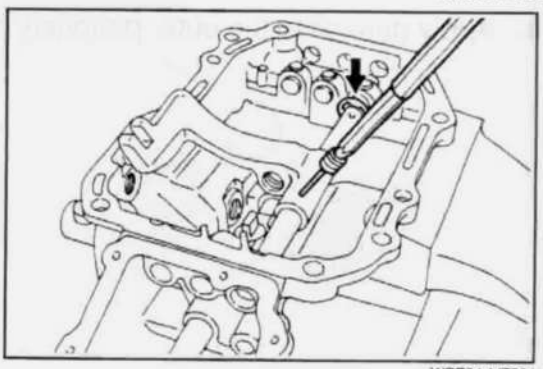
WRE91-MT322

11. The shift fork shaft differs from each other in shape as indicated in the right figure. It is, therefore, recommended to arrange each shaft before installing them to the transmission case cover.

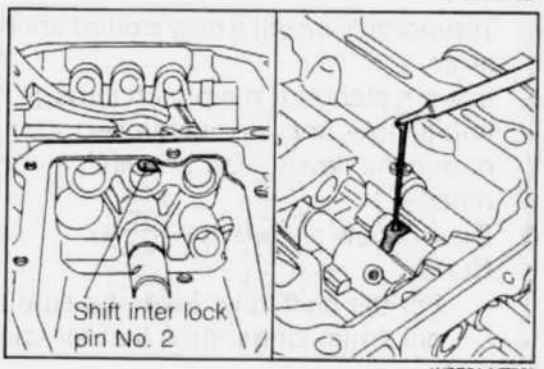


WRE91-MT323

12. Install a new "E" ring.
13. Drive a new slotted spring pin.

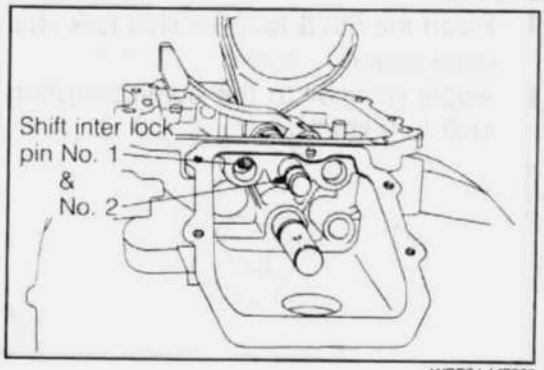

WRE91-MT324

14. Insert the shift interlocking pin No. 2.
15. Insert the 3rd & 4th shift fork shaft into the transmission case cover.
16. Apply gear oil to the outer periphery of the 3rd & 4th shift fork shaft.



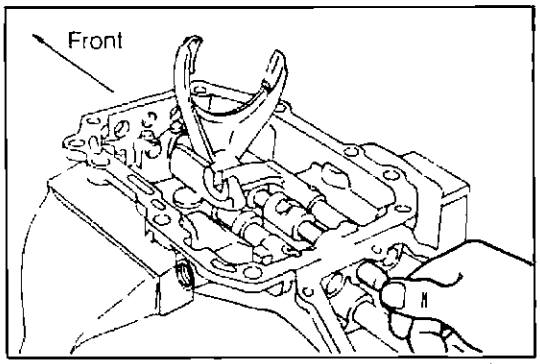
WRE91-MT325

17. Install the 3rd & 4th shift fork and gear shift head No. 2 to the 3rd & 4th shift fork shaft.
18. Insert the shift interlocking pins No. 1 and No. 2.

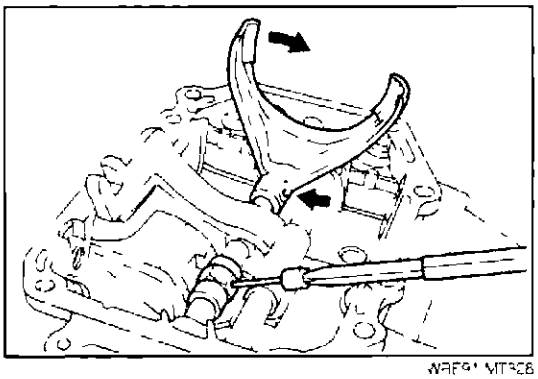


WRE91-MT326

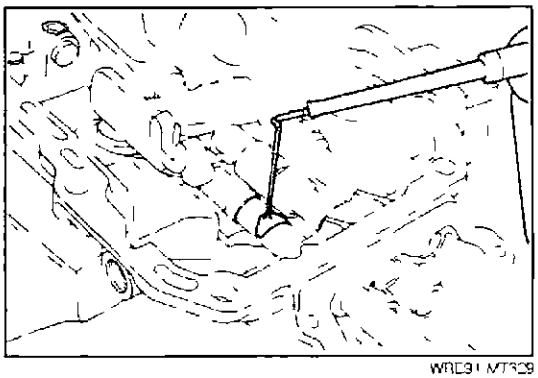
19 Push the 3rd & 4th shift fork shaft to the front side until the SST (09339-87301-000) comes out



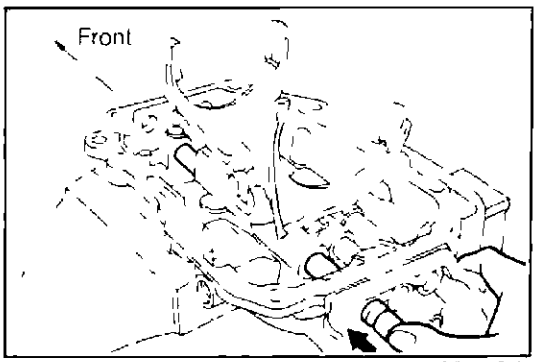
20 Drive the new slotted spring pin of the 3rd & 4th shift fork and gear shift head No 2, using the standard tool of pin pounch or the like



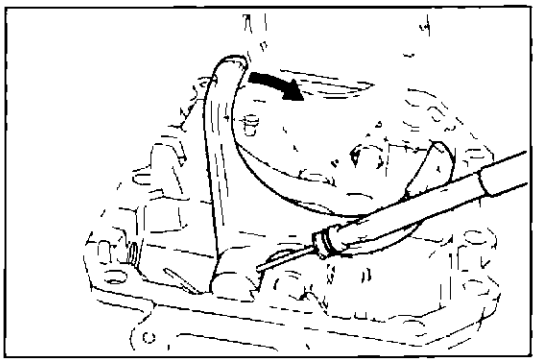
21 Apply gear oil to the outer periphery of the 1st & 2nd shift fork shaft



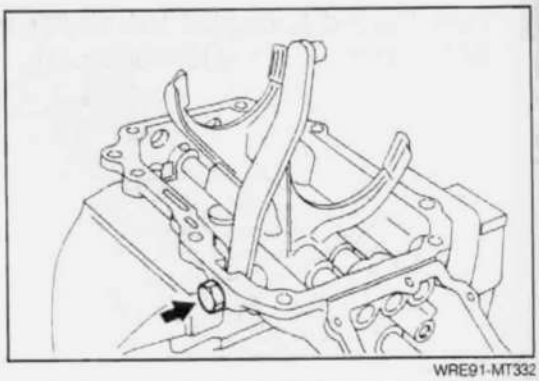
22 Install the 1st & 2nd shift fork to the 1st & 2nd shift fork shaft.
23 Push the 1st & 2nd shift fork shaft to the front side until the SST (09339-87301-000) comes out



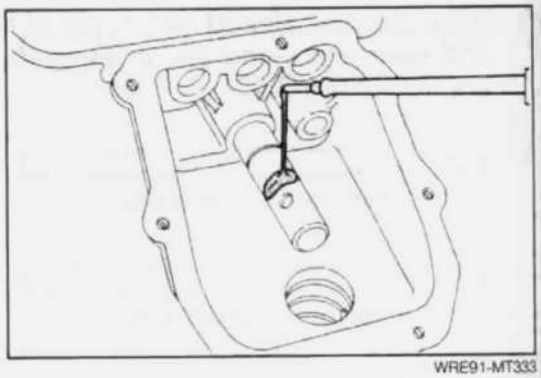
24 Drive the new slatted spring pin of the 1st & 2nd shift fork, using the standard tool of pin pounch or the like.



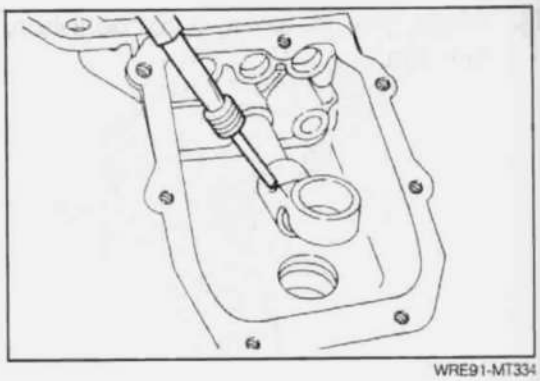
25. With a new gasket interposed, tighten the reverse shift arm by means of the shift arm pivot.
    Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)


WRE91-MT332

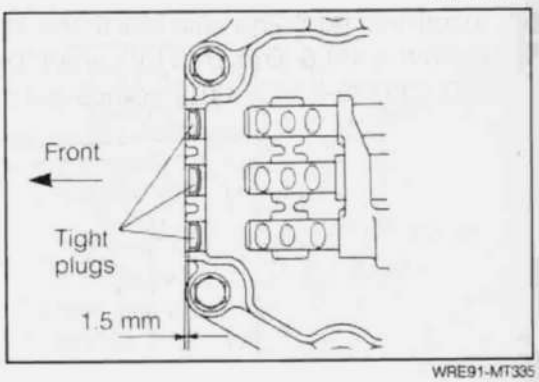
26. Apply gear oil to the outer periphery of the shift lever shaft.


WRE91-MT333

27. Install the shift outer lever No. 1 to the shift lever shaft.
28. Drive a new slotted spring pin of the shift outer lever No. 1.
    NOTE:
    - For the shift outer lever No. 1, be sure to use a slotted spring pin 2 mm longer than that for each fork shaft.

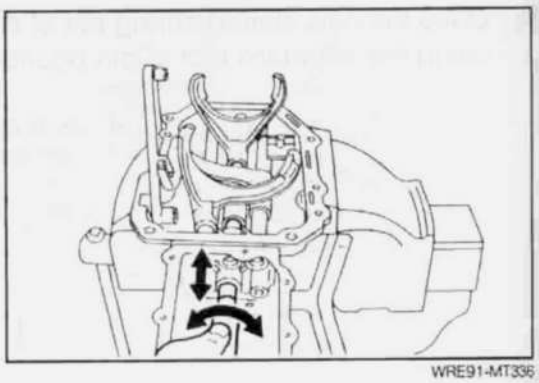

WRE91-MT334

29. Install new tight plugs.
    NOTE:
    - Make sure that the tight plugs are driven to a point 1.5 mm deep from the edge surface of the transmission case cover.

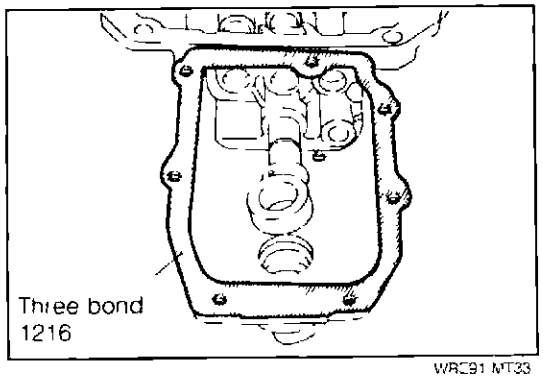


WRE91-MT335

30. After completion of installation of the parts above, manually check that each shift fork and shift fork shaft move smoothly.


WRE91-MT336

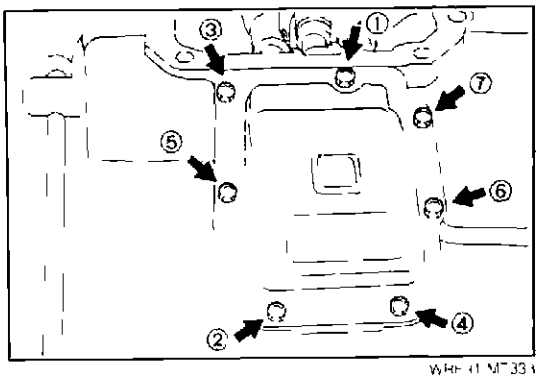
31 Apply following bond (slant line section in the right figure) to the seal surface of the shift lever dust housing cover in the transmission case cover
:THREE BOND 1216 (Three bond made)



WRC91 MT33

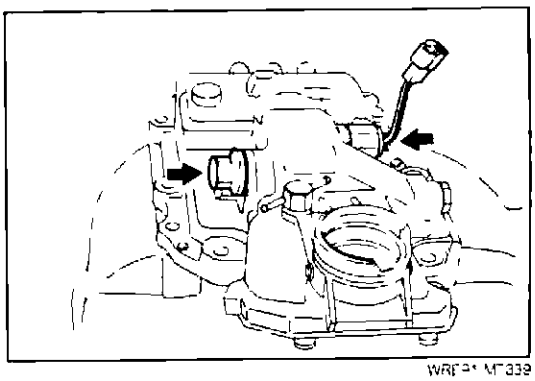
32 Tighten the shift lever dust housing cover with the seven bolts
Tightening Torque: 5.9 - 8.8 N m (0.6 - 0.9 kgf-m)

NOTE
- Be sure to tighten the bolts alternately and diagonally. (The right figure illustration indicates a typical example of the tightening sequence.)



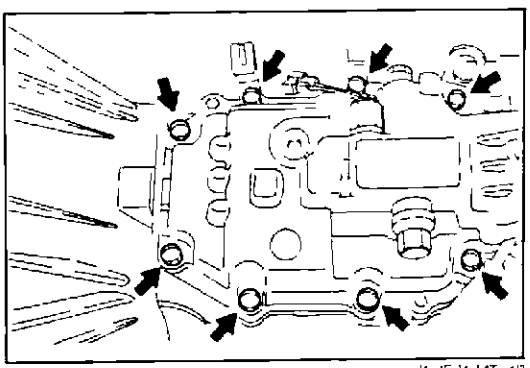
33 Tighten the back-up lamp switch Ay with new gasket
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)

34 Install the compression spring and two balls, tighten the reverse restrict pin holder with new gasket
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)



35 With the new gasket interposed, tighten the transmission case cover by means of the eight bolts
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The right figure illustration indicates a typical example of the tightening sequence.)



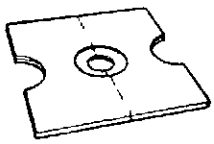
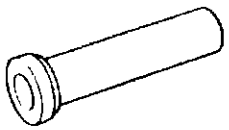
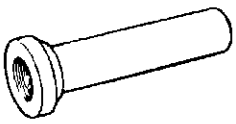
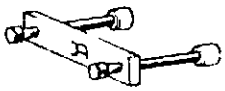
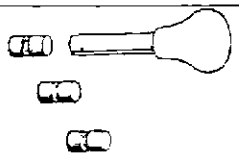
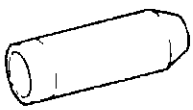
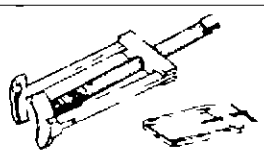
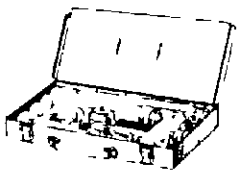
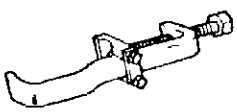
36 Install the transmission and transfer assembly to the vehicle

37 Fill the gear oil to the transmission and transfer

	Oil capacity	API	SAE
T/M	2.2L	GL-3	90
T/F	1.3L	GL-3	75W-90 or 75W-85

38 Tighten the both transmission and transfer filler plugs with new gasket
Tightening Torque: 29.4 - 49.0 N m (3.0 - 5.0 kgf-m)

SSTs

Shape	Parts number	Parts name
	09253-87202-000 (09253-87201-000)	Water pump bearing anvil (Crankshaft center bearing anvil)
	09309-87301-000	Output shaft bearing replacer
	09310-87301-000	Counter shaft front bearing replacer
	09310-87302-000	Counter shaft rear bearing replacer
	09312-36010-000	Input shaft remover
	09339-87301-000	Shift folk shaft guide
	09506-87303-000	Differential drive pinion bearing cone front replacer
	09602-87301-000	Counter gear bearing puller
	09950-20017-000 (09950-20016-000) (09950-20014-000) (09950-20013-000) (09950-20012-000) (09950-20011-000) (09950-20010-000)	Universal puller
	09956-00010-000	Tightening piece

WRE91 MT341

SERVICE SPECIFICATIONS

Unit: mm

			Specified value	Allowable limit	Remarks
Clearance between each gears and synchronizer rings			1.3 - 1.7	0.8	Using the filler gage
Contact width	Reverse gear		7 $^{0}_{-0.054}$	7.3	Using the micro meter
	Transmission hub sleeve No. 1, No. 2		7 $^{+0.068}_{0}$	7.3	
Contact width of each synchronizer ring and synchromesh shifting key	1st gear		8.4 ± 1	8.5	Using the vernier caliper gage
	Except 1st gear		11.0 ± 1	11.1	
Height of synchromesh shifting key		1st & 2nd gear	6 ± 0.15	5.6	Using the vernier caliper gage
		3rd, 4th & 5th gear	5.8 ± 0.15	5.4	
Bore diameter	Reverse gear		87.5 $^{+0.035}_{0}$	87.5	
	Transmission clutch hub No. 1		87.5 $^{+0.170}_{+0.150}$	87.3	
Outer diameter	Transmission hub sleeve No. 1		72.5 $^{0}_{-0.019}$	72.7	
	Transmission clutch hub No. 2		72.5 $^{+0.10}_{+0.07}$	72.3	
Outer diameter of output shaft		(A) section	23.0 $^{+0.020}_{+0.000}$	22.98	
		(B) section	40.0 $^{+0.030}_{+0.009}$	39.97	
		(C) section	48.0 $^{+0.015}_{-0.030}$	47.97	
		(D) section	38.0 $^{+0.025}_{+0.001}$	37.98	
Contact width	5th shift fork		14 $^{+0.027}_{0}$	13.97	
Thickness	1st gear thrust washer		4 ± 0.1	3.85	
Fitting width section	Counter gear shaft		7 $^{+0.05}_{+0.05}$	7.02	
	Woodruff key		7 $^{0.015}_{-0}$	7.0	
	Counter gear		7 ± 0.02	7.02	
Diameter (Outer)	Counter gear shaft		35 $^{+0.050}_{+0.034}$	35.05	
Diameter (Inner)	Counter gear		35 $^{+0.025}_{0}$	35.0	
Backlash	1st gear		0.06 - 0.20	0.25	
	2nd gear		0.06 - 0.20	↑	
	3rd gear & 4th gear		0.06 - 0.20	↑	
	5th gear		0.06 - 0.20	↑	
Thrust clearance	1st gear		0.11 - 0.29	0.35	
	2nd gear		0.10 - 0.30	0.35	
	3rd gear		0.13 - 0.57	0.60	
	5th gear		0.12 - 0.28	0.35	
Diameter (Outer)	Shift lever shaft		16 $^{0}_{-0.027}$	15.97	
Diameter (Inner)	Shift outer lever		16 $^{+0.078}_{+0.043}$	16.03	

DAIHATSU

F70,F75,F77

Service manual

PROPELLER SHAFT

PR

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

PROPELLER SHAFTS

FRONT

SECTIONAL VIEW ..... **PR– 2**
TROUBLE SHOOTING ..... **PR– 2**
COMPONENTS (FRONT & REAR) ..... **PR– 3**
REPLACEMENT OF PROPELLER SHAFT WITH NEW ONE
REMOVAL ..... **PR– 4**
INSTALLATION ..... **PR– 4**
CASE WHERE PROPELLER SHAFT IS REUSED
REMOVAL ..... **PR– 6**
INSPECTION ..... **PR– 7**
INSTALLATION ..... **PR– 8**
REPLACEMENT OF UNIVERSAL JOINT SPIDER S/A (FRONT & REAR)
REMOVAL ..... **PR– 9**
INSPECTION **PR–13**
INSTALLATION **PR–13**

REAR

SECTIONAL VIEW **PR–17**
TROUBLE SHOOTING **PR–17**
REPLACEMENT OF PROPELLER SHAFT WITH NEW ONE
REMOVAL **PR–18**
INSTALLATION **PR–18**
CASE WHERE PROPELLER SHAFT IS REUSED
REMOVAL **PR–20**
INSPECTION **PR–21**
INSTALLATION **PR–21**
SSTs **PR–23**
SERVICE SPECIFICATIONS **PR–23**
TIGHTENING TORQUE **PR–23**

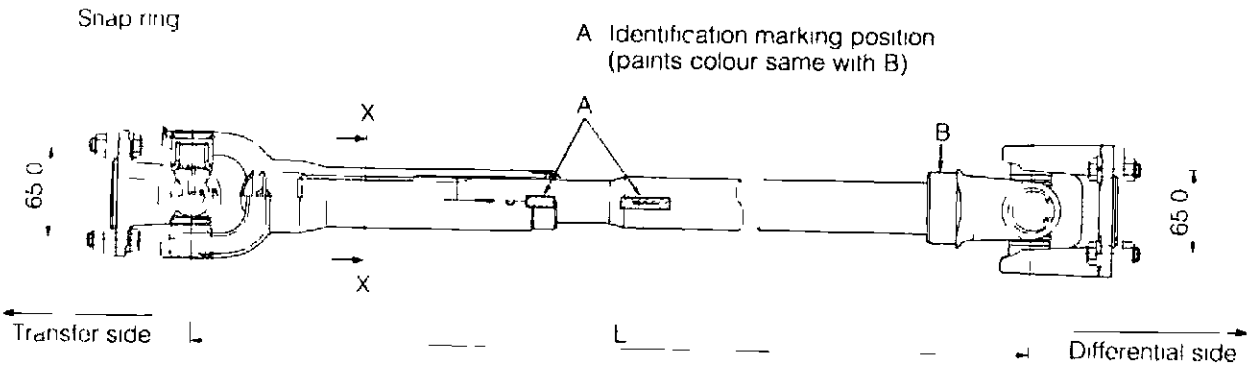
WRE91-PR001

FRONT PROPELLER SHAFT

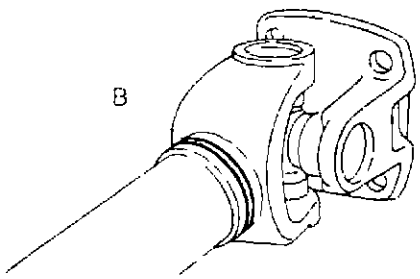
The front propeller shaft employs a two-joint type
Furthermore, the universal joint spiders adopt an outer snap ring as its securing method

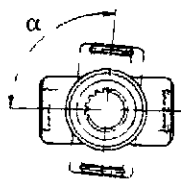
WRE91 PR002

SECTIONAL VIEW



B Identification marking position





X X section

Unit mm

MODEL	Type of transmission	Joint to joint interval (L)	Phase angle (α)	B
F70 F75 F77	4-speed	463	104°	White
	5-speed	567	115.5°	White

WRE91 PR003

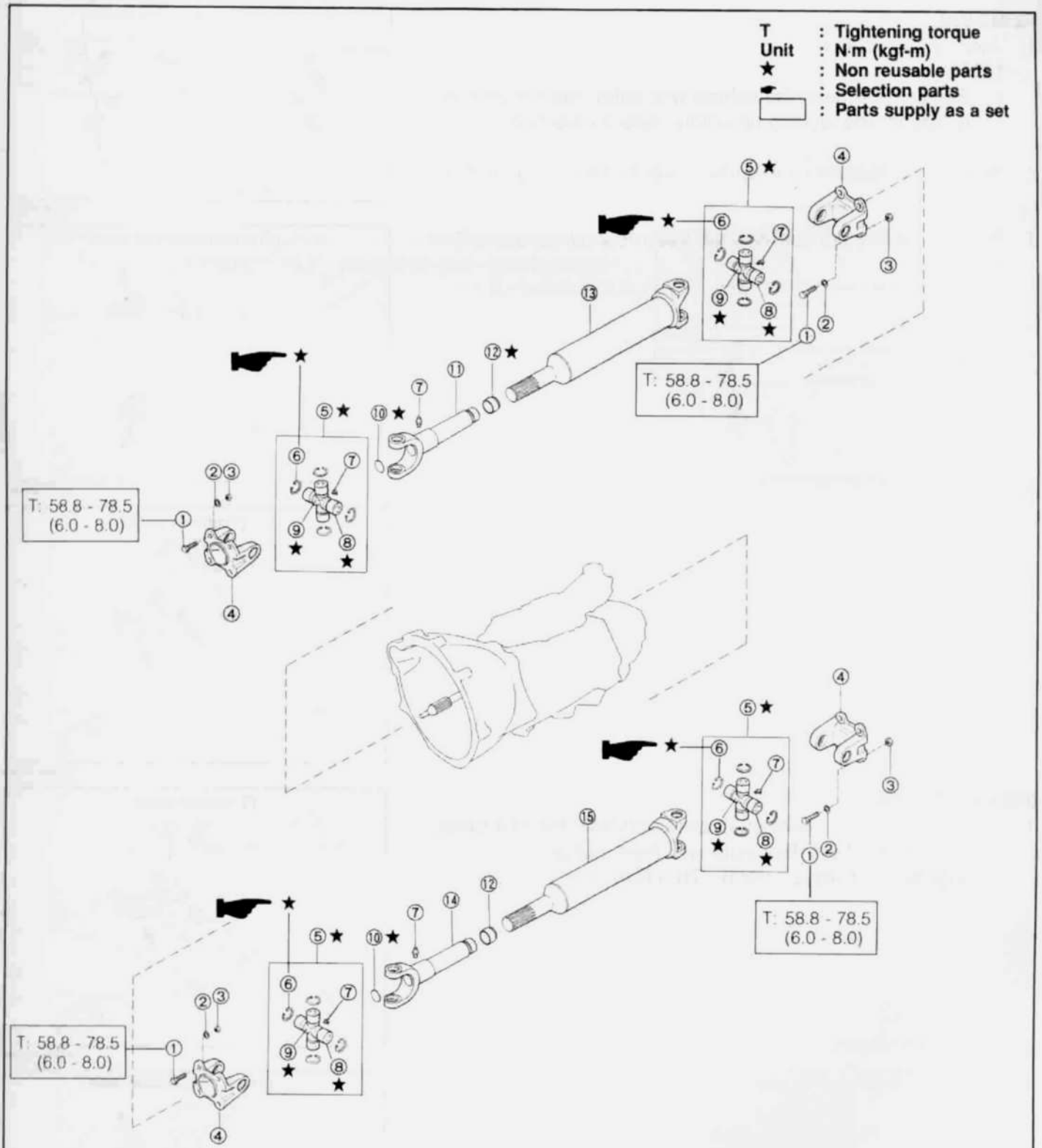
TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Abnormal noise Vibration	• Universal joint improperly lubricated	• Lubrication to grease nipple
	• Universal joint spider section damaged	• Check universal joint
	• Runout or damage of propeller shaft	• Check propeller shaft for runout

WRE91 PR004

PROPELLER SHAFT (FRONT & REAR)

COMPONENTS



① Bolt (4 pieces)
② Spring washer (4 pieces)
③ Nut (4 pieces)
④ Universal joint flange yoke
⑤ Universal joint spider kit
⑥ Snap ring hole (4 pieces)
⑦ Grease nipple
⑧ Universal joint spider cup
⑨ Universal joint spider
⑩ Plug
⑪ Universal joint sleeve front yoke S/A
⑫ Oil seal
⑬ Front propeller shaft
⑭ Universal joint sleeve yoke S/A
⑮ Rear propeller shaft

WRE91-PR005

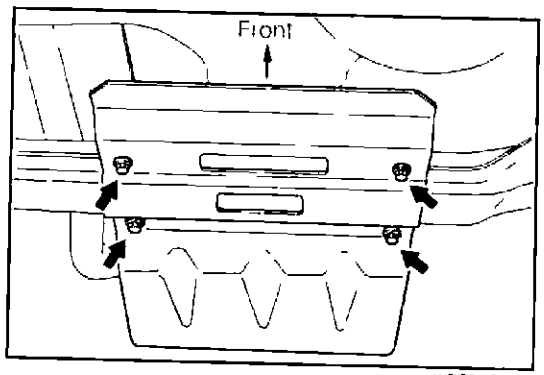
REPLACEMENT OF PROPELLER SHAFT WITH NEW ONE (FRONT)

REMOVAL

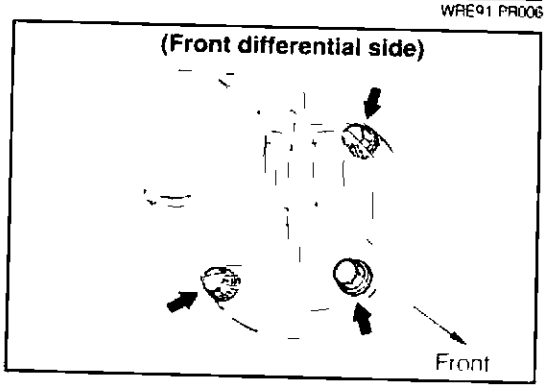
1 Jack up the vehicle
NOTE:
- Be sure to support the vehicle with safety stands securely. (As for the jacking up points, refer GI-section).

2 Remove the transmission under cover by removing the four bolts

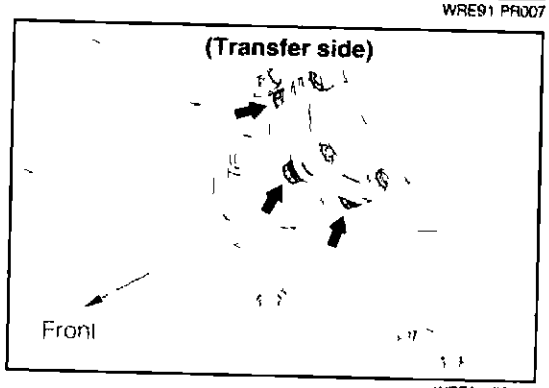
3 Remove the front propeller shaft assembly by removing the four bolts



WRE91 PR006



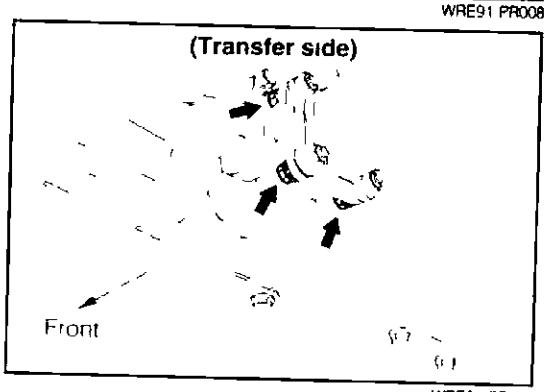
WRE91 PR007



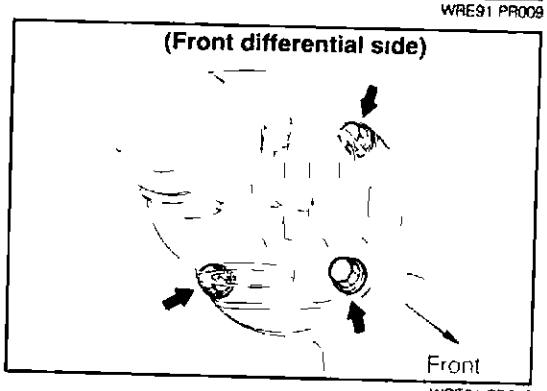
WRE91 PR008

INSTALLATION

1 Install the front propeller shaft assembly with the four bolts, four spring washers, four nuts and then, tighten the nuts
Tightening Torque. 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

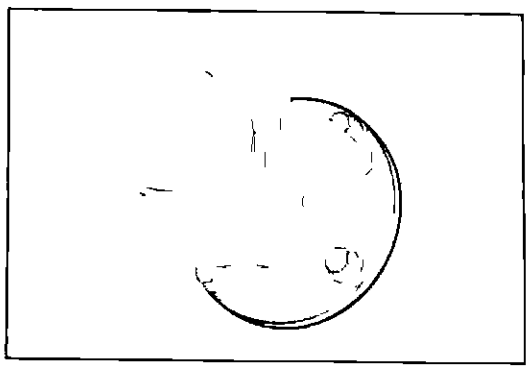


WRE91 PR009



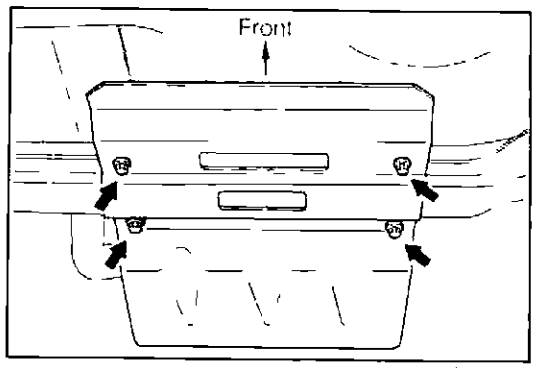
WRE91 PR010

2 After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure



3 Tighten the transmission under cover with the four bolts
Tightening Torque: 15.7 - 23.5 N·m (1.6 - 2.4 kgf-m)

4 Jack down the vehicle

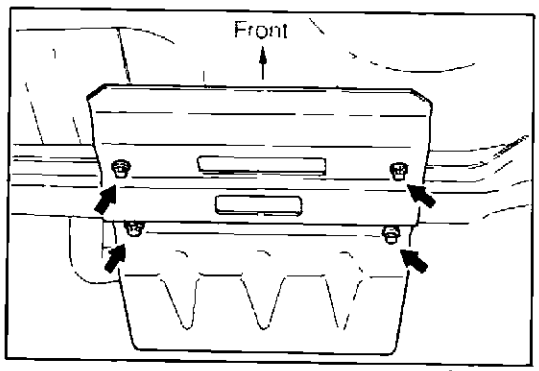


Case where propeller shaft is reused

REMOVAL

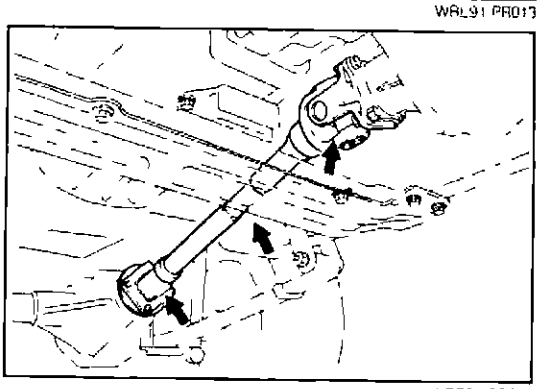
1 Jack up the vehicle
NOTE:
- Be sure to support the vehicle with safety stands. (As for the jacking up points, refer GI-section).

2 Remove the transmission undercover by removing the four bolts

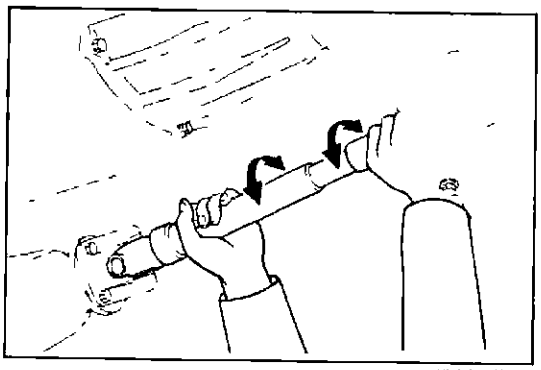


WRL91 PR013

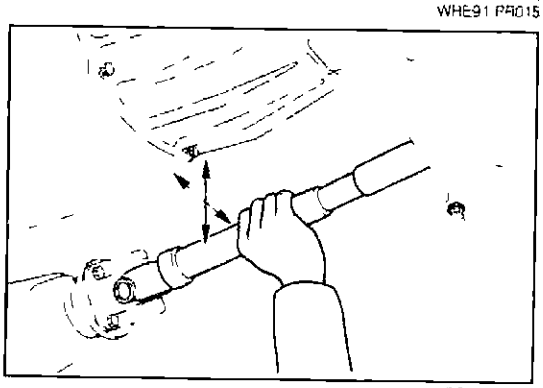
3 Fill new lithium multi-purpose grease into each grease nipple (at three points) by means of a grease gun or the like, until all existing grease is oozed out from the universal joint spider and universal joint sleeve


WRE91 PR014

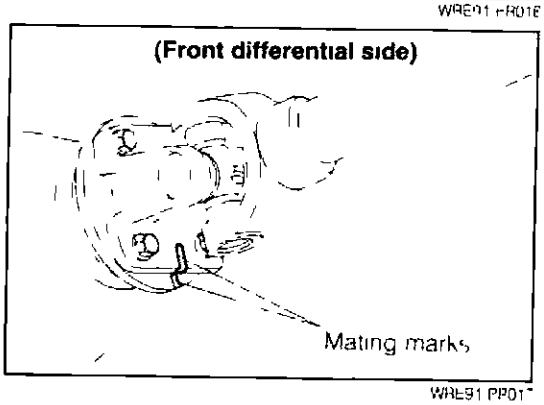
4 Check the universal joint sleeve spline for excessive looseness by turning the propeller shaft in one direction and the universal joint sleeve in the opposite direction
NOTE:
- If any abnormal looseness is present, replace the propeller shaft assembly or universal joint spider set with new one


WHE91 PR015

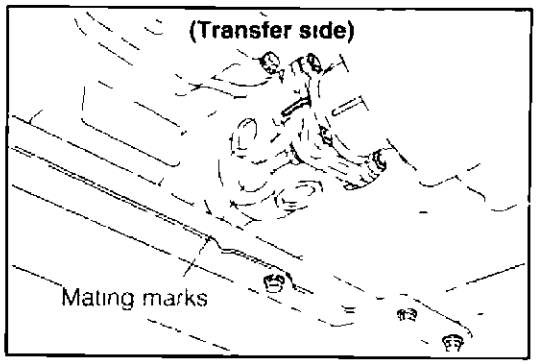
5 Move the center of the propeller shaft in up-&-down and right-&-left directions so as to check the universal joint spider for excessive play by hand feeling .
NOTE.
- If the universal joint spider exhibits abnormal looseness, measure the starting torque. (See page PR–14.)


WRE91 PR016

6 Remove the front propeller shaft by removing the four bolts
CAUTION·
- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.



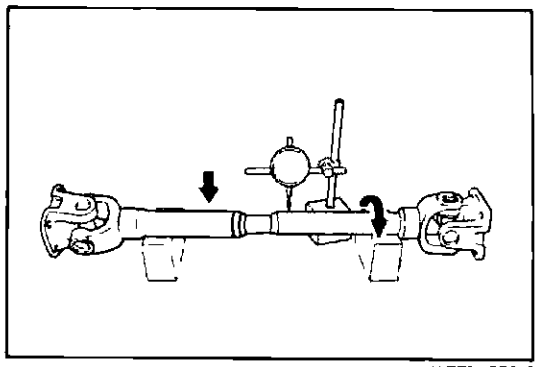
WRE91 PR017



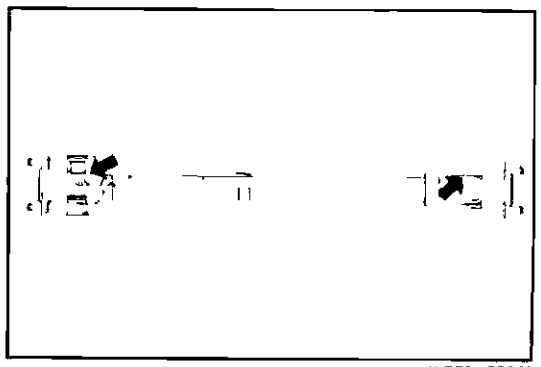
WRE91 PR018

INSPECTION

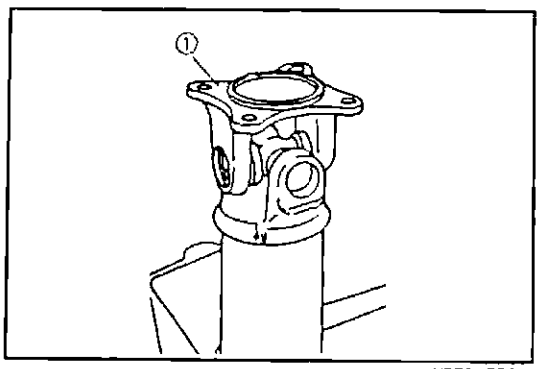
1. With a dial gauge placed at the center of the propeller shaft, measure the runout
   Allowable Runout Limit: 0.5 mm
   Replace to the new front propeller shaft, if the runout is exceed than 0.5 mm


WRE91 PR019

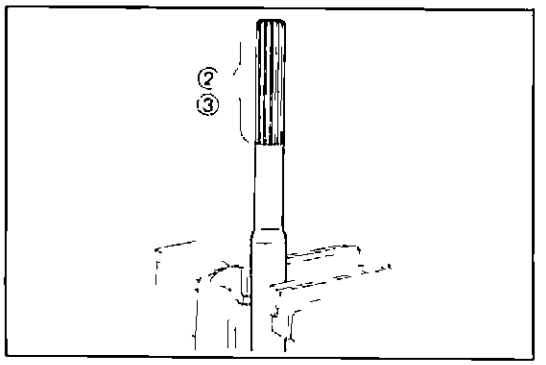
2 Check to see if any damage is present at the seal of the spider section of the universal joint.


WRE91 PR020

3 Check the flange yoke and sleeve yoke.
   (1) Inspect to see if any damage is present at the differential drive pinion companion flange-contact section ①.
   (2) Check the oil seal sliding section ② for damage or wear
   (3) Check the spline ③ for damage or wear.
   (4) Fit the sleeve yoke onto the sliding spline of the transmission output shaft
   Ensure that the spline exhibits no looseness in the rotation direction and the sleeve can slide freely in the axial direction on the spline



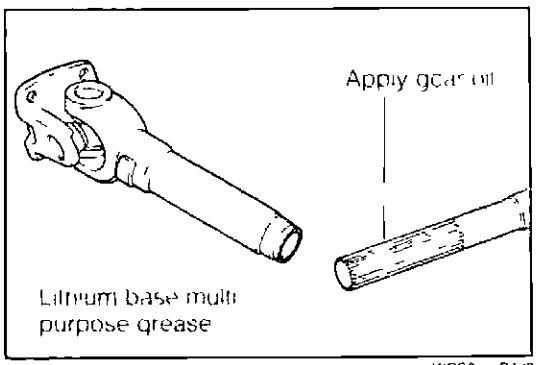
WRE91 PR021



WRE91 PR022

INSTALLATION

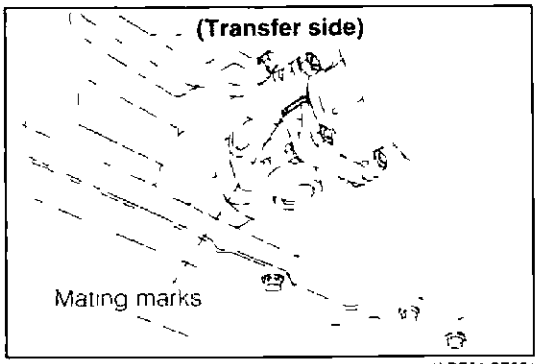
1 Apply gear oil to both the inner and outer sides of the propeller shaft sleeve
2 Apply lithium base multi purpose grease to the oil seal lip section

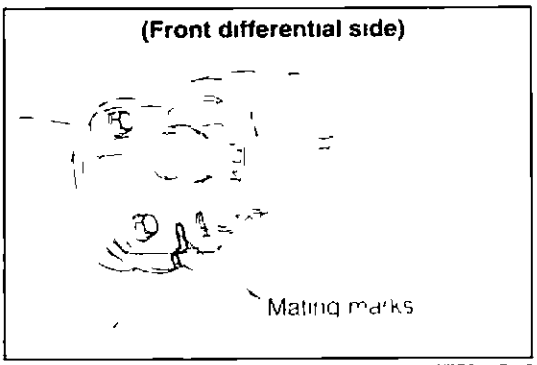


3 Install the rear propeller shaft assembly with the four bolts, four spring washers, four nuts then, tighten the nuts
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

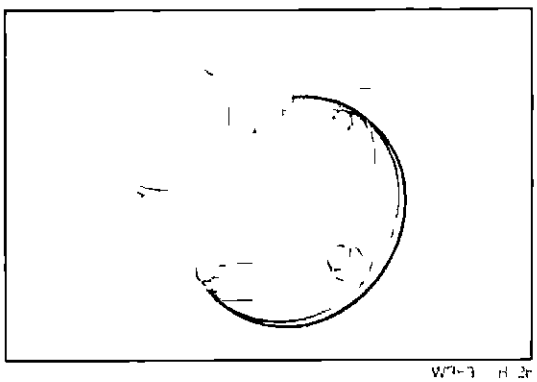
CAUTION·

- Make sure to line up those scribing lines that were put during the removal of the rear propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.



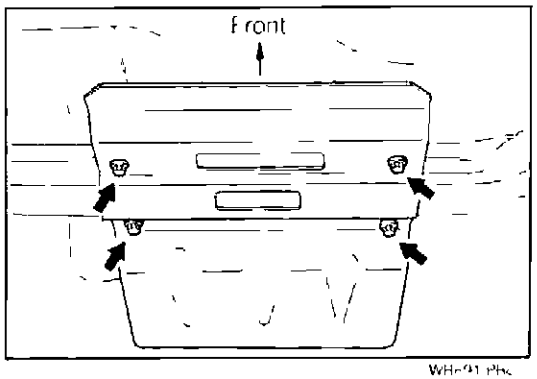


4 After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure
5 Apply lithium base multi-purpose grease to the grease nipples



6 Tighten the transmission under cover with the four bolts
Tightening Torque: 15.7 - 23.5 N·m (1.6 - 2.4 kgf-m)

7 Jack down the vehicle



REPLACEMENT OF UNIVERSAL JOINT SPIDER SUBASSEMBLY (FRONT & REAR)

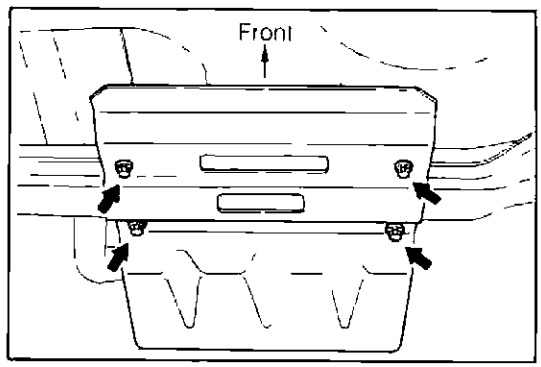
NOTE:
- The removal procedure for the universal joint spider subassembly is the same both front side and rear side. Therefore, the procedure for the front side (at the differential side) only is described here.

WRE91 PR028

REMOVAL

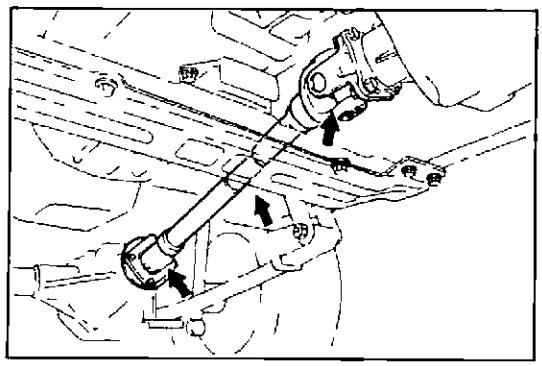
1 Jack up the vehicle
NOTE
- Be sure to support the vehicle with safety stands securely (As for the jacking up points, refer GI-section).

2 Remove the transmission under cover by removing the four bolts

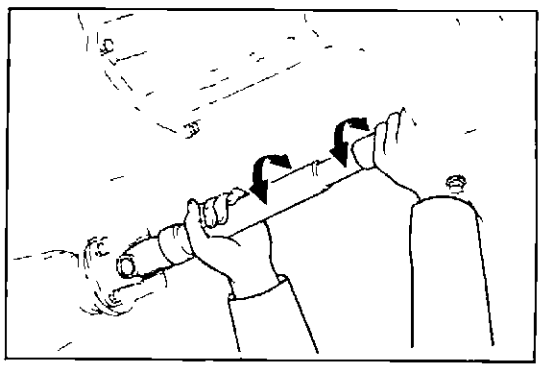


WRE91 PR029

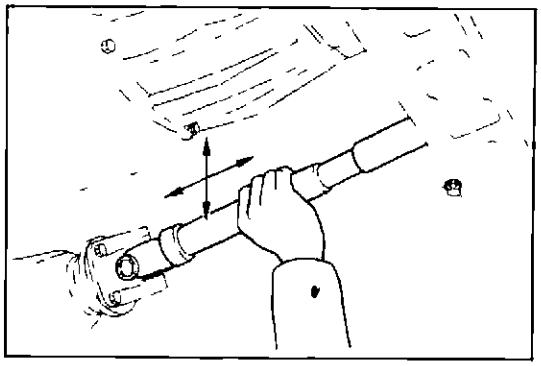
3 Fill new lithium multi-purpose grease into each grease nipple (at three points) by means of a grease gun or the like, until all existing grease is oozed out from the universal joint spider and universal joint sleeve


WRE91 PR030

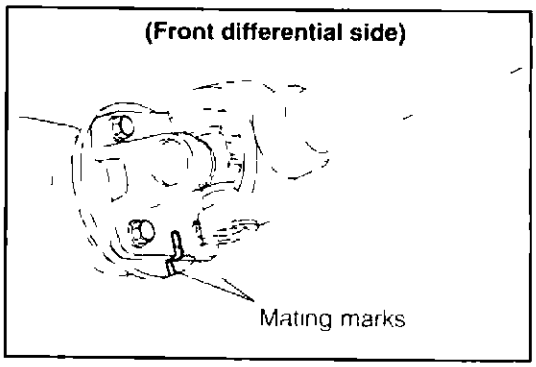
4 Check the universal joint sleeve spline for excessive looseness by turning the propeller shaft in one direction and the universal joint sleeve in the opposite direction.
NOTE:
- If any abnormal looseness is present, replace the propeller shaft assembly or universal joint spider set with new one.


WRE91 PRJ31

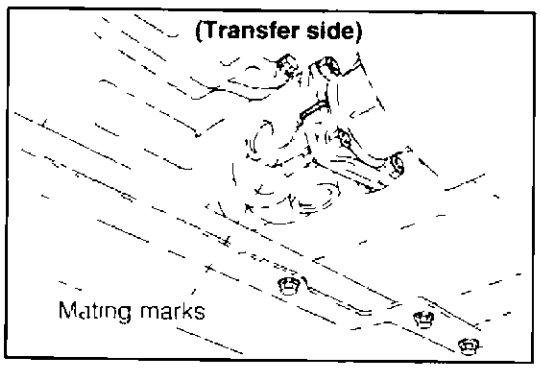
5 Move the center of the propeller shaft in up-&-down and right-&-left directions so as to check the universal joint spider for excessive play by hand feeling
NOTE·
- If the universal joint spider exhibits abnormal looseness, measure the starting torque. (See page PR–14.)


WRE91 PRJ32

6 Remove the front propeller shaft by removing the four bolts
CAUTION:
- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

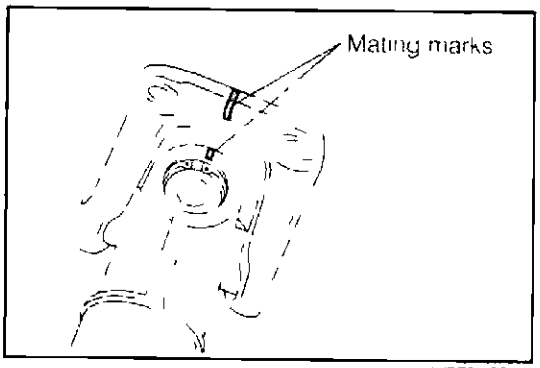


WRE91 PR033

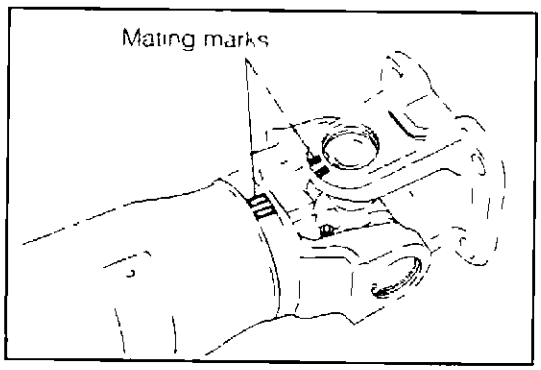


WRE91 PR034

7. Put different paint mating marks on the propeller shaft and each of the yoke side sections (universal joint sleeve yoke subassembly and universal joint with flange yoke) (The illustration in the right figure indicates an example of mating marks)
CAUTION:
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

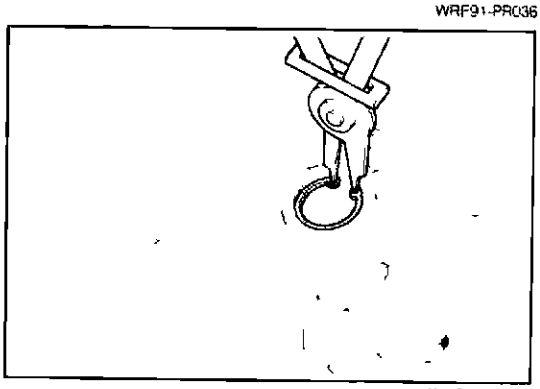


WRE91 PR035



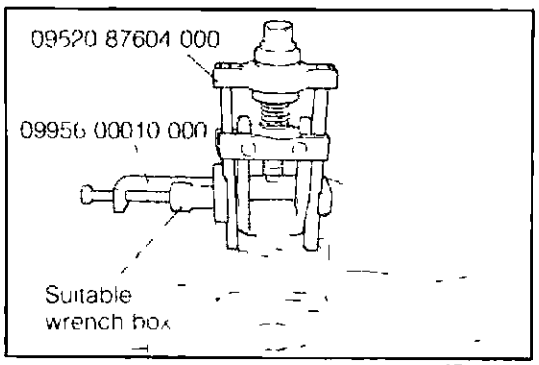
WRF91-PR036

8 Set the universal joint sleeve yoke in a vice
Remove the right & left snap rings, using the standard tool of snap ring pliers.
CAUTION:
- Never clamp the balancer weight section of the propeller shaft in a vise.
- Never reuse the snap ring.


WRE91 PR037

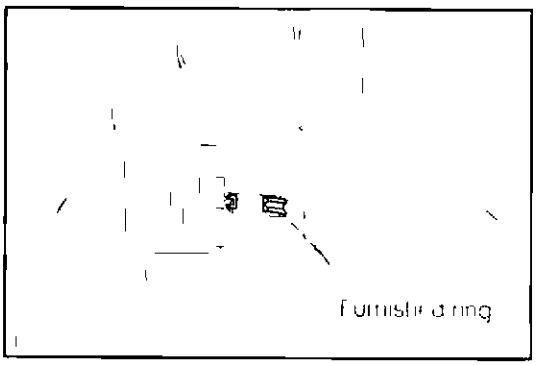
9 Push down the right and left universal joint spider bearing cups, using the suitable wrench box and the following SSTs
SST: 09520-87604-000
09956-00010-000

NOTE:
- At this stage, the universal joint spider bearing cups can not be removed completely.
- Prior to the removal, be sure to remove the black paint at the periphery of the universal joint spider bearing cup.



WRE91 PR038

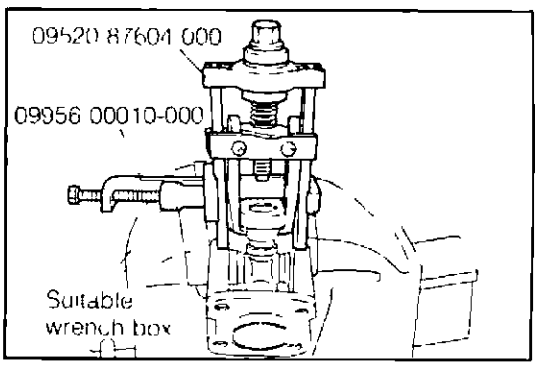
10 Lift the universal joint flange yoke S/A Install a furnished ring to the shaft section of the universal joint spider



WRE91 PR039

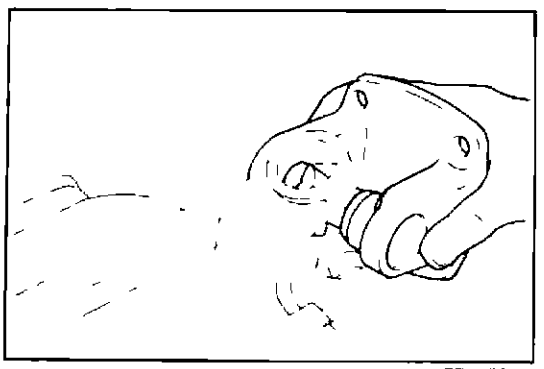
11 Remove the universal joint spider bearing cup at one side, using a suitable wrench box and the following SSTs
SST: 09520-87604-000
09956-00010-000

CAUTION:
- Never reuse the removed universal joint spider bearing cup.

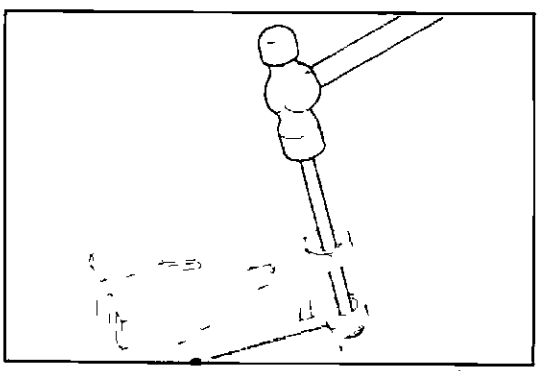


WRE91-PR040

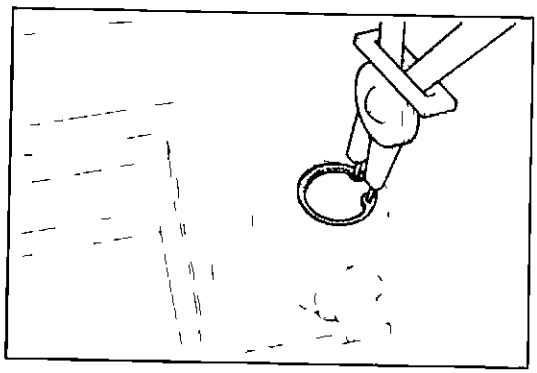
12 Remove the universal joint flange yoke from the universal joint sleeve yoke


WPE91 PR041

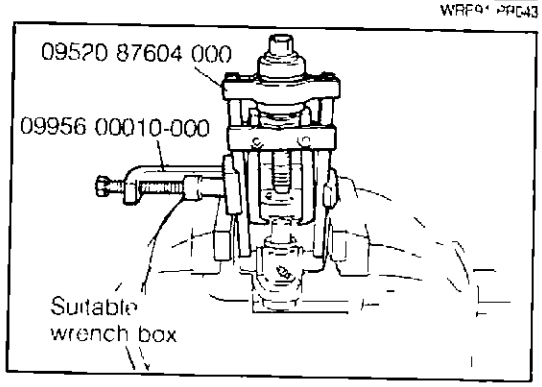
13 Remove the universal joint spider bearing cup by lightly tapping it, using a hammer in combination with a suitable metal rod
CAUTION:
- Never reuse the removed universal joint spider bearing cup.


WRE91 PR042

14 Remove the right and left side snap rings, using the standard tool of snap ring pliers
NOTE:
- Never reuse removed snap ring.

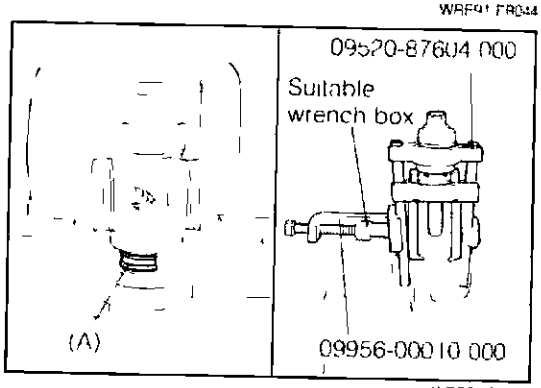


15 Push down the right and left universal joint spider bearing cups using the suitable wrench box and the following SSTs
SST: 09520-87604-000
09956-00010-000

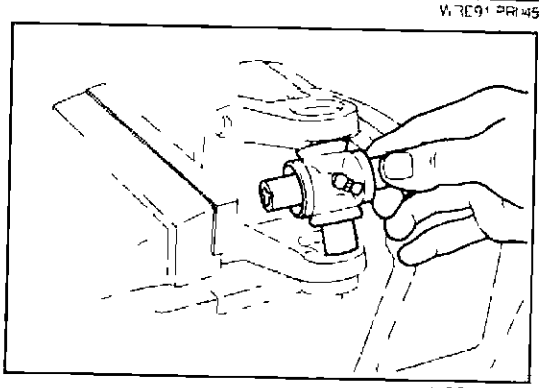


16 Install a furnished ring (A) to the shaft section of the universal joint spider Then, remove the universal joint spider bearing cup at one side, using the following SSTs
SSTs: 09520-87604-000
09956-00010-000

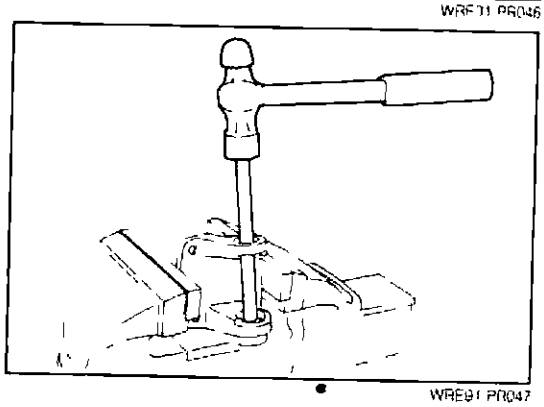
CAUTION:
- Never reuse the removed universal joint spider bearing cup.



17 Remove the universal joint spider
CAUTION:
- Never reuse the removed universal joint spider.



18 Remove the universal joint spider bearing cup by lightly tapping it, using a hammer in combination with a suitable metal rod
CAUTION:
- Never reuse the removed universal joint spider bearing cup.



INSPECTION

1 Conduct measurement at the two sections of A and B (cross direction) indicated in the right figure, using an inner dial gauge

Specified Value:

Sleeve Yoke

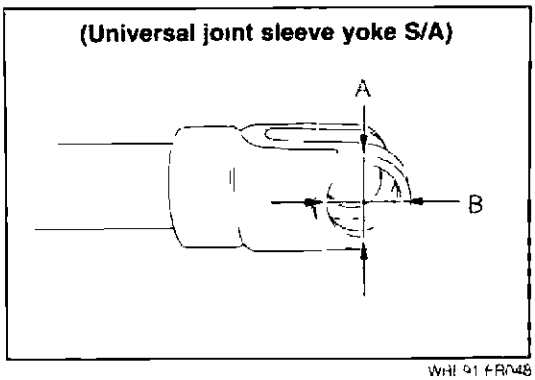
$28\ 0^{+0\ mm}_{+0.021\ mm}$

Flange Yoke

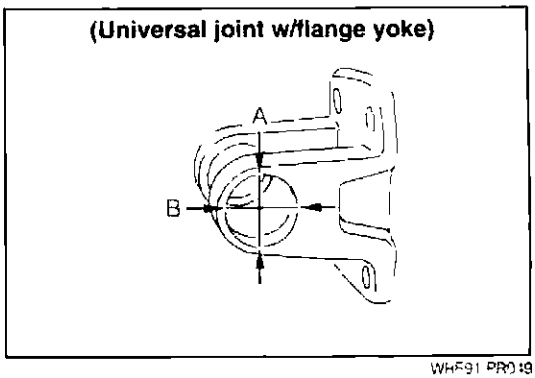
$28.0^{+0\ mm}_{+0.021\ mm}$

CAUTION:

- If the inner diameters of the sections A and B exceed the specified value above, replace the parts with new-one.



WHF91PR048



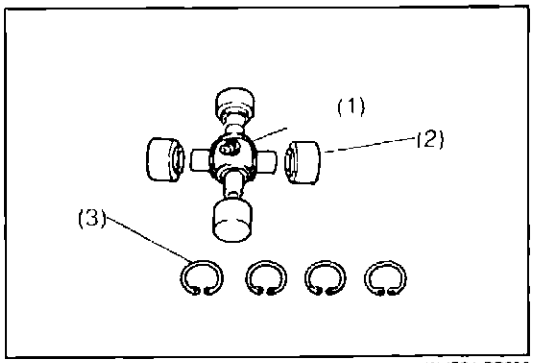
WHF91PR049

INSTALLATION

1 The following parts (1) (2) (3) are supplied in one set in the replacement parts for the universal joint spider subassembly

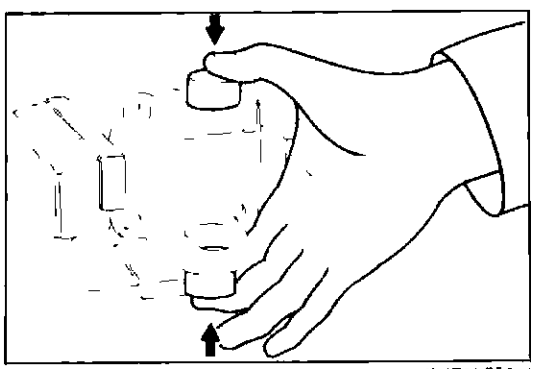
(1) Universal joint spider	1 piece
(2) Universal joint spider bearing cup	4 pcs
(3) Snap ring	4 pcs

Parts availability	Identification
T = 1.45 mm	None
T = 1.50 mm	Yellow paint applied on ring outer periphery
T = 1.55 mm	White paint applied on ring outer periphery



WHF91PR050

2 Temporarily install new universal joint spider bearing cups (two pcs) to the universal joint with flange yoke, by pushing them with fingers

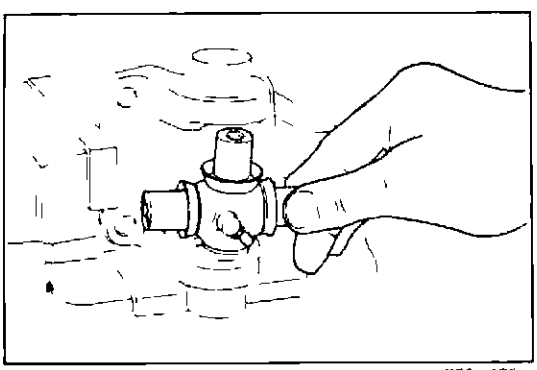


WHF91PR051

3 Set a new universal joint spider to the universal joint sleeve yoke S/A

NOTE:

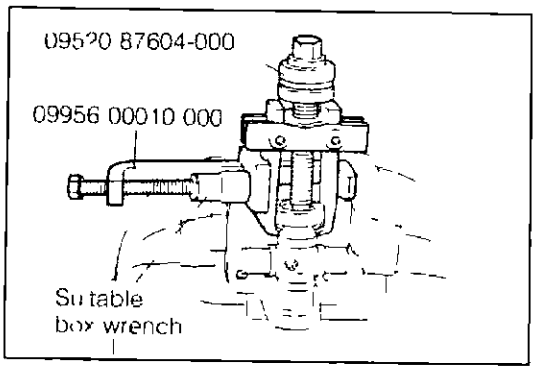
- Make sure that the grease nipple faces toward the universal joint w/flange yoke.



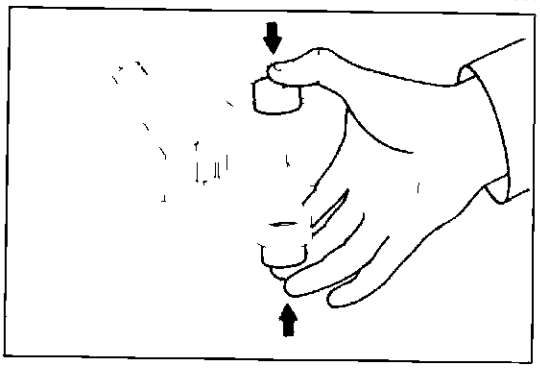
WHF91PR052

4 Install the right and left universal joint spider bearing cups, using the suitable wrench box and the following SSTs
SSTs: 09520-87604-000
09956-00010-000

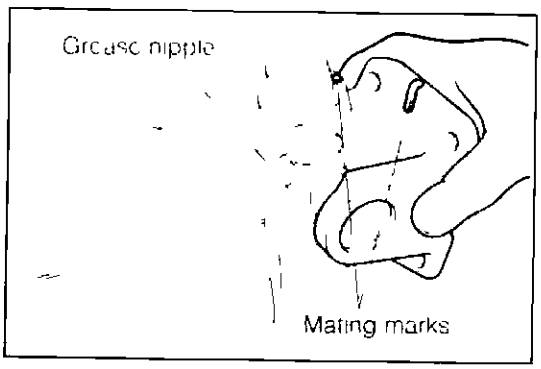
NOTE
- Be sure to evenly press the right and left cups, until you can see the snap ring attaching groove provided on the outer periphery surface of the universal joint spider bearing cup



5 Temporarily install new universal joint spider bearing cups (right and left) to the universal joint sleeve yoke by pushing them with finger

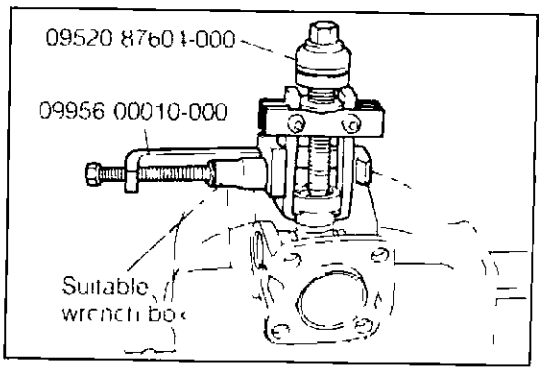


6 Temporarily install the universal joint flange yoke subassembly to the universal joint sleeve yoke S/A
CAUTION:
- Be sure to align the paint marks (at the universal joint sleeve yoke S/A and flange yoke sides) which were put before the removal with each other.
  If the mating marks described above are not aligned with each other, it may cause abnormal vibration or abnormal noise of the propeller shaft
- Make sure that the grease nipple faces toward the propeller shaft side

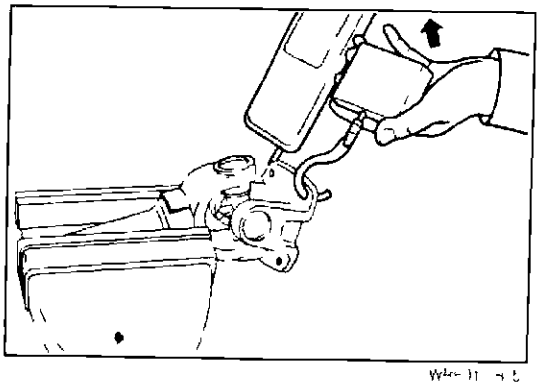


7 Install the right and left universal joint spider bearing cups using the suitable wrench box and the following SSTs
SSTs 09520-87604-000
09956-00010-000

NOTE
- Be sure to evenly press the right and left cups, until you can see the snap ring attaching groove provided on the outer periphery surface of the universal joint spider bearing cup.



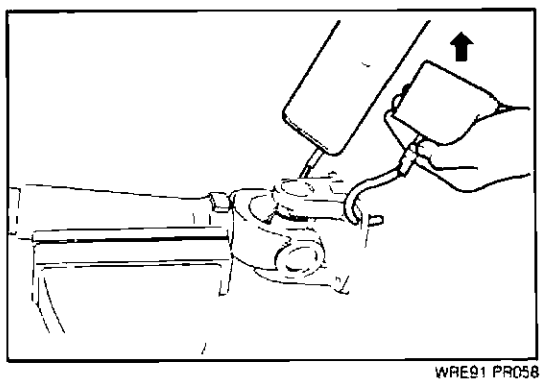
8 Measurement of universal joint starting torque
(1) Using a spring scale, install the selected snap ring so that the starting torque may fall within the specified range given below
Specified Value
(On both front and rear propeller shafts):
0.05 - 1.47 N·m (0.005 - 0.15 kgf-m)



(2) Turn the propeller shaft 90 degrees Measure the starting torque

CAUTION:

- As regards the snap rings positioned symmetrically relative to the universal joint spider, in principle, it is required to use the snap rings having the same thickness.
- However, if the starting torque does not reach or exceeds the specified range despite the fact that the snap rings having the same thickness have been used, use a snap ring having one class higher or lower thickness.

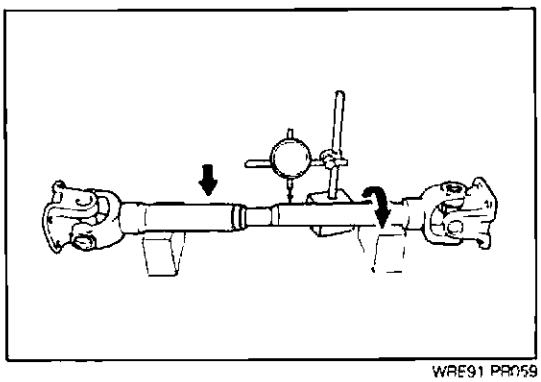


WRE91 PR058

9 With a dial gauge placed at the center of the propeller shaft, measure the runout

Allowable Runout Limit: 0.5 mm

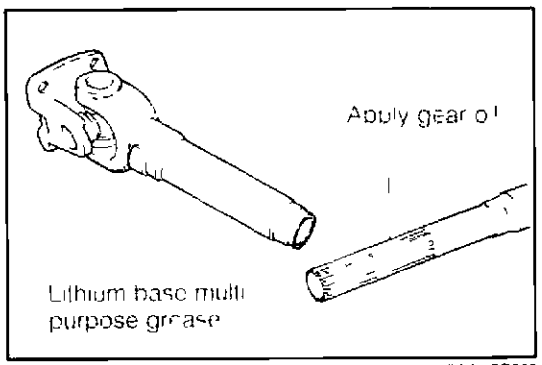
Replace to the new front propeller shaft, if the runout is exceed than 0.5 mm



WRE91 PR059

10 Apply gear oil to both the inner and outer sides of the propeller shaft

11 Apply the lithium base multi purpose grease to the oil seal lip section

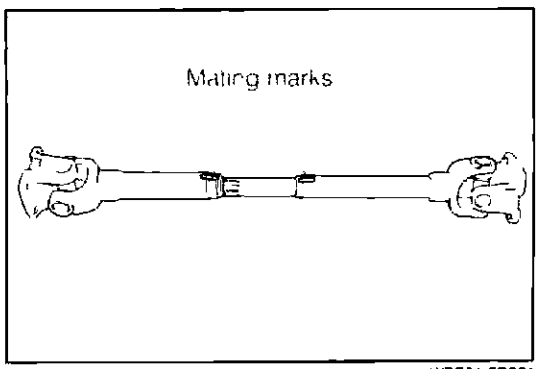


WRE91-PR060

12 Insert the universal joint yoke and universal joint sleeve yoke S/A

CAUTION:

- Make sure to line up those mating marks that were put during the factory of the propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.



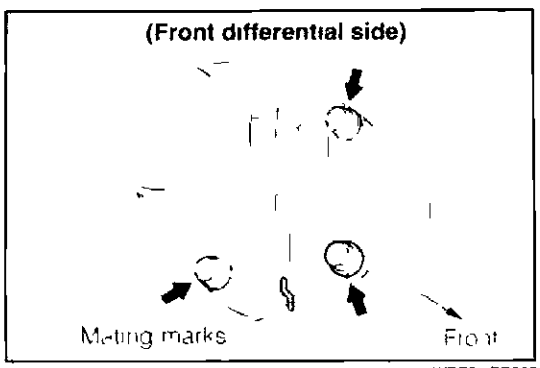
WRE91 PR061

13 Install the propeller shaft with the mating marks that were put during the removal of the propeller shaft aligned with each other

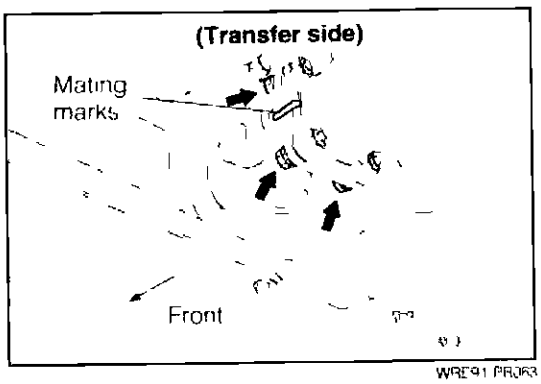
Tightening Torque. 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

CAUTION:

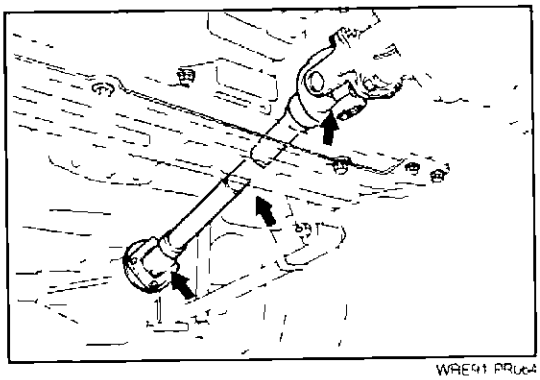
- Make sure to line up those mating marks that were put during the removal of the front propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.



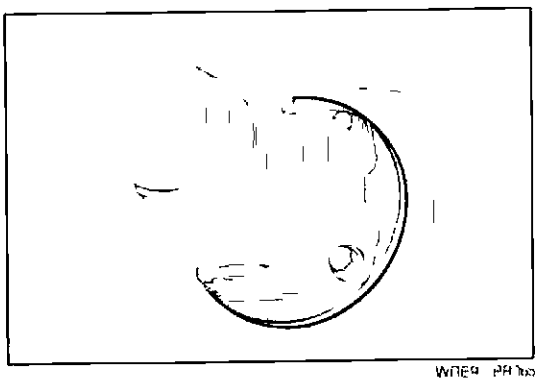
WRE91 PR062



14 Fill new lithium multi-purpose grease into each grease nipple (at three points) by means of a grease gun or the like, until all existing grease is oozed out from the universal joint spider and universal joint sleeve

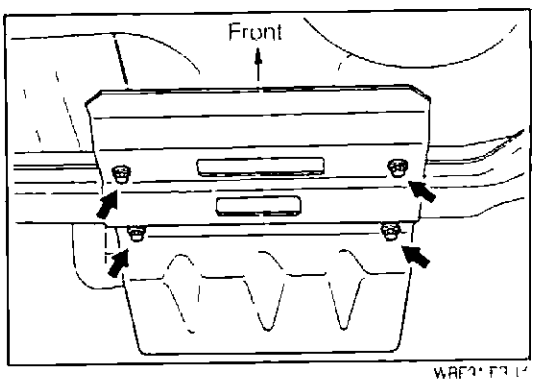


15 After installing the propeller shaft, apply black paint to the exposed machined surface of the differential companion flange (Slant line section in the right figure) as a rust preventive measure



16 Tighten the transmission under cover with the four bolts
Tightening Torque: 15.7 - 23.5 N m (1.6 - 2.4 kgf-m)

17 Jack down the vehicle

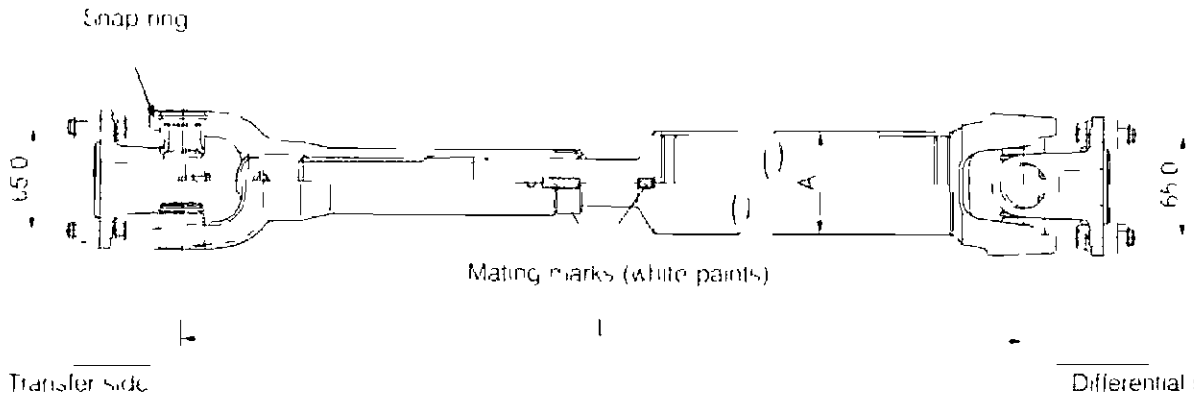


REAR PROPELLER SHAFT

The rear propeller shaft employs a two-joint type. Furthermore, the universal joint spiders adopt an outer snap ring as its securing method.

WHT-01-PR-16

SECTIONAL VIEW



Unit: mm

MODEL	Type of transmission	Joint to joint interval (L) × Outer dia. (A)	Kinds of engine (only for diesel)
E20 (Short wheel base)	4-speed	721 × 65	Natural aspiration
	5-speed	617 × 65	
	5-speed	617 × 75	Turbo charger
E20 (Long wheel base)	4-speed	1046 × 65	Natural aspiration
	5-speed	942 × 65	
	5-speed	942 × 75	Turbo charger
E20 (Long wheel base)	4-speed	1318 × 75	Natural aspiration
	5-speed	1213 × 75	

WHT-01-PR-01

TROUBLE SHOOTING

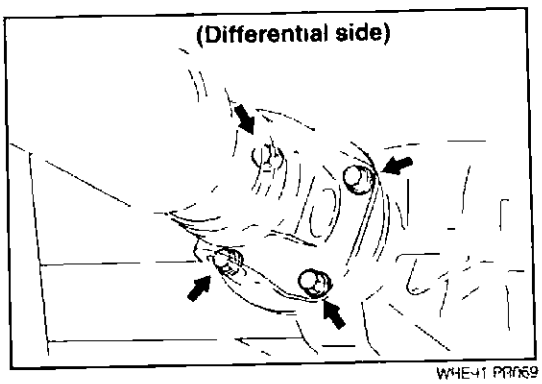
Symptom	Possible causes	Checking points
Abnormal noise, Vibration	• Universal joint improperly lubricated	• Lubrication to grease nipples
	• Damage of universal joint spider section	• Check universal joints
	• Runout or damage of propeller shaft	• Check propeller shaft for runout
	• Imbalance of propeller shaft	• Check mating marks that were put during installation or removal

REPLACEMENT OF PROPELLER SHAFT WITH NEW ONE (REAR)

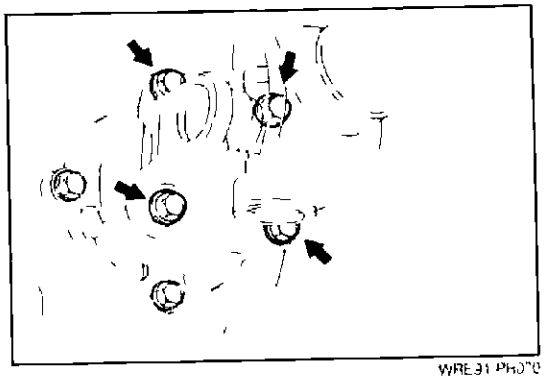
REMOVAL

1 Jack up the vehicle
NOTE:
- Be sure to support the vehicle with safety stands securely (As for the jacking up points, refer GI-section)

2 Remove the rear propeller shaft assemble by removing the four bolts

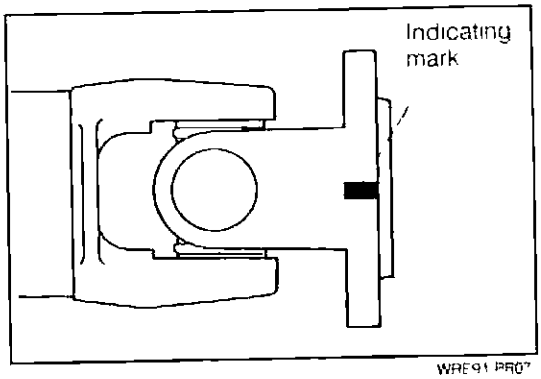


WHE41 PR069


WRE91 PR070

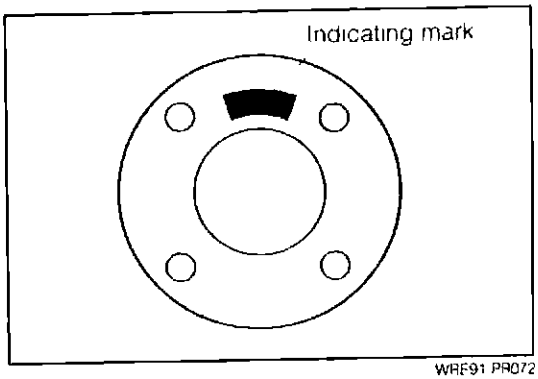
INSTALLATION

1 Confirm the installation indicating mark (painted with white) on the rear differential attaching surface of the front propeller shaft



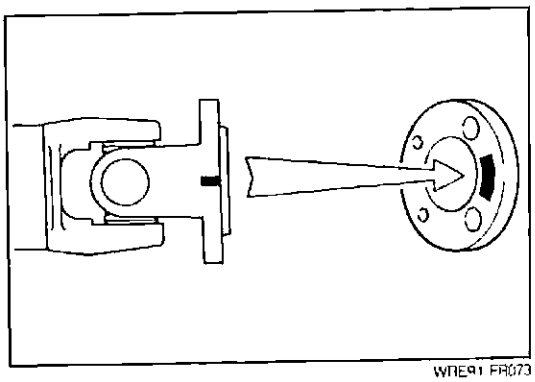
WRE91 PR07

2 Confirm the installation indicating mark (painted with pink) on the propeller shaft attaching surface of the rear differential companion flange

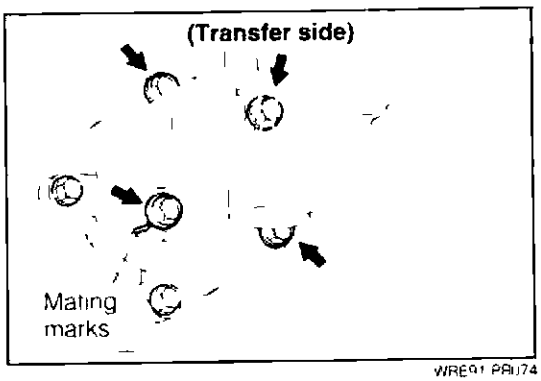


WRE91 PR072

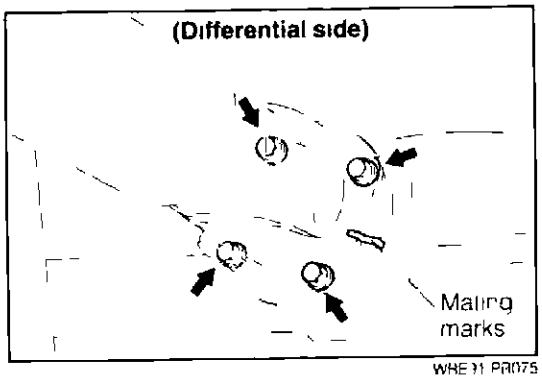
3 Install the propeller shaft in such a way that the installation indicating mark of the rear propeller shaft may be lined up with the installation indicating mark of the rear differential companion flange
CAUTION:
- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the rear differential.
- If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration.


WRE91 PR073

4 Install the rear propeller shaft assembly with the four bolts, four spring washers, four nuts and then, tighten the bolts
Tightening Torque: 58.8 - 78.5 N m (6.0 - 8.0 kgf-m)

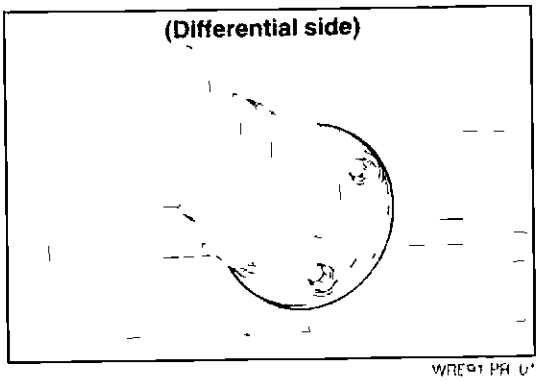


WRE91PR074



WRE91PR075

5 After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure
6 Fill new lithium multi-purpose grease into each grease nipple (at three points) by means of a grease gun or the like, until all existing grease is oozed out from the universal joint spider and universal joint sleeve



WRE91PR076

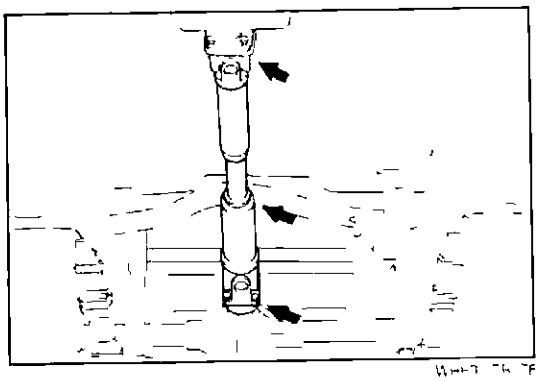
Case where propeller shaft is reused

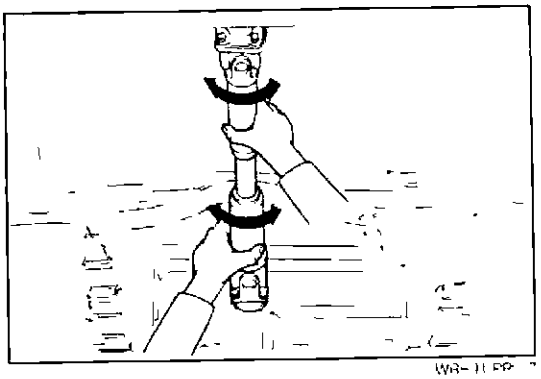
REMOVAL

1 Jack up the vehicle
NOTE
- Be sure to support the vehicle with safety stands securely (As for the jacking up points, refer GI-section).

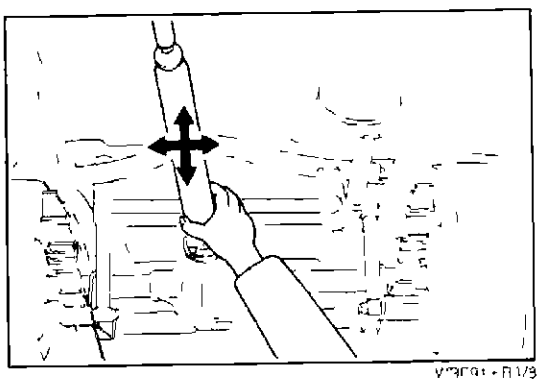
2 Fill new lithium multi-purpose grease into each grease nipple (at three points) by means of a grease gun or the like, until all existing grease is oozed out from the universal joint spider and universal joint sleeve

3 Check the universal joint sleeve spline for excessive looseness by turning the propeller shaft in one direction and the universal joint sleeve in the opposite direction

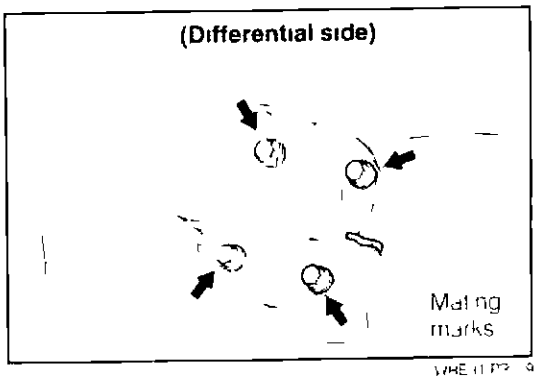


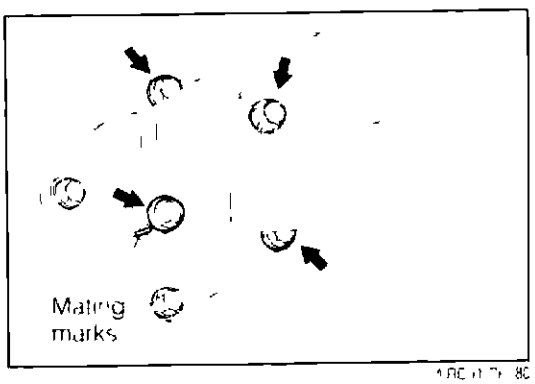


4 Move the center of the propeller shaft in up-&-down and right-&-left directions so as to check the universal joint spider for excessive play by hand feeling
NOTE
- If the universal joint spider exhibits abnormal looseness, measure the starting torque of the universal joint with flange yoke. (See page PR–14.)



5 Remove the rear propeller shaft by removing the four bolts both at the rear differential side and at the transfer side
CAUTION
- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running



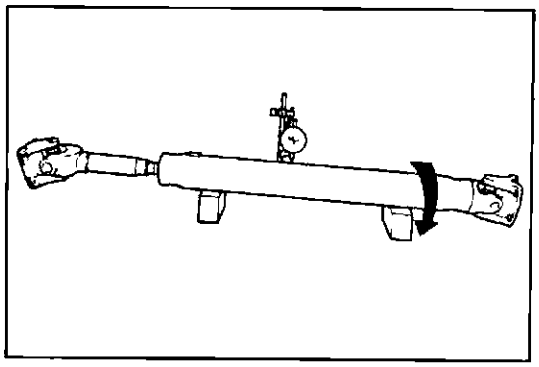


INSPECTION

1 Measure the runout with a dial gauge set to the center of the propeller shaft

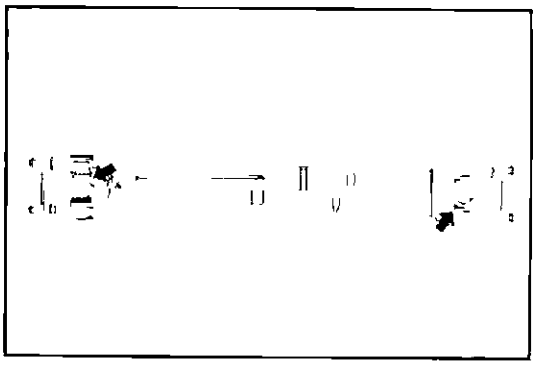
Allowable Runout: 0.5 mm

Replace the new propeller shaft, if the runout is exceed than 0.5 mm



WRE91 PR081

2 Check the oil seal of the universal joint spider section for damage



WRE91-PR082

3 Check the flange yoke and sleeve yoke.

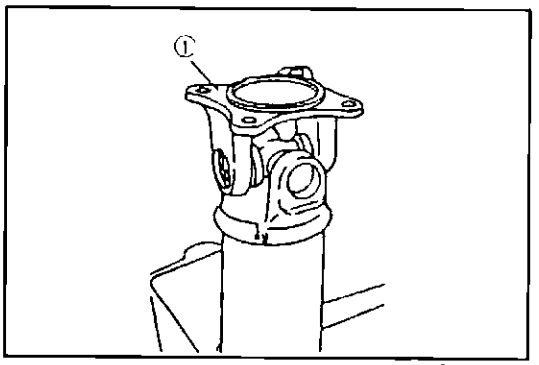
(1) Inspect to see if any damage is present at the differential drive pinion companion flange-contact section ①.

(2) Check the oil seal sliding section ② for damage or wear.

(3) Check the spline ③ for damage or wear

(4) Fit the sleeve yoke onto the sliding spline of the transmission output shaft.

Ensure that the spline exhibits no looseness in the rotation direction and the sleeve can slide freely in the axial direction on the spline

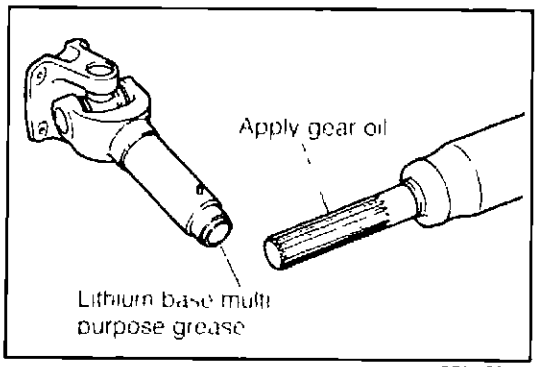


WRE91 PR083

INSTALLATION

1 Apply gear oil to both the inner and outer sides of the propeller shaft.

2 Apply lithium base multi purpose grease to the oil seal lip section



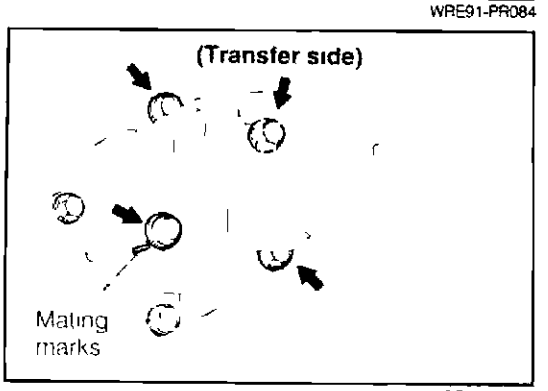
WRE91-PR084

3 Install the rear propeller shaft assembly with the four bolts, four spring washers, four nuts then, tighten the nuts

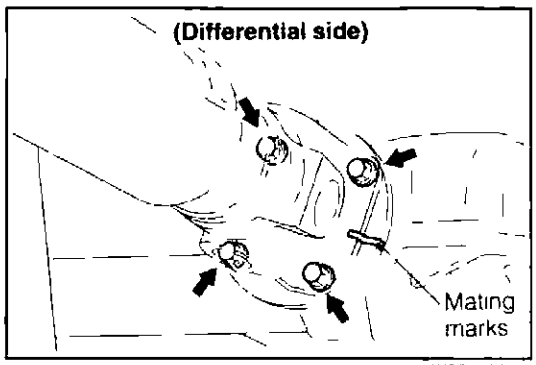
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

CAUTION:

- Make sure to line up those scribing lines that were put during the removal of the rear propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.

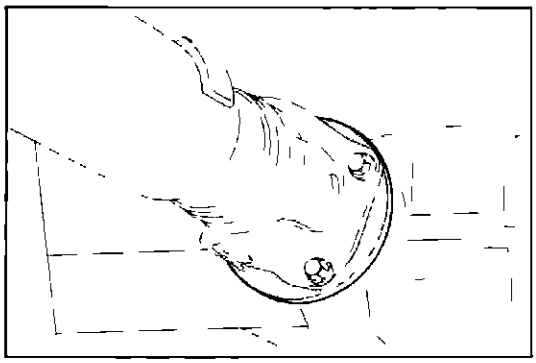


WRE91 PR085

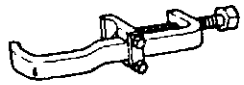


WRE91 PR086

4 After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure.
5 Fill new lithium multi-purpose grease into each grease nipple (at three points) by means of a grease gun or the like, until all existing grease is oozed out from the universal joint spider and universal joint sleeve


WRE91 PR102

SSTs

Shape	Parts No	Parts Name
	09520-87604-000	Puller universal joint
	09956-00010-000	Tightening piece

WRE91 PR087

SERVICE SPECIFICATIONS

Unit : mm

Item		Specified value	Allowable limit	Remarks
Propeller shaft (runout)		—	0.5	Front, rear
Yoke (Inner diameters)	Sleeve	28.0 $^{+0.021}_{0}$	—	Using an inner dial gauge
	Flange	28.0 $^{+0.021}_{0}$	—	
Universal joint spider (Starting torque)		0.05 - 1.47 N·m (0.005 - 0.15 kgf-m)	—	Using a spring scale or the like

WRE91 PR088

TIGHTENING TORQUE

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Front propeller shaft × Differential companion flange	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Rear propeller shaft × Differential companion flange	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9

WRE91 PR089

DAIHATSU

F70,F75,F77

Service manual

REAR AXLE & SUSPENSION

RS

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

REAR AXLE & SUSPENSION

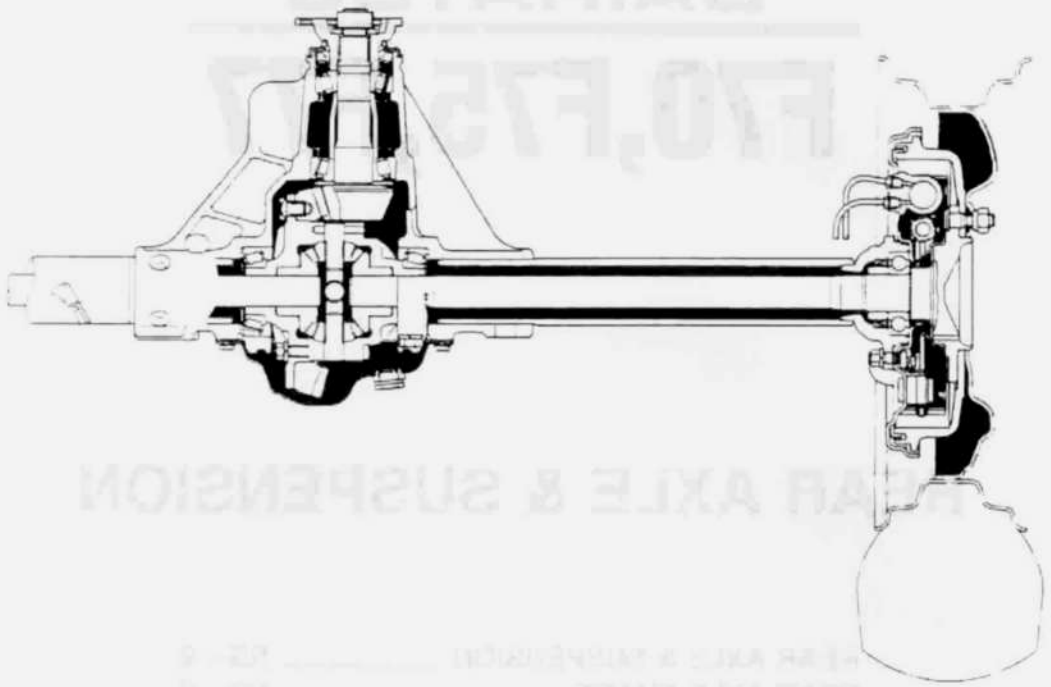
REAR AXLE & SUSPENSION ..... RS– 2
REAR AXLE SHAFT ..... RS– 5
REAR SHOCK ABSORBER RS–24
REAR SPRING RS–34
SSTs (Special Service Tools) RS–43
TIGHTENING TORQUE RS–44

WRE91-RS001

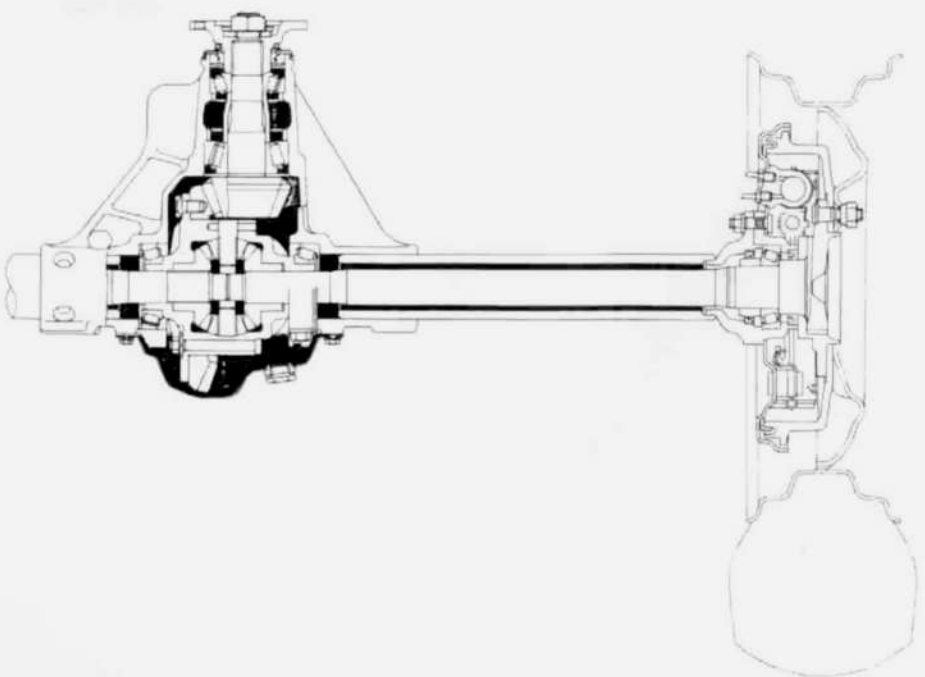
REAR AXLE & SUSPENSION

REAR AXLE

The rear axle employs a semi-floating type.



F70 and F75

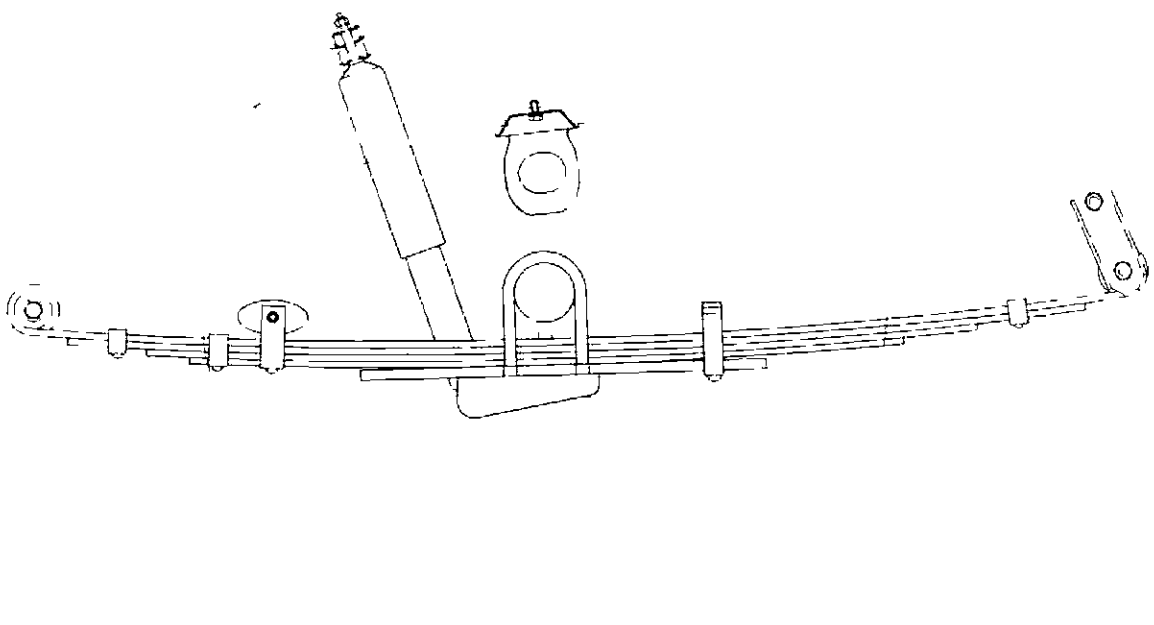


F77

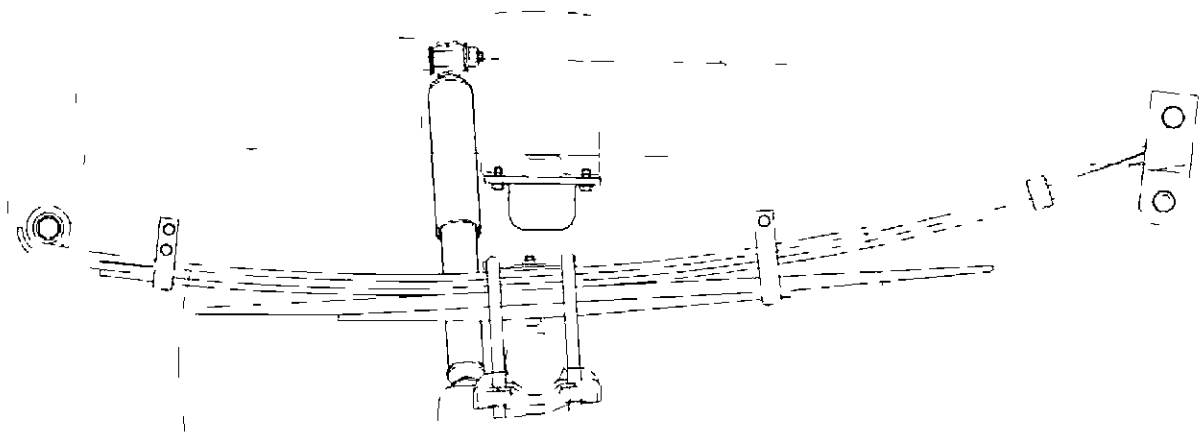
WRE91-RS002

REAR SUSPENSION

The rear suspension employs a rigid axle suspension



F70 and F75

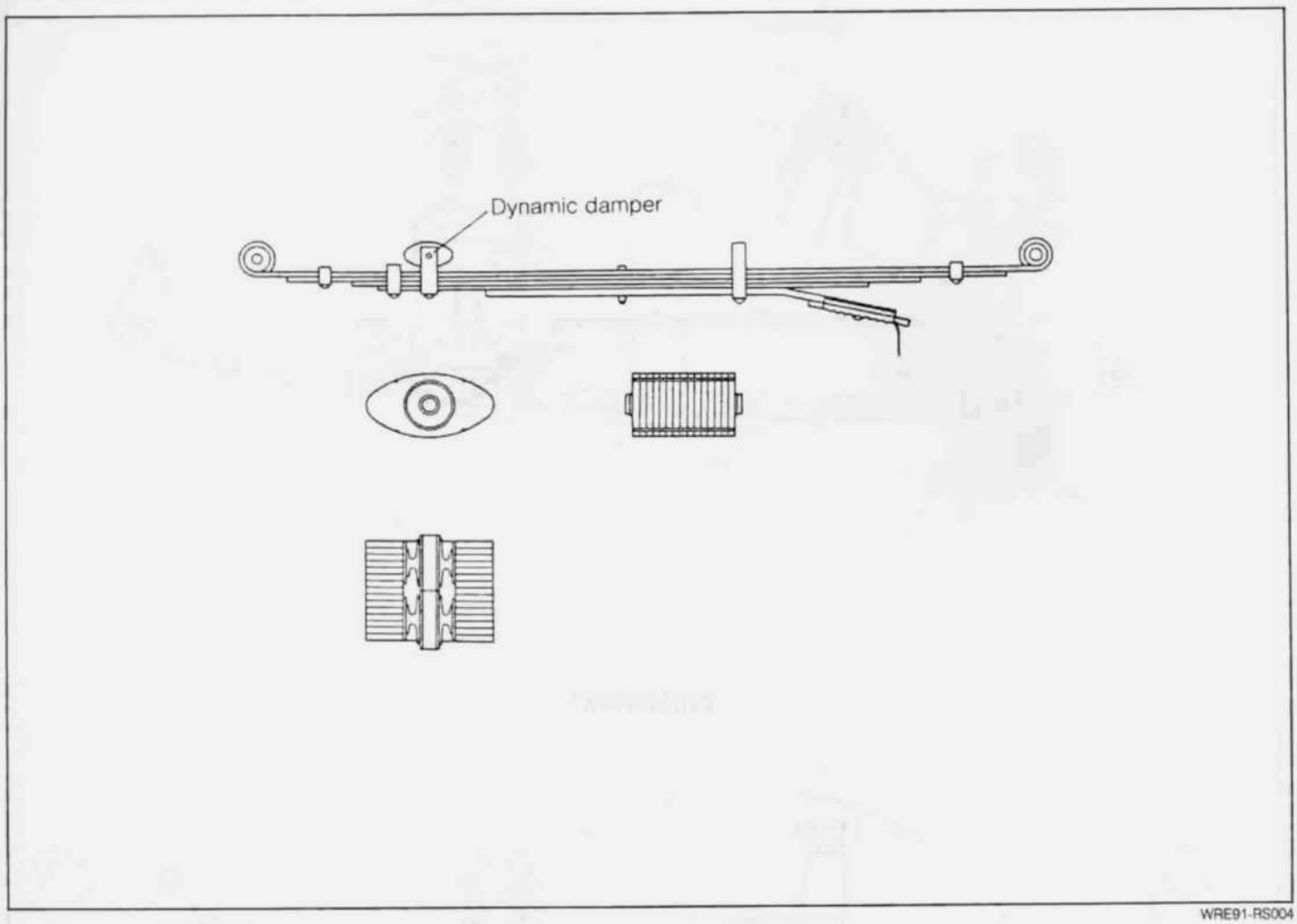


F77

W.REG' RS003

REAR LEAF SPRING

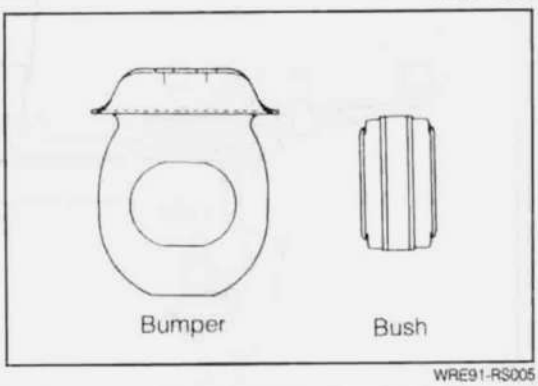
For improved quiet operation, a dynamic damper is provided for the soft suspension on F70 with DL52 as well as for the leaf spring on F70V and F75V.



WRE91-RS004

Rear spring bumper

The rear spring bumper is of rubber. The front eye bush of the spring reduces vibration and noise level efficiently.

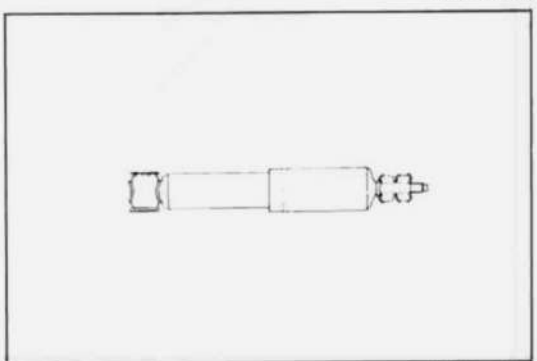


WRE91-RS005

Shock absorber

The gas-sealed shock absorber assures excellent riding comfort.

As regards the three-stage damper, refer to the Front Suspension section.



WRE91-RS006

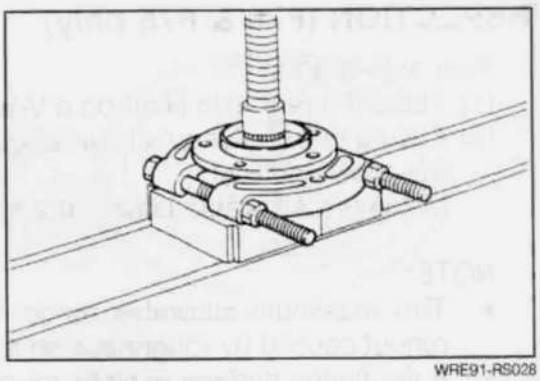
Specifications

Damping force Rebound stroke/compression stroke [at a piston speed of 0.3 m/s] kg	125/20

(3) Install the rear axle shaft on the oil deflector.
(4) Press the rear axle shaft into the oil deflector, using a press.

NOTE:

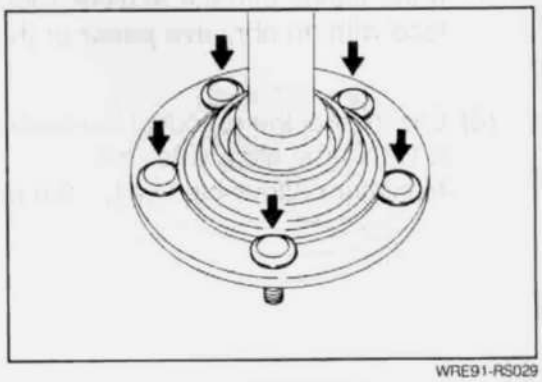
- The press-fitting should be carried out while turning the rear axle shaft evenly. Furthermore, care must be exercised to ensure that the oil deflector will not tilt during the press-fitting operation.


WRE91-RS028

2. Installation of hub bolts
   Install the hub bolt on the rear axle shaft, aligning the cutout section of the hub bolt. Drive the hub bolt into the rear axle shaft, using a hammer or the like.

   NOTE:

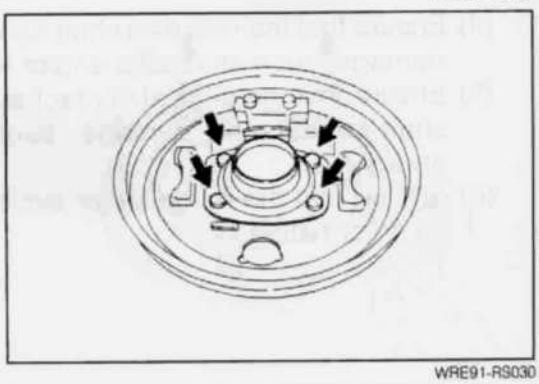
   - Be very careful not to damage the oil deflector during the installation.
   - Do not apply impacts beyond the required extent.


WRE91-RS029

3. Press the serration bolt to the backing plate.

   NOTE:

   - Be very careful not to damage the backing place during the installation.

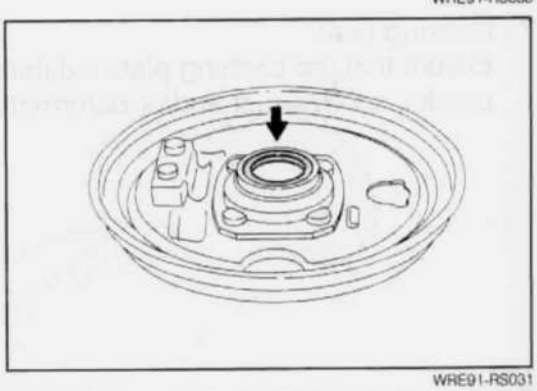

WRE91-RS030

4. Press a new oil seal evenly to the backing plate.

   NOTE:

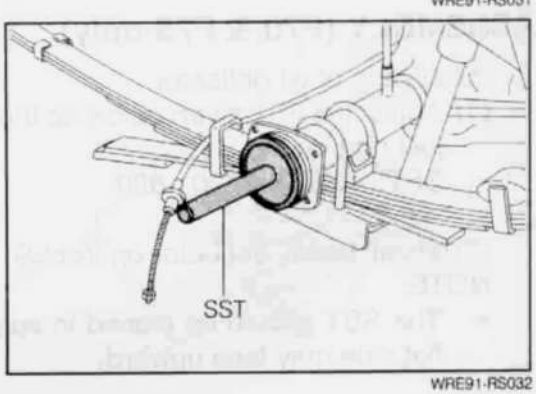
   - Care must be exercised not to tilt the oil seal during the installation.

5. Apply lithium-based MP grease to the lip section of the oil seal.


WRE91-RS031

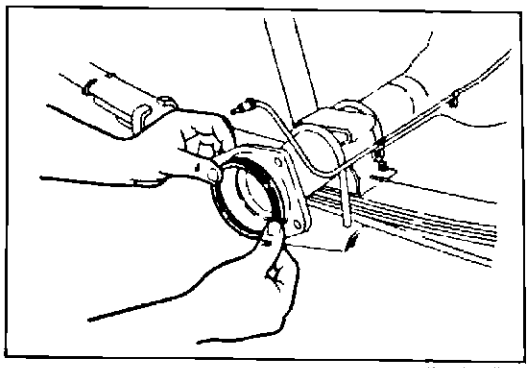
6. Press a new oil seal into the rear axle shaft, using the following SST.
   SST: 09608-30012-000

7. Apply lithium-based MP grease to the lip section of the oil seal.



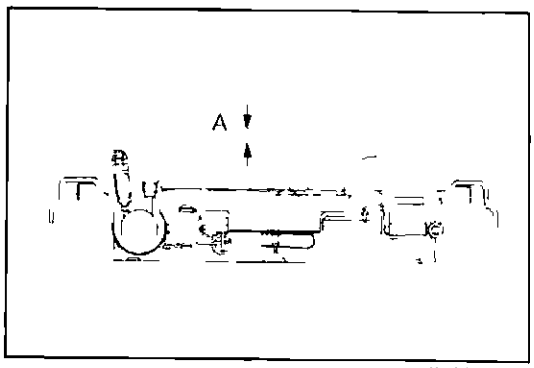
WRE91-RS032

8 Install a new gasket to the rear axle shaft



WHL9* RS033

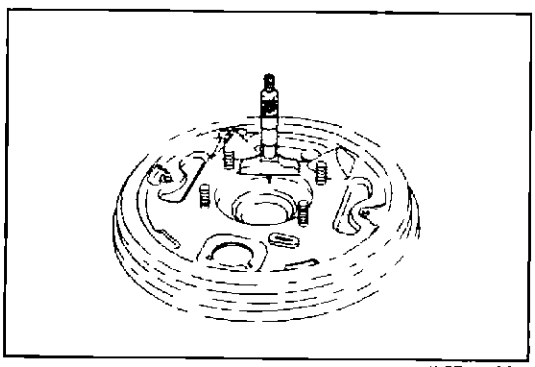
9 Selection of shim
(1) Measure the diameter A of the backing plate at four points which are diagonally opposite to each other.



WHL9 RS13

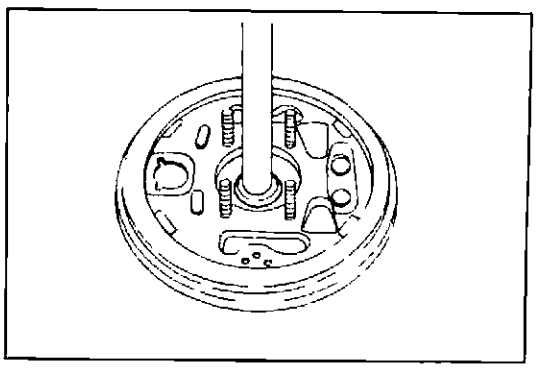
(2) Calculate the mean value of the measured dimensions Select a shim which corresponds to the calculated value, referring to the table below

Selecting shim	Measured average value
0 25 mm	14 66 - 14 90 mm
0 50 mm	14 40 - 14 65 mm



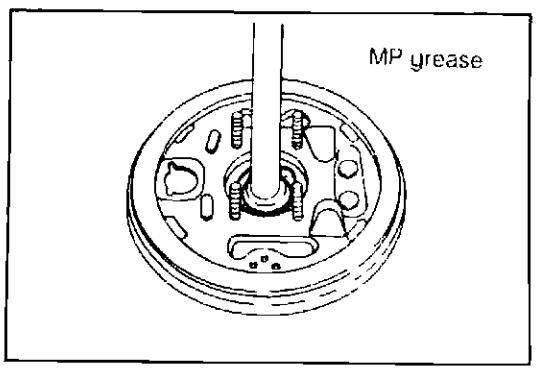
WRE11 RS13b

10 Install the backing plate to the rear axle shaft
NOTE:
- **Be very careful not to damage the oil seal during the installation.**



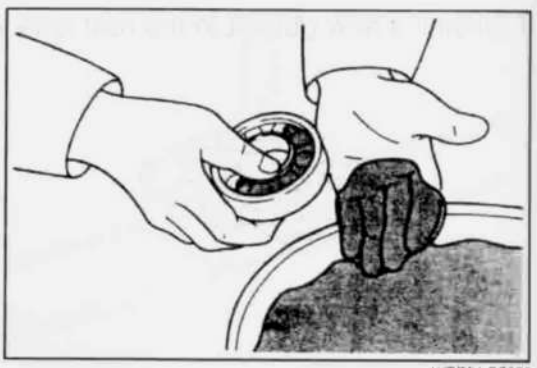
WRE11 RS136

11 Pack the back surface of the oil seal with 5 grams of lithium-based MP grease.

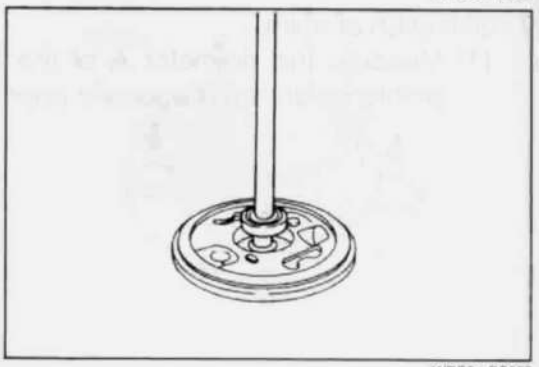


WHE9 RS13*

12. Pack the rear axle bearing with lithium-based MP grease.
NOTE:
- The application of grease should not be limited to the surface only. Be sure to pack the bearing with grease. Then, apply grease to the surface, too.

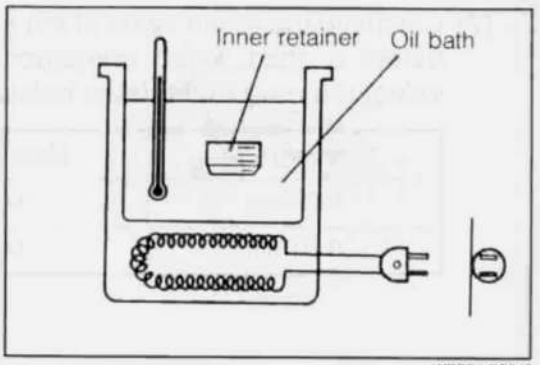

WRE91-RS038

13. Install the rear axle bearing to the rear axle shaft.


WRE91-RS039

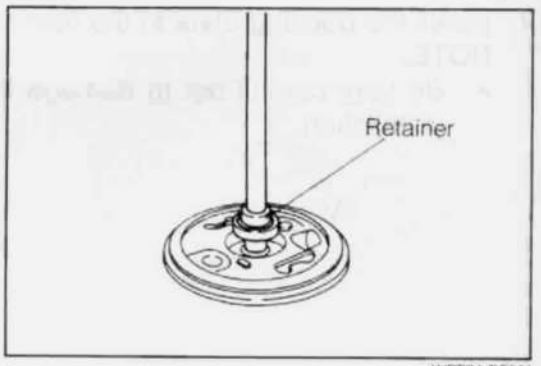
14. Installation of rear axle bearing retainer
NOTE:
- Perform this operation promptly before the retainer temperature drops.
- When the temperature rises above 150 ±15°C, the retainer surface will be turned to yellow. In this case, be careful not to heat the retainer any further.

CAUTION:
- Special attention must be paid not to burn yourself.



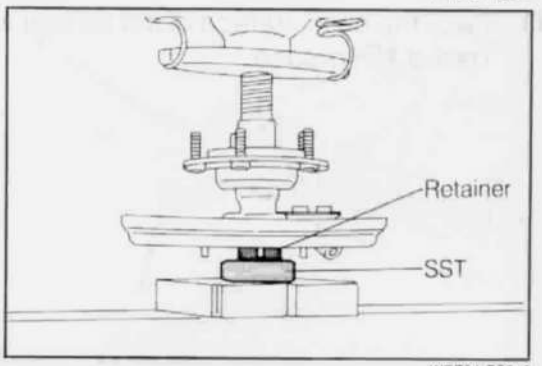
WRE91-RS040

(1) Heat the retainer to 150 ±15°C.
(2) Install the retainer to the rear axle shaft.



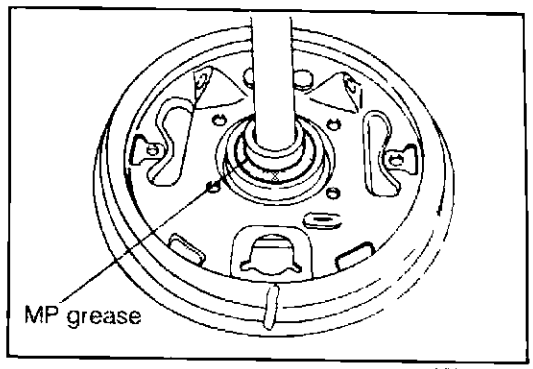
WRE91-RS041

(3) Press the retainer into the rear axle shaft, using a hydraulic press in combination with the following SST given below.
SST: 09515-21010-000



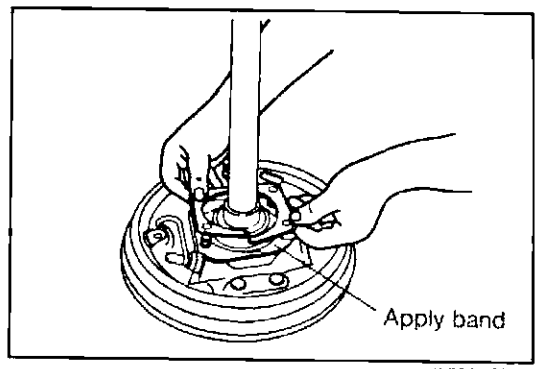
WRE91-RS042

15 Apply 5 grams of lithium-based MP grease to the rear axle bearing



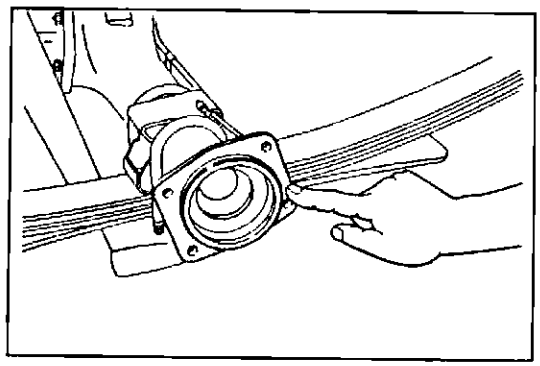
WRE91 RS043

16 Apply a thin film of Three Bond® 1104 to the shim contact surface of the backing plate.
17 Install the selected shim (at the step 9) to the backing plate.



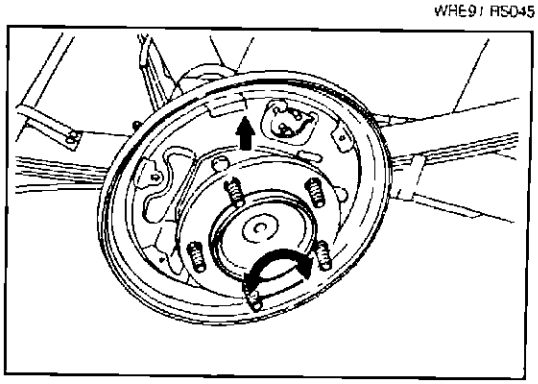
WRE91 RS044

18 Apply a thin film of Three Bond® 1104 to the backing plate installing surface of the axle housing.


WRE91 RS045

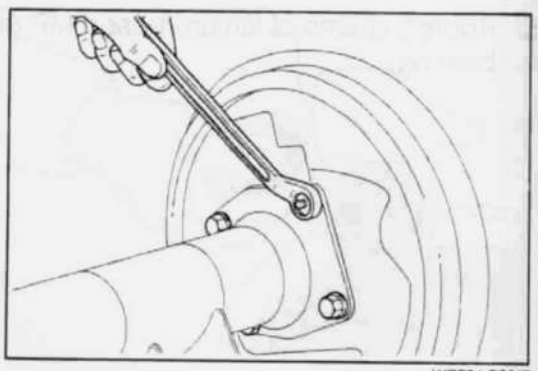
19. Insert the rear axle shaft into the rear axle housing.
NOTE:
- **Be careful not to damage the oil seal during the insertion.**

20 Install the backing plate to the rear axle in such a way that the attaching bolt of the backing plate is aligned with the attaching hole of the rear axle housing and that the wheel cylinder installing hole of the backing plate comes at the upper side
NOTE:
(1) **Turn the axle shaft so that the spline at the differential side may engage with the spline at the axle shaft side.**
(2) **Do not apply impacts to the bearing beyond the required extent.**


WRE91 RS046

21. Attach the backing plate attaching nuts with new spring washers interposed. Tighten them to the specified torque evenly over two or three stages.
    Tightening Torque: 39.2 - 53.9 N·m
    (4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)

22. Install the rear brake.
    (For details, see the Brake section.)

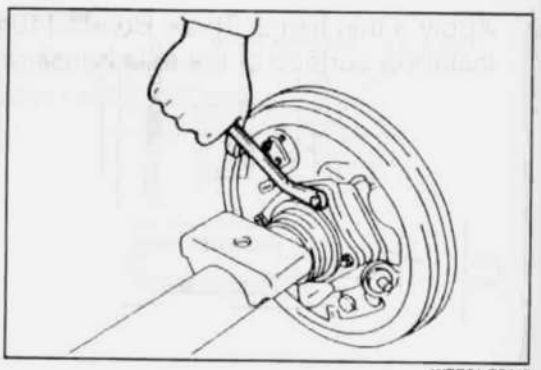

WRE91-RS047

REMOVAL (F77 only)

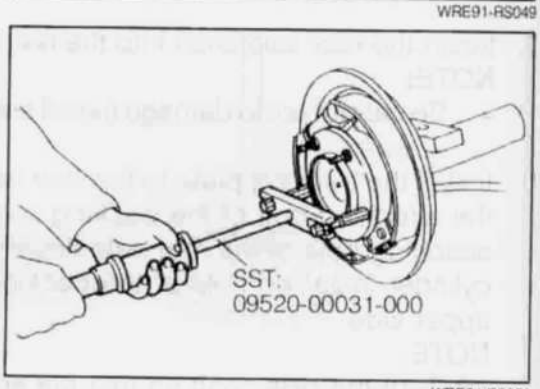
1. Disassemble the rear brake.
   (For details, see the Brake section.)

WRE91-RS048

2. Remove the attaching nuts of the backing plate from the rear axle housing.


WRE91-RS049

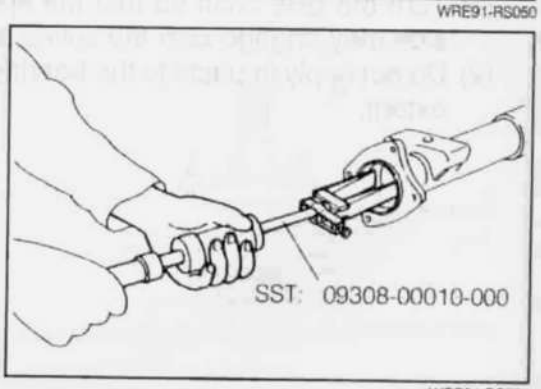
3. Remove the rear axle shaft, using the following SST.
   SST: 09520-00031-000



WRE91-RS050

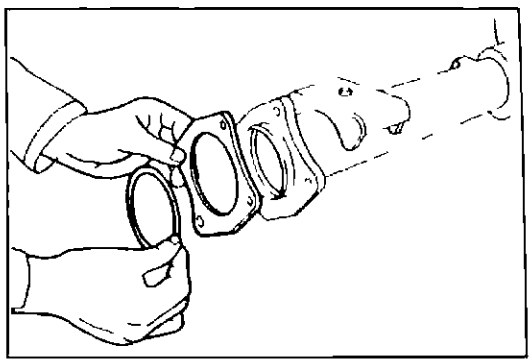
4. Remove the oil seal, using the following SST.
   SST: 09308-00010-000

   NOTE:
   - Never reuse the oil seal.



WRE91-RS051

5 Remove the O-ring from the rear axle housing.
6 Remove the shim from the rear axle housing

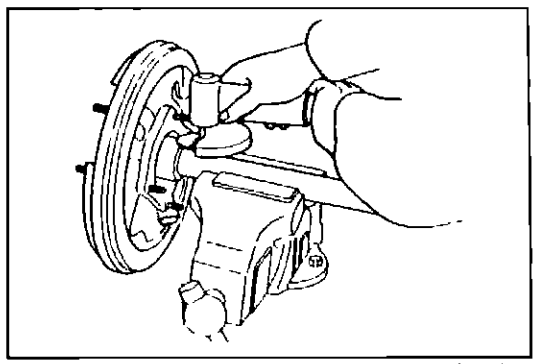

WRE9 RS052

DISASSEMBLY (F77 only)

1 Grind off the retainer, using a hand grinder

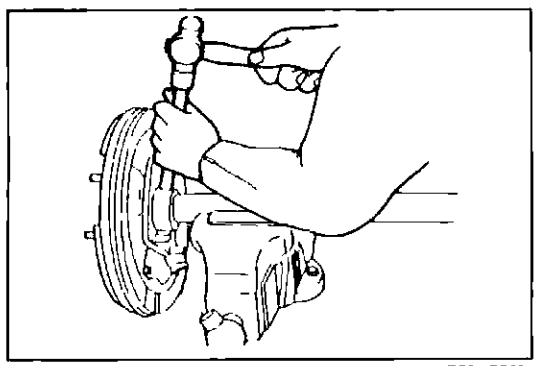
WARNING:
- Observe the operating instructions of the hand grinder manufacturer.
- Also, be sure to wear goggles during the grinding operation.

NOTE:
- Do not grind the rear axle shaft, bearing and/or bearing case.

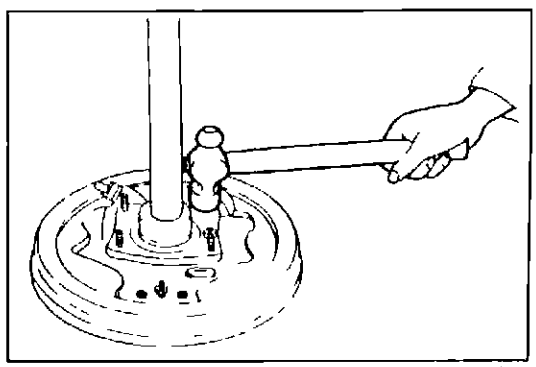

WRE91 RS053

2 Split the retainer with a chisel

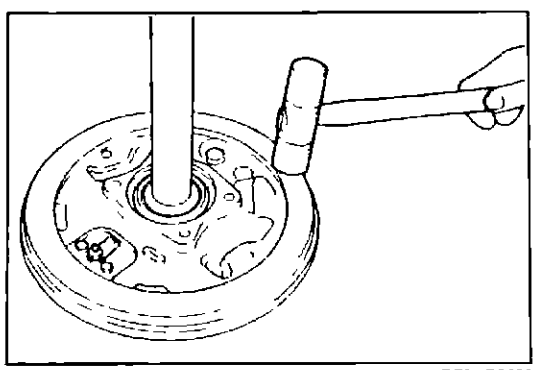
WARNING:
- Be sure to wear a pair of gloves and goggles during the operation.


WRE91 RS054

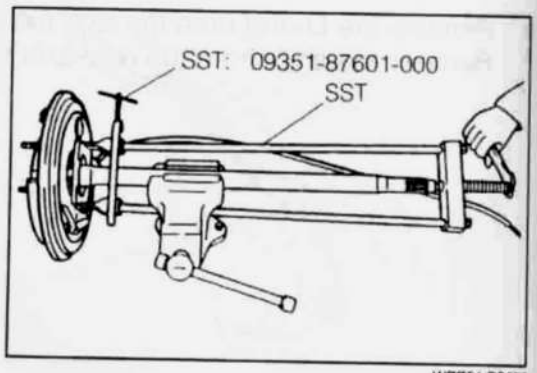
3 Pull out the serration bolt
Temporarily screw in a serration nut onto the end of the serration bolt in order to drive it off from the backing plate and bearing case


WRE91 RS055

4 Using a plastic hammer, lightly tap the backing plate and detach it from the bearing case

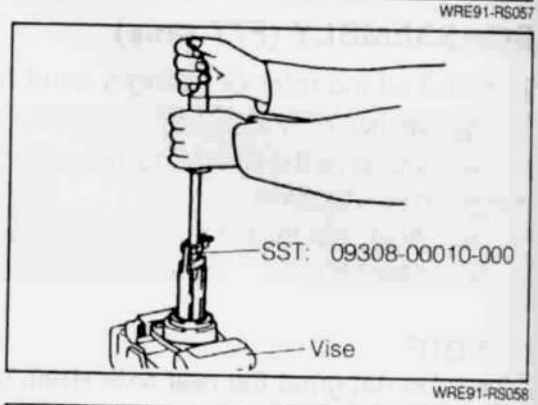

WRE91 RS056

5. Remove the tapered roller inner bearing using the SSTs given below. Pull out the inner bearing with the bearing case held by means of the SST.
   SST: 09521-87301-000 (Left hand side)
   SST: 09520-87601-000 (Right and side)
   SST: 09351-87601-000



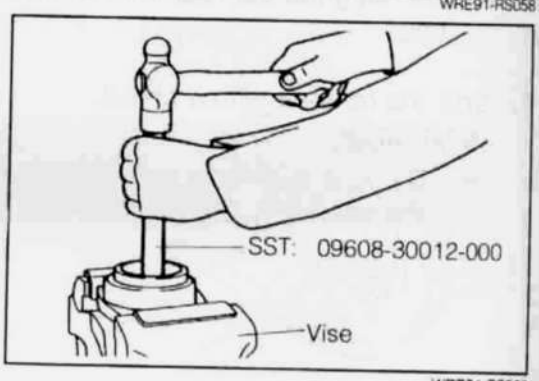
WRE91-RS057

6. Remove the bearing case Type "T" oil seal, using the following SST given below.
   SST: 09308-00010-000



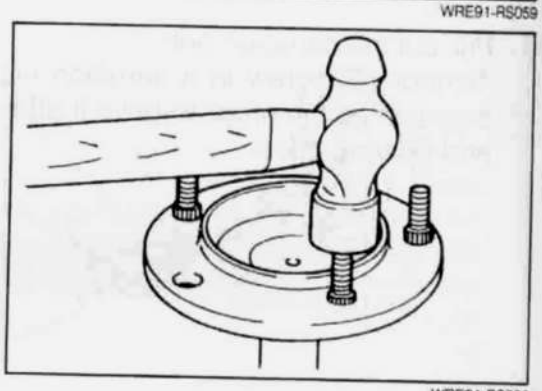
WRE91-RS058

7. Remove the tapered roller bearing outer race, using the following SST given below.
   SST: 09608-30012-000

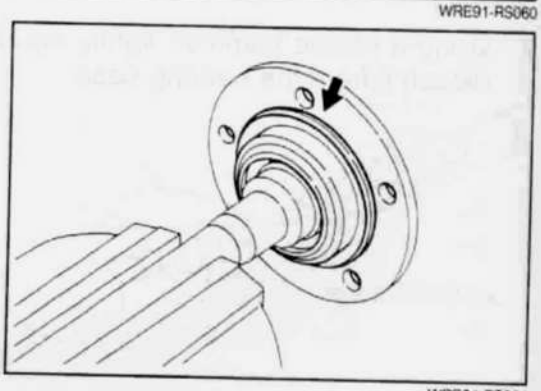


WRE91-RS059

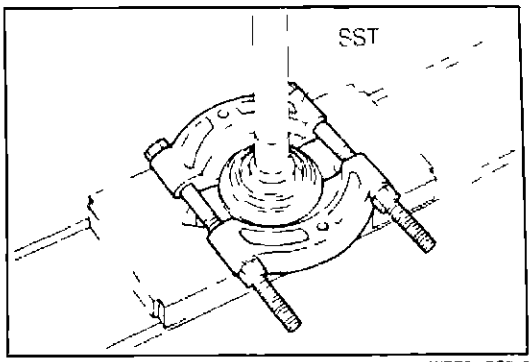
8. Drive out the hub bolts from the rear axle shaft, using a plastic hammer or the like. (Only as required)
   NOTE:
   - Do not reuse the removed hub bolts.


WRE91-RS060

9. Removal of oil deflector (Only as required)
   (1) Evenly tap around the oil deflector by means of a chisel so as to float the oil deflector from the rear axle shaft.


WRE91-RS061

(2) Install the following SST between the oil deflector and the rear axle shaft
SST. 09950-87701-000



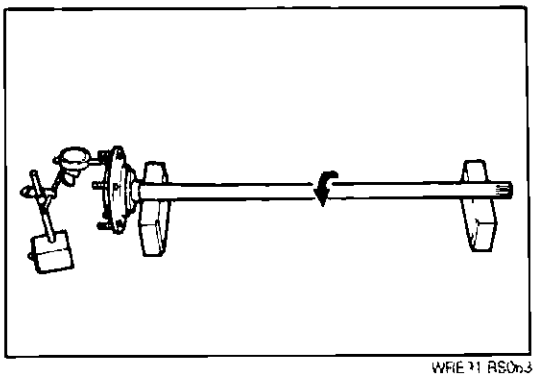
WRE91 RS063

(3) Remove the oil deflector from the rear axle shaft, using a press or the like

NOTE:
- Care must be exercised not to drop the rear axle shaft.
- Do not reuse the oil deflector.

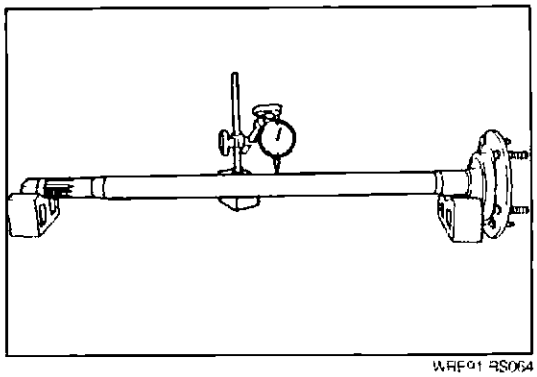
INSPECTION (F77 only)

1 Rear axle shaft
(1) Place the rear axle shaft on a V-block
(2) Ensure that the runout at the flange end surface is within the allowable limit
Maximum Allowable Limit: 0.2 mm

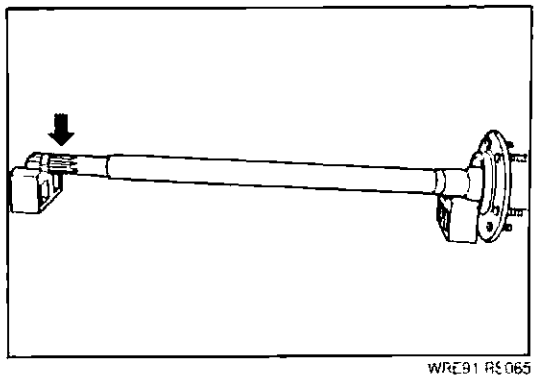

WRE91 RS063

NOTE:
- This maximum allowable runout does not include the runout caused by roughness on the flange surface.
- If the flange surface exhibits roughness, finish the surface with an abrasive paper or the like.

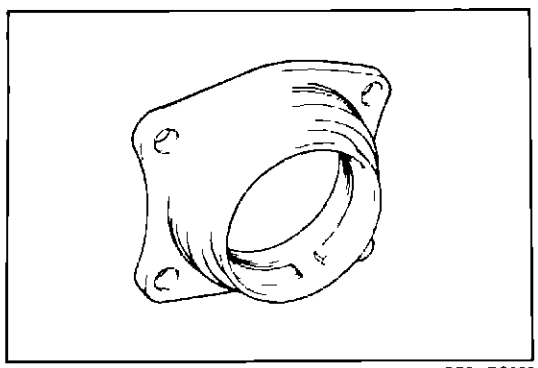
(3) Ensure that the runout at the center unmachined section is within the allowable limit
Maximum Allowable Limit: 2.0 mm


WRE91 RS064

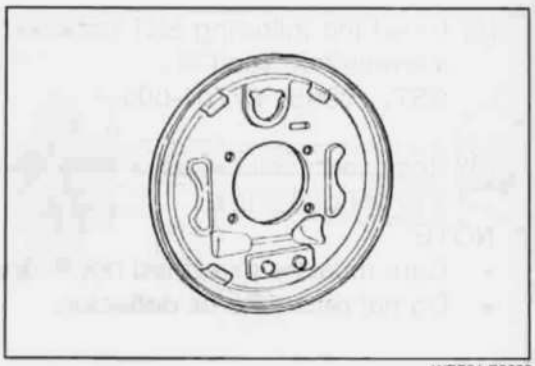
(4) Ensure that the rear axle shaft spline section exhibits no damage, such as cracks and/or wear
(5) Ensure that the oil seal contact surface of the rear axle shaft exhibits no damage, such as cracks, scores and/or rust
(6) Ensure that the oil deflector exhibits no damage, such as deformation


WRE91 RS065

2 Bearing case
Ensure that the bearing case exhibits no damage, such as cracks scores, rust and/or deformation


WRE91 RS066

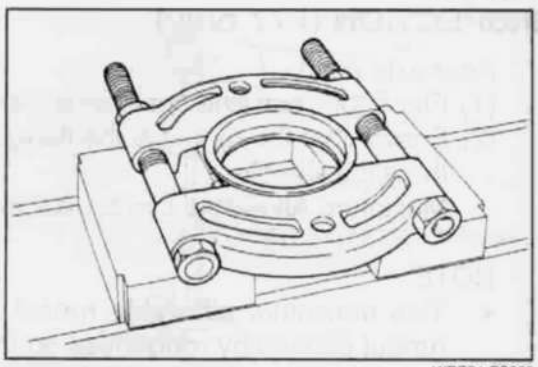
3. Backing plate
   Ensure that the backing plate exhibits no damage, such as cracks, scores, rust and/or deformation.


WRE91-RS067

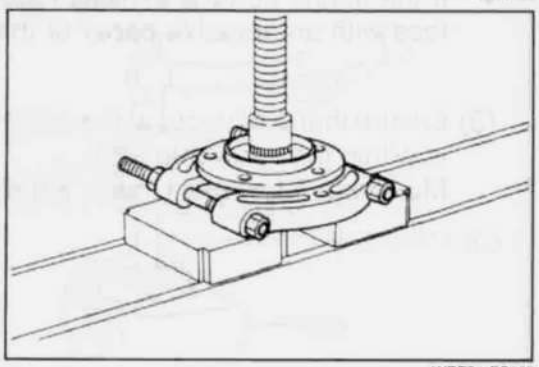
ASSEMBLY (F77 only)

1. Installation of oil deflector
   (1) Adjust the SST given below so that the oil deflector may just ride on the SST.
   SST: 09950-87701-000

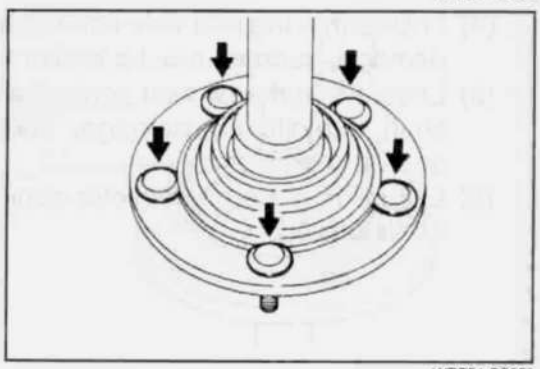
   (2) Install the oil deflector on the SST.
   NOTE:
   - The SST should be placed in such a direction that the flat side may face upward.


WRE91-RS068

   (3) Install the rear axle shaft on the oil deflector.
   (4) Press the rear axle shaft into the oil deflector.
   NOTE:
   - The press-fitting should be carried out while turning the rear axle shaft evenly. Furthermore, care must be exercised to ensure that the oil deflector will not tilt during the press-fitting operation.


WRE91-RS069

2. Installation of hub bolts
   Install the hub bolt on the rear axle shaft, aligning the cutout section of the hub bolt. Drive the hub bolt into the rear axle shaft.
   NOTE:
   - Be very careful not to damage the oil deflector during the installation.
   - Do not apply impacts beyond the required extent.

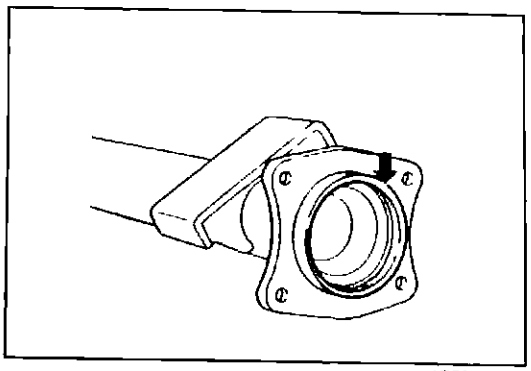

WRE91-RS070

3. Install the rear axle housing end type "T" oil seal, using the following SST.
   SST: 09608-30012-000

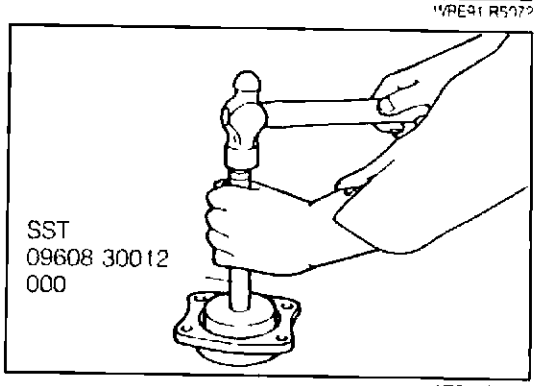


WRE91-RS071

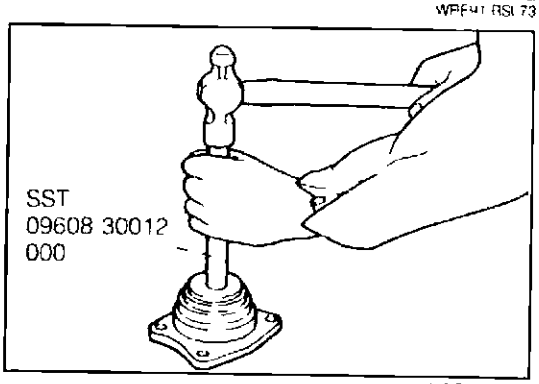
4 Apply 15 grams of lithium-based MP grease to the oil seal outer surface
5 Apply lithium-based MP grease to the lip section of the oil seal



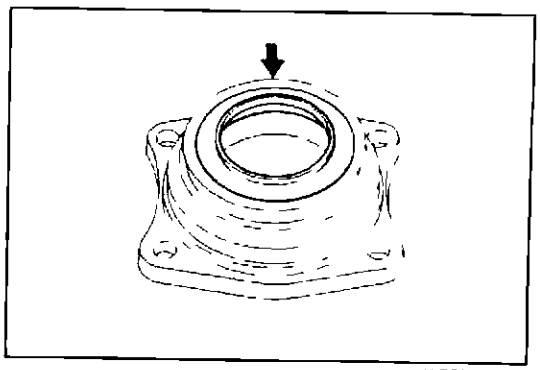
6 Install the bearing outer race into the bearing case, using the following SST given below
SST: 09608-30012-000



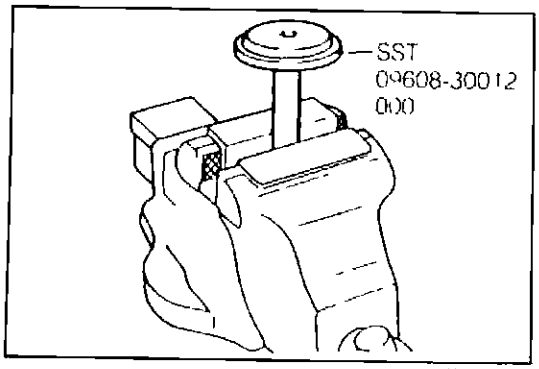
7 Install the type "T" oil seal to the bearing case, using the following SST given below
SST: 09608-30012-000



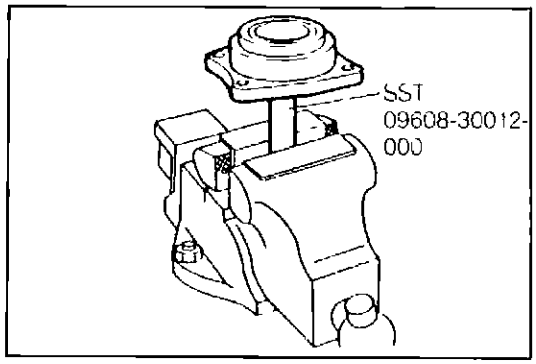
8 Apply lithium-based MP grease to the lip section of the oil seal



9 Assembly of backing plate and bearing case
(1) Clamp the SST in a vice, as indicated in the illustration
SST: 09608-30012-000

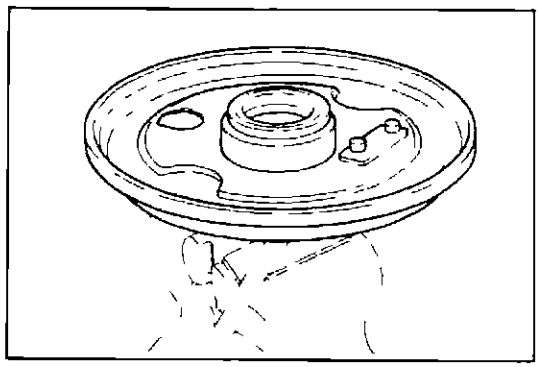


(2) Place the bearing case on the SST



WRE91 RS077

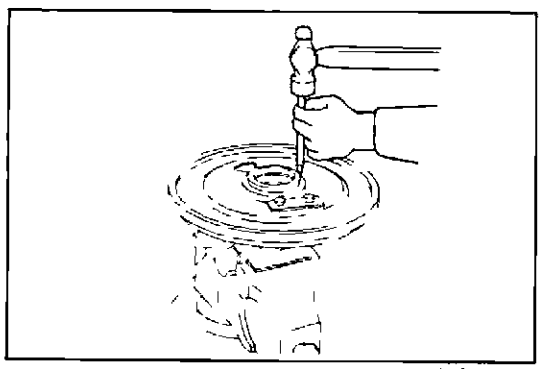
(3) Place the backing plate on the bearing case.


WRE91 RS078

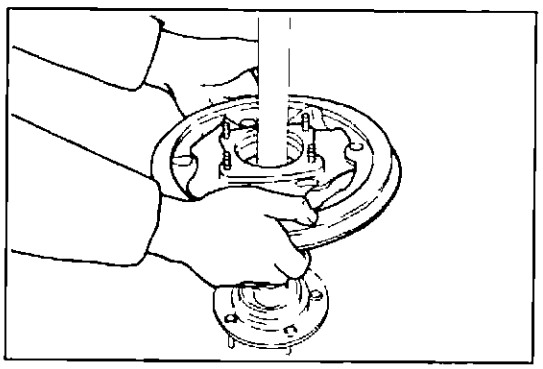
(4) Install the serration bolt. Drive the bolt into position, using a hammer and an iron rod.

NOTE:

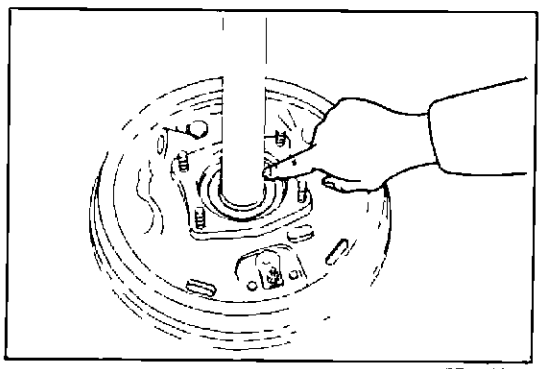
- Hold the backing plate and bearing case by hands so that they may not wobble during the installation
- Also, this driving into position must be performed in such a way that no gap may exist between the backing plate and the serration bolt


WRE91 RS079

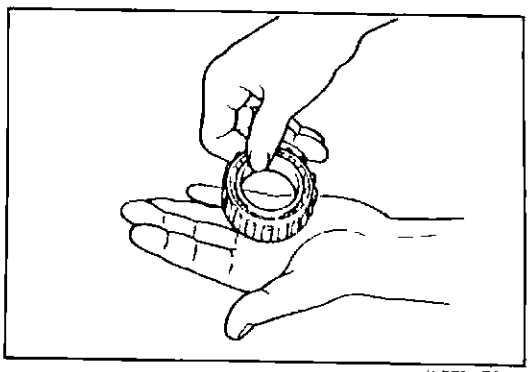
10 Assemble the backing plate bearing case onto the rear axle shaft


WRE91 RS080

11 Apply 15 grams of lithium-based MP grease to the upper part of the oil seal


WRE91 RS081

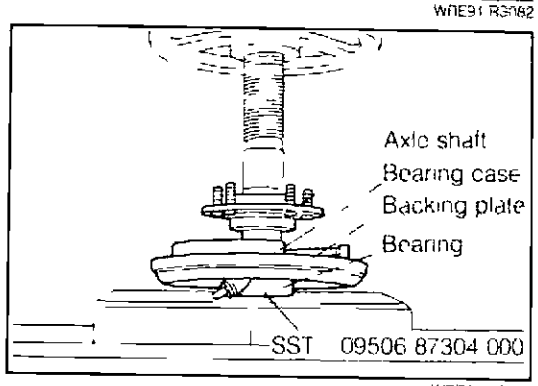
12 Pack the bearing with lithium-based MP grease



WRE91 RS082

13. Press-fit the bearing, using the following SST given below
SST: 09506-87304-000

NOTE:
- Special caution must be exercised to ensure that no scratch is made to the Type "T" oil seal of the bearing case during the installation.



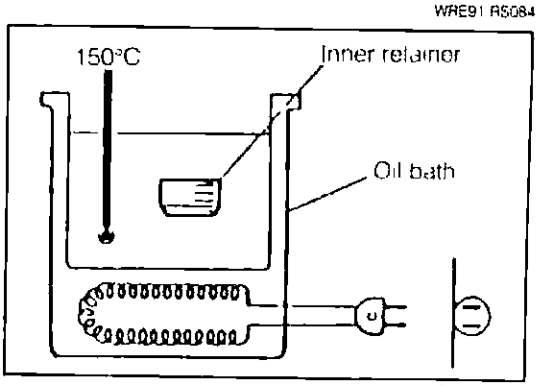
WRE91 RS083

14 Installation of rear axle bearing retainer
NOTE:
- Perform this operation promptly before the retainer temperature drops.
- When the temperature exceeds 150 ±15°C, the surface of the retainer will be turned to yellow. In this case, be careful not to heat the retainer any further.

CAUTION:
- Special attention must be paid not to burn yourself.

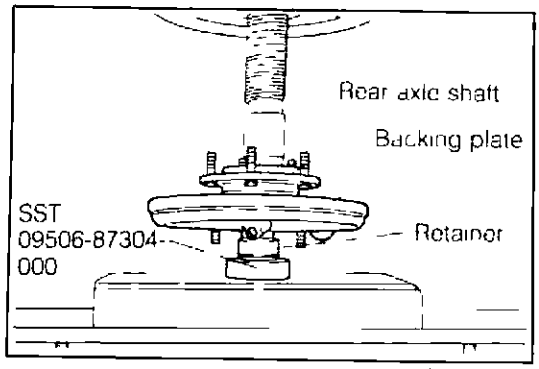
(1) Heat the retainer to 150 ±15°C

WRE91 RS084



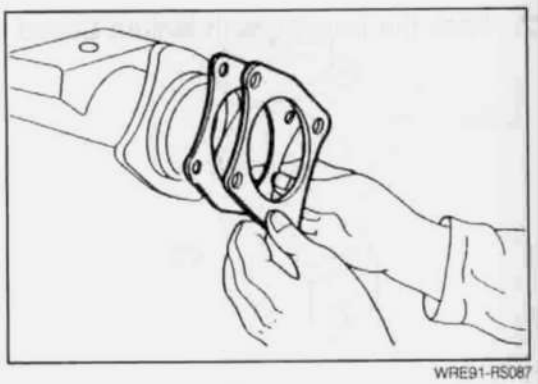
WRE91 RS085

(2) Install the retainer to the rear axle shaft, using a hydraulic press in combination with the following SST
SST: 09506-87304-000

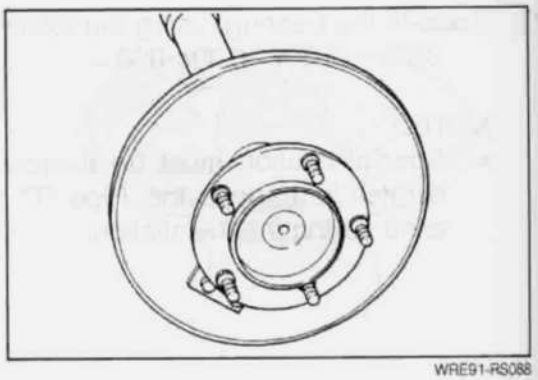


WRE91 RS086

15. Insert the shim having the same thickness as the original shim.

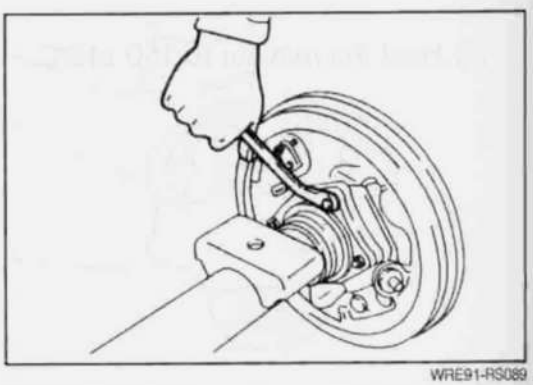

WRE91-RS087

16. Insert the rear axle shaft into the rear axle housing.
    NOTE:
    - Be very careful not to damage the oil seal.


WRE91-RS088

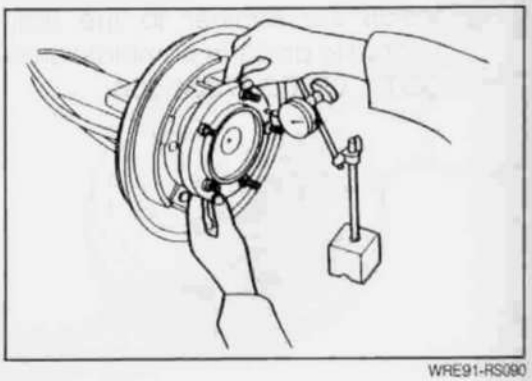
17. Install the backing plate to the rear axle in such a way that the attaching bolt of the backing plate is aligned with the attaching hole of the rear axle housing and that the wheel cylinder installing hole of the backing plate comes at the upper side.
    NOTE:
    (1) Turn the axle shaft so that the spline at the differential side may engage with the spline at the axle shaft side.
    (2) Do not apply impacts beyond the required extent to the bearing.

18. Attach the backing plate attaching nuts with spring washers interposed. Tighten them to the specified torque evenly over two or three stages.
    Tightening Torque: 39.2 - 53.9 N·m
    (4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)


WRE91-RS089

    NOTE:
    - Be sure to measure the rear axle shaft end play during the tightening. If the end play becomes zero before the torque reaches the specified torque, remove the rear axle shaft. Increase the shim thickness, compared with the shim installed at the step 15. Then, install the rear axle shaft again.

19. Adjustment of end play of rear axle shaft
    (1) Measure the end play of the rear axle shaft, using a dial gauge.
    End Play: 0.1 - 0.2 mm (0.0039 - 0.0079 inch)


WRE91-RS090

(2) Adjust the end play to 0.1 - 0.2 mm (0.0039 - 0.0079 inch) by increasing or decreasing the shim thickness. Install the shim in such a way that the cut end may come at the bottom.

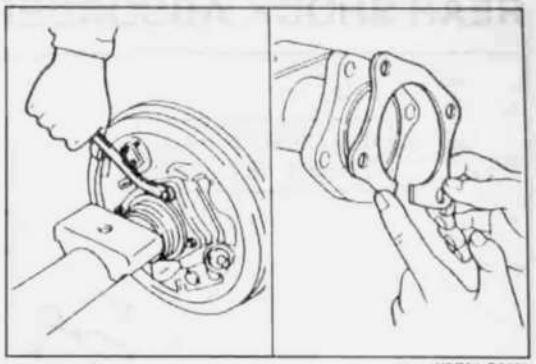
NOTE:

(1) Carry out the adjustment in such a way that the difference in thickness between the right and left shims may not exceed 1.0 mm (0.0039 inch).

(2) Special caution must be exercised to ensure that no scratch is made to the oil seal in the end housing while the rear axle shaft is being pulled out.

Kind of Shims:

1.0, 0.5, 0.2, 0.15, 0.1 mm
(0.039, 0.019, 0.008, 0.006, 0.004 inch)



WRE91-RS091

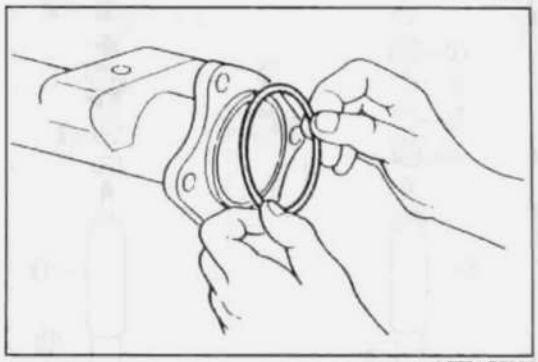
19. Pull out the rear axle shaft again. Install the "O" ring in the rear axle housing end.

NOTE:

(1) Be very careful not to scratch the "O" ring in the end housing.

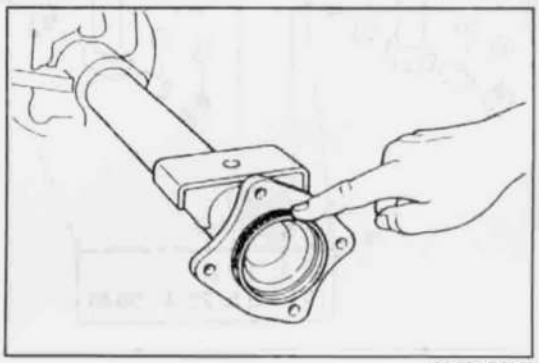
(2) Utmost attention must be paid so that the shim may not ride on the "O" ring or the "O" ring may not be installed in a tilted way in the spigot fitting section.

(3) Special caution must be exercised to ensure that no scratch is made to the oil seal in the rear axle housing while the rear axle shaft is being pulled out.



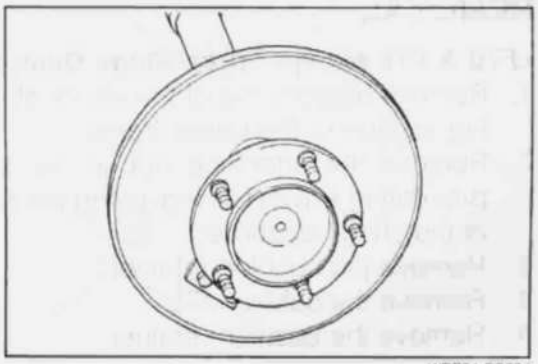
WRE91-RS092

20. Apply the Three Bond® (1270) sealer to the entire periphery of the spigot fitting section of the rear axle end.



WRE91-RS093

21. Install the rear axle shaft.
(See the step 16.)

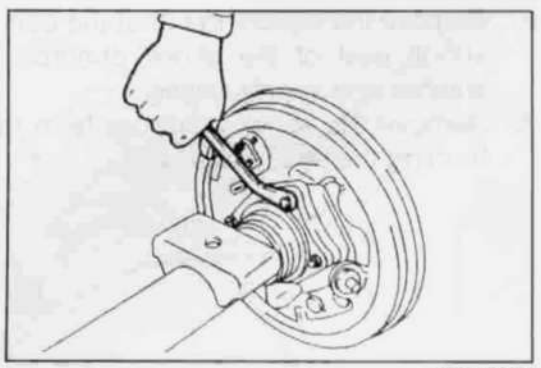


WRE91-RS094

22. Secure the bearing case to the rear axle housing end by means of the four attaching bolts with new spring washers interposed.

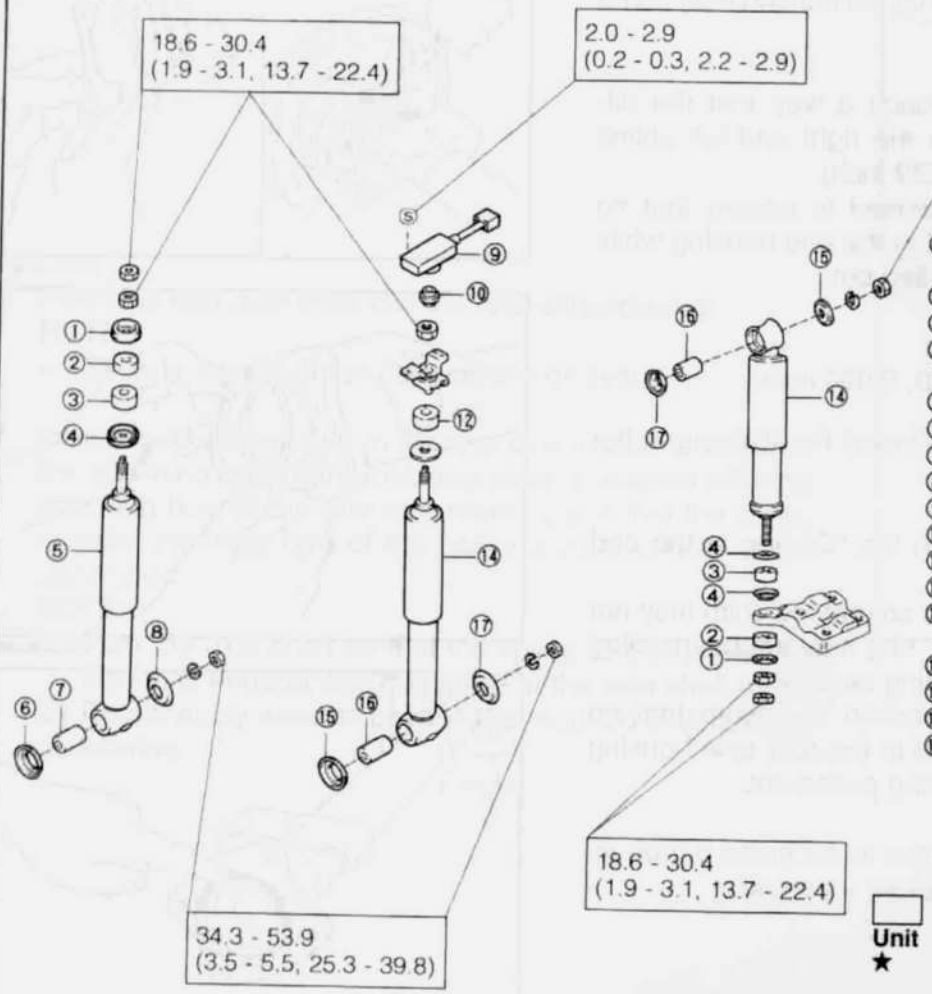
Tightening Torque: 39.2 - 53.9 N·m
(4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)

23. Install the rear brake.
(For details, see the Brake section.)



WRE91-RS095

REAR SHOCK ABSORBER



① Front & shock absorber cushion retainer
② Front shock absorber cushion
③ Front shock absorber cushion
④ Front shock absorber cushion retainer
⑤ Front shock absorber assembly
⑥ Front shock absorber washer No. 1
⑦ Front shock absorber bush
⑧ Front shock absorber washer No. 2
⑨ Absorber control actuator
⑩ Dust seal
⑪ Absorber control actuator bracket
⑫ Front shock absorber cushion
⑬ Front shock absorber cushion retainer
⑭ Front shock absorber assembly
⑮ Front shock absorber washer No. 1
⑯ Front shock absorber bush
⑰ Front shock absorber washer No. 2

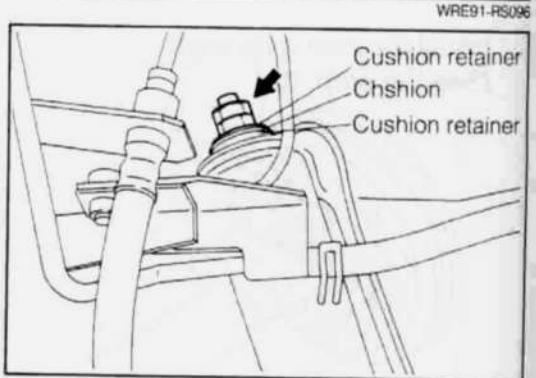
□ : **Tightening torque**
Unit : **N·m (kgf-m, ft-lb)**
★ : **Non-reusable part**

WRE91-RS096

REMOVAL

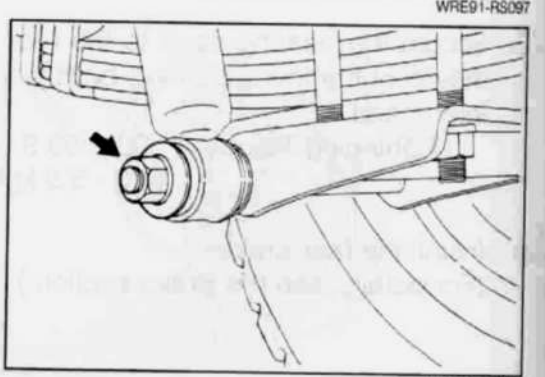
<F70 & F75 except Three-Stage Damper>

1. Remove the lock nut of the shock absorber at the connecting section of the upper frame.
2. Remove the attaching nut of the shock absorber, while preventing it from turning, using the section across two flats of the shock absorber.
3. Remove the cushion retainer.
4. Remove the cushion.
5. Remove the cushion retainer.



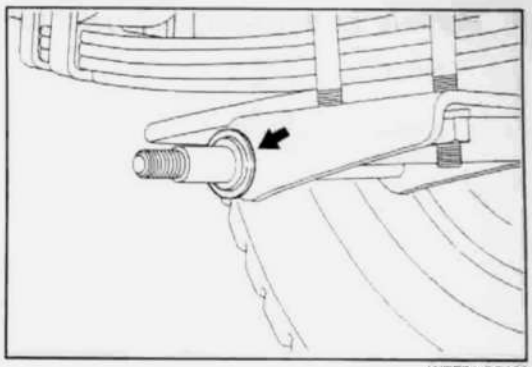
WRE91-RS097

6. Remove the attaching nut at the connecting section of the U-bolt seat of the shock absorber. Remove the plate washer and spring washer.
7. Remove the shock absorber from the vehicle, while contracting the shock absorber.



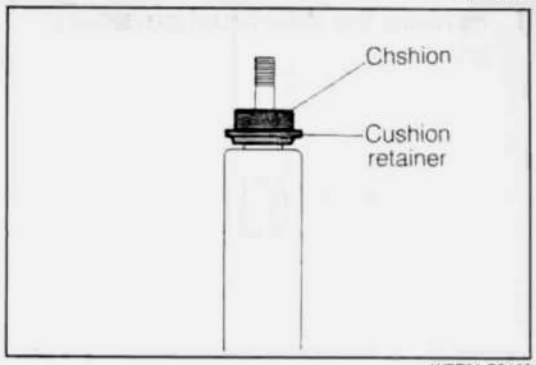
WRE91-RS098

8. Remove the plate washer from the U-bolt seat.
   NOTE:
   - It should be noted that this plate washer is different from the plate washer at the nut side.



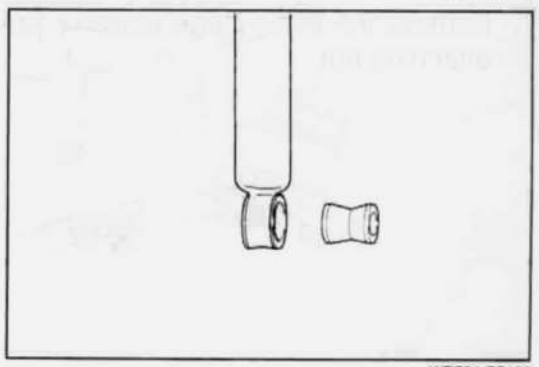
WRE91-RS099

9. Remove the cushion and cushion retainer from the removed shock absorber.



WRE91-RS100

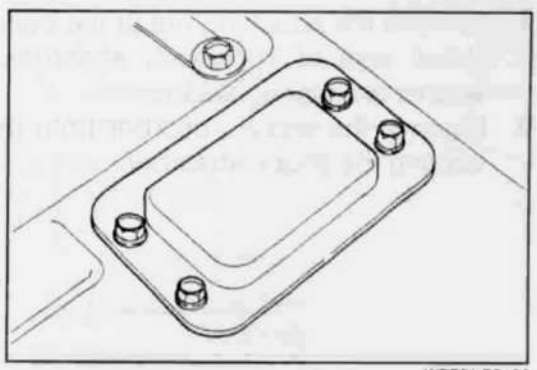
10. Remove the bush from the shock absorber.



WRE91-RS101

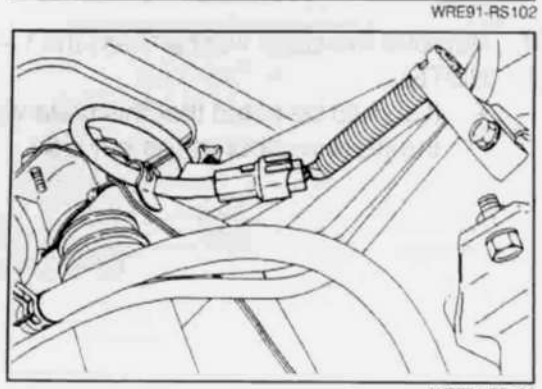
<F70 & F75 with Three-Stage Damper>

1. Raise the rear seat.
2. Remove the carpet.
3. Remove the service hole cover.



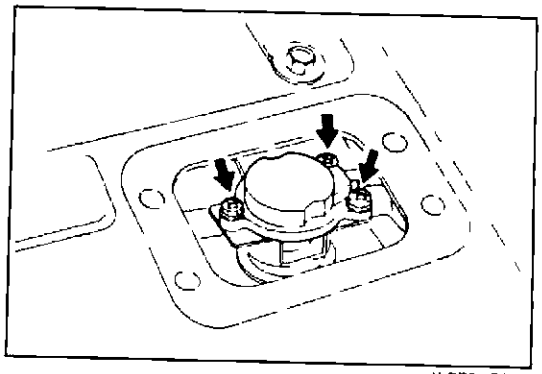
WRE91-RS102

4. Disconnect the connector of the three-stage actuator and remove it from the clamp.

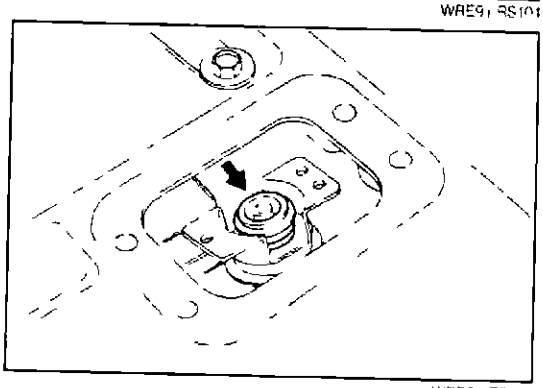


WRE91-RS103

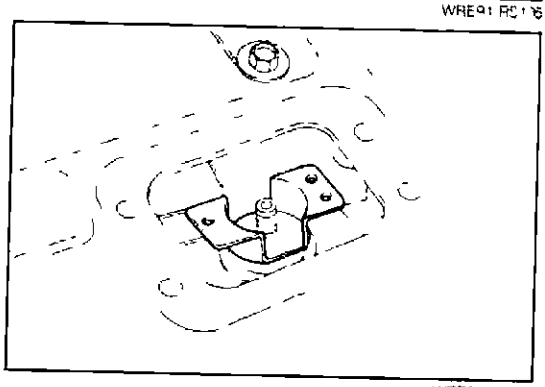
5 Remove the three-stage actuator form the bracket



6 Remove the dust-proof cover

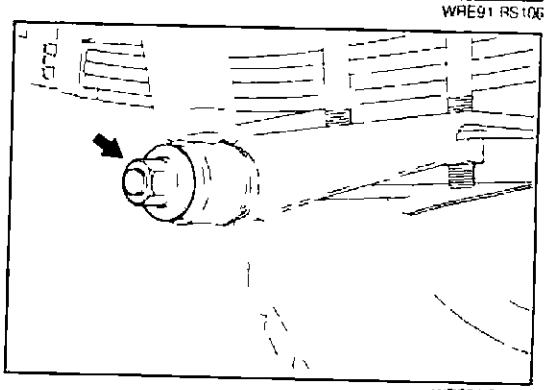


7 Remove the three-stage actuator bracket by removing the attaching nut



8 Remove the attaching nut at the connecting section of the U-bolt seat of the shock absorber. Remove the plate washer and spring washer

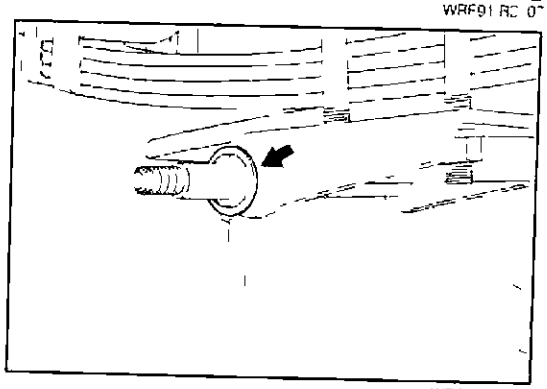
9 Remove the shock absorber from the vehicle while contracting the shock absorber



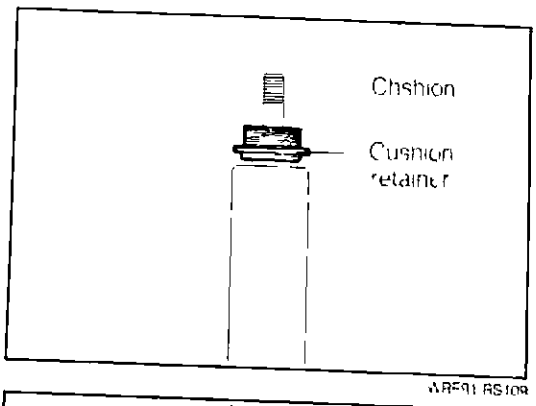
10 Remove the plate washer from the U-bolt seat

NOTE:

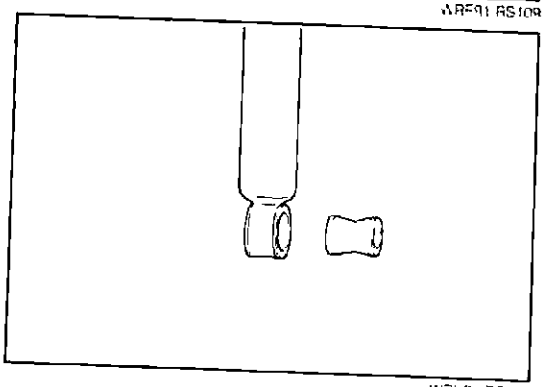
- It should be noted that this plate washer is different from the plate washer at the nut side.



11 Remove the cushion and cushion retainer from the removed shock absorber

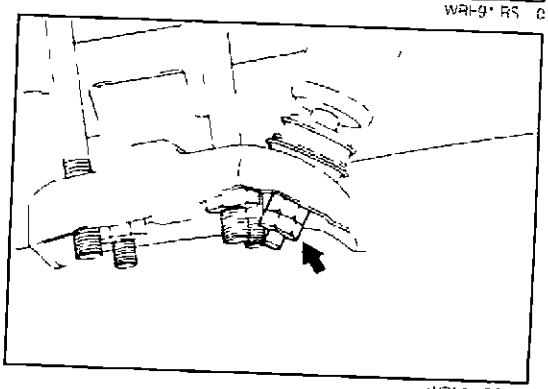


12 Remove the bush from the shock absorber

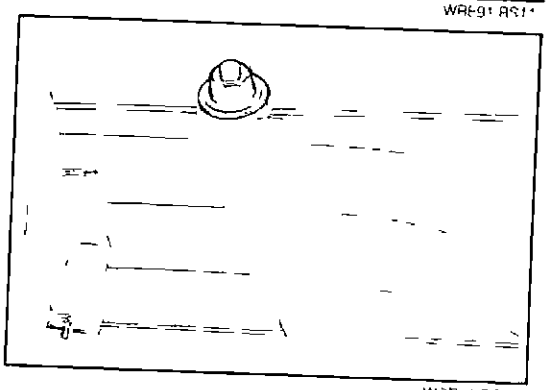


<F77 only>

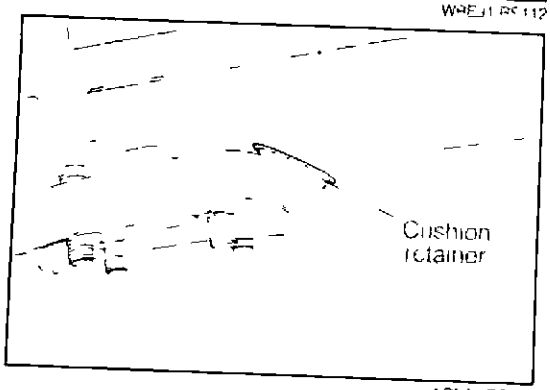
1 Remove the nut of the shock absorber at the connecting section of the upper frame Remove the plate washer and spring washer



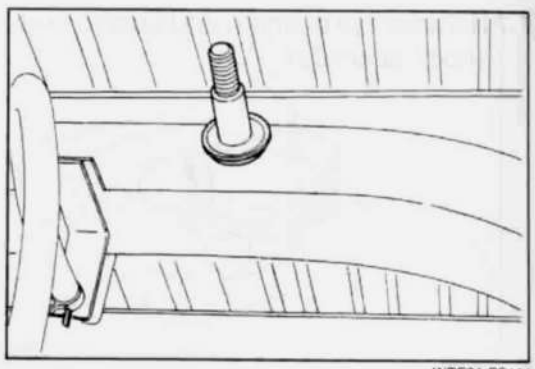
2 Remove the lock nut at the shock absorber connection section of the spring seat
3 Remove the attaching nut of the shock absorber, while preventing it from turning, using the section across two flats of the shock absorber
4 Remove the cushion retainer
5 Remove the cushion
6 Remove the shock absorber from the vehicle, while contracting the shock absorber



7 Remove the cushion retainer from the shock absorber installing section at the spring seat side

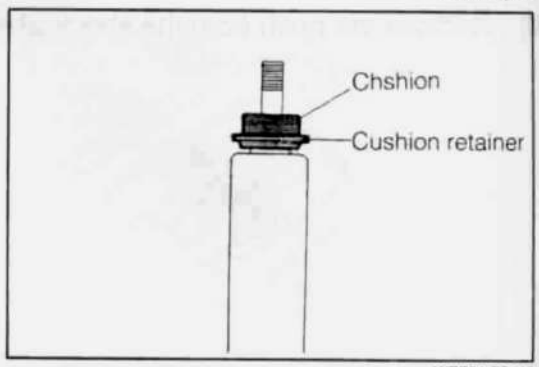


8. Remove the plate washer from the chassis.



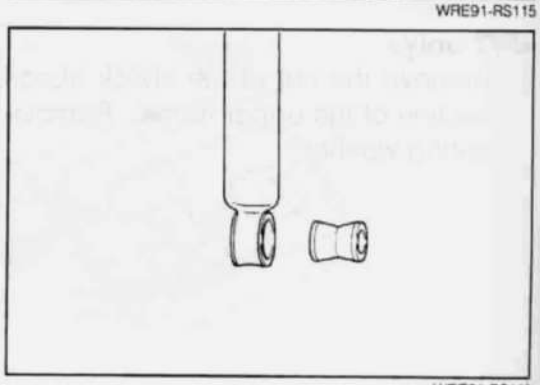
WRE91-RS114

9. Remove the cushion and cushion retainer from the removed shock absorber.



WRE91-RS115

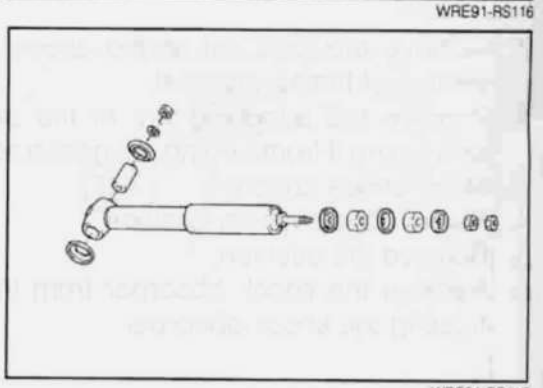
10. Remove the bush from the shock absorber.



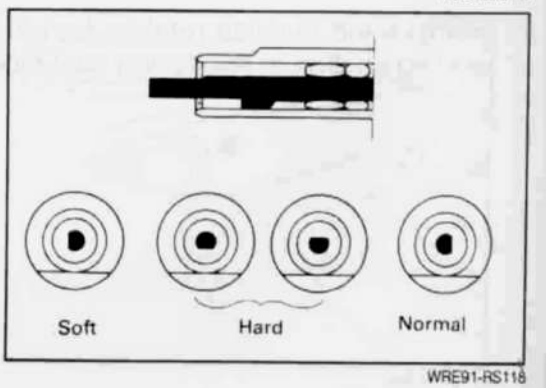
WRE91-RS116

INSPECTION

1. Check that the shock absorber exhibits no defect, such as deformation or oil leakage.
2. Check that the bushes, cushions and cushion retainers exhibit no damage, such as cracks, wear and deformation.
3. Check that the damping force is not abnormal.
4. Ensure that the rod provided on the upper side of the three-stage damper can be turned easily with pliers. (Three-stage damper only)
5. Check to see if damping force varies, when the rod is turned to such positions indicated in the right figure. (Three-stage damper only)



WRE91-RS117



WRE91-RS118

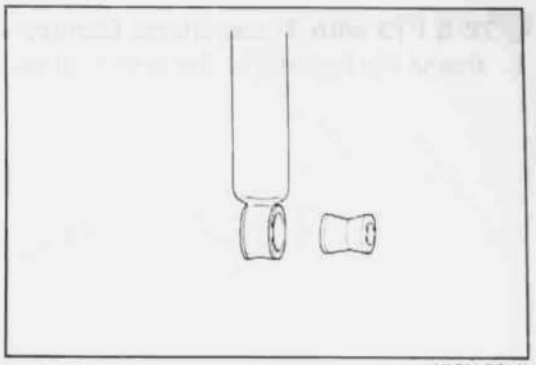
REFERENCE:

Selecting mode		Soft	Normal	Hard
Damping force kg Rebound/Compression [at a piston speed of 0.3m/s]	Front	118/28	140/41	182/55
	Rear	117/30	135/40	180/47

INSTALLATION

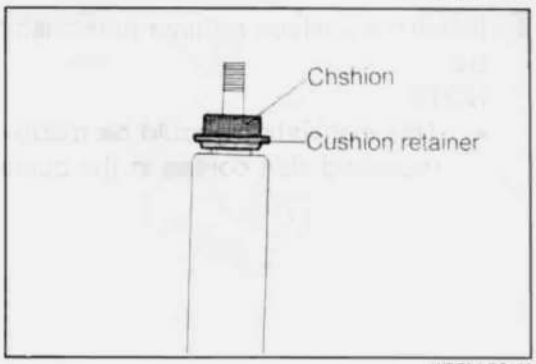
<F70 & F75 except Three-Stage Damper>

1. Install the bushes to the shock absorber.



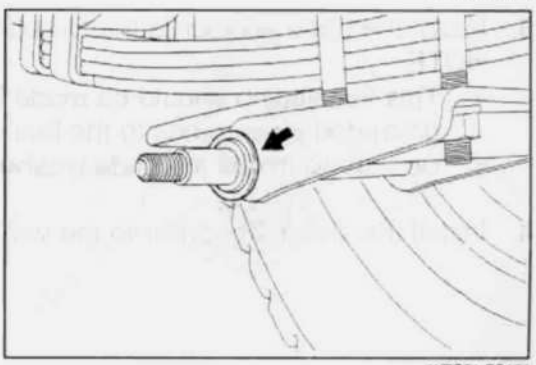
WRE91-RS119

2. Install the cushion retainer and cushion to the shock absorber.
   NOTE:
   - This installation should be made in such a way that the recessed side comes to the cushion side.



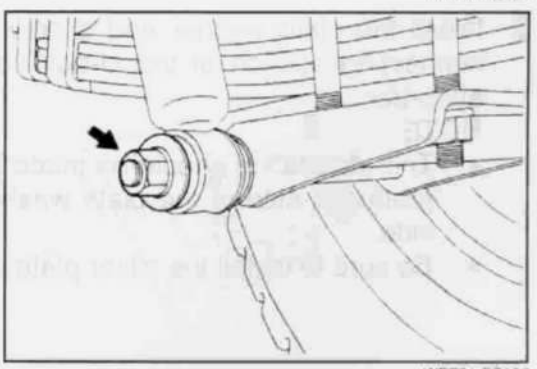
WRE91-RS120

3. Install the plate washer to the U-bolt seat in such a way that the protruded side of the plate washer comes to the bush side.
   NOTE:
   - It should be noted that this plate washer is different from the plate washer at the nut side.
4. Install the shock absorber to the vehicle, while contracting the shock absorber.



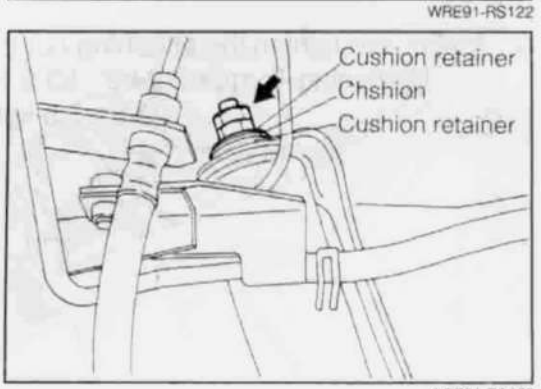
WRE91-RS121

5. Assemble the plate washer to the connecting section at the U-bolt seat side in such a way that the protruded side of the plate washer comes to the bush side.
6. Install and tighten the nut to the specified torque with a new spring washer interposed.
   Tightening Torque: 34.3 - 53.9 N·m
   (3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)



WRE91-RS122

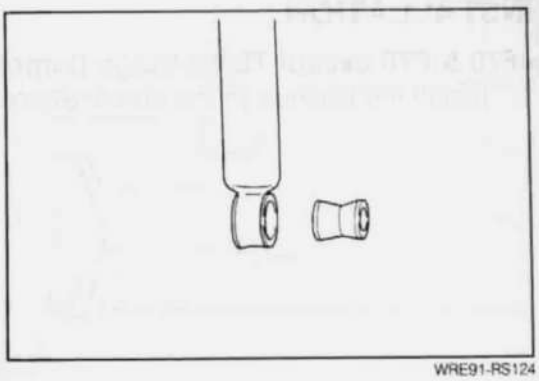
7. Install the cushion and cushion retainer to the shock absorber.
8. Tighten the attaching nut of the shock absorber to the specified torque, while preventing it from turning at the section across two flats of the shock absorber.
   Tightening Torque: 18.6 - 30.4 N·m
   (1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)
9. Tighten the lock nut to the specified torque.
   Tightening Torque: 318.6 - 30.4 N·m
   (1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)



WRE91-RS123

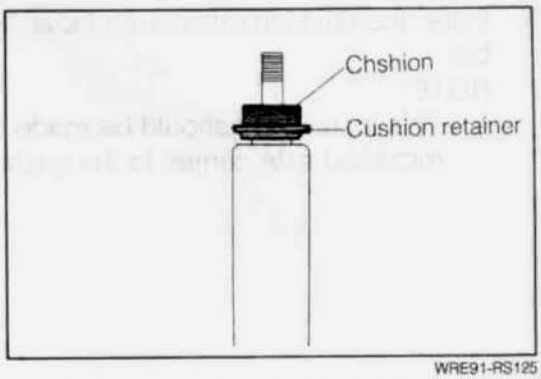
<F70 & F75 with Three-Stage Damper>

1. Install the bushes to the shock absorber.



WRE91-RS124

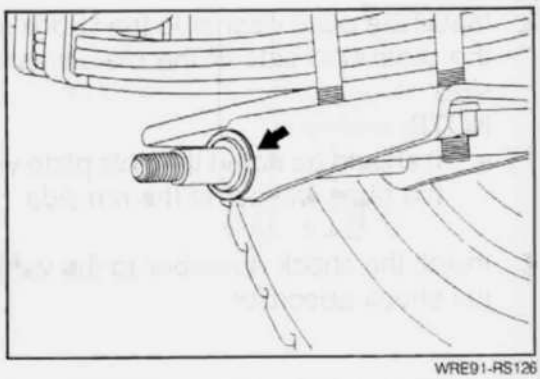
2. Install the cushion retainer and cushion to the shock absorber.
   NOTE:
   - This installation should be made in such a way that the recessed side comes to the cushion side.



WRE91-RS125

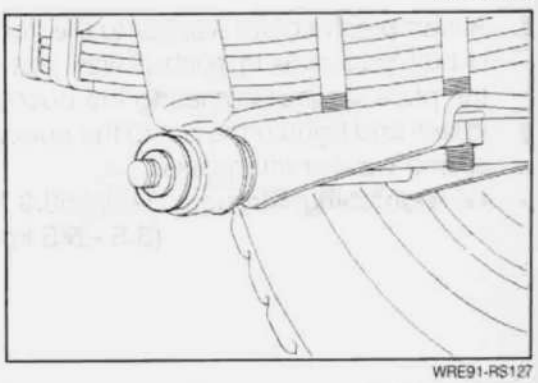
3. Install the plate washer to the U-bolt seat.
   NOTE:
   - This installation should be made in such a way that the protruded side comes to the bush side.
   - Be sure to install the plate washer with a yellowish tint.

4. Install the shock absorber to the vehicle.



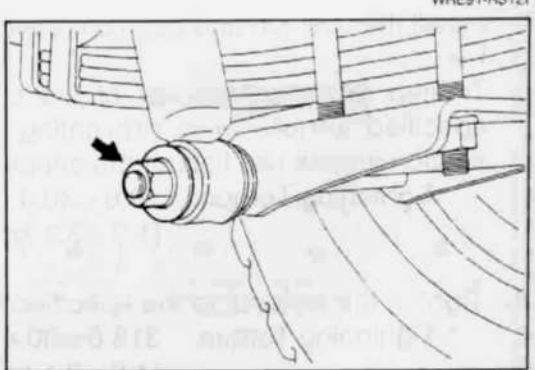
WRE91-RS126

5. Install the plate washer and a new spring washer to the connecting section at the U-bolt seat side of the shock absorber.
   NOTE:
   - This installation should be made in such a way that the protruded side of the plate washer comes to the bush side.
   - Be sure to install the silver plate washer.



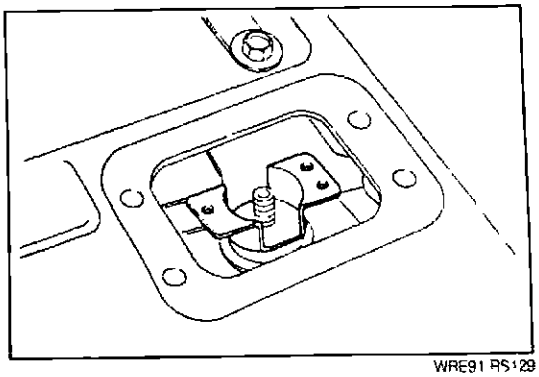
WRE91-RS127

6. Install and tighten the attaching nut to the specified torque.
   Tightening Torque: 34.3 - 53.9 N·m
   (3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)



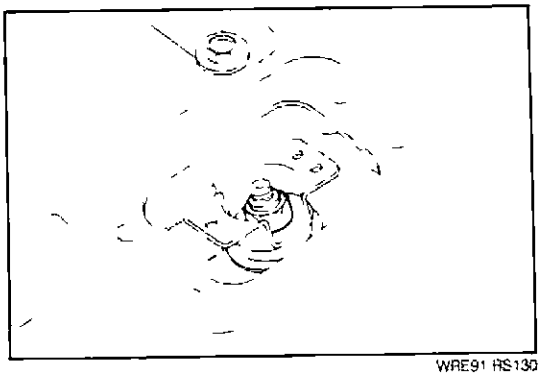
WRE91-RS128

7 Install the three-stage actuator bracket, while aligning the cutout section of the shock absorber with the cutout section of the three-stage actuator bracket

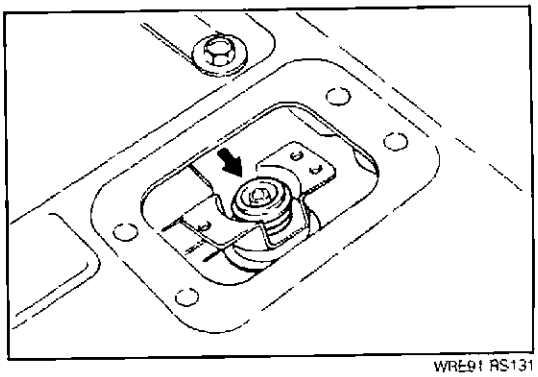

WRE91 RS129

8 Install the attaching nut of the three-stage actuator bracket and tighten the nut to the specified torque

Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)


WRE91 RS130

9 Install the dust-proof cover.

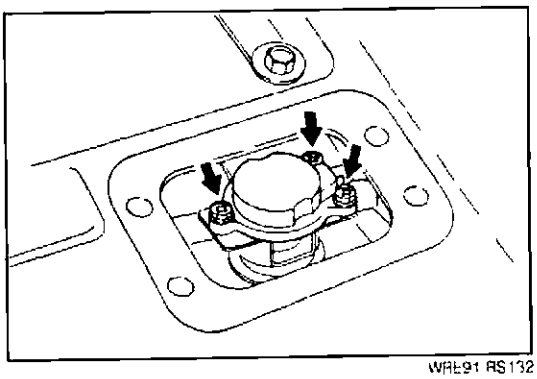

WRE91 RS131

10 Install the three-stage actuator to the bracket

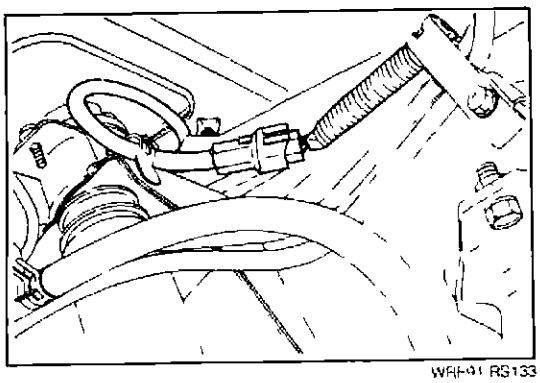
Tightening Torque: 2.0 - 2.9 N·m (0.2 - 0.3 kgf-m, 2.2 - 2.9 ft-lb)

NOTE:

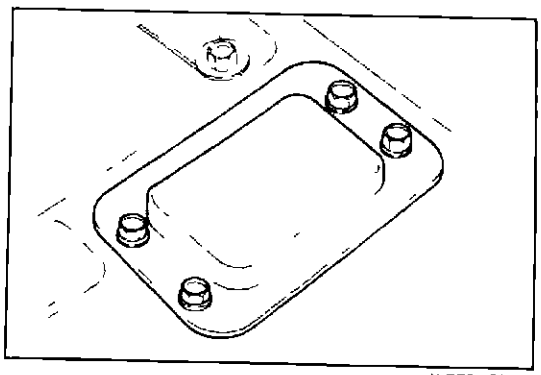
- **Be sure to align the cutout section of the actuator rotor with the cutout section of the three-stage damper rod during the assembly.**


WRE91 RS132

11. Connect the connector of the three-stage actuator and attach it to the clamp

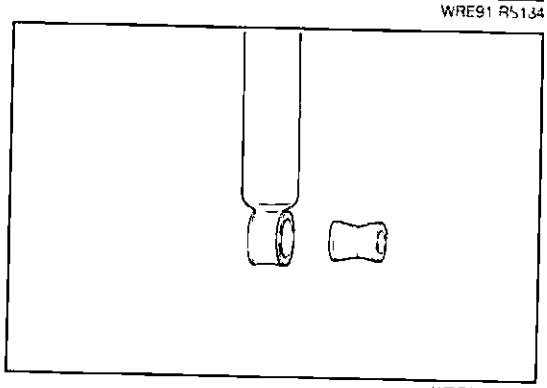

WRE91 RS133

12 Install the service hole cover
13 Install the carpet
14 Install the rear seat

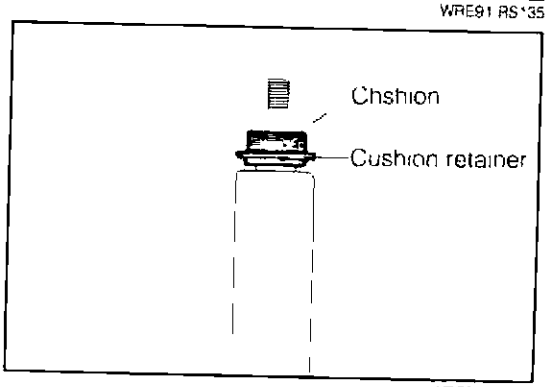

WRE91 RS134

F77 only

1 Install the bush to the shock absorber

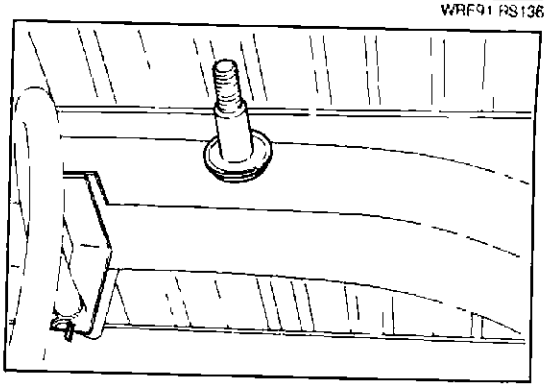

WRE91 RS135

2 Install the cushion retainer and cushion to the shock absorber
NOTE:
- This installation should be made in such a way that the recessed side of the cushion retainer comes to the cushion side.

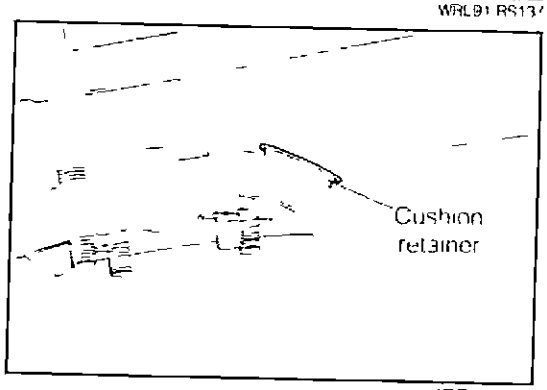


WRE91 RS136

3 Install the plate washer to the chassis side
NOTE:
- Be sure to install the plate washer with a yellowish tint.


WRE91 RS137

4 Install the spring seat to the shock absorber installing section at the spring seat side
5 Install the shock absorber to the vehicle, while contracting the shock absorber



WRE91 RS138

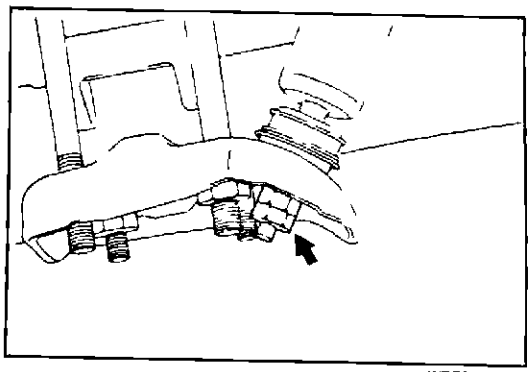
6 Install the cushion
7 Install the cushion retainer
NOTE:
- This installation should be made in such a way that the recessed side comes to the cushion side.

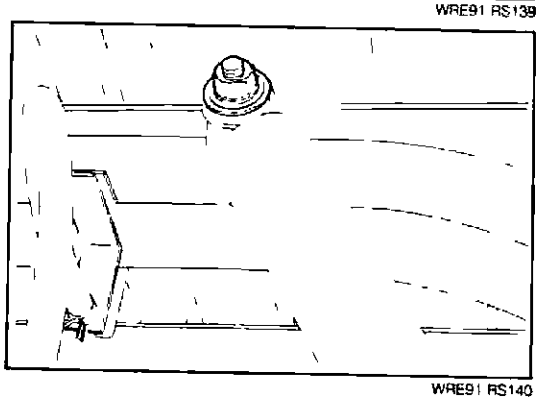
8 Tighten the attaching nut to the specified torque, while preventing it from turning at the section across two flats of the shock absorber
Tightening Torque: 18.6 - 30.4 N·m
(1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)

9. Install and tighten the lock nut to the specified torque.
Tightening Torque: 18.6 - 30.4 N·m
(1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)

10 Install the plate washer and a new spring washer to the shock absorber installing section of the upper frame
NOTE:
- This installation should be made in such a way that the protruded side of the plate washer comes to the bush side.
- Be sure to install the silver plate washer.

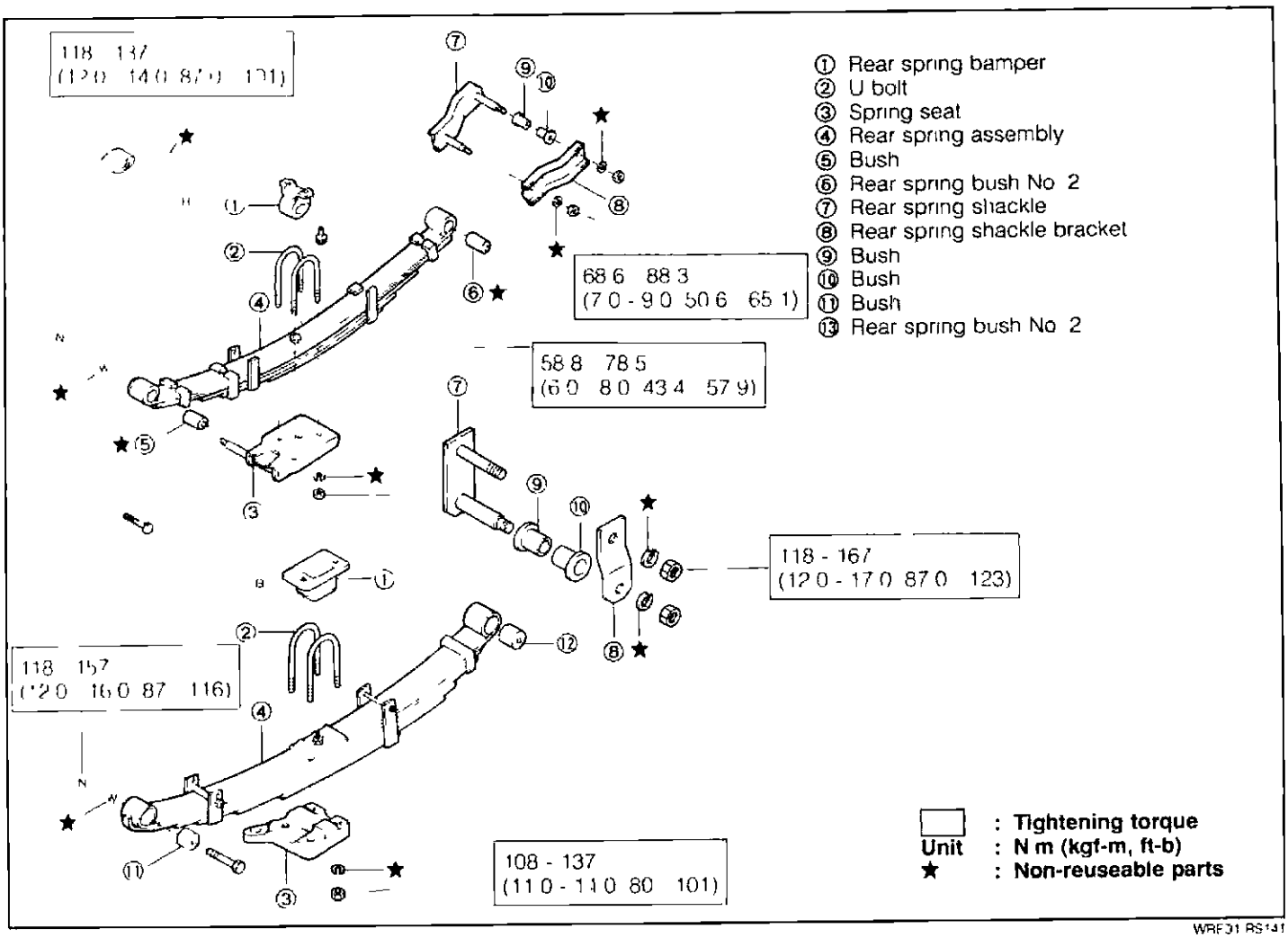
11 Install and tighten the attaching nut to the specified torque
Tightening Torque: 34.3 - 53.9 N·m
(3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)


WRE91 RS139


WRE91 RS140

REAR SPRING

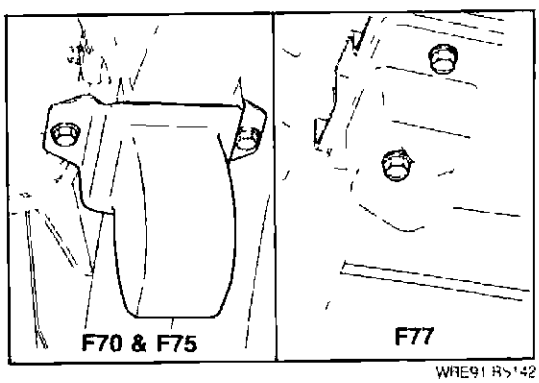
COMPONENTS



WRF91 RS141

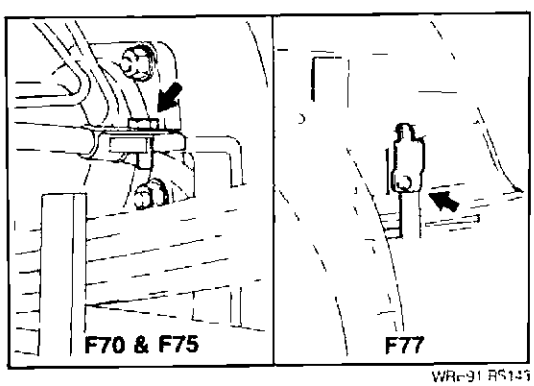
REMOVAL

1 Remove the shock absorber
(See page RS-24)
2 Remove the rear spring bumper



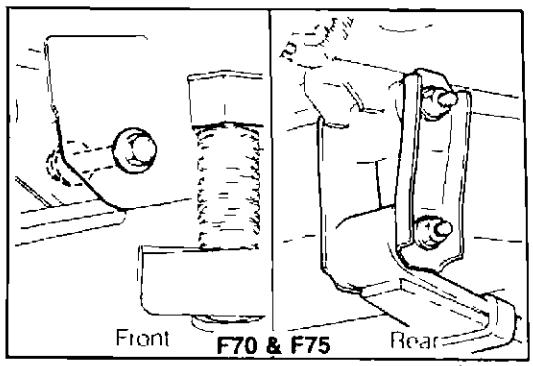
WRE91 RS142

3 Remove the parking brake cable clamp.

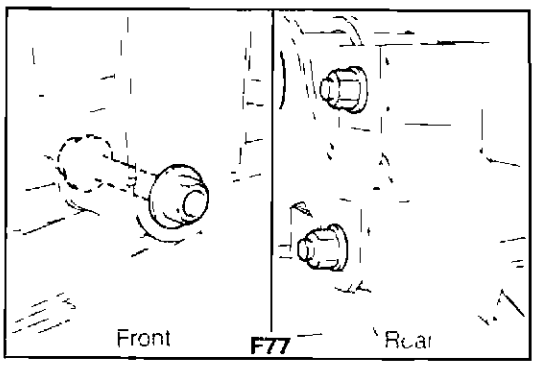


WRE91 RS143

4 Loosen the leaf spring attaching nuts
NOTE:
- This operation should be performed without jacking up the vehicle.

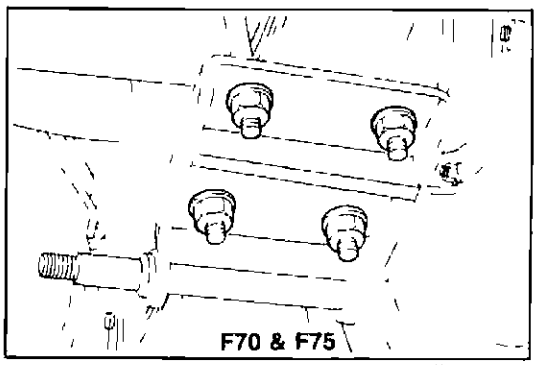


WRE91 RS144



WRE91 RS145

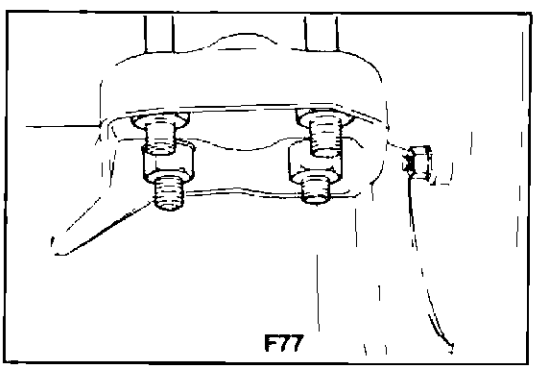
5 Jack up the vehicle and remove the U-bolt attaching nuts.
(F70 & F75 only)



WRE91 RS146

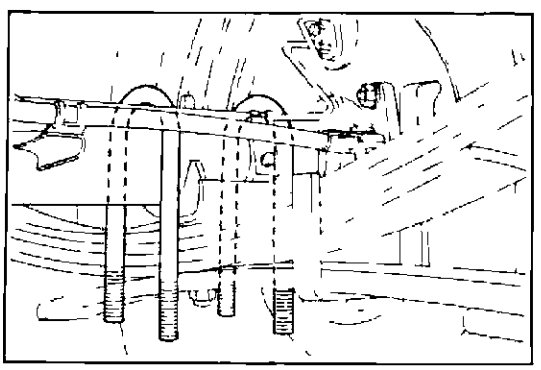
6 Jack up the vehicle once Then, jack down the vehicle, until the tires come in contact with the ground and the spring no longer supports the load of the rear axle shaft
(F77 only)
7 Remove the U-bolt attaching nuts
(F77 only)

WARNING:
- When loosening the nuts, make sure that the U-bolt supports no load.



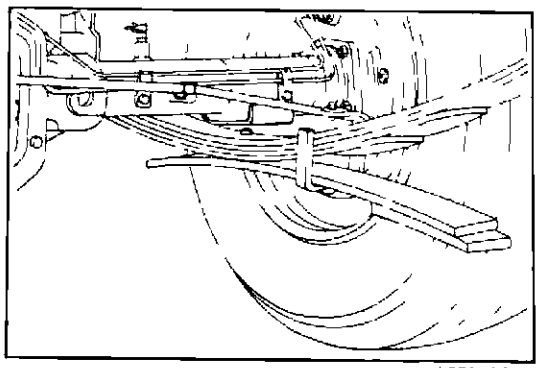
WRE91 RS147

8. Remove the U-bolt

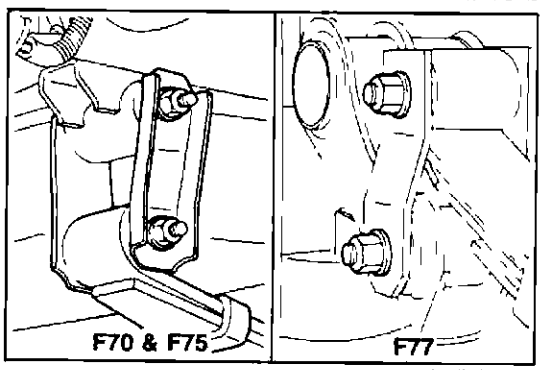

WRE91 RS148

9 Jack down the vehicle, until the rear axle housing clears from the spring
(F70 & F75 only)

10 Jack up the vehicle, until the rear axle housing clears from the spring
(F77 only)

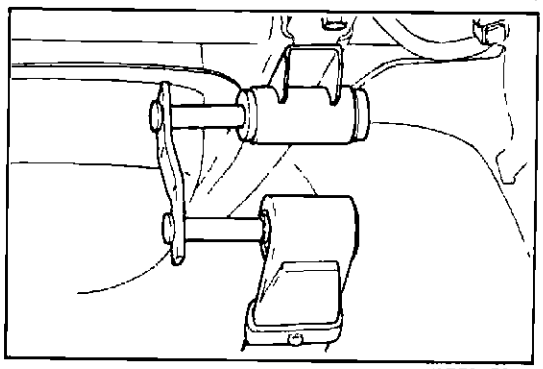

WRE91 RS149

11 Removal of rear spring shackle pin
(1) Remove the rear spring shackle attaching nuts
(2) Remove the shackle bracket

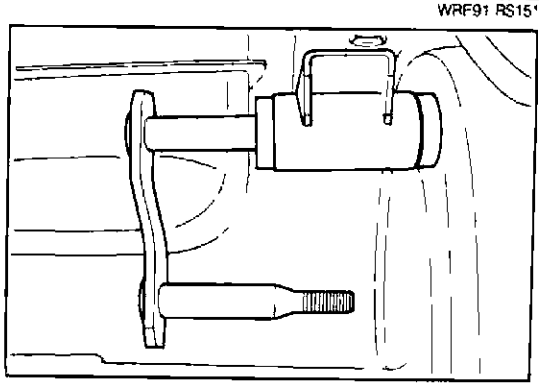


WRE91 RS150

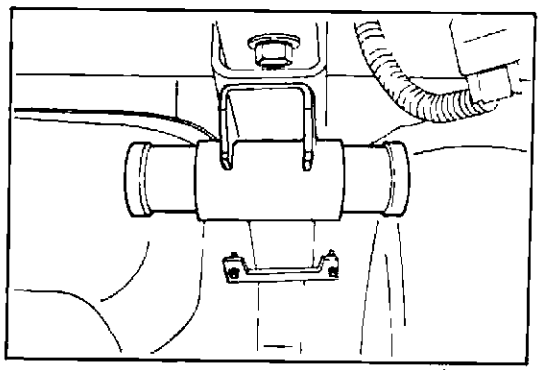
(3) Pull out the shackle pin about halfway by lightly tapping the shackle pin at its plate section by means of a plastic hammer or the like
(4) Remove the leaf spring from the shackle pin.


WRF91 RS151

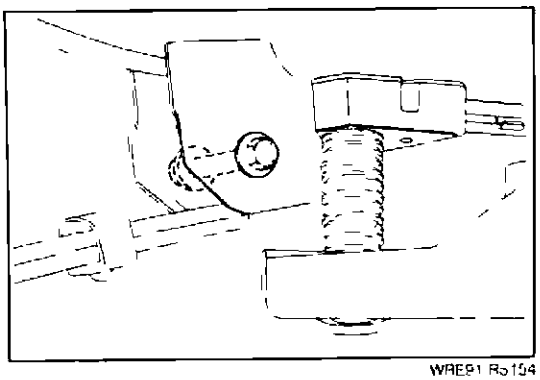
(5) Remove the shackle pin


WRE91 RS152

12. Remove the shackle pin bushes at the vehicle side from the frame
NOTE:
- As regards the shackle pin of the F77, remove the shackle pin after turning it 180 degrees.

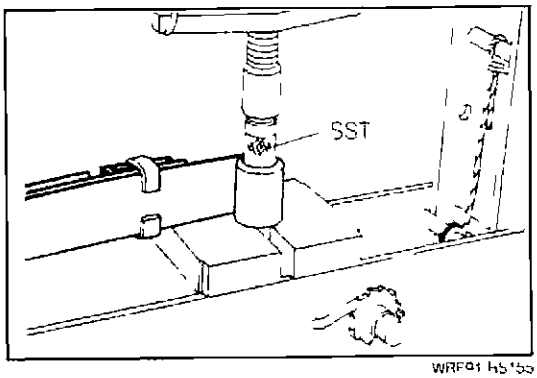

WRE91 RS153

13 Remove the spring attaching bolt and nut at the front side
Remove the spring from the vehicle
NOTE
- When removing the bolt, be very careful not to drop the leaf spring.


WRE91 RS154

14 Removal of rear spring bush and rear spring bush No 2
(1) Pull out the rear spring bush, using the following SST in combination with a hydraulic press
SST: 09608-87607-000

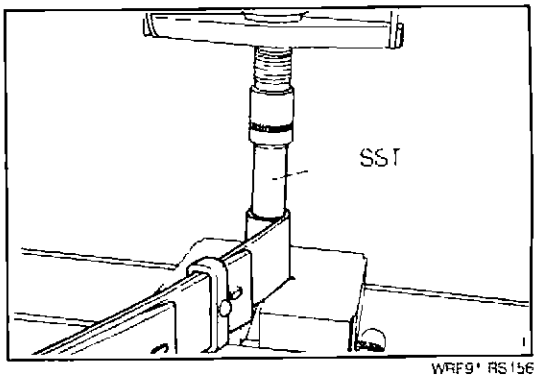
NOTE:
- Consideration should be taken at the receiver side so that the bush may be pulled downward.



WRE91 RS155

(2) Pull out the rear spring bush No.2, using the following SST in combination with a hydraulic press.
SST: 09608-87608-000

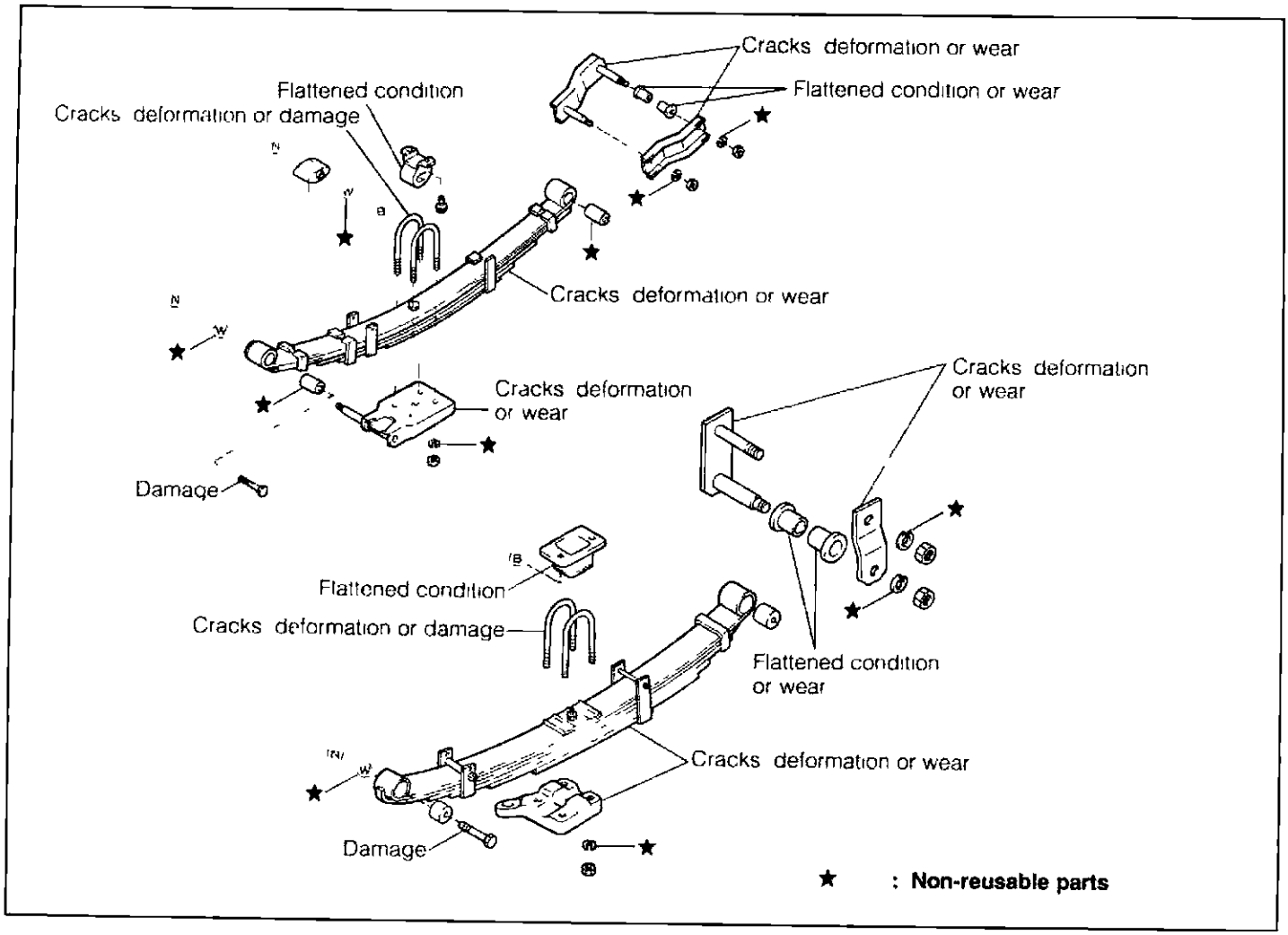
NOTE:
- Consideration should be taken at the receiver side so that the bush may be pulled downward.



WRE91 RS156

INSPECTION

1 Inspect each section in the figure below Replace any defective parts.

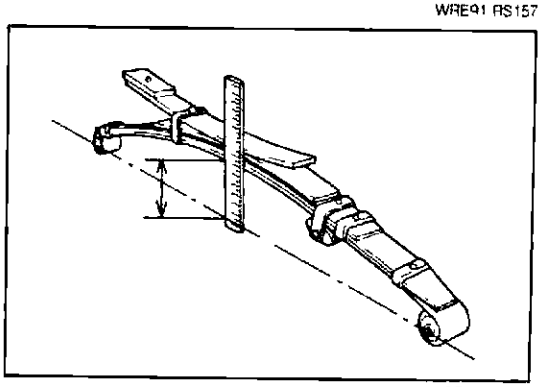


WRE91 RS157

2 Measure the height of the spring in order to determine whether the spring exhibits any flattened condition

Specified Height of Spring:

F70	Hard suspension	114 5 ±4 mm
F75 F75V F70V	Hard suspension	124 ±4 mm
F70 F70V F75 F75V	Soft suspension	128 ±4 mm
F77	Standard	180 5 ±4 mm

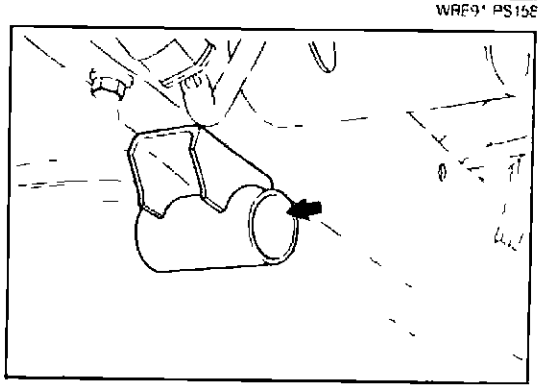


WRE91 RS158

NOTE:

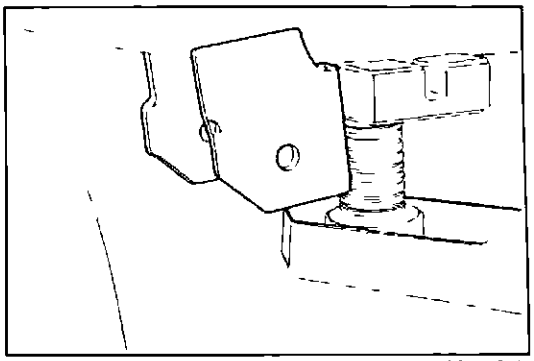
- The figure above represents the distance of the vertical portion of a line which is drawn vertically and downward from the surface of the leaf spring at the center bolt attaching section of No. 1 leaf spring, until it intersects with a line connecting centers of the spring bushes at both ends of No. 1 leaf spring.

3 Ensure that the bush installing section of the chassis exhibits no damage



WRE91 RS159

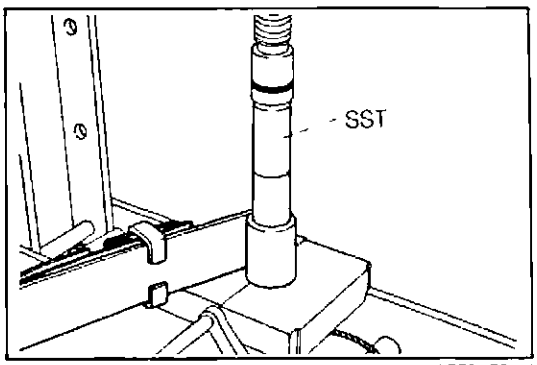
4 Ensure that the spring installing section of the chassis exhibits no damage


WRE91 RS160

INSTALLATION

1 Installation of rear spring bushes
(1) Press the rear spring bush into the rear spring with the following SST in combination with a press.
SST: 09608-87607-000

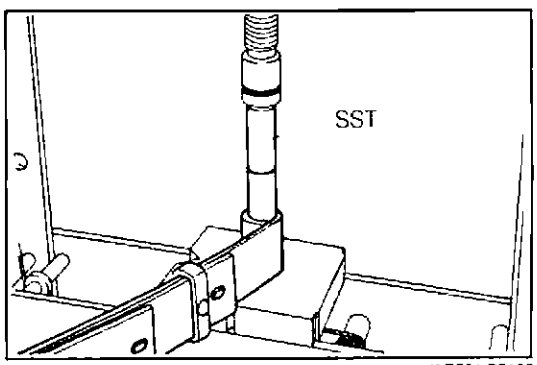
NOTE:
- Be sure to press the bush up to the edge surface of the spring.
- For this operation, use a press stand having a hole so that no interference with the inner bush may occur.



WRE91 RS161

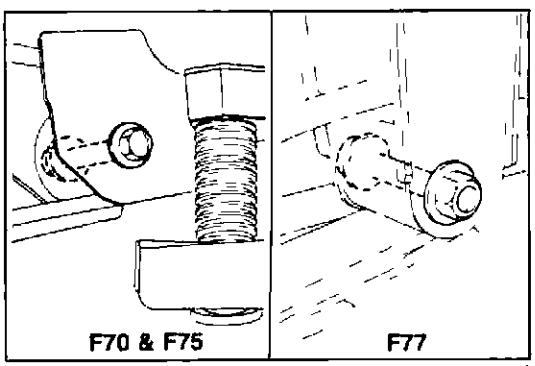
(2) Press the rear spring bush No 2 into the rear spring with the following SST in combination with a press
SST: 09608-87608-000

NOTE:
- Be sure to press the bush up to the edge surface of the spring.
- For this operation, use a press stand having a hole so that no interference with the inner bush may occur.



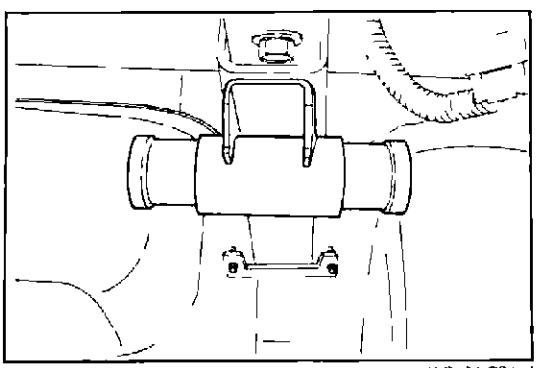
WRE91 RS162

2 Connect the front installing section of the rear spring Temporarily install the attaching bolt and nut.



WRE91 RS163

3 Install the shackle pin bushes to the frame
NOTE:
- If any difficulty is encountered, apply a thin film of SUNPER" 150 to the bushes.


WRE91 RS164

DAIHATSU

F70,F75,F77

Service manual

STARTING SYSTEM

ST

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

STARTING SYSTEM

STARTER MOTOR ..... **ST– 2**
1. COMPONENTS ..... **ST– 2**
2. STARTING SYSTEM CIRCUIT ..... **ST– 4**
3. TROUBLE SHOOTING ..... **ST– 5**
4. DESCRIPTION ..... **ST– 5**
5. SERVICING INSTRUCTIONS OF STARTER ..... **ST– 7**
6. IN-VEHICLE INSPECTION ..... **ST– 7**
7. REMOVAL ..... **ST– 7**
8. UNIT CHECK OF STARTER MOTOR ASSEMBLY ..... **ST– 8**
9. DISASSEMBLY **ST–10**
10. INSPECTION **ST–12**
11. ASSEMBLY **ST–18**

STARTER RELAY **ST–21**

PRE-HEATING SYSTEM **ST–22**
1. SYSTEM OUTLINE **ST–22**
2. SYSTEM CIRCUIT **ST–22**
3. TROUBLE SHOOTING **ST–23**
4. DIESEL ELECTRICAL SYSTEM DIAGNOSIS **ST–24**

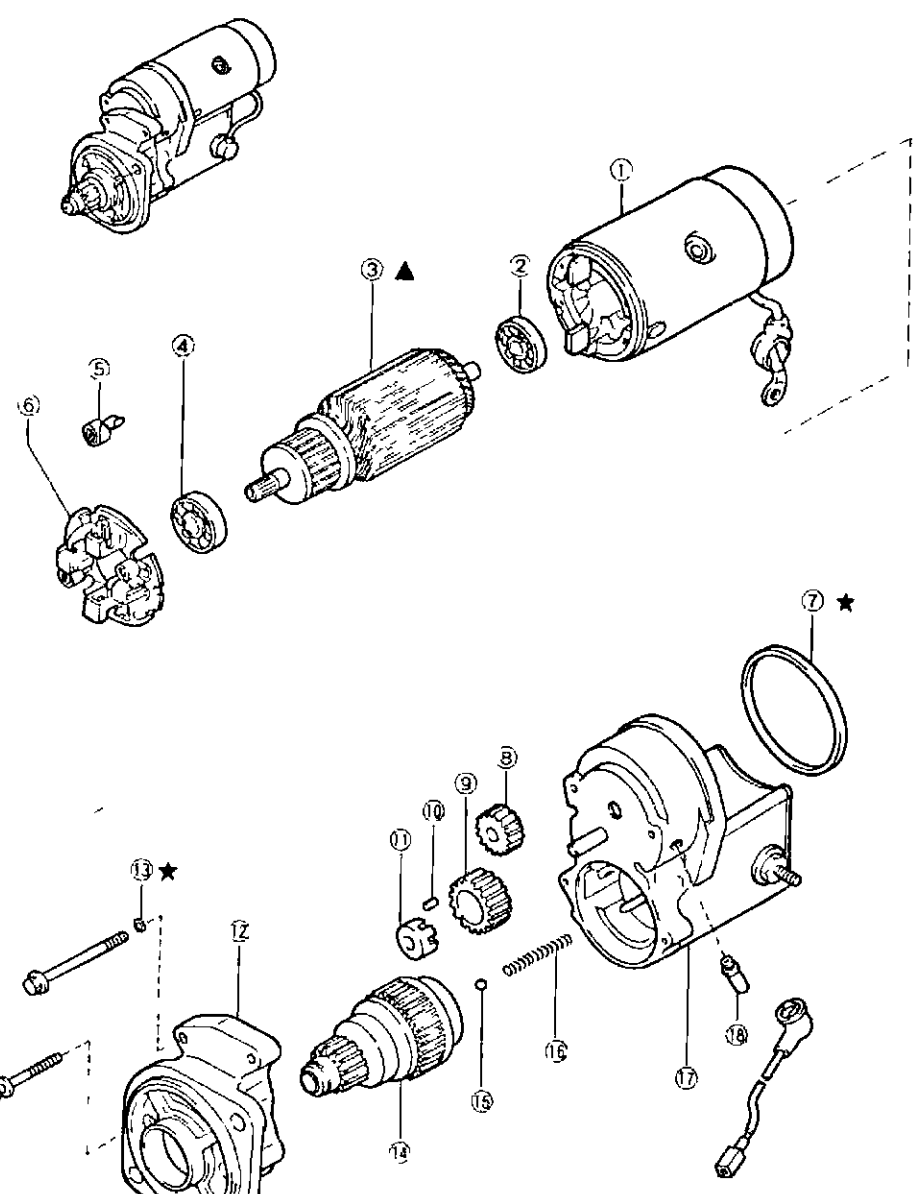
WRE91-ST001

STARTER MOTOR

1. COMPONENTS

The starter consists of a solenoid switch and a motor The power generated at the motor is transmitted to the clutch assembly through the idle gear The rotation speed is reduced in accordance with the gear ratio between the drive gear provided at the motor and the clutch gear On the other hand, the torque of the rotation increases

2.2 kW



① Starter yoke
② Bearing
③ Armature
④ Bearing
⑤ Spring
⑥ Brush holder
⑦ O ring
⑧ Drive gear
⑨ Idle gear
⑩ Roller
⑪ Retainer
⑫ Drive housing
⑬ O ring
⑭ Clutch
⑮ Ball
⑯ Spring
⑰ Magnet switch assy
⑱ Bush

★ : **Non-reusable parts**
▲ : **Asbestos parts**

WRE01 ST002

3. TROUBLE SHOOTING

Problem	Possible cause	Remedies
Engine will not crank	Battery not fully charged	Check specific gravity of battery electrolyte Charge or replace battery
	Battery cables loose corroded or worn	Repair or replace cables
	Starter relay faulty	Replace starter relay
	Fusible link blown	Replace fusible link
	Starter faulty	Repair starter
	Ignition switch faulty	Replace ignition switch
	Clutch switch faulty	Replace clutch switch
Engine cranks slowly	Battery not fully charged	Check specific gravity of battery electrolyte Charge or replace battery
	Battery cables loose corroded or worn	Repair or replace cables
	Starter faulty	Repair starter
Starter keeps running	Starter faulty	Repair starter
	Ignition switch faulty	Replace ignition switch
	Short in wiring	Repair or replace wiring
Starter spins Engine will not crank	Pinion gear teeth broken or faulty starter	Repair starter
	Flywheel teeth broken	Replace flywheel

WHE91-ST005

4. DESCRIPTION

Principles of operation & starting system circuit

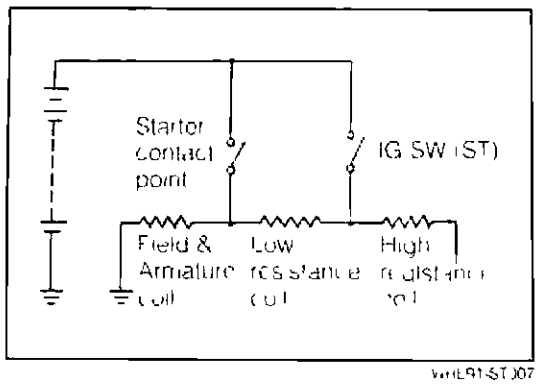
The starter operations can be divided into two stages
When the ignition switch is set to the start (ST) position, current from the battery flows to the motor through the solenoid Then, the motor begins to rotate Simultaneously, the solenoid pushes the shift fork forward thereby moving the motor pinion gear forward into mesh with the ring gear

When the pinion gear has shifted into a complete mesh with the ring gear, the solenoid contact points are closed The current from the battery now directly goes to the motor, thus supplying high power enough for cranking the engine In this way, the starter motor begins cranking the engine

The solenoid is composed of two coils One is a low-resistance coil which moves the shift fork The other is a high- resistance coil which retains the solenoid at the "start" position
The low-resistance coil is connected to the battery ground through the motor brush (and armature coil) and field coil The high-resistance coil is directly grounded to the solenoid case

WHE91-ST006

During the engine cranking, the solenoid is energized at the high-resistance coil alone Since the low-resistance coil has the same potential at its both ends, no current flows Consequently, the solenoid is retained at the "start" position by means of the high-resistance coil only The right figure shows an equivalent circuit of the system



WHE91-ST007

During the starting period, the low-resistance coil provides the solenoid with a large amount of current to move the shift fork. Afterward, however, it is no longer necessary to use a large amount of current to hold the solenoid. Therefore, the above-described circuit has been employed for the starting system so that no burning takes place.

The plunger of the solenoid has two functions. One is to move the shift fork and the other is to close the electric contact points which is simultaneous with the first function. For positive contact, the contact points are connected to the plunger through a spring.

When the ignition switch is set to the start (ST) position, current from the battery goes to the low-resistance coil and the field and armature coils. As a result, the motor starts rotating. Simultaneously, the high-resistance coil is also energized. These two coils exert drawing force on the plunger, thus making the plunger overcome the force of a spring (a spring which is provided to return the plunger and differs from the aforesaid spring provided at the contact points). The plunger then moves the shift fork strongly and brings the pinion gear into mesh with the ring gear. Simultaneously, the starter contact points are closed and current is directly drawn from the battery. At this stage, the low-resistance coil has an equal potential at its both ends as previously described. Hence, no current flows to the motor through the low-resistance coil.
After the engine has started, when the ignition switch is returned to the IG position, current to the solenoid is cut off (NOTE). The spring built in the solenoid returns the plunger, thereby opening the contact points and cutting the current to the motor. At the same time, the shift fork which has been pushing the pinion gear is returned to the original position by means of the aforesaid spring force. Consequently, the pinion gear is disengaged and separated from the ring gear.

This pinion gear's separation from the ring gear can not be performed positively and assuredly by the spring at the shift fork alone. To achieve positive separation, screw-shaped spline is provided between the motor shaft and the pinion gear. After start of the engine, the rotation speed of the ring gear continues to increase. Consequently, it becomes possible for the ring gear to drive the pinion gear. At this point, owing to the screw-shaped spline, the pinion gear is moved in such a direction that it tends to disengage from the ring gear. On the other hand, this screw-shaped spline helps the pinion gear to be pushed and moved into mesh with the ring gear during the starting period.

NOTE:

- In fact, at this moment, the current to the solenoid goes to the starter contact points and passes in series through the low-resistance coil and the high-resistance coil. Consequently, electromagnet function continues and drawing forces are generated. However, the electromagnetic forces generated at the low-resistance and high-resistance coils counteract, for the winding direction of the coil is opposite to each other. As a result, no drawing force is produced.
- On the other hand, when the ignition switch is set to the ON (ST/ON) position, a parallel circuit is formed. The electromagnetic forces generated at both coils are in the same direction, resulting in an increased drawing force.
- Namely, the direction of the current at the low-resistance coil changes reversely when the ignition switch is switched between the ON and OFF states. (This explanation applies only to the instance when the ignition switch is changed from the ST position to the IG position.)

5. SERVICING INSTRUCTIONS OF STARTER

(1) When connecting the starter terminal or battery terminal perform positive tightening so as to avoid poor connection If poor connection should exist, it presents the hazard of serious danger that a large amount of current flowing during starter operation can overheat the poor connection

(2) When removing the starter first disconnect the negative ⊖ terminal of the battery Then, disconnect the terminals (+B ST) at the starter side Since the battery voltage is always applied to the starter +B terminal, failure to observe this removing sequence may lead to battery short, which is extremely dangerous

(3) When installing the starter, install the starter in the clutch housing positively and be sure to tighten the attaching bolts to the specified torque Improper installation can cause premature wear of the teeth of the pinion gear or ring gear and also can cause breakage of the clutch housing

6. IN-VEHICLE INSPECTION

(1) Place the shift lever to the neutral position Apply the parking brake lever

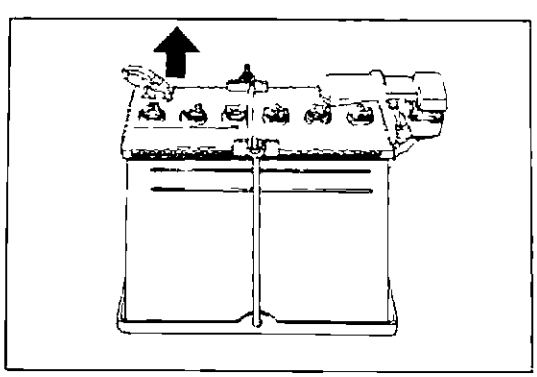
(2) Set the ignition switch to the ST position Check to see if the engine cranks

(3) If the engine will not crank perform the following checks
- Inspect the battery for damage Charge the battery
- Perform harness continuity test
- Perform the clutch switch check See page ST-oo

(4) If the starter motor still will not rotate even after the checks above have been performed, remove the starter motor and perform the unit check

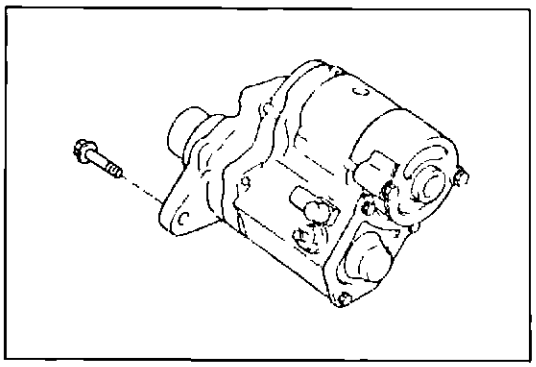
7. REMOVAL

(1) Disconnect the ground cable terminal from the negative (–) terminal of the battery



(2) Jack up the vehicle and support it with safety stands

(3) Disconnect the starter terminals ST and B from the starter
(4) Remove the starter motor from the clutch housing.

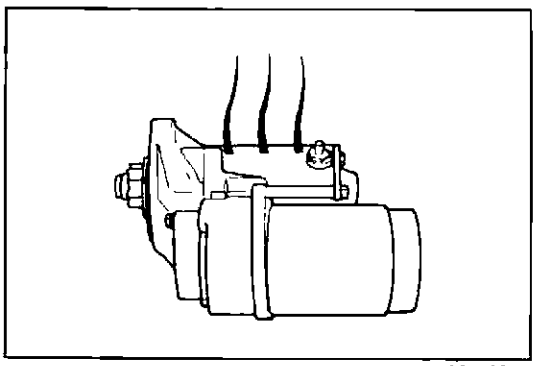


WRE91 ST 014

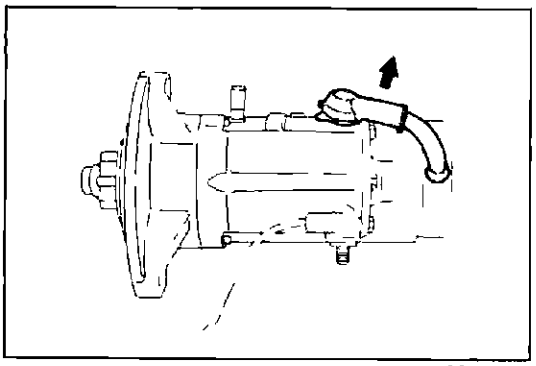
8. UNIT CHECK OF STARTER MOTOR ASSEMBLY

CAUTION:

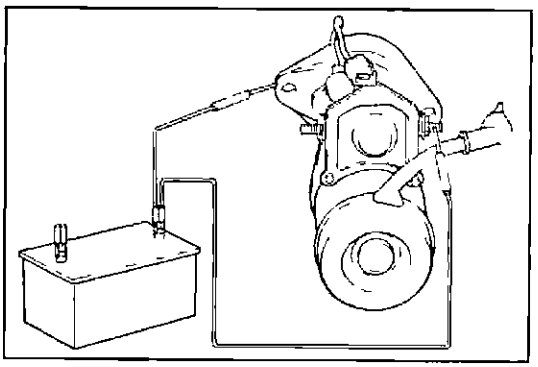
- Each of the following tests must be performed within three to five seconds. If you fail to observe this caution and the starter is energized for more than this duration, the coil may be burnt out.



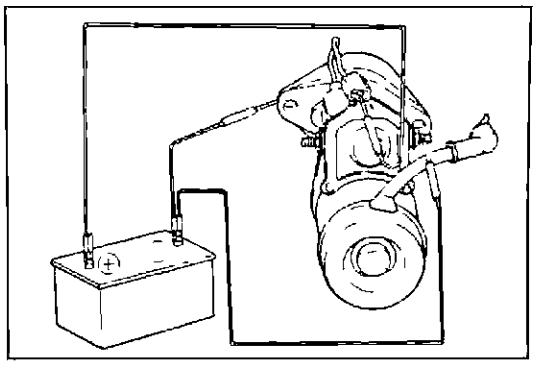
(1) Pull-in Test
① Disconnect the lead wire from the magnetic switch terminal



② Connect the negative (–) terminal of the battery to the starter body and magnetic switch terminal



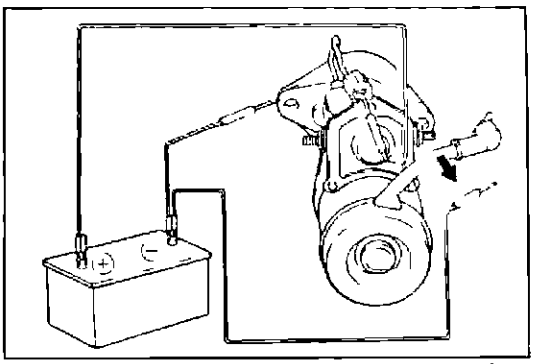
③ Connect the positive (+) terminal to the terminal ST. Ensure that the pinion is pushed outward. If the drive pinion fails to move out, replace the magnetic switch.



(2) Hold-in Test

After the check has been performed following the same procedure as with the pull-in test, disconnect the negative terminal of the magnetic switch terminal. Ensure that the drive pinion is held in a pushed-out state.

If the drive pinion fails to be held, replace the magnetic switch.



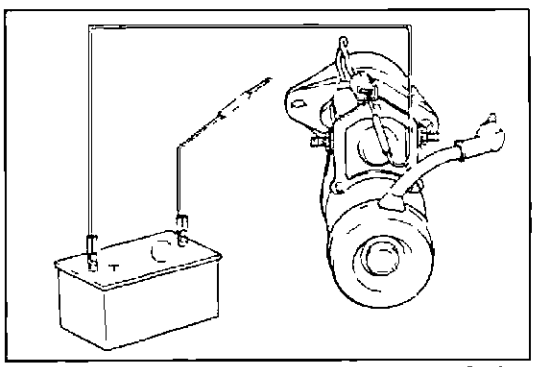
(3) Inspection of Plunger Return

After the check has been performed following the same procedure as with the hold-in test, disconnect the ground terminal of the starter body. Ensure that the drive pinion is drawn into the drive housing.

If the drive pinion fails to be drawn into the drive housing, replace the clutch assembly and return spring.

NOTE

- Connect the lead wire to the magnetic switch terminal after inspection is carried out.

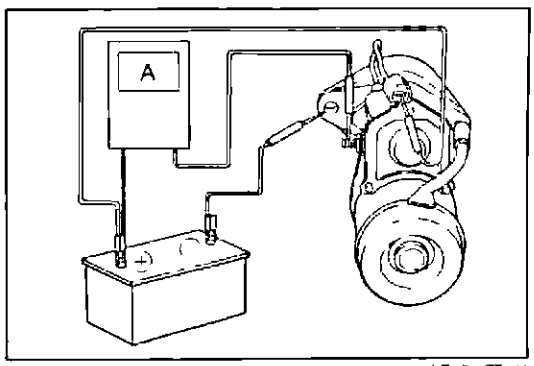


(4) No-load Performance Test

Connect the battery and an ammeter to the starter as shown in the right figure. Ensure that the starter rotates smoothly with the pinion moving out.

Measure the current the starter is drawing:

Specified Current: Less than 120A at 11.5V (2.2 kW)
Less than 170A at 11.5V (2.5 kW)

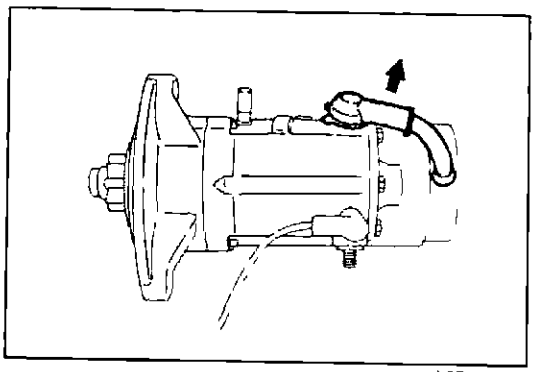


NOTE.

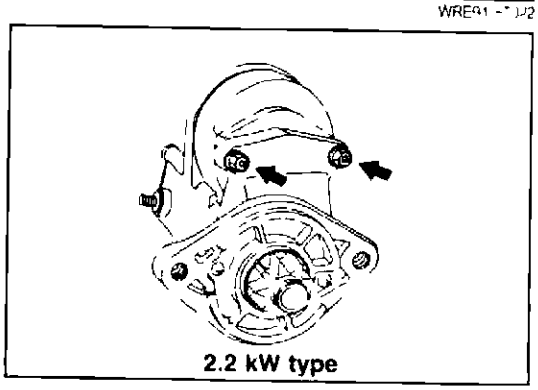
- Prior to the test, be sure to connect the lead wire to the magnetic switch.

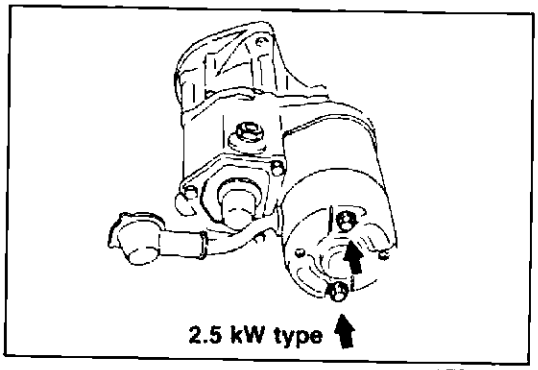
9. DISASSEMBLY

(1) Disconnect the lead wire from the magnetic switch

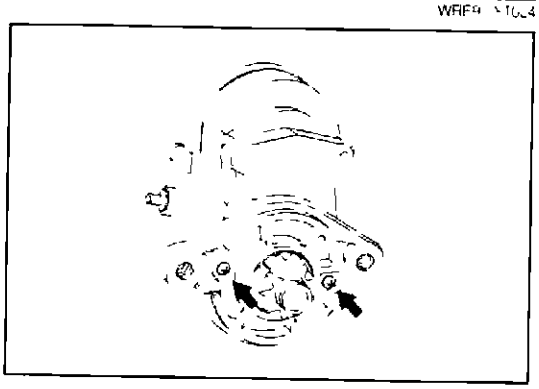


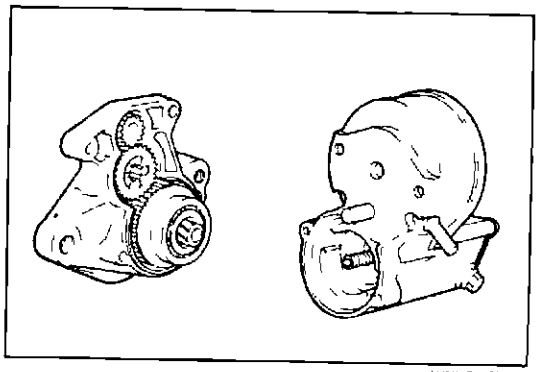
(2) Remove the field frame together with the armature by removing the two through bolts



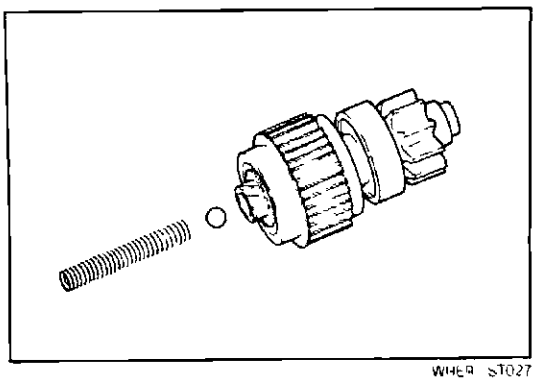


(3) Removal of starter housing, clutch assembly and gears
(2.2 kW type)
① Remove the two screws



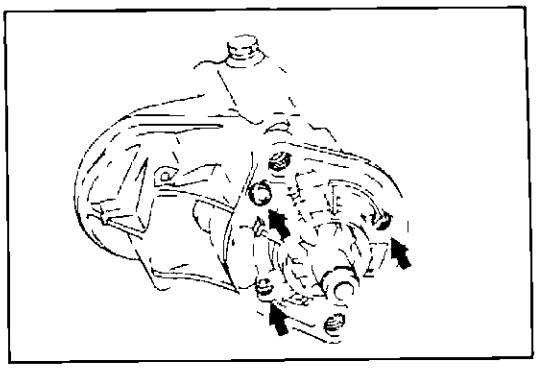


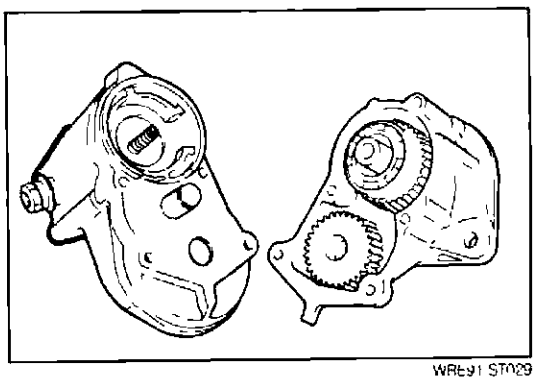
② Take out the clutch assembly, steel ball and return spring from the drive housing



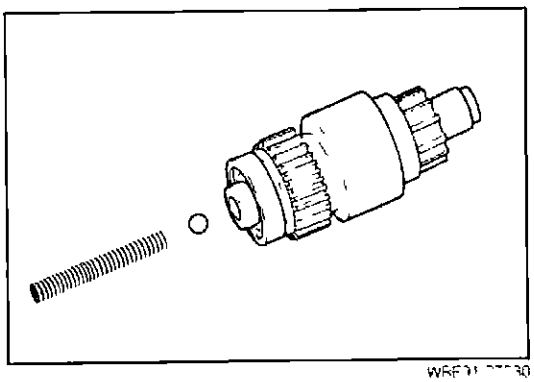
(2.5 kW type)

① Remove the three screws





② Take out the clutch assembly, steel ball and return spring from the drive housing



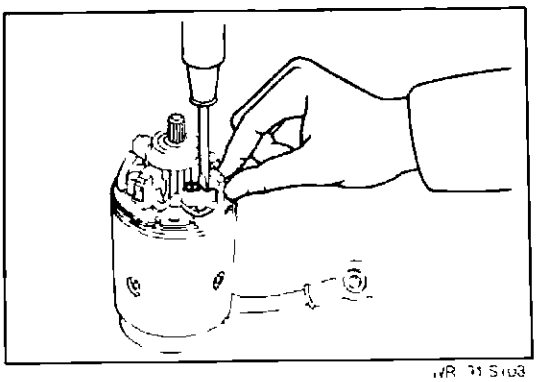
(4) Removal of brush holder

(2.2 kW type)

Remove the brush from the brush holder by means of nose pliers or a screwdriver

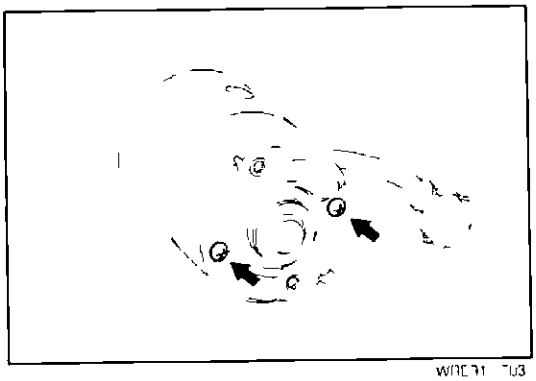
NOTE:

- Care must be exercised not to damage the brushes during the removal.



(2.5 kW type)

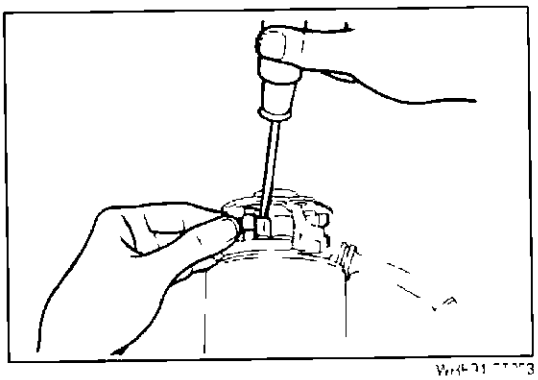
① Remove the commutator end frame by removing the two screws



② Remove the brush from the brush holder by means of nose pliers or a screwdriver

NOTE

- Care must be exercised not to damage the brushes during the removal



10. INSPECTION

10-1 Check of armature

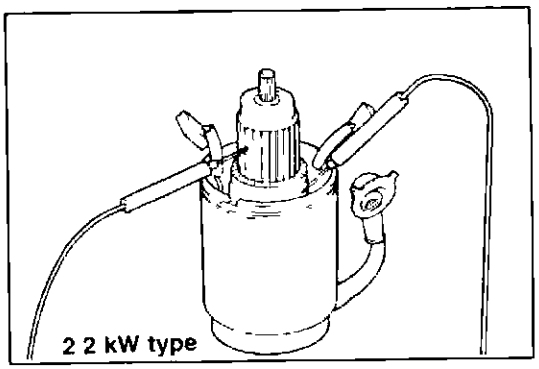
NOTE:

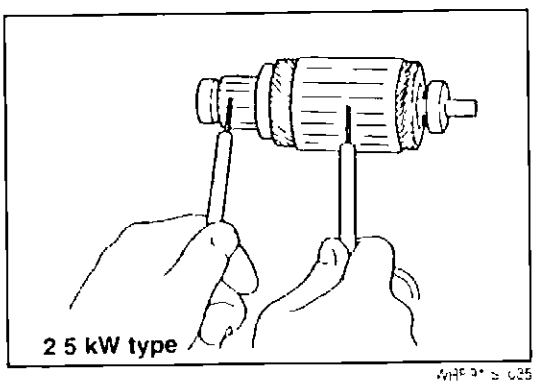
- In the case of the 2.2 kW type starter, perform the inspection without removing the armature from the starter yoke.

(1) Check of armature insulation

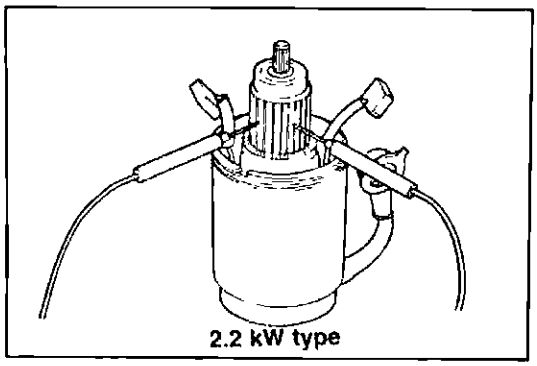
Ensure that no continuity exists between the commutator and the armature coil, using an ohmmeter

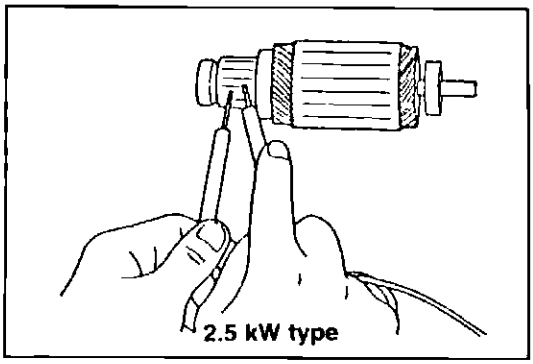
If continuity exists, replace the armature





(2) Check of commutator continuity
Check continuity between each adjacent segment of the commutator, using an ohmmeter
If no continuity exists between any adjacent segments, replace the armature





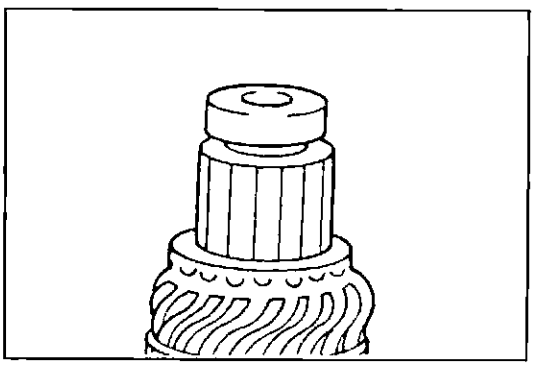
WHE91 5*07*

10-2 Check of commutator

NOTE:

- In the case of the 2.2 kW type starter, perform the inspection without removing the armature from the starter yoke.

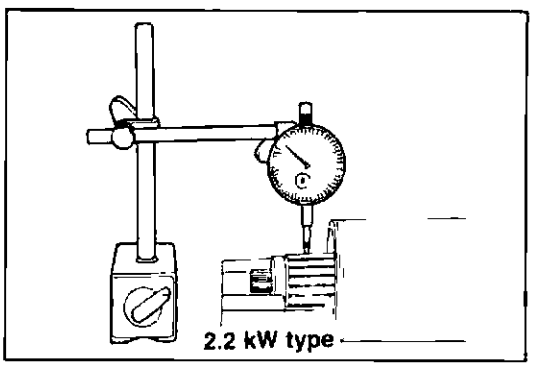
(1) Check each contact surface of the commutator segments with the brushes for burning
If the surfaces are dirty or burnt, correct the commutator surfaces, using abrasive paper (No 400) or a lathe

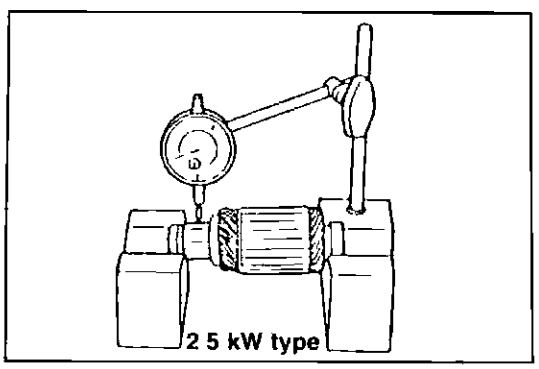


WRE91 ST038

(2) Check of commutator for circle runout
Support the armature on a Vee block
Check the commutator for circle runout, using a dial gauge
Circle Runout Limit: 0.05 mm (0.002 inch)

If the circle runout exceeds the allowable limit, turn down the commutator on a lathe



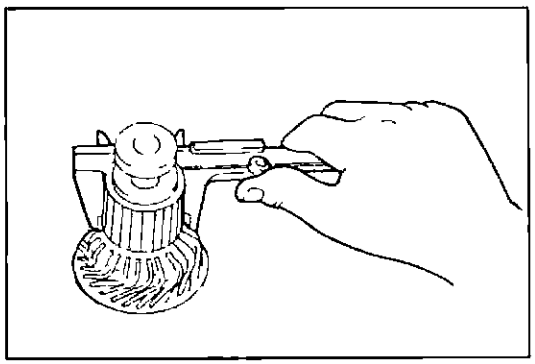


WRE91 ST040

(3) Measurement of commutator diameter
Measure the commutator diameter by means of a micrometer or vernier calipers.

Standard Diameter	35 mm (2.2 kW)
	36 mm (2.5 kW)
Minimum Diameter	34 mm (2.2 kW)
	35 mm (2.5 kW)

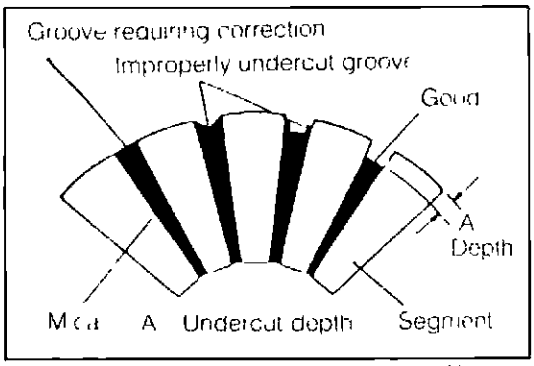
If the commutator diameter is less than the minimum diameter, replace the armature.



(4) Check of commutator undercut
Measure the depth of the insulator groove between the commutator segments.

Standard Depth: 0.7 - 0.9 mm
Minimum Depth: 0.2 mm

If the depth of the insulator groove becomes less than the limit value, replace the commutator.

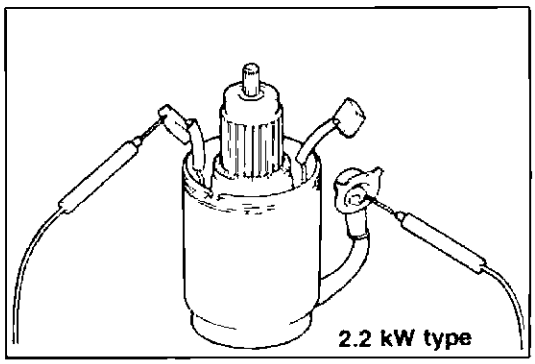


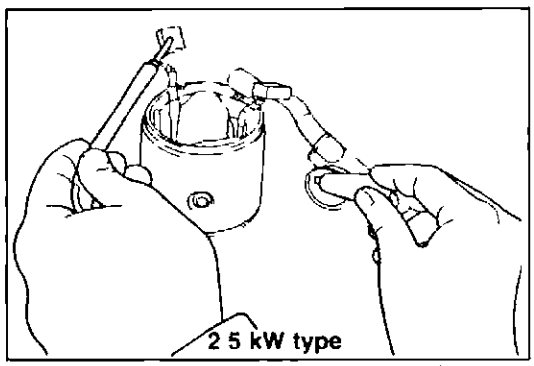
10-3 Check of field coil

NOTE.

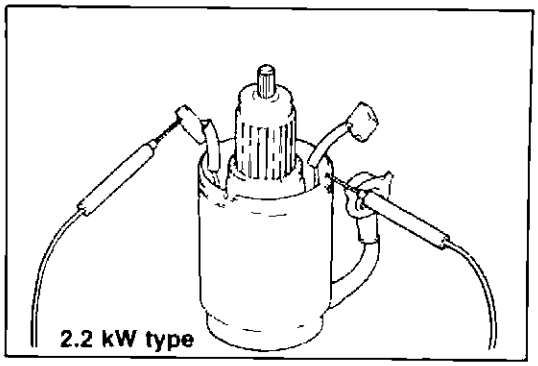
- In the case of the 2.2 kW type starter, perform the inspection without removing the armature from the starter yoke.

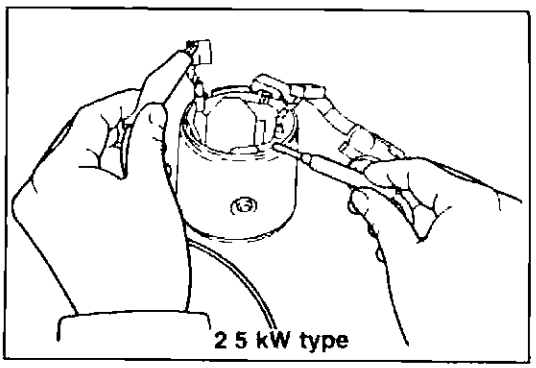
(1) Field coil continuity test
Perform field coil continuity test at a point between the lead wire and the brush, using an ohmmeter.
If no continuity exists, replace the yoke.





(2) Field coil short test
Perform field coil short test at a point between the brush and the yoke proper using an ohmmeter
If continuity exists, replace the yoke



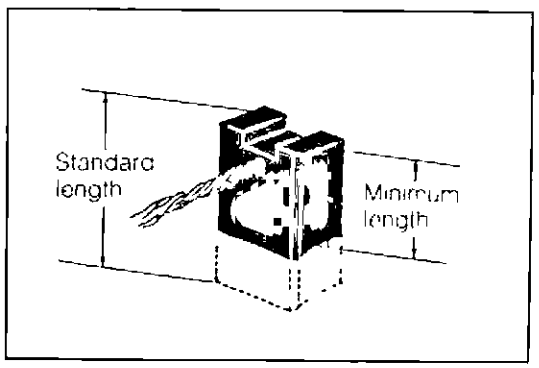


10-4 Check of brushes

Measurement of brush length
Measure the brush length, using vernier calipers

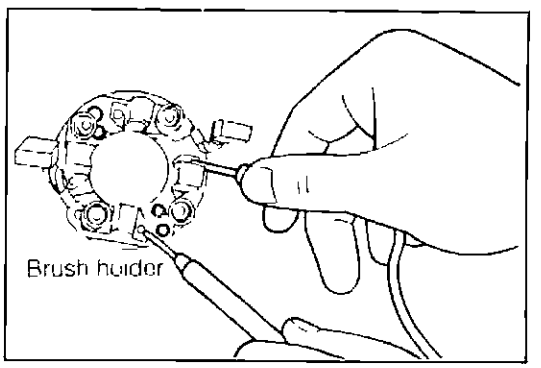
Standard Length:	16 mm (2.2 kW)
	20.5 mm (2.5 kW)
Minimum Length:	10.0 mm (2.2 kW)
	18.3 mm (2.5 kW)

If the length is less than the minimum requirement, replace the brush holder or the yoke as required



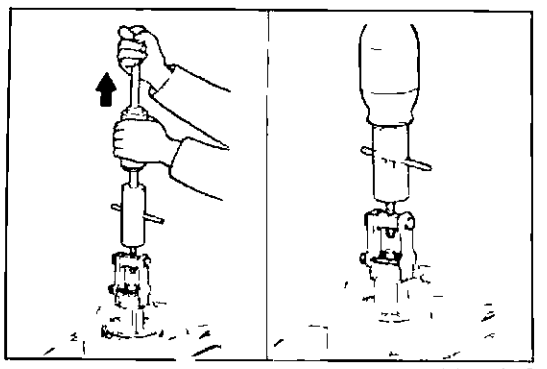
10-5 Check of brush holder

Check of brush holder for insulation
Ensure that there is no continuity between the positive (+) and negative (-) brush holders
If continuity exists, replace brush holder

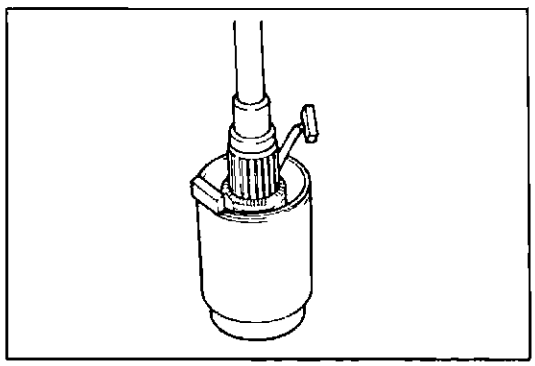


10-6 Removal/installation of armature (2.2 kW type) from starter yoke (If necessary)

(1) Removal
The armature can be removed by means of an armature bearing puller in combination with the following SST, as indicated in the figure
SST: 09912-87501

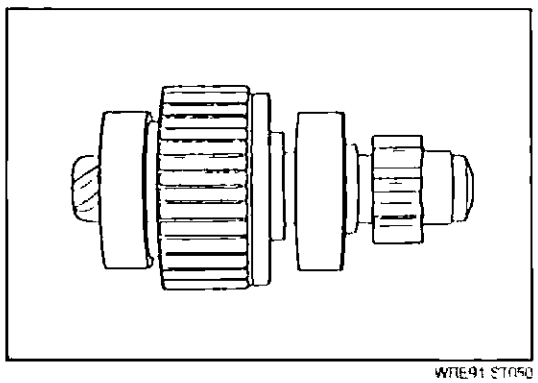


(2) Install the armature, using a press in combination with a suitable steel pipe

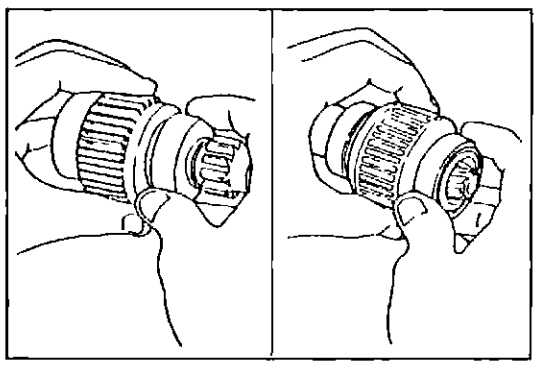


10-7 Inspection of clutch

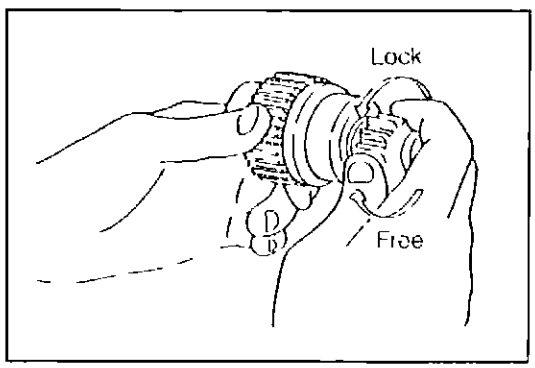
(1) Inspection of pinion gear and spline teeth
Check the teeth of the pinion gear and spline for wear or damage
If the teeth exhibit any damage, replace the clutch Also, inspect the flywheel ring gear for wear or damage



(2) Check of bearing
Lightly turn the bearing hand Ensure that the bearing turns smoothly

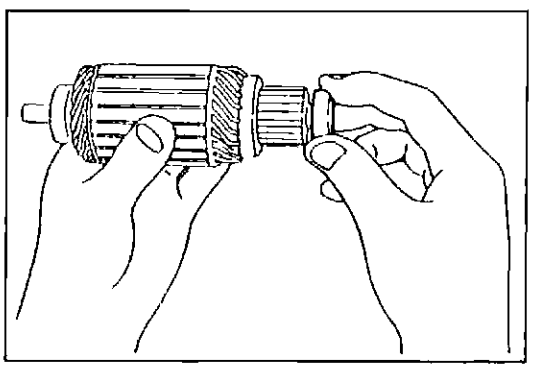


(3) Check of starter clutch
While holding the clutch, turn the pinion clockwise Ensure that the pinion turns smoothly
Turn the pinion counterclockwise Ensure that the pinion is locked
If the check results are unsatisfactory, replace the starter clutch

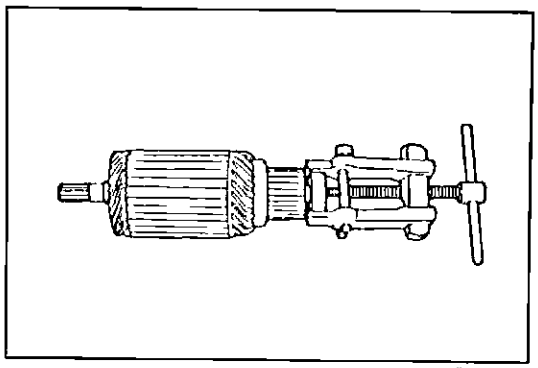


10-8 Inspection of bearings

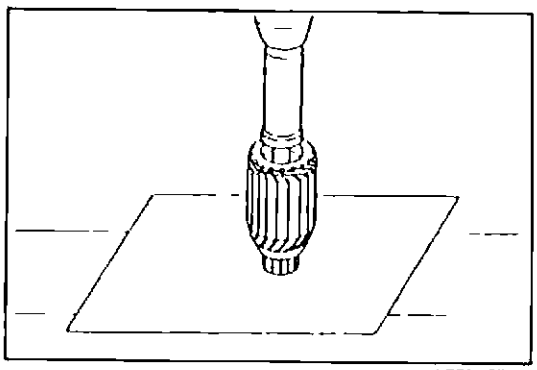
(1) Inspection of bearings
Turn the bearing while applying force to it by your hand Ensure that the bearing turns smoothly If the bearing fails to turn smoothly, replace the bearing



(2) Replacement of bearings (Only when bearing is faulty.)
① Remove the bearing, using an armature bearing puller
NOTE:
- In the case of 2.2 kW type, remove the bearing after removing the armature from the starter yoke.
Refer to page ST–15.

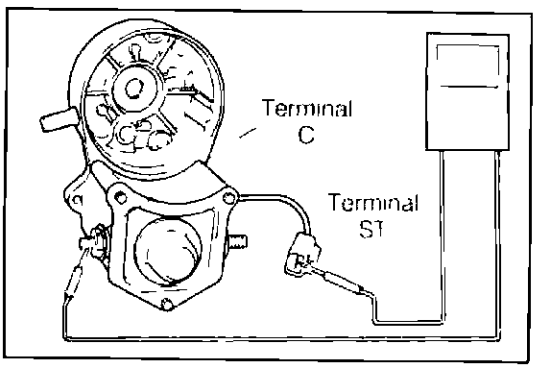


② Press the bearing into the armature shaft, using a press in conjunction with the suitable tool

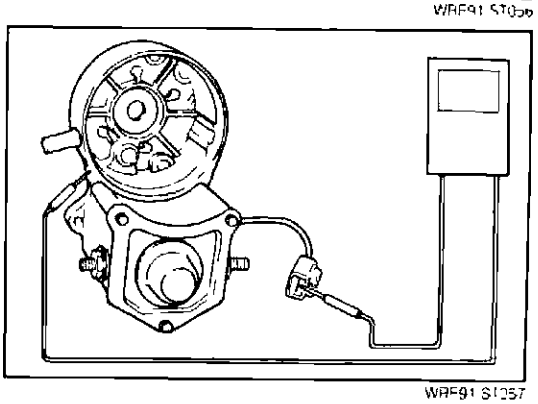


10-9 Check of magnetic switch

(1) Pull-in coil test
Using an ohmmeter, ensure that continuity exists between the terminal ST of the starter and the terminal C
If no continuity exists, replace the magnetic switch

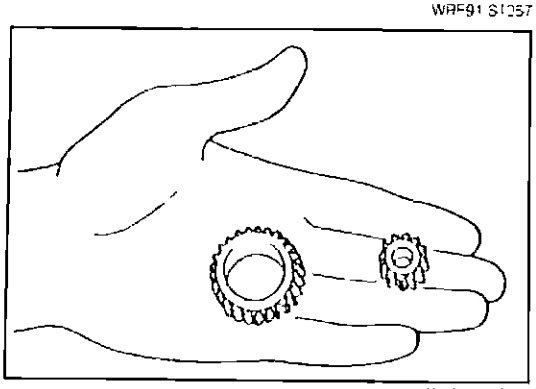


(2) Hold-in coil test
Ensure that continuity exists between the terminal ST of the magnetic switch and the switch body
If no continuity exists, replace the magnetic switch

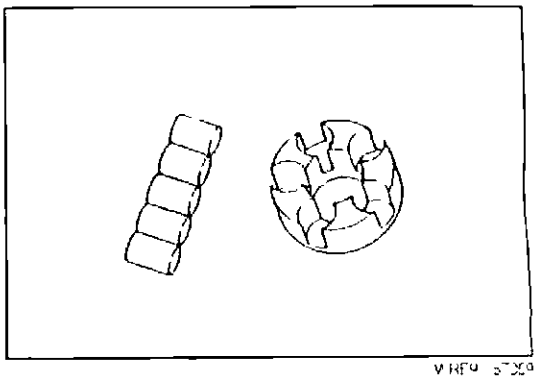


10-10 Inspection of gears

(1) Inspect the starter drive gear (cold area specifications) and starter idle gear for damage or wear
Replace the gear which exhibits damage or wear



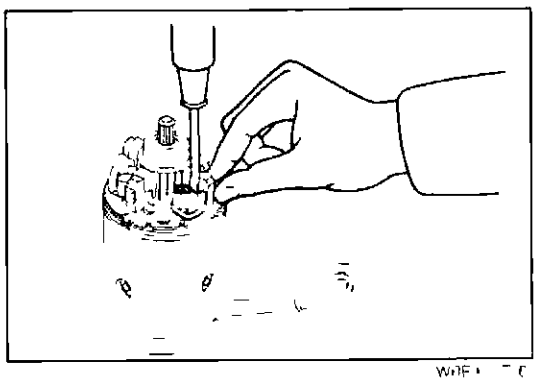
(2) Inspect the starter idle gear bearing and bearing housing for damage or wear
Replace the clutch or retainer as required



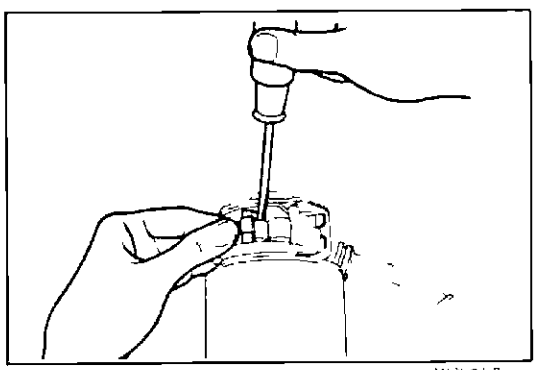
11. ASSEMBLY

NOTE:
- Use high-temperature grease to lubricate the bearings and gears when assembling the starter.

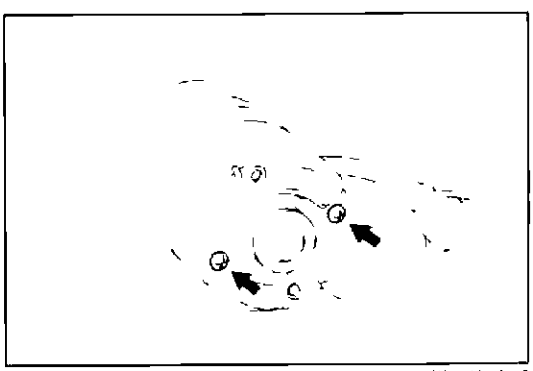
(1) Installation of brush holder
(2.2 kW type)
Install the brush to the brush holder, using nose pliers or a screwdriver
NOTE
- Align the protrusion of the brush holder with the cut-out section of the field frame.



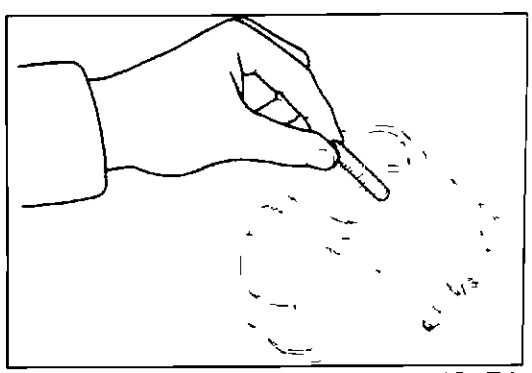
(2.5 kW type)
① Install the brush to the brush holder using nose pliers or a screwdriver



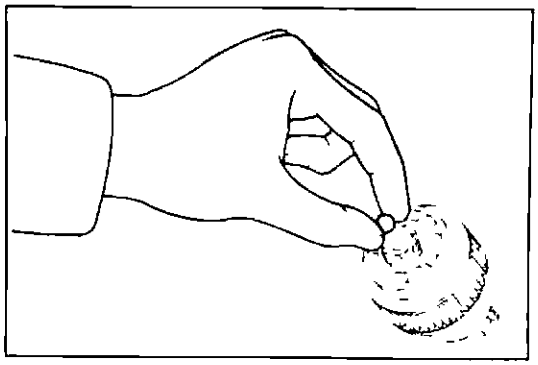
② Install the commutator end frame



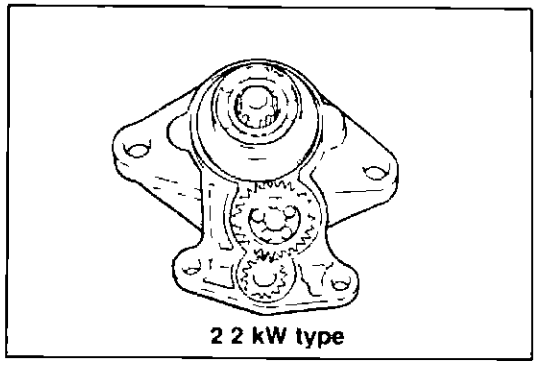
(2) Install the return spring in the starter switch assembly



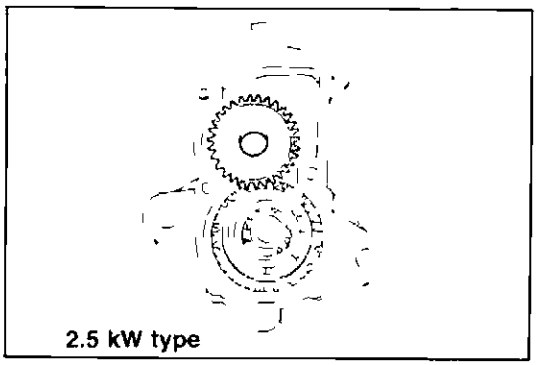
(3) Insert the steel ball into the clutch assembly



(4) Install the following parts to the starter housing
① Clutch assembly
② Idle gear
③ Pinion gear (2.2 kW)

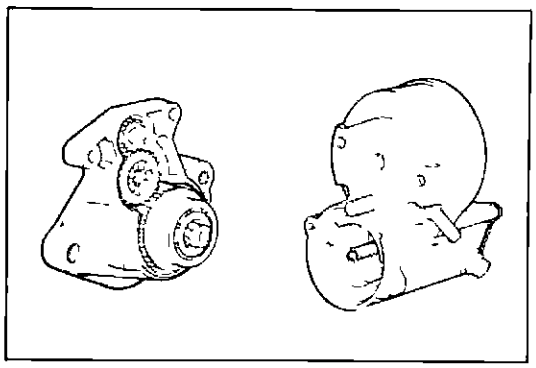


2.2 kW type



2.5 kW type

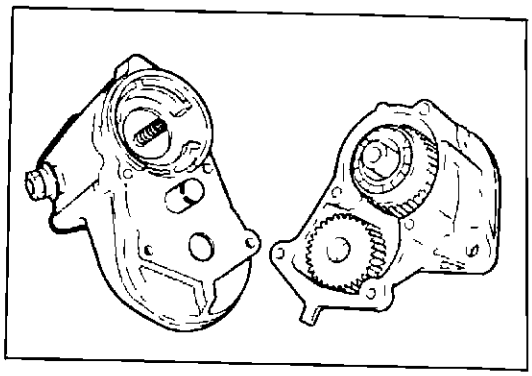
(5) Assembly of starter housing and magnetic switch
(2.2 kW type)
① Install the two screws

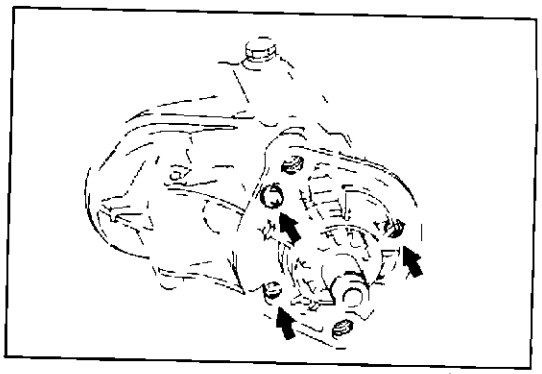




(2.5 kW type)

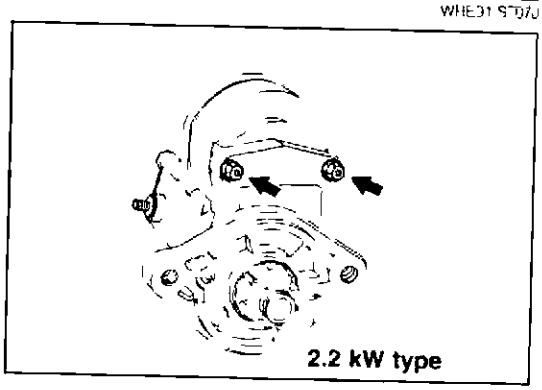
① Install the three screws

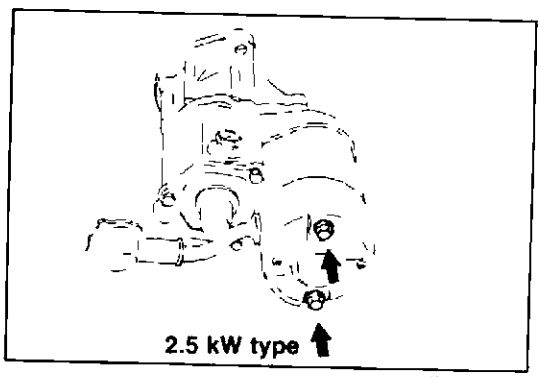




WHE01 ST07J

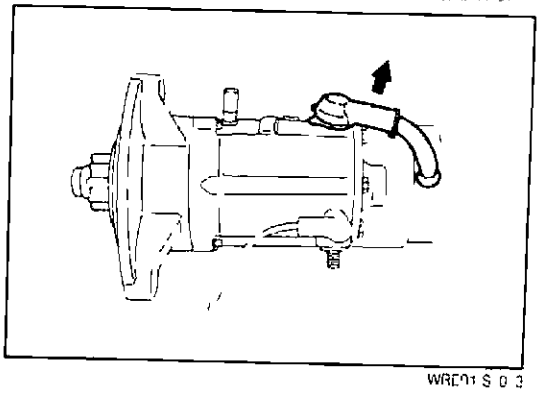
(6) Assemble the starter housing and field frame with the two through bolts interposed





WHE01 ST 22

(7) Connect a lead wire to the magnet switch



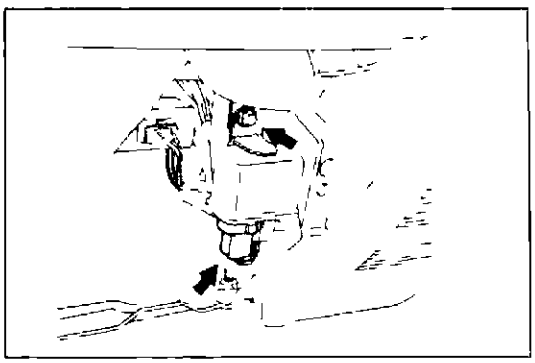
WRE01 S 0 3

STARTER RELAY

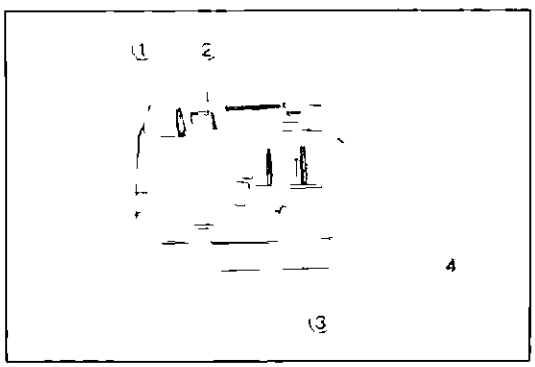
(1) Remove the glove compartment door subassembly by removing the two screws



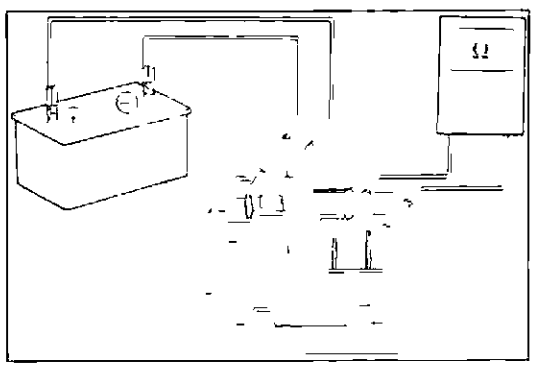
(2) Remove the starter relay



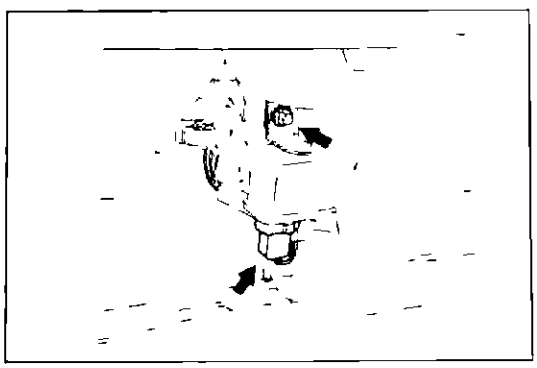
(3) Inspection of relay continuity (See Page ST–4)
① Ensure that continuity exists between the terminals ① and ②
If no continuity exists, replace the relay with a new one
② Ensure that no continuity exists between the terminals ③ and ④
If continuity exists, replace the relay with a new one



(4) Inspection of starter relay
Apply the battery voltage across the terminals ① and ②
Ensure that there is continuity between the terminals ③ and ④
If no continuity exists replace the relay with a new one



(5) Installation of starter relay
① Install the starter relay
② Connect the starter relay connector
③ Install the glove compartment door assembly



PRE-HEATING SYSTEM

1. SYSTEM OUTLINE

The pre-heating system of Type DL engine comes in two kinds the fixed delay type system and the variable delay type system

The fixed delay type pre-heating system, employed on some of Type DL-42 engine, consists of glow plugs, glow plug connectors, a glow plug relay and a pre-heating timer

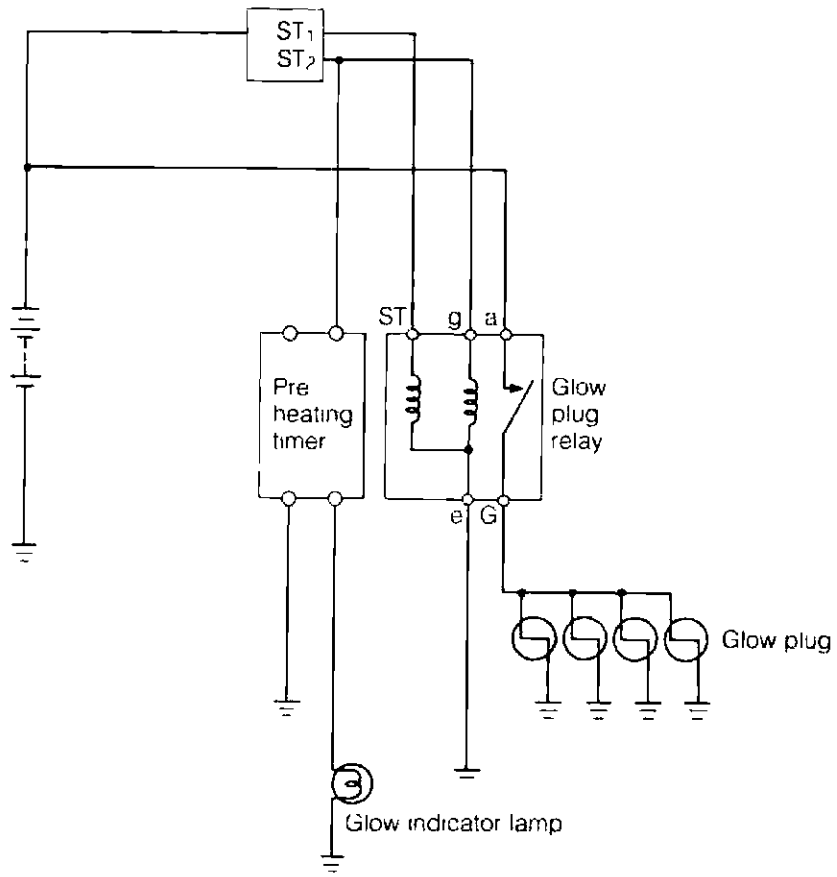
The variable delay type pre-heating system, employed on some of Type DL-42 engine and on Type DL-52 engine, consists of glow plugs, glow plug connectors, a current sensor, a glow plug relay, a water temperature sensor and a pre-heating timer

The variable delay type pre-heating system detects the engine conditions by means of the water temperature sensor and current sensor and varies the pre-heating time

WRE91 ST079

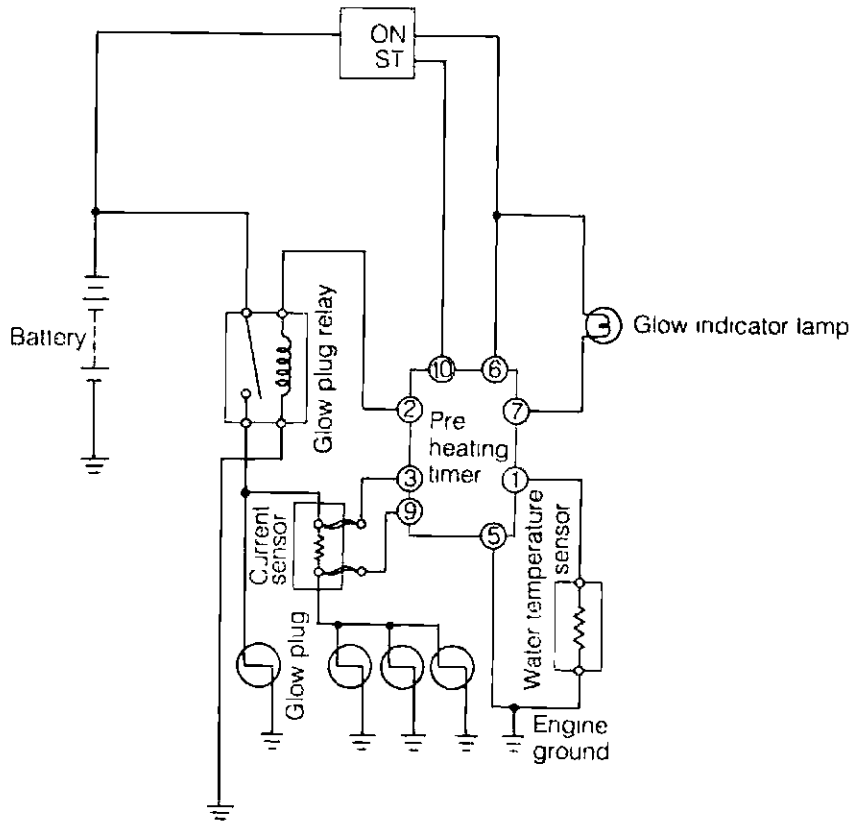
2. SYSTEM CIRCUIT

Fixed Delay Type



WRE91 STI080

Variable Delay Type. (QSI)



WRE91 ST081

3. TROUBLE SHOOTING

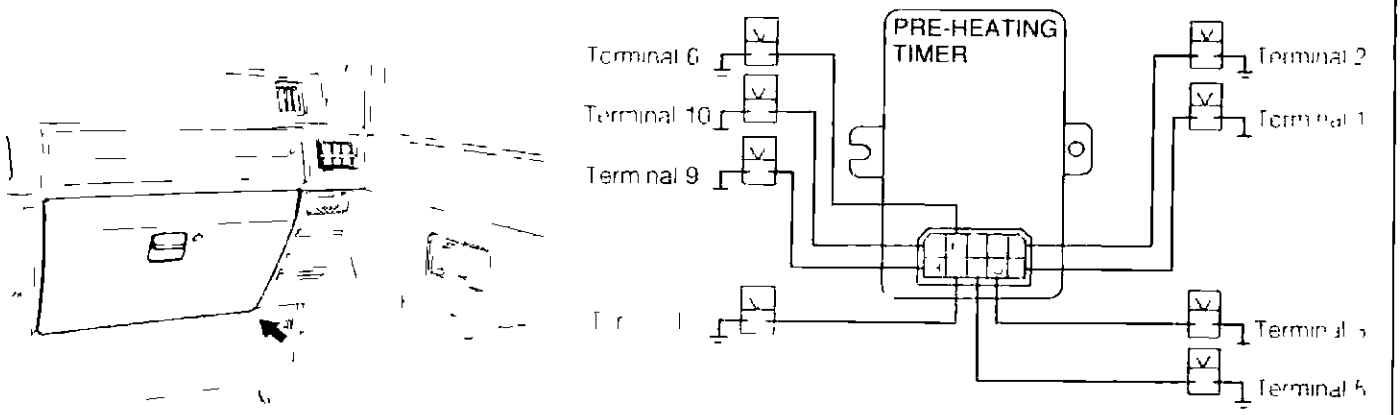
Probrem	Possible cause	Remedies
Engine will not start/Hard to start (Only cases where cranking by starter motor is normal)	Glow plug faulty	Replace glow plug
	Glow plug current sensor faulty (Variable Delay Type)	Replace glow plug current sensor
	Glow plug relay faulty	Replace glow plug relay
	Pre-heating timer faulty	Replace pre-heating timer
	Water temperature sensor faulty	Replace water temperature sensor
	Faulty wiring	Repair, as required

WRE91 ST082

4. DIESEL ELECTRICAL SYSTEM DIAGNOSIS (Variable Delay Type)

Items to Which Special Attention Must Be Paid

1 Be sure to turn OFF the engine switch each time new check is performed for each step Then turn ON the engine switch to start the measurement Furthermore the measurement must be carried out immediately after the switch has been turned ON
2 The check must be performed within 10 seconds after the engine switch is turned ON If the time elapses more than the specified duration the check should be performed after turning OFF/ON the engine switch again
3 The battery voltage is posted as about 12V When performing the check be sure to measure the battery voltage
4 An operating sound which the glow plug relay emits when the engine switch is turned ON can be used effectively in the diagnostic operation
5 The check can be performed with each connector in its connected state Use wires or the like so that no damage may be made to the terminals
6 The check can be performed when the battery voltage is within specification (about 12V)



The Pre-heating Timer is located under the instrument panel

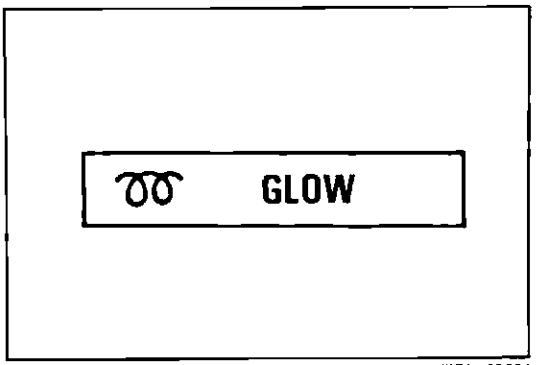
(1) Checking of glow plug indicator light

Ensure that the indicator lamp glows for 1 to 5 seconds.

↓ OK

Checking of glow plug voltage

(See page ST-26)



WRE91 ST084

[1] When light will not glow

Checking of timer power supply circuit at terminal 6 of Pre-heating timer with voltmeter
About 12V

NO → Voltage remains at about 0V
- Check and repair wiring of power supply circuit up to battery

OK ↓

Checking of timer earth circuit at terminal 5 of pre heating timer with voltmeter
0V

NO → Reading other than 0V
- Check and repair earth circuit

Checking of lamp circuit at terminal 7 of pre heating timer with voltmeter
Voltage rises from about 2V to about 12V within 5 sec

NO →
1 Voltage remains at about 12V
- Replace pre-heating timer
2 Voltage remains at 0V
- Check and repair light blown fuse or wire

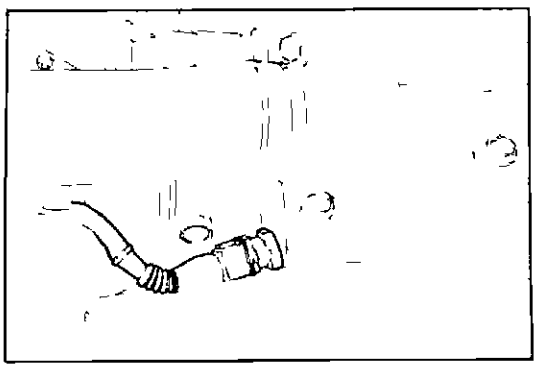
WRE91 ST085

[2] When light glow for 1 second (cooling water temperature is below 40°C) or, regardless of water temperature, when light remains illuminated for 6 seconds

Checking of water temperature sensor circuit at terminal 1 of pre-heating timer
About 2V when water temperature is 20°C

NO →
1 Voltage remains at about 7V
2 Voltage remains at 0V
- Check wire up to water temperature sensor and water temperature sensor to earth Then, check or replace sensor

NOTE: Water Temperature Sensor
Specified Resistance: 2.4 ± 0.24 kΩ at 20°
0.322 ± 0.0322 kΩ at 80°C

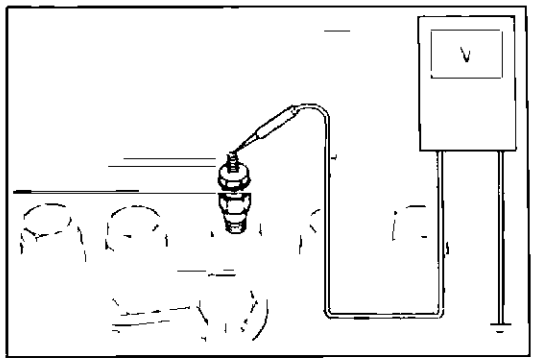


(2) Checking of glow plug voltage

Ensure that voltage varies repeatedly between 0 and 10V for 10 to 80 seconds owing to water temperature

OK

Check other systems

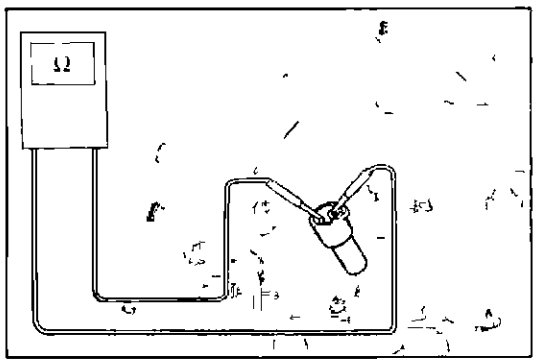


WHE91STU8A

1 **When voltage is 0V**

Check current sensor
Specified Resistance. 10 mΩ

NO → If no continuity exists replace current sensor



Checking of timer power supply circuit at terminal 6 of Pre-heating timer with voltmeter
About 12V

NO → Voltage remains at about 0V
- Check and repair wire of power supply circuit up to battery

OK

Checking of timer earth circuit at terminal 5 of pre-heating timer with voltmeter
0V

NO → Reading other than 0V
- Check and repair earth circuit

OK

WHE91STU8A

Checking of current sensor circuit at terminals 3 and 9 of pre-heating timer with voltmeter
Voltage changes repeatedly between about 10V and 0V

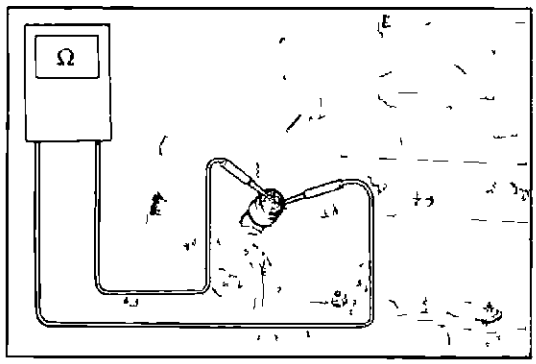
NO

1 Voltage at 3 remains at 0V
- Check and repair wire (including connectors) up to current sensor

2 Voltage at 9 remains at 7V
- Check wire (including connectors) up to current sensor

3 Voltages at 3 and 9 remain at 0V
With connectors disconnected perform continuity check
- If continuity exists (0 ohm) between connector terminal at timer side and body earth, it represents that wire is shorted. Repair shorted wire

OK



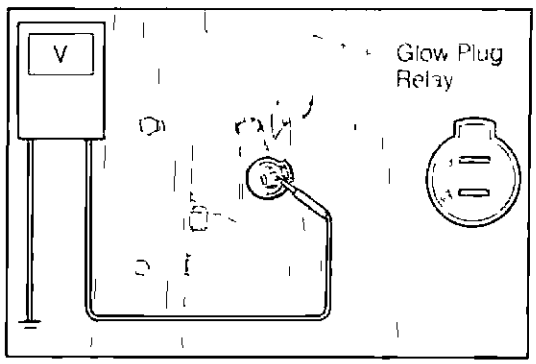
OK

(Checking of relay)

Check of glow plug relay earth circuit Ⓐ with voltmeter at glow plug relay connectors
0V

NO

More than 0V
- Check and repair earth circuit



OK

Checking of glow plug relay input circuit Ⓑ by volt meter at glow plug relays connector
Voltage change between about 11V and 0V occurs repeatedly

NO

1 Voltage remains 0V
Check or repair wire up to pre-heating timer

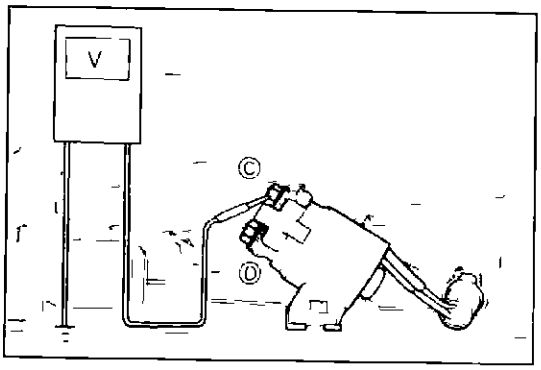
2 Voltage remains 0V after dropping from about 11V — Proceed to next

OK

Checking of glow plug relay power Supply voltage ⓒ
About 12V

NO → Check or repair wire up to battery

OK



Checking of glow plug relay output voltage ⓓ
Voltage change between about 10V and 0V occurs repeatedly

NO →
- Check and repair wire up to glow plug
- Replace relay

OK →

Checking of glow plug internal resistance
Specified Resistance 0.1 Ω

NO →

Replace defective glow plug

OK

Checking of glow plug relay circuit at terminal 2 of pre-heating timer
Voltage change between about 11V and 0V occurs repeatedly

NO → Replace timer

OK

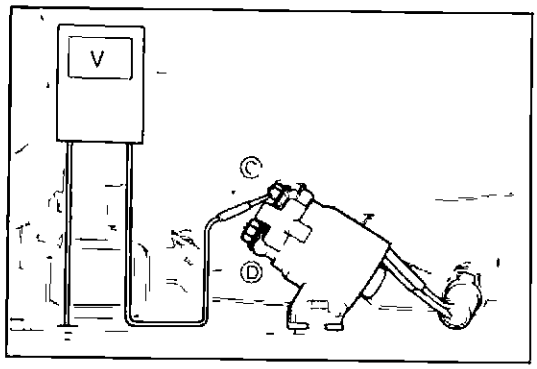
Check other systems

2 **When voltage remains at 12V**

Checking of glow plug relay output voltage Ⓓ when engine switch is turned OFF
0V

NO →
- Check and repair wire up to battery
- Replace glow plug relay

OK ↓



Checking of pre-heating timer earth circuit at terminal 5 of pre-heating timer
0V

NO → Check and repair earth circuit

OK ↓

Checking of glow plug relay circuit at terminal 2 of pre-heating timer
Voltage changes repeatedly between about 11V and 0V

NO →
1 Voltage remains at 0V
- Replace timer

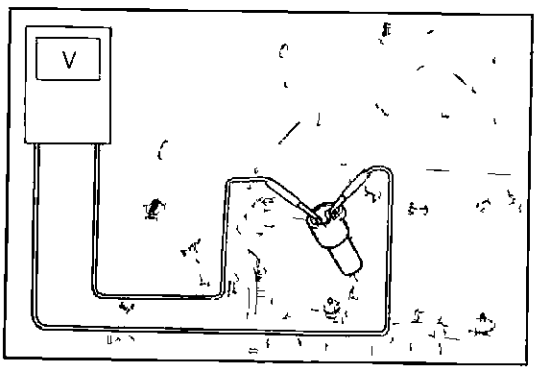
2 Voltage remains at 11V

Proceed to next

Checking of current sensor
Specified Resistance 10 mΩ

NO → Replace current sensor

OK ↓



Checking of current sensor circuit at terminals 3 and 9 of pre-heating timer with voltmeter
Voltage change repeatedly between about 10V and 0V

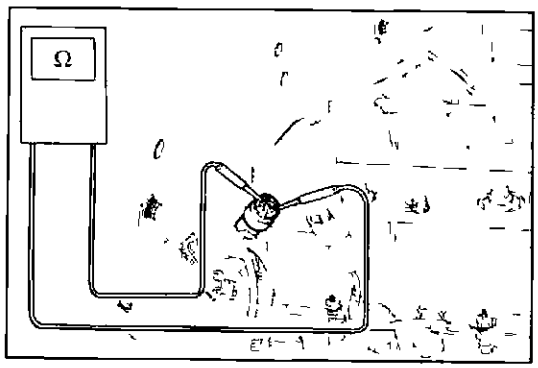
NO →

1 Voltage at 3 remains at 0V
- Check and repair wire (including connectors) up to current sensor

2 Voltage at 9 remains at 7V
- Check wire (including connectors) up to current sensor

3 Voltages at 3 and 9 remain at 0V
- With connectors disconnected
Perform continuity check
  - If continuity exists (0 ohm) between connector terminal at timer side and body earth, it represents that wire is shorted
Repair shorted wire

OK ↓



Checking of glow plug internal resistance
Specified Resistance 0.1 Ω

NO →

Replace defective glow plug

WRL91 ST091

DAIHATSU

F70,F75,F77

Service manual

STEERING

SR

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

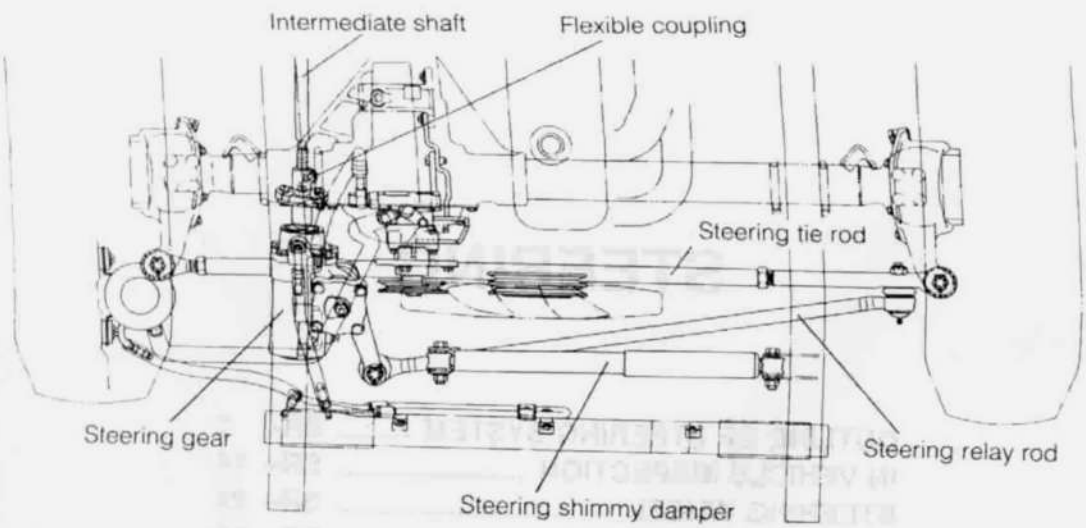
STEERING

OUTLINE OF STEERING SYSTEM ..... SR– 2
IN-VEHICLE INSPECTION ..... SR– 14
STEERING WHEEL ..... SR– 24
STEERING COLUMN ..... SR– 36
STEERING LINKAGE ..... SR– 57
STEERING GEAR HOUSING ..... SR– 67
VANE PUMP ..... SR– 94
SSTs (Special Service Tools) SR–113
SERVICE SPECIFICATIONS SR–114
TIGHTENING TORQUE SR–115

WRE91-SR001

OUTLINE OF STEERING SYSTEM

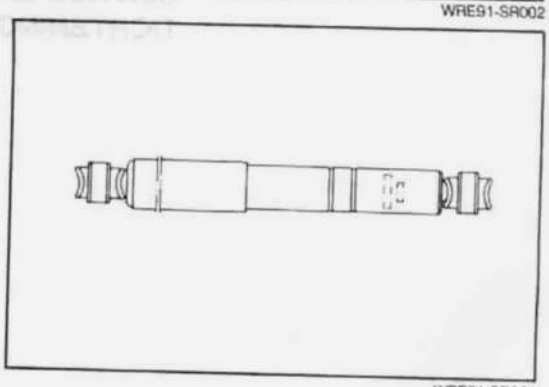
The steering system is composed of the steering intermediate shaft, steering flexible coupling, steering gear, relay rod, tie-rod, shimmy damper and knuckles. The steering intermediate shaft joint is installed between the intermediate shaft and the steering worm shaft. This joint enables the driver to assume an optimum driving position with the least possible fatigue. The power steering system is available as optional equipment. On the some models, the tilt steering wheel is standard equipment.



WRE91-SR002

Shimmy damper

The shimmy damper is installed between the relay rod and the frame so that the steering may stabilize during high speed operation or driving on irregular terrains.



WRE91-SR003

Specifications

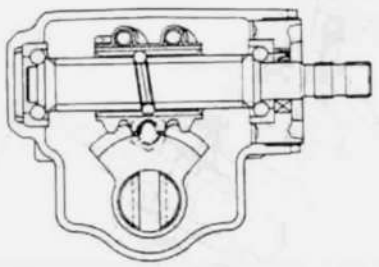
Damping force (kgf) Rebound stroke/compression stroke [at a piston speed of 0.3 m/sec.]	230/230
Length (mm)	395 - 577

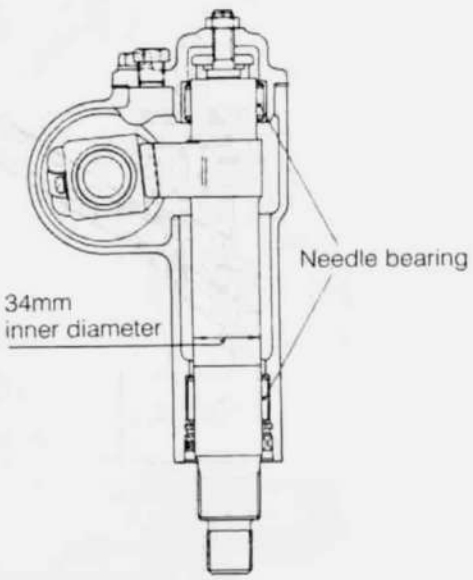
Steering shaft

For accurate steering control, the ball bearings are installed in the steering shaft.

Steering gear box

The 34 mm dia. sector shaft employs needle bearings so that accurate steering and straight traveling characteristics may be enhanced.



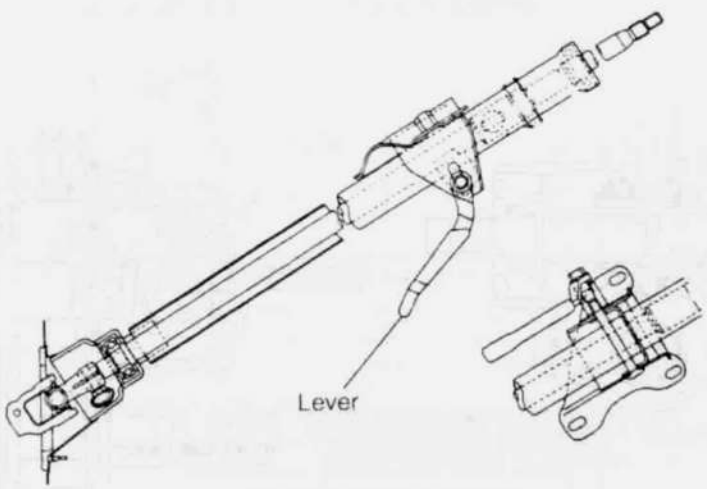


Gear ratio	24 - 28

WRE91-SR004

Tilt steering

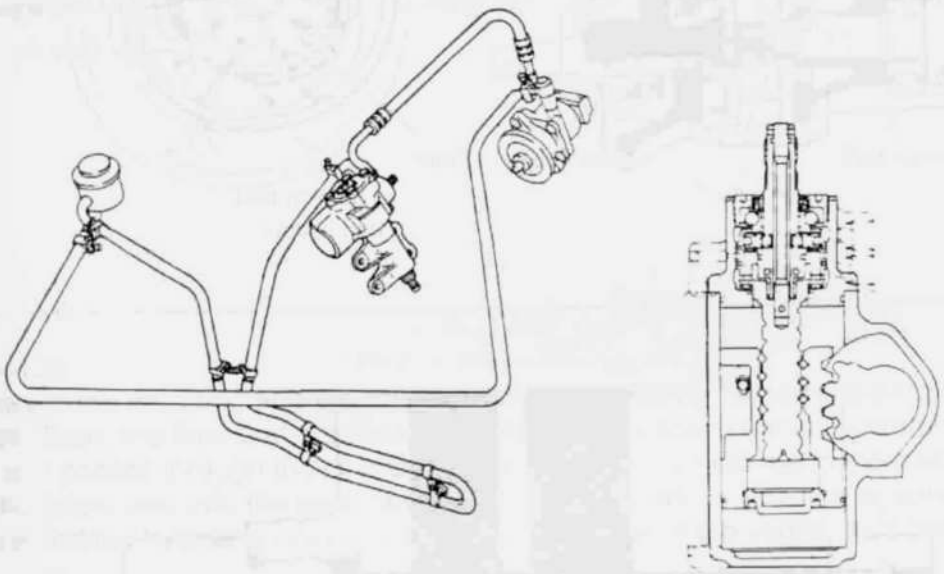
The some models are employs a tilt steering wheel that tilts with the steering shaft universal joint as the fulcrum. This construction allows stepless tilting 20 mm upward and 10 mm downward from the center of the wheel. This adjustment is done by means of the lever of the upper bracket.



WRE91-SR005

Power steering

The power steering system is available as optional equipment. The power steering system consists of a vane pump which generates hydraulic pressure and an integral gear box. This integral gear box detects the force acting on the steering system, controls the hydraulic pressure, and further converts the pressure into mechanical force. Power steering fluid is used as work oil.



WRE91-SR006

Specifications

Type		Integral type
Gear ratio		19.79
Power piston diameter	mm	70

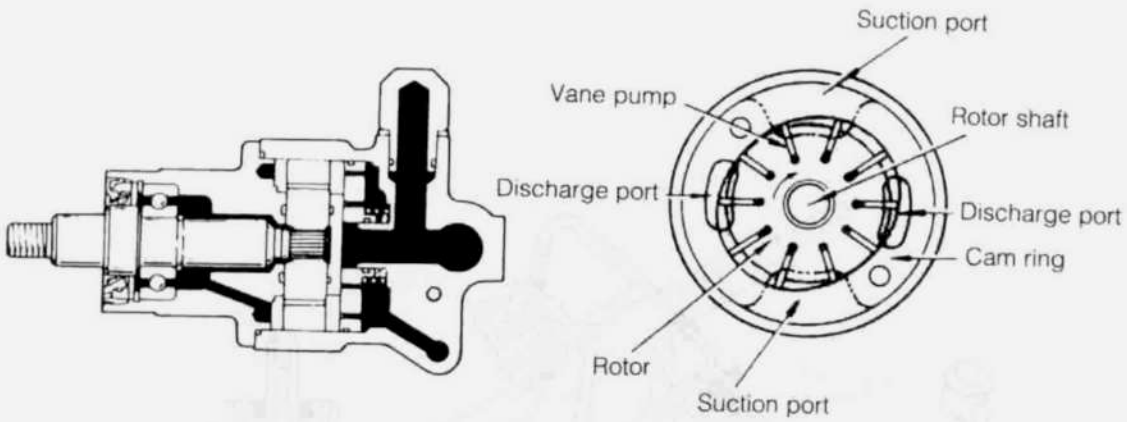
Oil reservoir

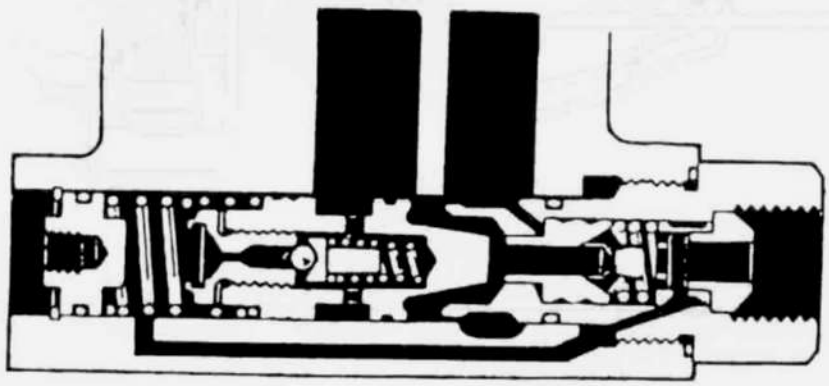
The oil reservoir is located at the front right side of the engine compartment. The cap of the oil reservoir also serves as a level gauge.

WRE91-SR007

Vane pump

A small size vane pump is used. At its rear side, the pump contains a flow control valve that controls the fluid flow rate depending on the pump speed.



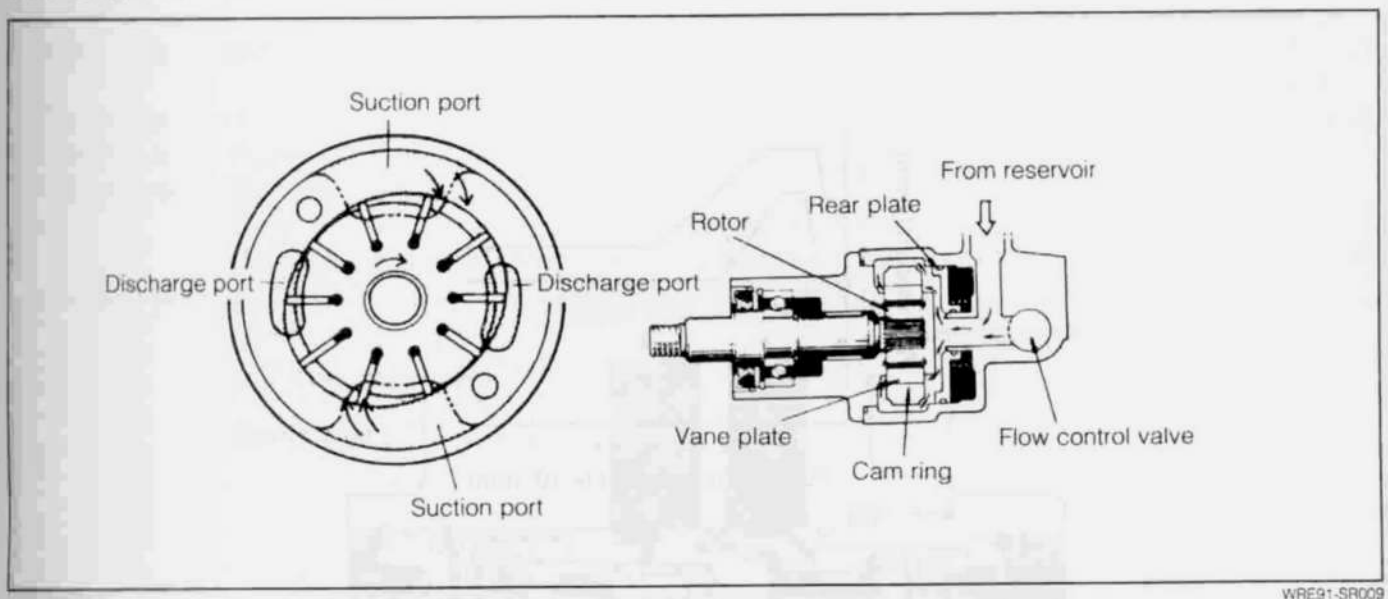


Specifications

Item	Model	F70, F75 and F77
Usable speed range	rpm	500 - 6,090
Theoretical discharge rate [at 1000 rpm]	liter/min	10.5
Relief set pressure	kg/cm^2	75 - 80
Ambient temperature	°C	120

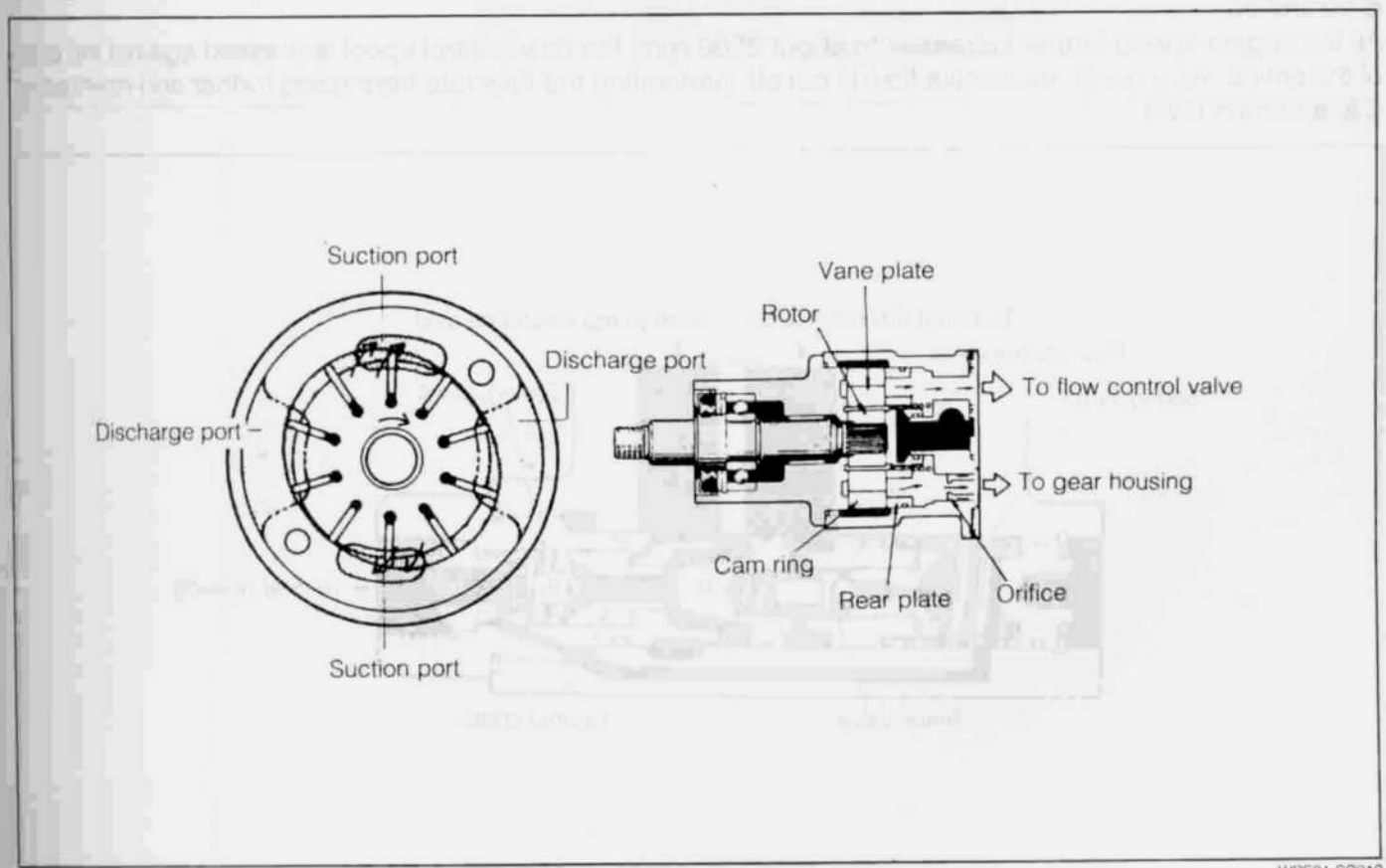
WRE91-SR008

Suction process:
The space between the cam ring and the rotor that is partitioned by the vane plate increases in volume as the rotor rotates. As the space volume increases, the fluid is sucked into the space through the intake port in the rear plate.



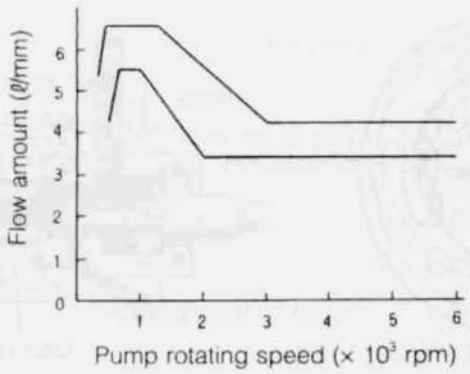
WRE91-SR009

Discharge process:
The space between the cam ring and the rotor that is partitioned by the vane plate decreases in volume as the rotor rotates. Then, the fluid that has been sucked into the space leaves it out of the discharge port in the rear plate, and passes through the oil channel inside the housing to reach the flow control valve in order to control the fluid flow rate into the gear housing. The vane plate is pressed against the cam ring by the centrifugal force and the hydraulic pressure acting on the back of the vanes, thus preventing the fluid from leaking.



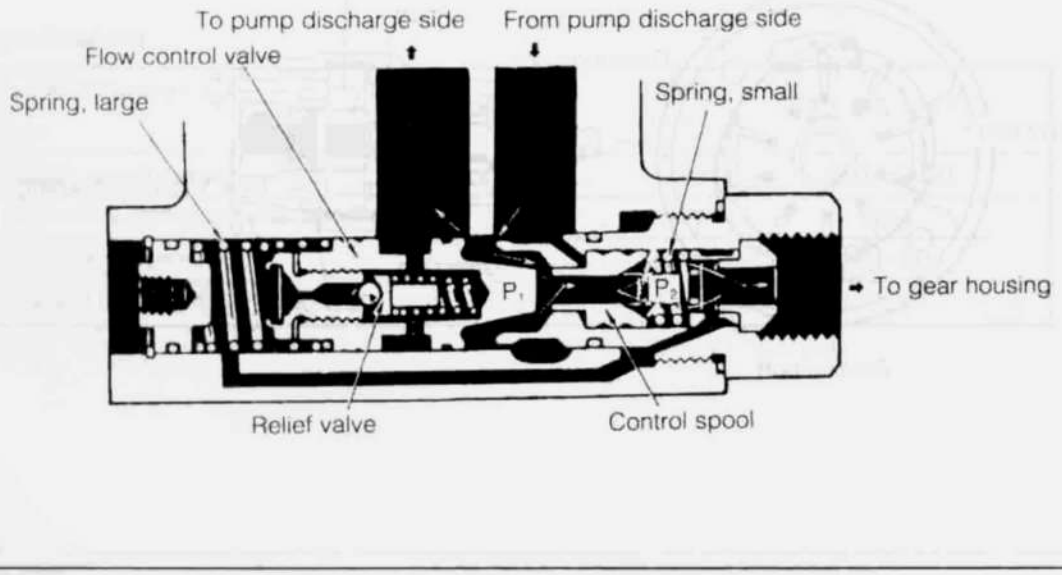
WRE91-SR010

Flow control valve:
This rpm-responsive flow control valve controls the fluid flow rate in accordance with the engine (pump) speed. It assures light steering effort at low speeds, and necessitates a certain manual steering effort at high speeds.



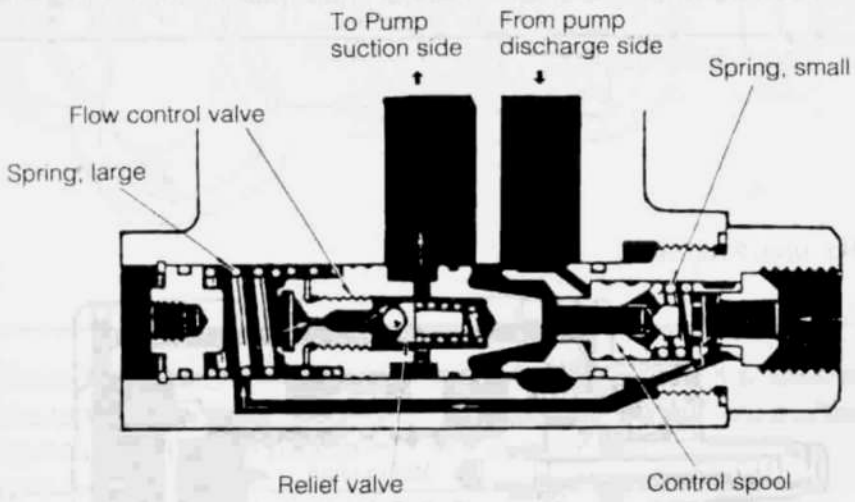
WRE91-SR011

Operation:
As the engine speed and pump discharge rate increase, a pressure difference is generated across the orifice channel, which is obtained as $P=P_1 - P_2$. This difference is attributed to the operation of the flow control valve, and it increases and decreases the oil supply to the gear housing.
With this particular pump, when the pump speed exceeds about 650 rpm, the pressure difference P overcomes the spring force, and drives the flow control valve to open the channel connecting with the pump suction port. Then, some of the fluid is returned to the suction side, so fluid quantity fed to the gear housing is controlled.
As the engine speed further increases to about 2500 rpm, the flow control spool is pressed against the edge of the orifice. As a result, excessive flow is cut off, preventing the flow rate from rising further and maintaining it at a certain level.



WRE91-SR012

Relief valve:
The relief valve is incorporated in the flow control valve. When the hydraulic pressure rises to a certain level, the relief valve opens, thus releasing only excessive pressure back to the pump suction side via the channel (see the figure) and maintaining the maximum hydraulic pressure at a level between 75 and 80 kgf/cm^2.



WRE91-SR013

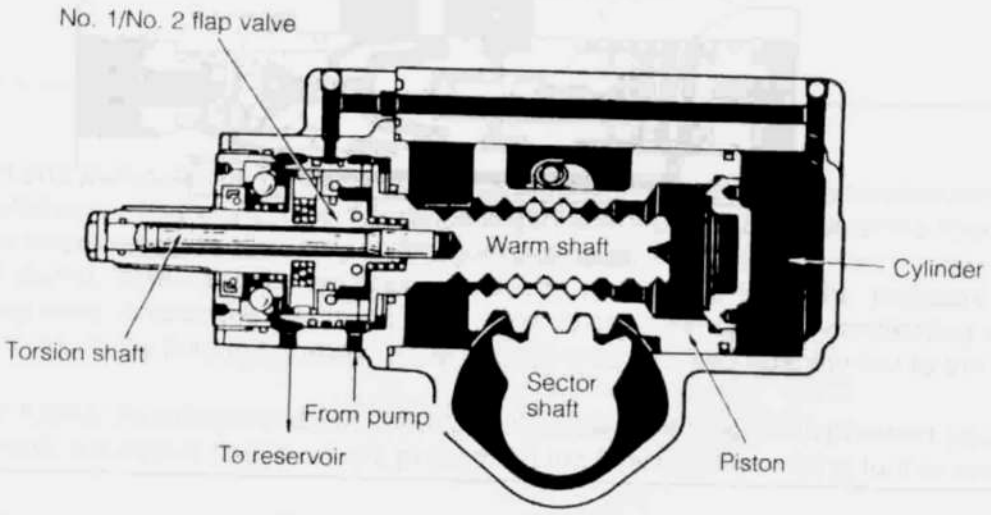
Power steering gear box

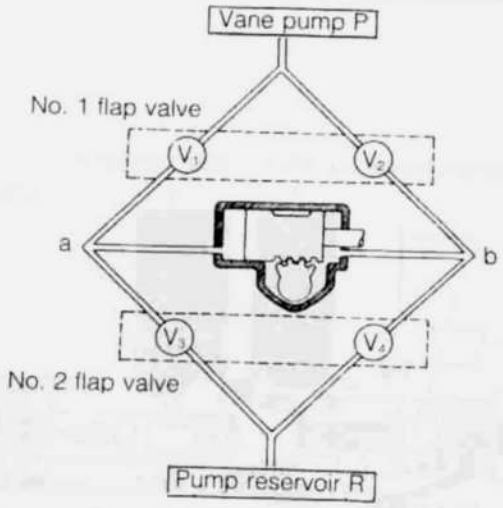
(1) The No. 1 flap valve of V1 and V2 is directional control valve. It switches the oil passage between P a R and R b P depending on the movement of the steering wheel.
The No. 2 flap valve of V3 and V4 is a pressure control valve. It determines the pressure at the points a and b according to the steering effort.

(2) With the steering wheel in the neutral position, all of V1, V2, V3 and V4 are open, and no pressure difference exists between the points a and b.

(3) When the wheel is operated clockwise, V1 closes, V2 and V3 remain open, and V4 almost closes. This causes the pressure at the point b (inside the cylinder) to rise, pushing the piston to the left (see the figure below) to assist the steering effort. The more the steering effort increases, the narrower the V4 becomes and the greater the pressure becomes at the point b.

(4) The reverse of step (3) occurs when the steering wheel is operated counterclockwise.

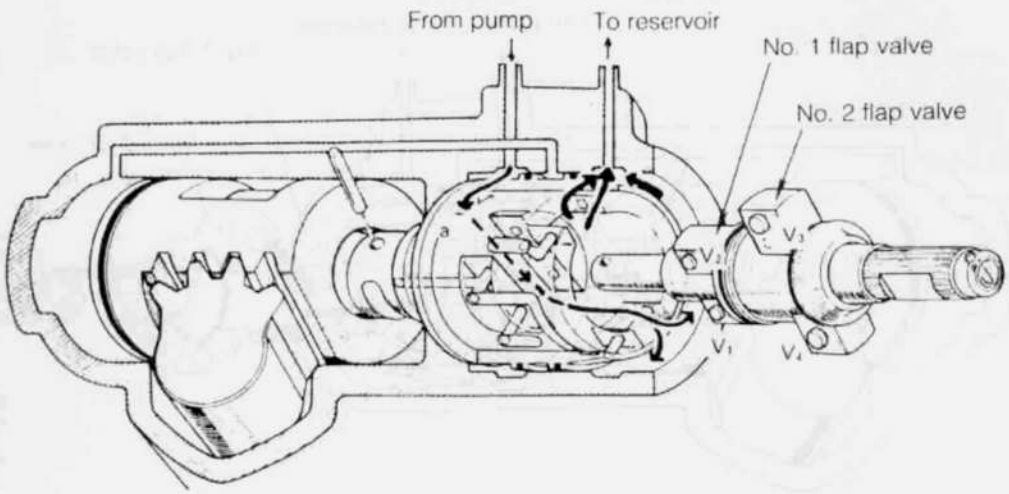




WRE91-SR014

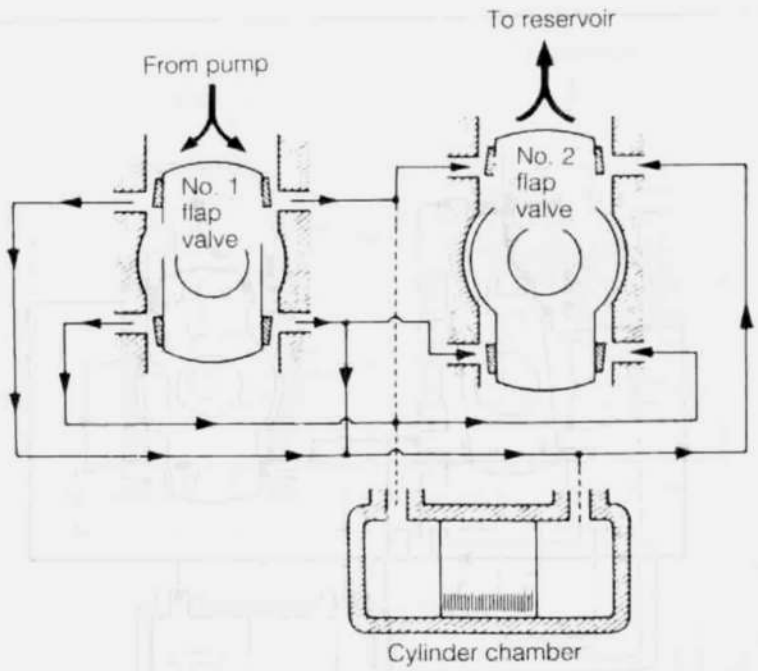
Oil passage

(1) When the steering wheel is in neutral:



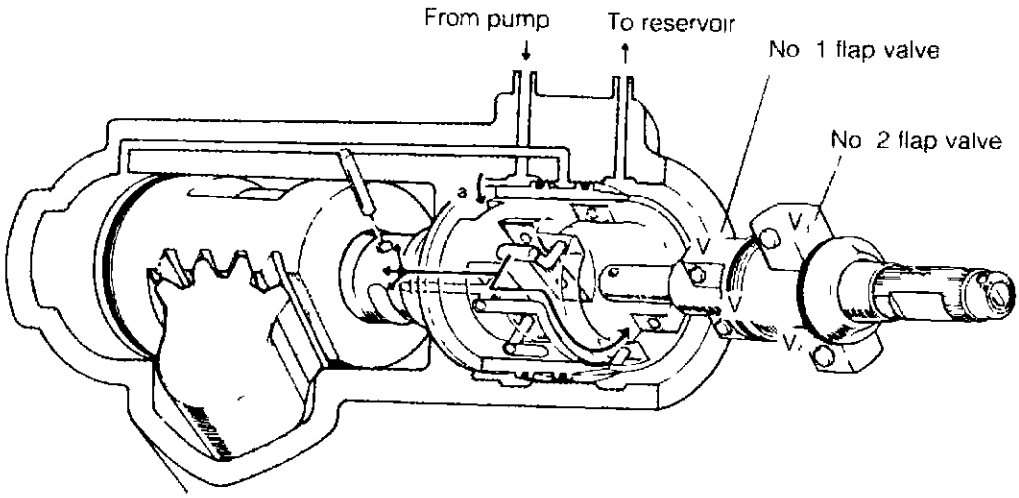
WRE91-SR015

As both No. 1 and No. 2 flap valves are in neutral, all the oil channels in the valve bodies are open, and oil from the pump returns to the reservoir through them. As a result, the hydraulic pressure remains low inside the cylinder, applying no impact to the piston.



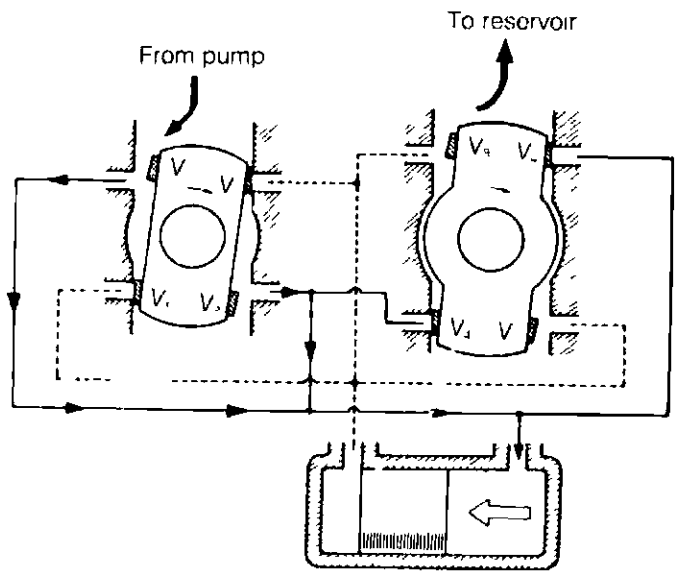
WRE91-SR016

(2) When the steering wheel is turned clockwise



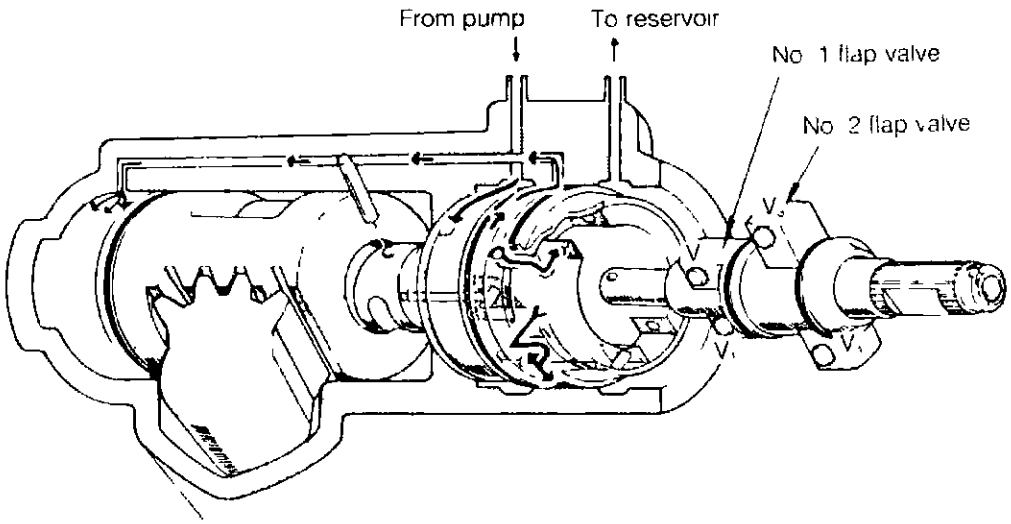
WRE31 SR017

When the steering wheel is turned clockwise V2 of No 1 flap valve opens, and V4 of No 2 flap valve almost closes Thus, the hydraulic pressure in the oil channels rises to generate oil flow as shown in the figure As a result, the hydraulic pressure on the right side of the power piston rises to push the piston to the left As the power acting on the worm shaft decreases, the torsion bar twist angle also becomes smaller. This expands V4 opening, lowering the hydraulic pressure that pushes the piston Meanwhile, as the power acting on the worm shaft increases V4 closes completely, which increases the hydraulic pressure pushing the piston This is how the hydraulic pressure is controlled to achieve the servo power in accordance with the steering effort by No 2 flap valve



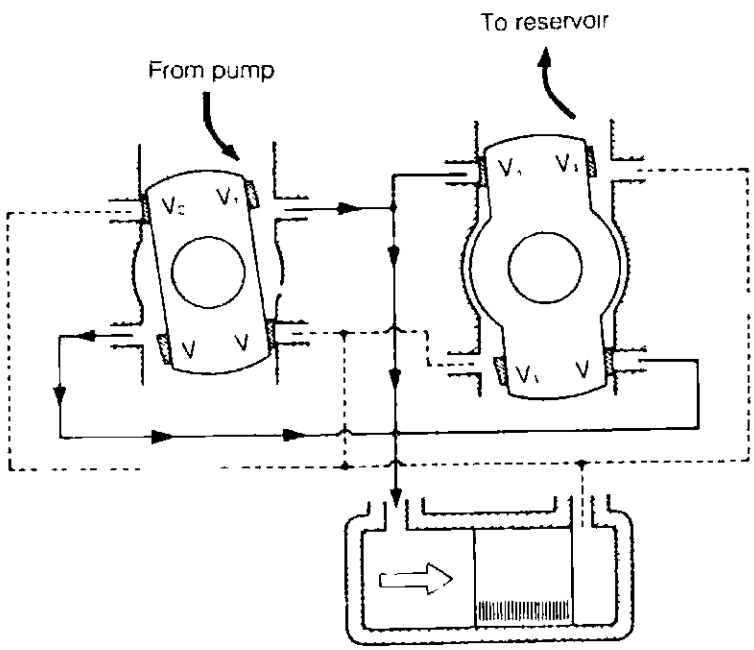
WRF91 SR018

(3) When the steering wheel is turned counterclockwise



WRE91 SR013

When the steering wheel is turned counterclockwise, V1 of No 1 flap valve opens and V3 of No 2 flap valve almost closes Thus, the oil flows along the oil groove in the outer ring, the oil channel in the valve body and housing, that of the steering gear housing eventually entering the chamber on the left side of the power piston to push the piston to the right

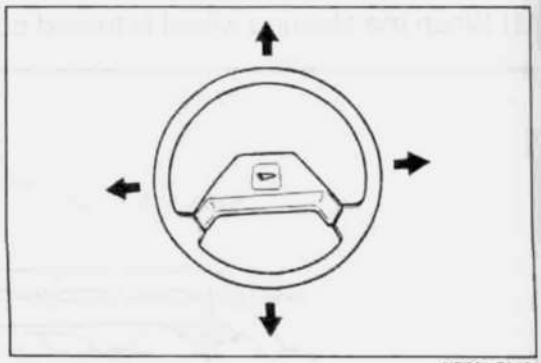


WRE91 SR020

IN-VEHICLE INSPECTION

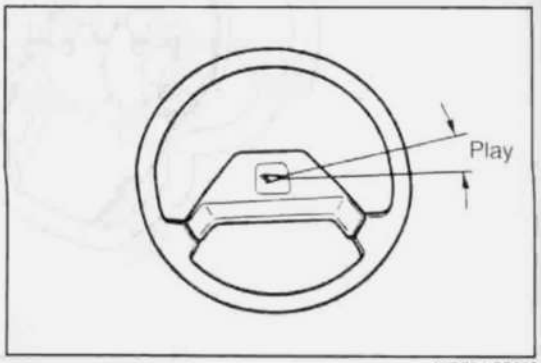
(Except power steering-equipped models)

1. Check of steering wheel
   Move the steering wheel in an axial direction and/or in a perpendicular direction so as to ensure no looseness and/or excessive play is present.
   If any looseness and/or excessive play is present, check the steering wheel for improper installing condition. Repair any defective parts.


WRE91-SR021

2. Check of steering wheel for free play
   (1) Set the steering wheel to a straight-ahead state.
   (2) Turn the steering wheel clockwise and counterclockwise. Measure the steering wheel movement at the circumference of the steering wheel which is registered before the steering tires start to be steered. Ensure that this steering wheel play is not more than the specified value.
   Specified Value: 30 mm

   If not, check each joint section for excessive play. If the joints are satisfactory, replace the steering gear box.
   If the joint sections exhibit defects, such as excessive play, replace the defective parts.

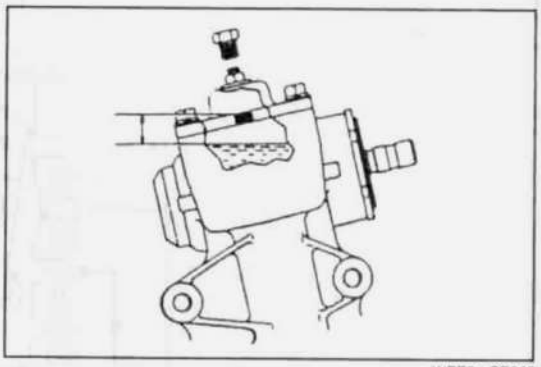


WRE91-SR022

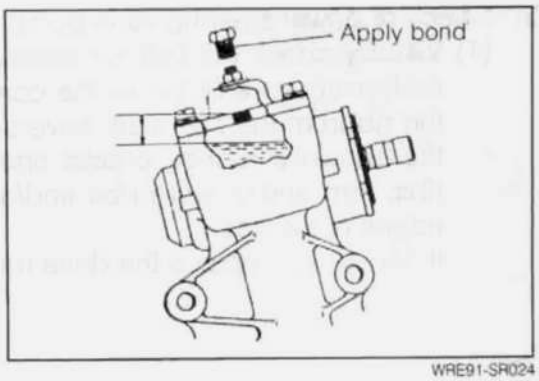
3. Check of steering gear box fluid level
   (1) Remove the fluid level check plug of the steering gear box.
   (2) Check the fluid level by inserting a clean screwdriver, etc. from the check hole. Ensure that the height from the fluid level to the upper edge of the check hole center conforms to the specified value.
   Specified Level: 13 - 23 mm

   If not, ensure that the steering gear box exhibits no fluid leakage. Replenish the specified fluid to the upper level.
   Specified Fluid: Gear oil API GL-3, SAE90

   If any fluid leakage is present, replace the steering gear box.

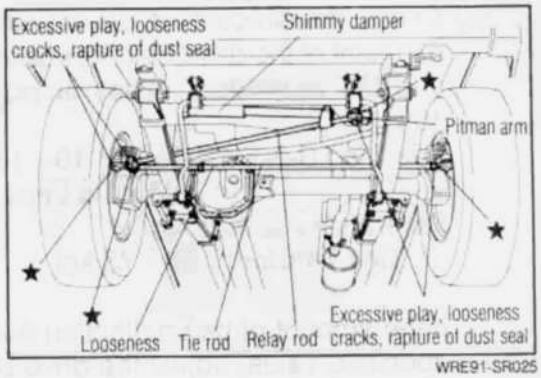

WRE91-SR023

(3) Clean the plug and plug hole. Furthermore, apply Three Bond® 1216 to the threaded portion of the plug. Tighten the plug to the specified torque.
Tightening Torque: 2.9 - 4.9 N·m (0.3 - 0.5 kgf-m, 2.2 - 3.6 ft-lb)



WRE91-SR024

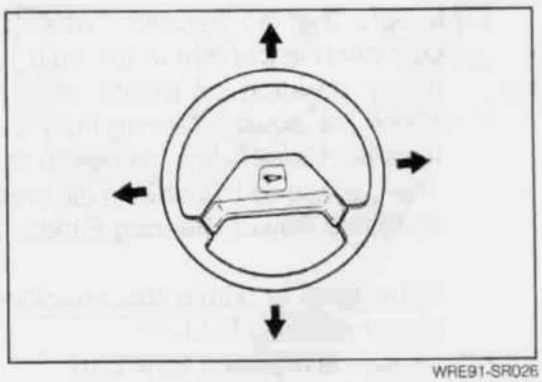
4. Check of steering linkage and gear housing
(1) Ensure that the steering linkage exhibits no excessive play and/or looseness.
If any excessive play and/or looseness is present, check and/or repair the defective parts.
(2) Ensure that the dust seals exhibits no damage. (Points bearing a "★" mark in the right figure.)
Replace any defective dust seal.
(3) Ensure that the steering gear housing exhibits no fluid leakage.
If any fluid leakage is present, replace the steering gear housing.



WRE91-SR025

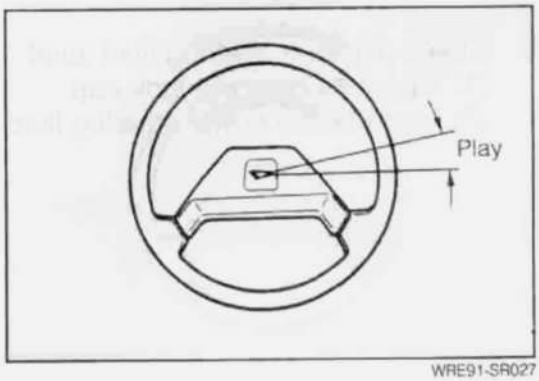
(Power steering-equipped models)

1. Check of steering wheel
Move the steering wheel in an axial direction and/or in a perpendicular direction so as to ensure that no looseness and/or excessive play is present.
If any looseness and/or excessive play is present, check the steering gear for improper installing condition. Repair any defective parts.


WRE91-SR026

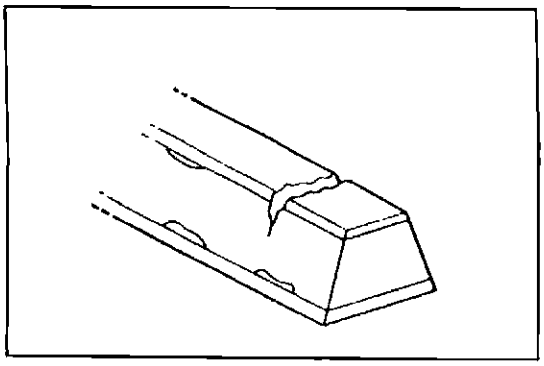
2. Check of steering wheel free play
(1) Set the steering wheel to a straight-ahead state.
(2) Turn the steering wheel clockwise and counterclockwise.
Measure the steering wheel movement at the circumference of the steering wheel which is registered before the steering tires start to be steered. Ensure that this steering wheel play is not more than the specified value.
Specified Value: 30 mm

If not, check each joint section for excessive play. If the joints are satisfactory, replace the steering gear box.
If the joint sections exhibit defects, such as excessive play, replace the defective parts.



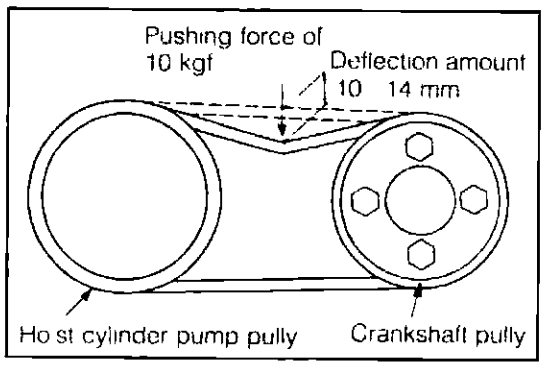
WRE91-SR027

3 Check of power steering vane pump drive belt
(1) Visually check the belt for separation of the adhesive rubber above and below the core, core separation of the rib from the belt side, severed core, separation of the adhesive rubber, cracks and/or separation of the ribs, torn and/or worn ribs and/or cracks in the inner ridges of the ribs
If necessary, replace the drive belt.


WRE91-SR028

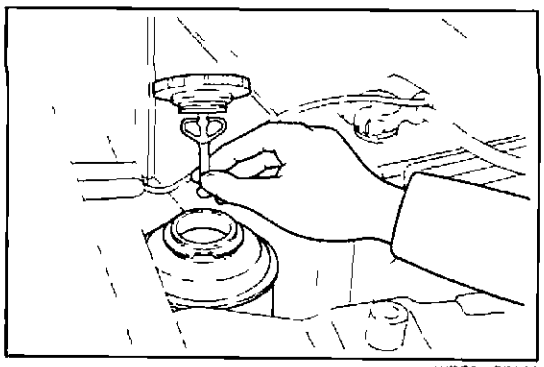
(2) Check the amount of drive belt deflection when the midpoint of the drive belt between the vane pump pulley and the crankshaft pulley is pushed with a force of 10 kgf
Specified Belt Deflection: 10 - 14 mm
[When a force of 10 kgf is applied.]
Reference:
Belt Tension: 50 - 75 kgf

If the amount of belt deflection does not conform to the specified value, adjust the drive belt tension.



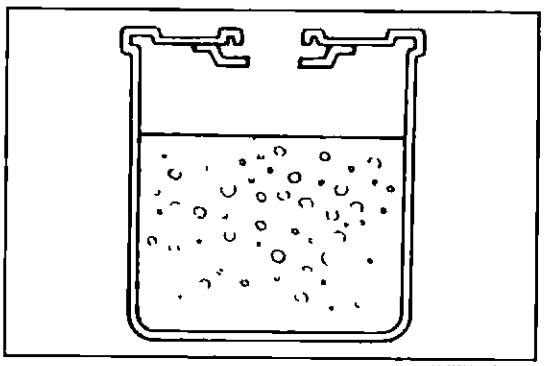
WRE91-SR029

4. Check of power steering fluid
(1) Open the reservoir tank cap
(2) Ensure that the power steering fluid viscosity is not low abnormally
If the viscosity is low abnormally, change the power steering fluid

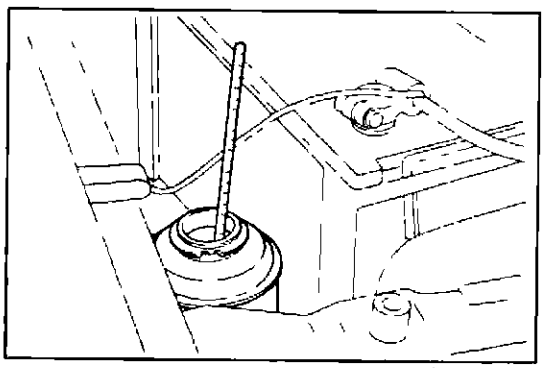

WRE91-SR030

(3) Ensure that no aeration, whitish cloudy state or discoloration is present in the fluid.
If any aeration or whitish cloudy state is observed, check the power steering fluid level.
If the fluid level is low, replenish the power steering fluid
Then, proceed to perform air bleeding.
Specified Power Steering Fluid: ATF DEXRON® II

If the level is within the specified range, change the power steering fluid
(4) Close the reservoir tank cap


WRE91 SR031

5 Check of power steering fluid level
(1) Open the reservoir tank cap.
(2) Measure the power steering fluid temperature


WRE91 SR032

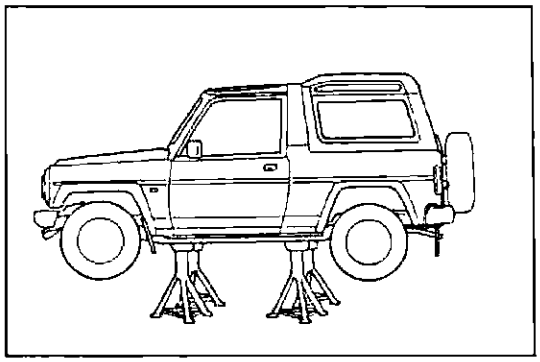
(3) When the power steering fluid temperature is with in the range of 0 to 40°C or 40 - 80°C, check to see if the fluid level is within the specified range corresponding to the measured temperature condition.

NOTE:

- **The term "cold" represents a range of 0 - 40°C.**
- **The term "hot" represents a range of 40 - 80°C.**

If the fluid level is low, replenish the specified power steering fluid up to the upper level
Specified Power Steering Fluid: ATF DEXRON® II

WRE91-SR033



WRE91-SR034

(4) Close the reservoir tank cap

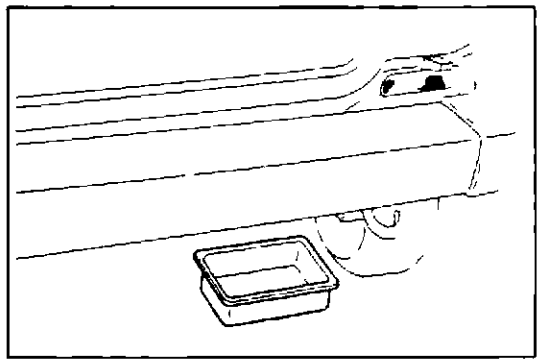
6 Power steering fluid change procedure

CAUTION:

- **Never start the engine while the power steering fluid is being drained.**

(1) Place the vehicle on a level floor Jack up the vehicle and support it with safety stands
(See page GI section)

(2) Place a suitable container below the return hose connecting section



WRE91-SR035

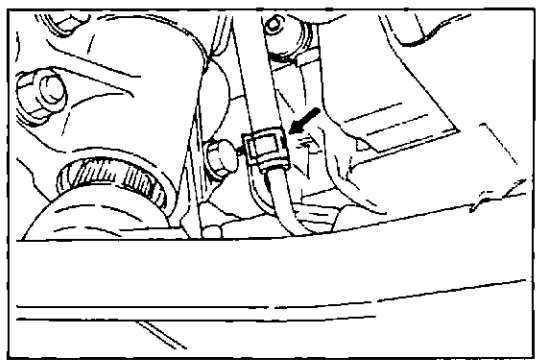
(3) Detach the return hose clamp Drain the fluid by disconnecting the return hose from the return pipe

CAUTION:

- **When disconnecting the return hose, special caution must be paid as to the flowing fluid.**

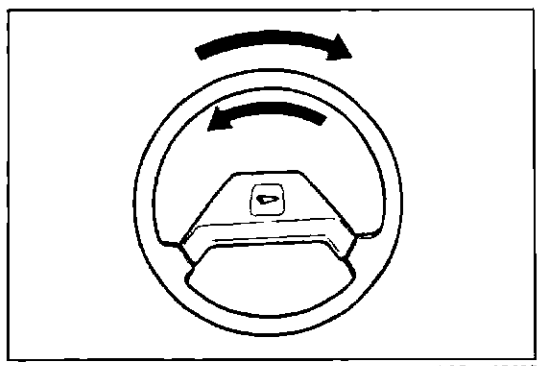
NOTE:

- **Be very careful not to deform the return pipe.**



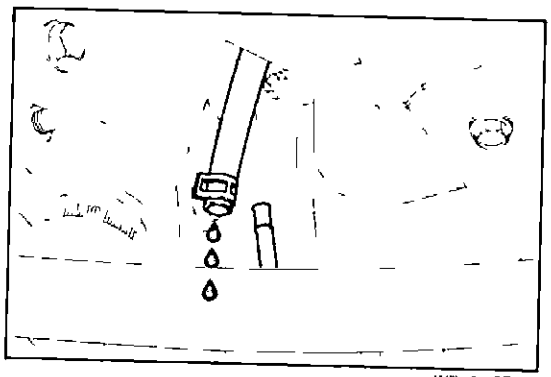
WRE91-SR036

(4) Turn the steering wheel fully clockwise or counterclockwise from the lock to the lock several times so as to drain the fluid inside the steering gear box



WRE91-SR037

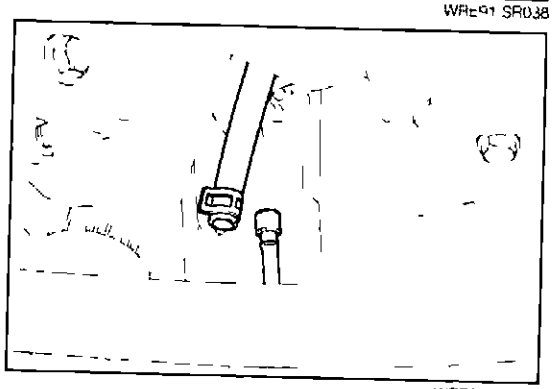
NOTE.
- When the steering wheel is turned fully from the lock to the lock, be certain to hold the steering wheel for four to five seconds at the fully turned state.
- Make sure that the fluid no longer flows from the return hose.


WRE91 SR038

(5) Pour the power steering fluid into the reservoir tank, until the fluid starts to flow from the return pipe. When the fluid starts flowing from the return pipe, install a blank plug to the return pipe

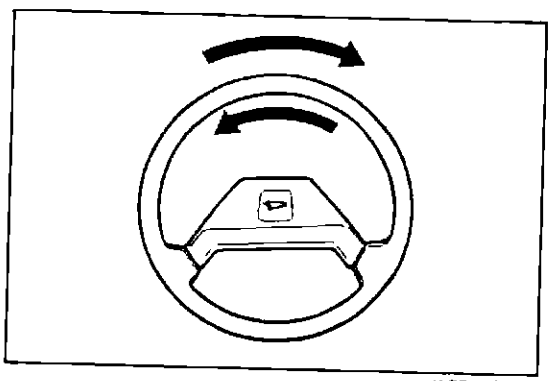
NOTE.
- Make sure that the power steering fluid will not run out from the reservoir tank.
- When the fluid starts flowing from the return pipe, allow about 100 cc of fluid to flow out so that the old fluid may be drained completely.

Specified Power Steering Fluid: ATF DEXRON® II


WRE91 SR039

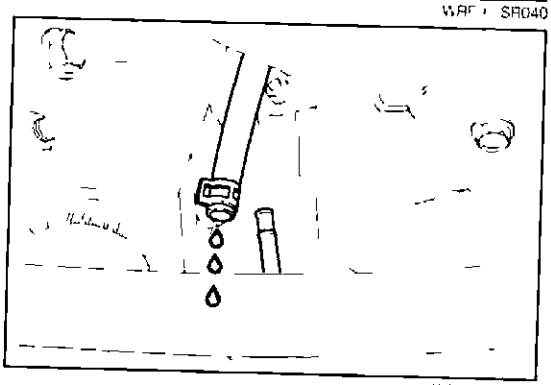
(6) While replenishing the power steering fluid to the reservoir tank approximately up to the upper level in the COLD range, keep turning the steering wheel fully clockwise and counterclockwise from the lock to the lock

NOTE:
- Make sure that the power steering fluid will not run out from the reservoir tank.
- When the steering wheel is turned fully from the lock to the lock, be certain to hold the steering wheel for four to five seconds at the fully turned state.
- Turn the steering wheel as quickly as possible. Do not stop the steering wheel midway nor turn the steering wheel reversely.


WRE91 SR040

(7) Turn the steering wheel fully clockwise and counterclockwise from the lock to the lock, until about 100 cc of the power steering fluid flows from the return hose

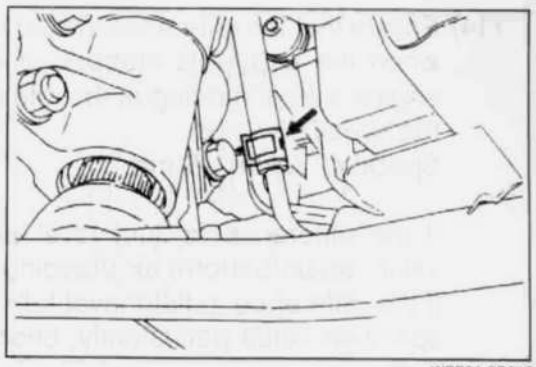
NOTE:
- Make sure that the power steering fluid will not run out from the reservoir tank.


WRE91 SR041

(8) Remove the blank plug from the return pipe. Connect the return hose to the return pipe and install the hose clamp.

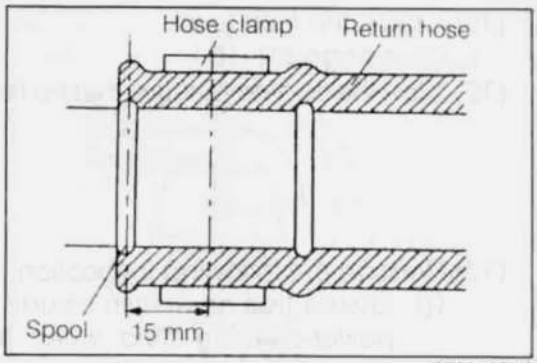
NOTE:

- Make sure that the power steering fluid will not run out from the reservoir tank.



WRE91-SR042

- Correctly clamp the return hose as shown in the right figure.
- Be sure to install the return hose so that the distance from the center of the hose clamp to the edge of the spool becomes 15 ± 2 mm.

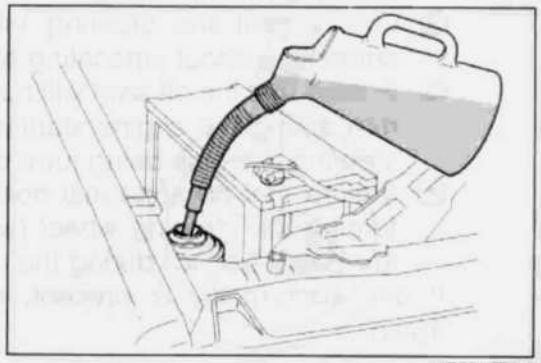


WRE91-SR043

(9) Replenish the power steering fluid to the reservoir tank approximately up to the upper level in the COLD range.
Specified Power Steering Fluid: ATF DEXRON® II

NOTE:

- If the oil temperature is above 40°C, fill the power-steering fluid up to the upper level in the HOT level.



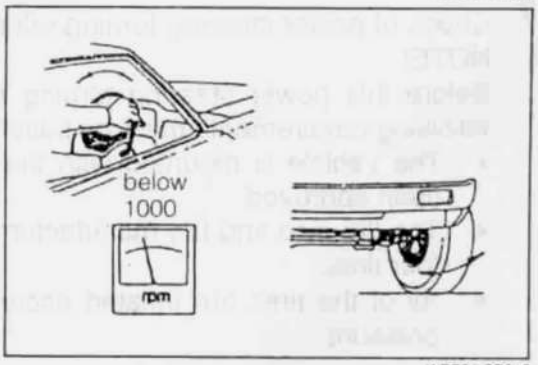
WRE91-SR044

(10) Start the engine. Keep running the engine at the idle speed.

(11) Turn the steering wheel fully either to the right or to the left. Hold the steering wheel for two to three seconds at the fully turned state. Then, turn the steering wheel in the opposite direction and hold it for two to three seconds.

NOTE:

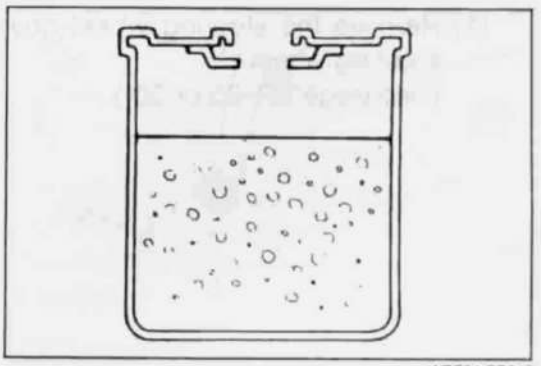
- Make sure that the power steering fluid will not run out from the reservoir tank.



WRE91-SR045

(12) Repeat the operations described in the step (11) onward three or four times.

(13) Ensure that no aeration or whitish cloudy state is present at the power steering fluid in the reservoir tank.
If any aeration and/or whitish cloudy state is observed, stop the engine. Wait for about ten minutes. Again, repeat the operations described in (10) onward.



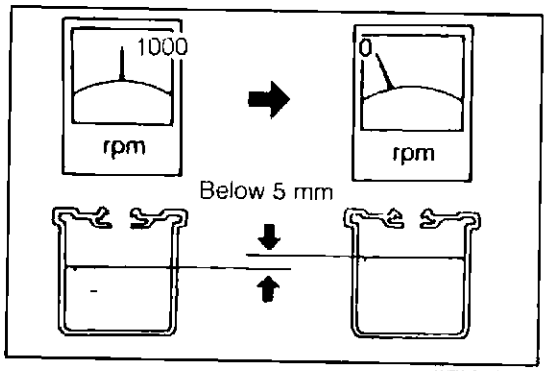
WRE91-SR046

(14) Ensure that the difference in fluid level between the time when the engine is stopped and the time when the engine is kept running at the idle speed will not exceed the specified value.
Specified Value: 5 mm

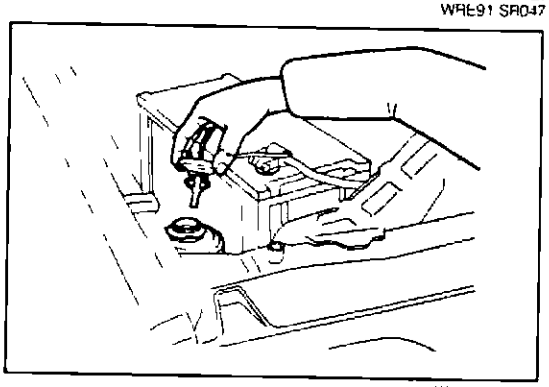
If the difference in fluid level exceeds the specified value, again perform air bleeding
If the difference in fluid level fails to become within the specified value persistently, check the hydraulic pressure

(15) Check the fluid level
(See page SR–16)

(16) Start the engine Ensure that no fluid leakage is present.



WRE91 SR047


WRE91-SR048

(17) Perform the following inspection
① Ensure that no whitish cloudy state is present in the power-steering fluid when the engine revolution speed is raised quickly
② Ensure that the steering wheel can be turned smoothly without emanating abnormal noise
③ Ensure that the oil level will not change more than 5 mm during the engine starting period or when the steering wheel is being turned
④ Ensure that no abnormal noise is emanated when turning the steering wheel (when the front wheels are being turned) during the running

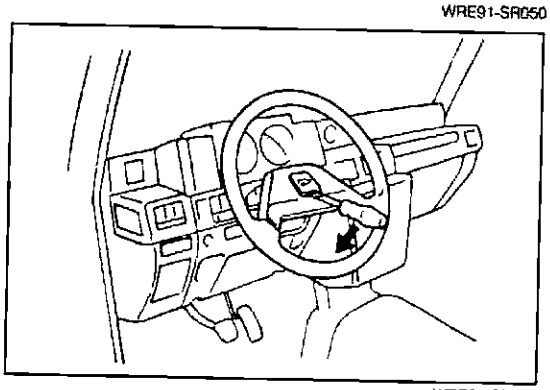
If any abnormality is present, perform air bleeding again

WRE91 SR049

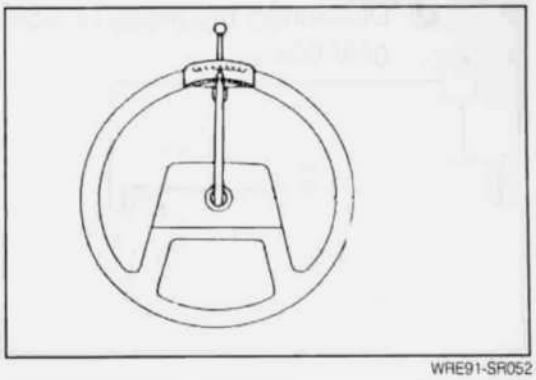
7 Check of power steering turning effort
NOTE:
Before this power steering turning effort is checked, the following requirements must be satisfied in advance.
- **The vehicle is mounted with the tires whose use has been approved.**
- **The tire size and tire manufacturer are the same on all four tires.**
- **All of the tires are inflated accurately to the specified pressure.**

(1) Remove the steering wheel cover assembly from the steering wheel
(See page SR–25 or 30.)

WRE91-SR050

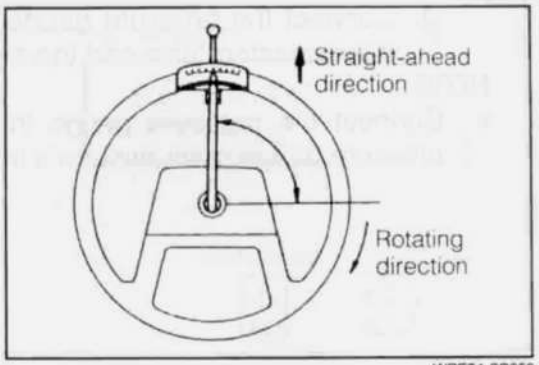

WRE91 SR051

(2) Start the engine. Keep running the engine at the idle speed.
(3) Set the steering wheel to a straight-ahead condition.
(4) Install a torque wrench to the steering wheel attaching nut.


WRE91-SR052

(5) Measure the maximum steering torque which is registered while the steering wheel is being turned slowly one-fourth turn in the clockwise direction by means of the torque wrench. Ensure that this maximum turning effort will not exceed the specified value.
Specified Value: 7.8 N·m (80 kgf-cm, 5.8 ft-lb)

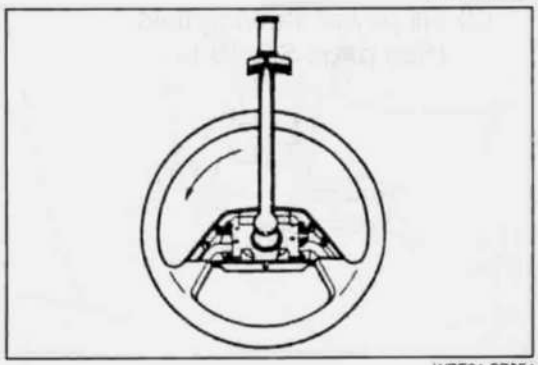
If not, perform the power steering hydraulic pressure check.
If the results of the hydraulic pressure check are satisfactory, check the following items given below:
Steering gear box preload, operating conditions of each steering linkage, steering shaft ball joints and/or operating conditions of universal joints.



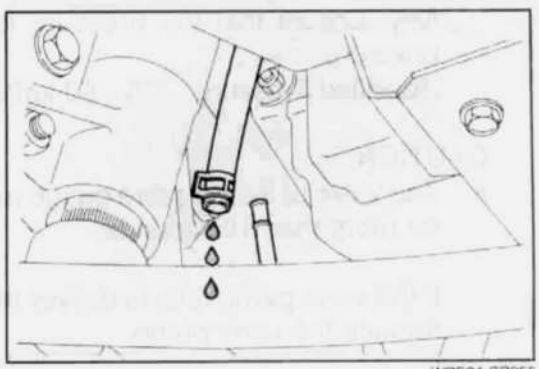
WRE91-SR053

(6) Set the steering wheel to a straight-ahead condition.
(7) Measure the maximum steering torque which is registered while the steering wheel is being turned one-fourth turn slowly in the counterclockwise direction by means of the torque wrench. Ensure that this maximum turning effort will not exceed the specified value.
Specified Value: 7.8 N·m (80 kgf-cm, 5.8 ft-lb)

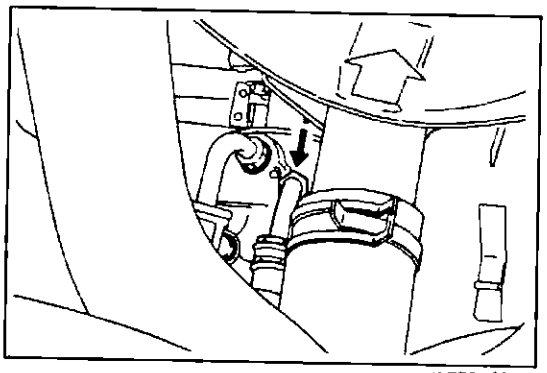
If not, perform the power steering hydraulic pressure check.
If the results of the hydraulic pressure check are satisfactory, check the following items given below:
Steering gear box preload, operating conditions of each steering linkage, steering shaft ball joints and/or operating conditions of universal joints.


WRE91-SR054

8. Check of power steering hydraulic pressure
(1) Installation of pressure gauge
① Drain the power steering fluid.
(See page SR–17, step (1) to step (4).)


WRE91-SR055

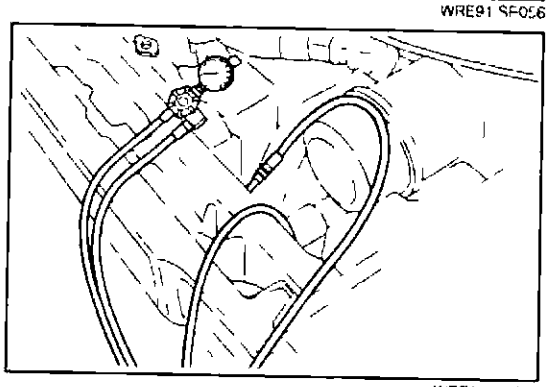
② Disconnect the pressure side tube from the steering gear box


WRE91 SR056

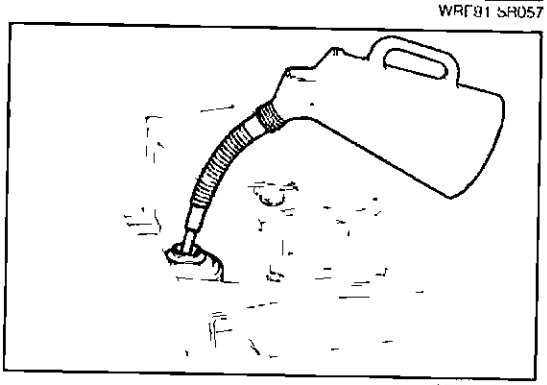
③ Connect the pressure gauge midway between the disconnected tube and the steering gear box

NOTE:

- **Connect the pressure gauge in accordance with the pressure gauge manufacturer's instructions.**

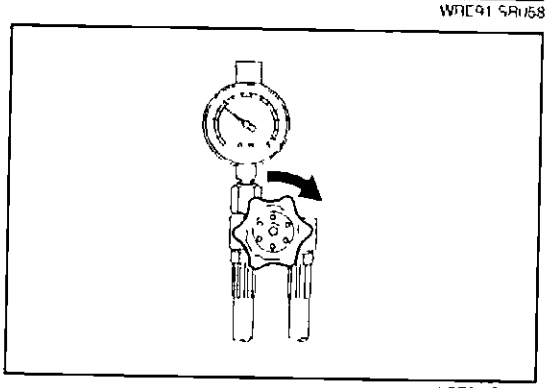

WRE91 SR057

(2) Fill power steering fluid.
(See page SR-19)

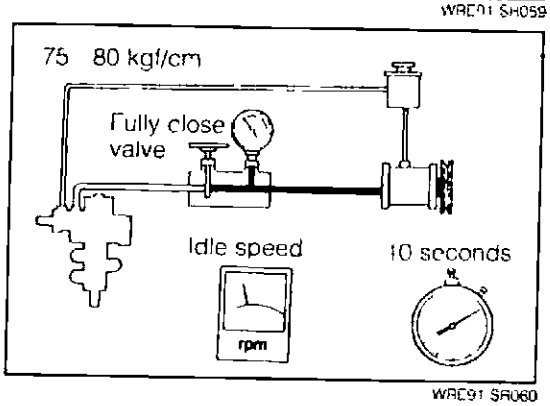

WRE91 SR058

(3) Start the engine

(4) With the valve of the pressure gauge closed and while maintaining the line pressure at 40 to 50 kg/cm^2, warm up the power steering fluid, until its temperature reaches 80°C.


WRE91 SR059

(5) Check of vane pump hydraulic pressure
Close the valve of the pressure gauge temporarily and fully Ensure that the pressure is within the specified pressure
Specified Pressure: 75 - 80 kgf/cm^2



WRE91 SR060

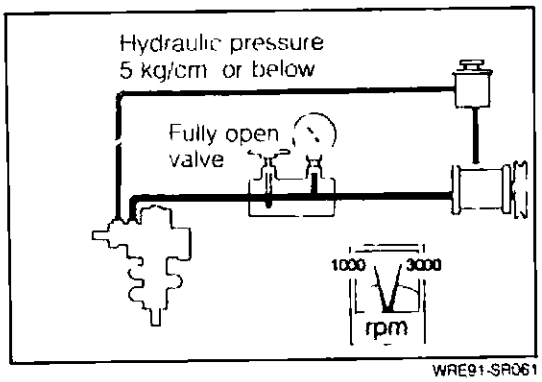
CAUTION:

- **The valve of the pressure gauge must not be kept closed for more than 10 seconds.**

If the vane pump fails to deliver the specified pressure, replace the vane pump

(6) Check of hydraulic pressure under unloaded state
① Open the valve of the pressure gauge fully.
② Set the steering wheel to a straight-ahead condition
③ Measure the hydraulic pressure at times when the engine speed is 1000 rpm and 3000 rpm, respectively Ensure that the difference in these pressures will not exceed the specified value
Specified Value: 5 kg/cm²

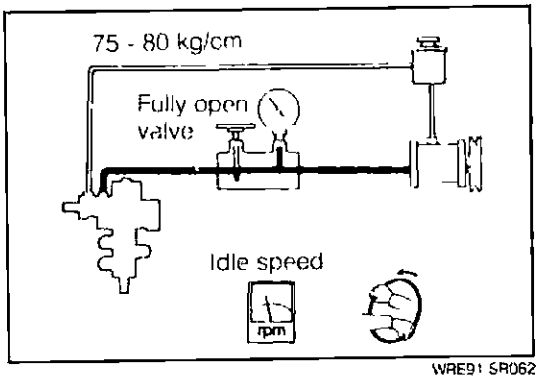
If the difference in pressure exceeds the specified value, replace the vane pump



WRE91-SR061

(7) Check of steering gear housing hydraulic pressure
① Open the valve of the pressure gauge fully
② Turn the steering wheel fully either clockwise or counterclockwise and hold the steering wheel at the fully turned state Ensure that the hydraulic pressure under this state with in the specified value
Specified Value: 75 - 80 kg/cm²

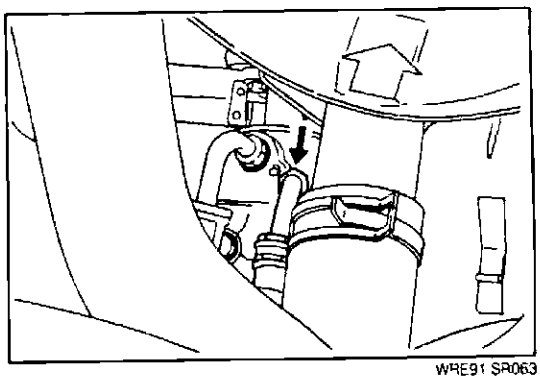
If the hydraulic pressure is below the specified value, replace the steering gear box



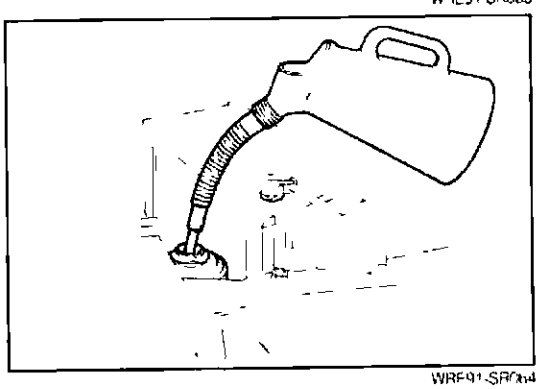
WRE91 SR062

(8) Remove the pressure gauge

(9) Connect the pressure side tube to the steering gear box
(See page SR-93)
Tightening Torque: 39.2 - 49.0 N·m
(4.0 - 5.0 kgf-m, 28.9 - 36.2 ft-lb)

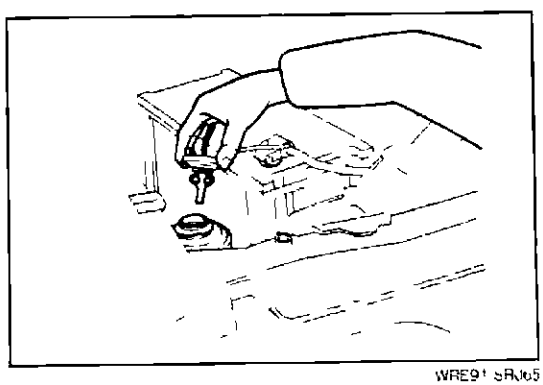

WRE91 SR063

(10) Replenish the power steering fluid to the reservoir tank
Perform air bleeding.
(For the air bleeding procedure, refer to page SR-19)


WRE91-SR064

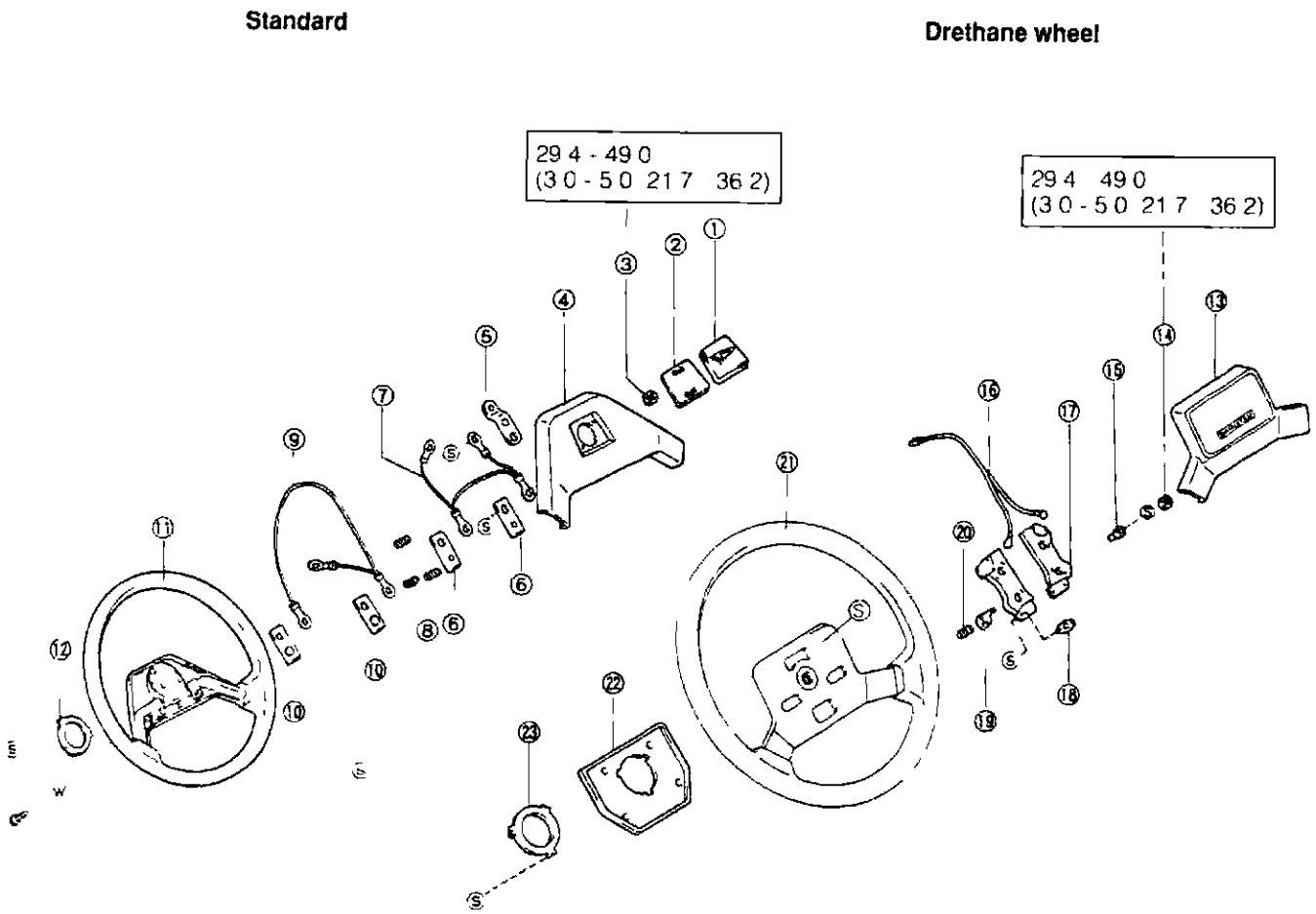
(11) Check the fluid level
(See page SR-16)

(12) Start the engine Ensure that no fluid leakage is present


WRE91 SR065

STEERING WHEEL

COMPONENTS



□ : Tightening torque
Unit : N m (kgf-m, ft-lb)

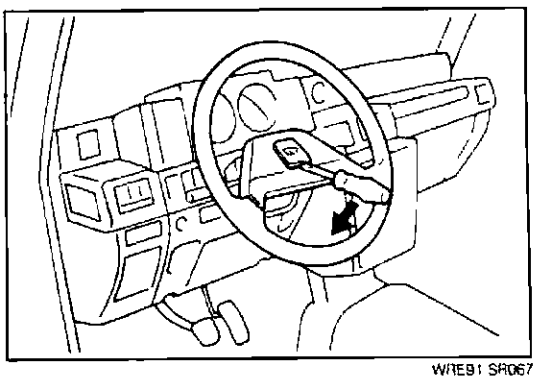
① Steering wheel ornament No 1
② Horn button cushion
③ Nut
④ Pad subassembly
⑤ Horn button stop plate
⑥ Horn button contact plate
⑦ Cord
⑧ Horn contact spring
⑨ Cord
⑩ Horn contact spring set plate
⑪ Steering wheel
⑫ Horn contact ring
⑬ Horn button assembly
⑭ Nut
⑮ Spacer
⑯ Cord
⑰ Horn button stop plate
⑱ Horn button contact seat
⑲ Horn contact plate spacer
⑳ Spring
㉑ Steering wheel
㉒ Steering wheel cover
㉓ Horn contact ring

WRE91 SR066

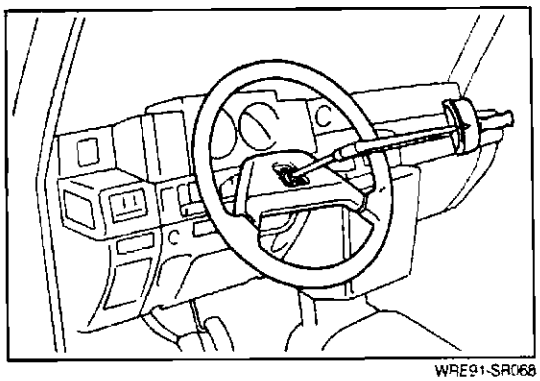
STANDARD STEERING WHEEL

REMOVAL

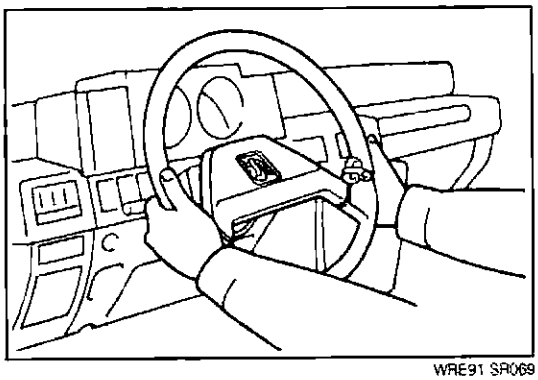
1 Remove the steering wheel ornament No 1 by prying it by means of a small standard screwdriver
NOTE:
- Be very careful not to damage the steering wheel.


WRE91 SR067

2 Loosen the steering wheel attaching nut two or three turns.

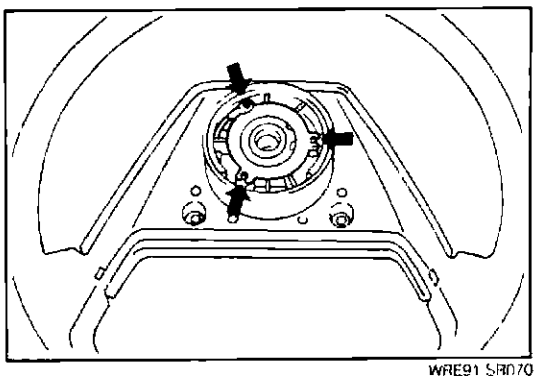

WRE91-SR068

3 Disconnect the steering wheel by applying an impact to it with palm of your hand.
4 Remove the steering wheel attaching nut
5 Remove the steering wheel.

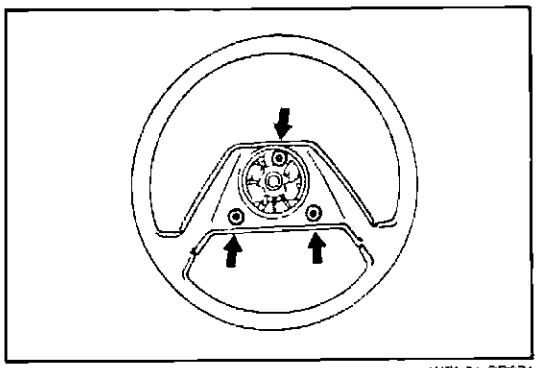

WRE91 SR069

DISASSEMBLY

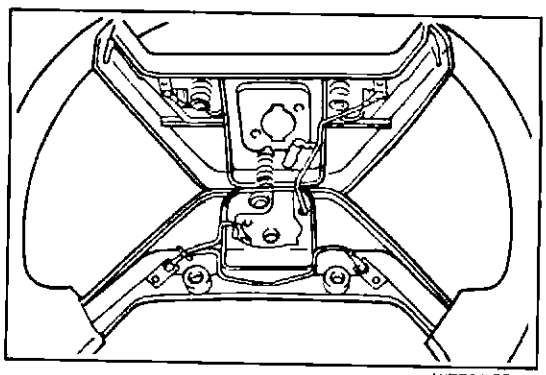
1 Remove the horn contact ring by removing the attaching screws


WRE91 SR070

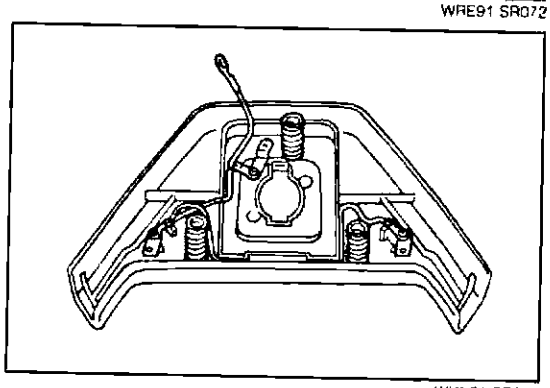
2 Remove the pad subassembly attaching screws


WRE91-SR071

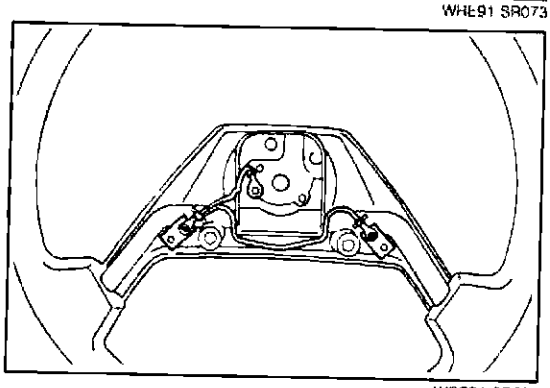
3 Remove the pad subassembly from the steering wheel
NOTE:
- Be very careful not to damage the wire during this operation.


WRE91 SR072

4 Remove the springs, wire, horn button contact plate and horn button stop plate from the pad subassembly

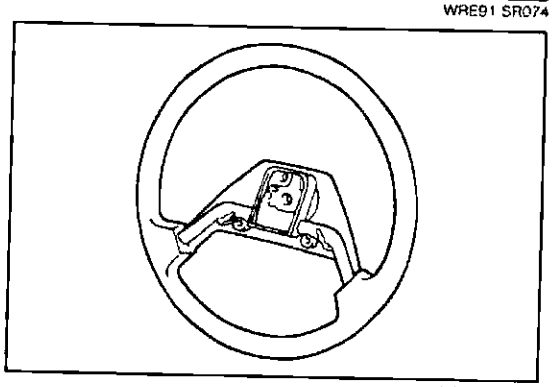

WRE91 SR073

5 Remove the wire and horn contact spring set plates from the steering wheel

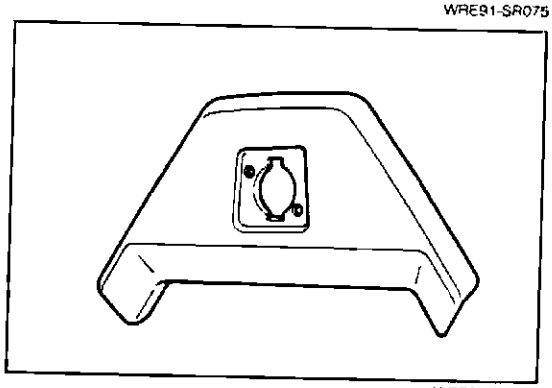

WRE91 SR074

INSPECTION

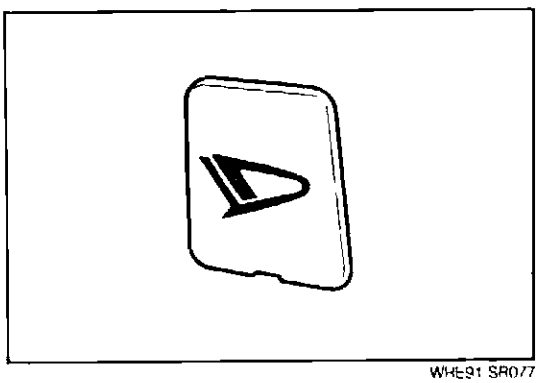
1 Ensure that the steering wheel exhibits no damage, such as cracks and wear
NOTE:
- Make sure that the serration section exhibits no damage.


WRE91-SR075

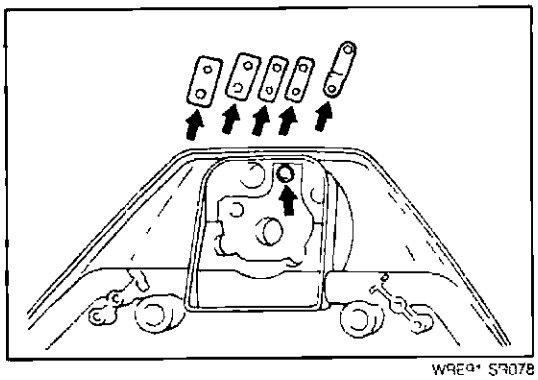
2 Ensure that the pad exhibits no damage, such as cracks.


WRE91-SR076

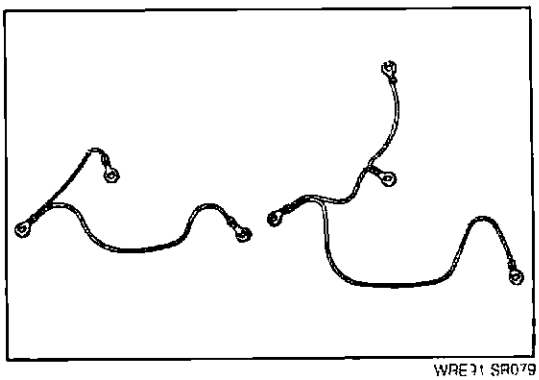
3 Ensure that the ornament exhibits no damage, such as cracks
4 Ensure that the horn button cushion is not deteriorated


WRE91SR077

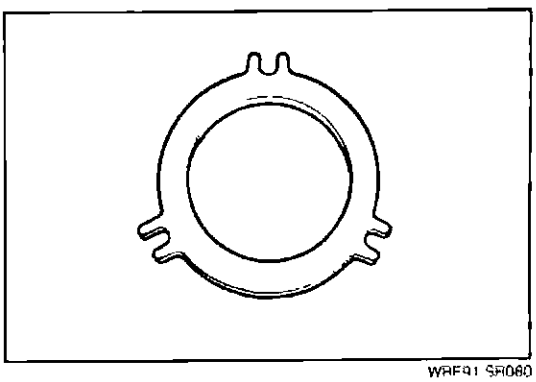
5 Ensure that each contact point section exhibits no damage, such as electrolytic corrosion.


WRE91SR078

6 Ensure that continuity exists between the terminals of each wire


WRE91SR079

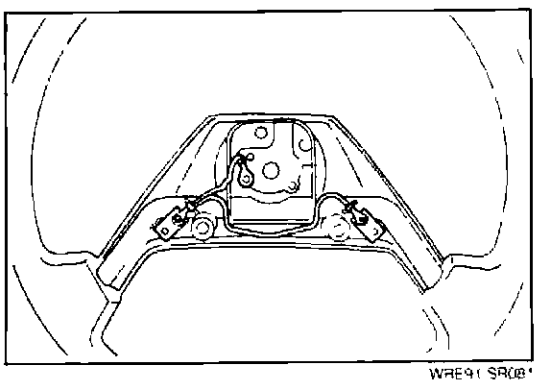
7 Ensure that the horn contact ring exhibits no damage, such as deformation, wear and electrolytic corrosion.


WRE91SR080

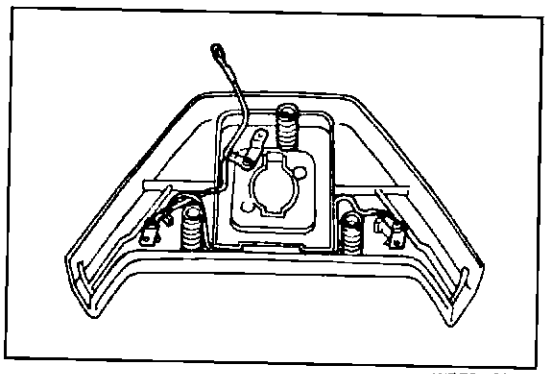
ASSEMBLY

1 Install the horn contact spring set plates to the steering wheel
NOTE:
- **Make sure that the point surface of the horn contact spring set plate faces upward during the installation.**

2 Connect the wire and tighten the attaching screw

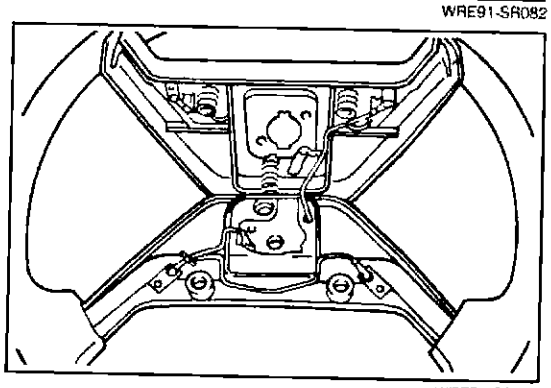

WRE91SR081

3 Install the horn button stop plate and horn button contact plate to the pad subassembly
NOTE:
- Make sure that the point surfaces of the horn button stop plate and horn button contact plate face upward during the installation.

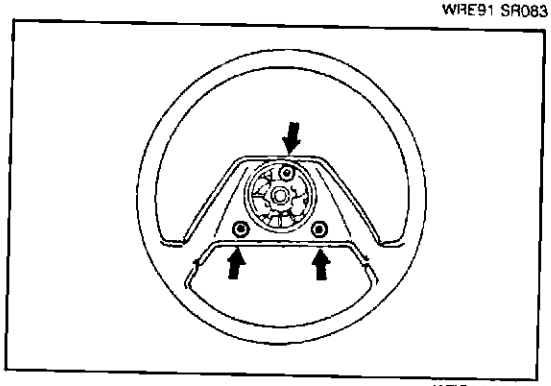

WRE91-SR082

4 Connect the wire and tighten the attaching screw
5 Install the springs to the pad subassembly

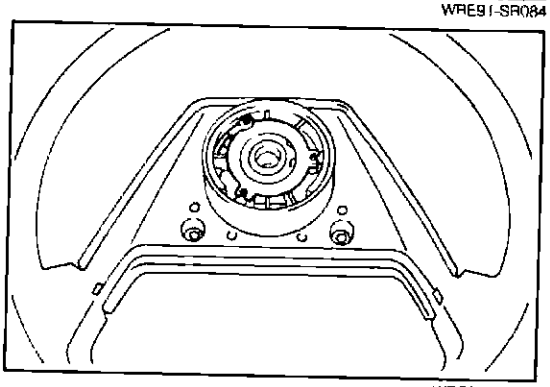
6 Pass the wire of the pad subassembly through the steering wheel Install the pad subassembly to the steering wheel


WRE91 SR083

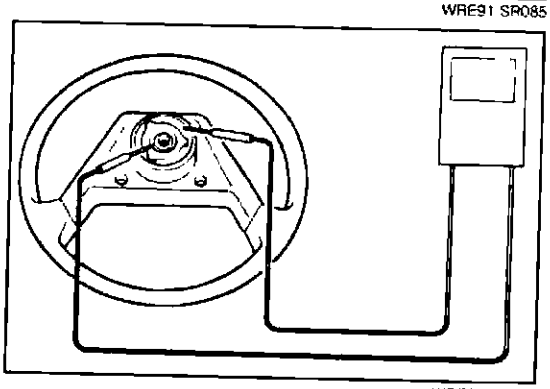
7 Install the pad subassembly attaching screws with new insulation washers interposed


WRE91-SR084

8 Install the horn contact ring to the steering wheel with the screws
NOTE:
- At this time, tighten the horn contact ring attaching screws together with the wire.

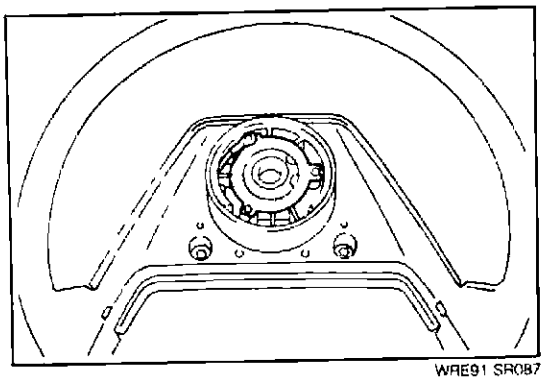

WRE91 SR085

9 Connect an ohm tester between the serration section and the horn contact ring of the steering wheel.
10 Ensure that continuity exists when the horn pad is pushed and that no continuity exists when the horn pad is not pushed

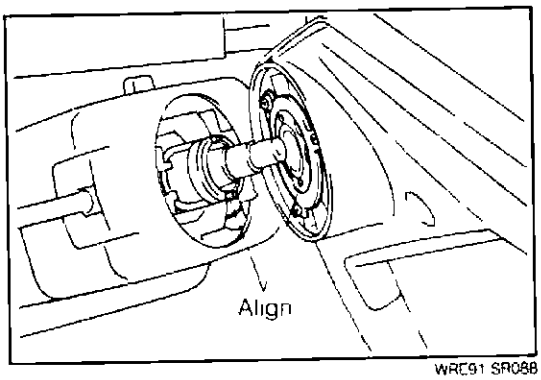

WRE91-SR086

INSTALLATION

1 Apply about two grams of rubber grease to the horn contact ring


WRE91 SR087

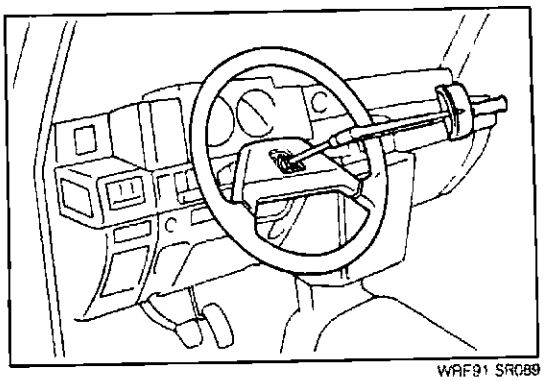
2 Align the hole of the steering wheel with the protruding section of the cancel cam. Install the steering wheel in such a way that it may be set to the straight-ahead position when the tires are in the straight-ahead position



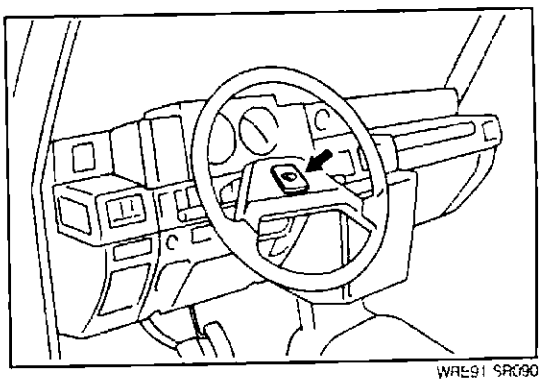
WRE91 SR088

3 Install a new steering wheel attaching nut and tighten it to the specified torque

Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m, 21.7 - 36.2 ft-lb)


WRE91 SR089

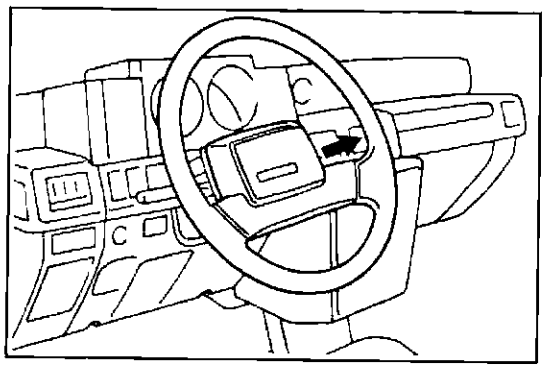
4 Fit the steering ornament No 1 to the steering wheel.


WRE91 SR090

URETHANE STEERING WHEEL

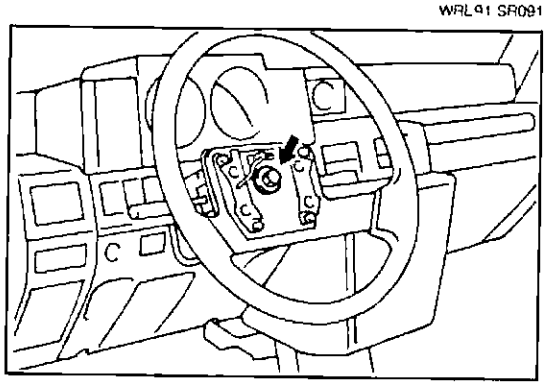
REMOVAL

1 Remove the horn pad by pulling it horizontally together with the steering shaft



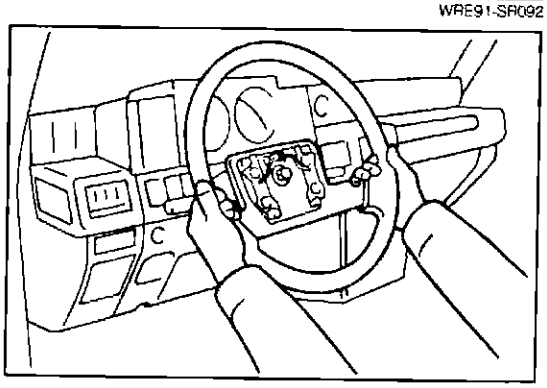
WRL91 SR091

2 Loosen the steering wheel attaching nut two or three turns



WRE91-SR092

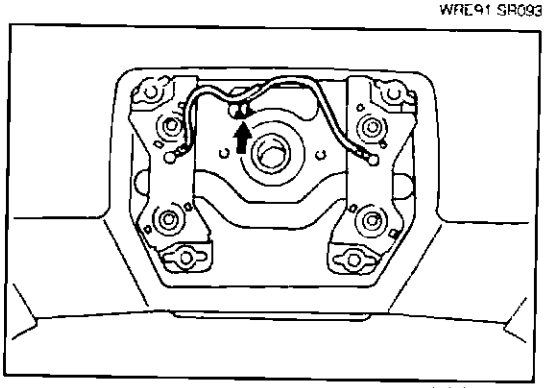
3 Disconnect the steering wheel by applying an impact to it with the palms of your hands
4 Remove the steering wheel attaching nut
5 Remove the steering wheel



WRE91 SR093

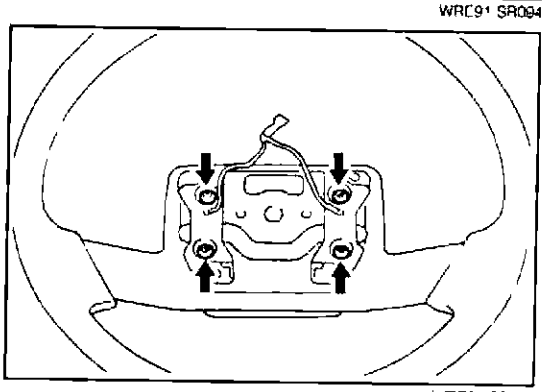
DISASSEMBLY

1 Disconnect the connector of the cord from the horn contact ring



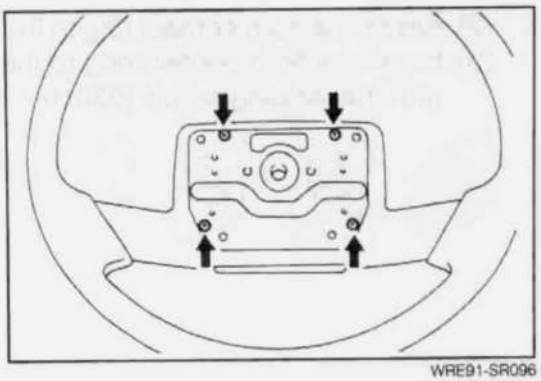
WRE91 SR094

2 Remove the horn button stop plates from the steering wheel by removing the attaching screws of the horn button stop plates together with the spacer

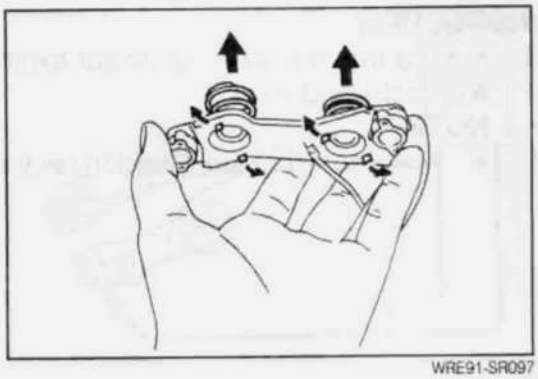


WRE91 SR095

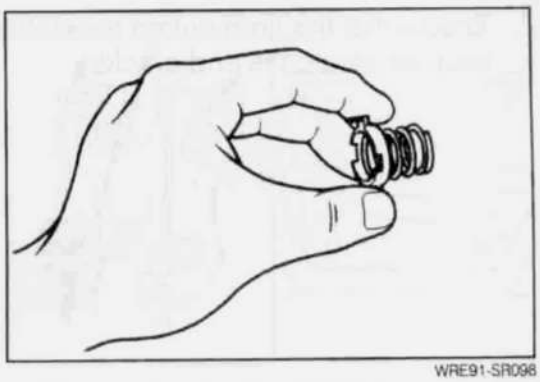
3. Remove the steering wheel cover from the steering wheel by removing the steering wheel cover attaching screws.


WRE91-SR096

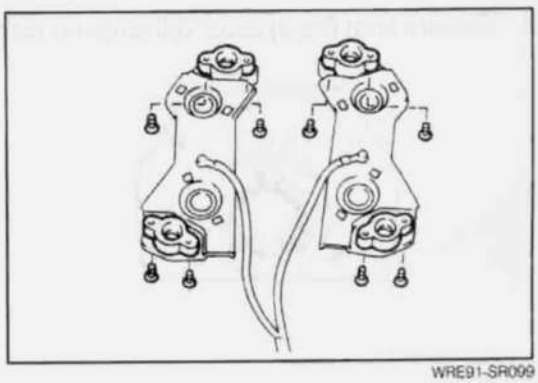
4. Remove the horn contact plate spacers together with the spring from the horn button stop plate.


WRE91-SR097

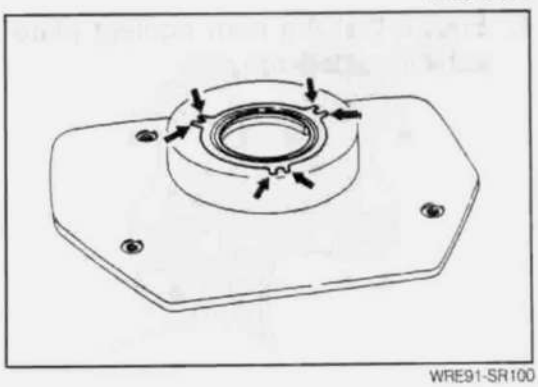
5. Remove the spring from the horn contact plate spacer by turning the spring counterclockwise.


WRE91-SR098

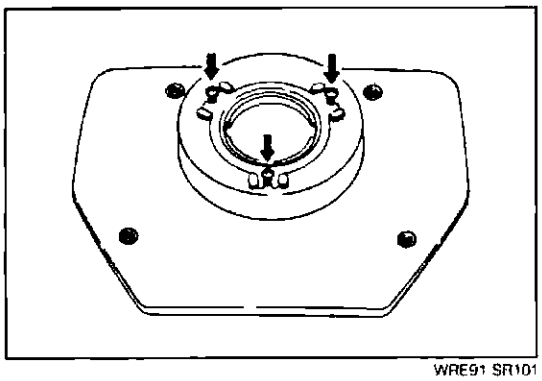
6. Remove the horn button contact seat from the horn button stop plate.


WRE91-SR099

7. Replace the horn contact ring.
   (Only as required)
   (1) Remove the horn contact ring by cutting off the horn contact ring installation staked section of the steering wheel cover by means of a cutting knife or the like.

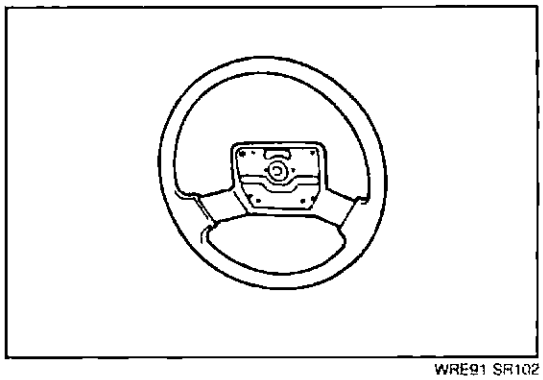

WRE91-SR100

(2) Attach the horn contact ring to the steering wheel cover
(3) Install the horn contact ring to the steering wheel cover with the tapping screw (93610-14012-000)

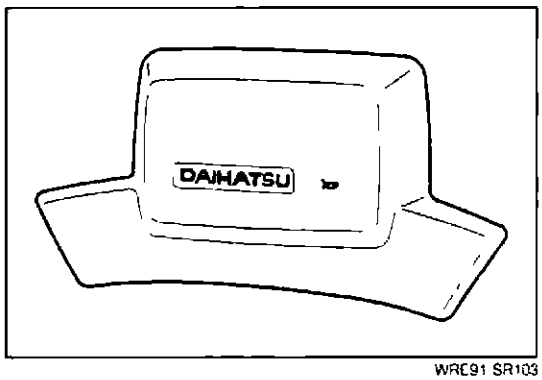

WRE91 SR101

INSPECTION

1 Ensure that the steering wheel exhibits no damage, such as cracks and wear
NOTE.
- Make sure that the serration section exhibits no damage.

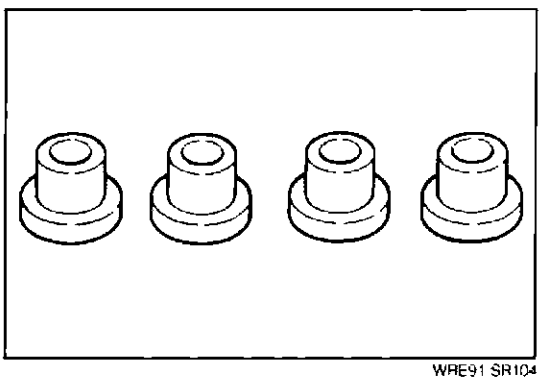

WRE91 SR102

2 Ensure that the horn button assembly exhibits no damage, such as scratches and cracks

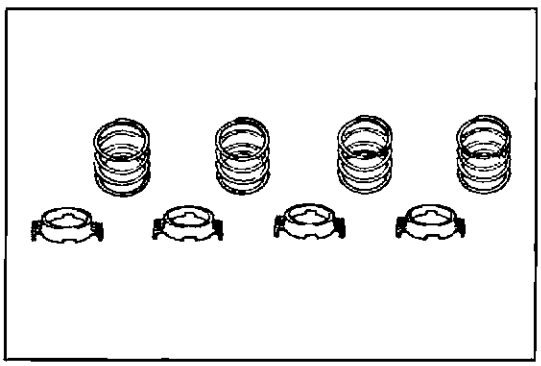


WRE91 SR103

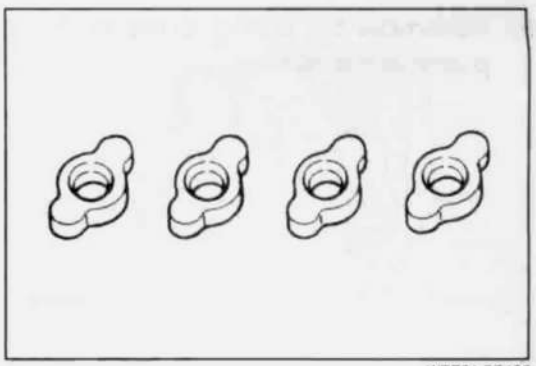
3 Ensure that the spacer exhibits no damage, such as cracks


WRE91 SR104

4 Ensure that the horn contact plate spacers and springs exhibit no damage

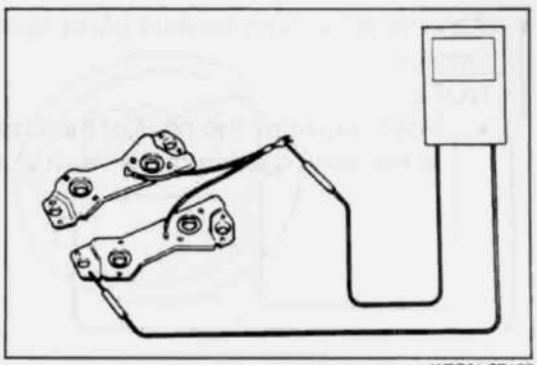

WRE91 SR105

5. Ensure that the horn button contact seat exhibits no damage, such as deformation and cracks.



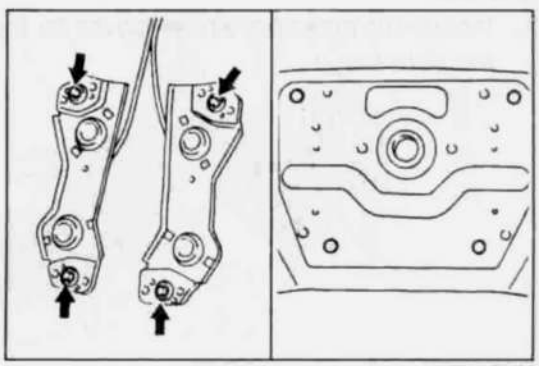
WRE91-SR106

6. Ensure that continuity exists between the cord terminal of the horn button stop plate and the horn button stop plate.
If no continuity exists, replace the cord.
When replacing the cord, remove the staked section by means of a drill or the like. Then, securely stake the cord to the horn contact plate with a new suitable rivet.



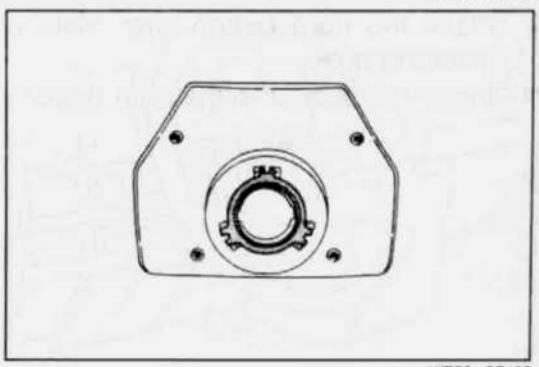
WRE91-SR107

7. Ensure that each contact point section exhibits no damage, such as electrolytic corrosion.



WRE91-SR108

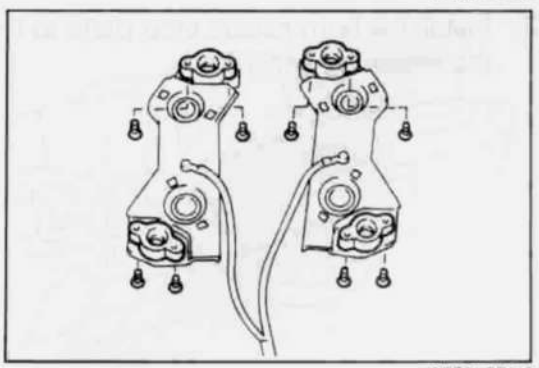
8. Ensure that the horn contact ring exhibits no damage, such as wear and electrolytic corrosion.
If the horn contact ring exhibits damage, replace the horn contact ring. (See page SR-31.)



WRE91-SR109

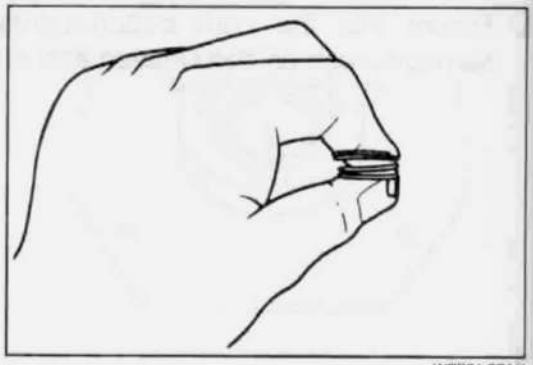
ASSEMBLY

1. Install the horn button stop plates to the horn button contact seat with the screws.



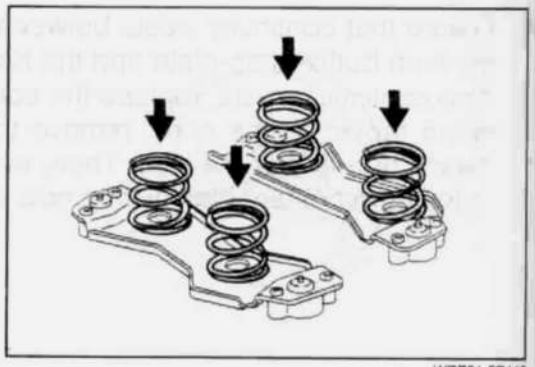
WRE91-SR110

2. Assemble the spring to the horn contact plate spacer by pushing the spring.



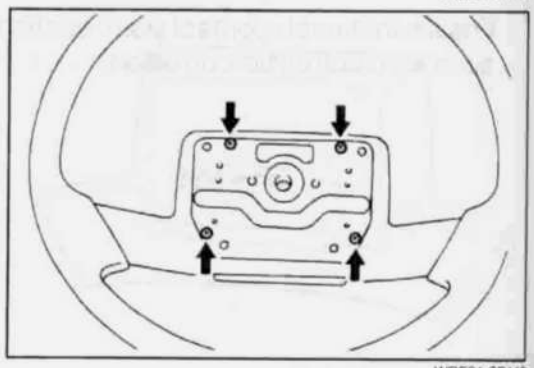
WRE91-SR111

3. Assemble the horn contact plate spacer to the horn button stop plate.
   NOTE:
   - Positively hook the pawl of the horn contact plate spacer to the pawl section of the horn button stop plate.



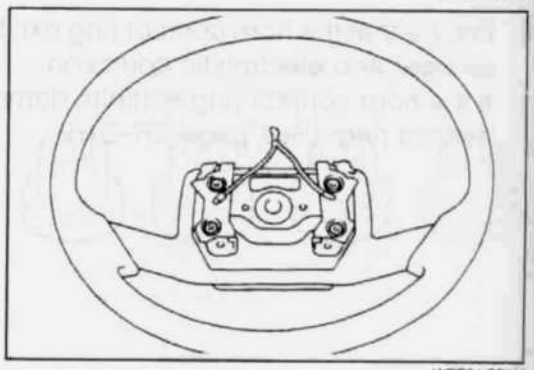
WRE91-SR112

4. Install the steering wheel cover to the steering wheel with the screws.



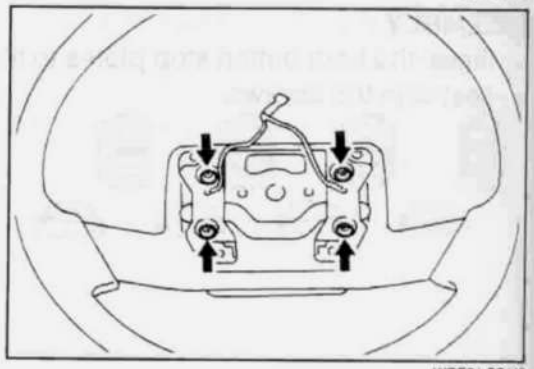
WRE91-SR113

5. Place the horn button stop plate on the steering wheel installing hole.
6. Install the spacer to the horn button stop plate.



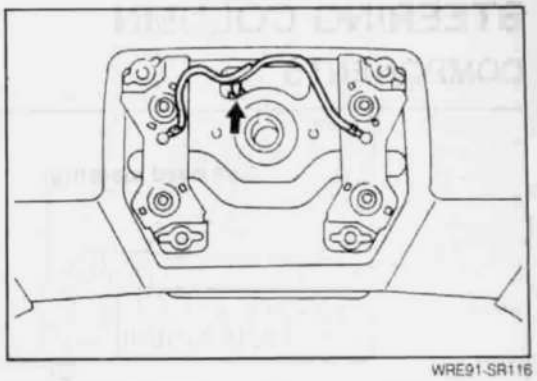
WRE91-SR114

7. Install the horn button stop plate to the steering wheel with the attaching screws.



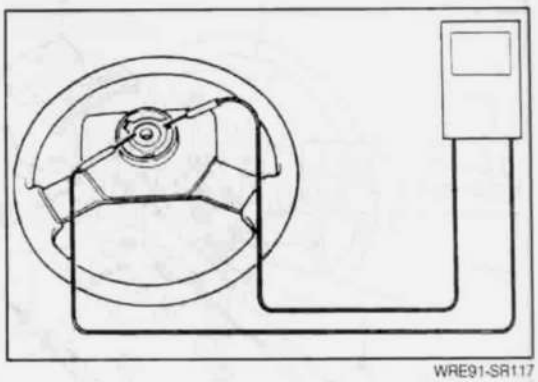
WRE91-SR115

8. Connect the connector of the cord to the horn contact ring.



WRE91-SR116

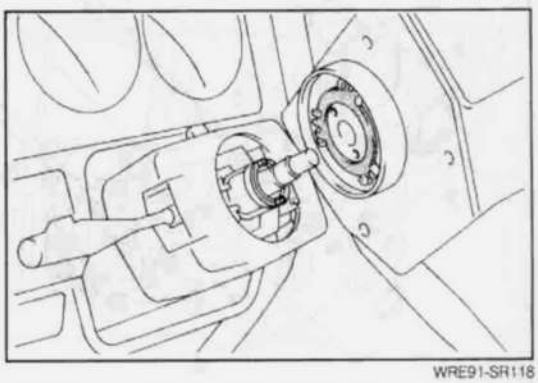
9. Connect an ohm meter between the serration section of the steering wheel and the horn contact ring. Ensure that continuity exists when the horn button stop plate is pushed and that no continuity exists when the horn button stop plate is not pushed.



WRE91-SR117

INSTALLATION

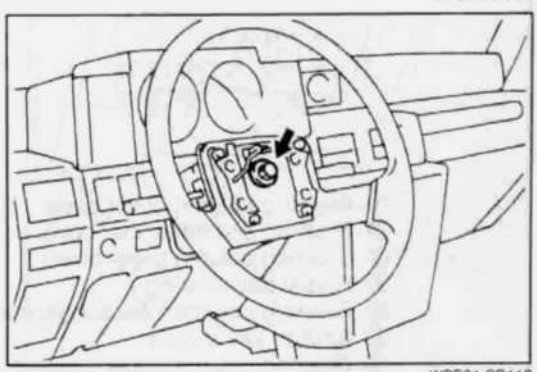
1. Apply about 2 grams of rubber grease to the horn contact ring.
2. Align the hole of the steering wheel with the protruding section of the cancel cam. Install the steering wheel in such a way that it may be set to the straight-ahead position when the tires are in the straight-ahead position.



WRE91-SR118

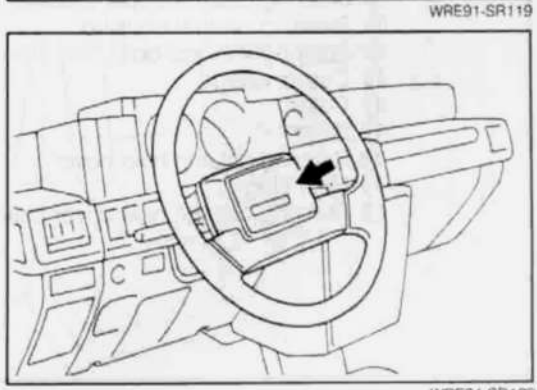
3. Install a new steering wheel attaching nut and tighten it to the specified torque.

   Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m, 21.7 - 36.2 ft-lb)



WRE91-SR119

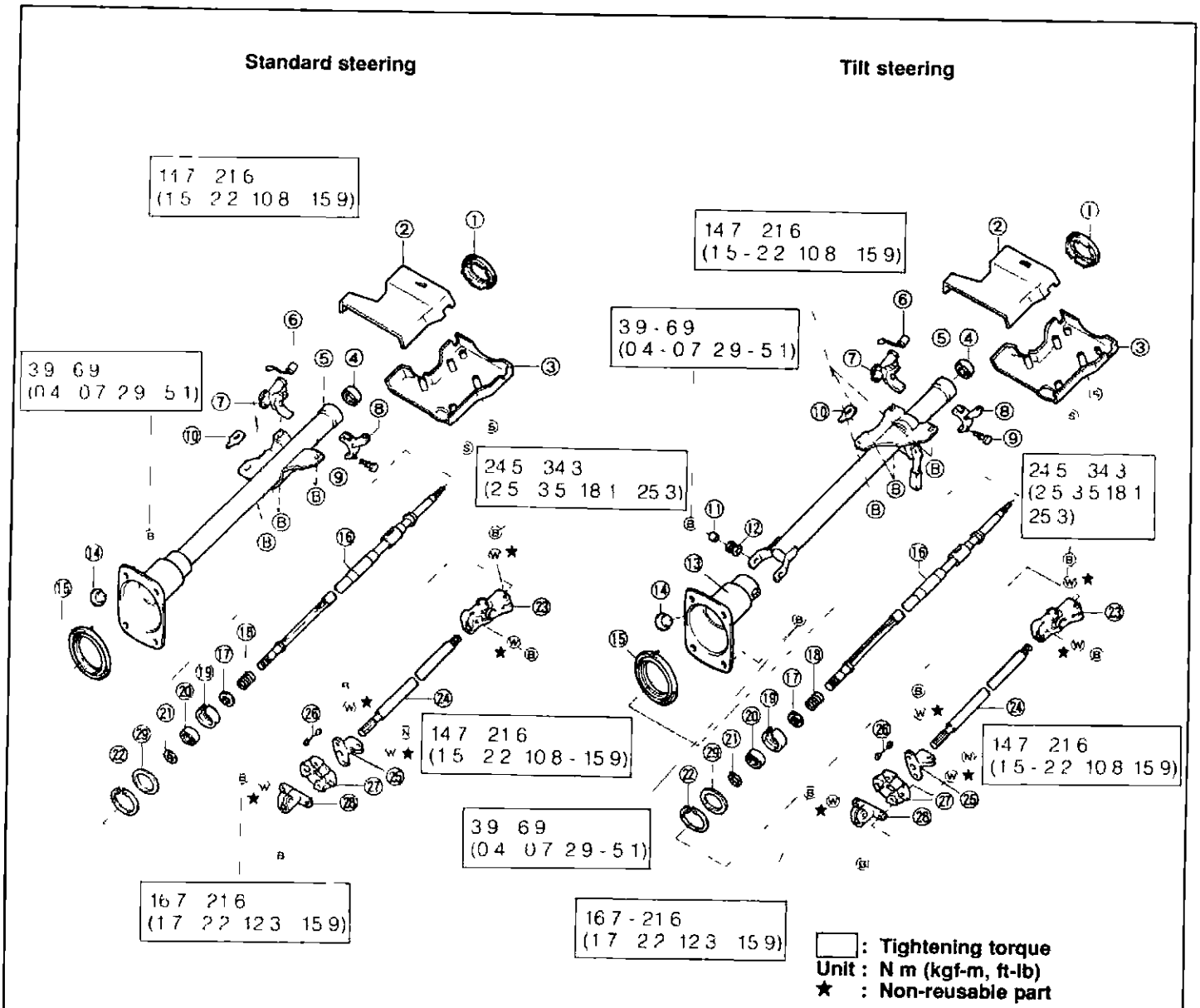
4. Install the horn button assembly while aligning it with the steering wheel attaching hole. Push the horn button assembly, until it is locked.



WRE91-SR120

STEERING COLUMN

COMPONENTS

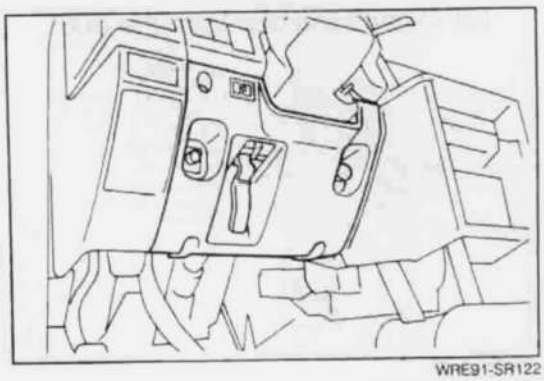


① Steering column cover plate
② Steering column upper cover
③ Steering column lower cover
④ Radial ball bearing
⑤ Steering column tube subassembly
⑥ Ignition key switch
⑦ Steering column upper bracket
⑧ Steering column housing
⑨ Steering lock set bolt
⑩ Caster wedge
⑪ Collar
⑫ Bush
⑬ Steering column hole cover
⑭ Hole plug
⑮ Steering column hole cover shield
⑯ Steering main shaft subassembly
⑰ Washer
⑱ Compression spring
⑲ Steering shaft thrust stopper
⑳ Radial ball bearing subassembly
㉑ Snap ring
㉒ Hole snap ring
㉓ Steering shaft universal joint assembly
㉔ Steering intermediate shaft
㉕ Main shaft flexible coupling yoke
㉖ Flexible coupling earth (Bond wire)
㉗ Flexible coupling assembly
㉘ Main shaft flexible coupling yoke
㉙ Washer

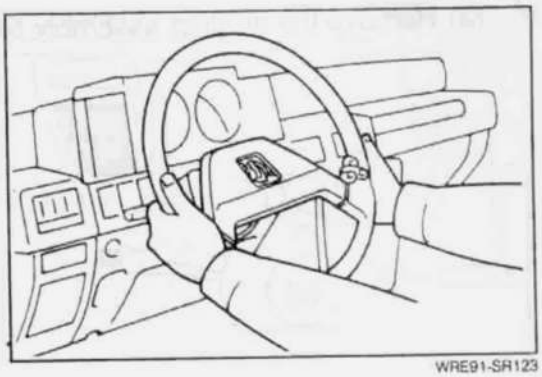
WRE91 SR121

REMOVAL

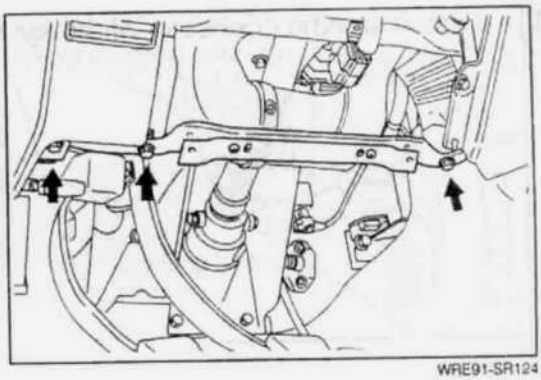
1. Remove the instrument panel finish lower panel.
   (For details, refer to the Body section.)


WRE91-SR122

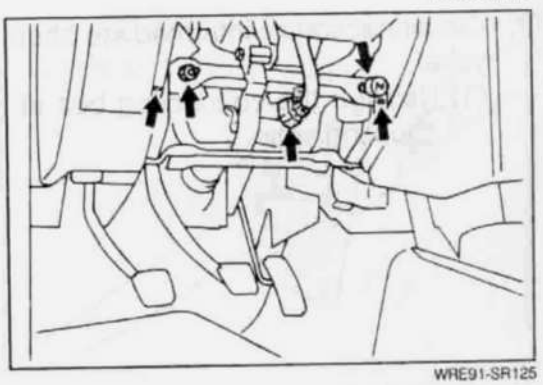
2. Remove the steering wheel.
   (See page SR–25 or SR–30.)

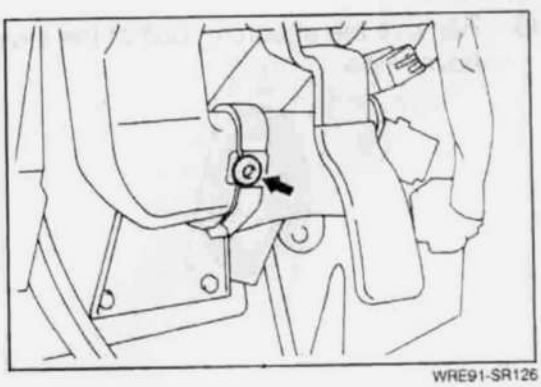

WRE91-SR123

3. Remove the instrument panel reinforcement subassembly.

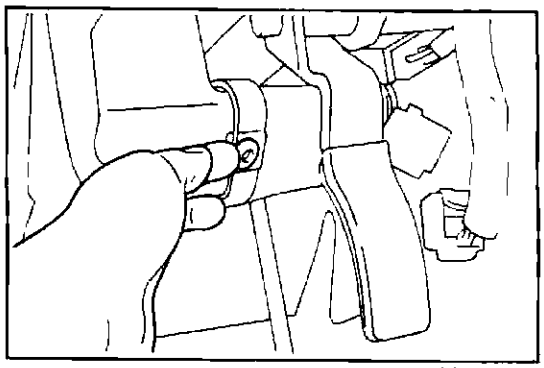

WRE91-SR124

4. Remove the throttle knob from the throttle cable by removing the throttle knob attaching screw.
5. Remove the throttle cable from the instrument panel finish panel No.1.
6. Disconnect the connector from the headlamp leveling switch.
   (Only vehicle so equipped)
7. Disconnect the connector of the turn signal switch.
8. Remove the connector of the turn signal switch from the instrument panel finish panel No. 1.
9. Remove the instrument panel finish panel No.1 from the instrument panel.
10. Removal of air duct assembly No. 1
    (1) Push the center part of the clip, using the forward end of a Phillips screwdriver or the like.


WRE91-SR125

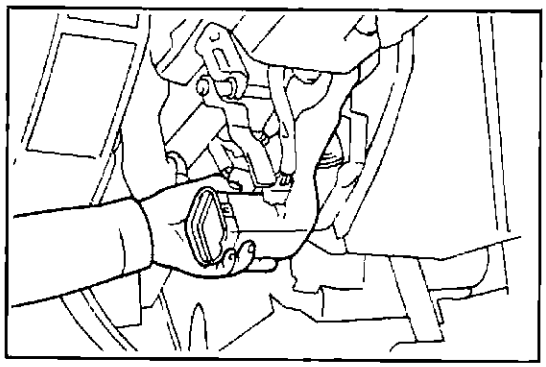

WRE91-SR126

(2) Detach the clip from the duct



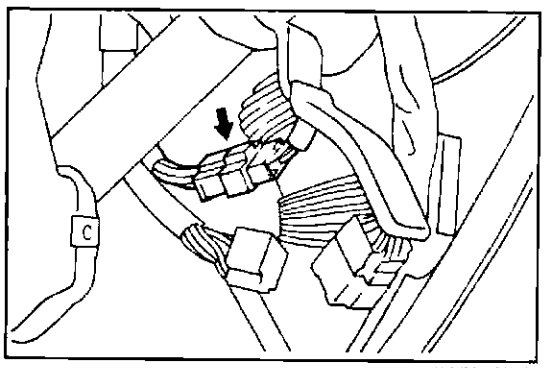
WRE91 SR127

(3) Remove the air duct assembly No. 1.



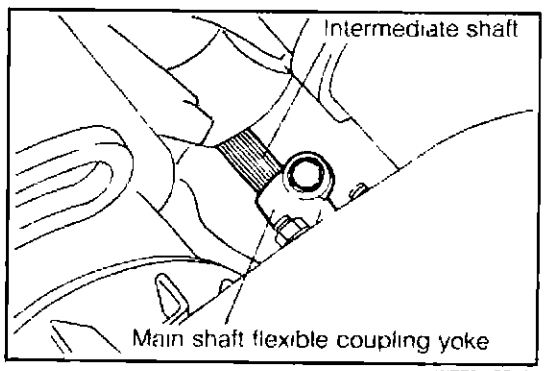
WRE91 SR128

11 Disconnect the connector of the ignition switch.



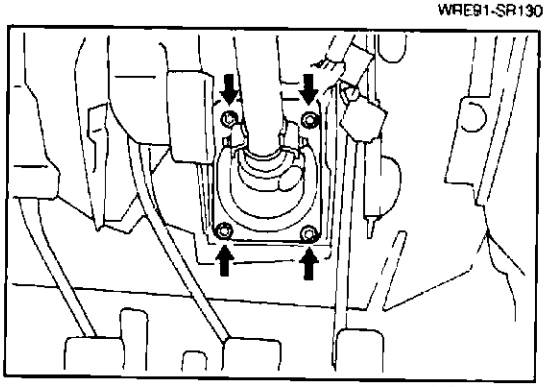
WRE91 SR129

12. Disconnection of intermediate shaft from flexible coupling yoke
(1) Remove the connecting bolt at the main shaft flexible coupling yoke.



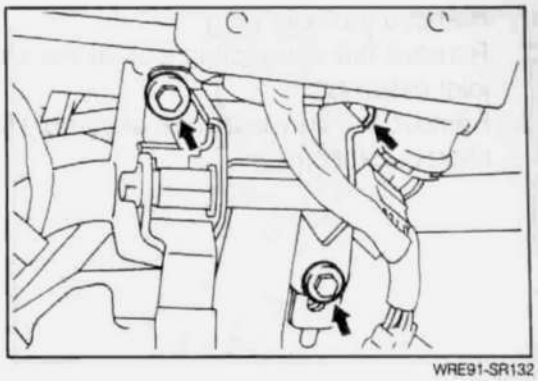
WRE91-SR130

13 Remove the attaching bolt at the steering column tube hole cover side.



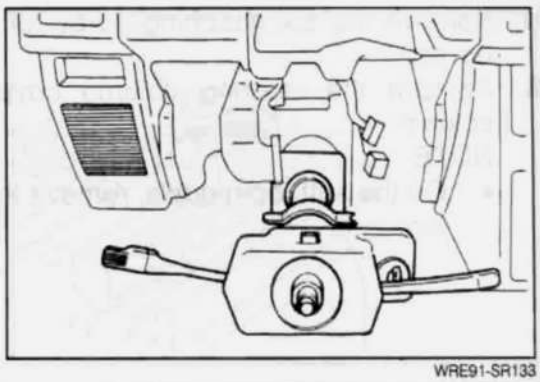
WRE91-SR131

14. Remove the steering column attaching bolts.
NOTE:
- Be very careful not to drop the steering column.
- Care must be exercised no to soil the seat.



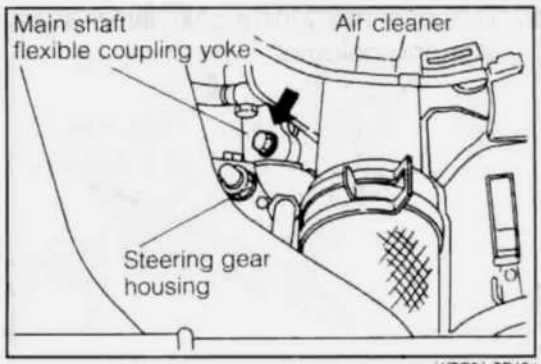
WRE91-SR132

15. Remove the steering column assembly together with the steering intermediate shaft from the vehicle.
NOTE:
- Care must be exercised not to soil the seat.



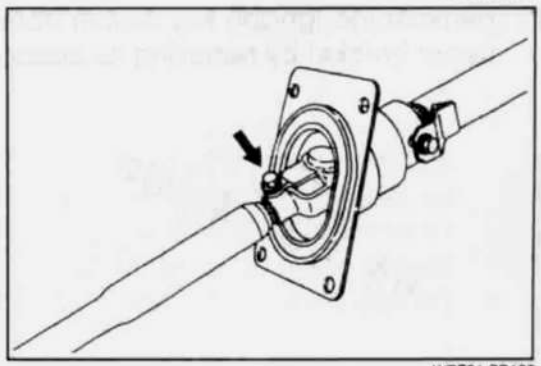
WRE91-SR133

16. Remove the connecting bolt at the main shaft flexible coupling yoke.
17. Remove the flexible coupling assembly from the steering gear housing.



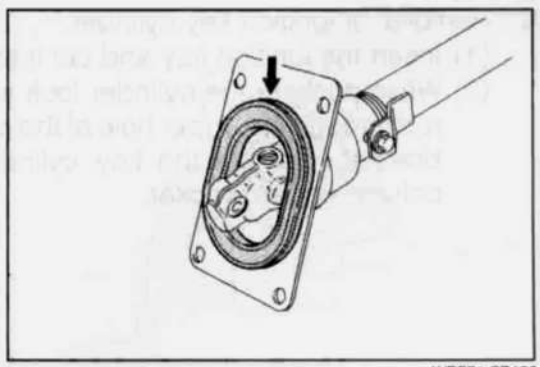
WRE91-SR134

18. Remove the connecting bolt at the steering shaft universal joint assembly.
19. Disconnect the steering intermediate shaft from the universal joint assembly.



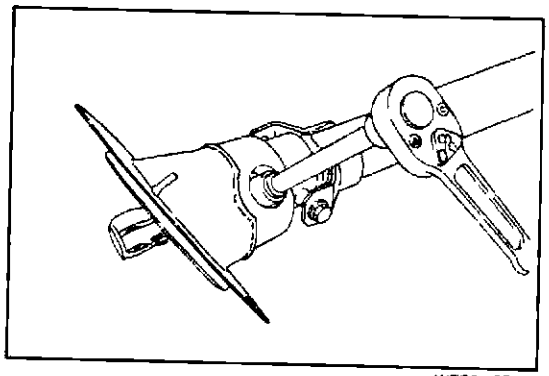
WRE91-SR135

20. Remove the steering column hole cover shield.

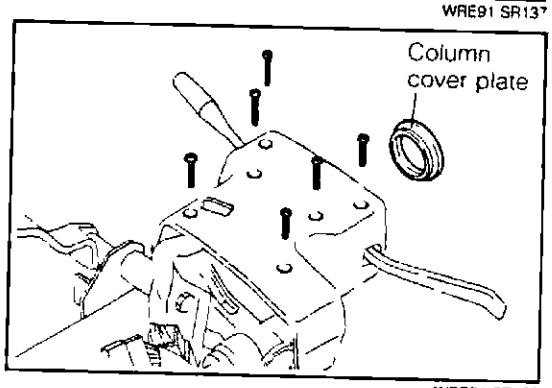


WRE91-SR136

21 Remove the hole plug.
22 Remove the connecting bolt at the steering shaft universal joint assembly.
23 Remove the universal joint assembly from the steering main shaft subassembly.

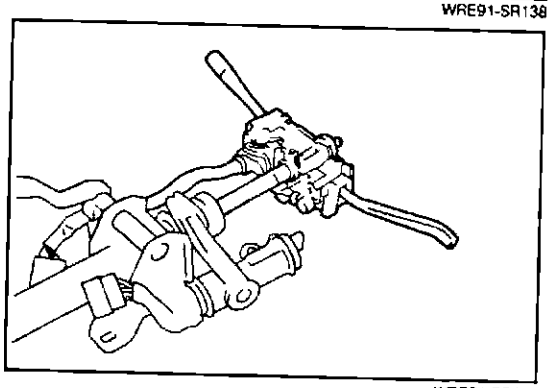

WRE91 SR137

24 Remove the six attaching screw of the steering column cover.
25 Remove the steering column cover from the steering column
NOTE.
- **On the soft top models, remove the column cover plate too.**

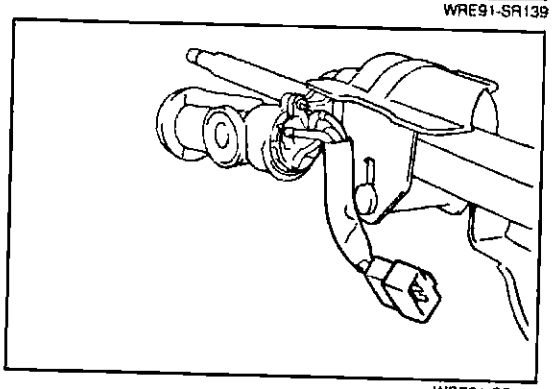


WRE91-SR138

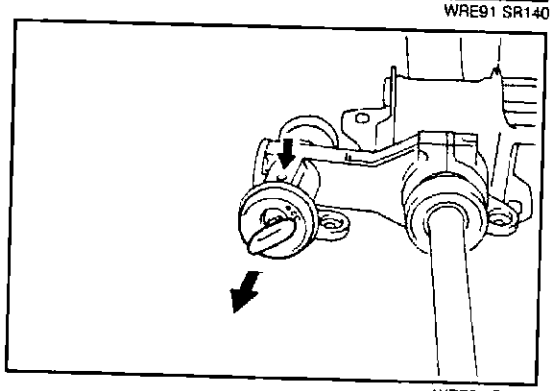
26 Remove the turn signal lamp switch assembly from the steering column.


WRE91-SR139

27 Remove the ignition key switch from the steering column upper bracket by removing its attaching screw.

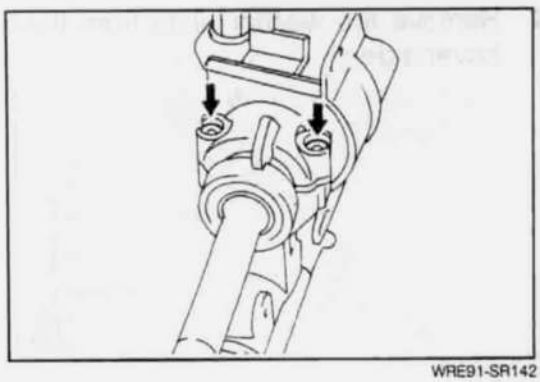

WRE91 SR140

28 Removal of ignition key cylinder
(1) Insert the ignition key and set it to the "ACC" position.
(2) While pushing the cylinder lock section with a suitable rod through the upper hole of the steering column upper bracket, pull out the key cylinder from the steering column upper bracket.

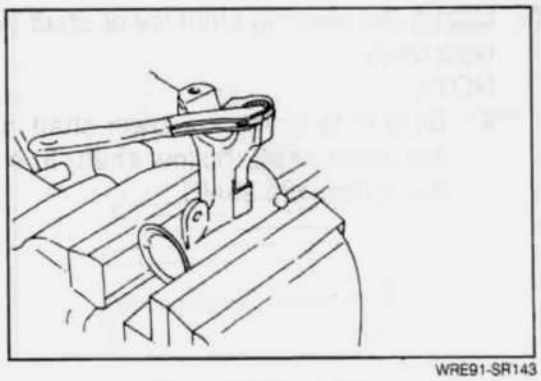

WRE91 SR141

29. Removal of steering column upper bracket
    (1) Make a recessed mark at the center of the steering lock set bolt with a center punch.
    (2) Remove the head of the set bolt by drilling the center of the set bolt with a drill having a diameter of about 8 mm.

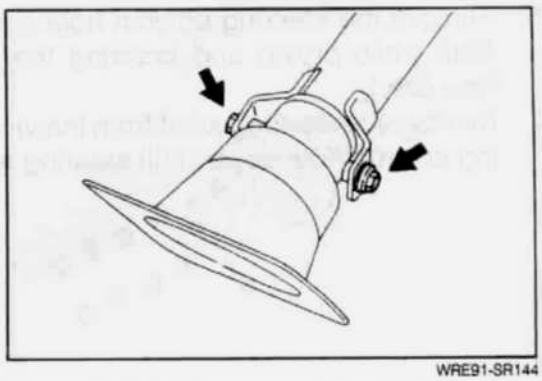
    NOTE:
    - Be very careful not to damage the steering column housing.
    - Care must be exercised not to drop the steering column housing.


WRE91-SR142

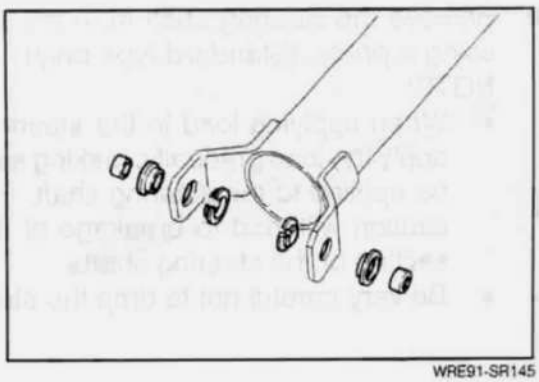
    (3) Remove the bolt threaded portion which remains at the steering column bracket, using a pipe wrench or the like.


WRE91-SR143

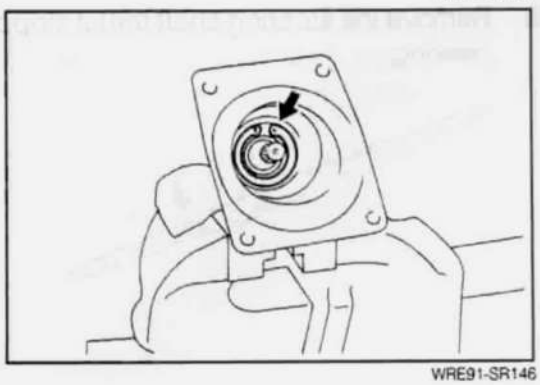
30. Remove the attaching bolts of the steering column hole cover.
    (Tilt steering type only)
31. Remove the steering column hole cover together with the steering column hole cover.
    (Tilt steering type only)


WRE91-SR144

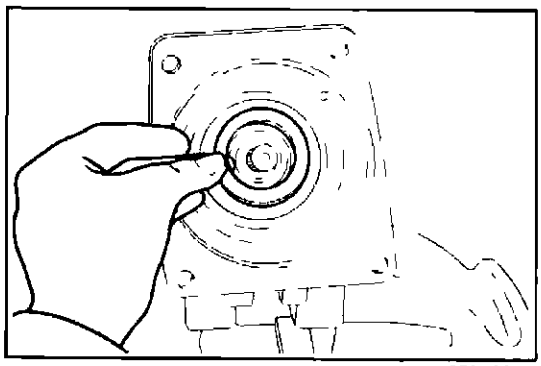
32. Remove the collars and bushes from the steering column tube subassembly.
    (Tilt steering type only)


WRE91-SR145

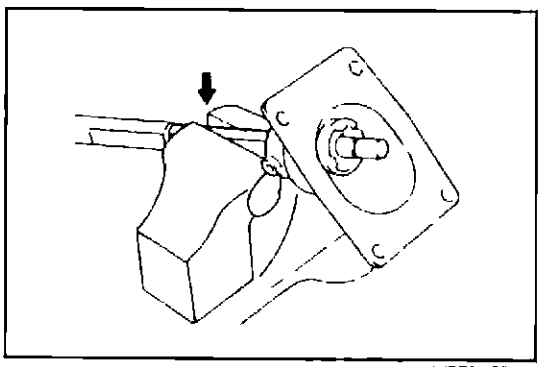
33. Detach the hole snap ring from the steering column hole cover.


WRE91-SR146

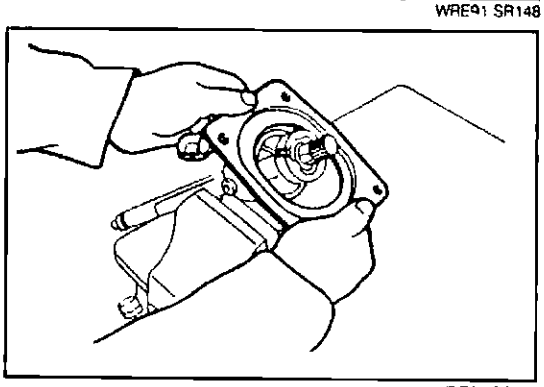
34. Remove the washer plate from the steering column hole cover side


WRE91-SR147

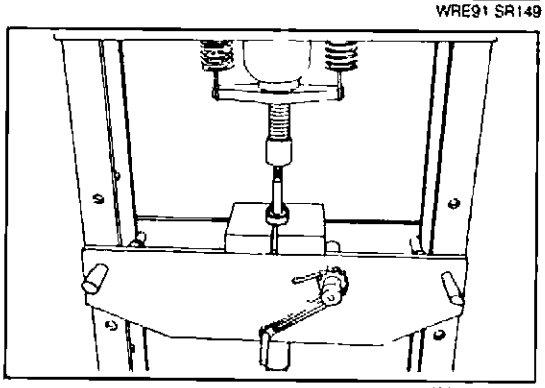
35 Clamp the steering shaft lower shaft in a vice. (Tilt steering type only)
NOTE:
- Be sure to clamp the lower shaft in a vice. Never clamp the upper shaft (hollow shaft) in a vice. (In the case of the collapsible shaft)


WRE91 SR148

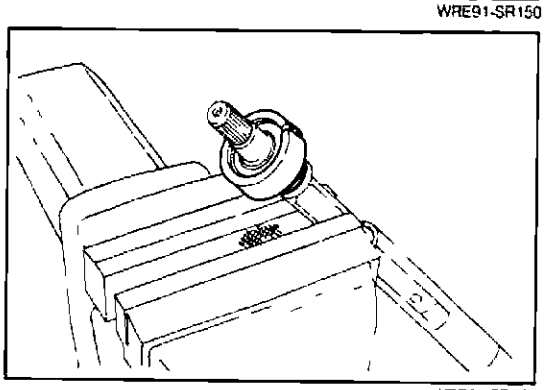
36 Remove the steering column hole cover from the steering shaft while prying and lowering the cover. (Tilt steering type only)
37 Remove the steering shaft from the vice Remove the steering column hole cover. (Tilt steering type only)


WRE91 SR149

38 Remove the steering shaft from the steering column tube, using a press (Standard type only)
NOTE:
- When applying load to the steering shaft with a press, apply the load gradually, making sure that no impact may be applied to the steering shaft. Failure to observe this caution will lead to breakage of the center connecting section of the steering shaft.
- Be very careful not to drop the steering shaft.


WRE91-SR150

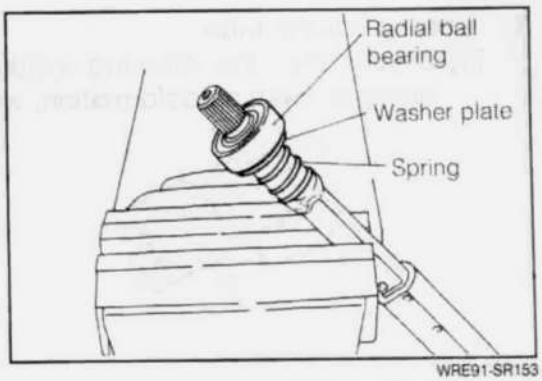
39 Remove the steering shaft thrust stopper from the radial ball bearing.


WRE91 SR151

40. Detach the snap ring from the steering main shaft subassembly.
NOTE:
- Never reuse the removed snap ring.
- If any difficulty is encountered in removing the snap ring, remove the snap ring while holding the bearing.

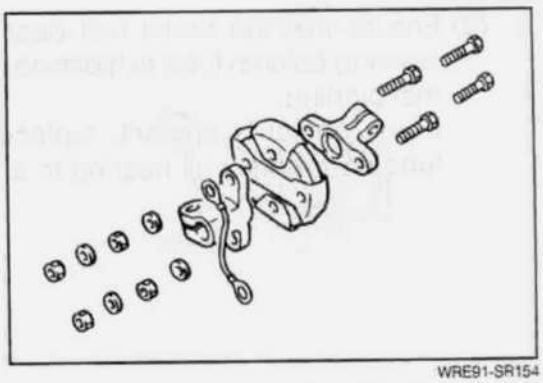

WRE91-SR152

41. Remove the radial ball bearing.
42. Remove the washer plate.
43. Remove the spring.



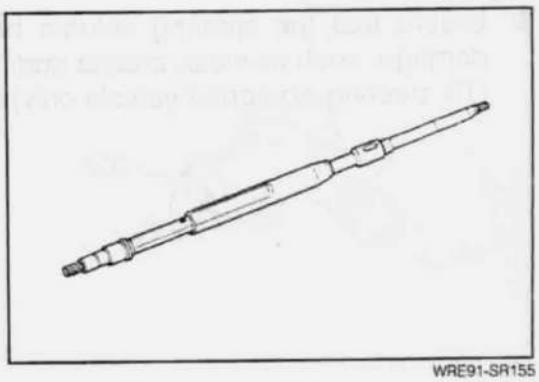
WRE91-SR153

44. Remove the main shaft flexible coupling yokes from the flexible coupling assembly.

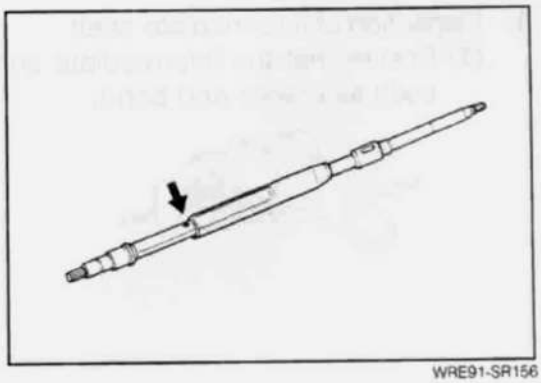

WRE91-SR154

INSPECTION

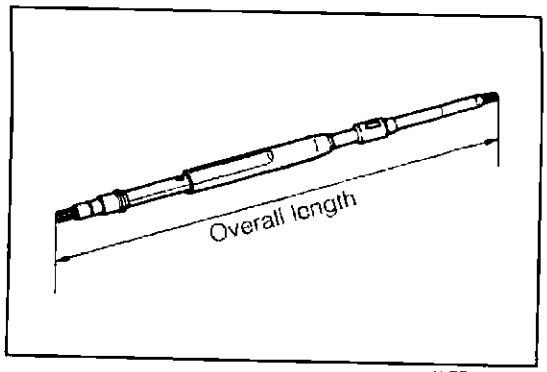
1. Inspection of steering shaft
   (1) Ensure that each section of the steering shaft exhibits no damage, such as wear, cracks and deformation.


WRE91-SR155

   (2) Ensure that no play or looseness is present at the connecting section between the upper and lower sections of the steering shaft.
   (Collapsible steering shaft-equipped vehicle only)

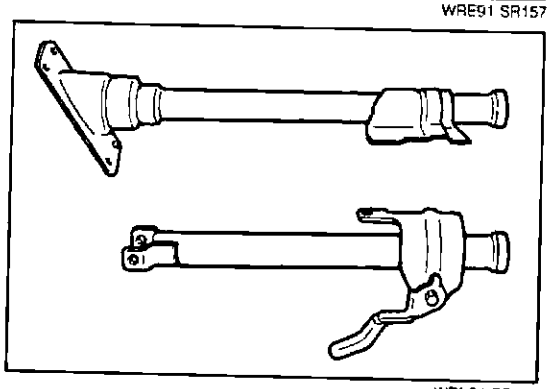

WRE91-SR156

(3) Ensure that the overall length of the steering shaft is within the specified value
(Collapsible steering shaft-equipped vehicle only)
Specified Value: About 659.3 mm

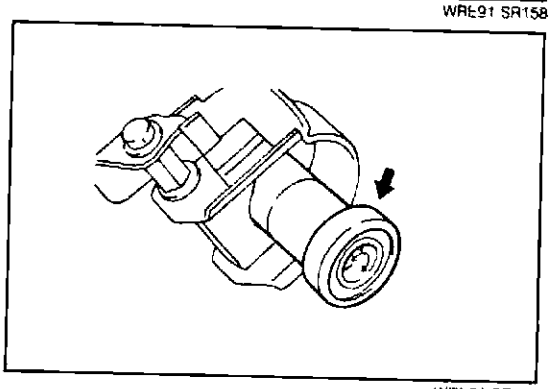


WRE91 SR157

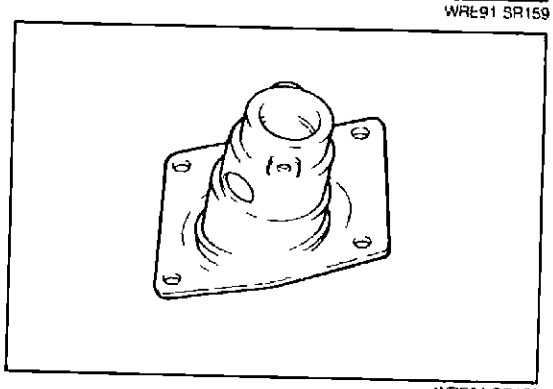
2 Steering column tube
(1) Ensure that the steering column tube exhibits no damage, such as deformation, wear and cracks.


WRE91 SR158

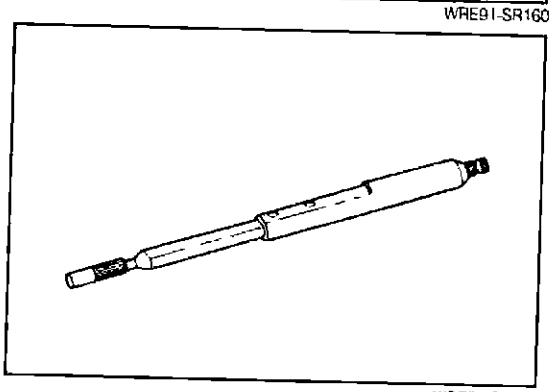
(2) Ensure that the radial ball bearing assembled in the steering column tube exhibits no defect, such as abnormal binding
If any defect is present, replace the steering column tube and radial ball bearing in a set


WRE91 SR159

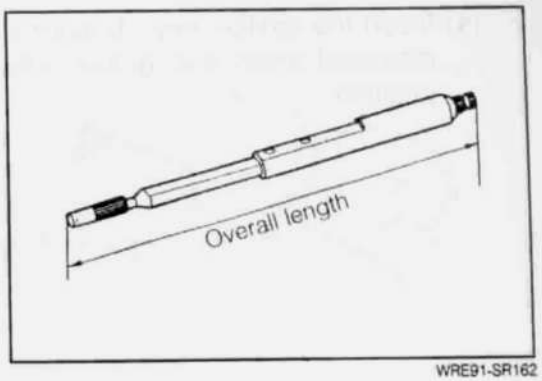
3 Ensure that the steering column hole cover exhibits no damage, such as wear, cracks and/or deformation
(Tilt steering-equipped vehicle only)


WRE91-SR160

4 Inspection of intermediate shaft
(1) Ensure that the intermediate shaft exhibits no defect, such as cracks and bend

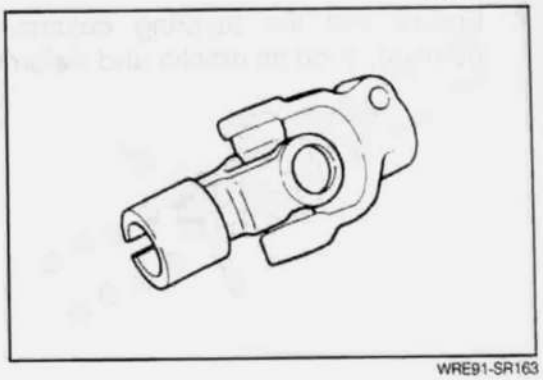

WRE91 SR161

(2) Ensure that the overall length of the intermediate shaft is within the specified value.
Overall Length: 472.5 ± 1 mm
(with power steering)
503.5 ± 1 mm
(with out power steering)

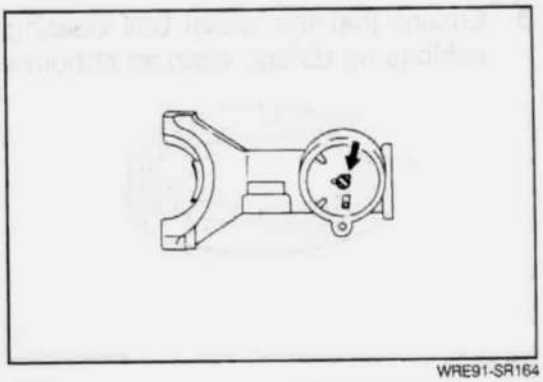


WRE91-SR162

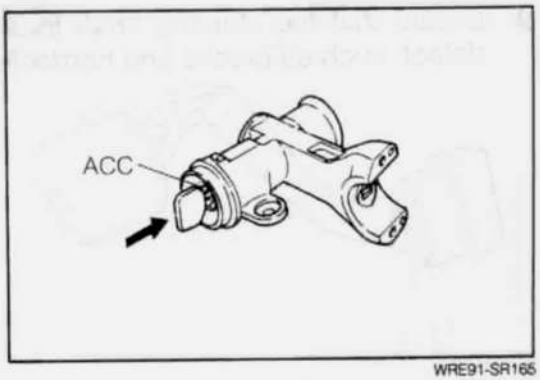
5. Inspection of universal joint assembly
Ensure that the universal joint exhibits no defect, such as excessive play and poor sliding. Also, check the rubber boot for rupture.


WRE91-SR163

6. Inspection of steering column upper bracket
(1) Set the cam of the steering column upper bracket, as indicated in the right figure.

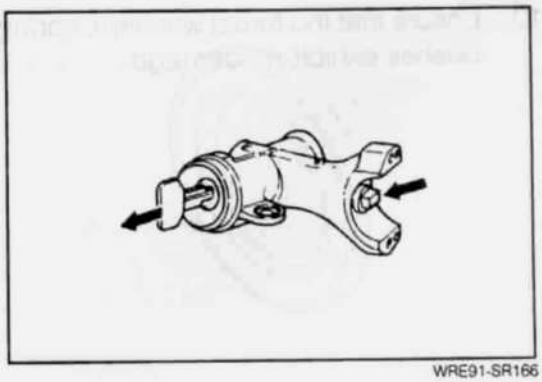

WRE91-SR164

(2) Set the ignition key to the "ACC" position. Insert the ignition key cylinder into the steering column upper bracket.
NOTE:
- If any difficulty is encountered in inserting the ignition key cylinder, do not push it forcibly. In this case, insert the ignition key cylinder while slightly turning the cam.

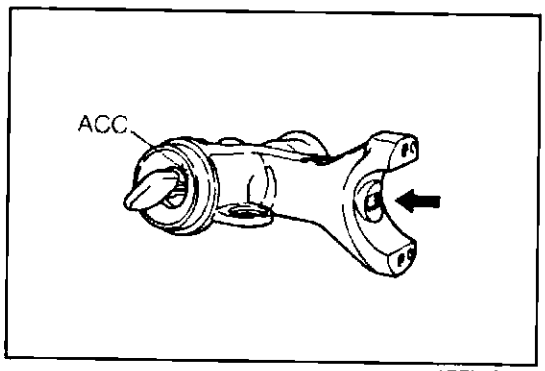


WRE91-SR165

(3) Set the ignition key to the "Lock" position. Ensure that the locking pawl protrudes when the ignition key is pulled out.
NOTE:
- If the cam position deviates 180 degrees, the locking pawl will not protrude.

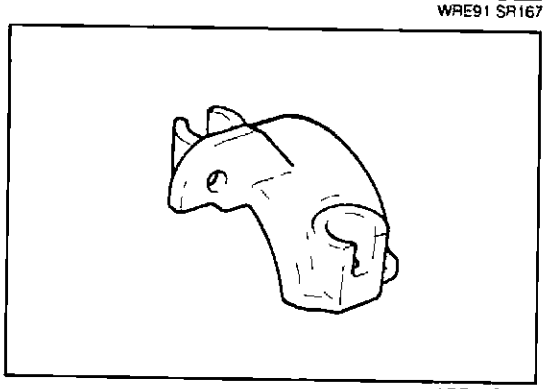

WRE91-SR166

(4) Insert the ignition key. Ensure that the locking pawl is retracted when the ignition key is set to the "ACC" position.

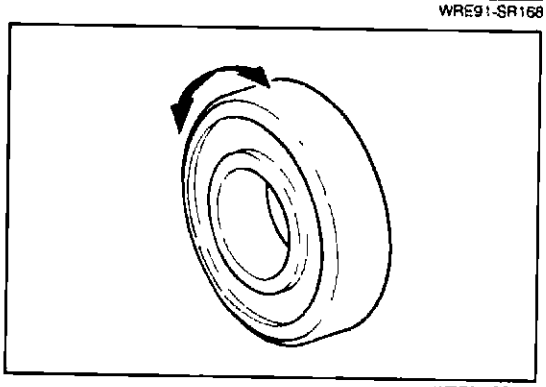


WRE91-SR167

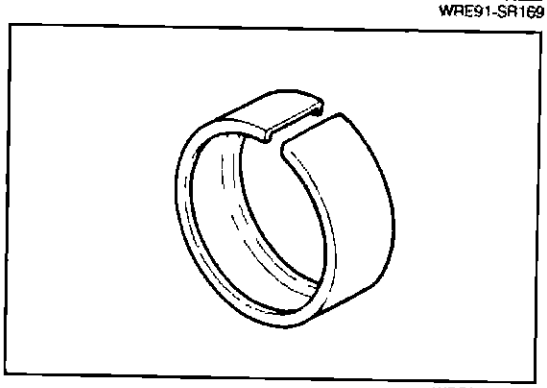
7 Ensure that the steering column housing exhibits no damage, such as cracks and deformation.


WRE91-SR168

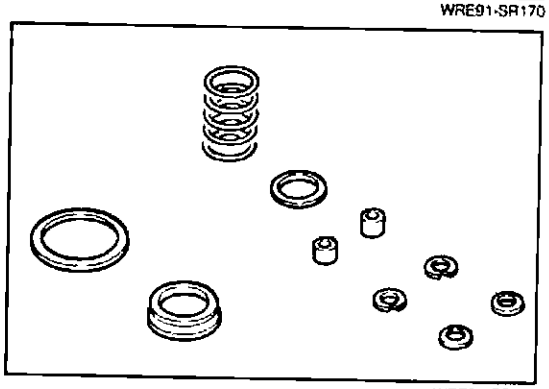
8 Ensure that the radial ball bearing of the steering shaft exhibits no defect, such as abnormal binding.


WRE91-SR169

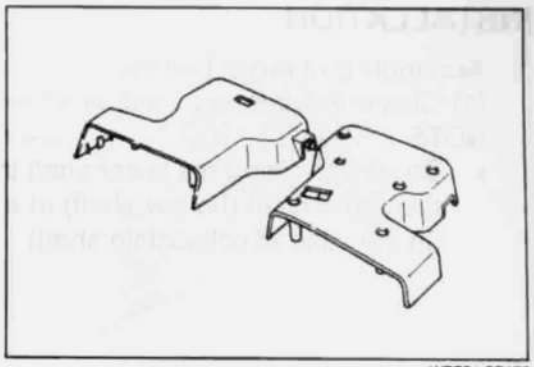
9 Ensure that the steering shaft thrust stopper exhibits no defect, such as cracks and hardening.


WRE91-SR170

10 Ensure that the thrust washers, spring hole plug, collars and bushes exhibit no damage.

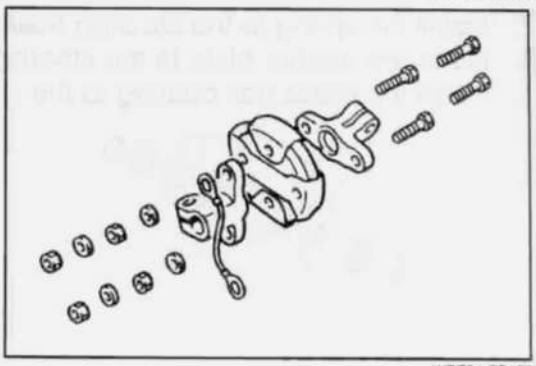

WRE91-SR171

11. Ensure that the steering column cover exhibits no damage, such as scratches, wear or deformation.



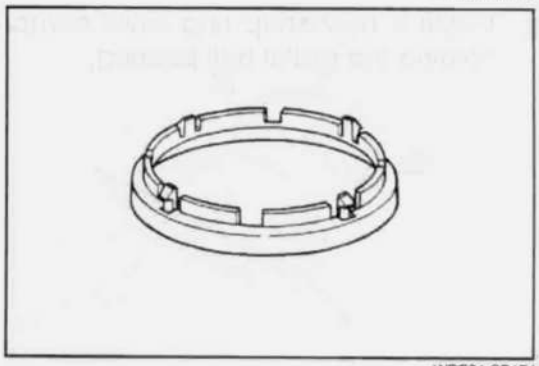
WRE91-SR172

12. Ensure that the flexible coupling and main shaft flexible coupling yoke exhibit no damage.
13. Ensure that the flexible coupling earth (bond wire) exhibits no damage, such as open wire.



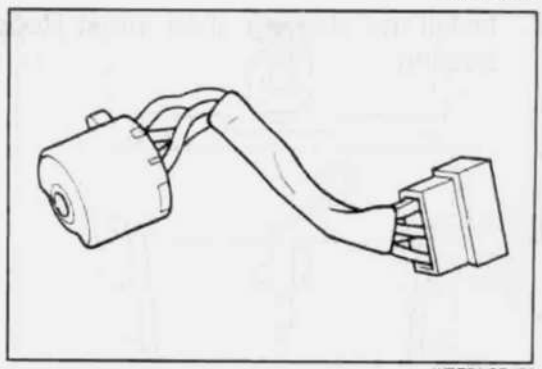
WRE91-SR173

14. Ensure that the steering column cover shield exhibits no damage, such as hardening and cracks. (Soft top model only)



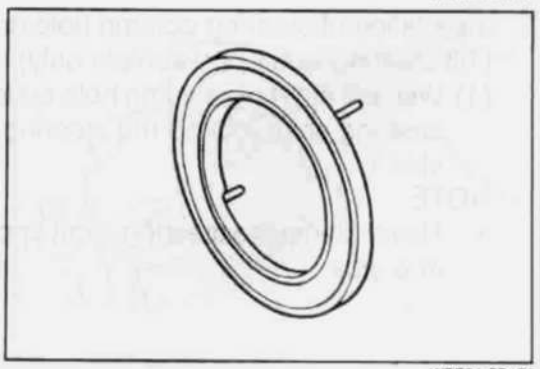
WRE91-SR174

15. Perform unit inspection for the ignition switch. (Refer to the Body Electrical System section.)



WRE91-SR175

16. Check the steering column hole cover shield for damage, such as cracks and hardening.



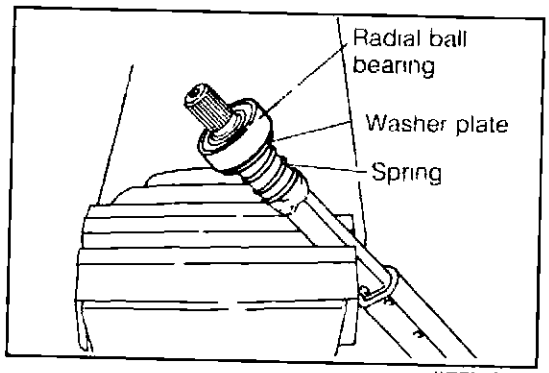
WRE91-SR176

INSTALLATION

1 Assembling of radial ball bearing
(1) Clamp the steering lower shaft in a vice
NOTE:
- Be sure to clamp the lower shaft in a vice. Never clamp the upper shaft (hollow shaft) in a vice.
(In the case of collapsible shaft)

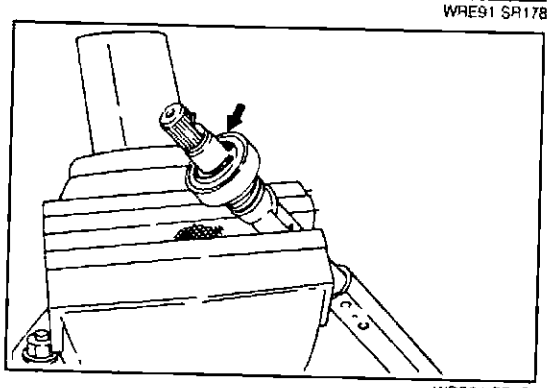
WRE91-SR177

2 Install the spring to the steering main shaft
3 Install the washer plate to the steering main shaft
4 Install the radial ball bearing to the steering main shaft.



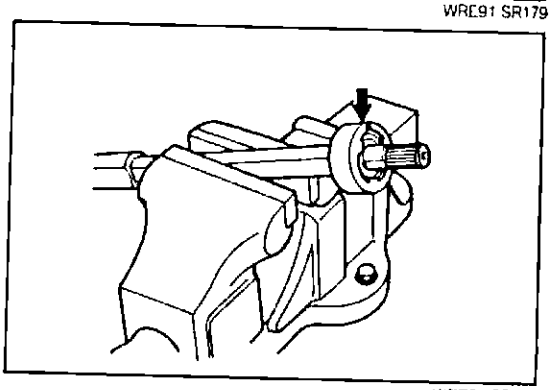
WRE91 SR178

5 Install a new snap ring while compressing the spring by holding the radial ball bearing



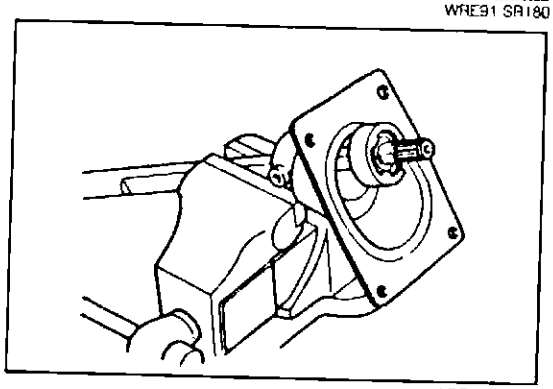
WRE91 SR179

6 Install the steering shaft thrust stopper to the radial ball bearing.



WRE91 SR180

7 Installation of steering column hole cover
(Tilt steering-equipped vehicle only)
(1) With the steering column hole cover passed through the steering shaft, clamp the steering shaft lower shaft in a vice
NOTE:
- Never clamp the steering shaft upper shaft (hollow shaft) in a vice.

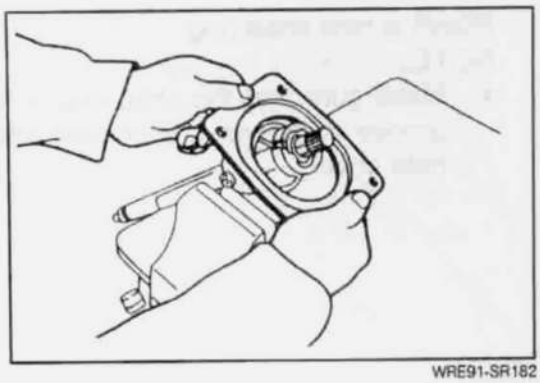


WRE91 SR181

(2) Assemble the steering column hole cover to the steering shaft thrust stopper by pulling the cover.

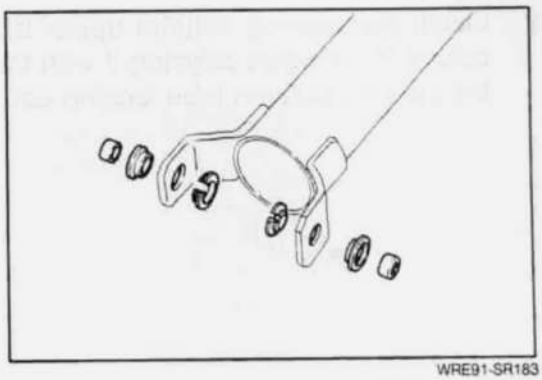
NOTE:

- Care must be exercised so that the steering shaft thrust stopper may not be detached.



WRE91-SR182

8. Installation of steering column tube
(Tilt steering-equipped vehicle only)
(1) Install the bushes and collars on the steering column hole cover installation section of the steering column tube.
(2) Insert the steering shaft into the steering column tube.

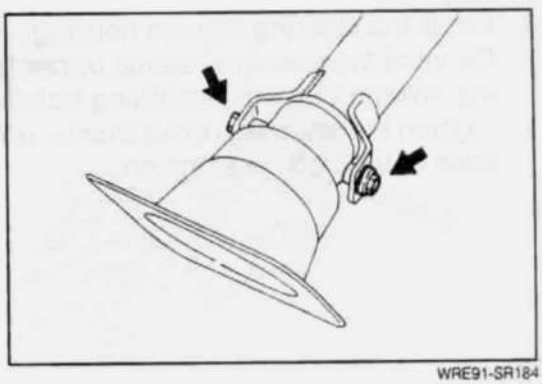


WRE91-SR183

(3) Connect the steering column tube to the steering column hole cover with the bolts. Tighten the bolts to the specified torque.
Tightening Torque: 3.9 - 6.9 N·m
(0.4 - 0.7 kgf-m, 2.9 - 5.1 ft-lb)

NOTE:

- Be sure to install the steering hole cover in the correct direction.

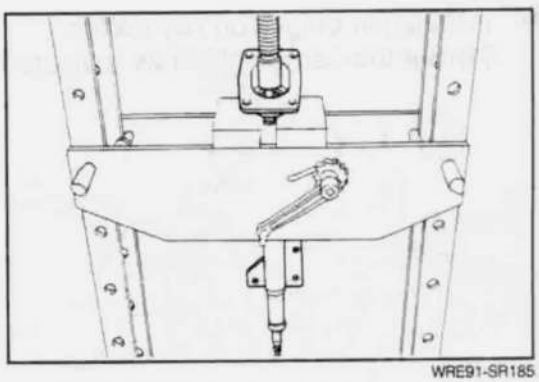


WRE91-SR184

9. Installation of steering column tube
(Standard type only)
Press the steering shaft into the steering column by means of a hydraulic press.

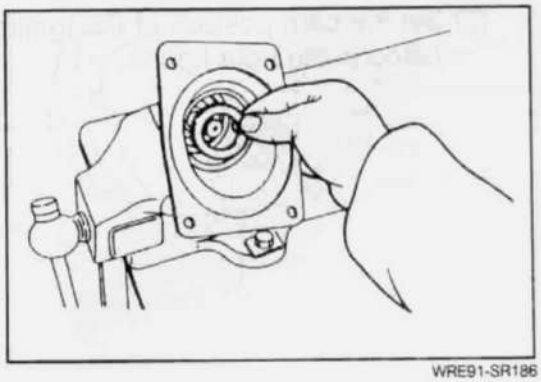
NOTE:

- Never apply excessive load to the steering shaft.
- Never hold the upper section of the steering column tube.
- The press-fitting should be performed only to such an extent that the washer and snap ring now can be installed. Do not press the steering shaft further beyond this.



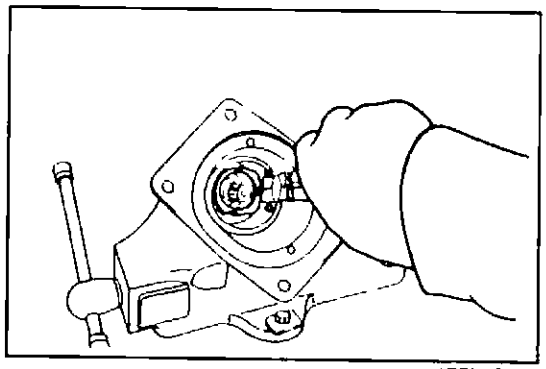
WRE91-SR185

10. Insert the washer at the steering column hole side.

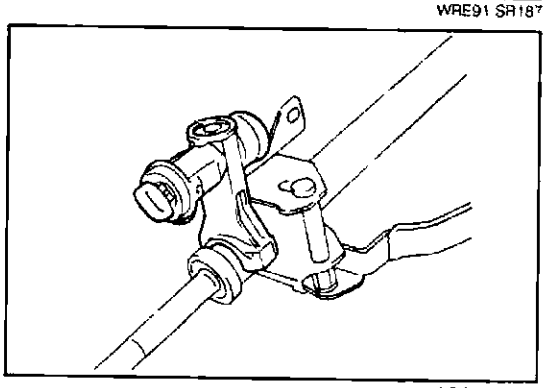


WRE91-SR186

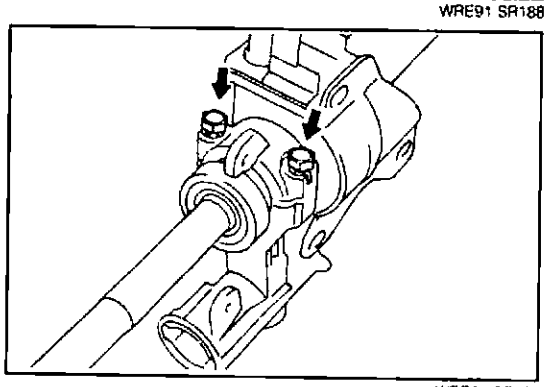
11 Attach a new snap ring
NOTE·
- Make sure that the snap ring is fitted in the snap ring groove of the steering column tube or steering column hole cover.


WRE91 SR187

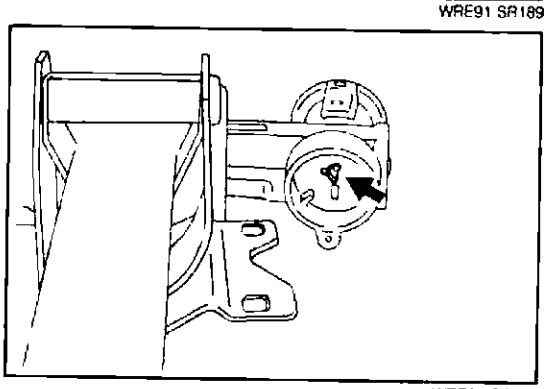
12 Install the steering column upper bracket to the steering column tube, while aligning it with the hole of the pawl for the steering column tube locking use


WRE91 SR188

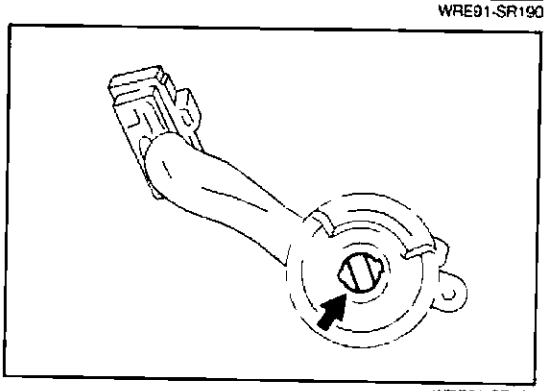
13 Install the steering column housing.
14 Connect the steering column upper bracket with the steering column with new attaching bolts.
15 Tighten the attaching bolts evenly, until the hexagonal sections of the bolts are broken.


WRE91 SR189

16 Installation of ignition key switch
(1) Set the cam position as indicated in the right figure.


WRE91-SR190

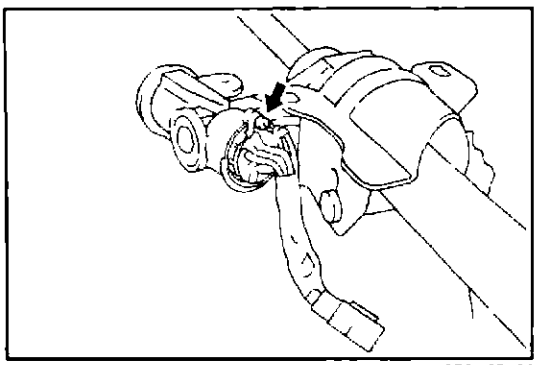
(2) Set the cam position of the ignition key switch as indicated in the right figure


WRE91 SR191

(3) Install the ignition key switch to the steering column housing. Tighten the attaching screw.

NOTE:

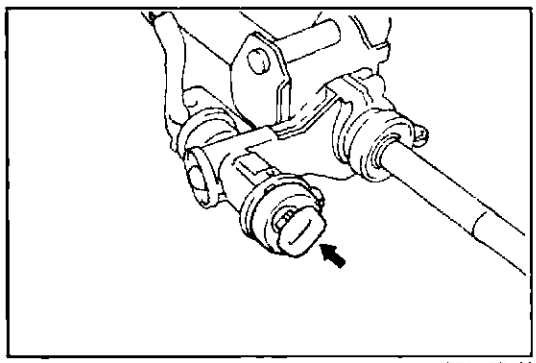
- If any difficulty is encountered in inserting the ignition key switch, align the recessed section of the ignition key switch with the cam of the steering column housing, while slightly turning the cam at the steering column side in a right-&-left direction.



WRE91-SR192

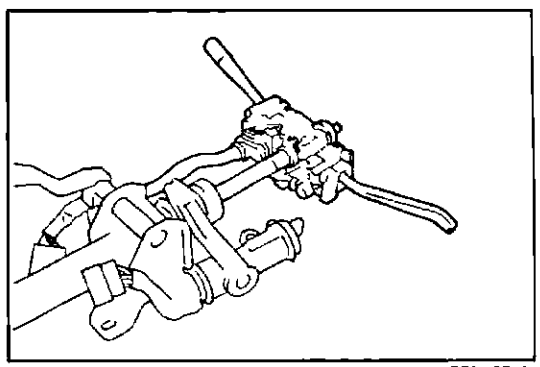
17 Installation of ignition key cylinder

Set the key of the ignition key cylinder to the ACC position. Align the recessed section of the steering column upper bracket with the protruded section of the ignition key cylinder. Under this setting, insert the ignition key cylinder into the steering upper bracket



WRE91-SR193

18 Install the turn signal lamp switch assembly to the steering column.

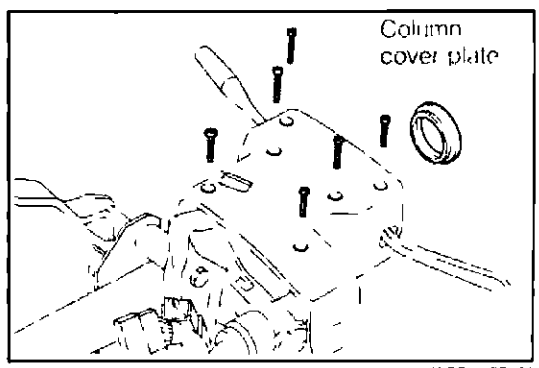


WRE91-SR194

19 Install the steering column cover to the steering column. Tighten the attaching screws.

NOTE:

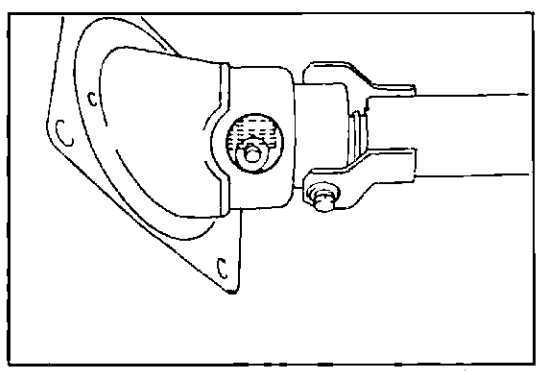
- On the soft top vehicle, fit the column cover plate after installing the steering column cover.



WRE91-SR195

20 Connection of steering shaft universal joint assembly

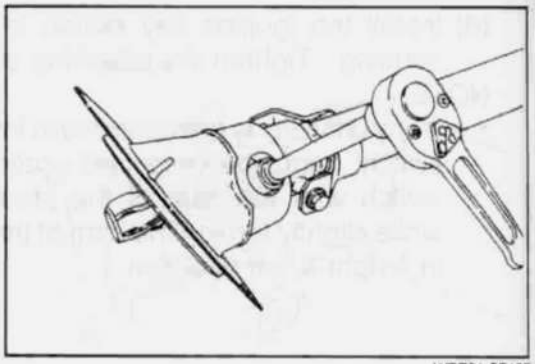
(1) With the bolt hole of the universal joint aligned with the cut-out section of the steering main shaft, connect the universal joint to the steering main shaft



WRE91-SR196

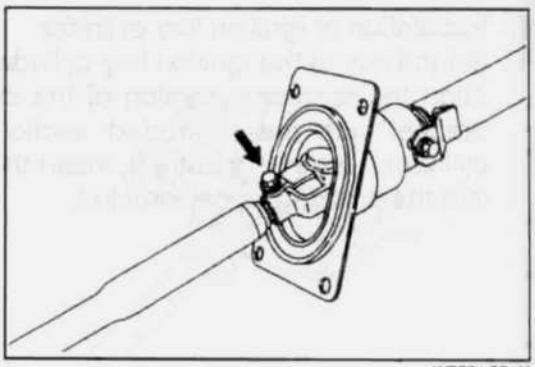
(2) Tighten the attaching bolts to the specified torque with new washers interposed.
Tightening Torque: 24.5 - 34.3 N·m
(2.5 - 3.5 kgf-m, 18.1 - 25.3 ft-lb)

21. Install the hole plug.
22. Install the steering column hole cover shield.

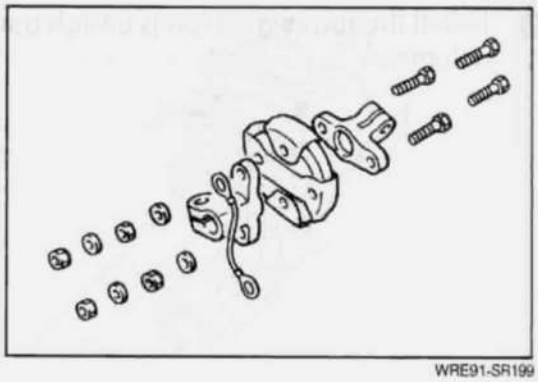

WRE91-SR197

23. Connection of steering intermediate shaft
(1) Connect the intermediate shaft to the universal joint.
NOTE:
- Assemble the parts while aligning the universal joint with the bolt groove of the intermediate shaft.

(2) Tighten the attaching bolts to the specified torque with new spring washers interposed.
Tightening Torque: 24.5 - 34.3 N·m
(2.5 - 3.5 kgf-m, 18.1 - 25.3 ft-lb)


WRE91-SR198

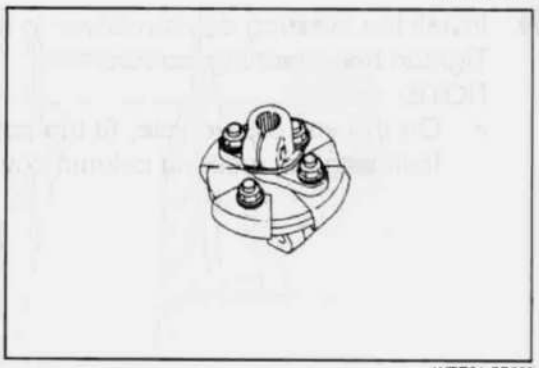
24. Assembling of flexible coupling assembly
(1) Assemble the main shaft flexible coupling yokes and flexible coupling earth (bond wire) to the flexible coupling assembly with the bolts, nuts and washers, as indicated in the right figure.
NOTE:
- Never reuse the washers. Be sure to use new ones.
- Insert the bolts from the steering gear housing side.


WRE91-SR199

- Connect the terminal of the flexible coupling earth to the flexible coupling assembly side.

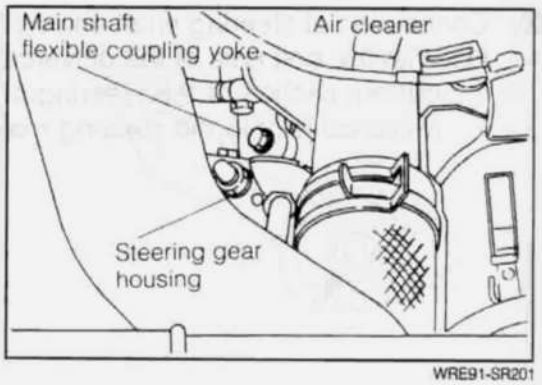
(2) Tighten the nuts to the specified torque.
Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)

NOTE:
- Care must be exercised not to cause open wire in the cord of the flexible coupling earth while tightening the nuts.


WRE91-SR200

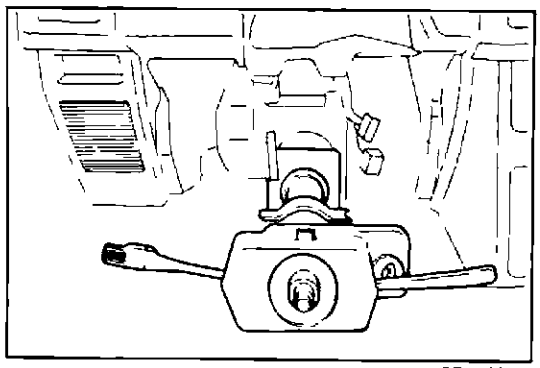
25. Connect the flexible coupling to the steering gear housing. Tighten the attaching bolt to the specified torque with a new washer interposed.
Tightening Torque: 16.7 - 21.6 N·m
(1.7 - 2.2 kgf-m, 12.3 - 15.9 ft-lb)

NOTE:
- Be sure to align the attaching bolt hole with the cut-out section of the worm shaft of the steering gear housing while assembling these parts.

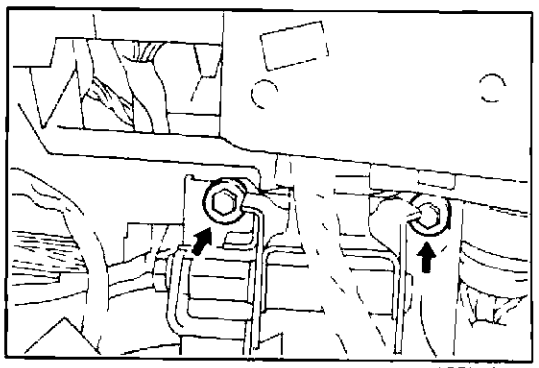


WRE91-SR201

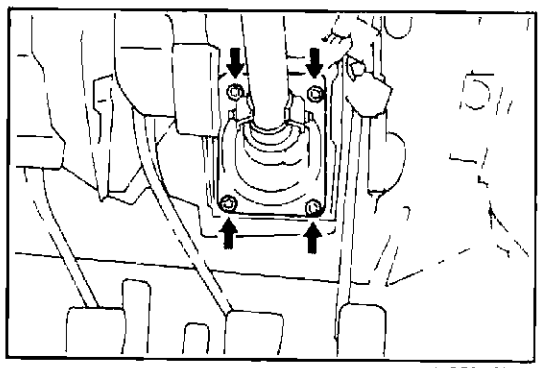
26 Insert the steering column assembly together with the intermediate shaft
NOTE:
- Care must be exercised so that the intermediate shaft may not interfere with other parts.


WRF91-SR202

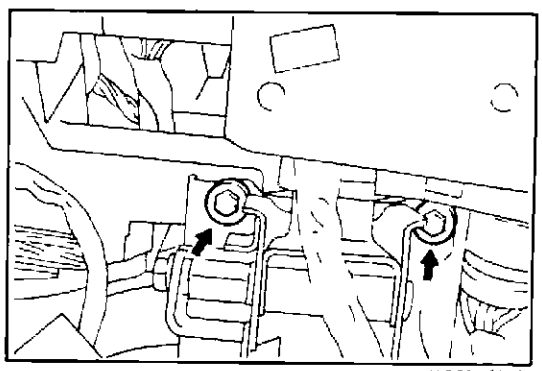
27 While connecting the intermediate shaft to the steering gear housing, temporarily tighten the two attaching bolts at the steering column upper section


WRF91-SR203

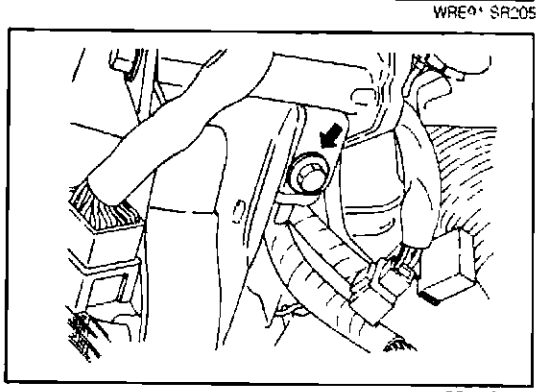
28 Install the attaching bolts at the column cover side of the steering column. Tighten them to the specified torque.
Tightening Torque: 3.9 - 6.9 N·m
(0.4 - 0.7 kgf-m, 2.9 - 5.1 ft-lb)


WRF91-SR204

29 Tighten the two attaching bolts at the steering column upper section to the specified torque
Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)

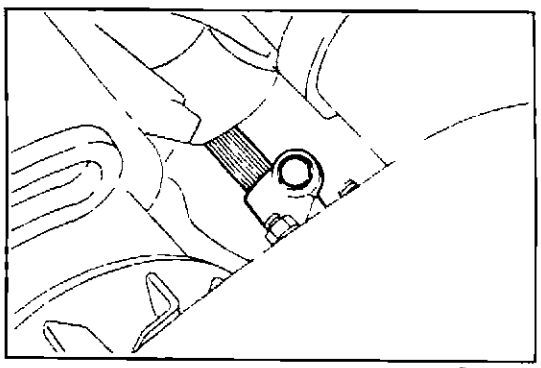

WRF91-SR205

30 Insert the caster wedge into the attaching section of the steering column upper section indicated in the right figure. Install the bolt.
31 While fully pushing the caster wedge by your hand, tighten the attaching bolt to the specified torque
Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)


WRF91-SR206

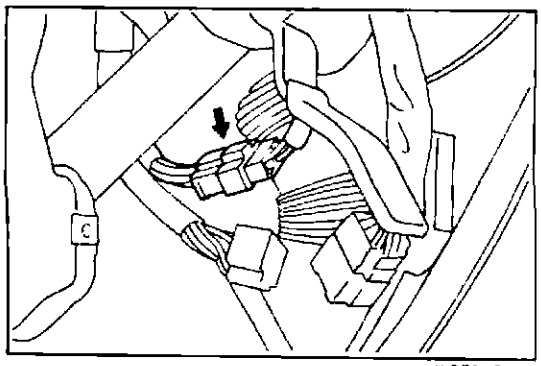
32 Install the bolts connecting the main shaft flexible coupling yoke to the intermediate shaft with new washers interposed Tighten the bolt to the specified torque

Tightening Torque: 16.7 - 21.6 N·m
(1.7 - 2.2 kgf-m, 12.3 - 15.9 ft-lb)



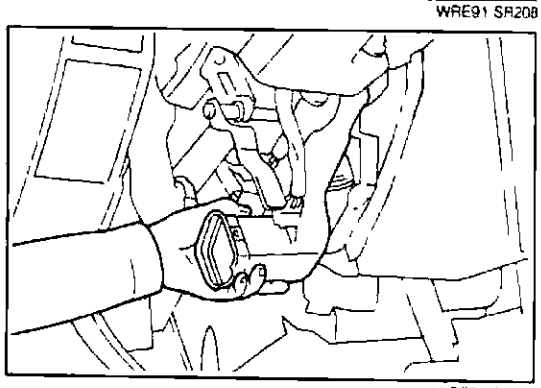
WRE91-SR207

33 Connect the connector of the ignition switch



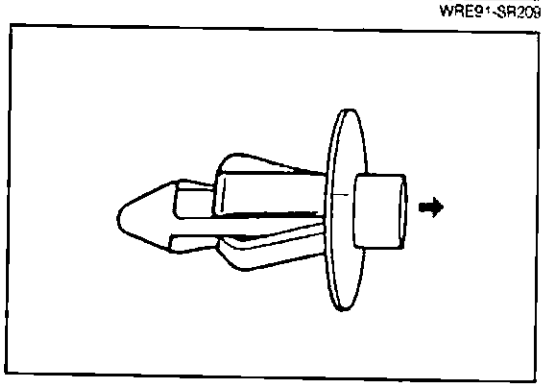
WRE91 SR208

34 Installation of air duct assembly No 1
(1) Install the air duct No. 1.



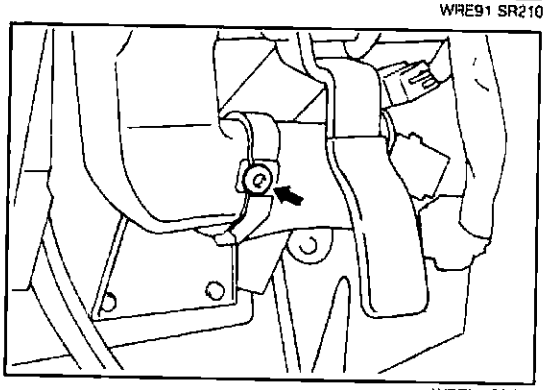
WRE91-SR209

35 Pull out the center of the clip, as indicated in the right figure.



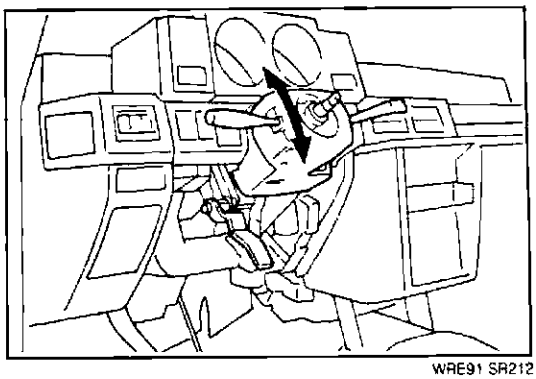
WRE91 SR210

36 Install the clip to the air duct No 1. Push down the shaft at the clip central section until it becomes flush with the clip surface to lock the clip.



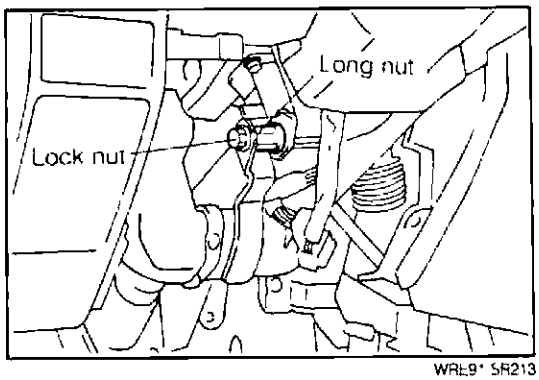
WRE91 SR211

37 Lower the tilt steering lever. Ensure that the steering tilt function operates properly.
(Tilt steering-equipped vehicle only)


WRE91 SR212

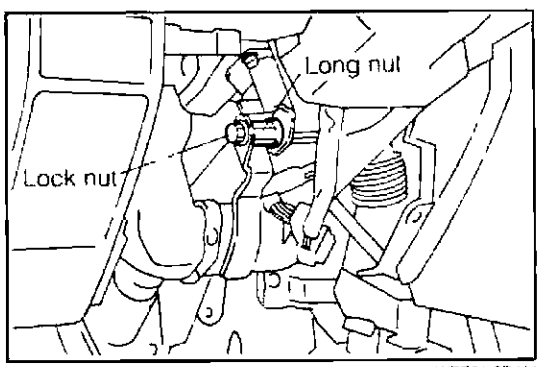
If the steering tilt function will not operate properly, loosen the steering lever attaching bolt while preventing the long nut from turning. Then, retighten the lock nut to the specified torque. With the steering lever attaching bolt applied to the stopper of the steering lever, retighten the steering lever attaching bolt to the specified torque while preventing the long nut from turning. Proceed to check again.

Tightening Torque:
Long Nut: 12.7 N·m (1.3 kgf-m, 9.4 ft-lb)
Bolt: 29.4 - 49.0 N·m
(3.0 - 4.5 kgf-m, 21.7 - 36.2 ft-lb)



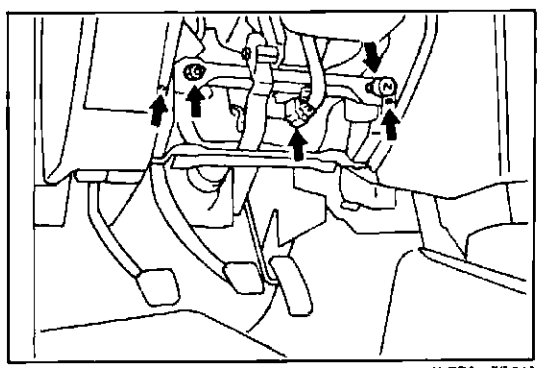
WRE91 SR213

38 Ensure that the steering column is secured when tightening the tilt steering lever.
If not, adjust the tightening torque of the long nut indicated in the step 37. Perform the check described in the step 37 again.



WRE91 SR214

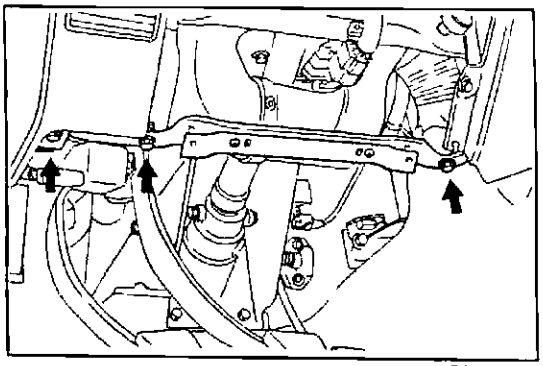
39 Install the instrument panel finish panel No.1 to the instrument panel.


WRE91 SR215

40 Connect the connector of the turn signal switch and clamp the connector to the instrument panel finish panel No. 1.
41 Connect the connector of the headlamp leveling switch. (Only vehicle so equipped)
42 Install the throttle cable to the instrument panel finish panel No. 1.
43 Install the throttle knob to the throttle cable.
NOTE:
- Tighten the attaching screw while aligning the attaching screw of the throttle knob with the attaching screw hole of the throttle cable.

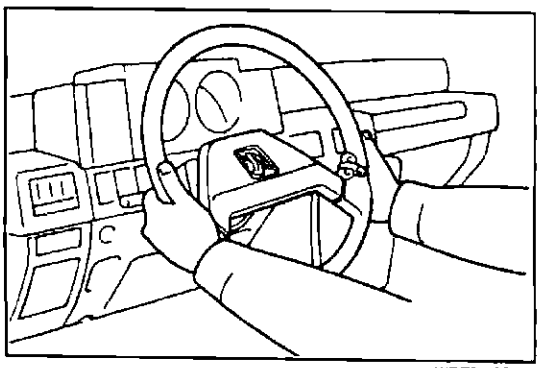
WRE91 SR216

44 Install the instrument panel reinforcement subassembly.



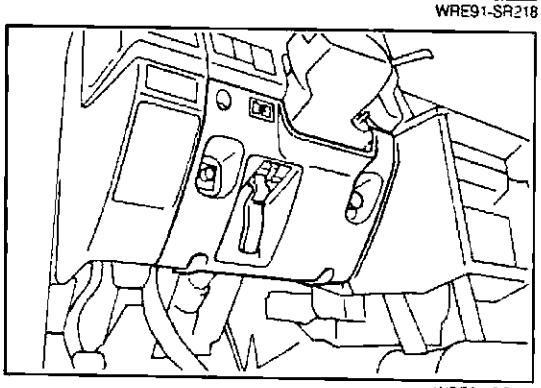
WRE91 SR217

45 Install the steering wheel
(See page SR–29 or SR–35)



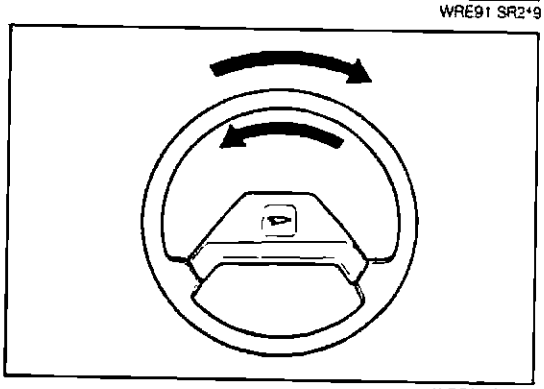
WRE91-SR218

46. Install the instrument finish lower panel.
(For details, refer to the Body section.)



WRE91 SR219

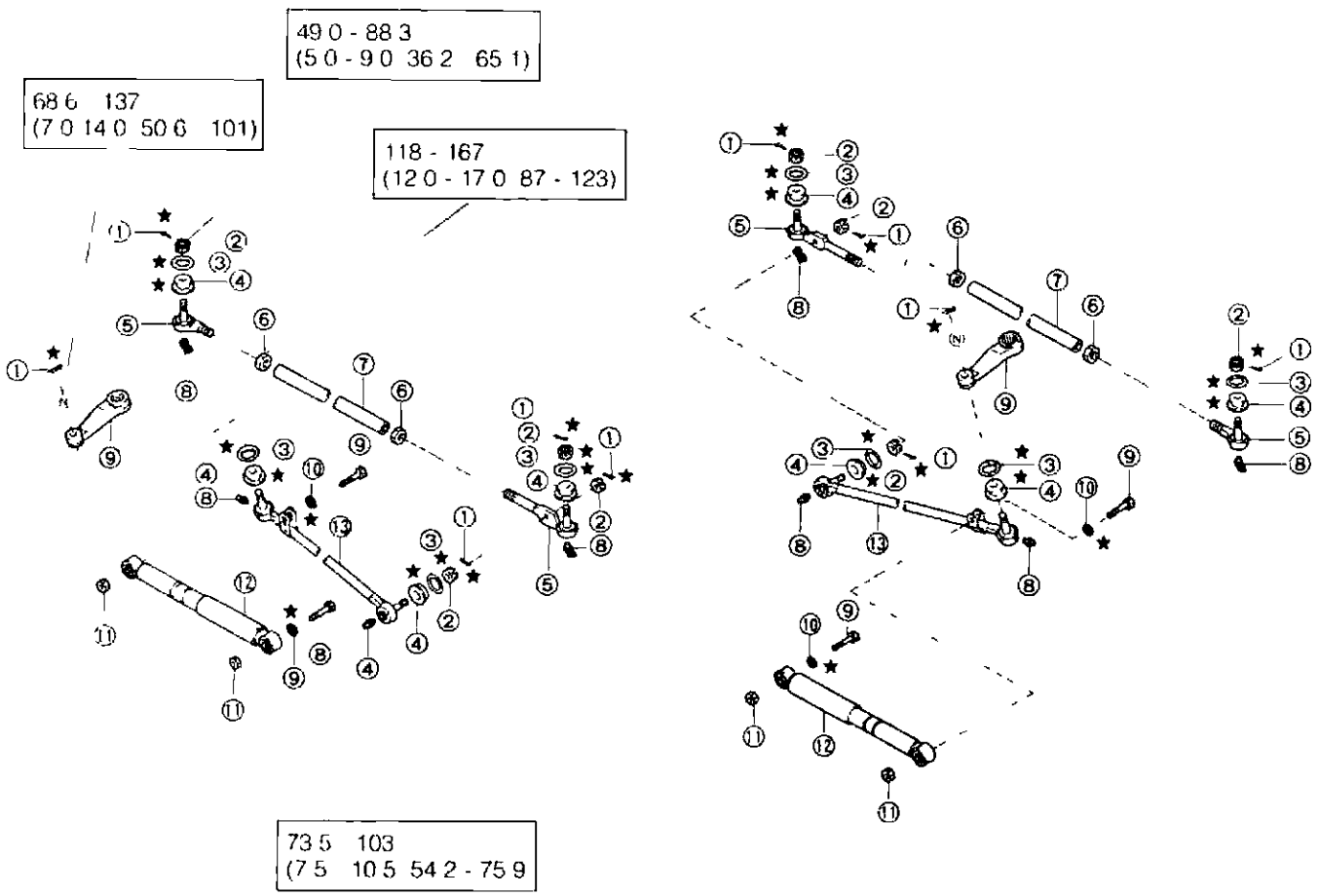
47 Ensure that the steering wheel turns smoothly without any abnormality.



WRE91-SR220

STEERING LINKAGE

COMPONENTS



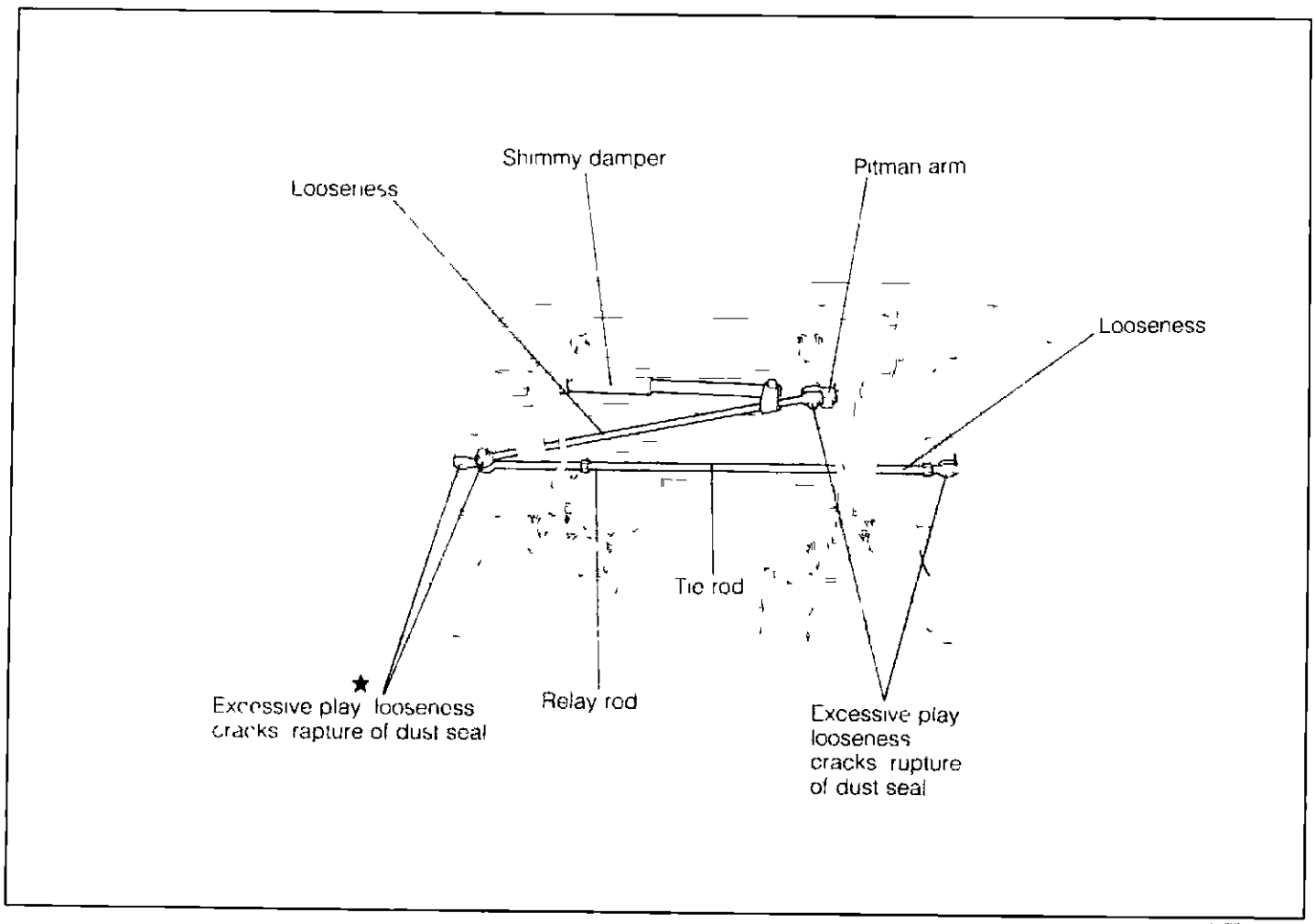
□ : Tightening torque
Unit : N m (kgf-m, ft-lb)
★ : Non-reusable parts

① Cotter pin
② Castle nut
③ Steering joint dust seal band
④ Steering joint dust seal
⑤ Tie-rod end subassembly
⑥ Nut
⑦ Steering tie-rod
⑧ Grease fitting
⑨ Pitman arm
⑩ Washer
⑪ Nut
⑫ Steering shimmy damper assembly
⑬ Steering relay rod

WRE91 SR221

INSPECTION

Ensure that each section exhibits no abnormality, such as cracks, excessive play, looseness and deformation
Replace any defective part



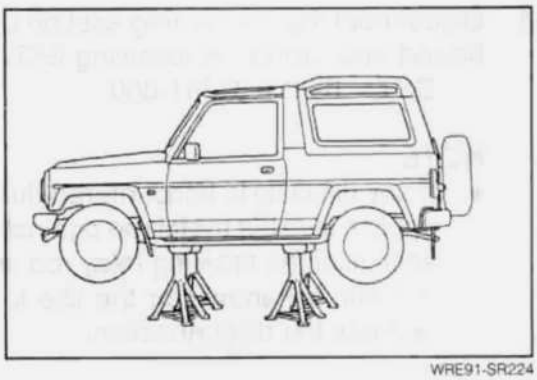
WRE91SR222

REMOVAL

1. Loosen the front wheel attaching bolts evenly.

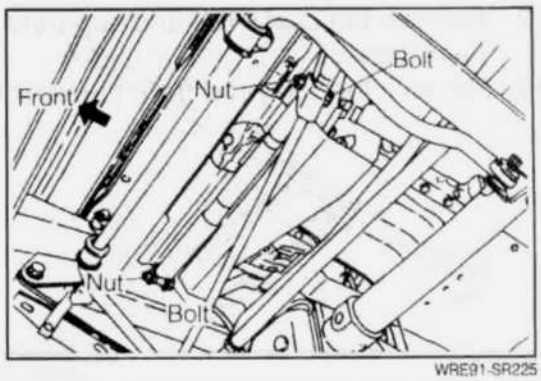
WRE91-SR223

2. Jack-up the vehicle and support it with safety stands.
3. Remove the front wheels.



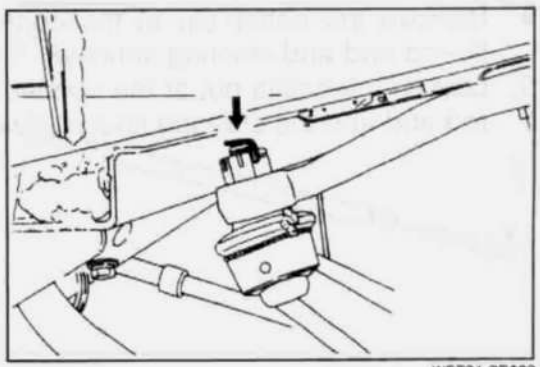
WRE91-SR224

4. Remove the steering shimmy damper assembly by removing the attaching bolts and nuts.



WRE91-SR225

5. Remove the cotter pin at the connecting section of the pitman arm and the relay rod.
6. Loosen the castle nut connecting the pitman arm with the relay rod four or five turns.

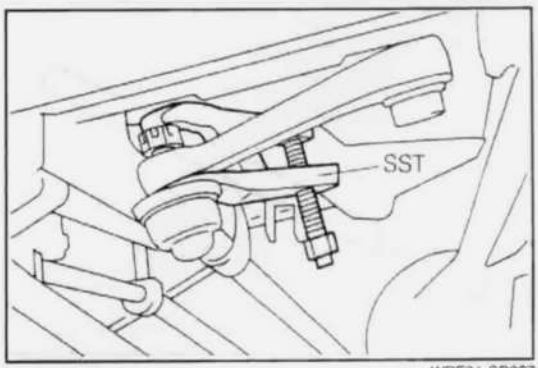


WRE91-SR226

7. Disconnect the connecting section of the pitman arm and the relay rod, using the following SST.
   SST: 09611-87701-000

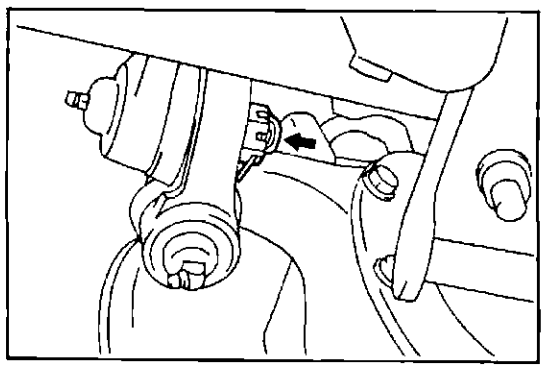
   NOTE:
   - If any difficulty is encountered during this disconnection, apply a suitable metal rod against the side of the tapered section of the relay rod and lightly tap the metal rod with a hammer or the like to give impact. This will facilitate the disconnection.

8. Remove the castle nut and separate the relay rod from the pitman arm.



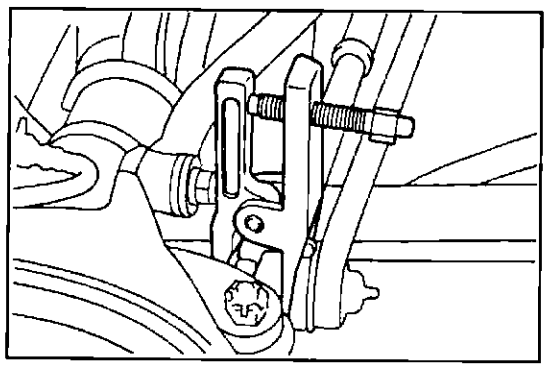
WRE91-SR227

9 Remove the cotter pin at the connecting section of the relay rod and the tie-rod end
10 Loosen the castle nut connecting the relay rod with the tie-rod end four or five turns.


WRE91 SR228

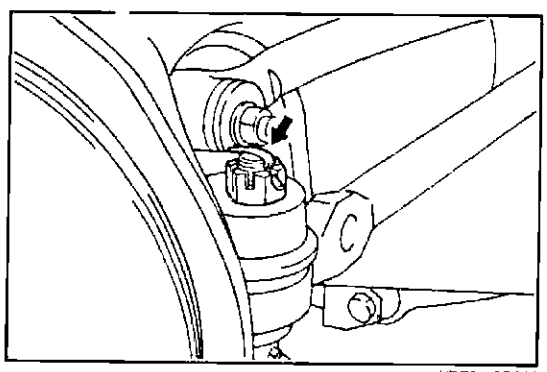
11 Disconnect the connecting section of the relay rod and the tie-rod end, using the following SST.
SST: 09611-87701-000

NOTE.
- If any difficulty is encountered during this disconnection, apply a suitable metal rod against the side of the tapered section of the steering relay rod and lightly tap the metal rod with a hammer or the like to give impact. This will facilitate the disconnection.


WRE91 SR229

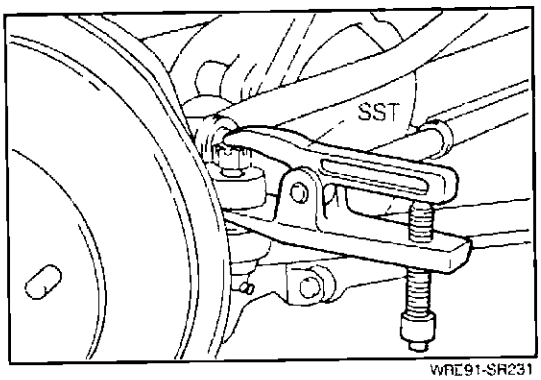
12 Remove the castle nut and separate the relay rod from the tie-rod end
13 Remove the relay rod from the vehicle

14 Remove the cotter pin at the connecting section of the tie-rod end and steering knuckle
15 Loosen the castle nut at the connecting section of the tie-rod end and the steering knuckle two or three turns


WRE91 SR230

16 Disconnect the connecting section of the tie rod end and the steering knuckle, using the following SST
SST: 09611-87701-000

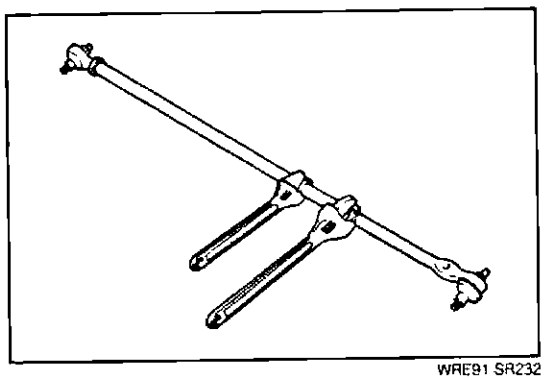
NOTE.
- If any difficulty is encountered during this disconnection, apply a suitable metal rod against the side of the tapered section of the steering knuckle and lightly tap the metal rod with a hammer or the like. This will facilitate the disconnection.



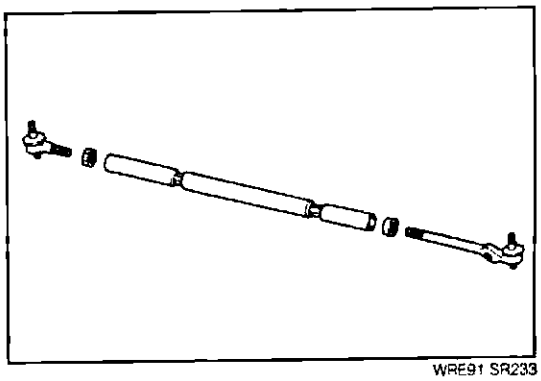
WRE91-SR231

17. Remove the castle nut
Separate the tie rod end from the steering knuckle
18 Remove the tie-rod from the vehicle

19 Loosen the tie-rod end and lock nut of the tie-rod while preventing the tie-rod from turning at the hexagonal section
NOTE:
- Loosen the parts above after confirming the direction of the threads.

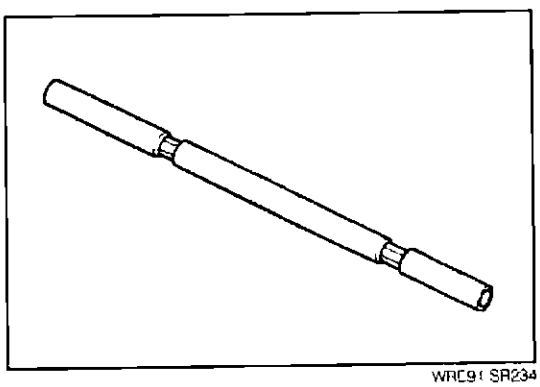

WRE91 SR232

20 Remove the tie-rod end and lock nut from the tie-rod.

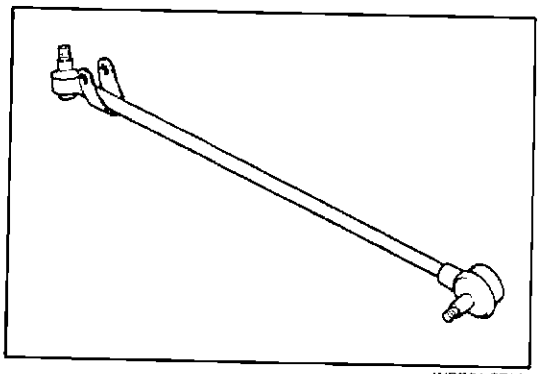

WRE91 SR233

INSPECTION

1 Ensure that the tie-rod exhibits no damage, such as cracks, dent or bend

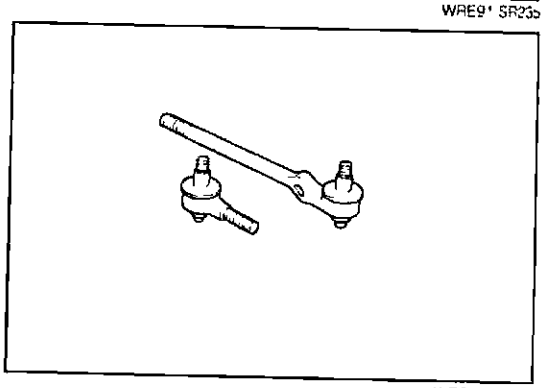

WRE91 SR234

2 Ensure that the relay rod exhibits no damage, such as cracks dent or bend



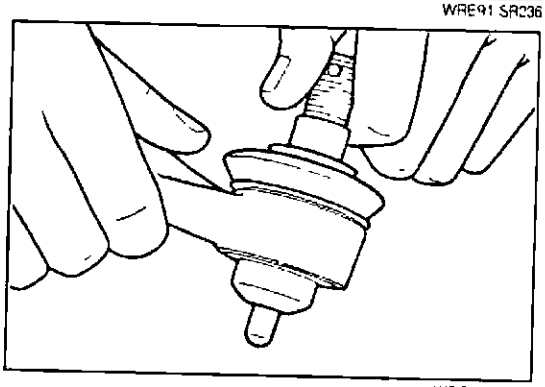
WRE91 SR235

3 Ensure that each tie-rod end exhibits no damage, such as cracks or dent



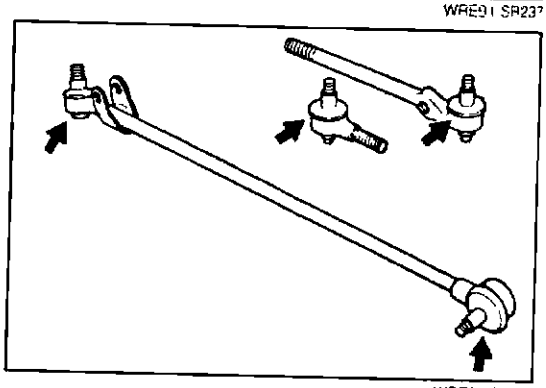
WRE91 SR236

4 Ensure that the ball joint sections of each tie-rod end and relay rod exhibit no excessive play or bending



WRE91 SR237

5 Ensure that the joint dust boots of each tie-rod end and relay rod exhibit no damage, such as cracks and rupture

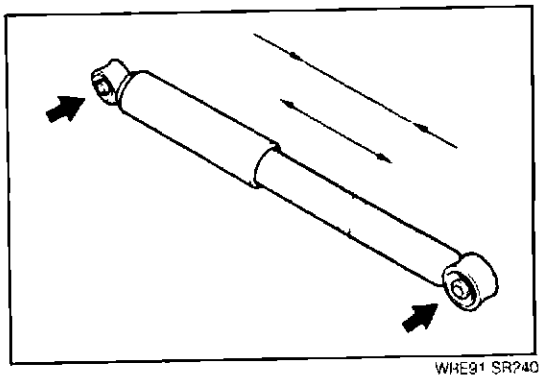


WRE91 SR238

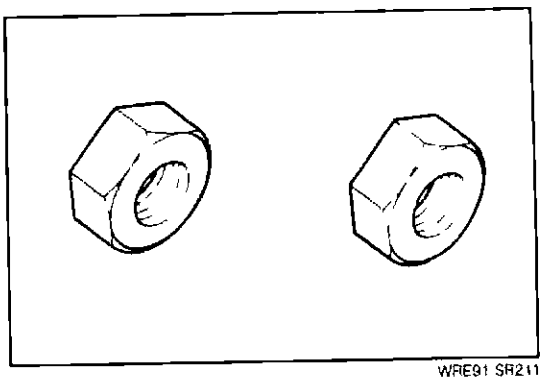
If the dust boot exhibits damage, such as cracks and rupture, remove the dust seal and dust seal band. Wipe off the grease at the joint section. Then, install a new dust boot and a new dust seal band

WRE91-SR239

6 Ensure that the bush section of the steering shimmy damper exhibits no damage, such as cracks and excessive play If the bush section exhibits damage, replace the steering shimmy damper with a new one
7 Compress and extend the steering shimmy damper At this time, ensure that you can feel a constant resistance without any binding or the like during this operation
8 Ensure that the grease fittings of each tie-rod end and relay rod exhibit no damage

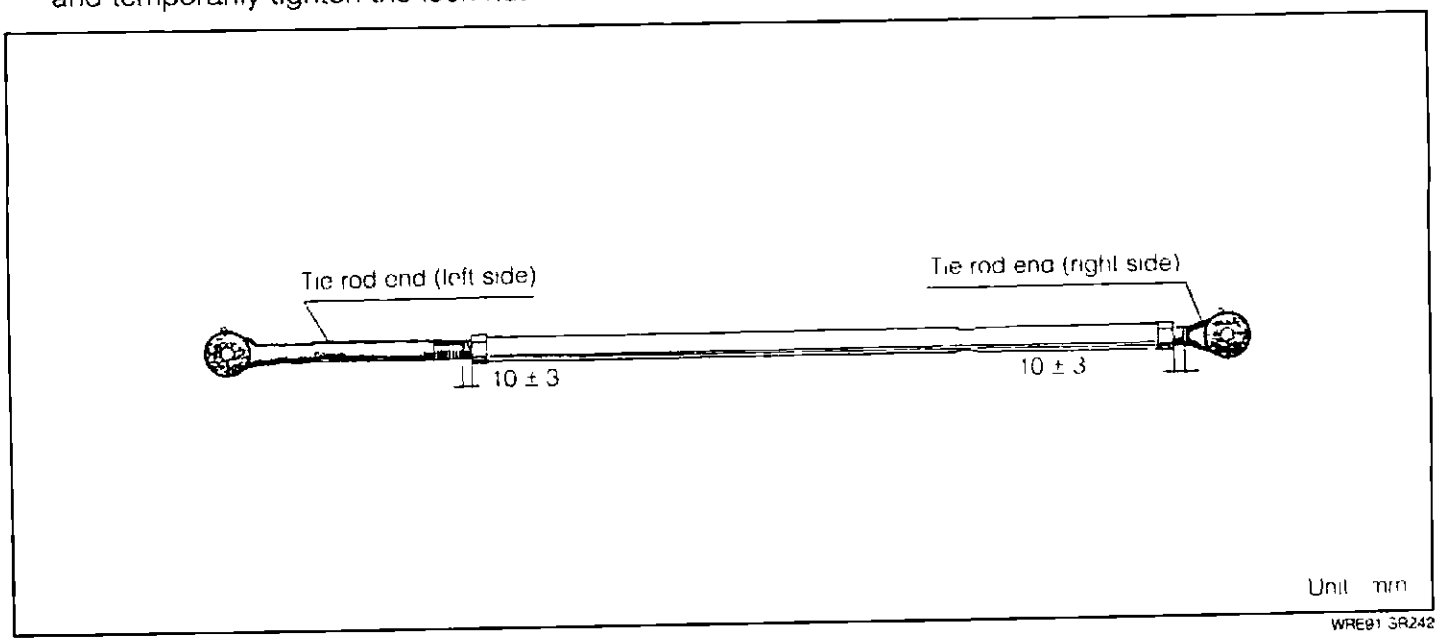

WRE91 SR240

9 Ensure that the tie-rod end lock nut exhibits no damage, such as deformation.


WRE91 SR241

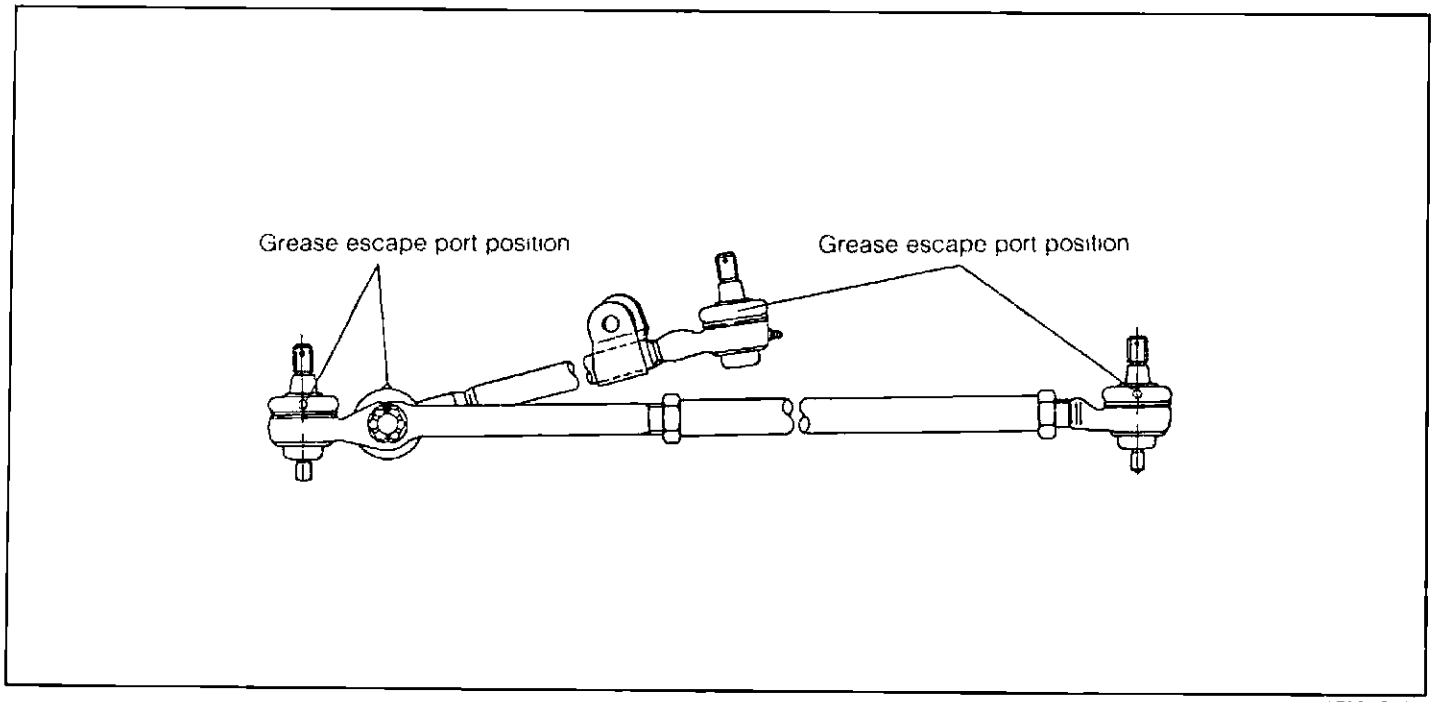
INSTALLATION

1 Screw-in the lock nut and tie-rod end into the tie-rod Set these parts as indicated in the figure below and temporarily tighten the lock nut



WRE91 SR242

2 Set the grease escape ports in such a way that they become as indicated in the right figure



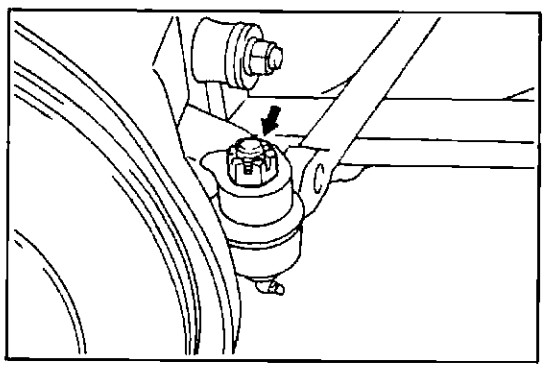
WRE91 SR243

3 Connect the tie-rod end to the steering knuckle. Tighten the castle nut to the specified torque

Tightening Torque: 49.0 - 88.3 N m
(5.0 - 9.0 kgf-m, 36.2 - 65.1 ft-lb)

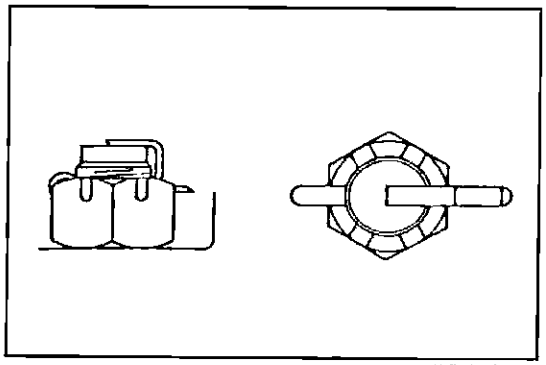
NOTE:

- At this time, align the cotter pin hole of the ball joint with the recessed section of the castle nut.



WRE91 SR244

4 Install a new cotter pin to the castle nut Bend the legs, as indicated in the right figure



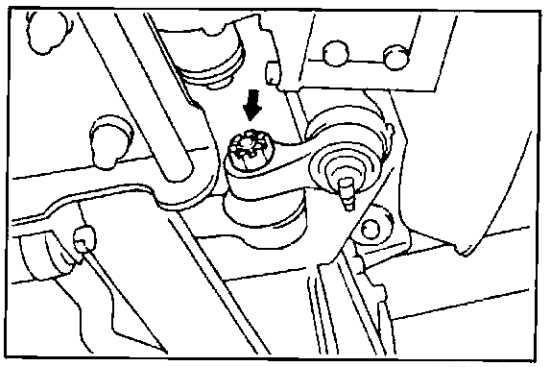
WRE91 SR245

5 Connect the relay rod to the tie-rod end Tighten the attaching nut to the specified torque

Tightening Torque: 68.6 - 137 N m
(7.0 - 14.0 kgf-m, 50.6 - 101 ft-lb)

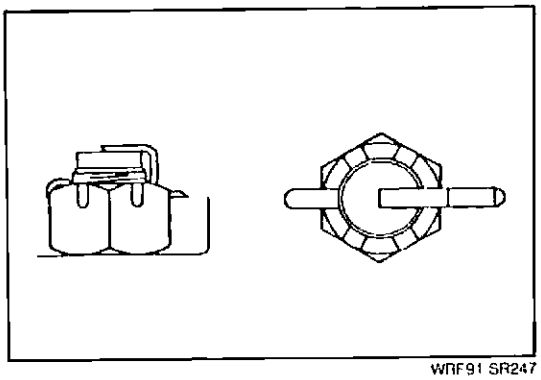
NOTE:

- At this time, align the cotter pin hole of the ball joint with the recessed section of the castle nut.



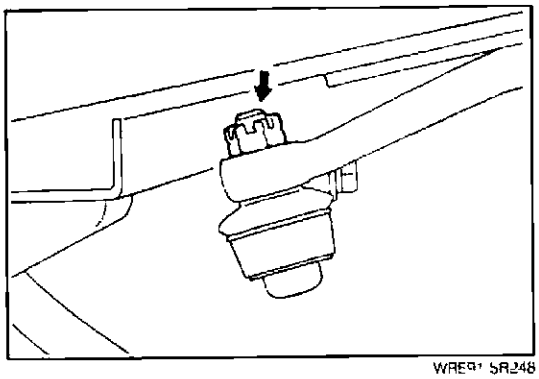
WRE91 SR246

6 Install a new cotter pin to the castle nut Bend the legs as indicated in the right figure

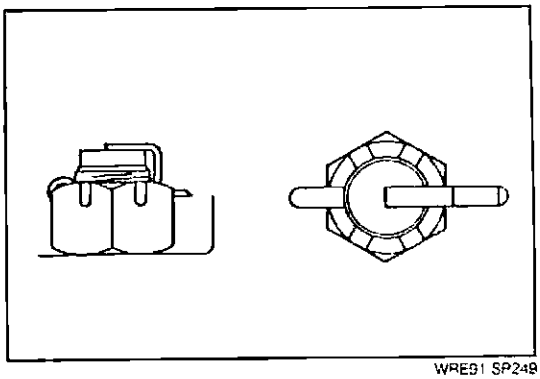

WRF91 SR247

7 Connect the steering relay rod to the pitman arm Tighten the attaching nut to the specified torque.
Tightening Torque: 68.6 - 137 N m
(7.0 - 14.0 kgf-m, 50.6 - 101 ft-lb)

NOTE:
- At this time, align the cotter pin hole of the ball joint with the recessed section of the castle nut.

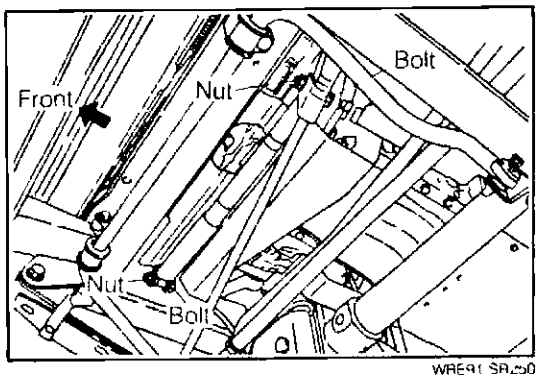

WRE91 SR248

8 Install a new cotter pin to the castle nut Bend the legs, as indicated in the right figure


WRE91 SR249

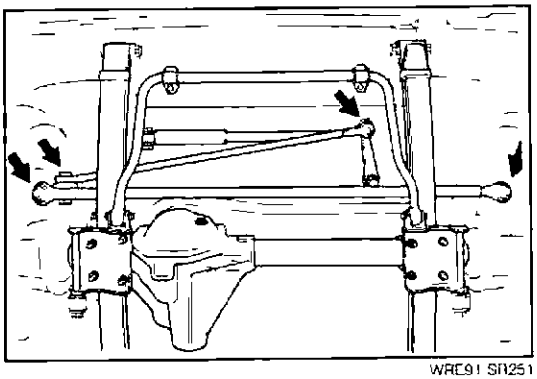
9 Install the steering shimmy damper by means of the bolts and nuts with new washers interposed. Tignten the bolts and nuts to the specified torque
Tightening Torque. 73.5 - 103 N m
(7.5 - 10.5 kgf-m, 54.2 - 75.9 ft-lb)

NOTE:
- Insert the bolts from the rear side of the vehicle.
- Install the washer at the bolt side.
- The tightening should be performed at the bolt side while preventing the nut from turning.



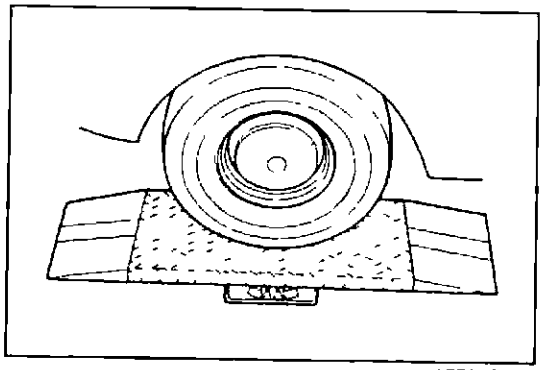
WRE91 SR250

10 Fill lithium-based MP grease from each grease fitting, until the grease oozes out from the grease escape ports

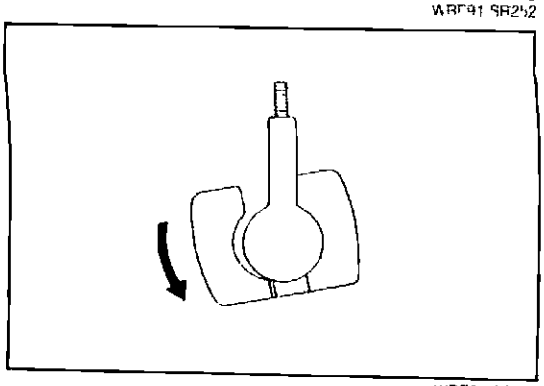

WRE91 SR251

11 Install the front wheels

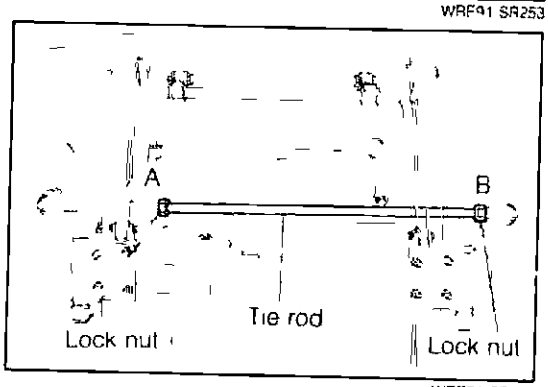
12 Jack down the vehicle. Adjust the sideslip
(For details, refer to the Front Axle & Suspension section.)
Sideslip 0 ± 3 mm


WRE91 SR252

13 Allow the sockets and ball studs of the right and left tie-rod ends to make contact with each other at the rear side. Under this condition, temporarily tighten the tie-rod end lock nut to the specified torque
Tightening Torque: 19.6 - 29.4 N·m (2.0 - 3.0 kgf-m, 14.5 - 21.7 ft-lb)


WRE91 SR253

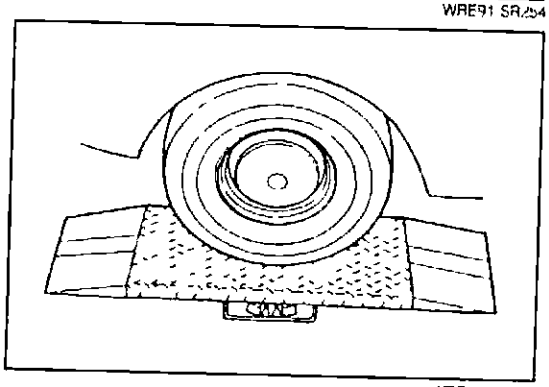
14 Alternatively tighten the right and left lock nuts of the tie-rod end twice to the specified torque
Tightening Torque: 118 - 167 N·m (120 - 17 kgf-m, 87-123 ft-lb)



WRE91 SR254

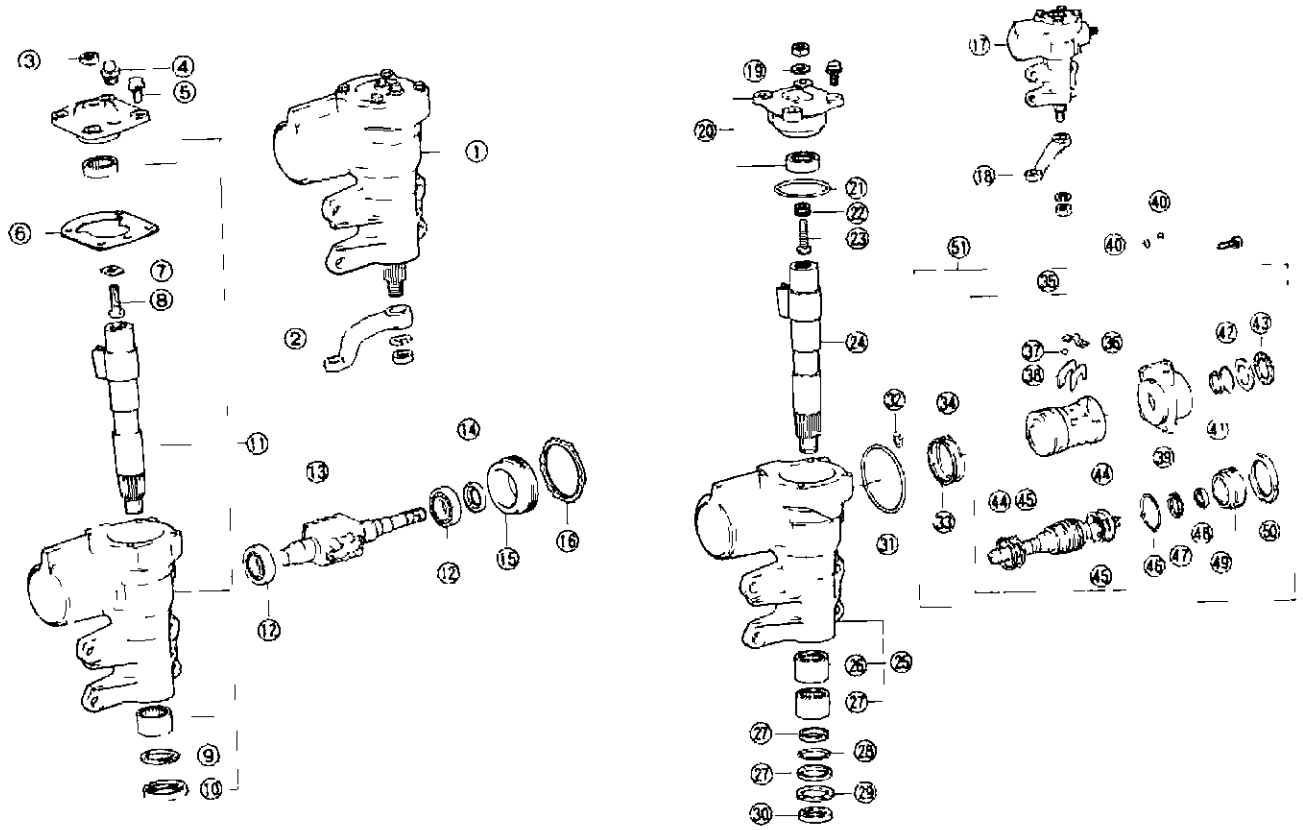
15 Ensure that the sideslip conforms to the specified value again
Sideslip. 0 ± 3 mm

(For details, refer to the Front Axle & Suspension section.)


WRE91 SR255

STEERING GEAR HOUSING

COMPONENTS

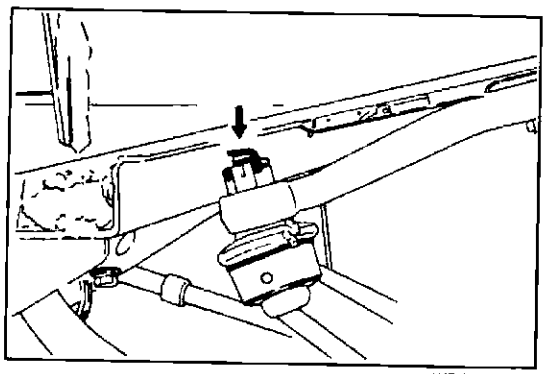


① Steering gear housing assembly
② Pitman arm subassembly
③ Sector shaft adjusting nut
④ Steering gear box oil plug
⑤ Sector shaft end cover bolt
⑥ Sector shaft end cover gasket
⑦ Sector shaft thrust washer
⑧ Sector shaft adjusting screw
⑨ Shaft snap ring
⑩ Type 'T' oil seal
⑪ Steering gear housing subassembly
⑫ Bearing
⑬ Steering worm w/ball nut joint assembly
⑭ Type "T" oil seal
⑮ Worm bearing adjusting screw
⑯ Worm bearing adjusting screw lock nut
⑰ Power steering gear assembly
⑱ Pitman arm subassembly
⑲ Seal washer
⑳ Sector shaft end cover
㉑ 'O' ring
㉒ Sector shaft adjusting nut
㉓ Sector shaft adjusting screw
㉔ Gross shaft
㉕ Power steering gear housing subassembly
㉖ Needle roller bearing
㉗ Ring
㉘ "O ring
㉙ Hole snap ring
㉚ Type "V" oil seal
㉛ 'O" ring
㉜ "O' ring
㉝ Ring
㉞ "O' ring
㉟ Power steering worm kit
㊱ Ball guide clamp
㊲ Ball
㊳ Ball guide
㊴ Valve housing subassembly
㊵ Union seat
㊶ Ring
㊷ "O" ring
㊸ Thrust needle bearing
㊹ Ring
㊺ "O ring
㊻ "O ring
㊼ Bearing
㊽ Type 'T' oil seal
㊾ Adjuster plug subassembly
㊿ Worm bearing adjusting screw lock nut
(51) Power steering control valve assembly

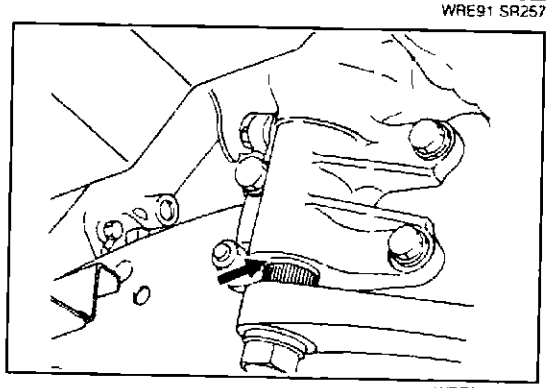
WRE91 5R256

IN-VEHICLE INSPECTION

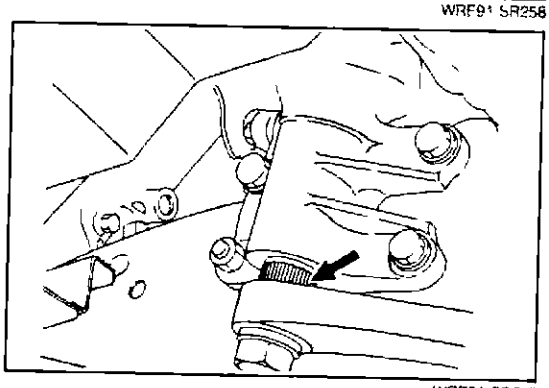
1 Ensure that the connecting section of the pitman arm and steering sector shaft exhibits no defect, such as excessive play and looseness
If any defect is present, check the tightening torque of the nut Retighten them or replace the defective parts, as required


WRE91 SR257

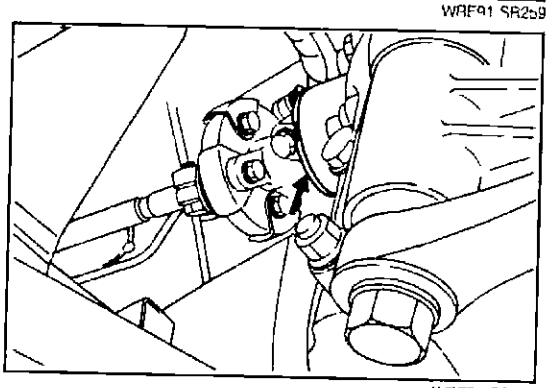
2 Ensure that no excessive play or looseness, etc. is present between the steering housing and sector shaft
If any excessive play, etc is present, replace the steering gear housing assembly


WRE91 SR258

3 Ensure that the connecting section of the steering shaft of the steering gear housing and main shaft flexible coupling yoke exhibits no defect, such as excessive play and looseness
If any defect is present, perform retightening or replace defective parts

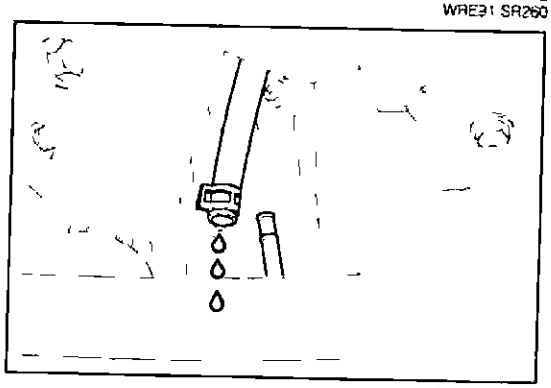

WRE91 SR259

4 Ensure that no defect, such as excessive play, is present between the steering housing and the main shaft flexible coupling yoke
If any defect is present, overhaul the steering gear housing
5 Ensure that the steering gear housing exhibits no oil leakage If any oil leakage is present, repair the leaky points

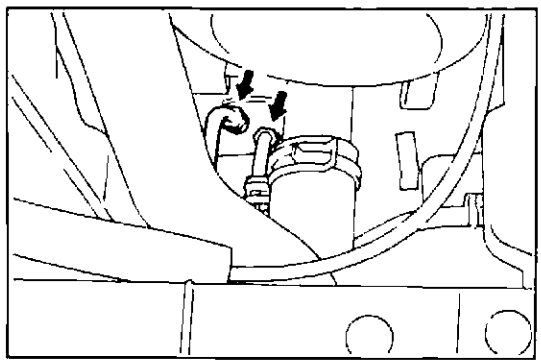

WRE91 SR260

REMOVAL

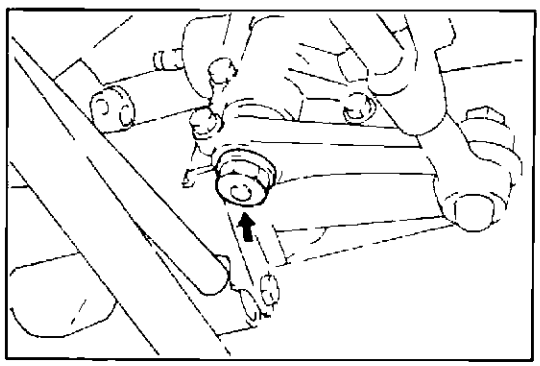
1 Drain the power steering fluid
(See page SR-17)
(Power steering-equipped vehicle only)


WRE91 SR261

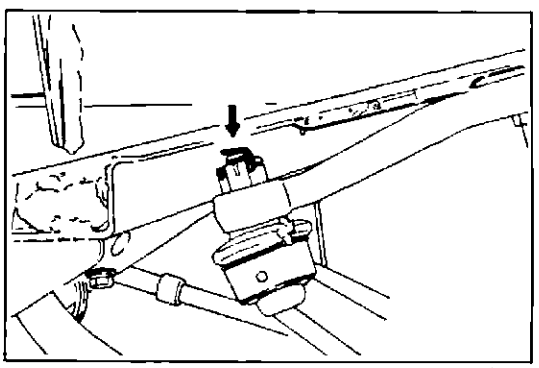
2 Disconnect the power steering pressure feed tubes from the power steering gear housing
(Power steering-equipped vehicle only)
NOTE:
- Since the power steering oil will flow out, be sure to place a suitable container under the power steering gear housing.


WRF91 SR262

3 Loosen the pitman arm attaching nut

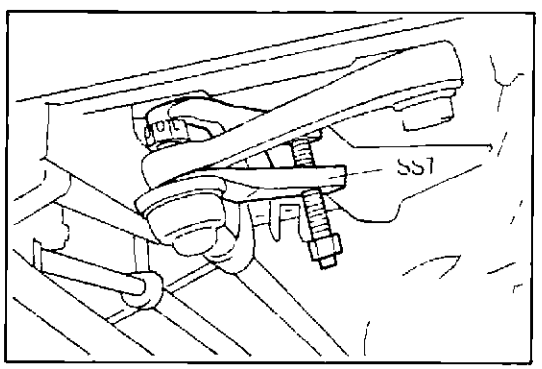

WRF91 SR263

4 Remove the cotter pin
5 Loosen the castle nut two or three threads


WRF91 SR264

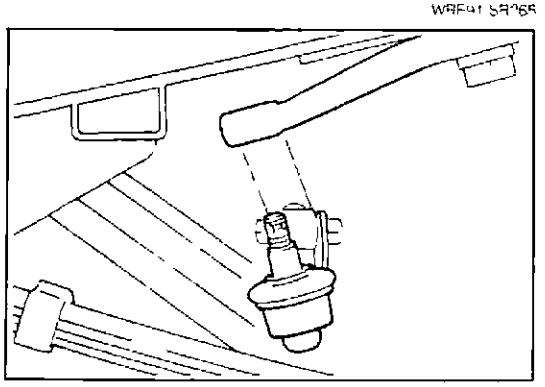
6 Disconnect the pitman arm from the relay rod, using the following SST
SST: 09611-87701-000

NOTE:
- Be careful not to apply excessive load during the removal.
- If the parts will not be disconnected even if the load is applied, put a suitable metal rod against the side of the tapered section of the pitman arm and lightly tap the metal rod with a hammer or the like to give impact. This will facilitate the disconnection.

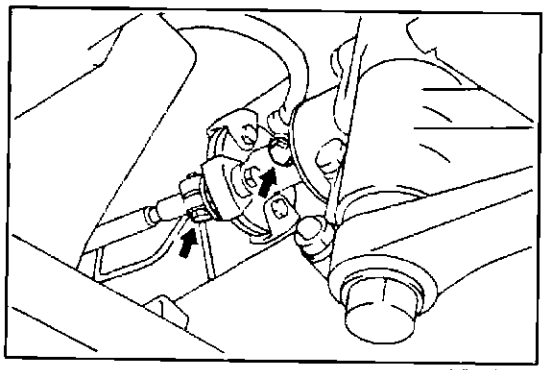


WRF91 SR265

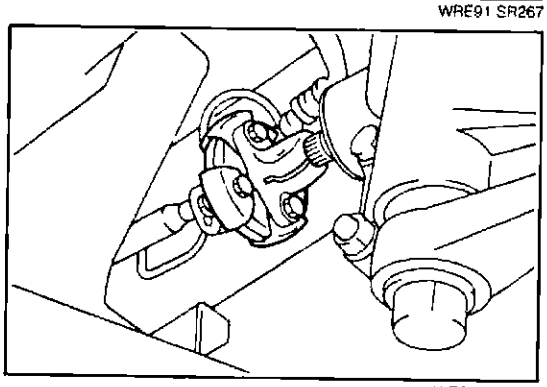
7 Remove the castle nut and disconnect the relay rod from the pitman arm


WRF91 SR266

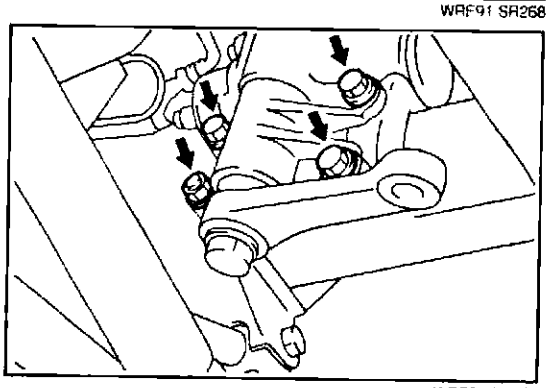
8 Remove the main shaft flexible coupling yoke connecting bolt at the steering gear housing side.
9 Loosen the main shaft flexible coupling yoke connecting bolt at the intermediate shaft side.


WRE91 SR267

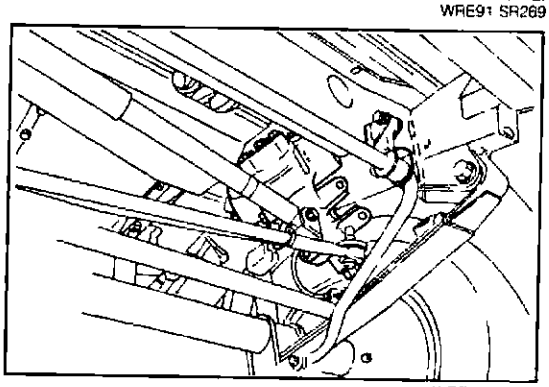
10 Disconnect the flexible coupling assembly from the steering gear housing by moving it toward the intermediate shaft side


WRE91 SR268

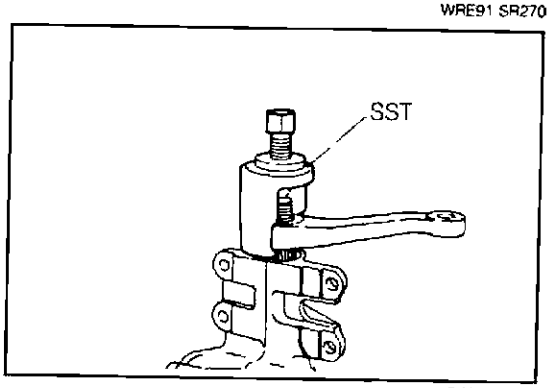
11. Loosen the attaching bolts and nut for the steering gear housing evenly.
12. Remove the attaching bolts and nut.


WRE91 SR269

13 Remove the steering gear housing from the vehicle.
NOTE:
- **Be very careful not to allow the steering gear housing to interfere with other parts strongly.**


WRE91 SR270

14. Remove the pitman arm attaching nut.
15 Disconnect the pitman arm from the sector shaft, using the following SST
SST: 09610-87301-000

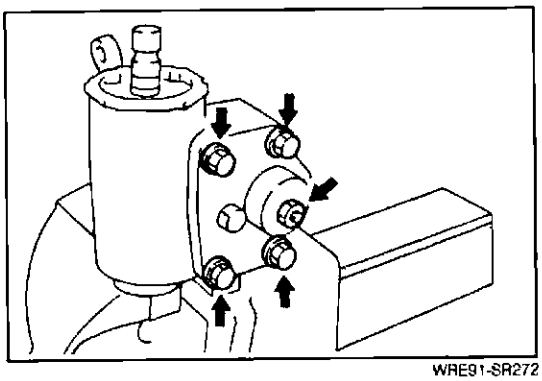


WRE91 SR271

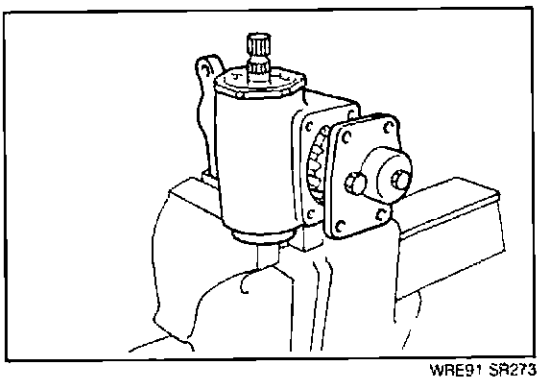
DISASSEMBLY

(Manual Steering Gear Assembly)

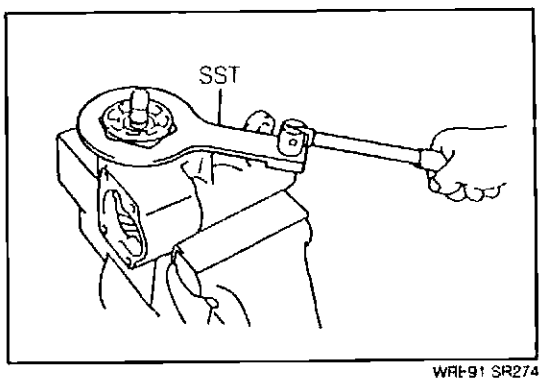
1 Remove the sector shaft adjusting screw set nut
2 Remove the end cover set bolt


WRE91-SR272

3 Pull out the sector shaft from the steering gear housing with end cover
4 Disassemble the sector shaft end cover, thrust washer, adjusting screw and end cover by screwing in the sector shaft adjusting screw.

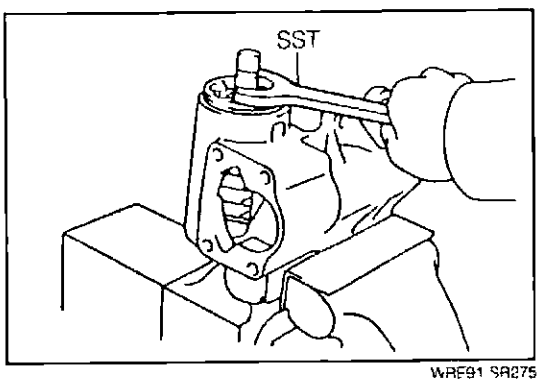

WRE91 SR273

5 Remove the worm bearing adjusting screw locker nut, using the following SST.
SST: 09617-28010-000



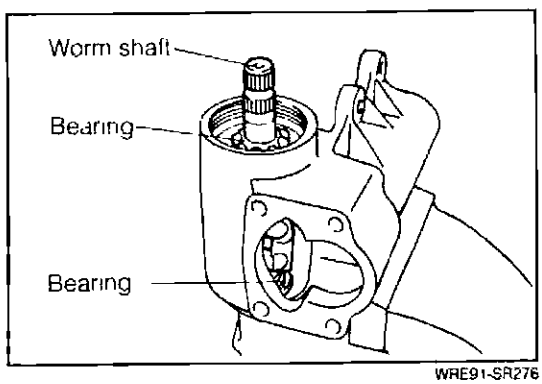
WRE91 SR274

6 Remove the worm bearing adjusting screw, using the following SST
SST: 09616-30011-000



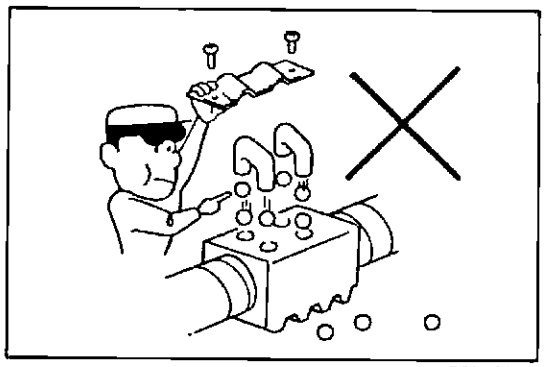
WRE91 SR275

7 Remove the worm shaft assembly and ball bearings from the steering gear housing

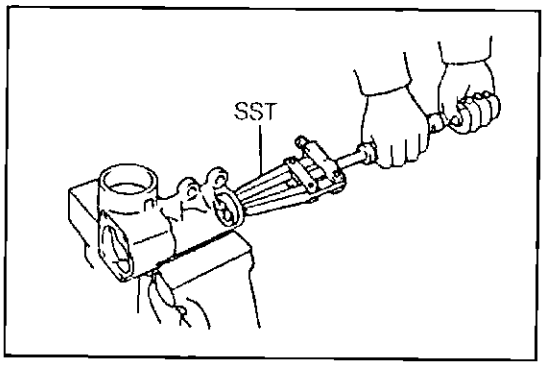


WRE91-SR276

NOTE.
- Never disassemble the ball nut from the steering worm assembly.
- Never let the ball nut run to collide with the either end of the worm.

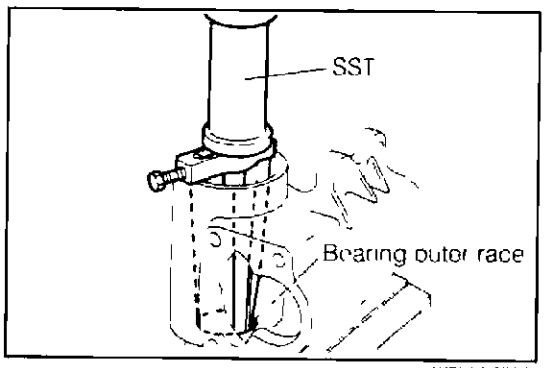

WRE91 SR277

8 Remove the oil seal, using the following SST.
SST 09308-00010-000



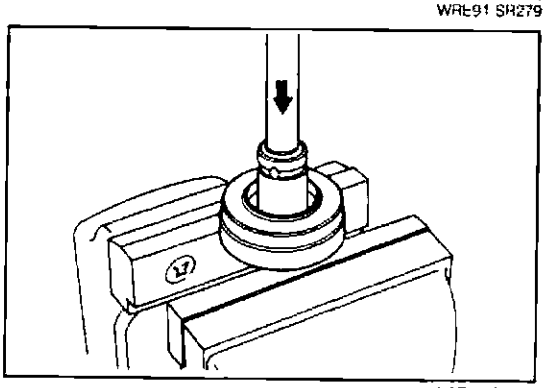
WRE91 SR278

9 Remove the ball bearing outer race from the steering gear housing using the following SST
SST: 09308-00010-000

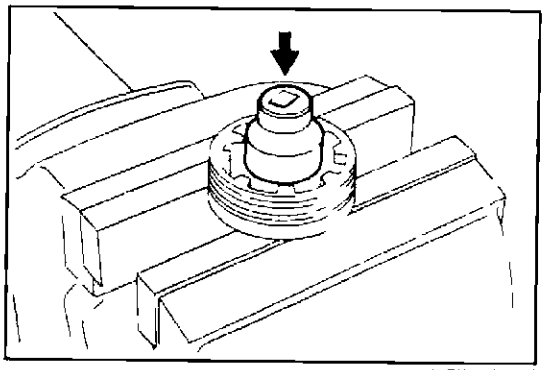


WRE91 SR279

10 Remove the oil seal from the worm bearing adjusting screw, using a suitable box wrench or a slotted pin puller


WRE91 SR280

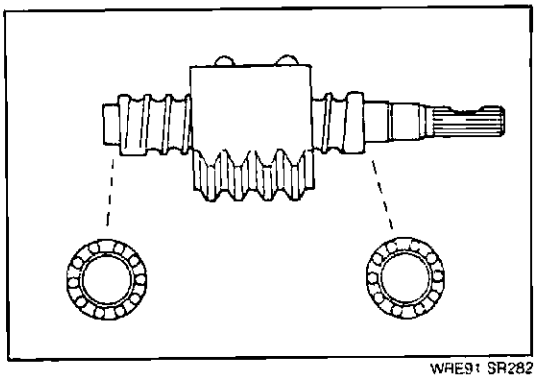
11 Remove the bearing outer race from the worm bearing adjusting screw, using a suitable box wrench or a slotted pin puller

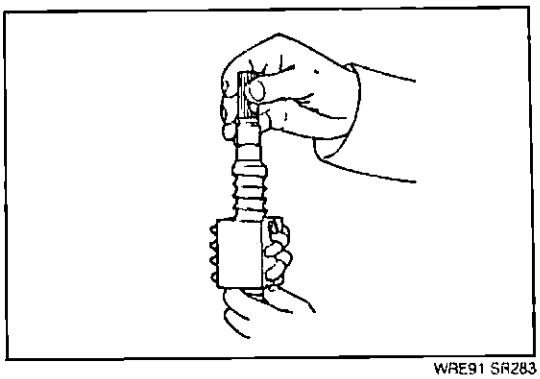

WRE91 SR281

INSPECTION

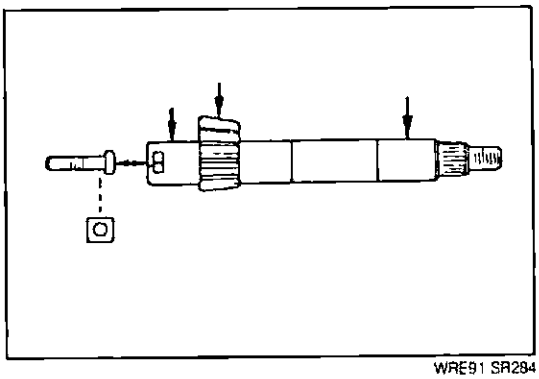
1 Inspection of steering worm shaft assembly
(1) Ensure that the worm shaft threaded portion exhibits no damage, such as wear.
(2) Ensure that the bearing race section of the worm shaft assembly exhibits no damage, such as wear and cracks
(3) Ensure that the ball nut rack section exhibits no damage, such as scratches, cracks and wear
(4) Ensure that the bearing exhibits no damage such as wear
(5) With the worm shaft held vertically, ensure that the ball nut rotates smoothly by its own weight

NOTE:
- **When the worm nut approaches the end, hold the worm nut by fingers so that it may not hit the worm's end.**

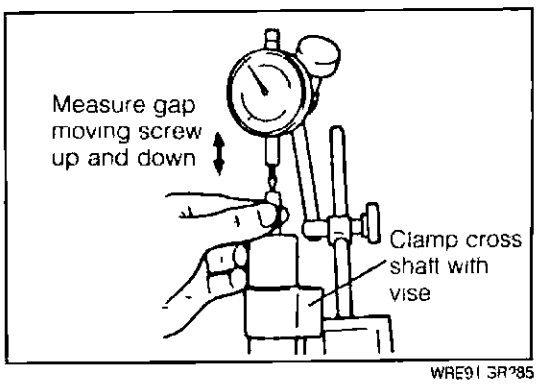

WRE91 SR282


WRE91 SR283

2 Inspection of sector shaft
(1) Check the gear section for damage.
(2) Check to see if any severe damage is present at the contacting surface of the sector shaft with the adjusting screw
(3) Check the contacting surface of each needle roller bearing for damage

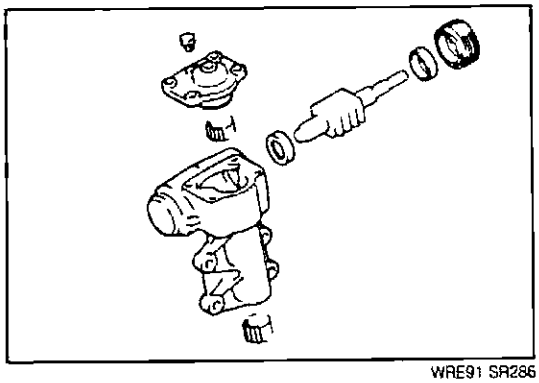

WRE91 SR284

(4) Measure the gap between the shaft and the adjusting screw
Specified Value: Not to exceed 0.05 mm



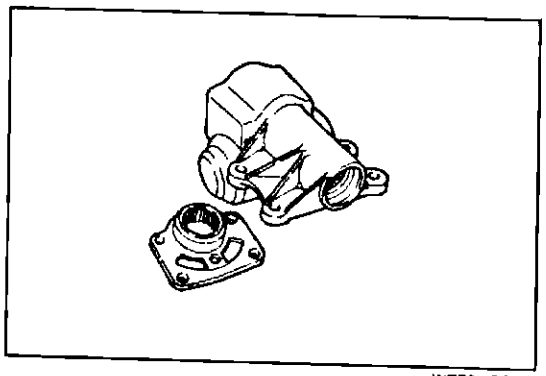
WRE91 SR285

3 Inspection of steering gear housing
(1) Check the needle roller bearings for damage.
(2) Check the worm bearing outer race for damage or wear
(3) Check the breather plug for clogging


WRE91 SR286

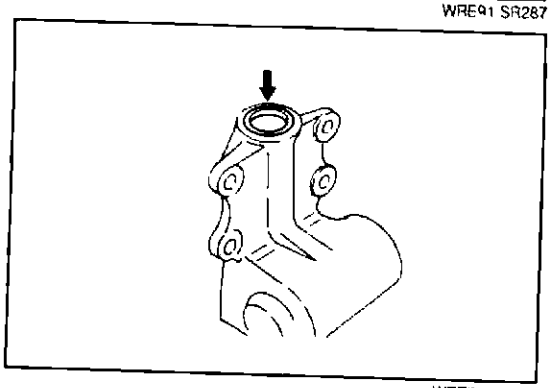
ASSEMBLY

1 Apply a thin film of lithium-based MP grease to the needle roller bearings



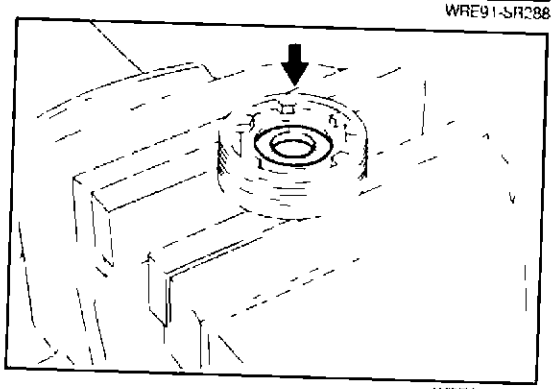
WRE91 SR287

2 Apply gear oil to the inner surface of the sector shaft oil seal
3 Press the oil seal, while applying a suitable iron rod or the like so that the oil seal may not tilt



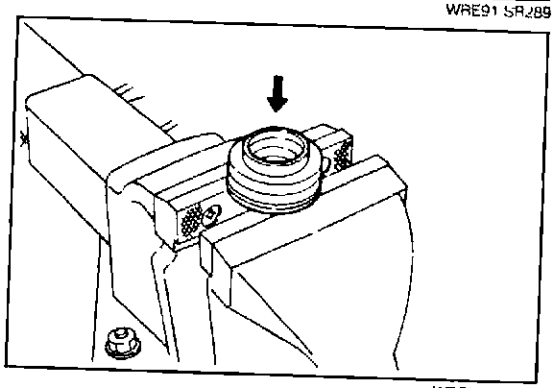
WRE91 SR288

4 Apply gear oil to the inner surface of the worm shaft oil seal
5 Press the bearing outer race into the worm bearing adjusting screw, while applying a suitable brass rod or the like so that the bearing outer race may not tilt
NOTE:
- Care must be exercised not to scratch the inner surface of the inner race.
- Make sure that the inner race may not tilt during the pressing.



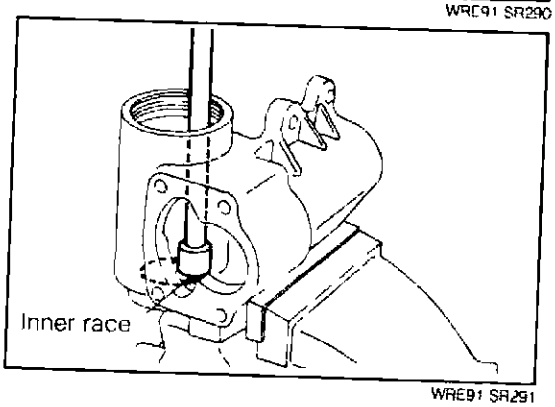
WRE91 SR289

6 Press an new oil seal into the worm bearing adjusting screw, while applying a suitable iron rod or the like so that the oil seal may not tilt
NOTE:
- Press the oil seal, until it contacts with the bearing outer race. Never press the oil seal farther beyond this limit.
- Make sure that the oil seal may not tilt during the pressing



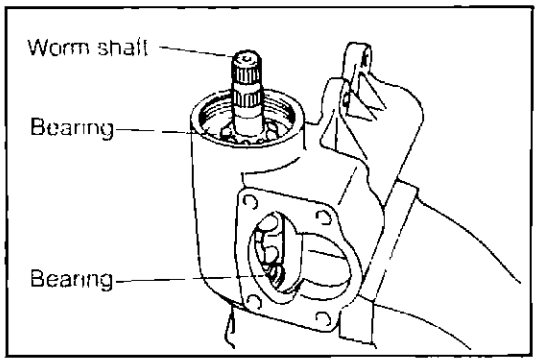
WRE91 SR290

7 Press the bearing outer race into the steering gear housing, while applying a suitable brass rod or the like so that the bearing outer race may not tilt
NOTE:
- Care must be exercised not to scratch the inner surface of the inner race.
- Make sure that the inner race may not tilt during the pressing.



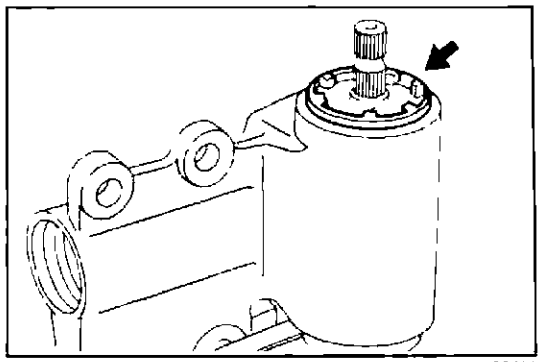
WRE91 SR291

8 Insert the bearings and ball nut into the steering gear housing



WRE91 SR292

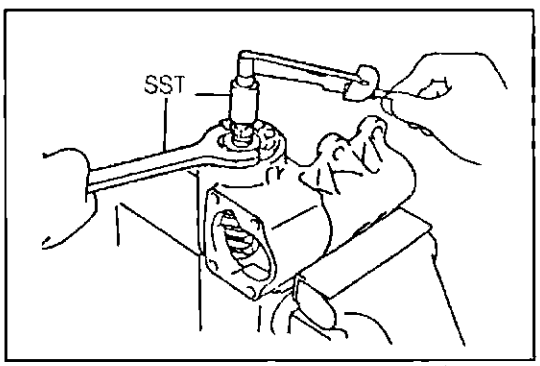
9 Screw in the worm bearing adjusting screw fully by your hand


WRE91 SR293

10 Install the SST indicated in the right figure to the worm shaft
Adjust the worm bearing adjusting screw, using the following SSTs, so that the bearing preload may become the specified value

Starting Torque: 0.29 - 0.49 N m
(0.03 - 0.05 kgf-m, 0.22 - 0.36 ft-lb)

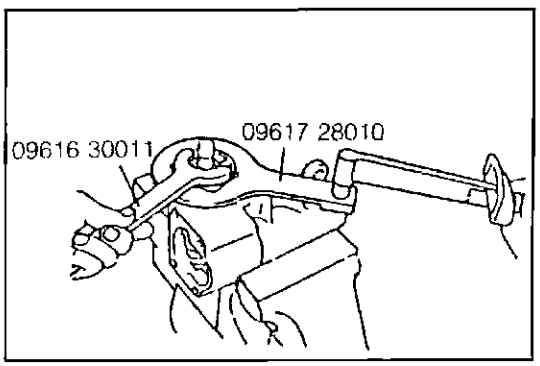
SSTs: 09616-00010-000
09616-30011-000



WRE91 SR294

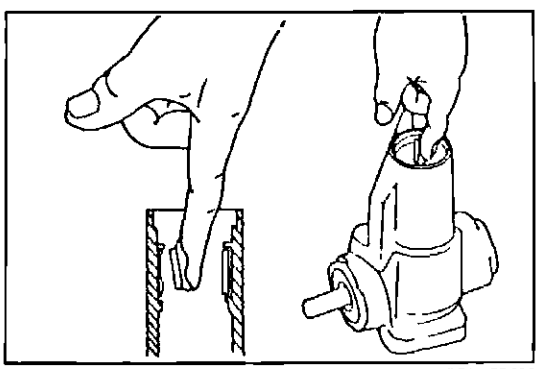
11 While preventing the adjusting screw from turning with the SST, lock the lock nut by tightening it, using the following SST

SSTs: 09616-30011-000
09617-28010-000

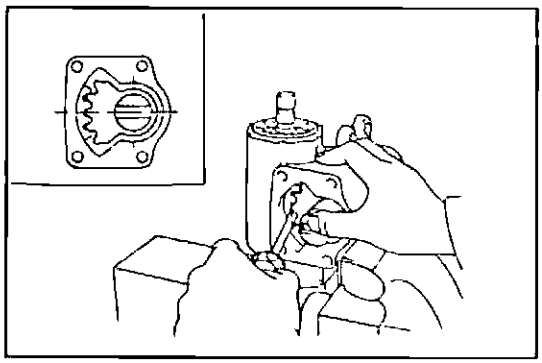


WRE91 SR295

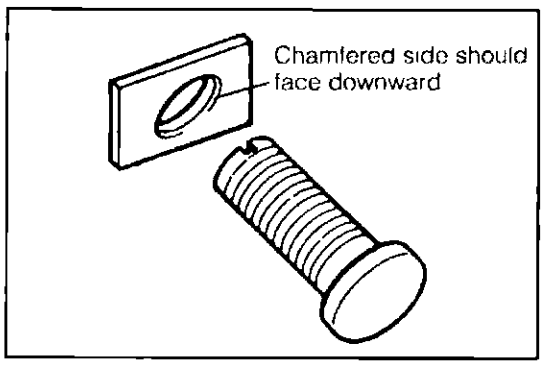
12 Ensure that no needle roller bearing is dropped.
If the needle roller bearing should be dropped, apply lithium-based MP grease and install the needle roller bearings in place


WRE91 SR296

13 Position the ball nut at the midpoint of the worm shaft. Assemble the sector shaft in such a way that the midpoint of the sector shaft is aligned with the midpoint of the ball nut

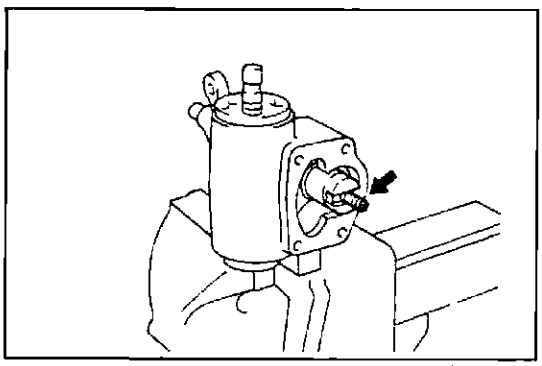

WRE91 SR297

14 Assemble the thrust washer into the sector shaft adjusting screw in such a way that the chamfered side of the thrust washer faces downward



WRE91 SR298

15 Assemble the sector shaft adjusting screw to the sector shaft

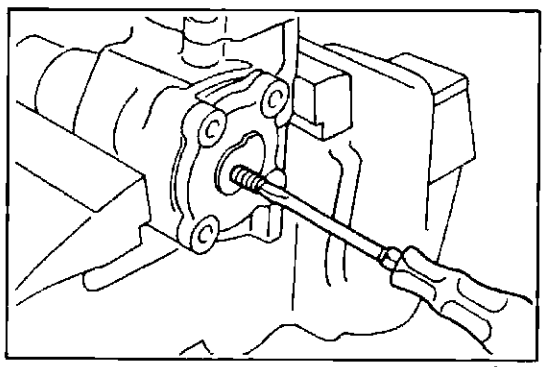

WRE91 SR299

16 Apply Three Bond® 1104 to a new gasket at its both surfaces Install the the gasket to the end cover.

17 Screw in the sector shaft adjusting screw fully to the end cover side, while aligning the sector shaft adjusting screw with the end cover.

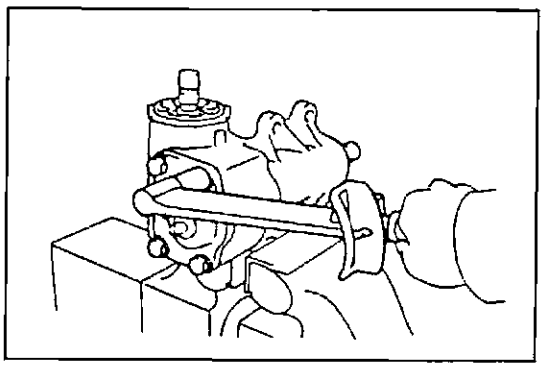
CAUTION:

- **Be certain to screw-in the sector shaft adjusting screw fully to the end cover side. Failure to observe this caution may cause breakage.**

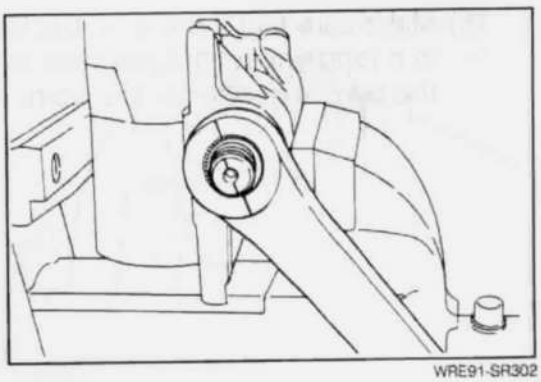

WRE91 SR300

18 Apply Three Bond® 1102 to the threaded portions of the end cover attaching bolts. Tighten the bolts to the specified torque evenly over two or three stages.

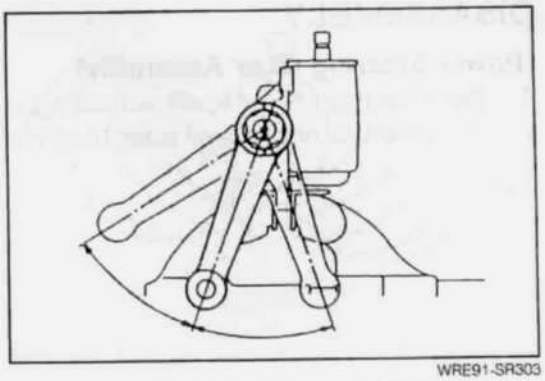
Tightening Torque: **44.1 - 53.9 N·m (4.5 - 5.5 kgf-m, 32.5 - 39.8 ft-lb)**


WRE91 SR301

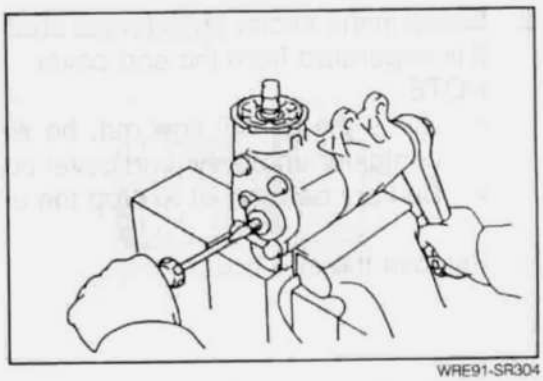
19. Pre-load adjustment of sector shaft
    (1) Install the pitman arm to the sector shaft, making sure that the mate marks on the pitman arm and sector shaft are lined up.
    (2) Temporarily install the pitman arm attaching nut with a new washer interposed.


WRE91-SR302

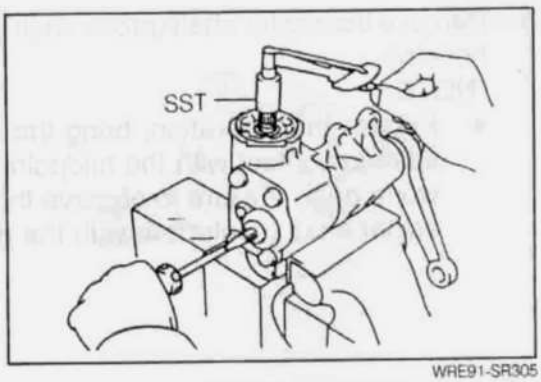
    (3) Determine the rotating center of the sector shaft (the central position of gear's engagement).


WRE91-SR303

    (4) Tighten the sector shaft adjusting screw until the backlash becomes zero.


WRE91-SR304

    (5) While gradually tightening the adjusting screw, measure the preload (starting torque) and set it at the specified value.
    SST: 09610-00010-000
    Specified Preload (Starting torque):
    0.69 - 1.0 N·m (0.07 - 0.1 kgf-m, 0.51 - 0.7 ft-lb)

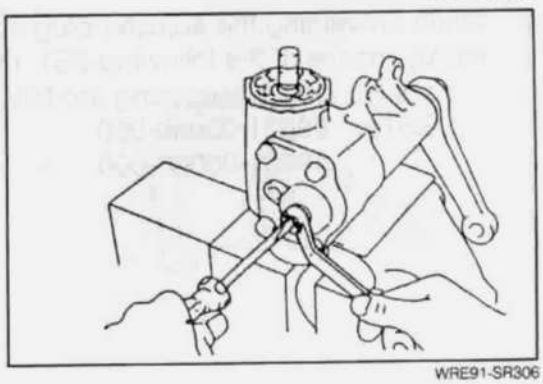


WRE91-SR305

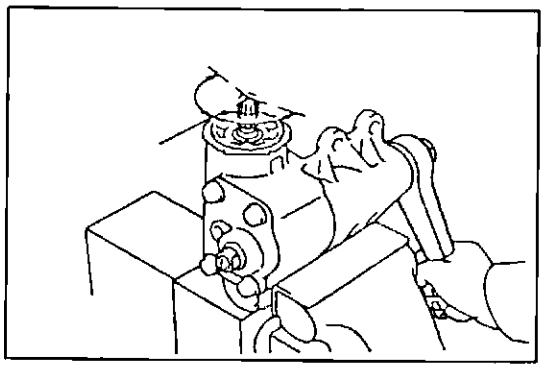
NOTE:
- Measurement should be performed at the central position of the gear's engagement.
- Perform the adjustment in the direction in which the adjusting screw is tightened.

    (6) Tighten the lock nut.
    Tightening Torque: 19.6 - 34.3 N·m
    (2.0 - 3.5 kgf-m, 14.5 - 25.3 ft-lb)

    (7) Measure the preload again and make sure that it is set within the specified value.


WRE91-SR306

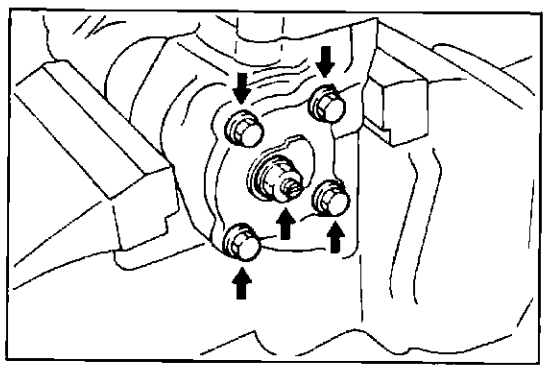
(8) Make sure that there is no backlash of the sector shaft in a range about 100 degrees to the right and left from the central position of the worm shaft


WRE91 SR307

DISASSEMBLY

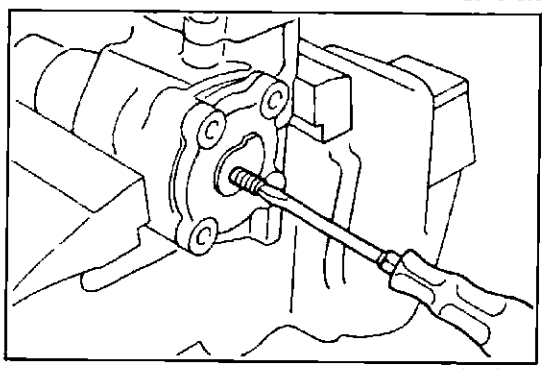
(Power Steering Gear Assembly)

1 Remove the sector shaft adjusting screw set nut
2 Remove the end cover attaching bolts

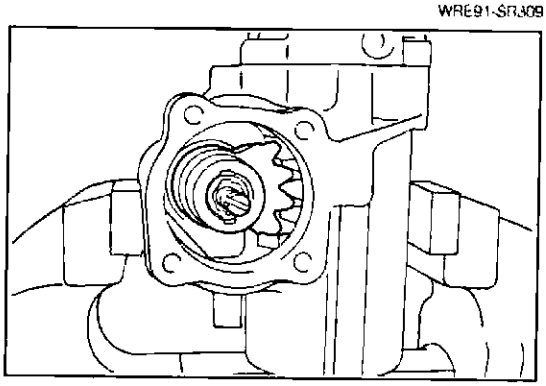

WRE91 SR308

3 Screw in the sector shaft (cross shaft) adjusting screw until it is separated from the end cover
NOTE.
- Since the oil will flow out, be sure to place a suitable container under the end cover connecting section.
- Be very careful not to drop the end cover.

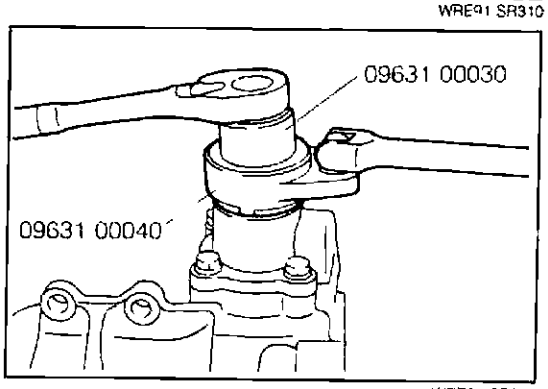
4 Remove the end cover


WRE91 SR309

5 Remove the sector shaft (cross shaft) from the steering gear housing
NOTE.
- Prior to this operation, bring the midpoint of the sector shaft in contact with the midpoint of the power steering worm gear. Failure to observe this caution will allow the sector shaft to interfere with the gear housing.

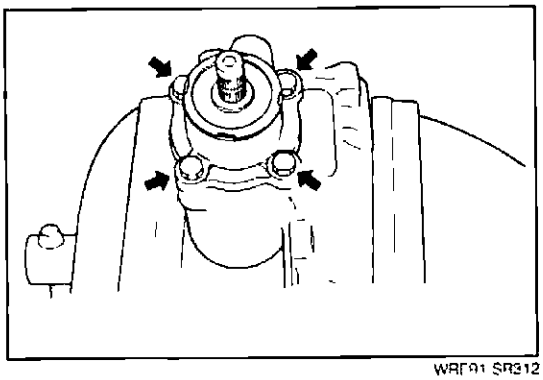

WRE91 SR310

6 While preventing the adjuster plug subassembly from turning by means of the following SST, remove the worm bearing adjusting lock nut, using the following SST
SSTs: 09631-00030-000
09631-00040-000



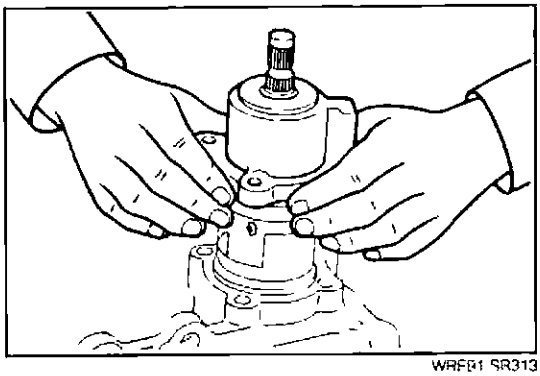
WRE91 SR311

7 Remove the valve housing attaching bolts by loosening them evenly



WRE91 SR312

8 Remove the valve housing from the steering gear housing together with the power piston nut.

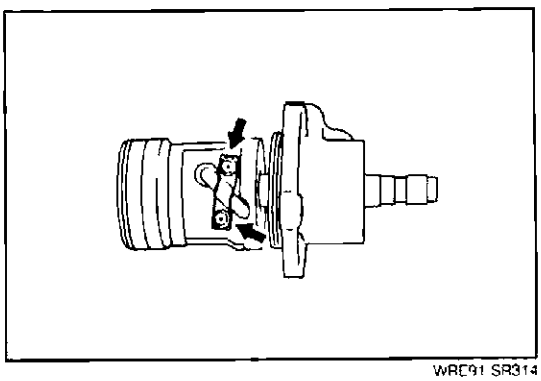


WRE91 SR313

9 Remove the ball guide clamp Remove the ball guide.
NOTE:
- Utmost care must be exercised not to drop the balls

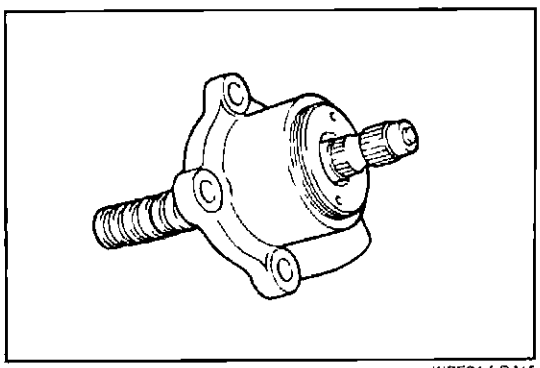
10 Remove the power piston nut from the worm shaft Pull out the balls
NOTE:
- Utmost care must be exercised not to drop the balls.

Reference:
- The number of balls is 44.



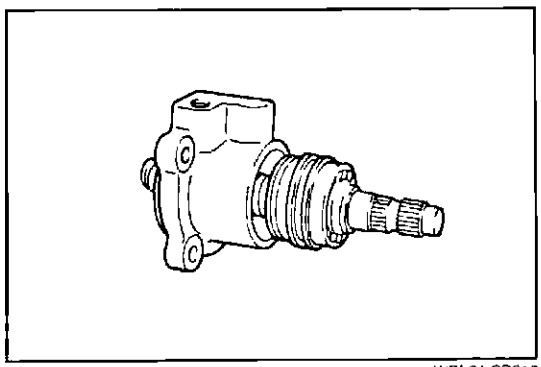
WRE91 SR314

11 Remove the adjuster plug from the valve housing



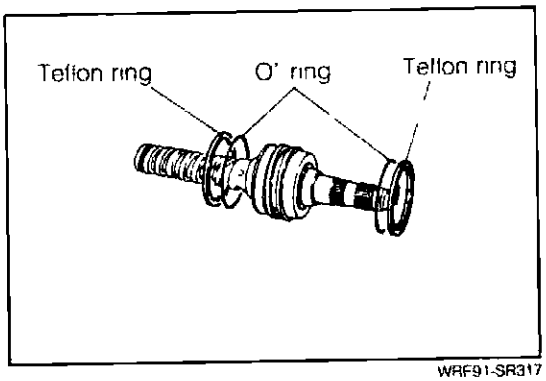
WRE91 SR315

12 Remove the worm shaft from the valve housing



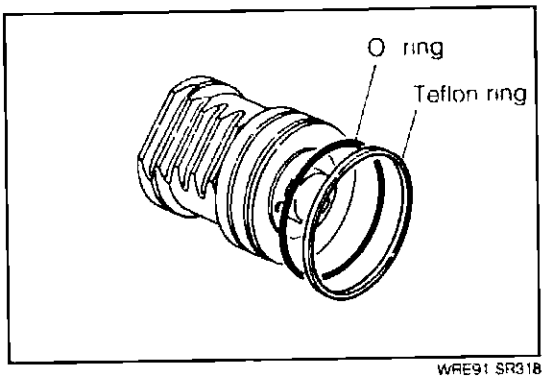
WRE91 SR316

13 Remove the teflon rings and "O" rings from the worm shaft.
NOTE:
- Never reuse the removed teflon rings or "O" rings.



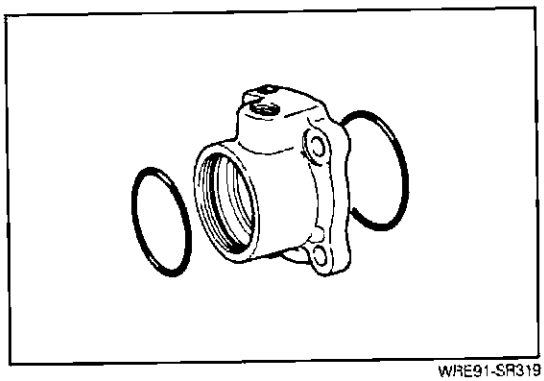
WRE91-SR317

14 Remove the teflon ring and "O" ring from the power piston nut
NOTE:
- Never reuse the removed teflon ring or "O" ring.

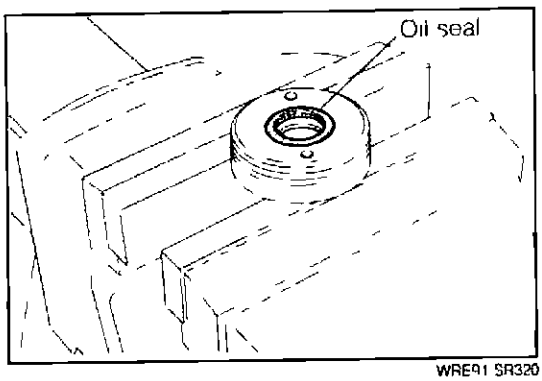


WRE91 SR318

15 Remove the "O" rings from the valve housing.
NOTE:
- Never reuse the removed "O" rings.

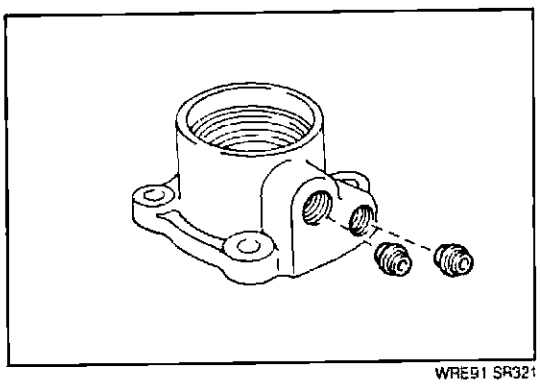

WRE91-SR319

16 Drive off the oil seal from the adjuster plug by applying a suitable rod

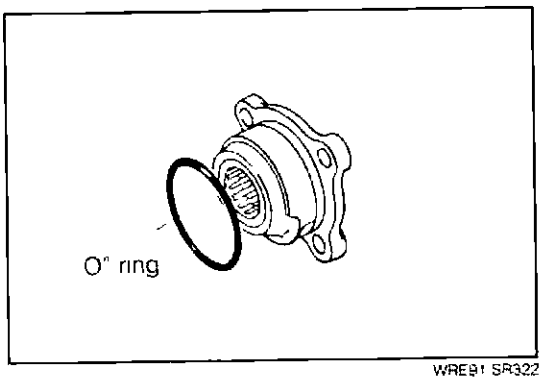


WRE91 SR320

17 Remove the union seat from the valve housing
NOTE:
- If any difficulty is encountered during the removal, use a screw extractor or the like to remove the union seat. If the union seat should be damaged, never reuse the union seat.

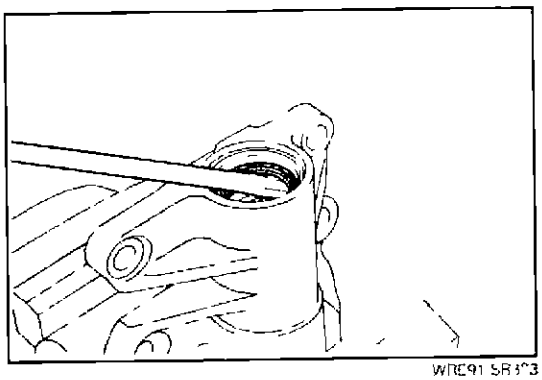

WRE91 SR321

18 Remove the oil seal from the sector shaft end cover

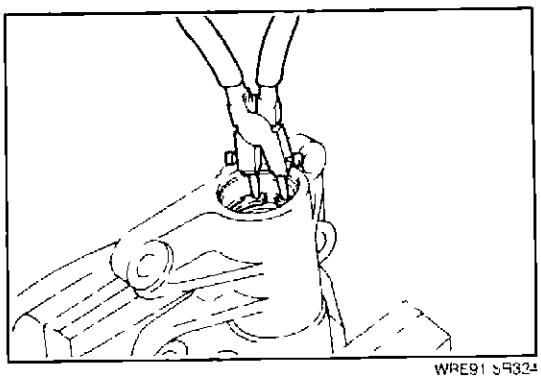


WRE91 SR322

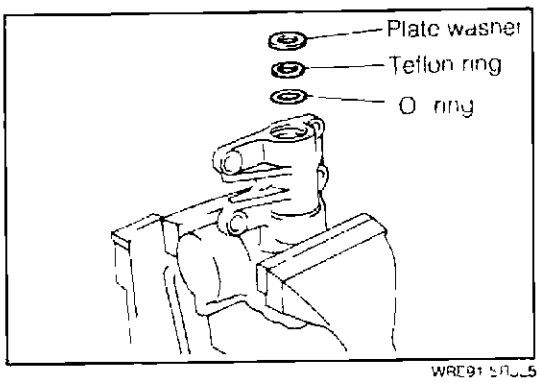
19 Remove the oil seal from the steering gear housing by prying it with a screwdriver or the like


WRE91 SR323

20 Remove the snap ring from the steering gear housing by means of snap ring pliers


WRE91 SR324

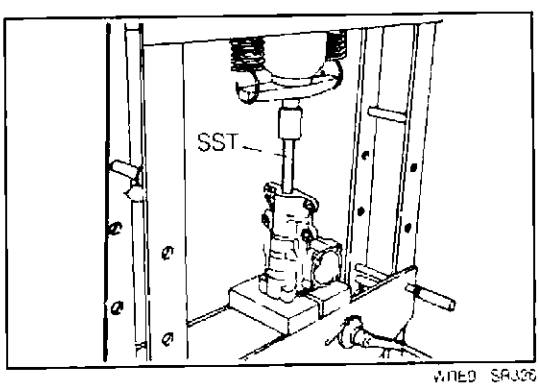
21 Remove the washer plate from the steering gear housing.
22 Remove the "O" ring and teflon ring from the steering gear housing



WRE91 SR325

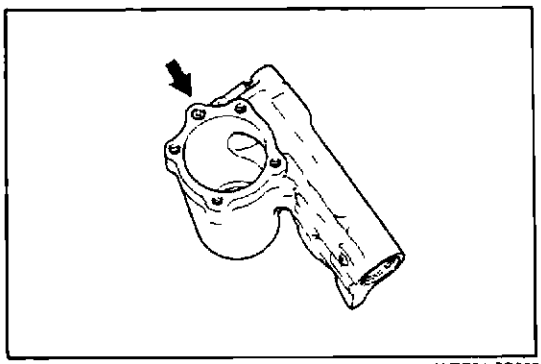
23 Remove the needle roller bearing by pressing the following SST with a press
SST 09515-87201-000

NOTE:
- Never reuse the removed needle roller bearing.



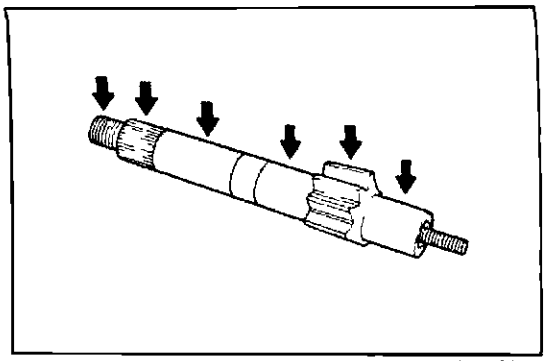
WRE9 SR326

24 Remove the "O" ring from the steering gear housing

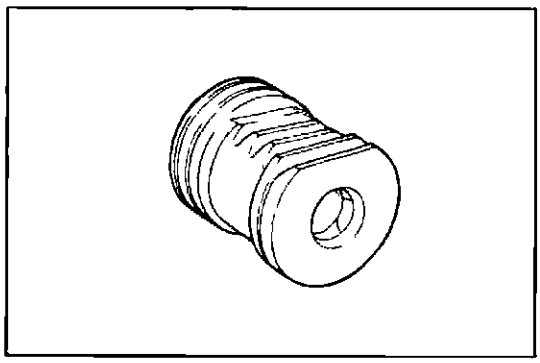

WRE91-SR327

INSPECTION

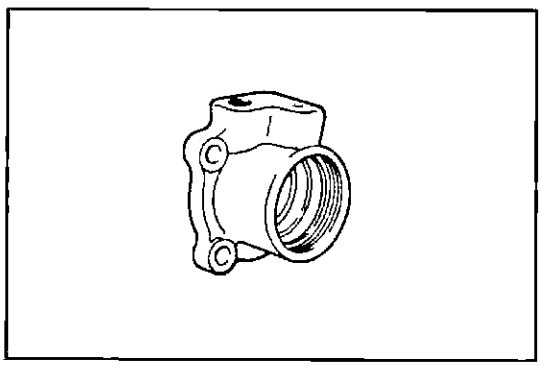
1 Check of sector shaft
(1) Ensure that the sector shaft gear section exhibits no damage, such as scratches and wear
(2) Ensure that the bearing section of the sector shaft exhibits no damage, such as scratches and wear
(3) Ensure that the threaded portion of the sector shaft exhibits no damage
(4) Ensure that the sector shaft exhibits no damage, such as cracks
(5) Ensure that the serration section of the sector shaft exhibits no damage, such as scratches and wear


WRE91 SR328

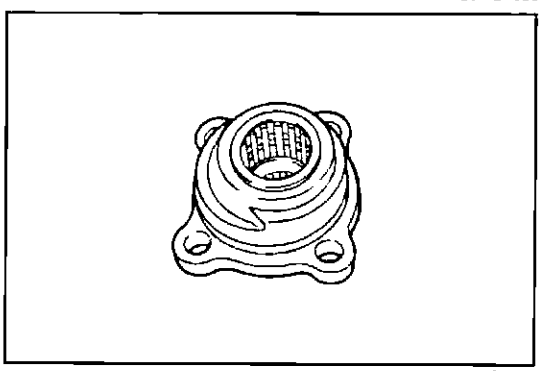
2 Power piston nut check
(1) Ensure that the ball contact surface and gear section of the power piston nut exhibits no damage such as scratches
(2) Ensure that the power piston nut exhibits no damage such as cracks


WRE91-SR329

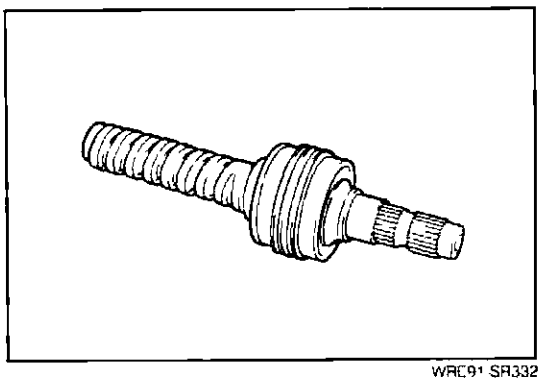
3 Check of valve housing
(1) Ensure that the valve housing exhibits no damage such as cracks
(2) Ensure that each oil passage of the valve housing exhibits no restriction or lodging of foreign matters


WRE91 SR330

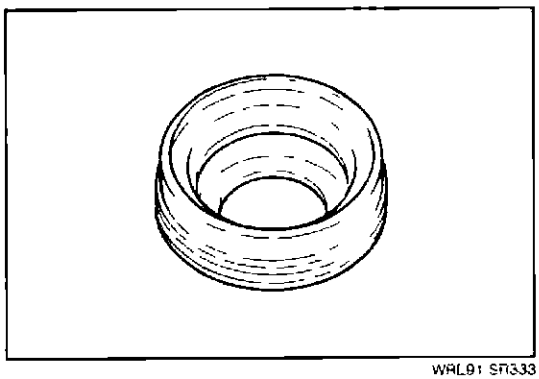
4 Check of sector shaft end cover
(1) Ensure that the sector shaft end cover exhibits no damage, such as cracks.
(2) Ensure that the needle roller bearing exhibits no damage or defect, such as improper sliding.
If any damage or defect is present at the needle roller bearing, replace the sector shaft end cover.


WRE91-SR331

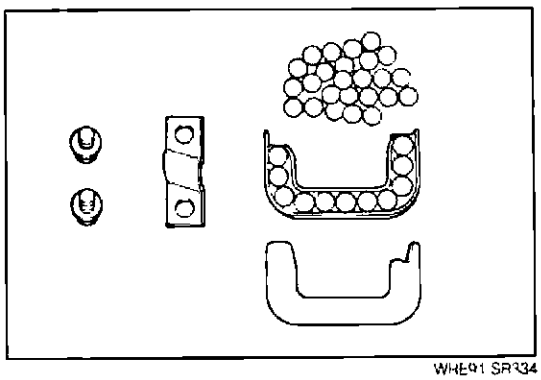
5 Check of worm shaft subassembly
(1) Ensure that the worm shaft subassembly exhibits no damage, such as cracks and rust formation
(2) Ensure that the flap valve section of the worm shaft subassembly exhibits no lodging of foreign matters or restriction of oil passage
(3) Ensure that the ball contact surface exhibits no roughness.


WRE91 SR332

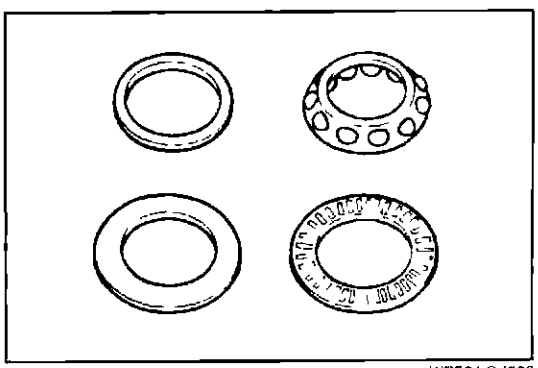
6. Inspection of adjuster plug subassembly
(1) Ensure that the adjuster plug subassembly exhibits no damage, such as cracks. Also, ensure that the threaded portion exhibits no damage
(2) Ensure that the outer race of the bearing exhibits no damage
If the outer race exhibits damage, replace the adjuster plug subassembly


WRE91 SR333

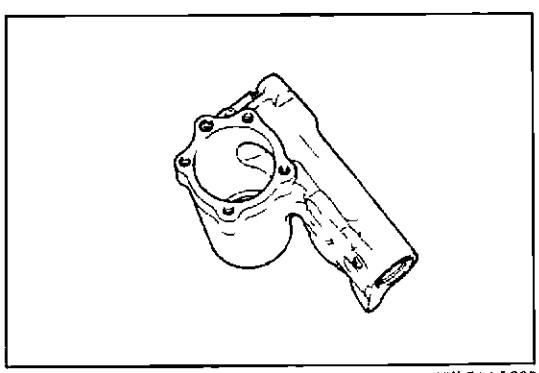
7 Inspection of ball guide clamp, ball guide and ball
(1) Ensure that the ball guide clamp and ball guide exhibit no damage, such as deformation
(2) Ensure that the balls exhibit no damage, such as scratches.
NOTE:
- **The number of the balls should be 44.**


WRE91 SR334

8 Inspection of washer plate, thrust plate, needle roller thrust bearing and ball bearing
Ensure that each part exhibits no damage, such as deformation and scratches


WRE91 SR335

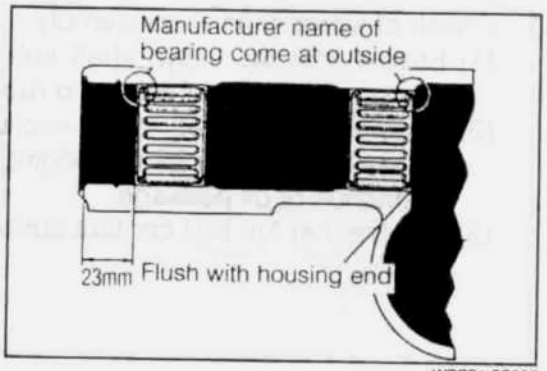
9 Inspection of steering gear housing
(1) Ensure that the steering gear housing exhibits no damage, such as cracks and deformation.
(2) Ensure that the oil passage exhibits no restriction or lodging of foreign matters.


WRE91 SR336

ASSEMBLY

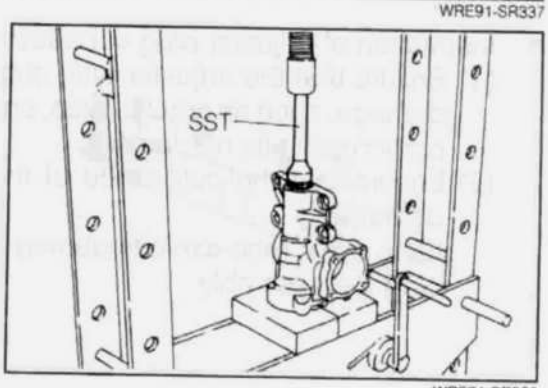
<Power Steering Gear Assembly>

1. Press the needle roller bearings, using the following SST in combination with a press, in such a way that the needle roller bearings come at the positions indicated in the right figure.
   SST: 09515-87201-000



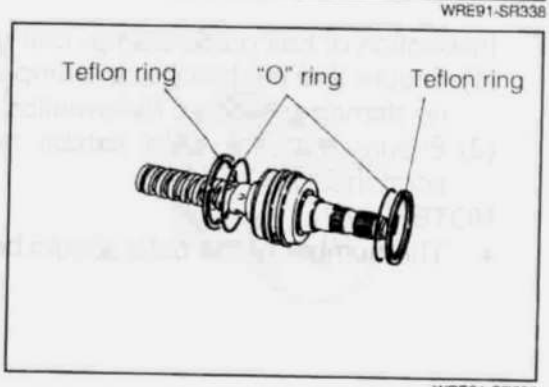
WRE91-SR337

NOTE:
- Make sure that the manufacturer's names of the needle roller bearings face in the direction indicated in the upper right figure.
- After the bearing has been pressed slightly, make sure that the bearing is not tilted and continue the operation. If any increase in force required for press-fitting is encountered, remove the bearing. Check each part for any defect.
- Never reuse the needle roller bearings.



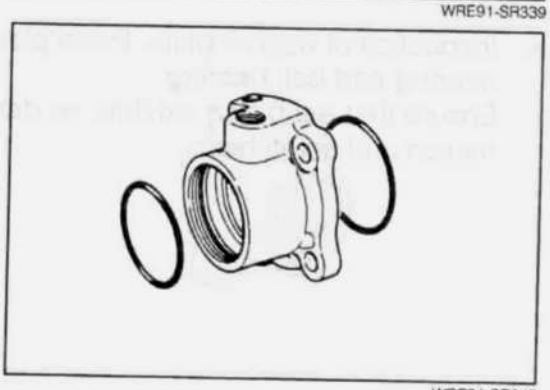
WRE91-SR338

2. Install "O" rings and teflon ring to the worm shaft assembly.
   NOTE:
   - Utmost care must be exercised not to scratch the "O" rings and teflon ring.
   - Prior to the assembling, apply the ATF DEXRON® II .
   - Never reuse the "O" rings and teflon ring.

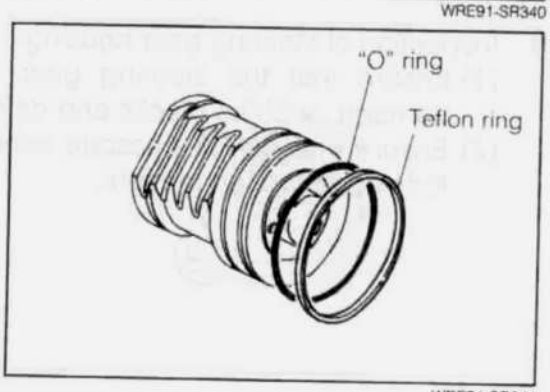


WRE91-SR339

3. Install "O" rings to the valve housing.
   NOTE:
   - Be very careful not to scratch the "O" rings.
   - Prior to the assembling, apply the ATF DEXRON® II.
   - Never reuse the "O" rings.

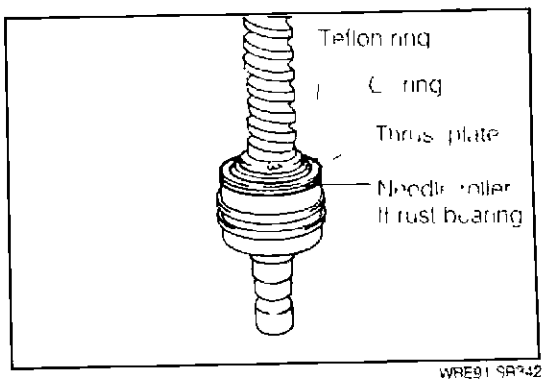

WRE91-SR340

4. Install "O" rings and teflon ring to the power piston nut.
   NOTE:
   - Be very careful not to scratch the "O" rings and teflon ring.
   - Prior to the assembling, apply the ATF DEXRON® II.
   - Never reuse the "O" rings and teflon ring.



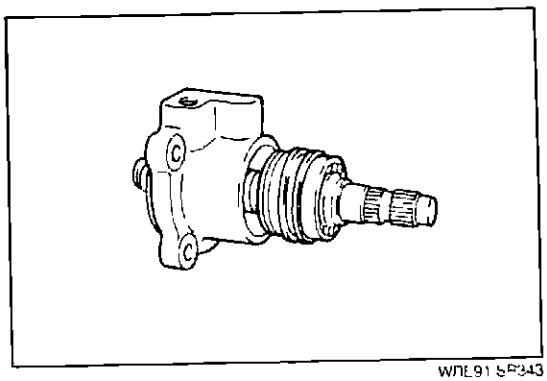
WRE91-SR341

5 Install the needle roller thrust bearing, thrust plate, teflon ring and "O" ring to the worm shaft assembly in this sequence
NOTE:
- Apply the ATF DEXRON® II to the parts to be installed
- The "O" ring should be installed by putting it over the teflon ring.
- Never reuse the "O" ring and teflon ring.

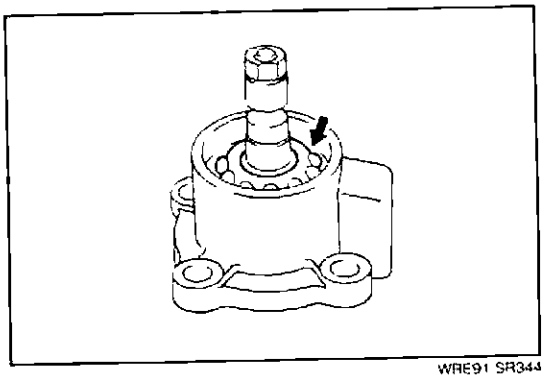


WRE91SR342

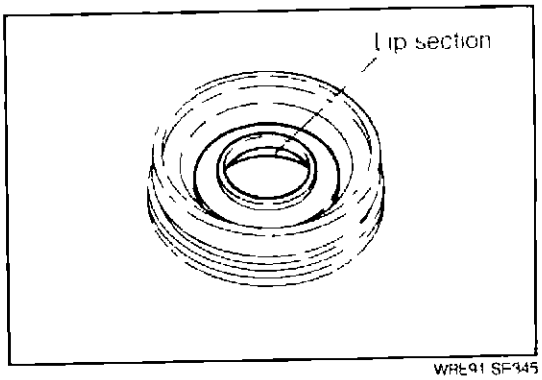
6 Install the valve housing to the worm shaft assembly
NOTE:
- Care must be exercised not to damage the "O" rings and teflon ring.


WRE91SR343

7 Install the roller bearing to the worm shaft

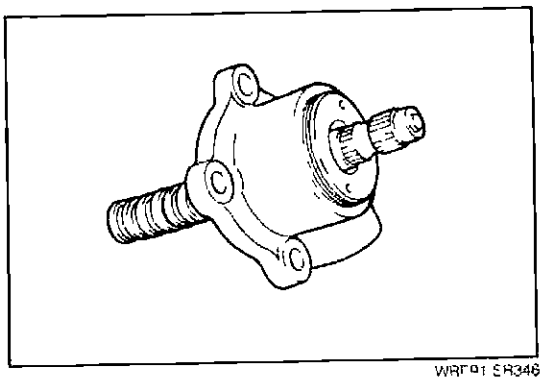

WRE91SR344

8 Press the oil seal to the adjuster plug with a suitable rod applied
NOTE:
- Apply the ATF DEXRON® II to the lip section of the oil seal in advance.

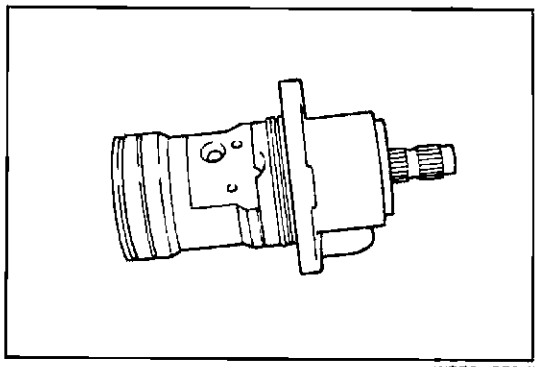


WRE91SR345

9 Tighten the adjuster plug, by your hand or using the following SST until the axial play of the worm shaft is eliminated
NOTE:
- Make sure that the worm shaft turns lightly by your hand.

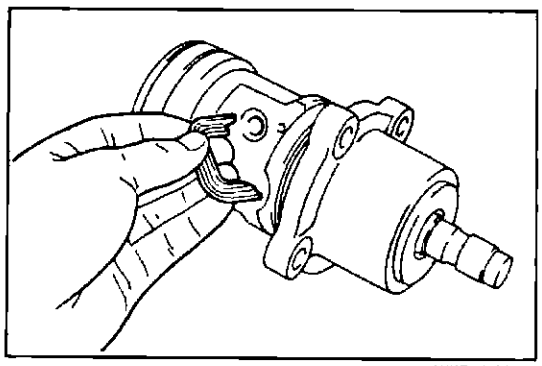

WRE91SR346

10 Assemble the power piston nut to the worm shaft.



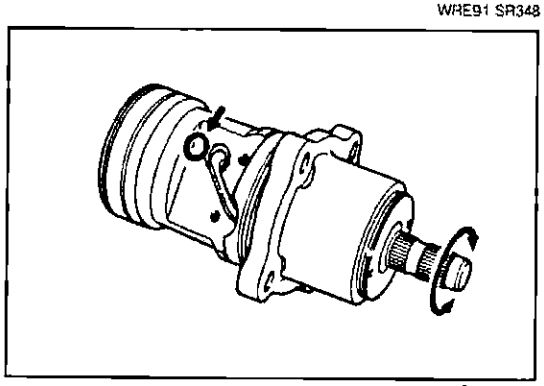
WRE91 SR347

11 Insert the ball guide into the power piston nut, as indicated in the right figure
NOTE:
- Assemble these parts in such a way that the turn prevention section of the ball guide comes at the power piston end side.



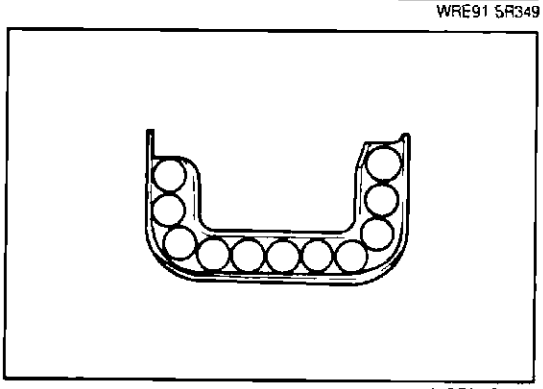
WRE91 SR348

12. Insert the 33 balls into the worm shaft while turning the worm shaft one or two turns in a right-&-left direction
NOTE:
- At this time, care must be exercised not to allow the balls to rotate toward the valve housing side. (In other words, be very careful not to allow the balls to travel toward the valve housing side beyond the ball hole section at the valve housing side.)
- Be very careful not to lose the balls.



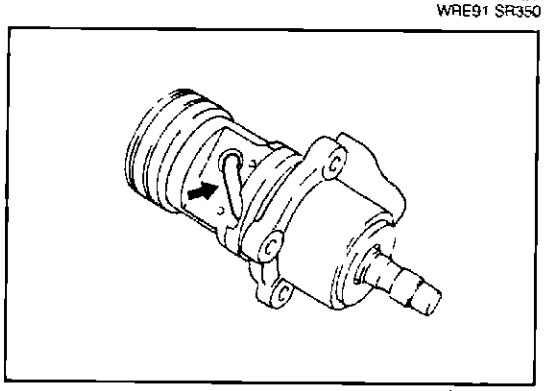
WRE91 SR349

13 Remove the ball guide
14 Assemble the 11 balls to the ball guide
NOTE:
- Be very careful not to lose any ball.



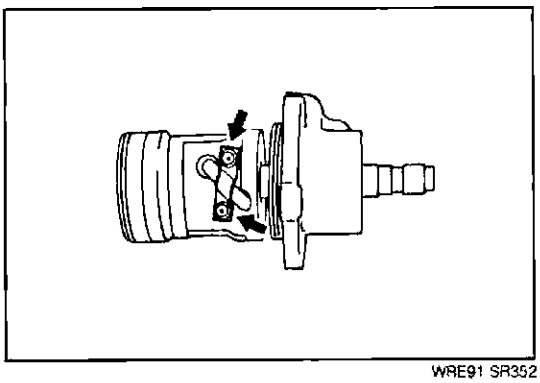
WRE91 SR350

15 With the balls interposed with the ball guide, insert the ball guide into the power piston nut
NOTE:
- Be very careful not to drop any ball.

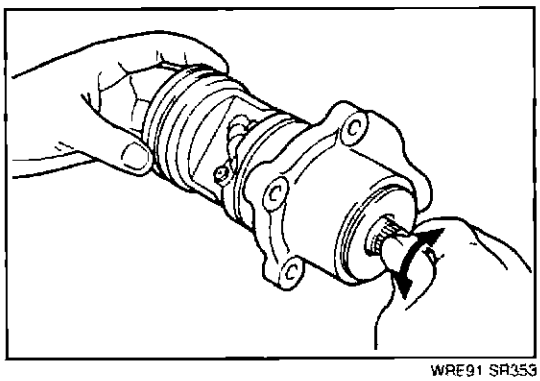


WRE91 SR351

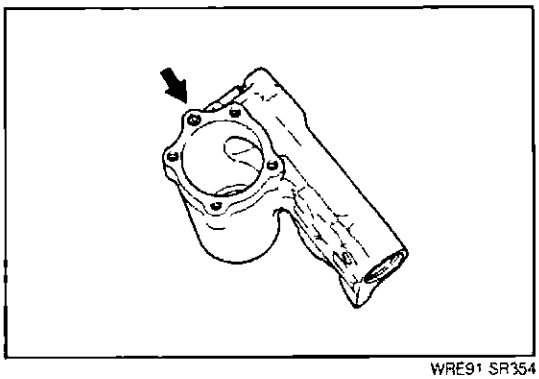
16 Install the ball guide clamp and tighten the attaching screws
Tightening Torque: 2.0 - 3.9 N m
(0.2 - 0.4 kgf-m, 1.4 - 2.9 ft-lb)


WRE91 SR352

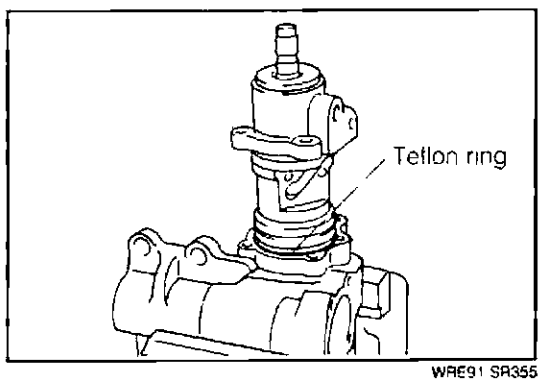
17 Ensure that the power piston nut turns smoothly without any binding
NOTE:
- Do not pull out the piston nut from the worm shaft excessively. Failure to observe this caution may cause the balls to enter the inside of the piston nut.


WRE91 SR353

18 Install the "O" ring to the steering gear housing

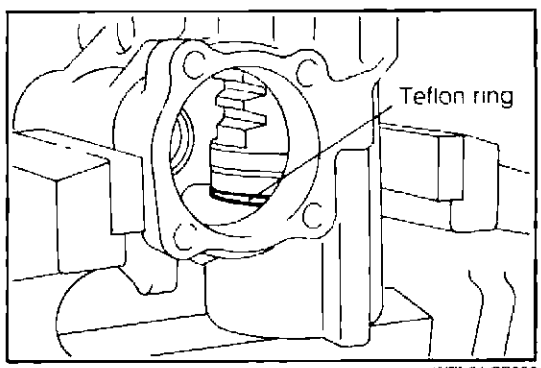

WRE91 SR354

19 Apply the ATF DEXRON® II to the teflon ring of the power piston nut as well as to the inner surface of the steering gear housing
20 Assemble the power piston nut to the steering gear housing with the gear tooth surface of the power piston nut faced toward the worm shaft side



WRE91 SR355

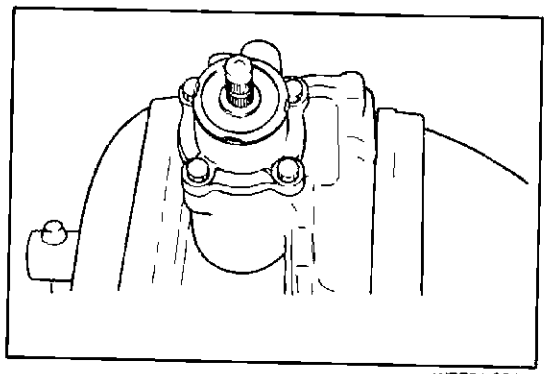
NOTE:
- Be very careful not to damage the teflon ring when inserting the power piston nut into the steering gear housing and when the power piston nut enters the cylinder.



WRE91 SR356

21 Tighten the valve housing attaching nuts to the specified torque evenly

Tightening Torque: 39.2 - 39.8 N·m
(4.0 - 5.5 kgf-m, 28.9 - 53.9 ft-lb)

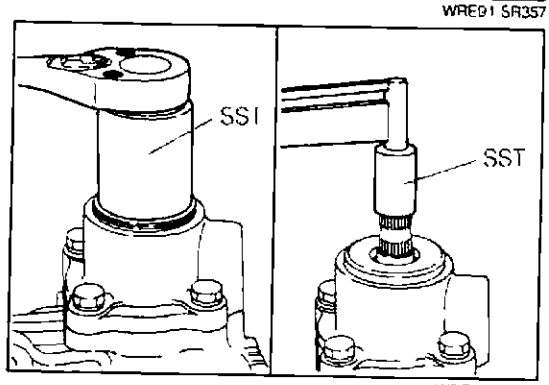


WRE91 SR357

22 Adjust the adjuster plug so that the starting torque of the worm shaft may conform to the specified value, using the following SSTs

SST: 09616-00010-000
09631-00030-000

Worm Shaft Starting Torque:
0.39 - 0.64 N m
(0.04 - 0.065 kgf-m, 0.29 - 0.47 ft-lb)



WRE91 SR358

23 Install the worm shaft adjusting screw lock nut.

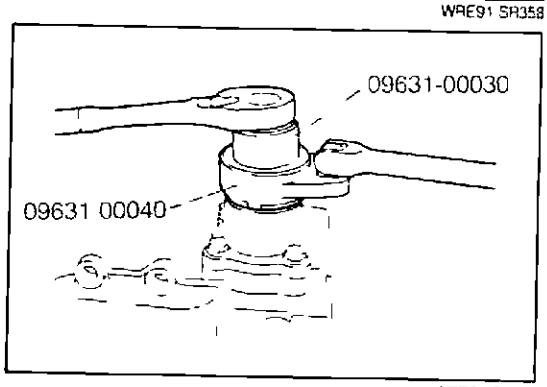
NOTE.

- If any damage is present at the threaded portion of the worm shaft adjusting screw lock nut, replace it with new one.

24 While preventing the adjuster plug from turning, using the following SST, tighten the worm shaft adjusting screw lock nut so as to lock the adjuster plug, using the following SST

SST: 09631-00030-000
09631-00040-000

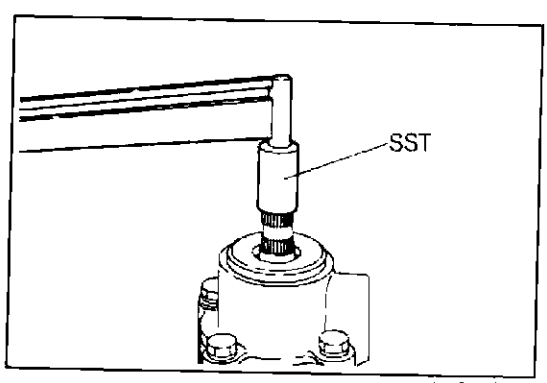
Tightening Torque: 49.0 N m
(5.0 kgf-m, 36.2 ft-lb)



WRE91 SR359

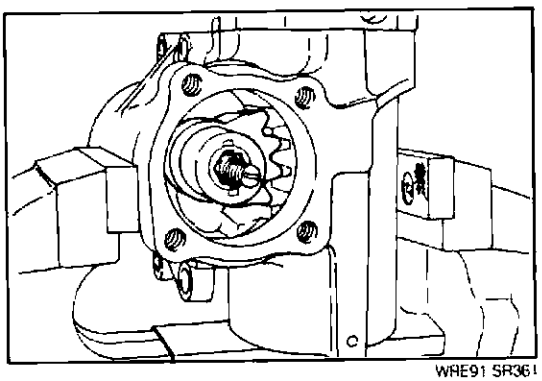
25 Ensure that the starting torque (preload) of the worm shaft is within the specified range
(See the step 22)

SST: 09616-00010-000

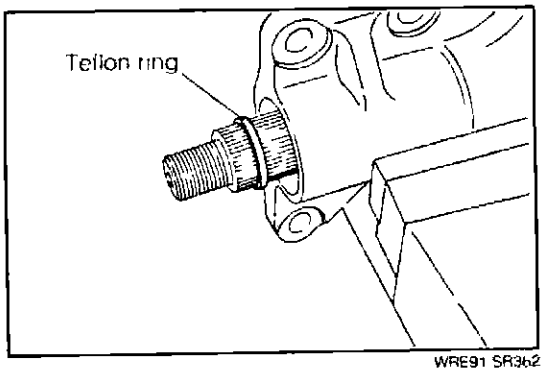


WRE91-SR360

26 Set the power piston nut so that the midpoint of the sector shaft (cross shaft) may engage with the midpoint of the power piston nut gear section Insert the sector shaft into the steering gear housing.

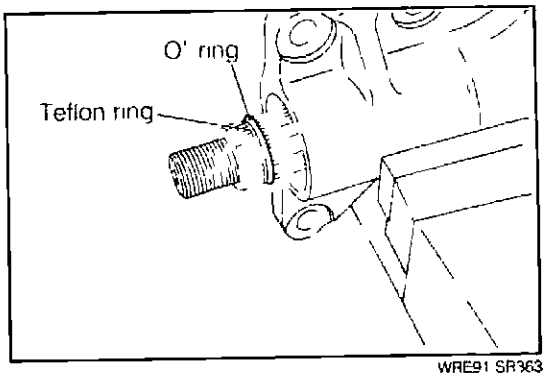

WRE91 SR361

27 Install a teflon ring to the sector shaft
NOTE:
- Apply the ATF DEXRON® II to the teflon ring in advance.
- Never reuse the teflon ring.
- Be very careful not to scratch the teflon ring.



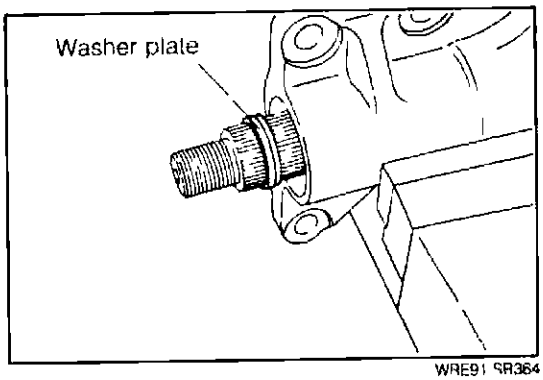
WRE91 SR362

28. Install an "O" ring on the teflon ring which has been installed to the sector shaft
NOTE:
- Apply the ATF DEXRON® II to the "O" ring in advance.
- Be very careful not to scratch the "O" ring.
- Never reuse the "O" ring.



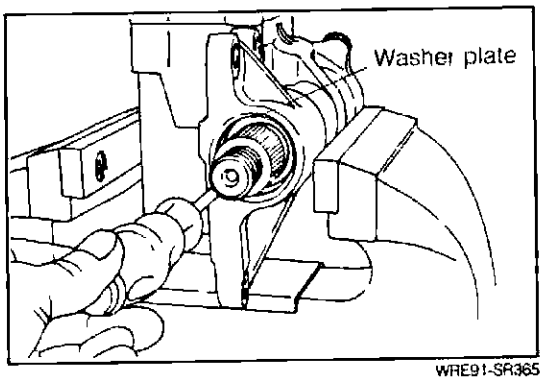
WRE91 SR363

29 Install the plate washer to the sector shaft.



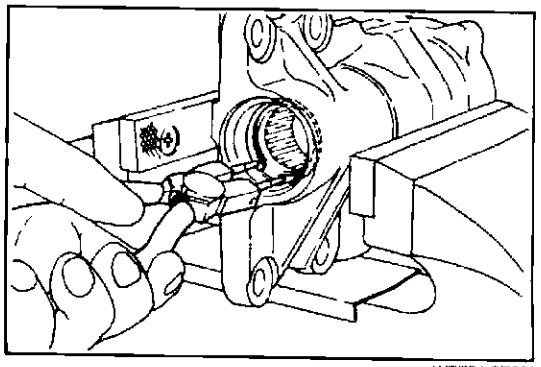
WRE91 SR364

30 Evenly insert the plate washer into the steering gear housing with a suitable rod or the like
31 Pull out the sector shaft



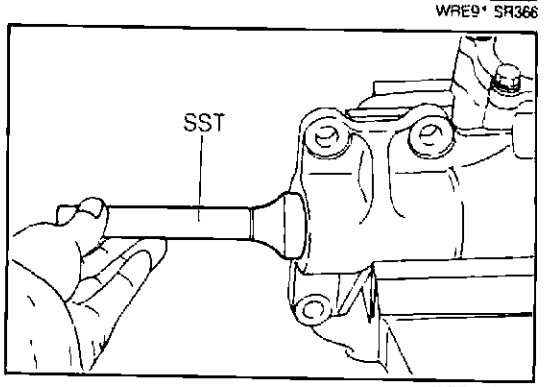
WRE91-SR365

32 Install a snap ring to the steering gear housing.
NOTE:
- Never reuse the snap ring.
- If the plate washer is not inserted into the place where the snap ring ought to enter, check to see if the "O" ring is assembled properly or not.


WRE91 SR366

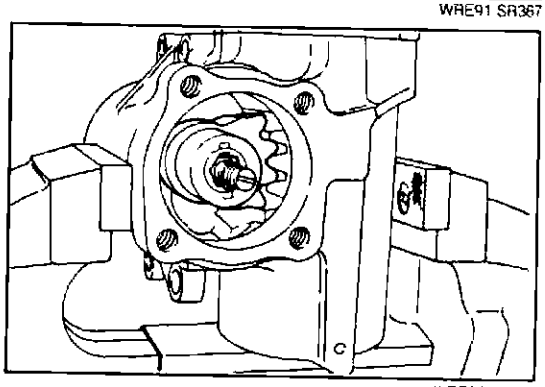
33 Press the oil seal to the steering gear housing, using the following SST
SST: 09515-87201-000

NOTE:
- Thinly apply the ATF DEXRON® II to the lip surface of the oil seal in advance.
- Make sure to assemble the oil seal in such a way that that the surface bearing the manufacturer's name of the oil seal faces toward the inside of the steering gear housing.

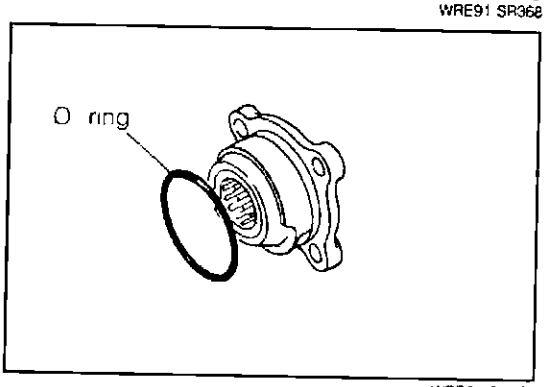


WRE91 SR367

34 Insert the sector shaft into the steering gear housing (See the step 26)

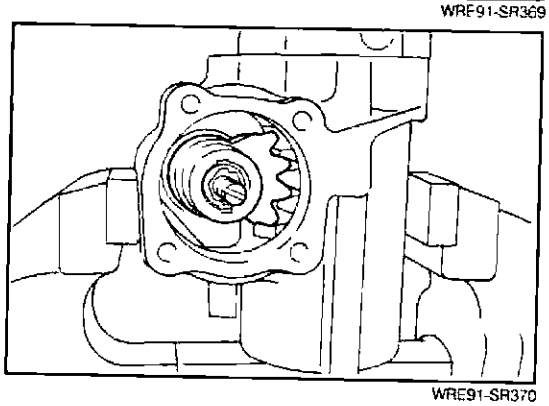

WRE91 SR368

35 Install the "O" ring to the sector shaft end cover.

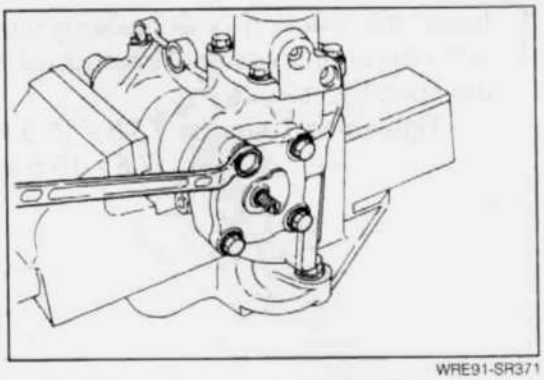


WRE91-SR369

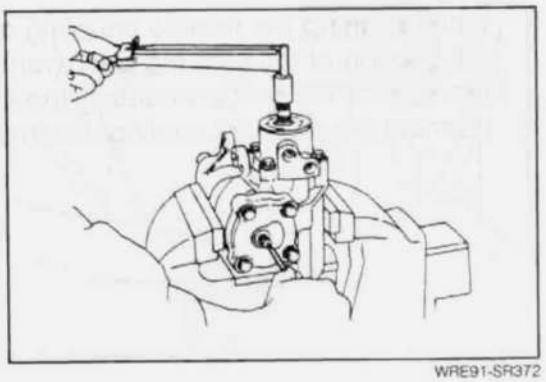
36 Install the adjusting screw of the sector shaft to the sector shaft end cover, while turning the adjusting screw counterclockwise. Thus, back off the adjusting screw fully


WRE91-SR370

37. Tighten the end cover attaching screws evenly over two or three stages to the specified torque.
    Tightening Torque: 44.1 - 53.9 N·m
    (4.5 - 5.5 kgf-m, 32.5 - 39.8 ft-lb)

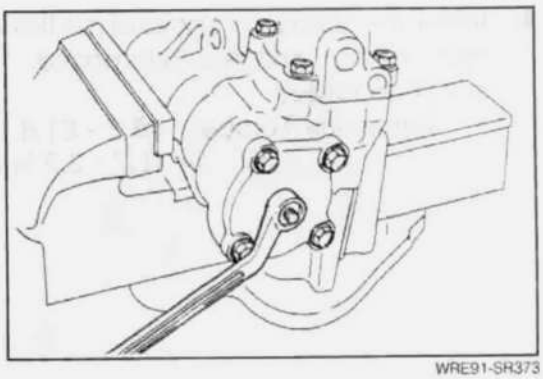

WRE91-SR371

38. While screwing in the adjusting screw of the sector shaft, adjust the starting torque of the worm shaft to the specified value.
    SST: 09616-00010-000
    Starting Torque (Preload):
    0.59 - 0.93 N·m
    (0.06 - 0.095 kgf-m, 0.43 - 0.69 ft-lb)

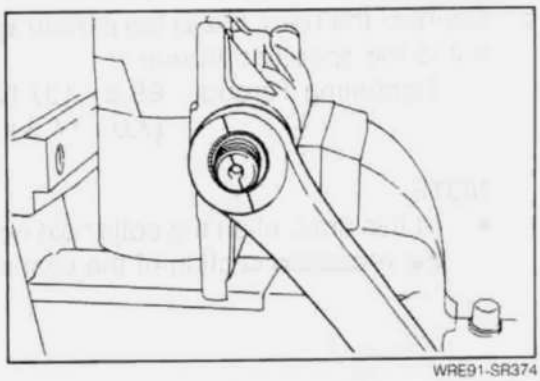

WRE91-SR372

39. Install the adjusting screw lock nut with a new gasket interposed. Tighten the adjusting screw lock nut to the specified torque while preventing the adjusting screw from turning.
    Tightening Torque: 19.6 - 34.3 N·m
    (2.0 - 3.5 kgf-m, 14.5 - 25.3 ft-lb)

40. Ensure that the preload conforms to the specified value. (See the step 38.)

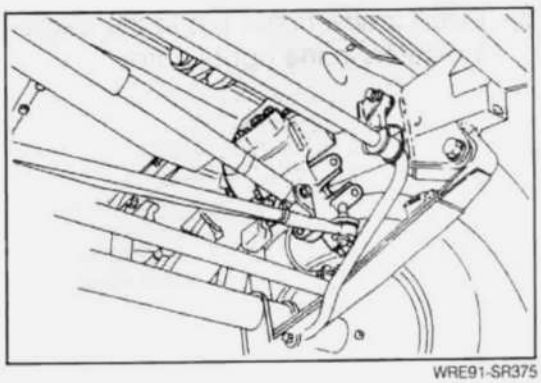

WRE91-SR373

41. Assemble the pitman arm to the sector shaft with the respective mating marks aligned with each other, as indicated in the right figure. Temporarily tighten the attaching nuts with new spring washers interposed.


WRE91-SR374

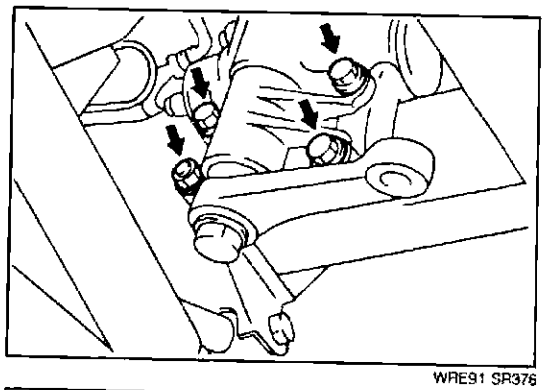
INSTALLATION

1. Install the steering gear housing to the vehicle.
   NOTE:
   - Be very careful not to allow the steering gear housing to strongly interfere with the other parts.

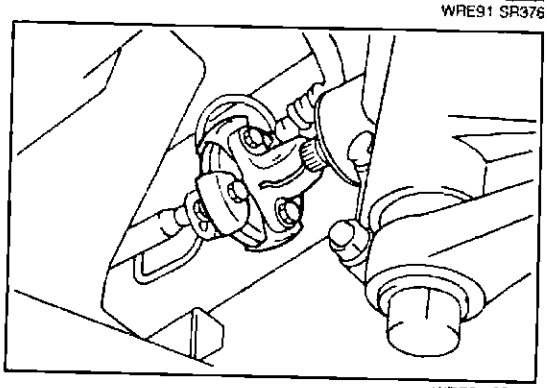

WRE91-SR375

2 Install the steering gear housing attaching nuts and bolts with new spring washers interposed. Evenly tighten them to the specified torque.

Tightening Torque: 73.5 - 10.3 N·m
(7.5 - 10.5 kgf-m, 54.2 - 75.9 ft-lb)

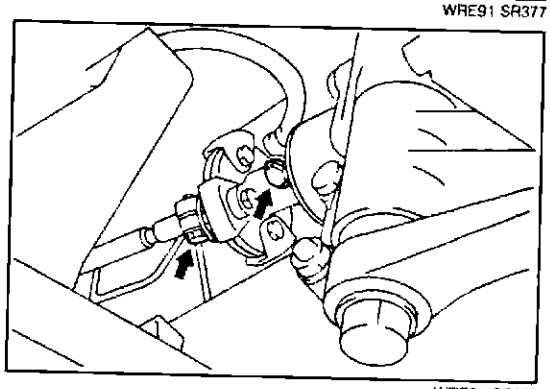

WRE91 SR376

3 While aligning the flexible coupling assembly with the cut-out section of the steering gear worm shaft as well as with the hole of the bolt connecting the flexible coupling yoke, connect the flexible coupling assembly.


WRE91 SR377

4 Install the connecting bolts of the flexible coupling yoke with new spring washers interposed. Tighten them to the specified torque.

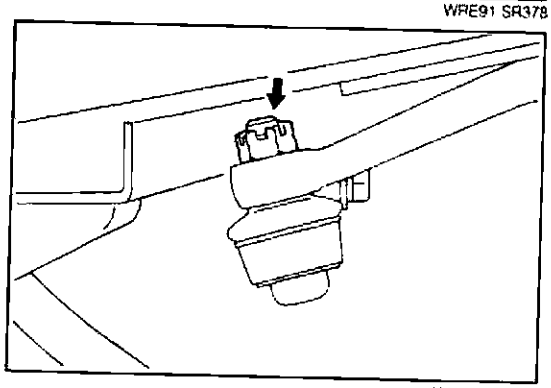
Tightening Torque: 16.7 - 21.6 N·m
(1.7 - 2.2 kgf-m, 12.3 - 15.9 ft-lb)


WRE91 SR378

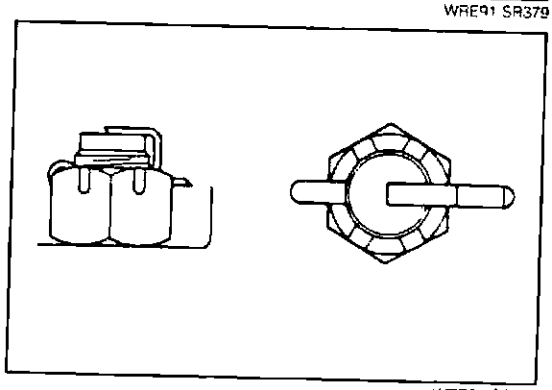
5 Connect the relay rod to the pitman arm. Tighten the castle nut to the specified torque.

Tightening Torque: 68.6 - 137 N·m
(7.0 - 14.0 kgf-m, 50.6 - 101 ft-lb)

NOTE:
- At this time, align the cotter pin hole of the ball joint with the recessed section of the castle nut.

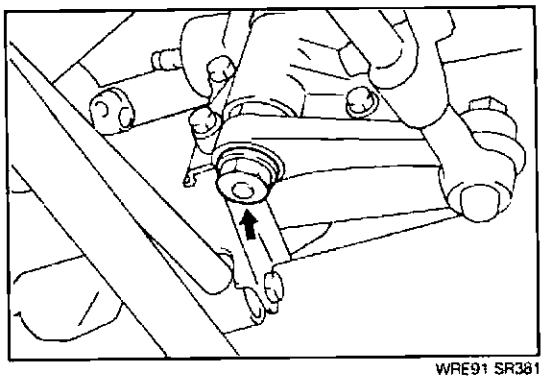

WRE91 SR379

6 Install a new cotter pin to the castle nut. Bend the legs as indicated in the right figure.


WRE91 SR380

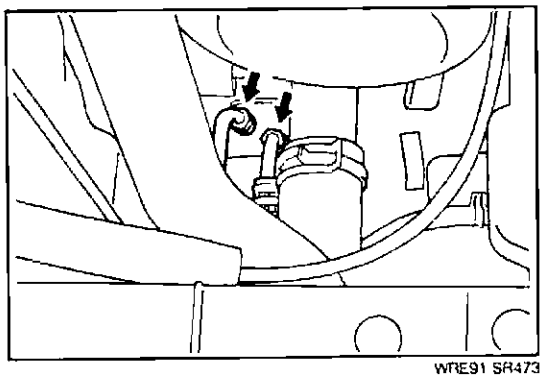
7 Tighten the pitman arm attaching nut to the specified torque

Tightening Torque: 147 - 196 N·m
(15 - 20 kgf-m, 109 - 145 ft-lb.)


WRE91 SR381

8 Connect the power steering pressure feed tubes to the power steering gear housing
(Power steering-equipped vehicle only)

Tightening Torque: 39.2 - 49.0 N·m
(4.0 - 5.0 kgf-m, 28.9 - 36.2 ft-lb)

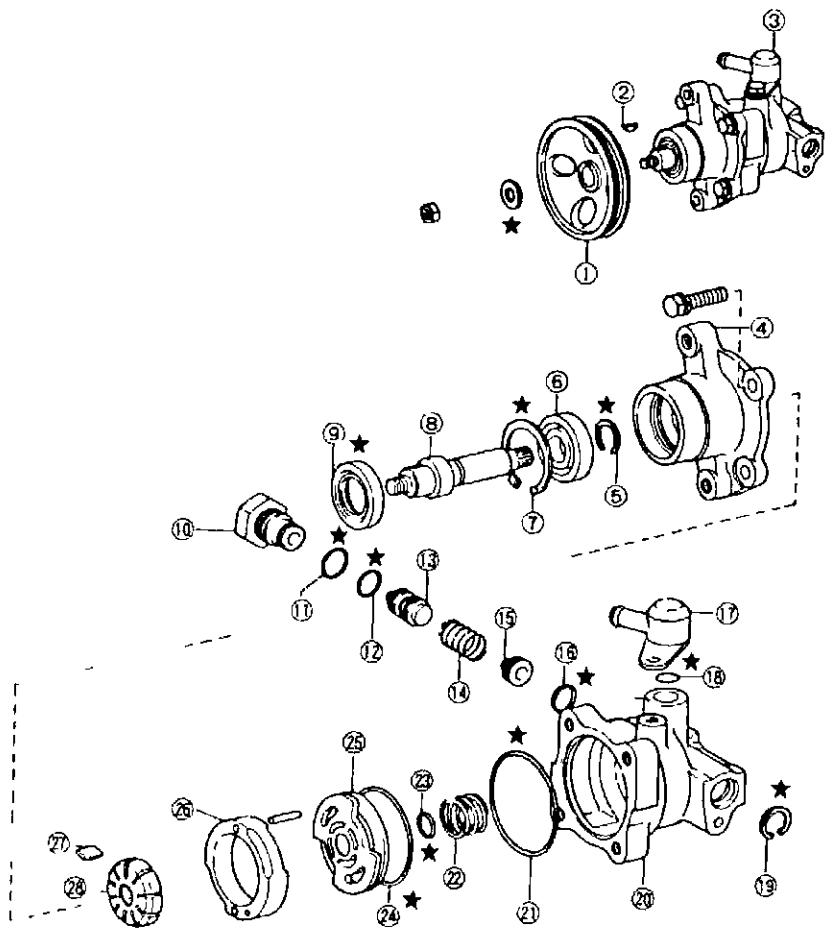

WRE91 SR473

9 Fill power steering fluid
(See page SR–17.)

10 Perform the in-vehicle inspection
(See page SR–15)

VANE PUMP

COMPONENTS



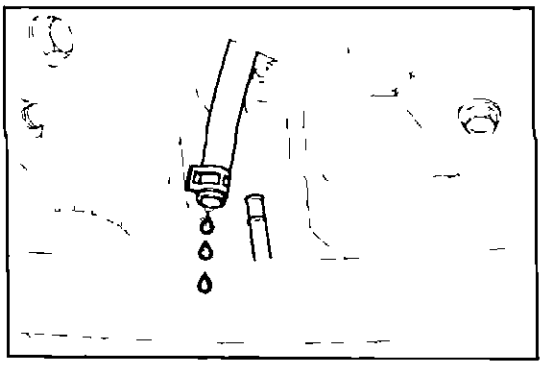
★ : **Non-reusable parts**

① Pully
② Key
③ Vane pump assembly
④ Pump front housing subassembly
⑤ Shaft snap ring
⑥ Radial ball bearing
⑦ Hole snap ring
⑧ Vane pump shaft
⑨ Type 'I' oil seal
⑩ Pressure port union subassembly
⑪ 'O' ring
⑫ 'O' ring
⑬ Flow control valve assembly
⑭ Compression spring
⑮ Flow control spring seat
⑯ "O" ring
⑰ Suction port union
⑱ O ring
⑲ Hole snap ring
⑳ Pump rear housing
㉑ 'O' ring
㉒ Compression spring
㉓ "O" ring
㉔ 'O" ring
㉕ Side front plate
㉖ Cam ring
㉗ Vane plate
㉘ Vane pump rotor

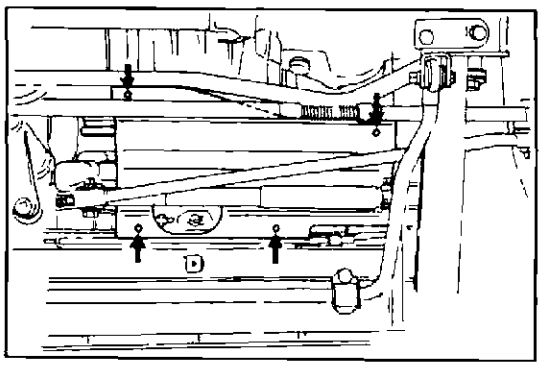
WRE91 SR382

REMOVAL

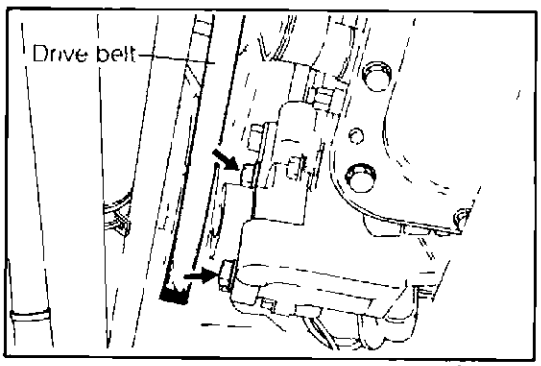
1 Drain the power steering fluid
(See page SR–17)


WRE91-SR383

2 Remove the engine undercover

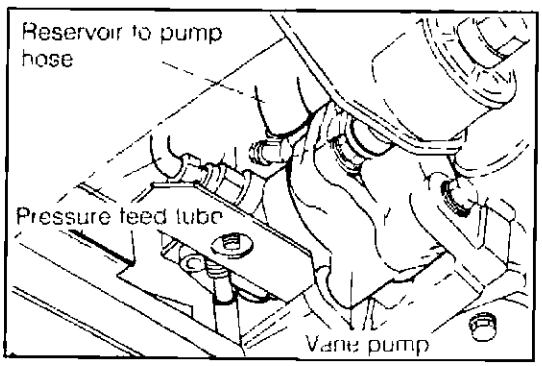

WRE91 SR384

3 Loosen the vane pump attaching bolts
4 Remove the vane pump drive belt



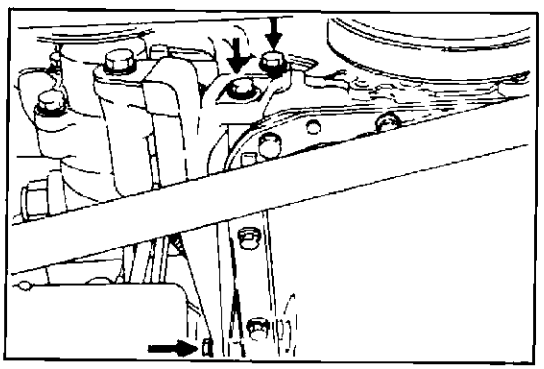
WHE01 SR385

5. Disconnect the pressure feed tubes and reservoir-to-pump hose from the vane pump

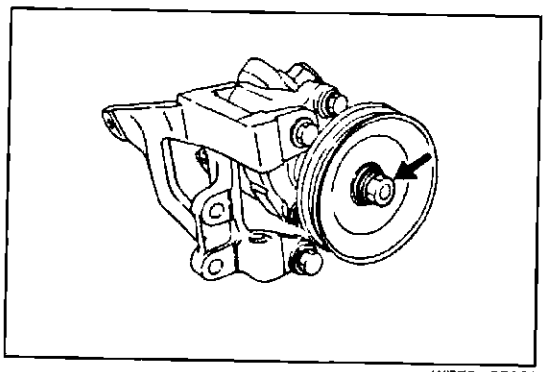


WRE91 SR386

6 Remove the vane pump bracket together with the vane pump by removing the vane pump bracket attaching bolts


WRE91 SR387

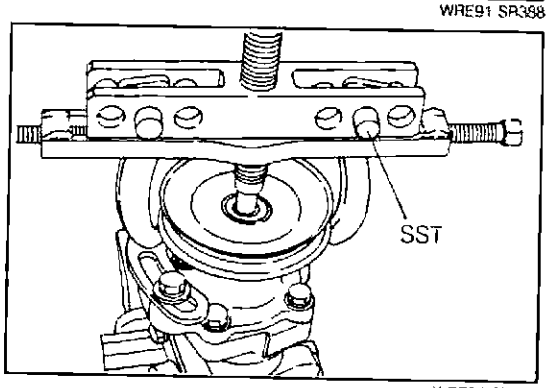
7 Remove the pulley attaching bolts by means of an impact wrench or the like



WRE91 SR388

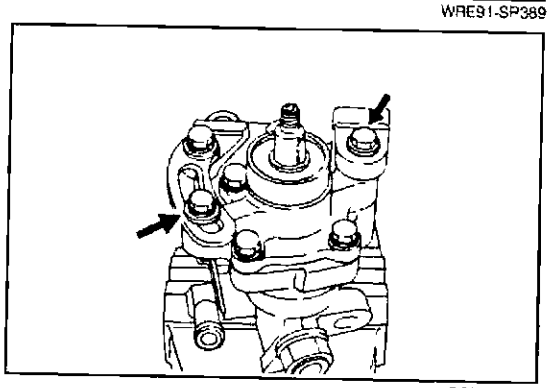
8 Remove the pulley from the vane pump, using the following SST

SST: 09950-20017-000



WRE91-SR389

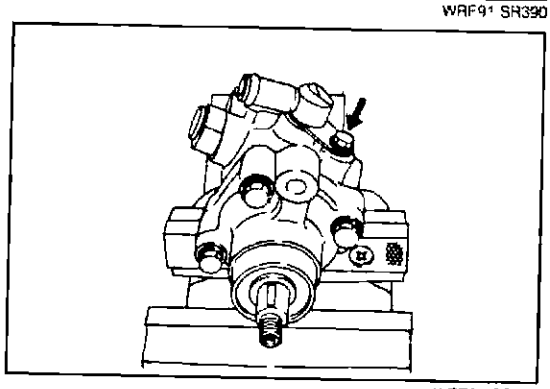
9 Remove the vane pump from the bracket by removing the vane pump attaching bolts



WRE91 SR390

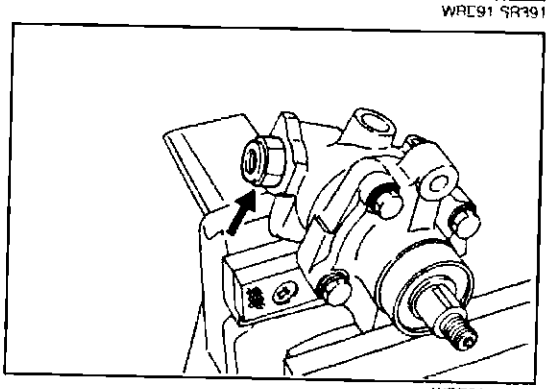
DISASSEMBLY

1 Remove the suction port union attaching bolt and remove the suction port



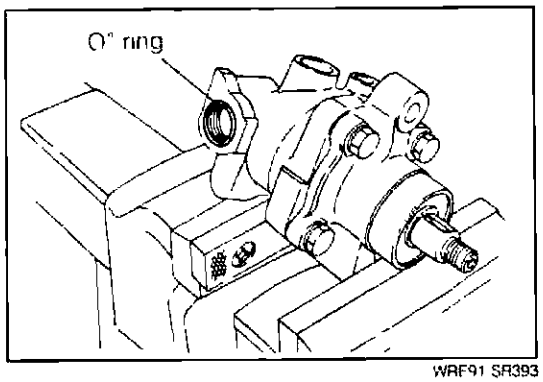
WRE91 SR391

2 Remove the pressure port union



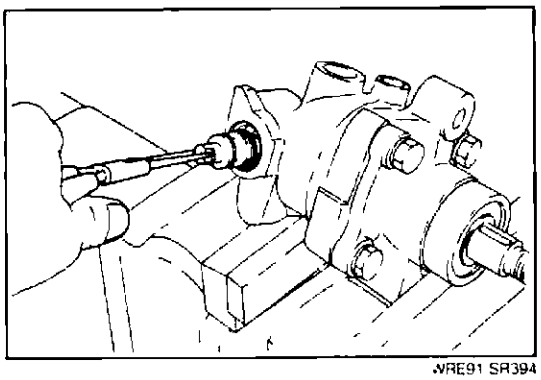
WRE91 SR392

3 Remove the "O" ring from the pump housing.

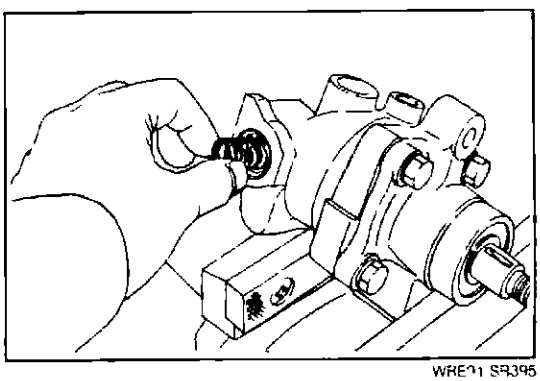


WRE91 SR393

4 Remove the flow control valve from the pump housing


WRE91 SR394

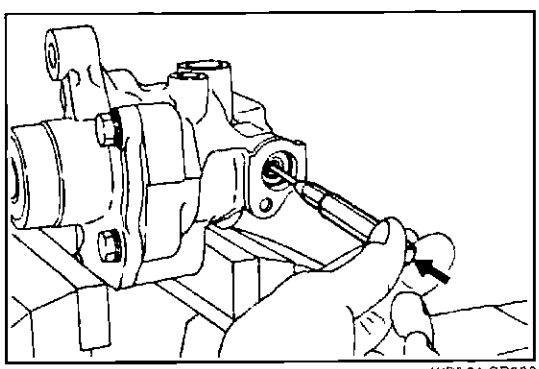
5 Remove the compression spring from the pump housing.


WRE91 SR395

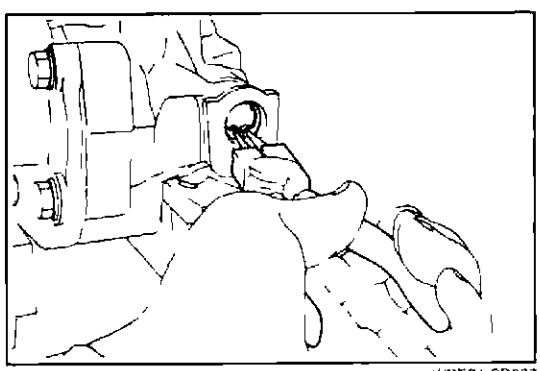
6 Remove the flow control spring seat from the pump housing by pushing the seat with a suitable rod

NOTE:

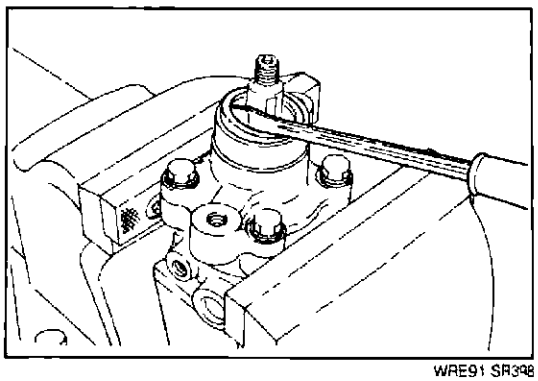
- Care must be exercised not to tilt the flow control spring seat at the inside of the attaching hole.
- Be very careful not to scratch the cylinder inner surface.


WRE91 SR396

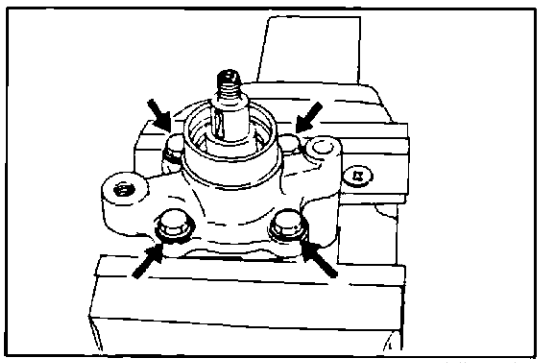
7 Detach the snap ring, using snap ring pliers


WRE91 SR397

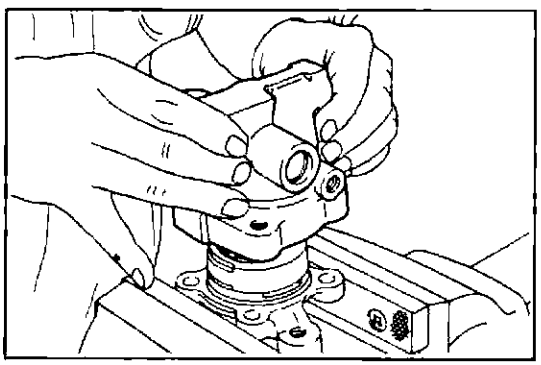
8 Insert a suitable screwdriver or the like into the oil seal Remove the oil seal by prying the oil seal
NOTE:
- Be very careful not to damage the oil seal contact surface of the vane pump shaft.


WRE91 SR398

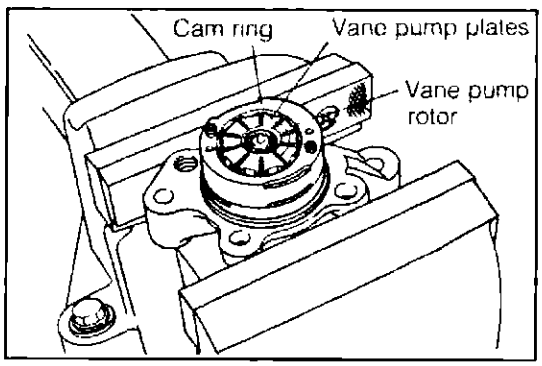
9 Remove the pump front housing attaching bolts


WRE91 SR399

10 Hold the pump front housing with a vice Remove the pump rear housing
NOTE:
- At this time, it should be noted that there are cases where the vane pump rotor, cam ring and vane plates are taken out together with the rear housing. Therefore, do not drop these parts.

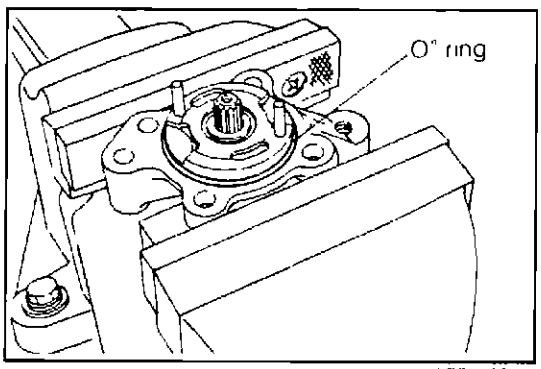

WRE91 SR400

11 Remove the vane pump rotor, cam ring and vane pump plates from the pump front housing



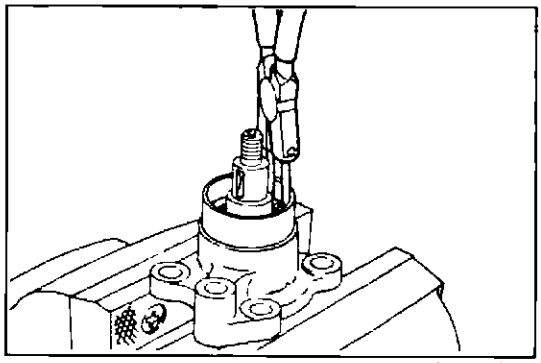
WRE91-SR401

12 Remove the "O" ring from the pump front housing



WRE91-SR402

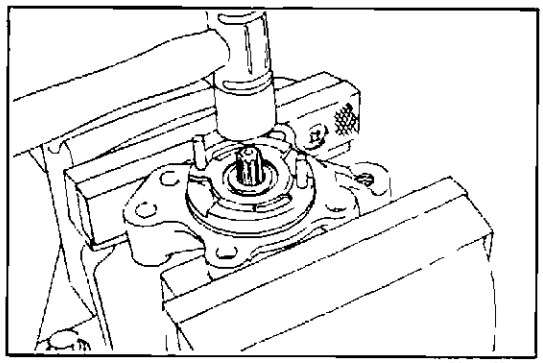
13 Remove the snap ring from the pump front housing, using snap ring pliers or the like


WRE91 SR403

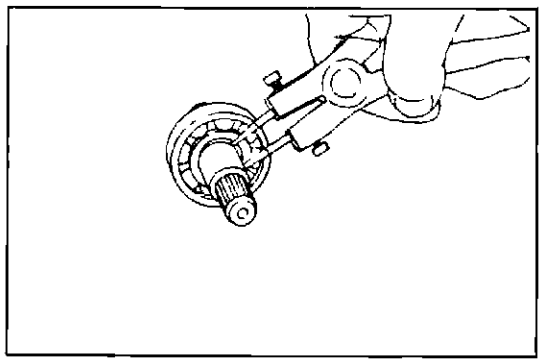
14 Remove the vane pump shaft from the pump front housing by lightly tapping the vane pump shaft with a plastic hammer or the like

NOTE:

- Care must be exercised not to drop the vane pump shaft.


WRE91 SR104

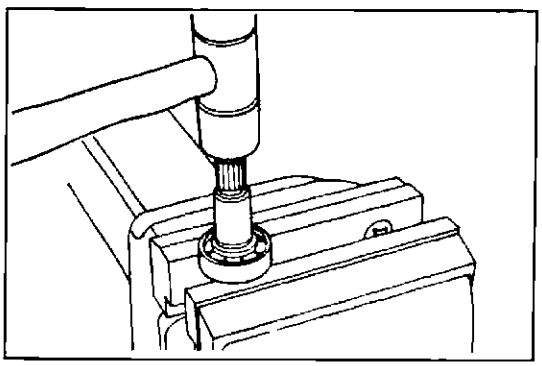
15 Remove the snap ring from the vane pump shaft


WRE91 SR405

16 Remove the radial ball bearing from the vane pump shaft

NOTE:

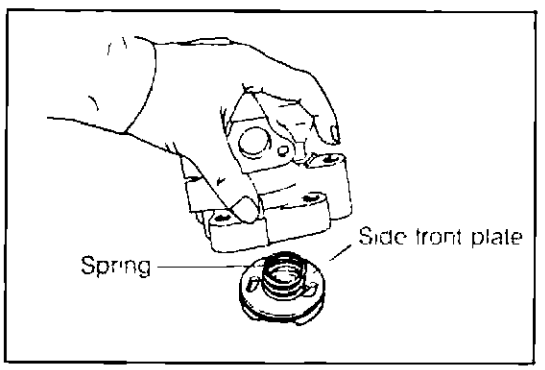
- Hold the inner race of the radial ball bearing with a vice or the like. Pull out the vane pump shaft by lightly tapping it by means of a plastic hammer or the like.


WRE91 SR406

17 Remove the side front plate and spring from the pump rear housing

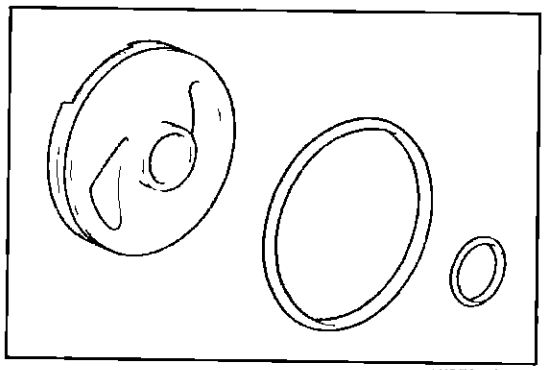
NOTE:

- If any difficulty is encountered in removing, turn the pump rear housing up-side down and lightly tap it against the working table so as to remove the parts.
- Be very careful not to damage the side front plate.

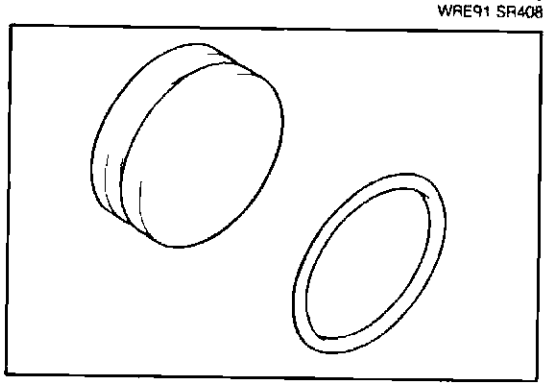


WRE91 SR407

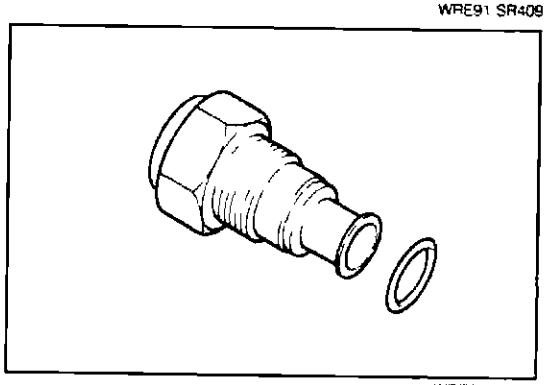
18 Remove the "O" rings from the side front plate.
NOTE:
- Never reuse the oil seal.


WRE91 SR408

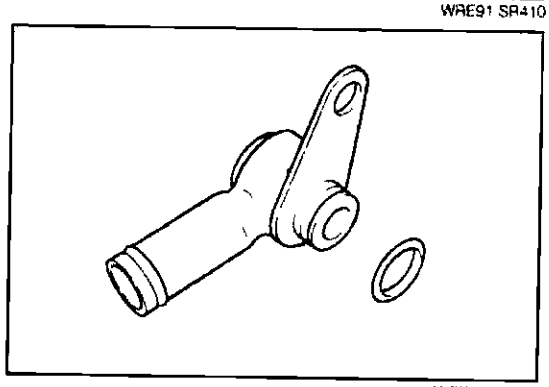
19 Remove the "O" ring from the flow control spring seat


WRE91 SR409

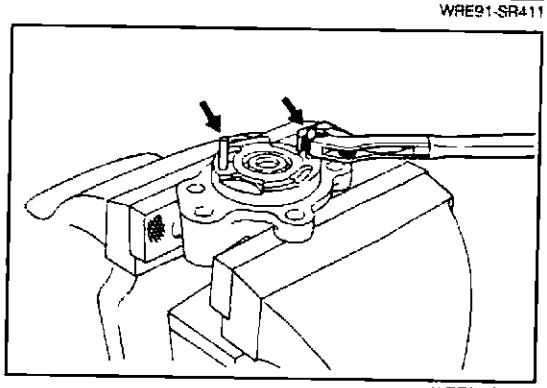
20 Remove the "O" ring from the pressure port union.


WRE91 SR410

21 Remove the union seat from the pressure port union.
NOTE:
- If any difficulty is encountered in this removal operation, use a screw extractor so as to remove the union seat.

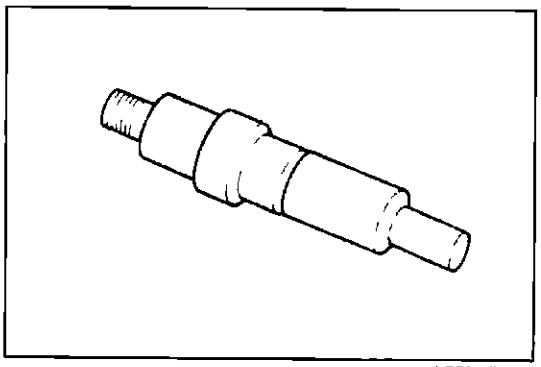

WRE91-SR411

22 Remove the straight pin provided on the front pump housing by means of a suitable pipe wrench or the like (Only as required)

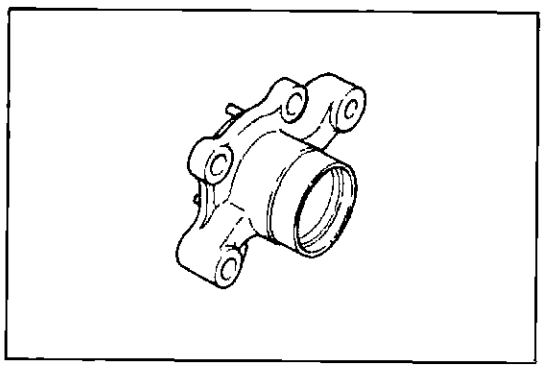

WRE91-SR412

INSPECTION

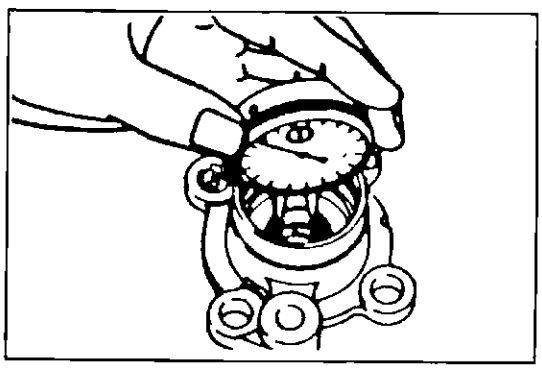
1 Ensure that the vane pump shaft exhibits no damage, such as cracks, scratches and wear


WRE91 SR413

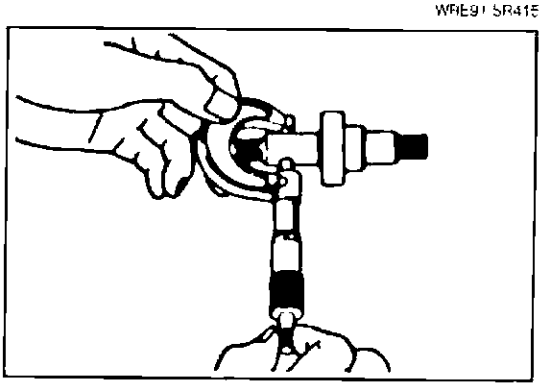
2 Ensure that the pump front housing exhibits no damage, such as cracks, scratches and wear
3 Ensure that the straight pin of the pump front housing exhibits no damage


WRE91 SR414

4 Check of pump front housing-to-vane pump shaft clearance
(1) Measure the bore diameter of the bush section of the pump front housing in two directions at a total of four points Record the measurement results


WRE91 SR415

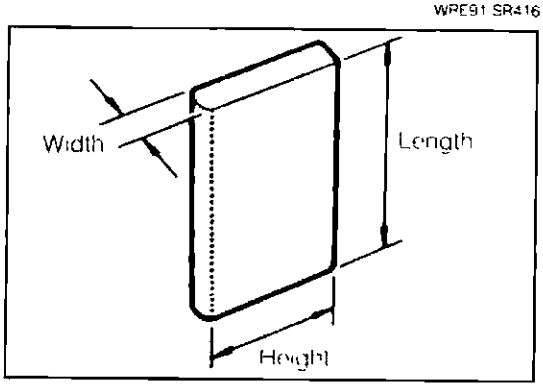
(2) Measure the outer diameter of the bush contact surface of the vane pump shaft in two directions at a total of four points Record the measurement results
(3) Subtract the maximum measurement value in the step (2) from the minimum measurement value in the step (1) Ensure that this subtracted value (clearance) is within the specified range
New Part: 0.01 to 0.03 mm
Maximum Limit: 0.07 mm


WRE91 SR416

5 Ensure that the vane plate exhibits no damage, such as cracks and scratches.
Also, ensure that the dimensions of the vane plate are within the specified range
Specified Value

Unit mm

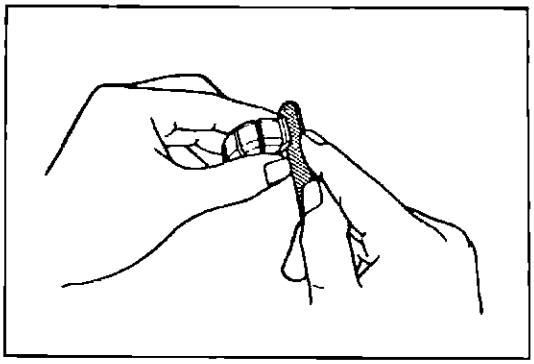
	Position	Specified Value	Limit
Vane plate	Length	15 00	14 99
	Height	8 2	8 1
	Width	1 800	1 797



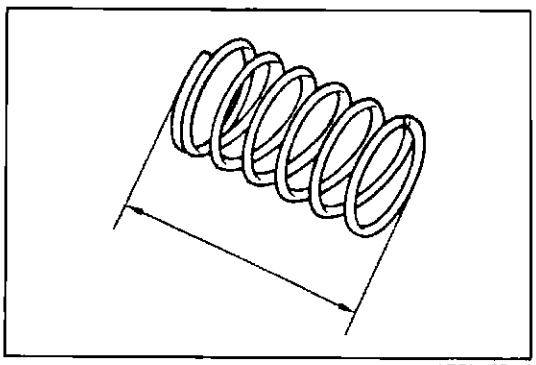
WRE91 SR417

6 Ensure that the clearance between the vane pump rotor and the vane plate is within the specified range
New Part: 0.01 mm
Maximum Limit: 0.028 mm

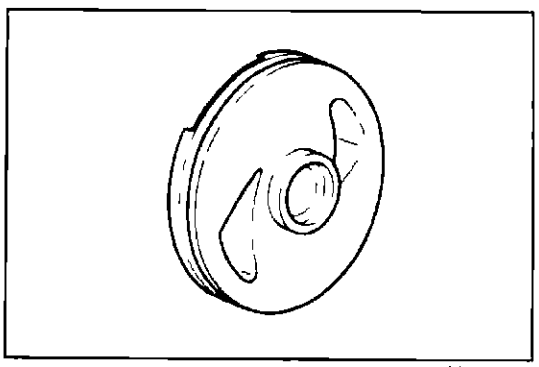
If the clearance exceeds the limit, replace the vane pump rotor and vane plate with new ones as a set
The vane pump rotor should be replaced with the same rotor as the old one. This replacement part must bear either no mark or the same mark of one to four as the old part. Also, be sure to use a vane plate corresponding to the mark


WRE91 SR418

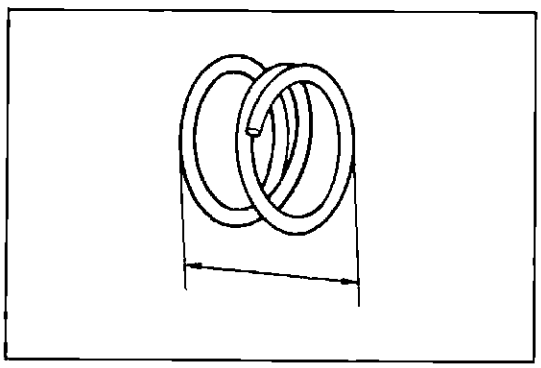
7 Ensure that the free length of the compression spring is within the specified range
New Part: 50 mm
Minimum Limit: 47 mm


WRE91 SR419

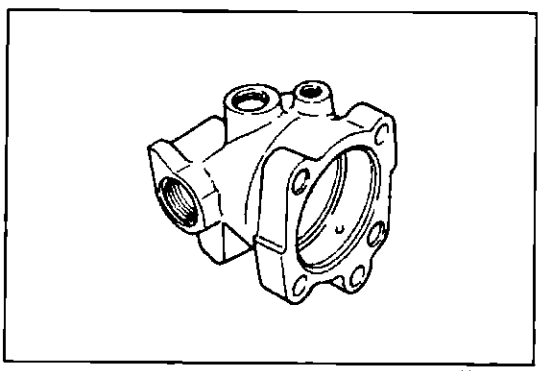
8 Ensure that the rotor contact surface of the front side plate exhibits no ridged wear and damage, such as cracks and scratches


WRE91 SR420

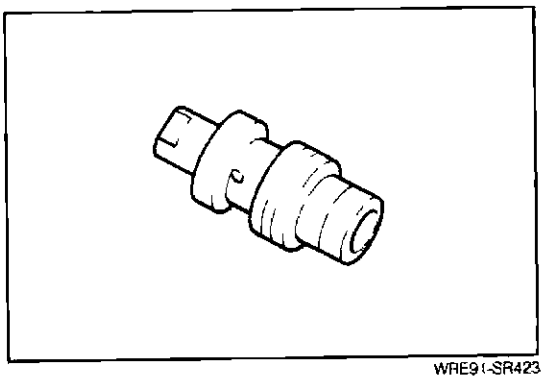
9 Ensure that the compression spring exhibits no damage, such as flattened condition and deformation
Free Length: 15 mm or more


WRE91 SR421

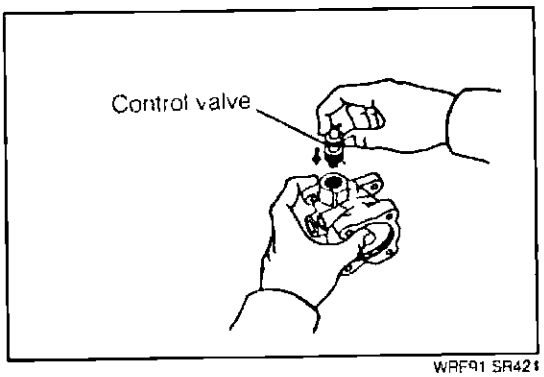
10 Ensure that the rear pump housing exhibits no damage, such as cracks and scratches


WRE91 SR422

11 Inspection of flow control valve
(1) Ensure that the flow control valve exhibits no damage, such as cracks, scratches and deformation
(2) Ensure that the strainer of the flow control valve exhibits no damage, such as restriction

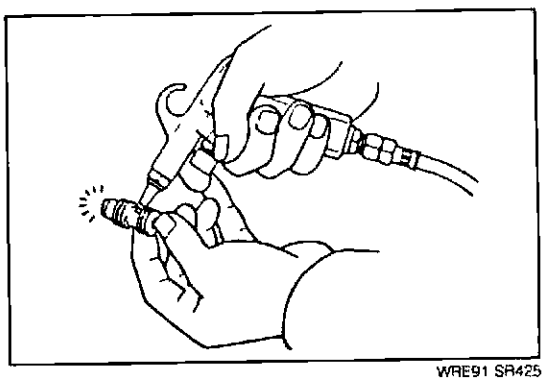

WRE91-SR423

(3) Apply the ATF DEXRON® II to the flow control valve Ensure that the flow control valve operates by its own weight when installing it to the pump rear housing

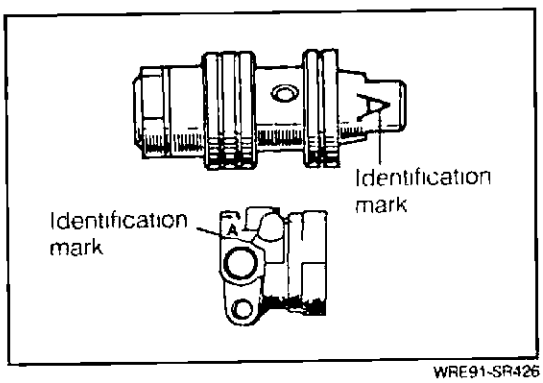


WRE91-SR424

(4) The leak check of the flow control valve is performed as follows
With one side of the hole of the valve plugged by a finger, blow compressed air into the other side of the hole If no air leaks from the small hole at the rear end, it shows normal operation of the valve

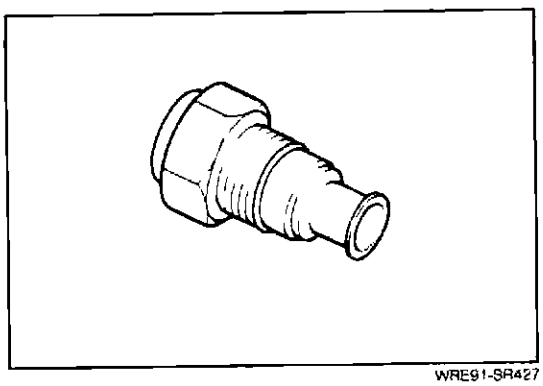

WRE91 SR425

NOTE:
- **Never attempt to disassemble the flow control valve.**
- **When replacing the housing and flow control valve, use parts which bear the same mark (six different marks from A through F).**

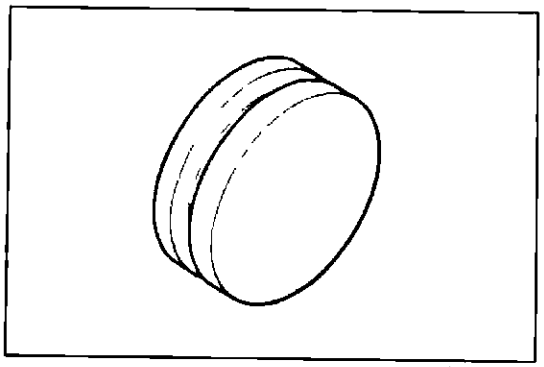


WRE91-SR426

12. Ensure that the pressure port union exhibits no damage, such as restriction and deformation

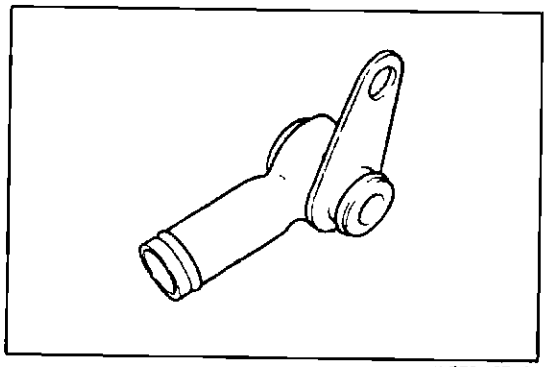

WRE91-SR427

13 Ensure that the flow control spring seat exhibits no damage, such as deformation



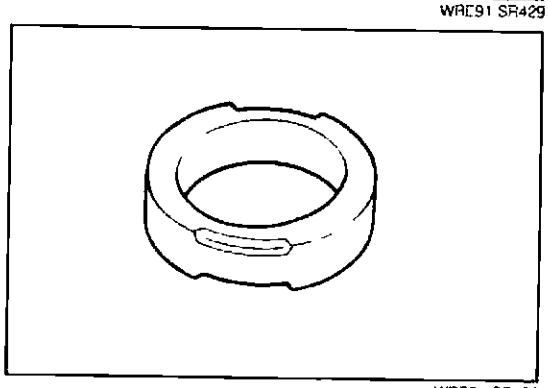
WRE91 SR428

14 Ensure that the suction port union exhibits no damage, such as deformation



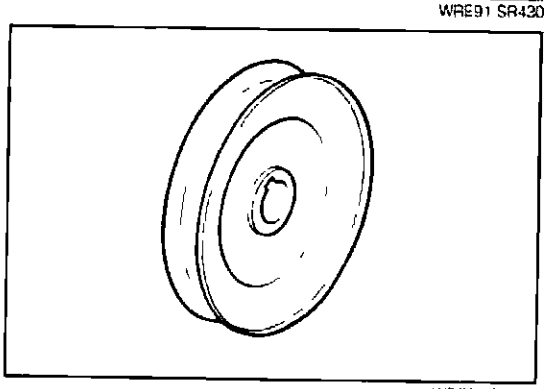
WRE91 SR429

15 Ensure that the cam ring exhibits no damage, such as cracks, scratches and wear
If the cam ring exhibits damage, replace the cam ring with a new one The cam ring should be replaced with the same cam ring as the old one This replacement part must bear either no mark or the same mark of one to four as the old part



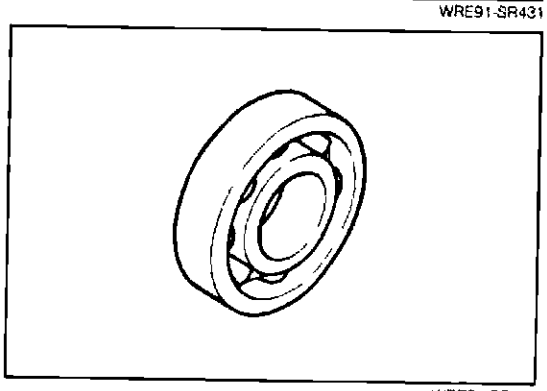
WRE91 SR430

16 Ensure that the pulley exhibits no damage, such as cracks and deformation.



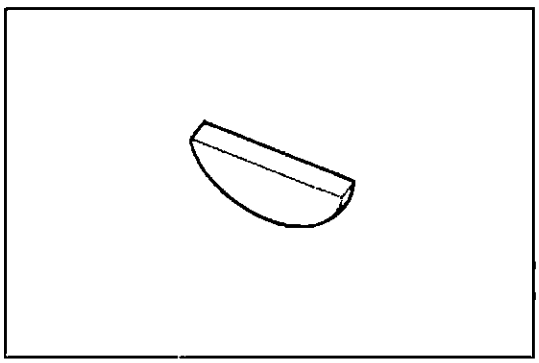
WRE91 SR431

17 Ensure that the radial ball bearing rotates smoothly without any binding



WRE91 SR432

18 Ensure that the woodruff key exhibits no damage.



WRE91 SR433

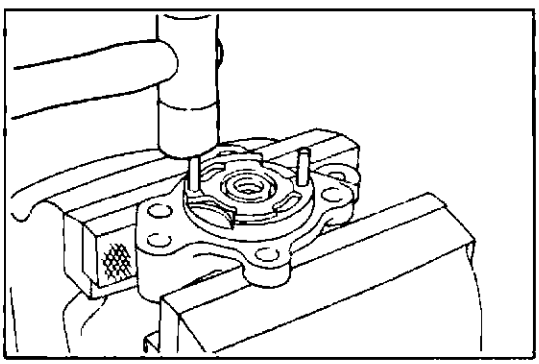
ASSEMBLY

NOTE:

- Prior to the assembly, wash and dry those parts to be assembled.

WRE91 SR434

1 Install the straight pin to the front pump housing Drive it into position by means of a plastic hammer

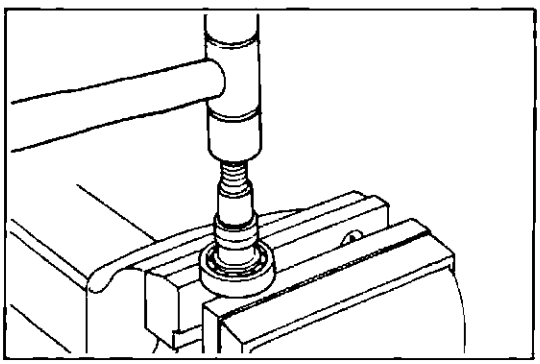


WRE91-SR435

2 Drive the vane pump shaft to the radial ball bearing by means of a plastic hammer.

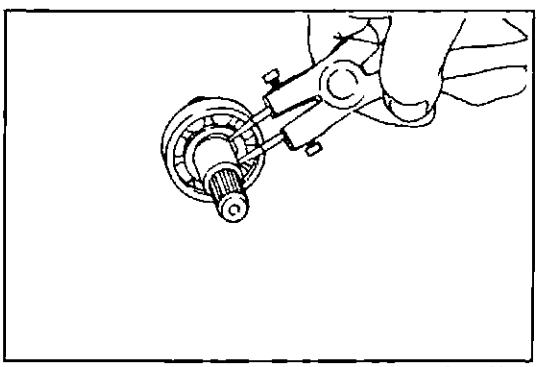
NOTE:

- As for the radial ball bearing, be sure to hold its inner race.



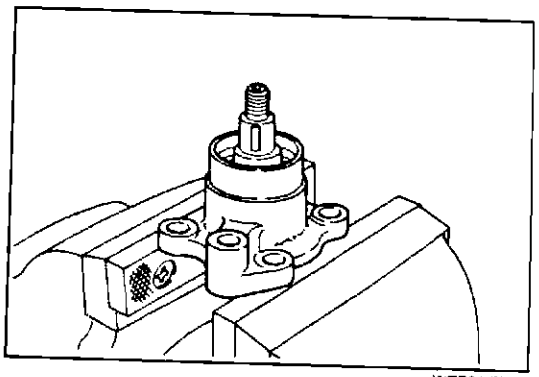
WRE91 SR436

3 Install a new snap ring to the vane pump shaft

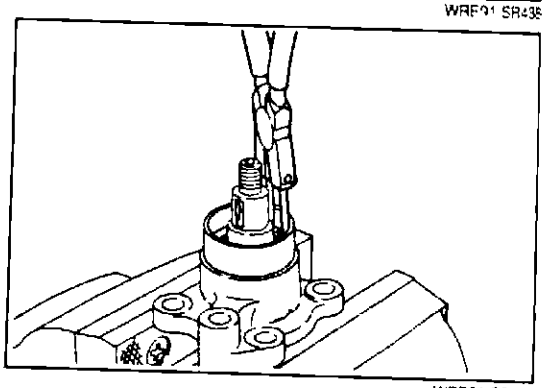


WRE91-SR437

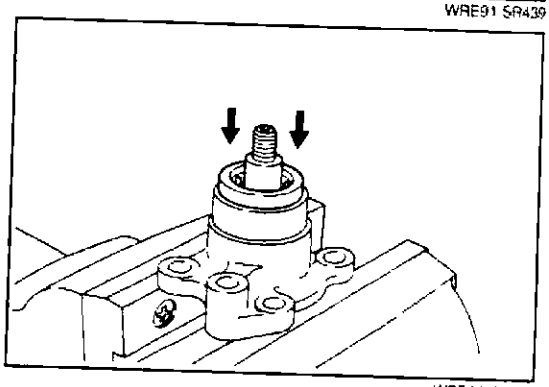
4 Drive the vane pump shaft together with the radial ball bearing to the front pump housing by means of a plastic hammer or the like


WRE91 SR438

5 Install a new snap ring to the front pump housing, using snap ring pliers


WRE91 SR439

6 Apply the ATF DEXRON® II to the inner surface of a new oil seal Drive the oil seal up to the edge surface of the front pump housing, using a plastic hammer or the like Care must be exercised not to tilt the oil seal during the installation

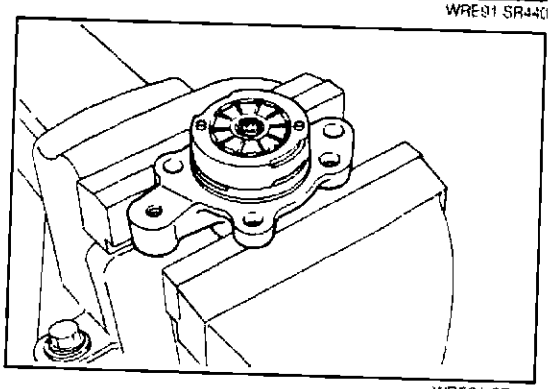

WRE91 SR440

7 Assemble the cam ring to the pump front housing with the cam ring's surface bearing a mark faced toward the pump front housing side

8 Assemble the vane pump rotor to the pump front housing with the surface bearing a punch mark (drilled mark) faced toward the pump front housing side

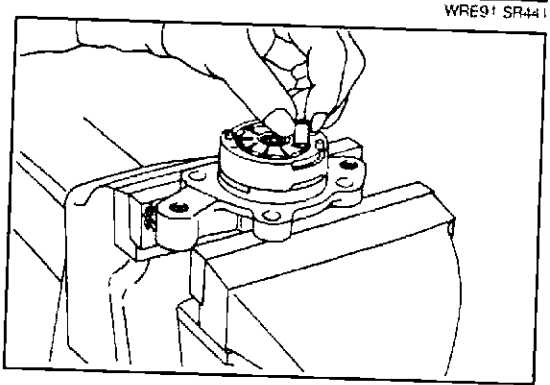
NOTE.

- Apply the ATF DEXRON® II to the thrust surface in advance.

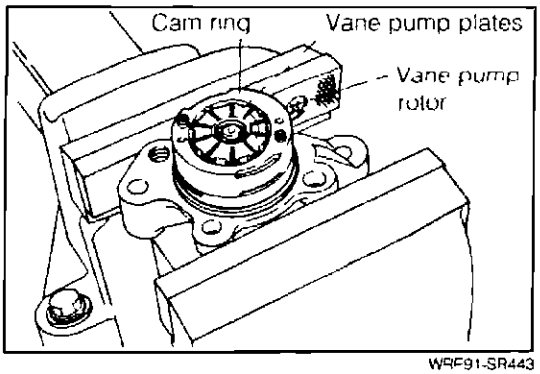

WRE91 SR441

9 Apply the ATF DEXRON® II to the vane plate

10 With the round side of the vane plate set to the cam ring side, insert the vane plate into the vane pump rotor

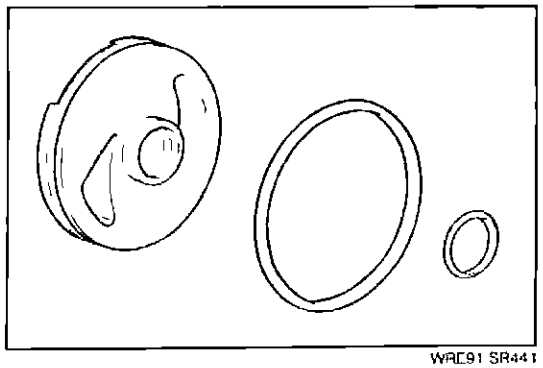

WRE91 SR442

11 Install the "O" ring to the front housing

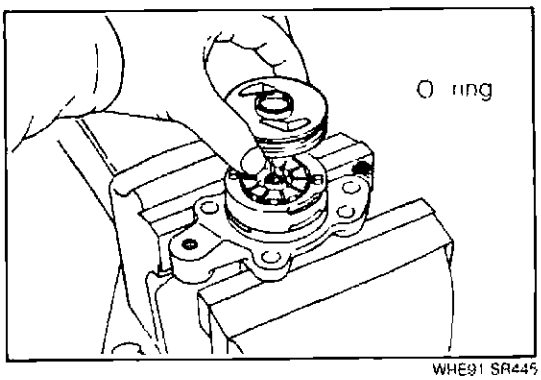


WRE91-SR443

12 Assemble a new "O" ring to the side front plate
NOTE:
- Never reuse the "O" ring
- Apply the ATF DEXRON® II to the "O" ring in advance.
- Be very careful not to scratch the "O" ring.

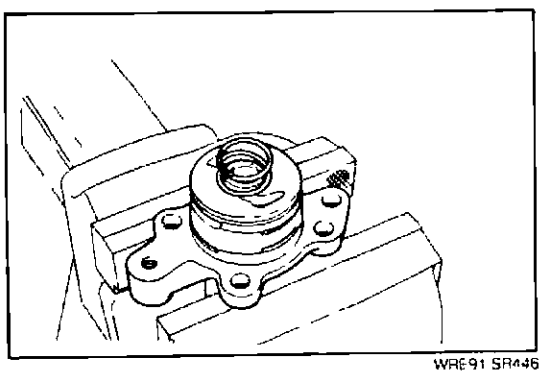

WRE91 SR441

13 While aligning the straight pin hole with the cam ring, install the side front plate.

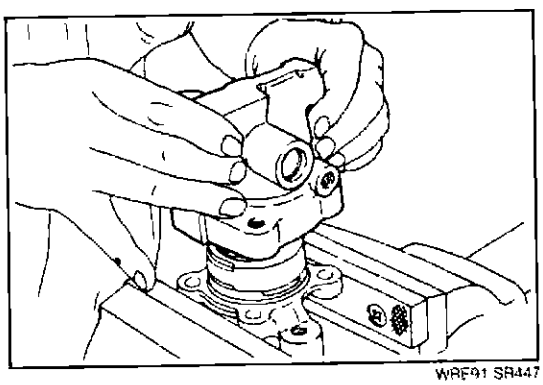


WHE91 SR445

14 Place the compression spring on the side front plate.

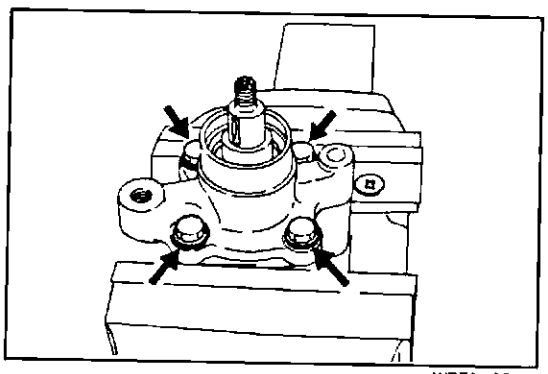

WRE91 SR446

15 Assemble the pump rear housing on the pump front housing
NOTE:
- Be very careful not to tilt the pump rear housing against the pump front housing.

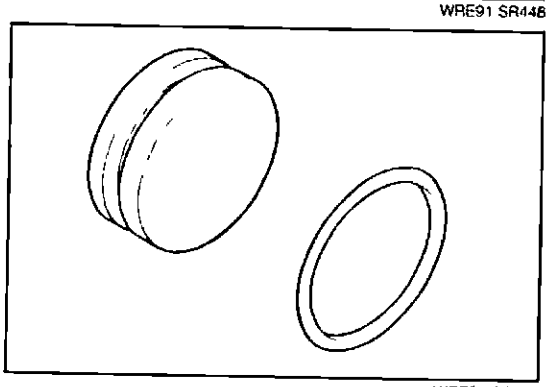

WRE91 SR447

16 Install the pump front housing attaching bolts and tighten them evenly over two or three stages to the specified torque

Tightening Torque: 43.1 - 53.9 N m
(4.4 - 5.5 kgf-m, 31.8 - 39.8 ft-lb)

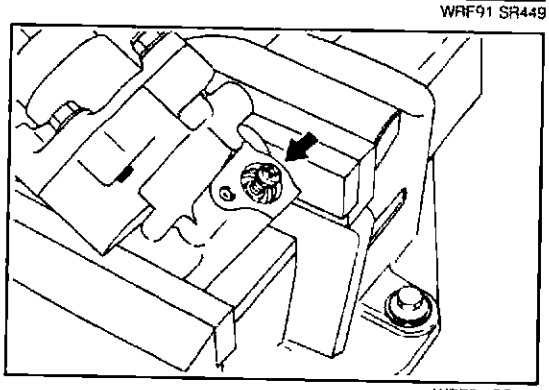

WRE91 SR448

17 Apply the ATF DEXRON® II to the "O" ring Install the "O" ring to the flow control spring seat
18 Screw-in a bolt (M6 x 0 85) having a suitable length to the flow control spring seat

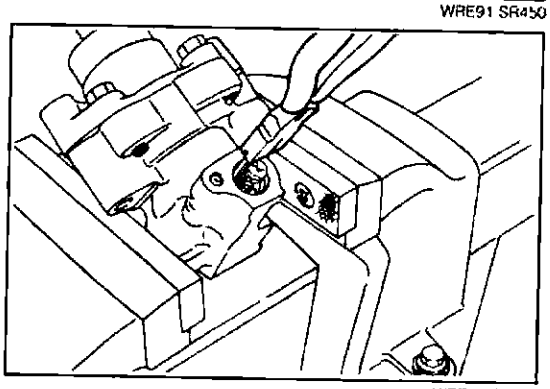

WRE91 SR449

19 Insert the flow control spring seat into the pump rear housing

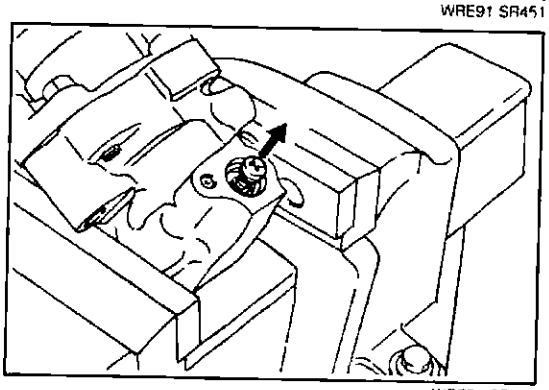
NOTE:
- Care must be exercised not to tilt the flow control spring seat during the installation.
- Be very careful not to scratch the "O" ring.


WRE91 SR450

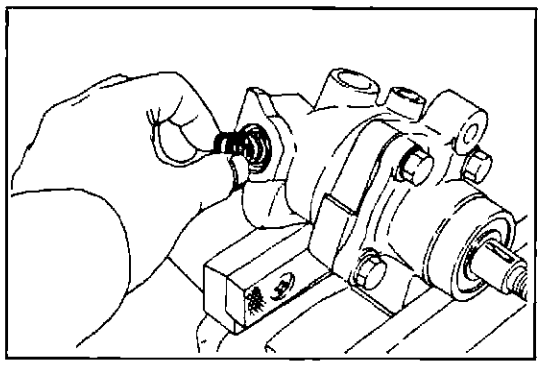
20 Install a new snap ring to the pump rear housing with snap ring pliers


WRE91 SR451

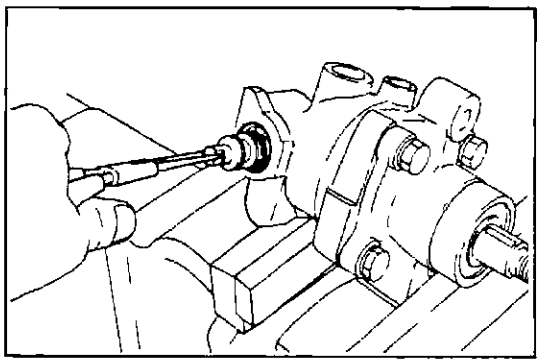
21 Pull the screw which has been installed to the flow control spring seat so as to settle the seat on the snap ring
22. Remove the screw from the flow control spring seat


WRE91 SR452

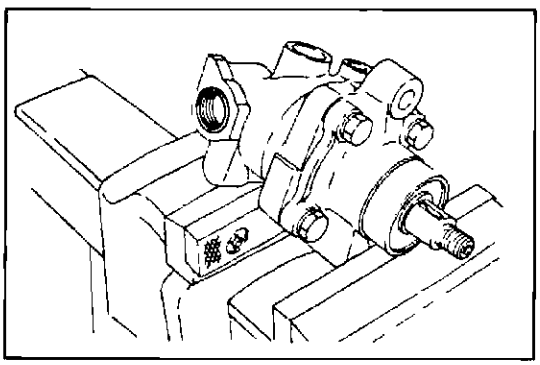
23 Insert the compression spring into the pump rear housing


WRE91 SR453

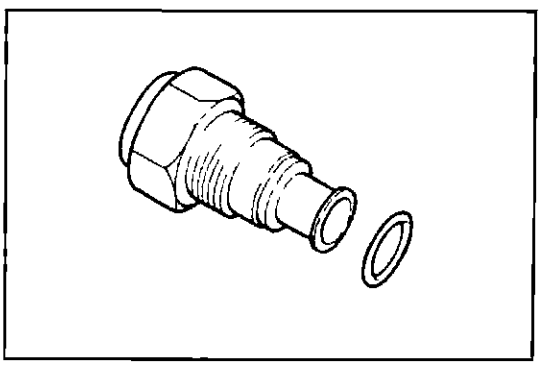
24 Insert the flow control valve into the pump rear housing.


WRE91 SR454

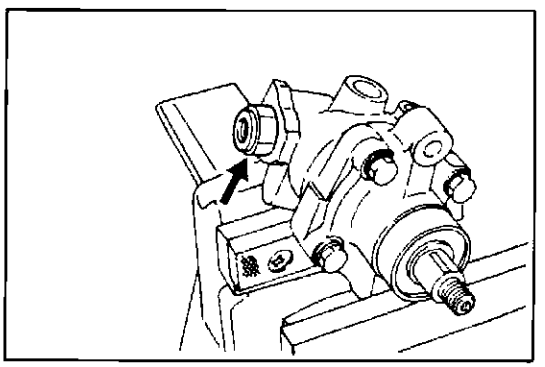
25 Install the "O" ring to the pump rear housing
NOTE:
- Apply the ATF DEXRON® II to the "O" ring in advance.
- Never reuse the "O" ring.


WRE91 SR455

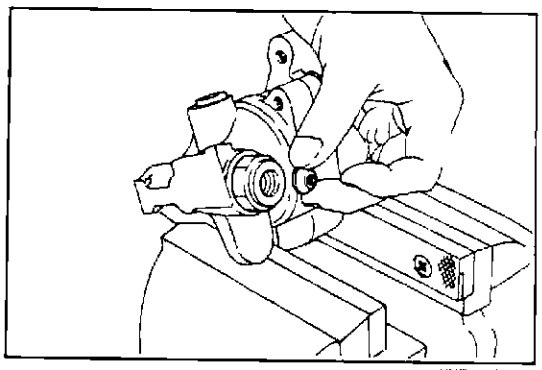
26 Install a new "O" ring to the pressure port union
NOTE:
- Apply the ATF DEXRON® II to the "O" ring in advance.
- Never reuse the "O" ring.


WRE91 SR456

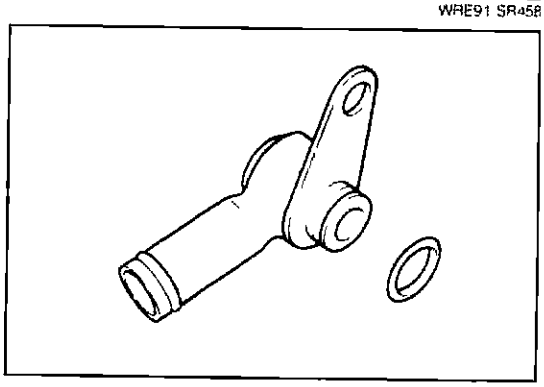
27 Install the pressure port union to the pump rear housing and tighten it to the specified torque.
Tightening Torque: 58.8 - 78.5 N·m
(6.0 - 8.0 kgf-m, 43.4 - 57.9 ft-lb)


WRE91-SR457

28 Insert the union seat into the pressure port union in advance
NOTE
- Be very careful not to drop the union seat.

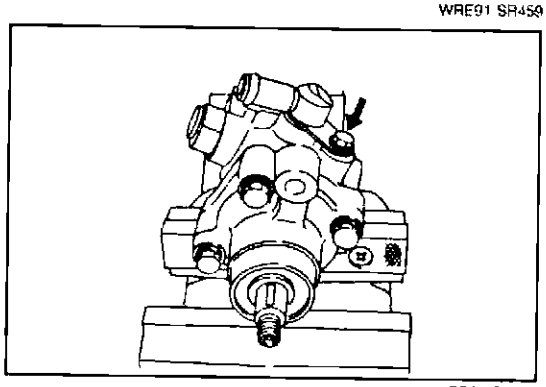

WRE91 SR458

29 Install a new "O" ring to the suction port union
NOTE.
- Apply the ATF DEXRON II to the "O" ring.
- Never reuse the "O" ring

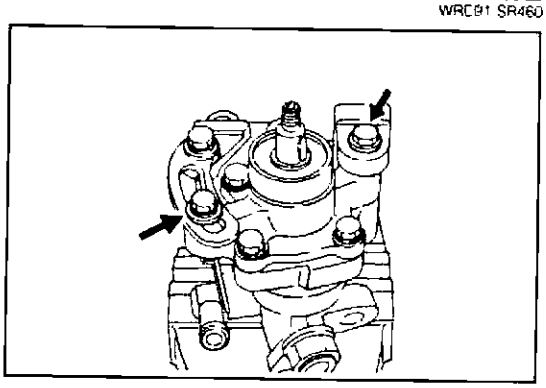

WRE91 SR459

30 Install the suction port to the pump rear housing Tighten the attaching bolts to the specified torque
Tightening Torque: 9.8 - 15.7 N m
(1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)

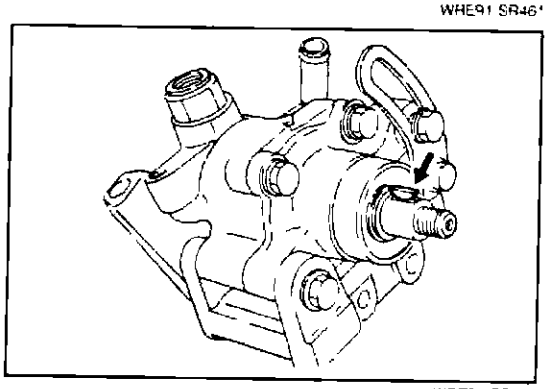
NOTE:
- Care must be exercised not to damage the "O" ring.


WRC91 SR460

31 Install the vane pump to the vane pump bracket. Temporarily tighten the attaching bolts

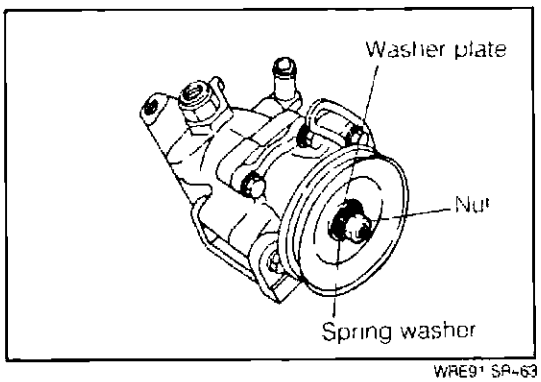

WRE91 SR461

32 Install the woodruff key to the vane pump shaft.
33 Install the vane pump pulley to the vane pump shaft


WRE91 SR462

34 Install the washer plate, new spring washer and nut to the vane pump shaft Tighten the attaching nut to the specified torque by means of an impact wrench

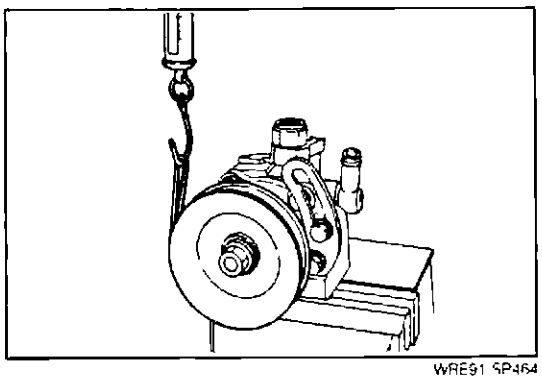
Tightening Torque: 34.3 - 53.0 N·m
(3.5 - 5.4 kgf-m, 25.3 - 39.1 ft-lb)



WRE91 SR-63

35 Wind a suitable cord around the pulley. Measure the starting torque by means of a spring balance Ensure that the starting torque preload is not exceeding the specified value

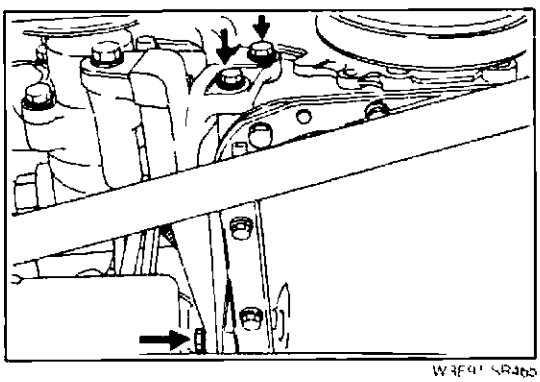
Specified Preload: 0.5 kgf


WRE91 SR464

INSTALLATION

1 Install the vane pump bracket to the engine Tighten the attaching bolts to the specified torque

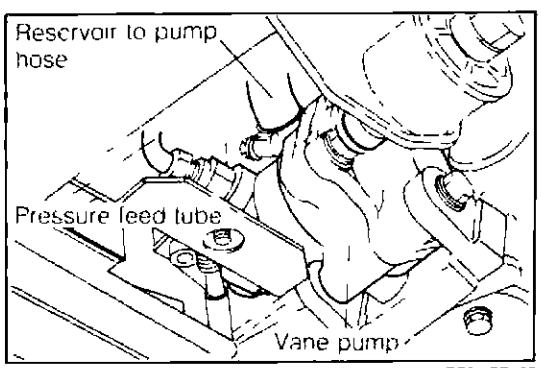
Tightening Torque: M8 bolt 8.34 - 20.1 N·m
(0.85 - 2.05 kgf-m, 6.15 - 14.8 ft-lb)
M10 bolt 17.7 - 41.2 N·m
(1.8 - 4.2 kgf-m, 13.0 - 30.4 ft-lb)


WRE91 SR465

2 Connect the suction tube and pressure tube to the vane pump

Tightening Torque: 39.2 - 49.0 N·m
(4.0 - 5.0 kgf-m, 28.9 - 36.2 ft-lb)

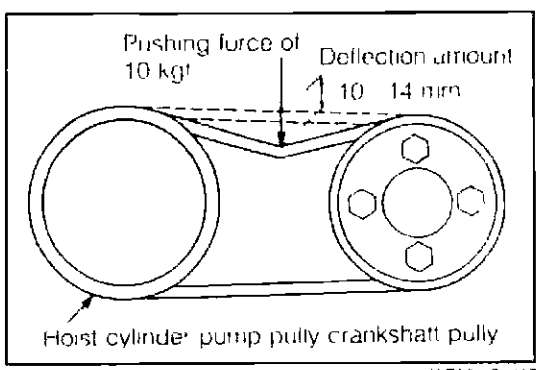
3 Install the vane pump drive belt



WRE91 SR466

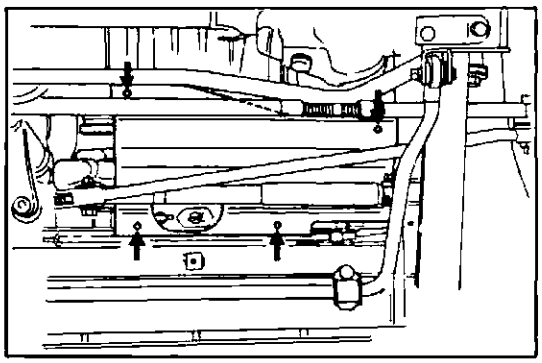
4 Tighten the attaching bolts to the specified torque, while adjusting the belt tension so that the deflection of the belt may become 10 - 14 mm when the midpoint of the vane pump drive belt is pushed with a force of 10 kgf

Tightening Torque: 37.3 - 44.1 N·m
(3.8 - 4.5 kgf-m, 27.5 - 32.5 ft-lb)



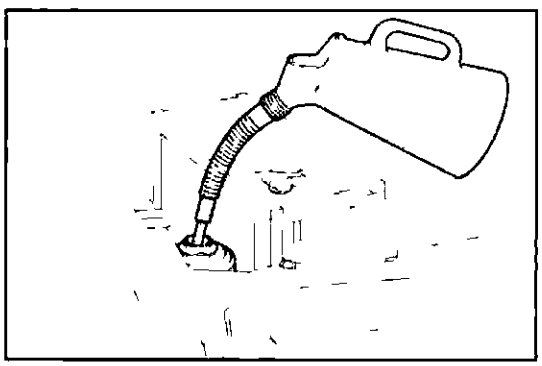
WRE91 SR467

5 Install the engine undercover and tighten the attaching bolts



WRE91-SR468

6 Fill power steering oil
(See page SR–17)
7 Perform the in-vehicle inspection.
(See page SR–15)



WRE91 SR469

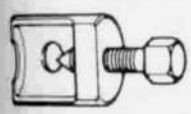
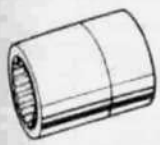


WRE91-SR468



WRE91-SR469

SSTs (Special Service Tools)

Shape	Part No. and name	Purpose	Remarks
	09611-87701-000 Tie rod end puller	Disconnection of tie rod end from steering knuckle	
	09610-87301-000 Pitman arm puller	Disconnection of pitman arm from sector shaft	
	09617-28010-000 Worm bearing adjusting screw lock nut wrench	Removal/installation of worm bearing adjusting screw lock nut	Manual steering gear assembly only
	09616-30011-000 Worm bearing adjusting screw wrench	Removal/installation of worm bearing adjusting screw	Manual steering gear assembly only
	09308-00010-000 Oil seal puller	Removal of steering gear box oil seal	Manual steering gear assembly only
	09616-00010-000 Steering pinion bearing adjusting socket	Measurement of preload	
	09631-00030-000 No. 1 wrench	Removal/installation of worm bearing adjuster plug	Power steering gear assembly only
	09631-00040-000 No. 2 wrench	Removal/installation of worm bearing adjusting lock nut	Power steering gear assembly only
	09515-87201-000 Rear axle bearing outer replacer	Removal/installation of needle roller bearing	Power steering gear assembly only
	09950-20017-000 Universal puller	Removal of vane pump pulley	Power steering only

WRE91-SR470

SERVICE SPECIFICATIONS

Item		
Steering wheel free play		Not more than 30 mm (1 18 inch)
Steering gear box fluid level		13 - 23 mm (0 51 - 0 91 inch) From upper edge of check hole center
Steering gear box oil (except power steering)		Gear oil GL3, SAE30
Vane pump drive belt	Specified deflection Belt tension	10 - 14 mm (0 4 - 0 55 inch) 50 - 75 kgf
Power steering fluid		ATF DEXRON® II
Power steering turning effort		Not to exceed 7 8 N m (80 kgf-cm, 5 8 ft-lb)
Vane pump hydraulic pressure	Maximum	75 - 80 kgf/cm^2
Difference in pressure under unloaded state (at 1000 and 3000 rpm)		Not more than 5 kg/cm^2
Steering shaft length		Approx 659 3 mm (25 96 inch)
Intermediate shaft	Without power steering With power steering	472 5 ± 1 mm (18 6 ± 0 4 inch) 503 5 ± 1 mm (19 8 ± 0 4 inch)
Manual steering gear box worm shaft starting torque (Worm shaft unit)		0 29 - 0 49 N m (0 03 - 0 05 kgf-m 0 22 - 0 36 ft-lb)
Manual steering gear box worm shaft starting torque (Total preload)		0 69 - 1 0 N m (0 07 - 0 1 kgf-m, 0 51 - 0 7 ft-lb)
Power steering gear box worm shaft starting torque (Worm shaft unit)		0 39 - 0 64 N m (0 04 - 0 065 kgf-m, 0 29 - 0 47 ft-lb)
Power steering gear box worm shaft starting torque (Total preload)		0 59 - 0 93 N m (0 06 - 0 095 kgf m, 0 43 - 0 69 ft-lb)
Vane plate		Unit mm (inch) Position / Specified Value / Limit Length: 15 00 (0 59055) / 14 99 (0 59015) Height: 8 2 (0 32283) / 8 1 (0 31889) Width: 1 800 (0 07086) / 1 797 (0 07074)
Vane pump rotor and vane plate clearance	New part Maximum limit	0 01 mm (0 0003937 inch) 0 028 mm (0 0011023 inch)
Vane pump compression spring free length	New part Minimum limit	50 mm (1 96 inch) 47 mm (1 85 inch)
Vane pump drive belt deflection (with pushing force of 10 kg)		10 - 14 mm (0 39 - 0 55 inch)

WRE91 SR471

TIGHTENING TORQUE

Tightening component		N·m	kgf-m	ft-lb
Steering gear box × Check plug		2.9 - 4.9	0.3 - 0.5	2.2 - 3.6
Steering gear box × Hydraulic tube (flare nut)		39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Steering wheel × Steering shaft		29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Steering column tube × Brace		14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Steering column hole cover × Floor panel		3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Steering shaft universal joint × Intermediate shaft		24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Steering column tube × Steering column hole cover		3.6 - 6.9	0.4 - 0.7	2.7 - 5.1
Flexible coupling × Flexible coupling yoke		14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Steering shaft universal joint × Steering shaft		24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Flexible coupling yoke × Steering gear box		16.7 - 21.6	1.7 - 2.2	12.3 - 15.9
Flexible coupling yoke × Intermediate shaft		16.7 - 21.6	1.7 - 2.2	12.3 - 15.9
Tie rod end subassembly × Steering knuckle		49.0 - 88.3	5.0 - 9.0	36.2 - 65.1
Tie rod end subassembly × Steering relay rod		68.6 - 137	7.0 - 14.0	50.6 - 101
Steering relay rod × Pitman arm		68.6 - 137	7.0 - 14.0	50.6 - 101
Steering relay rod × Shimmy damper		73.5 - 103	7.5 - 10.5	54.2 - 75.9
Shimmy damper × Frame		73.5 - 103	7.5 - 10.5	54.2 - 75.9
Pitman arm × Steering gear box		147 - 196	15 - 20	109 - 145
End cover × Steering gear box		44.1 - 53.9	4.5 - 5.5	32.5 - 39.8
Sector shaft adjusting screw lock nut		19.6 - 34.3	2.0 - 3.5	14.5 - 25.3
Steering guide clamp screw (Power steering gear box)		2.0 - 3.9	0.2 - 0.4	1.4 - 2.9
Valve housing attaching nuts (Power steering gear box)		39.2 - 39.8	4.0 - 5.5	28.9 - 53.9
Worm shaft adjusting screw lock nut		49.0	5.0	36.2
Steering gear box × Frame		73.5 - 103	7.5 - 10.5	54.2 - 75.9
Vane pump front housing × Rear housing		43.1 - 53.9	4.4 - 5.5	31.8 - 39.8
Vane pump pressure port union		58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Suction port union × Vane pump rear housing		9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Vane pump shaft × Vane pump pulley		34.3 - 53.0	3.5 - 5.4	25.3 - 39.1
Vane pump × Pressure tube		39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Vane pump bracket × Cylinder block	M8 M10	8.34 - 20.1 17.7 - 4.2	0.85 - 2.05 1.8 - 4.2	6.15 - 14.8 13.0 - 30.4
Vane pump × Adjusting bar Vane pump × Vane pump bracket		37.3 - 44.1	3.8 - 4.5	27.5 - 32.5

WRE91-SR472

DAIHATSU

F70,F75,F77

Service manual

TRANSFER

TR

DAIHATSU MOTOR CO., LTD. NO.9703-FE

DAIHATSU

F70,F75,F77

TRANSFER

TRANSMISSION & TRANSFER SPECIFICATIONS ..... **TR– 2**
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REMOVAL **TR–17**
DISASSEMBLY
TRANSFER ADAPTER **TR–21**
TRANSFER IDLER GEAR **TR–22**
TRANSFER FRONT CASE **TR–22**
DIAPHRAGM CYLINDER COVER **TR–24**
INSPECTION **TR–24**
ASSEMBLY
DIAPHRAGM CYLINDER COVER **TR–28**
TRANSFER IDLER GEAR **TR–28**
TRANSFER FRONT CASE **TR–28**
INSTALLATION **TR–31**
TRANSFER (4-Speed) **TR–38**
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DISASSEMBLY
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TRANSFER IDLER GEAR **TR–47**
TRANSFER OUTPUT **TR–47**
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TRANSFER IDLER GEAR **TR–51**
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INSTALLATION **TR–52**
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SERVICE SPECIFICATIONS **TR–60**
TIGHTENING TORQUE **TR–61**

WRE91-TR001

TRANSMISSION & TRANSFER SPECIFICATIONS

1. Specifications

[ ] Turbo charger equipped

Item \ Model			F70, F75, F77	
Transmission model			4VH	5VH
Transmission	Type		Constant-mesh type	←
	Gear ratio	1st	3 647	3 647 [3 477]
		2nd	2 136	2 136 [2 037]
		3rd	1 484	1 484 [1 317]
		4th	1 000	←
		5th	—	0 860 [0 820]
		Reverse	4 351	4 351 [4 148]
	Gear oil capacity	L	2 2	2 9
Transfer	Type		Constant-mesh type	←
	Gear ratio	High	1 297	←
		Low	2 370	←
	Gear oil capacity	L	1 3	←

WRE91 TR002

2. A label showing the production year, month and date of the transmission and transfer assembly has been affixed to the upper surface of the clutch housing case. At its upper column the label indicates the specifications of the transmission and transfer assembly in a form of alphanumeric letters (e g F31, 03B, 03C and 01B)

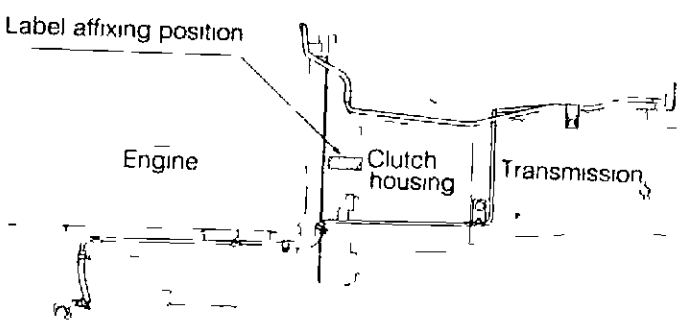
Label

Example

65A	(A)
F70MDW 07C058	(B) (C)

(A) Transmission & transfer assembly specifications
(B) Model
(C) Production year, month, date

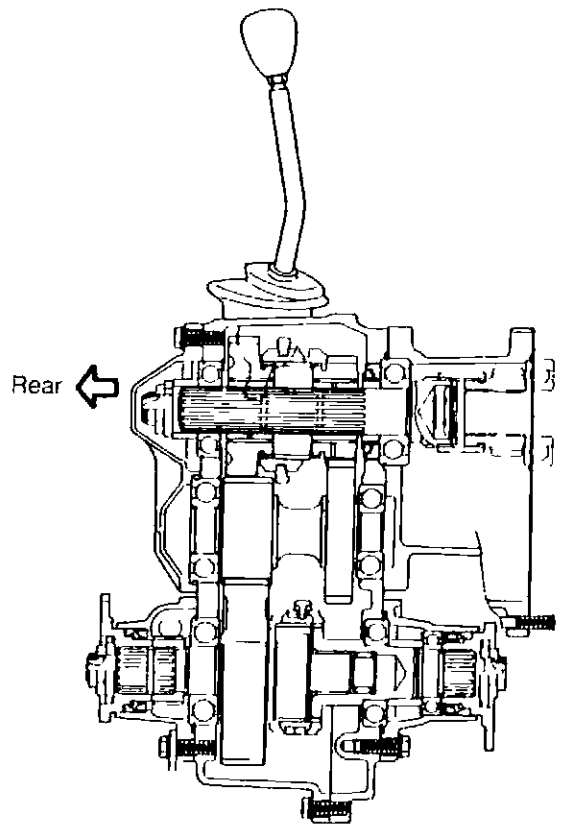
Model		Standard	Option	
			3rd gear ratio	Finland specifications
F70	RHD	R F31 MDT F65		MDT F66
	LHD	MDW2 F03		MDW F08
F75	RHD			
	LHD	MBHW 3A3		MBHW 08A
F77	RHD	PR 01B	PR 03B	PR 03C

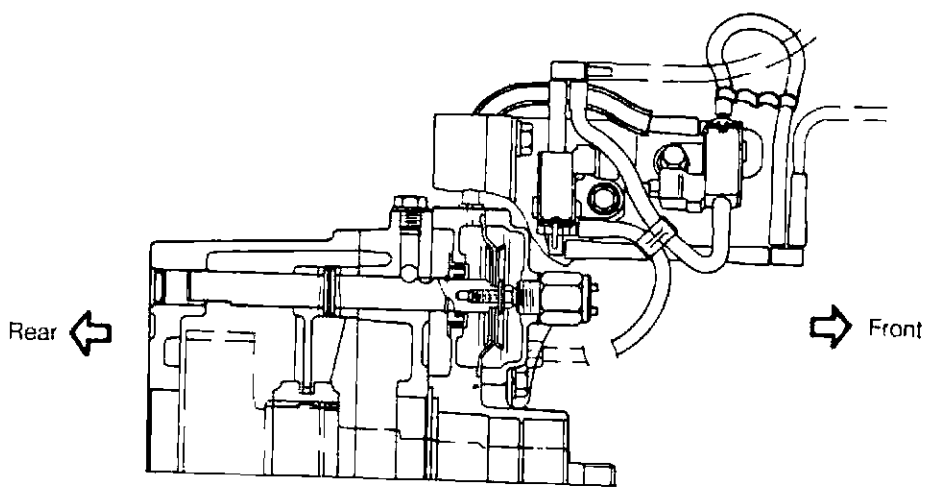


WRF91 TR003

EMPLOYMENT OF TRANSFER POWER SHIFT

For easier operation of the transfer, the transfer power shift has become standard equipment on the EL grade of Europian and Australian specifications
In addition to those motor vehicles above, the power shift is available as optional equipment on those motor vehicles mounted with Type DL engine and 5-speed transmission (except for motor vehicles equipped with mechanical winch)



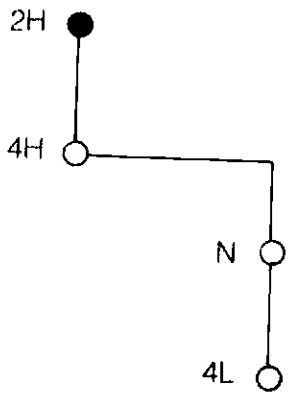


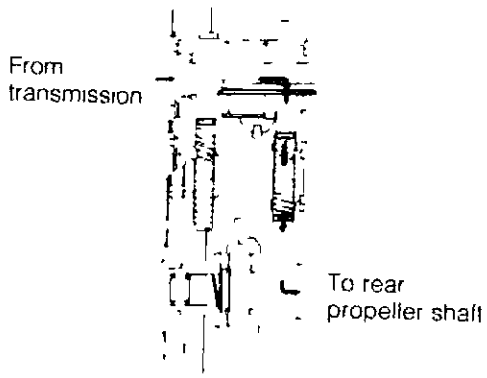
WIE91 TR004

SHIFT PATTERN

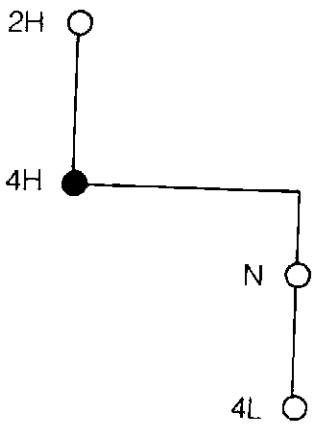
The four possible gear positions are 2H, 4H, N and 4L. The power from the transmission is transmitted into the transfer as follows

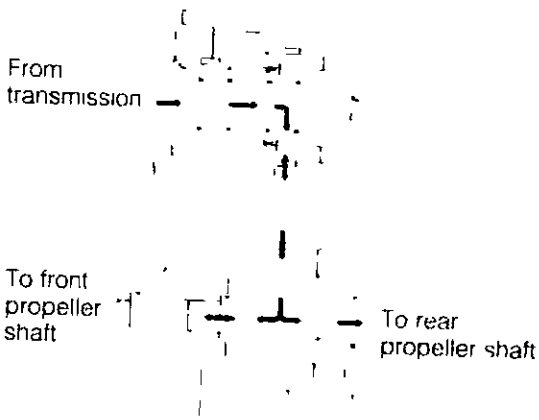
2H (2-rear wheel drive, high range)
This position is used for normal driving



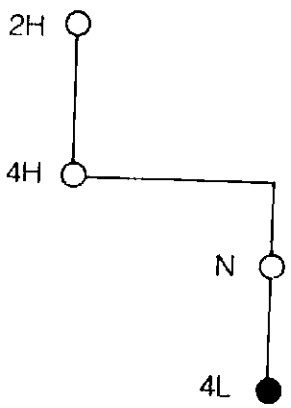


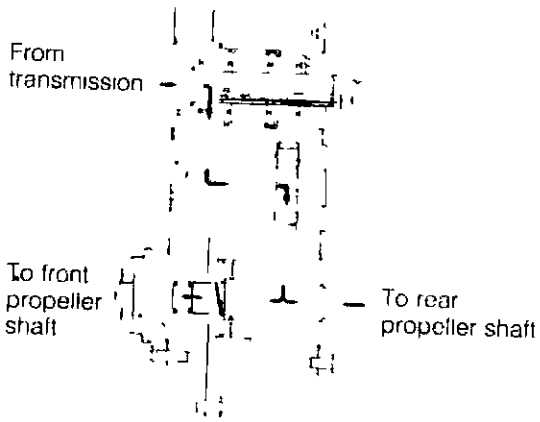
4H (4 wheel drive, high range)
This position is most suitable for snowy road driving





4L (4-wheel drive, low range)
This position is used for driving on steep upgrades, and muddy, sandy, or irregular terrains

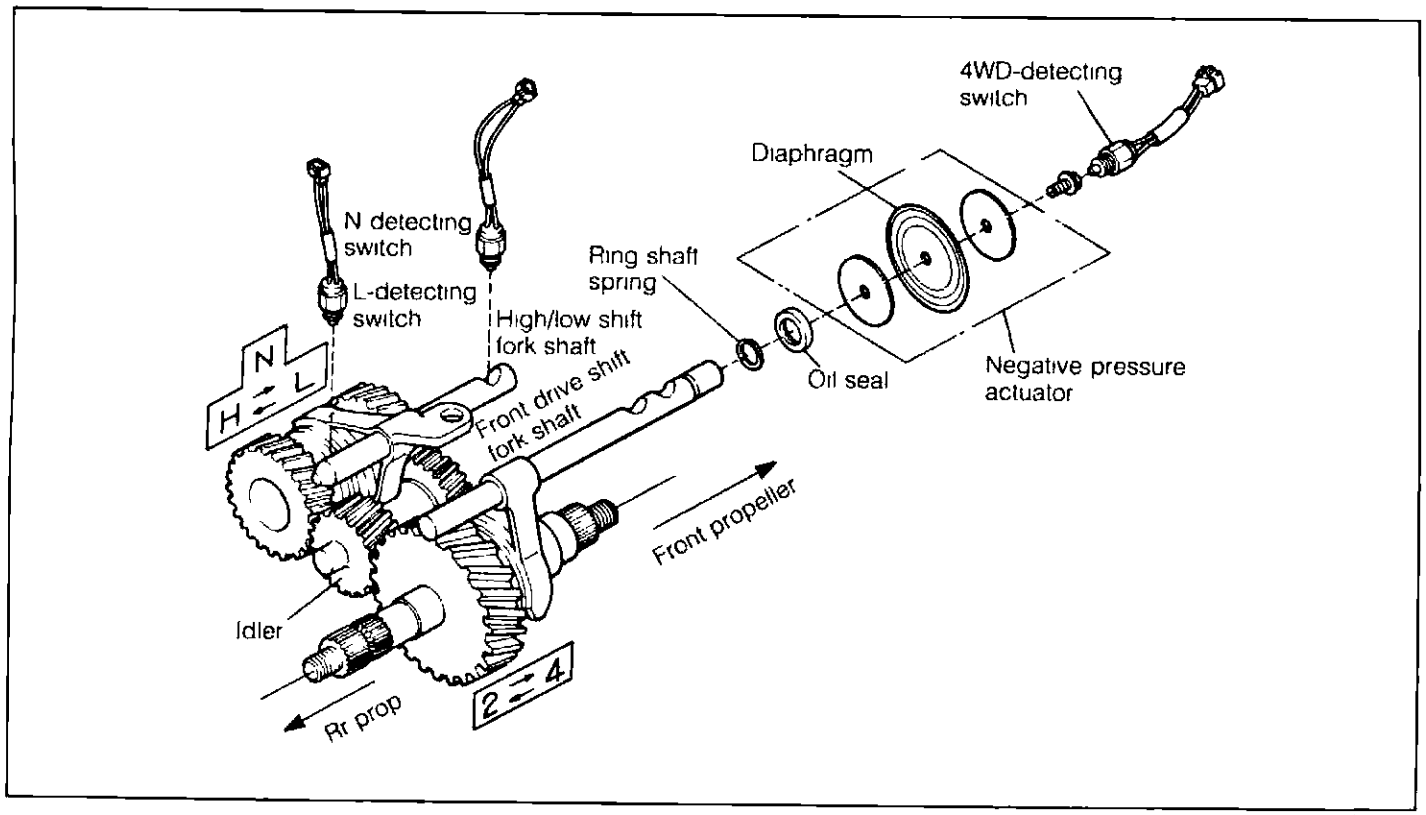




WRE91TR005

(1) DESCRIPTION

The shift from the two-wheel drive to the four-wheel drive and vice versa can be performed by means of a newly-provided power shift switch which utilizes a negative pressure
The negative pressure which has been generated by the negative-pressure pump or has been taken from the intake manifold is transmitted to a diaphragm type actuator provided inside the transfer case.
Consequently, the thrust generated by the actuator is transmitted directly to the drive shift fork shaft In this way, the shift from the two-wheel drive to the four-wheel drive and vice versa is performed.
The negative pressure is controlled by two VSV's For improved response of the actuator, these VSV's have been installed near the actuator (at the transmission case side)



WRE91 TR006

(2) BASIC OPERATION

Power shift switch	Transfer shift lever position	Driving conditions
 OFF	2H N 4L	2-wheel drive (for high speed operation) Neutral 4-wheel drive (for low-speed operation)
 ON	2H N 4L	4-wheel drive (for high speed operation) Neutral 4-wheel drive (for low-speed operation)

As is evident from the table above, it is possible to select your desirable driving conditions through the combination of positions of the power shift switch and the transfer shift lever.

WRE91 TR007

OPERATION

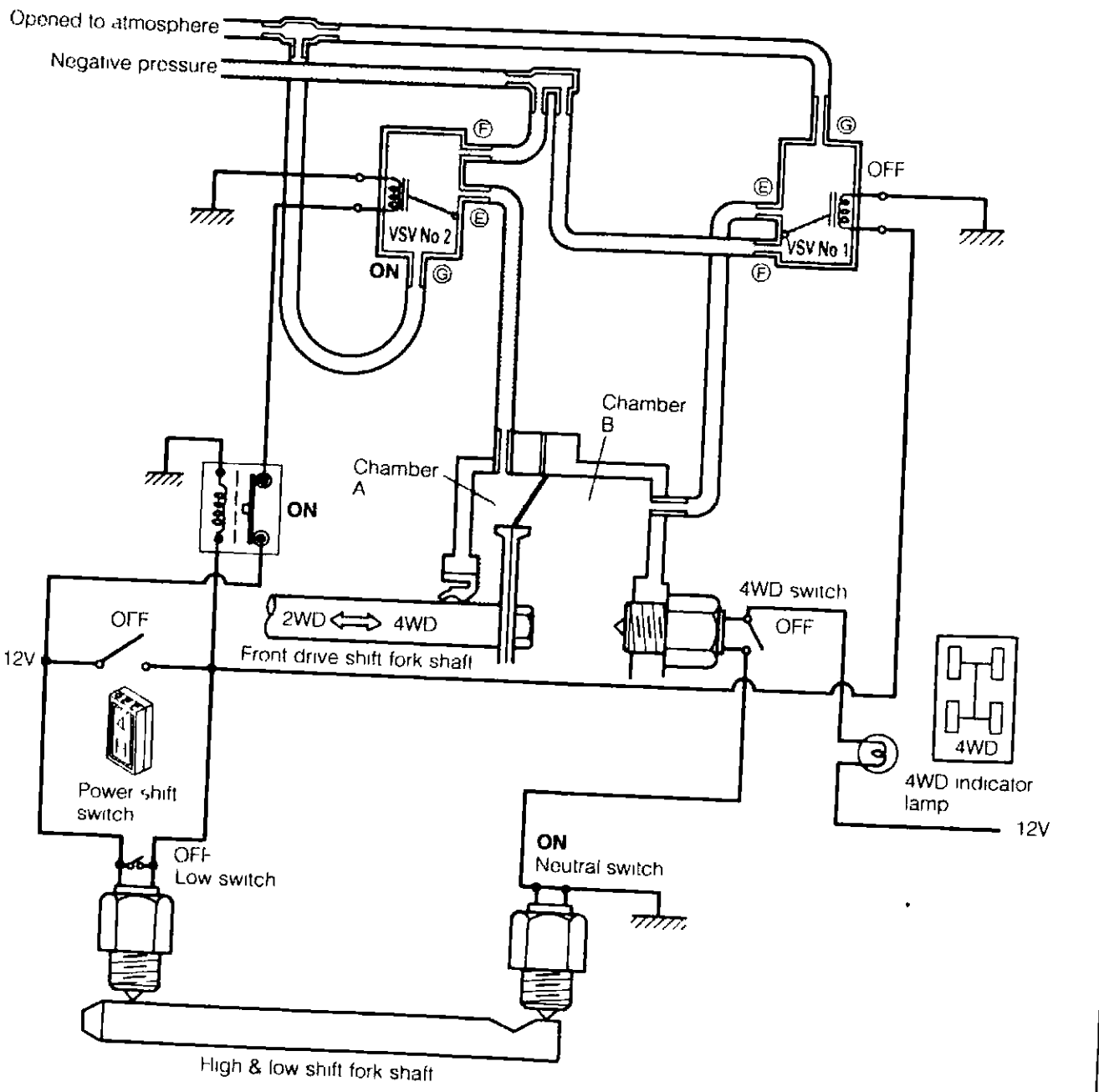
Two-rear-wheel drive

A negative pressure from the VSV No 2 is applied to the chamber A of the negative pressure actuator At this stage, the atmospheric pressure is applied to the chamber B of the negative pressure actuator from the VSV No 1 Consequently, because of the difference in air pressure being applied to the diaphragm the front drive shift fork shaft which is connected directly to the diaphragm will be shifted to the two wheel drive side

Power shift switch	Transfer shift lever position
OFF	2H

Operating conditions of each switch

VSV No 1	OFF
VSV No 2	**ON**
Low switch	OFF
Neutral switch	**ON**
4WD switch	OFF



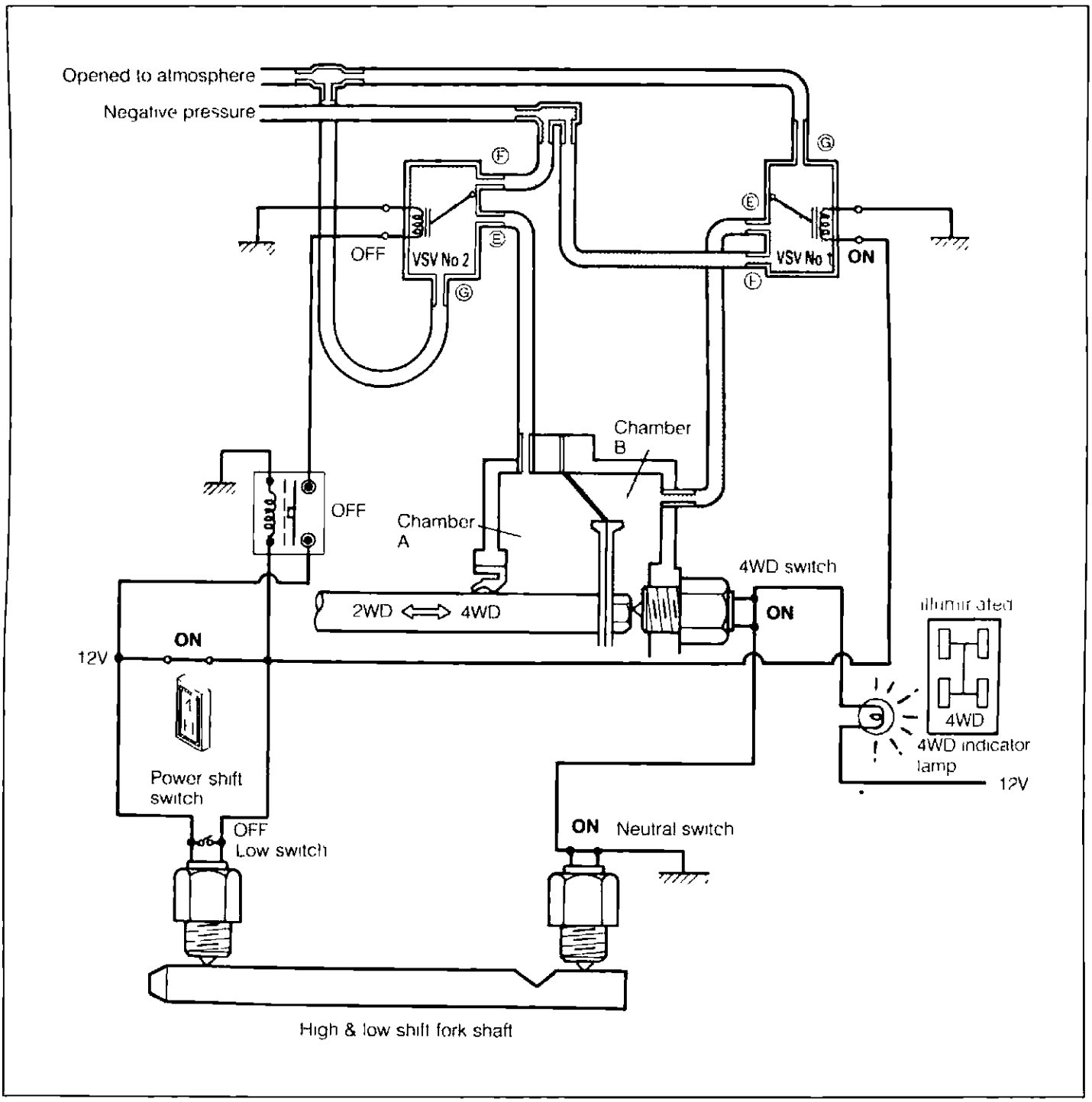
WRF41 TR008

Four-wheel drive (High-speed running range)
A negative pressure is applied to the chamber B of the negative pressure actuator through the VSV No 1 At this stage, the atmospheric pressure is applied to the chamber A of the negative pressure actuator from the VSV No 2 Consequently, because of the difference in air pressure being applied to the diaphragm, the front drive shift fork shaft which is connected directly to the diaphragm will be shifted to the four-wheel drive side

Power shift switch	Transfer shift lever position
ON	2H

Operating conditions of each switch

VSV No 1	**ON**
VSV No 2	OFF
Low switch	OFF
Neutral switch	**ON**
4WD switch	**ON**



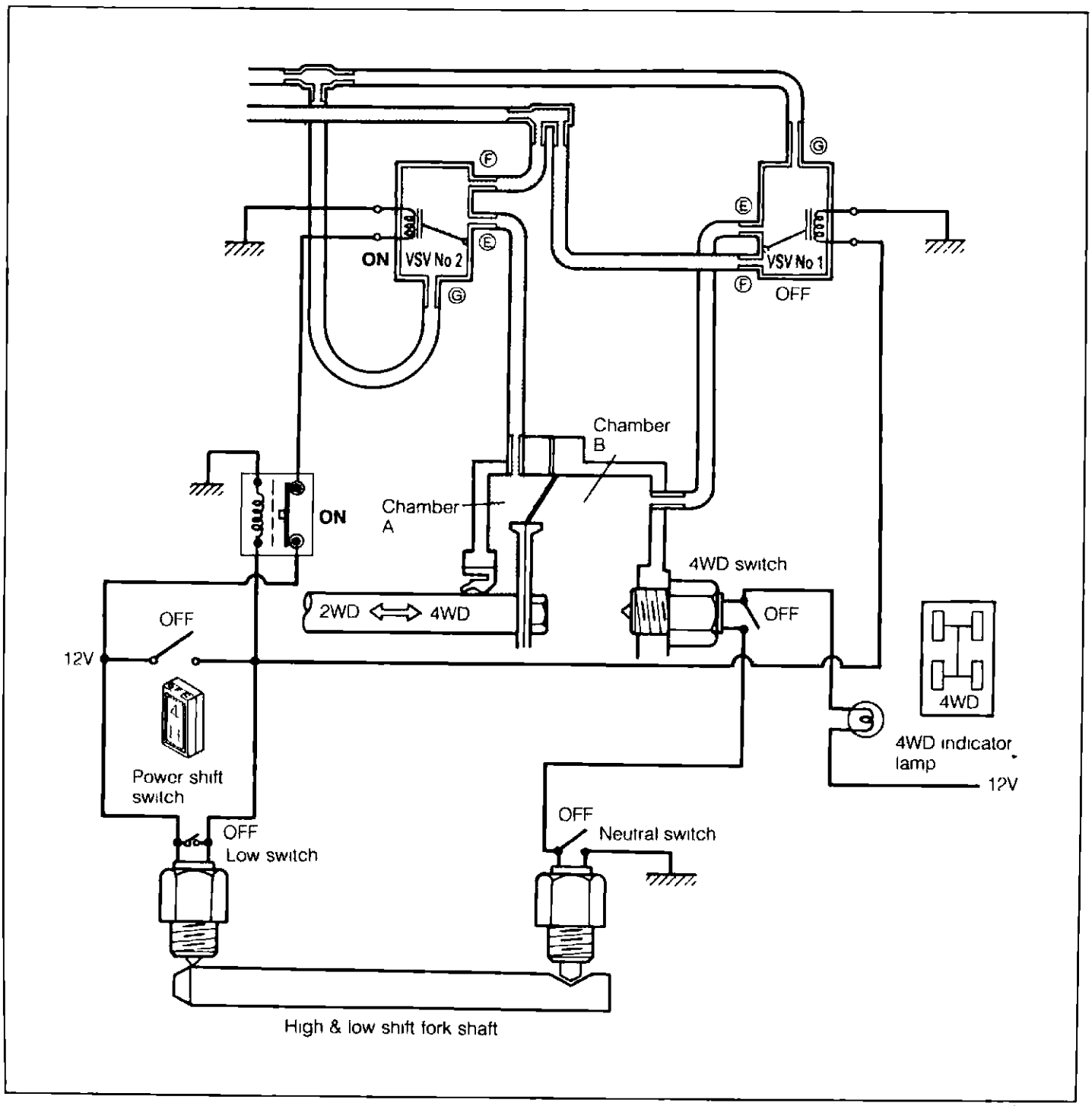
Two-wheel drive, neutral

The negative pressure is transmitted in the same way as with cases where the transfer shift lever is in the 2H position with the power switch turned OFF Since the high/low shift fork shaft is in the neutral position, the driving force of the drive shaft will not be transmitted to any component

Power shift switch	Transfer shift lever position
OFF	N

Operating conditions of each switch

VSV No 1	OFF
VSV No 2	**ON**
Low switch	OFF
Neutral switch	OFF
4WD switch	OFF



WRE91 TR010

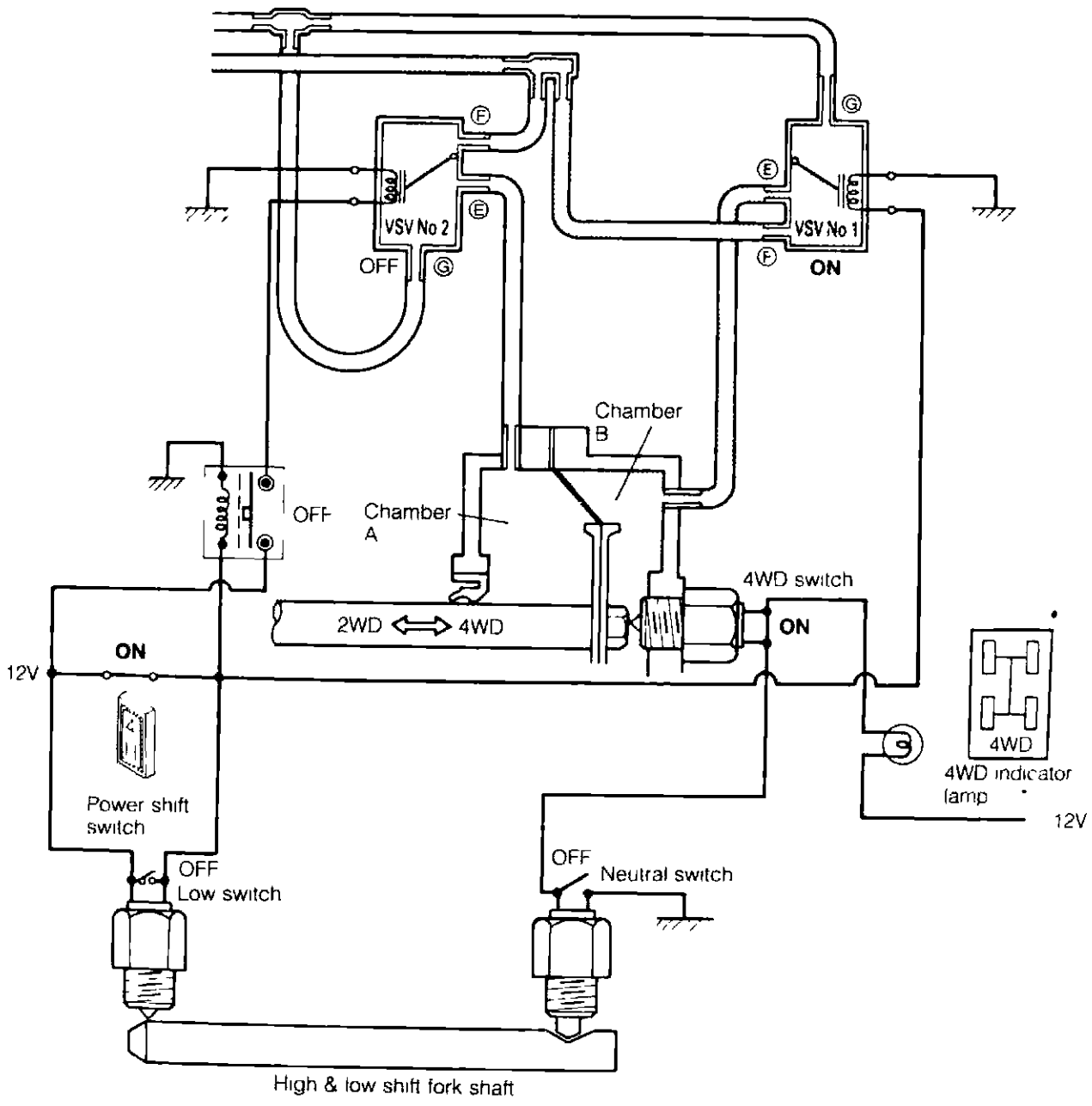
Four-wheel drive, neutral

The negative pressure is transmitted in the same way as with cases where the transfer shift lever is in the 2H position with the power switch turned ON. Since the high/low shift fork shaft is in the neutral position, the driving force of the drive shaft will not be transmitted to any component.

Power shift switch	Transfer shift lever position
ON	N

Operating conditions of each switch

VSV No. 1	**ON**
VSV No. 2	OFF
Low switch	OFF
Neutral switch	OFF
4WD switch	**ON**

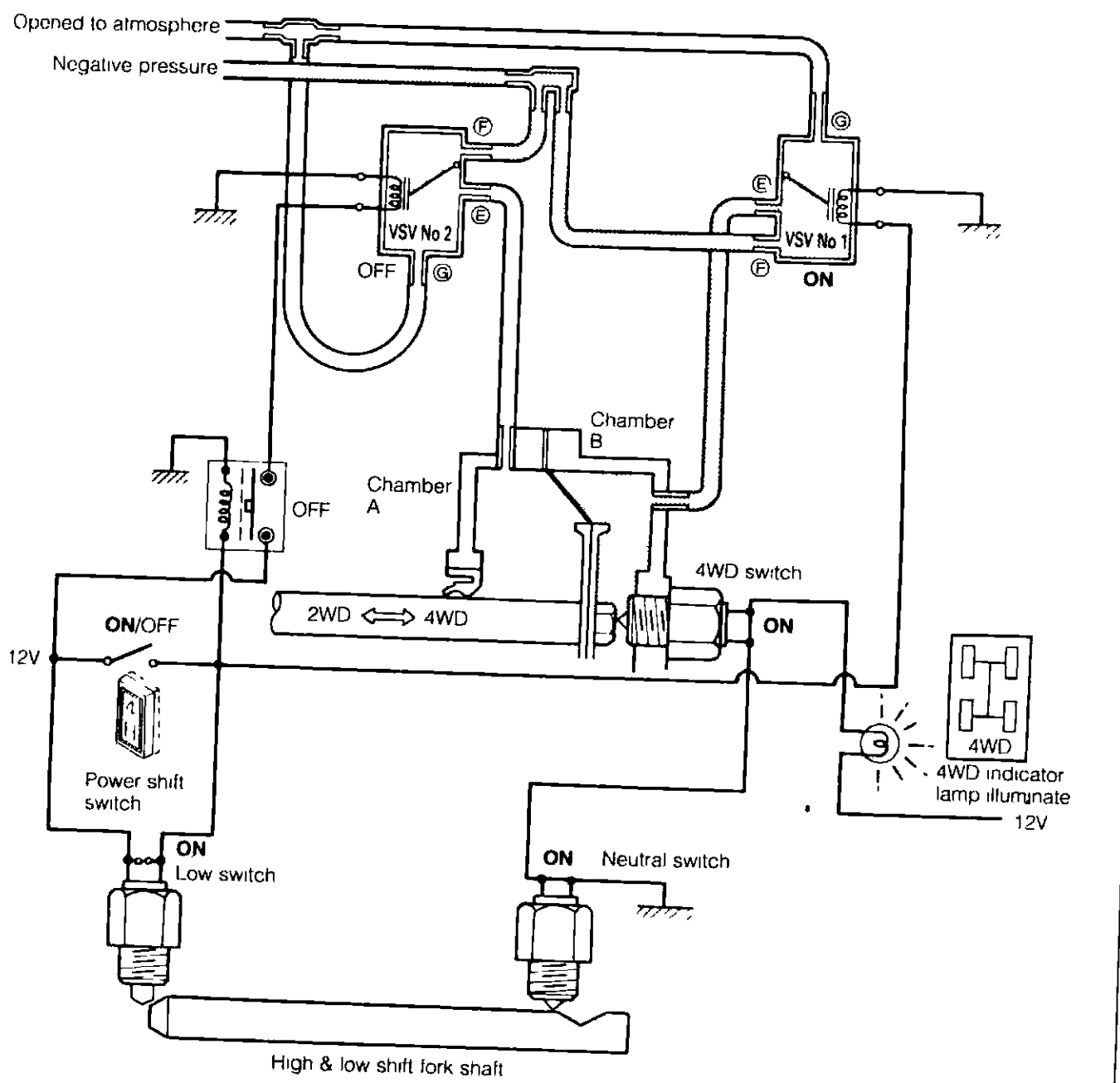


Four-wheel drive, (Low speed running range)
The negative pressure is transmitted in the same way as with cases where the transfer shift lever is in the 2H position with the power switch turned ON. Since the low switch is turned ON, the VSV No 2 is OFF regardless of the state of the power shift switch As a result, the motor vehicle is driven on the four-wheel drive

Power shift switch	Transfer shift lever position
ON/OFF	4L

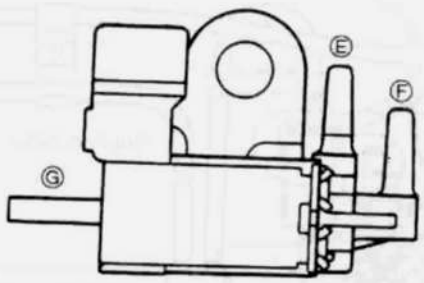
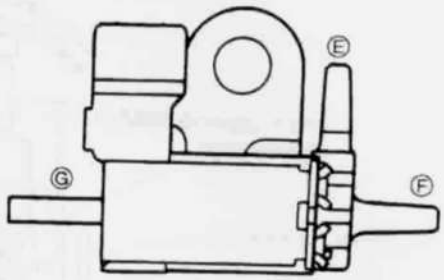
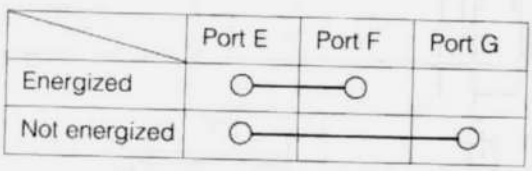
Operating conditions of each switch

VSV No 1	**ON**
VSV No 2	OFF
Low switch	**ON**
Neutral switch	**ON**
4WD switch	**ON**



WTE91TR012

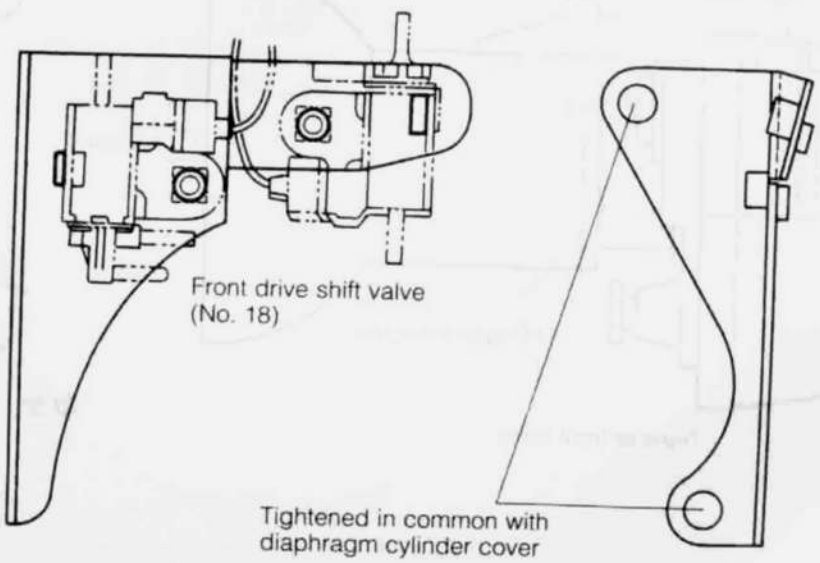
FRONT DRIVE SHIFT CONTROL VACUUM SWITCHING VALVE

		VSV No. 1	VSV No. 2
Shape			
Operation			←
Timing	4WD	Energized	Not energized
	2WD	Not energized	Energized
Coupler color		White	Blue

WRE91-TR013

VACUUM SHIFT CONTROL VALVE BRACKET

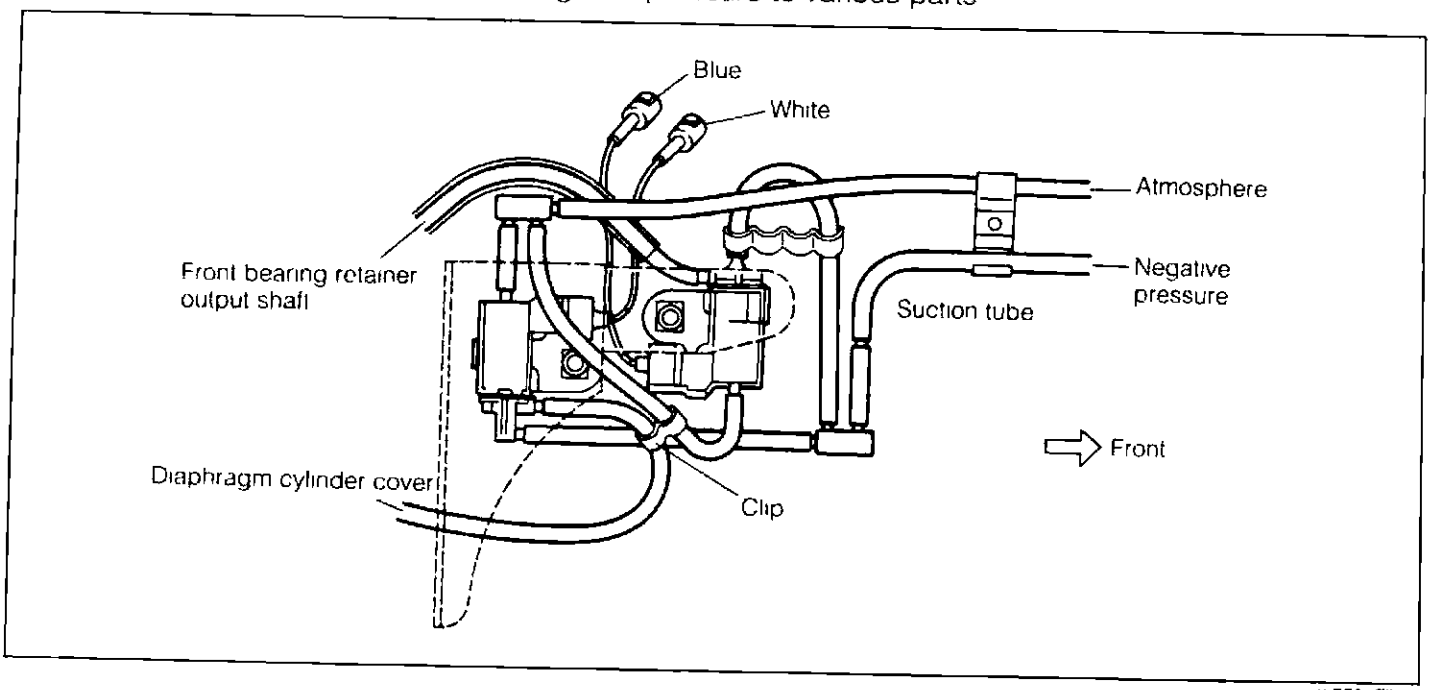
This bracket has been newly provided so as to install the VSV. This bracket is tightened in common by the diaphragm cylinder cover attaching bolts.



WRE91-TR014

VACUUM HOSE

Vacuum hoses are used to transmit a negative pressure to various parts



WRF91 TR015

TRANSPOSITION DETECTION SWITCH

Purpose

Low detection switch ①

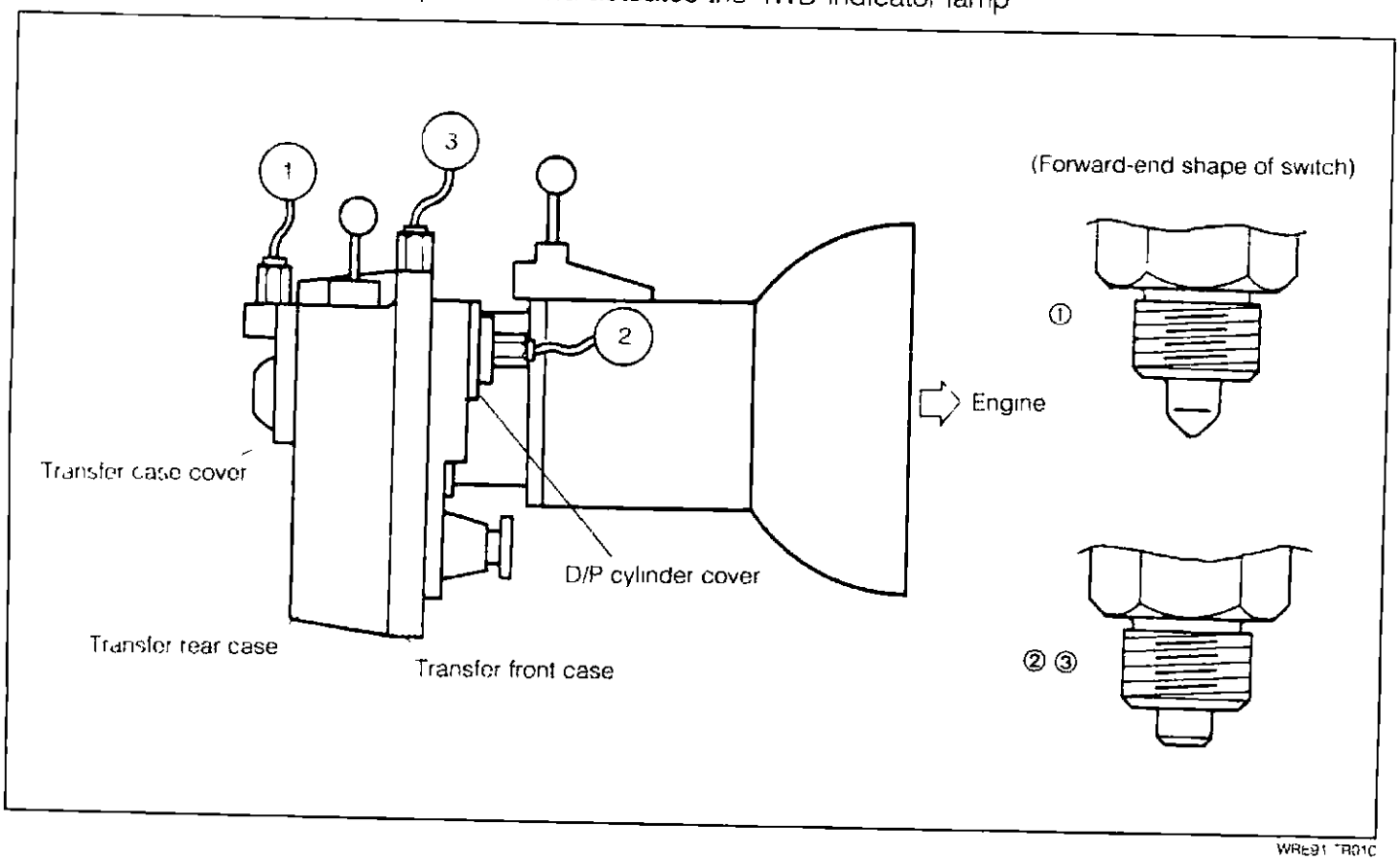
This switch is used to select the 4WD when the transfer shift lever is in the 4L position

4WD-detection switch ②

This switch actuates the 4WD indicator lamp

Neutral-detection switch ③

This switch detects the neutral position and actuates the 4WD indicator lamp



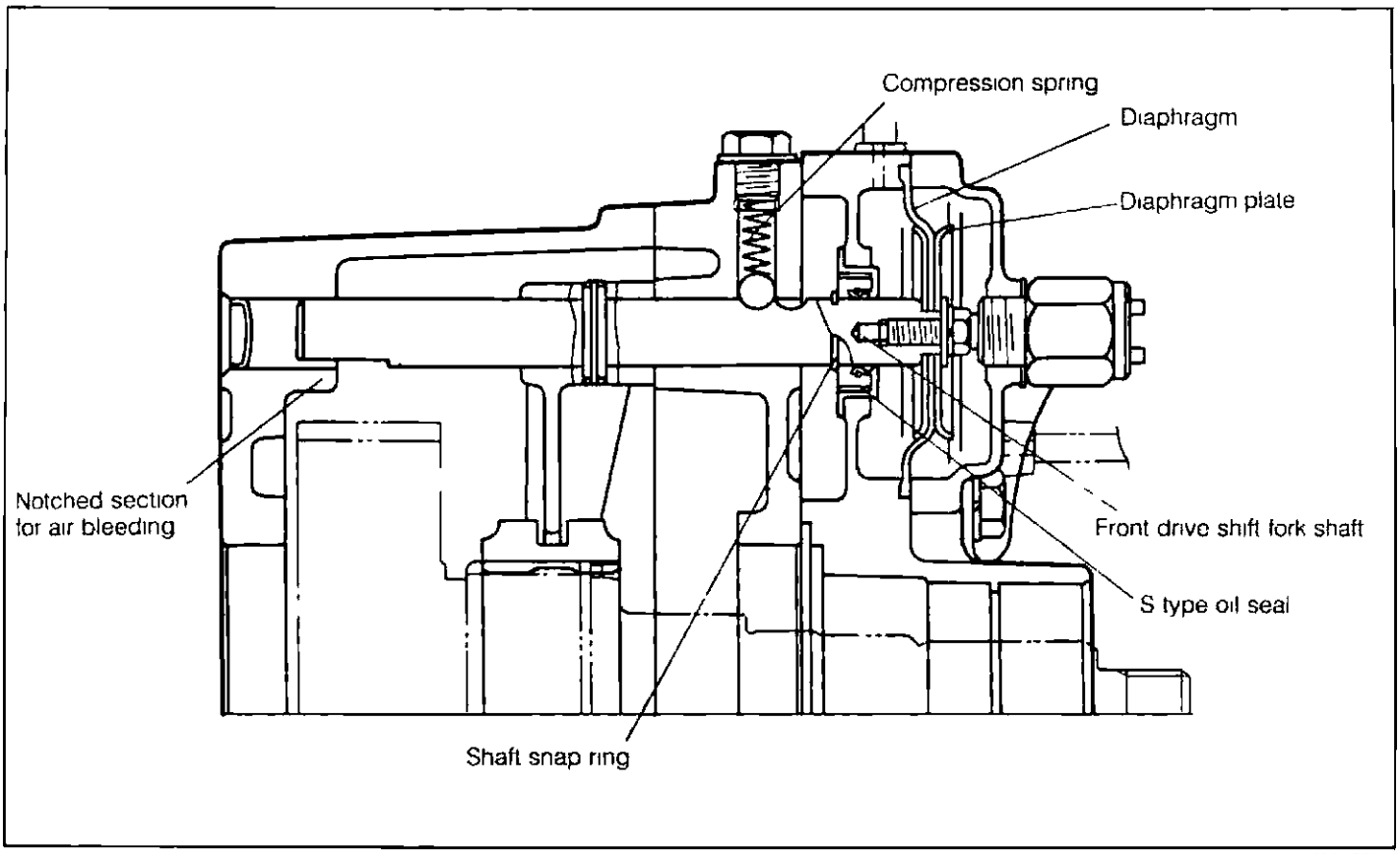
WRE91 TR01C

SHAFT SNAP RING

Since the front drive shift fork shaft always receives a thrust from the actuator, the case and snap ring serve as a stopper for shaft stroke

COMPRESSION SPRING

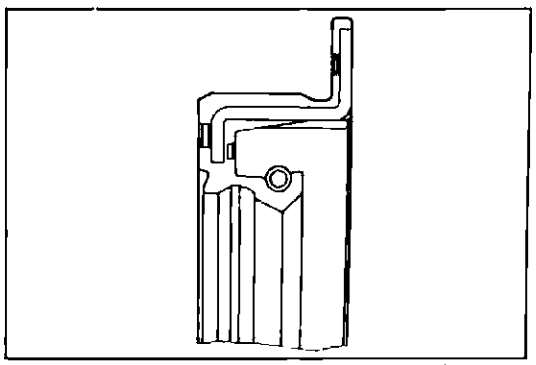
Its spring constant has been changed in accordance with the change in thrust by the actuator
k = 2.0 ➔ k = 0.2



WRE31 TR017

S TYPE OIL SEAL

An air (negative pressure) seal which slides in an axial direction has been employed.



WRE91 TR018

AIR-TIGHTNESS INSPECTION OF POWER SHIFT SWITCH DIAPHRAGM BY IN-VEHICLE INSPECTION OR BY UNIT INSPECTION TRANSMISSION AND TRANSFER ASSEMBLY

In-vehicle inspection

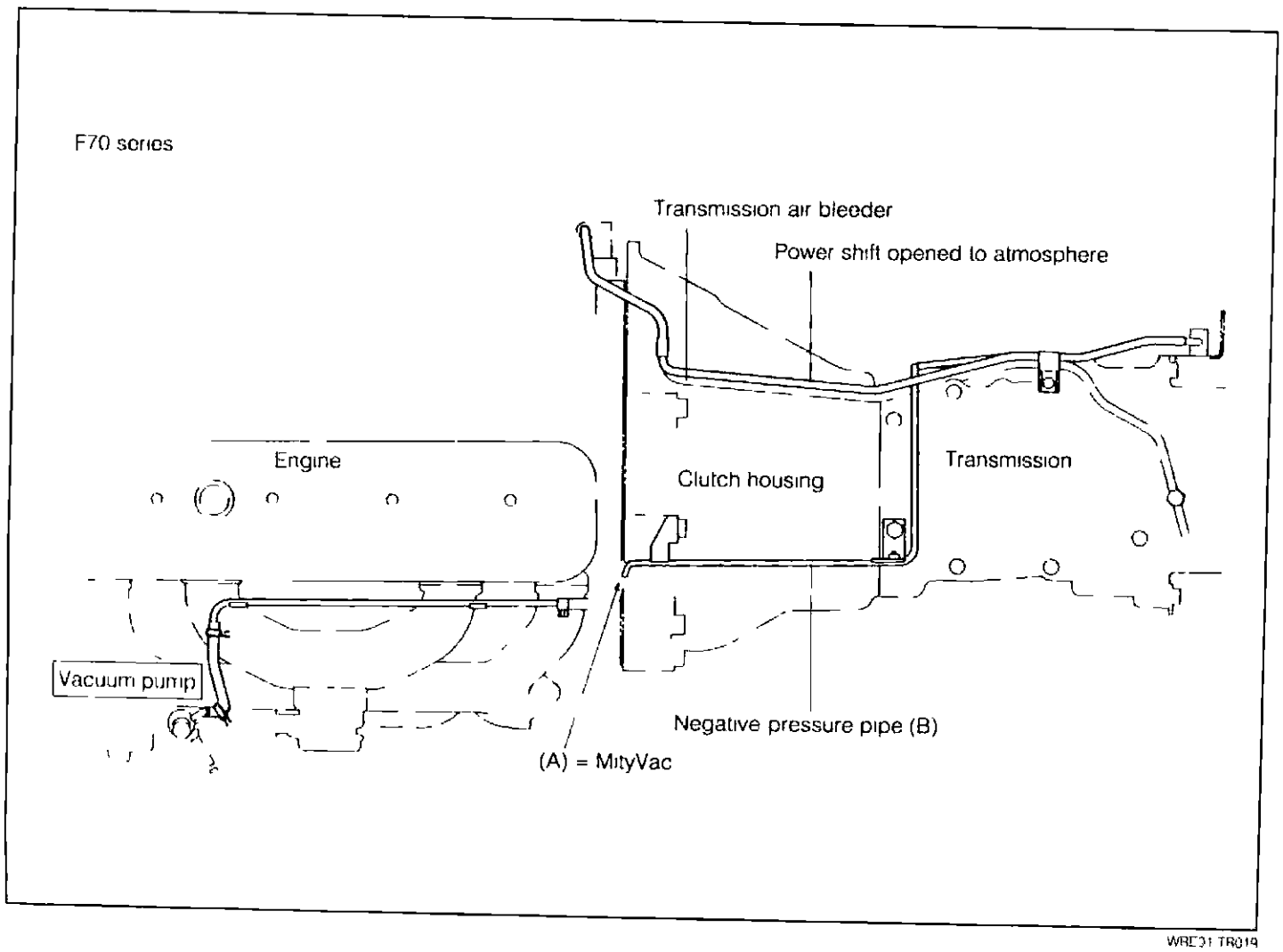
- Warm up the engine (After the engine has warmed up, stop the engine)
- Disconnect the negative-pressure pipe (B) at the section (A) indicated in the figure below
- Connect a MityVac to the negative-pressure pipe at the section (A)
- Turn ON the ignition switch, using a spare battery
- Turn ON the power shift switch. At each running range, move the shift lever to one of the transfer shift lever positions given in the table below

	Transfer shift lever position
High speed running range	2H
Four-wheel drive neutral	N
Low speed running range	4L

- Set the MityVac to –200 mmHg manually
- Hold the negative pressure of the MityVac at –200 mmHg for about 10 seconds

⇓

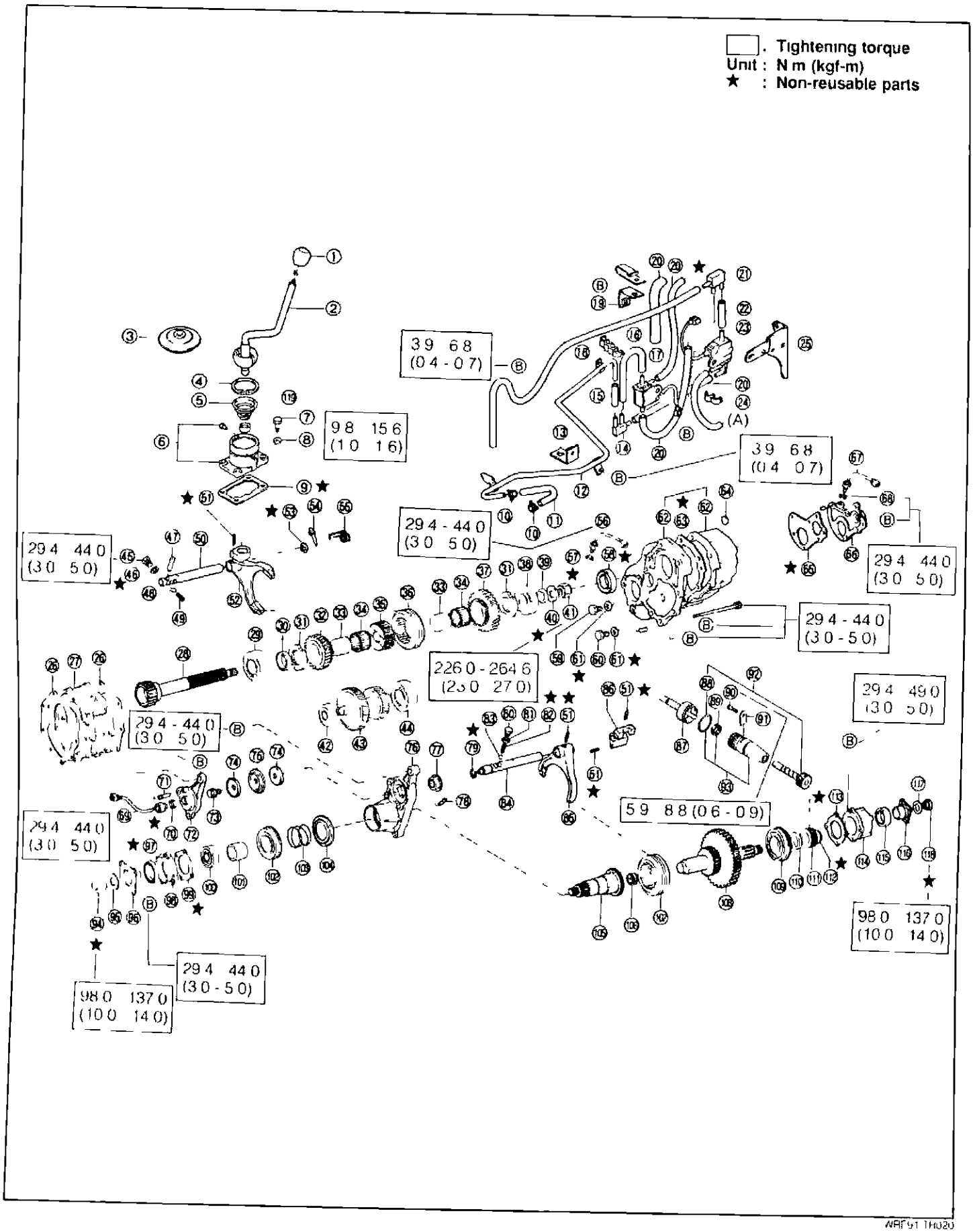
- If the diaphragm exhibits damage, deterioration and so forth, the negative pressure will rapidly return to positive pressure



WRE01TR019

TRANSFER (5-Speed)

COMPONENTS



① Shift lever knob S/A
② Transfer shift lever
③ Shift lever boot
④ Hole snap ring
⑤ Conical spring
⑥ Transfer shift lever retainer S/A
⑦ Bolt
⑧ Washer
⑨ Transfer shift lever retainer gasket
⑩ Hose clip
⑪ Hose
⑫ Vacuum tube No 1
⑬ Front drive vacuum tube LH front bracket
⑭ Three-way joint
⑮ Hose
⑯ Hose
⑰ Vacuum switching valve Ay No 2
⑱ Clamp
⑲ Front drive vacuum tube RH rear bracket
⑳ Hose
㉑ Three-way joint
㉒ Hose
㉓ Vacuum switching valve Ay
㉔ Clamp
㉕ Vacuum shift valve bracket
㉖ Transfer case front gasket
㉗ Transfer adapter
㉘ Transfer input shaft
㉙ Radial ball bearing
㉚ Transfer input shaft spacer No 1
㉛ Transfer input gear thrust washer
㉜ Transfer low speed input gear
㉝ Transfer input bearing inner race
㉞ Needle roller bearing
㉟ Transfer high & low clutch hub
㊱ Hub sleeve (for high & low clutch hub)
㊲ Transfer high speed input gear
㊳ Radial ball bearing
㊴ Transfer input shaft spacer No 2
㊵ Transfer input shaft spacer No 3
㊶ Lock nut
㊷ Radial ball bearing
㊸ Transfer idle gear
㊹ Radial ball bearing
㊺ Bolt
㊻ Gasket
㊼ Roller
㊽ Ball
㊾ Compression spring No 2
㊿ Transfer high & low shift fork shaft
(51) Slotted spring pin
(52) Transfer high & low shift fork
(53) E ring
(54) Pin (for shift fork shaft)
(55) Torsion spring
(56) Transmission position detect switch
(57) Gasket
(58) Type S oil seal
(59) Filler plug
(60) Drain plug

With P S S equipped: ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳ ㉑ ㉒ ㉓ ㉔ ㉕

(61) Gasket
(62) Transfer case
(63) Transfer case gasket
(64) Tight plug
(65) Transfer case cover gasket No 1
(66) Transfer case cover No 1
(67) Transfer position detect switch (for N detection)
(68) Gasket
(69) Transmission position switch Ay (for 4WD detection)
(70) Gasket
(71) Tube
(72) Diaphragm cylinder cover
(73) Bolt
(74) Diaphragm plate
(75) Diaphragm
(76) Output shaft bearing front retainer
(77) Type S oil seal

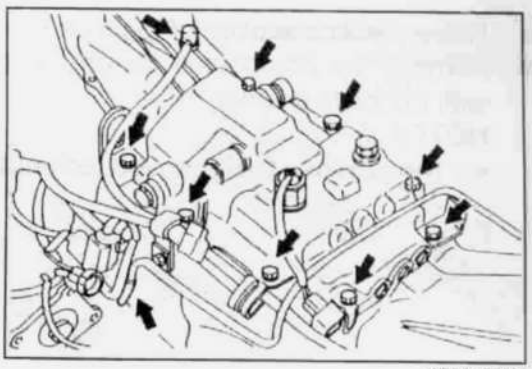
With P S S equipped: (69) (70) (71) (72) (73) (74) (75) (76) (77)

(78) Tube No 2
(79) Shaft snap ring
(80) Bolt
(81) Gasket
(82) Compression spring No 1
(83) Ball
(84) Transfer front drive shift fork shaft
(85) Transfer front drive shift fork
(86) Transfer gear shift head
(87) Speedometer cable Ay
(88) O ring
(89) Type V oil seal
(90) Bolt
(91) Speedometer sleeve lock plate
(92) Speedometer driven gear
(93) Speedometer shaft sleeve
(94) Lock nut
(95) Plate washer
(96) Output shaft companion flange
(97) Type T oil seal
(98) Output shaft bearing retainer front
(99) Output shaft bearing retainer front gasket
(100) Bearing
(101) Transfer output shaft spacer
(102) Radial ball bearing
(103) Compression spring
(104) Front drive disengage plate
(105) Transfer output front shaft
(106) Needle roller bearing
(107) Hub sleeve (for front drive clutch hub)
(108) Transfer output rear shaft
(109) Radial ball bearing
(110) Transfer rear output shaft spacer No 3
(111) Speedometer drive gear
(112) O ring
(113) Output shaft bearing rear retainer gasket
(114) Output shaft bearing rear retainer
(115) Type T oil seal
(116) Output shaft companion flange
(117) Plate washer
(118) Lock nut
(119)

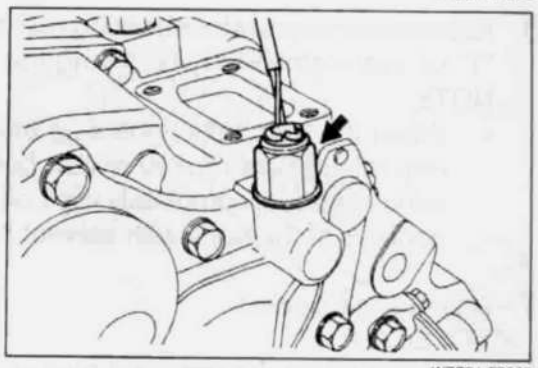
WRE91TR021

REMOVAL

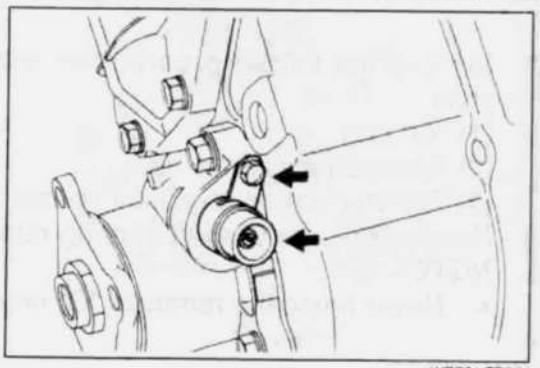
1. Remove the transmission & transfer assembly from the vehicle. (Refer to the MT section.)
2. Remove the transmission case cover with the gasket by removing the eight bolts.
   NOTE:
   - Never reuse the removed gasket.


WRE91-TR022

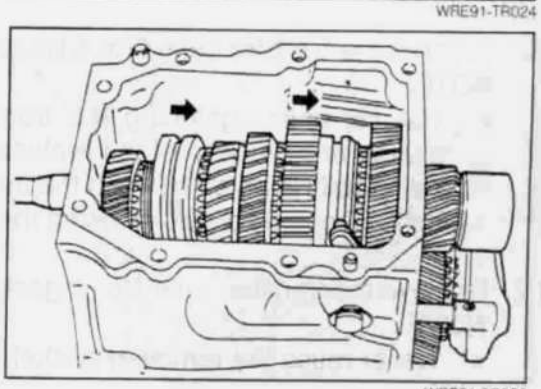
3. Remove the transfer position detect switch with the gasket.
   NOTE:
   - Never reuse the removed gasket.


WRE91-TR023

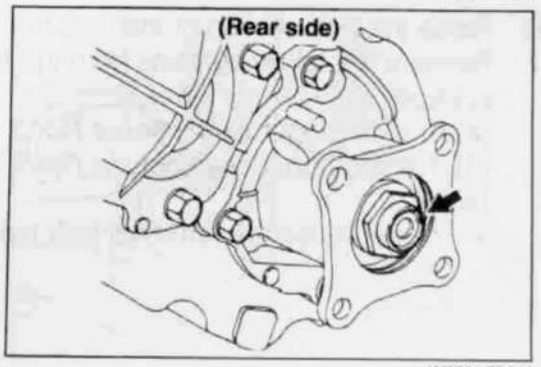
4. Remove the speedometer shaft sleeve by removing the bolt.


WRE91-TR024

5. Interlock the 1st gear with the 3rd gear.

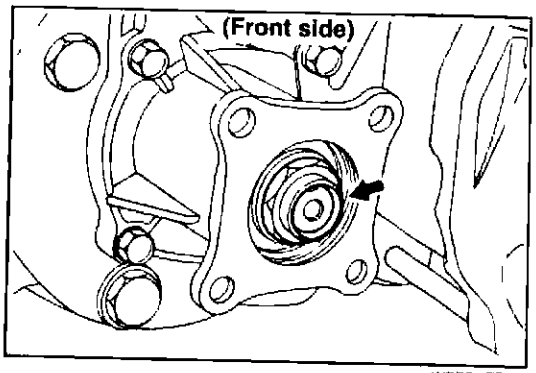

WRE91-TR025

6. Raise the lock section of the lock nut.
7. Remove the output shaft companion flange and plate washer by removing the lock nut.
   NOTE:
   - Never reuse the removed lock nut.



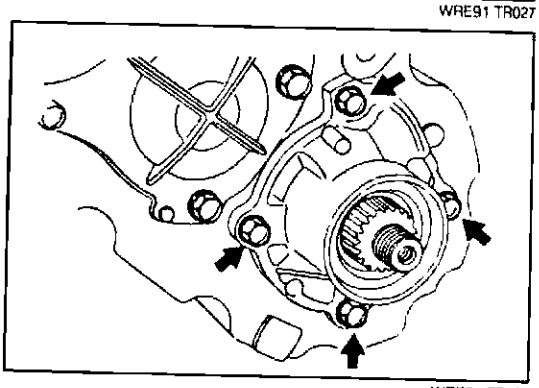
WRE91-TR026

8 Raise the lock section of the lock nut
9 Remove the companion flange by removing the lock nut with the plate washer
NOTE:
- Never reuse the removed lock nut.



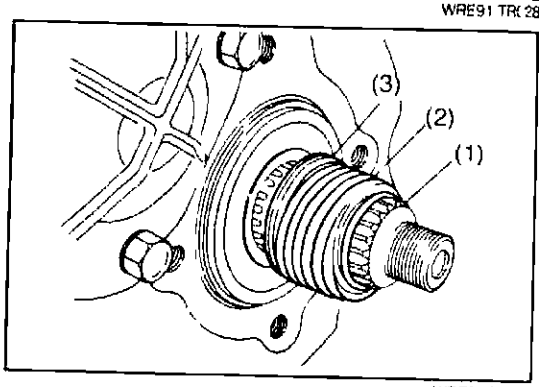
WRE91 TR027

10 Remove the output shaft bearing rear retainer, with the type "T" oil seal installed, by removing the four bolts
NOTE:
- When the four bolts tightening the output shaft bearing rear retainer are reused or new bolts of the replacement parts are used, completely wipe off or wash the threaded portions of the bolts with solvent before using the bolts.


WRE91 TR028

11 Remove the gasket
NOTE:
- Never reuse the removed gasket.

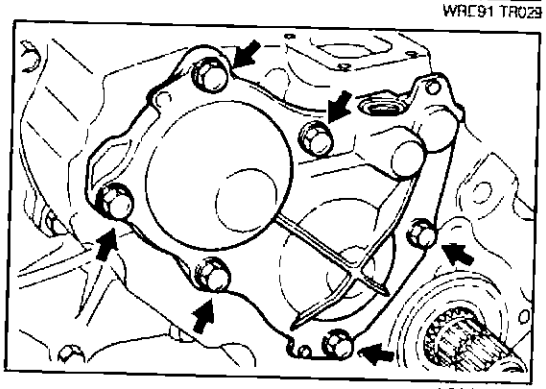
12 Remove the following parts from the transfer output rear shaft
(1) "O" ring
(2) Speedometer drive gear
(3) Transfer rear output shaft spacer No 3



WRE91 TR029

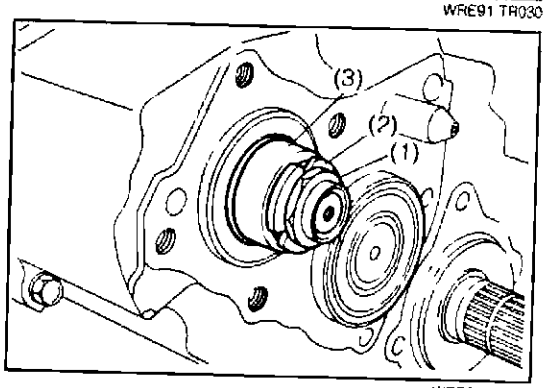
13 Remove the output shaft bearing retainer gasket
NOTE:
- Never reuse the removed "O" ring and gasket.

14 Remove the transfer case No 1 by removing the six bolts
NOTE:
- The six bolts tightening the transfer case No. 1 are reused or new bolts of the replacement parts are used, completely wipe off or wash the threaded portions of the bolts with solvent before using the bolts.


WRE91 TR030

15 Remove the transfer case No 1 gasket
NOTE:
- Never reuse the removed gasket.

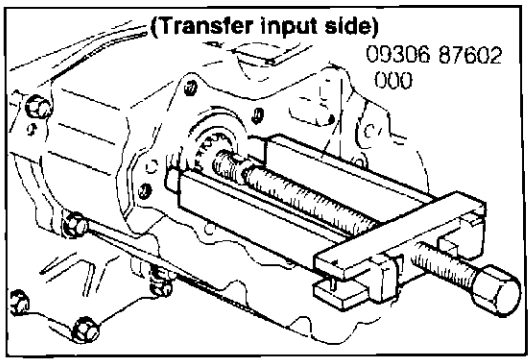
16 Raise the lock section of the lock nut
17 Remove the following parts from the transfer input shaft
(1) Lock nut
(2) Transfer input shaft spacer No 3
(3) Transfer input shaft spacer No 2
NOTE:
- Never reuse the removed lock nut.

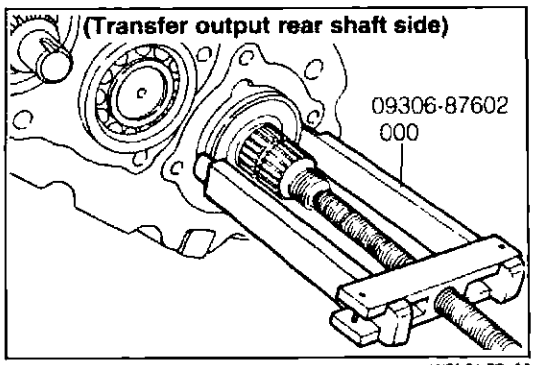


WRE91 TR031

18 Detach the stop ring of the radial ball bearing in the transfer output rear shaft

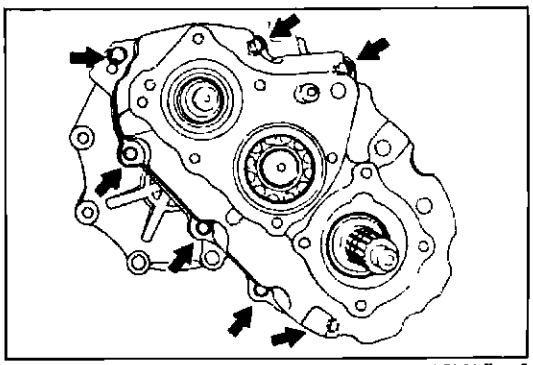
19 Remove the radial ball bearing, using the following SST
SST: 09306-87602-000





WRL91 TR132

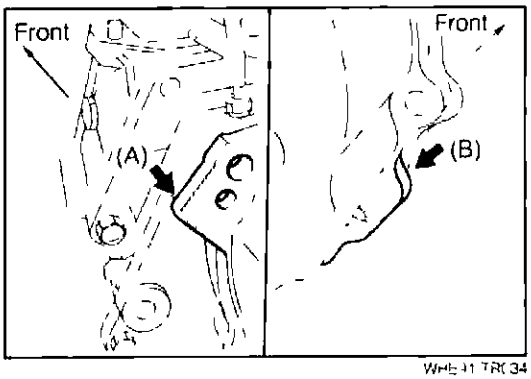
20 Remove the seven bolts of the transfer case



WRF91 TR 43

21 While lightly tapping the transfer case at the rib sections (A) and (B), using a plastic hammer or the like, remove the transfer case together with the radial ball bearing of the transfer output rear shaft

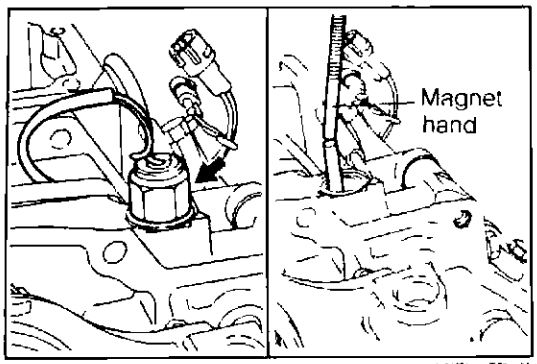
22 Remove the transfer gasket
NOTE:
- Never reuse the removed gasket.



WRE91 TR034

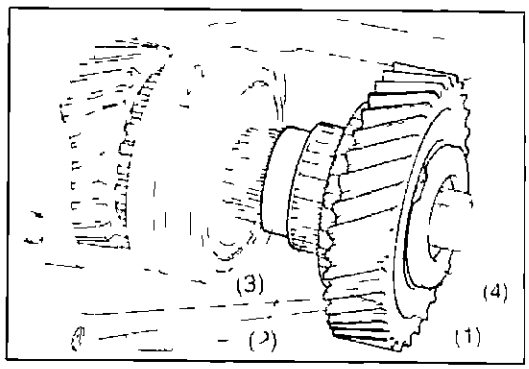
23 Remove the transfer position detect switch with the gasket
NOTE:
- Never reuse the removed gasket.

24 Remove the roller, using a standard magnet hand tool

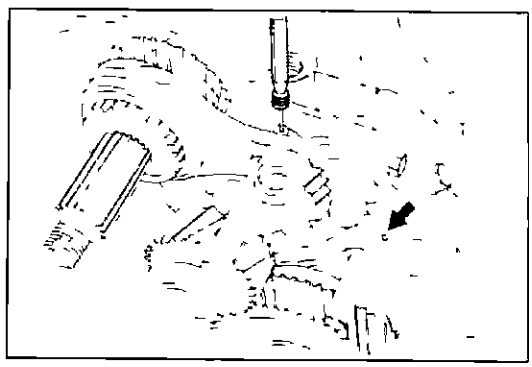


WRE91 TR035

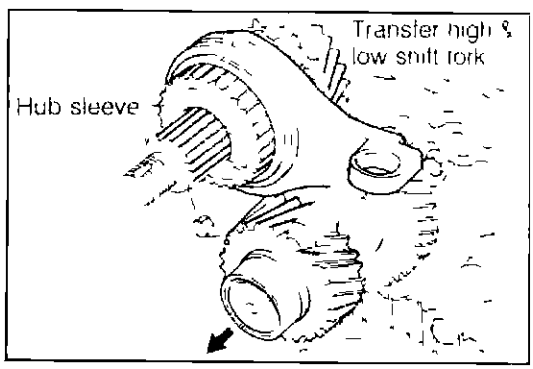
25 Remove the following parts from the transfer input shaft
(1) Transfer high speed input gear
(2) Needle roller bearing
(3) Transfer input bearing inner race
(4) Transfer input shaft spacer No 3



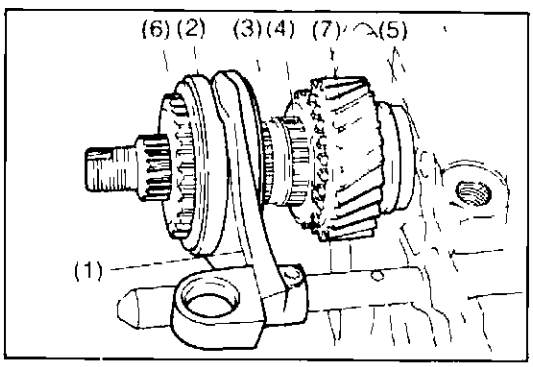
26 Drive off the slotted spring pin of the transfer high & low clutch fork and transfer high speed clutch fork



27 Slightly move the transfer high & low shift fork and hub sleeve as a set toward the transfer rear side Pull out the transfer idler gear toward your side



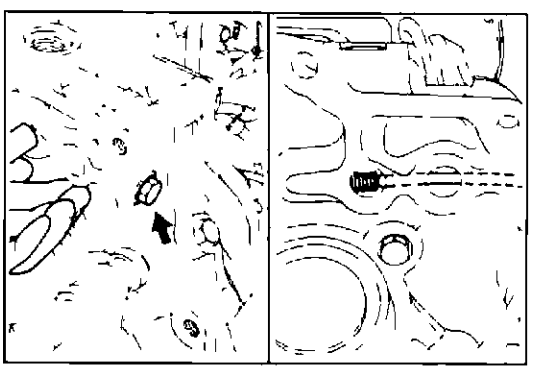
28 Remove the following parts from the transfer input shaft
(1) Transfer high & low shift fork
(2) Hub sleeve
(3) Transfer input bearing inner race
(4) Needle roller bearing
(5) Transfer input gear thrust washer
(6) Transfer high & low clutch hub
(7) Transfer low speed input gear



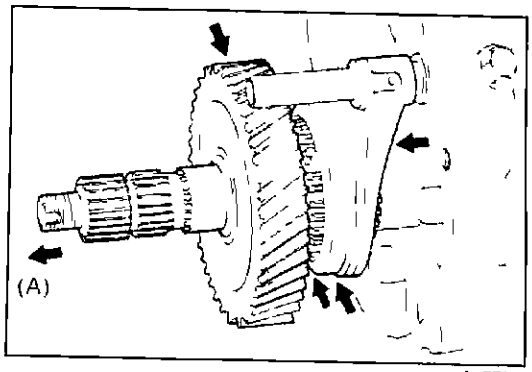
29 Remove the bolt with the gasket
NOTE:
- **Never reuse the removed gasket.**

30 Pull out the transfer front drive shift fork shaft toward your side

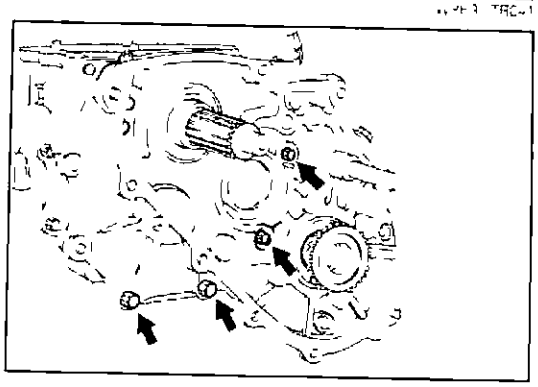
31 Remove the ball and compression spring, using a standard magnet hand tool



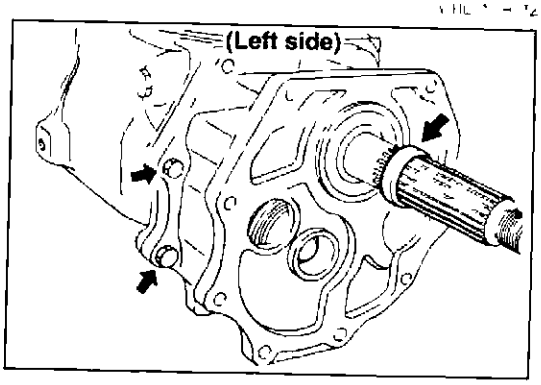
32 Pull out the transfer front drive shift fork hub sleeve and transfer output rear shaft as a set toward your side (A)

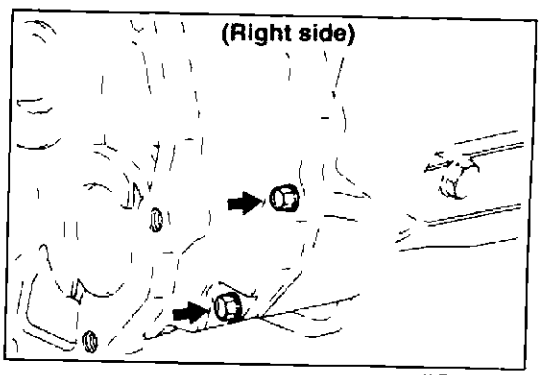


33 Remove the transfer case with the following parts installed by removing the four bolts
(1) Transfer output front shaft
(2) Power shift-related parts
(3) Output shaft bearing front retainer related parts
(4) Gasket
NOTE:
- Never reuse the removed gasket.



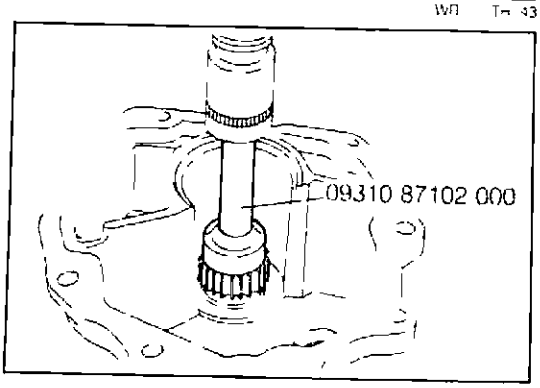
34 Remove the transfer input shaft spacer No.1
35 Remove the transfer adapter with the radial ball bearing and transfer input shaft installed by removing the four bolts
36 Remove the transfer case front gasket
NOTE:
- Never reuse the removed gasket.



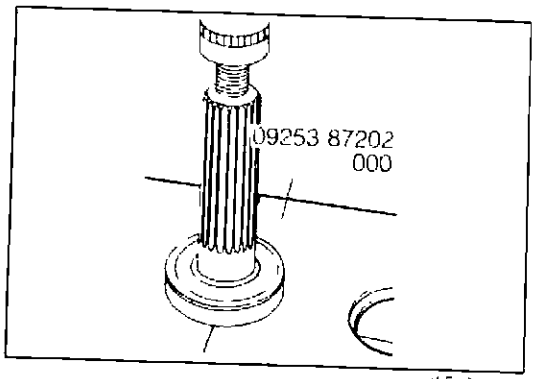


DISASSEMBLY OF TRANSFER ADAPTER

1 Remove the transfer input shaft with the bearing installed using the following SST
SST: 09310-87102-000

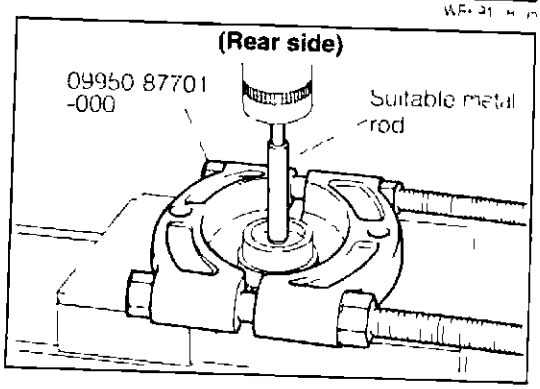


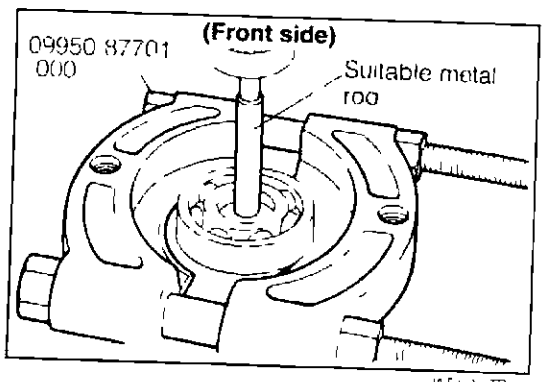
2 Remove the radial ball bearing using the following SST in conjunction with a press
SST 09253 87202-000



DISASSEMBLY OF TRANSFER IDLER GEAR BEARING

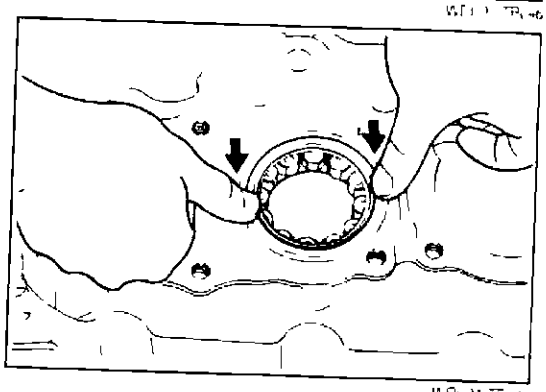
1 Remove the front and rear bearings using the following SST in conjunction with a press
SST. 09950-87701-000





DISASSEMBLY OF TRANSFER IDLER GEAR REAR BEARING IN TRANSFER FRONT CASE

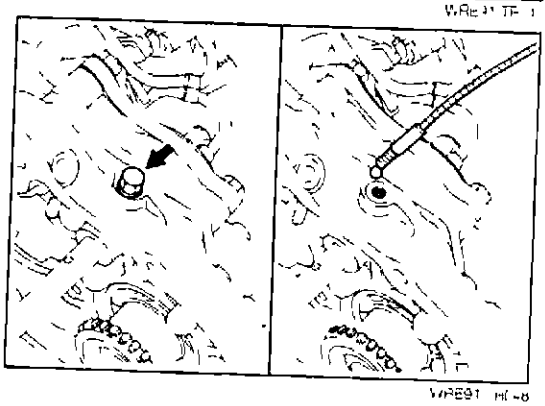
1 Remove the bearing by pushing its outer race with your fingers



DISASSEMBLY OF TRANSFER FRONT CASE

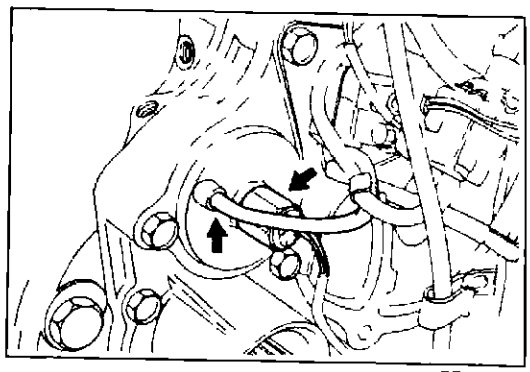
1 Remove the bolt with the gasket
NOTE:
- Never reuse the removed gasket.

2 Remove the compression spring and ball, using a standard magnet hand tool

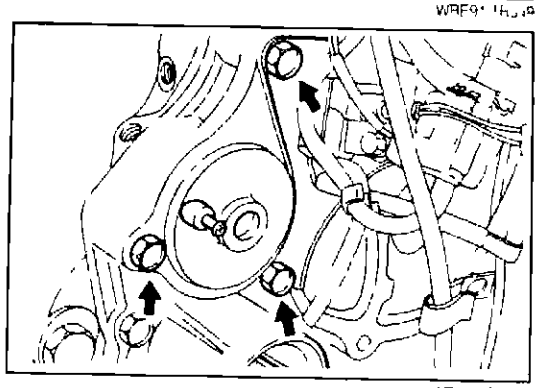


2 Remove the transmission position switch assembly with the gasket
NOTE:
- Never reuse the removed gasket.

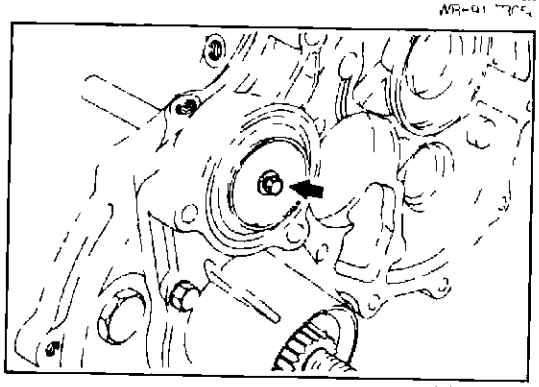
3 Disconnect the hose



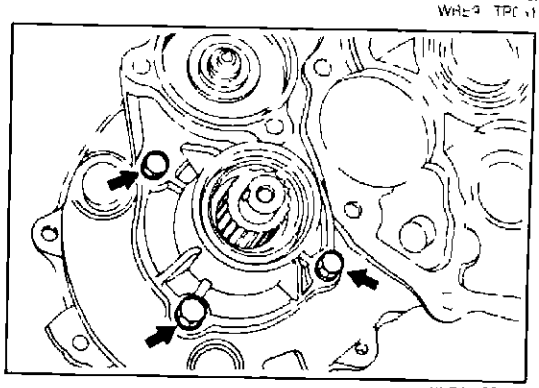
4 Remove the diaphragm cylinder cover with the vacuum shift valve bracket installed by removing the three bolts



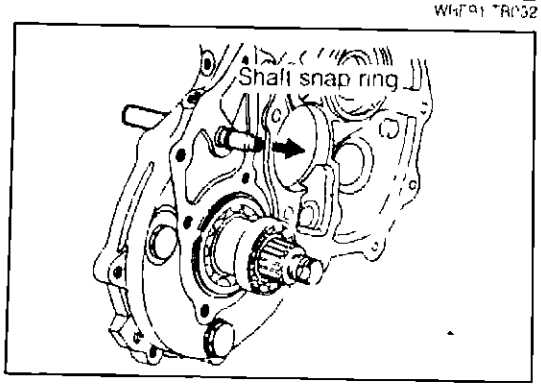
5 Separate the two diaphragms from the diaphragm plate by removing the bolts tightening the transfer front drive shift fork shaft



6 Remove the output shaft bearing front retainer with the gasket by removing the three bolts
NOTE:
- Never reuse the removed gasket.



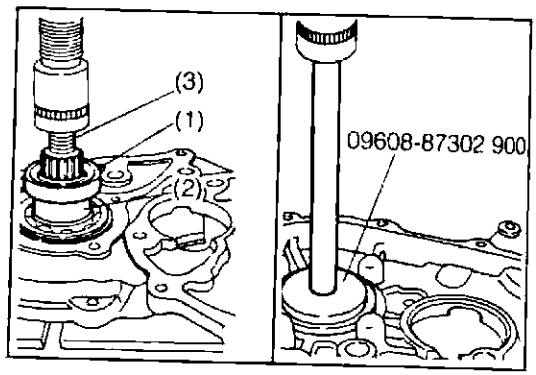
7 Pull out the transfer front drive shift fork shaft with the shaft snap ring installed toward your side
8 Remove the shaft snap ring
NOTE:
- Never reuse the removed shaft snap ring.



9. Remove the following parts, using a press
SST: 09253-87202-000

(1) Bearing
(2) Transfer output shaft spacer
(3) Transfer output front shaft

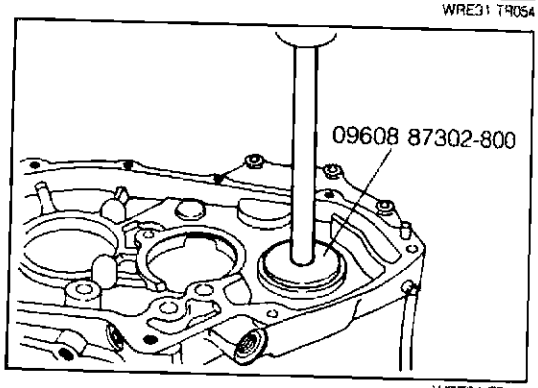
10 Remove the radial ball bearing, using the following SST
SST: 09608-87302-900



WRE31 TR054

11 Remove the type "S" oil seal, using the following SST
SST: 09608-87302-800

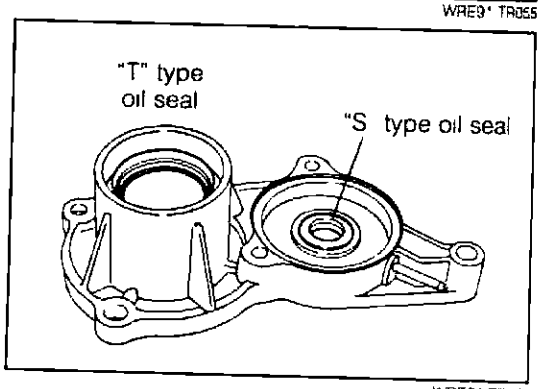
NOTE:
- Never reuse the removed type "S" oil seal.



WRE91 TR055

DISASSEMBLY OF DIAPHRAGM CYLINDER COVER OIL SEAL

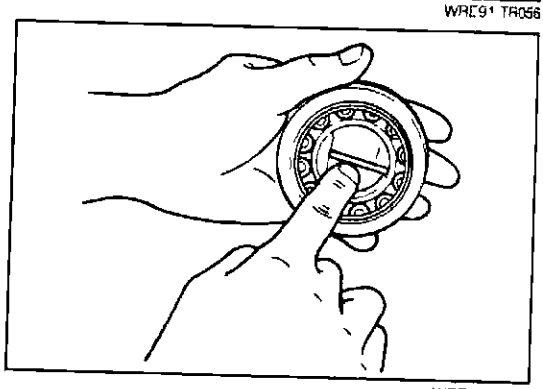
1 Remove the type "S" and type "T" oil seals, using a suitable metal rod
NOTE:
- Never reuse the removed type "S" oil seal.



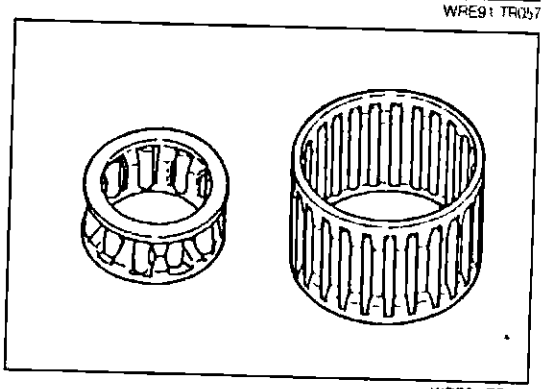
WRE91 TR056

INSPECTION

1 All bearings
Visually inspect the roller and roller guide surface for seizure due to poor oil lubrication and so forth
NOTE:
- The right figure indicates a typical example of the transfer idler gear rear bearing inspection.

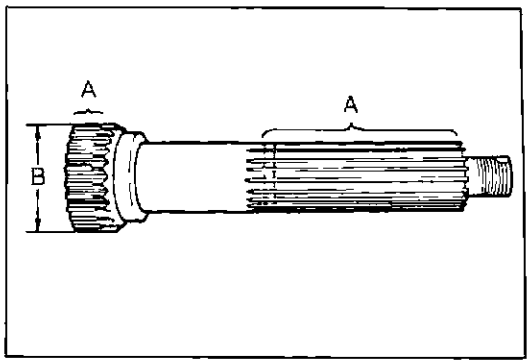

WRE91 TR057

2 All needle roller bearings
Check the roller outer periphery of the needle roller bearing for damage by scratching it by your fingernails Also, visually inspect the roller outer periphery for seizure due to poor oil lubrication or use of deteriorated oil.


WRE91 TR058

3 Transfer input shaft
(1) Check the fitting section and spline section (A) of the transmission 5th gear for damage or abnormal wear
(2) Measure the outer diameter (B) section
Specified Value:
Allowable Limit:

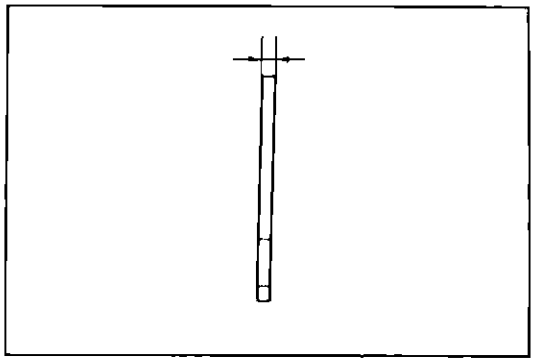
(3) Check the shaft for bend at the section (C)
Allowable Limit:



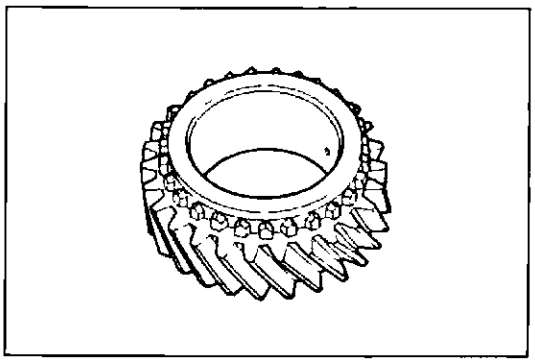
4 Measure the thickness of the transfer input gear thrust washer

Unit: mm

Specified value	4 ±0.05
Allowable limit	3.9



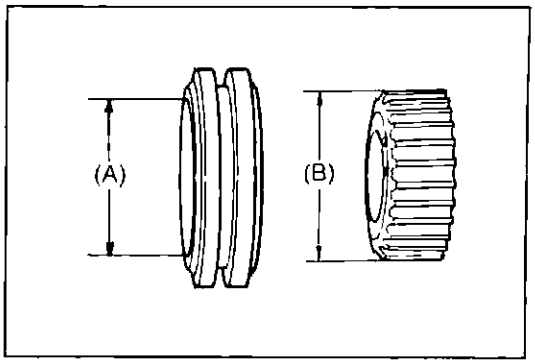
5 Visually inspect the transfer high & low speed input gear for damage or wear



6 Measure the inner and outer diameters of the following parts

Unit: mm

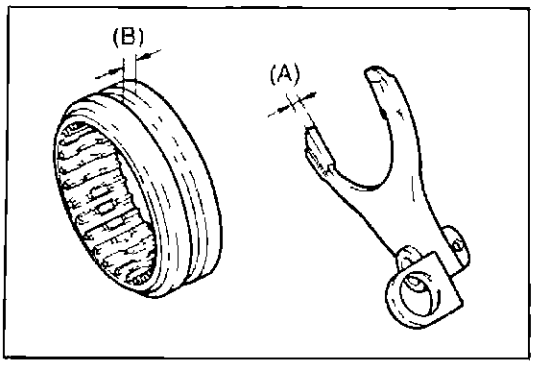
		Specified value	Allowable limit
Inner diameter (A)	Hub sleeve	72.5 $^{+0.2}_{-0.3}$	72.7
Outer diameter (B)	Transfer high & low clutch hub	72.5 $^{+0.10}_{-0.17}$	72.3



7 Check the contact surface between the transfer high & low shift fork (A) and the transfer high & low clutch hub (B)

Unit: mm

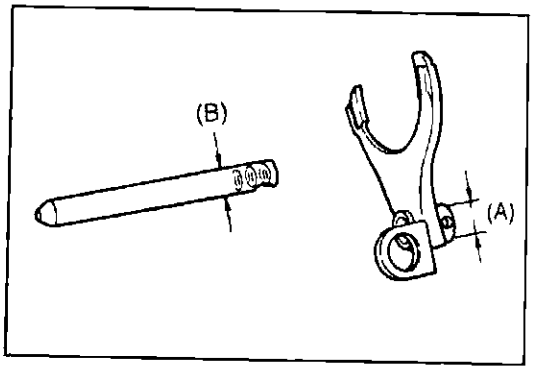
	Specified value	Allowable limit
(A)	7 $^{-0.15}_{-0.12}$	6.3
(B)	7 $^{0.058}_{0}$	7.3



8 Measure the inner and outer diameters of the following parts

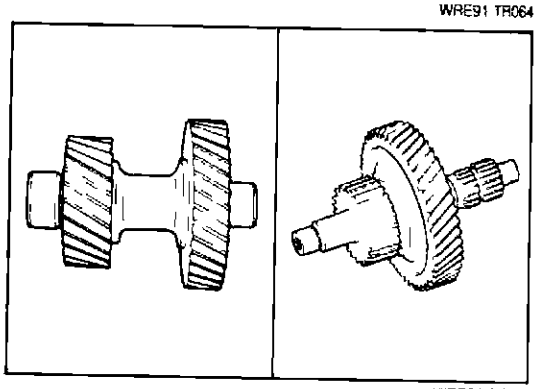
Unit mm

		Specified value	Allowable limit
Inner diameter (A)	Transfer high & low shift fork	$16^{+0.027}_{-0}$	16 0
Outer diameter (B)	Transfer high & low shift fork shaft	$16^{-0.025}_{-0.043}$	15 07

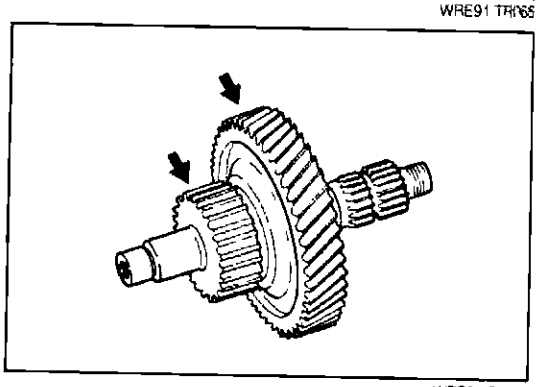


WRE91 TR064

9 Visually inspect the transfer idler gear and transfer output gear for damage or wear.


WRE91 TR065

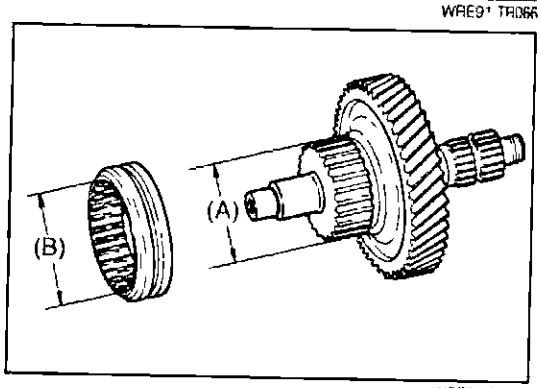
10 Visually inspect the gear of the transfer output front shaft for damage or wear


WRE91 TR066

11 Measure the inner and outer diameters of the following parts.

Unit mm

		Specified value	Allowable limit
Outer diameter	Transfer output rear shaft (A)	$72\,5^{-0\ \text{to}\ -0.17}$	72 3
Inner diameter	Hub sleeve (B)	$72\,5^{+0.2}_{0}$	72 7

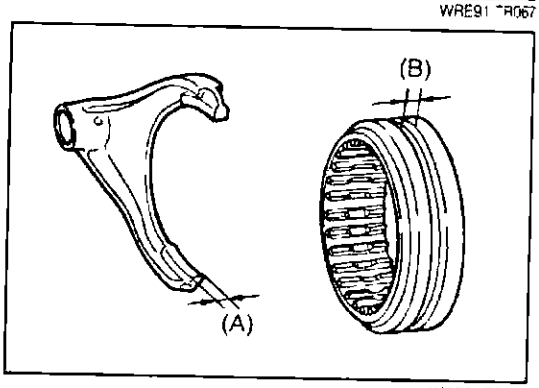


WRE91 TR067

12. Measure the contact surface between the transfer front drive shift fork and the hub sleeve

Unit mm

	Specified value	Allowable limit
Transfer front drive shift fork (A)	$7^{-0.1}_{-0.2}$	6 3
Hub sleeve (B)	$7^{+0.058}_{0}$	7 3

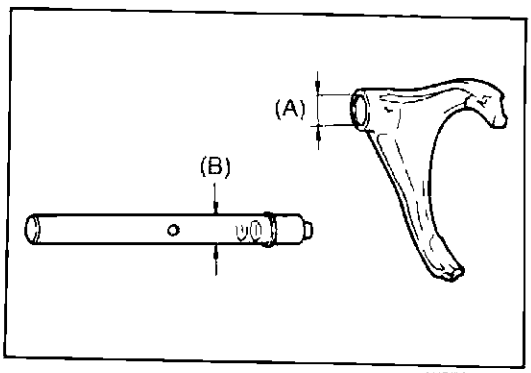


WRE91 TR068

13 Measure the inner and outer diameters of the following parts

Unit: mm

		Specified value	Allowable limit
Inner diameter	Transfer front drive shift fork (A)	16 $^{+0.027}_{+0}$	16.3
Outer diameter	Transfer front drive shift fork shaft (B)	16 $^{-0.025}_{-0.040}$	15.06

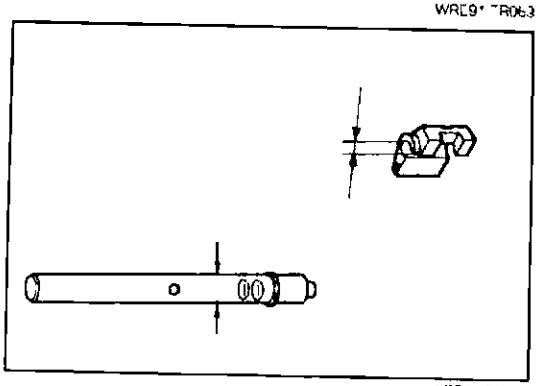


WRE91TR063

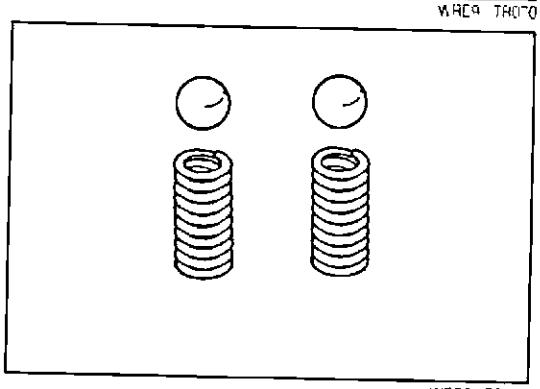
14 Measure the inner and outer diameters of the following parts

Unit: mm

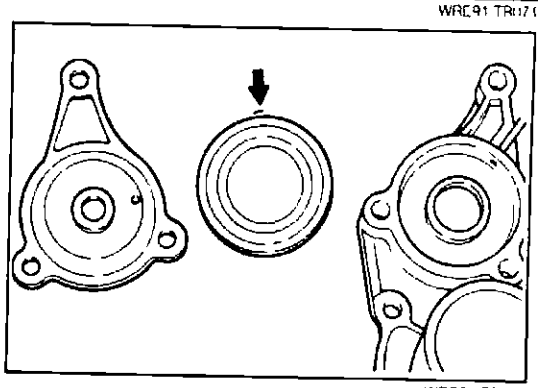
		Specified value	Allowable limit
Inner diameter	Transfer gear shift head	16 $^{+0.051}_{+0.016}$	16.06
Outer diameter	Transfer front drive shift fork shaft	16 $^{-0.032}_{-0.043}$	15.06


WRE91TR070

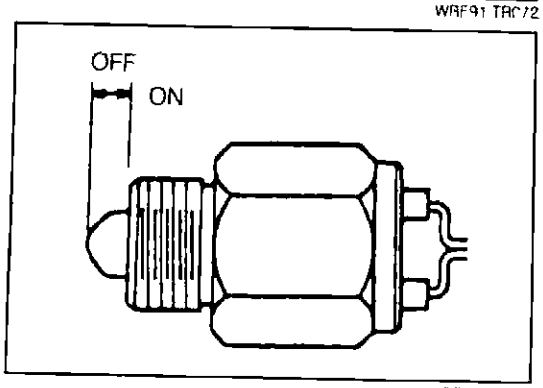
15 Visually inspect the ball and compression spring for damage or abnormal wear


WRE91TR071

16 Visually inspect the diaphragm, diaphragm cylinder cover and output shaft bearing front retainer for damage, abnormal wear or rapture


WRE91TR072

17 Turn ON and OFF the switch section of the transfer position detect switch assembly. Ensure that continuity exists when the switch is turned ON. Also, ensure that no continuity exists when the switch is turned OFF



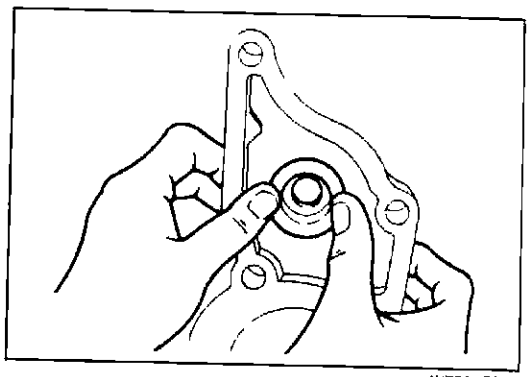
WRE91TR073

INSTALLATION

Prior to the assembly, clean the transfer adapter, front case, etc. by removing any dirt, gasket materials or the like.

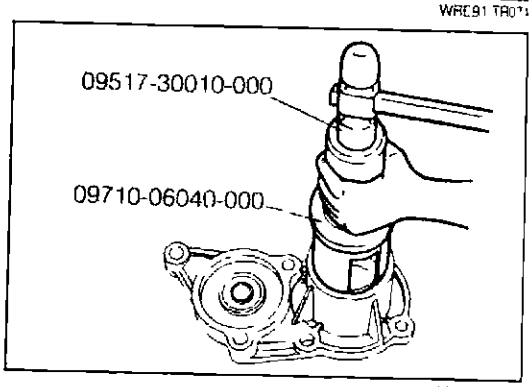
ASSEMBLY OF DIAPHRAGM CYLINDER COVER OIL SEAL

1 Install a new type "S" oil seal by pushing it with your fingers



WRE91 TR07

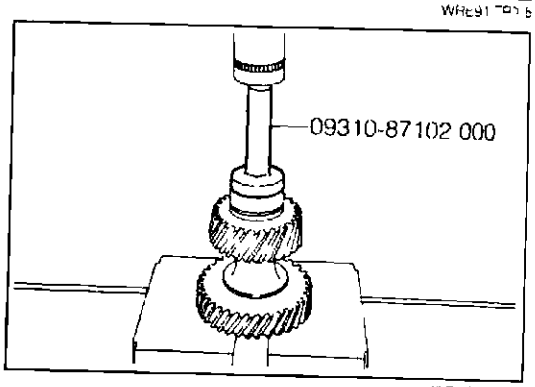
2 Install a new type "T" oil seal, using the following SSTs
SST. 09517-30010-000
09710-06040-000



WRE91 TR 5

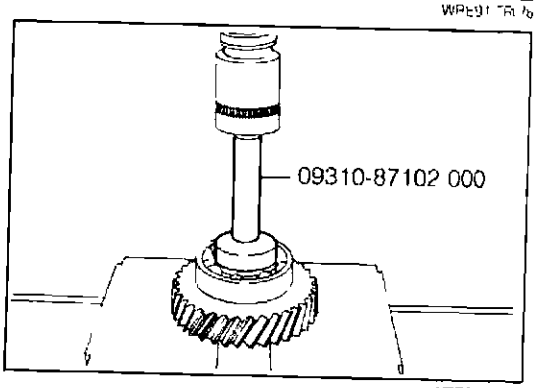
ASSEMBLY OF TRANSFER IDLER GEAR

1 Press the bearing inner race at the transfer idler gear rear side using the following SST
SST: 09310-87102-000



WRE91 TR 7b

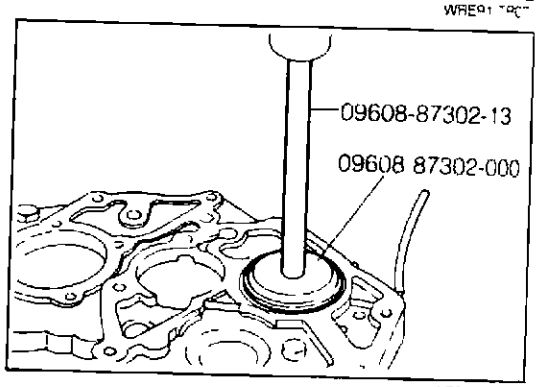
2 Press the front bearing, using the following SST.
SST: 09310-87102-000



WRE91 TR7c

ASSEMBLY OF TRANSFER FRONT CASE

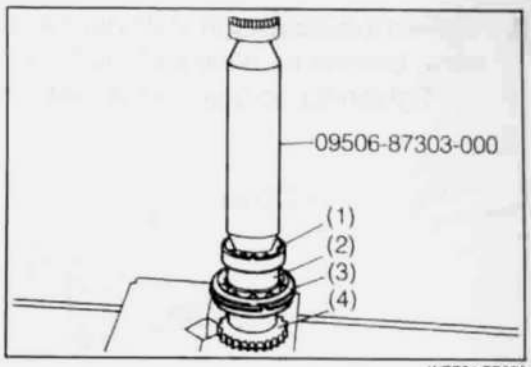
1 Install a new type "S" oil seal, using the following SST
SST: 09608-87302-000



WRE91 TR07

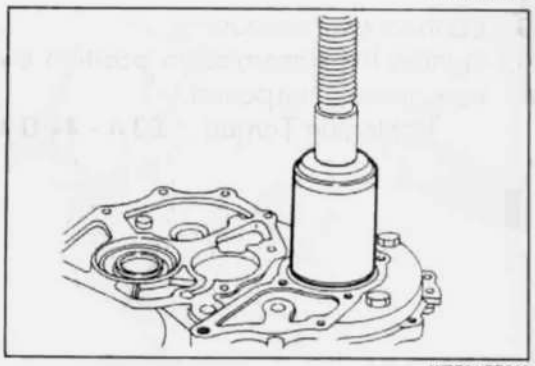
2. Install the following parts, using the following SST in conjunction with a press.
   SST: 09506-87303-000

   (1) Bearing
   (2) Transfer output shaft spacer
   (3) Radial ball bearing
   (4) Transfer output front shaft

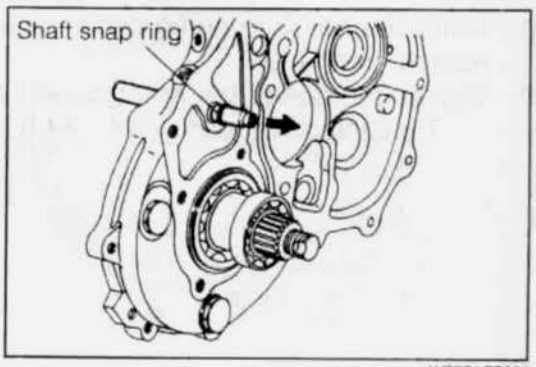


WRE91-TR079

3. Install the aforesaid parts to the transfer front case.

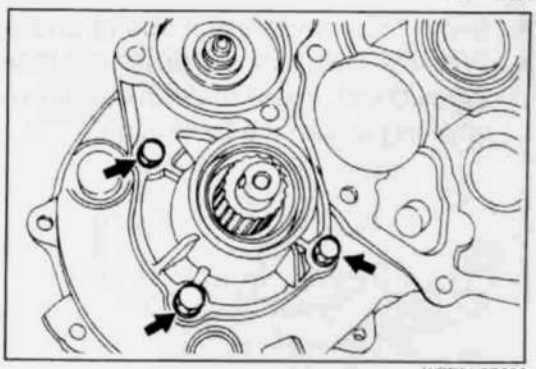

WRE91-TR080

4. Install the transfer front drive shift fork shaft with a new shaft snap ring installed.
   NOTE:
   - Positively insert a new shaft snap ring at right angles with the axle of the transfer front drive shift fork shaft.

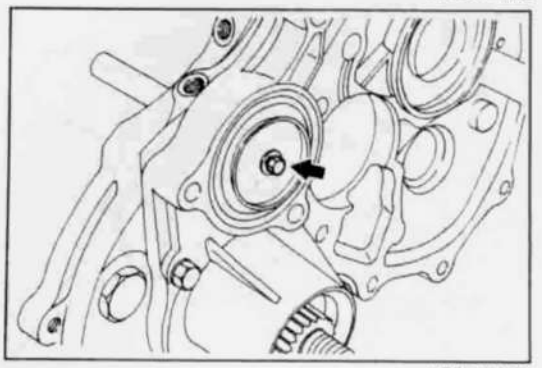


WRE91-TR081

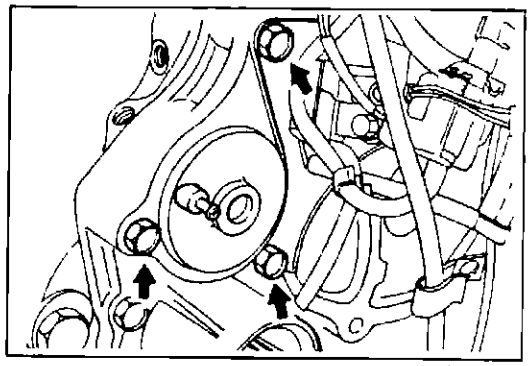
5. With a new gasket interposed, tighten the output shaft bearing front retainer with the three bolts.
   Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)


WRE91-TR082

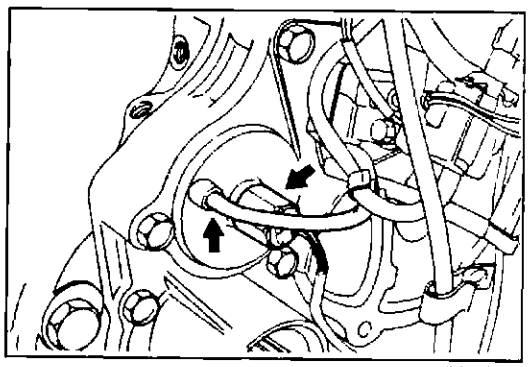
6. Install the diaphragm and two diaphragm plates.
7. Tighten the bolt at the forward end of the transfer front drive shift fork shaft.
   Tightening Torque: 9.8 - 15.7 N·m (1.0 - 1.6 kgf-m)


WRE91-TR083

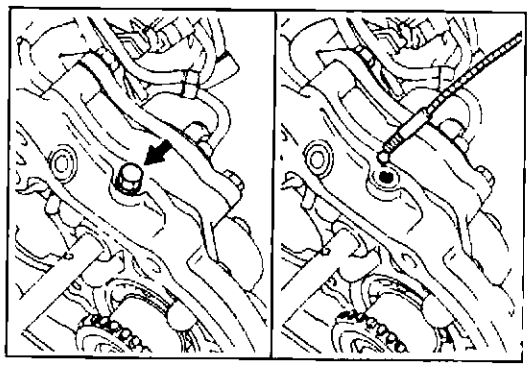
8 Tighten the diaphragm cylinder cover with the vacuum shift valve bracket by means of the three bolts
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)



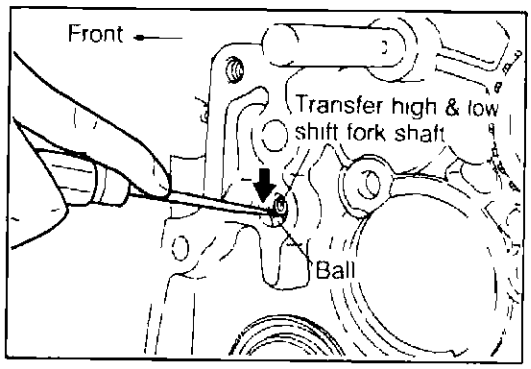
9 Connect the hose
10 Tighten the transmission position switch assembly with a new gasket interposed
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)



11 Install the ball and compression spring, using a standard magnet hand tool
12 Tighten the bolt with a new gasket interposed
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)



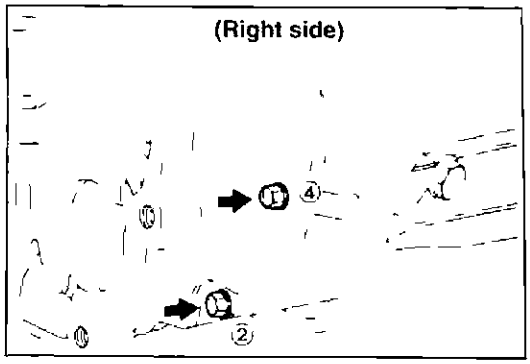
13 Install the compression spring and ball
14 With the ball pushed down by means of a standard flat screwdriver, install the transfer high & low shift fork shaft by pushing it from the back side



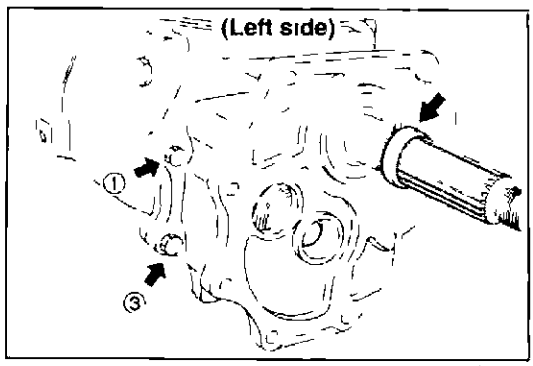
INSTALLATION

1 Turn the transfer input shaft clockwise or counterclockwise. Then install the transfer adapter case with a new gasket interposed.
2 Install the transfer adapter with the four bolts.
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

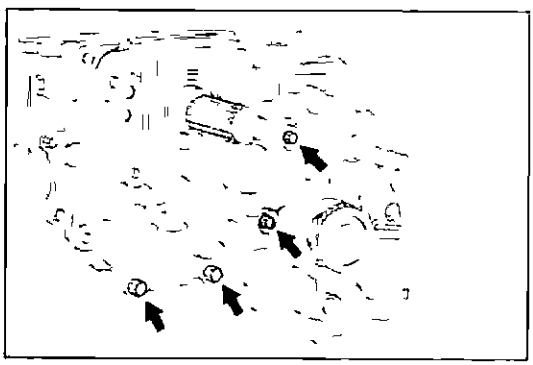
NOTE
- Be sure to tighten the bolts evenly and diagonally. (The right figure indicates a typical example of the tightening sequence.)



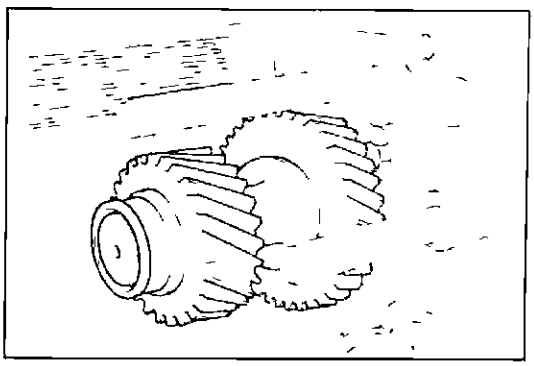
3 Install the transfer input shaft spacer No.1.



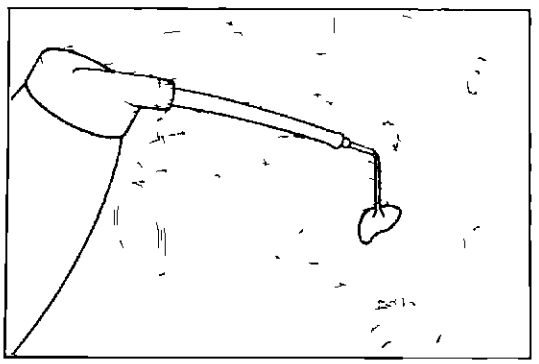
4 Apply gear oil to the outer periphery of the transfer input shaft spacer No.1.
5 With a new gasket interposed, tighten the transfer case with the four bolts.
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)



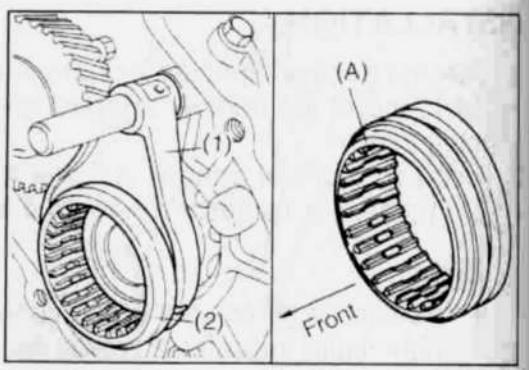
6 Place the transfer idler gear.



7 Apply gear oil to the outer periphery of the transfer front drive shift fork shaft.

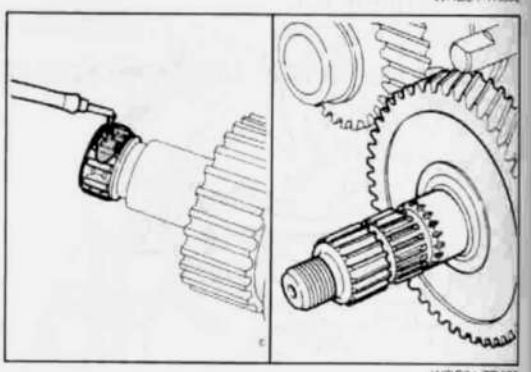


8. Install the following parts.
   (1) Transfer front drive shift fork
   (2) Hub sleeve
   NOTE:
   - Make sure that the machine-ground side of the hub sleeve section (A) faces toward front side.
   - Ensure that the cut-out section of the front drive shift fork shaft faces toward the transfer idler gear side.

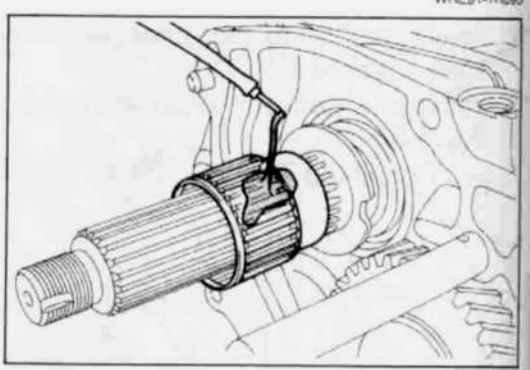


WRE91-TR092

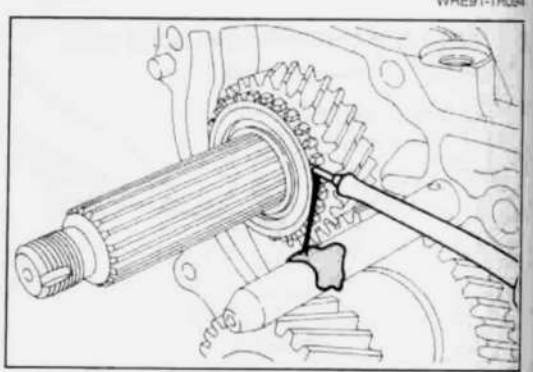
9. Apply gear oil to the outer periphery of the needle roller bearing.
10. Place the transfer output rear shaft.


WRE91-TR093

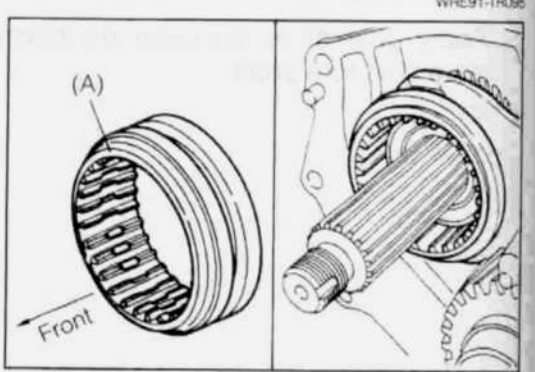
11. Install the transfer input gear thrust washer.
12. Apply gear oil to the transfer input bearing inner race and the outer periphery of the needle roller bearing.


WRE91-TR094

13. Install the transfer low speed input gear.
14. Apply gear oil to the outer periphery of the transfer high & low shift fork shaft.

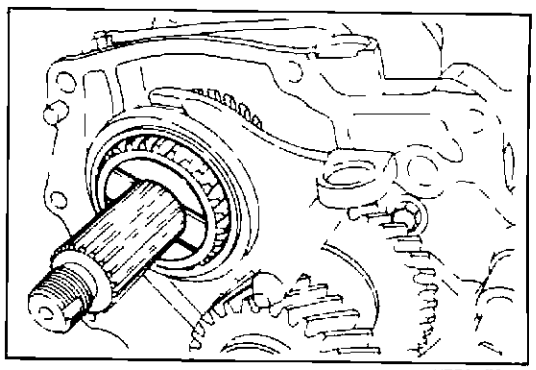

WRE91-TR095

15. Install the transfer high & low shift fork and hub sleeve as a set.
    NOTE:
    - Make sure that the machine-ground side of the hub sleeve section (A) faces toward front side.

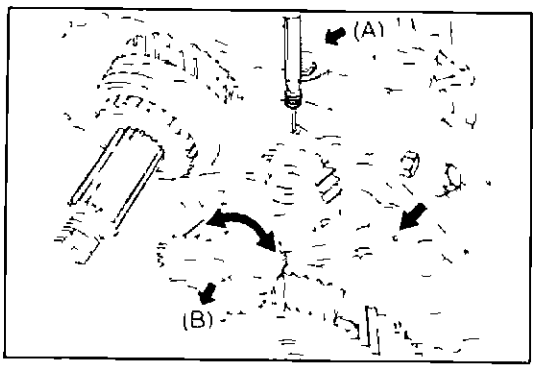


WRE91-TR096

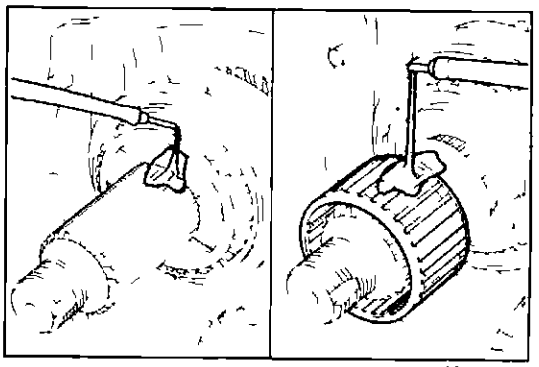
16 Install the transfer high & low clutch hub
NOTE:
- Make sure that the clutch hub's gear edge surface that is chamfered in wider area faces toward rear side.



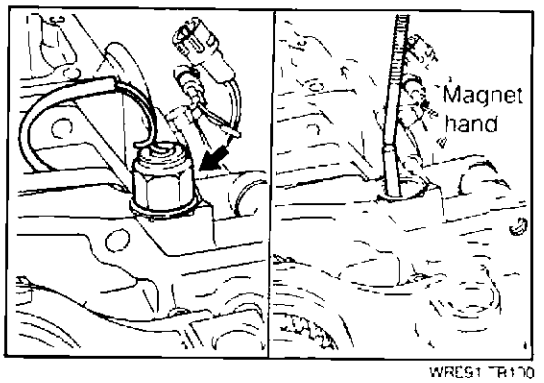
17 Drive a new slotted spring pin
NOTE:
- Prior to drive a new slotted spring pin, rotates the transfer high & low shift fork shaft either clock or counter clockwise while pulling out toward you slightly until the groove section of this shaft meets with the installation hole of roller for transfer position detect switch. If this operation failure to be observed, this notice caused by disengagement of gear.



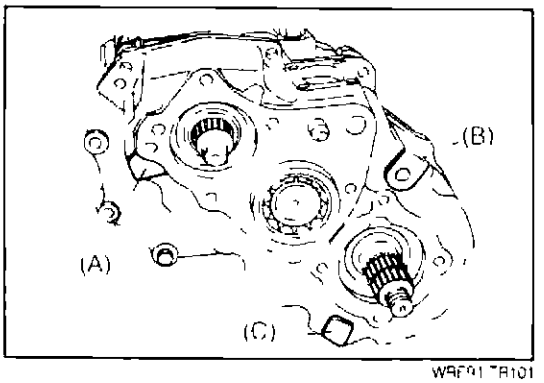
18 Apply gear oil to the following parts
(1) Surface of transfer high & low clutch hub
(2) Outer periphery of transfer input bearing inner race
(3) Outer periphery of needle roller bearing



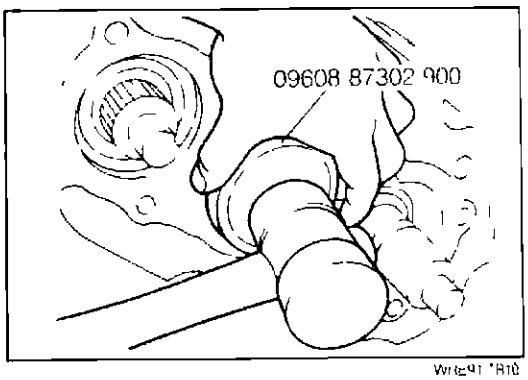
19 Install the roller, using a standard magnet hand tool
20 Tighten the transfer position detect switch with a new gasket interposed
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)



21 Install a new gasket
22 Temporarily install the rear bearing outer race of the transfer idler gear to the transfer case
23 Install the transfer case by tapping it evenly and lightly at the sections (A), (B) and (C) by means of a plastic hammer or the like

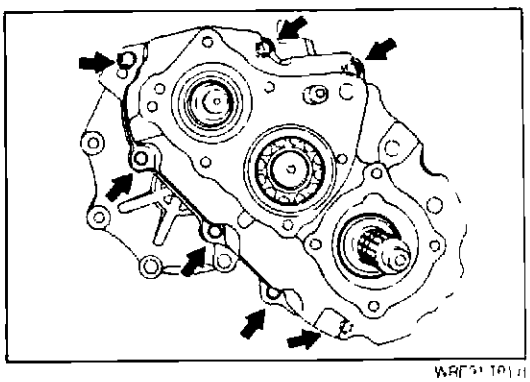


24 Install the transfer idler gear rear bearing, using the following SST in conjunction with a plastic hammer
SST: 09608-87302-900

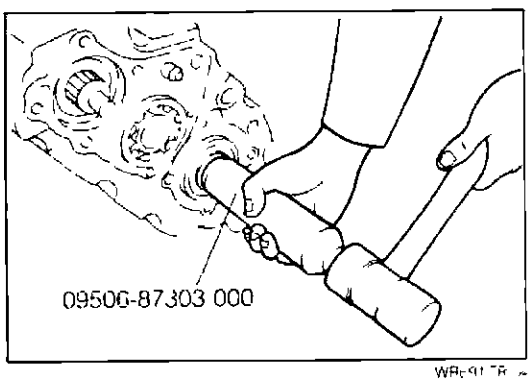


25 Tighten the transfer case with the seven bolts
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)

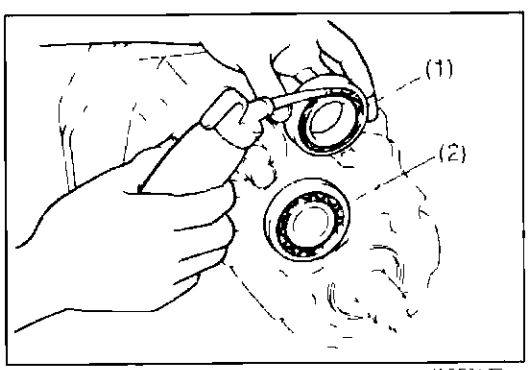
NOTE
- Be sure to tighten the bolts evenly and diagonally. (The right figure indicates a typical example of the tightening sequence.)



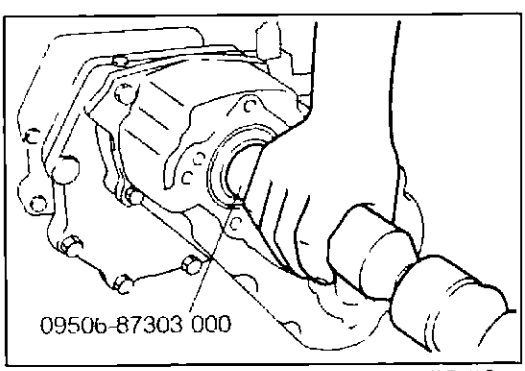
26 Install the radial ball bearing, using the following SST
SST: 09506-87303-000



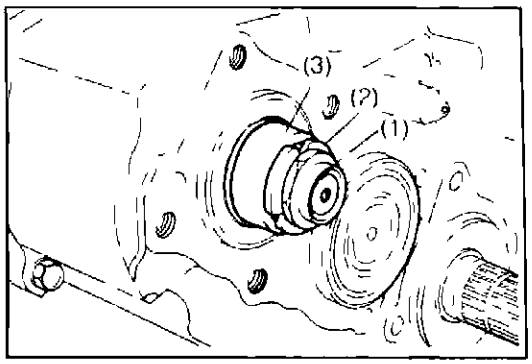
27 Apply gear oil to the following radial ball bearings
(1) Transfer input shaft rear
(2) Transfer idler gear shaft rear



28 Install the radial ball bearing at the transfer input shaft side, using the following SST
SST: 09506-87303-000



29 Interlock the 1st and 3rd gears
30 Install the following parts to the transfer input shaft
(1) Transfer input shaft spacer No.2
(2) Transfer input shaft spacer No 3
(3) New lock nut

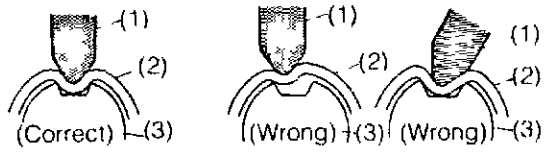


WRF01 TR107

31 Tighten a new lock nut
Tightening Torque: 226.0 - 264.0N m (23.0 - 27.0 kgf-m)

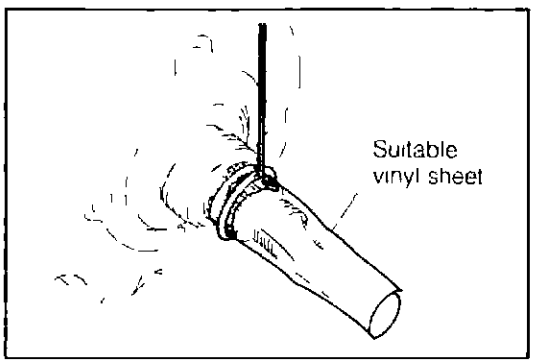
NOTE:
- When staking the lock nut, point a suitable staking tool toward the transfer input shaft axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

(1) Suitable staking tool
(2) New nut
(3) Shaft



WRF91 TR108

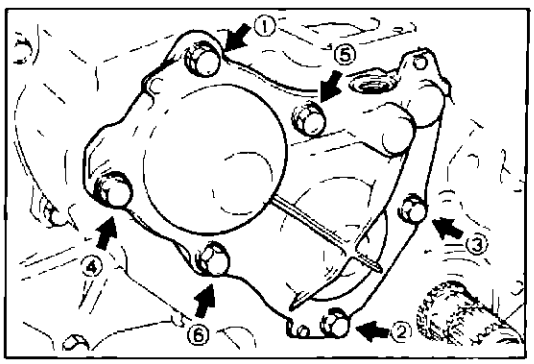
32 Install the following parts to the transfer output rear shaft
(1) Transfer rear output shaft spacer No 3
(2) Speedometer drive gear
(3) New "O" ring
NOTE:
- Prior to the installation of a new "O" ring, wind a suitable vinyl sheet around the transfer output rear shaft and apply gear oil to the "O" ring installing section.



WRE91 TR109

33 With the transfer case No 1 gasket interposed, tighten the transfer case No 1 with the six bolts
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

NOTE:
- Prior to the tightening of the bolts, apply Three Bond 1216 (made by Three Bond) to the threaded portions of the bolts.
- Be sure to tighten the bolts evenly and diagonally. (The right figure indicates a typical example of the tightening sequence.)



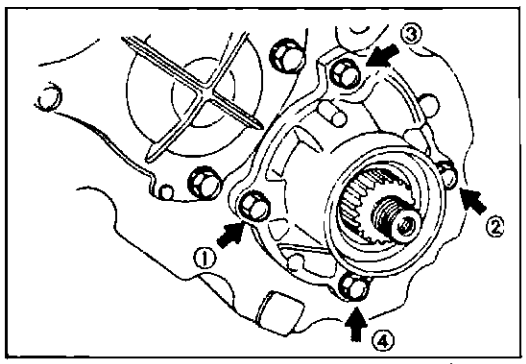
WRE91 TR110

34 Tighten the output shaft bearing rear retainer with the four bolts with the output shaft bearing rear retainer gasket interposed

Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)

NOTE:

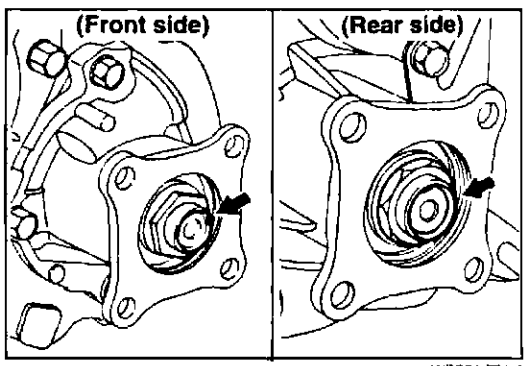
- **Prior to the tightening of the bolts, apply Three Bond 1216 (made by Three Bond) to the threaded portions of the bolts.**
- **Be sure to tighten the bolts evenly and diagonally. (The right figure indicates a typical example of the tightening sequence.)**



WRE91 TR111

35 Tighten both front and rear transfer output shaft companion flanges by means of new lock nuts and plate washers.

Tightening Torque:
Front: 98.0 - 137.0 N m (10.0 - 14.0 kgf-m)
Rear: 98.0 - 137.0 N·m (10.0 - 14.0 kgf-m)

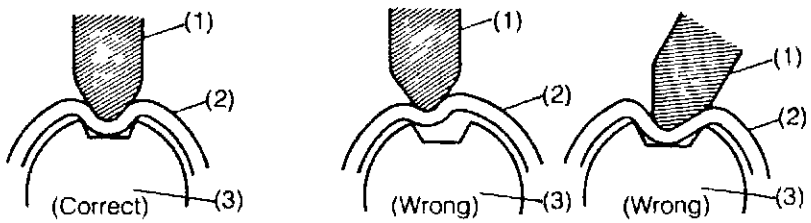


WRE91 TR112

NOTE:

- **When staking the lock nut, point a suitable staking tool toward the transfer output shaft front and rear axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)**

(1) Suitable staking tool
(2) New nut
(3) Shaft



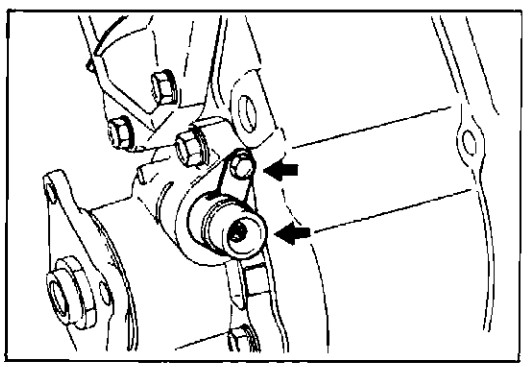
WRE91 TR113

36 Apply gear oil to the "O" ring prior to the insertion of the speedometer shaft sleeve

37 Insert the speedometer shaft sleeve into the output shaft bearing rear retainer

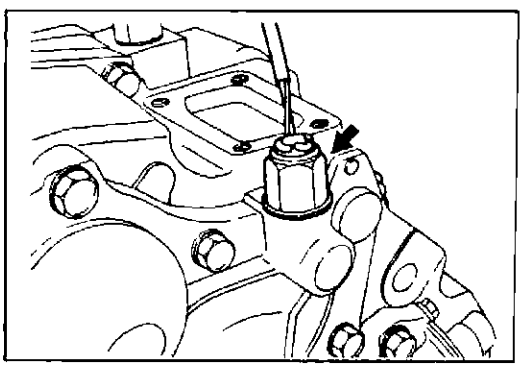
38. Tighten the speedometer sleeve lock plate with a bolt

Tightening Torque: 5.9 - 8.8 N m (0.6 - 0.9 kgf-m)


WRE91 TR114

39 Tighten the transfer position detect switch with a new gasket interposed

Tightening Torque: 29.4 - 44.0 N m (3.0 - 5 0 kgf-m)

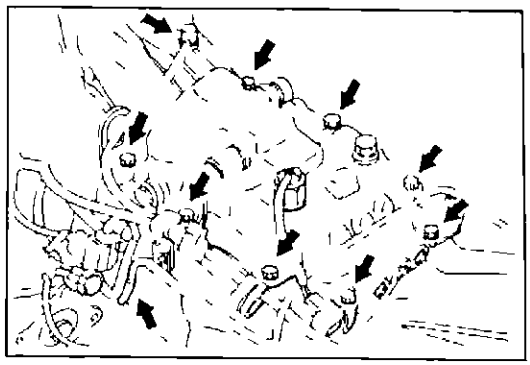

WRE91 TR115

40 With a new gasket interposed, tighten the transmission case cover with the eight bolts

Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

NOTE:

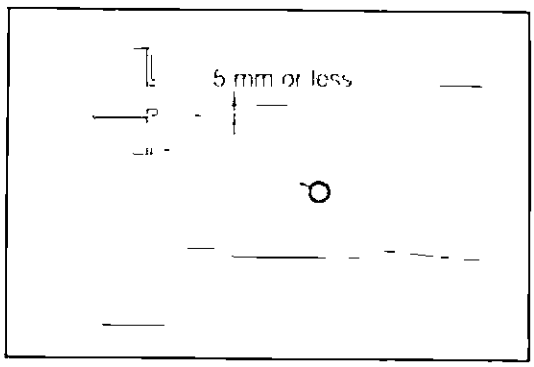
- Be sure to tighten the bolts alternately and evenly. (The right figure indicates a typical example of the tightening sequence.)



41 Install the transmission and transfer assembly to the vehicle (Refer to the MT section.)

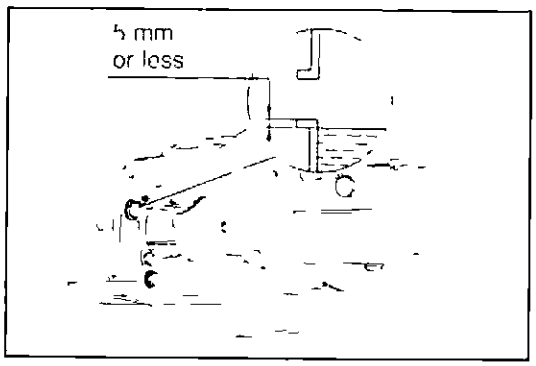
42 Fill the transmission and transfer with oil

	Oil capacity	API	SAE
T/M	2.9L	GL-3	90
T/F	1.3L	GL-3	75W-90 or 75W-85



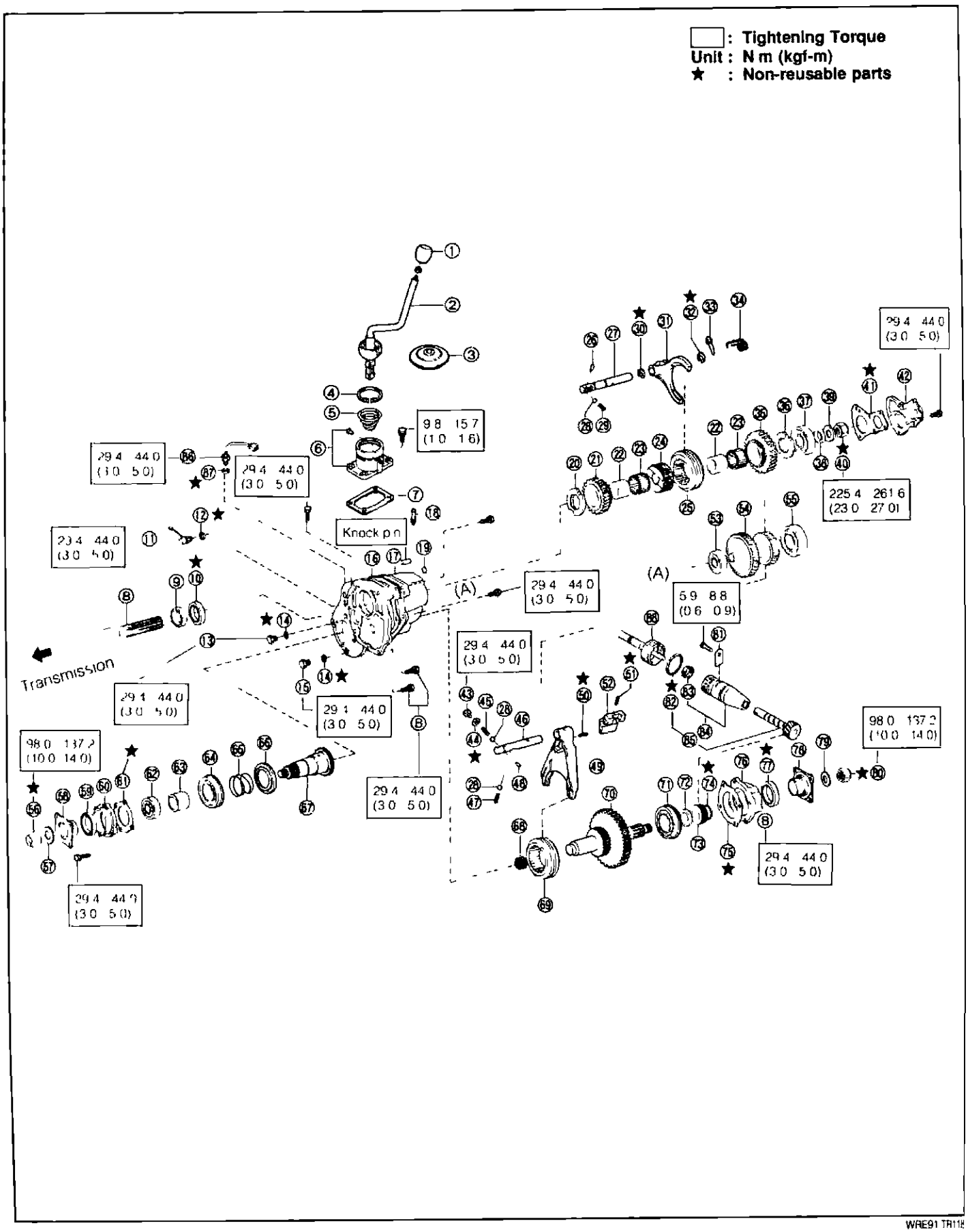
43 Tighten the both transmission and transfer filler plugs with new gasket

Tightening Torque 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)



TRANSFER (4-Speed)

COMPONENTS



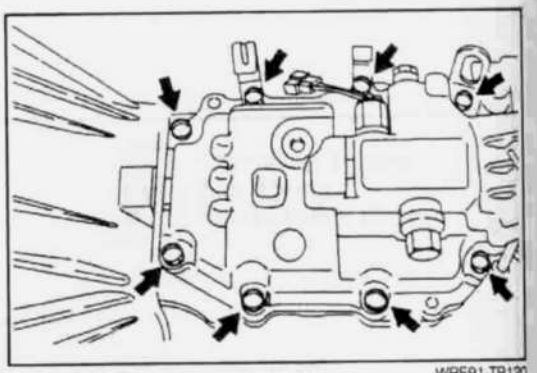
① Shift lever knob S/A
② Transfer shift lever
③ Shift lever boot
④ Hole snap ring
⑤ Conical spring
⑥ Transfer shift lever retainer S/A
⑦ Transfer shift lever retainer gasket
⑧ Transfer input shaft
⑨ Transfer input shaft spacer No 1
⑩ Type "S" oil seal
⑪ Transmission position switch A/Y (for 4WD detection)
⑫ Gasket
⑬ Filler plug
⑭ Gasket
⑮ Drain plug
⑯ Transfer case gasket
⑰ Transfer case
⑱ Union
⑲ Tight plug
⑳ Transfer input gear thrust washer
㉑ Transfer low speed input gear
㉒ Transfer input bearing inner race
㉓ Needle roller bearing
㉔ Transfer high & low clutch hub
㉕ Hub sleeve (for high & low clutch hub)
㉖ Roller
㉗ Transfer high & low shift fork shaft
㉘ Ball
㉙ Compression spring No 2
㉚ 'E" ring
㉛ Transfer high & low shift fork
㉜ E' ring
㉝ Pin (for shift fork shaft)
㉞ Torsion spring
㉟ Transfer high speed input gear
㊱ Transfer input gear thrust washer
㊲ Radial ball bearing
㊳ Transfer input shaft spacer No 2
㊴ Transfer input shaft spacer No 3
㊵ Lock nut
㊶ Transfer case cover gasket No 1
㊷ Transfer case cover No 1
㊸ Bolt
㊹ Gasket
㊺ Compression spring No 1
㊻ Transfer front drive shift fork shaft
㊼ Compression spring
㊽ Roller
㊾ Transfer front drive shift fork
㊿ Slotted spring pin
(51) Slotted spring pin
(52) Transfer gear shift head
(53) Radial ball bearing
(54) Transfer idler gear
(55) Radial ball bearing
(56) Lock nut
(57) Conical spring washer
(58) Output shaft companion flange
(59) Type 'T" oil seal
(60) Output shaft bearing front retainer
(61) Output shaft bearing front retainer gasket
(62) Bearing
(63) Transfer output shaft spacer
(64) Radial ball bearing
(65) Compression spring
(66) Front drive disengage plate
(67) Transfer output front shaft
(68) Needle roller bearing
(69) Hub sleeve (for front drive clutch hub)
(70) Transfer output rear shaft
(71) Radial ball bearing
(72) Transfer rear output shaft spacer No 3
(73) Speedometer drive gear
(74) "O" ring
(75) Output shaft bearing rear retainer gasket
(76) Output shaft bearing rear retainer
(77) Type "T" oil seal
(78) Output shaft companion flange
(79) Conical spring washer
(80) Lock nut
(81) Speedometer sleeve lock plate
(82) "O" ring
(83) Type 'V" oil seal
(84) Speedometer shaft sleeve (82 + 83)
(85) Speedometer driven gear (82 + 83 + 84)
(86) Transfer position detect switch (for N detection)
(87) Gasket

WRE91 TR119

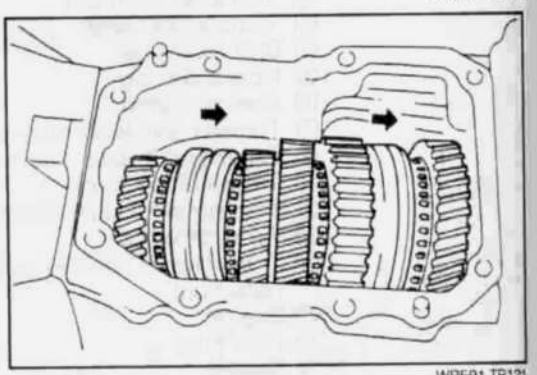
REMOVAL

Remove the transmission and transfer assembly from the vehicle.

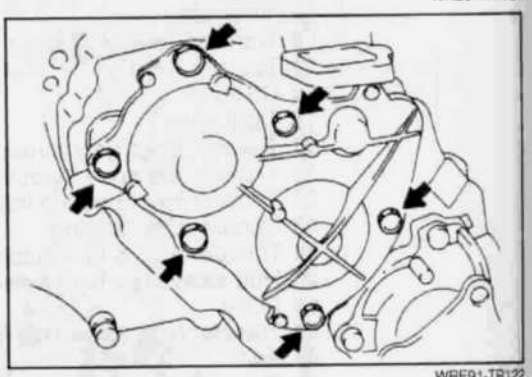
1. Remove the transmission case cover with the transmission case cover gasket by removing the eight bolts.
   NOTE:
   - Never reuse the removed gasket.


WRE91-TR120

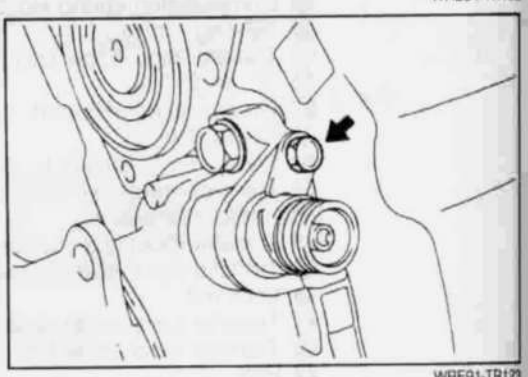
2. Interlock the 1st gear with the 3rd gear.


WRE91-TR121

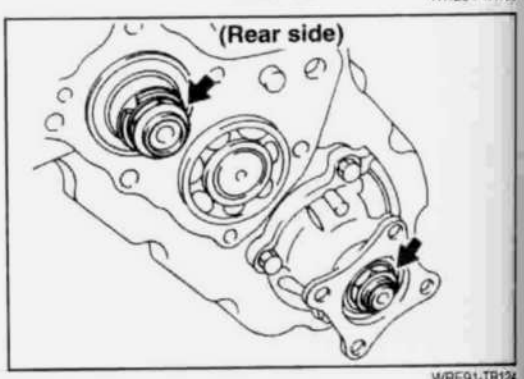
3. Remove the transfer case cover No. 1 with the transfer case cover No. 1 gasket by removing the six bolts.
   NOTE:
   - Since the threaded portions of the six bolts have been coated with resin, thoroughly wash the threaded portions in advance if the removed bolts are reused or new bolts are used.
   - Never reuse the removed gasket.


WRE91-TR122

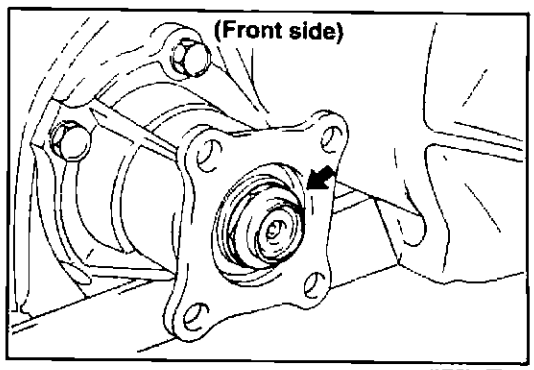
4. Remove the speedometer shaft sleeve with the speedometer driven gear installed by removing the speedometer sleeve lock plate by means of the bolt.


WRE91-TR123

5. Raise the lock section of the lock nut.
6. Remove the lock nut.

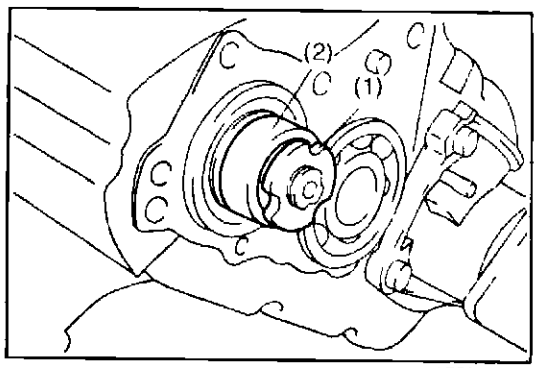


WRE91-TR124



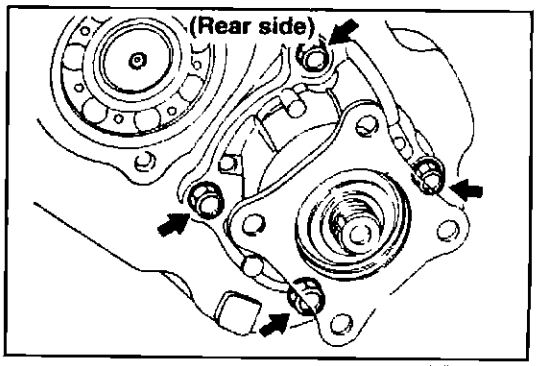
WRE91 TR125

7 Remove the following parts from the transfer input shaft.
(1) Transfer input shaft spacer No. 3
(2) Transfer input shaft spacer No 2



WRE91 TR126

8. Remove the output shaft bearing rear retainer with the output shaft companion flange installed by removing the four bolts
NOTE:
- **Since the threaded portions of the six bolts have been coated with resin, thoroughly wash the threaded portions in advance if the removed bolts are reused or new bolts are used.**

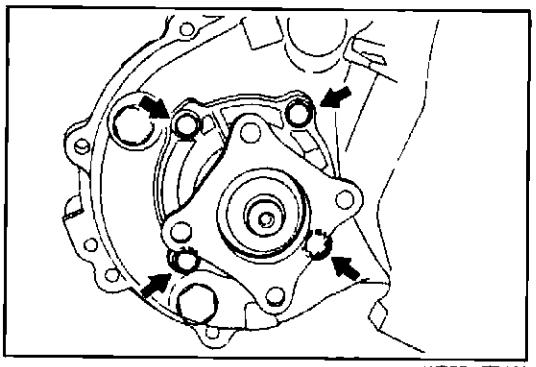


WRE91 TR127

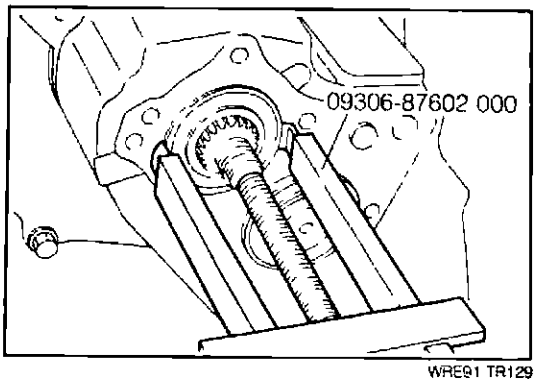
9. Remove the output shaft bearing rear retainer gasket.
NOTE:
- **Never reuse the removed gasket.**

10 Remove the output shaft bearing front retainer with the output shaft companion flange installed by removing the four bolts

11. Remove the output shaft bearing front retainer gasket
NOTE:
- **Never reuse the removed gasket.**

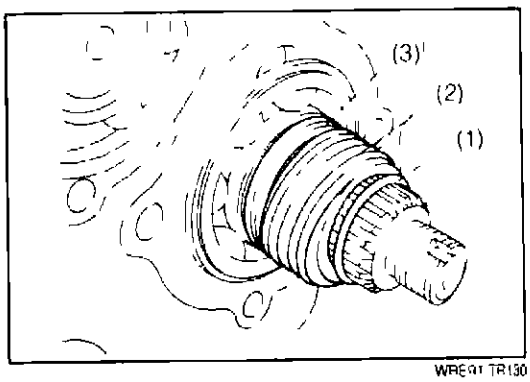

WRE91 TR128

12. Remove the radial ball bearing from the transfer input shaft, using the following SST.
SST: 09306-87602-000



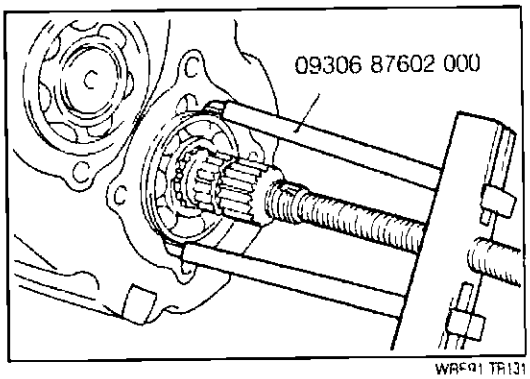
WRE91 TR129

13 Remove the following parts from the transfer output rear shaft
(1) "O" ring
(2) Speedometer drive gear
(3) Transfer rear output shaft spacer No 3
NOTE:
- Never reuse the removed "O" ring.



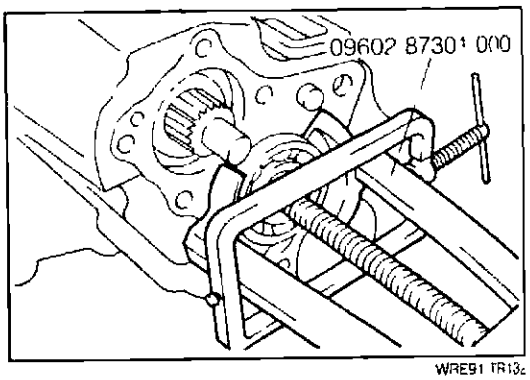
WRE91 TR130

14 Detach the stop ring of the radial ball bearing at the transfer output rear shaft
15 Remove the radial ball bearing, using the following SST
SST: 09306-87602-000



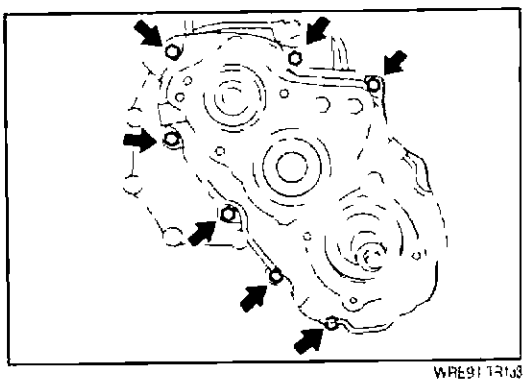
WRE91 TR131

16 Remove the radial ball bearing at the transfer idler gear rear side, using the following SST
SST: 09602-87301-000

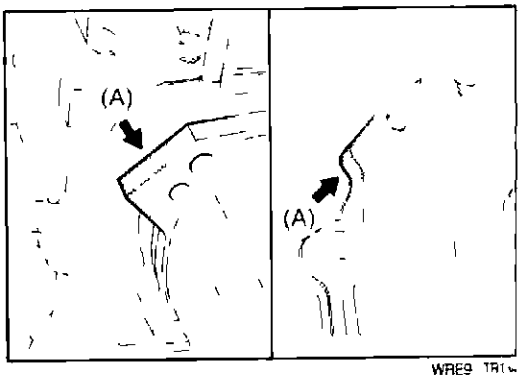


WRE91 TR13

17 Remove the seven bolts of the transfer case

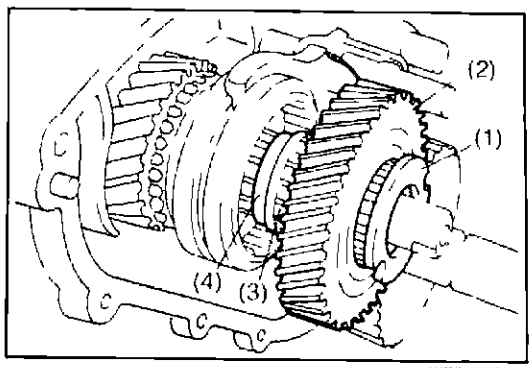

WRE91 TR13

18 While evenly and alternately tapping the transfer case at the rib sections (two points) from the direction (A), using a plastic hammer or the like, remove the transfer case
19 Remove the transfer case gasket
NOTE:
- Never reuse the removed gasket.



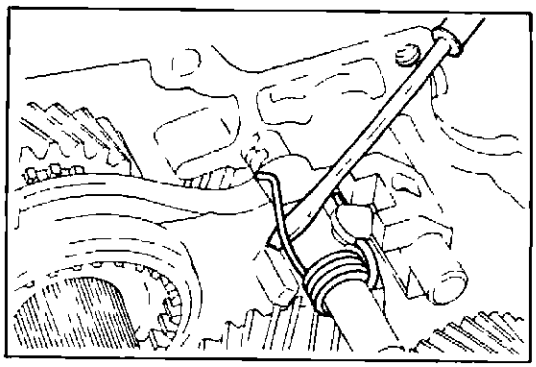
WRE9 TR1

20 Remove the following parts from the transfer input shaft
(1) Transfer input gear thrust washer
(2) Transfer high speed input gear
(3) Needle roller bearing
(4) Transfer input inner race bearing



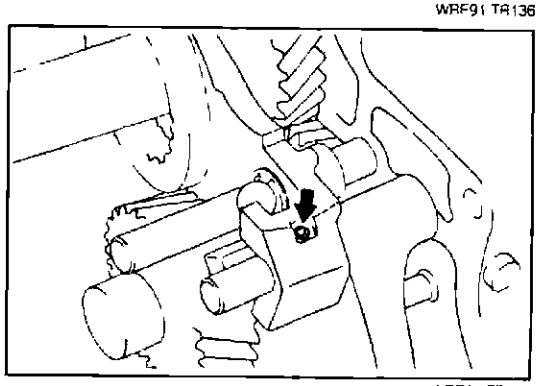
WRE91 TR135

21 Remove the torsion spring, using a standard flat screwdriver.

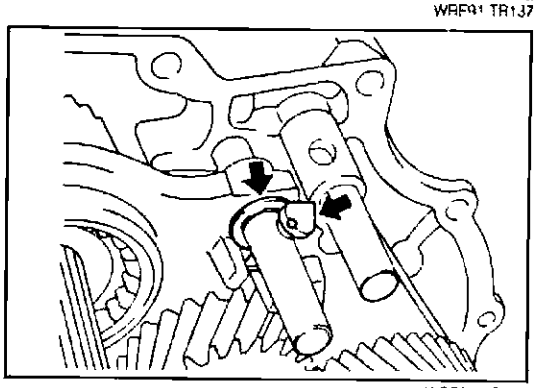

WRE91 TR136

22 Drive out the slotted spring pin, using a standard pin punch.
NOTE:
- **Never reuse the removed slotted spring pin.**

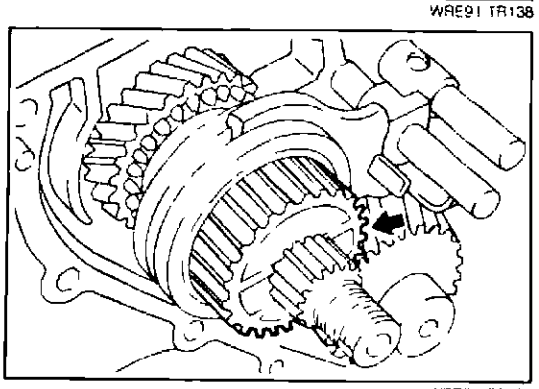
23 Remove the transfer gear shift head from the transfer front drive shift fork shaft


WRE91 TR137

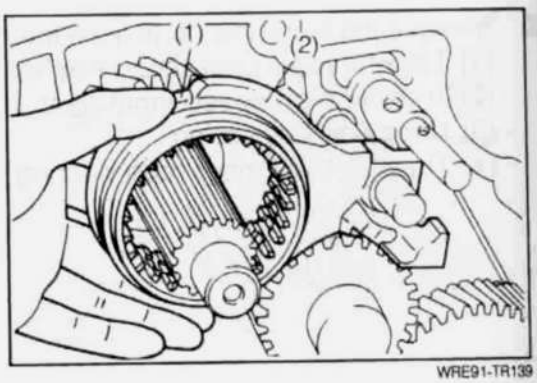
24 Remove the pin (for the shift fork shaft).
25 Remove the "E" ring
NOTE:
- **Never reuse the removed "E" ring.**


WRE91 TR138

26 Remove the transfer high & low clutch hub

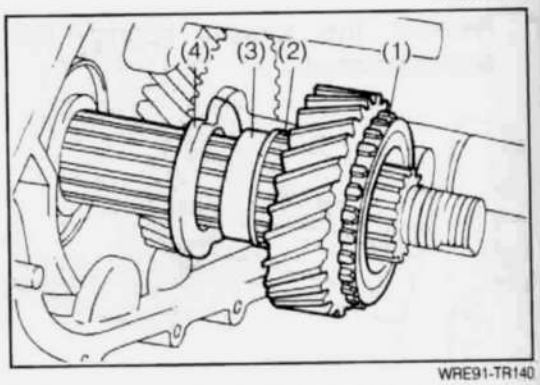

WRE91 TR139

27. Remove the following parts by pulling them toward your side.
    (1) Hub sleeve (for high & low clutch hub)
    (2) Transfer high & low shift fork



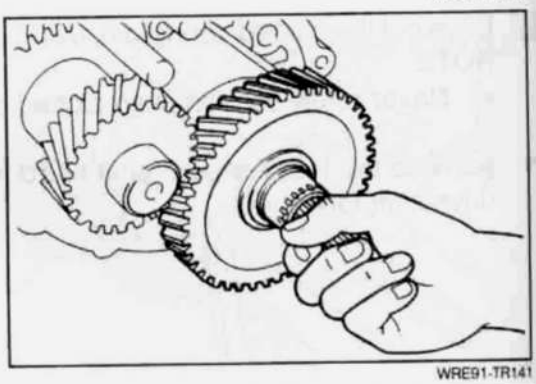
WRE91-TR139

28. Remove the following parts from the transfer input shaft.
    (1) Transfer low speed input gear
    (2) Needle roller bearing
    (3) Transfer input inner race bearing
    (4) Transfer input gear thrust washer

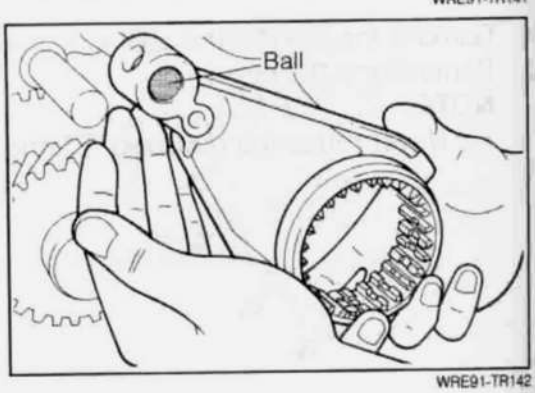


WRE91-TR140

29. Remove the transfer output rear shaft by pulling it toward your side.

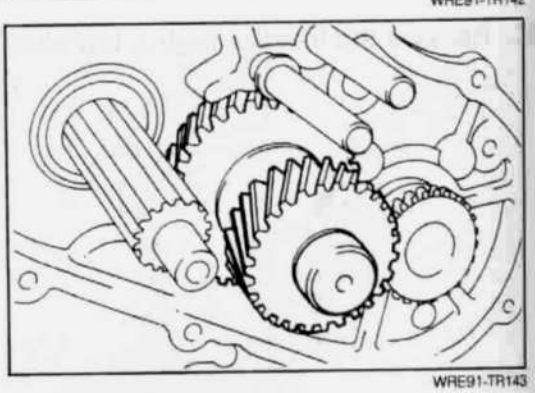

WRE91-TR141

30. Remove the following parts.
    (1) Transfer front drive shift fork
    (2) Hub sleeve (for front drive clutch hub)
    NOTE:
    - **Be very careful not to lose the ball placed between the front drive shift fork and the front drive shift fork shaft during the removal.**



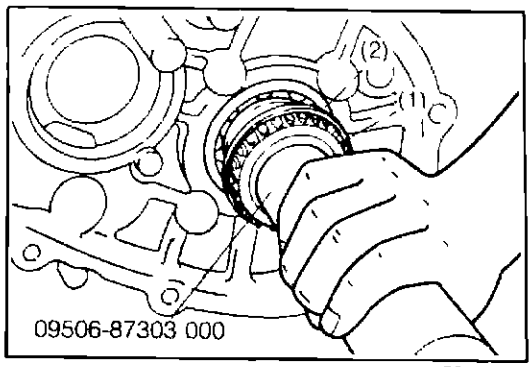
WRE91-TR142

31. With the radial ball bearing at the front side of the transfer idler gear installed, remove the transfer idler gear by pulling it toward your side.


WRE91-TR143

32 Remove the following parts as a set from the transfer front case to the front side, using the following SST
SST: 09506-87303-000

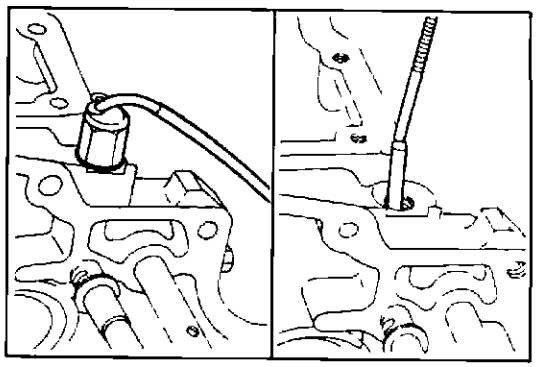
(1) Transfer output front shaft
(2) Front drive disengage plate
(3) Radial ball bearing



WRE91 TR144

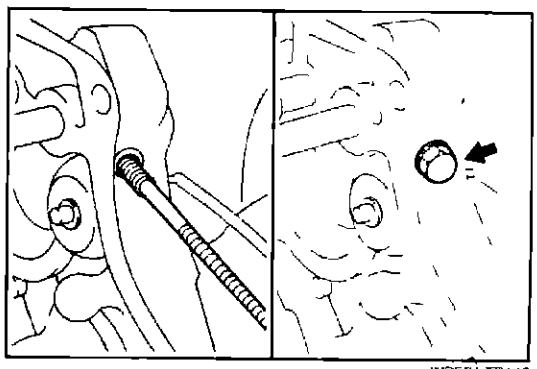
33 Remove the transmission position detect switch assembly with the gasket.
NOTE:
- **Never reuse the removed gasket.**

34 Remove the roller, using a standard magnet hand tool

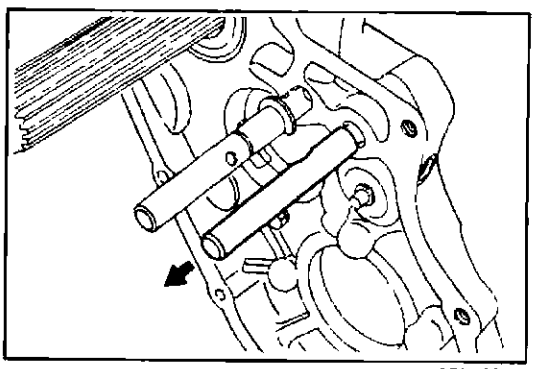

WRE91 TR145

35 Remove the bolt with the gasket
NOTE:
- **Never reuse the removed gasket.**

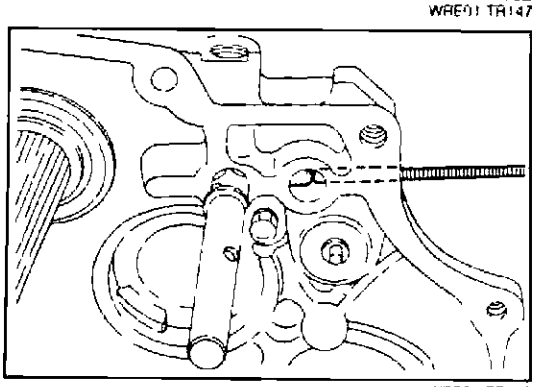
36 Remove the compression spring and ball, using a standard magnet hand tool


WRE91 TR146

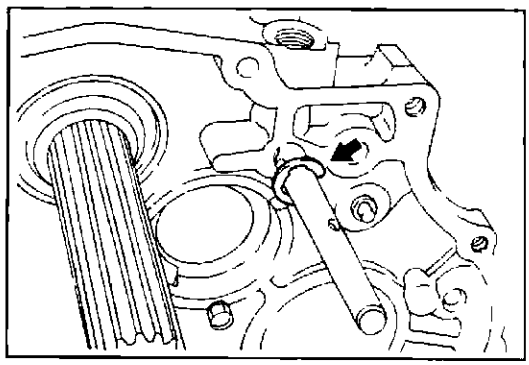
37 Remove the transfer front drive shift fork shaft by pulling it toward your side


WRE91 TR147

38 Remove the roller, using a standard magnet hand tool

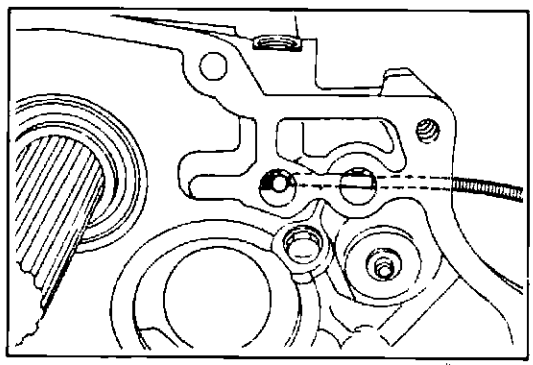

WRE91 TR148

39 Remove the "E" ring
NOTE:
- **Never reuse the removed "E" ring.**

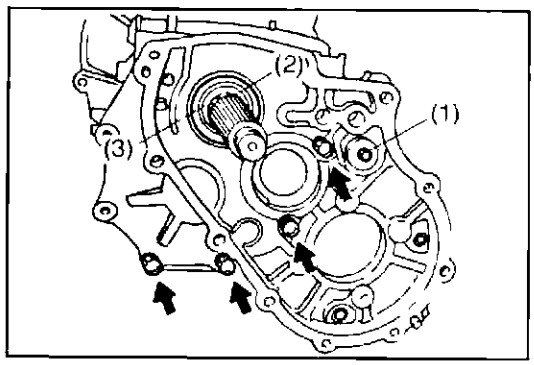

WRE91 TR149

40 Pull out the transfer high & low shift fork shaft toward your side

41 Remove the ball and compression spring No 2, using a standard magnet hand tool


WRE91 TR150

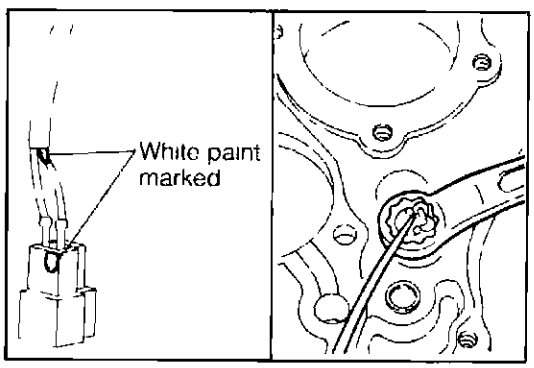
42. Remove the transfer front case with the following parts installed by removing the four bolts.
(1) Transmission position switch assembly (for 4WD detection)
(2) Transfer input shaft spacer No 1
(3) Type "S" oil seal



WRE91 TR151

DISASSEMBLY OF TRANSFER FRONT CASE

1 Disconnect the harness from the coupler (For the removal procedure, refer to the BE section)
NOTE:
- **Put a mark by means of a white pen prior to the removal of the harness from the coupler.**

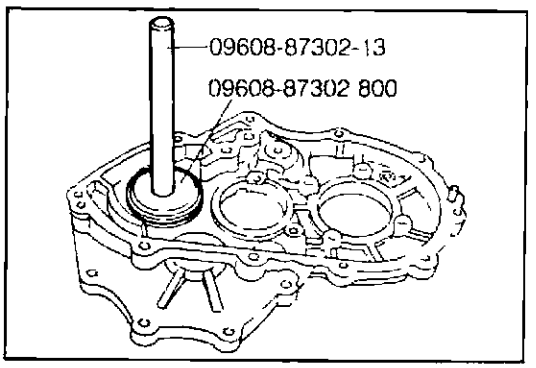


WRE91 TR152

2 Remove the transmission position switch assembly (for 4WD detection) and gasket
NOTE:
- **Never reuse the removed gasket.**

3 Remove the type "S" oil seal, using the following SSTs.
SST: 09608-87302-13
09608-87302-800

NOTE:
- **Never reuse the removed type "S" oil seal.**

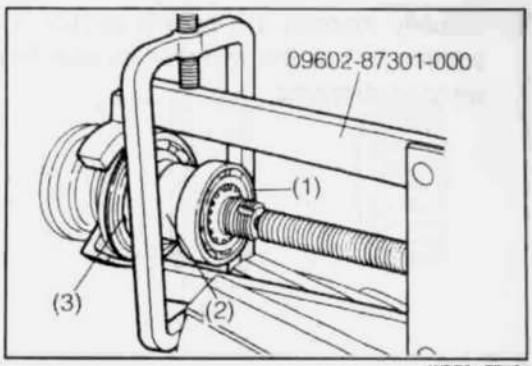


WRE91 TR153

DISASSEMBLY OF TRANSFER OUTPUT FRONT SHAFT

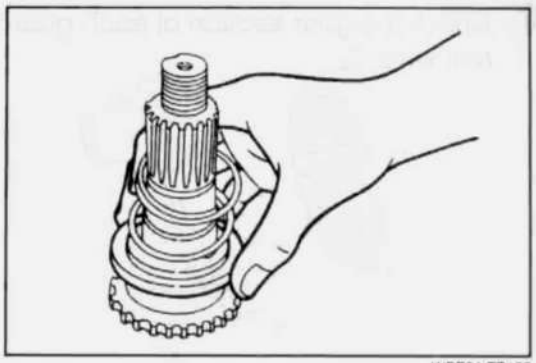
1. Remove the following parts, using the following SST.
   SST: 09602-87301-000

   (1) Bearing
   (2) Transfer output shaft spacer
   (3) Radial ball bearing



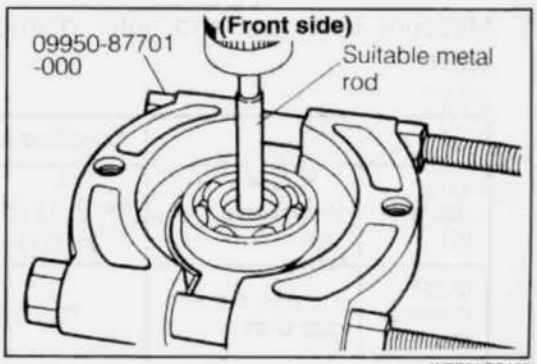
WRE91-TR154

2. Remove the compression spring.
3. Remove the front drive disengage plate.


WRE91-TR155

DISASSEMBLY OF TRANSFER IDLER GEAR BEARING (FRONT)

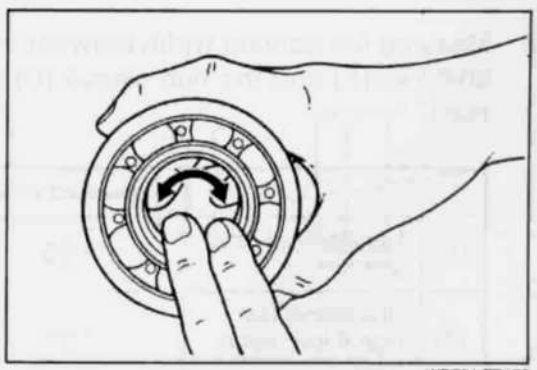
1. Remove the bearing, using the following SST in combination with a suitable metal rod and a press.
   SST: 09950-87701-000



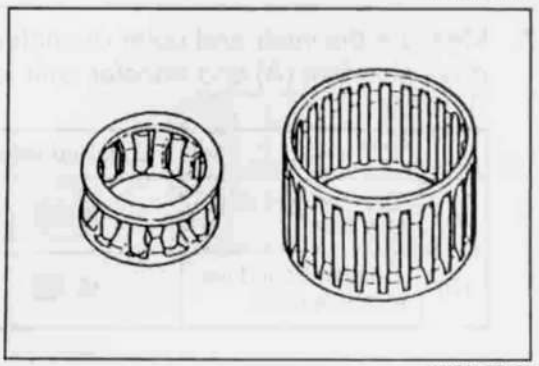
WRE91-TR156

INSPECTION

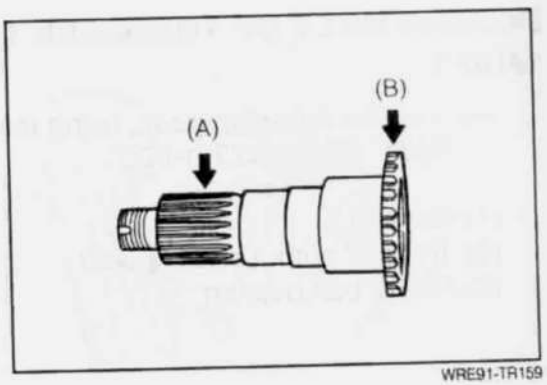
1. Radial ball bearings
   Rotate the bearing inner race by applying force with your finger. Check to see if the bearing inner race rotates smoothly without any sticking.


WRE91-TR157

2. Needle roller bearings
   Check the outer periphery of the needle roller bearing for damage by scratching it by your fingernail.
   Also, visually inspect the outer periphery for seizure due to poor oil lubrication or use of deteriorated oil.

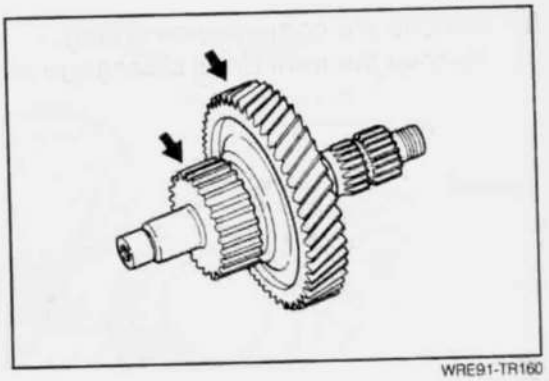

WRE91-TR158

3. Visually inspect the spline section (A) and gear chamfer section (B) of the transfer output front shaft for abnormal wear or damage.



WRE91-TR159

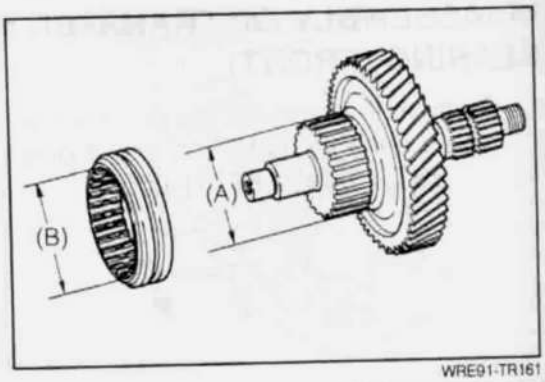
4. Check the gear section of each gear for damage or abnormal wear.


WRE91-TR160

5. Measure the inner and outer diameters of the following parts.

Unit: mm

		Specified value	Allowable limit
Inner diameter (B)	Hub sleeve	$72.5^{+0.2}_{+0}$	72.7
Outer diameter (A)	Transfer output rear shaft	$72.5^{-0.10}_{-0.17}$	72.3

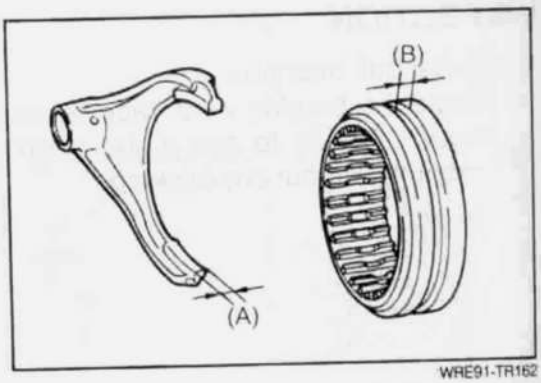


WRE91-TR161

6. Measure the contact width between the transfer front drive shift fork (A) and the hub sleeve (B) (for high & low clutch hub).

Unit: mm

		Specified value	Allowable limit
(A)	Transfer front drive shift fork	$7^{-0.36}_{-0.46}$	6.0
(B)	Hub sleeve (for high & low clutch hub)	$7^{+0.058}_{+0}$	7.3

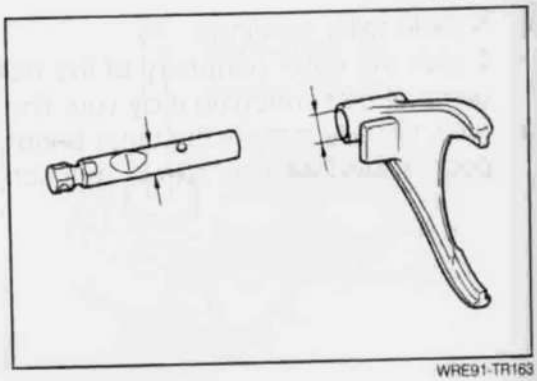


WRE91-TR162

7. Measure the inner and outer diameters of the transfer front drive shift fork (A) and transfer shift fork shaft.

Unit: mm

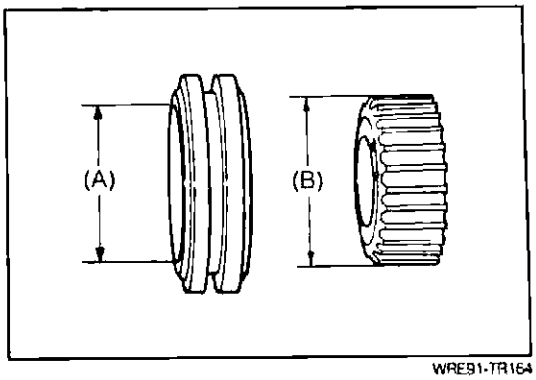
		Specified value	Allowable limit
(A)	Transfer front drive shift fork	$16^{+0.024}_{+0.005}$	16.03
(B)	Transfer front drive shift fork shaft	$16^{-0.016}_{-0.043}$	15.95


WRE91-TR163

8 Measure the outer diameter (A) of the transfer high & low clutch hub and inner diameter of the hub sleeve (for high & low clutch)

Unit: mm

	Specified value	Allowable limit
(A) Transfer high & low clutch hub	72.5 $^{0.2}_{0}$	72.7
(B) Hub sleeve (for high & low clutch)	72.5 $^{-0.10}_{-0.17}$	72.3

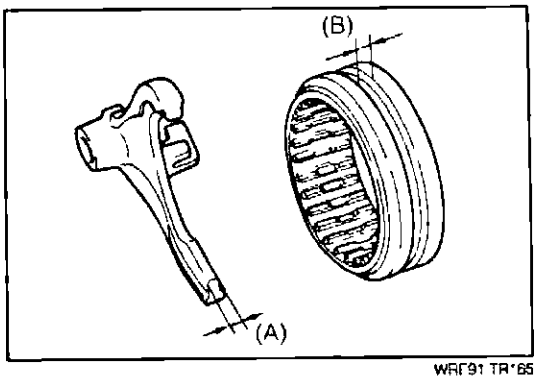


WRE91-TR164

9 Measure the contact surface between the transfer high & low shift fork (A) and the hub sleeve (B) (for the high & low clutch)

Unit: mm

		Specified value	Allowable limit
(A)	Transfer high & low shift fork	7 $^{0.15}_{0.25}$	6.3
(B)	Hub sleeve (for high & low clutch)	7 $^{0.058}_{+0}$	7.3

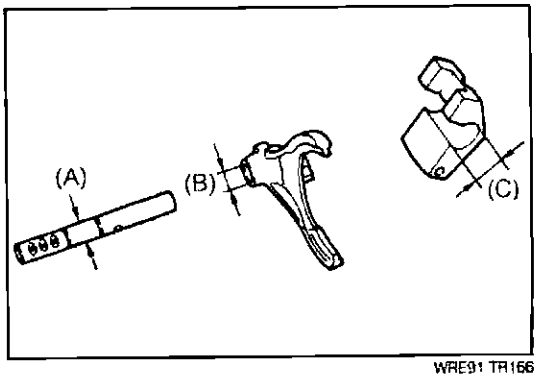


WRE91 TR165

10 Measure the inner and outer diameters of the transfer high & low shift fork shaft (A), transfer high & low shift fork (B) and transfer gear shift head (C)

Unit: mm

		Specified value	Allowable limit
(A)	Transfer high & low shift fork shaft	16 $^{-0.025}_{-0.040}$	15.06
(B)	Transfer high & low shift fork	16 $^{+0.24}_{0.006}$	16.03
(C)	Transfer gear shift head	16 $^{+0.29}_{+0.16}$	16.06

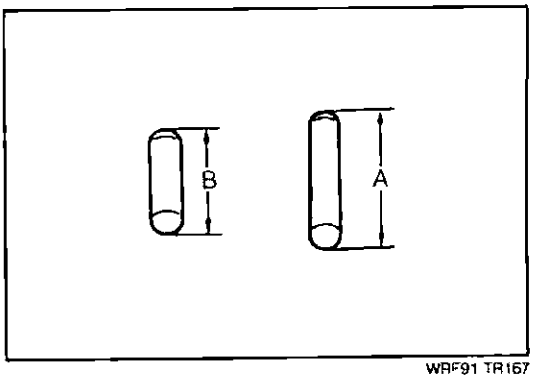


WRE91 TR166

11 Measure the length of the rollers

Unit: mm

		Specified value	Allowable limit
(A)	For transfer high & low shift fork shaft	36.5 ±0.1	36.4
(B)	Transfer front drive shift fork shaft	19 $^{+0}_{-0.2}$	18.8

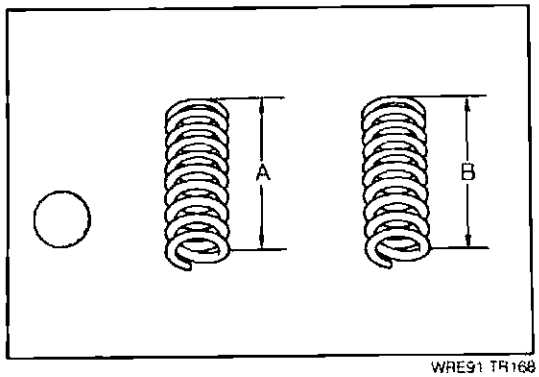


WRE91 TR167

12. Visually inspect the ball for wear or damage.
13 Measure the length of the compression springs No.1 and No.2

Unit: mm

Compression spring	Specified value	Allowable limi
No. 1	21.9 ±0.7	21.2
No. 2	↑	↑

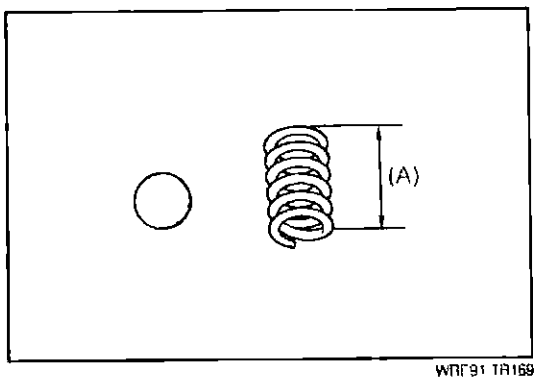


WRE91 TR168

14 Measure the length (A) of the compression spring installed in the transfer front drive shift fork

Unit: mm

	Specified value	Allowable limit
Compression spring	17.8 ±0.7	17.1

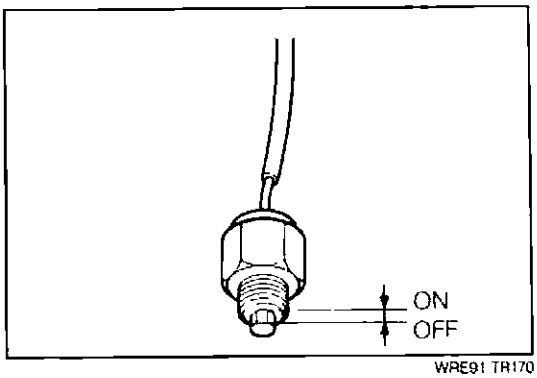


WRF91TR169

15 Visually inspect the ball for wear or damage

16 Check to see if continuity exists between the transmission position switch assembly (for 4WD detection) and the transfer position detect switch (for L or H detection)

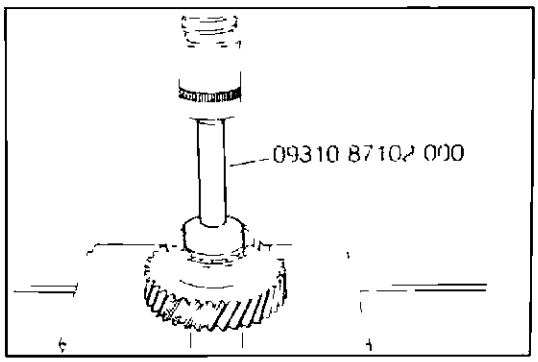
	Continuity	
	ON	OFF
Transmission position switch assembly (for 4WD detection)	Continuity exists	No continuity exists
Transfer position detect switch (for L or H detection)	↑	↑



WRE91TR170

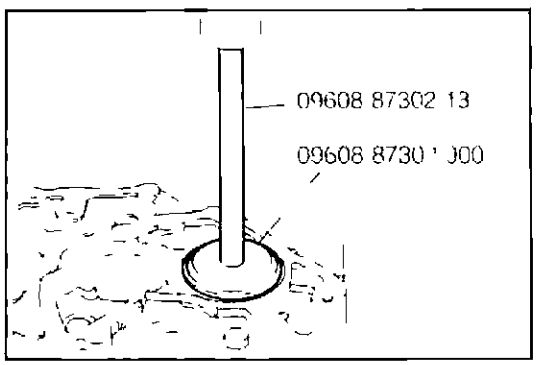
ASSEMBLY OF TRANSFER IDLER GEAR BEARING (FRONT)

1 Install the bearing, using the following SST in conjunction with a press
SST: 09310-87102-000



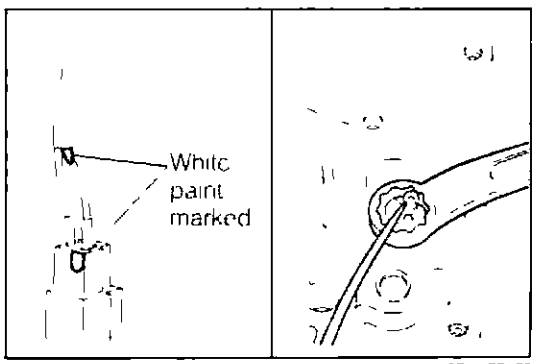
ASSEMBLY OF TRANSFER FRONT CASE

1 Install a new oil seal using the following SSTs
SST: 09608-87302-13
09608-87302-900

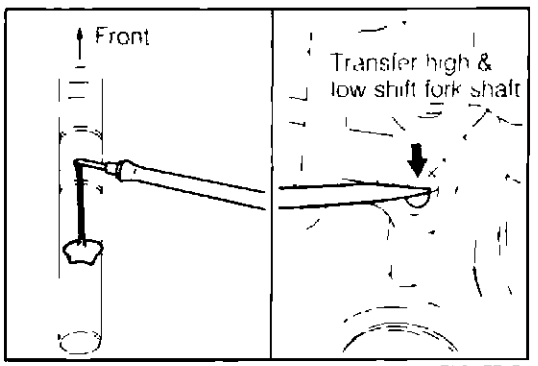


2 Tighten the transmission position switch assembly (for 4WD detection) with a new gasket interposed
Tightening Torque: 29.4 - 44.0 N m (3.0 - 5.0 kgf-m)

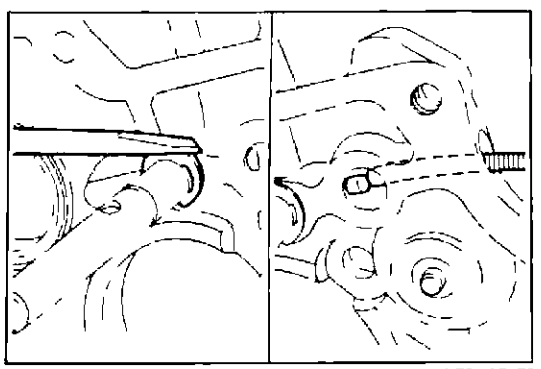
3 Connect the harness to the coupler



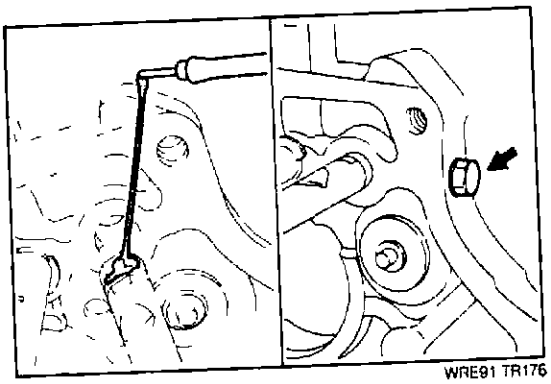
4 Place the compression spring No 2 and ball, using a standard magnet hand tool
5 Apply gear oil to the outer periphery of the transfer high & low shift fork shaft
6 With the ball pushed down by means of a standard flat screwdriver, insert the transfer high & low shift fork shaft from the rear side of the shaft



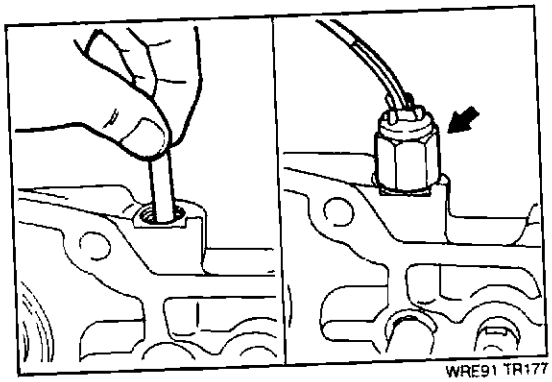
7 Install a new "E" ring, using a standard flat screwdriver
8 Insert the roller by means of a standard magnet hand tool



9. Apply gear oil to the outer periphery of the transfer front drive shift fork shaft
10 Insert the ball and compression spring No. 1.
11 Tighten the bolt with a new gasket interposed.
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

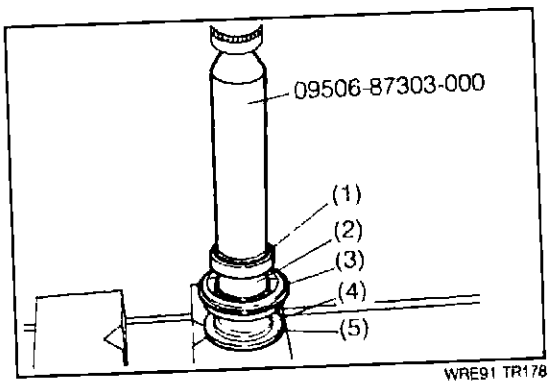

WRE91 TR176

12 Insert the roller (longer one)
13 Tighten the transfer position detect switch (for L or H detection) with a new gasket interposed.
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)


WRE91 TR177

ASSEMBLY OF TRANSFER OUTPUT FRONT SHAFT

1 Install the following parts to the transfer output front shaft and press them, using the following SST in conjunction with a press
SST: 09506-87303-000

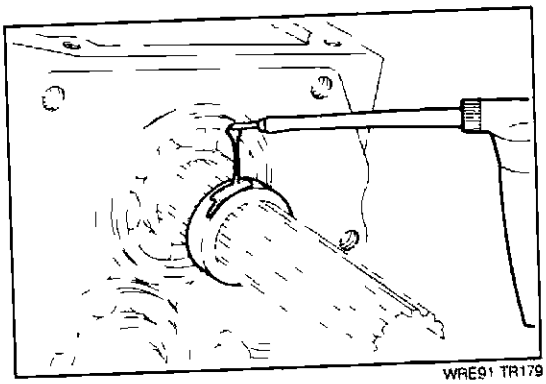


WRE91 TR178

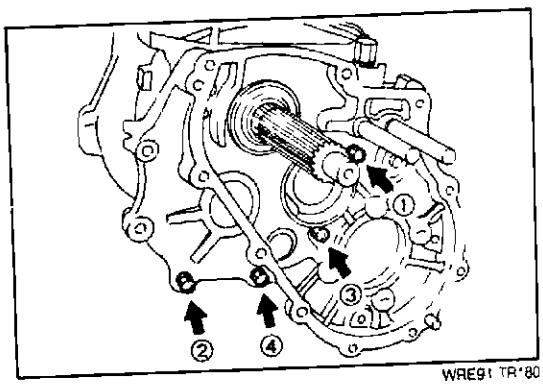
(1) Bearing
(2) Transfer output shaft spacer
(3) Radial ball bearing
(4) Compression spring
(5) Front drive disengage plate

INSTALLATION

1 Install a new transfer front case gasket
2 Apply gear oil to the outer periphery of the transfer input shaft spacer No 1


WRE91 TR179

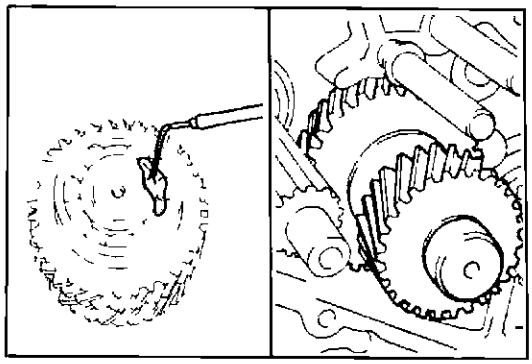
3 Temporarily install the transfer front case with the two bolts ((1) and (2) in the right figure)
4 Tighten the transfer front case after temporarily tightening the bolts
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)



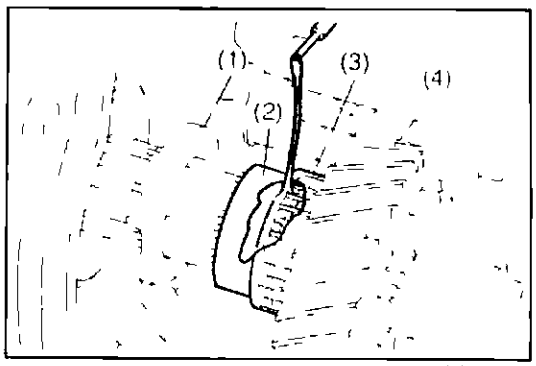
WRE91 TR180

NOTE:
- Be sure to tighten the bolts diagonally and evenly. (The right figure indicates a typical example of the tightening sequence.)

5 Apply gear oil to the bearing at the transfer idler gear front side
6 Install the transfer idler gear

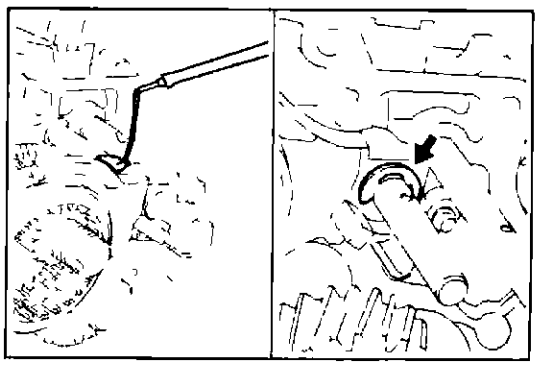

WRE91 TR181

7 Apply gear oil to the transfer input shaft spacer No. 4 and the outer periphery of the needle roller bearing
8 Install the following parts to the transfer input shaft.
(1) Transfer input gear thrust washer
(2) Transfer input shaft spacer No. 4
(3) Needle roller bearing
(4) Transfer low speed input gear

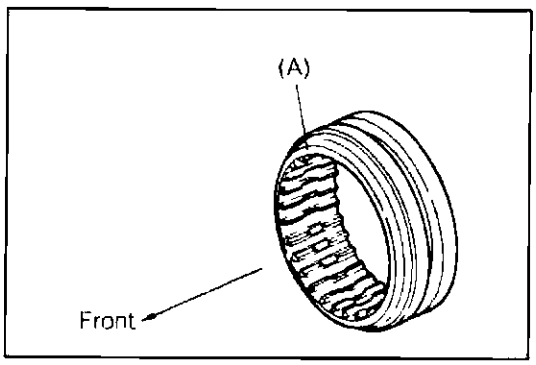


WRE91 TR182

9 Apply gear oil to the outer periphery of the transfer high & low shift fork shaft
10 Install the transfer high & low shift fork together with the transfer high & low clutch hub to the transfer high & low shift fork shaft
11 Install a new "E" ring

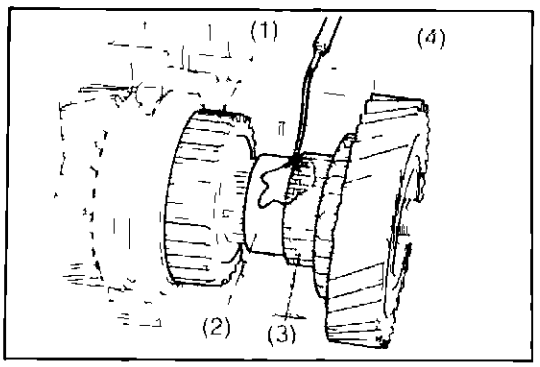

WRE91 TR 183

NOTE:
- **Make sure that the hub sleeve section (A) faces toward the front side.**



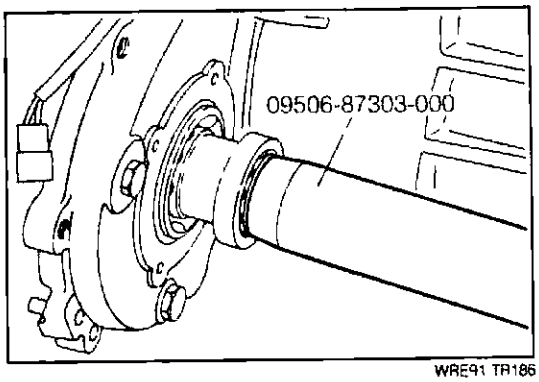
WRE91 TR184

12 Apply gear oil to the transfer input shaft spacer No 4 and the outer periphery of the needle roller bearing
13 Install the following parts to the transfer input shaft
(1) Transfer high & low clutch hub
(2) Transfer input shaft spacer No 4
(3) Needle roller bearing
(4) Transfer high speed input gear



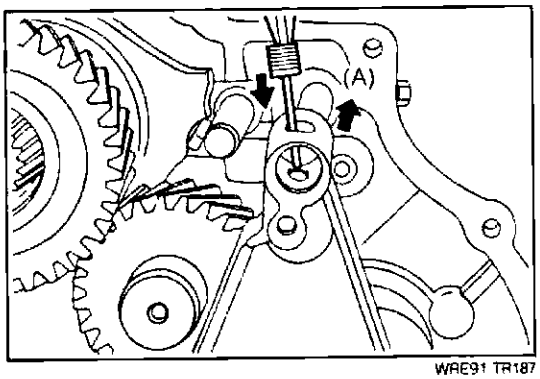
WRE91 TR185

14 Install the assembled transfer output front shaft to the transfer front case, using the following SST
SST: 09506-87303-000



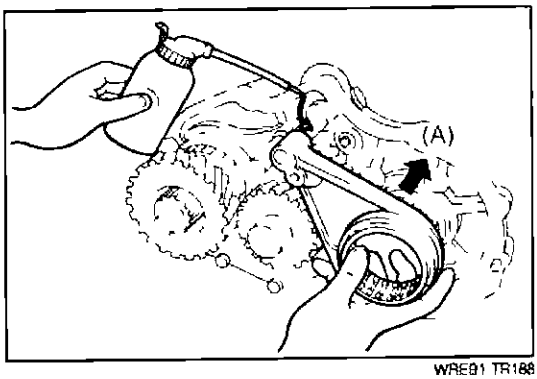
WRE91 TR186

15 Install the compression spring and ball to the transfer front drive shift fork
16 With the ball pushed down, push the transfer front drive shift fork in the front direction (A) by means of a standard pin punch



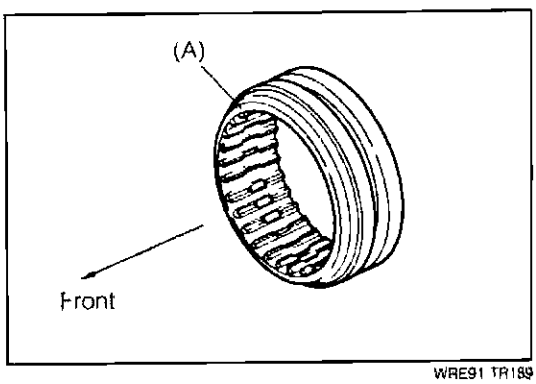
WRE91 TR187

17 Apply gear oil to the outer periphery of the transfer front drive shift fork shaft
18 Set the hub sleeve to the transfer front drive shift fork Then, push it in the transfer output front shaft direction (A).



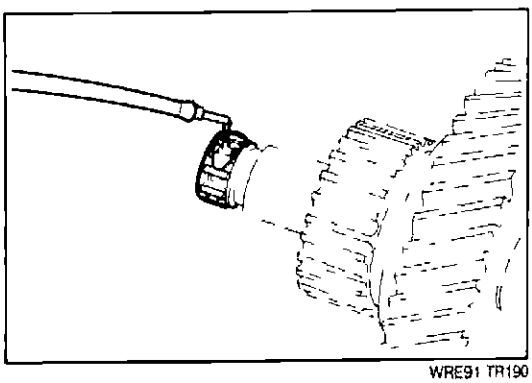
WRE91 TR188

NOTE:
- **Make sure that the section (A) faces toward the front side when installing the hub sleeve (for the front drive clutch hub).**

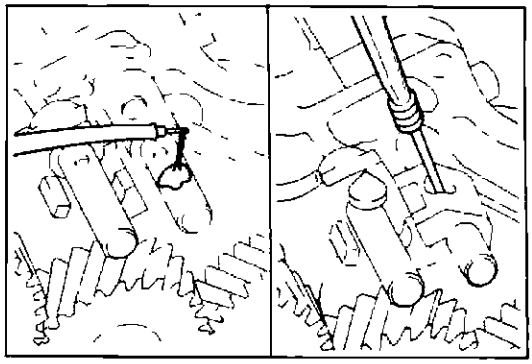


WRE91 TR189

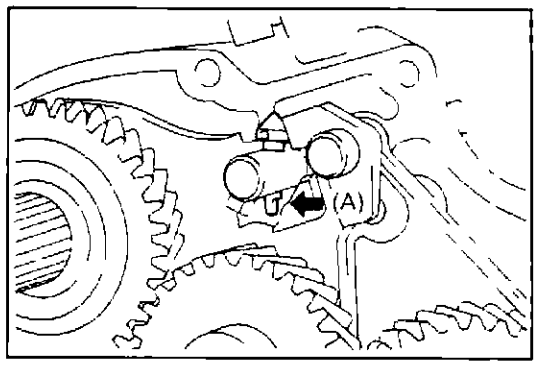
19 Apply gear oil to the outer periphery of the needle roller bearing
20 Install the transfer output rear shaft.


WRE91 TR190

21. Apply gear oil to the outer periphery of the transfer front drive shift fork shaft
22. Install the pin (for the shift fork shaft) to the transfer high & low shift fork shaft
23 Install the transfer gear shift head to the transfer front drive shift fork shaft with a new slotted spring pin, using a standard pin punch

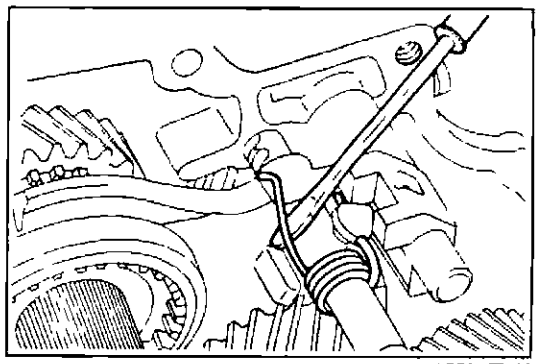

WRE91 TR191

NOTE:
- **Make sure that the cut-out section (A) of the pin (for the shift fork shaft) faces toward the transfer gear shift head side.**

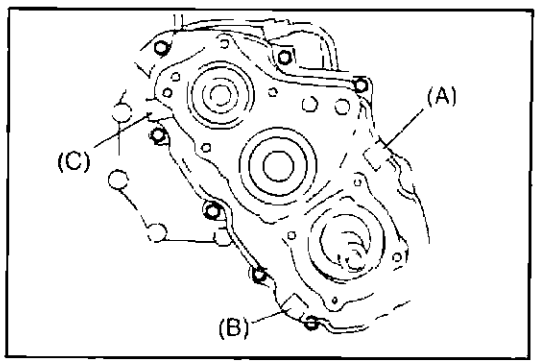


WRE91 TR192

24 Install the torsion spring by means of a standard flat screwdriver

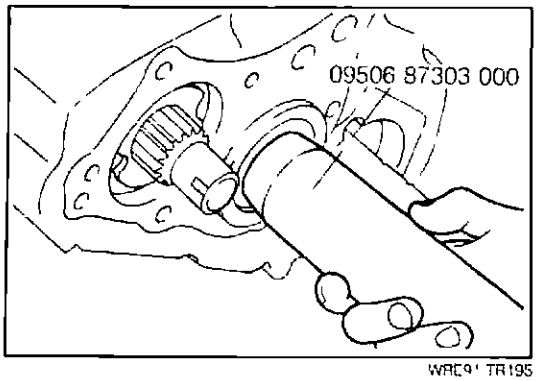

WRE91 TR193

25 Install a new transfer case gasket
26 Install the transfer case, by lightly tapping it at the rib sections (A), (B) and (C), using a plastic hammer or the like.



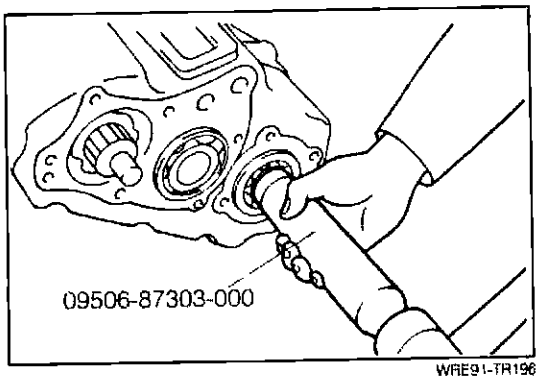
WRE91 TR194

27 Install the transfer idler gear rear bearing, using the following SST
SST: 09506-87303-000



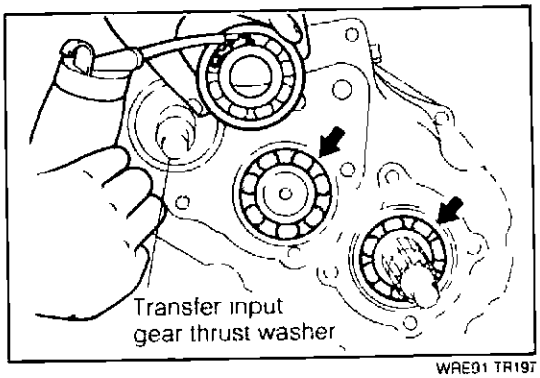
WRE91 TR195

28 Attach the stop ring of the radial ball bearing at the transfer output rear shaft
29 Install the radial ball bearing, using the following SST
SST: 09506-87303-000



WRE91-TR196

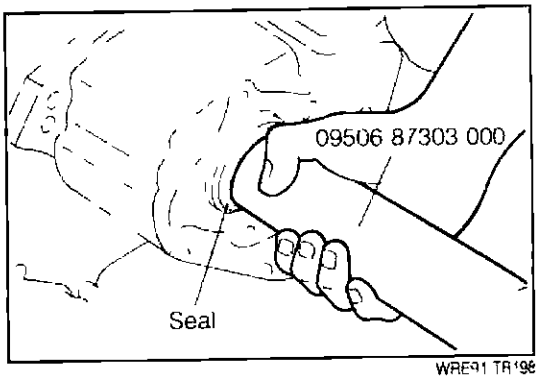
30 Install the transfer input gear thrust washer to the transfer input shaft.
31 Apply gear oil to the roller section of each bearing.



WRE91 TR197

32 Install the radial ball bearing, using the following SST
SST: 09506-87303-000

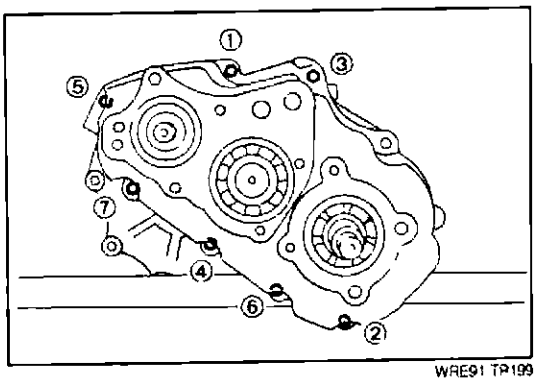
NOTE:
- Make sure that the seal surface of the bearing faces toward the rear side.



WRE91 TR198

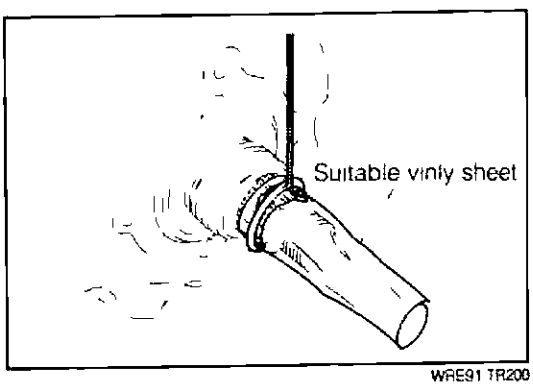
33 Tighten the transfer case with the seven bolts
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally. (The right figure indicates a typical example of the tightening sequence.)



WRE91 TR199

34 Install the transfer rear output shaft spacer No. 3 and speedometer drive gear to the transfer output rear shaft
35 Cover the transfer output rear shaft with a suitable vinyl sheet
36 Apply gear oil to the "O" ring and install it in place



WRE91 TR200

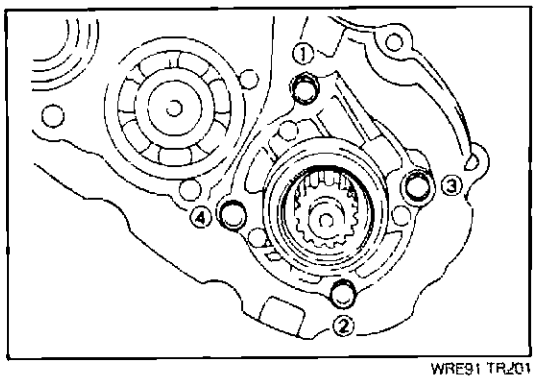
37 Apply Three Bond 1216 (made by Three Bond) to the threaded portion of the bolt

38 With a new output shaft bearing rear retainer gasket interposed, tighten the output shaft bearing rear retainer with the four bolts

Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

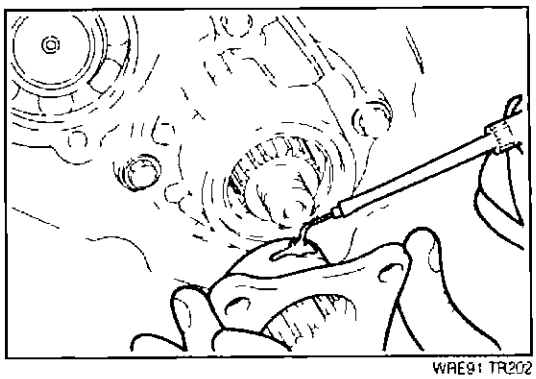
NOTE:

- **Be sure to tighten the bolts diagonally and evenly. (The right figure indicates a typical example of the tightening sequence.)**



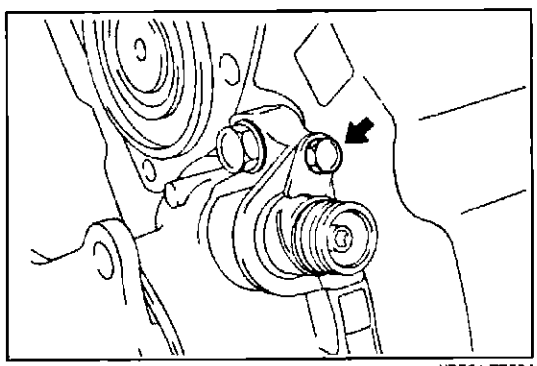
WRE91 TR201

39 Apply gear oil to the outer periphery (the contact surface with the lip section of the type "T" oil seal) of the output shaft companion flange and install it in place


WRE91 TR202

40 Install the speedometer driven gear to the speedometer shaft sleeve Tighten the speedometer sleeve lock plate with the bolt.

Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf-m)

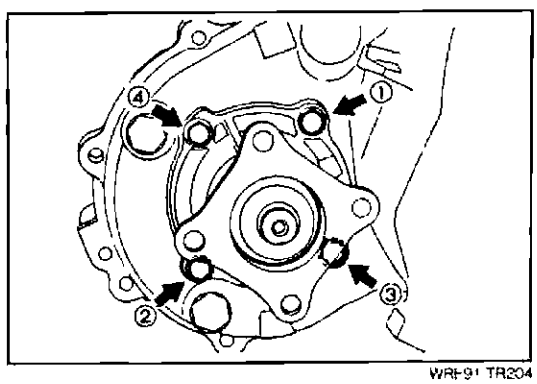

WRE91 TR203

41 With a new gasket interposed, tighten the output shaft bearing front retainer with the output shaft companion flange installed by means of the four bolts

Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

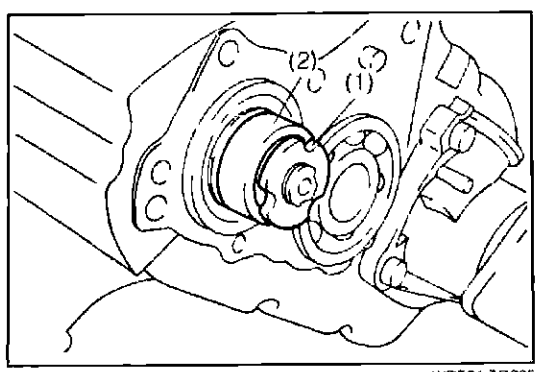
NOTE:

- **Be sure to tighten the bolts diagonally and evenly. (The right figure indicates a typical example of the tightening sequence.)**



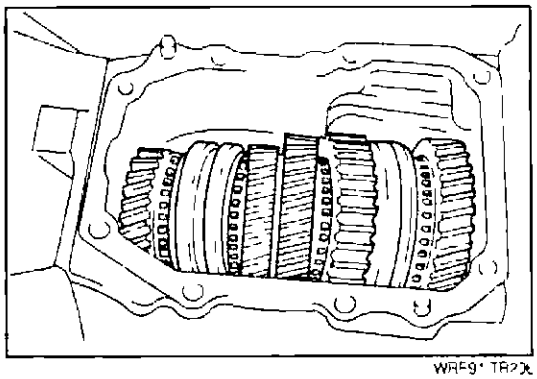
WRE91 TR204

42 Install the following parts to the transfer input shaft
(1) Transfer input shaft spacer No 2
(2) Transfer input shaft spacer No 3



WRE91 TR205

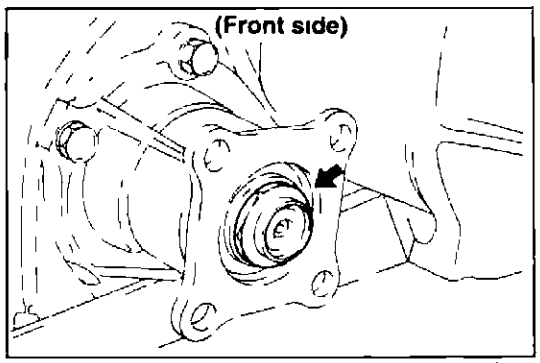
43 Interlock the 1st gear with the 3rd gear



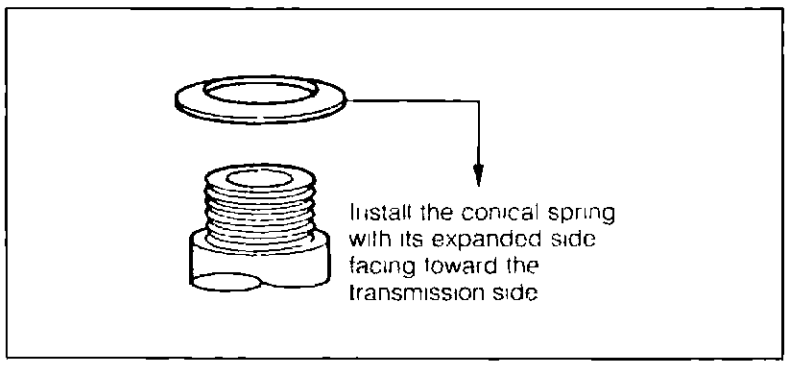
WRE91 TR2X

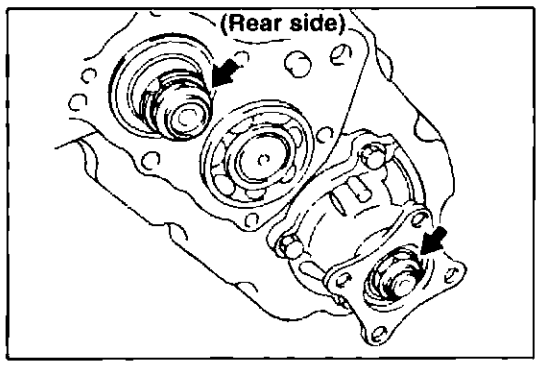
44 Install the conical spring washer
45 Tighten a new lock nut

		Tightening Torque	
		N·m	kgf-m
Transfer input shaft		225.4 - 261.6	23.0 - 27.0
Output shaft companion flange	Rear	78.0 - 137.2	10.0 - 14.0
	Front	78.0 - 137.2	10.0 - 14.0



WRE91 TR2Q

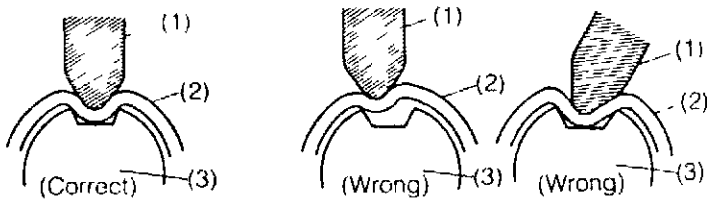




WRE9 TR2D8

NOTE:
- When staking the lock nut, point a suitable staking tool toward the transfer input shaft and transfer output front, rear shaft axis center and stake the lock nut securely, as shown in the figure below (Poor staking may cause abnormal noise)

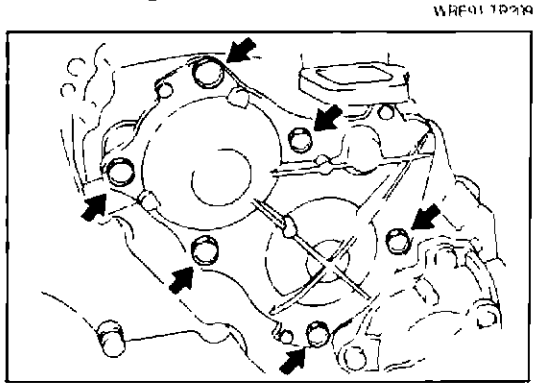
(1) Suitable staking tool
(2) New nut
(3) Shaft



WRE91 TR2X9

46 Apply Three Bond 1216 (made by Three Bond) to the threaded portion of the bolt
47 With a new gasket interposed, tighten the transfer case cover No. 1 with the six bolts
Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

NOTE:
- Be sure to tighten the bolts diagonally and evenly (The right figure indicates a typical example of the tightening sequence.)



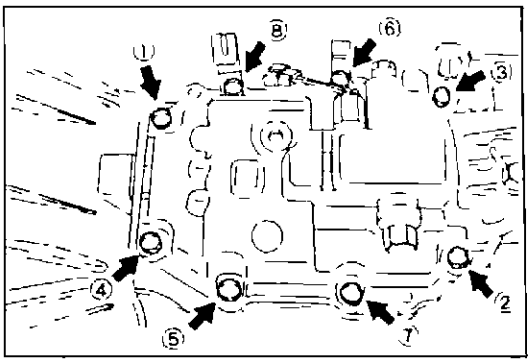
WRE91 TR2W

48 With a new gasket interposed, tighten the transmission case cover with the eight bolts

Tightening Torque: 29.4 - 44.0 N·m (3.0 - 5.0 kgf-m)

NOTE

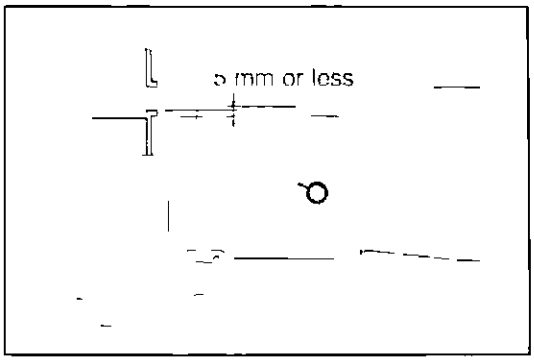
- Be sure to tighten the bolts diagonally and evenly. (The right figure indicates a typical example of the tightening sequence.)



49 Install the transmission and transfer assembly to the vehicle

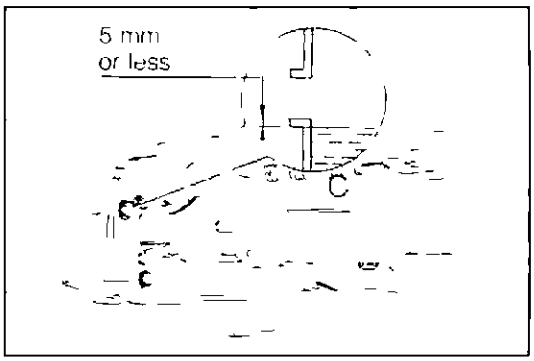
50 Fill the transmission and transfer with oil

	Oil capacity	API	SAE
T/M	2.2L	GL-3	90
T/F	1.3L	GL-3	75W-90 or 75W-85

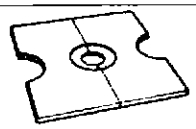
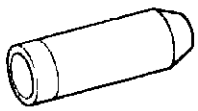
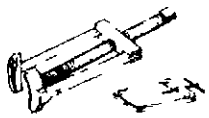
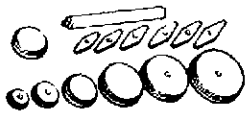
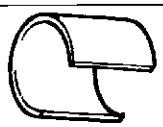


51 Tighten the both transmission and transfer filler plugs with new gasket

Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf-m)



SSTs

Shape	Part Number	Part Name
	09253-87202-000 (09253-87201)	Water pump bearing anvil [Crankshaft center bearing anvil]
	09506-87303-000	Differential drive pinion bearing cone front replacer
	09517-30010-000	Rear axle shaft oil seal replacer
	09602-87301-000	Counter gear bearing puller
	09608-87302-000 (09608-87301)	Axle hub & drive pinion bearing tool set
	09710-06040-000	"A" front suspension upper arm bush base

WRF91 TR213

SERVICE SPECIFICATIONS

5-SPEED

Unit: mm

			Specified value	Allowable limit	Remarks
Thickness		Transfer input gear thrust washer	4 ±0.05	3.9	
Diameter	Outer	Transfer high & low clutch hub	72.5 $^{-0.10}_{-0.17}$	72.3	
	Bore	Hub sleeve	72.5 $^{+0.2}_{0}$	72.7	
Contact width section		Transfer high & low shift fork	7 $^{-0.15}_{-0.2}$	6.3	
		Transfer high & low clutch hub	7 $^{+0.058}_{0}$	7.3	
Diameter	Outer	Transfer high & low shift fork shaft	16 $^{-0.025}_{-0.040}$	15.07	
	Inner	Transfer high & low shift fork	16 $^{+0.027}_{+0}$	16.0	
Diameter	Outer	Transfer output rear shaft	72.5 $^{-0.10}_{-0.17}$	72.3	
	Bore	Hub sleeve	72.5 $^{+0.2}_{0}$	72.7	
Contact width section		Transfer front drive shift fork	7 $^{-0.1}_{-0.2}$	6.3	
		Hub sleeve	7 $^{+0.058}_{+0}$	7.3	
Diameter	Outer	Transfer front drive shift fork shaft	16 $^{-0.025}_{-0.040}$	15.06	
	Inner	Transfer front drive shift fork	16 $^{+0.027}_{+0}$	16.03	

WRE91 TR214

4-SPEED

Unit: mm

			Specified value	Allowable limit	Remarks
Diameter	Outer	Transfer output rear shaft	72.5 $^{+0.10}_{+0.06}$	72.3	
	Bore	Hub sleeve	72.5 $^{+0.1}_{-0}$	72.7	
Contact width section		Transfer front drive shift fork	7 $^{+0.36}_{+0.16}$	6.0	
		Hub sleeve (for high & low clutch hub)	7 $^{+0.058}_{-0}$	7.3	
Diameter	Outer	Transfer front drive shift fork shaft	16 $^{-0.016}_{-0.043}$	15.95	
	Inner	Transfer front drive shift fork	16 $^{+0.043}_{+0.016}$	16.03	
Diameter	Outer	Transfer high & low clutch hub	72.5 $^{+0.2}_{+0}$	72.7	
	Bore	Hub sleeve (for high & low clutch)	72.5 $^{+0.1}_{+0.06}$	72.3	
Contact width section		Transfer high & low shift fork	7 $^{+0.15}_{+0.05}$	6.3	
		Hub sleeve	7 $^{+0.058}_{-0}$	7.3	
Diameter	Outer	Transfer high & low shift fork shaft	16 $^{-0.016}_{-0.043}$	15.06	
	Inner	Transfer high & low shift fork	16 $^{+0.043}_{+0.016}$	16.03	
		Transfer gear shift head	16 $^{+0.059}_{+0.016}$	16.06	

WHS91TH-5

TIGHTENING TORQUE

5-SPEED

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Transfer shift lever retainer subassembly x Transfer case	9.8 - 15.6	1.0 - 1.6	7.2 - 11.6
Bolt (for transfer high & low shift fork shaft) x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Bolt x Vacuum switching valve No. 2	3.9 - 6.8	0.4 - 0.7	2.9 - 5.1
Transfer input shaft x Lock nut	226.0 - 264.0	23.0 - 27.0	166.0 - 194.4
Transmission position detect switch x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer position detect switch x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transmission position switch assembly x Diaphragm cylinder cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Diaphragm cylinder cover x Output shaft bearing front retainer	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing front retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Bolt (for transfer front drive shift fork shaft) x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing retainer front x Output shaft bearing front retainer	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer output front shaft x Lock nut	98.0 - 137.0	10.0 - 14.0	72.0 - 101.0
Transfer output rear shaft x Lock nut	98.0 - 137.0	10.0 - 14.0	72.0 - 101.0
Output shaft bearing rear retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing rear retainer x Speedometer sleeve lock plate	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5

WHLA1-TH

4-SPEED

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Transfer shift lever retainer subassembly x Transfer case	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Transfer position detect switch x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Filler & drain plug x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer case cover No. 1 x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Bolt (for transfer front drive shift fork shaft) x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer output front shaft x Lock nut	98.0 - 137.2	10.0 - 14.0	72.0 - 101.0
Output shaft bearing front retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Output shaft bearing rear retainer x Transfer case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Transfer output rear shaft x Lock nut	98.0 - 137.2	10.0 - 14.0	72.0 - 101.0
Output shaft bearing rear retainer x Speedometer sleeve lock plate	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5

WRE91 TR217