AUTOMATIC TRANSMISSION

CONTENTS

E23AA--

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

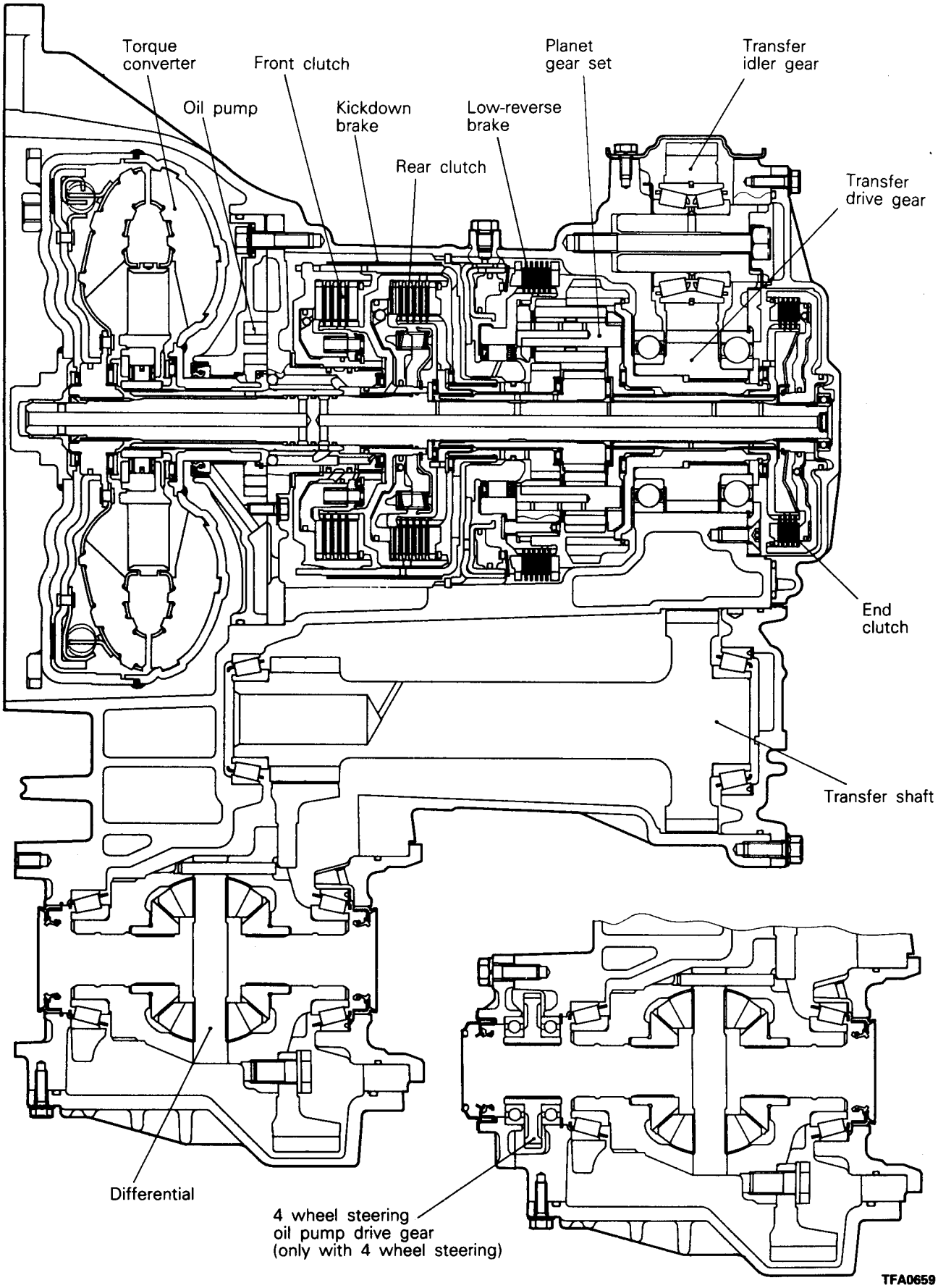
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

 May 1994 PWGE9004-G REVISED

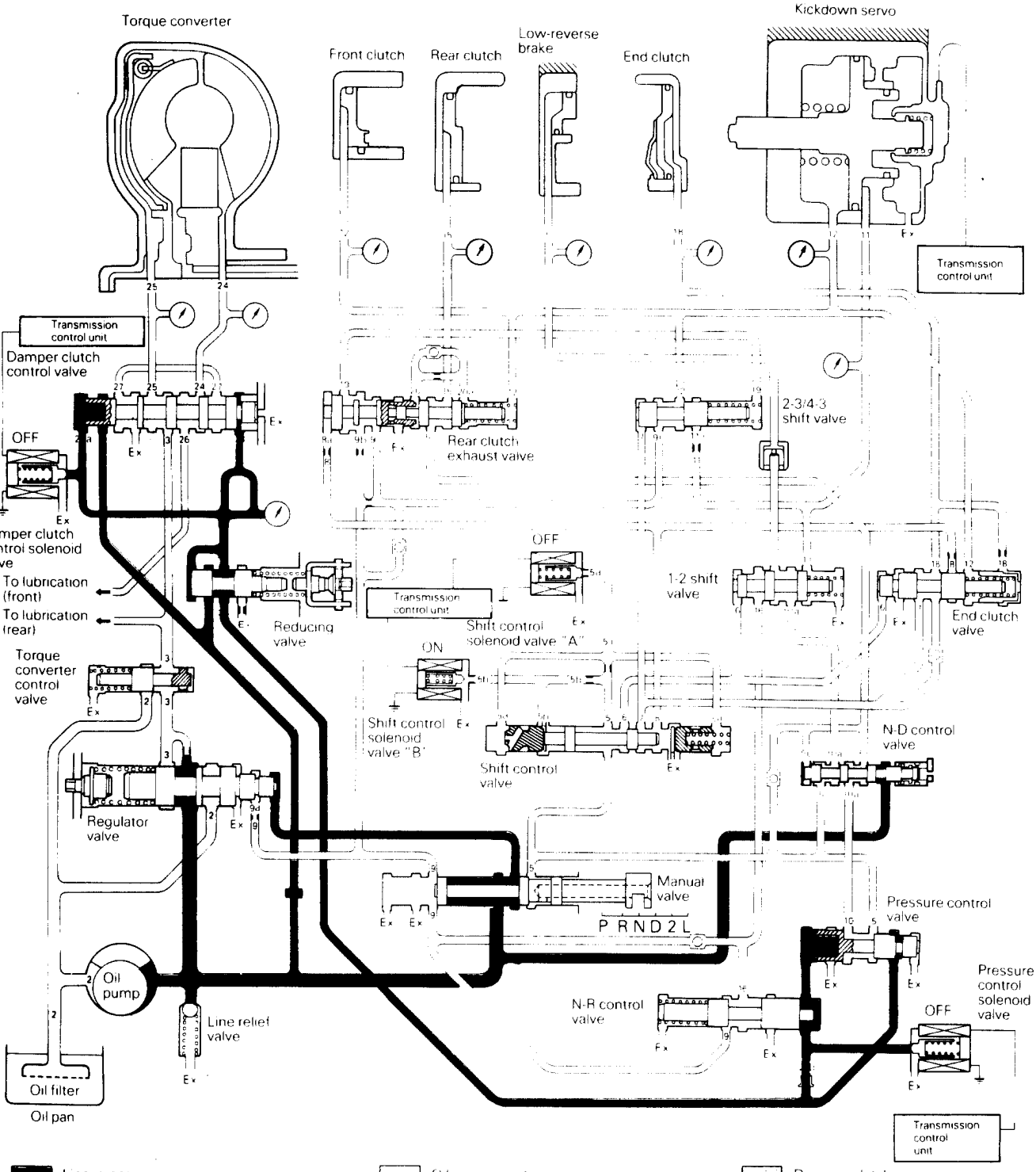
GENERAL INFORMATION

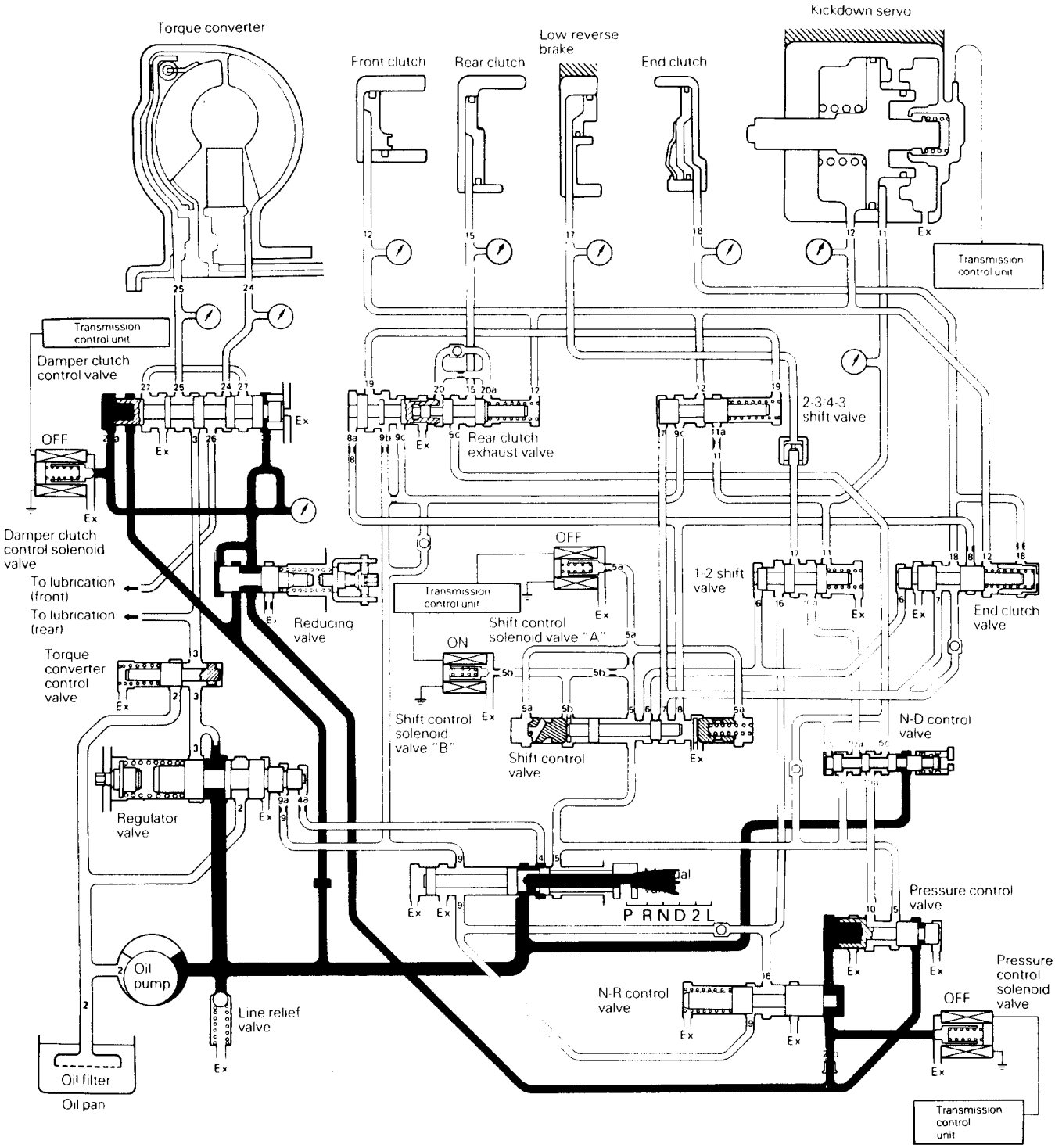
E23BAAK

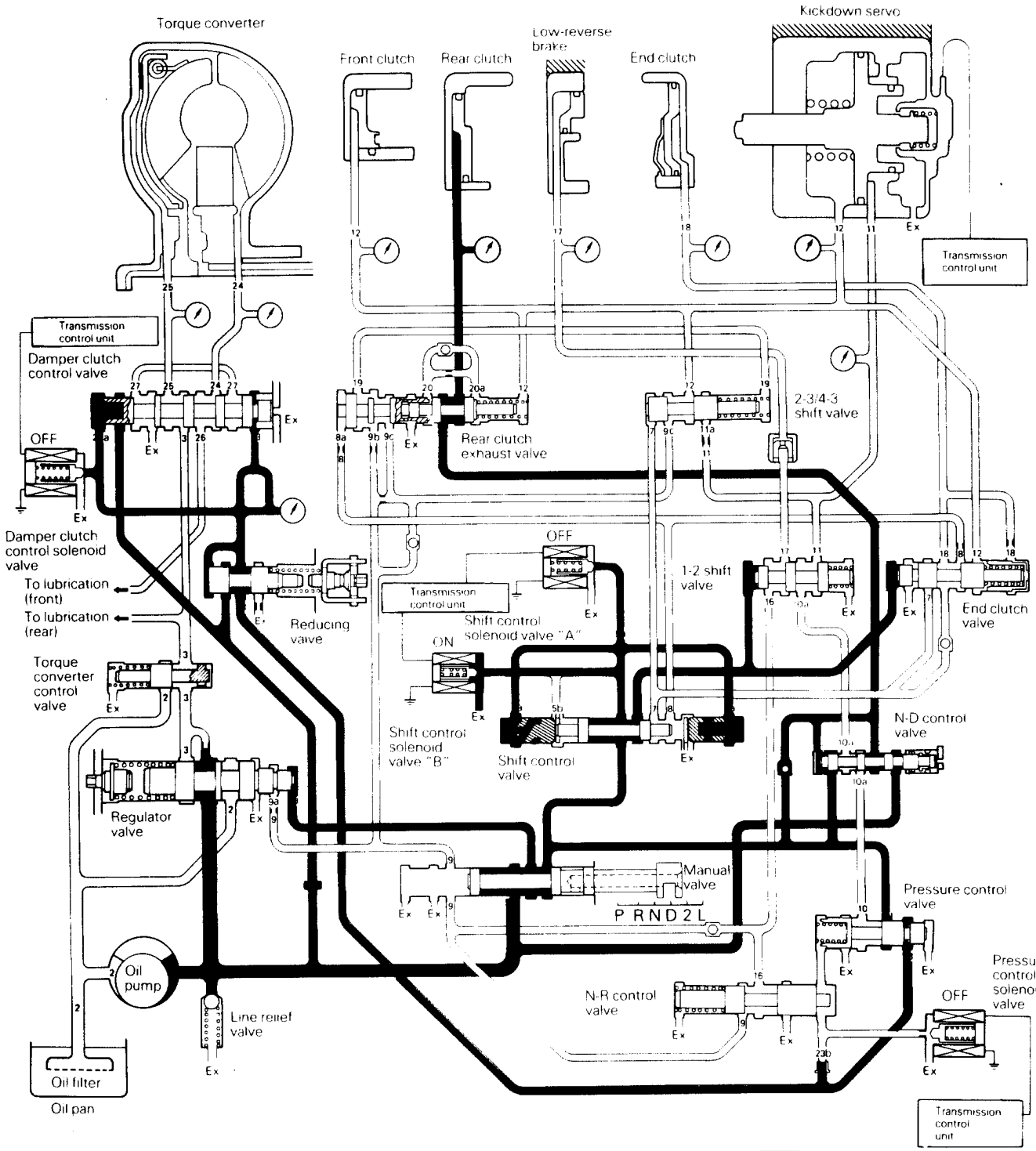
SECTIONAL VIEW



HYDRAURIC CIRCUIT




Torque converter
Front clutch
Rear clutch
Low-reverse brake
End clutch
Kickdown servo
Transmission control unit
Damper clutch control valve
OFF
Damper clutch control solenoid valve
To lubrication (front)
To lubrication (rear)
Torque converter control valve
Reducing valve
Rear clutch exhaust valve
2-3/4-3 shift valve
1-2 shift valve
End clutch valve
Shift control solenoid valve "A"
ON
Shift control solenoid valve "B"
Shift control valve
N-D control valve
Regulator valve
P R N D 2 L
Pressure control valve
Pressure control solenoid valve
N-R control valve
Oil pump
Line relief valve
Oil filter
Oil pan
Line pressure
Torque converter and lubrication pressure
Reducing pressure
Oil pump suction pressure
Modulated line pressure
Pressure control solenoid valve pressure
Damper clutch pressure
Damper clutch control solenoid valve pressure
Parking
TFA0071


Torque converter
Front clutch
Rear clutch
Low-reverse brake
End clutch
Kickdown servo
Transmission control unit
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OFF
Ex
Damper clutch control solenoid valve
To lubrication (front)
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Shift control valve
N-D control valve
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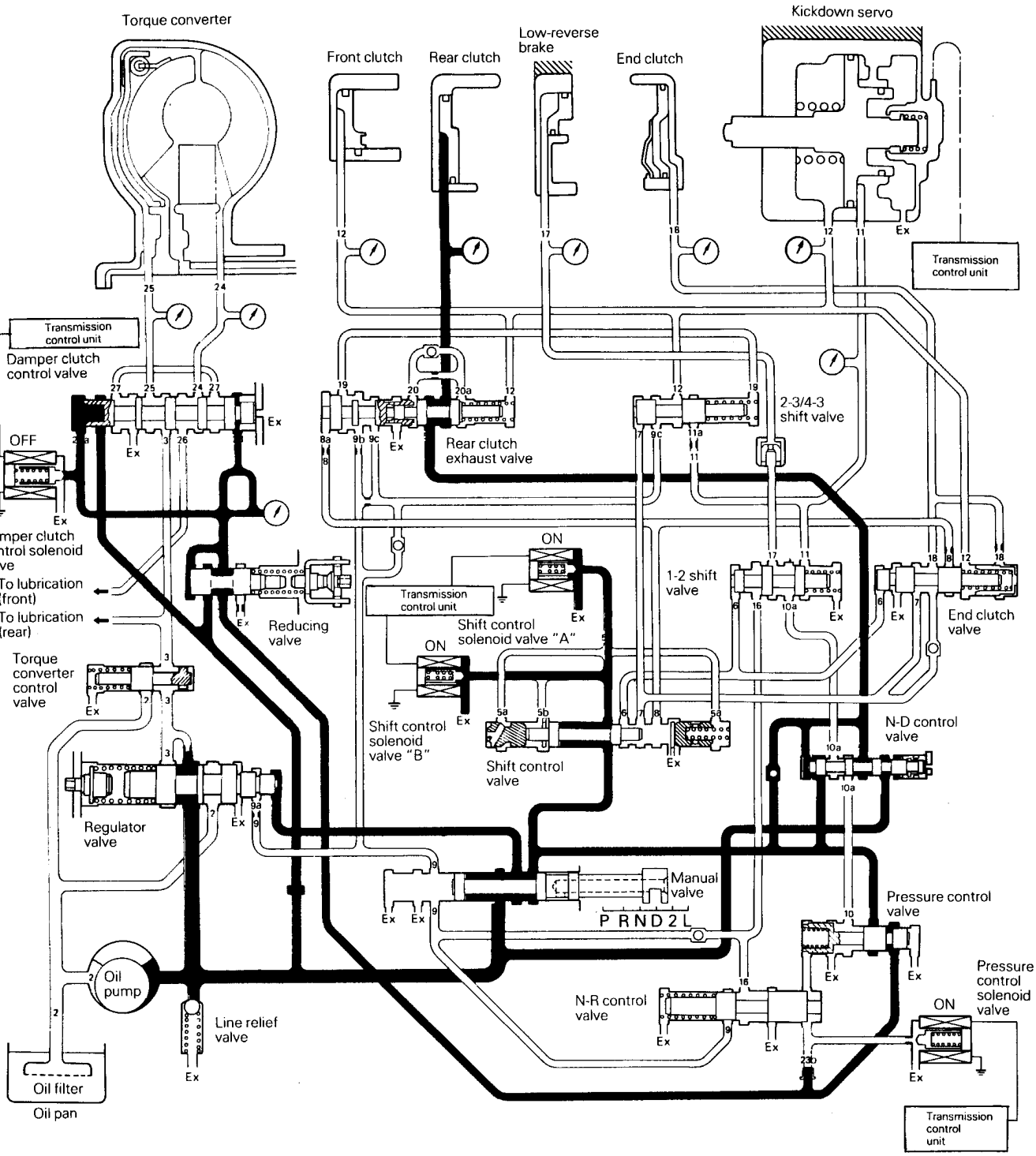
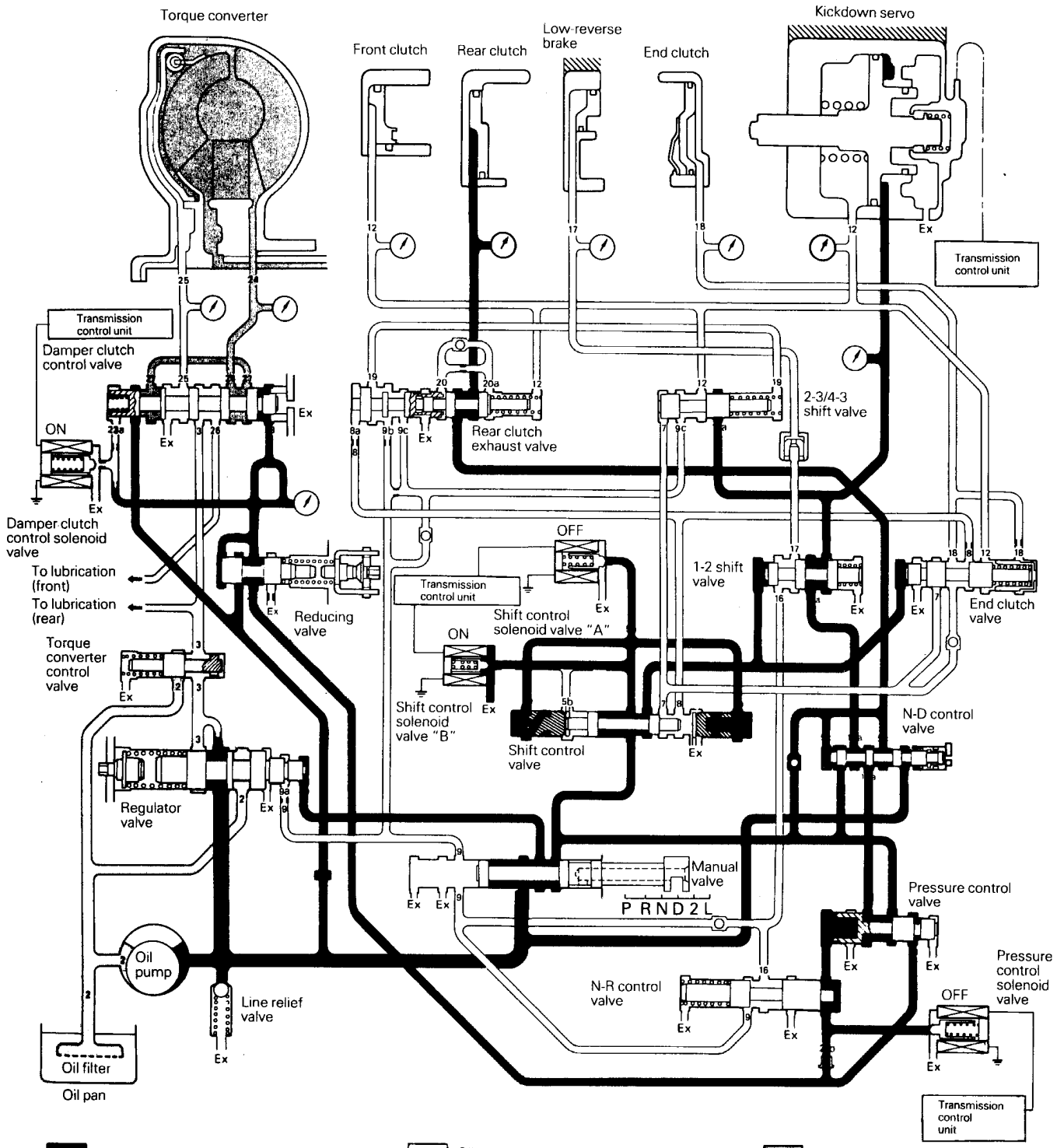
P R N D 2 L
Pressure control valve
Pressure control solenoid valve
N-R control valve
Oil pump
Line relief valve
Oil filter
Oil pan
Line pressure
Torque converter and lubrication pressure
Reducing pressure
Oil pump suction pressure
Modulated line pressure
Pressure control solenoid valve pressure
Damper clutch pressure
Damper clutch control solenoid valve pressure
Drive (Stop)

TFA0242



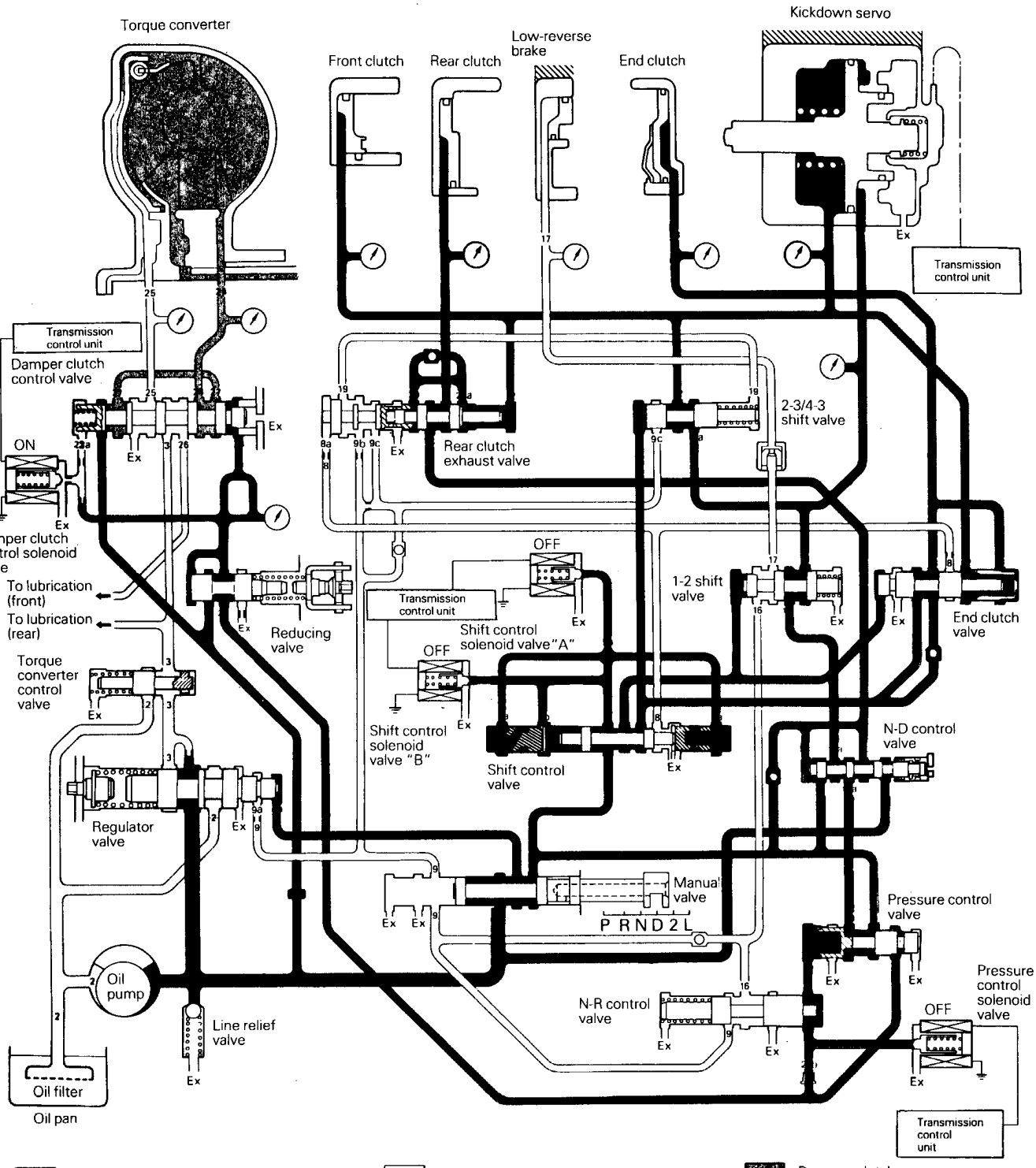
Drive (First)

TFA0072



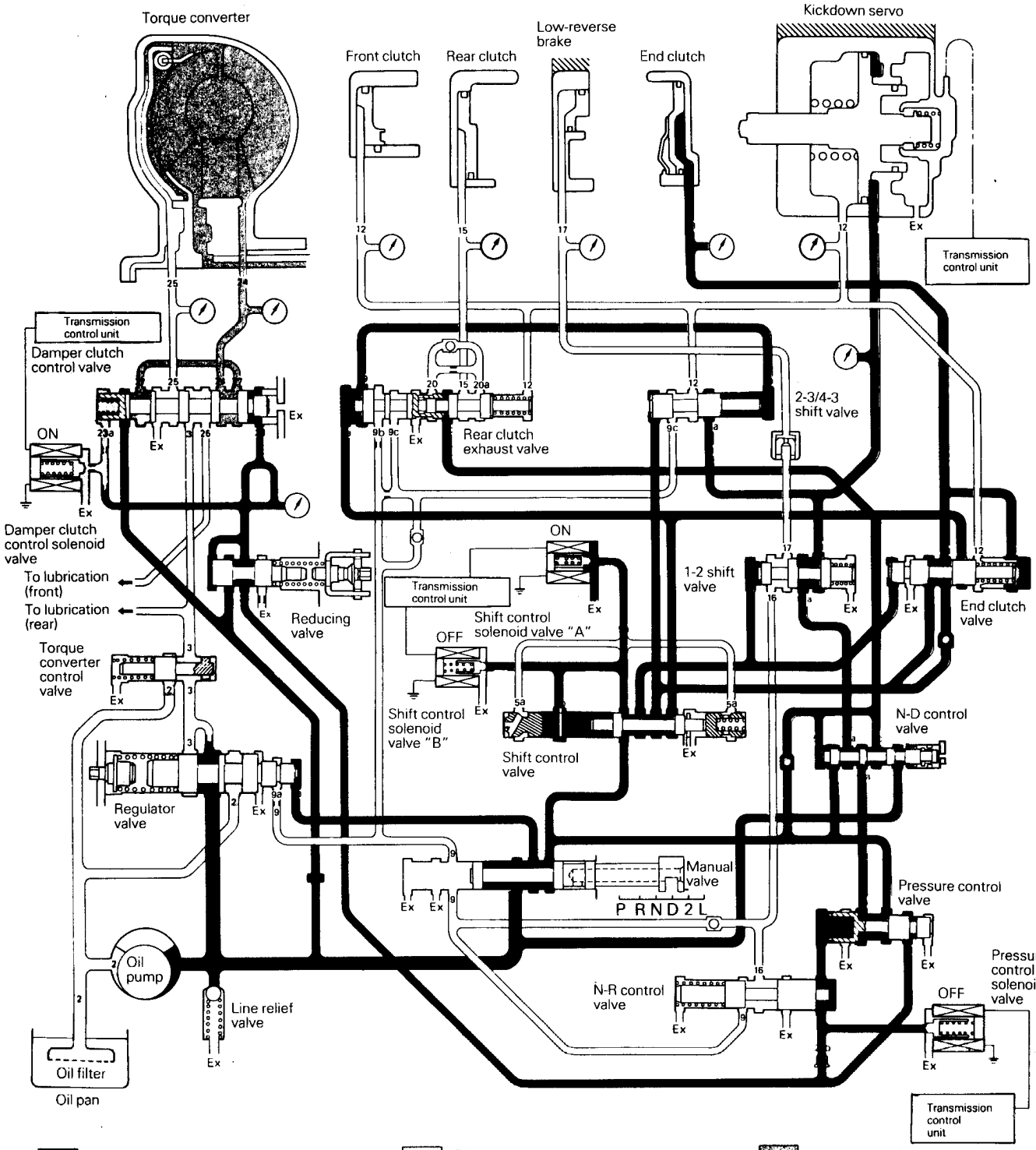
Drive (Second)

TFA0073



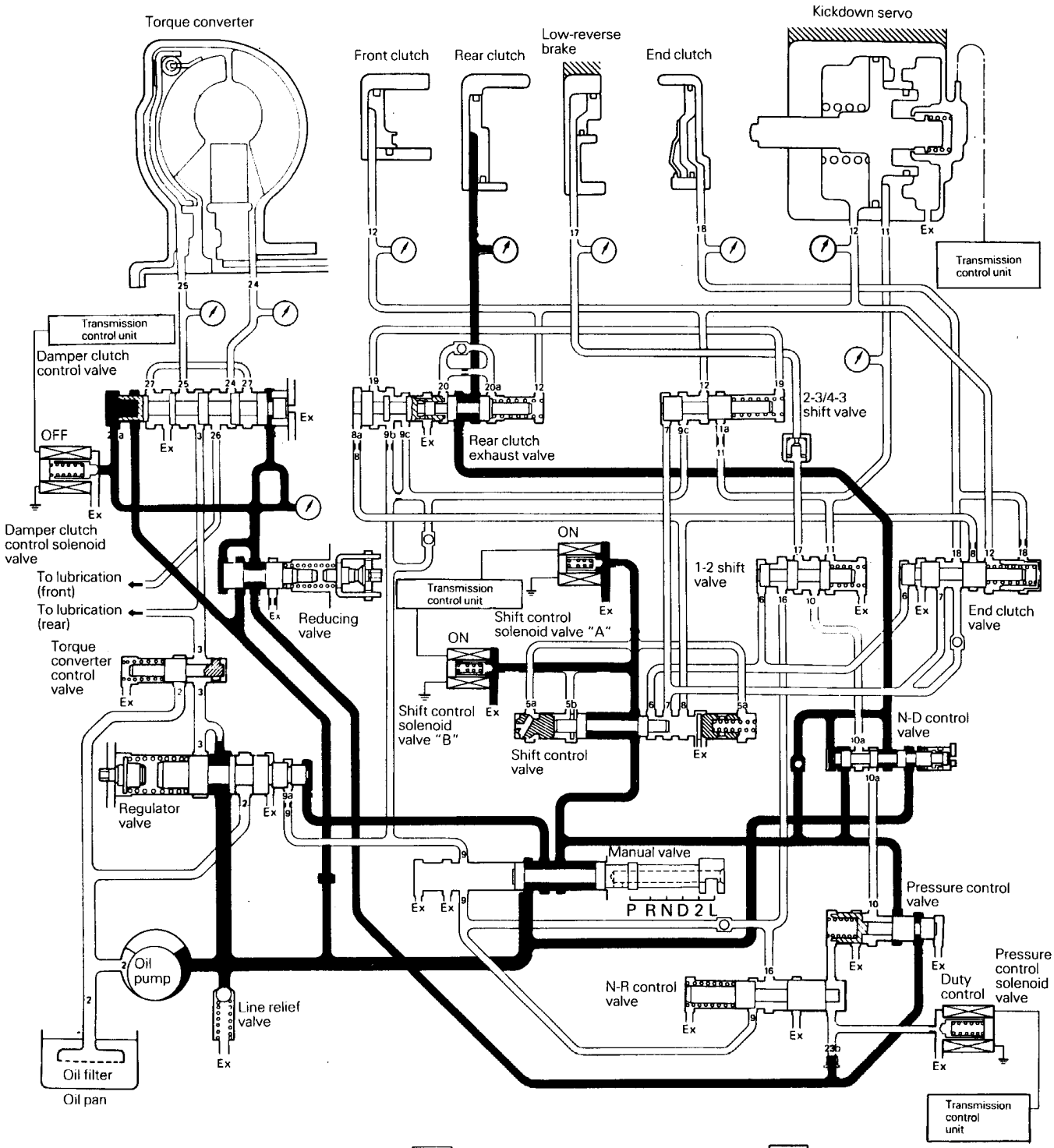
Drive (Third)

TFA0074



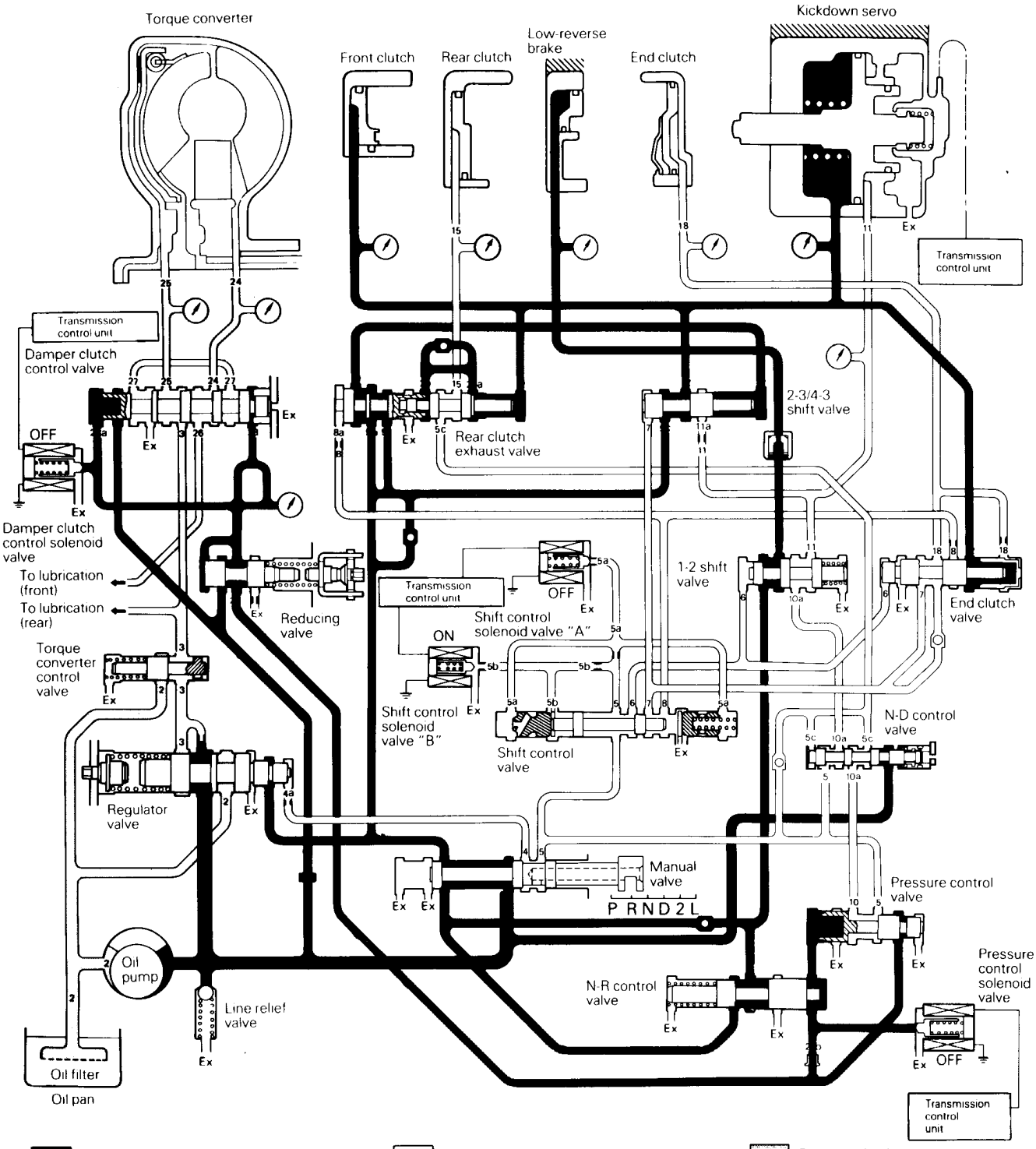
Drive (Fourth)

TFA0075



Lock-up (First)

TFA0076


Torque converter
Front clutch
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Oil filter
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Line pressure
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Oil pump suction pressure
Modulated line pressure
Pressure control solenoid valve pressure
Damper clutch pressure
Damper clutch control solenoid valve pressure
Reverse

TFA0077

SPECIFICATIONS

GENERAL SPECIFICATIONS

E23CA--

Transmission model		F4A33
Torque converter		
Type		3 element with damper clutch
Engine stall speed	r/min.	1,800–2,800
Transmission		
Type		4-speed full automatic
Front clutch (No. of discs)		4
Rear clutch (No. of discs)		5
End clutch (No. of discs)		4
Low-reverse brake (No. of discs)		6
Kickdown brake		Band type
One-way clutch		Sprag type
Hydraulic control by		Electronic control unit
Oil pump		Gear type
Gear ratio		
1st		2.551
2nd		1.488
3rd		1.000
4th		0.685
Reverse		2.176
Oil cooling method		Water-cooled type oil cooler

SERVICE SPECIFICATIONS

E23CB--

Items		Specifications
Standard value		
Line pressure	kPa (kg/cm^2, psi)	870–890 (8.7–8.9, 124–126)
Oil pressure change for each turn of adjustment screw	kPa (kg/cm^2, psi)	38 (0.38, 4.6)
Accelerator pedal stroke (accelerator pedal switch ON to OFF)	mm (in.)	2–6 (0.08–0.24)
Length of front height sensor rod	mm (in.)	269–270 (10.6–11.0)
Sleeve and selector lever and measurements	mm (in.)	15.2–15.9 (0.598–0.625)

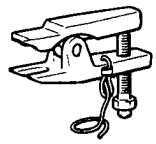
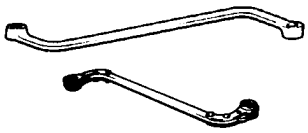
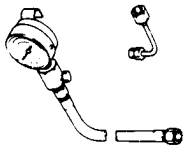
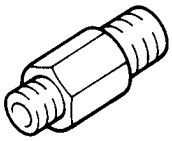
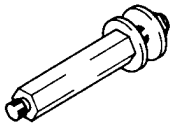
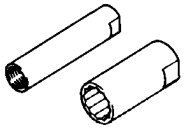
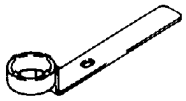
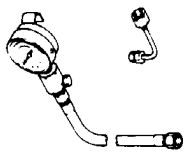
LUBRICANTS

E23CD--

Items	Specified lubricant	Quantity
Transmission fluid	DIA QUEEN ATF-SP or equivalent	7.5 lit. (7.9 U.S.qts., 6.6 Imp.qts.)
Torque converter connection bolt	DIA QUEEN ATF-SP or equivalent	As required

SPECIAL TOOLS

E23DA--

Tool	Number	Name	Use
	MB991113 or MB990635	Steering linkage puller	• Disconnection of the coupling of the knuckle and lower arm ball joint • Disconnection of the coupling of the knuckle and tie-rod end ball joint
	MB991341	Multi-use tester sub assembly	Checking of the diagnosis code, actuator testing, and checking of the service data
	(For the number, refer to GROUP 00 – Precautions Before Service.)	ROM pack	
	MB990900 or MB991164	Door hinge adjusting wrench	Removal and installation of oil pump assembly
	MD998330	Oil pressure gauge 3000 kPa (30 kg/cm^2, 400 psi)	Measuring oil pressure
	MD998332	Adapter	Connection of the oil pressure gauge
	MD998915	Kickdown servo wrench adapter	Adjustment of kickdown servo
	MD998916	Kickdown servo adjust wrench set	Adjustment of kickdown servo
	MD998918	Kickdown servo wrench	Adjustment of kickdown servo
	MD999563	Oil pressure gauge 1000 kPa (10 kg/cm^2, 140 psi)	Measuring of pressure

Based upon use of the troubleshooting guide, the probable location of the problem should be estimated.

⇩

Checks should be made of fluid levels and the condition of the ATF, as well as the condition of the manual control cables; adjustments should then be made if found to be necessary.

⇩

If a presumption has been made that there is an abnormal condition somewhere in the electronic-control system, check the fault code, in order to determine the probable location of the problem, by using a multi-use tester.

⇩

When the abnormal system is discovered, check each element (sensors, etc.) one by one, and make repairs as necessary.

⇩

When the abnormal condition is presumed to be in the oil-pressure-control system, check by making an oil-pressure test.

⇩

When the result of the oil-pressure test does not satisfy the specified pressure, check each system at places related to the valve body, check the oil-pressure passages for leakage, etc.

⇩

If the problem is unusually dirty ATF, abnormal noises, oil leakage, or slippage of the clutch or brakes, or an abnormal condition of the transmission itself, disassemble and repair the transmission.

TROUBLESHOOTING

E23EAAJ

Functional malfunctions of the ELC-4A/T can lead to other problems, such as those described below:
(1) Improper maintenance and/or adjustments
(2) Malfunctions of the electronic control functions
(3) Malfunctions of mechanical functions
(4) Malfunctions of hydraulic control functions
(5) Malfunctions of engine performance
etc.

In order to properly determine ("Troubleshoot") the source of these malfunctions, it is first essential to methodically question the user concerning the details of the problem, such as the condition of the problem, the situation at the time the problem occurred, and any other relevant information, all in as much detail as possible. The user should also be asked whether or not the problem has occurred more than once, and under what conditions. Subsequently, certain tests should be conducted in a certain order, as described at the left.

TROUBLESHOOTING GUIDE

		Problem / Presumed cause	Driving impossible or abnormal (before start-off)											
			Starter motor won't function	Forward/backward movement impossible	Forward movement impossible	Backward movement impossible	Engine stalls when N → D or R	Clutch slips at D (stall rpm too high)	Clutch slips at R (stall rpm too high)	Stall rpm too low	Vehicle moves at P or N	Engine starts, or vehicle moves, between N-R or N-D	Parking doesn't hold	Abnormal vibration-shock when shift to D-2-L-R
Engine	1	Abnormal idling rpm					⊗							×
	2	Performance malfunction					×			×				
Transmission (power train)	3	Improper adjustment of manual linkage	×	⊗	⊗	⊗		⊗	⊗		⊗	⊗	⊗	⊗
	4	Malfunction of torque convertor		×	×	×				×				
	5	Operation malfunction of oil pump		×	×	×		×	×					
	6	Malfunction of one-way clutch			×			×						
	7	Damaged or worn gear or other rotating part, or improper adjustment of the preload												
	8	Malfunction of parking mechanism									×		×	
	9	Cracked drive plate, or loose bolt		×										
	10	Worn inside diameter of front clutch retainer				×			×					
Oil-pressure system (including friction elements)	11	Low fluid level		⊗	⊗	⊗		×	×					
	12	Line pressure too low (seal damaged, leakage, looseness, etc.)		⊗	⊗	⊗		⊗	⊗					
	13	Malfunction of valve body (sticking valve, working cavity, adjustment, etc.)		⊗	⊗	⊗	×	×	×		×	×		×
	14	Malfunction of front clutch or piston				×			×					×
	15	Malfunction of rear clutch or piston			⊗			×						×
	16	Malfunction of kickdown band or piston												
	17	Improper adjustment of kickdown servo												
	18	Malfunction of low-reverse brake or piston		×		×			×					×
	19	O-ring of low-reverse brake circuit between valve body and case not installed				×			×					
	20	Malfunction of end clutch or piston (check ball hole, other)												
Electronic-control system	21	Malfunction of inhibitors switch, damaged or disconnected wiring, or improper adjustment	×								×	×		×
	22	Malfunction of TPS, or improper adjustment												×
	23	Pulse generator (A) damaged or disconnected wiring, or short-circuit												
	24	Pulse generator (B) damaged or disconnected wiring, or short-circuit				×								
	25	Malfunction of kickdown servo switch												
	26	SCSV-A or B damaged or disconnected wiring, or short-circuit or sticking (valve open)												
	27	Malfunction of ignition signal system												
	28	Incorrectly grounded ground strap												
	29	PCSV damaged or disconnected wiring, or short-circuit												
	30	PCSV damaged or disconnected wiring (valve open)		⊗	⊗	⊗		×	×					
	31	DCCSV damaged or disconnecting wiring (valve closed)												
	32	DCCSV short-circuit or sticking (valve open)					⊗							
	33	Malfunction of overdrive control switch												
	34	Malfunction of accelerator switch, or improper adjustment												×
	35	Malfunction of oil-temperature sensor												
	36	Malfunction of lead switch												
	37	Poor contact of ignition switch												
	38	Malfunction of transmission control unit												×

NOTE: ⊗ indicates items of high priority during inspection.
Abbreviations: TPS = Throttle position sensor SCSV = Shift control solenoid valve

	Transmission malfunction of shift-shock (after start-off)																Abnormal noise, other			
	Won't shift from 2nd to 3rd	Won't shift to 4th	Overdrive control switch doesn't function	Doesn't shift according to shift pattern (shifting is possible)	Improper start-off (starts off from 2nd, etc.)	Excessive creeping or idling vibration	Excessive vibration-shock when shift 1-2 or 3-4	Excessive vibration-shock when shift 2-3 or 4-3	Excessive vibration-shock during upshift	Excessive vibration-shock during D-2 downshift	Sudden engine rpm increase during upshift	Sudden engine rpm increase during 3-2 shift, excessive vibration	Excessive vibration-shock only when cold	Excessive vibration-shock (other than already described)	Damper clutch won't function	Abnormal vibration in high-load region in low gear (approx. ↑ Hz)	Abnormal noise from convertor housing together with engine rpm	Mechanical noise (clatter noise) from convertor housing	Abnormal noise inside transmission case	3rd gear is held
1						×														
2					×		×	×	×	×			×	×		×				
3		×			×															×
4					×										×	×				
5												×					×			
6																				
7																			×	
8																				
9																		×		
10	×	×									×	×								×
11												×								×
12											⊗	⊗		×						×
13	×			×	×		×	×	×	×	×	×	×	×	×	×				×
14	×							×	×		×									×
15																				×
16							×				×	×								×
17							×				×	×		×						
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19																				×
20		⊗					×				×									×
21		×			×															×
22				⊗			×	×	⊗	×	⊗	×		×	×	×				
23							×	×	×	×	×	×		×	×	×				×
24				×											×	×				×
25							×					×								×
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27							×	×	×	×	×	×		×	×					
28																				×
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31															×					
32																×				×
33		×	×																	
34					×	×									×					
35														×	×	×				
36																				×
37				×																×
38	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×			×

PSCV = Pressure control solenoid valve
DCCSV = Damper clutch control solenoid valve

INSPECTION OF ELECTRONIC CONTROL SYSTEM COMPONENTS

1. Wiring

→ Based on the wiring diagram, check whether the continuity and grounding of each harness is OK.

→ No continuity

→ Improper connection of connector, damaged or disconnected harness, or incorrect wiring connection.

→ Reconnect the connector; repair or replace the harness.

Based on the wiring diagram, check whether the continuity and grounding of each harness is OK.

→ Continuity

→ Normal

2. Oil-temperature sensor <Vehicles built up to November, 1992>

→ Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2 or 2 and 3.

→ No continuity (resistance: ∞)

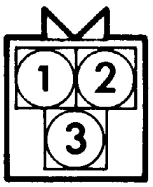
→ Damaged or disconnected wiring

→ Replace the oil-temperature sensor

Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2 or 2 and 3.

→ Changes of the resistance continuous and smooth.

→ Normal



1750447

1. Low temperature side
2. Earth
3. High temperature side

2. Oil-temperature sensor <Vehicles built from December, 1992>

→ Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2.

→ No continuity (resistance: ∞)

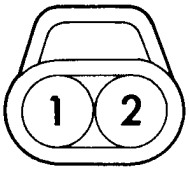
→ Damaged or disconnected wiring

→ Replace the oil-temperature sensor

Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2.

→ Changes of the resistance continuous and smooth.

→ Normal

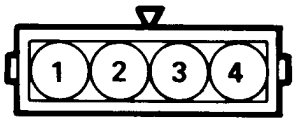


TFA0821

1. (+) side
2. (–) side

3. Throttle-position sensor (TPS)

TPS terminal



7FU0535

1. Earth
2. Idle position switch
3. Output
4. Power

Check the resistance between terminals 1 and 4 of the TPS.

Resistance: high or infinite → Damaged or disconnected wiring → Replace the TPS.

3.5–6.5 kΩ/20°C (68°F)

Check the resistance between terminals 4 and 2 with the engine idling after throttle-valve opening warm-up.

Resistance: more or less tnan 0.4 kΩ/20°C (68°F) → Improper adjustment → Readjust the TPS installation.

Resistance: approx. 0.4 kΩ/20°C (68°F)

Check for changes of the resistance between terminals 4 and 2 when the throttle valve is operated from the idling position to the fully open position.

Changes of the resistance are not continuous. → Poor contact → Replace the TPS.

Changes of the resistance continuous and smooth.

Normal

NOTES

4. Pulse generator A or B

Check the resistance between terminals 1 and 2 or 3 and 4.

Resistance: very low or very high → Short-circuit, or damaged or disconnected wiring → Replace the pulse generator.

215–275 Ω/20°C (68°F) → Normal

Pulse generator terminals

1–2: pulse generator A
3–4: pulse generator B

1750338

5. Pulse generator A or B (checking by an oscilloscope)

Connect the pulse generator and body harness, and connect an oscilloscope. Check with the chassis on a dynamo or with the front wheels raised.

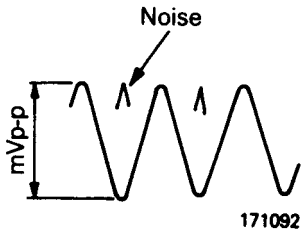
With the selector lever at the "L" position and the engine running at 1,000 rpm, check the voltage waveform between terminals 1 and 2.

Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator. → Correct the installation condition, or replace the pulse generator.

Noise in the waveform → Improper grounding of the pulse generator circuit's shielded wiring. → Replace the pulse generator.

1,000 mVp-p or higher

Oscilloscope waveform



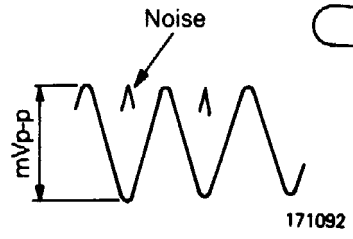
171092

With the selector lever at the "L" position and the engine running at 1,000 rpm, check the voltage waveform between terminals 3 and 4.

Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator. → Correct the installation condition, or replace the pulse generator.

Noise in the waveform → Improper grounding of the pulse generator circuit's shielded wiring. → Replace the pulse generator.

500 mVp-p or higher



171092

Normal

6. Pressure-control solenoid valve (PCSV)

Solenoid valve connector terminals

1750338

1: PCSV
2: Damper clutch control solenoid valve
3: Shift control solenoid valve A
4: Shift control solenoid valve B

Check the resistance between terminal 1 of the solenoid valve connector and the transmission case.

- Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the PCSV.
- 2.9 ± 0.3Ω/20°C (68°F)

Connect 12V between the transmission case and terminal 1; switch ON and OFF and check for operation noise.

- No operation noise. (stroke: 0.3 mm (0.012 in.) or less) → Foreign material caught between the valve and guide → Replace the PCSV.
- Noise exists.
- Normal

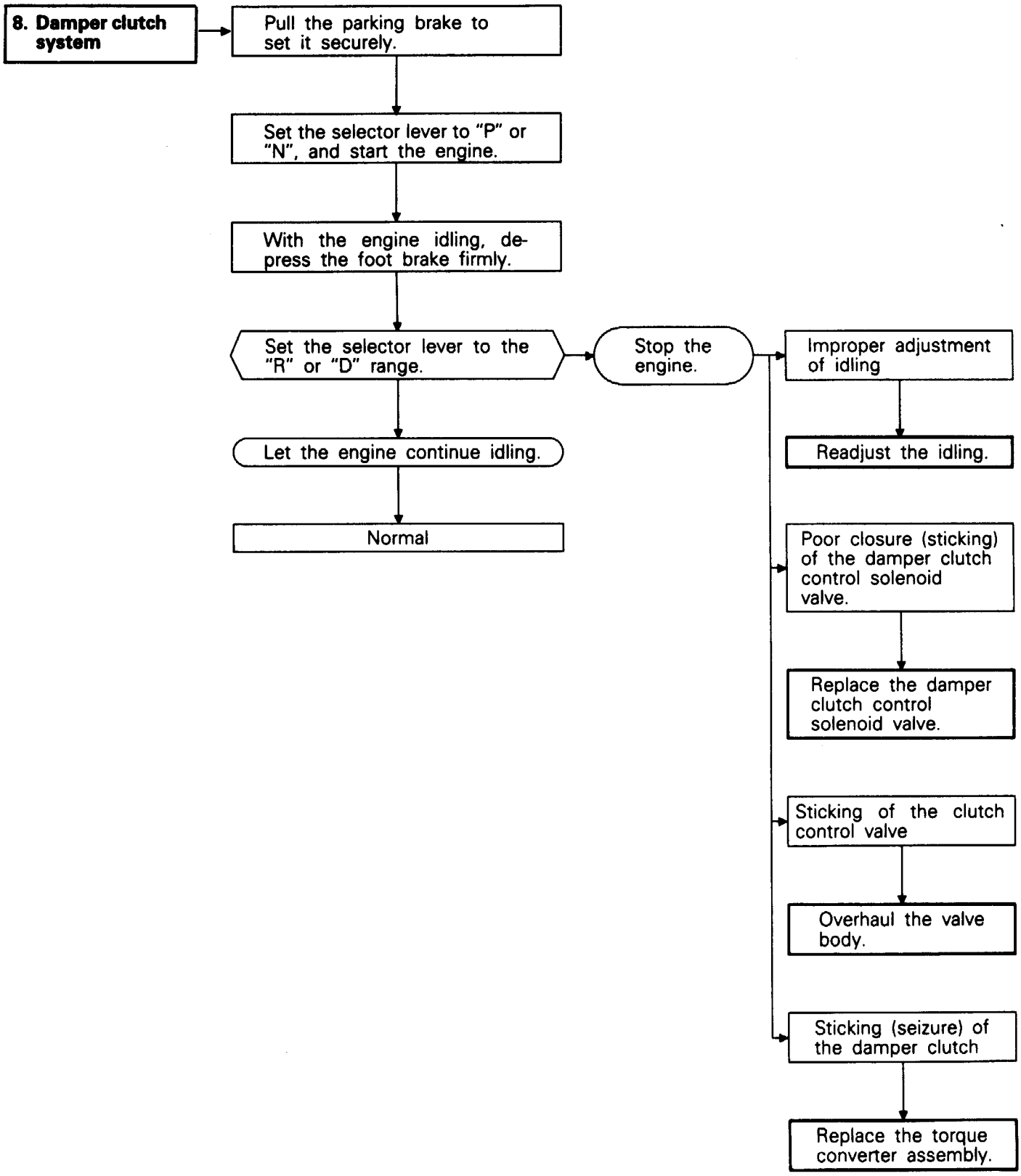
7. Shift-control solenoid valve (SCSV) A or B

Check the resistance between terminal 3 or 4 of the solenoid valve connector and the transmission case.

- Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the SCSV.
- 22.3 ± 1.5Ω/20°C (68°F)

Connect 12V between the transmission case and terminal 3 or 4; switch ON and OFF and check for operation noise of the solenoid valve, and check the valve stroke.

- No operation noise. (stroke: 0.25 mm (0.010 in.) or less). → Residue accumulated in valve and core. → Replace the SCSV.
- Noise exists.
- Normal



9. Damper clutch control solenoid valve (DCCSV)

Check the resistance between terminal 2 of the solenoid valve connector and the transmission case.

Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the DCCSV.

Standard value: 3Ω/20°C

Connect 12V between the transmission case and terminal 2; switch ON and OFF and check for operation noise.

No operation noise. Check for sticking. * (Valve stroke: 0.3 mm (0.012 in.) or less) → Foreign terminal caught between the valve and guide → Replace the DCCSV.

*Sticking is usually at the release side.

Noise exists.

Normal

Solenoid valve connector terminals

1750338

1: PCSV
2: DCCSV
3: Pressure control solenoid valve A
4: Pressure control solenoid valve B

10. Accelerator switch <Vehicles built up to November, 1992 only>

With the accelerator pedal not depressed, check the resistance between terminals 1 and 2.

No continuity (resistance: ∞) → Check the installation of the accelerator switch; adjust if necessary. → Problem not solved. → Replace the accelerator switch.

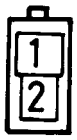
Continuity exists (resistance: 0)

With the accelerator pedal depressed slightly (about 5%), check the resistance between terminals 1 and 2.

Continuity exists (resistance: 0)

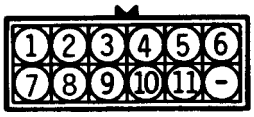
No continuity (resistance: ∞)

Normal



171096

11. Inhibitor switch <Vehicles built up to November, 1992>



1750339

In the "P" range, check for continuity between terminals 3 and 4, and terminals 8 and 9.

Continuity exists

In the "R" range, check for continuity between terminals 4 and 7, and terminals 10 and 11.

Continuity exists

In the "N" range, check for continuity between terminals 2 and 4, and terminals 8 and 9.

Continuity exists

In the "D" range, check for continuity between terminals 4 and 6.

Continuity exists

In the "2" range, check for continuity between terminals 1 and 4.

Continuity exists

In the "L" range, check for continuity between terminals 4 and 5.

Continuity exists

Normal

No continuity

Poor contact, or damaged or disconnected wiring.

Replace the inhibitor switch.

11. Inhibitor switch <Vehicles built from December, 1992>

TFA0802

In the "P" range, check for continuity between terminals 3 and 4, and terminals 7 and 8.

Continuity exists

In the "R" range, check for continuity between terminals 2 and 3, and terminals 5 and 6.

Continuity exists

In the "N" range, check for continuity between terminals 3 and 12, and terminals 7 and 8.

Continuity exists

In the "D" range, check for continuity between terminals 3 and 10.

Continuity exists

In the "2" range, check for continuity between terminals 3 and 11.

Continuity exists

In the "L" range, check for continuity between terminals 3 and 9.

Continuity exists

Normal

No continuity

Poor contact, or damaged or disconnected wiring.

Replace the inhibitor switch.

NOTES

12. Kickdown (K/D) servo switch

Check for continuity between the kickdown servo switch terminal and the transmission case.

- No continuity → Poor contact, or damaged or disconnected wiring → Replace the K/D servo switch.
- Continuity exists

<Vehicles built up to November, 1992>

TFA0389

<Vehicles built from December, 1992>

TFA0809

Start the engine, set to the "D" range, and let the engine idle; check for continuity between the kickdown servo switch terminal and the transmission case.
NOTE: Be sure the brakes are applied during this check.

- Continuity exists → Poor contact (sticking) → Replace the K/D servo switch.
- No continuity → Normal

13. Transmission control unit (TCU)

Disconnect the harness (both A and B connectors) from the vehicle's TCU. Then connect, via an intermediate harness for checking, a new TCU to this harness and make a road test.

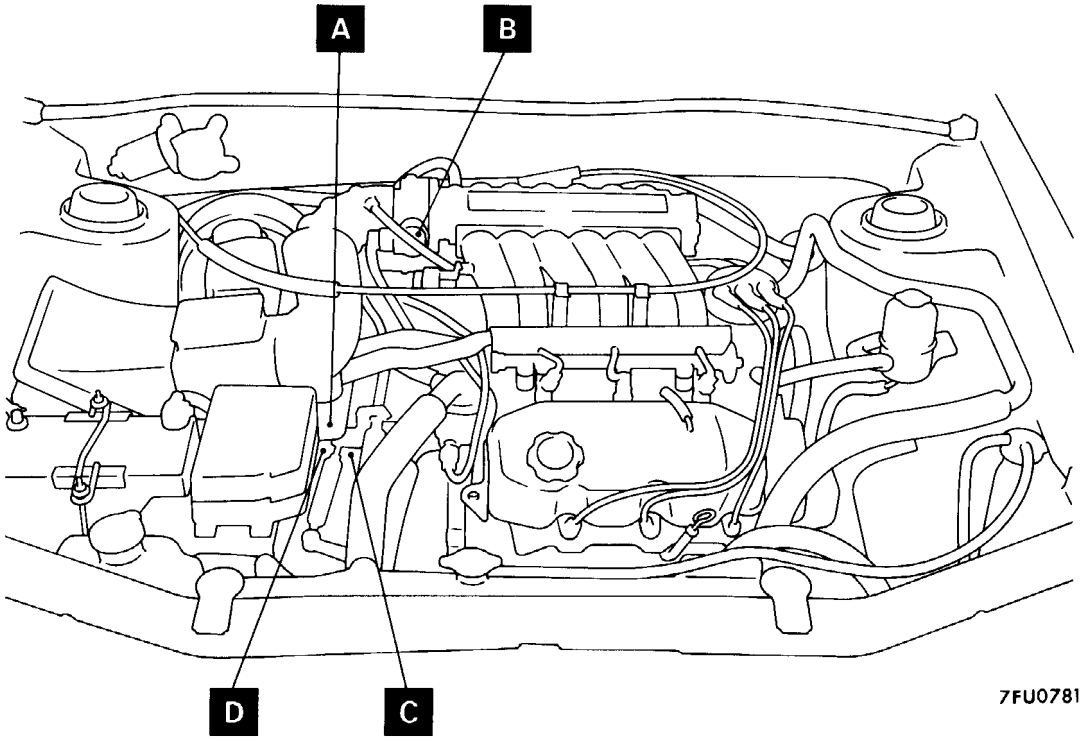
- The problem does not occur. → Malfunction of the original TCU → Install a new TCU.

Consider the original TCU to be normal, and again check the sensors, wiring, etc. → Same problem (as before TCU exchange) occurs.

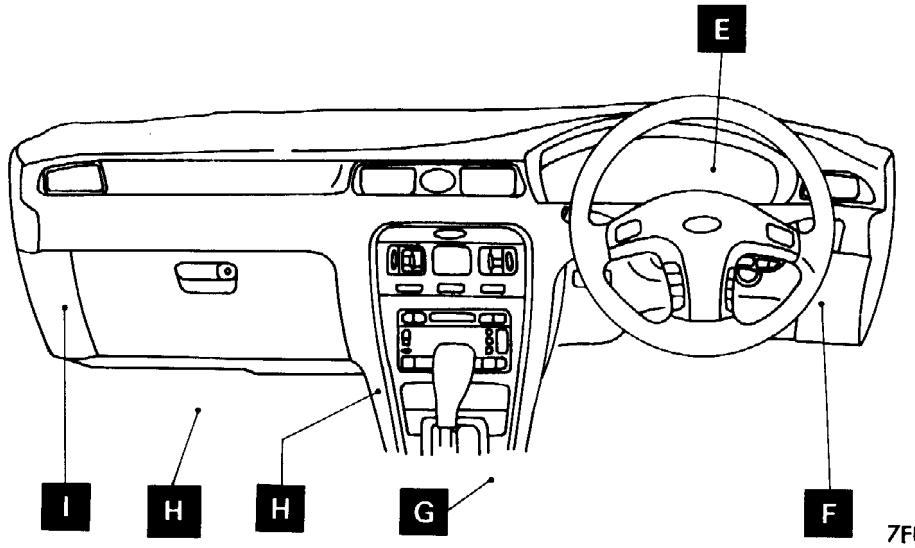
E.L.C. 4-SPEED AUTOMATIC TRANSMISSION CONTROL COMPONENTS LAYOUT

Name	Symbol	Name	Symbol
4 A/T control unit	H	Pulse generator A	A
M.P.I. control unit	I	Pulse generator B	A
M.P.I. throttle position sensor	B	Self-diagnosis check connector	F
Oil temperature sensor	D	Solenoid valve	C
Power (PWR)/Economy (ECO) switch	G	Vehicle-speed sensor	E

NOTE
C and D are built into the transmission.
For details of the location of the throttle position sensor, refer to GROUP 13 – On-vehicle Inspection of MPI components.



7FU0781



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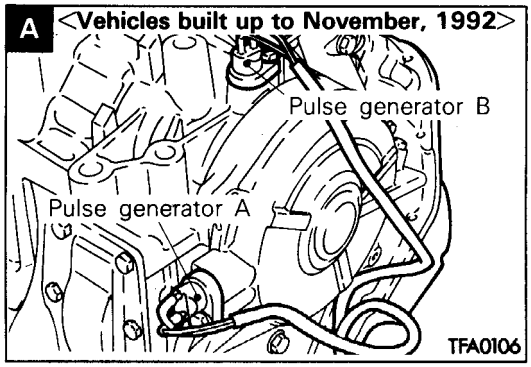
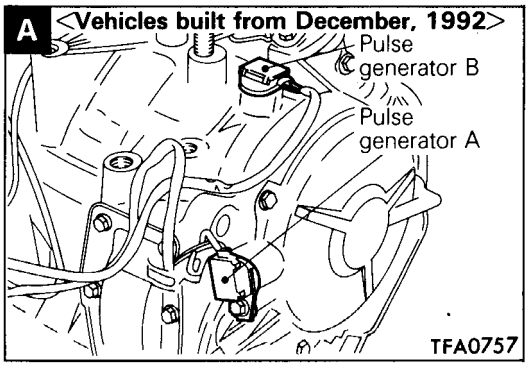
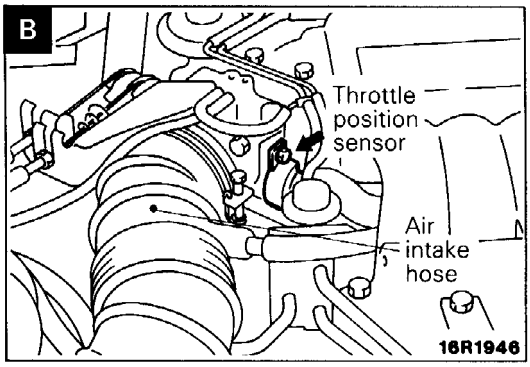
A <Vehicles built up to November, 1992>



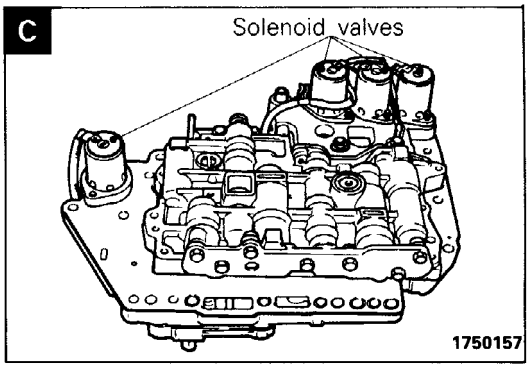
A <Vehicles built from December, 1992>



B



C



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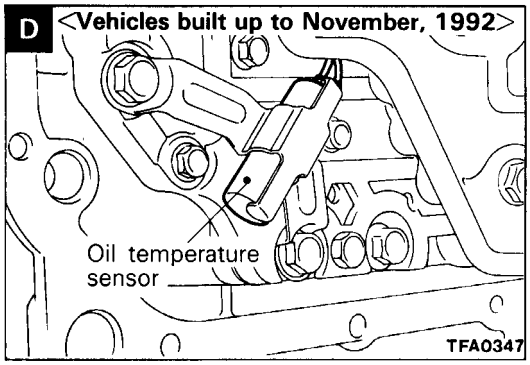

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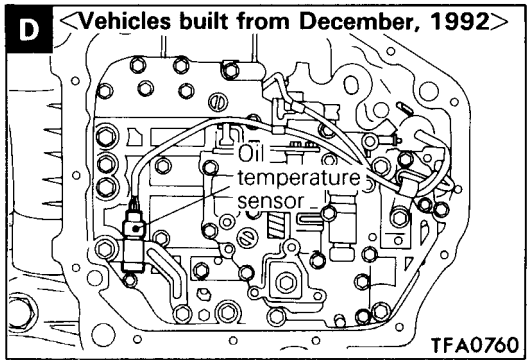
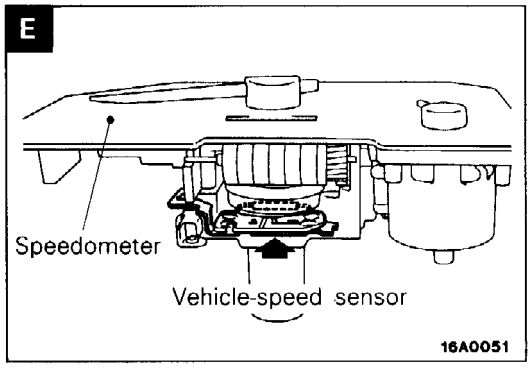
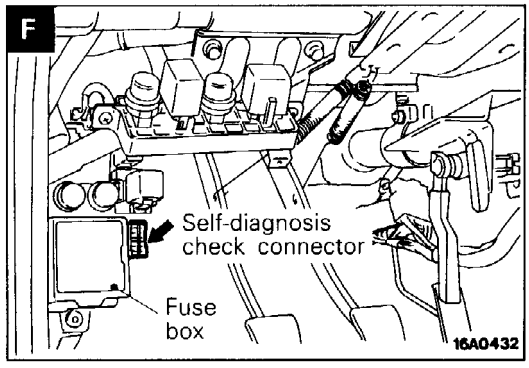


E



F



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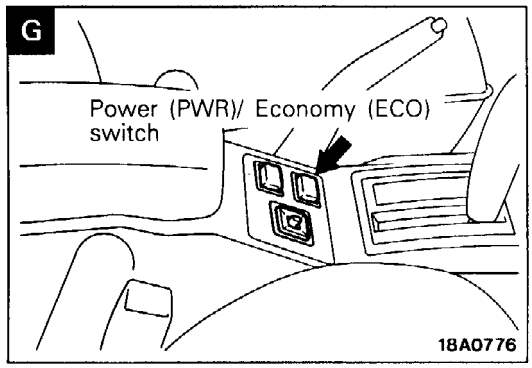
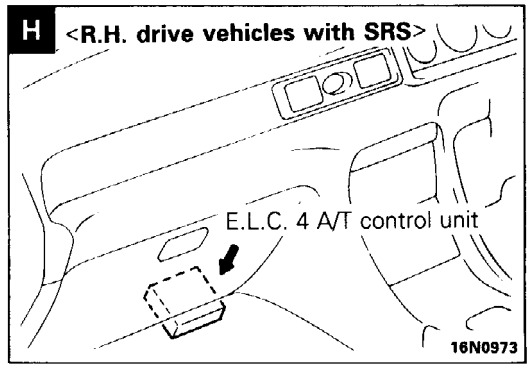
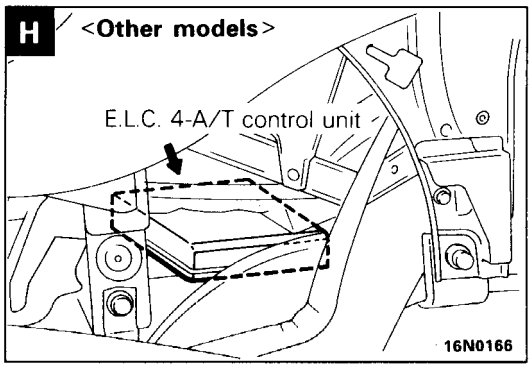
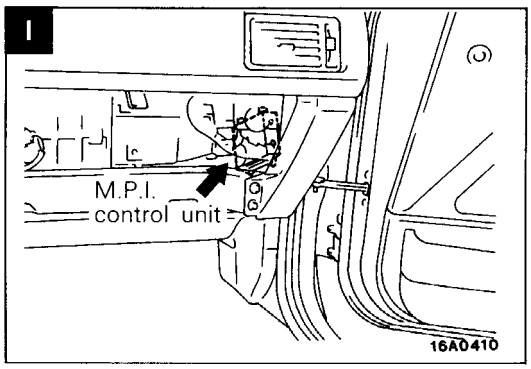
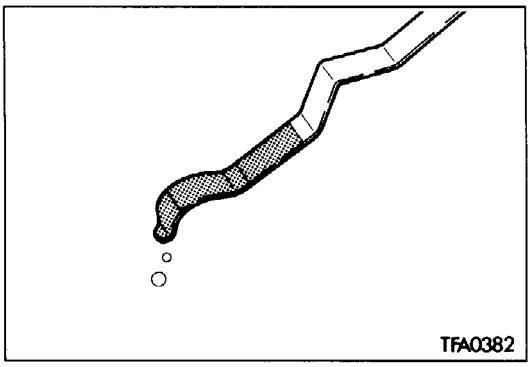


H <R.H. drive vehicles with SRS>









SERVICE ADJUSTMENT PROCEDURES

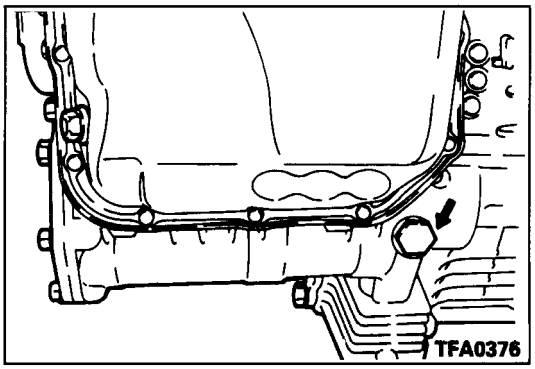
E23FLAI

TRANSMISSION FLUID LEVEL INSPECTION

1. Drive until the fluid temperature reaches the usual temperature [70–80°C (160–180°F)].
2. Place vehicle on level floor.
3. Move selector lever sequentially to every position to fill torque converter and hydraulic circuit with fluid, then place lever in "N" Neutral position.
4. Before removing dipstick, wipe all dirt from area around dipstick. Then take out the dipstick and check the condition of the fluid.
   The transmission should be overhauled under the following conditions.
   - If there is a "burning" odor.
   - If the fluid color has become noticeably blacker.
   - If there is a noticeably great amount of metal particles in the fluid.
5. Check to see if fluid level is in "HOT" range on dipstick. If fluid level is low, add automatic transmission fluid until level reaches "HOT" range.

   Transmission fluid: DIA QUEEN ATF-SP or equivalent

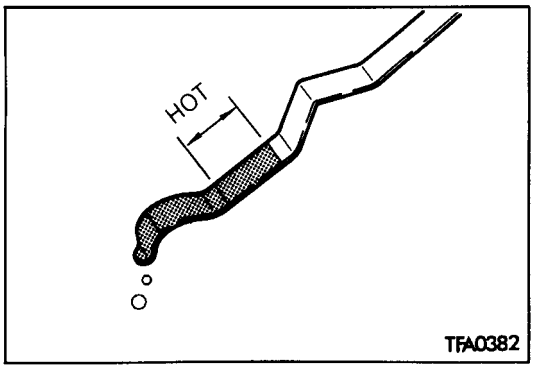
   Low fluid level can cause a variety of conditions because it allows pump to take in air along with fluid. Air trapped in hydraulic circuit forms bubbles which make fluid spongy. Therefore, pressures will be erratic, causing delayed shift, slippy clutch and brakes, etc.
   Improper filling can also raise fluid level to high. When transmission has too much fluid, gears churn up foam and cause the same conditions which occur with low fluid level, resulting in accelerated deterioration of automatic transmission fluid.
   In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transmission vent where it may be mistaken for a leak.
6. Be sure to examine fluid on dipstick closely.



TRANSMISSION FLUID REPLACEMENT E23FX--

Drain the fluid and check whether there is any evidence of contamination.
Replenish with new fluid after the cause of any contamination has been corrected.

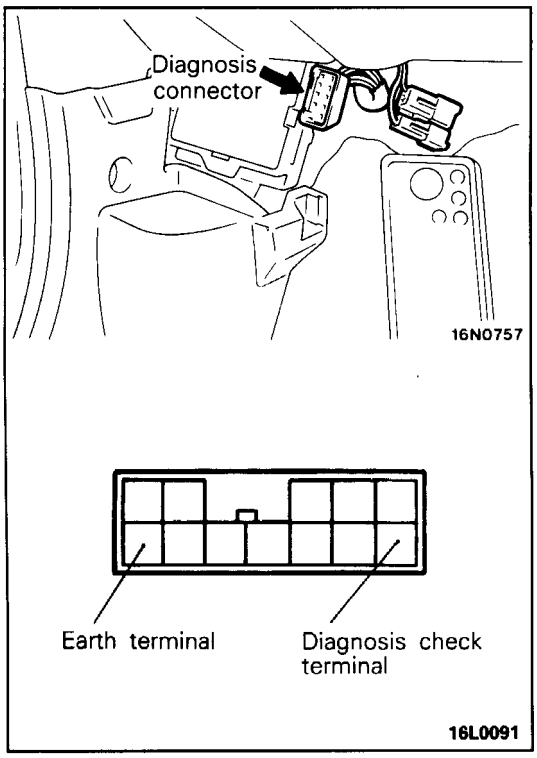
1. Remove drain plug at transmission case bottom to let fluid drain.
2. Place a drain container with large opening under the transmission oil pan.
3. Loosen oil pan bolts and tap pan at one corner to break it loose allowing fluid to drain, then remove oil pan.
4. Check the oil filter for clogging and damage and replace if necessary.
5. Clean drain plug and tighten drain plug with gasket to 30–35 Nm (3.0–3.5 kgm, 22–25 ft.lbs.).
6. Clean both gasket surfaces of transmission case and oil pan.
7. Install oil pan with new gasket and tighten oil pan bolts to 10–12 Nm (1.0–1.2 kgm, 7.5–8.5 ft.lbs.).



8. Pour 4.5 liters (4.8 U.S.qts., 4.0 Imp.qts.) of specified ATF into case through dipstick hole. [Total quantity of ATF required is approx. 7.5 liters (7.9 U.S.qts., 6.6 Imp.qts.). Actually however, approx. 4.5 liters (4.8 U.S.qts., 4.0 Imp.qts.) of fluid can be replaced because rest of fluid remains in torque converter.]

   Specified fluid: DIA QUEEN ATF-SP or equivalent

9. Start engine and allow to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position, ending in "N" Neutral position.
10. Add sufficient ATF to bring fluid level to lower mark. Recheck fluid level after transmission is at normal operating temperature. Fluid level should be between upper and lower marks of "HOT" range. Insert dipstick fully to prevent dirt from entering transmission.

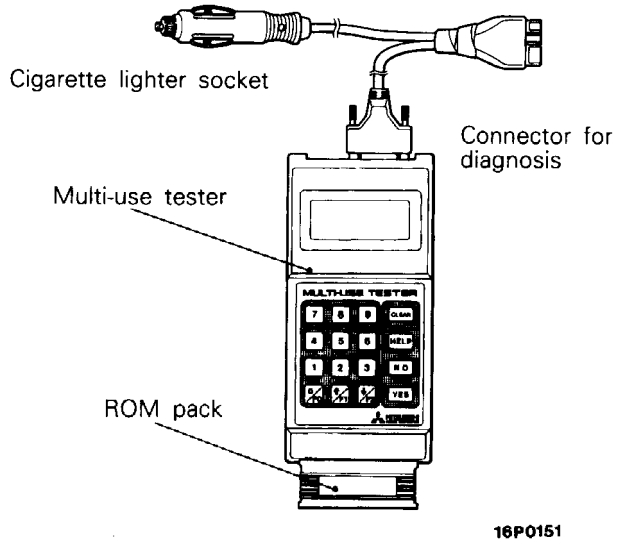


READ OUT OF MALFUNCTION CODE E23FAAHa

Caution
Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

(1) Connect the voltmeter or multi-use tester to the connector for diagnosis.
(2) Read out malfunction codes.
(3) Check the cause according to the "DIAGNOSIS CHART" and "FAIL-SAFE CHART" and repair.
(4) Use the multi-use tester to erase the malfunction code. If you do not have a multi-use tester, remove the (–) terminal of the battery to erase the malfunction code.

Multi-use tester



DIAGNOSIS CHART

Code No.	Description	Remedy
11	Excessively high throttle position sensor output	• Check the throttle position sensor connector. • Check the throttle position sensor itself. • Adjust the throttle position sensor. • Check the accelerator switch (No. 24: output or not). <Vehicles built up to November, 1992 only>
12	Excessively low throttle position sensor output	
13	Throttle position sensor malfunction	
14	Improperly adjusted throttle position sensor system	
15	•Open in the low-temperature side of the oil temperature sensor circuit. <Vehicles built up to November, 1992> •Open the oil temperature sensor circuit. <Vehicles built from December, 1992>	• Oil temperature sensor connector inspection • Oil temperature sensor inspection
16	Short in the high-temperature side of the oil temperature sensor circuit. <Vehicles built up to November, 1992 only>	
17	Open in the high-temperature side of the oil temperature sensor circuit or short in the low-temperature side circuit. <Vehicles built up to November, 1992 only>	
21	Open kickdown servo switch circuit	• Check the kickdown servo switch connector. • Check the kickdown servo switch.
22	Shorted kickdown servo switch circuit	
23	Open ignition pulse pickup cable circuit	• Check the ignision pulse signal line.
24	Open-circuited or improperly adjusted accelerator switch <Vehicles built up to November, 1992 only>	• Check the accelerator switch connector. • Check the acelerator switch itself. • Adjust the accelerator switch.
31	Open pulse generator A circuit	• Check the pulse generator A and pulse generator B. • Check the vehicle speed reed switch (for chattering.)
32	Open pulse generator B circuit	

Code No.	Description	Remedy
33	Open-circuit or improperly adjusted wide open throttle switch	• Check the wide open throttle switch connector. • Check the wide open throttle switch itself. • Adjust the wide open throttle switch.
34	Short-circuit or improperly adjusted wide open throttle switch	
41	Open shift control solenoid valve A circuit	• Check the solenoid valve connector. • Check shift control solenoid valve A.
42	Shorted shift control solenoid valve A circuit	
43	Open shift control solenoid valve B circuit	• Check the solenoid valve connector. • Check shift control solenoid valve B.
44	Shorted shift control solenoid valve B circuit	
45	Open pressure control solenoid valve circuit	• Check the solenoid valve connector. • Check the pressure control solenoid valve.
46	Shorted pressure control solenoid valve circuit	
47	Broken wire in damper clutch control solenoid valve	• Inspection of solenoid valve connector • Individual inspection of damper clutch control solenoid valve
48	Short circuit in damper clutch control solenoid valve	
49	Defect in the damper clutch system	• Inspection of damper clutch hydraulic system • Individual inspection of damper clutch control solenoid valve • Replacement of control unit

Code No.	Description	Remedy
51	Shifting to 1st gear does not match the engine speed.	• Check the pulse generator A and pulse generator B connector. • Check pulse generator A and pulse generator B. • Rear clutch slippage.
52	Shifting to 2nd gear does not match the engine speed.	• Check the pulse generator A connector. • Check pulse generator A. • Kickdown brake slippage.
53	Shifting to 3rd gear does not match the engine speed.	• Check the pulse generator A and pulse generator B connector. • Check pulse generator A and pulse generator B. • Front clutch slippage. • Rear clutch slippage.
54	Shifting to 4th gear does not match the engine speed.	• Check the pulse generator A connector. • Check pulse generator A. • Kickdown brake slippage.
61	Short-circuited torque reduction request signal line or open-circuited torque reduction execution signal line.	• Check torque reduction request signal line. • Check torque reduction execution signal line.
62	Open-circuited torque reduction request signal line.	• Check torque reduction request signal line.
63	Short-circuited torque reduction execution signal line.	• Check torque reduction execution signal line.
–	Normal	–
–	Defective transmission control unit (TCU)	• TCU power supply inspection • TCU earth inspection • TCU replacement

FAIL-SAFE CHART

Output code Code No.	Description	Fail-safe countermeasure	Note (relation to self-diagnosis)
81	Open-circuited pulse generator A	Locked in 3rd (D) or 2nd (2,L)	When code No. 31 is generated 4th time
82	Open-circuited pulse generator B	Locked in 3rd (D) or 2nd (2,L)	When code No. 32 is generated 4th time
83	Open-circuited or shorted shift control solenoid valve A	Locked in 3rd	When code No. 41 or 42 is generated 4th time
84	Open-circuited or shorted shift control solenoid valve B	Locked in 3rd	When code No. 43 or 44 is generated 4th time
85	Open-circuited or shorted pressure control solenoid valve	Locked in 3rd (D) or 2nd (2,L)	When code No. 45 or 46 is generated 4th time
86	Gear shifting does not match the engine speed	Locked in 3rd (D) or 2nd (2,L)	When code No. 51, 52, 53 or 54 is generated 4th time
–	Defective transmission control unit (TCU)	Fixed for 3rd speed	–

NOTES

CHECKING THE CONTROL SYSTEM (WHEN A MULTI-USE TESTER IS USED)

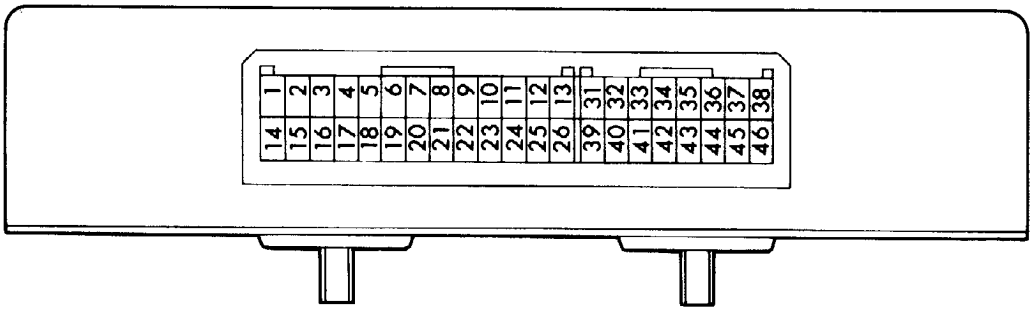
Using the multi-use tester, follow the checking procedures as described in the table below.

Check items	Check procedures		Probable cause (or remedy) if a malfunction is found
	Check conditions	Normal value	
Throttle position sensor (TPS) • Data reading • Item No. 11	Accelerator completely closed	0.3–1.0 V	• TPS is incorrectly adjusted if voltage is high during fully closed or fully open • TPS or circuit harness malfunction if there is no change • TPS or acclerator wire malfunction if the change is not smooth
	Accelerator slowly depressed	Changes occur according to degree of opening	
	Accelerator completely open	4.5–5.5 V	
Oil temperature sensor • Data reading • Item No. 15	Engine cold (before starting)	Corresponding to outside air temperature	• Oil temperature sensor or circuit harness malfunction
	Engine warming up (during driving)	Gradual increase	
	After engine warmed up	80–110°C	
Kickdown servo switch • Data reading • Item No. 21	L range; idling	ON	• Kickdown servo improperly adjusted • Kickdown servo switch or circuit harness malfunction • Kickdown servo malfunction
	D range; 1st or 3rd gear	ON	
	D range; 2nd or 4th gear	OFF	
Ignition signal line • Data reading • Item No. 23	N range; idling	600–800 r/min.	• Ignition system malfunction • Ignition signal pick-up circuit harness malfunction
	N range; 2,500 r/min. (tachometer reading)	2,400–2,600 r/min.	
Accelerator switch <Vehicles built up to November, 1992 only> • Data reading • Item No. 24	Accelerator fully closed	ON	• Accelerator switch incorrectly adjusted • Accelerator switch or circuit harness malfunction
	Accelerator slightly depressed	OFF	
Idle position switch • Data reading • Item No. 25	Accelerator fully closed	ON	• TPS is incorrectly adjusted • TPS or circuit harness malfunction
	Accelerator slightly depressed	OFF	
Air conditioner relay signals • Data reading • Item No. 26	D range; air conditioner switch ON	ON	• Air conditioner power relay ON signal-detection circuit harness malfunction
	D range; air conditioner switch OFF	OFF	

Check items	Check procedures		Probable cause (or remedy) if a malfunction is found
	Check conditions	Normal value	
Transmission gear position ● Data reading ● Item No. 27	D range; idling	C	● TCU malfunction ● Accelerator switch system malfunction ● Inhibitor switch system malfunction ● TPS system malfunction
	L range; idling	1ST	
	2 range; 2nd gear	2ND	
	D range; overdirve-OFF; 3rd gear	3RD	
	D range; overdirve; 4th gear	4TH	
Pulse generator A ● Data reading ● Item No. 31	D range; stopped	0 r/min.	● Pulse generator A or circuit harness malfunction ● Pulse generator A shielded line malfunction ● Kickdown brake slippage
	D range; driving at 50 km/h in 3rd gear	1,600–2,000 r/min.	
	D range; driving at 50 km/h in 4th gear	1,100–1,400 r/min.	
Pulse generator B ● Data reading ● Item No. 32	D range; stopped	0 r/min.	● Pulse generator B or circuit harness malfunction ● Pulse generator B shielded line malfunction
	D range; driving at 50 km/h in 3rd gear	1,600–2,000 r/min.	
	D range; driving at 50 km/h in 4th gear	1,600–2,000 r/min.	
Over drive switch ● Data reading ● Item No. 35	Overdrive switch ON	OD	● Overdrive switch or circuit harness malfunction
	Overdrive switch OFF	OD-OFF	
Power/ Economy select switch ● Data reading ● Item No. 36	Selection of the Power pattern (including during E pattern control when oil temperature is low)	Power	● Power/ Economy select switch or circuit harness malfunction
	Selection of the Economy pattern	Economy	
Inhibitor switch ● Data reading ● Item No. 37	Shift to P range	P	● Inhibitor switch improperly adjusted ● Inhibitor switch or circuit harness malfunction ● Manual control cable malfunction
	Shift to R range	R	
	Shift to N range	N	
	Shift to D range	D	
	Shift to 2 range	2	
	Shift to L range	L	
Vehicle speed reed switch ● Data reading ● Item No. 38	Vehicle stopped	0 km/h	● Vehicle speed reed switch malfunction if high-speed signals emitted while vehicle is stopped ● Otherwise, vehicle speed reed switch or circuit harness malfunction
	Driving at 30 km/h	30 km/h	
	Driving at 50 km/h	50 km/h	

Check items	Check procedures		Probable cause (or remedy) if a malfunction is found
	Check conditions	Normal value	
PCSV duty ● Data reading ● Item No. 45	D range; idling	50–70 %	● Duty should become 100 % when, while idling in D range, accelerator is pressed even slightly ● TCU malfunction ● TPS malfunction ● Accelerator switch system malfunction
	D range; 1st gear	100 %	
	D range; during shift	Changes occur according to conditions	
Amount of damper clutch slip ● Data reading ● Item No. 47	D range, 3rd gear 1,500 r/min. (reading on tachometer)	100–300 r/min.	● Damper clutch is defective. ● Ignition signal line or pulse generator system is defective. ● Transmission hydraulic pressure is inadequate. ● Damper clutch control solenoid valve (DCCSV) is defective.
	D range, 3rd gear 3,500 r/min. (reading on tachometer)	0 r/min.	
DCCSV duty ● Data reading ● Item No. 49	D range, 3rd gear 1,500 r/min. (reading on tachometer)	0 %	● Transmission control unit is defective. ● TPS system is defective. ● Pulse generator B system is defective.
	D range, 3rd gear 3,500 r/min. (reading on tachometer)	Change according to negative load	

TRANSMISSION CONTROL UNIT (TCU)



TFA0744

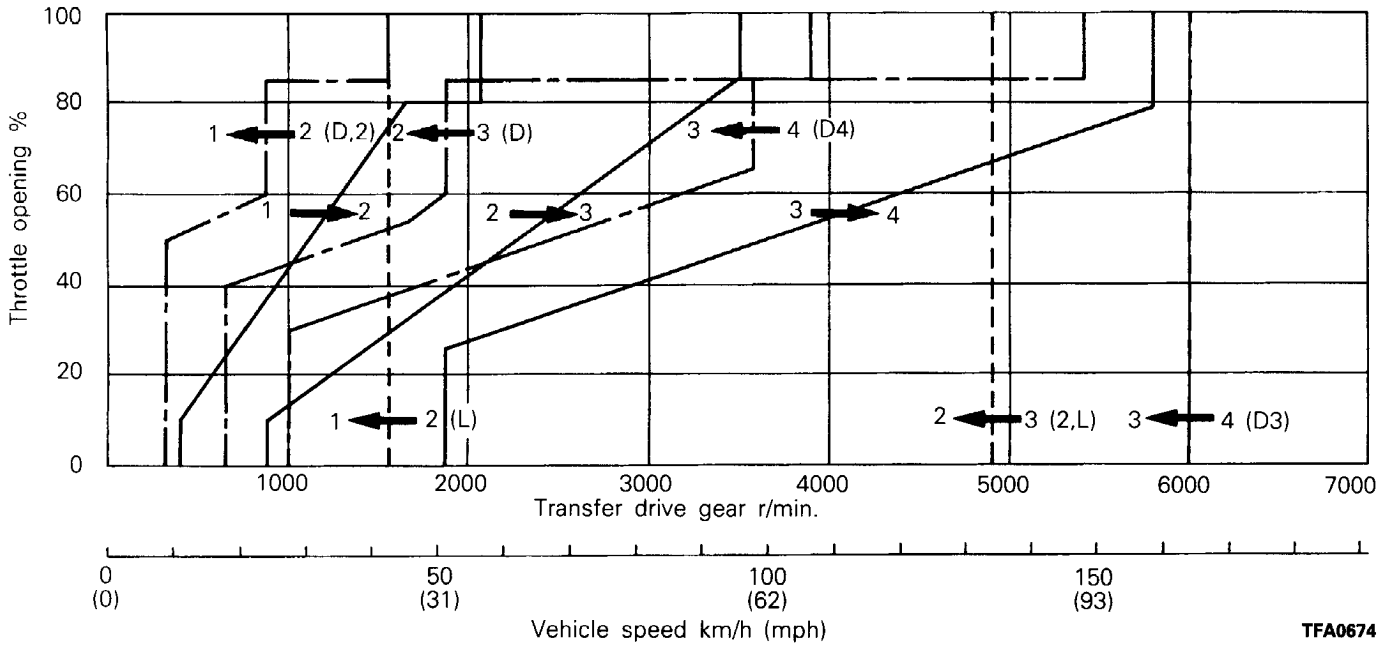
1. Damper clutch control solenoid valve
2. Shift control solenoid valve A
3. –
4. Communication line to engine
5. –
6. –
7. Kickdown servo switch
8. Air conditioner relay signal
9. Diagnosis output terminal
10. Pulse generator B output
11. Diagnosis control terminal
12. Power source
13. Earth
14. Pressure control solenoid valve
15. Shift control solenoid valve B
16. Wide open throttle switch <L.H. drive vehicles only>
17. Communication line to engine
18. Communication line to engine
19. –
20. Idle position switch
21. Throttle position sensor
22. –
23. Oil temperature sensor
24. Sensor earth
25. Power source
26. Earth

31. Inhibitor switch (P)
32. Inhibitor switch (R)
33. Inhibitor switch (N)
34. Inhibitor switch (D)
35. Inhibitor switch (2)
36. Inhibitor switch (L)
37. Overdrive switch
38. Power mode signal
39. Power source (Backup)
40. Vehicle speed reed switch
41. Pulse generator (B)
42. Pulse generator (B)
43. Pulse generator (A)
44. Pulse generator (A)
45. Earth
46. Ignition pulse

SHIFT PATTERNS

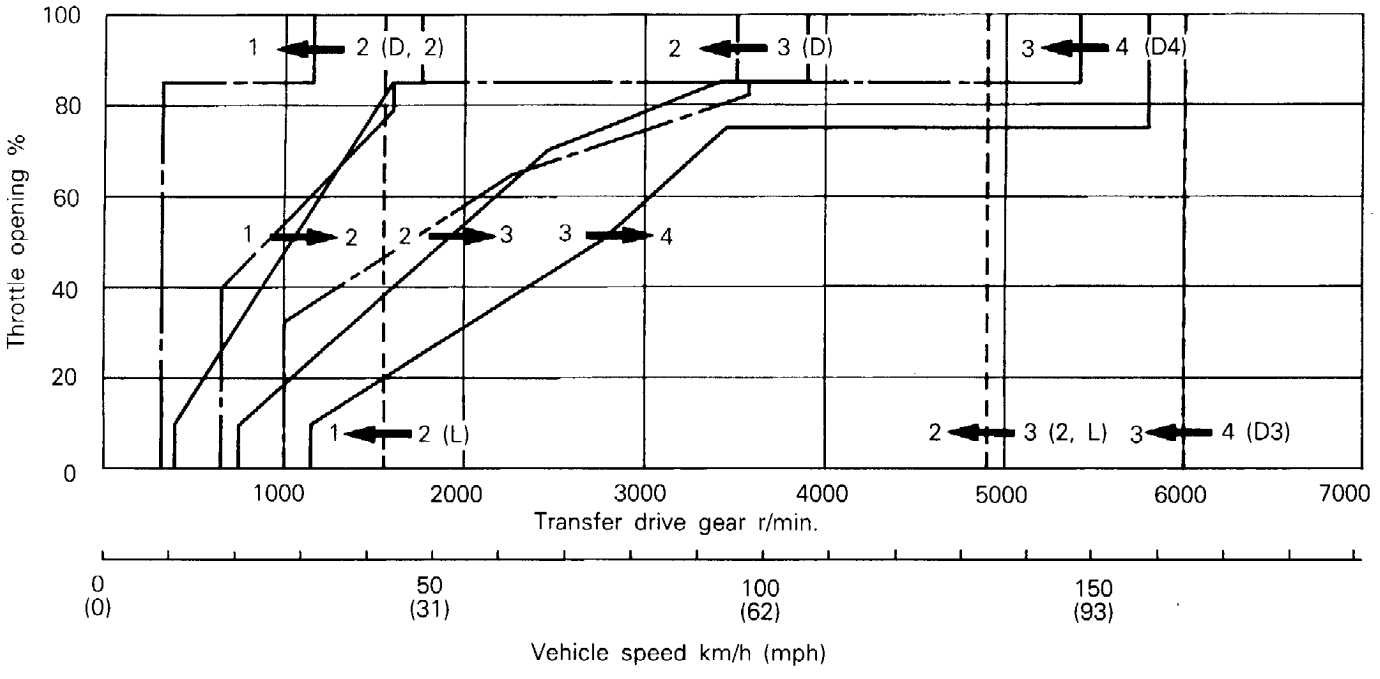
Certain shift patterns have been preset in order to provide the optimum shifting performance in accordance with engine performance.
The solid lines shown in these shift patterns indicate upshifts, and the broken lines indicate downshifts. The reason why there is a difference between the shift points for upshifts and for downshifts is so that upshifts and downshifts will not occur frequently when driving at a speed in the vicinity of the shift point.
When the vehicle is stopped, there is a shift to 2nd gear in order to obtain a suitable "creeping", but when the accelerator pedal is then depressed the vehicle starts off in 1st gear.

<F4A33-1-UNN3 · F4A33-1-UNP3>
Power (PWR) position



TFA0674

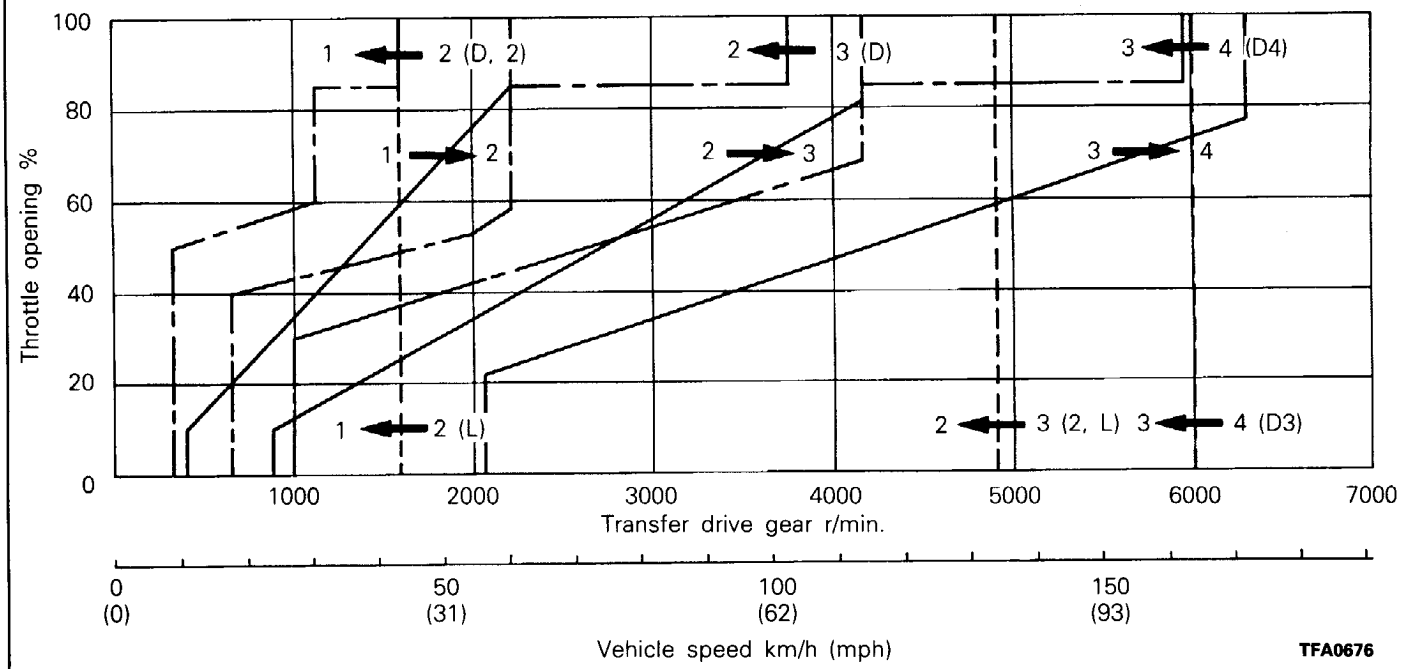
Economy (ECO) position



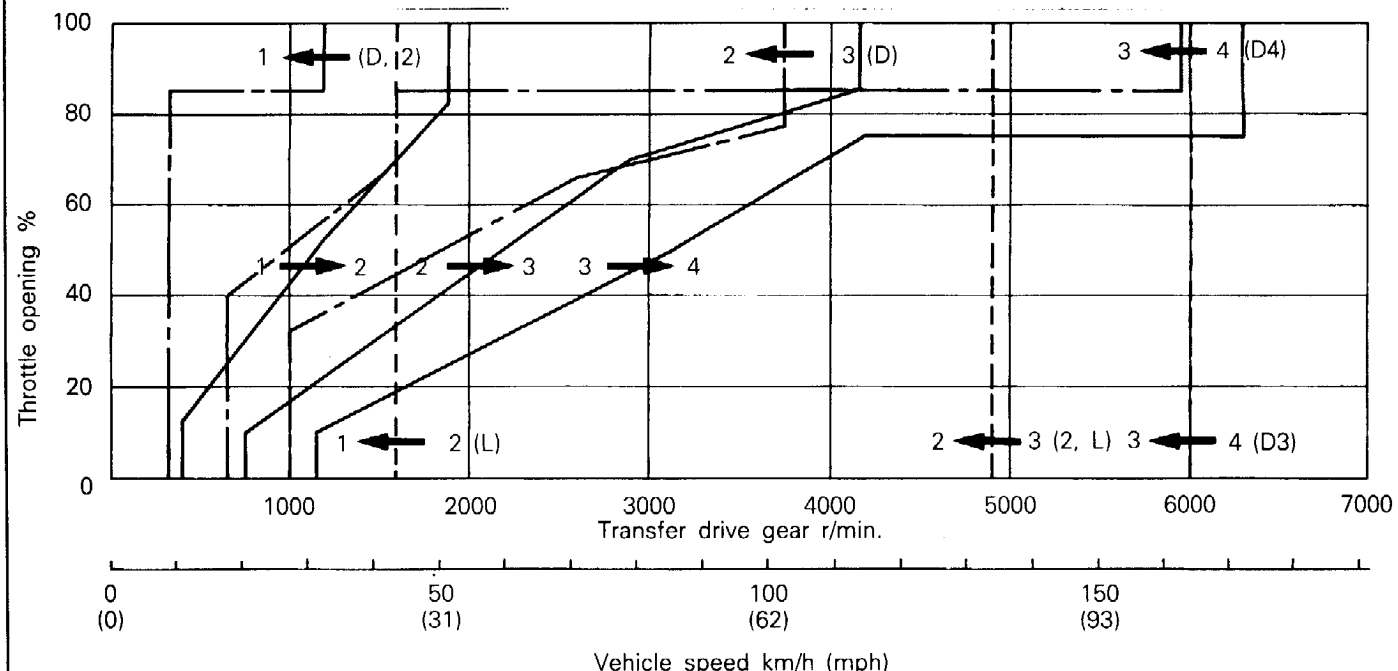
TFA0675

〈 F4A33-1-UNN4 · F4A33-1-UNP4 〉
〈 F4A33-1-UNN5 · F4A33-1-UNP5 〉

Power (PWR) position

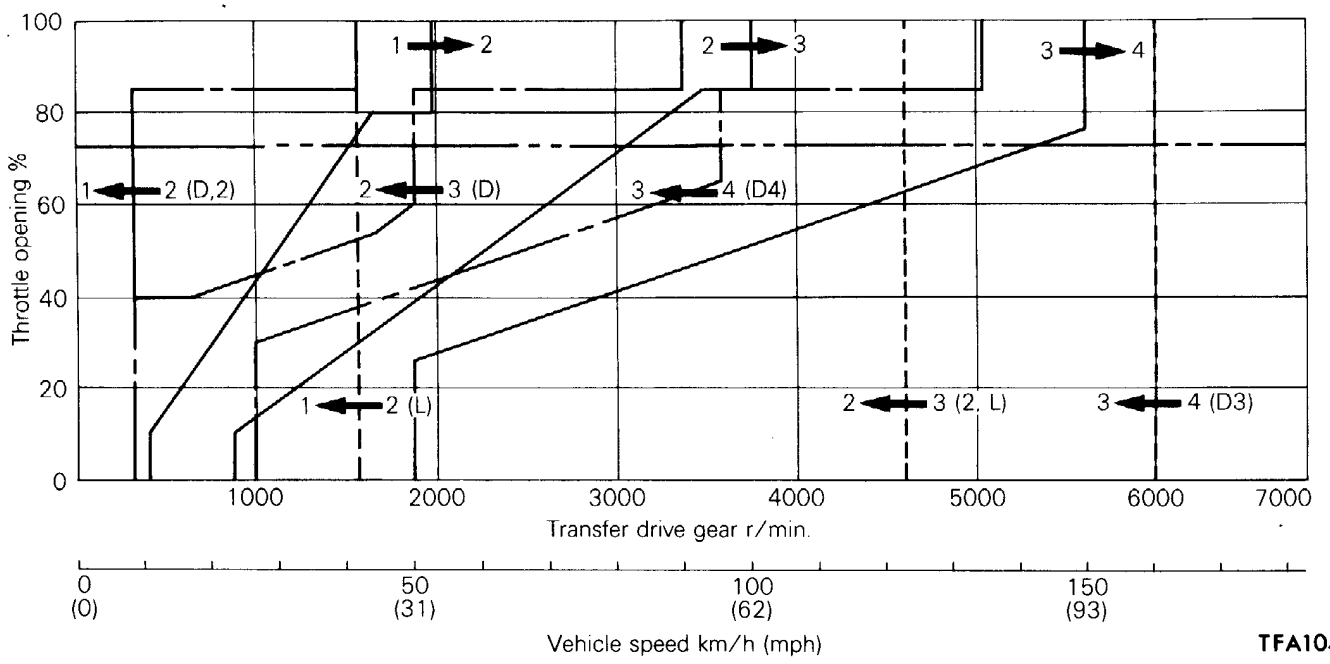


Economy (ECO) position



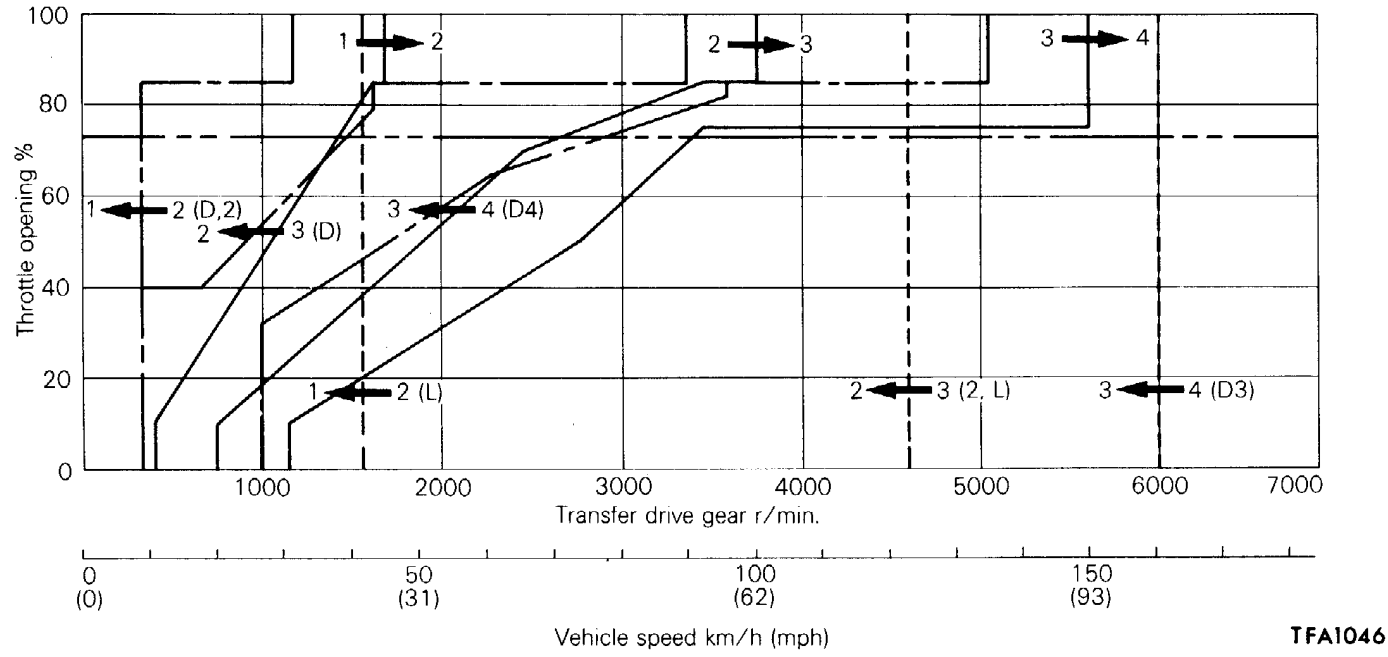
<F4A33-1-UNQ7 (L.H. drive vehicles)>

Power (PWR) position



TFA1045

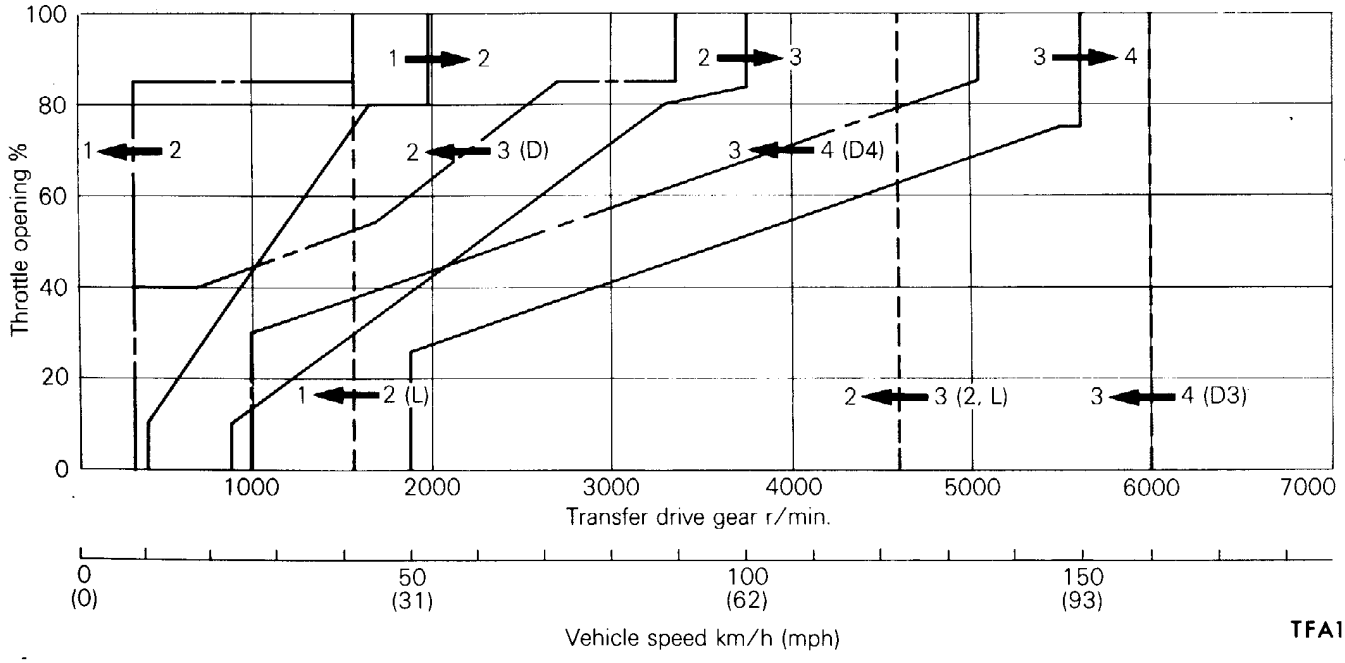
Economy (ECO) position



TFA1046

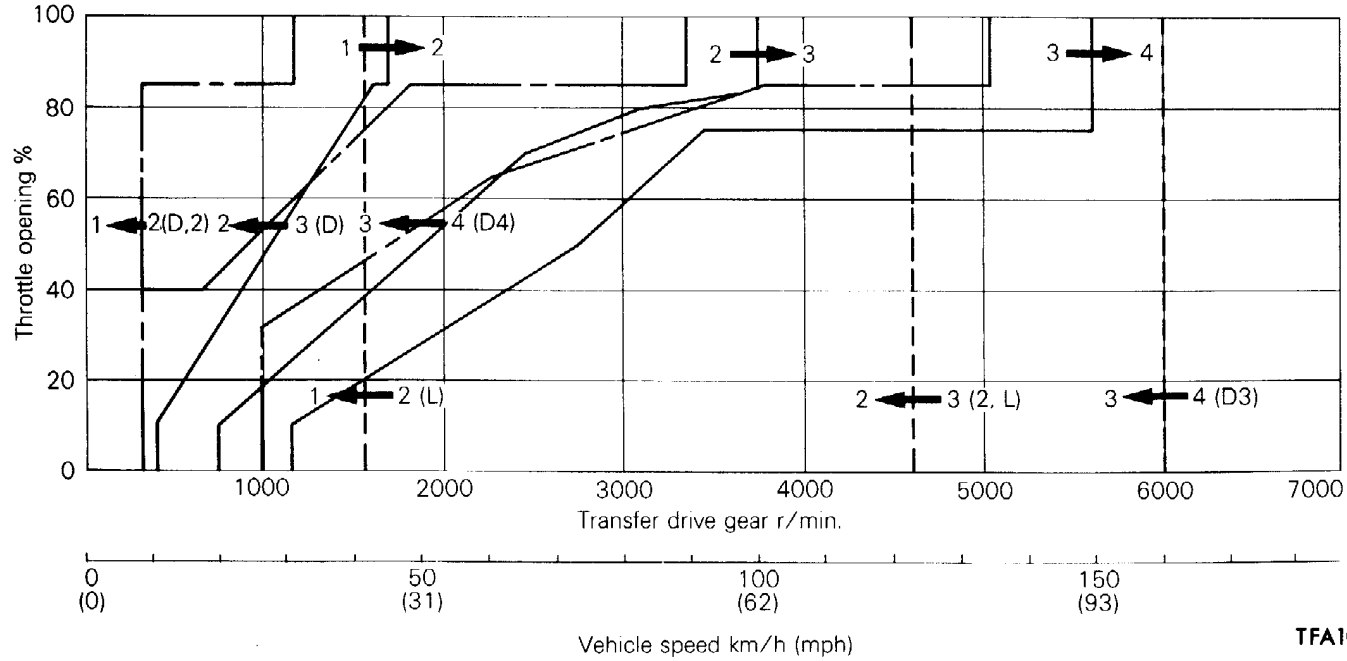
<F4A33-1-UNQ7 (R.H. drive vehicles)>

Power (PWR) position



TFA1051

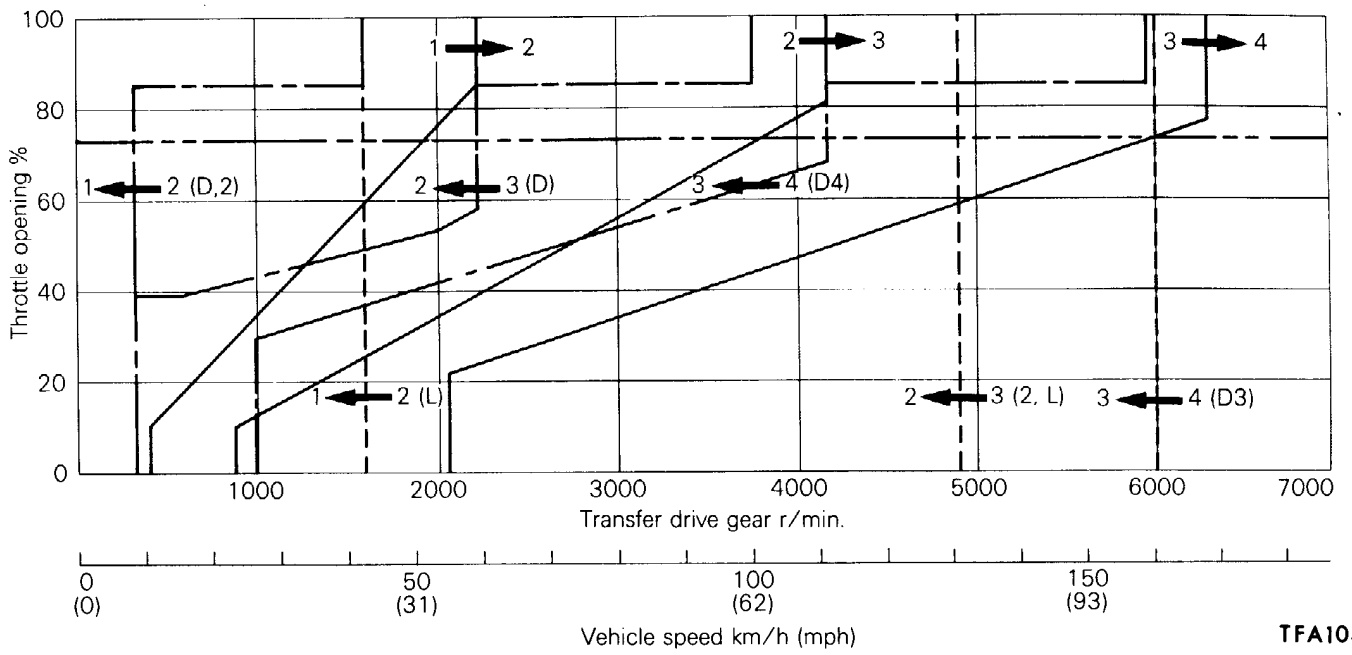
Economy (ECO) position



TFA1052

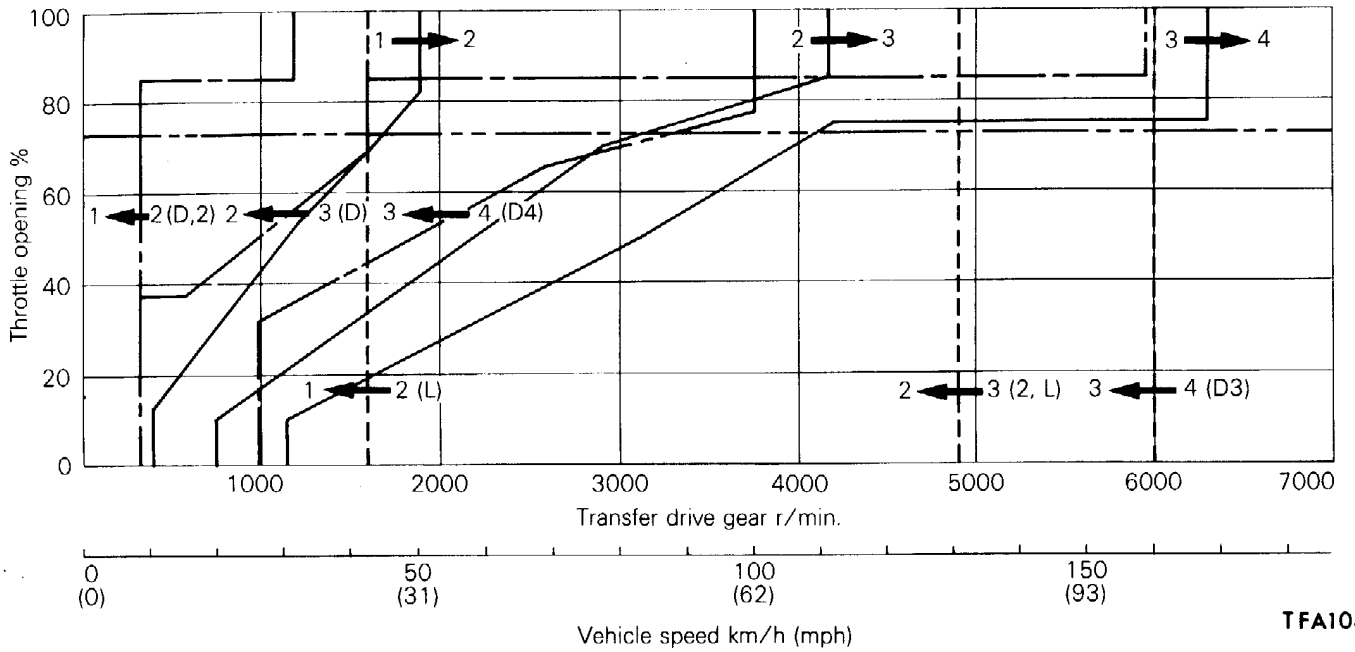
〈F4A33-1-UNQ5 (L.H. drive vehicles)〉
〈F4A33-1-UNQ6 (L.H. drive vehicles)〉

Power (PWR) position



TFA1047

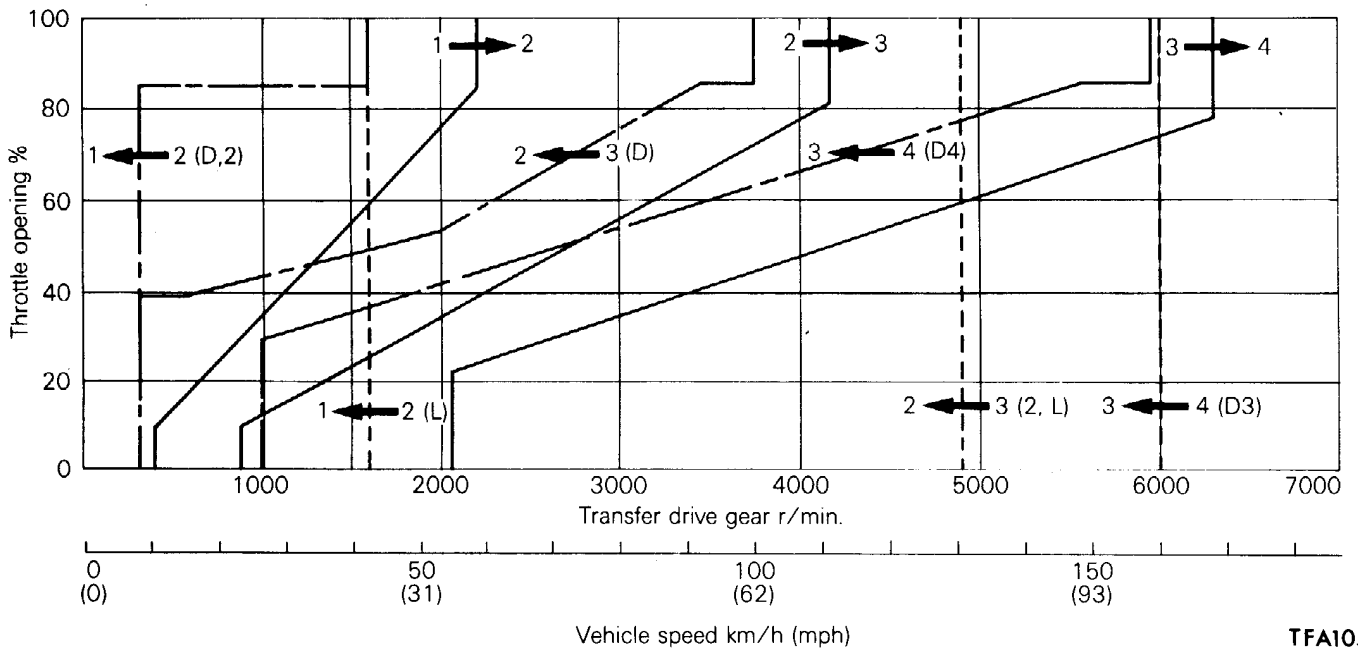
Economy (ECO) position



TFA1048

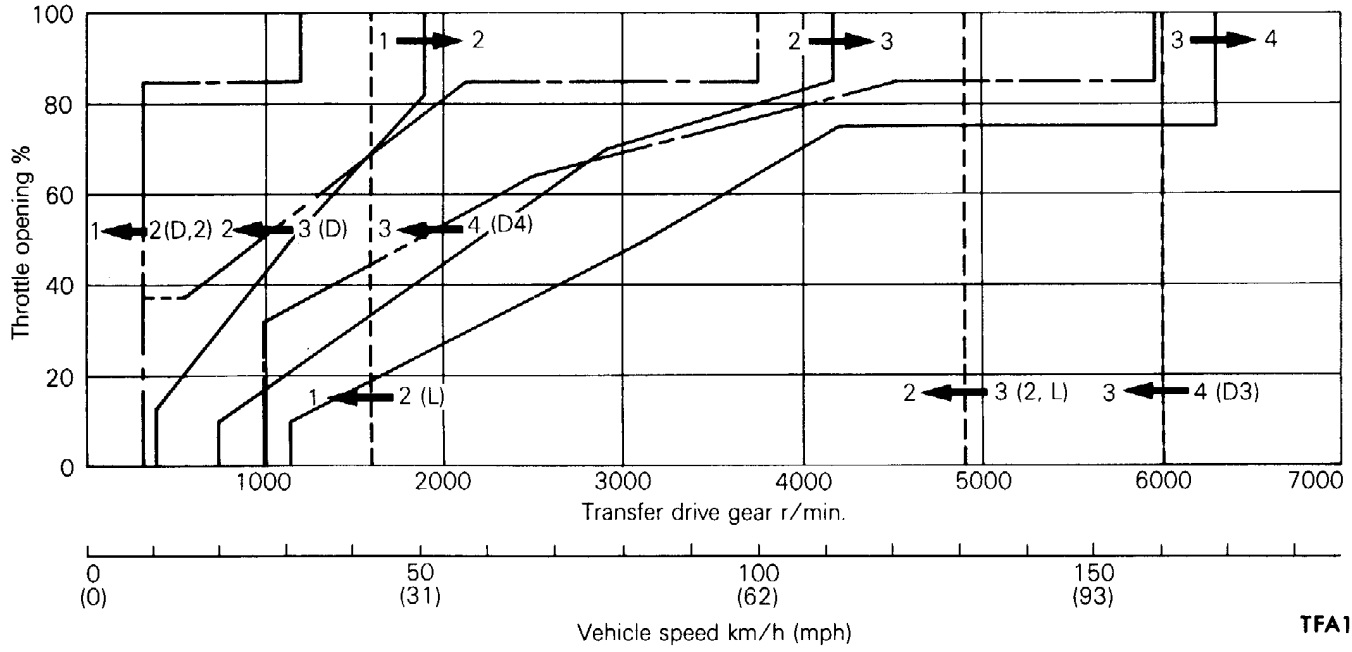
〈F4A33-1-UNQ5 (R.H. drive vehicles)〉
〈F4A33-1-UNQ6 (R.H. drive vehicles)〉

Power (PWR) position



TFA1053

Economy (ECO) position



TFA1054

CONVERTER STALL TEST E23FEAC

Stall test consist of determining maximum engine speed obtained at full throttle in "D" and "R" positions. This test checks torque converter stator overrunning clutch operation, and holding ability of transmission clutches and low-reverse brake.

Caution
During this test, make sure that no one stand in front of or behind vehicle.

1. Check transmission fluid level. Fluid should be at normal operating temperature [70–80°C (160–180°F)]. Engine coolant should also be at normal operating temperature [80–90°C (180–190°F)].
2. Apply chocks to both rear wheels.
3. Attach engine tachometer.
4. Apply parking and service brakes fully.
5. Start engine.
6. With selector lever in "D" position, depress accelerator pedal fully to read engine maximum rpm. Do not hold throttle wide open any longer than is necessary to obtain maximum engine rpm reading, and never longer than 5 seconds at a time. If more than one stall test is required, operate engine at approximately 1,000 r/min in neutral for 2 minutes to cool transmission fluid between tests.

   Standard value: 1,800–2,800 r/min
7. Place selector lever to "R" position and perform stall test by the same procedure as in foregoing item.

Stall Speed Above Specification in "D"

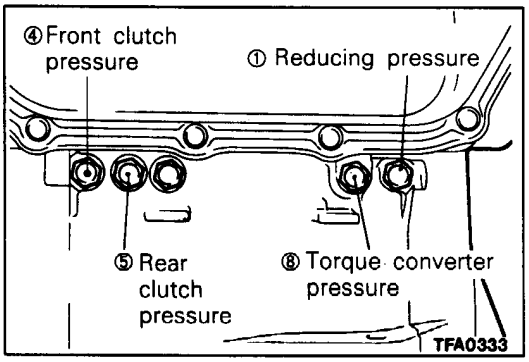
If stall speed is higher than specification, rear clutch or overrunning clutch of transmission is slipping. In this case, perform hydraulic test to locate cause of slippage.

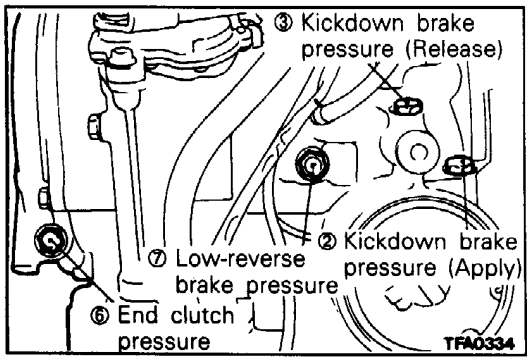
Stall Speed Above Specification in "R"

If stall speed is higher than specification, front clutch of transmission or low-reverse brake is slipping. In this case, perform hydraulic test to locate cause of slippage.

Stall Speed Above Specification in "D" and "R"

If stall speed is lower than specification, insufficient engine output or faulty torque converter is suspected. Check for engine misfiring, ignition timing, valve clearance etc. If these are good, torque converter is faulty.





OIL PRESSURE TEST E23FBAI

1. Completely warm up the transmission.
2. Raise the vehicle by using a jack so that the drive wheels can be rotated.
3. Connect an engine tachometer and place it in a position where it's easy to see.
4. Attach the special oil-pressure gauge (MD998330, MD999563) and the adaptor (MD998332) to each oil-pressure outlet port.
   When the reverse pressure is to be tested, the 3,000 kPa (400 psi) type of gauge should be used.
5. Measure the oil pressure under various conditions, and check to be sure that the measured results are within the standard value range shown in the "Standard oil pressure table" below.
   If the oil pressure is not within the specified range, check and repair as described in the section "Remedial steps if oil pressure is not normal".

Standard Oil Pressure Table

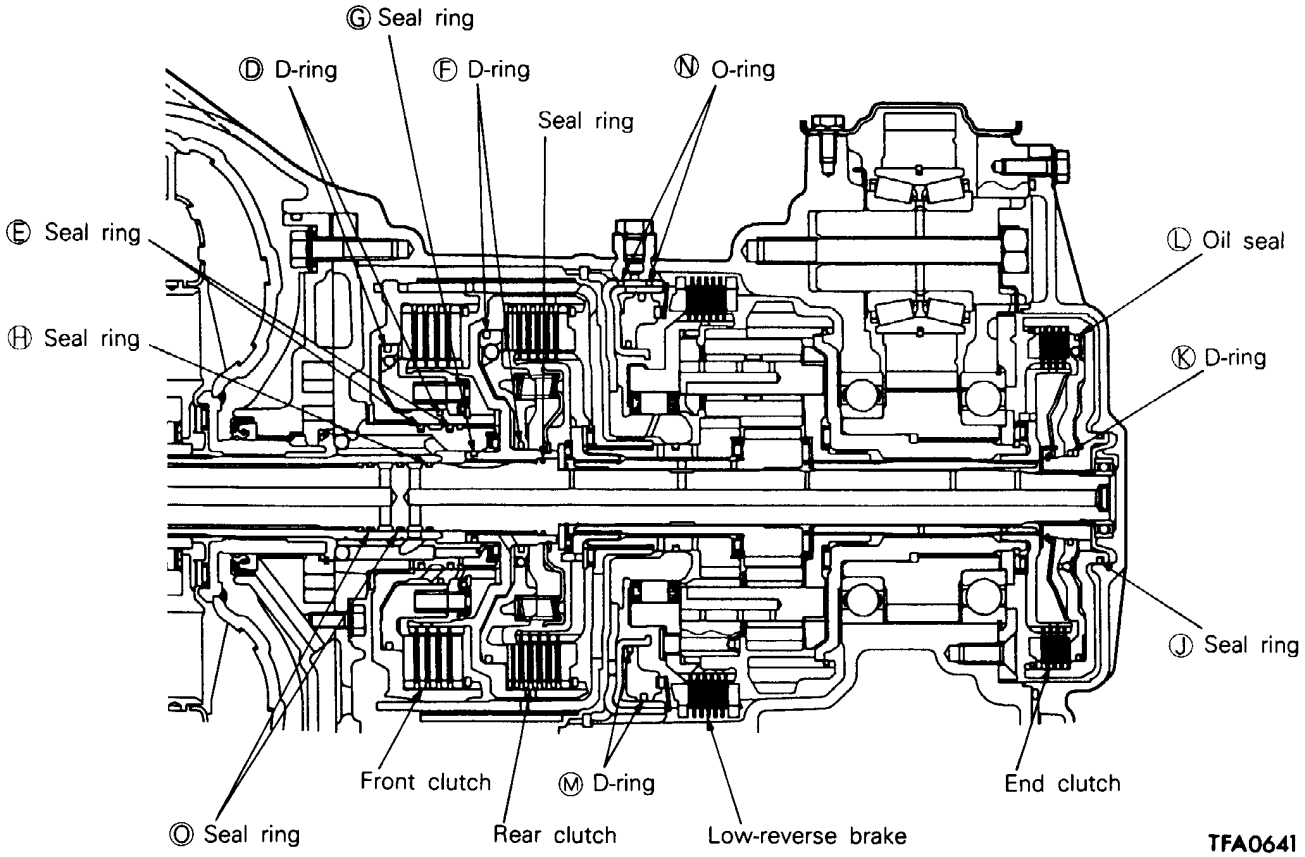
No.	Conditions			Standard oil pressure kPa (kg/cm², psi)							
	Select lever position	Engine speed rpm	Shift position	① Reducing pressure	② Kickdown brake pressure (Apply)	③ Kickdown brake pressure (Release)	④ Front clutch pressure	⑤ Rear clutch pressure	⑥ End clutch pressure	⑦ Low-reverse brake pressure	⑧ Torque-converter pressure
1	N	Idling	Neutral	360–480 (3.6–4.8, 51–68)	–	–	–	–	–	–	☆
2	D	Idling	2nd gear	360–480 (3.6–4.8, 51–68)	100–210 (1.0–2.1, 14–30)	–	–	730–830 (7.3–8.3, 104–118)	–	–	☆
3	D (SW-ON)	Approx. 2,500	4th gear	360–480 (3.6–4.8, 51–68)	830–900 (8.3–9.0, 118–128)	–	–	–	830–900 (8.3–9.0, 118–128)	–	450–650 (4.5–6.5, 64–92)
4	D (SW-OFF)	Approx. 2,500	3rd gear	360–480 (3.6–4.8, 51–68)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	–	450–650 (4.5–6.5, 64–92)
5	2	Approx. 2,500	2nd gear	360–480 (3.6–4.8, 51–68)	830–900 (8.3–9.0, 118–128)	–	–	830–900 (8.3–9.0, 118–128)	–	–	450–650 (4.5–6.5, 64–92)
6	L	Approx. 1,000	1st gear	360–480 (3.6–4.8, 51–68)	–	–	–	830–900 (8.3–9.0, 118–128)	–	300–450 (3.0–4.5, 43–64)	☆
7	R	Approx. 2,500	Reverse	360–480 (3.6–4.8, 51–68)	–	1,640–2,240 (16.4–22.4, 233–319)	1,640–2,240 (16.4–22.4, 233–319)	–	–	1,640–2,240 (16.4–22.4, 233–319)	450–650 (4.5–6.5, 64–92)
		Approx. 1,000				1,500 (15, 123) or more	1,500 (15, 123) or more			1,500 (15, 123) or more	

NOTE
– must be 10 kPa (0.1 kg/cm², 1.4 psi) or less.
SW-ON: Switch ON the overdrive control switch
SW-OFF: Switch OFF the overdrive control switch
☆: Hydraulic pressure is generated, but not the standard value.

Remedial Steps If Oil Pressure Is Not Normal

Trouble symptom	Probable cause	Remedy
1. Line pressures are all low (or high). NOTE * "Line pressures" refers to oil pressure ②, ③, ④, ⑤, ⑥ and ⑦, in the "Standard oil pressure table" on the previous page.	a. Clogging of oil filter b. Improper adjustment of oil pressure (line pressure of regulator valve) c. Functional malfunction of valve body assembly d. Looseness of valve body tightening part e. Improper oil pump dischange pressure	a. Visually inspect the oil filter; replace the oil filter if it is clogged. b. Measure line pressure ② (kickdown brake pressure); if the pressure is not the standard value, readjust the line pressure, or, if necessary, replace the valve body assembly. c. Replace the valve body assembly. d. Tighten the valve body tightening bolt and installation bolt. e. Check the side clearance of the oil pump gear; replace the oil pump assembly if necessary.
2. Improper reducing pressure	a. Clogging of the filter (L-shaped type) of the reducing-pressure circuit b. Improper adjustment of oil pressure c. Functional malfunction of valve body assembly	a. Disassemble the valve body assembly and check the filter; replace the filter if it is clogged. b. Measure the ① reducing pressure; if it is not the standard value, readjust, or replace the valve body assembly. c. Replace the valve body assembly.
3. Improper kickdown brake pressure (Apply)	a. Malfunction of the seal ring Ⓐ, D-ring Ⓑ or seal ring Ⓒ of the sleeve of the kickdown servo piston. b. Functional malfunction of the valve body assembly	a. Disassemble the kickdown servo and check whether the seal ring or D-ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. b. Replace the valve body assembly.
4. Improper kickdown brake pressure (Release)	a. Malfunction of the seal ring Ⓐ, D-ring Ⓑ or seal ring Ⓒ of the sleeve of the kickdown servo piston. b. Functional malfunction of the valve body assembly	a. Disassemble the kickdown servo and check whether the seal ring or D-ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. b. Replace the valve body assembly.
5. Improper front clutch pressure	a. Malfunction of the seal ring Ⓐ, D-ring Ⓑ or seal ring Ⓒ of the sleeve of the kickdown servo piston. b. Functional malfunction of the valve body assembly c. Wear of the front clutch piston or retainer, or malfunction of the D-ring Ⓓ or seal ring Ⓔ	a. Disassemble the kickdown servo and check whether the seal ring or D-ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. b. Replace the valve body assembly. c. Disassemble the transmission itself and check whether or not there is wear of the front clutch piston and retainer inner circumference, or damage of the D-ring and/or seal ring. If there is any wear or damage, replace the piston, retainer, D-ring and/or seal ring.

Trouble symptom	Probable cause	Remedy
6. Improper rear clutch pressure	a. Malfunction of D-ring Ⓕ of rear clutch piston, retainer seal ring Ⓖ and seal rings Ⓗ and Ⓘ of input shaft. b. Functional malfunction of the valve body assembly	a. Disassemble the rear clutch, check input shaft seal ring, retainer seal ring, piston D-ring, etc. and replace broken or damaged parts. b. Replace the valve body assembly.
7. Improper end clutch pressure	a. Malfunction of the seal ring Ⓙ or the D-ring Ⓚ and/or oil seal Ⓛ of end clutch. b. Functional malfunction of the valve body assembly	a. Disassemble the end clutch and check the oil seal or D-ring of the piston, seal ring of the retainer, etc.; replace if there are cuts, scars, scratches or damage. b. Replace the valve body assembly.
8. Improper low-reverse brake pressure	a. O-ring between valve body and transmission damaged or missing b. Functional malfunction of the valve body assembly c. Malfunction of the D-ring Ⓜ of the low-reverse brake piston or the O-ring Ⓝ of the retainer.	a. Remove the valve body assembly and check to be sure that the O-ring at the upper surface of the upper valve body is not missing or damaged; install or replace the O-ring if necessary. b. Replace the valve body assembly. c. Disassemble the transmission itself and check the D-ring and O-ring for damage; replace if there are cuts, scars, scratches or damage.
9. Improper torque converter pressure	a. Sticking of the damper clutch control solenoid valve (DCCSV) or the damper clutch control valve. b. Clogging or leaking of the oil cooler and or piping. c. Damage to the input shaft Ⓞ seal ring. d. Malfunction of the torque converter.	a. Check the operation of the damper clutch system and the DCCSV. b. Repair or replace, as necessary, the cooler and or piping. c. Disassemble the transmission itself and check for damage of the seal ring, replace the seal ring if there is damage. d. Replace the torque converter.



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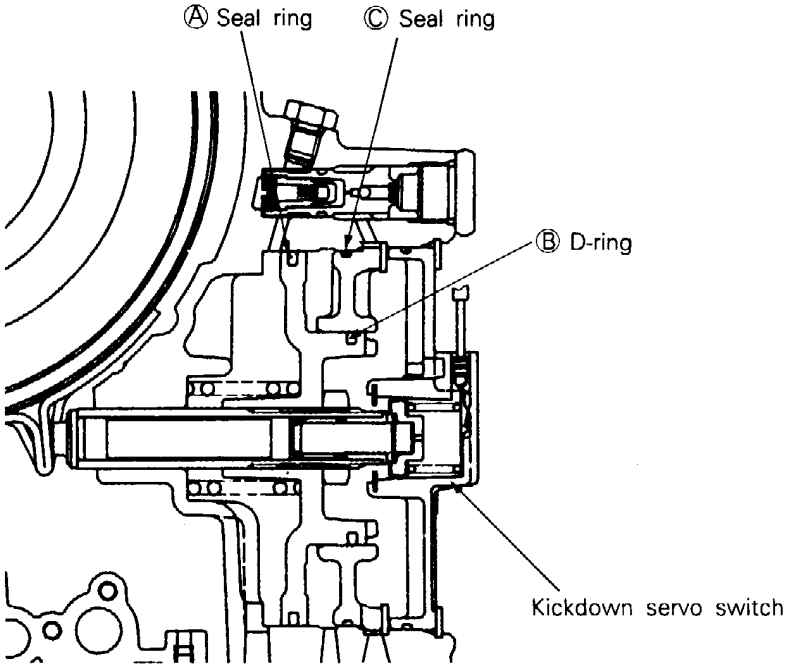


TFA0362

ACTUATOR TEST E23FVAA

Using the multi-use tester, force the actuator to activate, and then check the kickdown brake pressure of the pressure-control solenoid valve (PCSV) during 50 % duty.

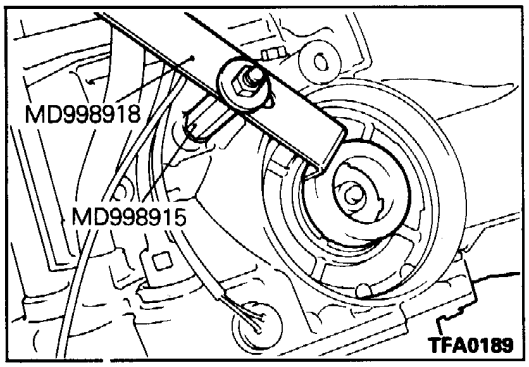
NOTE
Conditions making forced activation possible
① Vehicle speed: 0 km/h (0 mph)
② Select lever position: D
③ Accelerator switch: ON
④ Throttle opening: 10 % or less

There will be a change to the 50 % duty condition when there is forced activation for five seconds, if all of the above conditions are met.

Standard value: 250–300 kPa (2.5–3.0 kg/cm², 36–43 psi) <when warm>

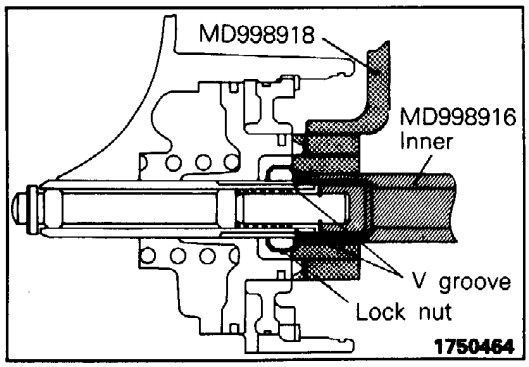
KICKDOWN SERVO ADJUSTMENT E23FH8C

1. Completely remove all dirt and other materials adhered around the kickdown servo switch.
2. Remove the snap ring.
3. Remove the kickdown servo switch.

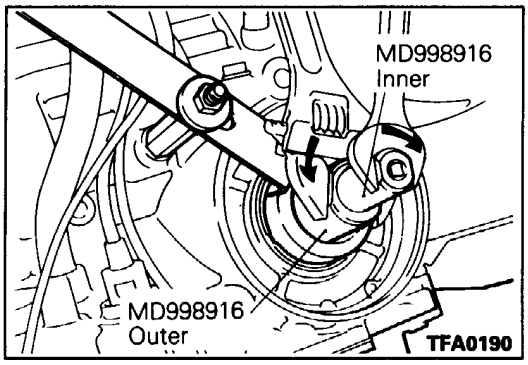


4. To prevent rotation of the piston, engage the pawl of the special tool into the notch of the piston, and using the adapter, fix the piston as shown in the left.

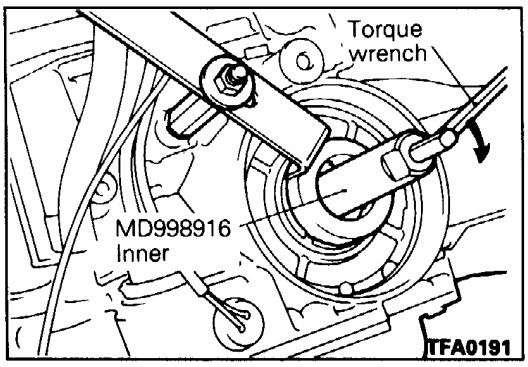
Caution
1. Don't press in the piston with the special tool.
2. When mounting the adapter on the transmission case, tighten it by hand. Don't apply much torque.



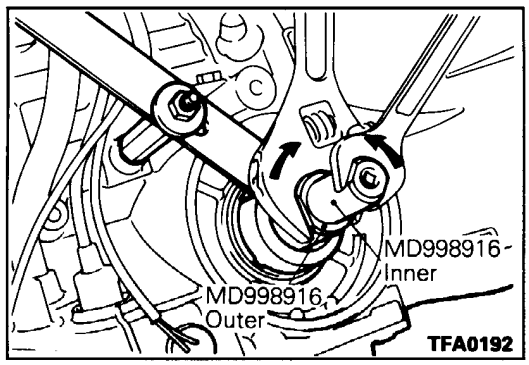
5. Loosen the lock nut to before the V groove of the adjusting rod, and tighten the special tool (inner) until it contacts the lock nut.



6. Engage the special tool (outer) on the lock nut. Rotating the outer cylinder counterclockwise and the inner cylinder clockwise, lock the lock nut and special tool (inner).

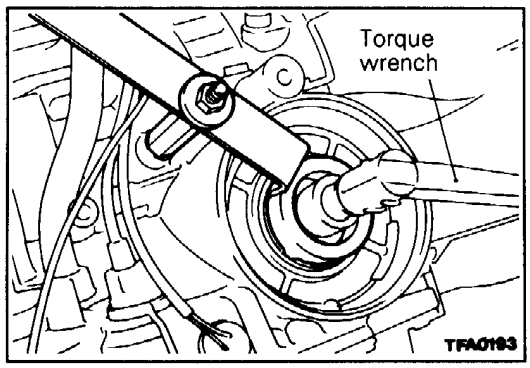


7. Attach a torque wrench to the special tool (inner wrench) and tighten to a torque of 5 Nm (0.5 kgm, 3.6 ft.lbs.) after using 10 Nm (1 kgm, 7.2 ft.lbs.) and repeating "Tighten" and "Loosen" two times. After that, back off the special tool (inner wrench) 2 to 2-1/4 turns.



8. Engage the special tool (outer) on the lock nut. Rotating the outer cylinder clockwise and the inner cylinder counterclockwise, unlock the lock nut and special tool (inner).

Caution
When unlocking the lock, apply equal force to both tools.

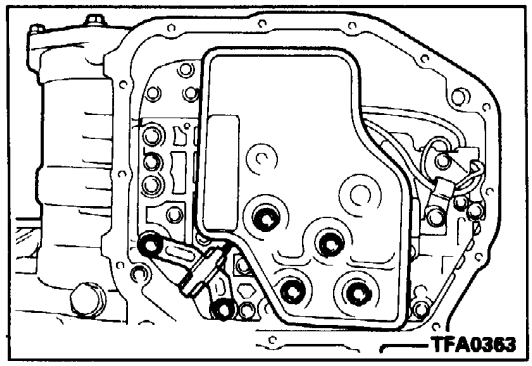


9. Tighten the lock nut by hand until the lock nut contacts the piston. Then, using the torque wrench, tighten to the specified torque.

Lock nut: 25–32 Nm (2.5–3.2 kgm, 18–23 ft.lbs.)

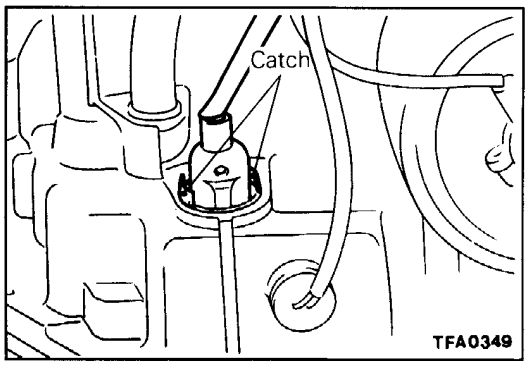
Caution
If it is rapidly tightened with the socket wrench or torque wrench, the lock nut and adjusting rod may rotate together.

10. Remove the special tool which fastens the piston. Attach the plug to the outlet of the low-reverse pressure.

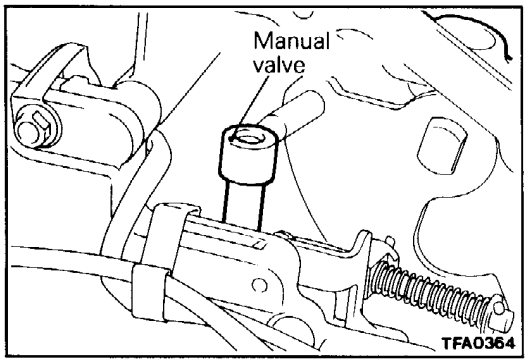


LINE PRESSURE ADJUSTMENT E23FNAF

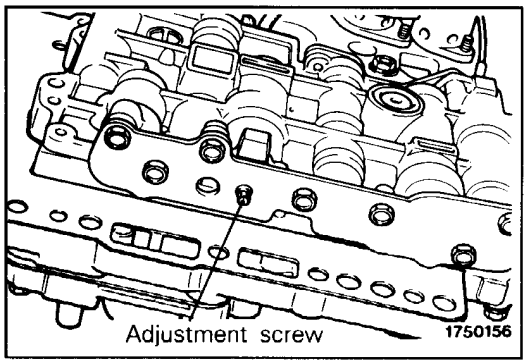
1. Drain out the automatic transmission fluid.
2. Remove the oil pan.
3. Remove the oil filter.
4. Remove the oil-temperature sensor.
5. Press the solenoid valve harness grommet and connector into the transmission case.



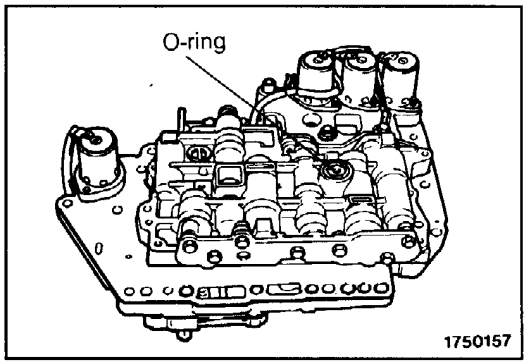
6. Press the catches of the solenoid valve harness grommets and pass the connector through the case hole.



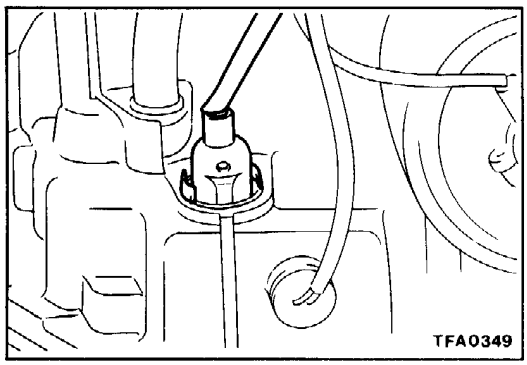
7. Remove the valve body assembly. The manual valve can come out, so be careful not to drop it.



8. Turn the adjustment screw of the regulator valve and adjust so that the line pressure (kickdown brake pressure) becomes the standard value.
   When the adjustment screw is turned to the clockwise, the line pressure becomes lower; when it is turned to counter-clockwise, it becomes higher.
   Standard value: 870–890 kPa (8.7–8.9 kg/cm^2, 124–126 psi)
   Oil pressure change for each turn of adjustment screw: 38 kPa (0.38 kg/cm^2, 5.4 psi)

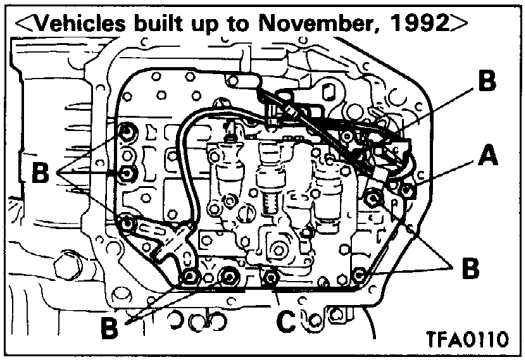


9. Check to be sure that the O-ring is installed on the upper surface of the valve body at the place shown in the figure.
10. Replace the O-ring of the solenoid valve harness grommet with a new one.

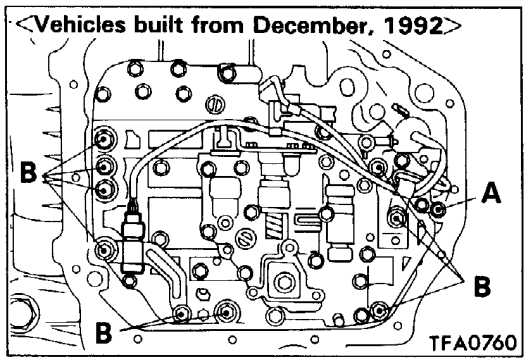


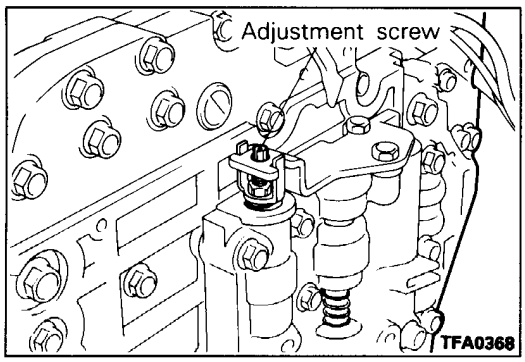
11. Pass the solenoid valve connector through the inside of the hole in the case.

<Vehicles built up to November, 1992>



<Vehicles built from December, 1992>





12. Install the valve body and oil temperature sensor, and then tighten valve body assembly mounting bolts.

    A bolt: 18 mm (0.709 in.) long
    B bolt: 25 mm (0.984 in.) long
    C bolt: 40 mm (1.575 in.) long

13. Install the oil filter.
14. Install a new oil pan gasket and oil pan.
15. Pour in the specified amount of Automatic transmission fluid.
16. Make the oil pressure test. Readjust if necessary.

REDUCING PRESSURE ADJUSTMENT E23FNBC

WHEN A MULTI-USE TESTER IS NOT USED

1. Remove parts up to the oil filter in the same way as for adjustment of the line pressure. The valve body need not be removed.
2. Turn the adjustment screw of the lower valve body and adjust so that the reducing pressure is the standard value. When the adjustment screw is turned to the right, the reducing pressure becomes lower; when it is turned to the left, it becomes higher.

   NOTE
   When adjusting the reducing pressure, aim for the center value (425 kPa, 4.25 kg/cm^2, 60 psi) of the standard value allowance.

   Standard value: 425±10 kPa
   (4.25±0.1 kg/cm^2, 60±1 psi)

   Oil pressure change for each turn of adjustment screw: 45 kPa (0.45 kg/cm^2, 6.4 psi)

3. Install the oil filter and oil pan in the same way as for adjustment of the line pressure.
4. Make the oil pressure test. Readjust if necessary.

WHEN A MULTI-USE TESTER IS USED

1. Use the multi-use tester to force-actuate the pressure control solenoid valve to 50% duty, and measure the kickdown brake pressure at that time. If the kickdown pressure is not within the standard value adjust using the reducing pressure adjustment screw.

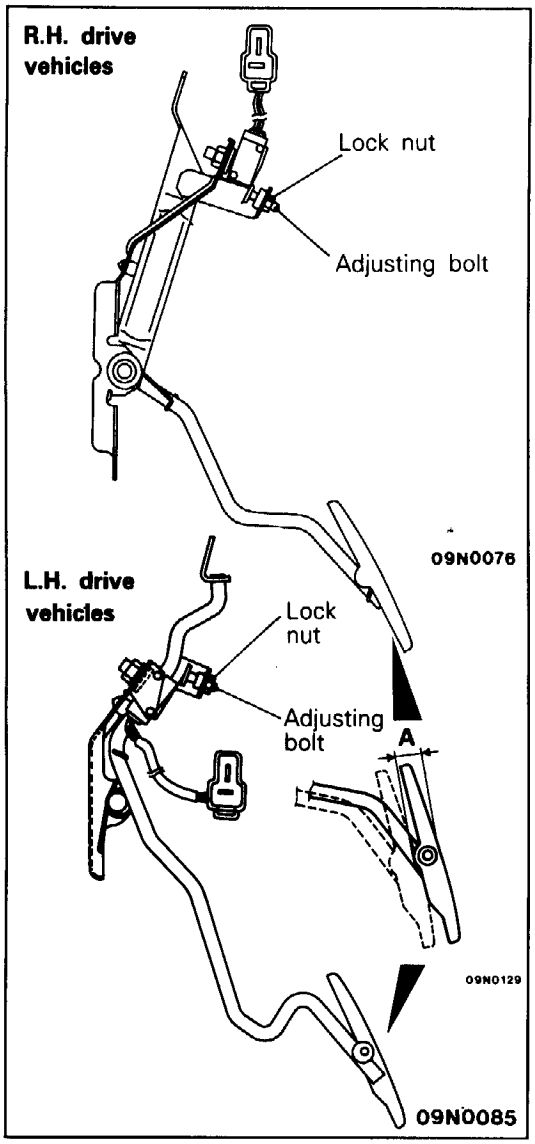
   Standard value: 275±25 kPa
   (2.75±0.25 kg/cm^2, 39±4 psi)

   Oil pressure change for each turn of adjustment screw: 22 kPa (0.22 kg/cm^2, 3 psi)

2. Check to be sure, after completing this adjustment, that the reducing pressure is within the range of 360–480 kPa (3.6–4.8 kg/cm^2, 51–68 psi)

   Caution
   The adjustment should be made at an oil temperature of 70–80°C (158–176°F).
   If the adjustment is made at an oil temperature that is too high, the line pressure will decrease during idling, with the result that a correct adjustment cannot be made.

NOTES



THROTTLE-POSITION SENSOR ADJUSTMENT

E23FZ--

Refer to GROUP 13 – Service Adjustment Procedures.

ACCELERATOR PEDAL SWITCH INSPECTION AND ADJUSTMENT

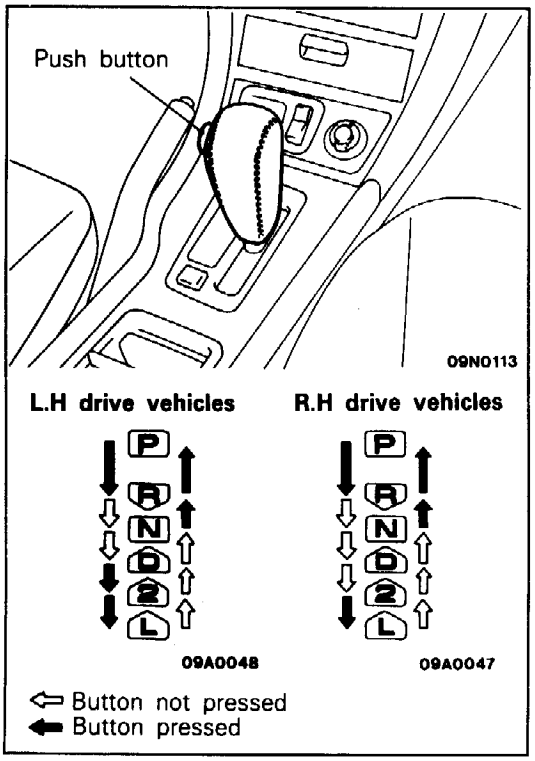
E23FUAB

<Vehicles built up to November, 1991>

When the accelerator pedal is not depressed, there is continuity between the accelerator pedal switch terminals. Check that there is no continuity between the switch terminals when the pedal is depressed and indication stroke A reaches the standard value.

Standard value (A): 2–6 mm (0.08–0.24 in.)

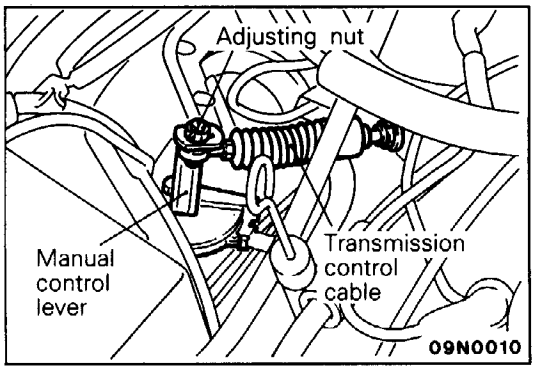
When the stroke shown in the figure deviates from the standard value, adjust with the adjusting bolt.



SELECTOR LEVER OPERATION CHECK

E23FOAB

1. Shift selector lever to each range and check that lever moves smoothly and is controlled. Check that position indicator is correct.
2. Check to be sure the selector lever can be shifted to each position (by button operation as shown in the illustration).
3. Start the engine and check if the vehicle moves forward when the selector lever is shifted from N to D, and moves backward when shifted to R.
4. When the shift lever malfunctions, adjust control cable and selector lever sleeve. Check for worn shift lever assembly sliding parts.

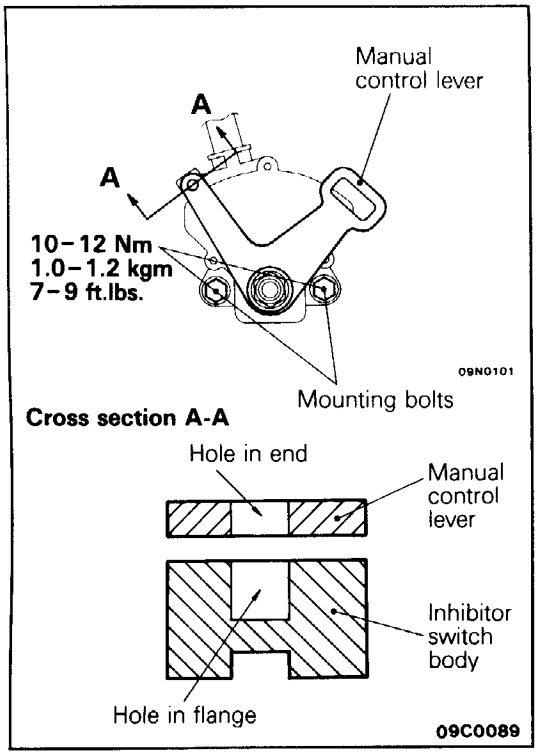


INHIBITOR SWITCH AND CONTROL CABLE ADJUSTMENT

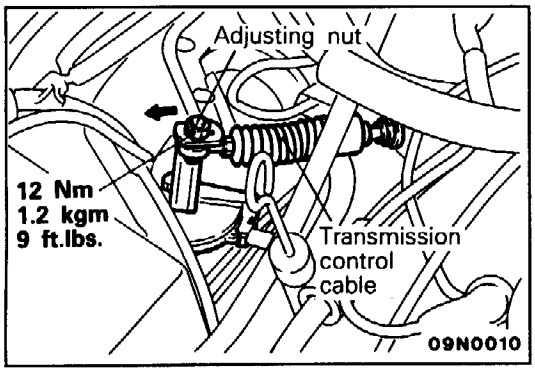
E23F0AG

INHIBITOR SWITCH

1. Place selector lever in "N" (Neutral) position.
2. Loosen transmission control cable to manual control lever coupling adjusting nut to set cable and lever free.



3. Place manual control lever in "N" (neutral) position.
4. Loosen the inhibitor switch body mounting bolts, rotate and adjust the inhibitor switch body so the hole in the end of the manual control lever and the hole (cross section A-A in the figure on the left) in the flange of the inhibitor switch body are aligned.
5. Tighten the mounting bolts of the inhibitor switch body to the specified torque. Be careful at this time that the position of the switch body is not changed.



6. Lightly pull the transmission control cable in the arrow's direction, and tighten the adjusting nut to the specified torque.
7. Check that the selector lever is in the "N" position.
8. Check that each range on the transmission side operates and functions correctly for each position of the selector lever.

CONTROL CABLE

Whether control cable is properly adjusted can be confirmed by checking whether inhibitor switch is performing well.

1. Apply parking brakes and service brakes securely.
2. Place selector lever to "R" range.
3. Set ignition key to "ST" position.
4. Slowly move the selector lever upward until it clicks as it fits in notch of "P" range. If starter motor operates when lever makes a click, "P" position is correct.
5. Then slowly move selector lever to "N" range by the same procedure as in foregoing paragraph. If starter motor operates when selector lever fits in "N" , "N" position is correct.
6. Also check to be sure the vehicle doesn't begin to move and the lever doesn't stop between P-R-N-D.
7. The control cable is properly adjusted if, as described above, the starter motor starts at both the "P" range and the "N" range.

SPEEDOMETER CABLE REPLACEMENT E23FPAE

Refer to GROUP 22 – Service Adjustment Procedures.

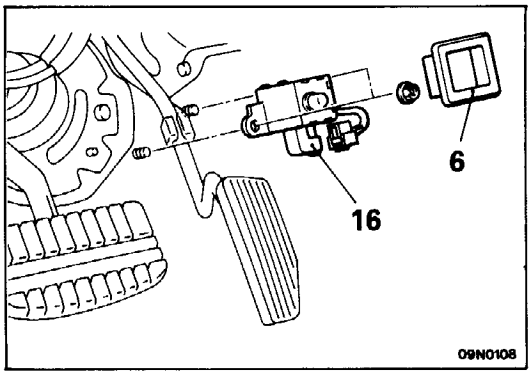
TRANSMISSION CONTROL

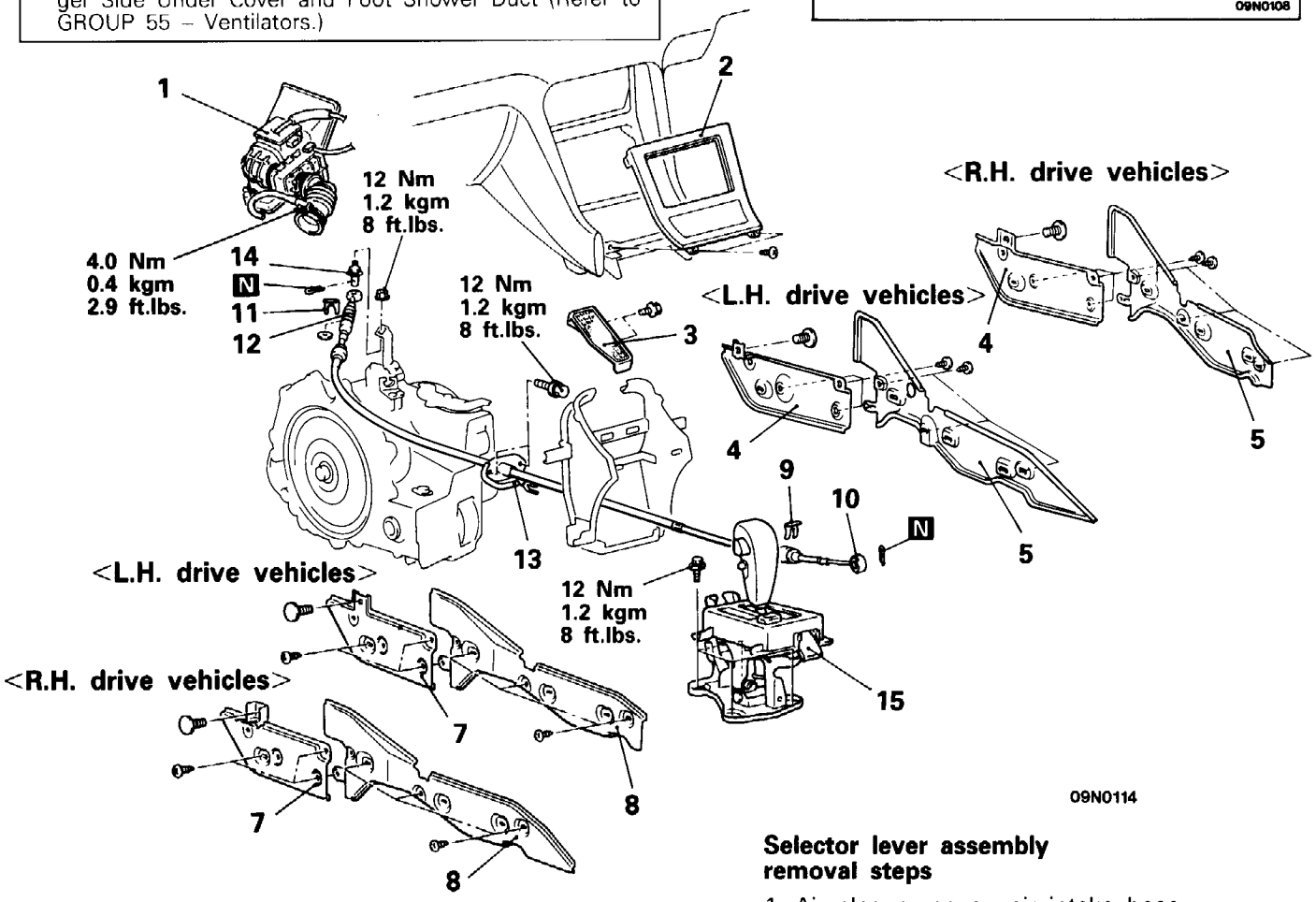
E23IA--

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Floor Console Assembly (Refer to GROUP 52 – Floor Console.)

  CAUTION: SRS <L.H. drive vehicles>
  When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.
- Removal and Installation of Passenger Side Under Cover and Foot Shower Duct (Refer to GROUP 55 – Ventilators.)





Transmission control cable assembly removal steps

1. Air cleaner cover, air intake hose
2. Audio panel
3. Foot rest <R.H. drive vehicles>
4. Front center reinforcement (R.H. side)
5. Rear center reinforcement (R.H. side)
9. Clip
- ◆◆ 10. Connection for the transmission control cable assembly (selector lever assembly side)
11. Clip
12. Connection for the transmission control cable assembly (transmission side)
13. Transmission control cable assembly
14. Adjuster

Selector lever assembly removal steps

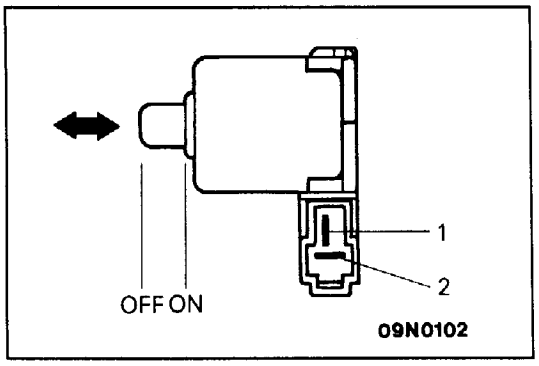
1. Air cleaner cover, air intake hose
2. Audio panel and ashtray
3. Foot rest <R.H. drive vehicles>
4. Front center reinforcement (R.H. side)
5. Rear center reinforcement (R.H. side)
6. Cover <L.H. drive vehicles>
7. Front center reinforcement (L.H. side)
8. Rear center reinforcement (L.H. side)
9. Clip
- ◆◆ 10. Connection for the transmission control cable assembly (selector lever assembly side)
15. Selector lever assembly

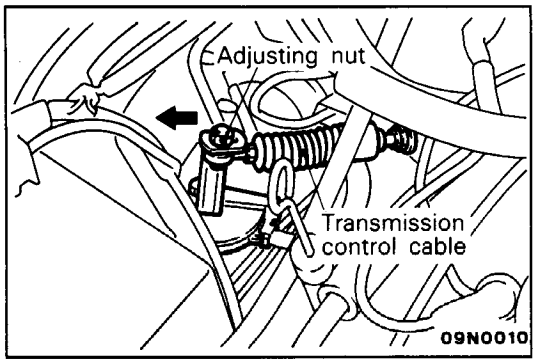
Removal of wide open throttle switch <L.H. drive vehicles>

6. Cover
16. Wide open throttle switch

INSPECTION E23ICAI

Check the transmission control cable assembly for function and for damage.





WIDE OPEN THROTTLE SWITCH <L.H. DRIVE VEHICLES>

Check for continuity between terminals when the switch is OFF and when ON.

	1	2
ON	○———	———○
OFF		

NOTE
○—○ indicates that there is continuity between the terminals.

SERVICE POINTS OF INSTALLATION E23IDAJ

10. INSTALLATION OF THE TRANSMISSION CONTROL CABLE ASSEMBLY (SELECTOR LEVER ASSEMBLY SIDE)

After installing the transmission control cable, adjust in the following way.

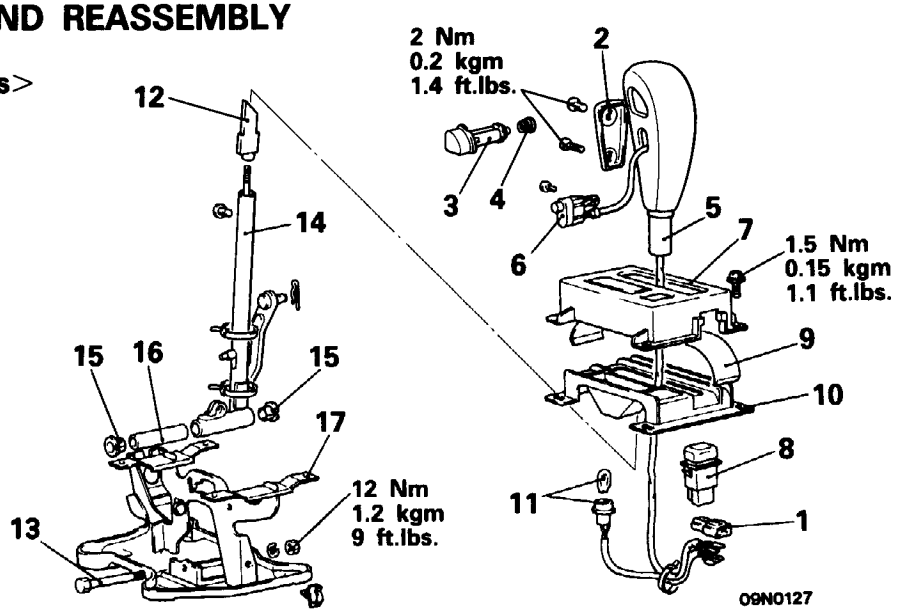
(1) Put the selector lever in the "N" position.
(2) Loosen the adjusting nut, gently pull the transmission control cable in the direction of the arrow and tighten the nut.

SELECTOR LEVER ASSEMBLY

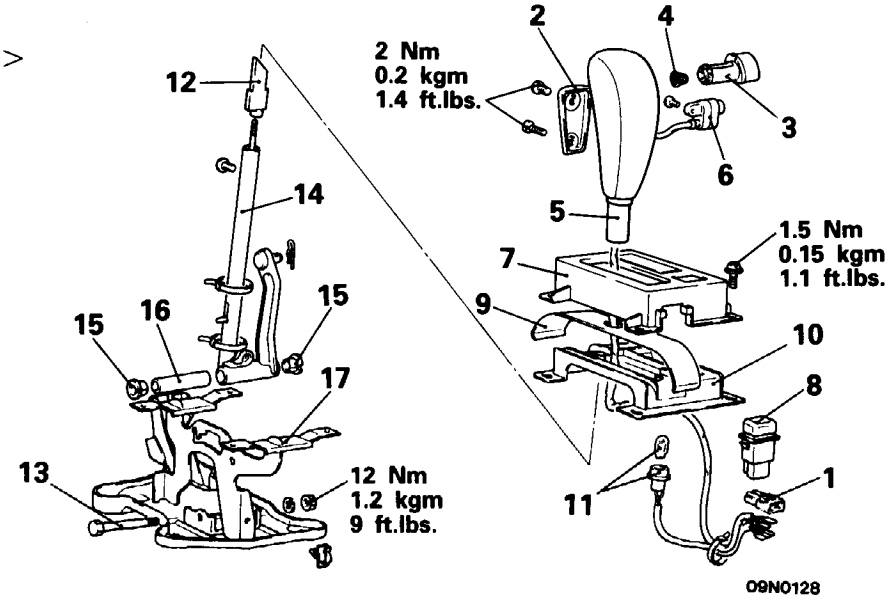
E23NA–

DISASSEMBLY AND REASSEMBLY

<L.H. drive vehicles>



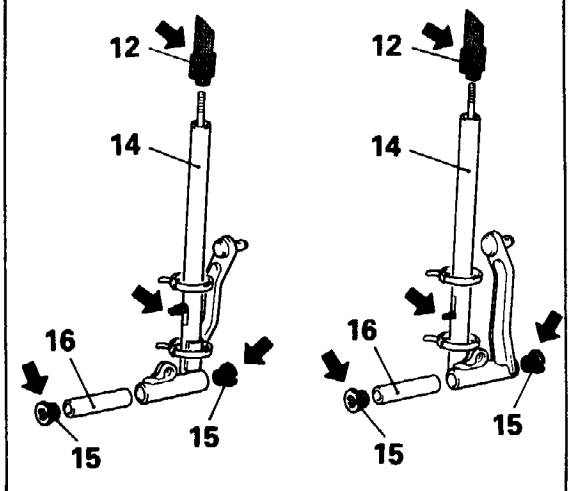
<R.H. drive vehicles>

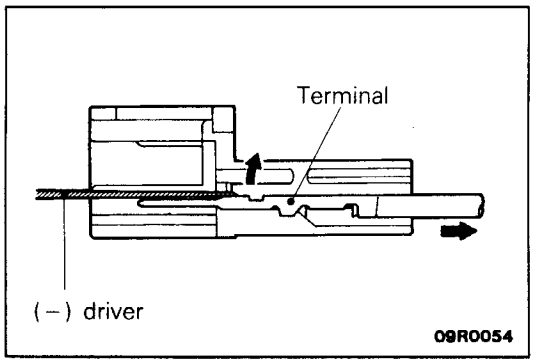


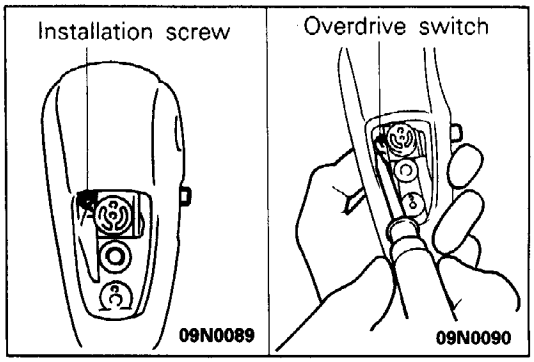
Disassembly steps

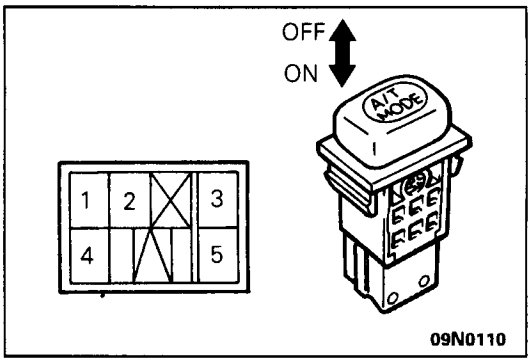
- ◆◆ 1. Overdrive switch/position lamp connector case
- 2. Cover
- 3. Push button
- 4. Spring
- 5. Selector knob
- ◆◆ 6. Overdrive switch
- 7. Upper panel
- 8. Power (PWR)/Economy (ECO) changeover switch
- 9. Slider
- 10. Lower panel
- 11. Position indicator lamp assembly
- ◆◆ 12. Sleeve
- 13. Bolt
- 14. Selector lever assembly
- 15. Push
- 16. Pipe
- 17. Bracket assembly

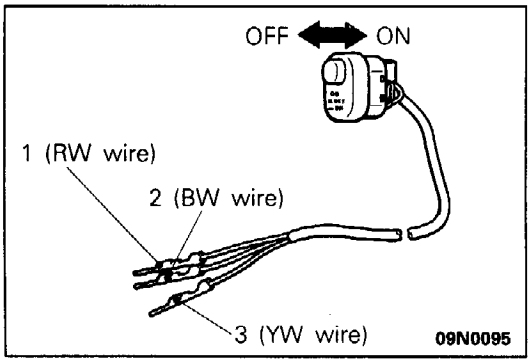
<L.H. drive vehicles> <R.H. drive vehicles>

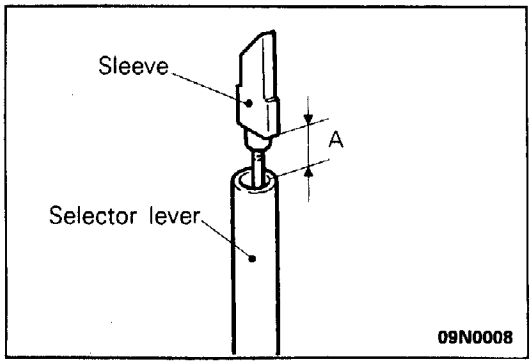












SERVICE POINTS OF DISASSEMBLY E23NBAA

1. REMOVAL OF THE OVERDRIVE SWITCH/POSITION LAMP CONNECTOR CASE

Use a flat-tip screwdriver or similar tool and pull out the terminal from the overdrive switch/position lamp connector case

6. REMOVAL OF OVERDRIVE SWITCH

Remove the screw attaching the overdrive switch, press the switch and remove the selector knod.

INSPECTION E23NCAA

- Check the detent plate for wear.
- Check the bushing for wear or damage.
- Check the spring for damage or deterioration.

POWER (PWR)/ECONOMY (ECO) CHANGEOVER SWITCH

Check for continuity between terminals when the switch is OFF and when ON.

Switch position \ Terminal	1	2	3	4	5
ON (PWR)				○——	——○
OFF (ECO)			○——	——	——○

NOTE
○—○ indicates that there is continuity between the terminals.

OVERDRIVE SWITCH

Check for continuity between terminals when the switch is OFF and when ON.

Switch position \ Terminal	1	2	3
Overdrive operating (ON)	○——	——○	
Overdrive not operating (OFF)	○——	——	——○

NOTE
○—○ indicates that there is continuity between the terminals.

SERVICE POINTS OF REASSEMBLY E23NDAA

12. INSTALLATION OF SLEEVE

Put the selector lever in the "N" position, turn the sleeve and adjust dimension A between the sleeve and the end of the lever so it reaches the standard value.

Standard value A: 15.2–15.9mm (0.598–0.625 in.)

TRANSMISSION OIL COOLER HOSES

E23KA–

REMOVAL AND INSTALLATION

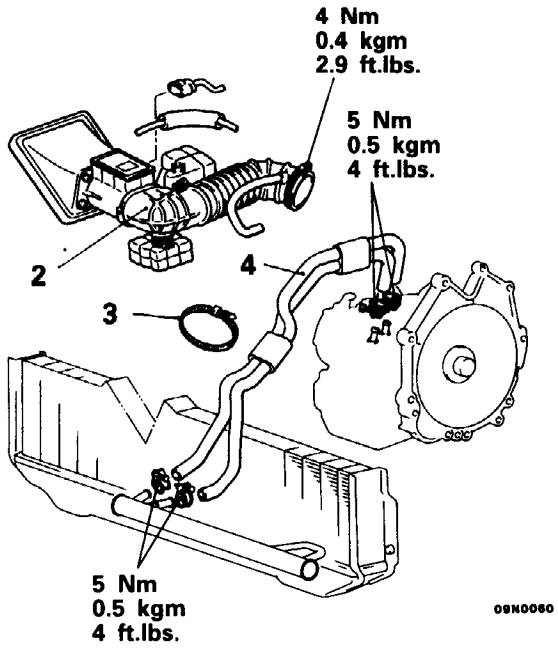
Pre-removal and Post-installation Operation
(1) Draining and Filling with Transmission Fluid (Refer to P.23-27.)
(2) Removal and Installation of Front Bumper <Vehicles with Oil Cooler> (Refer to GROUP 51 – Front Bumper.)

1. Hose B <Vehicles with oil cooler>

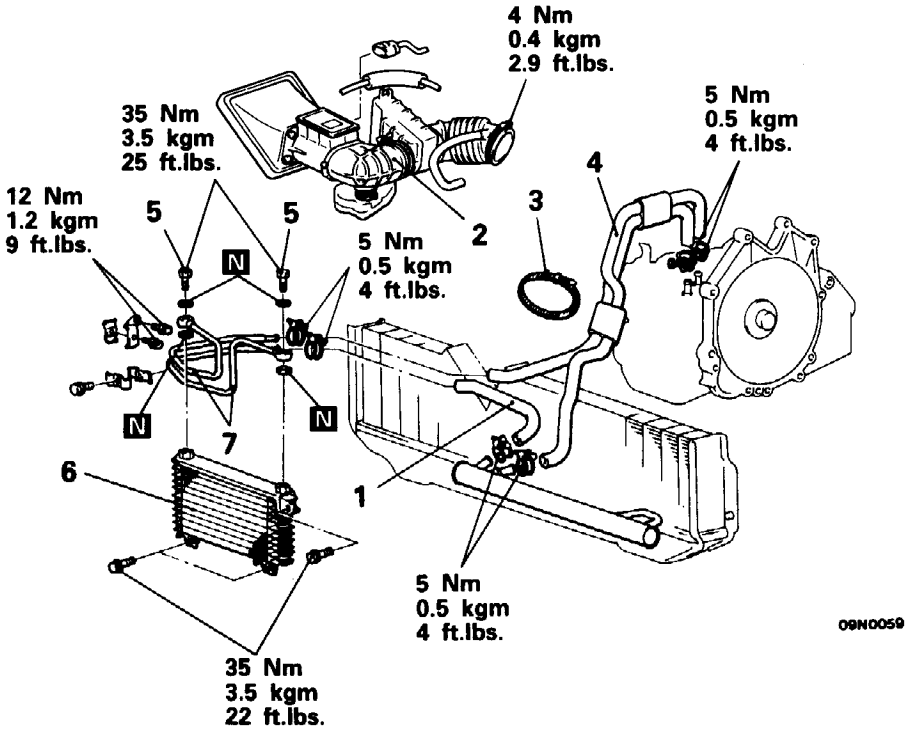
Hose assembly removal steps

2. Air cleaner cover, air intake hose
3. Hose band
4. Hose assembly <Vehicles with oil cooler>

<Vehicles without oil cooler>



<Vehicles with oil cooler>

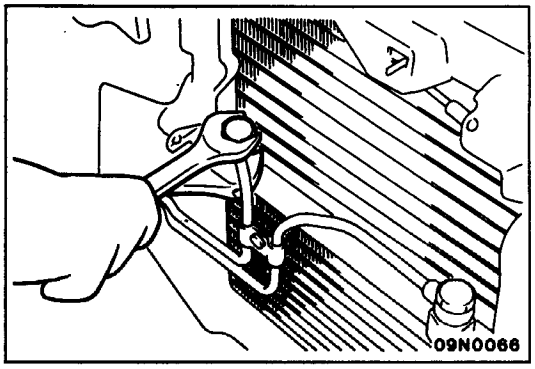


Transmission oil cooler removal steps

◆◆ ▶◀ 5. Eye bolt
6. Oil cooler

Transmission oil pipe assembly removal steps

◆◆ ▶◀ 5. Eye bolt
7. Oil pipe assembly



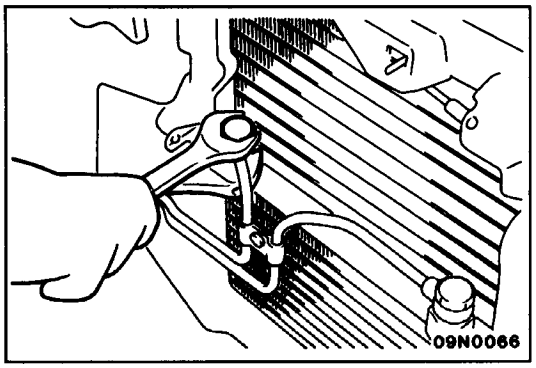
SERVICE POINTS OF REMOVAL E23KBAD

5. REMOVAL OF EYE BOLT

Caution
Secure the connector with a wrench or similar tool and, being careful not to apply unnecessary force to the oil cooler connector, remove the eye bolt.

INSPECTION E23KCAB

- Check the hose and pipe for crack, damage or clog.
- Check for rusted or clogged radiator oil cooler.
- Check the eye bolt for clogging or deformation.



SERVICE POINTS OF INSTALLATION E23KDAC

5. INSTALLATION OF EYE BOLT

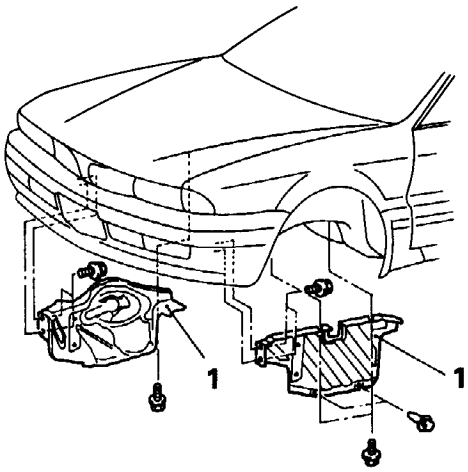
(1) Carefully wipe off dirt, etc. from the screw threads and fitting surface.
(2) Secure the connector with a wrench or similar tool and, being careful not to apply unnecessary force to the oil cooler connector, tighten the eye bolt.

TRANSMISSION ASSEMBLY

E23LA--

REMOVAL AND INSTALLATION

Pre-removal Operation
(1) Drainage of Transmission Fluid (Refer to P.23-27.)
(2) Removal of Front Under Cover <Vehicles with Front Under Cover>
(3) Removal of Drive Shaft (left side), Inner Shaft Assembly <Vehicles with 4WS> (Refer to GROUP 26 – Drive Shaft.)



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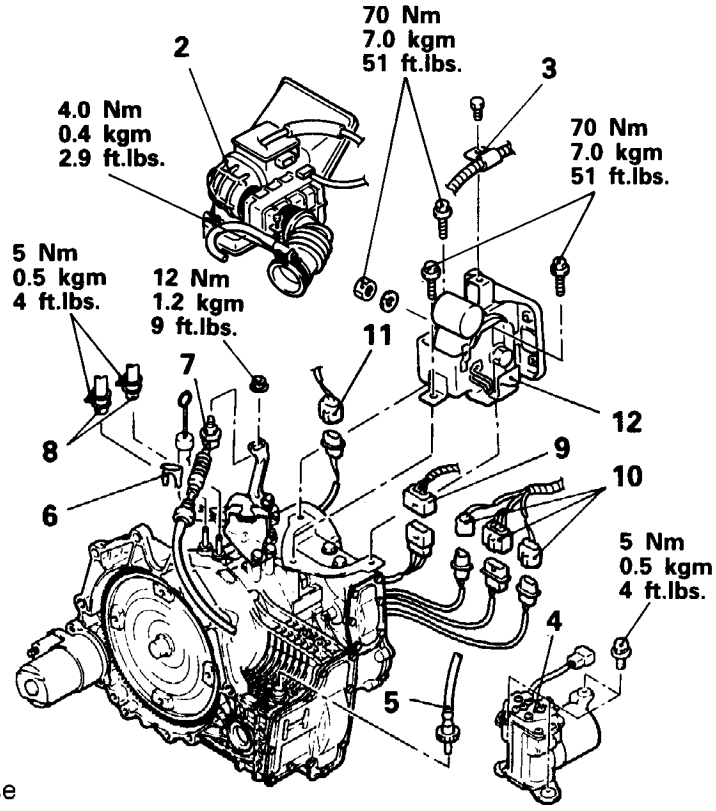
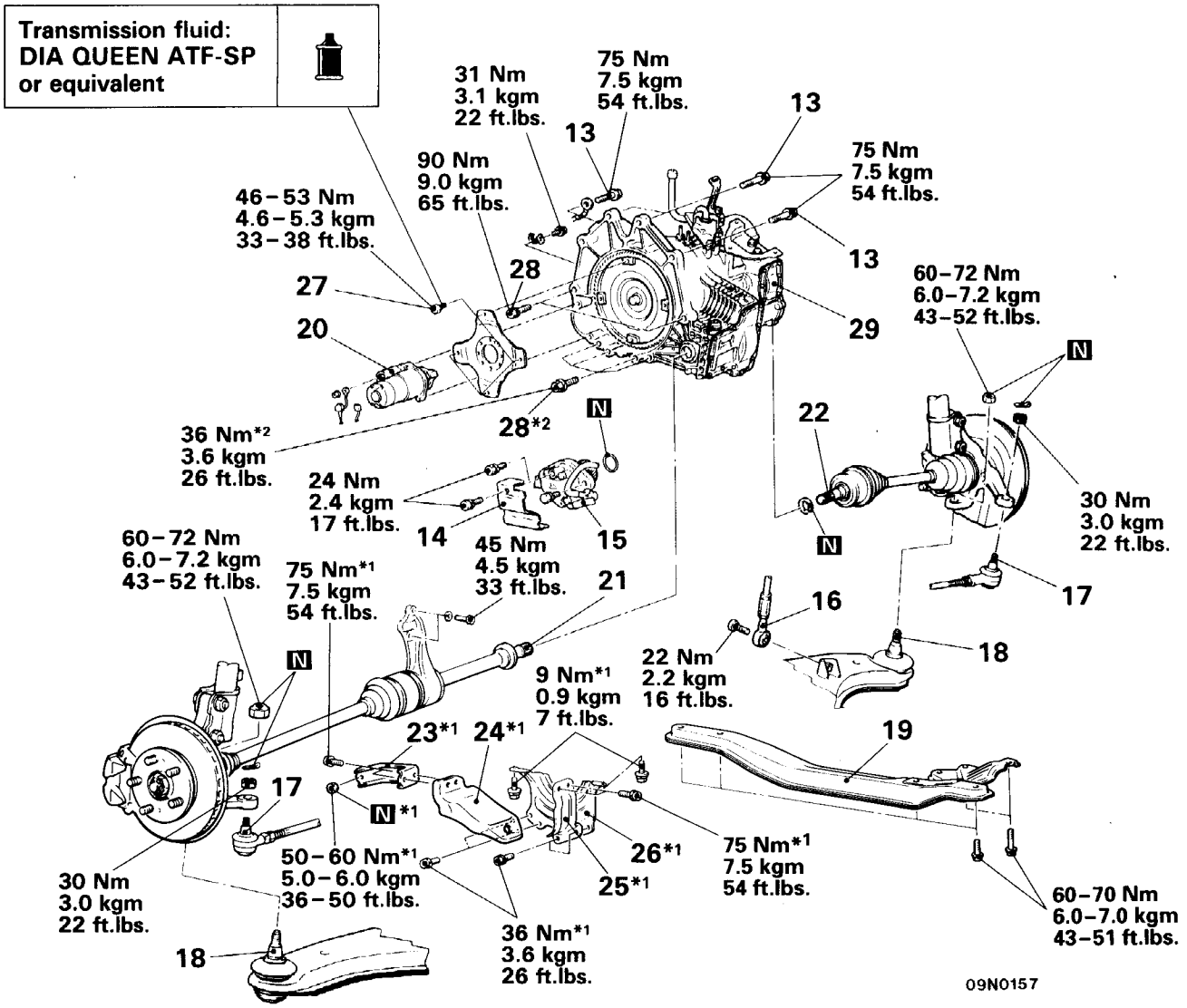


09N0097

Removal steps

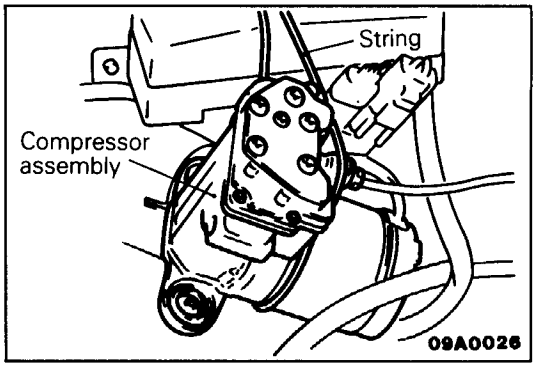
1. Side under cover
2. Air cleaner cover, air intake hose
3. Engine harness connection
4. ◀▶ Compressor assembly <Vehicles with ACTIVE-ECS>
5. Speedometer cable connection
6. Clip
7. ▶◀ Transmission control cable connection
8. Connection for transmission fluid cooler hose
9. Inhibitor switch connector
10. Kick down servo switch connector, pulse generator connector, oil temperature sensor connector
11. Shift control solenoid valve connector
12. ◀▶ Connection for transmission mounting bracket



13. Transmission assembly upper connection bolt
14. Heat protector <Vehicles with 4WS>
15. Oil pump assembly <Vehicles with 4WS>
16. Front height sensor rod <Vehicles with ACTIVE-ECS>
17. Connection for tie rod end and knuckle
18. Connection for lower arm ball joint and knuckle
19. Right member
20. Starter
21. Drive shaft (left side), inner shaft assembly
22. Drive shaft (right side)
23. Roll stopper stay A*1
24. Transmission stay (Front bank side)*1
25. Transmission stay (Rear bank side)*1
26. Bell housing cover*1
27. Torque converter connection bolt
28. Transmission assembly lower connection bolt
29. Transmission assembly

Post-installation Operation
(1) Installation of Drive Shaft (left side), Inner Shaft Assembly <Vehicles with 4WS> (Refer to GROUP 26 – Drive Shaft.)
(2) Installation of Front Under Cover <Vehicles with Front Under Cover>
(3) Filling in Transmission Fluid (Refer to P.23-27.)
(4) Check operation of the selector lever and operation in each position.
(5) Check operation of meters and gauges.

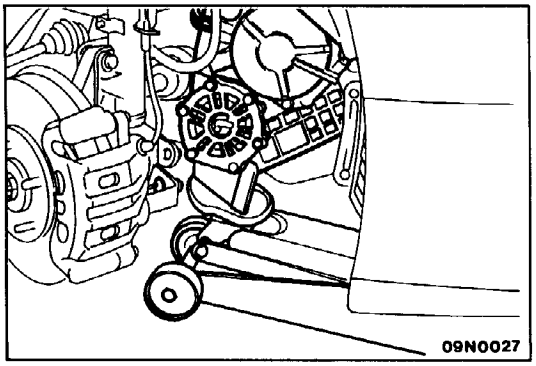
NOTE
*1 : DOHC built up to October, 1992 and SOHC
*2 : DOHC built from November, 1992



SERVICE POINTS OF REMOVAL

4. REMOVAL OF COMPRESSOR ASSEMBLY <VEHICLES WITH ACTIVE-ECS>

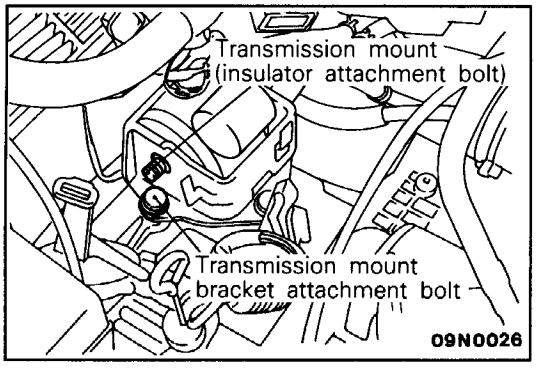
Remove the compressor assembly from the bracket and secure it to the body without removing the air hose connection.



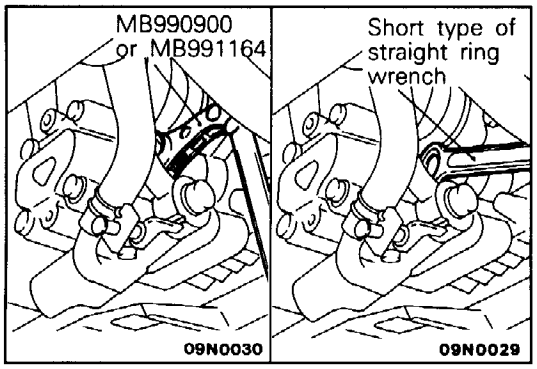
12. REMOVAL OF TRANSMISSION MOUNT BRACKET CONNECTION

(1) Use a garage jack to support the transmission assembly, setting it in a position so there is no weight on the insulators.

NOTE
When jacking it up, support the transmission assembly over a wide area so force is not applied to one part of it.



(2) Remove the nut, move the transmission mount insulator attachment bolt to set a wrench or similar tool on the transmission mount bracket attachment bolt and remove the transmission mount bracket attachment bolt.



15. REMOVAL OF OIL PUMP ASSEMBLY <VEHICLES WITH 4WS>

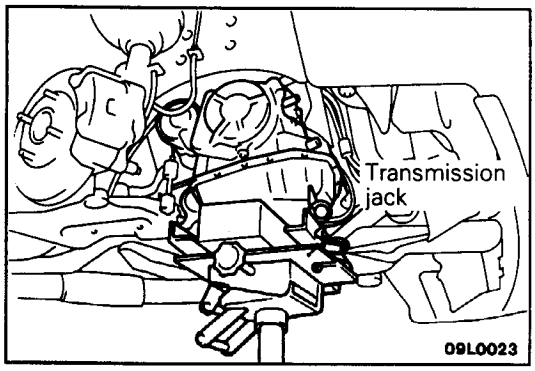
(1) Without removing the oil hose connection, loosen the bolt using a short type of straight ring wrench or special tool.

Caution
Do not apply more than 100 Nm (10 kgm, 72 ft.lbs.) of torque to the special tool (MB991164).

(2) Secure the removed oil pump assembly to the body with a wire or something similar.

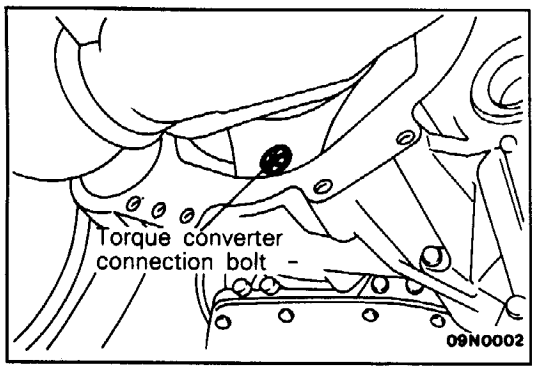
17. DISCONNECTION OF TIE ROD END AND KNUCKLE/18. LOWER ARM BALL JOINT AND KNUCKLE/21. DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY/22. DRIVE SHAFT (RIGHT SIDE)

Refer to GROUP 22 – Transmission Assembly.



27. REMOVAL OF TORQUE CONVERTER CONNECTION BOLT/28. TRANSMISSION ASSEMBLY LOWER CONNECTION BOLT/29. TRANSMISSION ASSEMBLY

(1) Support the transmission assembly with a transmission jack.

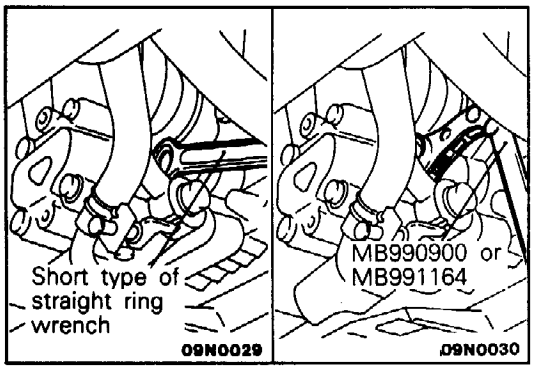


(2) Remove the connection bolts (4 locations) while turning the crank shaft.
(3) Press in the torque converter to the transmission side so the torque converter does not remain on the engine side.
(4) Remove the transmission assembly lower connection bolt and lower the transmission assembly.

SERVICE POINTS OF INSTALLATION E23LDAJ

22. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)/16. FRONT HEIGHT SENSOR ROD <VEHICLES WITH ACTIVE-ECS>

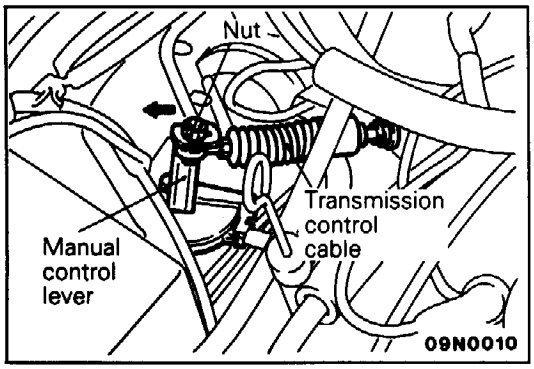
Refer to GROUP 22 – Transmission Assembly.



15. INSTALLATION OF OIL PUMP ASSEMBLY <VEHICLES WITH 4WS>

Use a short type of straight ring wrench or the special tool to tighten the bolt.

Caution
Do not apply more than 100 Nm (10 kgm, 72 ft.lbs.) of torque to the special tool (MB991164).



7. INSTALLATION OF TRANSMISSION CONTROL CABLE

After installing the transmission control cable, adjust in the following way.
(1) Put the selector lever in the "N" position.
(2) Loosen the adjusting nut, gently pull the transmission control cable in the direction of the arrow and tighten the nut.