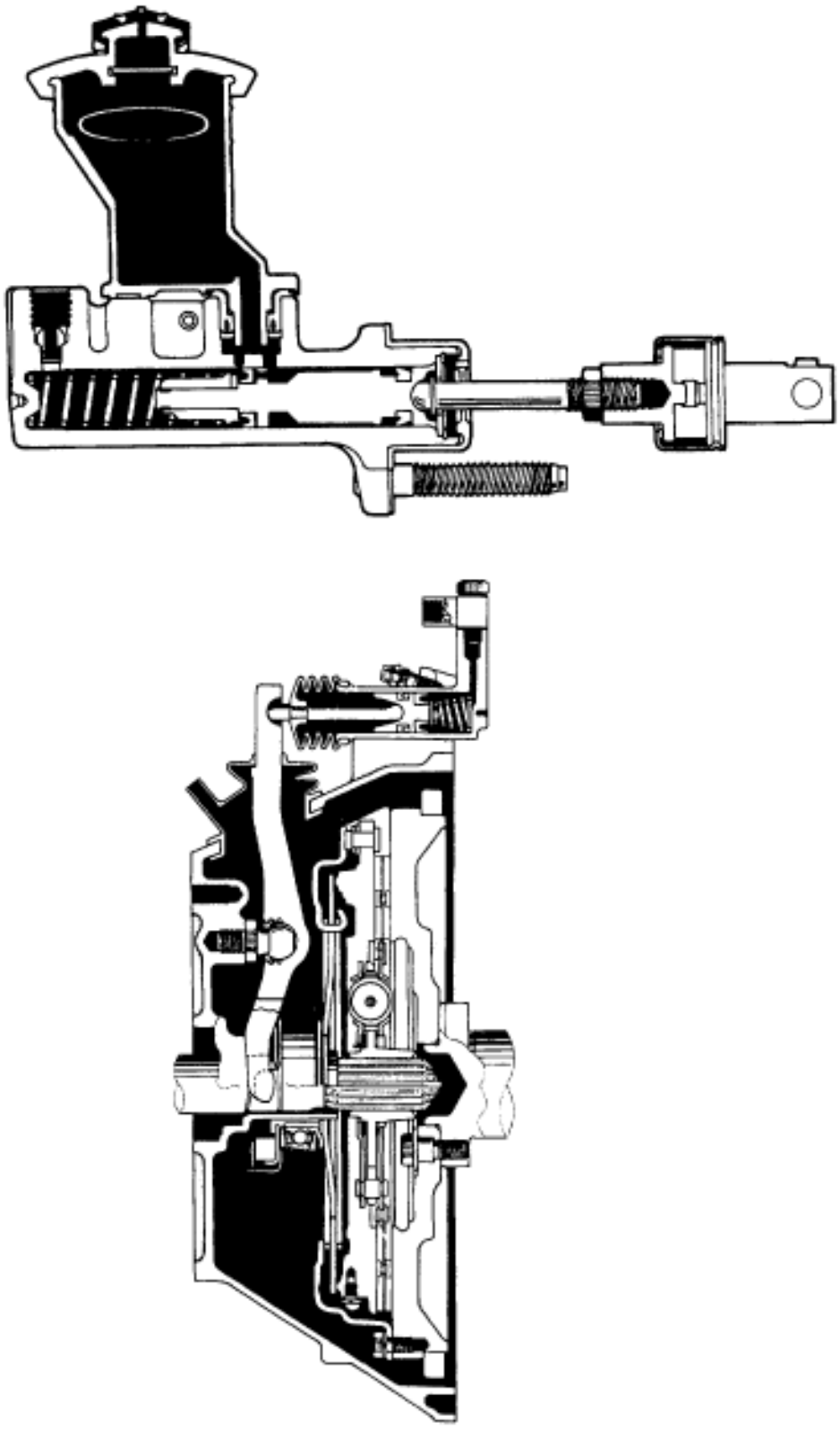
CLUTCH

DESCRIPTION

CL002–01

The diaphragm spring turnover type clutch providing lighter release performance.



G00301
G00304

2005

PREPARATION

SST (SPECIAL SERVICE TOOLS)

CL003–03

	09023–00100 Brake Tube Union Nut 10mm Wrench	Clutch line tube
	09301–00220 Clutch Guide Tool	
	09333–00013 Clutch Diaphragm Spring Aligner	

RECOMMENDED TOOLS

CL00S–01

	09082–00015 TOYOTA Electrical Tester	
	09905–00013 Snap Ring Pliers	

EQUIPMENT

CL004–01

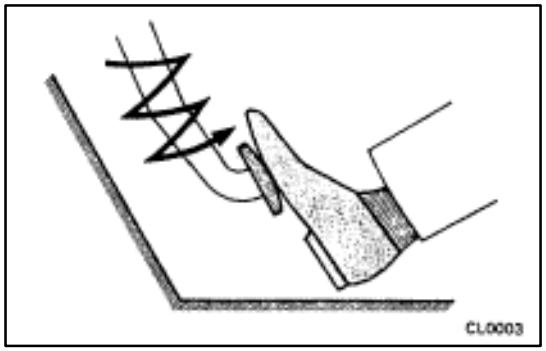
Calipers	
Dial indicator	
Torque wrench	

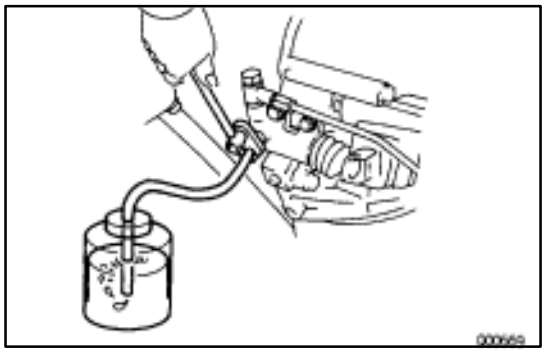
TROUBLESHOOTING

CL005–01

You will find the cause of trouble more easily by properly using the table shown below. In this table, the numbers indicate the priority of the probable cause of trouble. Check each part in the order shown. If necessary, repair or replace the part.

See Page / Parts Name / Trouble	Clutch pedal (Freeplay out of adjustment)	Clutch line (Air in line)	Master cylinder cup (Damaged)	Release cylinder cup (Damaged)	Engine mounting (Loosen)	Release bearing (Worn, dirty or damaged)	Input shaft bearing (Worn or damaged)	Clutch disc (Out of true)	Clutch disc (Runout is excessive)	Clutch disc (Lining broken)	Clutch disc (Dirty or burred)	Clutch disc (Oily)	Clutch disc (Worn out)	Clutch disc torsion rubber (Damaged)	Clutch disc (Harden)	Clutch disc (Lack of spline grease)	Diaphragm spring (Damaged)	Diaphragm spring (Out of tip alignment)	Pressure plate (Distortion)	Flywheel (Distortion)
See Page	CL–6	CL–5	CL–8	CL–11	-	CL–17	MX–35	CL–17	CL–17	CL–17	CL–17	CL–17	CL–17	CL–17	CL–17	CL–20	CL–17	CL–19	CL–17	-
Clutch grabs/chatters					1				2			2	2	2	2			2		
Clutch pedal spongy		1	2	2																
Clutch noisy						1	2							3						
Clutch slips	1											2	2				3		4	5
Clutch does not disengage	1	2	3	4			5	6	6	6	6	6				6	7	7	8	





CLUTCH SYSTEM BLEEDING

CL006–02

HINT: If any work is done on the clutch system or if air is suspected in the clutch lines, bleed the system of air.

NOTICE: Do not let brake fluid remain on a painted surface. Wash it off immediately.

1. FILL CLUTCH RESERVOIR WITH BRAKE FLUID

Check the reservoir frequently. Add fluid if necessary.

2. CONNECT VINYL TUBE TO BLEEDER PLUG

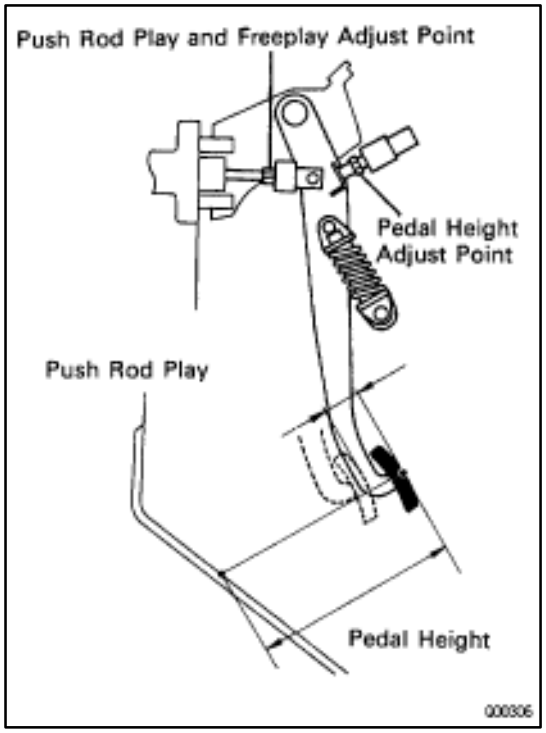
Insert the other end of the tube in a half–full container of brake fluid.

3. BLEED CLUTCH LINE

(a) Slowly pump the clutch pedal several times.

(b) While pressing on the pedal, loosen the bleeder plug until the fluid starts to run out. Then close the bleeder plug.

(c) Repeat this procedure until there are no more air bubbles in the fluid.



CLUTCH PEDAL

CLUTCH PEDAL CHECK AND ADJUSTMENT

CL007–03

1. CHECK THAT PEDAL HEIGHT IS CORRECT

Pedal height from asphalt sheet:

164.7–174.7 mm (6.48–6.88 in.)

2. IF NECESSARY, ADJUST PEDAL HEIGHT

Loosen the lock nut and turn the clutch switch until the height is correct. Tighten the lock nut.

3. CHECK THAT PEDAL FREEPLAY AND PUSH ROD PLAY ARE CORRECT

(Pedal freeplay)

Push in on the pedal until the beginning of clutch resistance is felt.

Pedal freeplay:

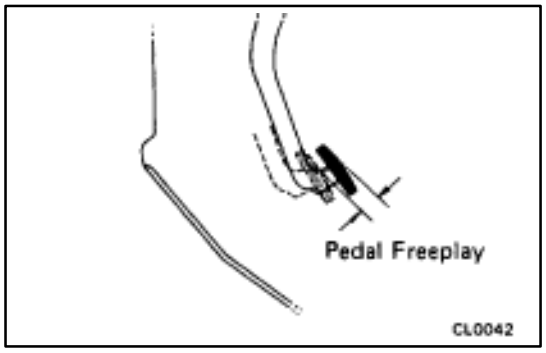
5.0–15.0 mm (0.197–0.591 in.)

(Push rod play)

Push in on the pedal with a finger softly until the resistance begins to increase a little.

Push rod play at pedal top:

1.0–5.0 mm (0.039–0.197 in.)

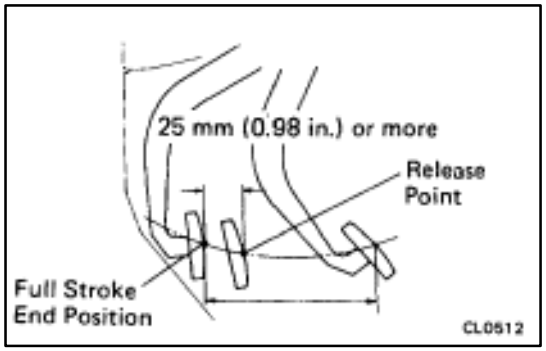


4. IF NECESSARY, ADJUST PEDAL FREEPLAY AND PUSH ROD PLAY

(a) Loosen the lock nut and turn the push rod until the freeplay and push rod play are correct.

(b) Tighten the lock nut.

(c) After adjusting the pedal freeplay, check the pedal height.



5. INSPECT CLUTCH RELEASE POINT

(a) Pull the parking brake lever and install wheel stopper.

(b) Start the engine and idle the engine.

(c) Without depressing the clutch pedal, slowly shift the shift lever into reverse position until the gears contact.

(d) Gradually depress the clutch pedal and measure the stroke distance from the point the gear noise stops (release point) up to the full stroke end position.

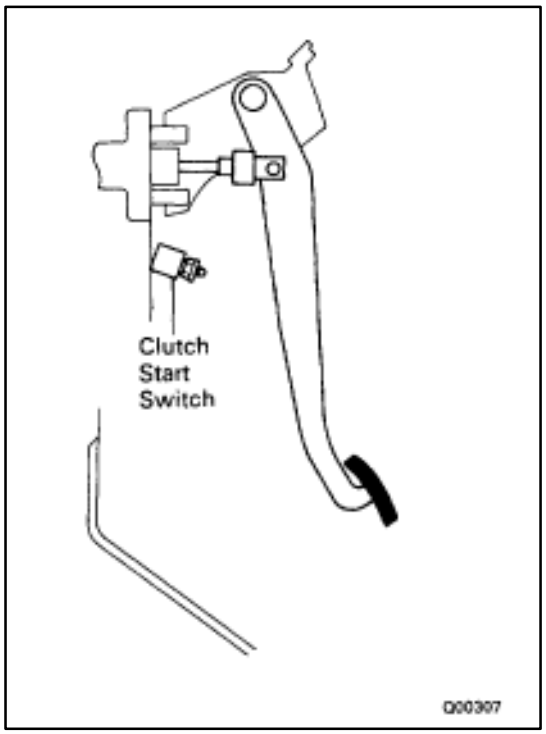
Standard distance:

25 mm (0.98 in.) or more

(From pedal stroke end position to release point)

If the distance not as specified, perform the following operation.

- Inspect pedal height.
- Inspect push rod play and pedal freeplay.
- Bleed the clutch line.
- Inspect the clutch cover and disc.

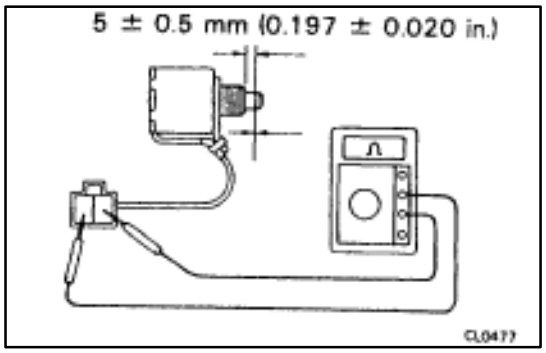


6. CHECK CLUTCH START SYSTEM

(a) Check that the engine does not start when the clutch pedal is released.

(b) Check that the engine starts when the clutch pedal is fully depressed.

If necessary, adjust or replace the clutch start switch.



7. INSPECT CONTINUITY OF CLUTCH START SWITCH

(a) Check that there is continuity between terminals when the switch is ON (pushed).

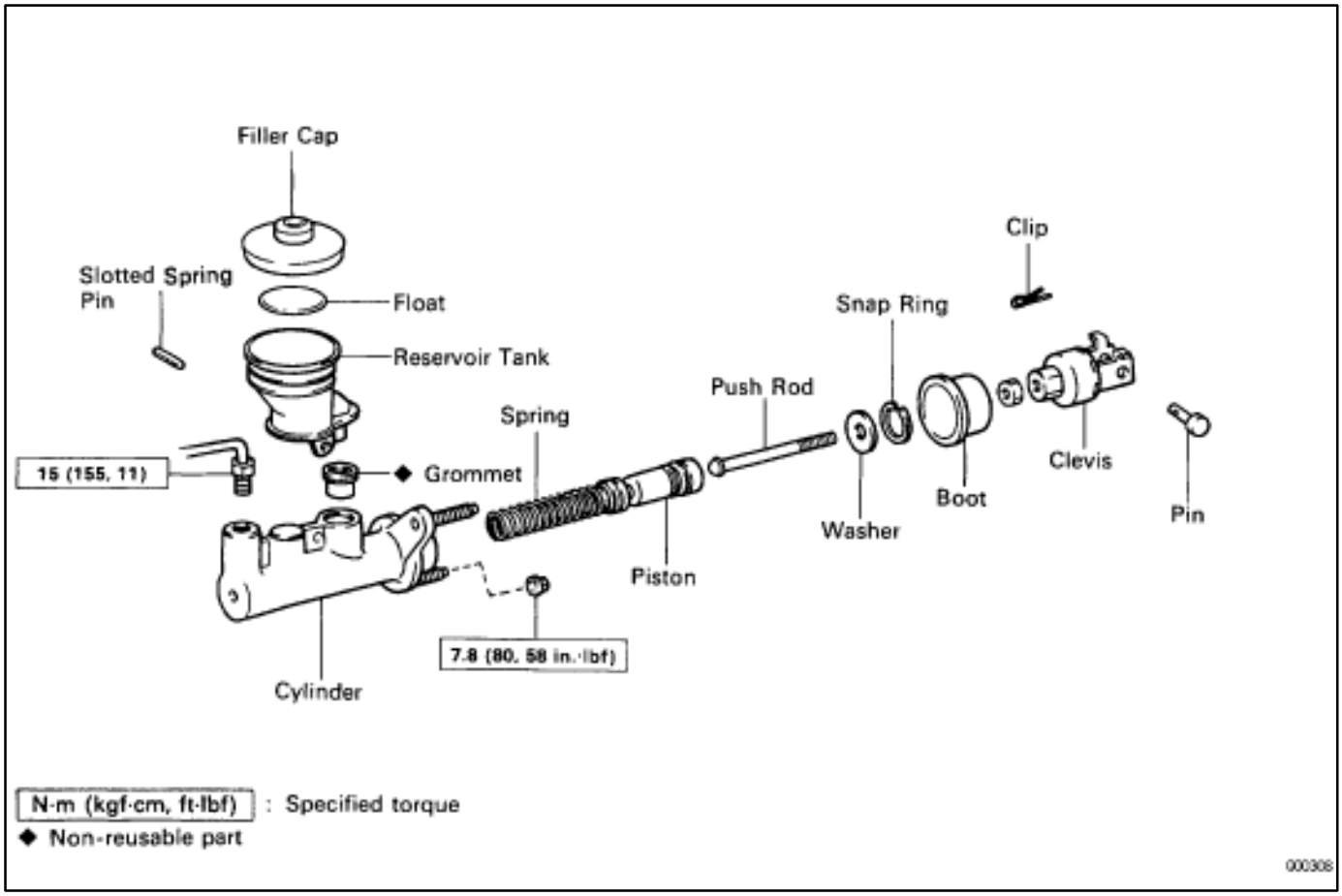
(b) Check that there is no continuity between terminals when the switch is OFF (free).

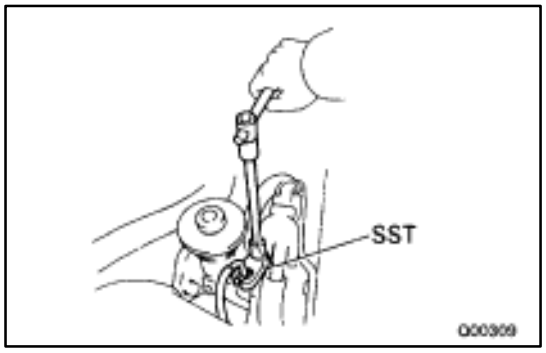
If continuity is not as specified, replace the switch.

CLUTCH MASTER CYLINDER

COMPONENTS

CL008–02

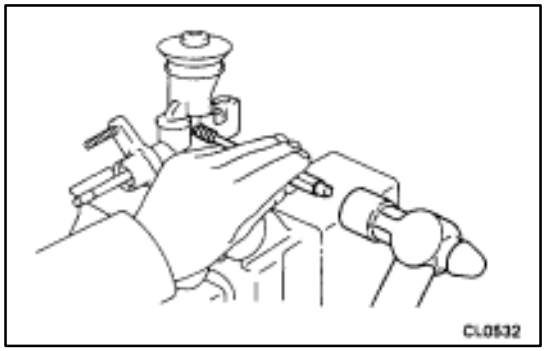




MASTER CYLINDER REMOVAL

CL009–02

1. **DRAW OUT FLUID WITH SYRINGE**
2. **DISCONNECT CLUTCH LINE TUBE**
   Using SST, disconnect the tube. Use a container to catch the brake fluid.
   SST 09023–00100
3. **REMOVE CLIP AND CLEVIS PIN**
4. **REMOVE MOUNTING NUTS AND PULL OUT MASTER CYLINDER**



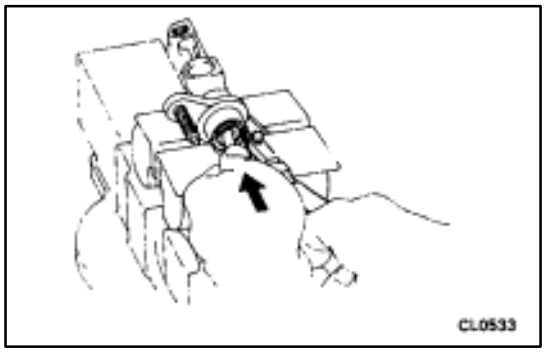
MASTER CYLINDER DISASSEMBLY

CL00A–02

1. REMOVE RESERVOIR TANK

(a) Using a pin punch and a hammer, drive out the slotted spring pin.

(b) Remove the reservoir tank and grommet.



2. REMOVE PUSH ROD

Pull back the boot, and using snap ring pliers, remove the snap ring.

3. REMOVE PISTON

MASTER CYLINDER INSPECTION

CL00B–01

HINT: Clean the disassembled parts with compressed air.

1. INSPECT MASTER CYLINDER BORE FOR SCORING OR CORROSION

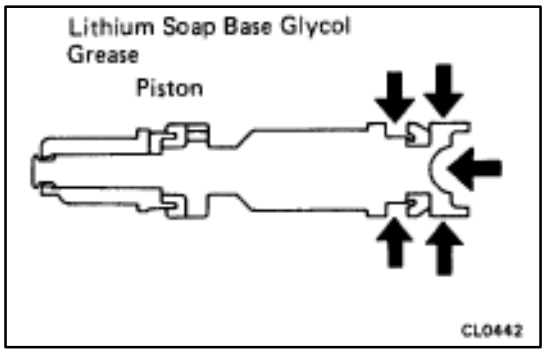
If a problem is found, clean or replace the cylinder.

2. INSPECT PISTON AND CUPS FOR WEAR, SCORING, CRACKS OR SWELLING

If either one requires replacement, use the parts from the cylinder kit.

3. INSPECT PUSH ROD FOR WEAR OR DAMAGE

If necessary, replace the push rod.



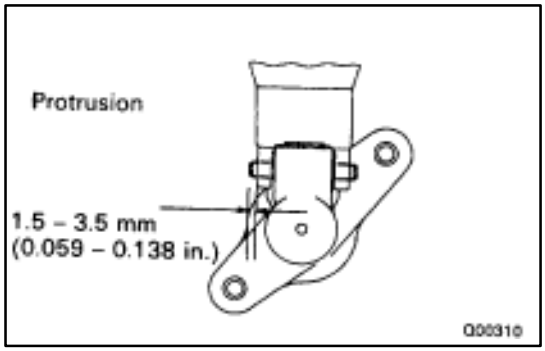
MASTER CYLINDER ASSEMBLY

CL00C–02

1. COAT PARTS WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN

2. INSERT PISTON INTO CYLINDER

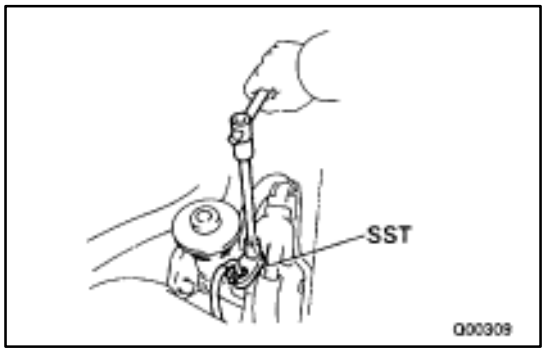
3. INSTALL PUSH ROD ASSEMBLY WITH SNAP RING



4. INSTALL RESERVOIR TANK

(a) Install the reservoir tank and new grommet.

(b) Using a pin punch and a hammer, drive in the slotted spring pin.



MASTER CYLINDER INSTALLATION

CL00D–03

1. INSTALL MASTER CYLINDER

Install the mounting nuts, and torque them.

Torque: 7.8 N·m (80 kgf·cm, 58 in·lbf)

2. CONNECT CLUTCH LINE UNION

Using SST, connect the union.

SST 09023–00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

3. CONNECT PUSH ROD AND INSTALL PIN

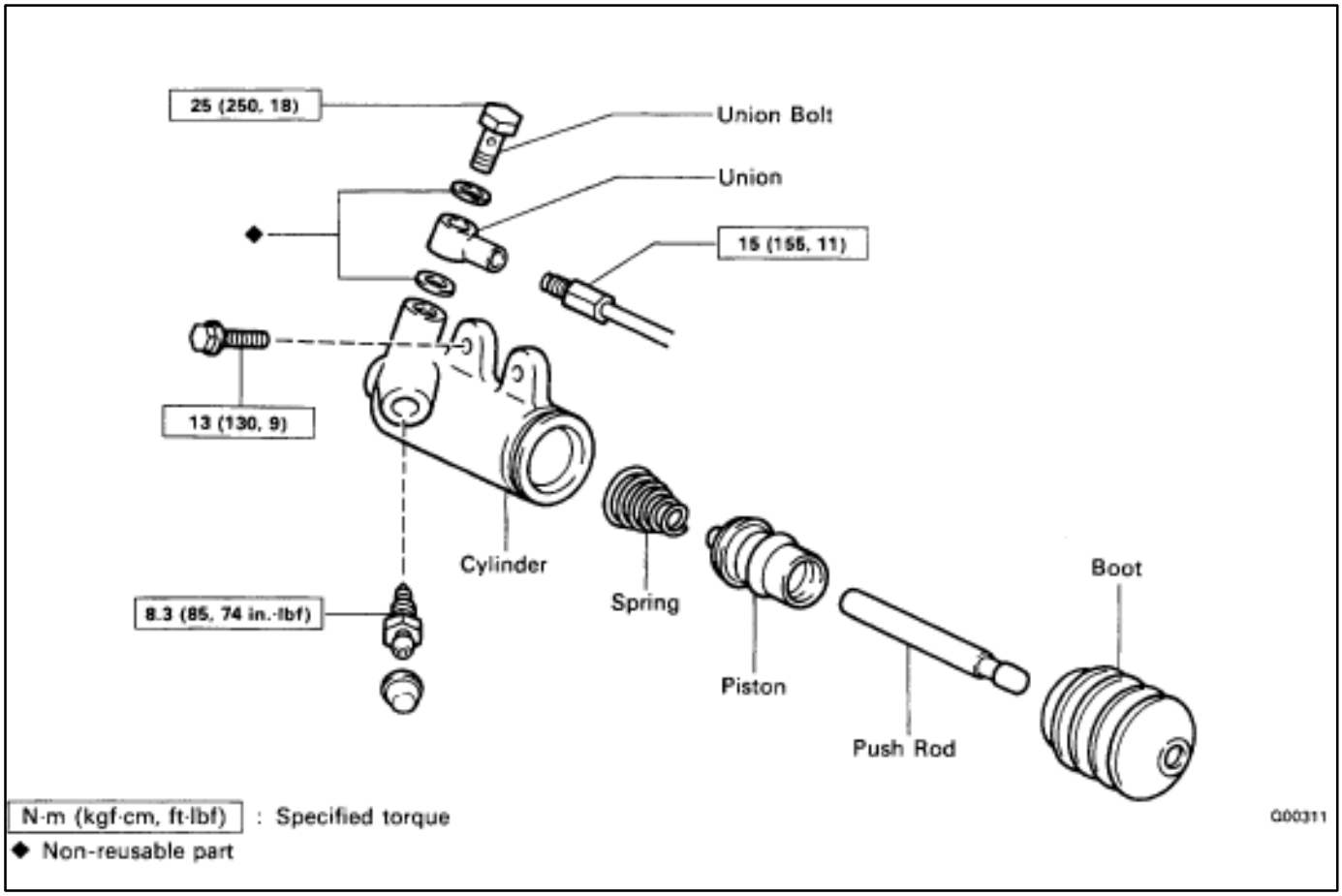
Install the clip in the push rod pin.

4. BLEED SYSTEM AND ADJUST CLUTCH PEDAL

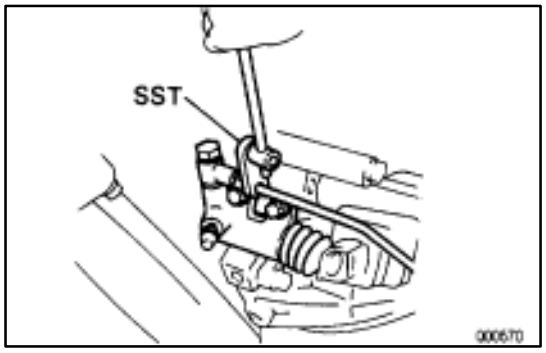
CLUTCH RELEASE CYLINDER

COMPONENTS

CL00E–02



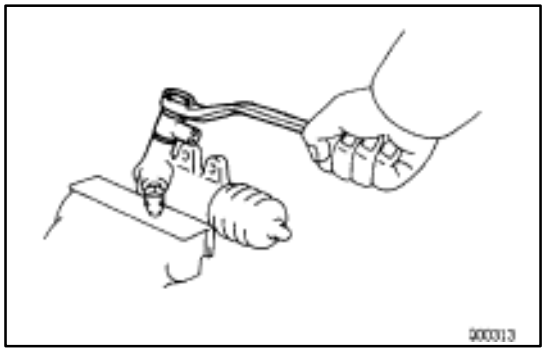
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part



RELEASE CYLINDER REMOVAL

CL00F–02

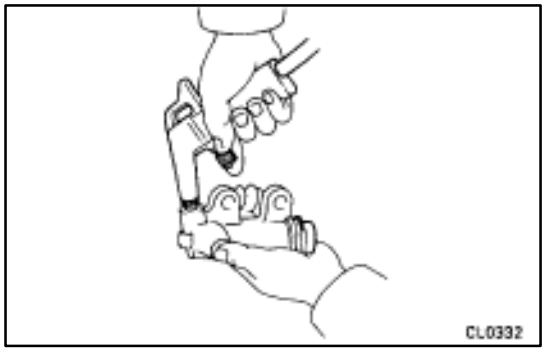
1. **DISCONNECT CLUTCH LINE TUBE**
   Using SST, disconnect the tube. Use a container to catch the brake fluid.
   SST 09023–00100
2. **REMOVE TWO BOLTS AND PULL OUT RELEASE CYLINDER**



RELEASE CYLINDER DISASSEMBLY

CL00T–01

1. **REMOVE UNION FROM RELEASE CYLINDER**
   Remove the union bolt, two gaskets and union from the release cylinder.



2. PULL OUT BOOT WITH PUSH ROD

3. REMOVE PISTON

Using compressed air, remove the piston with the spring from the cylinder.

RELEASE CYLINDER INSPECTION

CL00U–01

HINT: Clean the disassembled parts with compressed air.

1. INSPECT RELEASE CYLINDER BORE FOR SCORING OR CORROSION

If a problem is found, clean or replace the cylinder.

2. INSPECT PISTON AND CUPS FOR WEAR, SCORING, CRACKS OR SWELLING

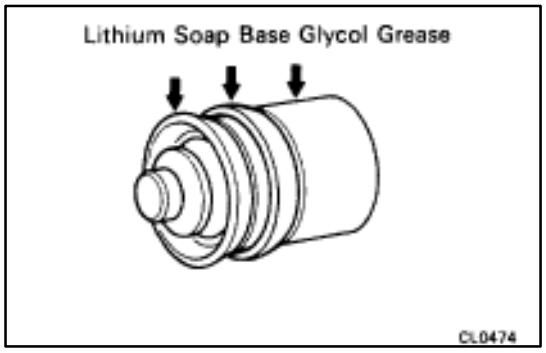
If either one requires replacement, use the parts from the cylinder kit.

3. INSPECT PUSH ROD FOR WEAR OR DAMAGE

If necessary, replace the push rod.

RELEASE CYLINDER ASSEMBLY

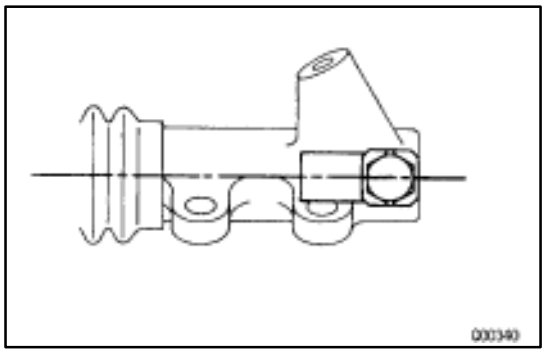
CL00V–01



1. COAT PISTON WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN

2. INSTALL PISTON WITH SPRING INTO CYLINDER

3. INSTALL BOOT WITH PUSH ROD TO CYLINDER

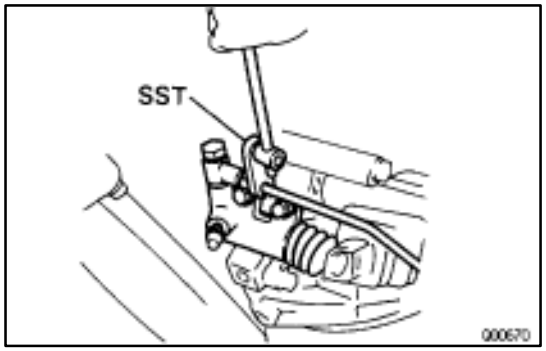


4. INSTALL UNION TO RELEASE CYLINDER

(a) Adjust the center line of the union is in parallel with the release cylinder.

(b) Install the union bolt.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



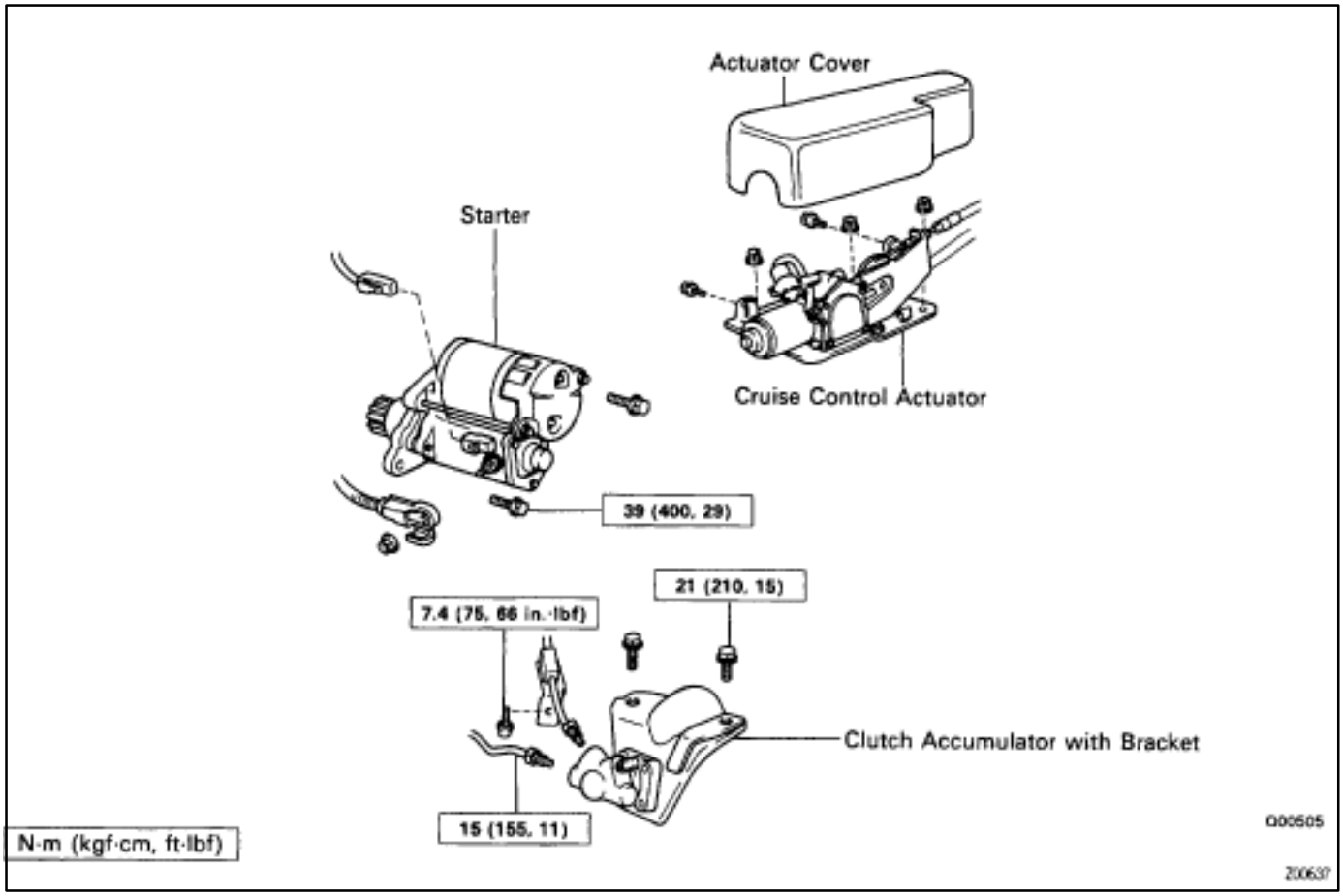
RELEASE CYLINDER INSTALLATION

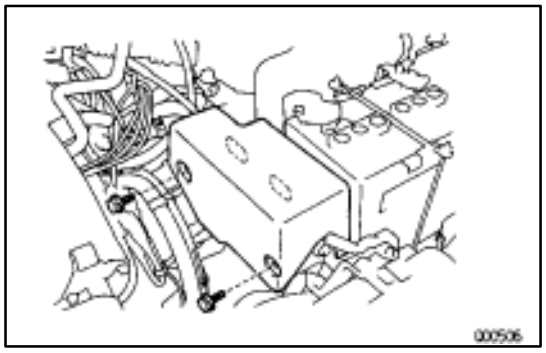
CL00J–03

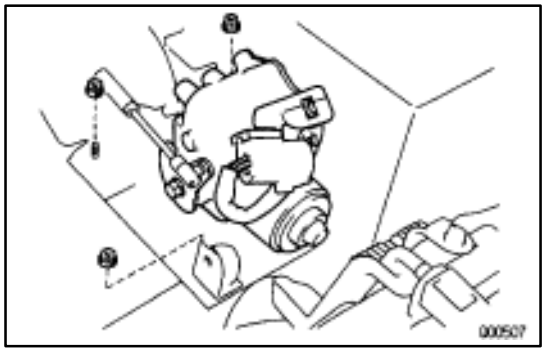
1. **INSTALL RELEASE CYLINDER WITH TWO BOLTS**
   Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)
2. **CONNECT CLUTCH LINE TUBE**
   Using SST, connect the tube.
   SST 09023–00100
   Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)
3. **FILL CLUTCH RESERVOIR WITH BRAKE FLUID AND BLEED CLUTCH SYSTEM**
4. **CHECK FOR LEAKS**

CLUTCH ACCUMULATOR
COMPONENTS

CL00Z–01







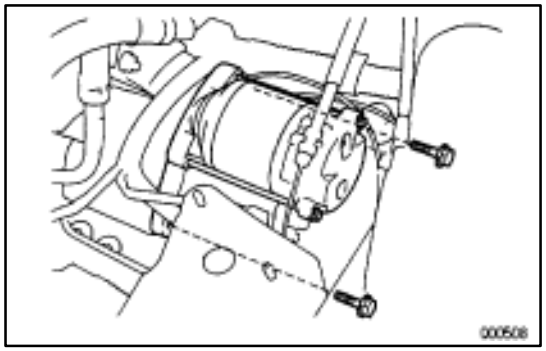
CLUTCH ACCUMULATOR REMOVAL

CL00X–02

1. REMOVE CRUISE CONTROL ACTUATOR

(a) Remove the two bolts and actuator cover.

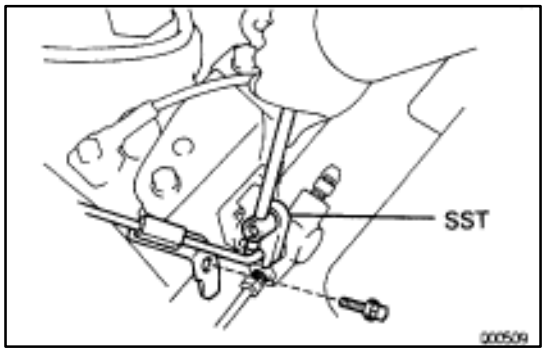
(b) Remove the three nuts and actuator.



2. REMOVE STARTER

(a) Disconnect the connector and wire from the starter.

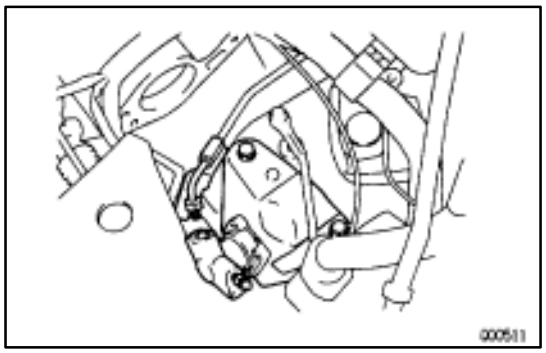
(b) Remove the two bolts and starter.



3. REMOVE CLUTCH ACCUMULATOR WITH BRACKET

(a) Remove the bolt and clamp.

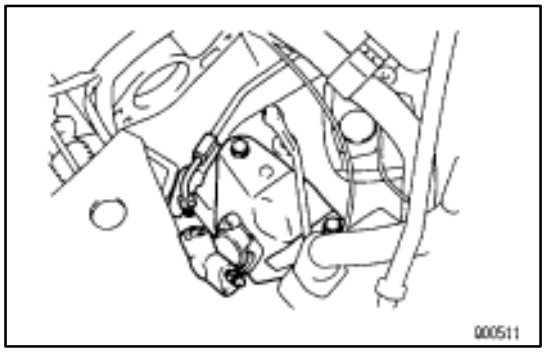
(b) Using SST, disconnect the clutch line unions from the clutch accumulator.
SST 09023–00100



(c) Remove the two bolts and clutch accumulator.

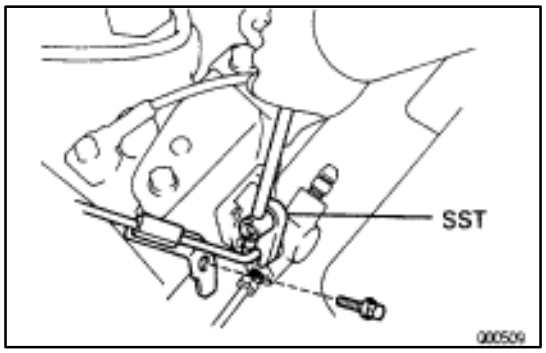
CLUTCH ACCUMULATOR INSTALLATION

CL00Y–02



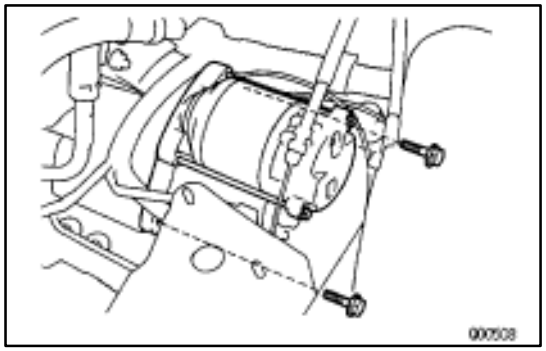
1. INSTALL CLUTCH ACCUMULATOR WITH BRACKET

(a) Install the clutch accumulator with the two bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



(b) Using SST, connect the clutch line unions to the clutch accumulator.
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)
SST 09023–00100

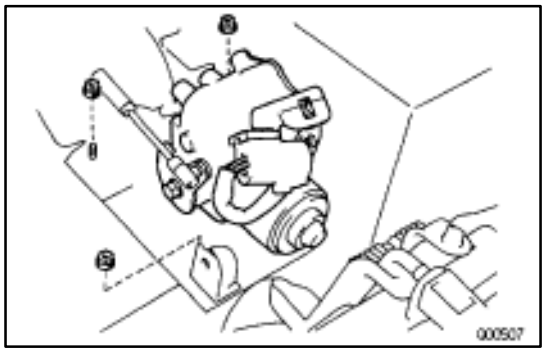
(c) Install the clamp with the bolt.
Torque: 7.4 N·m (75 kgf·cm, 66 in·lbf)



2. INSTALL STARTER

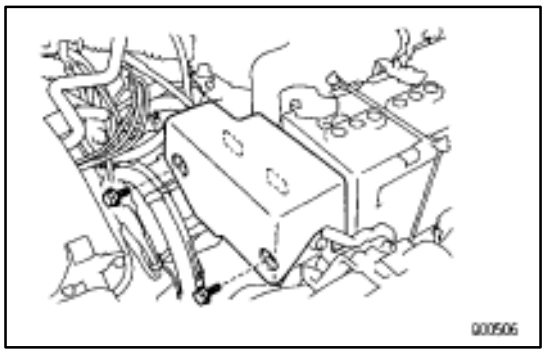
(a) Install the starter with the two bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Connect the connector and wire harness to the starter.



3. INSTALL CRUISE CONTROL ACTUATOR

(a) Install the actuator with the three nuts.



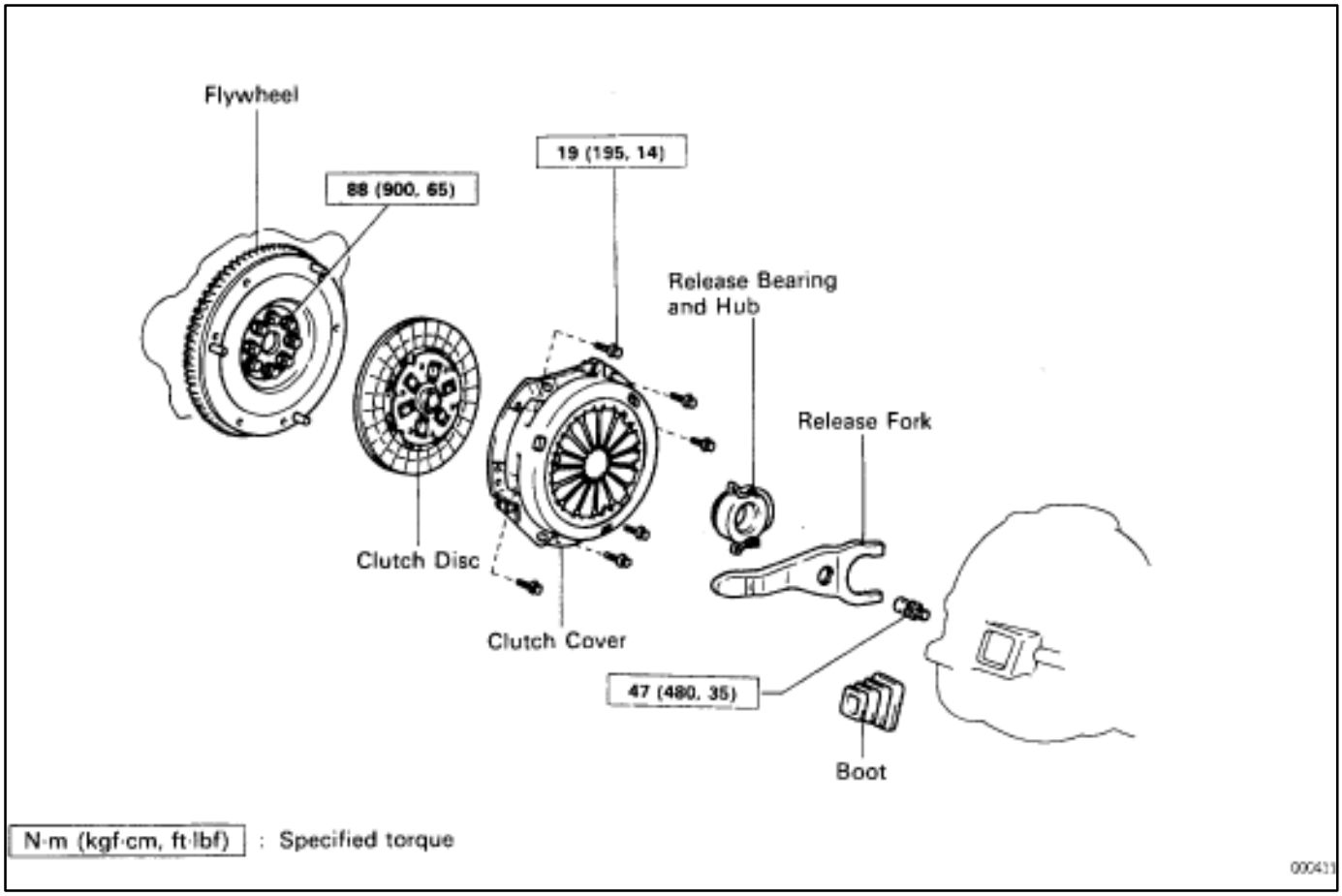
(b) Install the actuator cover with the two bolts.

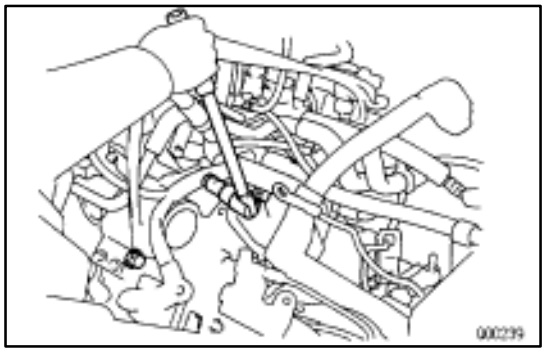
4. FILL CLUTCH RESERVOIR WITH BRAKE FLUID AND BLEED CLUTCH SYSTEM

5. CHECK FOR LEAKS

CLUTCH UNIT
COMPONENTS

CL00K–02

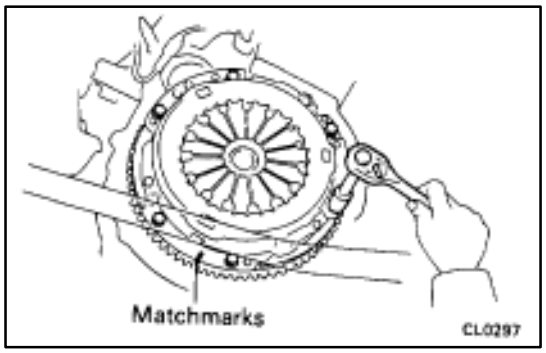




CLUTCH UNIT REMOVAL

CL00L–02

1. REMOVE TRANSAXLE FROM ENGINE (See MX section)



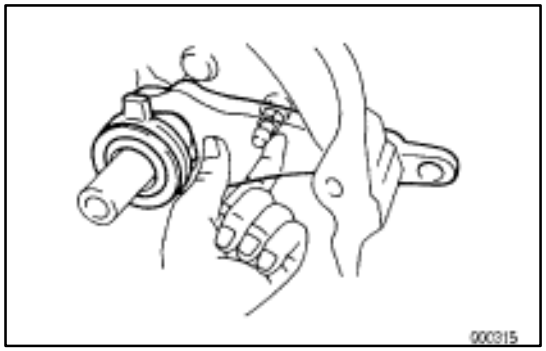
2. REMOVE CLUTCH COVER AND DISC

(a) Place matchmarks on the flywheel and clutch cover.

(b) Loosen each set bolt one turn at a time until spring tension is released.

(c) Remove the set bolts, and pull off the clutch cover with the clutch disc.

NOTICE: Do not drop the clutch disc.



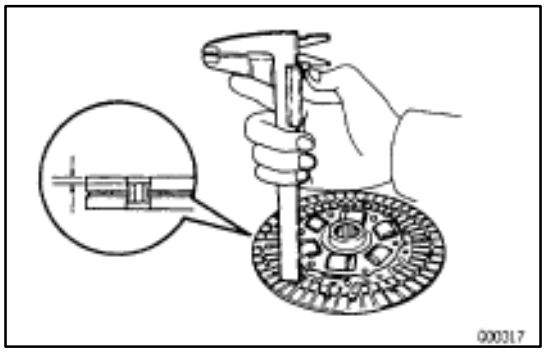
3. REMOVE RELEASE BEARING AND FORK FROM TRANSAXLE

(a) Remove the release bearing together with the fork and then separate them.

(b) Remove the boot.

CLUTCH PARTS INSPECTION

CL00M–02



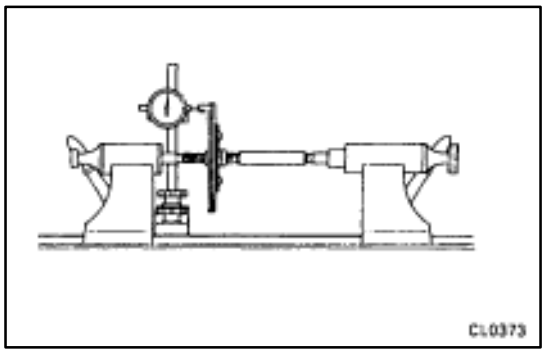
1. INSPECT CLUTCH DISC FOR WEAR OR DAMAGE

Using calipers, measure the rivet head depth.

Minimum rivet depth:

0.3 mm (0.012in.)

If a problem is found, replace the clutch disc.



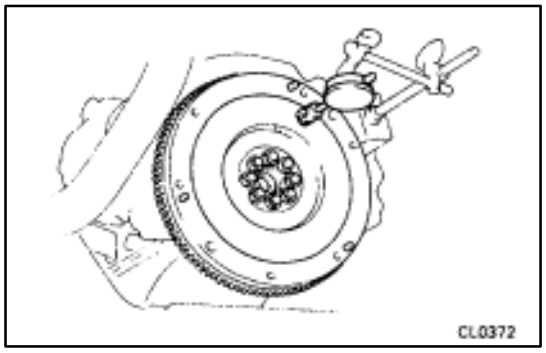
2. INSPECT CLUTCH DISC RUNOUT

Using a dial indicator, check the disc runout.

Maximum runout:

0.8 mm (0.031 in.)

If runout is excessive, replace the clutch disc.



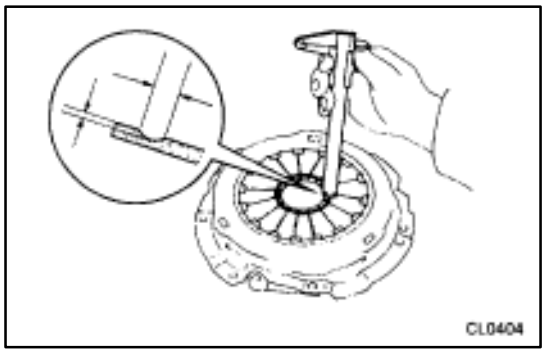
3. INSPECT FLYWHEEL RUNOUT

Using a dial indicator, check the flywheel runout.

Maximum runout:

0.1 mm (0.004 in.)

If runout is excessive, replace the flywheel.



4. INSPECT DIAPHRAGM SPRING FOR WEAR

Using calipers, measure the diaphragm spring for depth and width of wear.

Maximum:

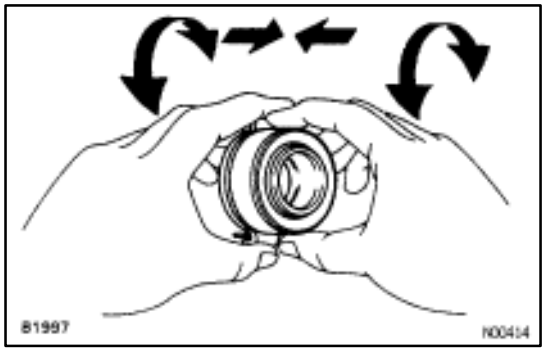
Depth

0.6 mm (0.024 in.)

Width

5.0 mm (0.197 in.)

If necessary, replace the clutch cover.



5. INSPECT RELEASE BEARING

Turn the bearing by hand while applying force in the axial direction.

HINT: The bearing is permanently lubricated and requires no cleaning or lubrication.

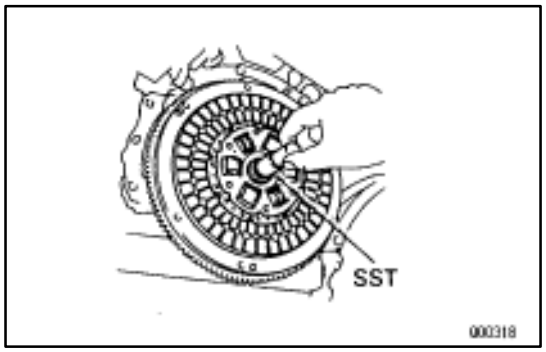
If a problem is found, replace the bearing.

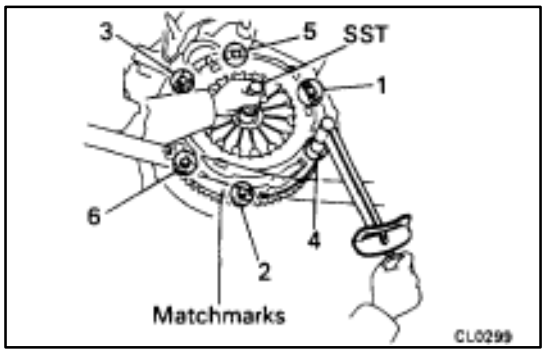
CLUTCH UNIT INSTALLATION

CL00W–02

1. INSTALL CLUTCH DISC AND CLUTCH COVER ON FLYWHEEL

(a) Insert the SST in the clutch disc, and then set them and the clutch cover in position.
SST 09301–00220





(b) Align the matchmarks on the clutch cover and flywheel.

(c) Temporarily tighten the topmost bolt from the three near the knock pins.
HINT: Temporarily tighten the No.3 bolt.

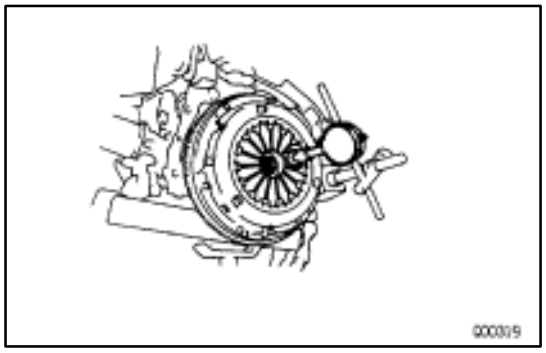
(d) Torque the bolts on the clutch cover in the order shown.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

2. CHECK DIAPHRAGM SPRING TIP ALIGNMENT

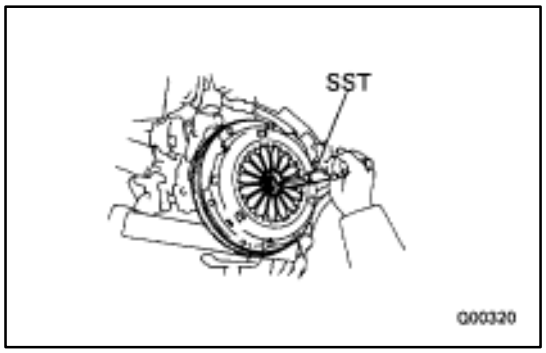
Using a dial indicator with roller instrument, check the diaphragm spring tip alignment.

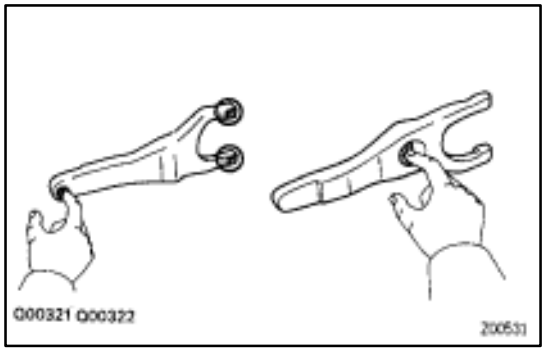
Maximum non–alignment:

0.5 mm (0.020 in.)



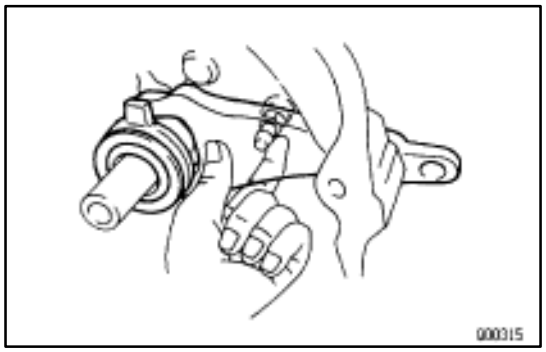
If alignment is not as specified, using SST, adjust the diaphragm spring tip alignment.
SST 09333–00013





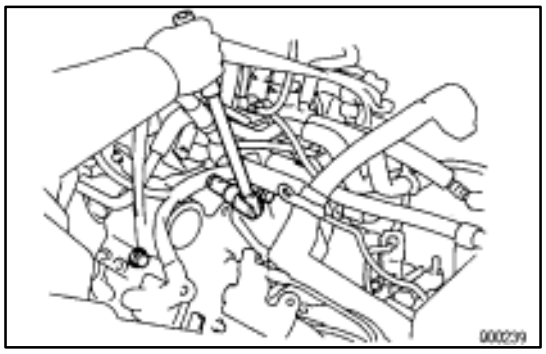
3. APPLY MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE (NLGI NO.2) TO FOLLOWING PARTS

- Release fork and hub contact point
- Release fork and push rod contact point
- Release fork pivot point
- Clutch disc spline



4. INSTALL RELEASE BEARING AND FORK TO TRANSAXLE

Install the bearing to the release fork, and then install them to the transaxle.



5. INSTALL TRANSAXLE TO ENGINE
(See MX section)

SERVICE SPECIFICATIONS

SERVICE DATA

CL00P–06

Pedal height from asphalt sheet	164.7–174.7 mm (6.48–6.88in.)
Push rod play at pedal top	1.0–5.0mm (0.039–0.197in.)
Pedal freeplay	5.0–15.0mm (0.197–0.591 in.)
Clutch release point from pedal full stroke end position	25 mm (0.98in.) or more
Disc rivet head depth (Minimum)	0.3mm (0.012in.)
Disc runout (Maximum)	0.8mm (0.031in.)
Diaphragm spring tip non–alignment (Maximum)	0.5mm (0.020in.)
Diaphragm spring finger wear (Maximum depth)	0.6mm (0.024in.)
Diaphragm spring finger wear (Maximum width)	5.0mm (0.197in.)
Flywheel runout (Maximum)	0.1mm (0.004in.)

TORQUE SPECIFICATIONS

CL00Q–05

Part tightened	N·m	kgf·cm	ft·lbf
Master cylinder installation nut	7.8	80	58 in·lbf
Release cylinder installation bolt	13	130	9
Union bolt	25	250	18
Clutch line union	15	155	11
Bleeder plug	8.3	85	74 in·lbf
Clutch accumulator installation bolt	21	210	15
Release fork support	47	480	35
Clutch cover x Flywheel	19	195	14
Flywheel set bolt	88	900	65

MANUAL TRANSAXLE

DESCRIPTION

MX01Q–01

PRECAUTIONS

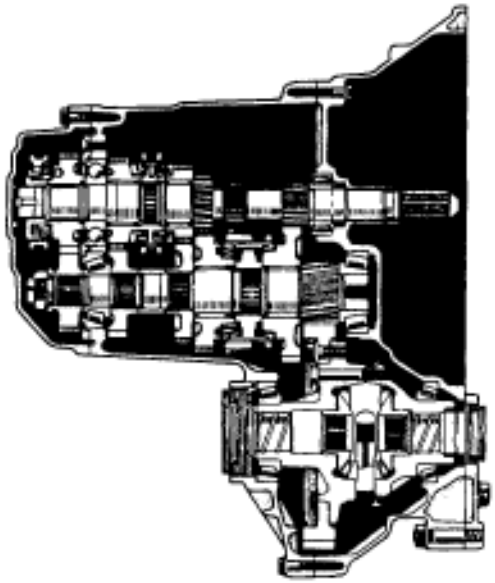
When working with FIPG materials, you must be observe the following.

- ⁎ Using a razor blade and gasket scraper, remove all the old sealant(FIPG) material from the gasket surfaces.
- ⁎ Thoroughly clean all components to remove all the loose material.
- ⁎ Clean both sealing surfaces with a non–residue solvent.
- ⁎ Apply the sealant in approx. 1 mm (0.04 in.) bead along the sealing surface.
- ⁎ Part must be assembled within 10 minutes of application. Otherwise, the sealant (FIPG) material must be removed and reapplied.

DESCRIPTION

MX01R–01

- ⁎ The gear and shaft layout is the same as the E52 manual transaxle.
- ⁎ A triple–cone type synchromesh mechanism is used in the second gear and a double–cone type synchromesh mechanism is used in the third gear to improve the shift feeling characteristics. This helps to reduce the shifting effort, provide smoothly shifting.
- ⁎ A reverse synchromesh mechanism is used to suppress gear engagement noise in reverse gear shifting while providing smoothly shifting.



OD0028

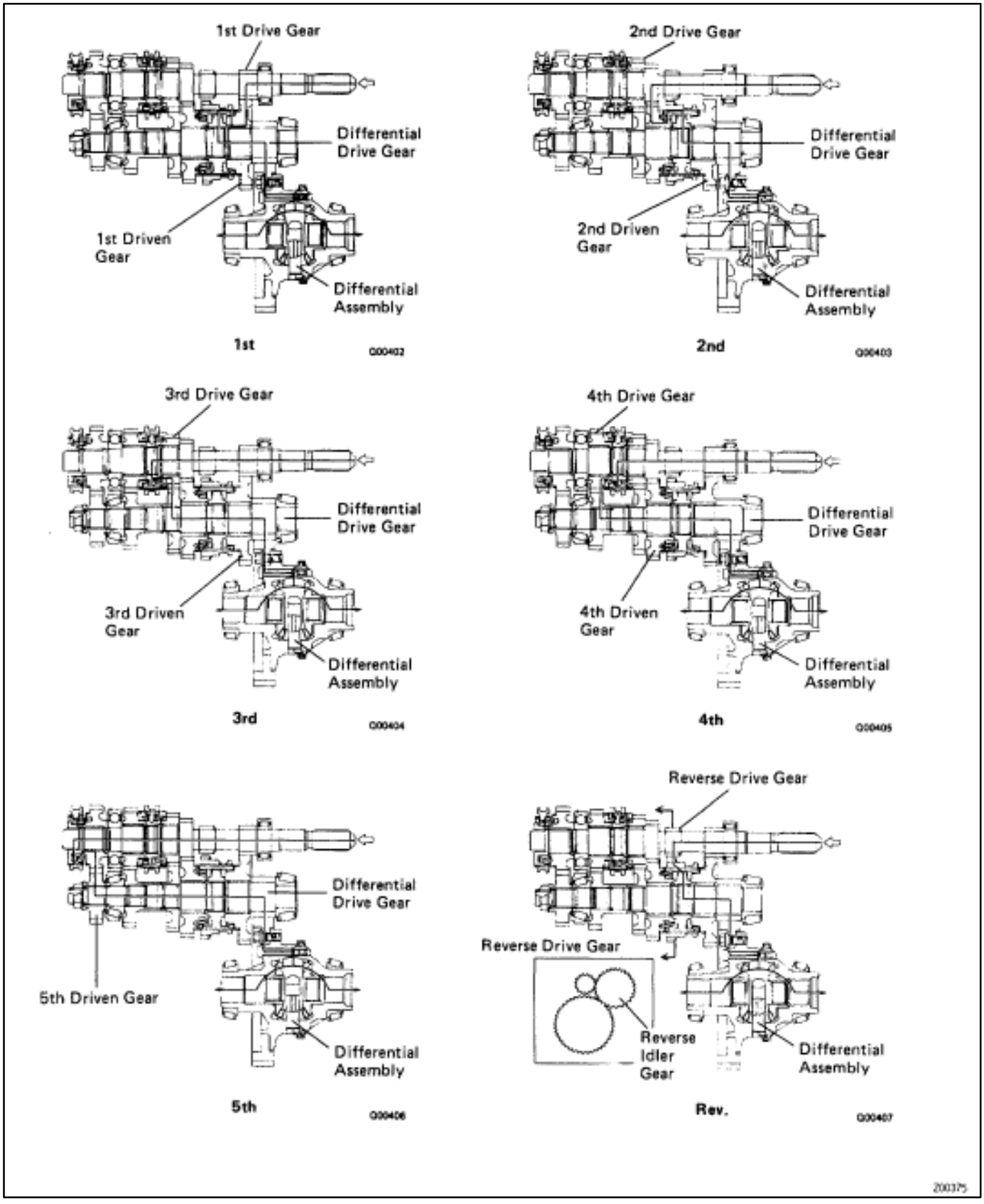
Type of Transaxle		E53
Type of Engine		3VZ-FE
Gear Ratio	1st	3.583
	2nd	2.045
	3rd	1.333
	4th	1.028
	5th	0.820
	Reverse	3.583
Differential Gear Ratio		3.625
Oil Capacity		4.2 liters (4.4 US qts, 3.6 Imp. qts)
Oil Viscosity		SAE 75W-90 or 80W-90
Oil Grade		API GL-4 or GL-5

Z00374

OPERATION

MX00E–02

✳ The illustrations below show the engagements of transaxle gears.



PREPARATION

MX01S–01

SST (SPECIAL SERVICE TOOLS)

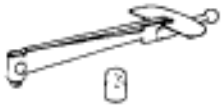
	09223–15010	Crankshaft Rear Oil Seal Replacer	Differential case oil seal
	09308–00010	Oil Seal Puller	
	09310–17010	Transaxle Gear Remover & Replacer	
	(09310–07010)	Plate	
	(09310–07020)	Center Bolt	
	(09310–07030)	Set Bolt	
	(09310–07040)	Claw	
	(09310–07050)	Adaptor	
	09313–30021	Detent Ball Plug Socket	
	09316–20011	Transfer Bearing Replacer	Input shaft bearing Side bearing
	09316–60010	Transmission & Transfer Bearing Replacer	No.1 hub sleeve Differential case taper roller bearing outer race Transaxle case cover oil seal
	(09316–00010)	Replacer Pipe	
	(09316–00020)	Replacer "A"	

	(09316–00040)	Replacer "C"	
	(09316–00070)	Replacer "F"	
	09506–30012	Differential Drive Pinion Rear Bearing Cone Replacer	Output shaft rear bearing
	09506–35010	Differential Drive Pinion Rear Bearing Replacer	No.2 hub sleeve Side bearing Input shaft bearing
	09608–12010	Front Hub & Drive Pinion Bearing Replacer Set	Input shaft oil seal
	(09608–00020)	Remover & Replacer Handle	
	(09608–00060)	Drive Pinion Front Bearing Cup Replacer	
	(09608–00080)	Replacer	
	09612–65014	Steering Worm Bearing Puller	Input shaft bearing Differential taper roller bearing outer race
	09620–30010	Steering Gear Box Replacer Set	Control shaft cover oil seal
	(09627–30010)	Steering Sector Shaft Bushing Replacer	
	(09631–00020)	Handle	
	09921–00010	Spring Tension Tool	Speedometer driven gear oil seal
	09950–00020	Bearing Remover	

	09950–00030 Bearing Remover Attachment	
	09950–20017 Universal Puller	

RECOMMENDED TOOLS

MX01T–01

	09025–00010 Small Torque Wrench	Differential preload
	09031–00030 Pin Punch	
	09042–00040 Torx Socket T50	
	09042–00050 Torx Socket T45	
	09905–00012 Snap Ring No. 1 Expander	

EQUIPMENT

MX01U–01

Dial indicator with magnetic base	
Feeler gauge	
Micrometer	
Straight edge	
Torque wrench	

LUBRICANT

MX013–01

Item	Capacity	Classification
Manual transaxle oil (w/Differential oil)	4.2 liters (4.4 US qts, Imp. qts)	API GL–4 or GL–5 SAE 75W–90 or 80W–90

SSM(SPECIAL SERVICE MATERIALS)

MX01V–01

08826–00090	Seal Packing 1281, Three bond 1281 or equivalent	Transaxle case X Case cover Transmission case X Transaxle case Transmission case X Case cover
08833–00080	Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Transaxle case cover bolt Straight screw plug Control shaft cover bolt

TROUBLESHOOTING

MX00D–01

You will find the troubles easier using the table well shown below. In this table, each number shows the priority of causes in troubles. Check each part in order. If necessary, replace these parts.

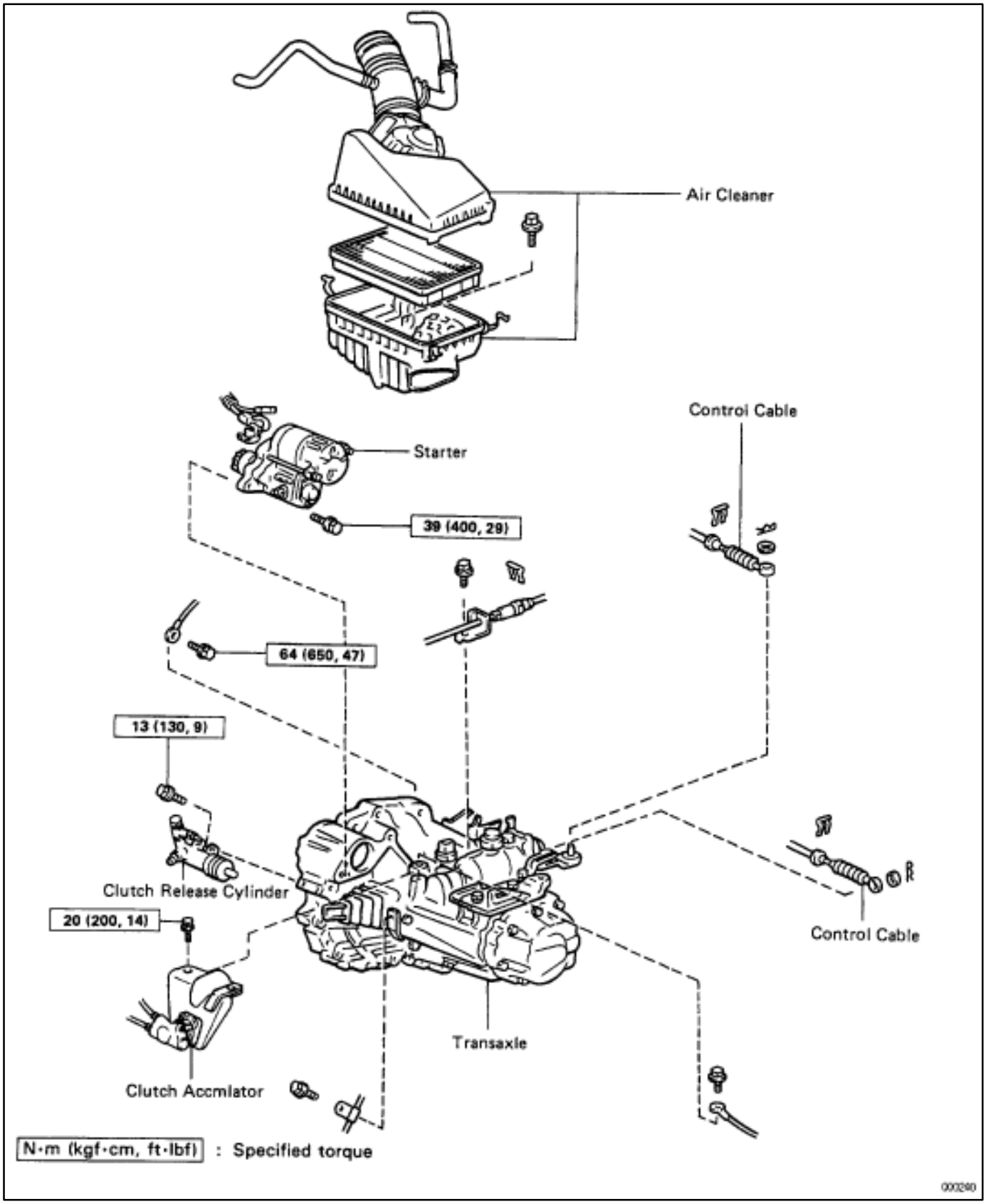
See Page / Parts Name / Trouble	–	MX–2	–	MX–23	MX–23	MX–23	MX–89	MX–23	MX–23	MX–23	MX–23	MX–40, 46	MX–40, 46			
	Oil (Level low)	Oil (Wrong)	Oil (Level too high)	Gasket (Damaged)	Oil seal (Worn or damaged)	O-Ring (Worn or damaged)	Control cable (Faulty)	Locking ball spring (Damaged)	Shift fork (Worn)	Gear (Worn or damaged)	Bearing (Worn or damaged)	Synchronizer ring (Worn or damaged)	Shifting key spring (Damaged)			
Noise	1	2								3	3					
Oil leakage			1	2	2	3										
Hard to shift or will not shift							1					2	3			
Jumps out of gear								1	2	3	3					

v00300

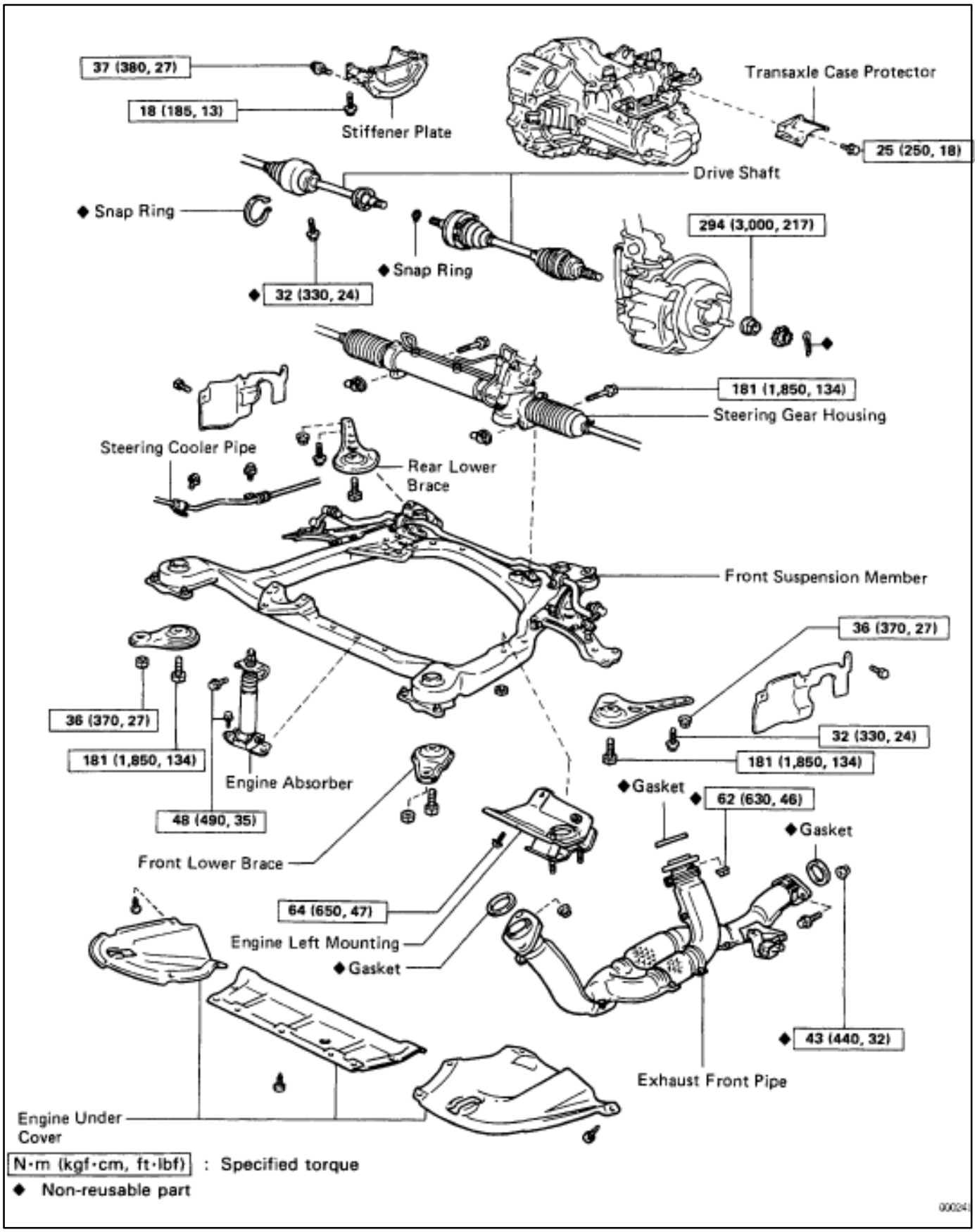
ASSEMBLY REMOVAL AND INSTALLATION

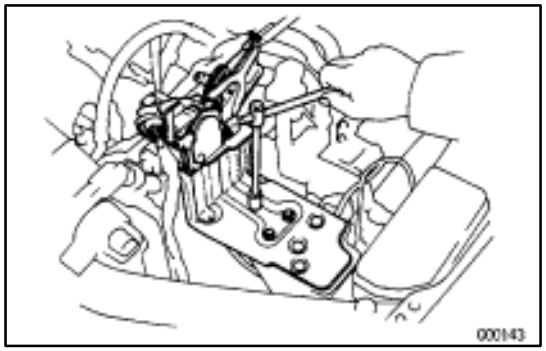
MX01W–01

Removal and installation the parts as shown below.



Removal and installation the parts as shown below.





TRANSAXLE REMOVAL

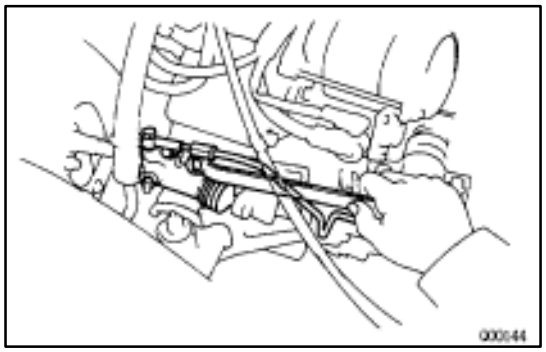
MX01X–01

1. REMOVE NEGATIVE BATTERY CABLE

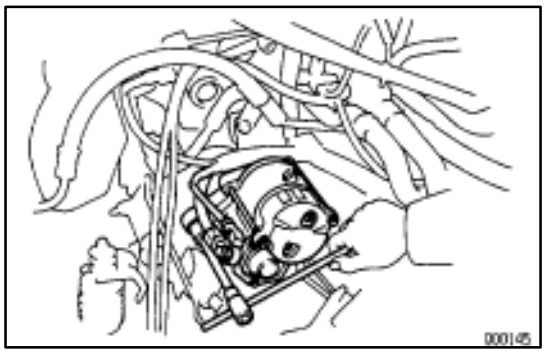
2. REMOVE AIR CLEANER CASE ASSEMBLY WITH AIR HOSE

3. REMOVE CRUISE CONTROL ACTUATOR

(a) Remove the cruise control actuator cover.
(b) Disconnect the connector.
(c) Remove the three bolts and cruise control actuator with bracket.

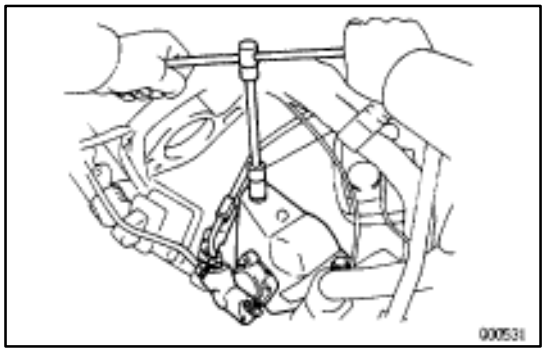


4. REMOVE CLUTCH RELEASE CYLINDER



5. REMOVE STARTER

(a) Disconnect the connector and wire from the starter.
(b) Remove the two bolts and starter.

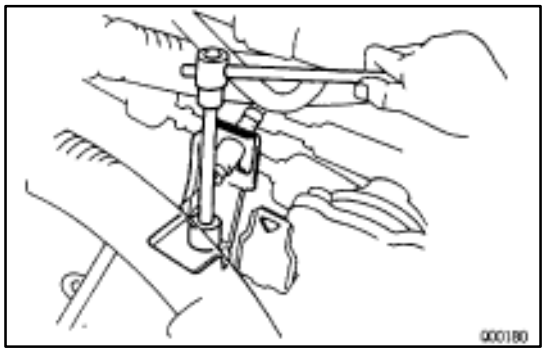


6. REMOVE CLUTCH ACCUMLATOR AND TUBE CLAMP

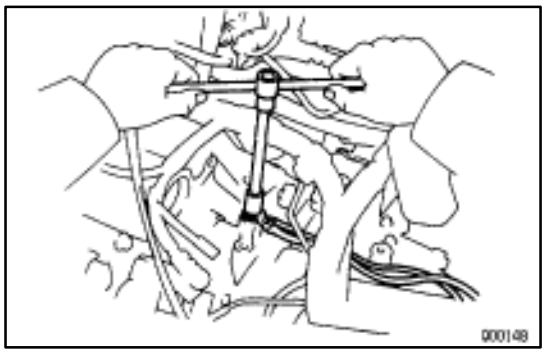
(a) Remove the two bolts and clutch accumlator with bracket.
(b) Remove the bolt and clutch tube clamp.

7. DISCONNECT BACK–UP LIGHT SWITCH CONNECTOR

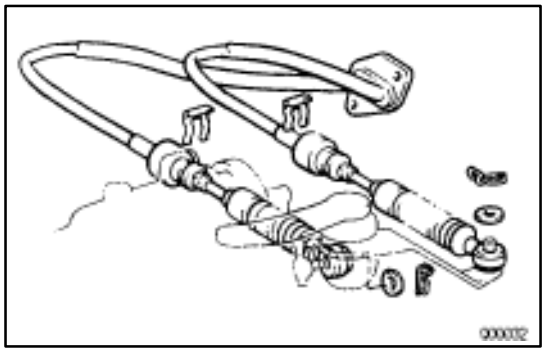
8. DISCONNECT WIRES CLAMPS



9. REMOVE CLUTCH RELEASE CYLINDER BRACKET



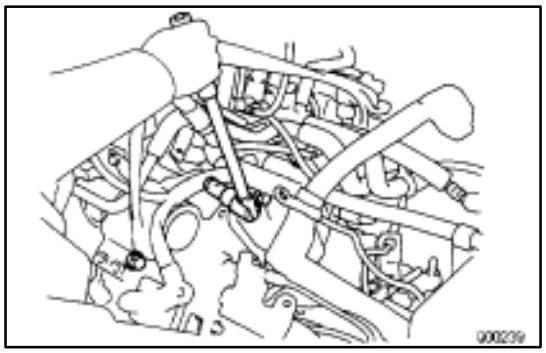
10. REMOVE EARTH CABLES



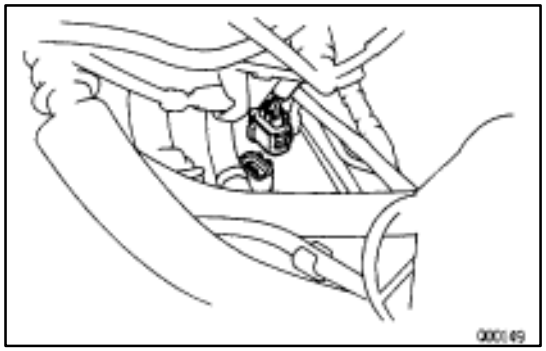
11. DISCONNECT CONTROL CABLES

(a) Remove the clips and washers.

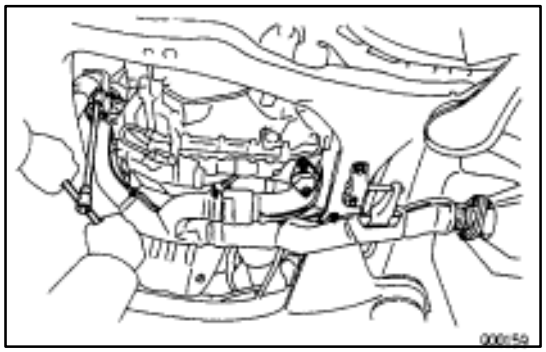
(b) Remove the retainer from the cables.



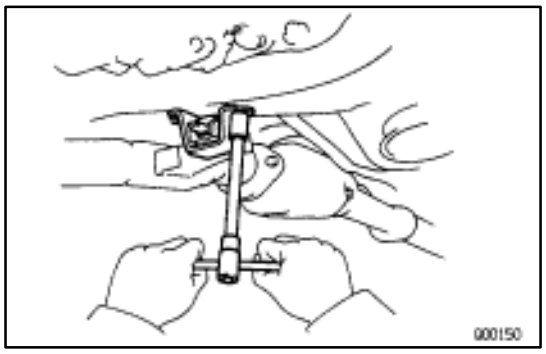
12. REMOVE TRANSAXLE MOUNTING THREE BOLTS OF TRANSAXLE CASE UPPER SIDE



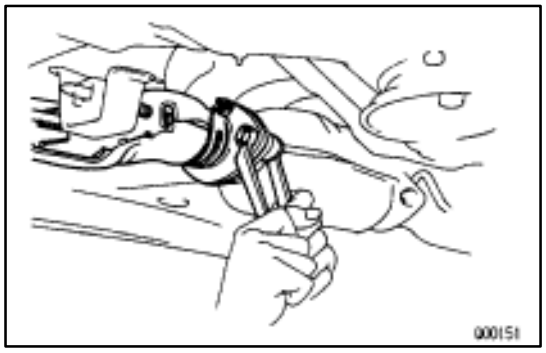
13. DISCONNECT SPEED SENSOR CONNECTOR



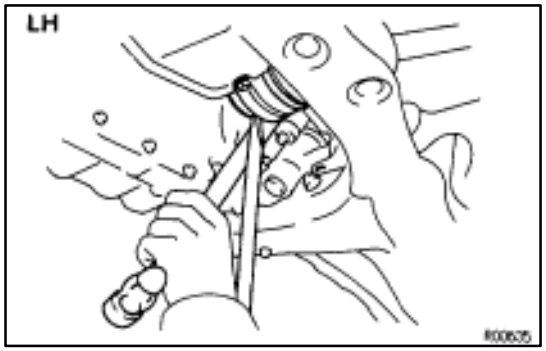
14. REMOVE FRONT WHEEL
15. RAISE VEHICLE
NOTICE: Be sure the vehicle is securely supported.
16. REMOVE UNDER COVERS AND SIDE COVERS
17. DRAIN TRANSAXLE OIL
18. REMOVE EXHAUST FRONT PIPE
(a) Remove the four nuts.



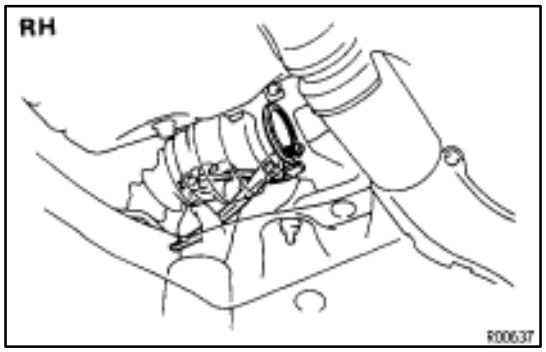
(b) Remove the two bolts and front pipe support.

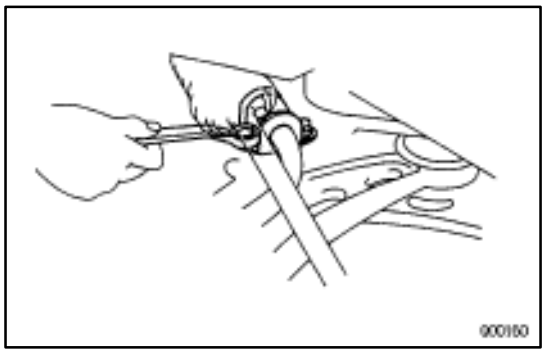


(c) Remove the two bolts and nuts.
(d) Remove the front pipe.



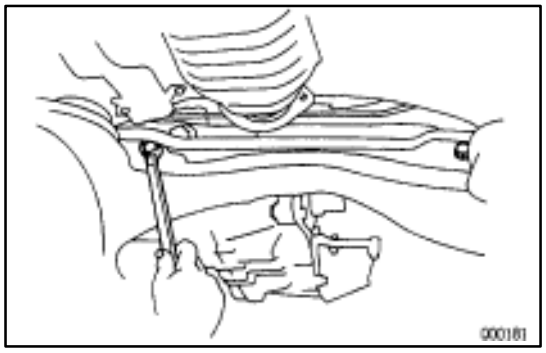
19. REMOVE DRIVE SHAFT
(See page SA–20)



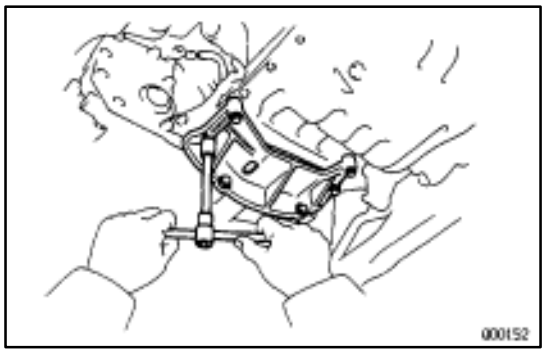


20. DISCONNECT STEERING GEAR HOUSING FROM FRONT SUSPENSION MEMBER

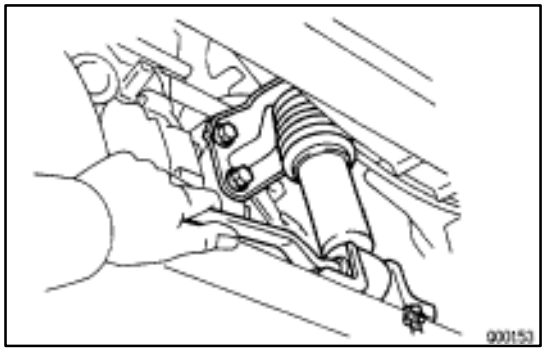
(a) Remove the four bolts.
(b) Remove the stabilizer bar bushing bracket.



(c) Remove the two set bolts and nuts.
(d) Disconnect the steeling gear housing from the front suspension member.
HINT: Suspend the steering gear housing with cord.

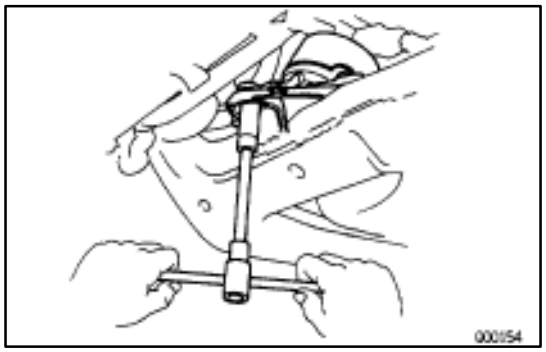


21. REMOVE STIFFENER PLATE



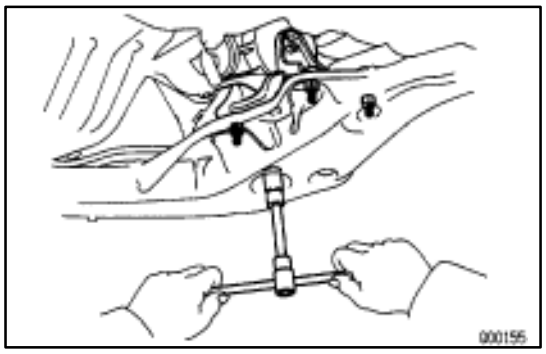
22. REMOVE ENGINE ABSORBER

Remove the four bolts and engine absorber.



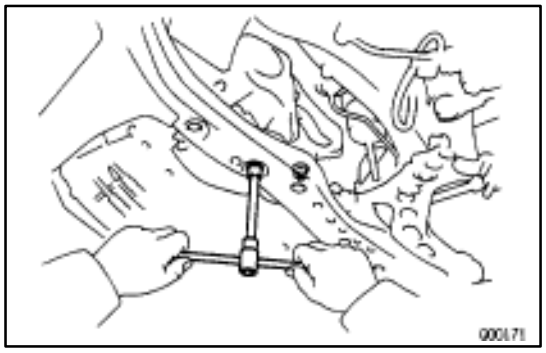
23. REMOVE ENGINE FRONT MOUNTING SET BOLTS AND NUT

Remove the two bolts and a nut.



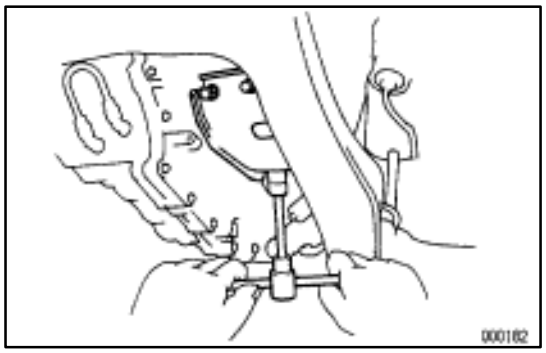
24. REMOVE ENGINE REAR MOUNTING SET NUTS

(a) Remove the two hole plugs.
(b) Remove the four nuts.

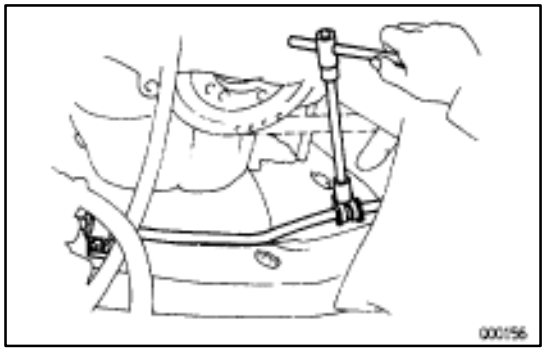


25. REMOVE ENGINE LEFT MOUNTING

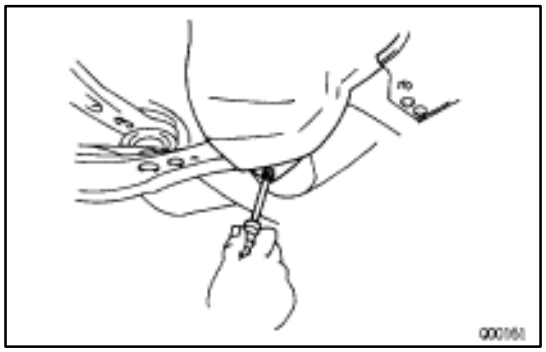
(a) Raise the transaxle and engine slightly with a jack and wooden block in between.
(b) Remove the two hole plugs and nuts.



(c) Remove the three bolts and engine left mounting.

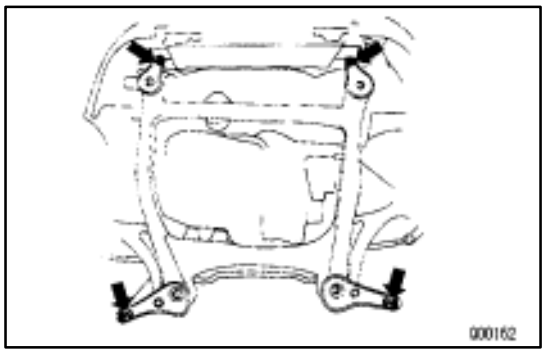


26. REMOVE STEERING COOLER PIPE SET BOLTS

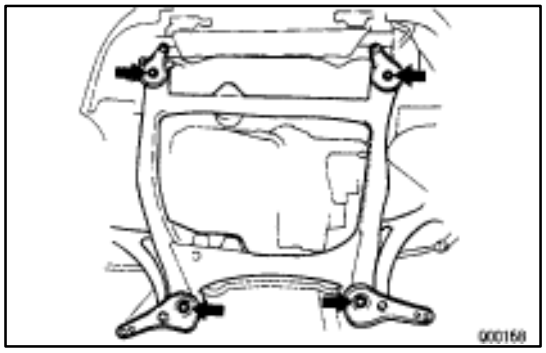


27. REMOVE FRONT SUSPENSION MEMBER

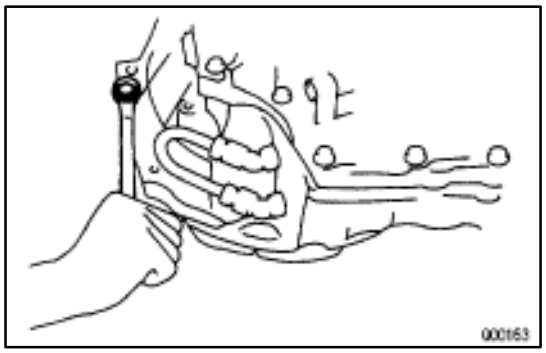
(a) Remove the left and right fender liner set screws.



(b) Remove the two bolts and four nuts.

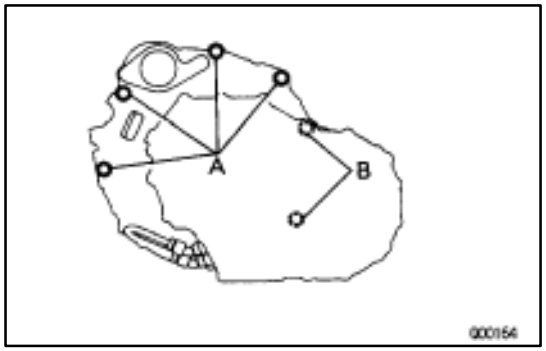


(c) Remove the four bolts.
(d) Remove the two front lower braces, rear lower braces and front suspension member.



28. REMOVE TRANSAXLE

(a) Remove the transaxle mounting bolts from the engine.
(b) Lower the engine left side and remove the transaxle from the engine.



TRANSAXLE INSTALLATION

MX01Z–01

(See pages MX–9, 10)

1. INSTALL TRANSAXLE TO ENGINE

(a) Align the input shaft spline with the clutch disc and install the transaxle to the engine.

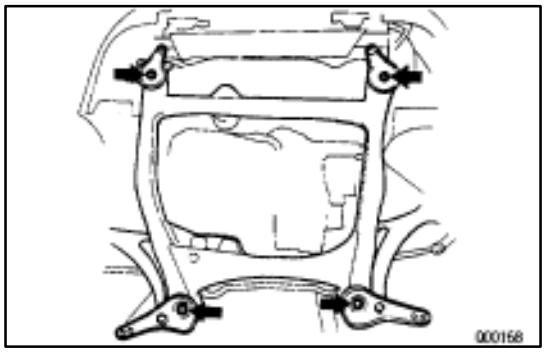
(b) Torque the bolts.

Bolt A

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

Bolt B

Torque: 46 N·m (470 kgf·cm, 34 ft·lbf)

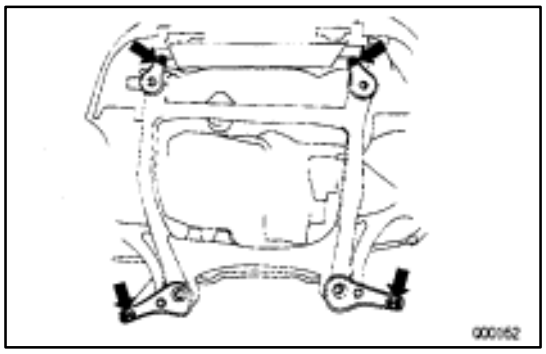


2. INSTALL FRONT SUSPENSION MEMBER

(a) Install the front suspension member, rear lower brace, front lower brace and four bolts.

(b) Torque the four bolts.

Torque: 181 N·m (1,850 kgf·cm, 134 ft·lbf)



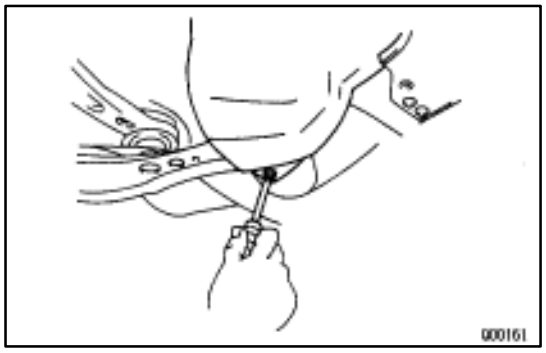
(c) Install and torque the two bolts and four nuts.

Bolt

Torque: 32 N·m (330 kgf·cm, 24 ft·lbf)

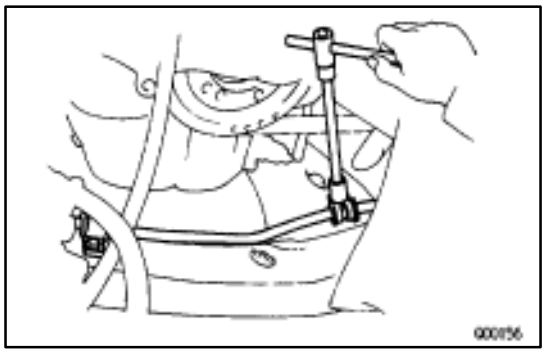
Nut

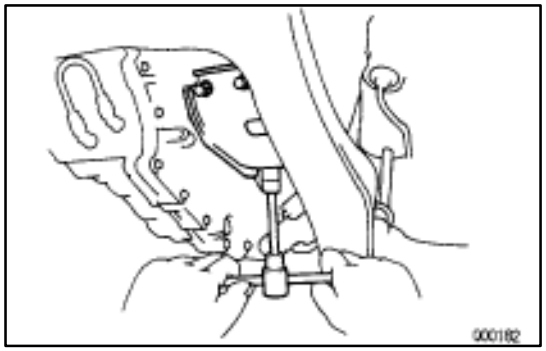
Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)



(d) Install the left and right fender liner set screws.

3. INSTALL STEERING COOLER PIPE SET BOLTS

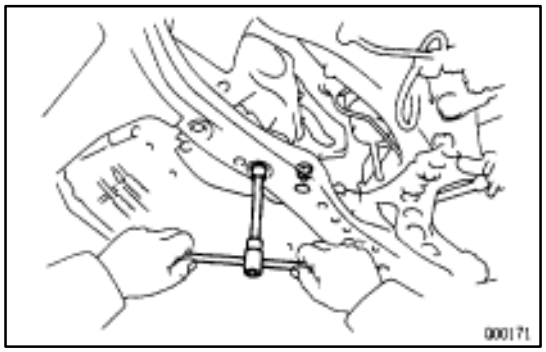




4. INSTALL ENGINE LEFT MOUNTING

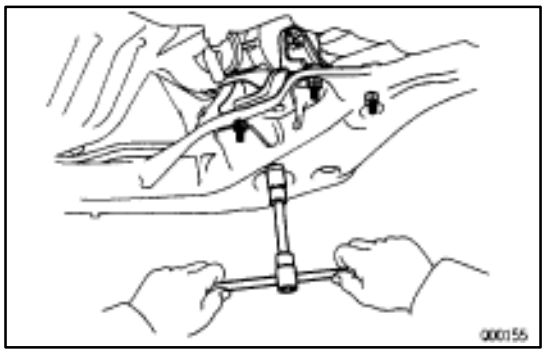
(a) Install the engine left mounting.

(b) Install and torque the three bolts.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)



(c) Install and torque the two nuts.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

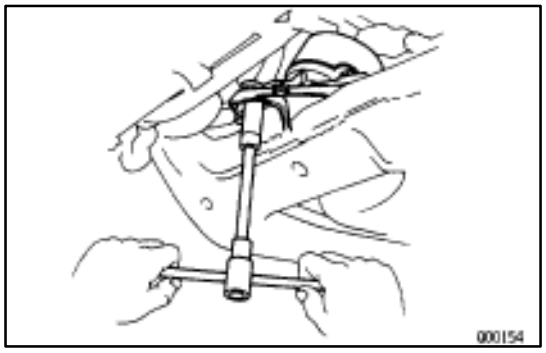
(d) Install the two hole plugs.



5. INSTALL ENGINE REAR MOUNTING SET NUTS

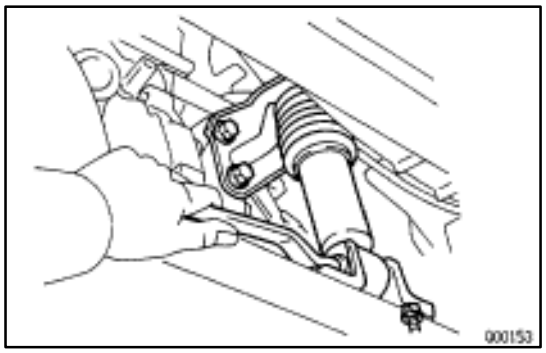
(a) Install and torque the four nuts.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

(b) Install the two hole plugs.



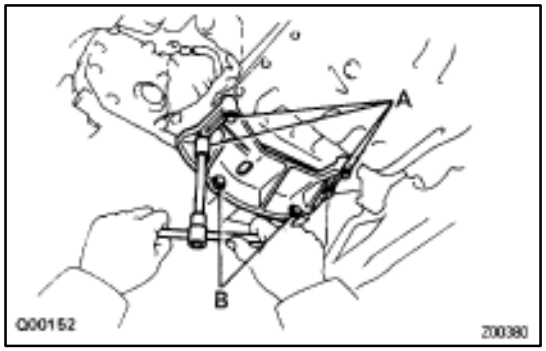
6. INSTALL ENGINE FRONT MOUNTING SET BOLTS AND NUT

Install and torque the two bolts and a nut.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)



7. INSTALL ENGINE ABSORBER

Install and torque the four bolts.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)



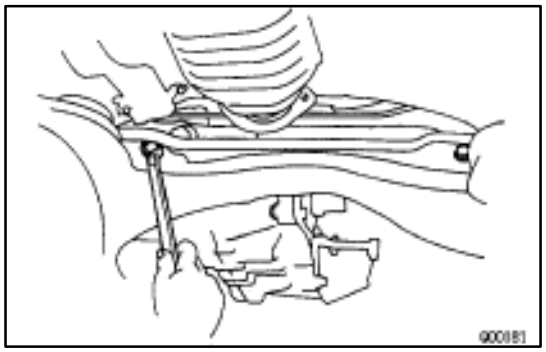
8. INSTALL STIFFENER PLATE

Bolt A

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

Bolt B

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

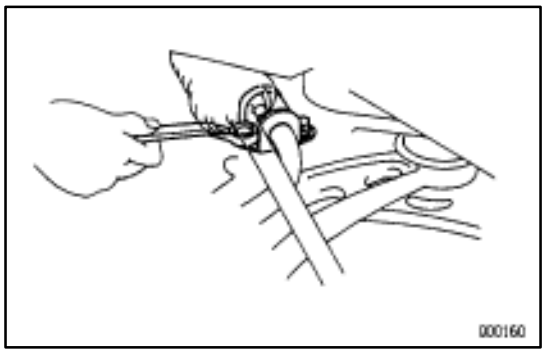


9. CONNECT STEERING GEAR HOUSING TO FRONT SUSPENSION MEMBER

(a) Connect the steering gear housing to the front suspension member.

(b) Install and torque the two set bolts and nuts.

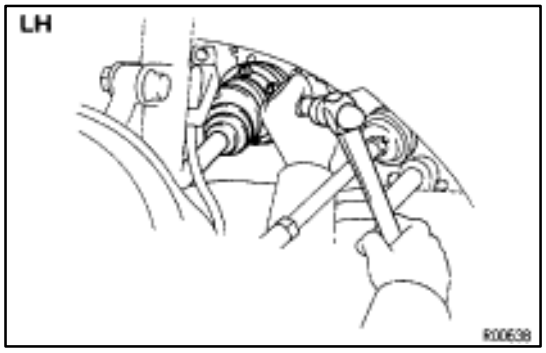
Torque: 181 N·m (1,850 kgf·cm, 134 ft·lbf)



(c) Install the stabilizer bar bushing bracket.

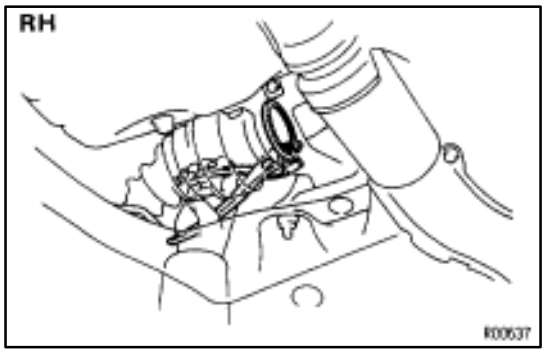
(d) Install and torque the four bolts.

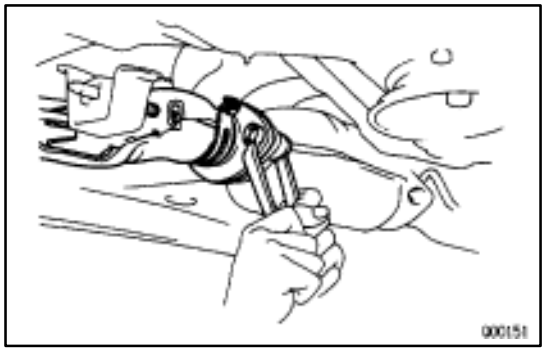
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)



10. INSTALL DRIVE SHAFT

(See page SA–23)





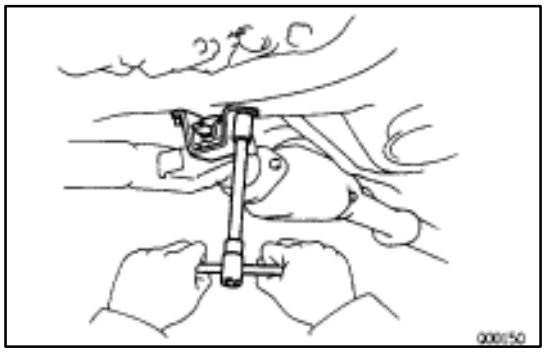
11. INSTALL EXHAUST FRONT PIPE

(a) Install a new gasket.

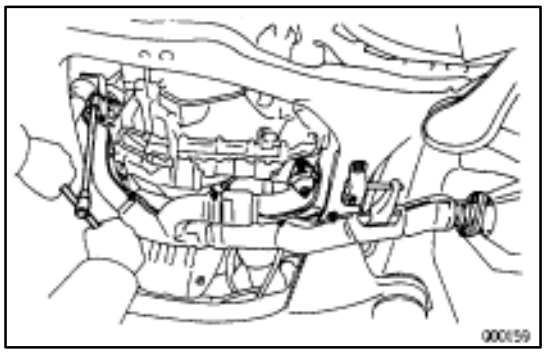
(b) Install the exhaust front pipe.

(c) Install and torque the two bolt and new nuts.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



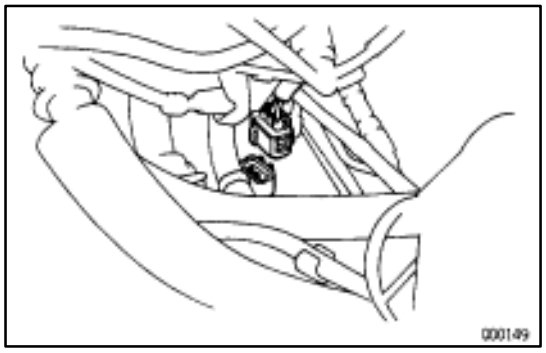
(d) Install the exhaust front pipe support and two bolts.



(e) Install two new gaskets.

(f) Install and torque four new nuts.

Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)



12. FILL TRANSAXLE WITH GEAR OIL

Oil:

Gear oil super (08885–02106) or equivalent

Recommended oil

Oil grade:

API GL–4 or GL–5

Viscosity:

SAE 75W–90 or 80W–90

Above–18°C (0°F) SAE 90

Below–18°C (0°F) SAE 80W

Capacity:

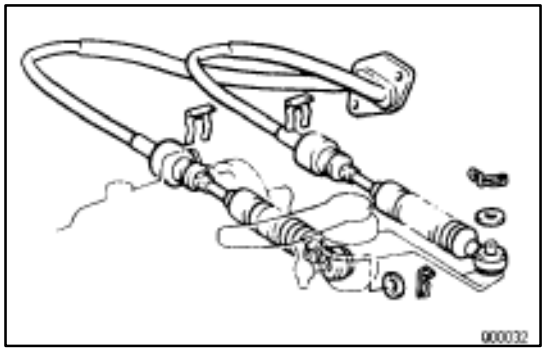
4.2 Litters (4.4 US qts, 3.7 Imp. qts)

13. INSTALL UNDER COVERS AND SIDE COVERS

14. INSTALL FRONT WHEEL AND LOWER VEHICLE

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

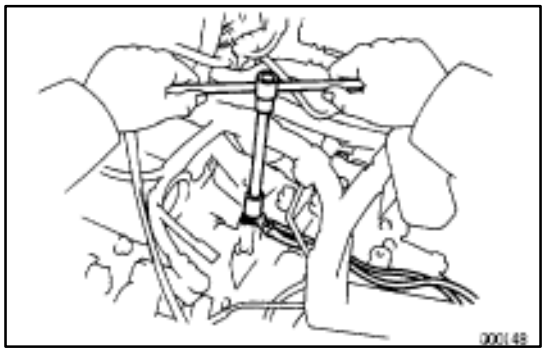
15. CONNECT SPEEDOMETER SENSOR CONNECTOR



16. CONNECT CONTROL CABLES

(a) Install the retainer to the cables.

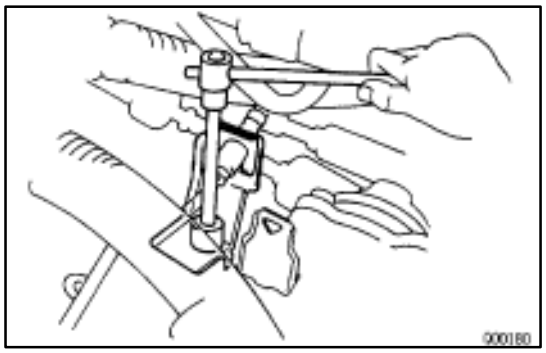
(b) Connect the cables to the linkage with the washers and clips.



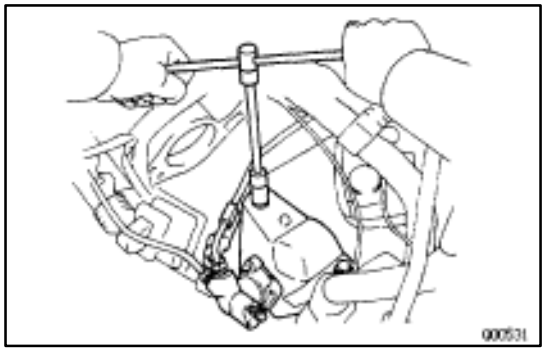
17. INSTALL EARTH CABLES

18. CONNECT WIRES CLAMPS

19. CONNECT BACK–UP LIGHT SWITCH CONNECTOR



20. INSTALL CLUTCH RELEASE CYLINDER BRACKET

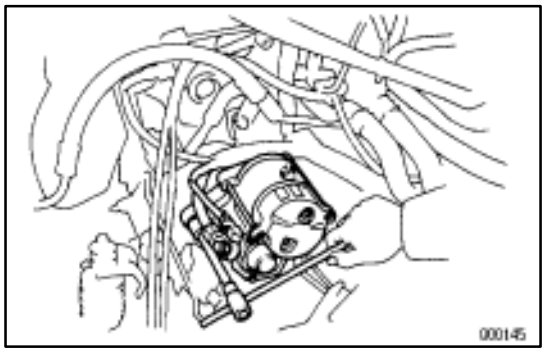


21. INSTALL CLUTCH ACCUMLATORAND TUBE CLAMP

(a) Install the tube clamp and bolt.

(b) Install and torque the two bolts.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



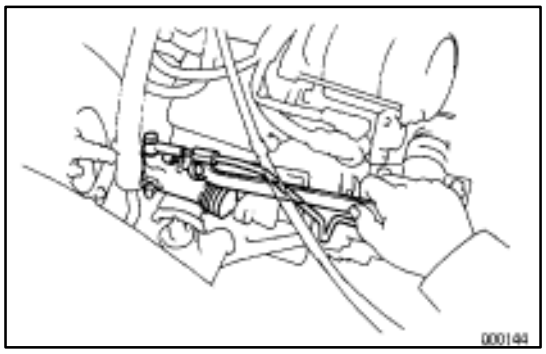
22. INSTALL STARTER

(a) Install the starter.

(b) Install and torque the two bolts.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Connect the connector and wire to the starter.

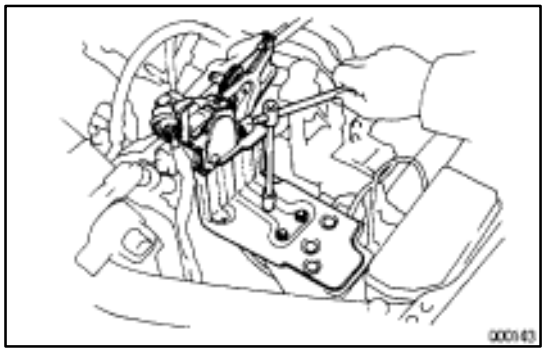


23. INSTALL CLUTCH RELEASE CYLINDER AND TUBE CLAMP

(a) Place the release cylinder and torque the two bolts.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Install the tube clamp bolt.



24. INSTALL CRUISE CONTROL ACTUATOR

(a) Install the cruise control actuator with bracket the three bolts.

(b) Connect the connector.

(c) Install the cruise control actuator cover.

25. INSTALL AIR CLEANER CASE ASSEMBLY WITH AIR HOSE

26. INSTALL NEGATIVE BATTERY CABLE

27. INSPECT FRONT WHEEL ALIGNMENT

(See page SA–3)

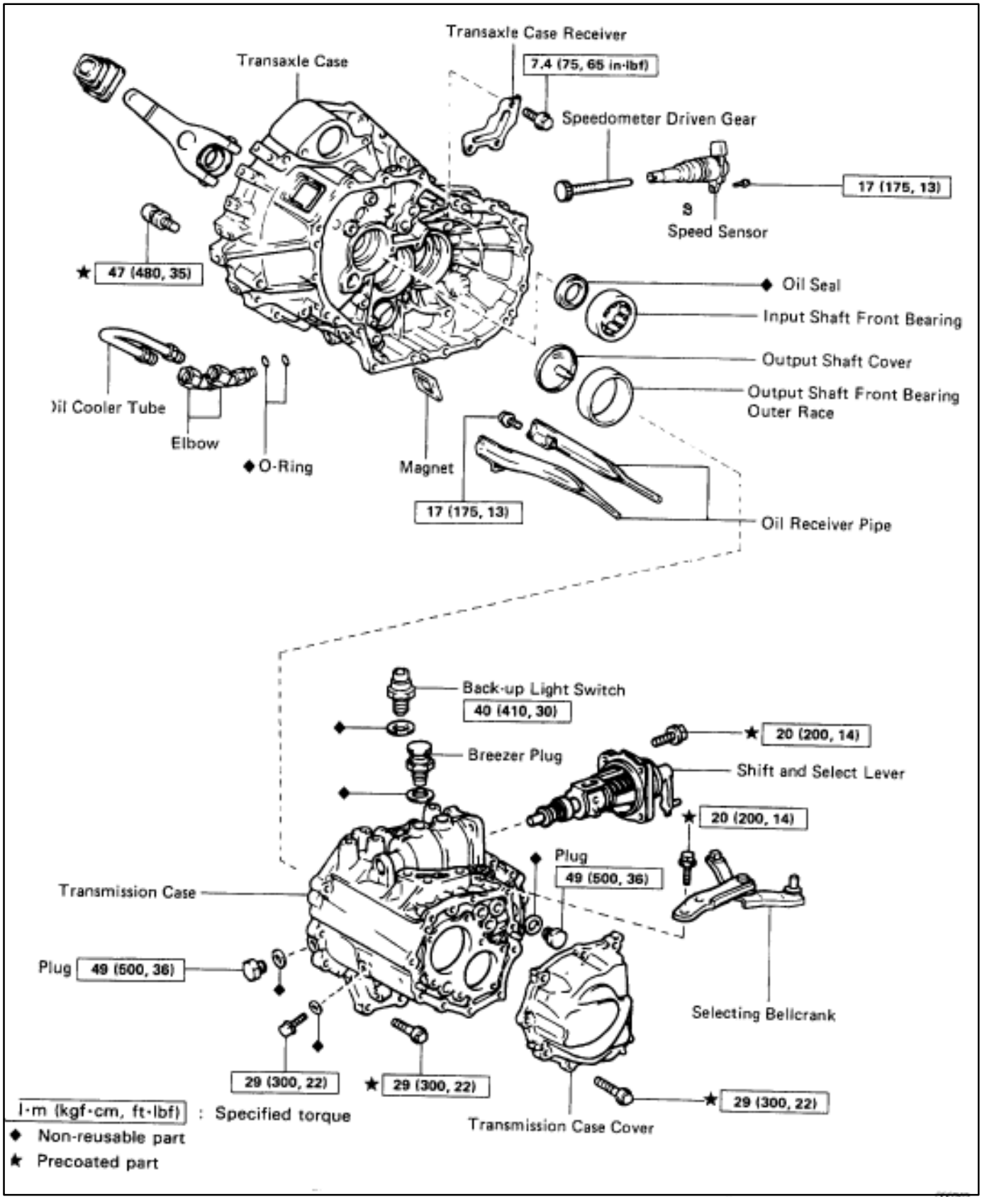
28. PERFORM ROAD TEST

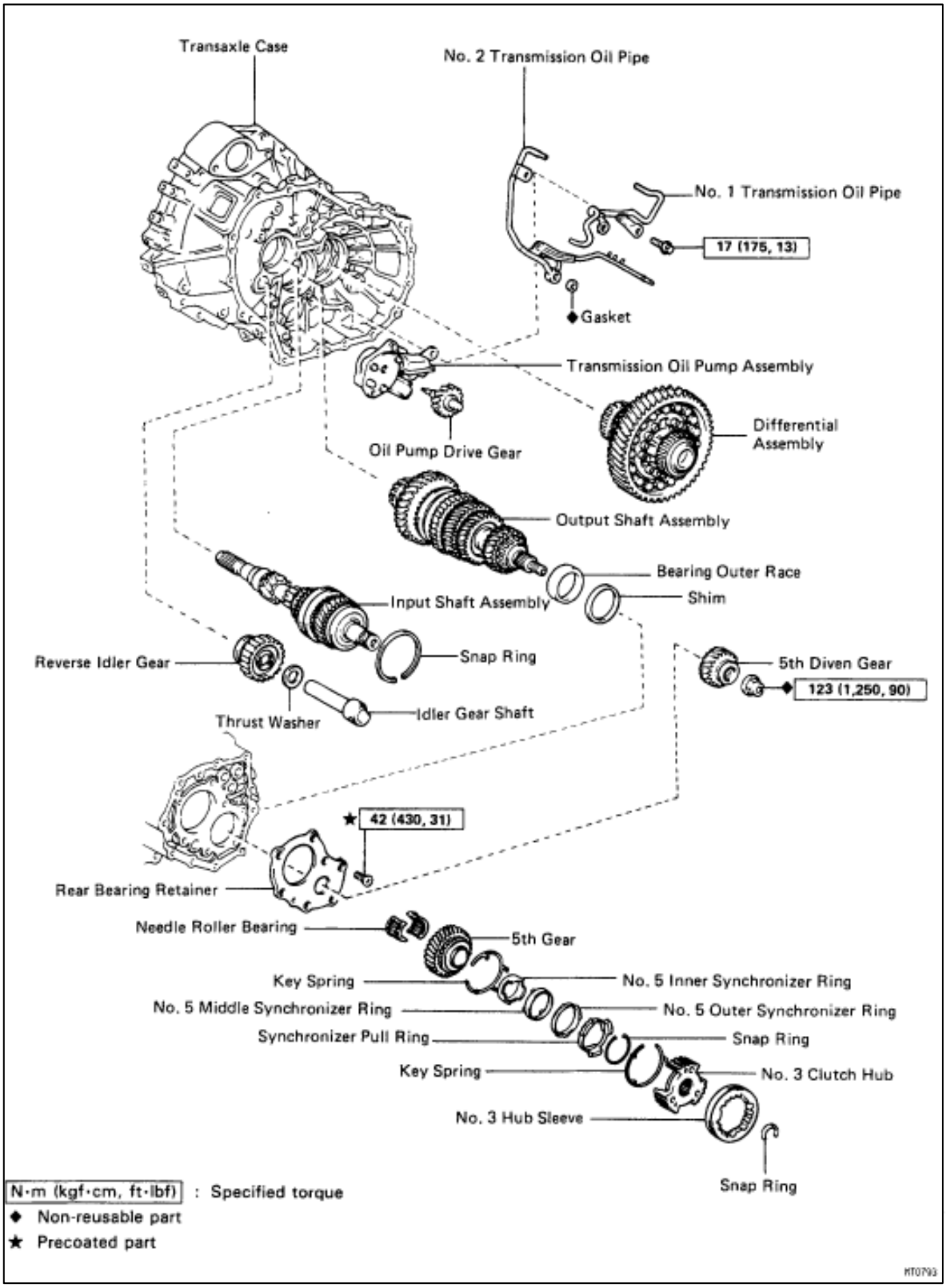
Check for abnormal noise and smooth shifting.

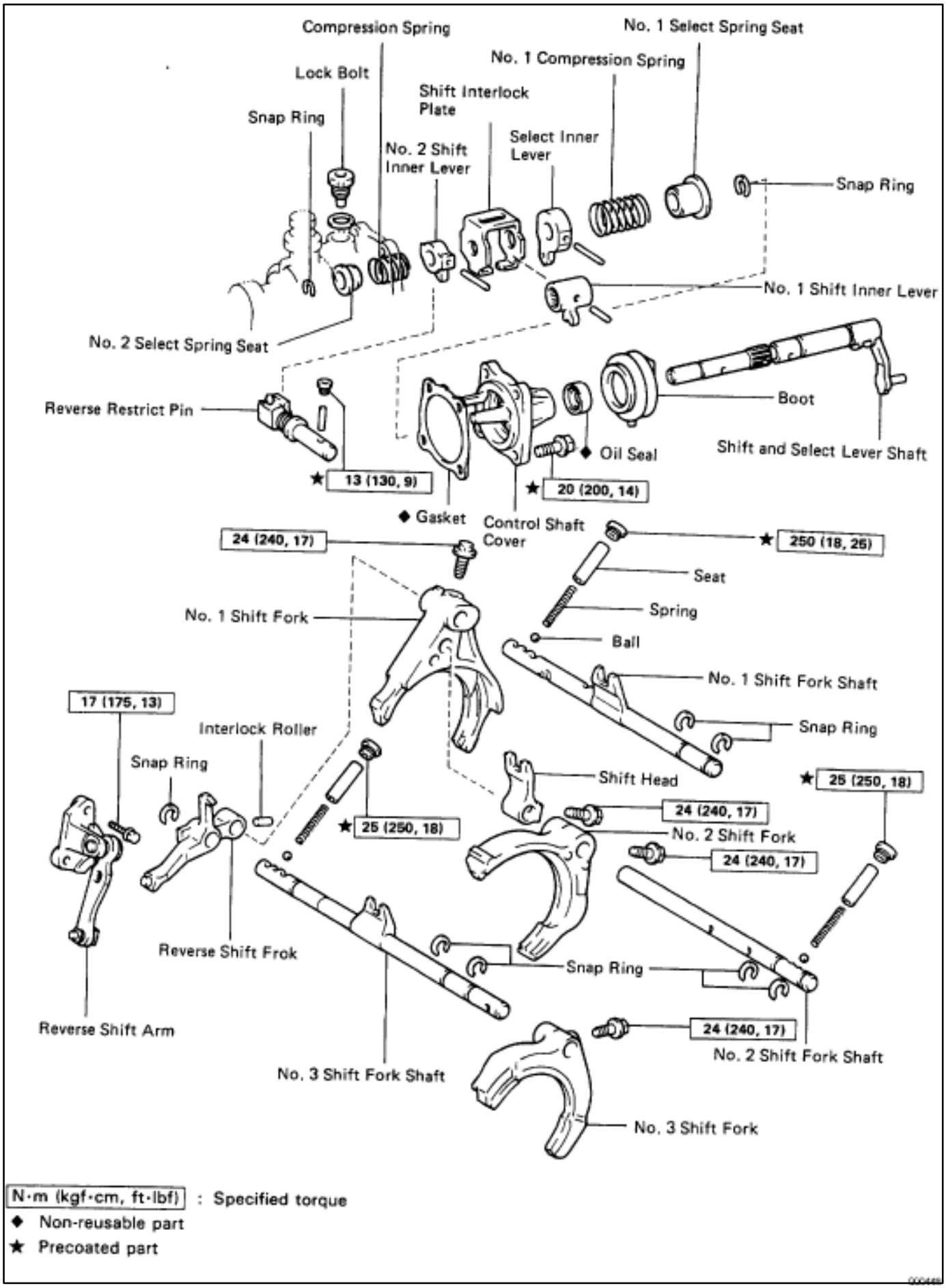
COMPONENT PARTS REMOVAL

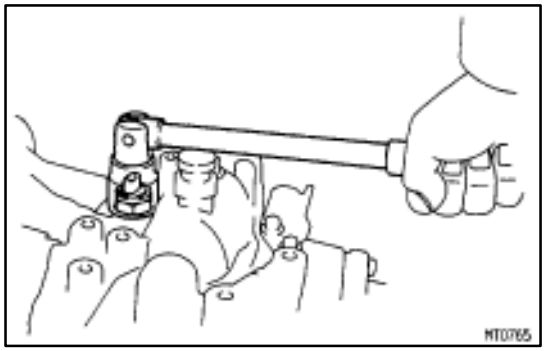
MX014–01

COMPONENTS




Transaxle Case
No. 2 Transmission Oil Pipe
No. 1 Transmission Oil Pipe
17 (175, 13)
◆Gasket
Transmission Oil Pump Assembly
Oil Pump Drive Gear
Differential Assembly
Output Shaft Assembly
Bearing Outer Race
Shim
Input Shaft Assembly
Snap Ring
Reverse Idler Gear
5th Diven Gear
123 (1,250, 90)
Thrust Washer
Idler Gear Shaft
★ 42 (430, 31)
Rear Bearing Retainer
Needle Roller Bearing
5th Gear
Key Spring
No. 5 Inner Synchronizer Ring
No. 5 Middle Synchronizer Ring
No. 5 Outer Synchronizer Ring
Synchronizer Pull Ring
Snap Ring
Key Spring
No. 3 Clutch Hub
No. 3 Hub Sleeve
Snap Ring
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
MT0793


Compression Spring
No. 1 Select Spring Seat
No. 1 Compression Spring
Lock Bolt
Shift Interlock Plate
Snap Ring
No. 2 Shift Inner Lever
Select Inner Lever
Snap Ring
No. 1 Shift Inner Lever
No. 2 Select Spring Seat
Reverse Restrict Pin
Boot
Oil Seal
Shift and Select Lever Shaft
★ 13 (130, 9)
★ 20 (200, 14)
◆ Gasket
Control Shaft Cover
24 (240, 17)
★ 250 (18, 25)
Seat
Spring
No. 1 Shift Fork
Ball
No. 1 Shift Fork Shaft
17 (175, 13)
Interlock Roller
Snap Ring
Snap Ring
Shift Head
★ 25 (250, 18)
24 (240, 17)
★ 25 (250, 18)
No. 2 Shift Fork
24 (240, 17)
Reverse Shift Frok
Snap Ring
Reverse Shift Arm
24 (240, 17)
No. 2 Shift Fork Shaft
No. 3 Shift Fork Shaft
No. 3 Shift Fork
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part

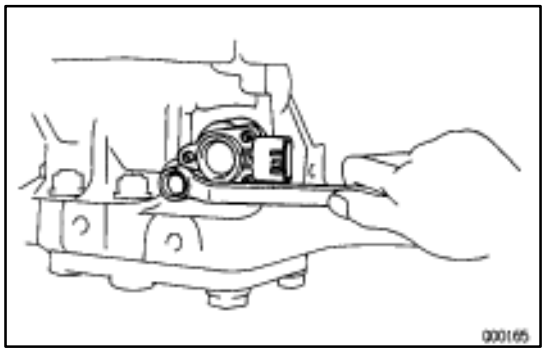


BASIC SUBASSEMBLY SEPARATION

MX01Y–01

(See pages MX–23 to 25)

1. **REMOVE RELEASE FORK AND BEARING**
2. **REMOVE BACK–UP LIGHT SWITCH**

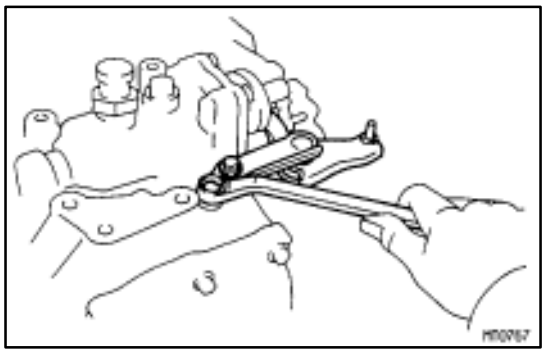


3. **REMOVE SPEED SENSOR**

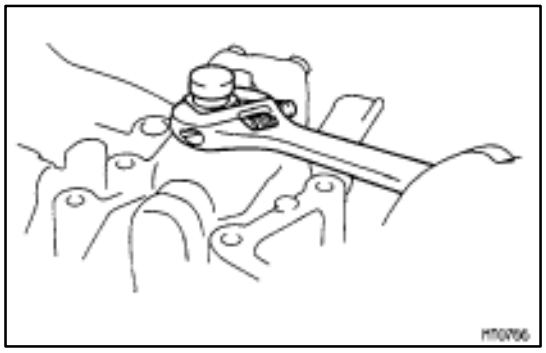
(a) Remove the set bolt and lock plate.

(b) Remove the speed sensor.

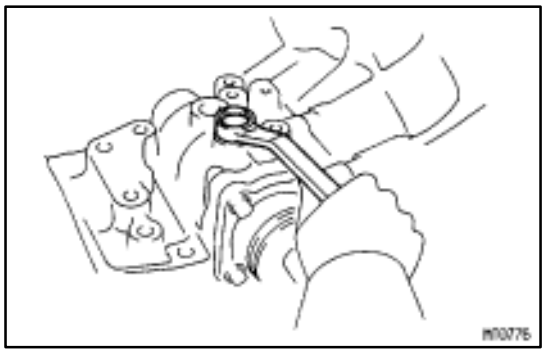
4. **REMOVE THREE BOLTS AND SHIFT CONTROL BRACKET**



5. **REMOVE SELECTING BELLCRANK ASSEMBLY**

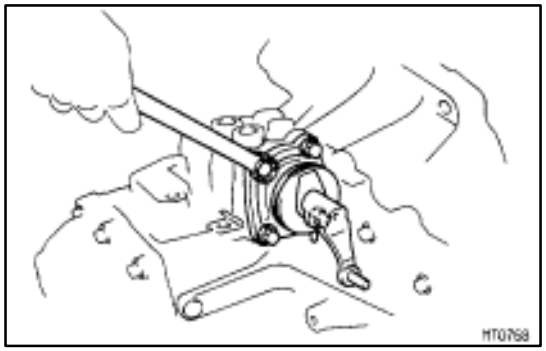


6. **REMOVE BREATHER PLUG**

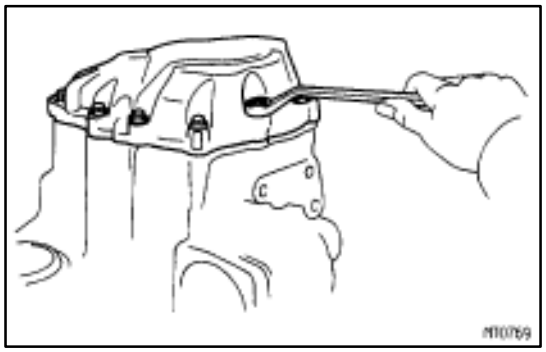


7. **REMOVE SHIFT AND SELECT LEVER SHAFT ASSEMBLY**

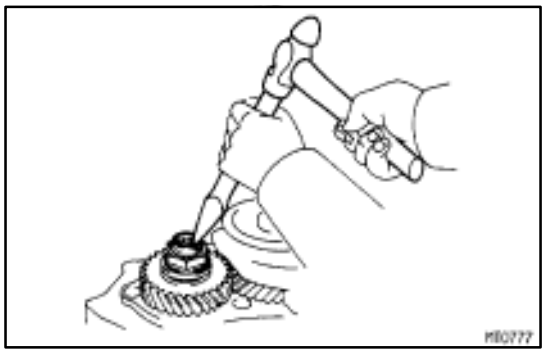
(a) Remove the lock bolt.



(b) Remove the four bolts and pull out the shift and select lever shaft assembly.

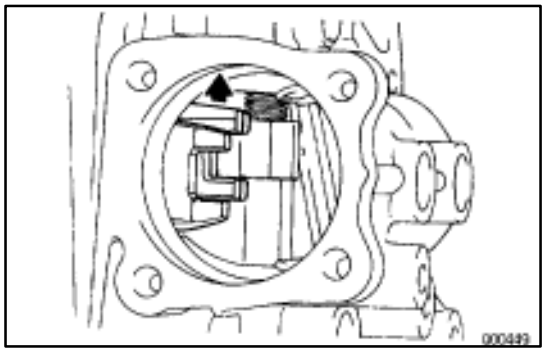


8. REMOVE TRANSMISSION CASE COVER

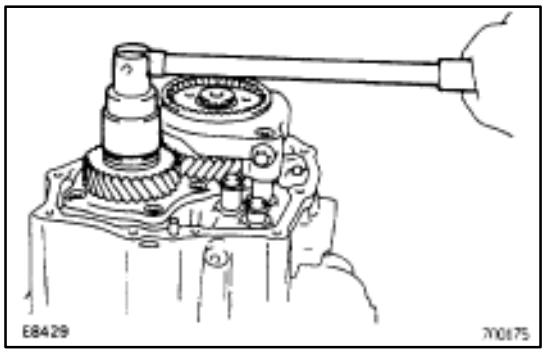


9. REMOVE LOCK NUT

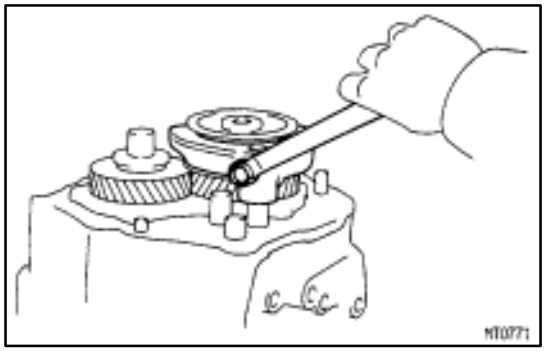
(a) Unstake the lock nut.



(b) Engage the gear double meshing.

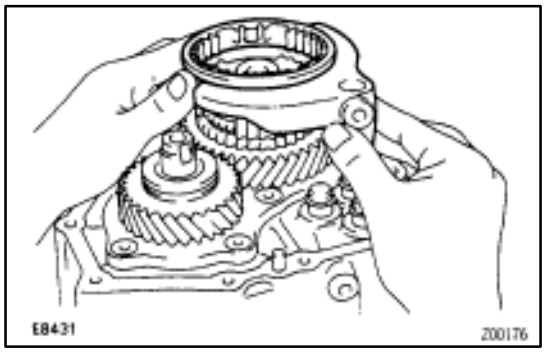


(c) Remove the lock nut.
(d) Disengage the gear double meshing.

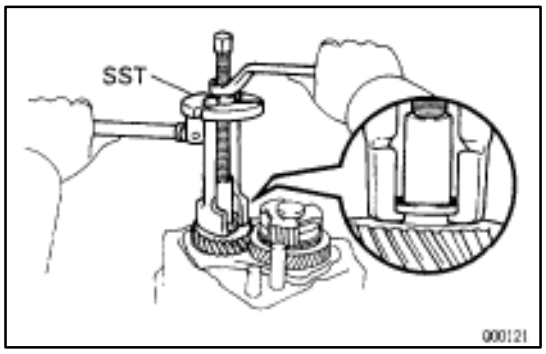


10. REMOVE NO. 3 HUB SLEEVE AND NO. 3 SHIFT FORK

(a) Remove the No.3 shift fork set bolt.

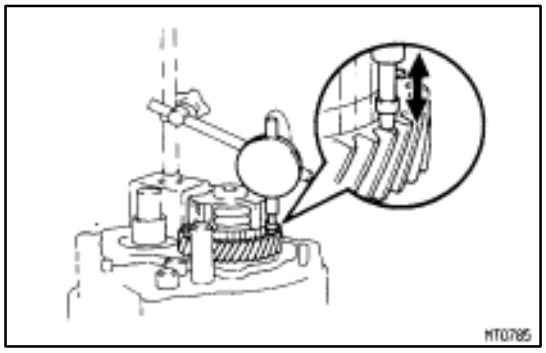


(b) Remove the No.3 hub sleeve and No.3 shift fork.



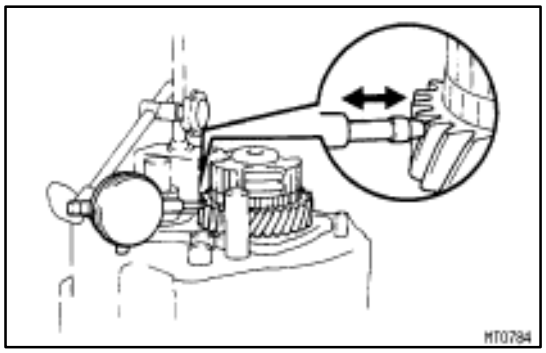
11. REMOVE FIFTH DRIVEN GEAR

Using SST, remove the 5th driven gear.
SST 09310–17010 (09310–07010, 09310–07020, 09310–07040, 09310–07050)

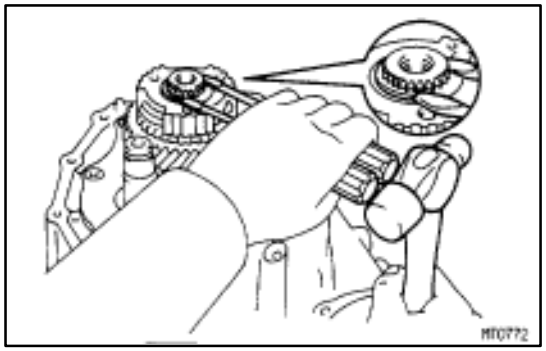


12. MEASURE FIFTH GEAR THRUST CLEARANCE AND OIL CLEARANCE

(a) Using a dial indicator, measure the thrust clearance.
Standard clearance:
0.10–0.57 mm (0.0039–0.0224 in.)
Maximum clearance:
0.65 mm (0.0256 in.)

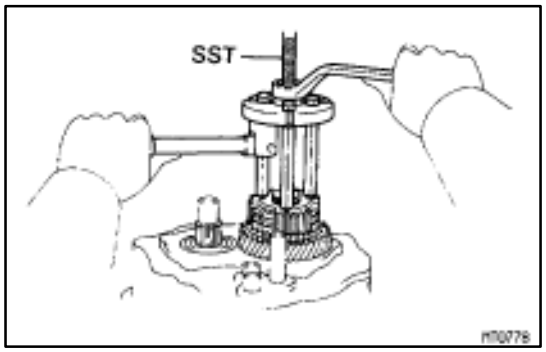


(b) Using a dial indicator, measure the oil clearance.
Standard clearance:
0.009–0.050 mm (0.0004–0.0020 in.)
Maximum clearance:
0.070 mm (0.0028 in.)



13. REMOVE NO.3 CLUTCH HUB AND FIFTH GEAR

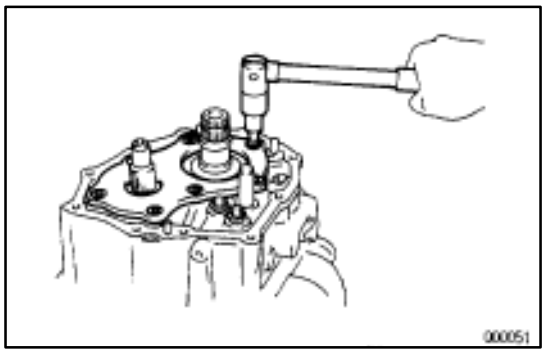
(a) Using two screwdrivers and a hammer, tap out the snap ring.



(b) Using SST, remove the No.3 clutch hub with synchronizer ring and 5th gear.
SST 09310–17010 (09310–07010, 09310–07020, 09310–07040, 09310–07050)

(c) Remove the 5th gear.

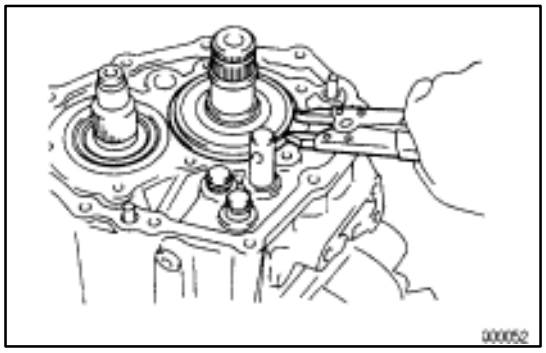
14. REMOVE NEEDLE ROLLER BEARING



15. REMOVE REAR BEARING RETAINER

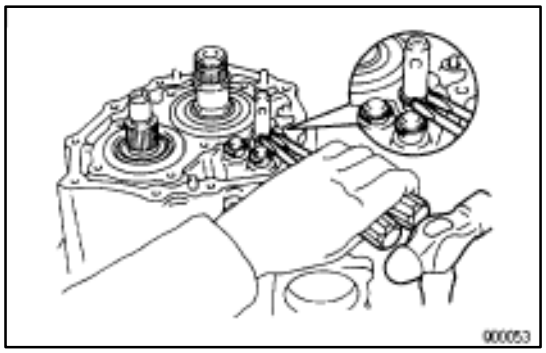
(a) Using a torx wrench, remove the seven torx screws and bearing retainer.
Torx wrench T45 09042–00050

(b) Remove the adjust shim.

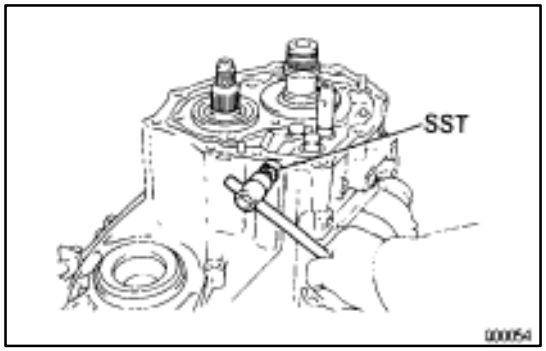


16. REMOVE SNAP RING

(a) Using a snap ring expander, remove the snap ring.

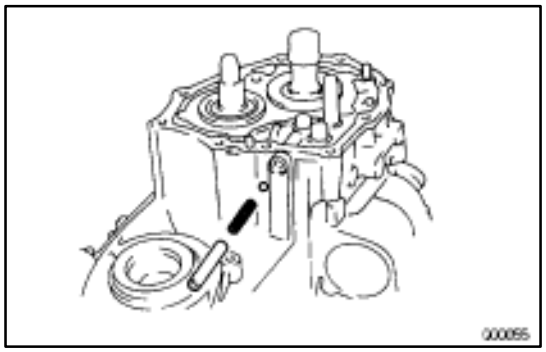


(b) Using two screwdriver and a hammer, remove the three snap rings.

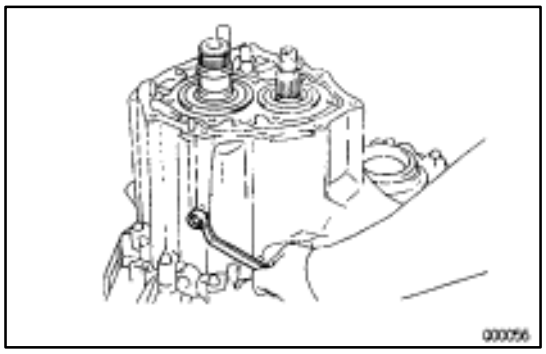


17. REMOVE PLUG, SEAT, SPRING AND LOCKING BALL

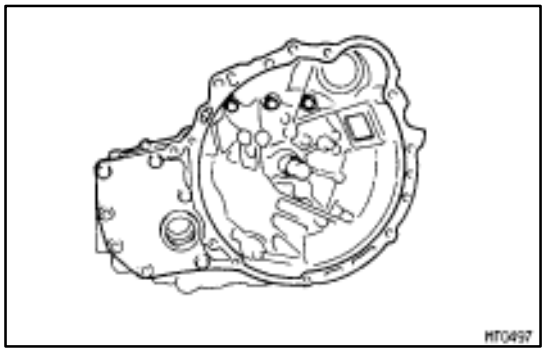
(a) Using SST, remove the plug.
SST 09313–30021



(b) Using a magnetic finger, remove the seat, spring and locking ball.

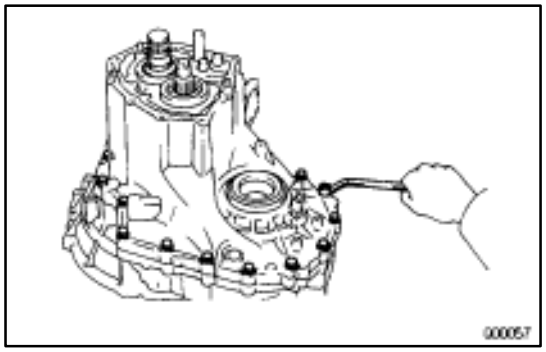


18. REMOVE REVERSE IDLER GEAR SHAFT RETAINING BOLT

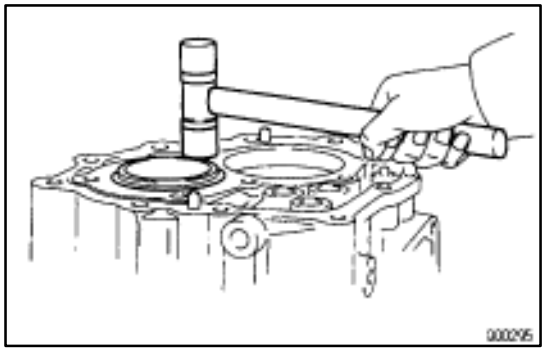


19. REMOVE TRANSMISSION CASE

(a) Remove the three bolts from transaxle case side.

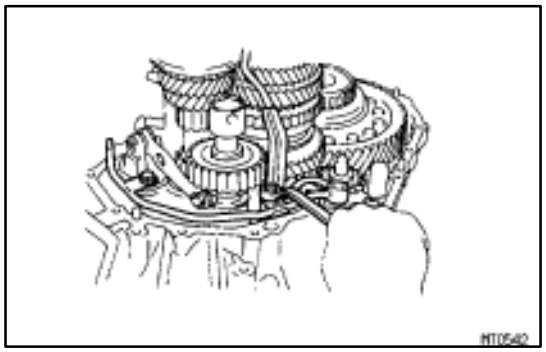


(b) Remove the fourteen bolts from the transmission case side and tap off the case with a plastic hammer.



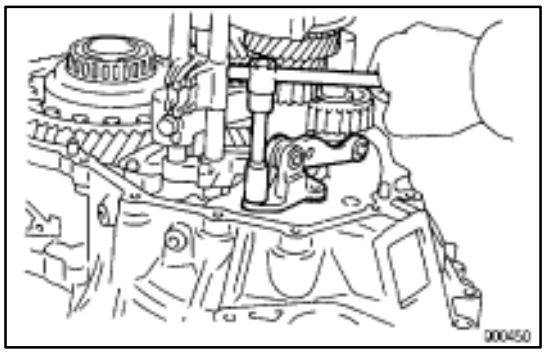
20. REMOVE OUTPUT SHAFT REAR TAPERED ROLLER BEARING OUTER RACE

Using a plastic hammer, tap out the outer race.



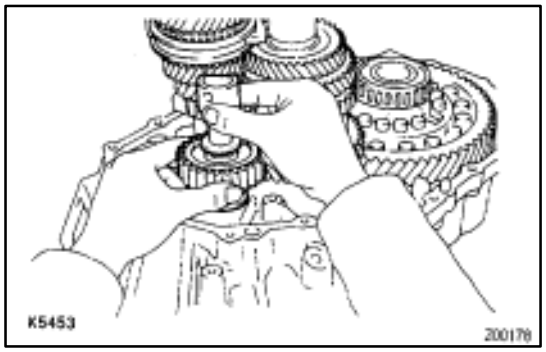
21. REMOVE NO.2 OIL PIPE

(a) Remove the gasket.
(b) Remove the two bolts and oil pipe.



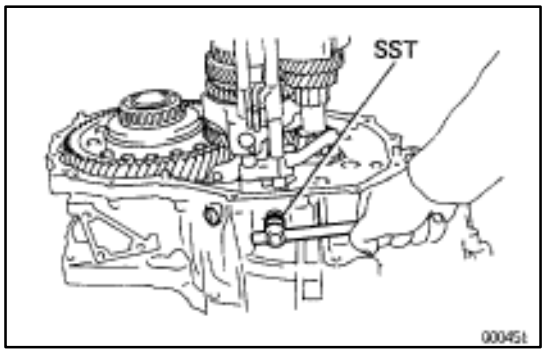
22. REMOVE REVERSE SHIFT ARM BRACKET

Remove the bolt and pull off the bracket.



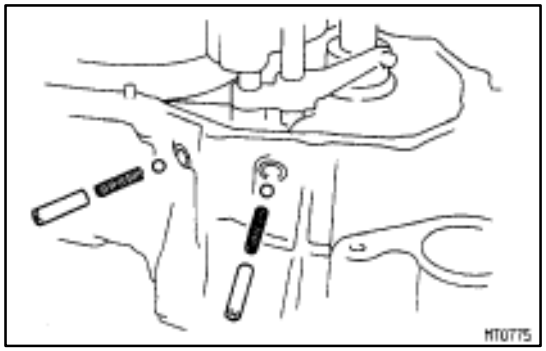
23. REMOVE REVERSE IDLER GEAR AND SHIFT

Pull out the shift, remove the reverse idler gear and thrust washer.

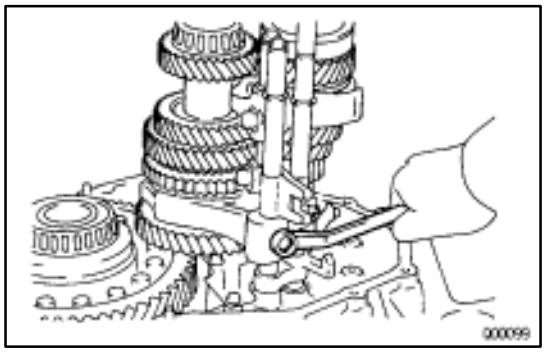


24. REMOVE TWO PLUGS, LOCKING BALLS AND SPRINGS

(a) Using SST, remove the two plugs.
SST 09313–30021

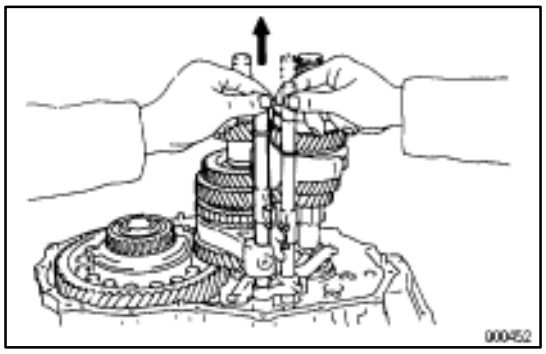


(b) Using a magnetic finger, remove the two spring seats, springs and balls.

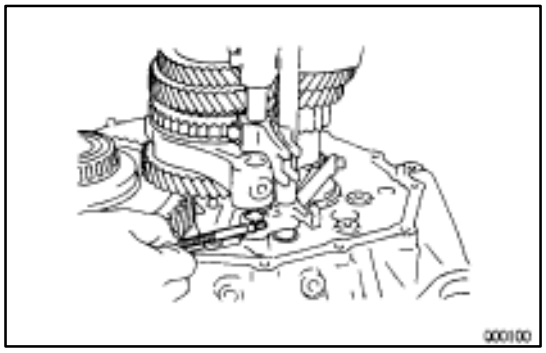


25. REMOVE NO.1 SHIFT FORK SHAFT

(a) Remove the set bolt.

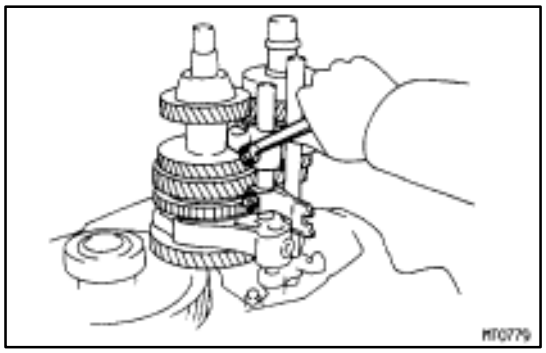


(b) Pull up the No.3 shift fork shaft, remove the No.1 shift fork shaft.



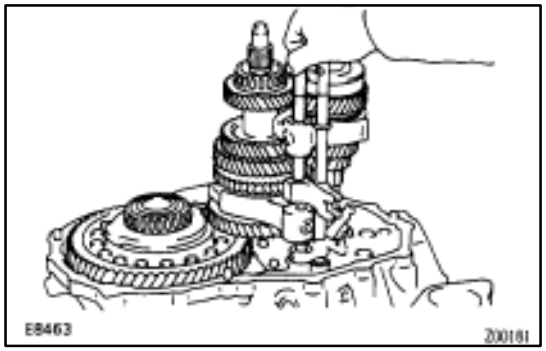
26. REMOVE INTERLOCK ROLLER

Using a magnetic finger, remove the interlock roller from the reverse shift fork.

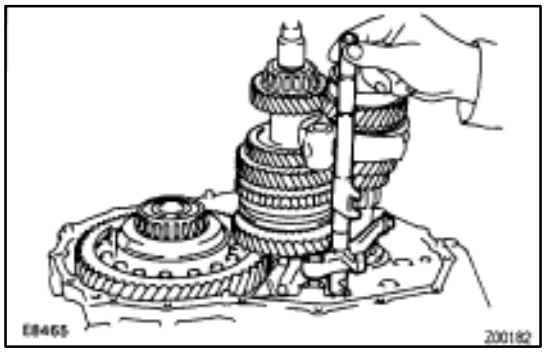


27. REMOVE NO.2 SHIFT FORK SHAFT, SHIFT HEAD AND NO.1 SHIFT FORK

(a) Remove the two set bolts.

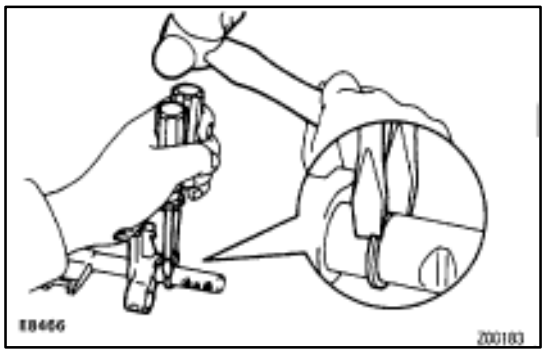


(a) Pull out the No.2 shift fork shaft.
(b) Remove the shift head and No.1 shift fork.



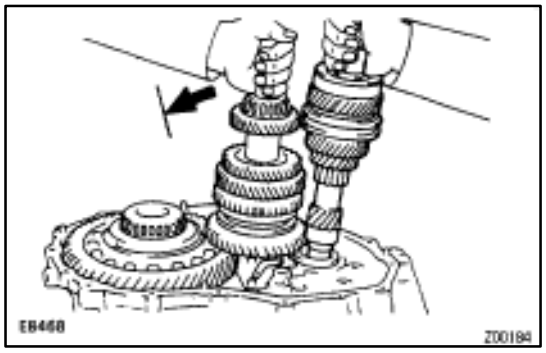
28. REMOVE NO.3 SHIFT FORK SHAFT WITH REVERSE SHIFT FORK AND NO.2 SHIFT FORK

(a) Pull out the No.3 shift fork shaft with reverse shift fork.
(b) Remove the No. 2 shift fork.



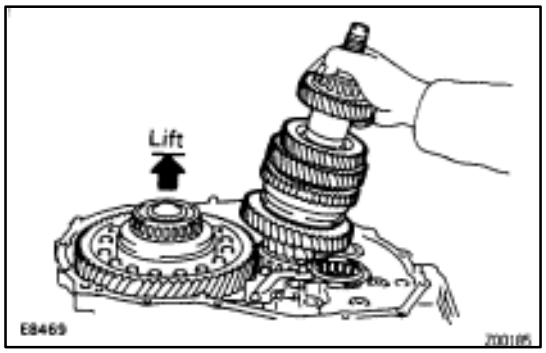
29. REMOVE SNAP RINGS

(a) Using two screwdriver and a hammer, remove the snap ring and reverse shift fork from the No.3 shift fork shaft.
(b) Using two screwdriver and a hammer, remove the snap rings from the No.1, No.2 and No.3 shift fork shaft.

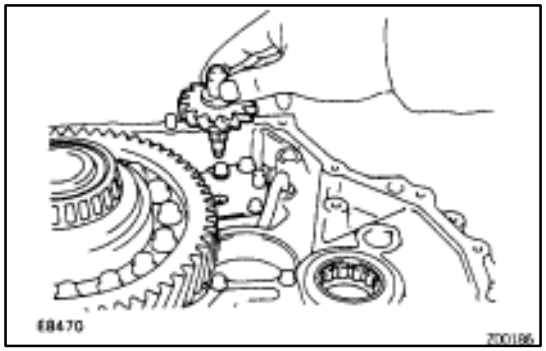


30. REMOVE INPUT AND OUTPUT SHAFT ASSEMBLY

(a) Leaning the output shaft to the differential side remove the input shaft assembly.

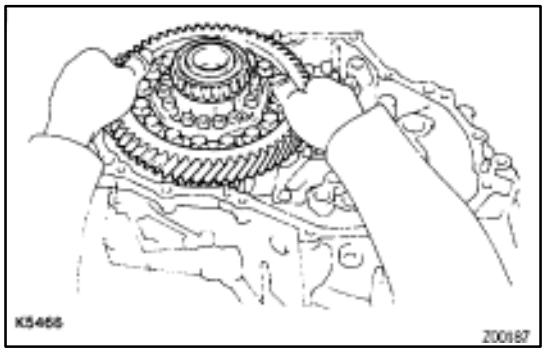


(b) Lift up the differential case assembly, remove the output shaft.

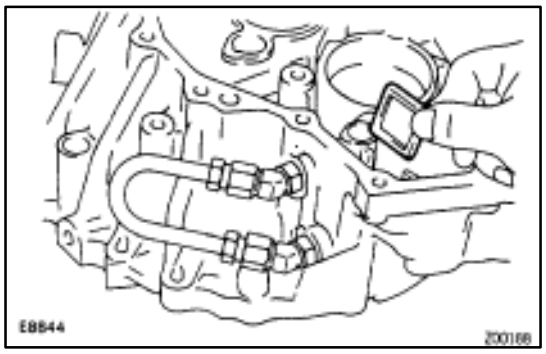


31. REMOVE DIFFERENTIAL ASSEMBLY

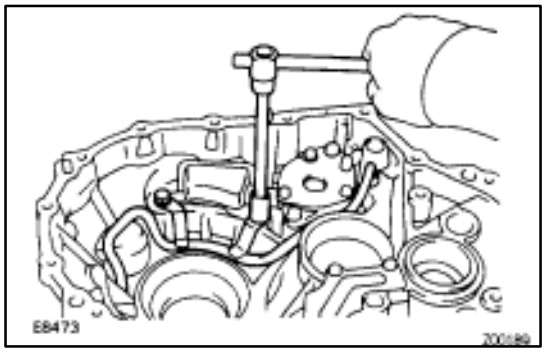
(a) Remove the oil pump drive gear.



(b) Remove the differential case assembly.

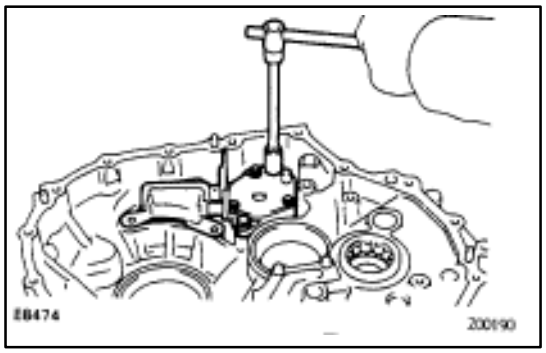


32. REMOVE MAGNET FROM TRANSAXLE CASE

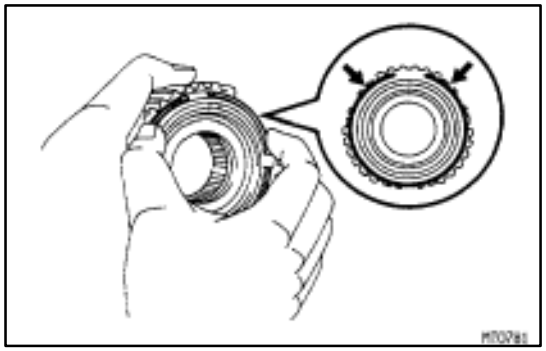


33. REMOVE OIL PUMP ASSEMBLY

(a) Remove the two bolts and oil pipe.

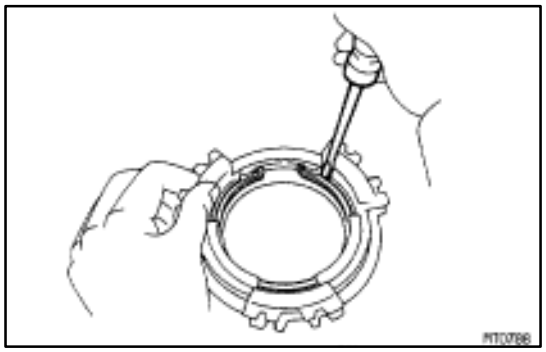


(b) Remove the two bolts and oil pump.



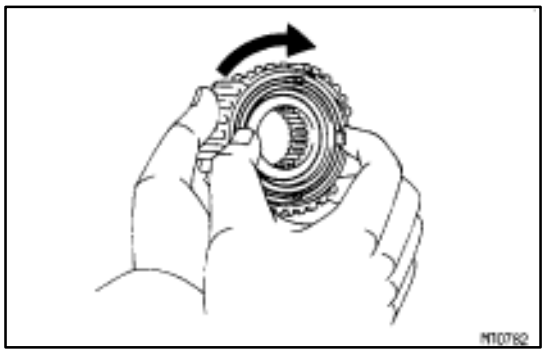
34. REMOVE NO.5 SYNCHRONIZER RING WITH KEY SPRING FROM NO.3 CLUTCH HUB

(a) Remove the No.5 synchronizer ring with key spring from No.3 clutch hub.



(b) Using a screwdriver, remove the snap ring.
HINT: Wrap vinyl tape on the screwdriver to prevent damaging the synchronizer ring.

(c) Remove the synchronizer rings.



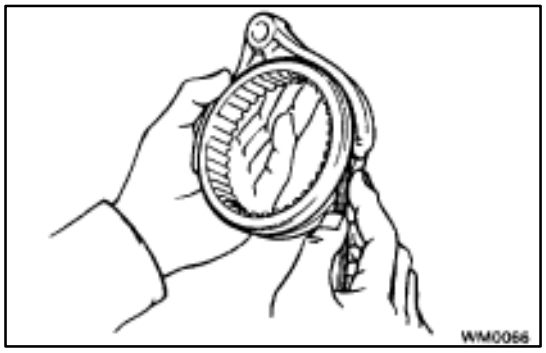
COMPONENT PARTS INSPECTION

MX015–01

1. INSPECT NO.5 SYNCHRONIZER RINGS

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring.
Turn the middle No.5 synchronizer ring in one direction while pushing it to the outer No.5 synchronizer ring and check that the ring is locked.
If the braking effect is insufficient, replace the synchronizer ring.



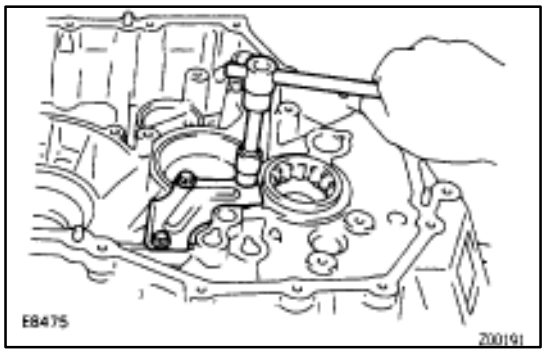
2. MEASURE CLEARANCE OF SHIFT FORKS AND HUB SLEEVE

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance:

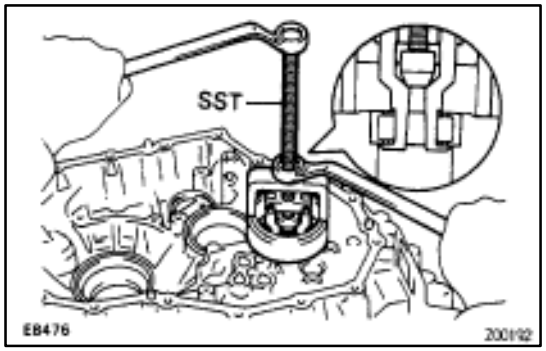
1.0 mm (0.039 in.)

If the clearance exceeds the limit, replace the shift fork or hub sleeve.

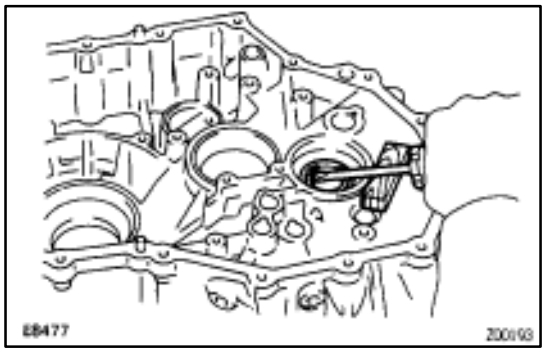


3. IF NECESSARY, REPLACE INPUT SHAFT BEARING AND OIL SEAL

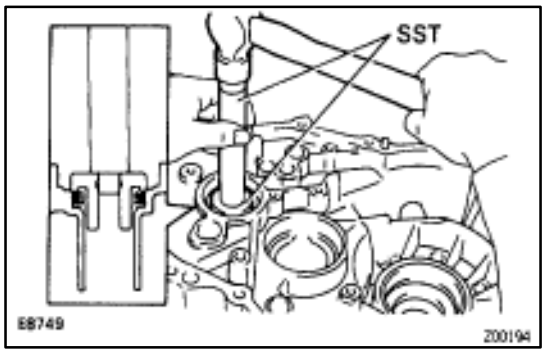
(a) Remove the three bolts and transaxle case receiver.



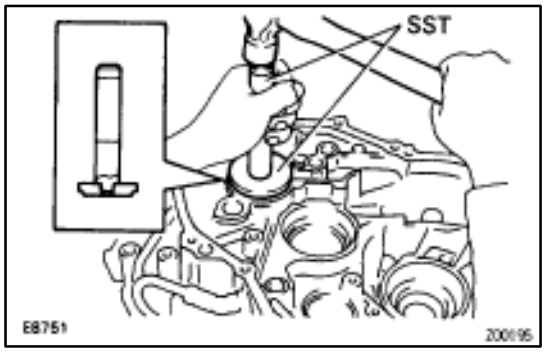
(b) Using SST, pull out the bearing.
SST 09612–65014



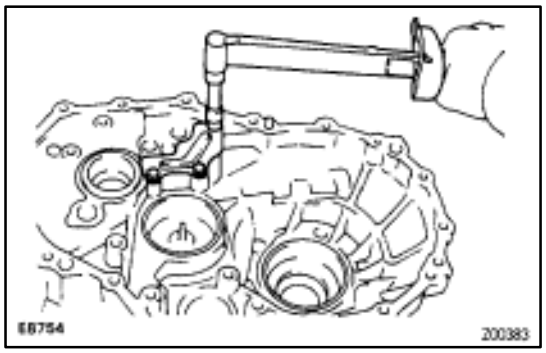
(c) Using a screwdriver, remove the oil seal.



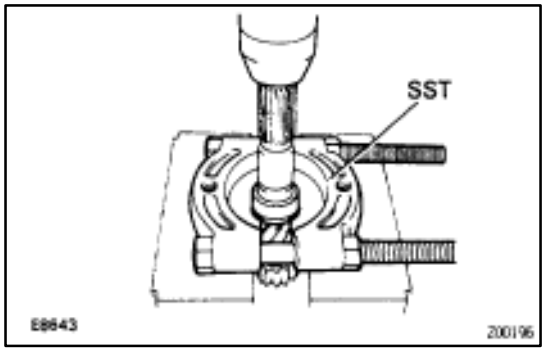
(d) Using SST, drive in a new oil seal.
SST 09608–12010 (09608–00020, 09608–00080)
(e) Coat the lip of seal with MP grease.



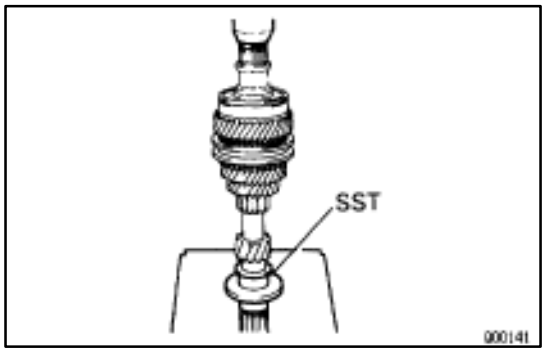
(f) Using SST, drive in a new bearing.
SST 09608–12010 (09608–00020, 09608–00060)



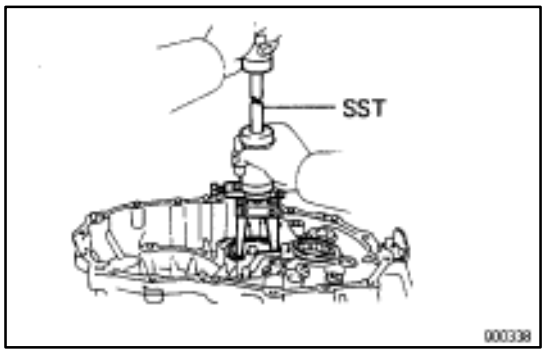
(g) Install the transaxle case receiver.
(h) Install and torque the three bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)



(i) Using SST and a press, remove the inner race.
SST 09950–00020



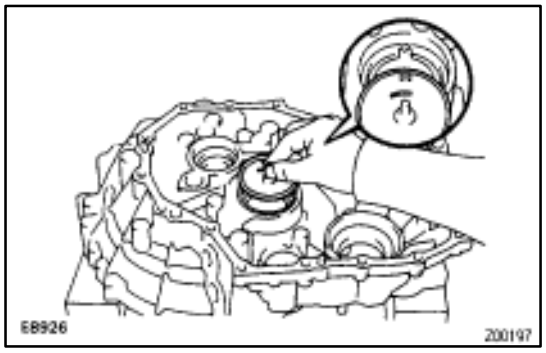
(j) Using SST and a press, install a new input shaft front bearing inner race.
SST 09316–60010 (09316–00020)



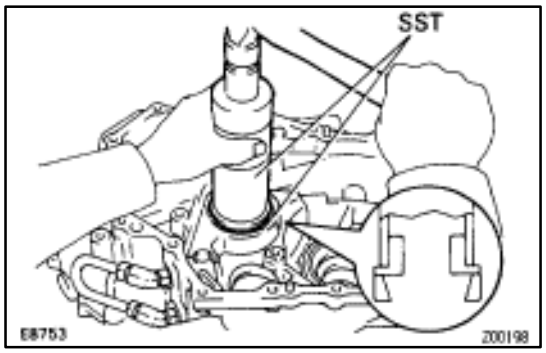
4. IF NECESSARY, REPLACE OUTPUT SHAFT FRONT BEARING AND OUTPUT SHAFT FRONT COVER

(a) Using SST, pull out the output shaft front bearing outer race.
SST 09308–00010

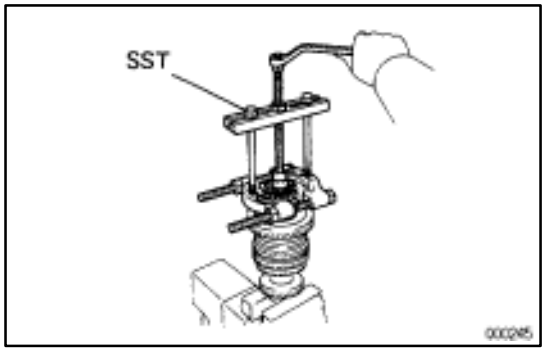
(b) Remove the output shaft front cover.



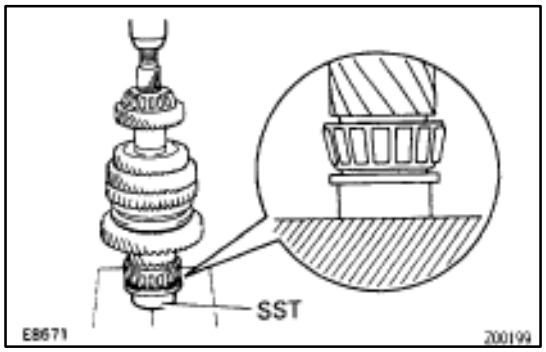
(c) Install a new output shaft front cover.
HINT: Install the output shaft front cover projection into the case side groove.



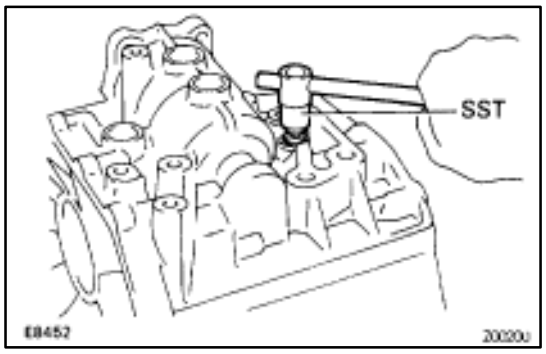
(d) Using SST and a hammer, drive in a new output shaft front bearing outer race.
SST 09316–60010 (09316–00010, 09316–00020)



(e) Using SST and a socket wrench, remove the output shaft front bearing.
SST 09950–00020, 09950–00030

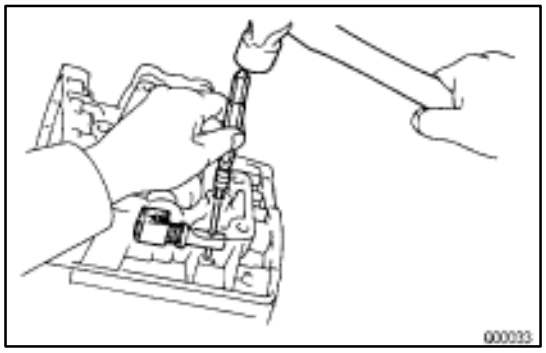


(f) Using SST and a press, install a new output shaft front bearing.
SST 09316–60010 (09316–00070)

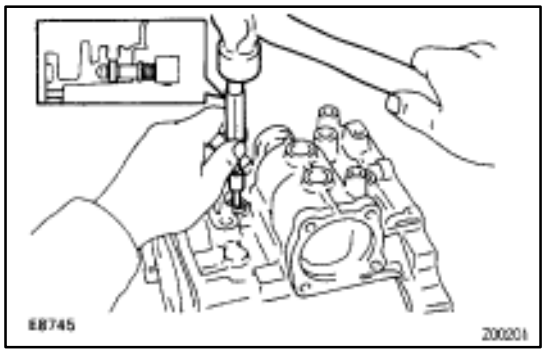


5. IF NECESSARY, REPLACE REVERSE RESTRICT PIN

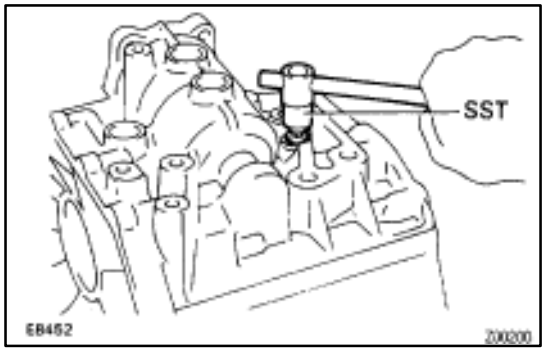
(a) Using SST, remove the screw plug.
SST 09313–30021



(b) Using a pin punch and hammer, drive out the slotted spring pin.



(c) Replace the reverse restrict pin.
(d) Using a pin punch, drive in the slotted spring pin.



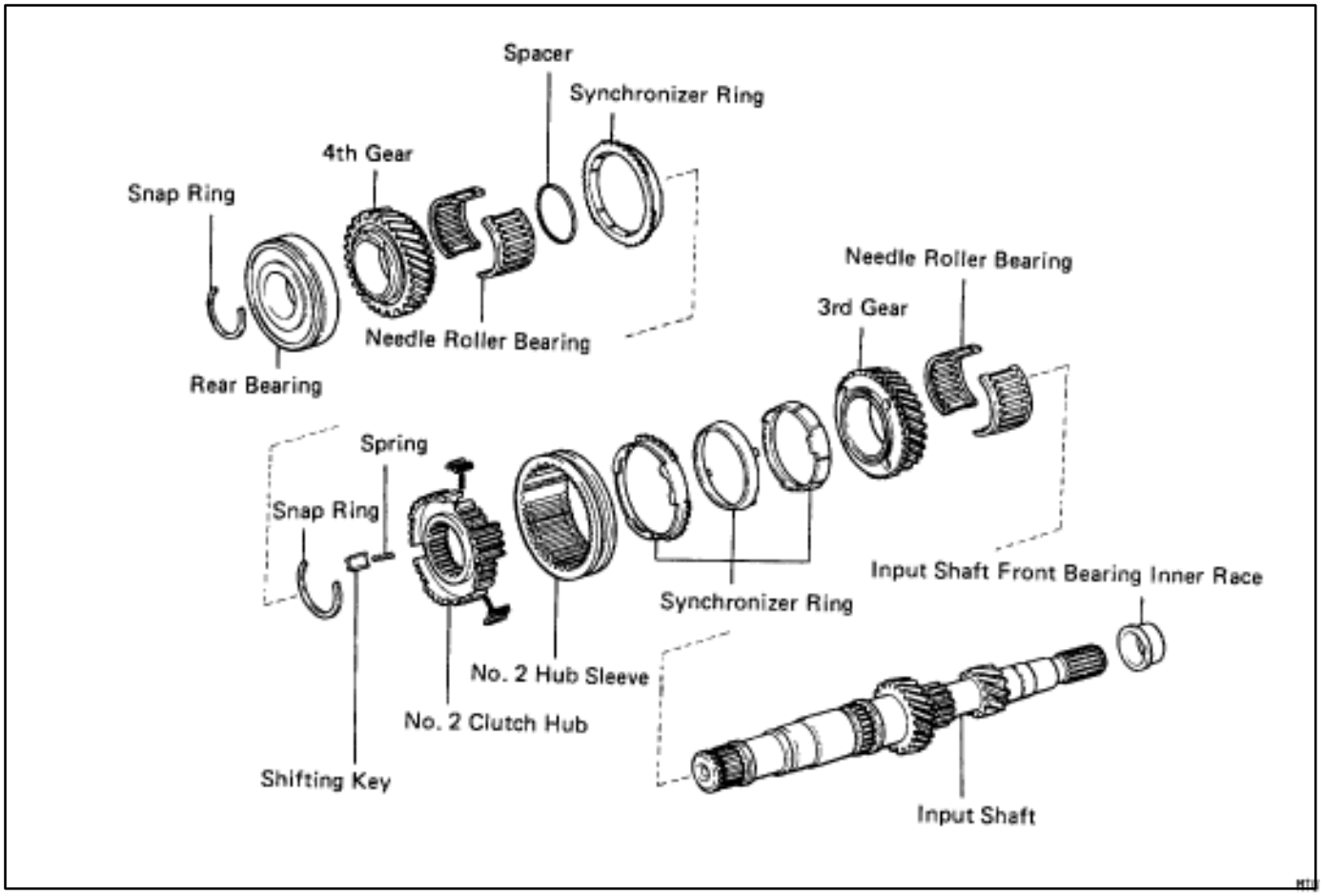
(e) Apply sealant to the screw plug threads.
Sealant:
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

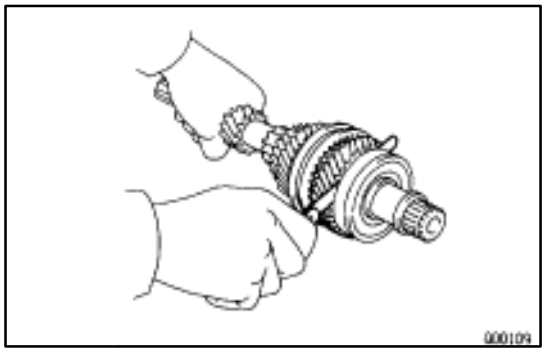
(f) Using SST, install the screw plug.
SST 09313–30021

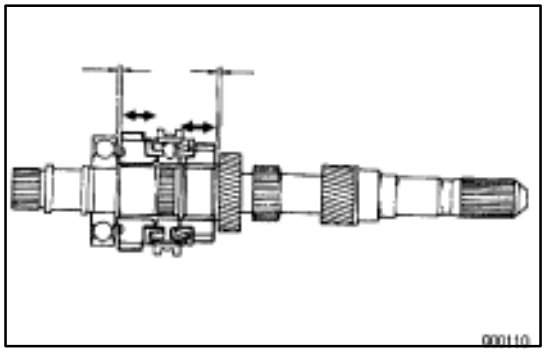
INPUT SHAFT

MX016–01

COMPONENTS







INPUT SHAFT DISASSEMBLY

MX017–01

1. MEASURE THIRD AND FOURTH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance.

Standard clearance:

3rd gear

0.10–0.45 mm (0.0039–0.0177 in.)

4th gear

0.10–0.55 mm (0.0039–0.0217 in.)

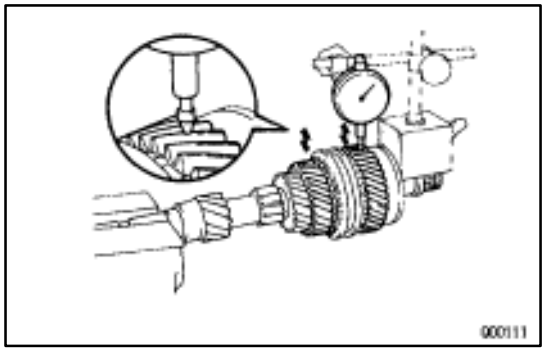
Maximum clearance:

3rd gear

0.50 mm (0.0197 in.)

4th gear

0.60 mm (0.0236 in.)



2. CHECK OIL CLEARANCE OF THIRD AND FORTH GEAR

Using dial indicator, measure the oil clearance between the gear and shaft.

Standard clearance:

3rd gear

0.009–0.053 mm (0.0004–0.0021 in.)

4th gear

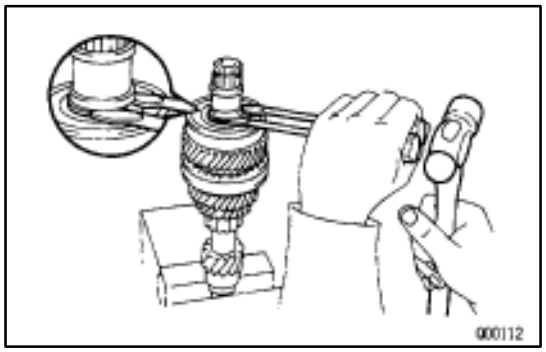
0.009–0.051 mm (0.0004–0.0020 in.)

Maximum clearance:

3rd and 4th gear

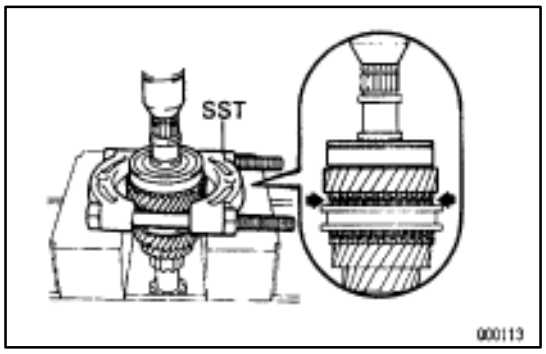
0.070 mm (0.0028 in.)

If clearance exceeds the limit, replace the gear, needle roller bearing or shaft.



3. REMOVE SNAP RING

Using two screwdriver and a hammer, tap out the snap ring.

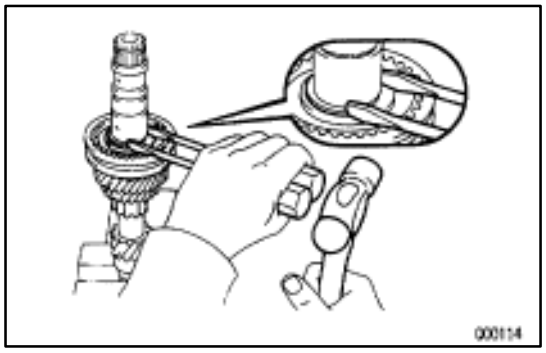


4. REMOVE RADIAL BALL BEARING AND FOURTH GEAR

Using SST and a press, remove the radial bearing.

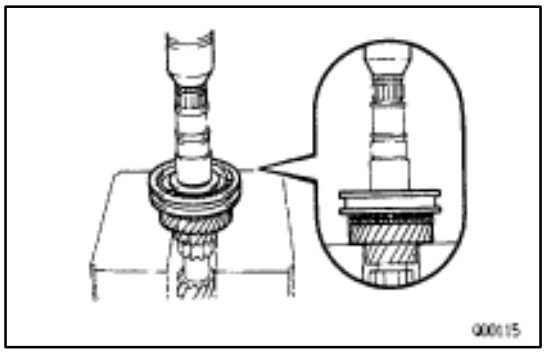
SST 099650–00020

5. REMOVE NEEDLE ROLLER BEARINGS, SPACER AND SYNCHRONIZER RING



6. REMOVE SNAP RING

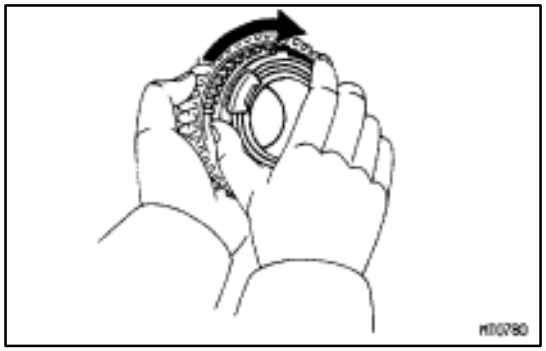
Using two screwdrivers and a hammer, tap out the snap ring.



7. REMOVE NO.2 CLUTCH HUB ASSEMBLY, SYNCHRONIZER RING AND THIRD GEAR

Using a press, remove No.2 hub sleeve, 3rd gear, synchronizer ring and needle roller bearings.

8. REMOVE NEEDLE ROLLER BEARING



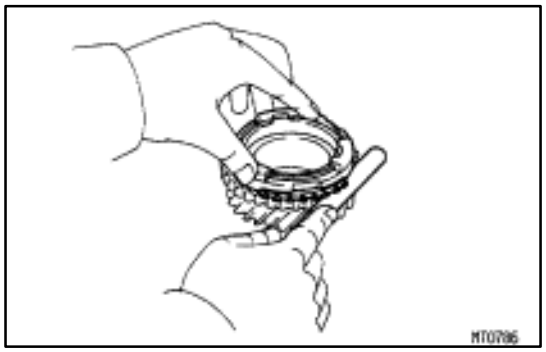
INPUT SHAFT COMPONENT PARTS INSPECTION

MX018–01

1. INSPECT SYNCHRONIZER RING FOR THIRD GEAR

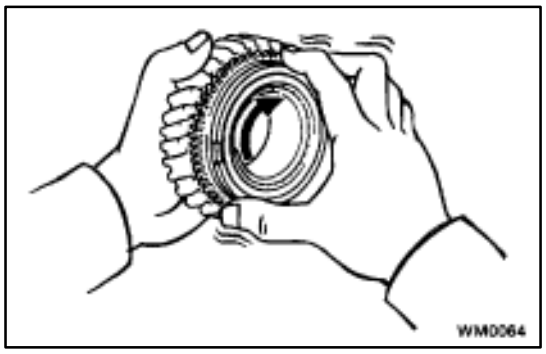
(a) Check for wear damage.

(b) Check the braking effect of the synchronizer ring.
Turn the synchronizer ring in one direction while pushing it to the gear cone and check that the ring is locked.



If the braking effect is insufficient, replace the synchronizer ring.

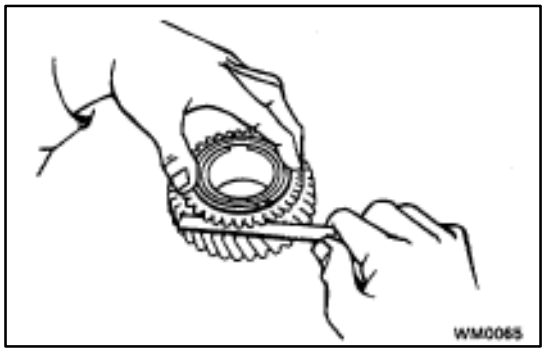
(c) Measure the clearance between the synchronizer ring back and gear spline end.
Minimum clearance:
0.7 mm (0.028 in.)
If the clearance is less than the limit, replace the synchronizer ring.



2. INSPECT SYNCHRONIZER RING FOR FOURTH GEAR

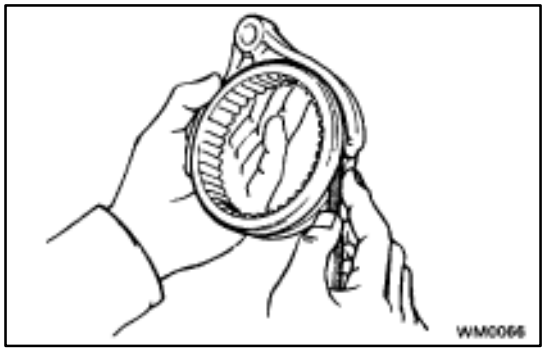
(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring.
Turn the synchronizer ring in one direction while pushing it to the gear cone and check that the ring is locked.
If the braking effect is insufficient, lightly rub the synchronizer ring and gear cone by applying a small amount of fine lapping compound.



NOTICE:
- **Wash off completely the fine lapping compound after rubbing.**
- **Check again the braking effect of the synchronizer ring.**

(c) Measure the clearance between the synchronizer ring back and spline end.
Minimum clearance:
0.6 mm (0.024 in.)
If the clearance is less than the limit, replace the synchronizer ring and gear cone by applying a small amount of fine lapping compound.
NOTICE: Wash off completely, the fine lapping compound after rubbing.



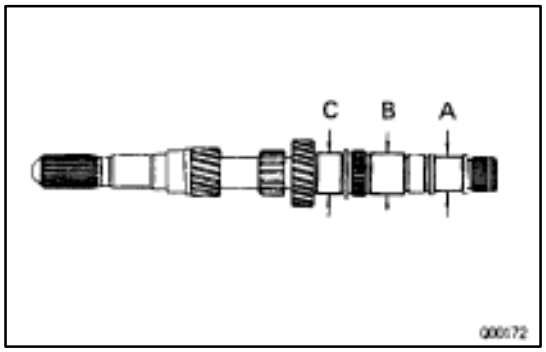
3. MEASURE CLEARANCE OF NO.2 SHIFT FORK AND HUB SLEEVE

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance:

1.0 mm (0.039 in.)

If the clearance exceeds the limit, replace the shift fork or hub sleeve.



4. INSPECT INPUT SHAFT

(a) Check the input shaft for wear or damage.

(b) Using a micrometer, measure the outer diameter of the input shaft journal surface.

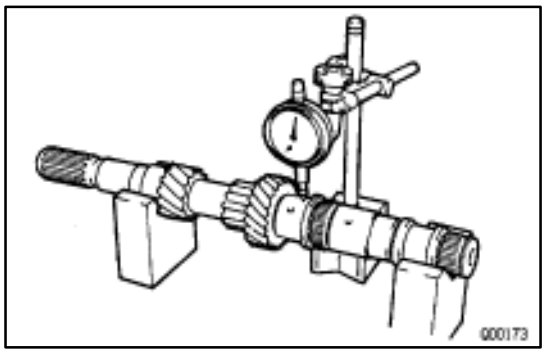
Maximum clearance:

Part A

27.950 mm (1.1004 in.)

Part B and C

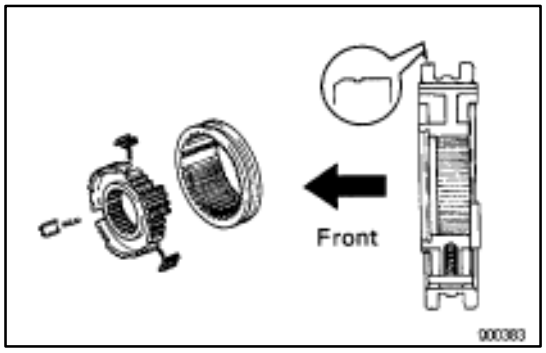
35.950 mm (1.4154 in.)



(c) Using a dial indicator, check the shaft runout.

Maximum clearance:

0.05 mm (0.0020 in.)



INPUT SHAFT ASSEMBLY

MX019–01

(See page MX–40)

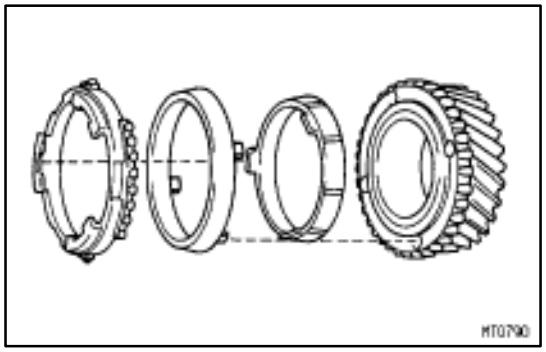
HINT: Coat all of the sliding and rotating surface with gear oil before assembly.

1. INSTALL NO.2 CLUTCH HUB INTO HUB SLEEVE

(a) Install the three springs and shifting keys to the clutch hub.

(b) Install the hub sleeve to the clutch hub.

HINT: Direct identification groove of the hub sleeve to front of the transmission.

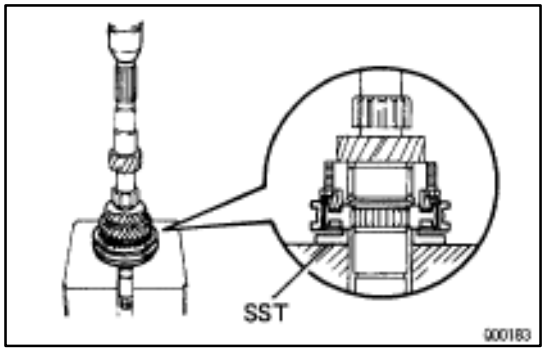


2. INSTALL NEEDLE ROLLER BEARING, THIRD GEAR, SYNCHRONIZER RINGS AND NO.2 HUB SLEEVE ASSEMBLY TO INPUT SHAFT

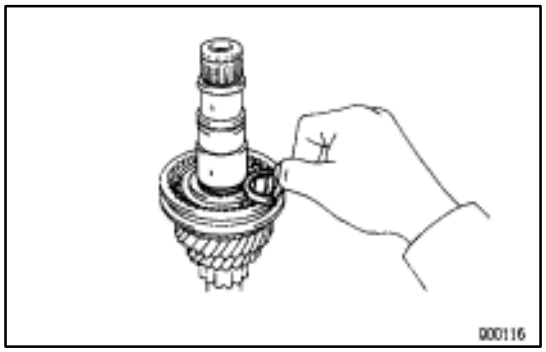
(a) Apply MP grease to the needle roller bearing.

(b) Assembly the needle roller bearings into the 3rd gear.

(c) Place the synchronizer rings on the gear and align the ring slots with the shifting keys.



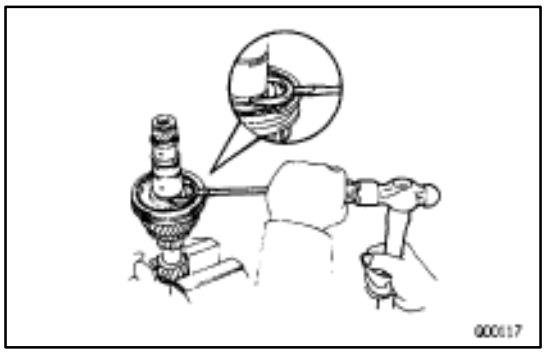
(d) Using SST and a press, install the 3rd gear and No.2 hub sleeve.
SST 09506–35010



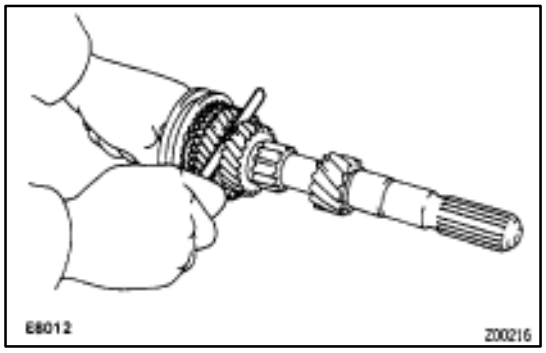
3. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
H	2.30 (0.0906)	M	2.50 (0.0984)
J	2.35 (0.0925)	N	2.55 (0.1004)
K	2.40 (0.0945)	P	2.60 (0.1024)
L	2.45 (0.0965)		



(b) Using a screwdriver and hammer, tap in the snap ring.

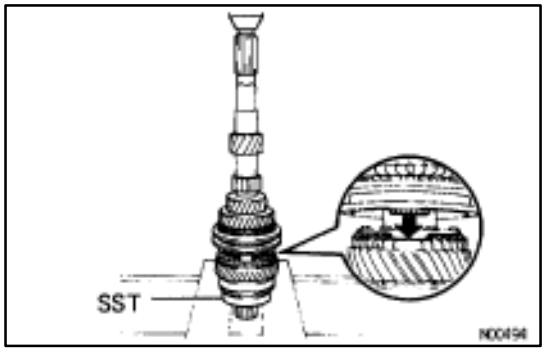


4. MEASURE THIRD GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 3rd gear thrust clearance.

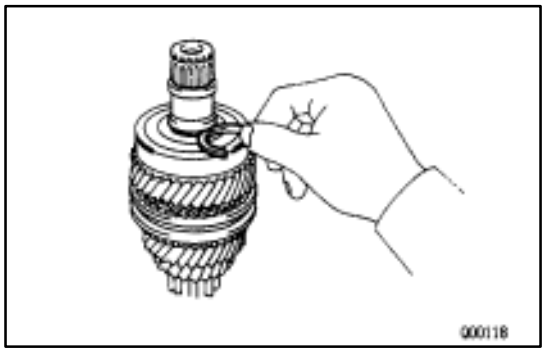
Standard clearance:

0.10 – 0.45 mm (0.0039 – 0.0177 in.)



5. INSTALL SPACER, SYNCHRONIZER RING, NEEDLE ROLLER BEARINGS, FOURTH GEAR AND RADIAL BALL BEARING

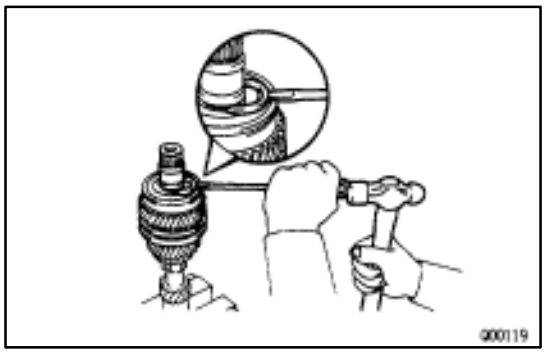
(a) Install the spacer.
(b) Apply MP grease to the needle roller bearings.
(c) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.
(d) Install the 4th gear.
(e) Using SST and a press, install the radial ball bearing.
SST 09506–35010



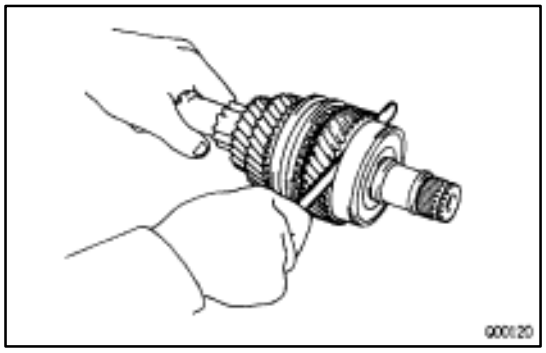
6. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
1	2.35 (0.0925)	5	2.55 (0.1004)
2	2.40 (0.0945)	6	2.60 (0.1024)
3	2.45 (0.0965)	7	2.65 (0.1043)
4	2.50 (0.0984)	8	2.70 (0.163)



(b) Using a screwdriver and hammer, tap in the snap ring.

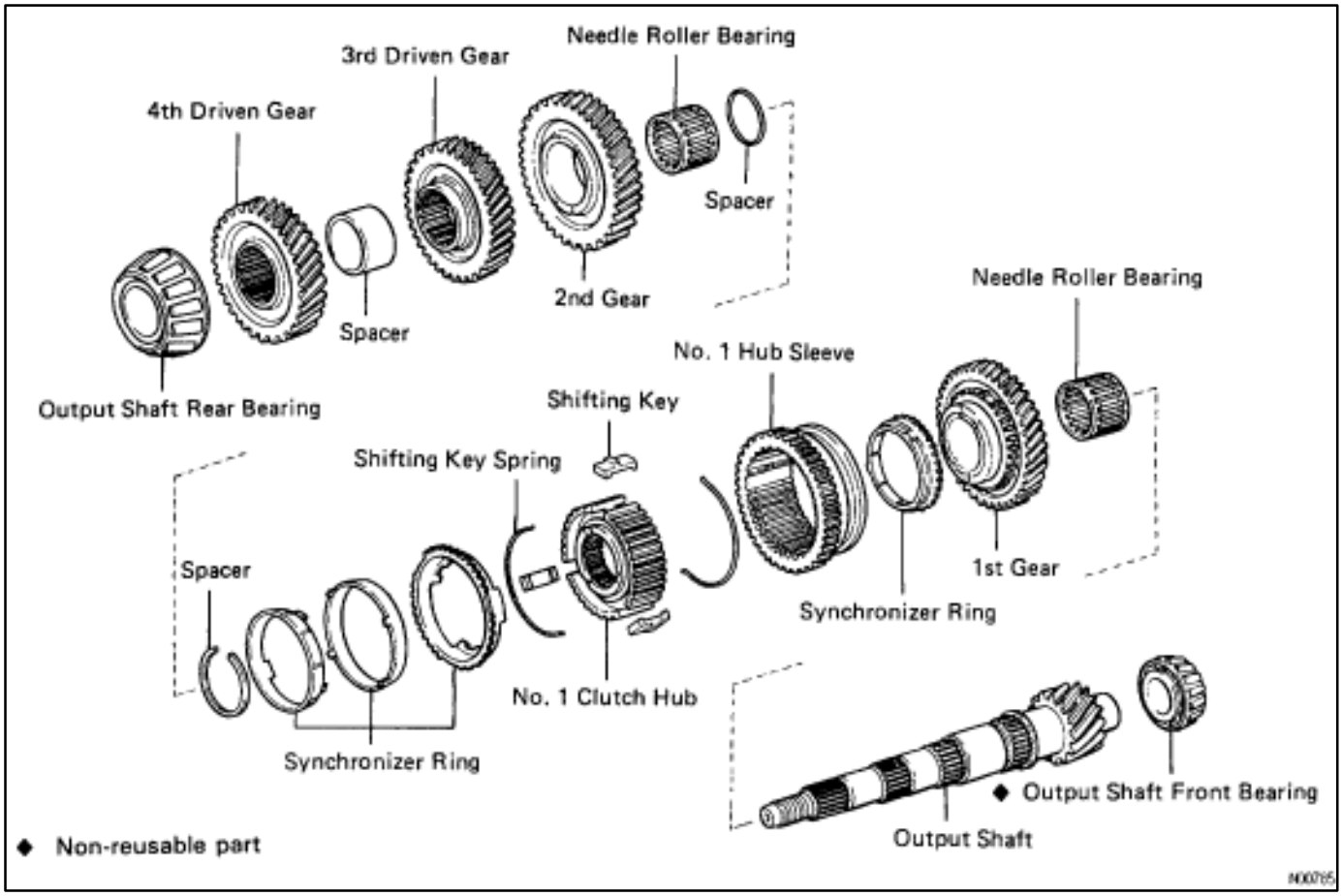


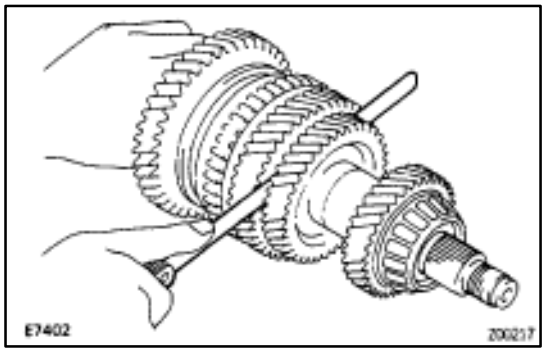
7. MEASURE FOURTH GEAR THRUST CLEARANCE

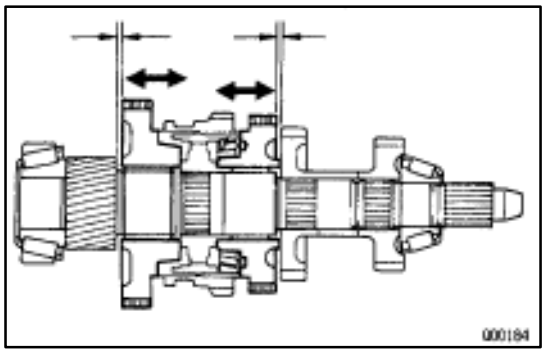
Using a feeler gauge, measure the 4th gear thrust clearance.
Maximum clearance:
0.10 – 0.55 mm (0.0039 – 0.0217 in.)

OUTPUT SHAFT
COMPONENTS

MX01A–01







OUTPUT SHAFT DISASSEMBLY

MX01B–01

1. MEASURE FIRST AND SECOND GEAR THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance.

Standard clearance:

1st gear

0.10 – 0.35 mm (0.0039 – 0.0138 in.)

2nd gear

0.10 – 0.45 mm (0.0039 – 0.0177 in.)

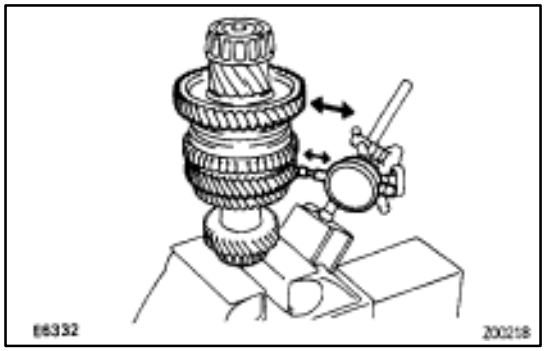
Maximum clearance:

1st gear

0.40 mm (0.0157 in.)

2nd gear

0.50 mm (0.0197 in)



2. CHECK OIL CLEARANCE OF FIRST AND SECOND GEAR

Using a dial indicator, measure the oil clearance between the gear and shaft.

Standard clearance:

1st gear

0.009 – 0.051 mm (0.0004 – 0.0020 in.)

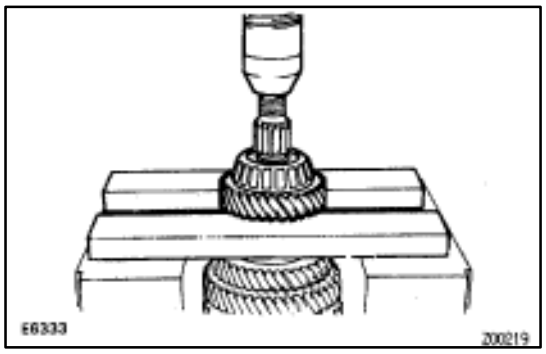
2nd gear

0.009 – 0.053 mm (0.0004 – 0.0021 in.) Maximum clearance:

1st and 2nd gear

0.070 mm (0.0028 in.)

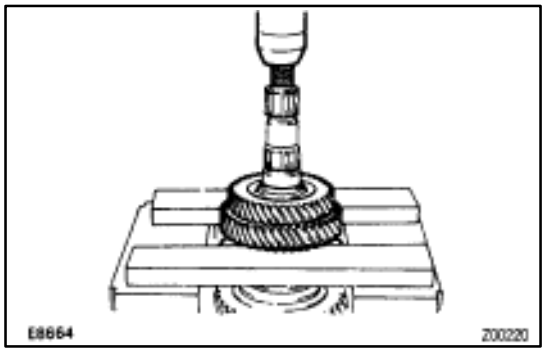
If the clearance exceeds the limit, replace the gear, needle roller bearing or shaft.



3. REMOVE OUTPUT SHAFT REAR BEARING, FOURTH DRIVEN GEAR AND SPACER

(a) Using a press, remove the bearing and 4th driven gear.

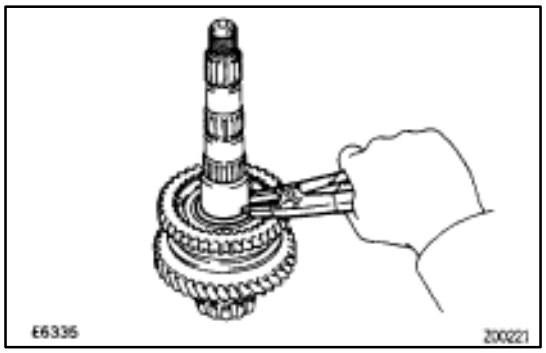
(b) Remove the spacer.



4. REMOVE THIRD DRIVEN GEAR AND SECOND GEAR

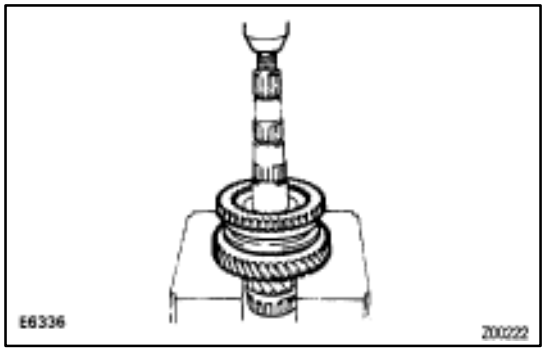
Using a press, remove the 3rd driven gear and 2nd gear.

5. REMOVE NEEDLE ROLLER BEARING SPACER AND SYNCHRONIZER RINGS



6. REMOVE SNAP RING

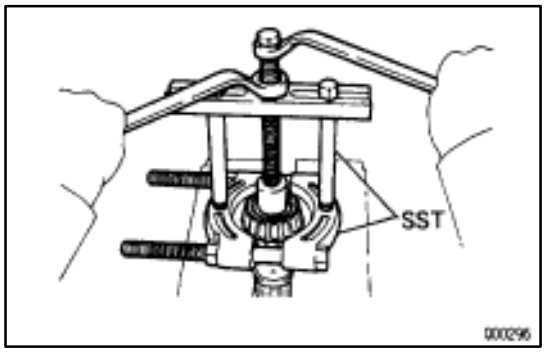
Using a snap ring expander, remove the snap ring.



7. REMOVE NO. 1 HUB SLEEVE ASSEMBLY AND FIRST GEAR

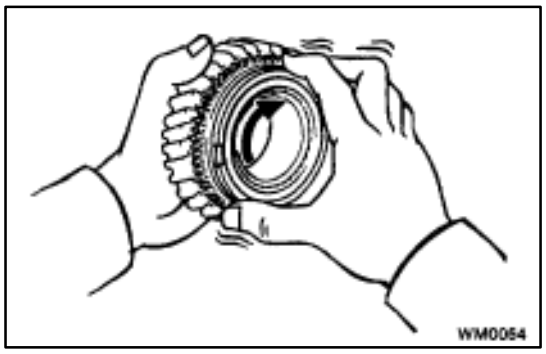
Using a press, remove the NO.1 hub sleeve and 1st gear.

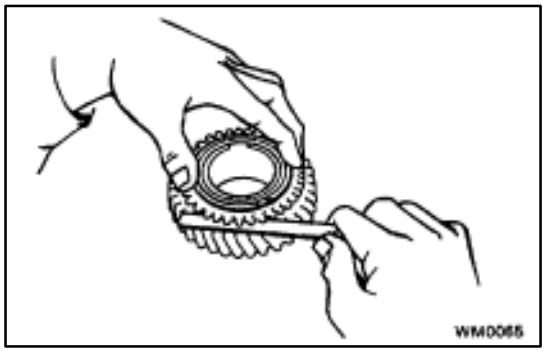
8. REMOVE SYNCHRONIZER RING AND NEEDLE ROLLER BEARINGS



9. REMOVE OUTPUT SHAFT FRONT BEARING

Using SST, remove the output shaft front bearing.
SST 09950–00020, 09950–00030





OUTPUT SHAFT COMPONENT PARTS INSPECTION

MX01C–01

1. INSPECT SYNCHRONIZER RING FOR FIRST GEAR

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring.
Turn the synchronizer ring in one direction while pushing it to the gear cone and check that the ring is locked.

If the braking effect is insufficient, lightly rub the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

NOTICE:

- **Wash off completely the fine lapping compound after rubbing.**
- **Check again the braking effect of the synchronizer ring.**

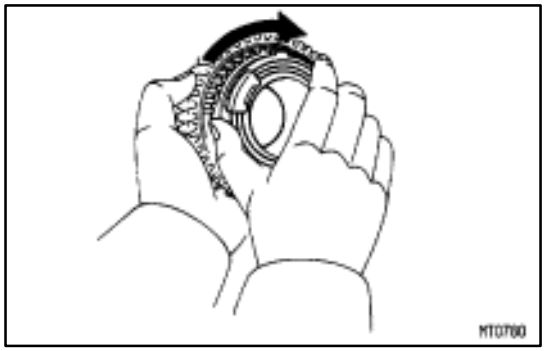
(c) Measure the clearance between the synchronizer ring back and gear spline end.

Maximum clearance:

0.6 mm (0.024 in.)

If the clearance is less than the limit, replace the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

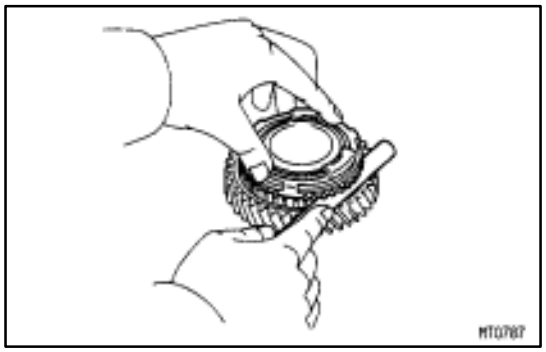
NOTICE: Wash off completely the fine lapping compound after rubbing.



2. INSPECT SYNCHRONIZER RING FOR SECOND GEAR

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, replace the synchronizer ring.

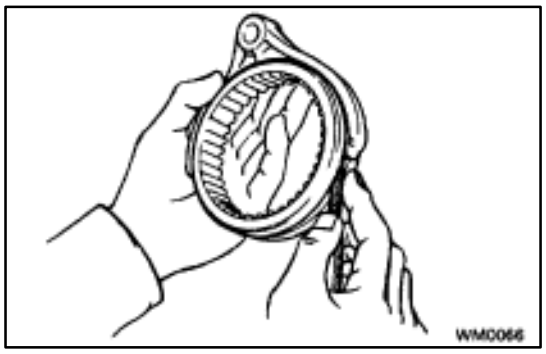


(c) Measure the clearance between the synchronizer ring back and gear spline end.

Minimum clearance:

0.7 mm (0.028 in.)

If the clearance is less than the limit, replace the synchronizer ring.



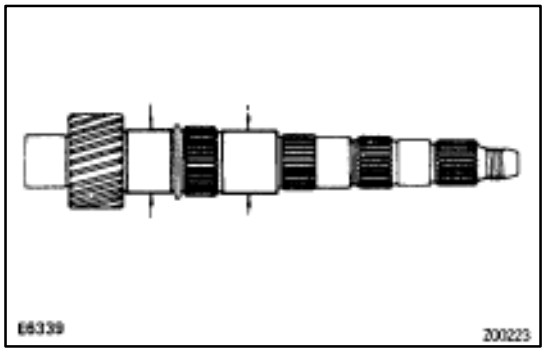
3. MEASURE CLEARANCE OF NO.1 SHIFT FORK AND HUB SLEEVE

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance:

1.0 mm (0.039 in.)

If the clearance exceeds the limit, replace the shift fork or hub sleeve.



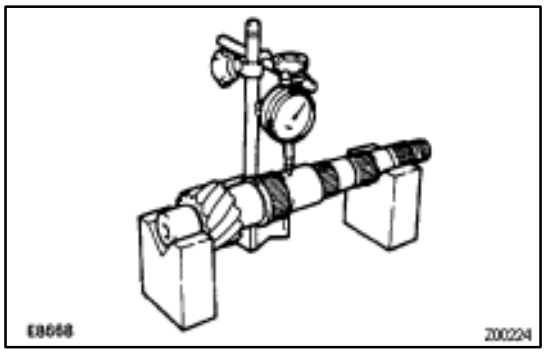
4. INSPECT OUTPUT SHAFT

(a) Check the output shaft for wear or damage.

(b) Using a micrometer, measure the outer diameter of the output shaft journal surface.

Minimum clearance:

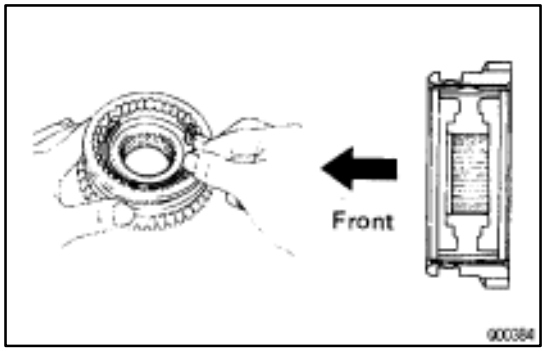
38.950 mm (1.5335 in.)



(c) Using a dial indicator, check the shaft runout.

Maximum clearance:

0.06 mm (0.0024 in.)



OUTPUT SHAFT ASSEMBLY

MX01D–01

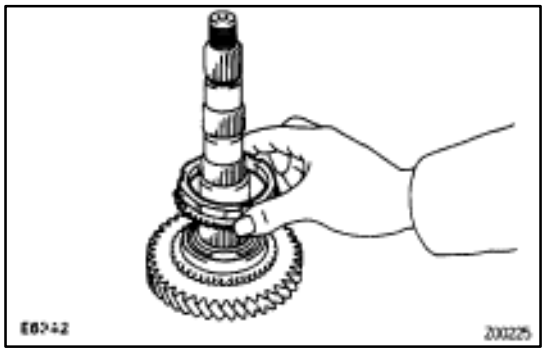
(See page MX–46)

HINT: Coat all of the sliding and rotating surface with gear oil before assembly.

1. INSPECT NO.1 CLUTCH HUB INTO HUB SLEEVE

(a) Install the clutch hub and shifting keys to the hub sleeve.

(b) Install the shifting key springs under the shifting keys.



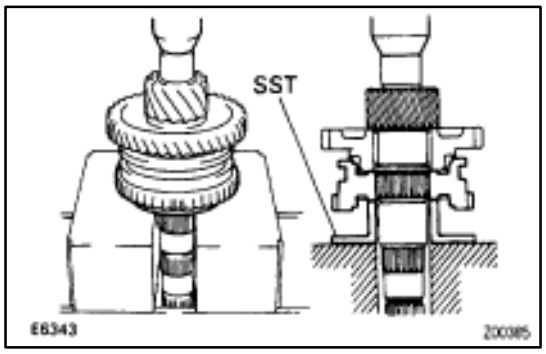
NOTICE: Install the key springs positioned so that their end not in line.

2. INSTALL NEEDLE ROLLER BEARING, FIRST GEAR, SYNCHRONIZER RING AND NO.1 HUB SLEEVE TO OUTPUT SHAFT

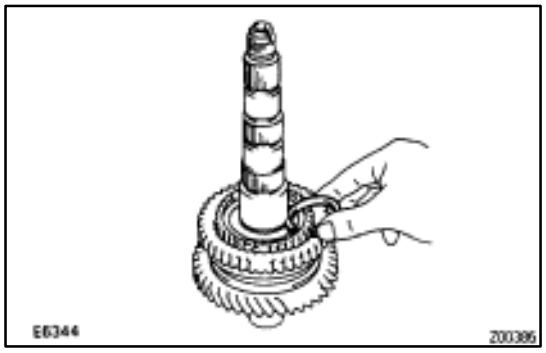
(a) Apply MP grease to the needle roller bearings.

(b) Install the 1st gear.

(c) Place the synchronizer ring (for 1st gear) on the gear and align the ring slots with the shifting keys.



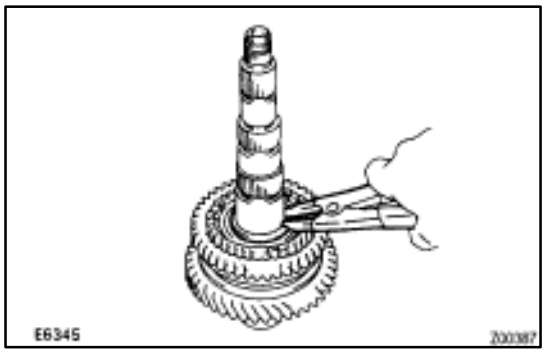
(d) Using SST and a press, install the 1st gear and No.1 hub sleeve.
SST 09316–60010 (09316–00040)



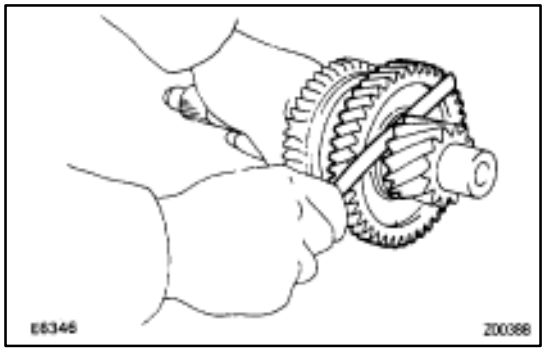
3. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.80 (0.1102)	E	3.00 (0.1181)
B	2.85 (0.1122)	F	3.05 (0.1201)
C	2.90 (0.1142)	G	3.10 (0.1220)
D	2.95 (0.1161)		



(b) Using a snap ring expander, install the snap ring.

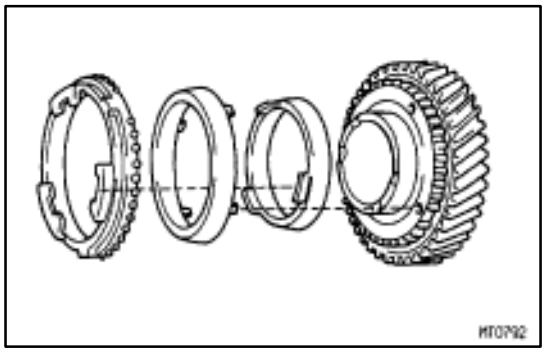


4. MEASURE FIRST GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 1st gear thrust clearance.

Standard clearance:

0.10 – 0.35 mm (0.0039 – 0.0138 in.)



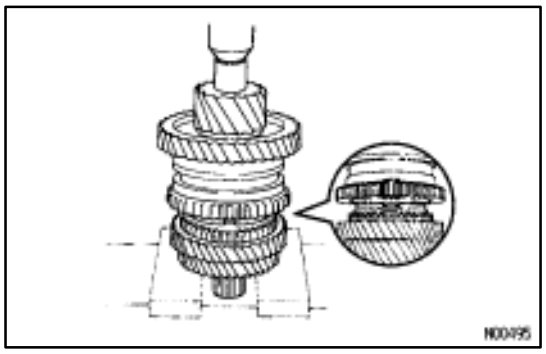
5. INSTALL SPACER, NEEDLE ROLLER BEARING, SYNCHRONIZER RINGS, SECOND GEAR AND THIRD DRIVEN GEAR

(a) Install the spacer.

(b) Apply MP grease to the needle roller bearing.

(c) Place the synchronizer rings (for 2nd gear) on the gear.

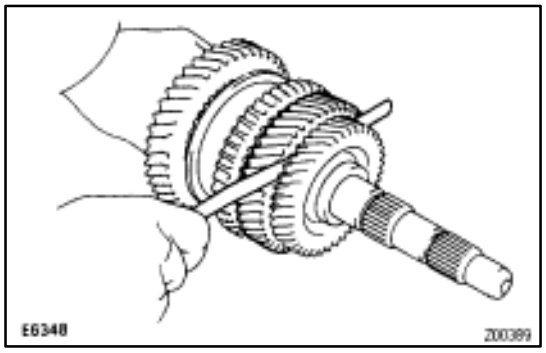
NOTICE: Do not install the synchronizer ring for 1st gear.



(d) Install the 2nd gear.

(e) Using a press, install the 3rd driven gear.

NOTICE: Align the clutch hub grooves with the projections on the synchronizer ring.

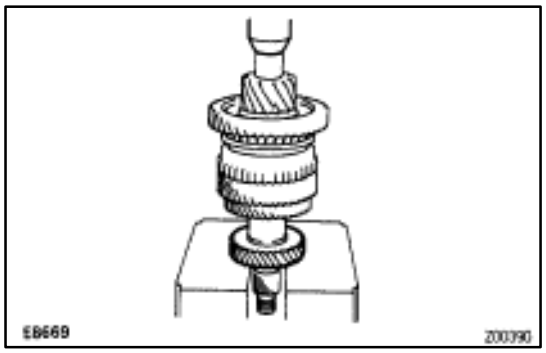


6. MEASURE SECOND GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 2nd gear thrust clearance.

Maximum clearance:

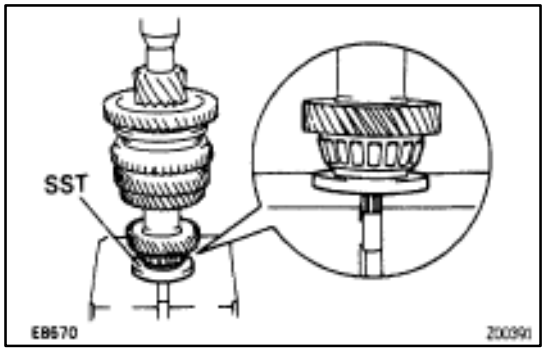
0.10 – 0.45 mm (0.0039 – 0.0177 in.)



7. INSTALL SPACER AND FOURTH DRIVEN GEAR

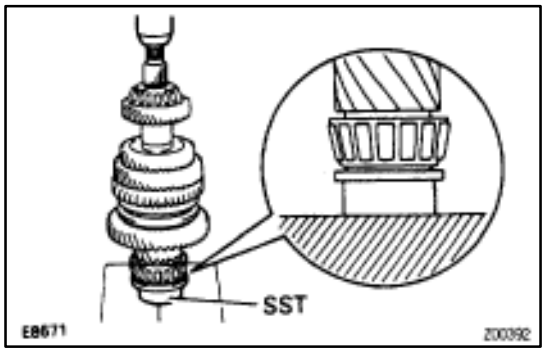
(a) Install the spacer.

(b) Using a press, install the 4th driven gear.



8. INSTALL OUTPUT SHAFT REAR BEARING

Using SST and a press, install the bearing.
SST 09506–30012

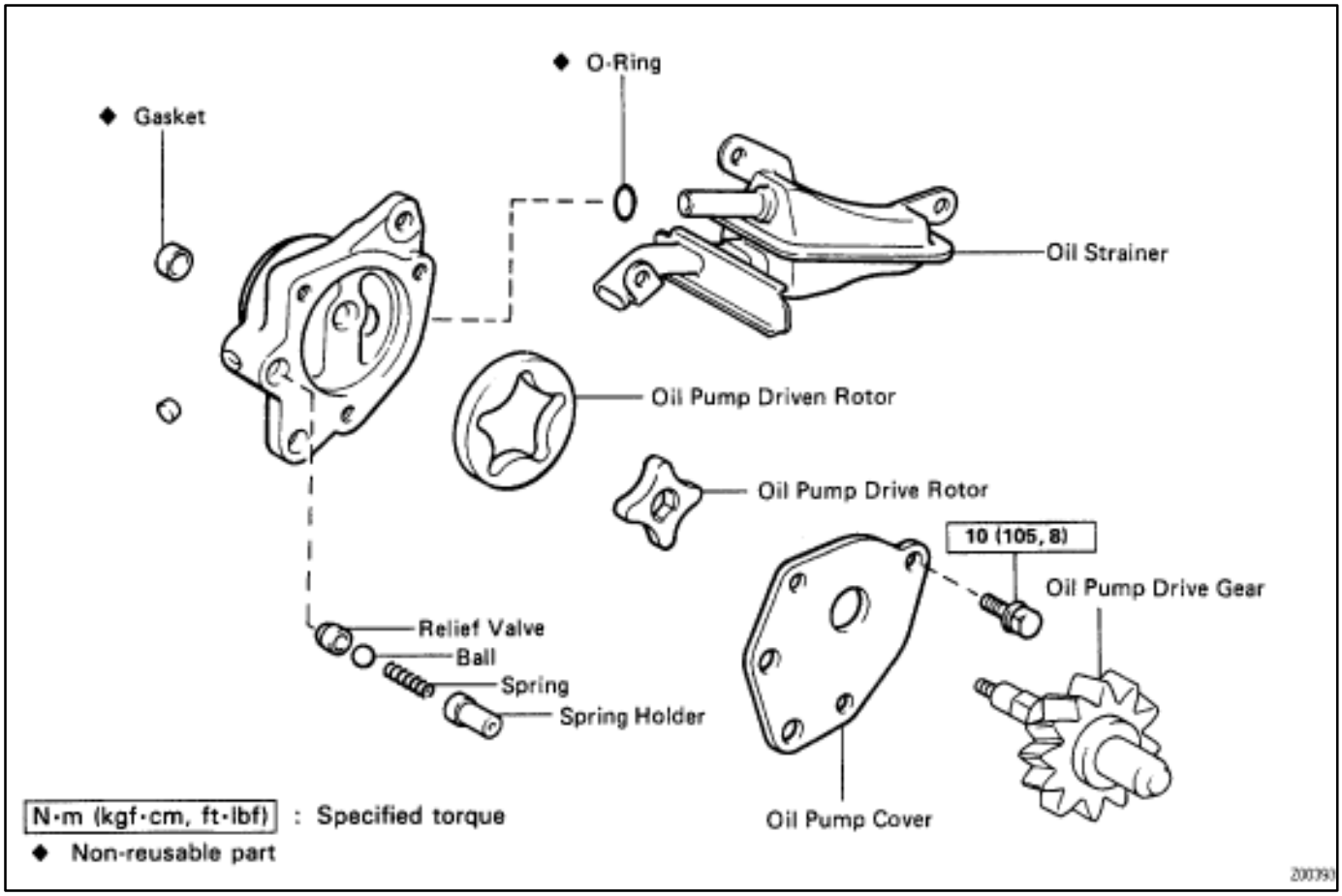


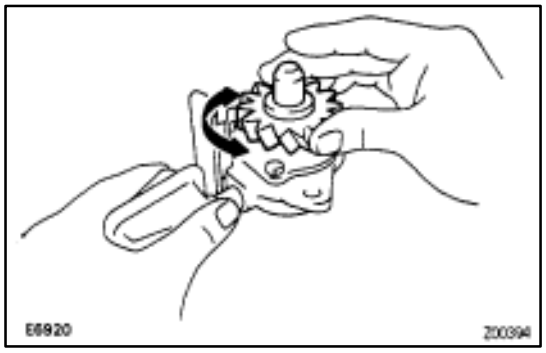
9. INSTALL OUTPUT SHAFT FRONT BEARING

Using SST and a press, install the output shaft front new bearing.
SST 09316–60010 (09316–00070)

OIL PUMP
COMPONENTS

MX01E–01



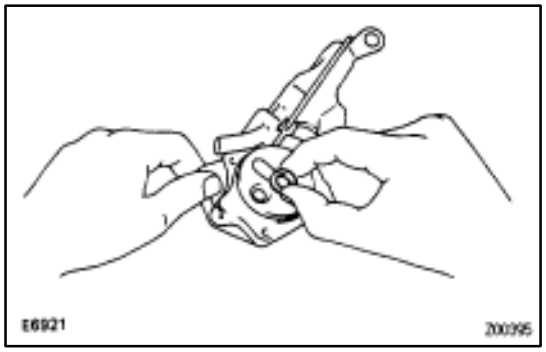


OIL PUMP DISASSEMBLY

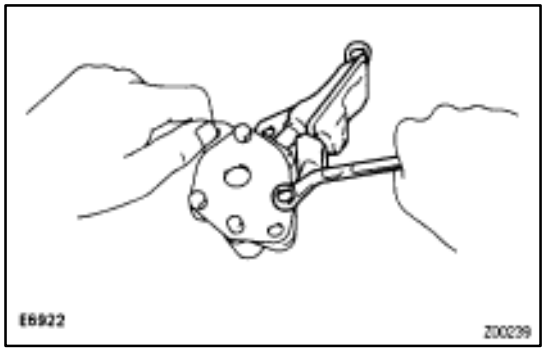
MX01F–01

1. CHECK OPERATION OF OIL PUMP

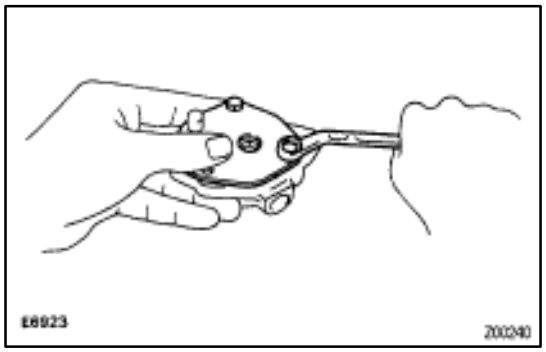
Install the oil pump drive gear to the drive rotor, check that the drive rotor turns smoothly.



2. REMOVE GASKET FROM OIL PUMP CASE

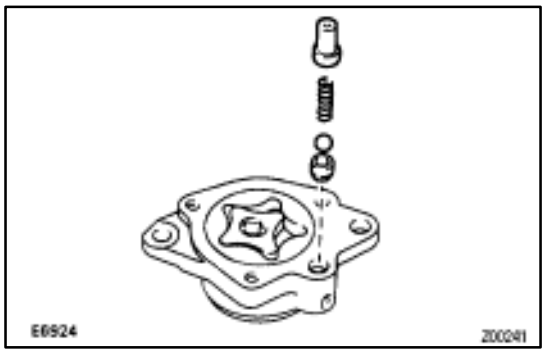


3. REMOVE BOLT AND OIL STRAINER

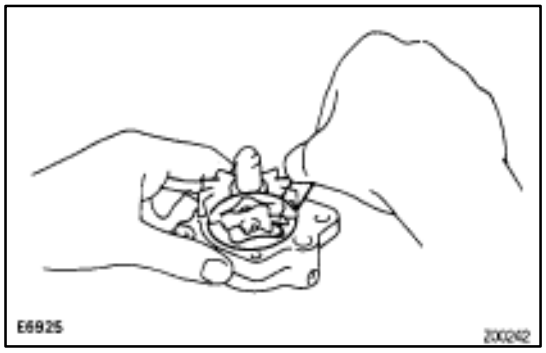


4. REMOVE OIL PUMP COVER

(a) Hold the pump cover, remove the two bolts and a cover.



(b) Remove the spring holder, spring, ball and relief valve seat.



5. CHECK ROTOR BODY CLEARANCE

(a) Install the oil pump drive gear to the drive rotor.

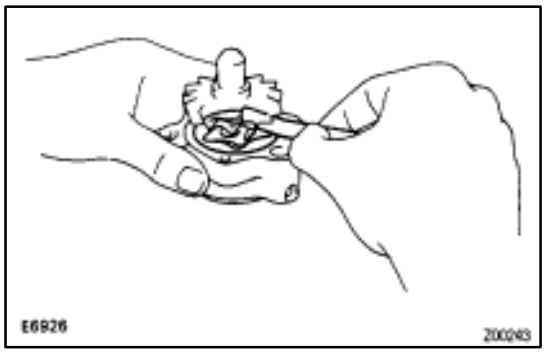
(b) Using a feeler gauge, measure the body clearance between the drive rotor and oil pump case.

Standard clearance:

0.10 – 0.16 mm (0.0039 – 0.0063 in.)

Maximum clearance:

0.30 mm (0.0118 in.)



6. CHECK ROTOR TIP CLEARANCE

(a) Install the oil pump drive gear to the drive rotor.

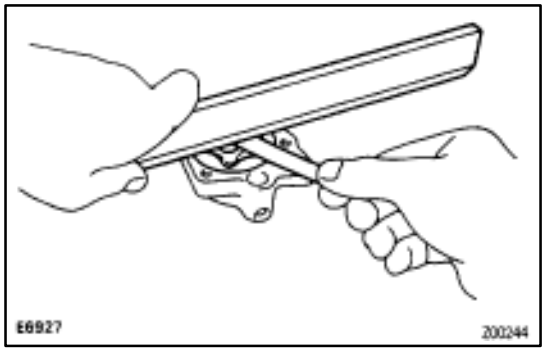
(b) Using a feeler gauge, measure the tip clearance between the drive and driven rotors.

Standard clearance:

0.08 – 0.15 mm (0.0031 – 0.0059 in.)

Maximum clearance:

0.30 mm (0.0118 in.)



7. CHECK SIDE CLEARANCE

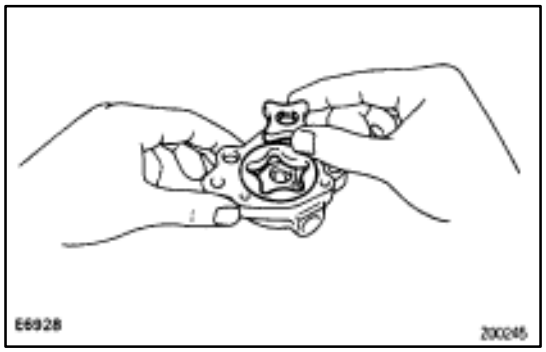
Using a precision straight edge and feeler gauge, measure the side clearance of both rotors.

Standard clearance:

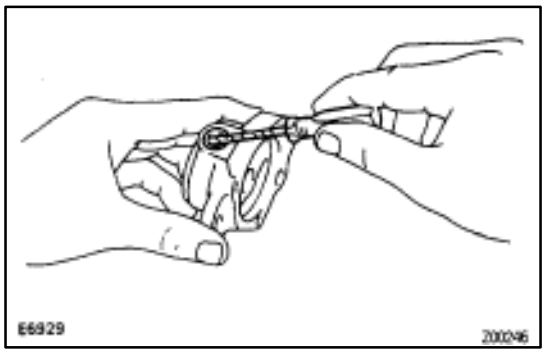
0.03 – 0.08 mm (0.0012 – 0.0031 in.)

Maximum clearance:

0.15 mm (0.0059 in.)

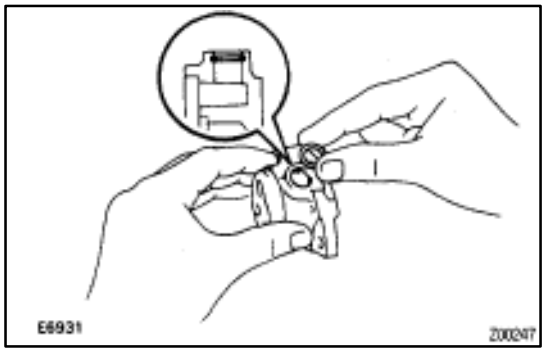


8. REMOVE OIL PUMP DRIVE ROTOR AND DRIVEN ROTOR



9. IF NECESSARY, REPLACE O–RING

(a) Using a screwdriver, remove the O–ring.

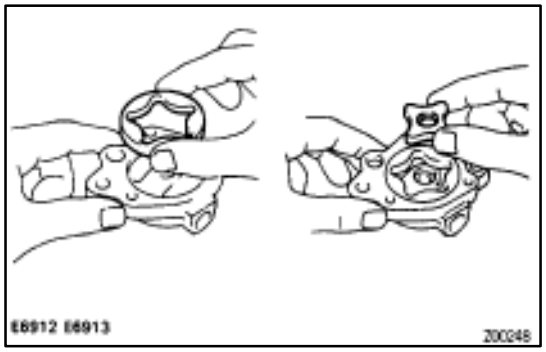


(b) Apply gear oil to the O–ring.

(c) Install the O–ring.

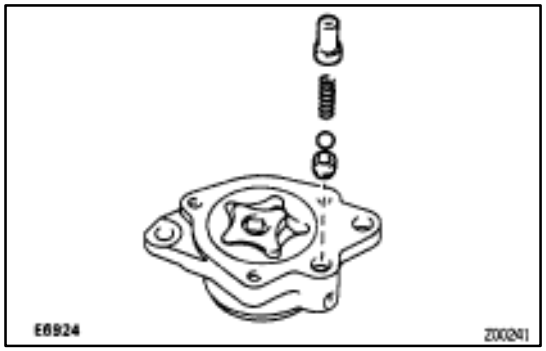
OIL PUMP ASSEMBLY

MX01G–01



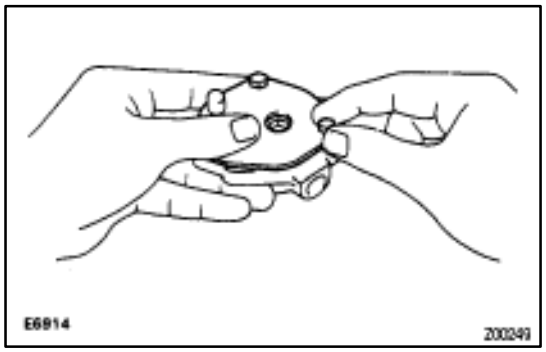
(See page MX–53)

1. INSTALL DRIVEN ROTOR AND DRIVE ROTOR

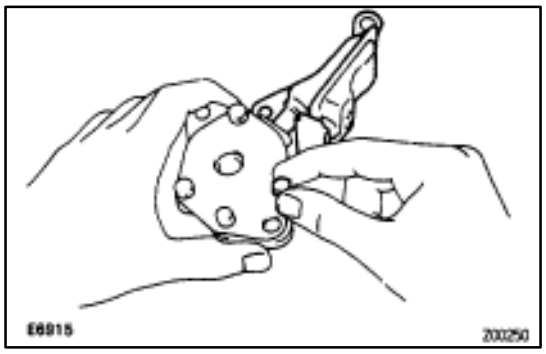


2. INSTALL OIL PUMP COVER

(a) Install the relief valve, ball, spring and spring holder to the oil pump case.

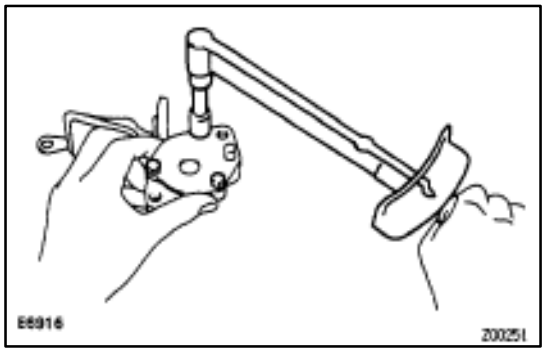


(b) Hold the oil pump cover, temporarily install the two bolts.



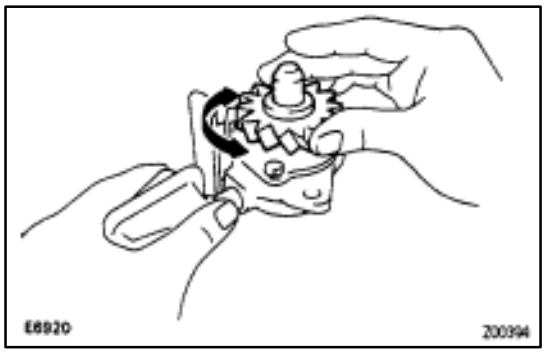
3. INSTALL OIL STRAINER

Install the oil strainer to the oil pump case, temporarily install the bolt.



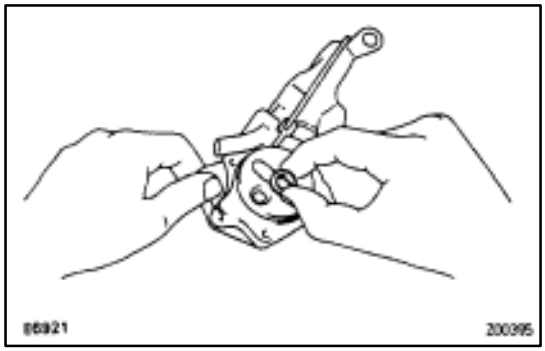
4. TORQUE OIL PUMP COVER BOLTS

Torque the three bolts evenly.
Torque: 10 N·m (105 kgf·cm, 8 ft·lbf)



5. CHECK OPERATION OF OIL PUMP

Install the oil pump drive gear to the drive rotor, check that the drive rotor turns smoothly.



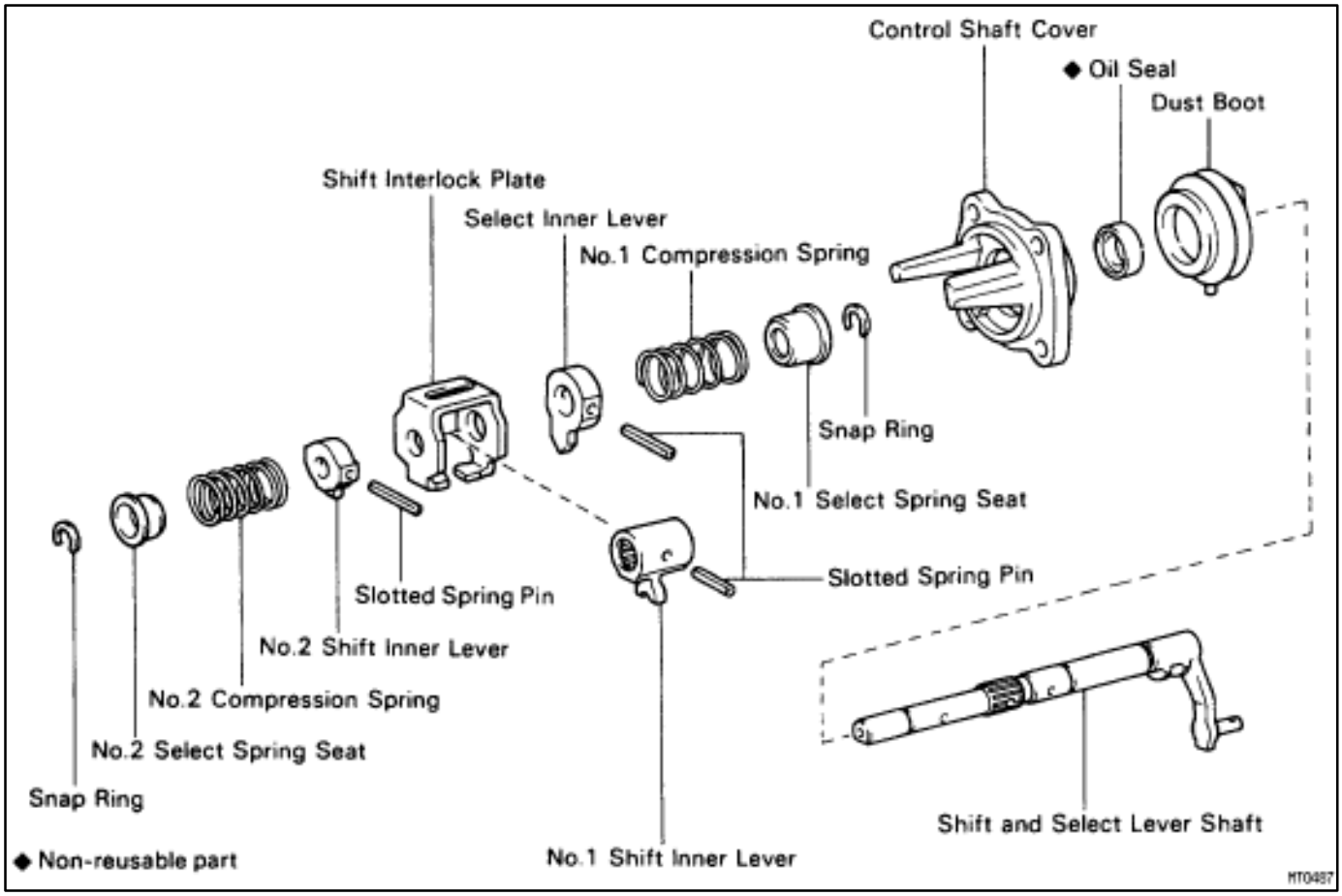
6. INSTALL GASKET

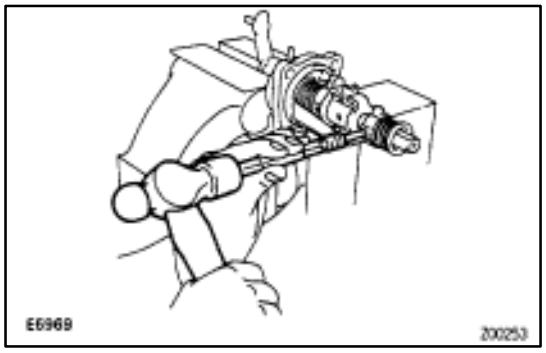
Install a new gasket to the oil pump case.

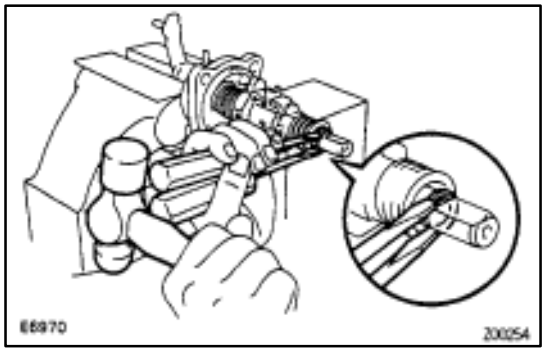
SHIFT AND SELECT LEVER SHAFT

COMPONENTS

MX01H–01







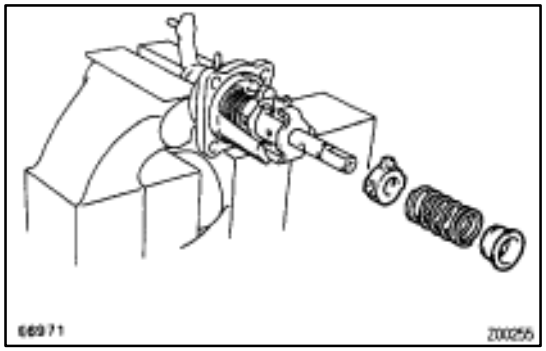
SHIFT AND SELECT LEVER SHAFT DISASSEMBLY

MX01J–01

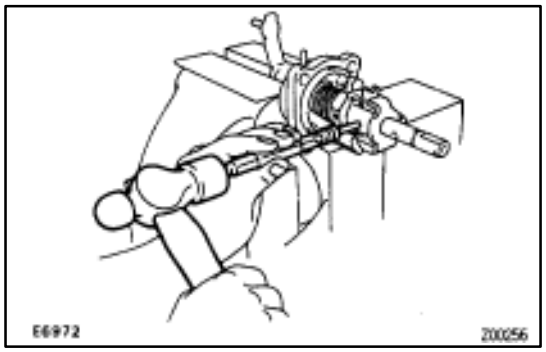
1. REMOVE NO.2 SHIFT INNER LEVER

(a) Using a pin punch and hammer, drive out the slotted spring pin.

(b) Using two screwdrivers and a hammer, remove the snap ring.

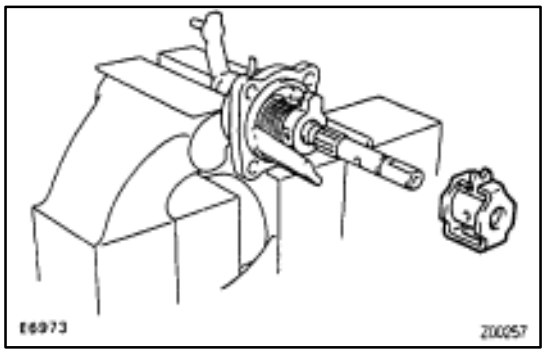


(c) Remove the No.2 select spring seat, No.2 compression spring and No.2 shift inner lever.

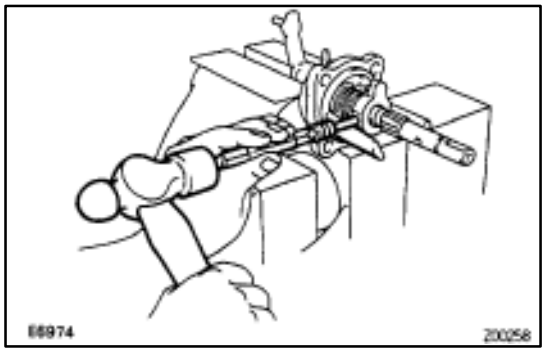


2. REMOVE SHIFT INTERLOCK PLATE AND NO. 1 SHIFT INNER LEVER

(a) Using a pin punch and hammer, drive out the slotted spring pin.

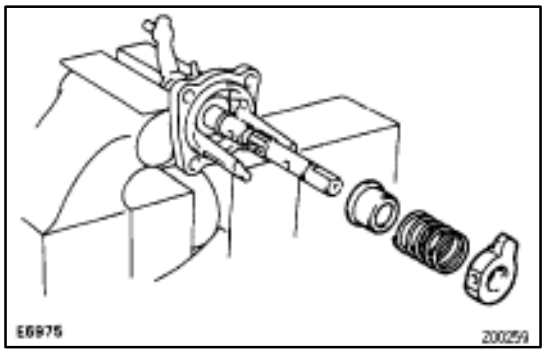


(b) Remove the shift interlock plate and No.1 shift inner lever.

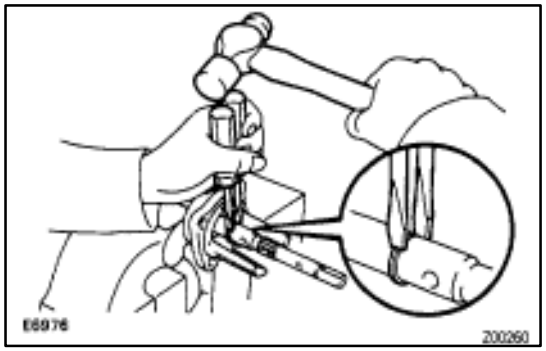


3. REMOVE SELECT INNER LEVER

(a) Using a pin punch and hammer, drive out the slotted spring pin.

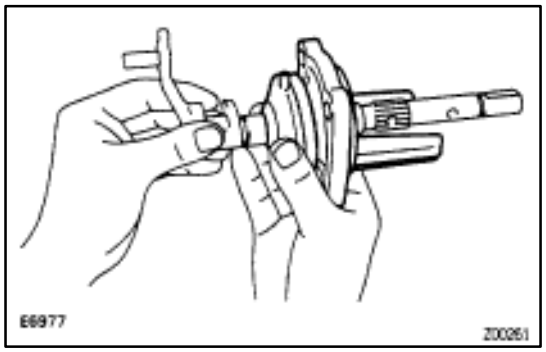


(b) Remove the select inner lever, No. 1 compression spring and No.1 select spring seat.



4. REMOVE SNAP RING

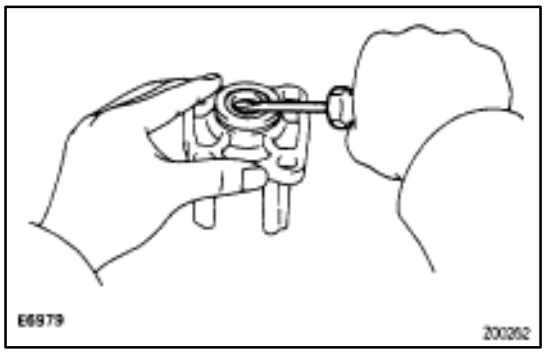
Using two screwdrivers and a hammer, remove the snap ring.



5. REMOVE CONTROL SHAFT COVER AND DUST BOOT

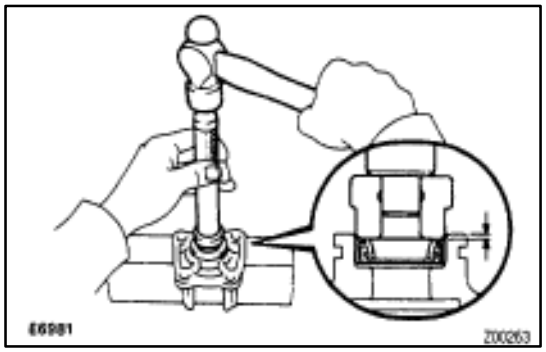
(a) Remove the control shaft with dust boot from the shaft.

(b) Remove the dust boot from the control shaft cover.



6. IF NECESSARY, REPLACE CONTROL SHAFT COVER OIL SEAL

(a) Using a screwdriver, pry out the oil seal.



(b) Using SST and a hammer, drive in a new oil seal.
SST 09620–30010 (09627–30010, 09631–00020)
Drive in depth:
0 – 1.0 mm (0 – 0.039 in.)

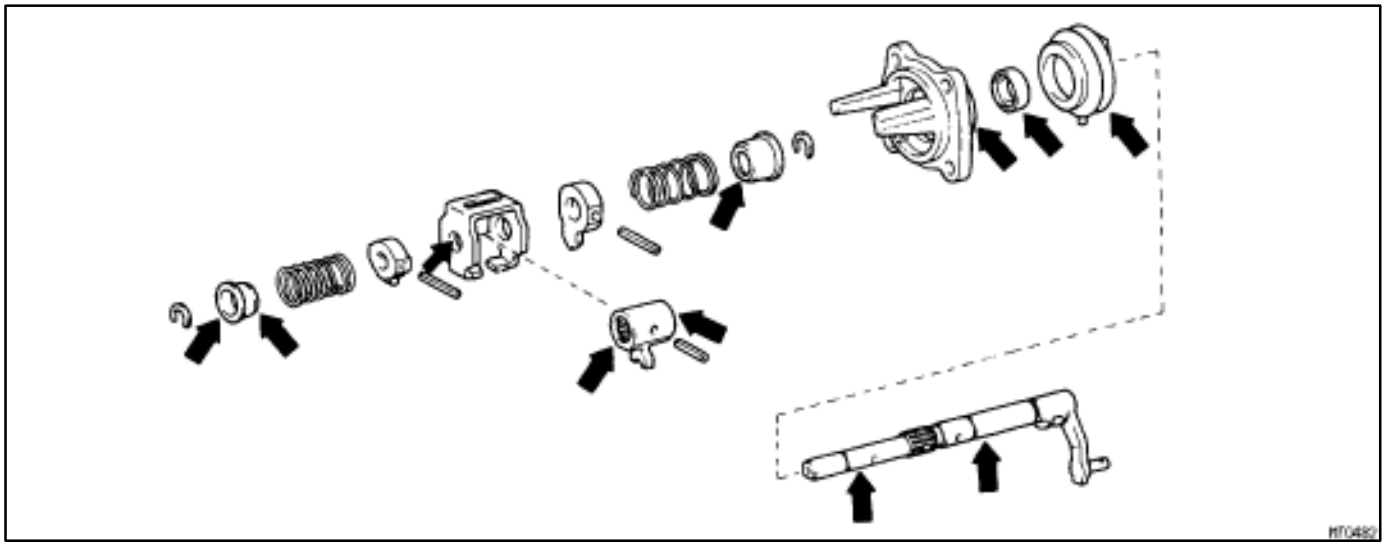
(c) Coat the oil seal lip with MP grease.

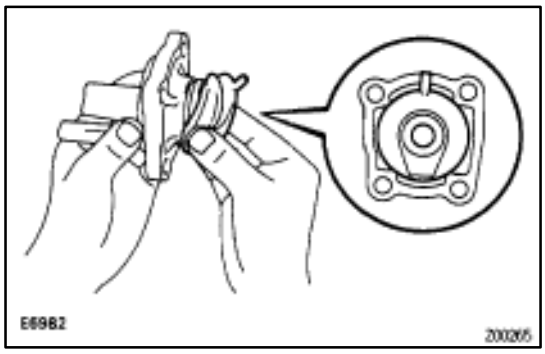
SHIFT AND SELECT LEVER SHAFT ASSEMBLY

MX020–01

(See page MX–58)

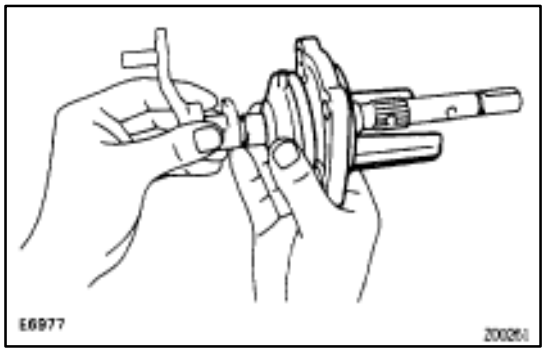
1. COAT SHAFT WITH MP GREASE, AS SHOWN



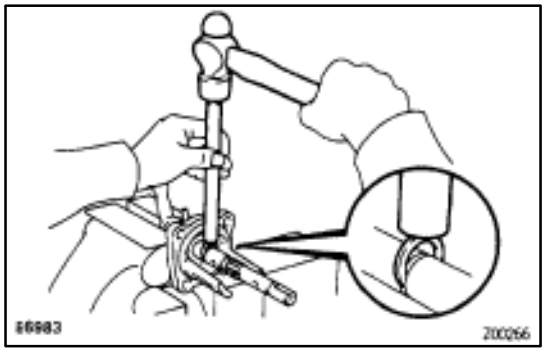


2. INSTALL DUST BOOT AND CONTROL SHAFT COVER

(a) Install the dust boot to the control shaft cover as shown.

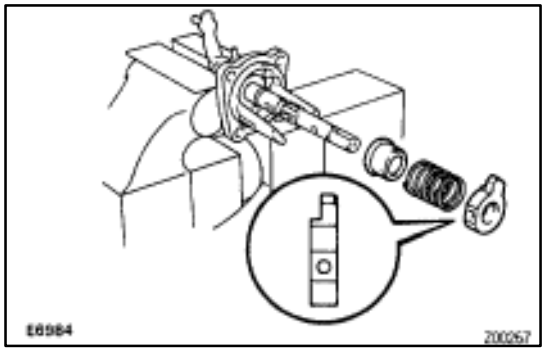


(b) Install the control shaft to the control shaft cover.



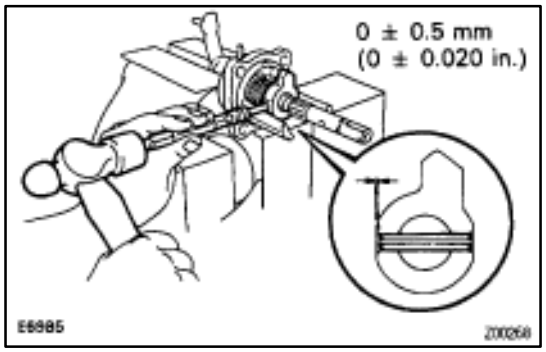
3. INSTALL SNAP RING

Using a brass bar and hammer, install the snap ring.



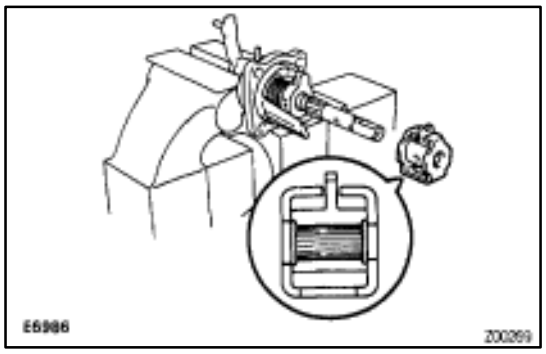
4. INSTALL SELECT INNER LEVER

(a) Install the No.1 select spring seat, No.1 compression spring and select inner lever.



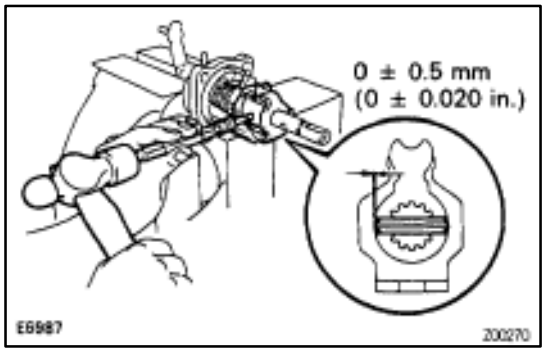
(b) Using a pin punch and hammer, drive in the slotted spring pin.
Drive in depth:
0 ± 0.5 mm (0 ± 0.020 in.)

(c) Check that the No.1 select spring seat slides smoothly.

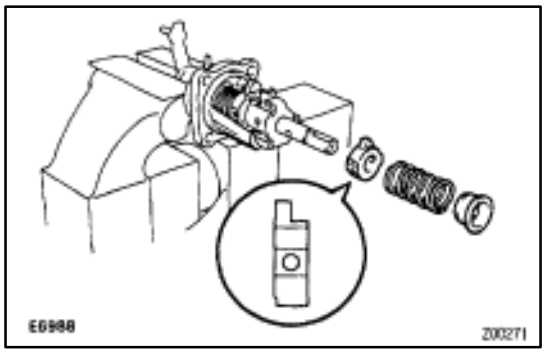


5. INSTALL SHIFT INTERLOCK PLATE AND NO. 1 SHIFT INNER LEVER

(a) Install the shift interlock plate and No.1 shift inner lever as shown.

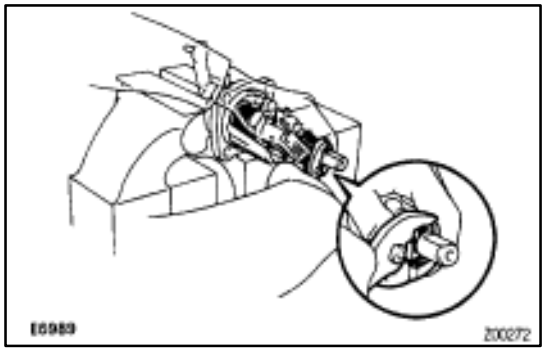


(b) Using a pin punch and hammer, drive in the slotted spring pin.
Drive in depth:
0 ± 0.5 mm (0 ± 0.020 in.)

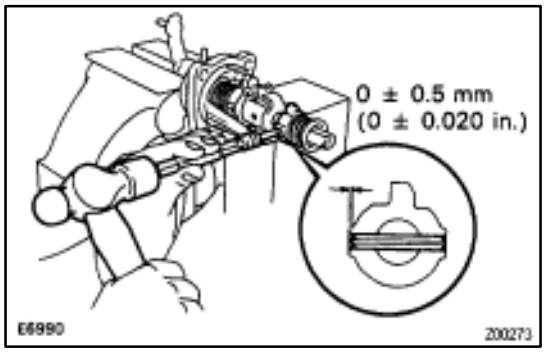


6. INSTALL NO.2 SHIFT INNER LEVER

(a) Install the No.2 shift inner lever, No.2 compression spring and No.2 select spring seat.



(b) Compress the spring and install the snap ring with pliers.



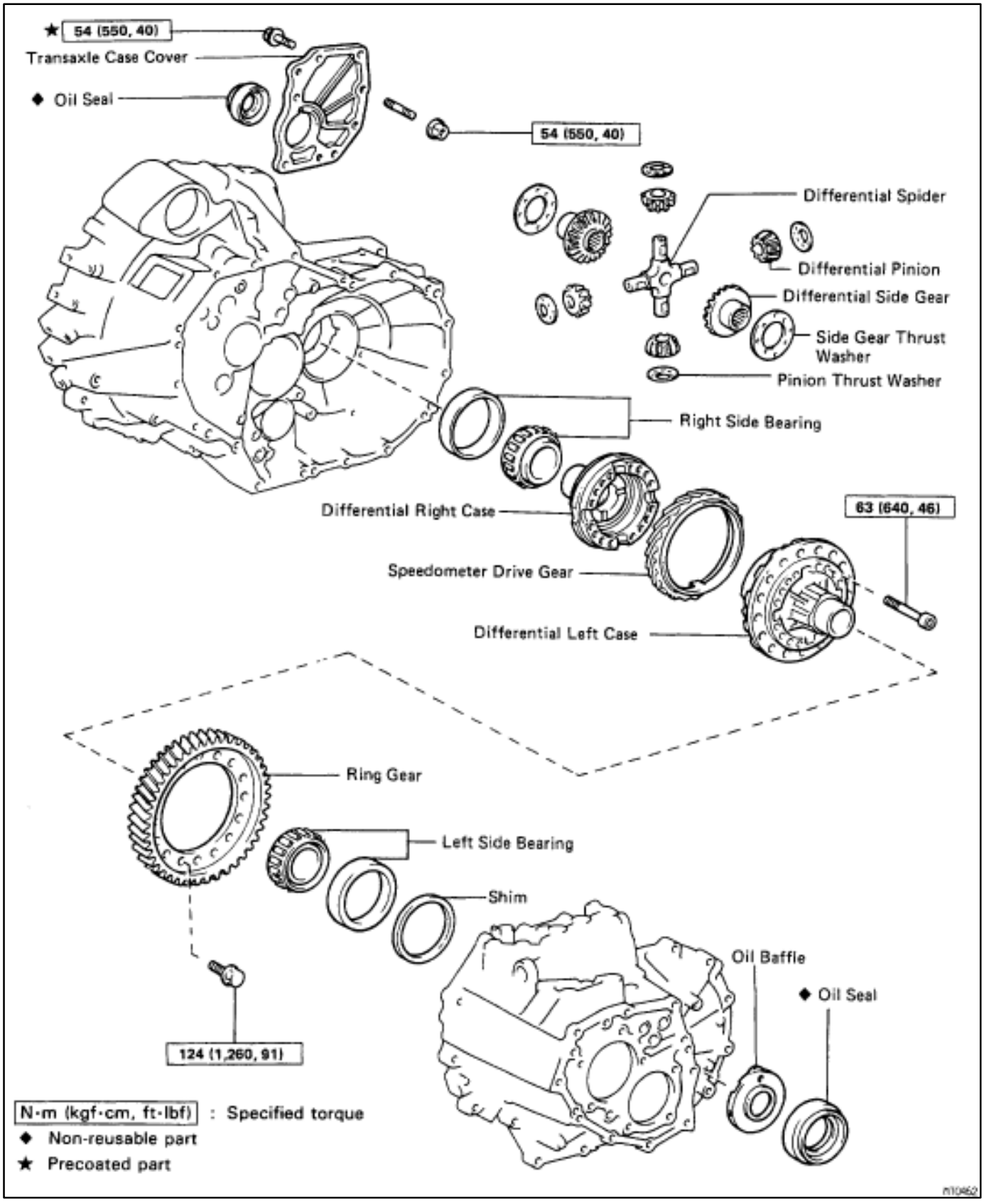
(c) Using a pin punch and hammer, drive in the slotted spring pin.
Drive in depth:
0 ± 0.5 mm (0 ± 0.020 in.)

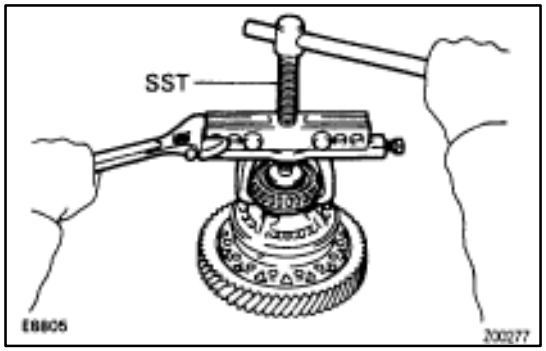
(d) Check that the No.2 select spring seat slides smoothly.

DIFFERENTIAL CASE

COMPONENTS

MX01K–01



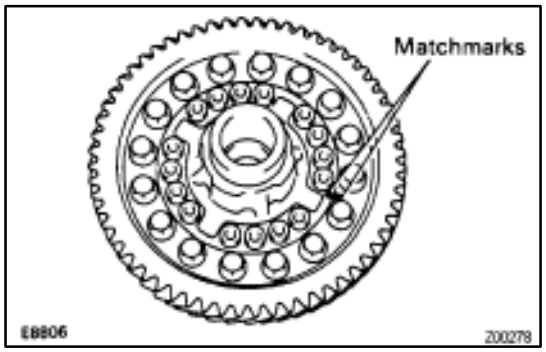


DIFFERENTIAL CASE DISASSEMBLY

MX01L–01

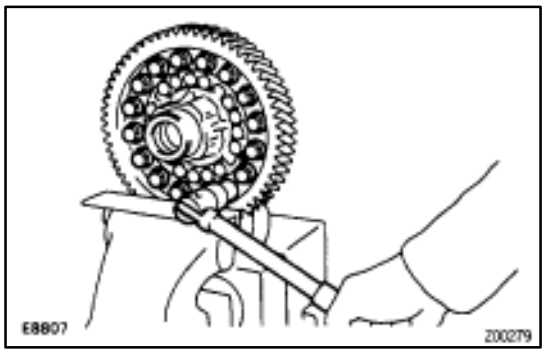
1. REMOVE SIDE BEARING

Using SST, remove the two side bearing.
SST 09950–20017

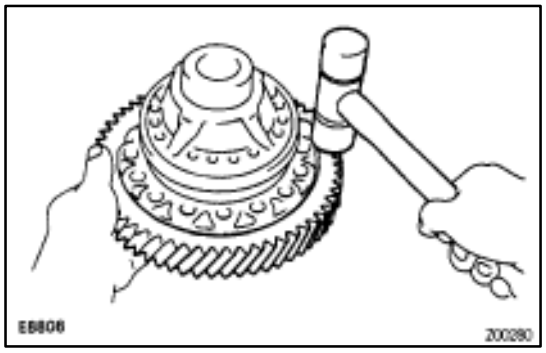


2. REMOVE RING GEAR

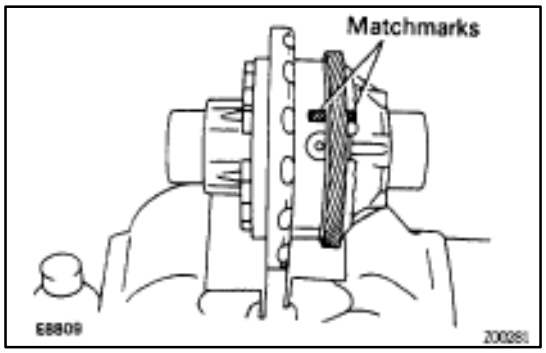
(a) Place the matchmarks on both the differential case and ring gear.



(b) Remove the sixteen bolts.

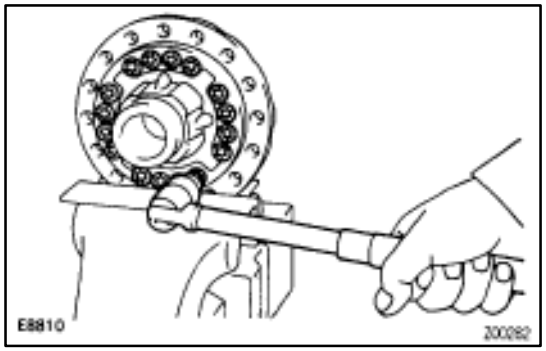


(c) Using a plastic hammer, tap out the ring gear.

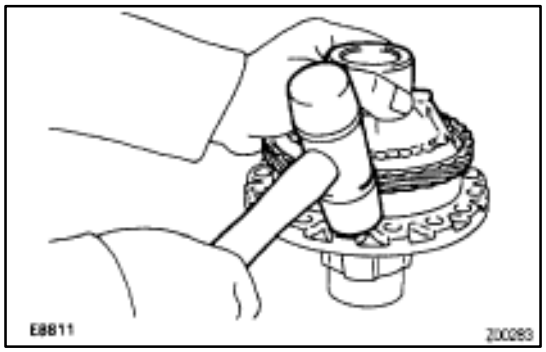


3. DISASSEMBLE DIFFERENTIAL CASE

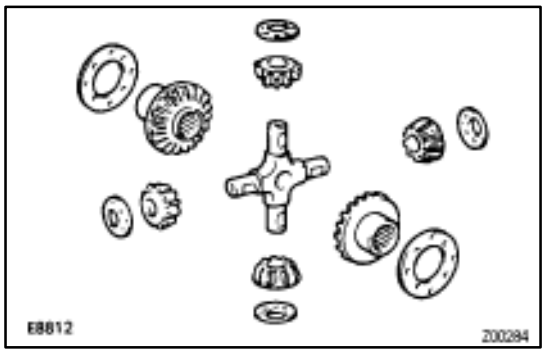
(a) Place the matchmarks on the differential right and left case.



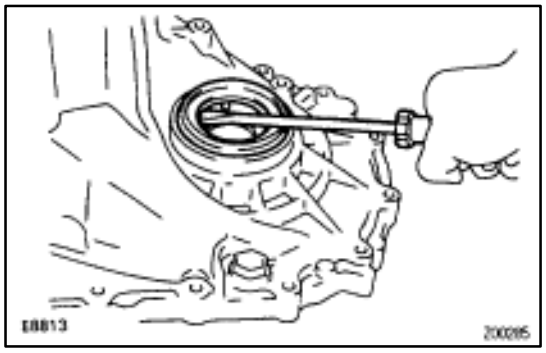
(b) Using a torx wrench, remove the sixteen torx screws.
Torx wrench: T50 09042–00040



(c) Using a plastic hammer, tap out the differential left case.
(d) Remove the speedometer drive gear from the differential right case.

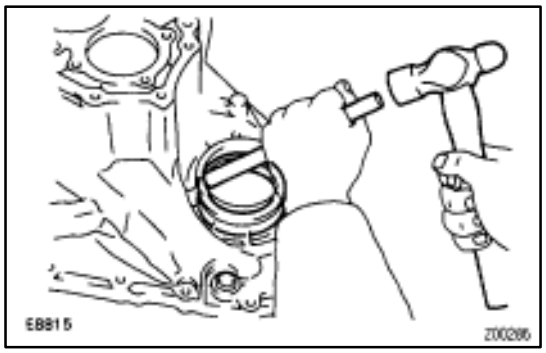


(e) Remove the two differential side gears, two side gear thrust washers, differential pinions and four pinion washers from the differential left case.

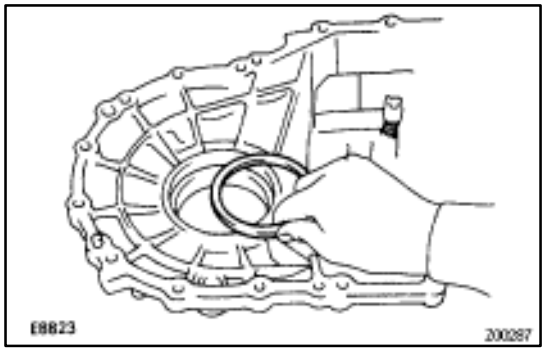


4. (TRANSMISSION CASE SIDE)
IF NECESSARY, REPLACE OIL SEAL AND TAPER ROLLER BEARING OUTER RACE

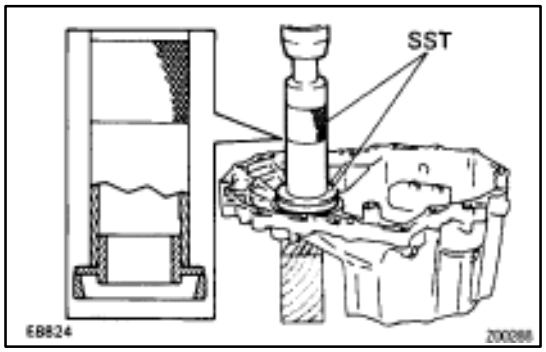
(a) Using screwdriver, remove the oil seal.
(b) Remove the transmission oil baffle.



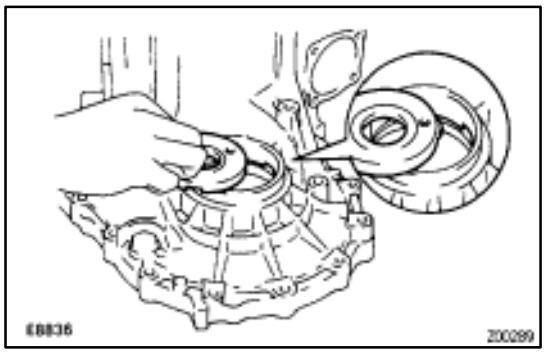
(c) Using a brass bar and hammer, drive out the bearing outer race lightly and evenly.
(d) Remove the shim.



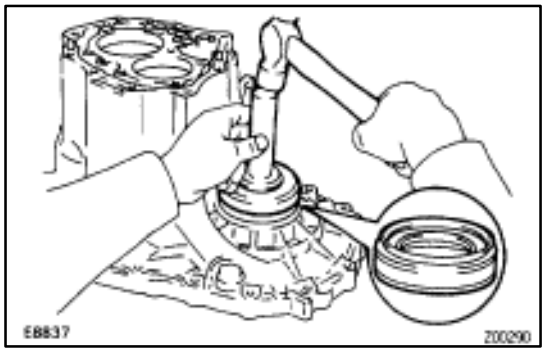
(e) Install the shim.
(See page MX–74)
HINT: First select and install a shim of leaser thickness than before.



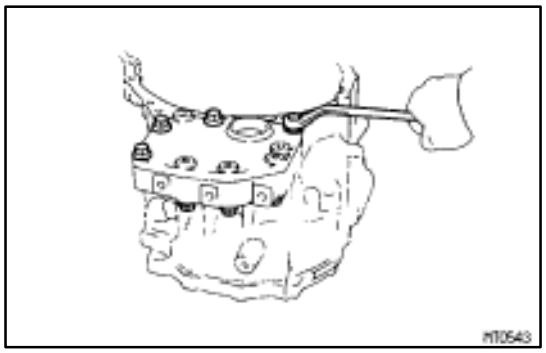
(f) Using SST and a press, install the taper roller bearing outer race.
SST 09316–60010 (09316–00010, 09316–00040)



(g) Install the transmission oil baffle.
HINT: Install the transmission oil baffle projection into the case side cutout.

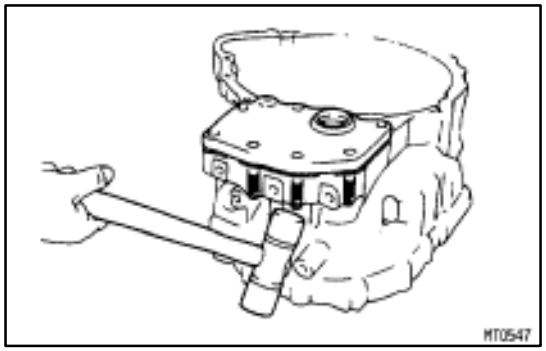


(h) Using SST and a hammer, drive in a new oil seal.
SST 09223–15010
(i) Coat the lip of oil seal with MP grease.

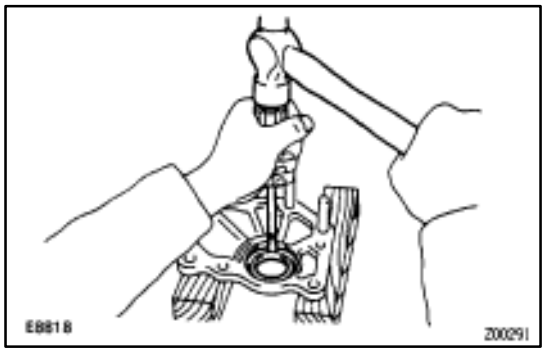


5. (TRANSAXLE CASE SIDE)
IF NECESSARY, REPLACE OIL SEAL AND TAPER ROLLER BEARING OUTER RACE

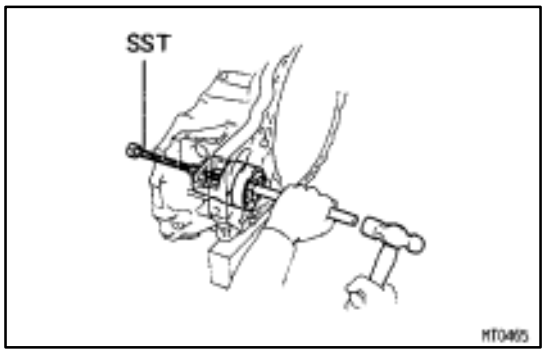
(a) Remove the four bolts and three nuts.



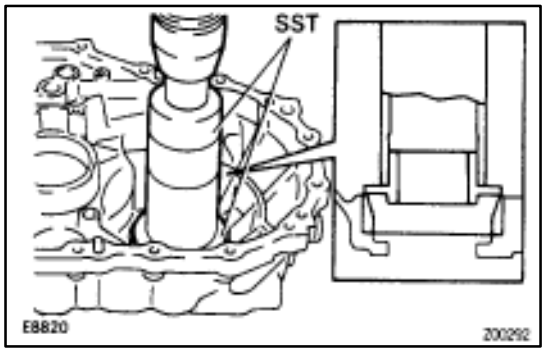
(b) Using a plastic hammer, tap the stud bolt and remove the transaxle case cover.



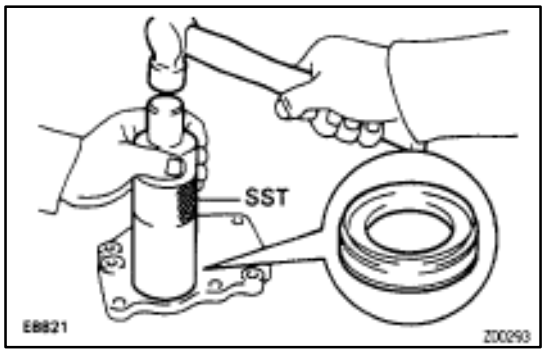
(c) Using a screwdriver and hammer, drive out the oil seal.



(d) Using a SST, brass bar and hammer, remove the taper roller bearing outer race.
SST 09612–65014

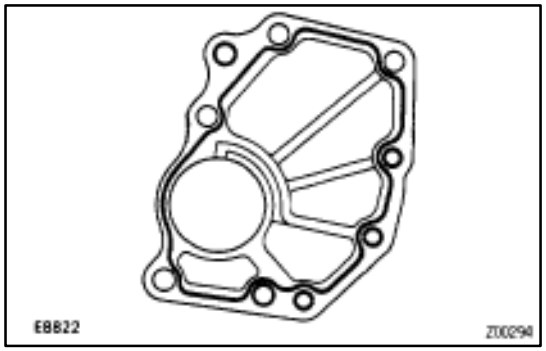


(e) Using SST and a press, install the taper roller bearing.
SST 09316–60010 (09316–00010, 09316–00040)



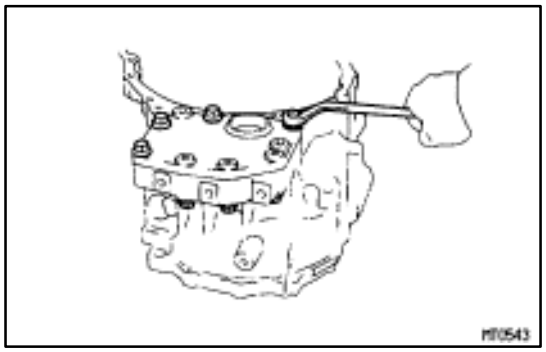
(f) Using SST and a hammer, drive in a new oil seal.
SST 09316–60010 (09316–00010)

(g) Coat the lip of oil seal with MP grease.



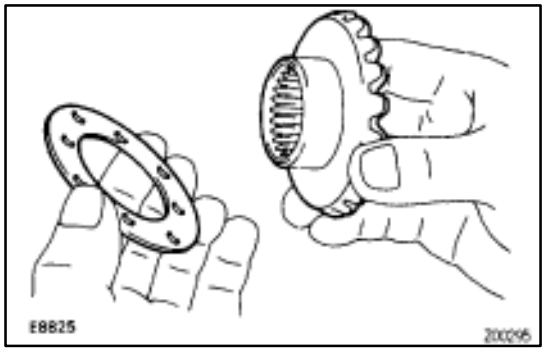
(h) Remove any packing material and be careful not to drop oil on the contacting surfaces of the transaxle case or case cover.

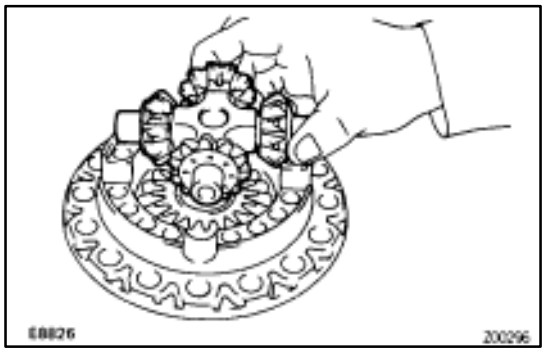
(i) Apply seal packing to the transaxle case cover as shown.
Seal packing:
Part No. 08826–00090, THREE BOND 1281 or equivalent
HINT: Install the transaxle case cover as shown as the seal packing is applied.

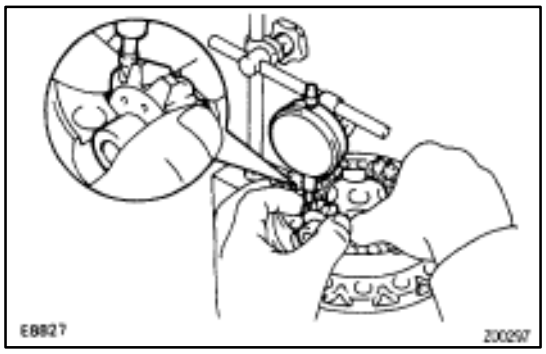


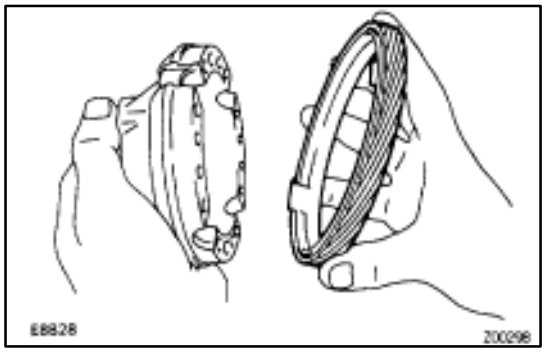
(j) Apply sealant to the bolt threads.
Sealant:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

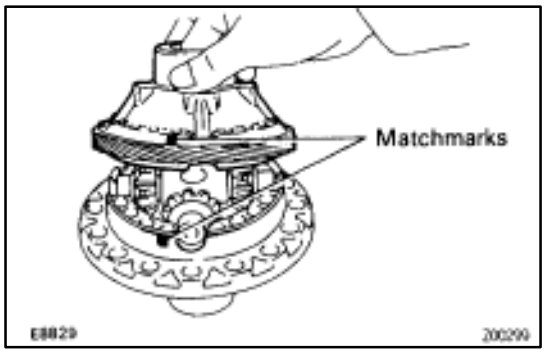
(k) Install and torque the four bolts and three nut.
Torque: 54 N·m (550 kgf·cm, 40 ft·lbf)











DIFFERENTIAL CASE ASSEMBLY

MX021–01

(See page MX–64)

1. ASSEMBLE DIFFERENTIAL CASE

HINT: Coat all of the sliding and rotating surface with gear oil before assembly.

(a) Install the thrust washer to the side gear.

(b) Install the four pinions and thrust washers to the spider.

(c) Install the side gear and spider with four pinions to the differential left case.

(d) Using a dial indicator, measure the backlash of one pinion gear while holding the No.2 differential case.

Standard backlash:

0.05–0.20 mm (0.0020–0.0079 in.)

HINT: Push the pinion gear and spider with four pinions to the right side a of the left side of the differential case.

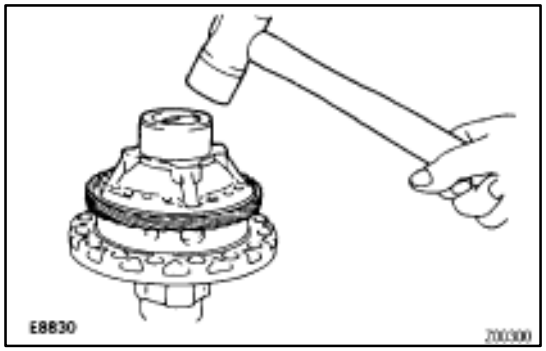
(e) Install the side gear and spider with four pinions to the right side of the differential case. Check the side gear backlash.

(f) Referring to the table below, Select the thrust washer which will ensure that the backlash is within specification. Try to select a washer of the same size.

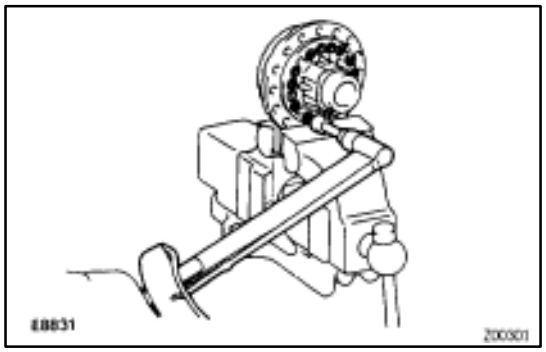
Thickness mm (in.)	Thickness mm (in.)
0.80 (0.0315)	1.20 (0.0472)
0.90 (0.0354)	1.30 (0.0512)
1.00 (0.0394)	1.40 (0.0551)
1.10 (0.0433)	

(g) Install the speedometer drive gear.

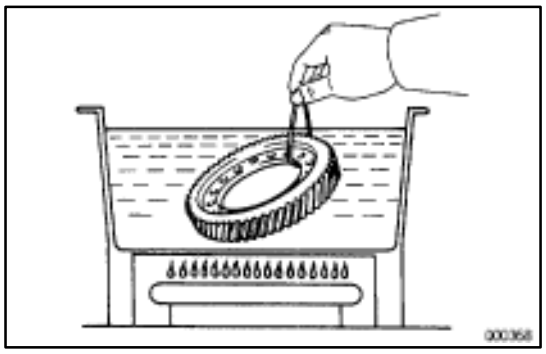
(h) Align the matchmarks on the differential cases.



(i) Using a plastic hammer, carefully tap the differential case to install it.

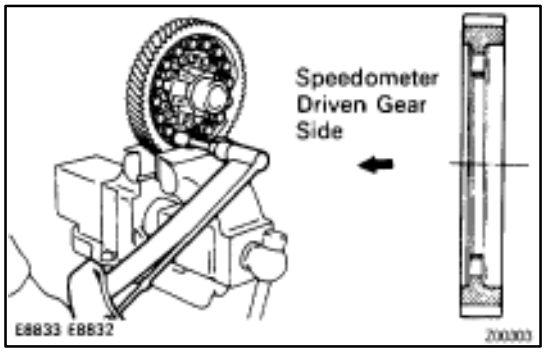


(j) Using a torx wrench, install and torque the sixteen torx screws.
Torx wrench T50 09042–00040
Torque: 63N·m (640 kgf·cm, 46 ft·lbf)

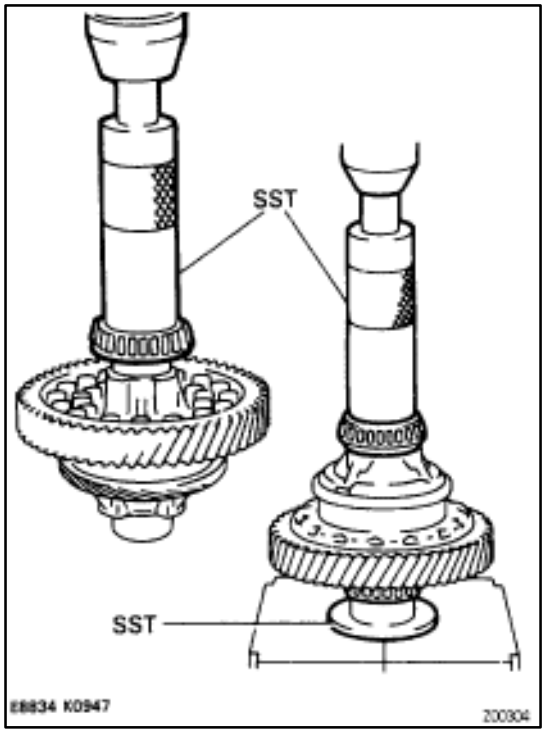


2. INSTALL RING GEAR

(a) Clean the contact surface of the differential case and the threads of the ring gear and differential case.
(b) Hear the ring gear in boiling water.
(c) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.



HINT: Align the matchmarks on the differential left case and contact the ring gear.
(d) Temporarily install the sixteen bolts.
NOTICE: The ring gear set bolts should not be tightened until the ring gear has cooled sufficiently.
(e) After the ring gear has cooled sufficiently, torque the ring gear set bolts.
Torque: 124 N·m (1,260 kgf·cm, 91 ft·lbf)



3. INSTALL SIDE BEARING

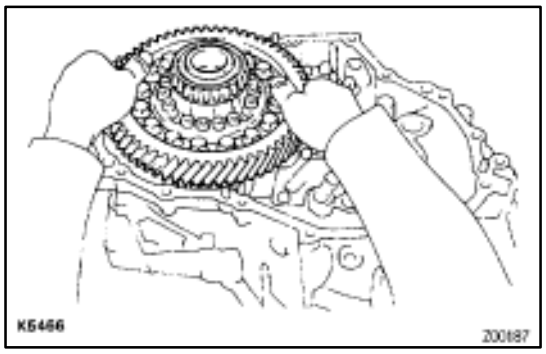
Using SST and a press, install the side bearings onto the differential case.

SST 09316–20011, 09316–60010 (09316–00010)

HINT: Press the bearing on the ring side first.

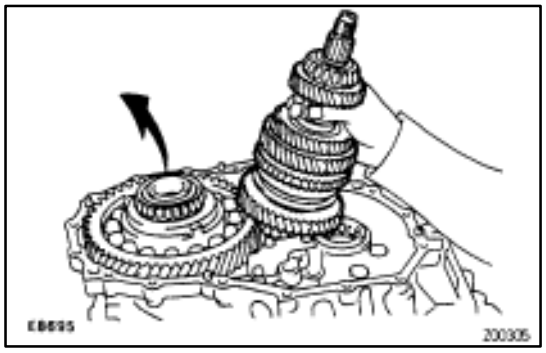
4. ADJUST OUTPUT SHAFT ASSEMBLY PRELOAD

(See pages MX–76 to 78)



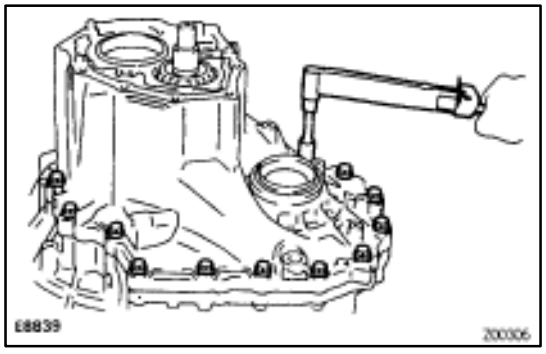
5. INSTALL DIFFERENTIAL CASE ASSEMBLY

Install the differential case assembly to the transaxle case.



6. INSTALL OUTPUT SHAFT ASSEMBLY

Lift up the differential case, install the output shaft assembly.



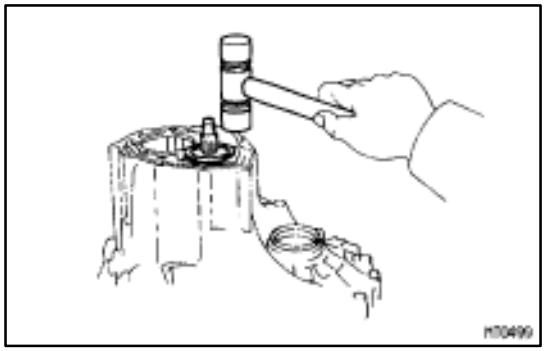
7. INSTALL TRANSMISSION CASE

(a) Install the transmission case.

HINT: If necessary, tap on the case with a plastic hammer.

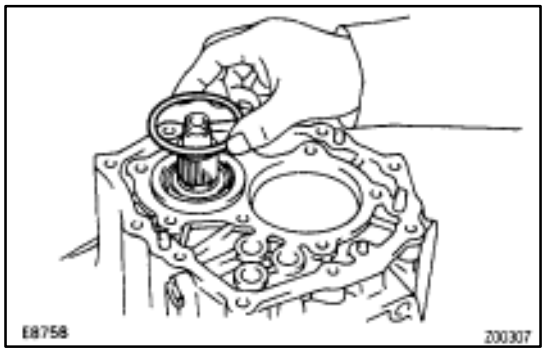
(b) Install and torque the seventeen bolts.

Torque: 29 N·m (300 kgf·cm 22 ft·lbf)



8. INSTALL OUTPUT SHAFT REAR TAPER ROLLER BEARING OUTER RACE

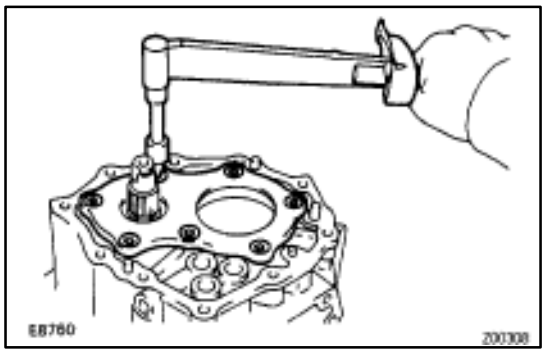
Using a plastic hammer, drive in the outer race.



9. INSTALL SHIM

(See pages MX–76 to 78)

HINT: Install the previously selected shim.

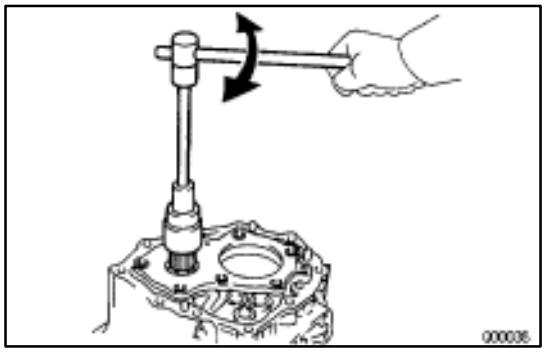


10. INSTALL REAR BEARING RETAINER

Using a torx wrench, install and torque the seven torx screws.

Torx wrench T45 09042–00050

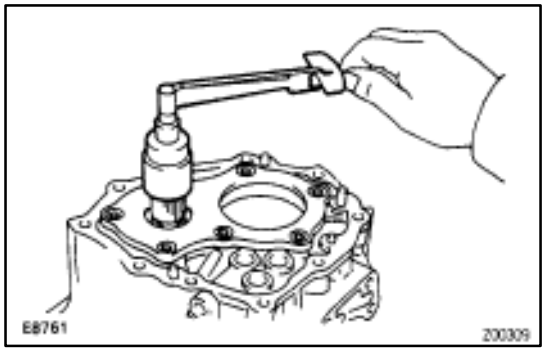
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



11. ADJUST DIFFERENTIAL CASE SIDE BEARING PRELOAD

(a) Install the new lock nut to the output shaft.

(b) Turn the output shaft right and left two or three times to allow the bearings to settle.



(c) Using a small torque wrench, measure the preload.

Preload (at starting):

New bearing (Add output shaft preload)

0.2–0.4 N·m (2.0–4.1 kgf·cm, 1.7–3.6 in.·lbf)

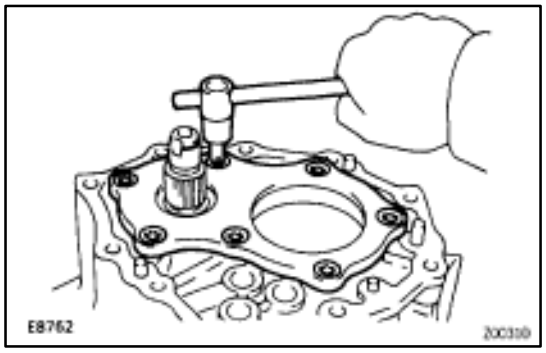
Reused bearing (Add output shaft preload)

0.1–0.2 N·m (1.3–2.5 kgf·cm, 1.1–2.2 in.·lbf)

If the preload is not within specification, select the thrust washers.

HINT: The total preload will change about 0.1–0.2 N·m (1–2 kgf·cm, 0.9–1.7 ft·lbf) with each shim thickness.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
0	2.00 (0.0787)	9	2.45 (0.0965)
1	2.05 (0.0807)	A	2.50 (0.0984)
2	2.10 (0.0827)	B	2.55 (0.1004)
3	2.15 (0.0846)	C	2.60 (0.1024)
4	2.20 (0.0866)	D	2.65 (0.1043)
5	2.25 (0.0886)	E	2.70 (0.1063)
6	2.30 (0.0906)	F	2.75 (0.1083)
7	2.35 (0.0925)	G	2.80 (0.1102)
8	2.40 (0.0945)	H	2.85 (0.1122)

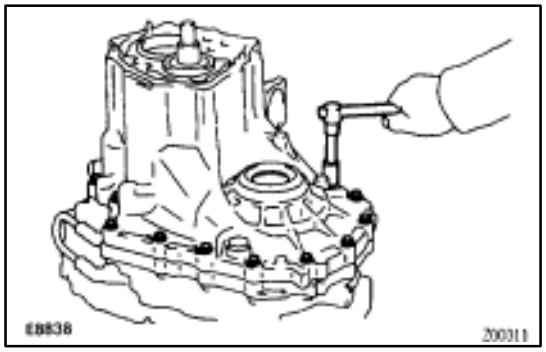


12. REMOVE REAR BEARING RETAINER

Using torx wrench, remove the seven torx screws and rear bearing retainer.

Torx wrench T45 09042–00050

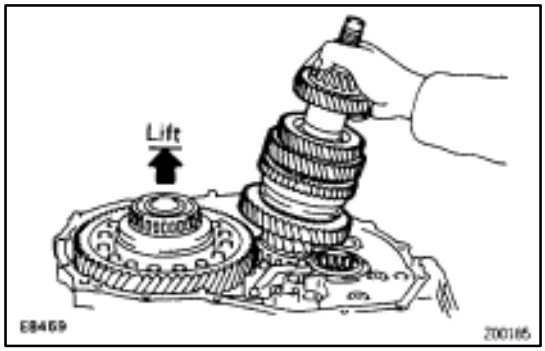
13. REMOVE SHIM



14. REMOVE TRANSMISSION CASE

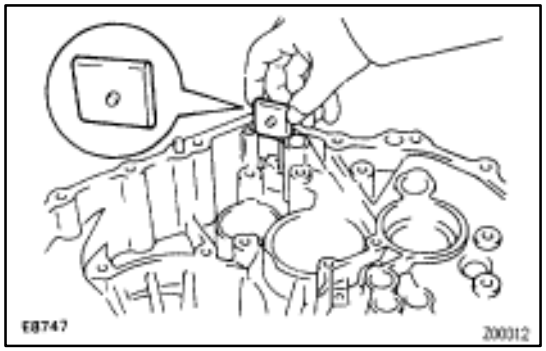
(a) Remove the seventeen bolts.

(b) Using a plastic hammer, tap off the transmission case.



15. REMOVE OUTPUT SHAFT ASSEMBLY

16. REMOVE DIFFERENTIAL CASE ASSEMBLY



COMPONENT PARTS INSTALLATION

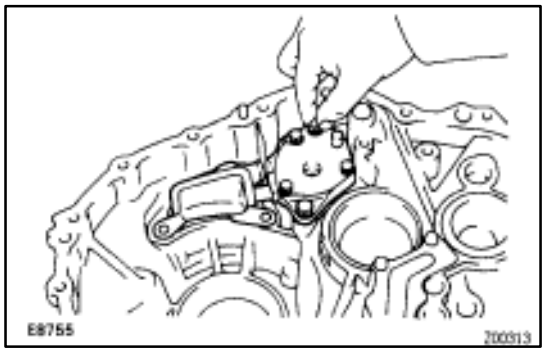
BASIC SUBASSEMBLY REASSEMBLY

MX01M–01

(See pages MX–23 to 25)

HINT: Coat all of the sliding and rotating surface with gear oil before assembly.

1. INSTALL MAGNET TO TRANSAXLE CASE

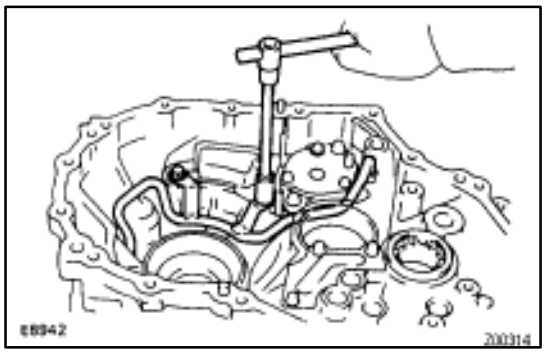


2. INSTALL OIL PUMP ASSEMBLY AND OIL PIPE

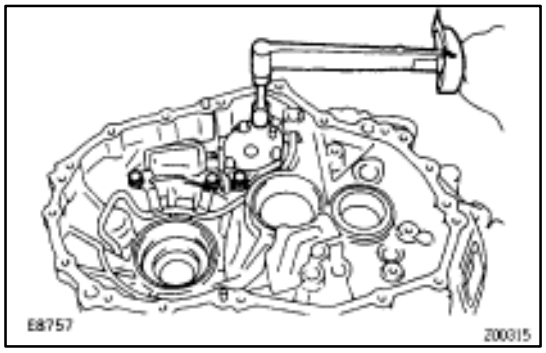
(a) Install the oil pump assembly.

(b) Install the two bolts.

HINT: Be careful not to drop the oil pump gasket.

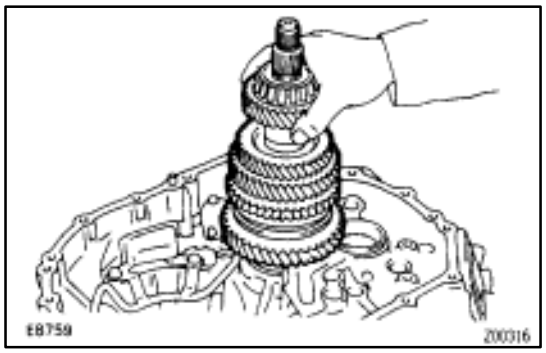


(c) Install the oil pipe and two bolts.



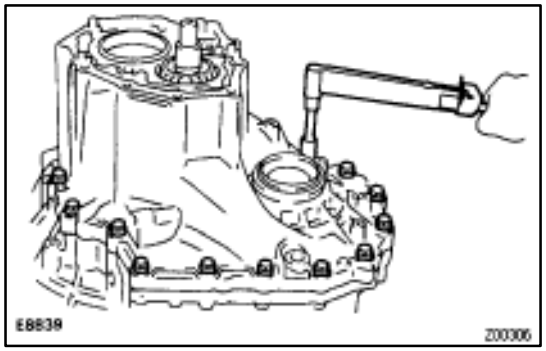
(d) Torque the four bolts.

Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)

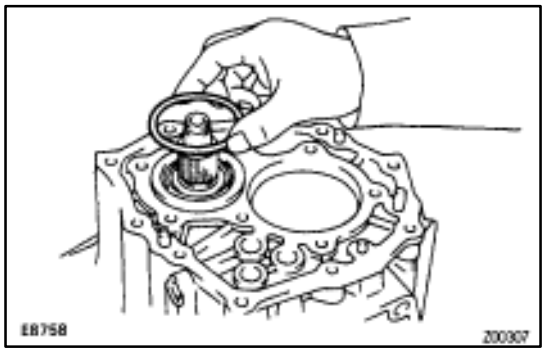


3. ADJUST OUTPUT SHAFT PRELOAD

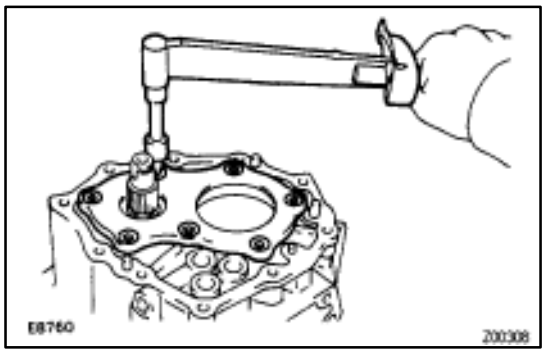
(a) Install the output shaft assembly.



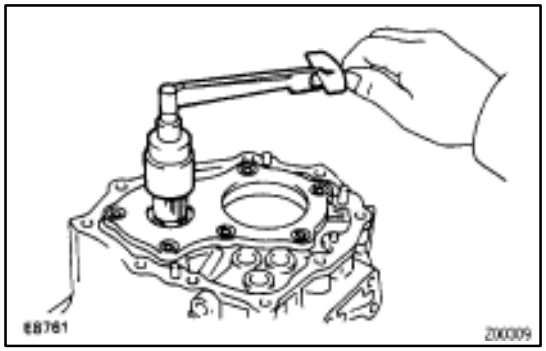
(b) Install the transmission case.
HINT: If necessary, tap on the case with a plastic hammer.
(c) Install and torque the seventeen bolts.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)
(d) Install the output shaft rear taper roller bearing outer race.



(e) Install the adjust shim.
HINT: When re–using the output shaft bearing, first install a shim of the same thickness as before. If installing a new tapered roller bearing, first select and install a shim of lesser thickness than before.

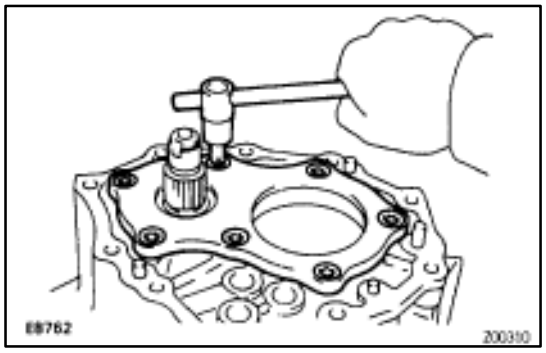


(f) Install the bearing retainer.
(g) Using a torx wrench, install and torque the seven bolts.
Torx wrench T45 09042–00050
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)
(h) Install a new lock nut to the output shaft.
(i) Turn the output shaft right and left two or three times to allow the bearings to settle.

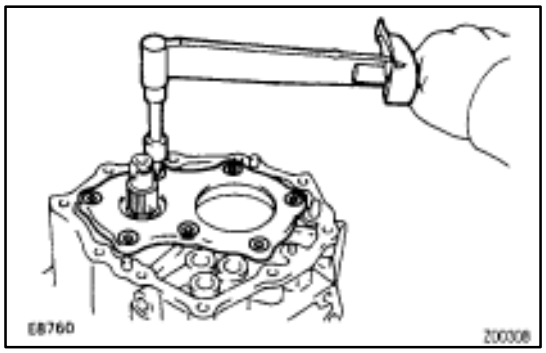


(j) Using a small torque wrench, measure the preload.
Preload (at starting):
New bearing
0.8–1.6 N·m (8–16 kgf·cm, 6.9–13.9 in.·lbf)
Reused bearing
0.5–1.0 N·m (5–10 kgf·cm, 4.3–8.7 in.·lbf)
If the preload is not within specification, select the thrust washers.
HINT: The preload will change about 0.4–0.5 N·m (4–5 kgf-·cm, 3.5–4.3 in.·lbf) with each shim thickness.

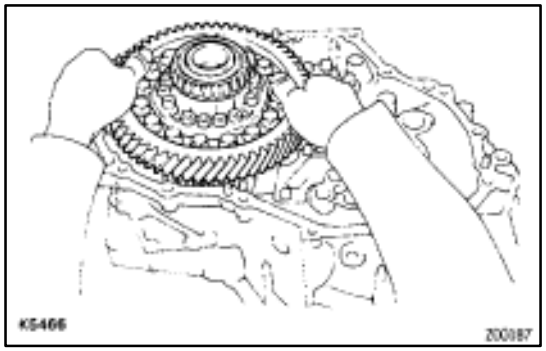
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
0	1.30 (0.0512)	D	1.95 (0.0768)
1	1.35 (0.0531)	E	2.00 (0.0787)
2	1.40 (0.0551)	F	2.05 (0.0807)
3	1.45 (0.0571)	G	2.10 (0.0827)
4	1.50 (0.0591)	H	2.15 (0.0846)
5	1.55 (0.0610)	J	2.20 (0.0866)
6	1.60 (0.0630)	K	2.25 (0.0886)
7	1.65 (0.0650)	L	2.30 (0.0906)
8	1.70 (0.0669)	M	2.35 (0.0925)
9	1.75 (0.0689)	N	2.40 (0.0945)
A	1.80 (0.0709)	P	2.45 (0.0965)
B	1.85 (0.0728)	Q	2.50 (0.0984)
C	1.90 (0.0748)		



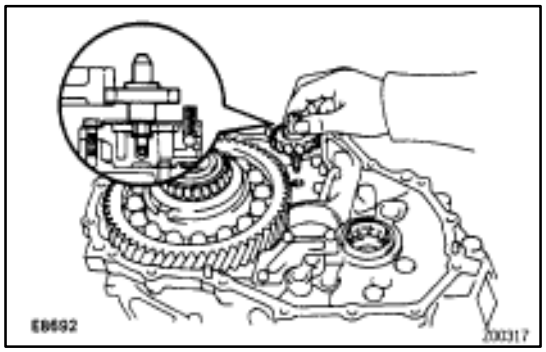
(k) Remove the lock nut.
(i) Using a torx wrench, remove the seven torx screws and rear bearing retainer.
Torx wrench T45 09042–00050



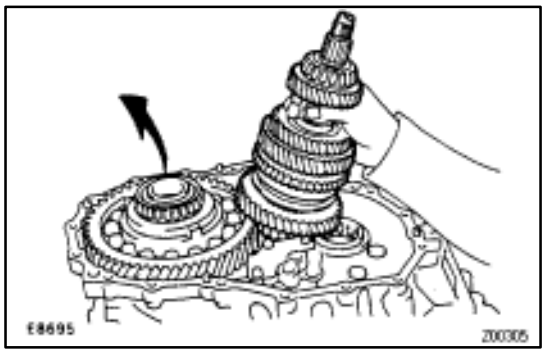
(m) Remove the shim.
(n) Remove the seventeen bolts and transmission case.
(o) Remove the output shaft assembly.



4. INSTALL DIFFERENTIAL CASE ASSEMBLY

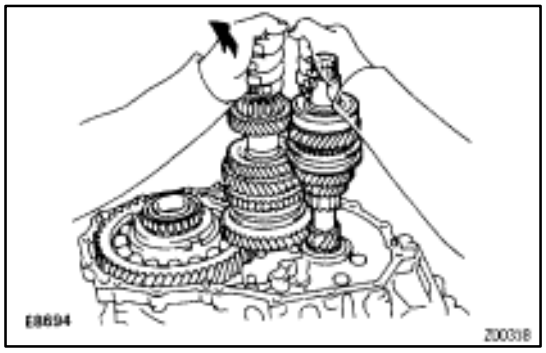


5. INSTALL OIL PUMP DRIVE GEAR

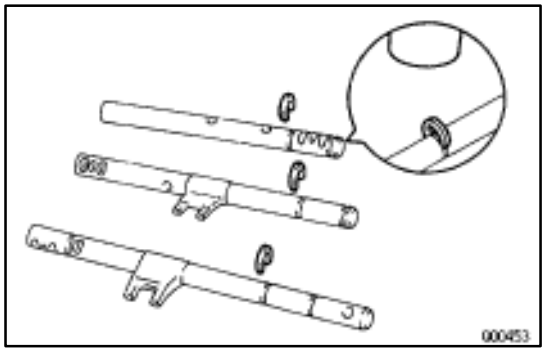


6. INSTALL OUTPUT SHAFT ASSEMBLY

(a) Lift up the differential case, install the output shaft assembly.

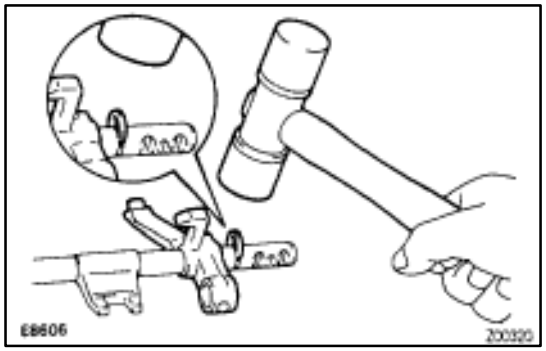


(b) Leaning the output shaft to the differential side, install the input shaft assembly.

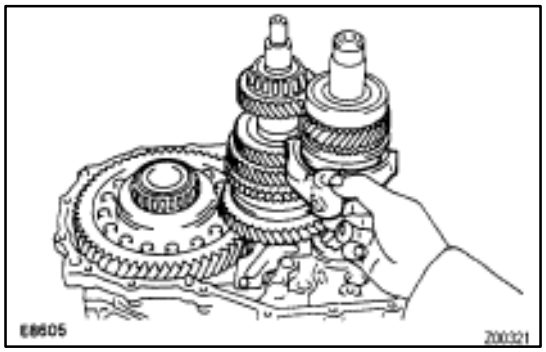


7. INSTALL SNAP RINGS

(a) Using a plastic hammer, install the snap rings to the No.1, No.2 and No.3 shift fork shafts.

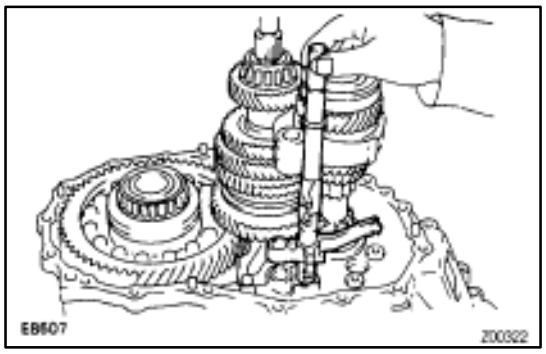


(b) Using a plastic hammer, the reverse shift fork and snap ring to the No.3 shift fork shaft.

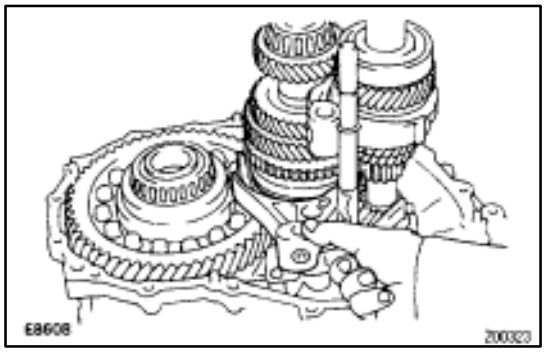


8. INSTALL NO.2 SHIFT FORK AND NO.3 SHIFT FORK SHAFT WITH REVERSE SHIFT FORK

(a) Install the No.2 shift fork to the No.2 hub sleeve.

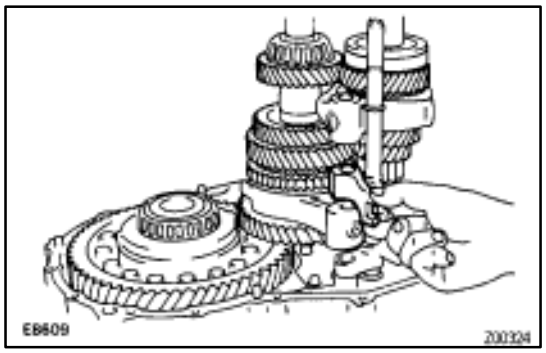


(b) Install the No.3 shift fork shaft with reverse shift fork.

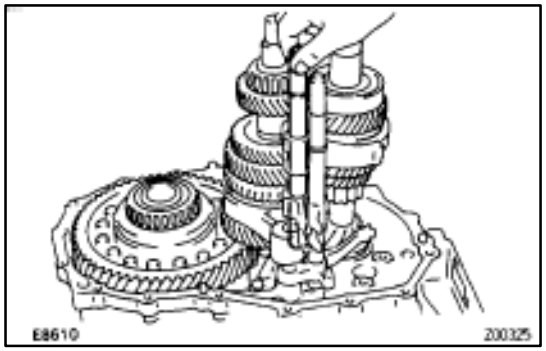


9. INSTALL NO.1 SHIFT FORK, SHIFT HEAD AND NO.2 SHIFT FORK SHAFT

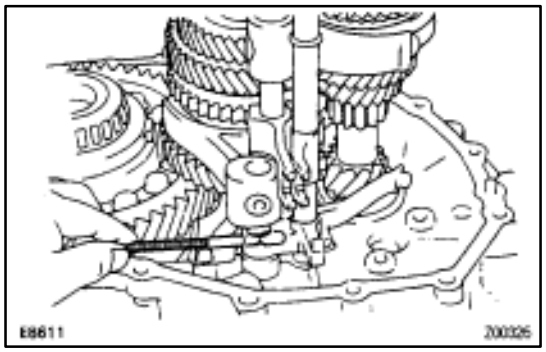
(a) Install the No.1 shift fork to the No.1 hub sleeve.



(b) Put shift head onto the No.1 shift fork.

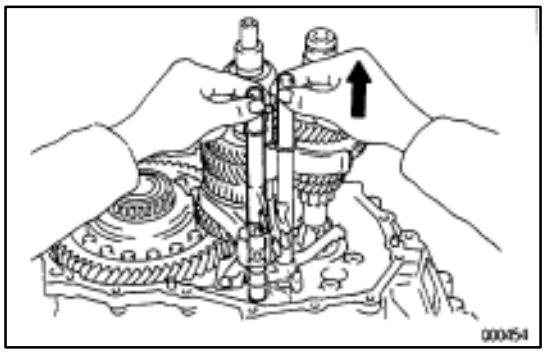


(c) Install the No.2 shift fork shaft to the transaxle case, through the shift head and No.1 shift fork.



10. INSTALL INTERLOCK ROLLER

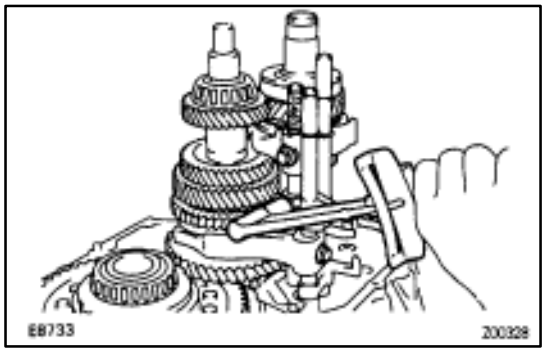
Using a magnetic finger, install the interlock roller to the reverse shift fork.



11. INSTALL NO.1 SHIFT FORK SHAFT

Install the No.1 shift fork shaft to the case, through the No.1 shift fork and reverse shift fork.

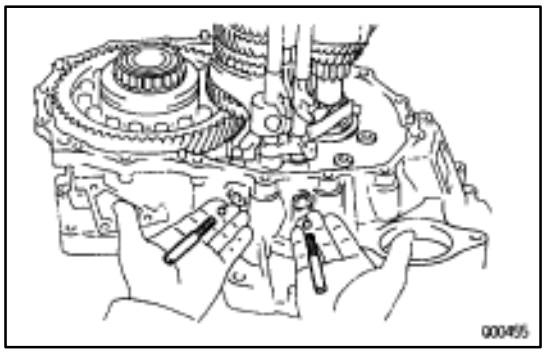
HINT: When it is difficult to the fork shaft through the reverse shift fork, pull up the No.3 shift fork shaft.



12. INSTALL SET BOLTS

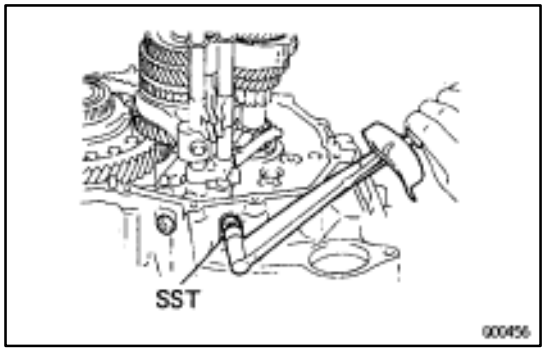
Install and torque the three set bolts.

Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)



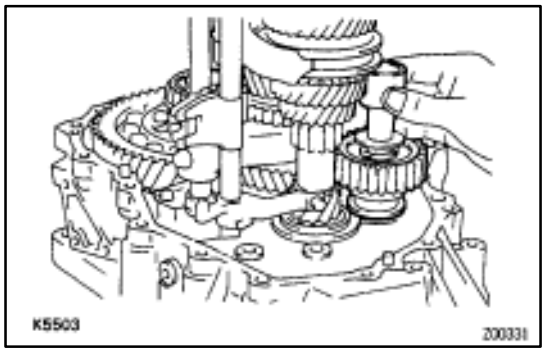
13. INSTALL TWO LOCKING BALLS, SPRINGS, SEATS AND PLUGS

(a) Install the two locking balls, springs and seats.



(b) Apply sealant to the two plugs.
Sealant:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

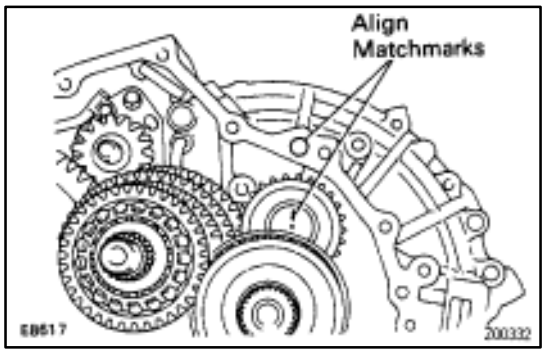
(c) Using SST, install and torque two plugs.
SST 09313–30021
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



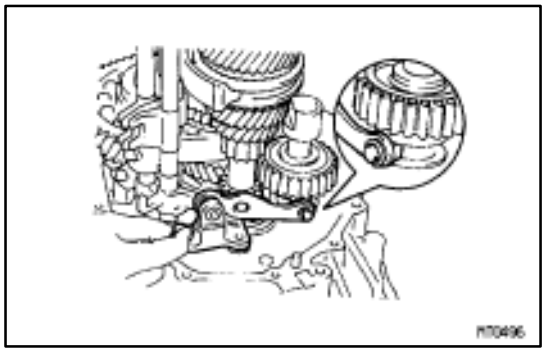
14. INSTALL REVERSE IDLER GEAR AND SHAFT

(a) Install the reverse idler gear shaft and thrust washer to the shaft.

(b) Install the reverse idler gear shaft into the case hole.



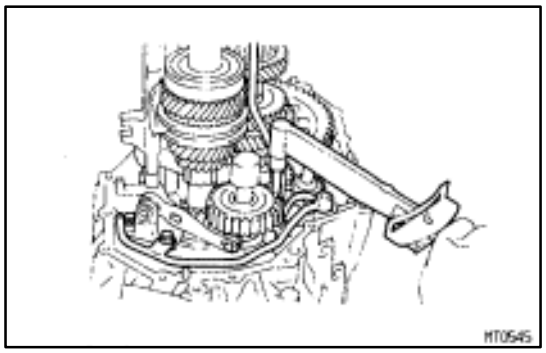
(c) Align matchmarks as shown.



15. INSTALL REVERSE SHIFT ARM BRACKET AND NO.2 OIL PIPE

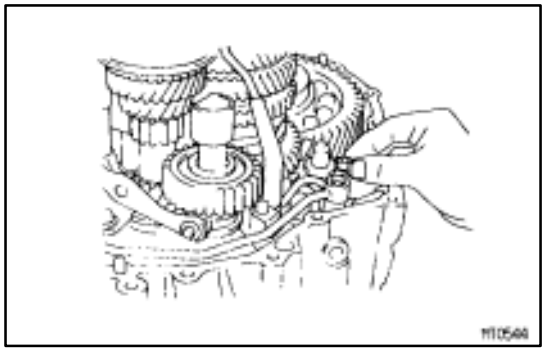
(a) Put the reverse shift fork pivot into the reverse shift arm install the reverse shift arm bracket to the transaxle case.

(b) Install the bolt.

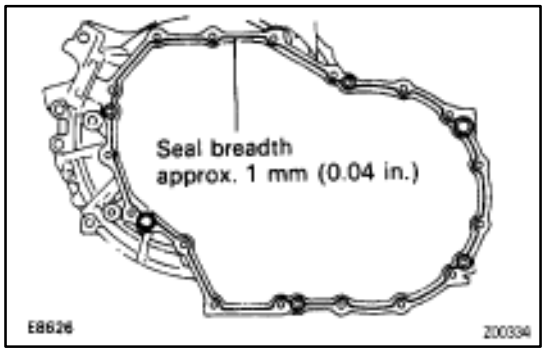


(c) Install the No.2 oil pipe and two bolts.

(d) Torque the reverse shift arm and oil pump bolts.
Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)



(e) Install a new gasket to the No.2 oil pipe.



16. INSTALL TRANSMISSION CASE

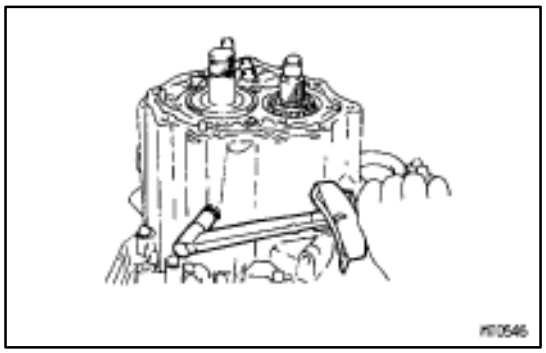
(a) Remove the any packing material and be careful not to drop oil on the contacting surfaces of the transmission case or transaxle case.

(b) Apply seal packing to the transmission case as shown in the figure.

Seal packing:

Part No.08826–00090, THREE BOND 1281 or equivalent

HINT: Install the transmission case as shown as the seal packing is applied.



(c) Install and torque the fourteen bolts to the transmission case side.

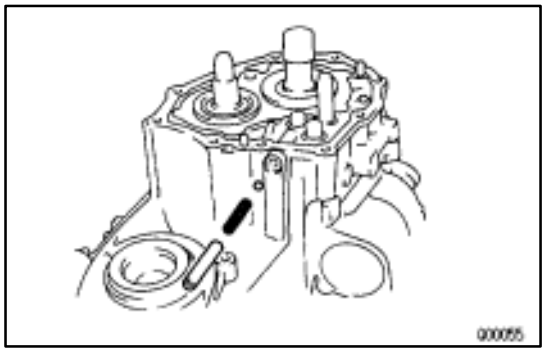
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

(d) Install and torque the three bolts to the transaxle case side.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

17 INSTALL AND TORQUE REVERSE IDLER GEAR SHAFT RETAINING BOLT

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



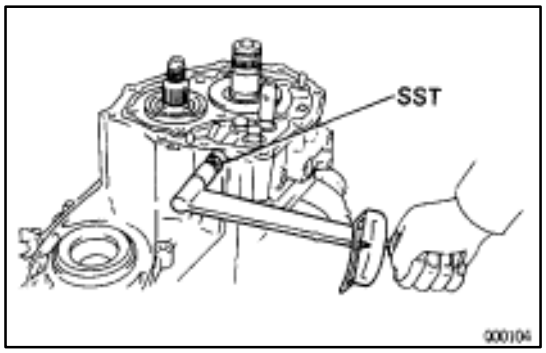
18. INSTALL LOCKING BALL, SPRING, SEAT AND PLUG

(a) Install the locking ball, spring and seat.

(b) Apply sealant to the plug.

Sealant:

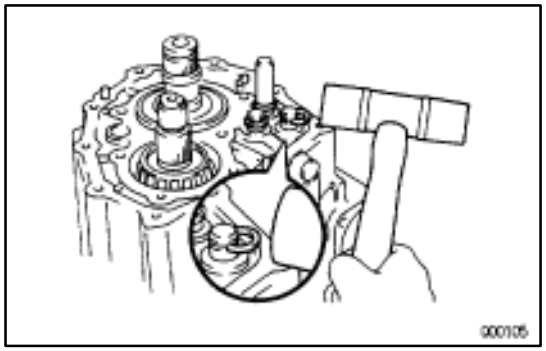
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent



(c) Using SST, install and torque the plug.

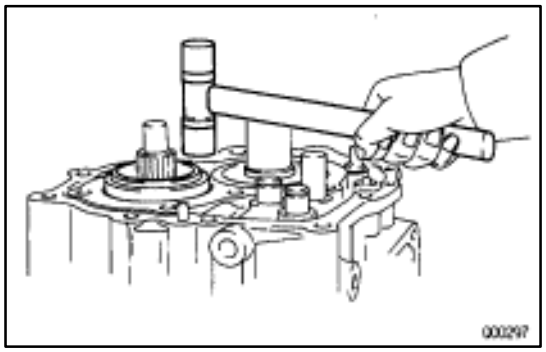
SST 09313–30021

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



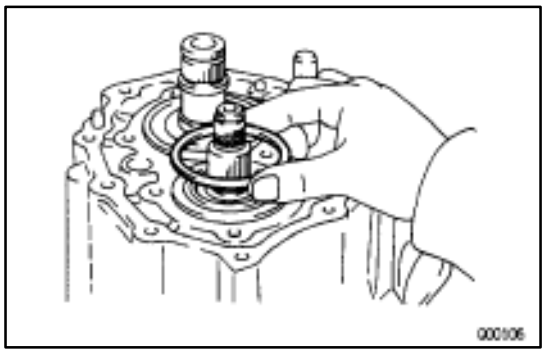
19. INSTALL SNAP RINGS

Using a plastic hammer, install the three snap rings.



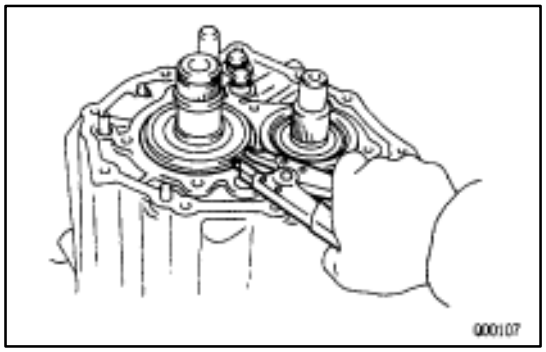
20. INSTALL OUTPUT SHAFT REAR TAPER ROLLER BEARING OUTER RACE

Using a plastic hammer, tap in the outer race.



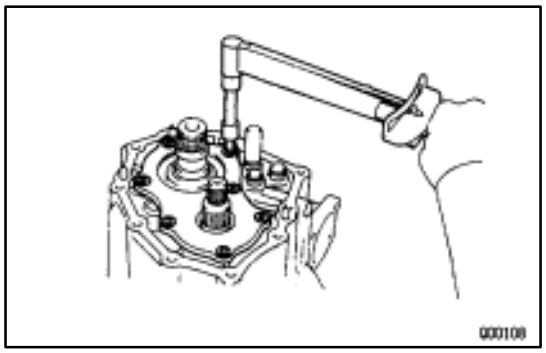
21. INSTALL SHIM

HINT: Install the previously selected.



22. INSTALL SNAP RING

Using a snap ring expander, install the snap ring to the input shaft rear bearing.



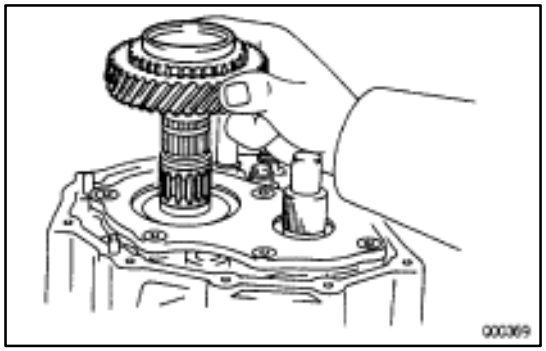
23. INSTALL REAR BEARING RETAINER

(a) Clean the threads of the torx screws.

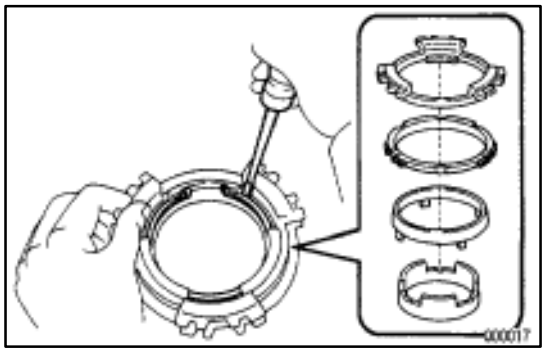
(b) Using a torx wrench, install and torque the seven torx screws.

Torx wrench T45 09042–00050

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



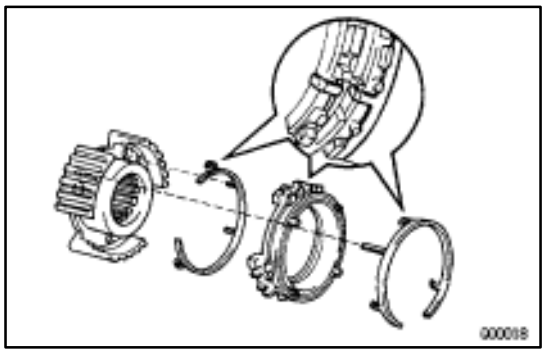
24. INSTALL NEEDLE ROLLER BEARING AND FIFTH GEAR



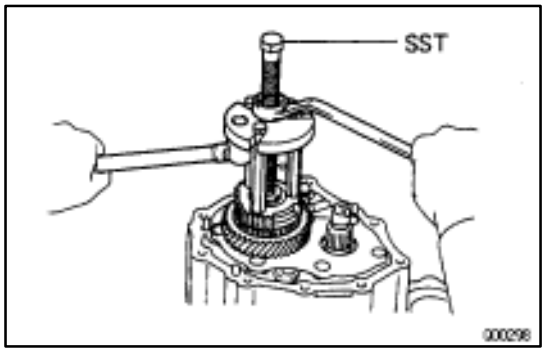
25. INSTALL NO.5 SYNCHRONIZER RINGS WITH KEY SPRING TO NO.3 CLUTCH HUB

(a) Assemble the No.5 synchronizer rings.

(b) Using a screwdriver, install the snap ring.
HINT: Wrap vinyl tape on the screwdriver to prevent damaging the synchronizer ring.

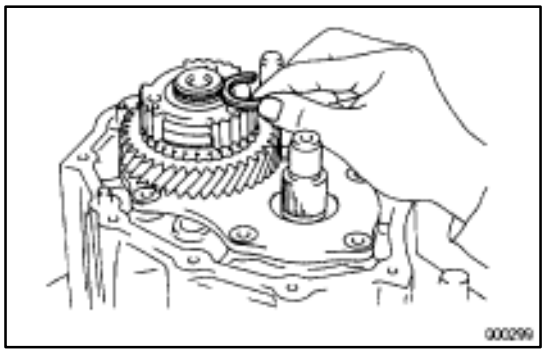


(c) Install the No.5 synchronizer rings with key springs to the No.3 clutch hub.
HINT: Align the holes of the clutch hub with key spring.



26. INSTALL NO.3 CLUTCH HUB

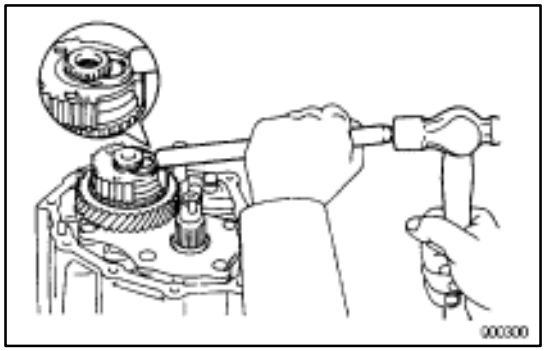
Using SST, install the No.3 clutch hub with synchronizer ring and key spring.
SST 09310–17010 (09310–07010, 09310–07020, 09310–07030)



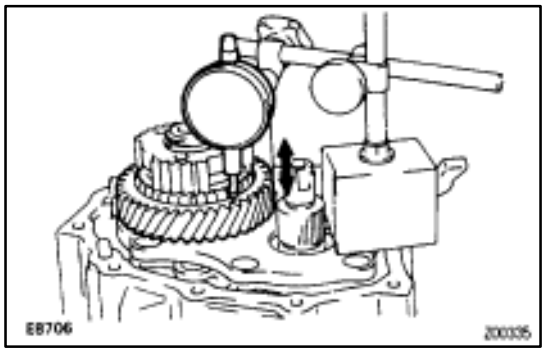
27. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
Q	2.25 (0.0886)	V	2.50 (0.0984)
R	2.30 (0.0906)	W	2.55 (0.1004)
S	2.35 (0.0925)	X	2.60 (0.1024)
T	2.40 (0.0945)	Y	2.65 (0.1043)
U	2.45 (0.0965)		



(b) Using a brass bar and hammer, install the snap ring.

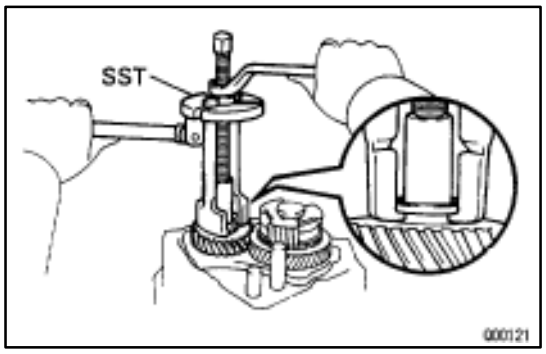


28. INSPECT FIFTH GEAR THRUST CLEARANCE

Using a dial indicator measure the 5th gear thrust clearance.

Standard clearance:

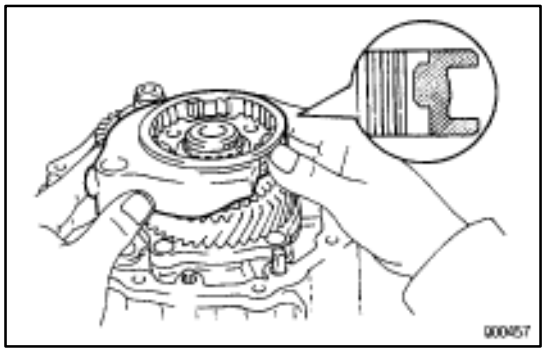
0.10–0.57 mm (0.0039–0.0224 in.)



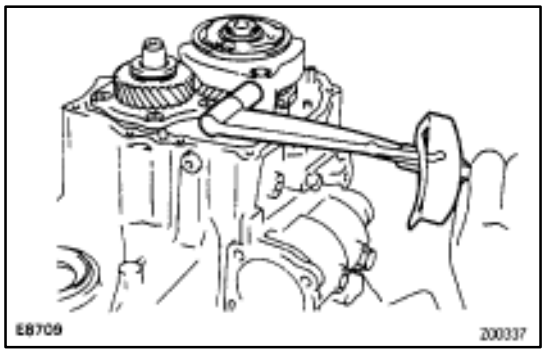
29. INSTALL FIFTH DRIVEN GEAR

Using SST, install the 5th driven gear.

SST 09310–17010 (09310–07010, 09310–07020, 09310–07040, 09310–07050)



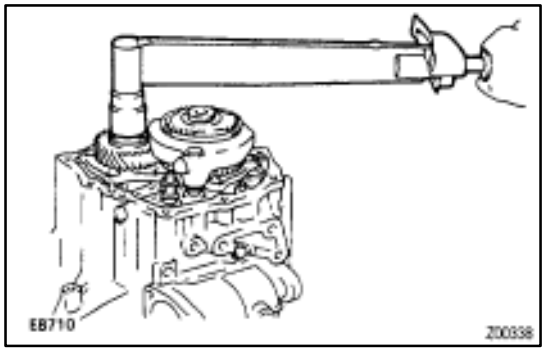
30. INSTALL NO.3 HUB SLEEVE WITH NO.3 SHIFT FORK



31. INSTALL SET BOLT

Install and torque the set bolt.

Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)



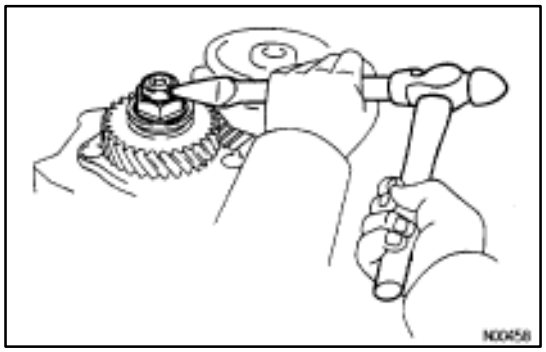
32. INSTALL LOCK NUT

(a) Engage the gear double meshing.

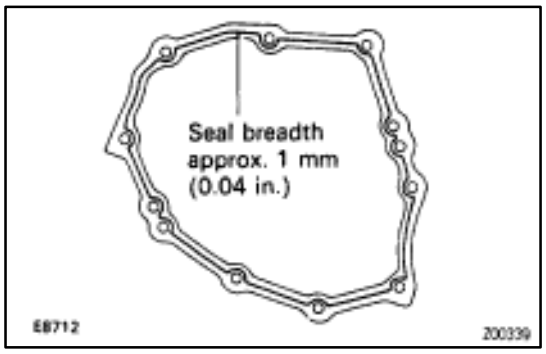
(b) Install and torque the lock nut.

Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(c) Disengage the gear double meshing.



(d) Stake the lock nut.



33. INSTALL TRANSMISSION CASE COVER

(a) Remove the any packing material and be careful not to drop oil on the contacting surfaces of the transmission case cover.

(b) Apply seal packing to the transmission case as shown in the figure.

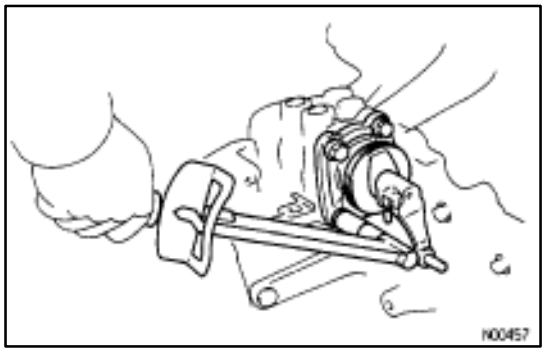
Seal packing:

Part No. 08826–00090, THREE BOND 1281 or equivalent

HINT: Install the transmission case cover as soon as the seal packing is applied.

(c) Install and torque the ten bolts.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



34. INSTALL SHIFT AND SELECT LEVER SHAFT ASSEMBLY

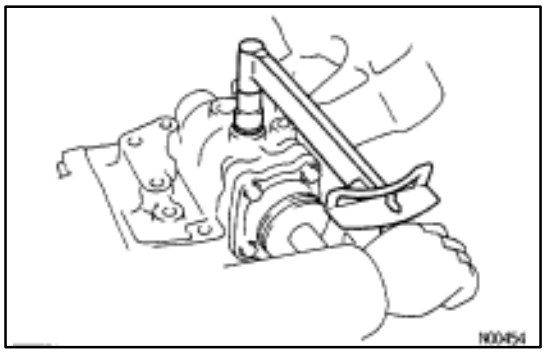
(a) Place a new gasket in position on the control shaft cover.

(b) Install the control shaft cover.

(c) Apply sealant to the bolt threads.

Sealant:

Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

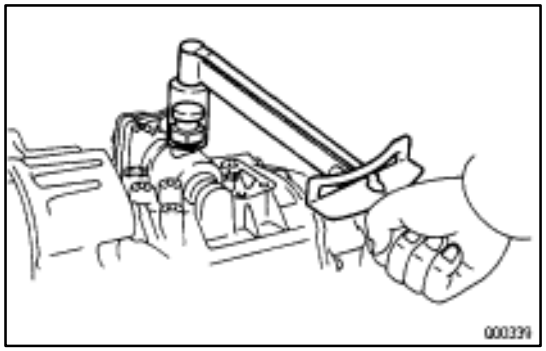


(d) Install and torque the four bolts.

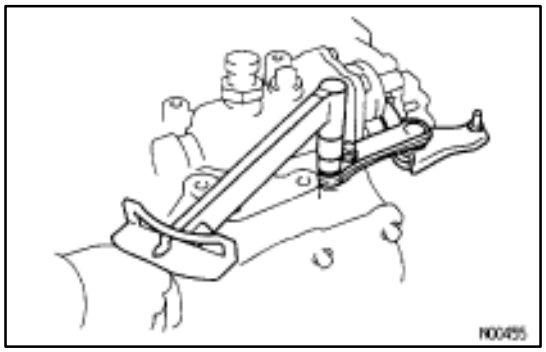
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

35. INSTALL AND TORQUE LOCK BOLT

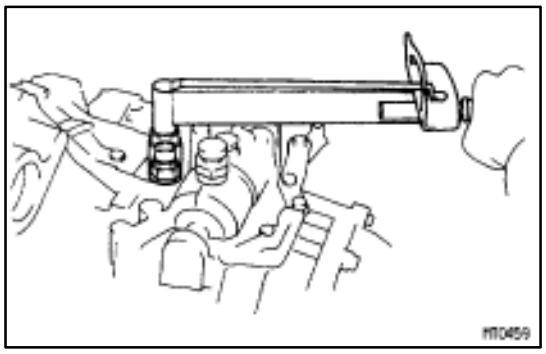
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



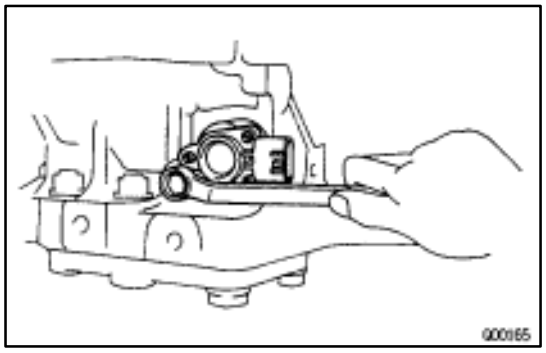
36. INSTALL BREATHER PLUG
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



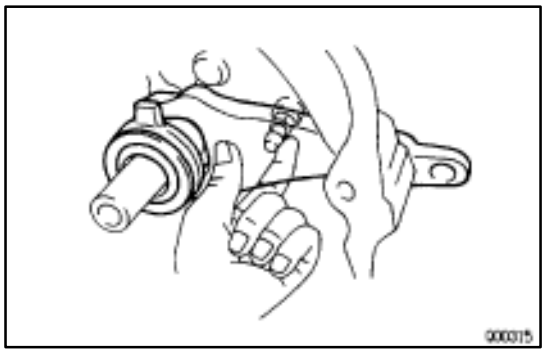
37. INSTALL AND TORQUE SELECTING BELLCRANK ASSEMBLY
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



38. INSTALL BACK–UP LIGHT SWITCH
Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)



39. INSTALL SPEEDOMETER DRIVEN GEAR
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

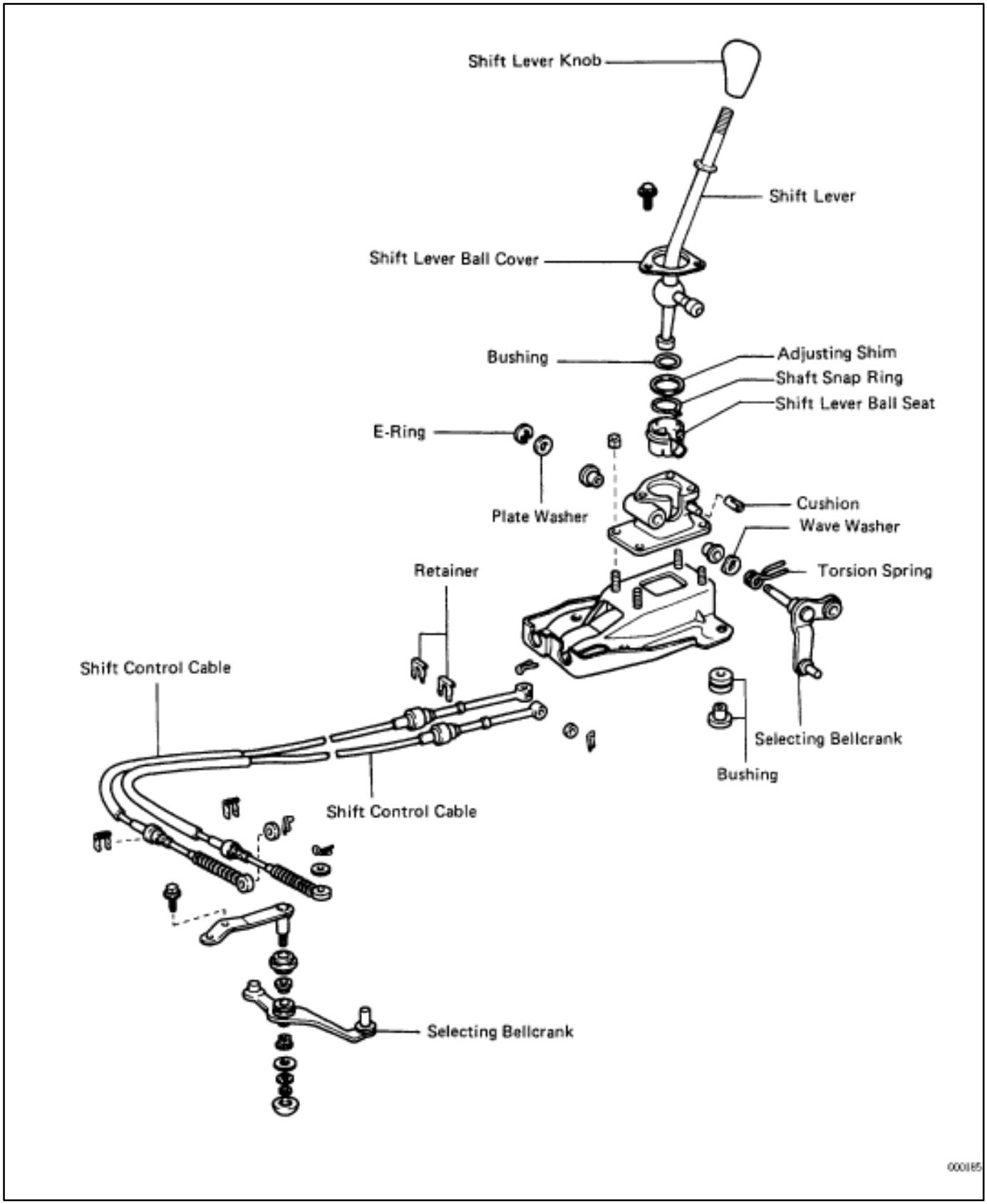


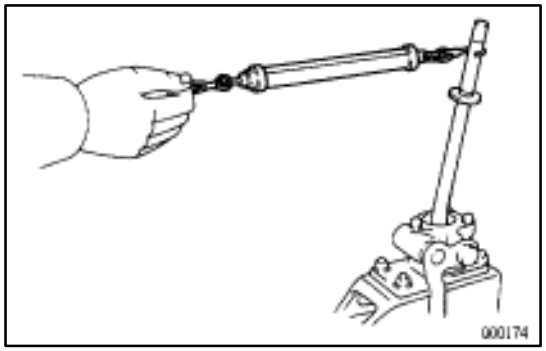
40. INSTALL RELEASE FORK AND BEARING
Apply molybdenum disulphide lithium base grease to the following parts:
- Input shaft spline
- Release fork contact surface

SHIFT LEVER AND CONTROL CABLE

COMPONENTS

MX01N–01





INSPECTION OF SHIFT LEVER

MX01P–01

INSPECT SHIFT LEVER PRELOAD

(a) Remove the shift lever ball cover, selecting bellcrank and torsion spring.

(b) Install and torque the shift lever ball cover.
Torque: 5.0 N·m (50 kgf·cm, 43 in.·lbf)

(c) Selecting shim of a thickness that allow a preload of 0.49–14.7 N (60–150 kgf, 0.1–0.3 lbf) at the top of lever and install it in the shift lever seat.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	0.5 (0.020)	H	1.2 (0.047)
B	0.6 (0.024)	J	1.3 (0.051)
C	0.7 (0.028)	K	1.4 (0.055)
D	0.8 (0.031)	L	1.5 (0.059)
E	0.9 (0.035)	M	1.6 (0.063)
F	1.0 (0.039)	N	1.7 (0.067)
G	1.1 (0.043)		

SERVICE SPECIFICATIONS

SERVICE DATA

MX00Z–01

Input shaft 3rd and 4th gear journal diameter			
	Limit	35.950 mm	1.4154 in.
Input shaft 5th gear journal diameter			
	Limit	27.950 mm	1.1004 in.
Input shaft runout			
	Limit	0.05 mm	0.0020 in.
Output shaft 1st and 2nd gear journal diameter			
	Limit	38.950 mm	1.5335 in.
Output shaft runout			
	Limit	0.06 mm	0.0024 in.
Gear thrust clearance 1st			
	STD	0.10–0.35 mm	0.0039–0.0138 in.
	Limit	0.40 mm	0.0157 in.
Gear thrust clearance 2nd			
	STD	0.10–0.45 mm	0.0039–0.0177 in.
	Limit	0.50 mm	0.0197 in.
Gear thrust clearance 3rd			
	STD	0.10–0.45 mm	0.0039–0.0177 in.
	Limit	0.50 mm	0.0197 in.
Gear thrust clearance 4th			
	STD	0.10–0.55 mm	0.0039–0.0217 in.
	Limit	0.60 mm	0.0236 in.
Gear thrust clearance 5th			
	STD	0.10–0.57 mm	0.0039–0.0224 in.
	Limit	0.65 mm	0.0256 in.
Gear oil clearance 1st			
	STD	0.009–0.051 mm	0.0004–0.0020 in.
	Limit	0.070 mm	0.00280in
Gear oil clearance 2nd			
	STD	0.009–0.053 mm	0.0004–0.0021 in.
	Limit	0.070 mm	00028 in
Gear oil clearance 3rd			
	STD	0.009–0.053 mm	0.0004–0.0021 in.
	Limit	0.070 mm	0.0028 in
Gear oil clearance 4th			
	STD	0.009–0.051 mm	0.0004–0.0020 in.
	Limit	0.070 mm	0.0028 in.
Gear oil clearance 5th			
	STD	0.009–0.050 mm	0.0004–0.0020 in.
	Limit	0.070 mm	0.0028 in.
Shift fork to hub sleeve clearance			
	Limit	1.0 mm	0.039 in.
Synchronizer ring to gear clearance 1st, 4th and 5th			
	Limit	0.6 mm	0.024 in.
Synchronizer ring to gear clearance 2nd and 3rd			
	Limit	0.7mm	0.028 in.

Input shaft snap ring thickness			
No.2 clutch hub	Mark H	2.30 mm	0.0906 in.
No.2 clutch hub	Mark J	2.35 mm	0.0925 in.
No.2 clutch hub	Mark K	2.40 mm	0.0945 in.
No.2 clutch hub	Mark L	2.45 mm	0.0965 in.
No.2 clutch hub	Mark M	2.50 mm	0.0984 in.
No.2 clutch hub	Mark N	2.55 mm	0.1004 in.
No.2 clutch hub	Mark P	2.60 mm	0.1024 in.
No.3 clutch hub	Mark Q	2.25 mm	0.0886 in.
No.3 clutch hub	Mark R	2.30 mm	0.0906 in.
No.3 clutch hub	Mark S	2.35 mm	0.0925 in.
No.3 clutch hub	Mark T	2.40 mm	0.0945 in.
No.3 clutch hub	Mark U	2.45 mm	0.0965 in.
No.3 clutch hub	Mark V	2.50 mm	0.0984 in.
No.3 clutch hub	Mark W	2.55 mm	0.1004 in.
No.3 clutch hub	Mark X	2.60 mm	0.1024 in.
No.3 clutch hub	Mark Y	2.65 mm	0.1043 in.
Output shaft snap ring thickness			
No.1 clutch hub	Mark A	2.80 mm	0.1102 in.
No.1 clutch hub	Mark B	2.85 mm	0.1122 in.
No.1 clutch hub	Mark C	2.90 mm	0.1142 in.
No.1 clutch hub	Mark D	2.95 mm	0.1161 in.
No.1 clutch hub	Mark E	3.00 mm	0.1181 in.
No.1 clutch hub	Mark F	3.05 mm	0.1201 in.
No.1 clutch hub	Mark G	3.10 mm	0.1220 in.
Oil pump body clearance			
	STD	0.10–0.16 mm	0.004–0.006 in.
	Limit	0.30 mm	0.012 in.
Oil pump tip clearance			
	STD	0.08–0.15 mm	0.003–0.006 in.
	Limit	0.30 mm	0.012 in.
Oil pump side clearance			
	STD	0.03–0.08 mm	0.001–0.003 in.
	Limit	0.15 mm	0.006 in.
Control shaft cover oil seal drive in depth		0–1.0 mm	0–0.039 in.

Differential pinion to side gear backlash		0.05–0.20 mm	0.0020–0.0079 in.	
Differential side gear thrust washer thickness				
	None Mark	0.80 mm	0.0315 in.	
	None Mark	0.90 mm	0.0354 in.	
	None Mark	1.00 mm	0.0394 in.	
	None Mark	1.10 mm	0.0433 in.	
	None Mark	1.20 mm	0.0472 in.	
	None Mark	1.30 mm	0.0512 in.	
	None Mark	1.40 mm	0.0551 in.	
Differential case side bearing preload (at starting)				
New bearing (add output shaft preload)		0.2–0.4 N·m	2.0–4.1 kgf·cm	1.7–3.6 in.·lbf
Reused bearing (add output shaft preload)		0.1–0.2 N·m	1.3–2.5 kgf·cm	1.1–2.2 in.·lbf
Differential side bearing adjusting shim thickness				
	Mark 0	2.00 mm	0.0787 in.	
	Mark 1	2.05 mm	0.0807 in.	
	Mark 2	2.10 mm	0.0827 in.	
	Mark 3	2.15 mm	0.0846 in.	
	Mark 4	2.20 mm	0.0866 in.	
	Mark 5	2.25 mm	0.0886 in.	
	Mark 6	2.30 mm	0.0906 in.	
	Mark 7	2.35 mm	0.0925 in.	
	Mark 8	2.40 mm	0.0945 in.	
	Mark 9	2.45 mm	0.0965 in.	
	Mark A	2.50 mm	0.0984 in.	
	Mark B	2.55 mm	0.1004 in.	
	Mark C	2.60 mm	0.1024 in.	
	Mark D	2.65 mm	0.1043 in.	
	Mark E	2.70 mm	0.1063 in.	
	Mark F	2.75 mm	0.1083 in.	
	Mark G	2.80 mm	0.1102 in.	
	Mark H	2.85 mm	0.1122 in.	
Output shaft bearing preload (at starting)				
New bearing		0.8–1.6 N·m	8–16 kgf·cm	6.9–13.9 in.·lbf
Reused bearing		0.5–1.0 N·m	5–10 kgf·cm	4.3–8.7 in.·lbf

Output shaft rear bearing adjusting shim thickness				
	Mark 0	1.30 mm	0.0512 in.	
	Mark 1	1.35 mm	0.0531 in.	
	Mark 2	1.40 mm	0.0551 in.	
	Mark 3	1.45 mm	0.0571 in.	
	Mark 4	1.50 mm	0.0591 in.	
	Mark 5	1.55 mm	0.0610 in.	
	Mark 6	1.60 mm	0.0630 in.	
	Mark 7	1.65 mm	0.0650 in.	
	Mark 8	1.70 mm	0.0669 in.	
	Mark 9	1.75 mm	0.0689 in.	
	Mark A	1.80 mm	0.0709 in.	
	Mark B	1.85 mm	0.0728 in.	
	Mark C	1.90 mm	0.0748 in.	
	Mark D	1.95 mm	0.0768 in.	
	Mark E	2.00 mm	0.0787 in.	
	Mark F	2.05 mm	0.0807 in.	
	Mark G	2.10 mm	0.0827 in.	
	Mark H	2.15 mm	0.0846 in.	
	Mark J	2.20 mm	0.0866 in.	
	Mark K	2.25 mm	0.0886 in.	
	Mark L	2.30 mm	0.0906 in.	
	Mark M	2.35 mm	0.0925 in.	
	Mark N	2.40 mm	0.0945 in.	
	Mark P	2.45 mm	0.0965 in.	
	Mark Q	2.50 mm	0.0984 in.	
Shift lever preload		0.49–1.47 N	60–150 kgf	0.1–0.3 lbf
Shift lever preload adjusting shim thickness				
	Mark A	0.5 mm	0.020 in.	
	Mark B	0.6 mm	0.024 in.	
	Mark C	0.7 mm	0.028 in.	
	Mark D	0.8 mm	0.031 in.	
	Mark E	0.9 mm	0.035 in.	
	Mark F	1.0 mm	0.039 in.	
	Mark G	1.1 mm	0.043 in.	
	Mark H	1.2 mm	0.047 in.	
	Mark J	1.3 mm	0.051 in.	
	Mark K	1.4 mm	0.055 in.	
	Mark L	1.5 mm	0.059 in.	
	Mark M	1.6 mm	0.063 in.	
	Mark N	1.7 mm	0.067 in.	

TORQUE SPECIFICATIONS

MX010–01

Part tightened	N·m	kgf·cm	ft·lbf
Transaxle X Engine			
12 mm bolt	64	650	47
10 mm bolt	46	470	34
Front suspension member X Body	181	1,850	134
Front lower brace X Body	36	370	27
Rear lower brace X Body			
Bolt	32	330	24
Nut	36	370	27
Engine rear mounting X Front suspension member	80	820	59
Engine front mounting X Front suspension member	80	820	59
Engine absorber lock bolt	48	490	35
Engine X Stiffener plate	18	185	13
Transaxle X Stiffener plate	37	380	27
Steering gear housing X Front suspension member	181	1,850	134
Stabilizer bar bushing bracket lock bolt	19	195	14
Exhaust front pipe X Catalytic converter	43	440	32
Exhaust front pipe X Exhaust manifold	62	630	46
Transaxle X Clutch accumulator bracket	20	200	14
Transaxle X Starter	39	400	29
Transaxle X Clutch release cylinder	13	130	9
Transaxle X Transaxle case receiver	7.4	75	65 in.·lbf
Oil pump X Cover	10	105	8
Transaxle case X Transaxle case cover	54	550	40
Differential right case X Differential left case	63	640	46
Differential ring gear X Differential case	124	1,260	91
Transaxle case X Oil pump	17	175	13
Transaxle case X Transmission case	29	300	22
Reverse idler gear lock bolt	29	300	22
Transmission case X Rear bearing retainer	42	430	31
5th driven gear lock nut	123	1,250	90
Transmission case X Transmission case cover	29	300	22
Shift and select lever shaft lock bolt	20	200	14
Shift lever lock bolt	49	500	36
Breather plug	49	500	36
Selecting bellcrank lock bolt	20	200	14
Back–up light switch	40	410	30
Speed sensor lock bolt	7.4	75	65 in.·lbf
Shift lever ball cover lock bolt	5.0	50	43 in.·lbf

AUTOMATIC TRANSAXLE

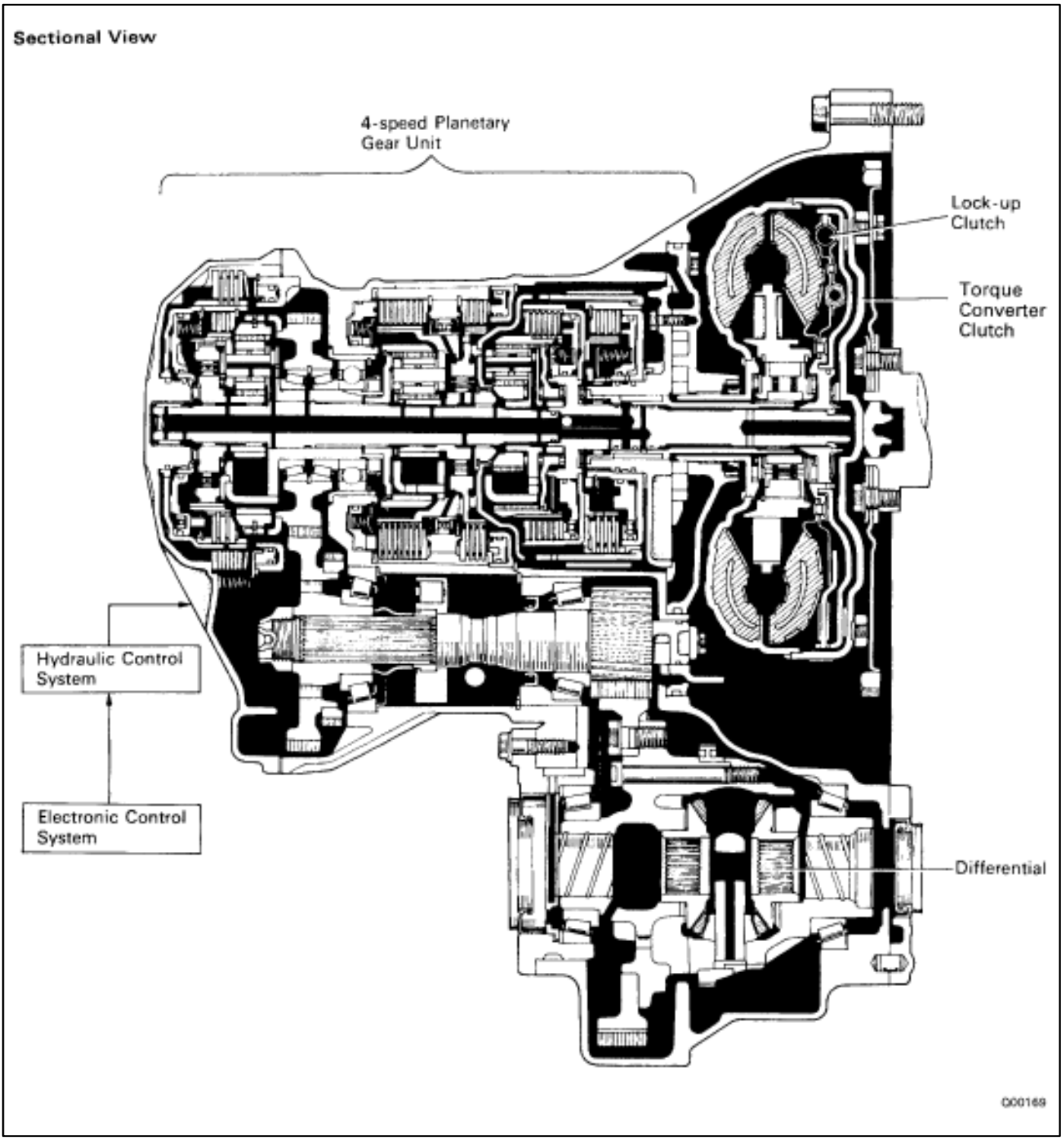
DESCRIPTION

GENERAL DESCRIPTION

AX016–01

The A540E is a 4–speed Electronic Controlled Transaxle (hereafter called ECT) developed exclusively for use with a transversely–mounted engine. A lock–up is built into the torque converter.

The A540E transaxle is mainly composed of the torque converter clutch, the 4–speed planetary gear unit, the differential, the hydraulic control system and the electronic control system.



SPECIFICATIONS

AX017–01

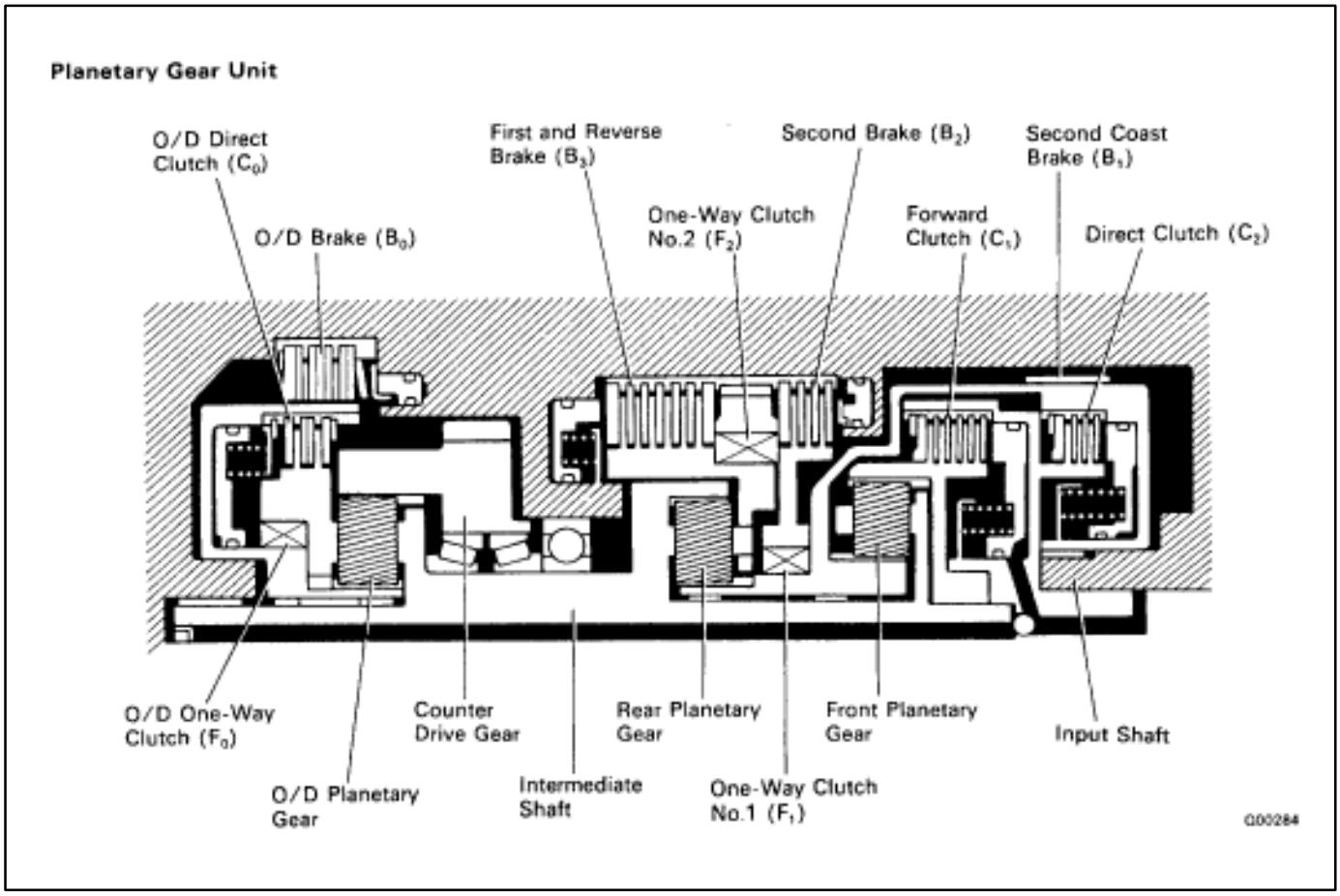
Type of Transmission				A540E
Type of Engine				3VZ–FE
Torque Converter Clutch	Stall Torque Ratio			1.9 : 1
	Lock–Up Mechanism			Equipped
Gear Ratio	1st Gear			2.810
	2nd Gear			1.549
	3rd Gear			1.000
	O/D Gear			0.734
	Reverse Gear			2.296
Number of Discs and Plates (Disc/Plate)	C_0	O/D Direct Clutch		2/2
	C_1	Forward Clutch		5/5
	C_2	Direct Clutch		3/3
	B_2	2nd Brake		3/3
	B_3	First & Reverse Brake		7/7
	B_0	O/D Brake		3/3
B_1 Band Width			mm (in.)	38 (1.50)
ATF	Type			ATF DEXRON® II
	Capacity liter		A/T	6.5 (6.9, 5.7)
	(US qts, Imp. qts)		D/F	0.8 (0.8, 0.7)

V00334

OPERATION

MECHANICAL OPERATION

AX018–01



O ... Operating

Shift lever position	Gear position	C_0	C_1	C_2	B_0	B_1	B_2	B_3	F_0	F_1	F_2
P	Parking	O									
R	Reverse	O		O				O			
N	Neutral	O									
D	1st	O	O						O		O
	2nd	O	O				O		O	O	
	3rd	O	O	O			O		O		
	O/D		O	O	O		O				
2	1st	O	O						O		O
	2nd	O	O			O	O		O	O	
	*3rd	O	O	O			O		O		
L	1st	O	O					O	O		O
	*2nd	O	O			O	O		O	O	

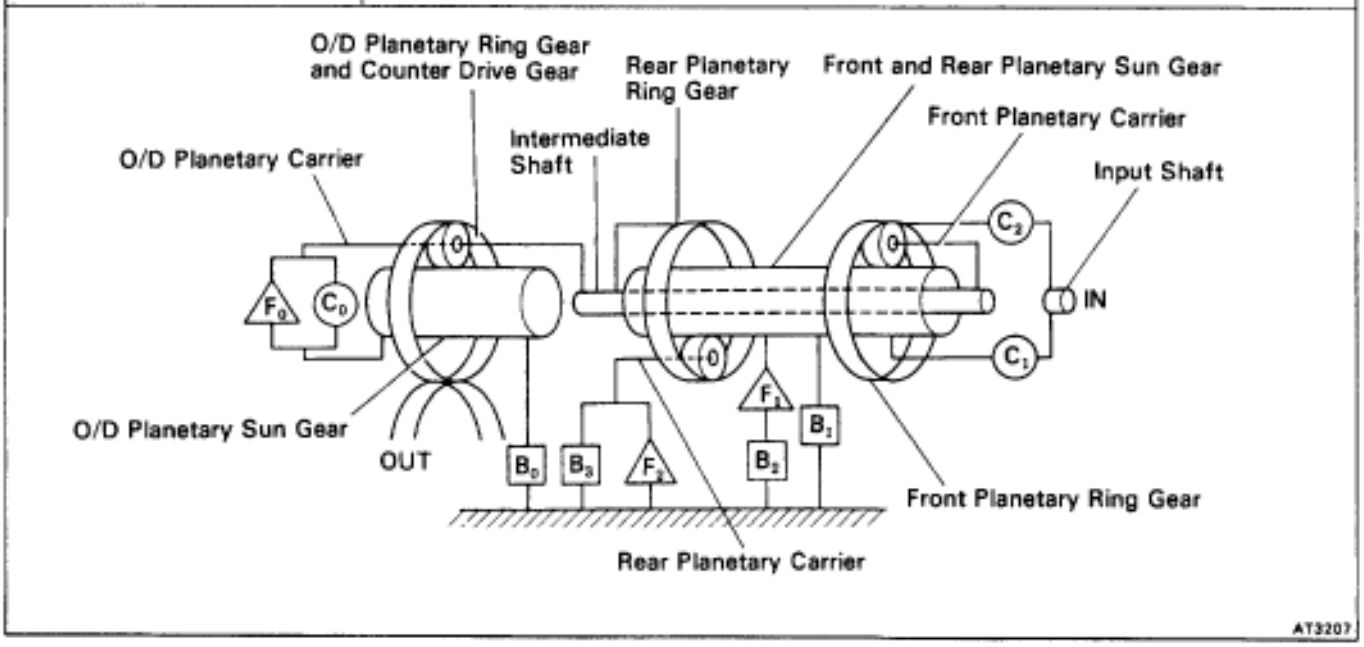
* Down–shift–no up–shift

V00337

FUNCTION OF COMPONENTS

AX019–01

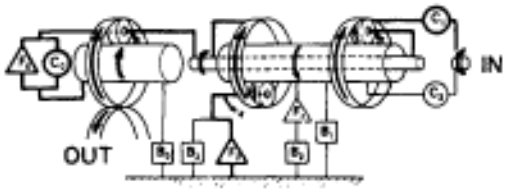
NOMENCLATURE		OPERATION
Forward Clutch	C_1	Connects input shaft and front planetary ring gear
Direct Clutch	C_2	Connects input shaft and front & rear planetary sun gear
2nd Coast Brake	B_1	Prevents front & rear planetary sun gear from turning either clockwise or counterclockwise
2nd Brake	B_2	Prevents outer race of F_1 from turning either clockwise or counterclockwise, thus preventing front & rear planetary sun gear from turning counterclockwise
1st & Reverse Brake	B_3	Prevents rear planetary carrier from turning either clockwise or counterclockwise
No. 1 One-Way Clutch	F_1	When B_2 is operating, prevents front & rear planetary sun gear from turning counterclockwise
No. 2 One-Way Clutch	F_2	Prevents rear planetary carrier from turning counterclockwise
O/D Direct Clutch	C_0	Connects overdrive sun gear and overdrive planetary carrier
O/D Brake	B_0	Prevents overdrive sun gear from turning either clockwise or counterclockwise
O/D One-Way Clutch	F_0	When transmission is being driven by engine, connects overdrive sun gear and overdrive carrier
Planetary Gears		These gears change the route through which driving force is transmitted in accordance with the operation of each clutch and brake in order to increase or reduce the input and output speed



V00341

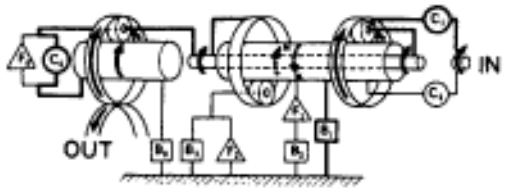
Power from the engine transmitted to the input shaft via the torque converter clutch is then transmitted to the planetary gears by the operation of the clutch.
By operation of the brake and one–way clutch, either the planetary carrier or the planetary sun gear are immobilized, altering the speed of revolution of the planetary gear unit.
Shift change is carried out by altering the combination of clutch and brake operation.
Each clutch and brake operates by hydraulic pressure; gear position is decided according to the throttle opening angle and vehicle speed, and shift change automatically occurs.
The conditions of operation for each gear position are shown on the following illustrations:

D or 2 Range 1st Gear



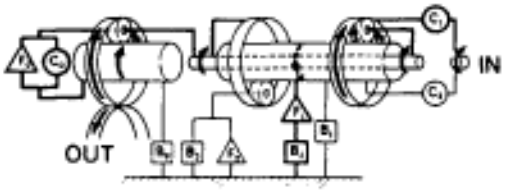
AT1097

2 Range 2nd Gear



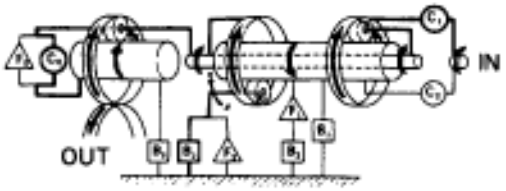
AT1102

D Range 2nd Gear



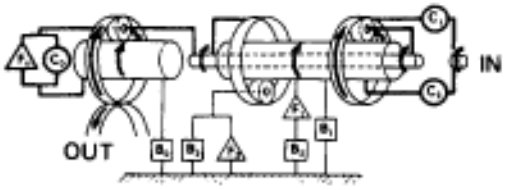
AT1098

L Range 1st Gear



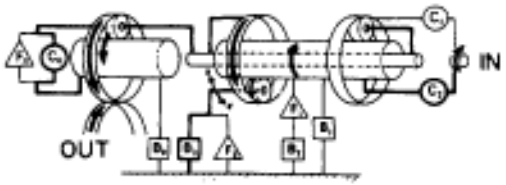
AT1103

D Range 3rd Gear



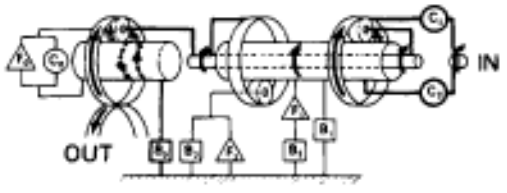
AT1099

R Range Reverse Gear



AT1101

D Range O/D Gear



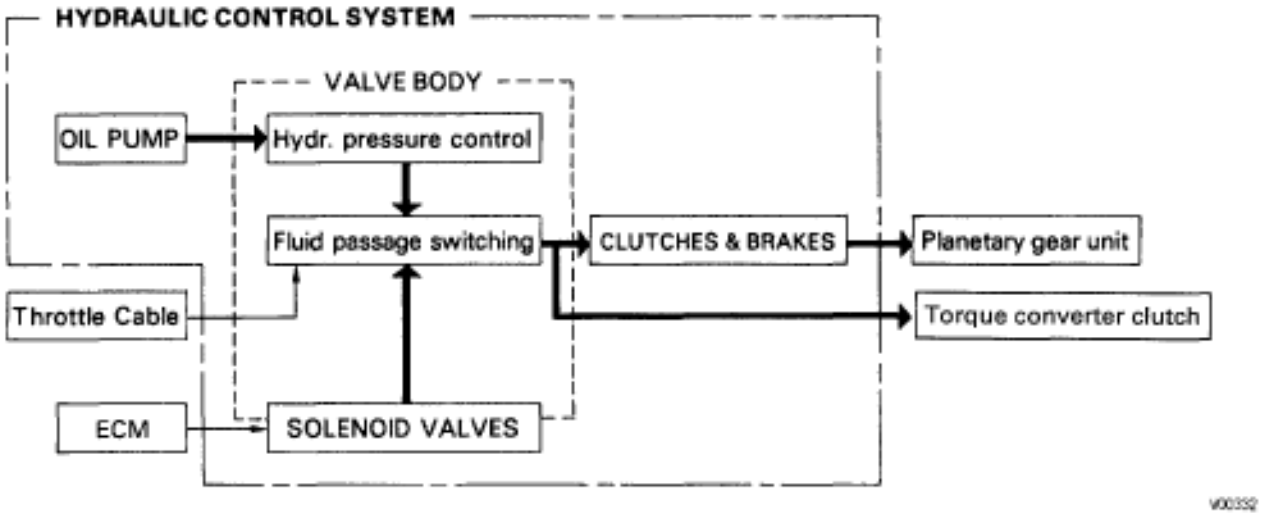
AT1100

VDD042

HYDRAULIC CONTROL SYSTEM

AX01A–01

The hydraulic control system is composed of the oil pump, the valve body, the solenoid valves, the accumulators, the clutches and brakes as well as the fluid passages which connect all of these components.
Based on the hydraulic pressure created by the oil pump, the hydraulic control system governs the hydraulic pressure acting on the torque converter clutch, clutches and brakes in accordance with the vehicle driving conditions.
There are three solenoid valves on the valve body.
The No. 1 and No. 2 solenoid valves are turned on and off by signals from the ECM to operate the shift valves and change the gear shift position.
The SL solenoid valve is operated by signals from the ECM to engage or disengage the lock–up clutch of the torque converter (clutch).



ELECTRONIC CONTROL SYSTEM

AX01B–01

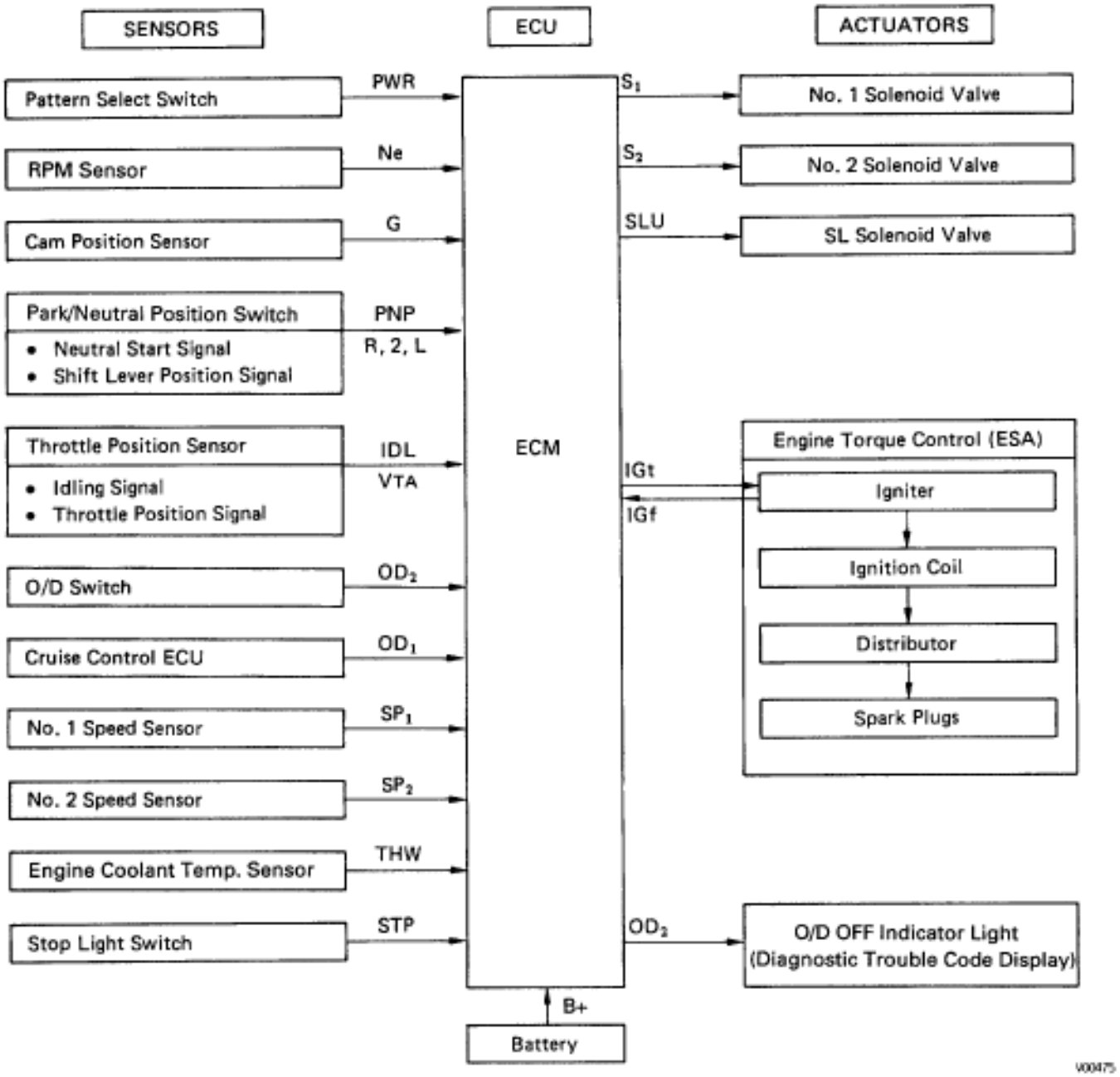
GENERAL

The electronic control system for the A540E automatic transaxle provides extremely precise control of the gear shift timing and lock–up timing in response to driving condition as sensed by various sensors located throughout the vehicle and in response to the engine's running condition. At the same time, the ECM control reduces vehicle squat when the vehicle starts out and gear shift shock.

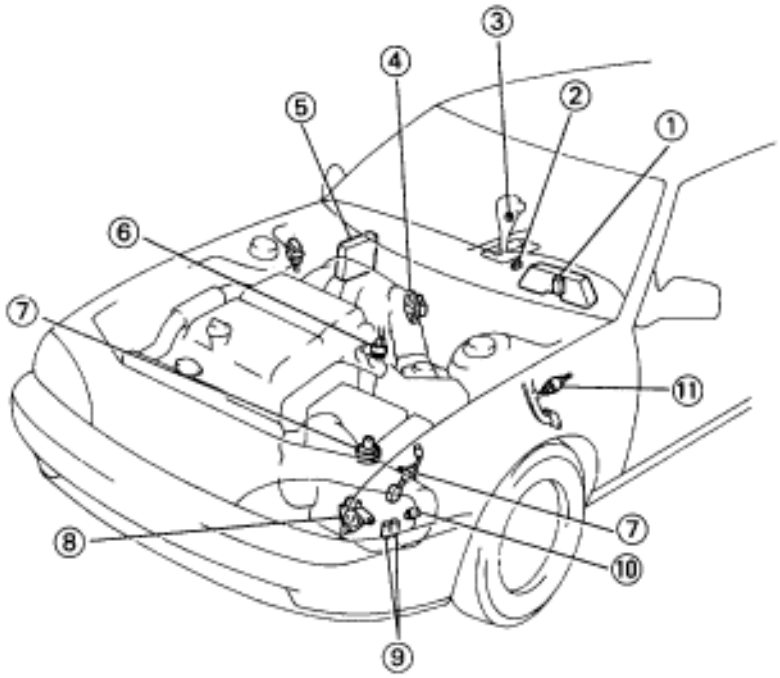
The electronic control system is also equipped with a self diagnosis system which diagnoses malfunctions of electronically controlled components and warns the driver, and a fail–safe system which makes it possible for the vehicle to continue functioning when a malfunction occurs.

CONSTRUCTION

The electronic control system can be broadly divided three groups; the sensors, ECM, and actuators.



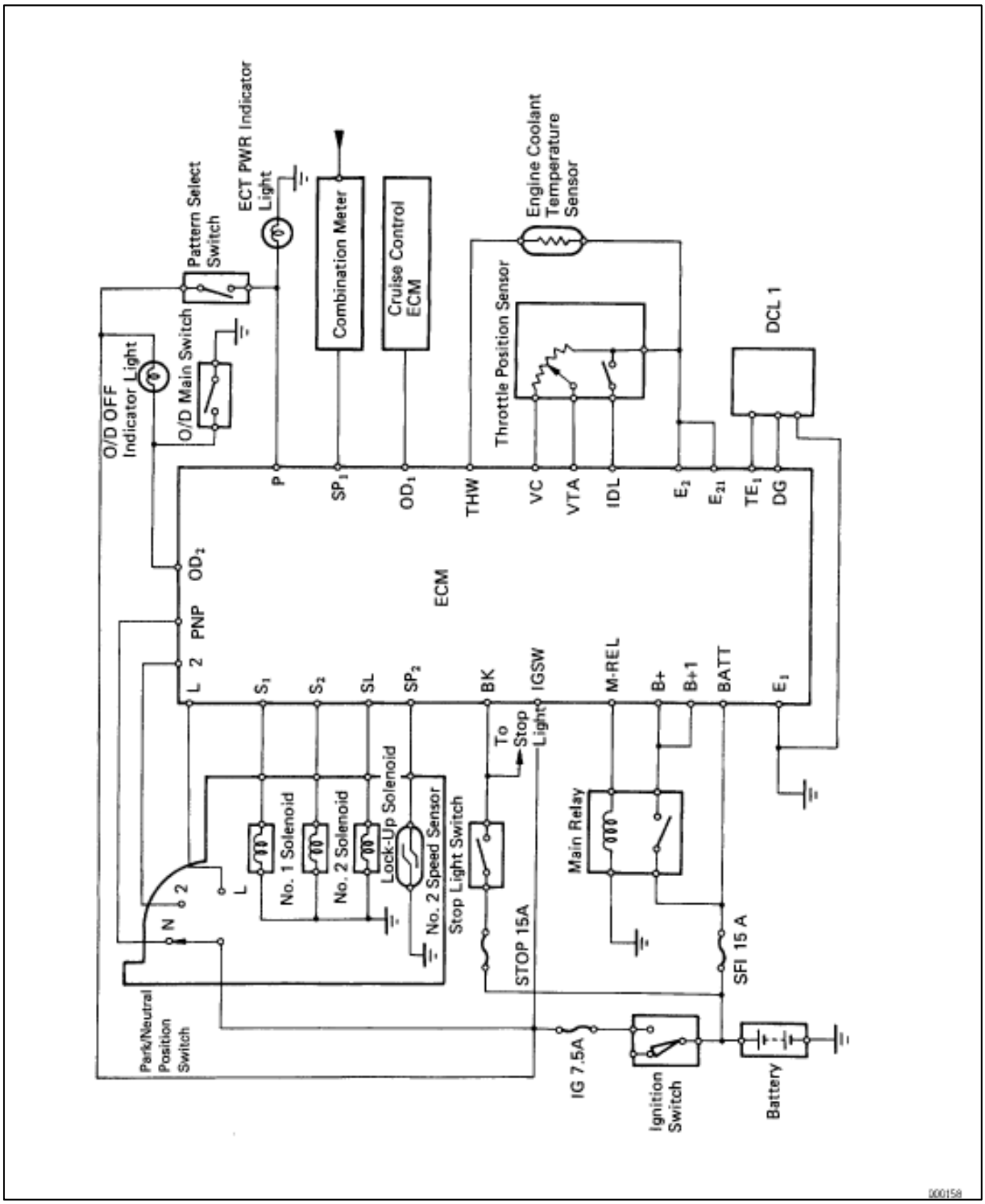
ARRANGEMENT OF COMPONENTS



No.	Components	Functions
①	O/D OFF Indicator Light	Blinks and warns the driver, while the O/D main switch is pushed in, when the electronic control circuit is malfunctioning.
②	Pattern Select Switch	Selects the Power mode or the Normal mode for shift and lock-up timing.
③	O/D Switch	Prevents up shift to the O/D gear if the O/D switch is off.
④	Throttle Position Sensor	Detects the throttle valve opening angle.
⑤	ECM	Controls the engine and transmission actuators based on signals from each sensor.
⑥	Engine Coolant Temp. Sensor	Detects the engine coolant temperature.
⑦	No. 1 and No. 2 Speed Sensors	Detect the vehicle speed. Ordinarily, ECT control uses signals from the No. 2 speed sensor, and the No. 1 speed sensor is used as a back-up
⑧	Park/Neutral Position Switch	Detects the shift lever position.
⑨	No. 1 and No. 2 Solenoid Valves	Control the hydraulic pressure applied to each shift valve, and control the gear shift position and timing.
⑩	No. 3 Solenoid For lock-up control pressure modulation	Controls the hydraulic pressure applied to the lock-up clutch and controls lock-up timing.
⑪	Stop Light Switch	Detects if the brake pedal is depressed.

V00476

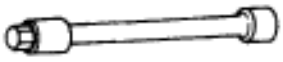
SYSTEM DIAGRAM



PREPARATION

SST (SPECIAL SERVICE TOOLS)

AX01C–01

	09043–38100	Hexagon 10 mm Wrench	Remove and install oil pan drain plug.
	09223–15010	Crankshaft Rear Oil Seal Replacer	
	09308–00010	Oil Seal Puller	Remove side gear shaft oil seal.
	09316–60010	Transmission & Transfer Bearing Replacer	Install RH side bearing to differential case.
	(09316–00010)	Replacer Pipe	Install right sid, gear shaft oil seal.
	09350–32014	TOYOTA Automatic Transmission Tool Set	
	(09351–32010)	One–way Clutch Test Tool	
	(09351–32020)	Stator Stopper	
	09843–18020	Diagnosis Check Wire	
	09992–00094	Automatic Transmission Oil Pressure Gauge Set	Line pressure

RECOMMENDED TOOLS

AX01D–01

	09031–00030 Pin Punch	Pin diameter 3mm(0.12in.)
	09082–00015 TOYOTA Electrical Tester	

EQUIPMENT

AX01E–01

Straight edge	Check torque converter clutch installation.
Vernier calipers	Check torque converter clutch installation.
Dial indicator or dial indicator with magnetic base	Measure drive plate runout.
Torque wrench	

LUBRICANT

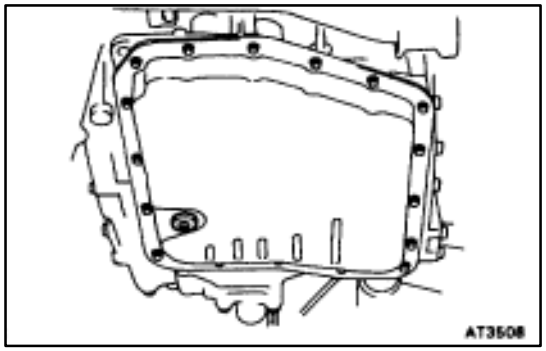
AX01Q–02

Item	Capacity	Classification
Automatic transaxle fluid (w/o differential oil) Dry fill Drain and refill	 6.5 liters (6.9 US qts, 5.7 Imp. qts) 2.9 liters (3.1 US qts, 2.6 Imp. qts)	ATF DEXRON® II
Differential oil (w/Differential oil)	0.8 liters (0.8 US qts, 0.7 Imp. qts)	ATF DEXRON® II

SSM (Special Service Materials)

AX01F–01

08833–00070	Adhesive 1324, THREE BOND 1324 or equivalent	Torque converter clutch mounting bolt

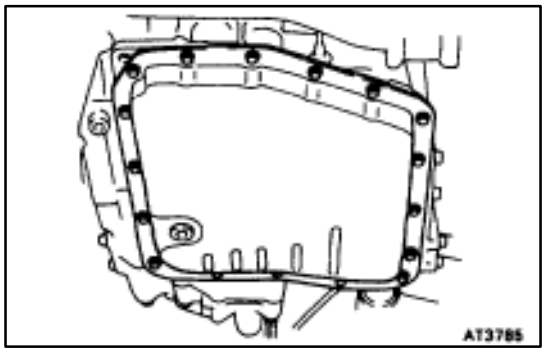


ON–VEHICLE REPAIR
VALVE BODY REMOVAL

AX02C–01

1. CLEAN TRANSMISSION EXTERIOR

To help prevent contamination, clean the exterior of the transmission.



2. DRAIN TRANSMISSION FLUID

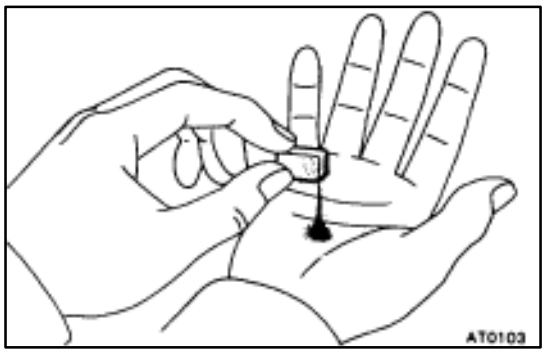
Using SST, remove the drain plug and the fluid into suitable container.

SST 09043–38100

3. REMOVE OIL PAN AND GASKET

NOTICE: Some fluid will remain in the oil pan.

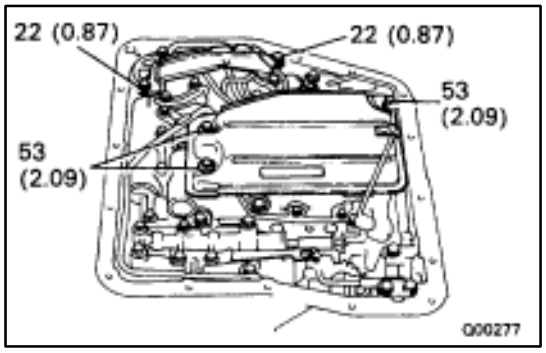
Remove all pan bolts, and carefully remove the pan assembly. Discard the gasket.



4. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect any steel chips. Look carefully at the chips and particles in the pan and the magnet to anticipate what type of wear you will find in the transmission.

- Steel (magnetic): bearing, gear and plate wear
- Brass (non–magnetic): bushing wear

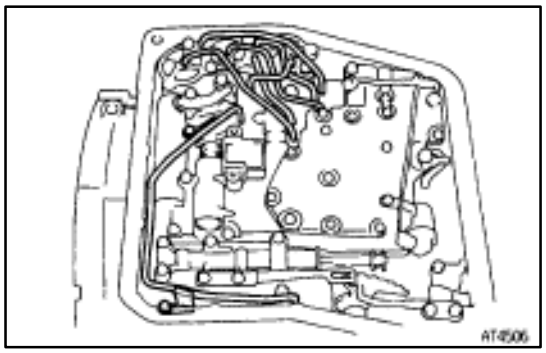


5. REMOVE OIL STRAINER AND APPLY TUBE BRACKET

(a) Remove the three bolts and the oil strainer.

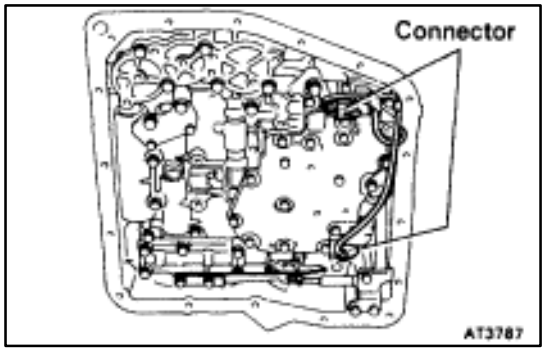
NOTICE: Be careful as shown oil will come out with the strainer.

(b) Remove the two bolts and the apply tube bracket.

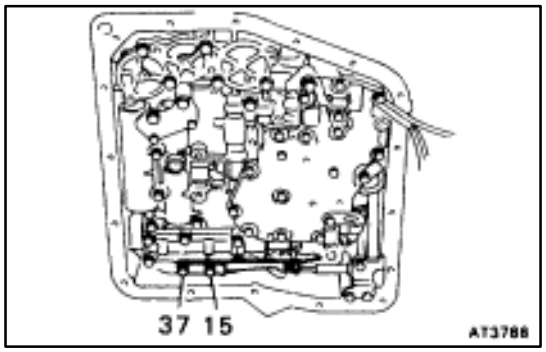


6. REMOVE OIL TUBES

Pry up both tube ends with a large screwdriver and remove the seven tubes.

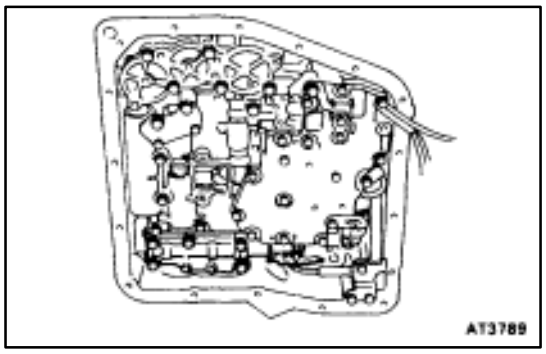


7. DISCONNECT SOLENOID CONNECTORS

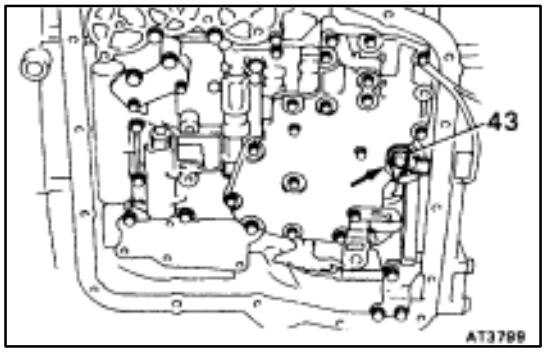


8. REMOVE MANUAL VALVE BODY

(a) Remove the two bolts and detent spring.

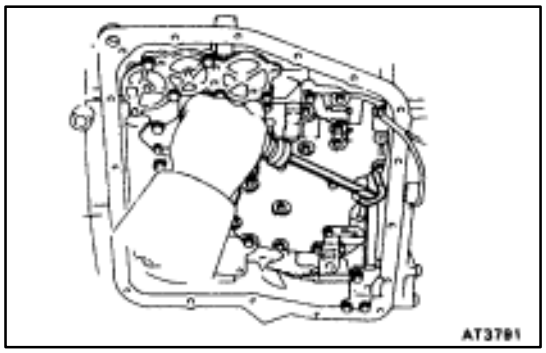


(b) Remove the five bolts and manual valve body.

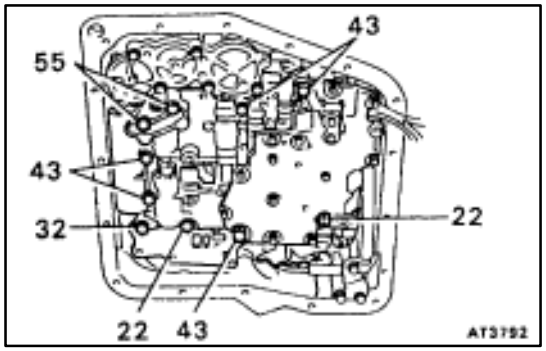


9. REMOVE B_3 APPLY TUBE

(a) Remove the tube retainer.

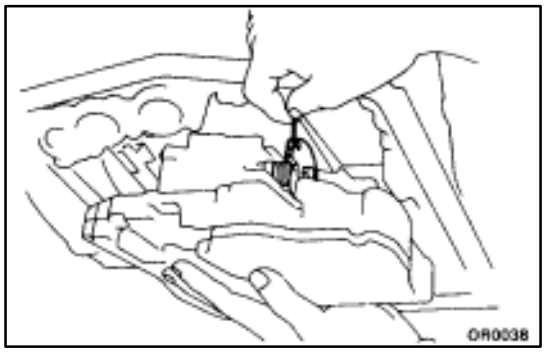


(b) Pry up the tube with a screwdriver and remove the tube.

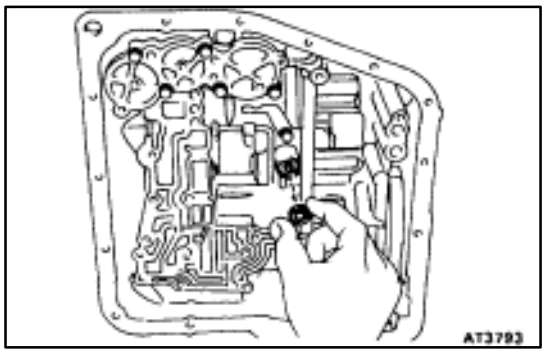


10. REMOVE VALVE BODY

(a) Remove the ten bolts and connector clamp.



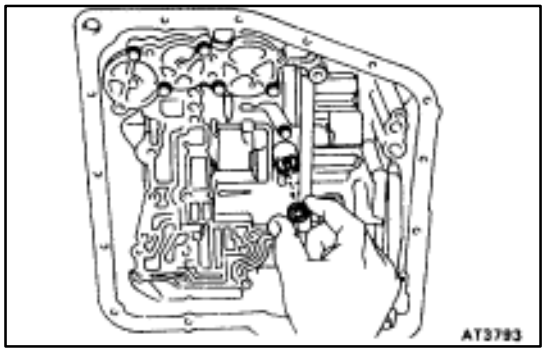
(b) Disconnect the throttle cable from cam and remove the valve body.



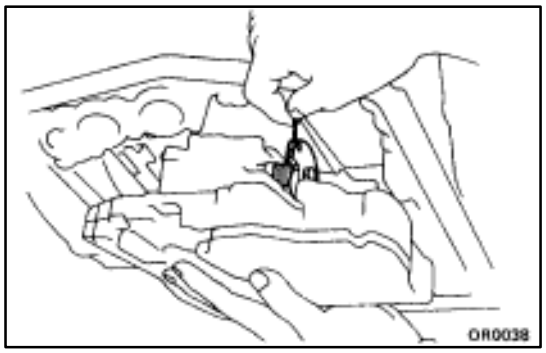
11. REMOVE SECOND BRAKE APPLY GASKET

VALVE BODY INSTALLATION

AX02D–01



1. INSTALL NEW SECOND BRAKE APPLY GASKET

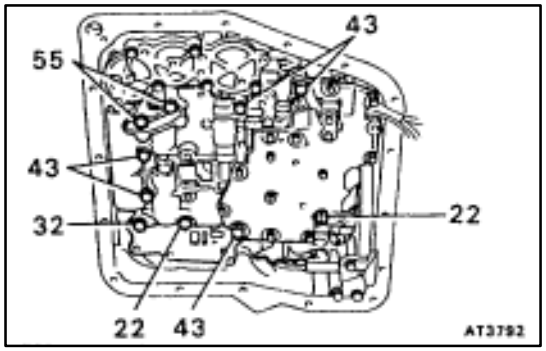


2. INSTALL VALVE BODY

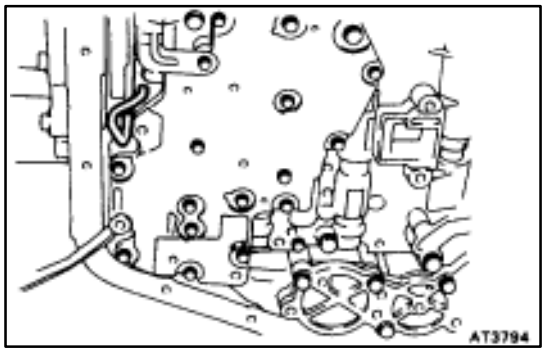
(a) While holding the cam down with your hand, slip the cable end into the slot.

(b) Bring valve body into place.

NOTICE: Be careful not to entangle the solenoid wire.

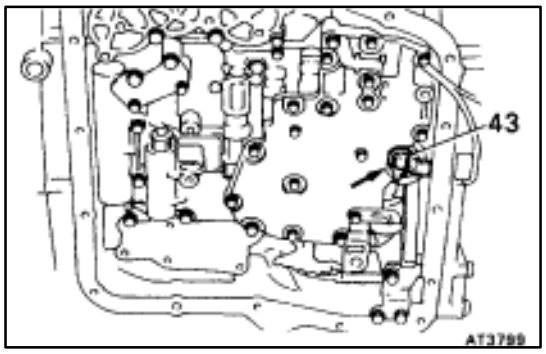


(c) Finger tighten all bolts first. Then tighten them with a torquewrench.
HINT: Each bolt length (mm) is indicated in the figure.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

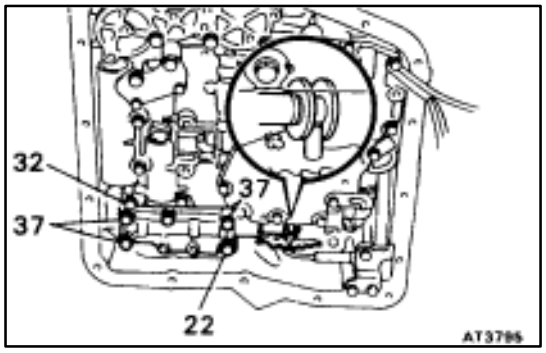


3. INSTALL B3 APPLY TUBE

(a) Install the tube.
NOTICE: Be careful not to bend of damage the tube.

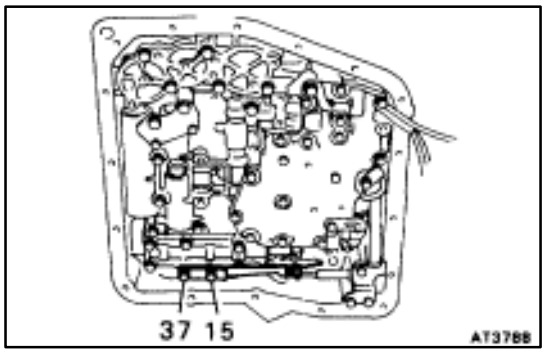


(b) Install the tube retainer.
HINT: The bolt length (mm) is indicated in the figure.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)



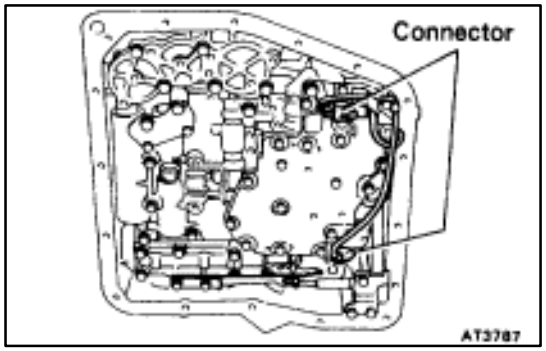
4. INSTALL MANUAL VALVE BODY

(a) Align the manual vale with the pin on the manual valve lever.
(b) Install the valve body into place.
(c) Finger tighten the five bolts first. Then tighten them with a torque wrench.
HINT: Each bolt length (mm) is indicated in the figure.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

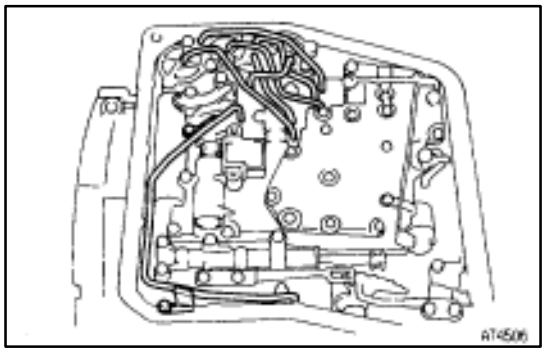


(d) Install the detent spring.
HINT: Each bolt length (mm) is indicated in the figure.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

(e) Check that the manual valve lever is in contact with the center of the roller at the tip of the detent spring.

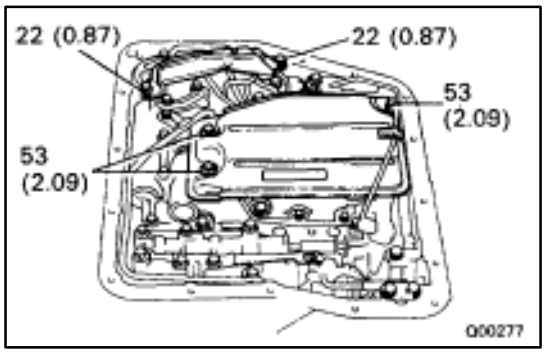


5. CONNECT SOLENOID CONNECTORS



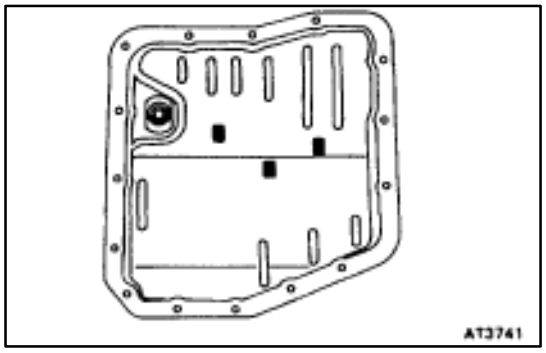
6. INSTALL OIL TUBES

(a) Using a plastic hammer, install the tubes into the positions indicated in the figure.
Torque: 5.4 N·m (55 kgf·cm, 48 ft·lbf)
HINT: Bolt length (mm (in.)) is indicated in the figure.
NOTICE: Be careful not to bend or damage the tubes.



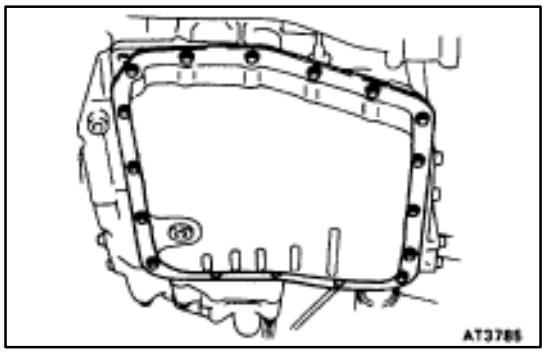
7. INSTALL OIL STRAINER AND APPLY TUBE BRACKET

Oil strainer
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)
Tube bracket
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
HINT: Each bolt length (mm) is indicated in the figure.



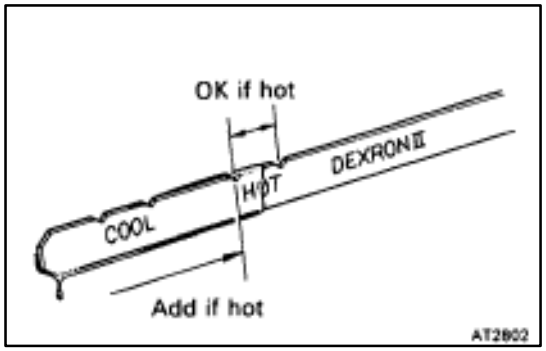
8. INSTALL MAGNET IN PLACE AS SHOWN

NOTICE: Make sure that the magnet does not interfere with the oil tubes.



9. INSTALL OIL PAN

(a) Install a new gasket and oil pan.
(b) Install and torque new seventeen bolts.
Torque: 4.9 N·m (50 kgf·cm, 43 ft·lbf)

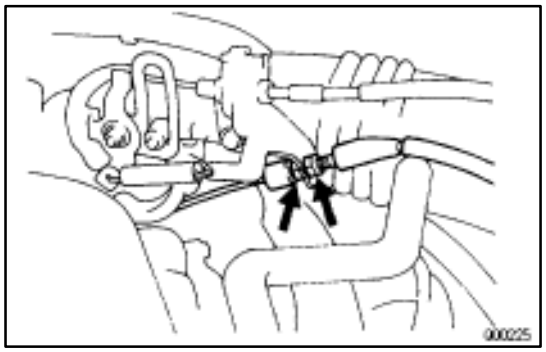


10. FILL TRANSMISSION WITH ATF
NOTICE: Do not overfill.
Fluid type:
ATF DEXRON® II

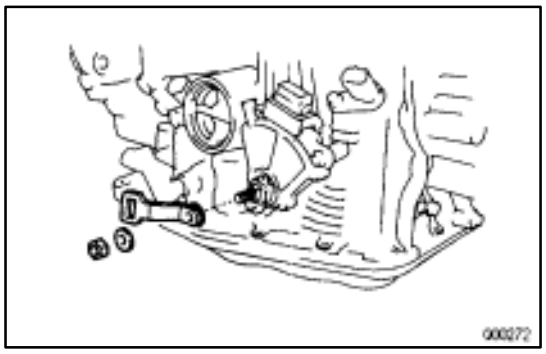
11. CHECK FLUID LEVEL (See page AX–56)

THROTTLE CABLE REMOVAL

AX01G–01

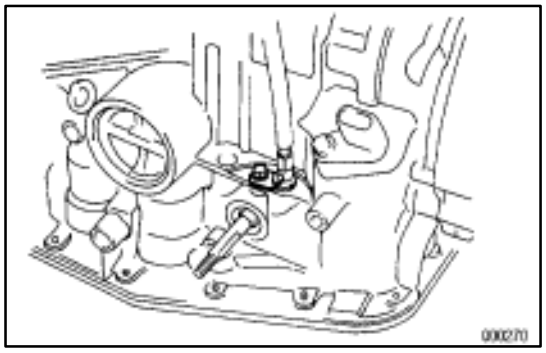


1. DISCONNECT THROTTLE CABLE FROM ENGINE
Disconnect the cable from the throttle linkage.



2. REMOVE PARK/NEUTRAL POSITION SWITCH
(a) Disconnect the transaxle control cable from the transaxle control shaft lever.
(b) Remove the transaxle control shaft lever.
(c) Remove the park/neutral position switch.

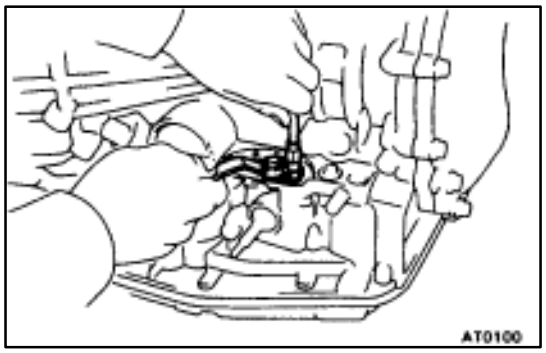
3. REMOVE VALVE BODY (See page AX–13)



4. REMOVE THROTTLE CABLE
(a) Remove the bolt and retaining plate.
(b) Pull out the cable from the transaxle case.

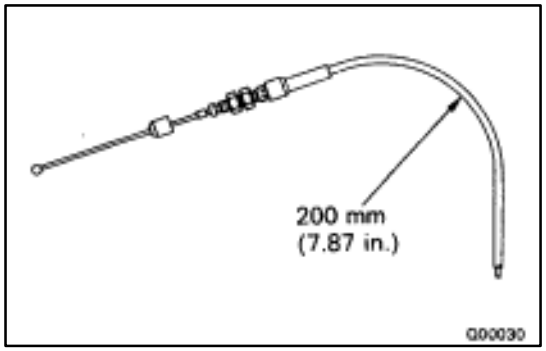
THROTTLE CABLE INSTALLATION

AX02E–01



1. INSTALL CABLE INTO TRANSAXLE CASE
(a) Be sure to push it in all the way.
(b) Install the retaining plate and bolt.

2. INSTALL VALVE BODY (See page AX–15)

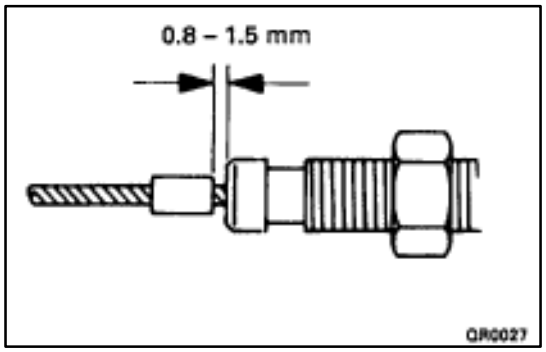


3. IF THROTTLE CABLE IS NEW, STAKE STOPPER OR PAINT MARK ON INNER CABLE

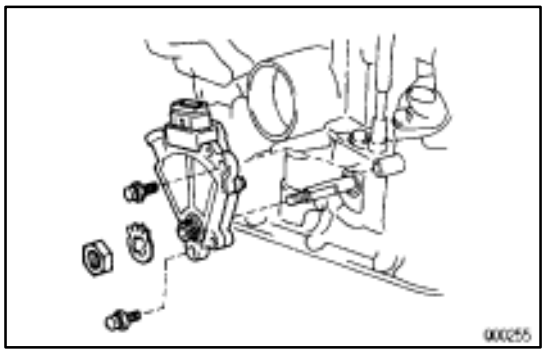
HINT: New cables do not have a staked cable stopper.

(a) Bend the cable so there is a radius of about 200 mm (7.87 in.)

(b) Pull the inner cable lightly until a light resistance is felt, and hold it in position there.



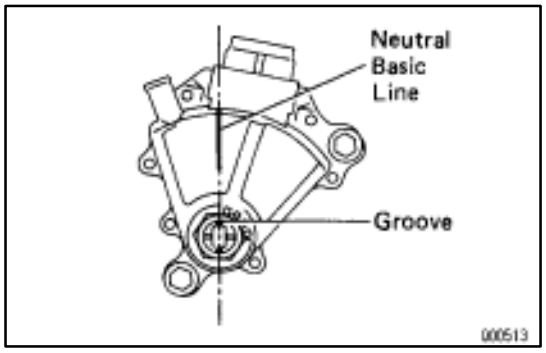
(c) Stake the stopper, 0.8–1.5 mm (0.031–0.059 in.) from the end of outer cable.



4. CONNECT THROTTLE CABLE TO ENGINE

5. ADJUST THROTTLE CABLE

(See page AX–58)



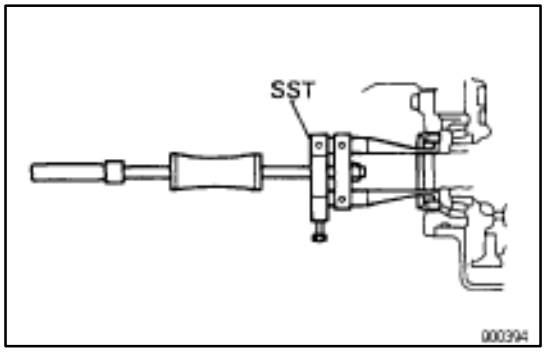
6. INSTALL PARK/NEUTRAL POSITION SWITCH

(a) Install the park/neutral position switch.

(b) Adjust the park/neutral position switch. (See page AX–58)

(c) Install the transaxle control shaft lever.

7. TEST DRIVE VEHICLE



SIDE GEAR SHAFT OIL SEAL REPLACEMENT

AX01H–01

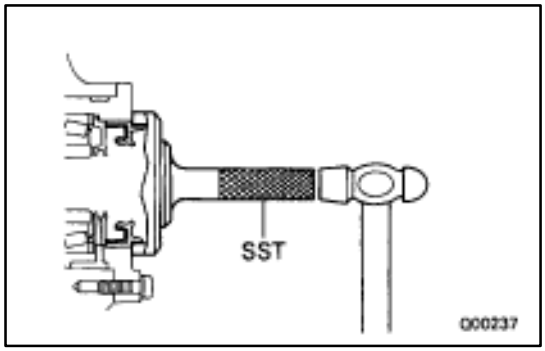
1. REMOVE BOTH DRIVE SHAFTS

(See page SA–20)

2. REMOVE BOTH SIDE GEAR SHAFT OIL SEALS

Using SST, pull out the oil seal.

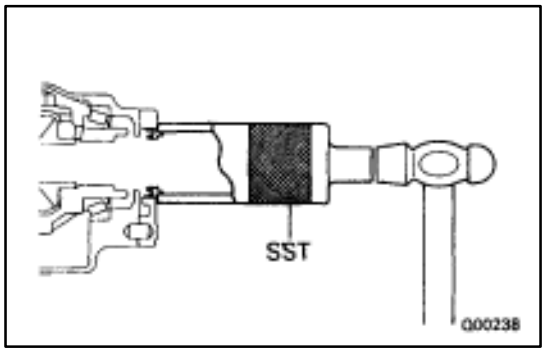
SST 09308–00010



3. INSTALL LEFT SIDE GEAR SHAFT OIL SEAL

(a) Using SST, drive in a new oil seal.
SST 09223–15010
Oil seal depth:
0±0.5 mm (0±0.02 in.)

(b) Coat the lip of oil seal with MP grease.



4. INSTALL RIGHT SIDE GEAR SHAFT OIL SEAL

(a) Using SST, drive in a new oil seal.
SST 09316–60010(09316–00010)
Oil seal depth:
0±0.5 mm (0±0.02 in.)

(b) Coat the lip of oil seal with MP grease.

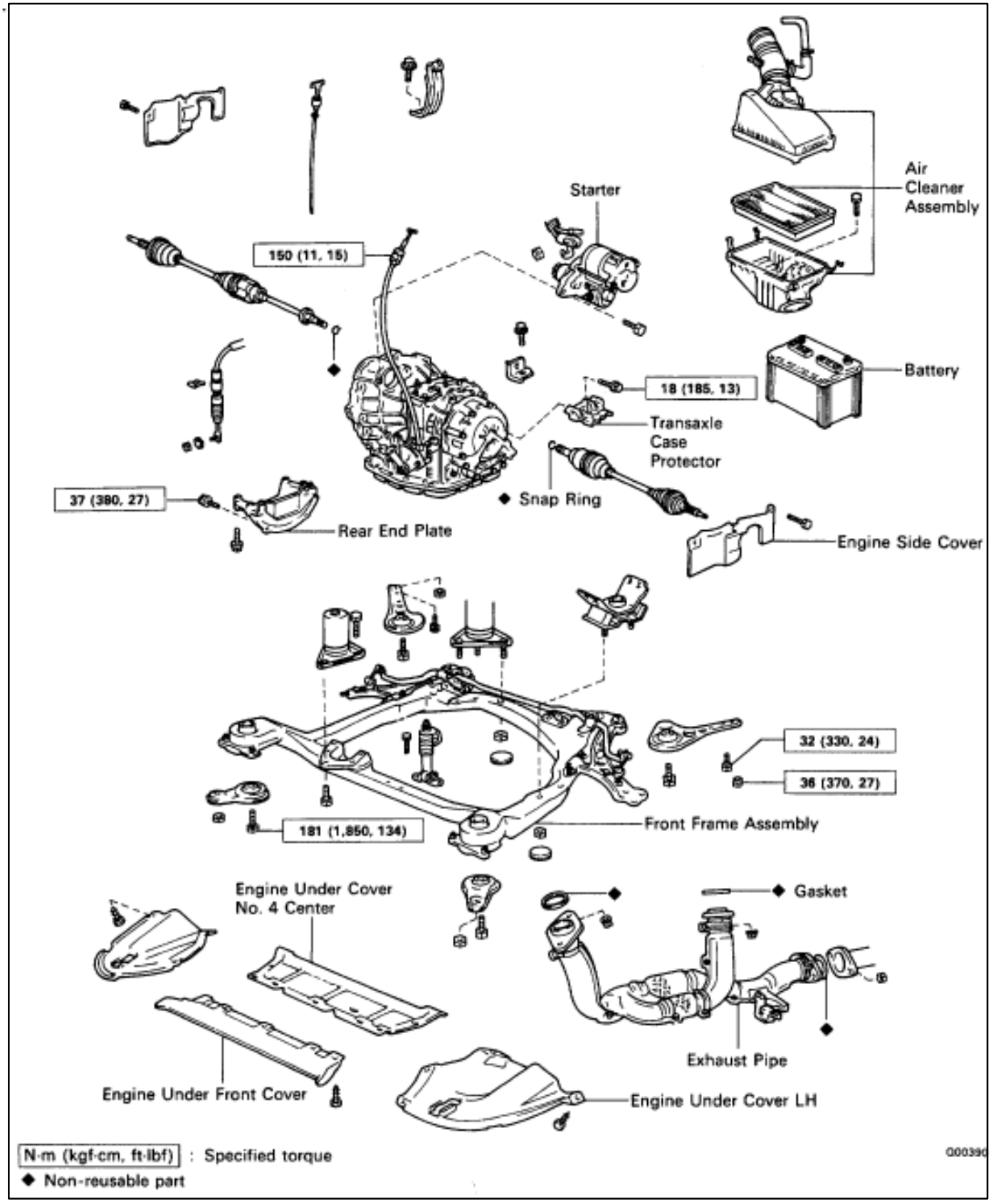
5. INSTALL BOTH DRIVE SHAFTS
(See page SA–23)

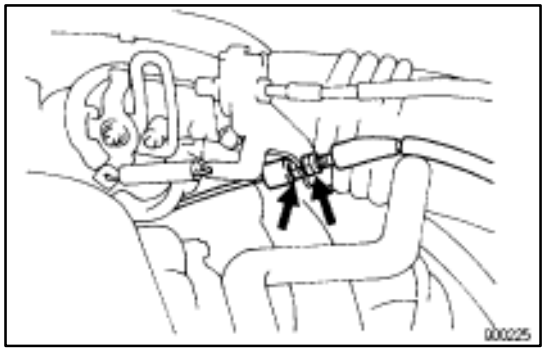
6. CHECK TRANSAXLE FLUID LEVEL
(See page AX–56)

ASSEMBLY REMOVAL AND INSTALLATION

AX01J–01

Remove and install the parts as shown.

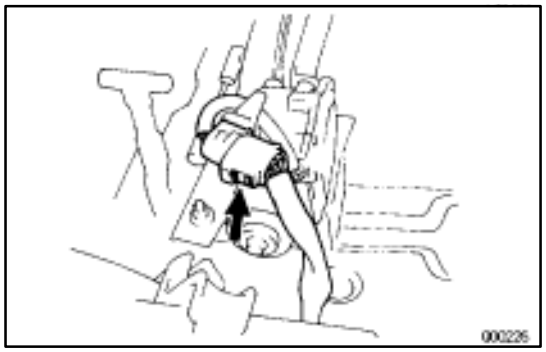




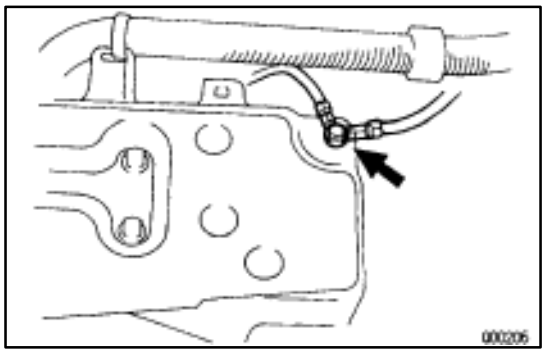
TRANSAXLE REMOVAL

AX02F–01

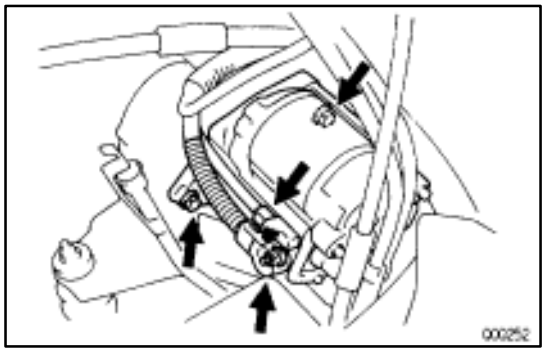
1. DISCONNECT AND REMOVE BATTERY
2. REMOVE AIR CLEANER ASSEMBLY
3. REMOVE THROTTLE CABLE FROM ENGINE



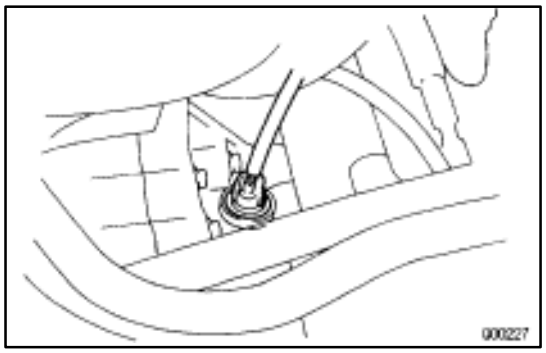
(w/ Cruise Control System)
4. REMOVE CRUISE CONTROL ACTUATOR COVER
5. DISCONNECT CONNECTOR FROM CRUISE CONTROL ACTUATOR



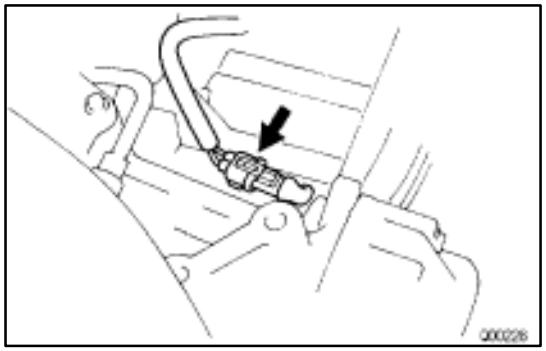
6. REMOVE GROUND EARTH TERMINAL



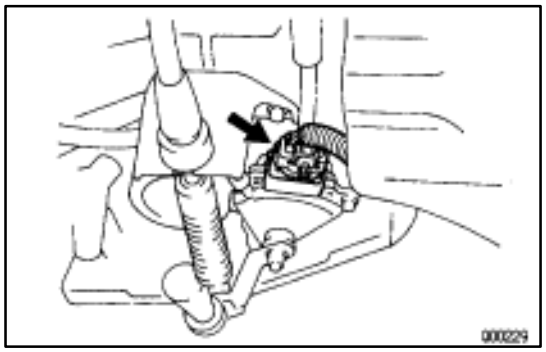
7. REMOVE STARTER
(a) Disconnect the connector and remove the nut.
(b) Remove the two bolts and the starter.



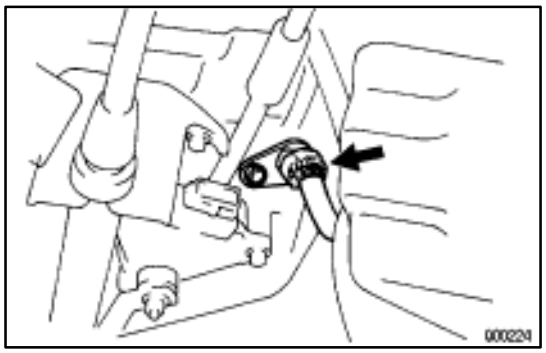
8. DISCONNECT NO.1 SPEED SENSOR CONNECTOR



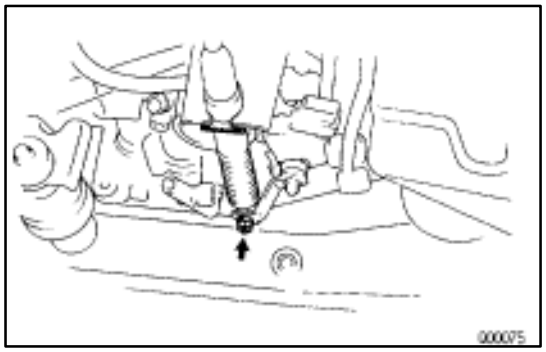
9. DISCONNECT NO.2 SPEED SENSOR CONNECTOR



10. DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR



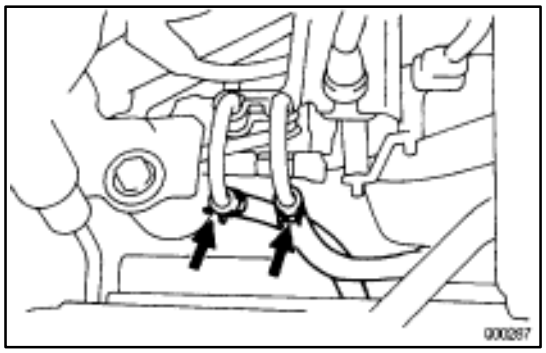
11. DISCONNECT SOLENOID CONNECTOR



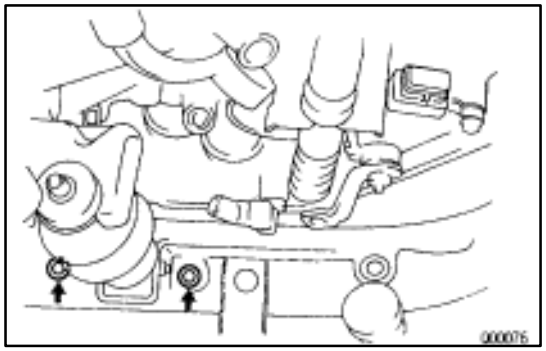
12. DISCONNECT SHIFT CONTROL CABLE

(a) Remove the clip from the shift control cable.

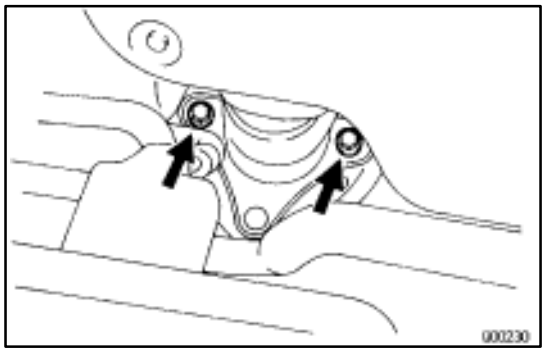
(b) Remove the unit.



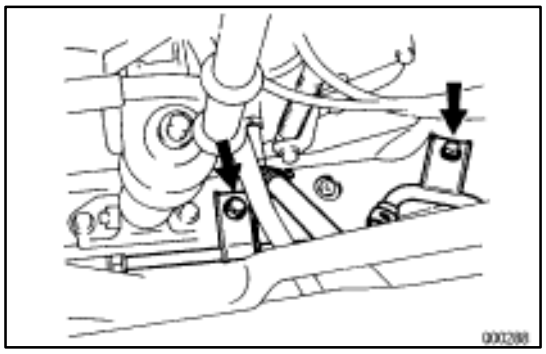
13. DISCONNECT OIL COOLER HOSE



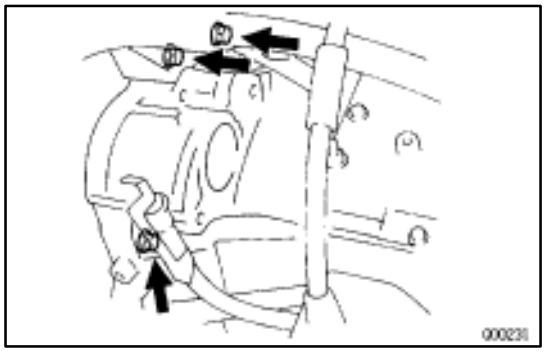
14. REMOVE TWO FRONT SIDE TRANSAXLE MOUNTING BOLTS



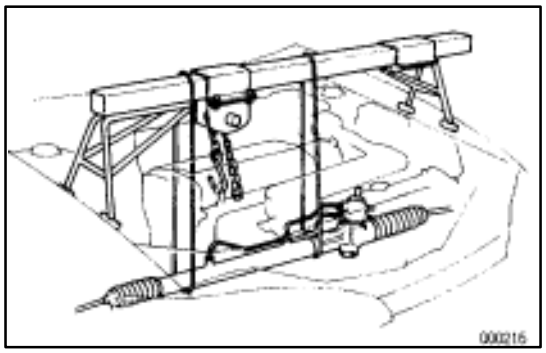
15. REMOVE TWO FRONT SIDE ENGINE MOUNTING BOLTS



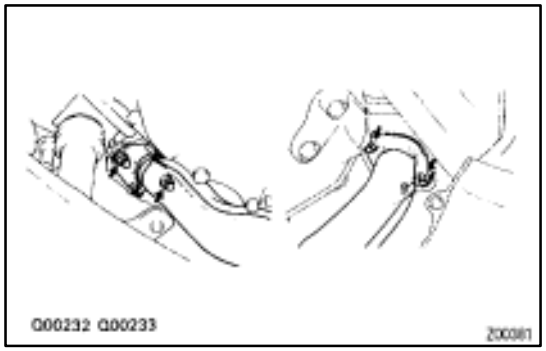
16. REMOVE OIL COOLER CLAMPING BOLTS FROM FRONT FRAME ASSEMBLY



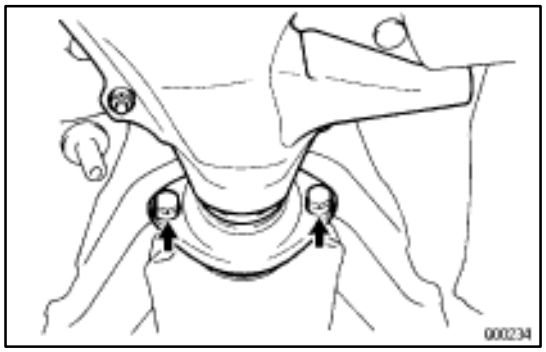
17. REMOVE THREE UPPER TRANSAXLE–TO–ENGINE BOLTS



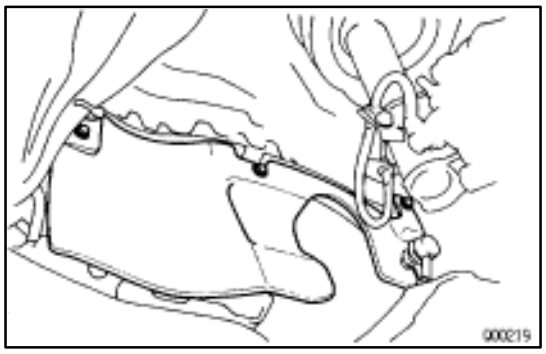
18. INSTALL ENGINE SUPPORT FIXTURE
19. TIE STEERING GEAR HOUSING TO ENGINE SUPPORT FIXTURE BY CORD OR EQUIVALENT



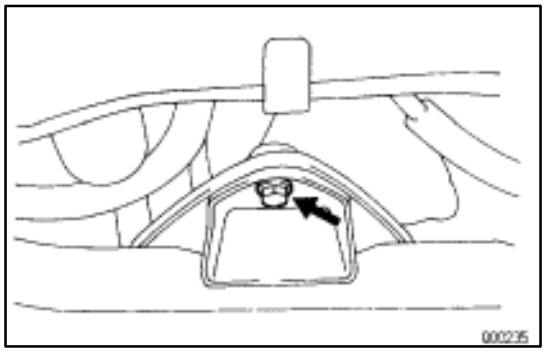
20. RAISE AND SUITABLY SUPPORT VEHICLE
21. REMOVE FRONT WHEEL
22. REMOVE EXHAUST PIPE
(a) Remove four nuts.



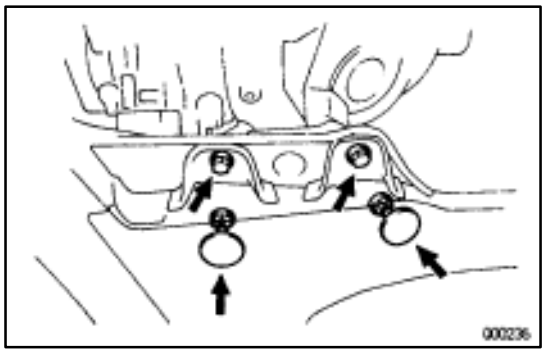
(b) Remove the two bolts and nuts from the rear exhaust pipe.
23. REMOVE DIFFERENTIAL FLUID DRAIN PLUG AND GASKET
24. DRAIN DIFFERENTIAL FLUID INTO A SUITABLE CONTAINER



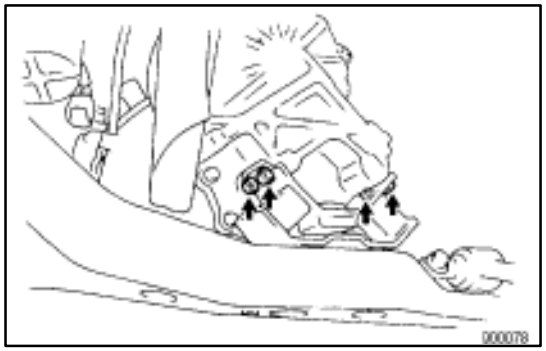
25. REMOVE RIGHT AND LEFT ENGINE SIDE COVER NO.2
26. REMOVE ENGINE UNDER FRONT COVER NO.1 AND NO.2



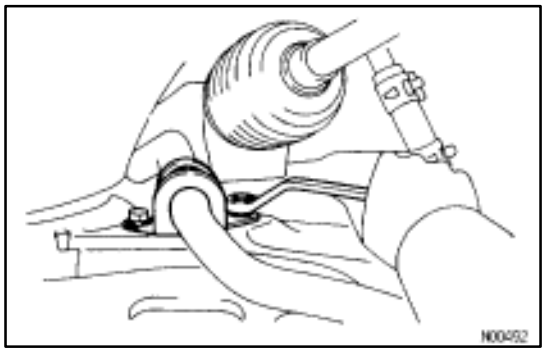
27. REMOVE DRIVE SHAFT
(See page SA–20)
28. REMOVE FRONT SIDE ENGINE MOUNTING NUT



29. REMOVE REAR SIDE ENGINE MOUNTING BOLTS
(a) Remove two hole plugs.
(b) Remove two bolts and nuts.

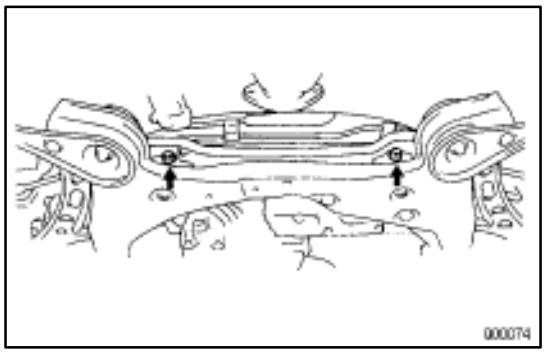


30. REMOVE FOUR LEFT SIDE TRANSAXLE MOUNTING BOLTS

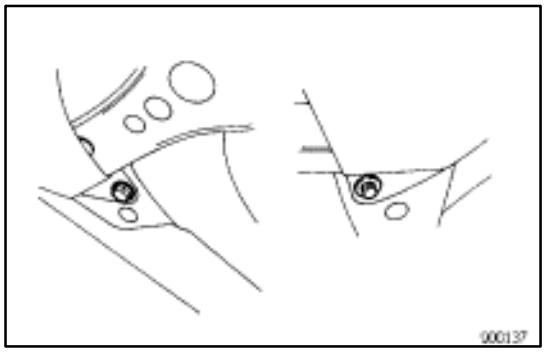


31. REMOVE STEERING GEAR HOUSING

(a) Remove the four bolts and disconnect the stabilizer bar bush bracket from the front frame assembly.

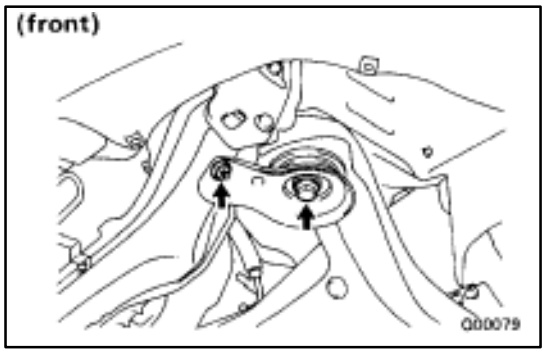


(b) Remove two bolts and nuts from the steering gear housing.
(c) Remove the steering gear housing.

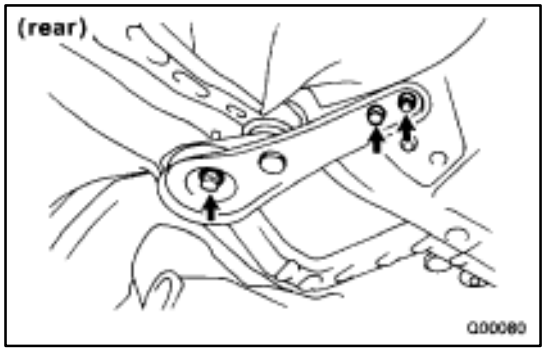


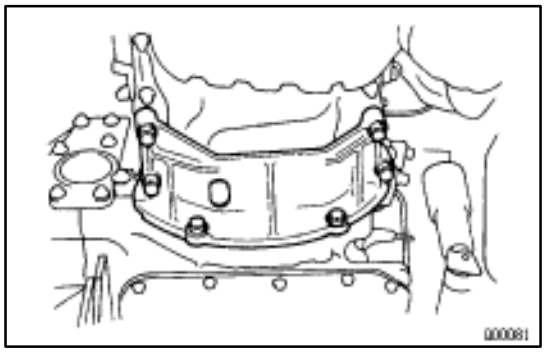
32. REMOVE FRONT FRAME ASSEMBLY

(a) Hold the front frame assembly with a jack.
(b) Remove two set screws from the right and left fender liners.



(c) Remove six bolts and four nuts.
(d) Remove the front frame assembly.



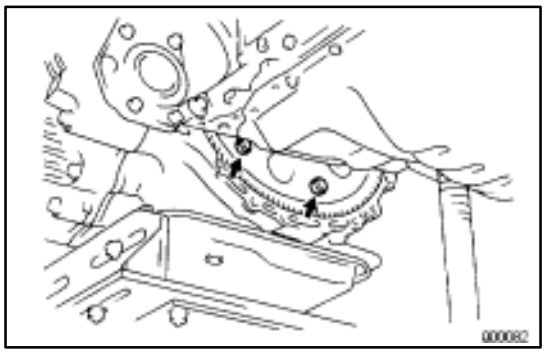


33. HOLD TRANSAXLE WITH A JACK

34. REMOVE REAR END PLATE

(a) Remove six bolts.

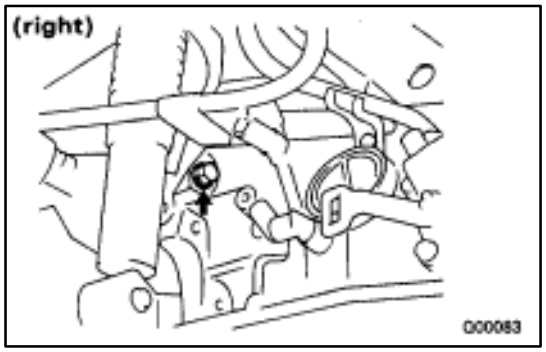
(b) Remove the rear end plate.



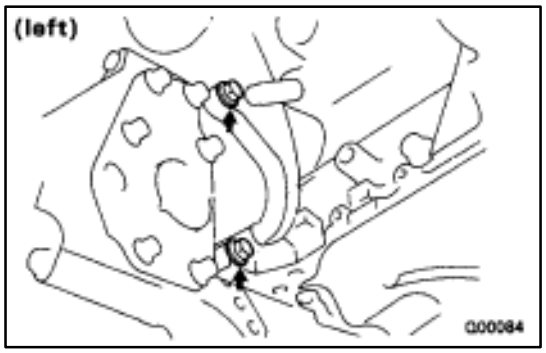
35. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLTS

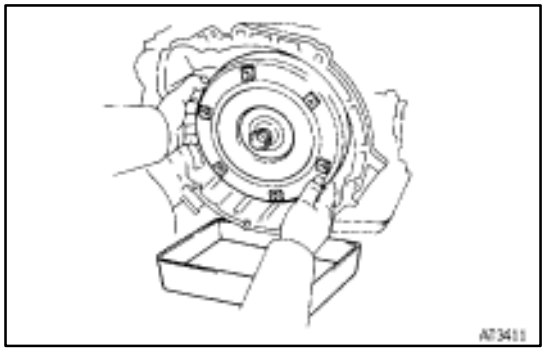
(a) Turn the crankshaft to gain access to each bolt.

(b) Hold the crankshaft pulley nut with a wrench and remove the six bolts.



36. REMOVE TRANSAXLE TO ENGINE BOLTS



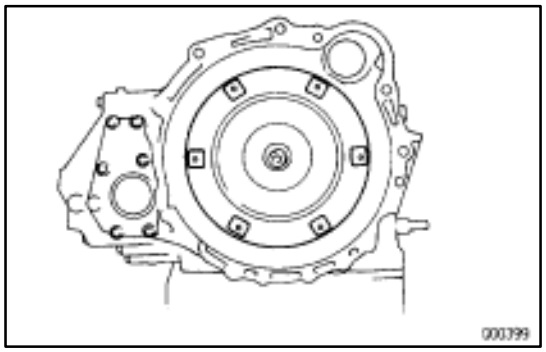


37. REMOVE TRANSAXLE ASSEMBLY

Separate transaxle and engine, and lower the transaxle.

38. REMOVE TORQUE CONVERTER CLUTCH FROM TRANSAXLE

TRANSAXLE INSTALLATION

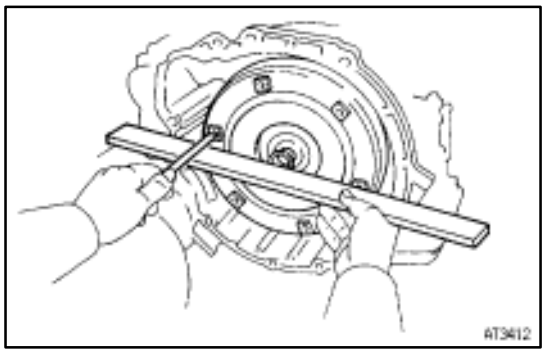


1. INSTALL TORQUE CONVERTER CLUTCH IN TRANSAXLE

If the torque converter clutch has been drained and washed, refill with new ATF.

Fluid type:

ATF DEXRON® II

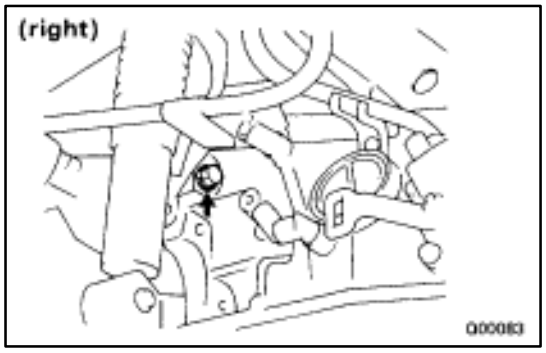


2. CHECK TORQUE CONVERTER CLUTCH INSTALLATION

Using calipers and a straight edge, measure from the installed surface to the front surface of the transmission housing.

Correct distance:

More than 13.7 mm (0.539 in.)



3. ALIGN TRANSAXLE AT INSTALLATION POSITION

(a) Align the two knock pins on the block with the converter housing.

(b) Temporarily install one bolt.

4. INSTALL TRANSAXLE TO ENGINE BOLTS

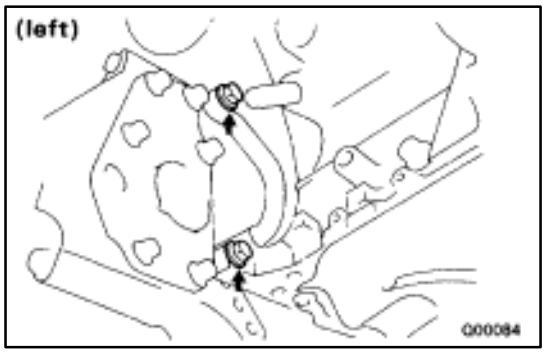
Install the transaxle–to–engine bolts.

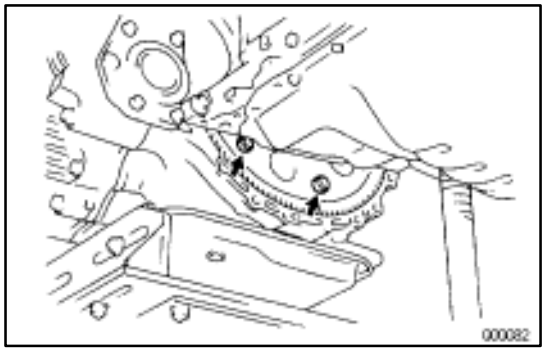
12 mm head bolt

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

10 mm head bolt

Torque: 46 N·m (470 kgf·cm, 34 ft·lbf)





5. INSTALL TORQUE CONVERTER CLUTCH MOUNTING BOLTS

(a) Clean the threads of the bolts with gasoline.

(b) Coat the threads of the bolts with sealer.

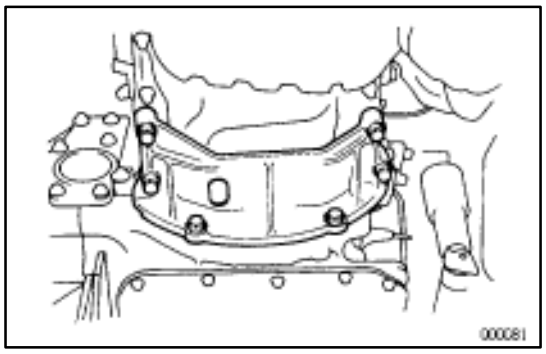
Sealer:

Part No. 08833–00070, THREE BOND 1324 or equivalent

(c) Tighten the bolts evenly.

Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

HINT: First install dark green colored bolt and then the five bolts.

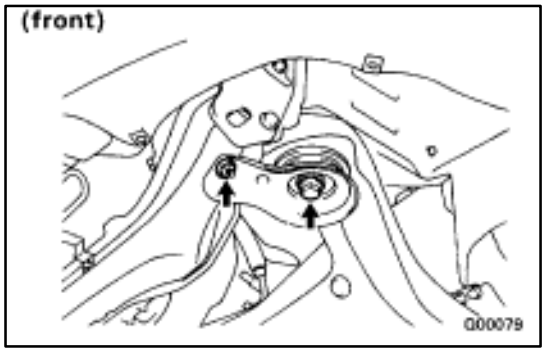


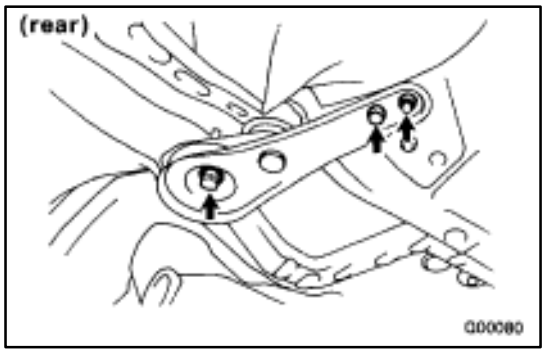
6. INSTALL REAR END PLATE

(a) Install the rear end plate with the six bolts.

(b) Torque the six bolts.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)





7. INSTALL FRONT FRAME ASSEMBLY

(a) Hold the front frame assembly.

(b) Install the six bolts and four nuts.

(c) Torque the bolts and nuts.

19 mm head bolt

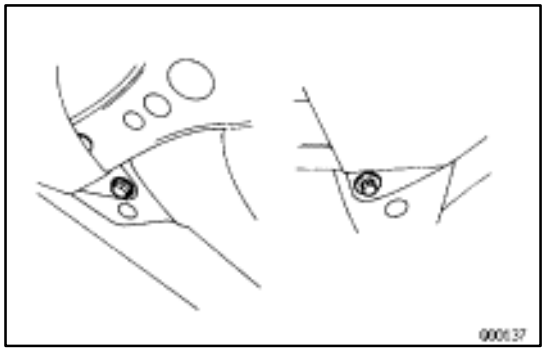
Torque: 181 N·m (1,850 kgf·cm, 134 ft·lbf)

12 mm head bolt

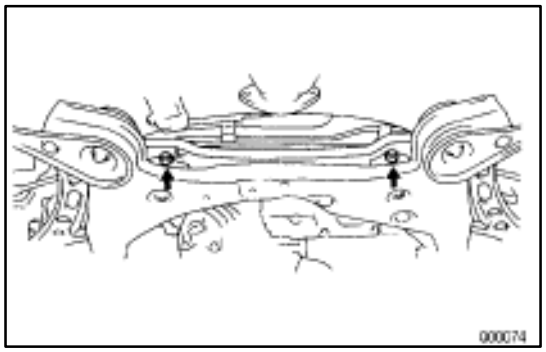
Torque: 32 N·m (330 kgf·cm, 24 ft·lbf)

Nut

Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)



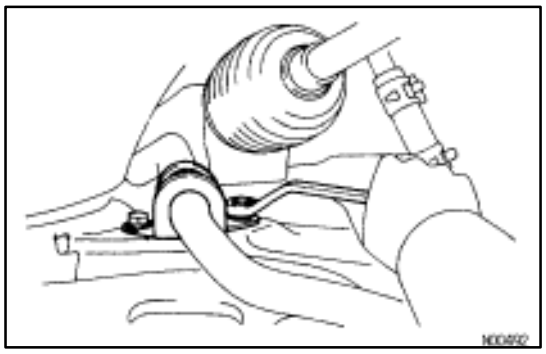
(d) Install the two set screws in the right and left fender liners.



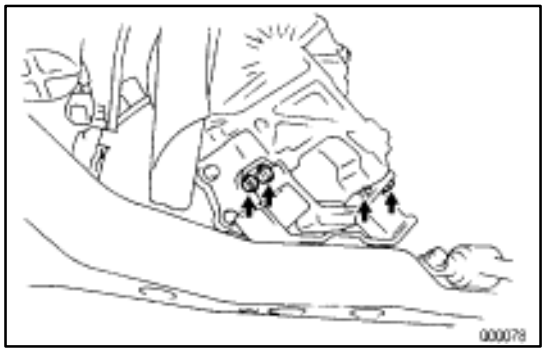
8. INSTALL STEERING GEAR HOUSING

(a) Install the steering gear housing to the front frame assembly.

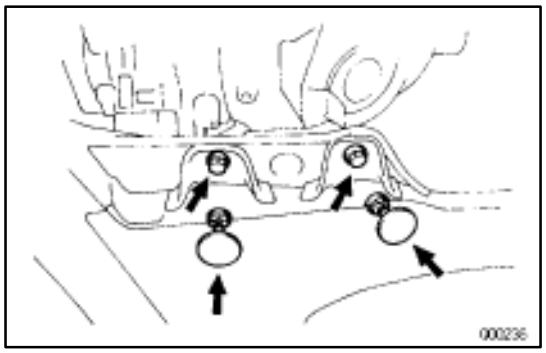
(b) Install and torque the two bolts and nuts.
Torque 181 N·m (1,850 kgf·cm, 134 ft·lbf)



(c) Connect the stabilizer bar bush bracket with the four bolts.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)



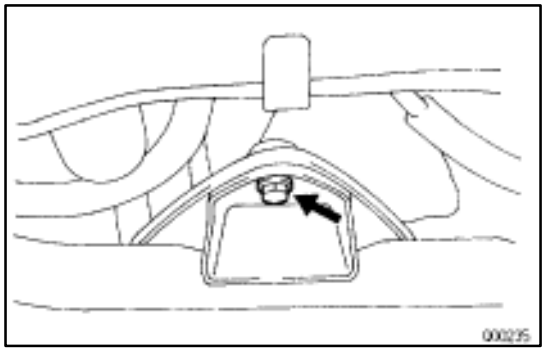
9. INSTALL FOUR LEFT SIDE TRANSAXLE MOUNTING BOLTS
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)



10. INSTALL REAR SIDE MOUNTING BOLTS AND NUTS

(a) Install and torque the two bolts and nuts.
Torque: 66 N·m (670 kgf·cm, 48 ft·lbf)

(b) Install two hole plugs.

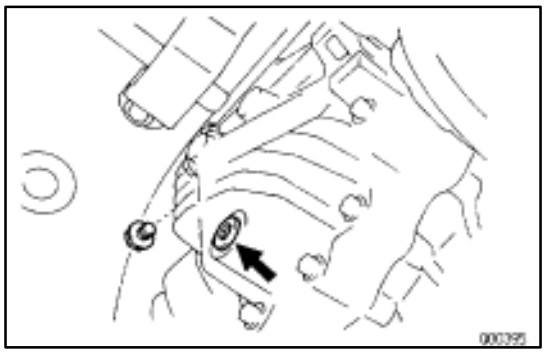


11. INSTALL FRONT SIDE ENGINE MOUNTING NUT
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

12. INSTALL DRIVE SHAFT
(See page SA–23)

14. INSTALL RIGHT AND LEFT ENGINE SIDE COVER NO.2

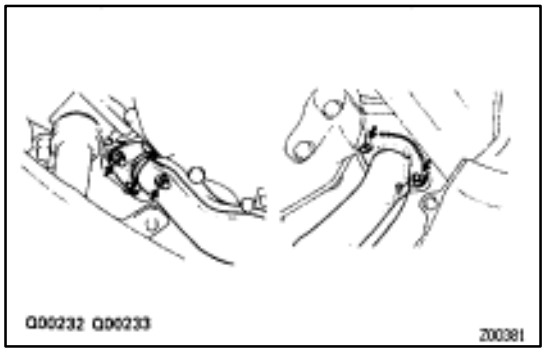
15. INSTALL ENGINE UNDER FRONT COVER NO.1 AND NO.2



16. INSTALL DIFFERENTIAL FLUID DRAIN PLUG WITH A NEW GASKET

17. FILL DIFFERENTIAL
Fluid Type:
ATF DEXRON® II
Capacity:
Differential 0.8 liters (0.8 US qts, 0.7 Imp. qts)

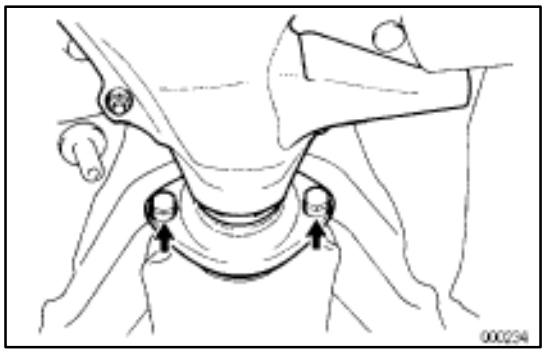
18. CHECK DIFFERENTIAL FLUID LEVEL



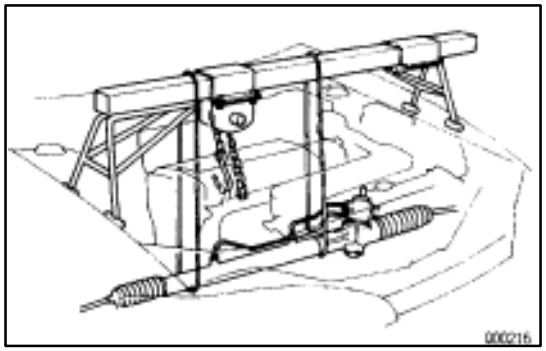
19. INSTALL EXHAUST PIPE

(a) Install and torque the four nuts.
Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

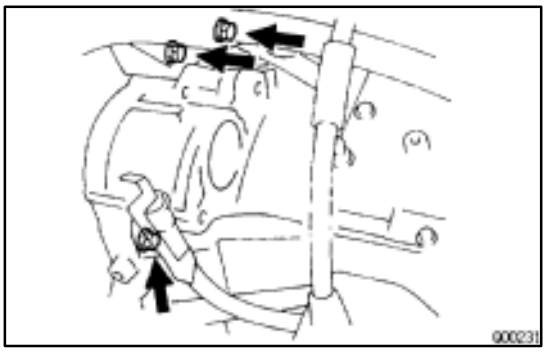
(b) Install the rear exhaust pipe with the two bolts and nuts.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



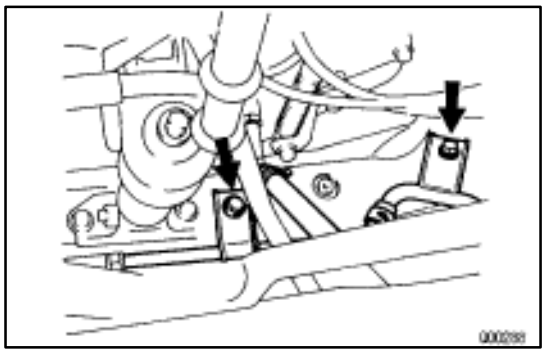
20. INSTALL FRONT WHEEL AND LOWER VEHICLE
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



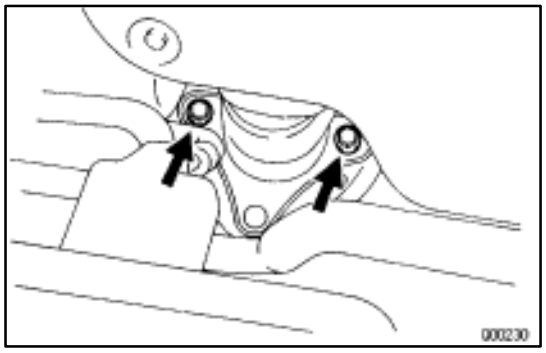
21. UNTIE STEERING GEAR HOUSING TO ENGINE SUPPORT FIXTURE BY CORD OR EQUIVALENT REMOVE ENGINE SUPPORT FIXTURE



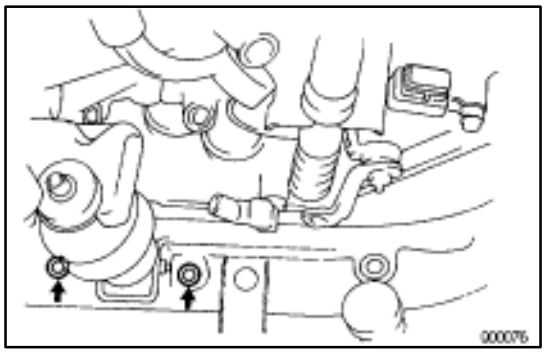
22. INSTALL THREE UPPER TRANSAXLE–TO–ENGINE BOLTS
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)



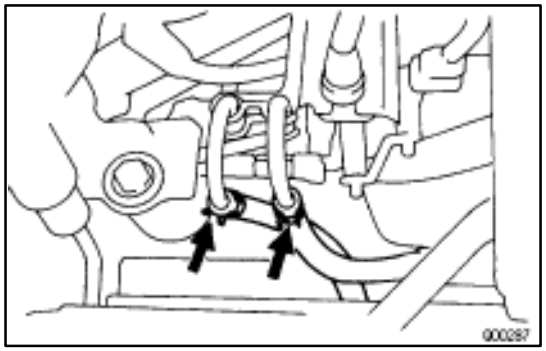
23. INSTALL OIL COOLER CLAMPING BOLTS TO FRONT FRAME ASSEMBLY



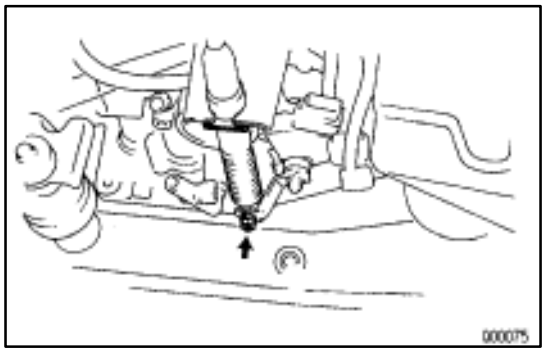
24. INSTALL TWO FRONT SIDE ENGINE MOUNTING BOLTS
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)



25. INSTALL TWO FRONT SIDE TRANSAXLE MOUNTING BOLTS
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

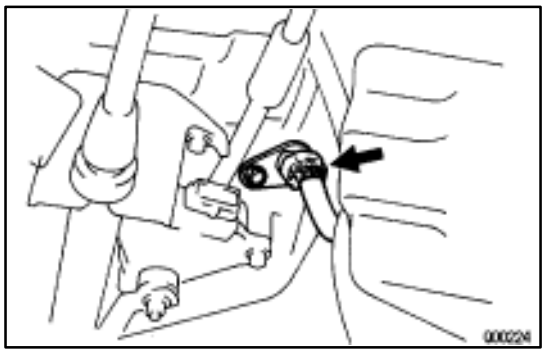


26. CONNECT OIL COOLER HOSE

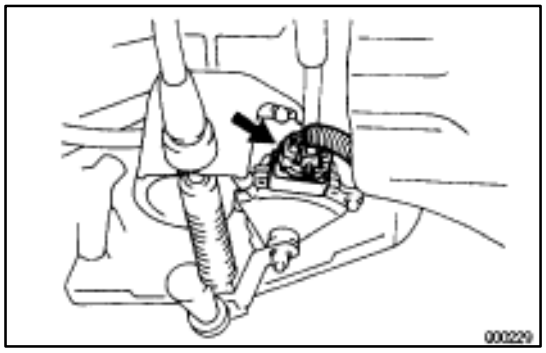


27. CONNECT SHIFT CONTROL CABLE

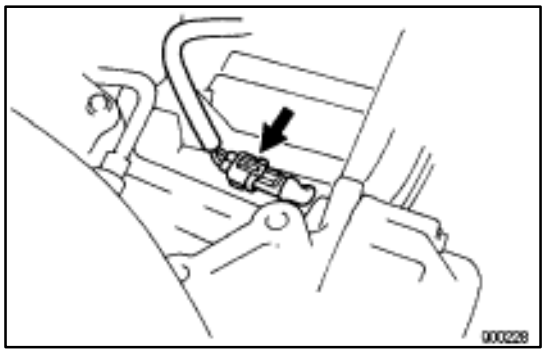
(a) Install the clip from the shaft control cable.
(b) Install and torque the nut.
(c) Adjust the shift control cable.
(See page AX–58)



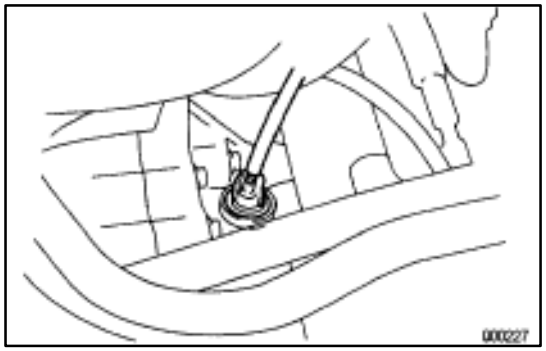
28. CONNECT SOLENOID CONNECTOR



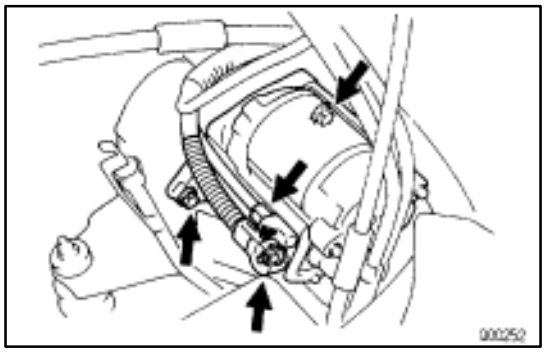
29. CONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR



30. CONNECT NO.2 SPEED SENSOR CONNECTOR



31. CONNECT NO.1 SPEED SENSOR CONNECTOR



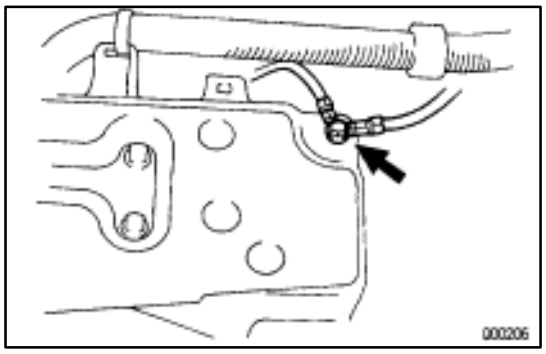
32. INSTALL STARTER

(a) Install the starter with the two bolts.

(b) Torque the two bolts.

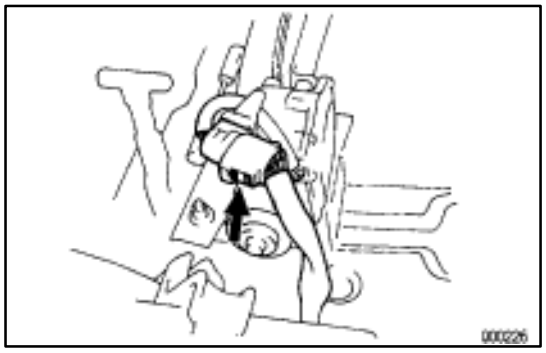
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Connect the connector and install the nut.



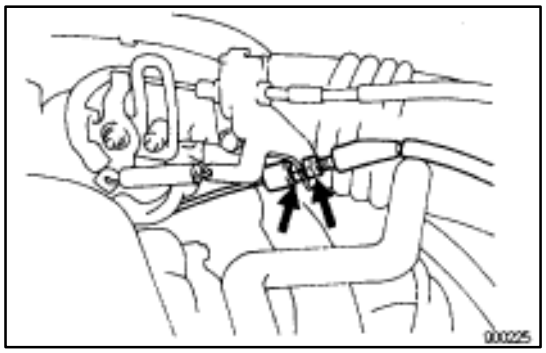
33. INSTALL GROUND EARTH TERMINAL

(w/ Cruise Control System)



34. CONNECT CONNECTOR TO CRUISE CONTROL ACTUATOR

35. INSTALL CRUISE CONTROL ACTUATOR COVER



36. INSTALL THROTTLE CABLE TO ENGINE

(a) Torque the nuts.

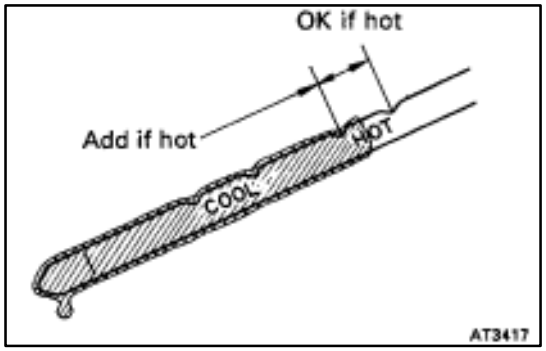
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Adjust the throttle cable

(See page AX–58)

37. INSTALL AIR CLEANER ASSEMBLY

38. INSTALL BATTERY



39. CHECK FLUID LEVEL (See page AX–56)

40. INSPECT FRONT WHEEL ALIGNMENT (See page SA–3)

41. PERFORM ROAD TEST

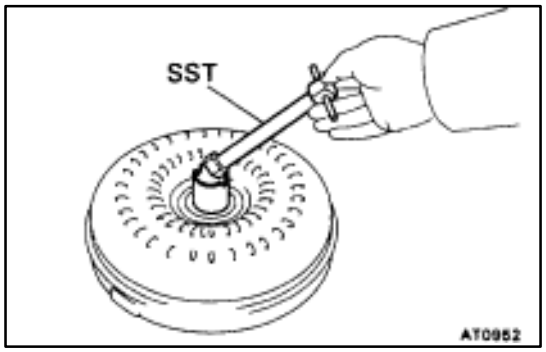
Check for abnormal noise and smooth shifting.

TORQUE CONVERTER CLUTCH AND DRIVE PLATE INSPECTION

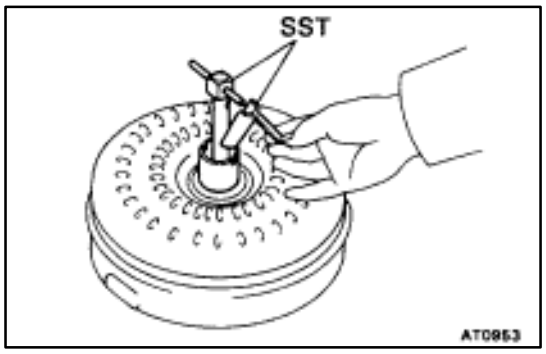
AX01K–01

1. INSPECT ONE–WAY CLUTCH

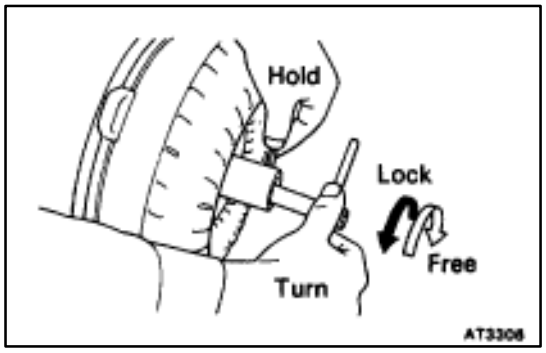
(a) Install SST into the inner race of the one–way clutch.
SST 09350–32014(09351–32020)



(b) Install SST so that is fits in the notch of the converter hub and outer race of the one–way clutch.
SST 09350–32014(09351–32020)

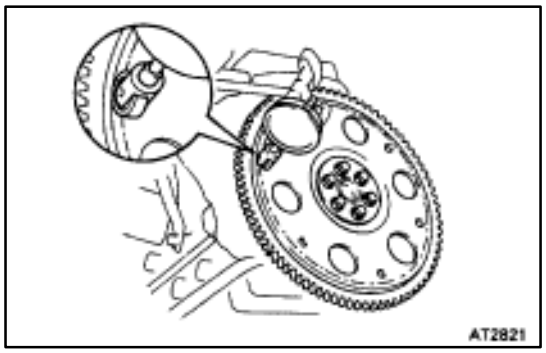


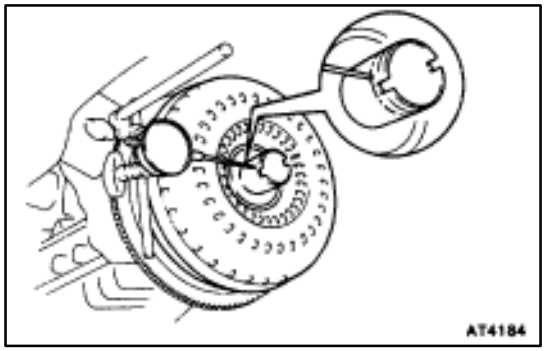
(c) With the torque converter clutch standing on its side, the clutch locks when turned counterclockwise, and rotates freely and smoothly clockwise.
If necessary, clean the converter and retest the clutch. Replace the converter if the clutch still fails the test.



2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator and measure the drive plate runout.
If runout exceeds 0.20 mm (0.0079 in.) or if the ring gear is damaged replace the drive plate, if installing a new drive plate, note the orientation of spacers and tighten the bolts.
Torque 83 N·m (850 kgf·cm, 61 ft·lbf)





3. MEASURE TORQUE CONVERTER CLUTCH SLEEVE RUNOUT

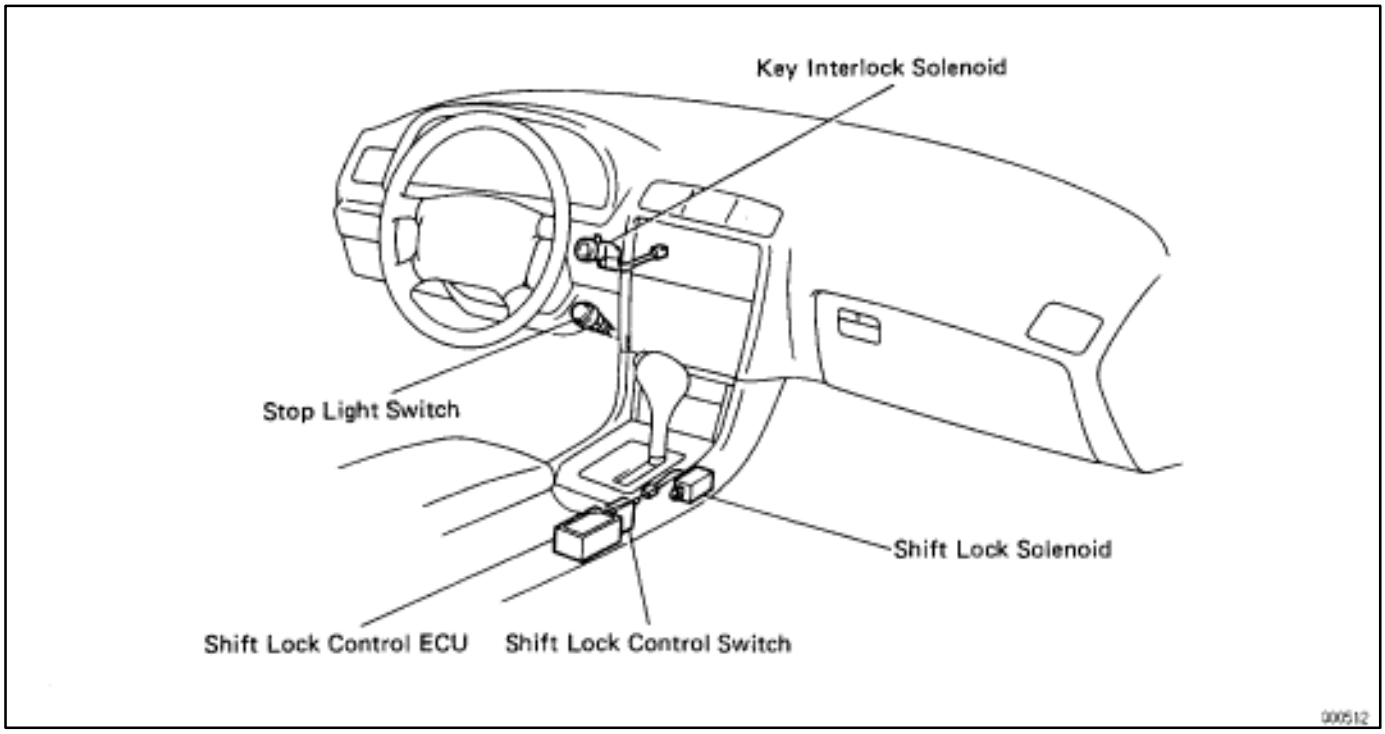
(a) Temporarily mount the torque converter clutch to the drive plate. Set up a dial indicator.
If runout exceeds 0.30 mm (0.0118 in.), try to correct by reorienting the installation of the converter. If excessive runout cannot be corrected replace the torque converter.
HINT: Mark the position of the converter to ensure correct installation.

(b) Remove the torque converter clutch.

SHIFT LOCK SYSTEM

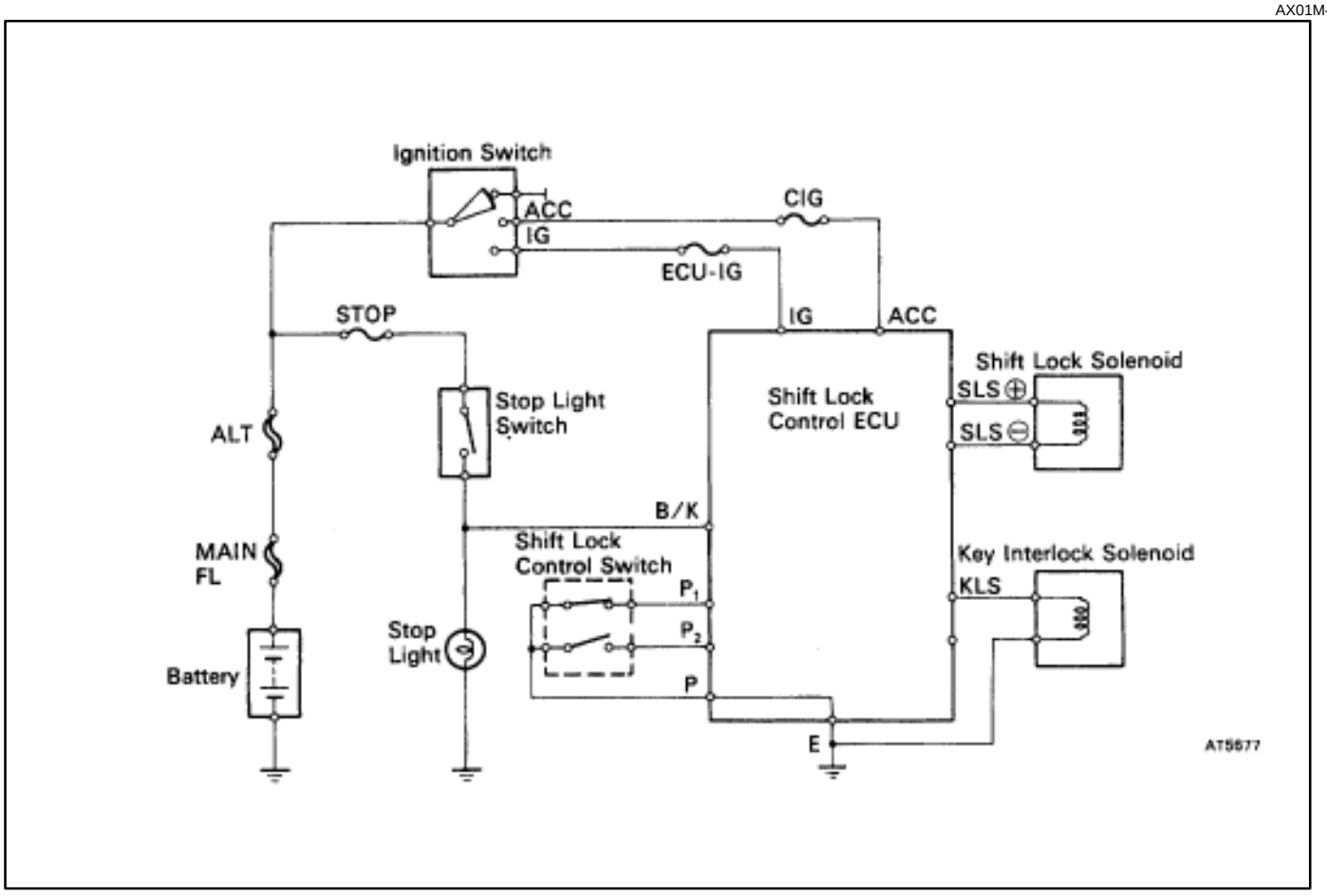
COMPONENT PARTS LOCATION

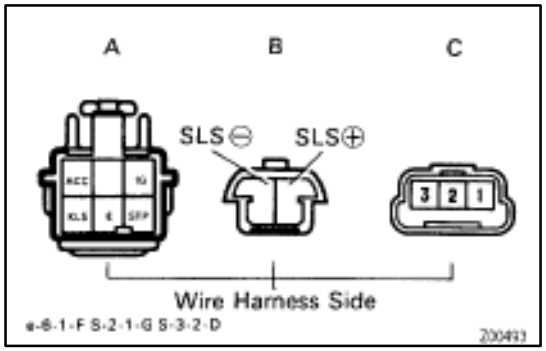
AX01L–01



WIRING DIAGRAM

AX01M–01





ELECTRIC CONTROL COMPONENTS INSPECTION

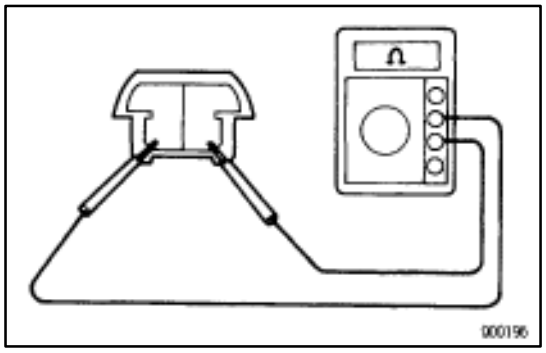
AX02H–01

1. INSPECT SHIFT LOCK CONTROL ECU

Using a voltmeter, measure the voltage at each terminal.
HINT: Do not disconnect the computer connector.

Connector	Terminal	Measuring condition	Voltage(V)
A	ACC–E	Ignition switch ACC position	10–14
	IG–E	Ignition switch ON position	10–14
	B/K–E	Depress brake pedal	10–14
	KLS–E	① Ignition switch ACC position and P range	0
		② Ignition switch ACC position and except P range	10–14
		③ (Approx–after one second)	6–9
B	SLS + – SLS–	① Ignition switch ON position and P range	0
		② Depress brake pedal	8.5–13.5
		③ (Approx–after 20 seconds)	5.5–9.5
		④ Except P range	0
C	P_1–P	① Ignition switch ON, P range and depress brake pedal	0
		② Shift except P range under conditions above	9–13.5
	P_2–P	① Ignition switch ACC position and P range	9–13.5
		② Shift except P range under condition above	0

V00369

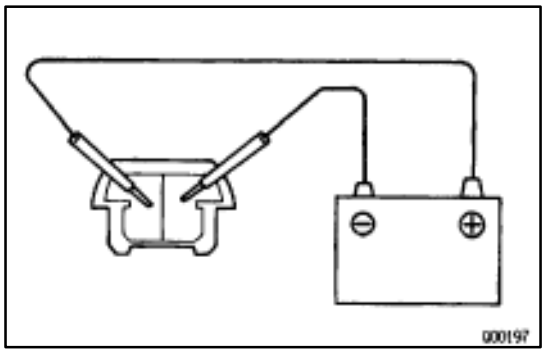


2. INSPECT SHAFT LOCK SOLENOID

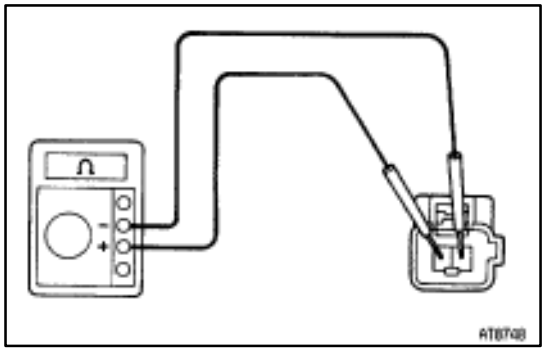
(a) Disconnect the solenoid connector.
(b) Using an ohmmeter, measure the resistance between terminals.

Standard resistance:

21–27



(c) Apply the battery positive voltage between terminals. Check that operation noise can be heard from the solenoid.



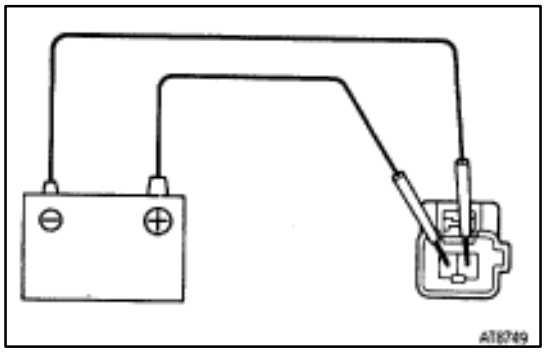
3. INSPECT KEY INTERLOCK SOLENOID

(a) Disconnect the solenoid connector.

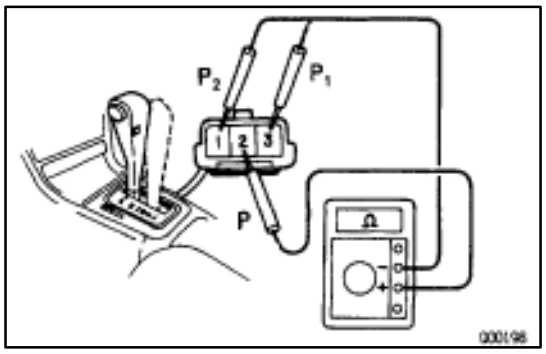
(b) Using an ohmmeter, measure the resistance between terminals.

Standard resistance:

12.5–16.5



(c) Apply the battery positive voltage between terminals. Check that an operation noise can be heard from the solenoid.



4. INSPECT SHIFT LOCK CONTROL SWITCH

Inspect that there is continuity between each terminal.

Terminal / Shift Position	P	P_1	P_2
P Range (Release button is not pushed)	○——	——○	
P Range (Release button is pushed)	○——	——○	——○
R, N, D, 2, L Range	○——	——	——○

–MEMO–

TROUBLESHOOTING

HOW TO PROCEED WITH TROUBLESHOOTING

For troubleshooting using a volt/ohm meter, see page AX–42 ~ 44.
For troubleshooting using both volt/ohm meter and ECT checker, see page AX–45 ~ 46.

HOW TO PROCEED WITH TROUBLESHOOTING USING VOLT/OHM METER

✳ CUSTOMER PROBLEM ANALYSIS

Using the customer problem analysis check sheet for reference, ask the customer in as much detail as possible about the problem.

2 CHECK AND CLEAR THE DIAGNOSTIC TROUBLE CODES (PRECHECK)

Before confirming the problem symptom, first check the diagnostic trouble code if there are any trouble codes stored in memory. When there are trouble codes, make a note of them, then clear them and proceed to "3 Problem Symptom Confirmation".

3 PROBLEM SYMPTOM CONFIRMATION, 4 SYMPTOM SIMULATION,

Confirm the problem symptoms. If the problem does not reappear, be sure to simulate the problem by mainly checking the circuits indicated by the diagnostic trouble code in step 2, using "Problem Simulation method".

5 DIAGNOSTIC TROUBLE CODE CHECK

Check the diagnostic trouble codes. Check if there is abnormality in the sensors or the wire harness.
If a malfunction code is output, proceed to "6 Diagnostic Trouble Code Chart".
If the normal code is output, proceed to "7 Matrix Chart of Problem Symptoms".
Be sure to proceed to "6 Diagnostic Trouble Code Chart" after the steps 2 and 3 are completed.
If troubleshooting is attempted only by following the malfunction code stored in the memory is output, errors could be made in the diagnosis.

6 DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is confirmed in the diagnostic trouble code check, proceed to the inspection procedure indicated by the matrix chart for each diagnostic trouble code.

7 PRELIMINARY CHECK

Carry out a preliminary check of the transmission oil level, throttle cable adjustment, etc.

8 SHIFT POSITION SIGNAL CHECK

Carry out the shift position signal check when the transaxle gears do not upshift, downshift, or lockup.
This is to check the signal output condition from the ECU to each solenoid. If the results are NG, then it is likely that the trouble is in the electrical system (particularly in the sensors or the ECU). Proceed to Part 1 (Electrical System) under [11] "Matrix Chart of Problem Symptoms". If all the circuits specified in Part 1 are OK, check the ECU and replace it.

9 MECHANICAL SYSTEM TEST

(Stall Test, Time Lag Test, Line Pressure Test)

If the malfunction is found in the stall test, time lag test, line pressure test, check the parts indicated in the respective tests.

10 MANUAL SHIFTING TEST

If the results of the manual driving test are NG, it is likely that the trouble is in the mechanical system or hydraulic system. Proceed to Part 2 (Mechanical System) under the Matrix Chart of Problem Symptoms.

[11] MATRIX CHART OF PROBLEM SYMPTOMS

If the normal code is confirmed in the diagnostic trouble code check, perform inspection according to the inspection order in the matrix chart of problem symptoms. Perform diagnosis of each circuit or part in the order shown in the Matrix Chart. The Matrix Chart contains 3 chapters, Electronically Controlled Circuits in Chapter 1, On–vehicle Inspection in Chapter 2 and Off–vehicle Inspection in Chapter 3. If all the circuits indicated in Chapter 1 are normal, proceed to Chapter 2. If all the parts indicated in Chapter 2 are normal, proceed to Chapter 3. If all the circuits and parts in Chapter 1–Chapter 3 are normal and the trouble still occurs, check and replace the ECU.

[12] CIRCUIT INSPECTION

Perform diagnosis of each circuit in accordance with the inspection order confirmed in 6 and [11].
Judge whether the cause of the problem is in the sensor, actuators, wire harness and connectors, or the ECU. In some cases, the Flow Chart instructs that a throttle signal check, brake signal check (in test mode) be performed. These are diagnosis functions used to check if signals are being input correctly to the ECU.

[13] PART INSPECTION

Check the individual parts of the mechanical system and hydraulic system in the order of the numbers indicated in the Matrix Chart.

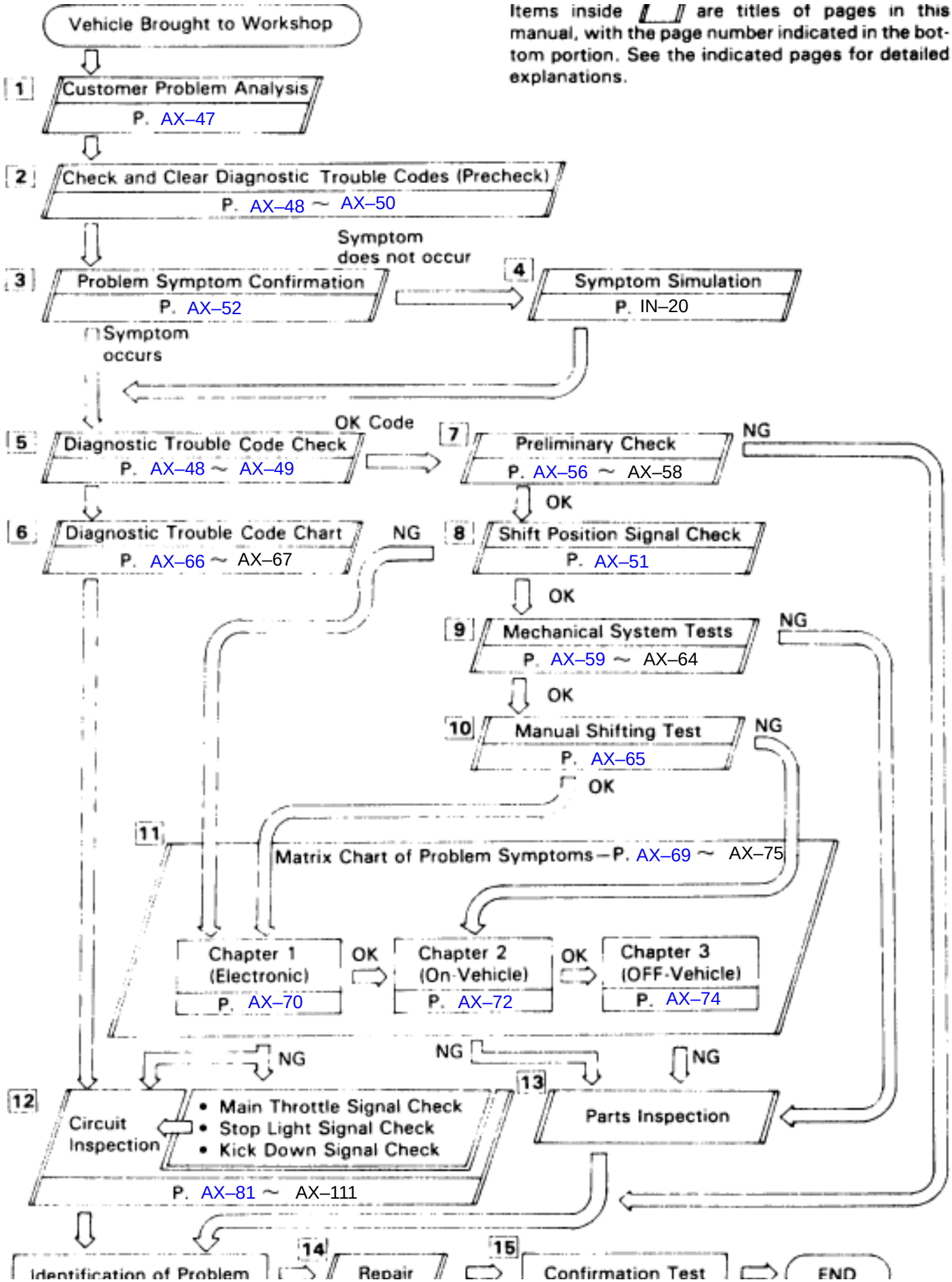
[14] REPAIRS

After the cause of the problem is located, perform repairs by following the inspection and replacement procedures in this manual or ‘92 A540E Automatic Transaxle repair manual (Pub No. RM 245U).

[15] CONFIRMATION TEST

After completing repairs, confirm not only that the malfunction is eliminated, but also conduct a test drive, etc., to make sure the entire ECT system is operating correctly.

Items inside [ ] are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.

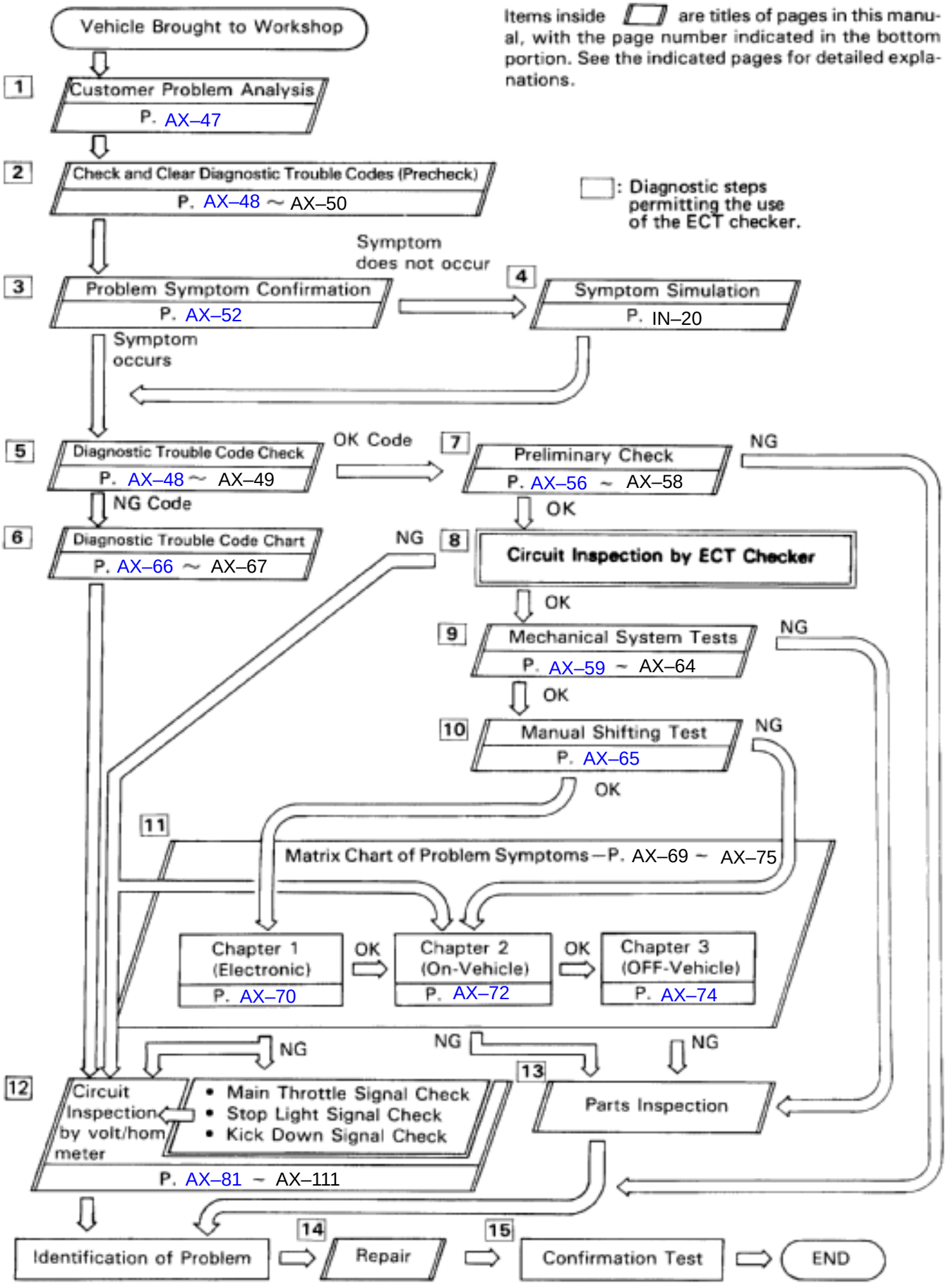


HOW TO PROCEED WITH TROUBLESHOOTING USING VOLT/OHM METER AND ECT CHECKER

For the explanation of steps ✳~7 and 9~[15], see the explanation of steps with the same title on page AX–42.

8 CIRCUIT INSPECTION BY CHECKER

Connect ECT checker to the vehicle and check all the circuits which can be inspected using the checker. If the malfunctioning circuit can be defected using the checker, proceed to [11] Matrix chart of Problem Symptoms–Part 2 (on Vehicle) or [12] Circuit Inspection by Volt/ohm meter and perform troubleshooting. For instructions on how to connect the checker to the vehicle and how to use the checker, please refer to the Instruction Manual for ECT checker.


Items inside ▭ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.
Vehicle Brought to Workshop
1 Customer Problem Analysis
P. AX–47
2 Check and Clear Diagnostic Trouble Codes (Precheck)
P. AX–48 ~ AX–50
▭: Diagnostic steps permitting the use of the ECT checker.
3 Problem Symptom Confirmation
P. AX–52
Symptom does not occur
4 Symptom Simulation
P. IN–20
Symptom occurs
5 Diagnostic Trouble Code Check
P. AX–48 ~ AX–49
OK Code
7 Preliminary Check
P. AX–56 ~ AX–58
NG
NG Code
OK
6 Diagnostic Trouble Code Chart
P. AX–66 ~ AX–67
NG
8 Circuit Inspection by ECT Checker
OK
9 Mechanical System Tests
P. AX–59 ~ AX–64
NG
OK
10 Manual Shifting Test
P. AX–65
NG
OK
11 Matrix Chart of Problem Symptoms – P. AX–69 ~ AX–75
Chapter 1 (Electronic)
P. AX–70
OK
Chapter 2 (On-Vehicle)
P. AX–72
OK
Chapter 3 (OFF-Vehicle)
P. AX–74
NG
NG
NG
12 Circuit Inspection by volt/hom meter
• Main Throttle Signal Check
• Stop Light Signal Check
• Kick Down Signal Check
P. AX–81 ~ AX–111
13 Parts Inspection
Identification of Problem
14 Repair
15 Confirmation Test
END

CUSTOMER PROBLEM ANALYSIS

ECT Check Sheet

Inspector's Name :

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km Mile

Condition of Problem Occurrence	Date of Problem Occurence	/ /
	How Often does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

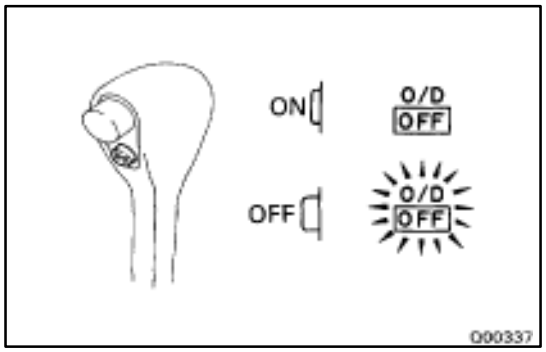
Symptoms	☐ Vehicle does not move. (☐ Any range ☐ Particular range)
	☐ No up-shift (☐ 1st→2nd ☐ 2nd→3rd ☐ 3rd→OD)
	☐ No down-shift (☐ OD→3rd ☐ 3rd→2nd ☐ 2nd→1st)
	☐ Lock-up malfunction
	☐ Shift point too high or too low.
	☐ Harsh engagement (☐ N→D ☐ Lock-up ☐ Any drive range)
	☐ Slip or shudder
	☐ No kick-down
	☐ No pattern select
	☐ Others ( )

Check Item	Check engine warning light	☐ Normal ☐ Remains ON

Diagnostic Trouble Code Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

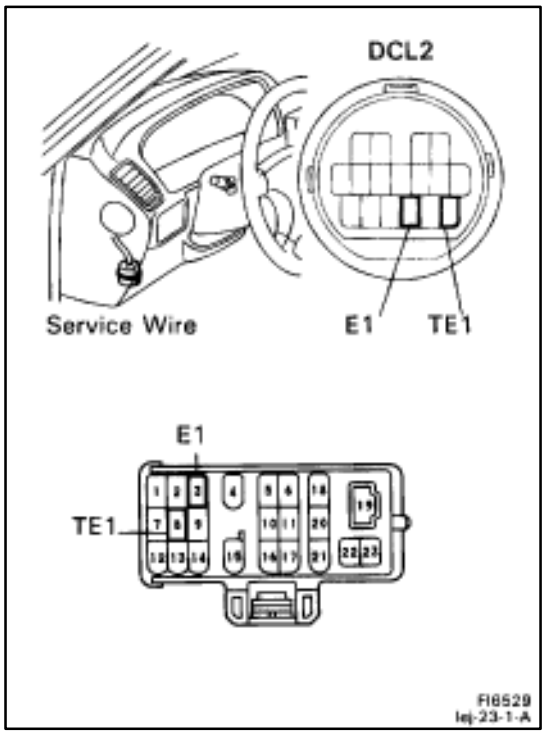
DIAGNOSIS SYSTEM

The ECT system has built–in self–diagnostic functions. If the malfunction occurs in the system, the ECU stores the malfunction code in memory and the O/D OFF (Overdrive OFF) indicator light blinks to inform the driver. The diagnostic trouble code stored in memory can be read out by the following procedure.



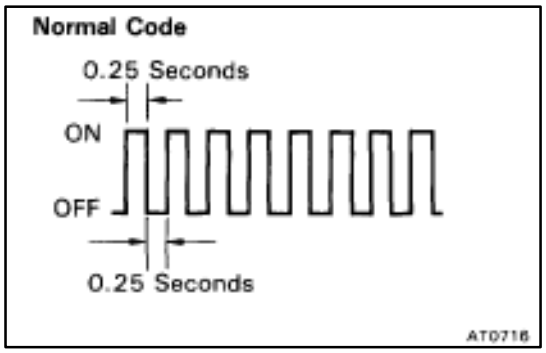
O/D OFF INDICATOR LIGHT INSPECTION

1. Turn the ignition switch to ON.
2. Check if the O/D OFF indicator light lights up when the O/D main switch is pushed out to OFF and goes off when the O/D main switch is pushed in to ON.
   HINT:
   - If the O/D OFF indicator light does not light up or stay on all the time, carry out the check for “O/D OFF Indicator Light Circuit” on page AX–101.
   - If the O/D OFF indicator light blinks, a malfunction code is stored in the ECU memory.

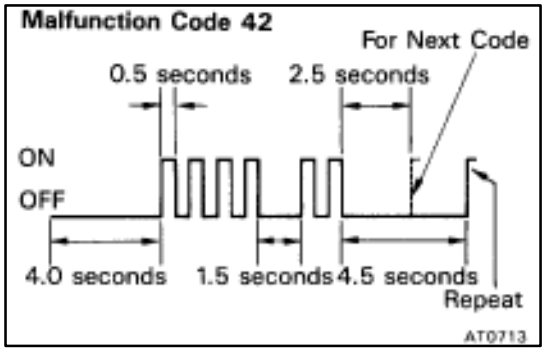


DIAGNOSTIC TROUBLE CODE CHECK

1. Turn the ignition switch ON, but do not start the engine.
2. Push in the O/D main switch to ON.
   HINT: Warning and diagnostic trouble codes can be read only when the overdrive switch is ON. If it is OFF, the overdrive OFF light will light up continuously and will not blink.
3. Using SST, connect terminals TE1 and E1 of the DCL2 or DCL1.
   SST 09843–18020



4. Read the diagnostic trouble code indicated by the number of times the O/D OFF indicator light blinks (See next page).
   HINT: If the system is operating normally, the light will blink 2 times per second.



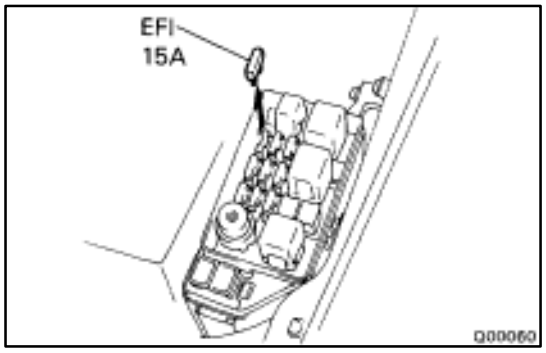
The malfunction code is indicated as shown in the illustration at left (Diagnostic trouble code “42” is shown as an example).
HINT: When 2 or more malfunction codes are stored in memory, the lower–numbered code is displayed first.
If no diagnostic trouble code is output, or if a diagnostic trouble code is output even though no diagnostic trouble code output operation is performed, check the TE1 terminal circuit on page AX–109.

DIAGNOSTIC CODE

Code No.	Blinking Pattern	Diagnosis	Trouble Area
42	 BE3934	No. 1 speed sensor signal malfunction	• No. 1 speed sensor • Harness or connector of No.1 speed sensor • ECU
61	 BE3935	No. 2 speed sensor signal malfunction	• No. 2 speed sensor • Harness or connector of No.2 speed sensor • ECU
62	 BE3936	Open or short circuit in No.1 solenoid valve	• No.1 or No.2 solenoid valve • Harness or connector of No.1 or No.2 solenoid valve • ECU
63	 BE3936	Open or short circuit in No.2 solenoid valve	
64	BE3936	Open or short circuit in No.3 solenoid valve	• No.3 solenoid valve • Harness or connector of No.3 solenoid valve • ECU

HINT:

- If the malfunction returns to normal while a malfunction warning is being output, the O/D OFF indicator light stops blinking and goes off. However, the malfunction code is retained in memory until it is cleared from memory.
- If the diagnosis system outputs a malfunction code even though the O/D OFF indicator was not blinking, there is intermittent trouble. Check all the connections in the circuits corresponding to that code.
- If speed sensors No.1 and No.2 happen to fail simultaneously, the ECU will neither alert the driver by blinking the O/D OFF indicator nor record any diagnostic trouble code. It will, however, decide that the vehicle can be driven only in 1st and none of the other gears; shifting upward will then be prohibited.
- Codes 62, 63 and 64 are limited to short or open circuits in the electrical system comprised of the solenoids, wire harness, and connectors. The ECU is unable to detect mechanical trouble (sticking, for example) in the solenoid valves.
- If No.3 solenoid valve (for lock–up clutch control) fails, the ECU will not blink the O/D OFF indicator to alert the driver. It will, however, record the failure as code 64, which may be displayed during troubleshooting.



CANCELLING DIAGNOSTIC TROUBLE CODE

After repair of the trouble area, the diagnostic trouble code retained in the ECU memory must be cancelled out by removing the SFI fuse for 10 seconds or more, with the ignition switch off. Check that the normal code is output after connecting the fuse.

CHECK TERMINAL T_T OUTPUT VOLTAGE

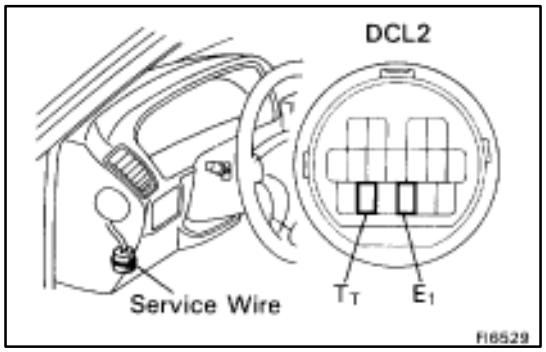
When a voltmeter is connected to the DCL2, the following items can be checked.

1. Throttle position sensor signal
2. Brake signal
3. Shift position signal

1. VOLTMETER CONNECTION

Connect the (+) positive probe of the voltmeter to terminal T_T and the negative (–) probe to terminal E_1 of the DCL2 connector.

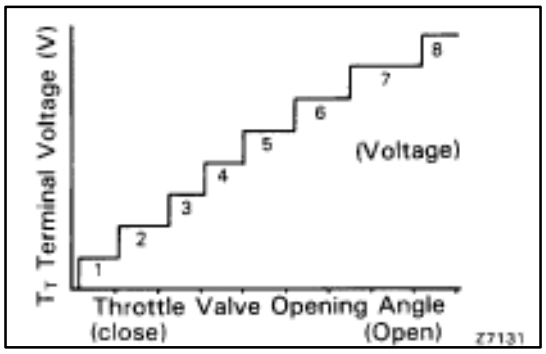
HINT: If a voltmeter with small internal resistance is used, the correct voltage will not be indicated, so use a voltmeter with an internal resistance of at least 10 k .



2. TURN IGNITION SWITCH TO ON (DO NOT START THE ENGINE)

3. CHECK THROTTLE POSITION SENSOR SIGNAL

Check if the voltage changes from approximately 0 V to approximately 8 V when the accelerator pedal is gradually depressed from the fully closed position.



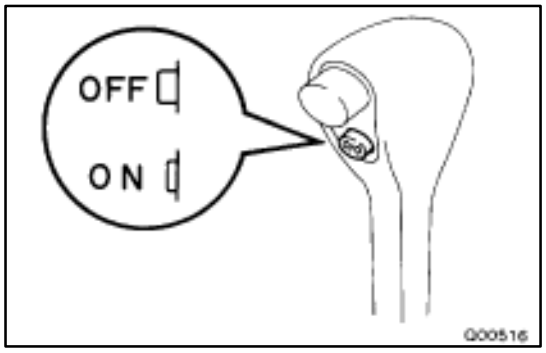
4. CHECK BRAKE SIGNAL (LOCK–UP CUT SIGNAL)

(a) Open the throttle valve fully to apply approximately 8 V to terminal T_T.

(b) In this condition, check terminal T_T voltage when the brake pedal is depressed and released.

When brake pedal is depressed: 0 V
When brake pedal is released: 8 V

5. INSPECT EACH UP–SHIFT POSITION



(a) Warm up the engine.
Engine coolant temperature: 176°F (80°C)

(b) Turn the O/D switch to “ON”.

(c) Place the pattern select switch in “Normal” and the shift lever into the D range.

(d) During a road test (above 10 km/h or 6 mph) check that voltage at the TT terminal is as indicated below for each up–shift position.

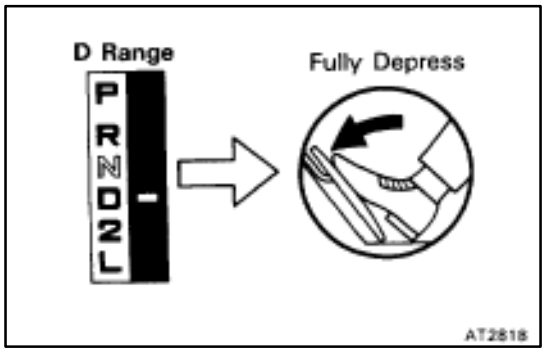
If the voltage rises from 0 V to 7 V in the sequence shown, the control system is okay.

The chart on the left shows the voltmeter reading and corresponding gears.HINT: Determine the gear position by a light shock or change in engine rpm when shifting. The lock–up clutch will turn ON only infrequently during normal 2nd and 3rd gear operation. To trigger this action, press the accelerator pedal to 50% or more of its stroke. At less than 50%, the voltage may change in the sequence 2 V–4 V–6 V –7 V.

T_T terminal (V)	Gear position
Below 0.5	1st
1.5 ~ 2.6	2nd
2.5 ~ 3.6	2nd Lock-Up
3.5 ~ 4.6	3rd
4.5 ~ 5.6	3rd Lock-Up
5.5 ~ 6.6	O/D
6.5 ~ 7.6	O/D Lock-Up

PROBLEM SYMPTOM CONFIRMATION

Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms of the trouble. If the problem is that the transaxle does not up–shift, does not downshift, or the shift point is too high or too low, conduct the following road test for the automatic shift schedule and simulate the problem symptoms.



ROAD TEST

NOTICE: Perform the test at normal operating fluid temperature (50–80°C or 122–176°F).

1. D RANGE TEST IN NORM AND PWR PATTERN RANGES

Shift into the D range and keep the accelerator pedal at the full throttle valve opening position.

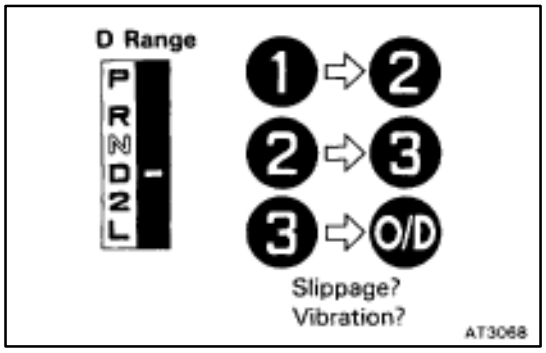
Check the following:

(a) Check that 1–2, 2–3 and 3–O/D up–shift takes place, at the shift point shown in the automatic shift schedule. (See page AX–55)

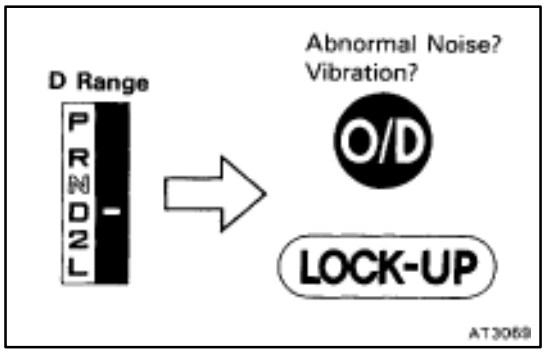
Conduct the test for both Normal and Power patterns.

HINT:

- There is no O/D up–shift and lock–up when the engine coolant temp. is below 60°C (140°F).
- When the engine coolant temp. is below 60°C (140°F), the shift point is lower than specified in the automatic shift schedule.

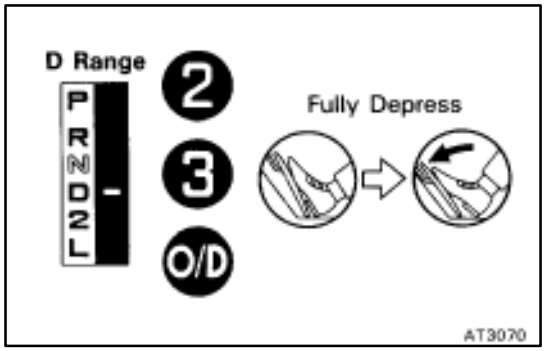


(b) Check for shift shock and slip at the 1 2, 2 3 and 3 O/D up–shifts.



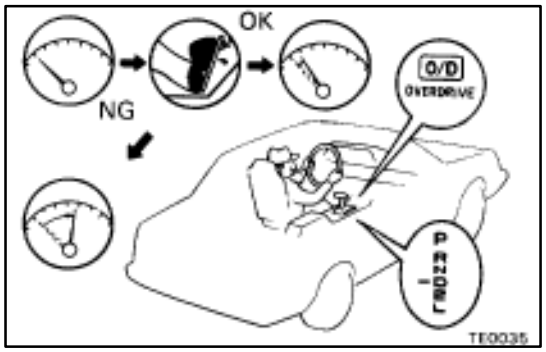
(c) Check for abnormal noise and vibration at the D range lockup or O/D gear and check for abnormal noise and vibration.

HINT: The check for the cause of abnormal noise and vibration must be performed very thoroughly as it could also be due to loss of balance in the drive shaft, tire, torque converter clutch, etc.



(d) Check kickdown operation while running in the D range, 2nd, 3rd and O/D gears, check to see that the possible kickdown vehicle speed limits for 2 1, 3 2 and O/D 3 kickdowns conform to those indicated on the automatic shift schedule. (See page AX–55)

(e) Check for abnormal shock and slip at kick–down.

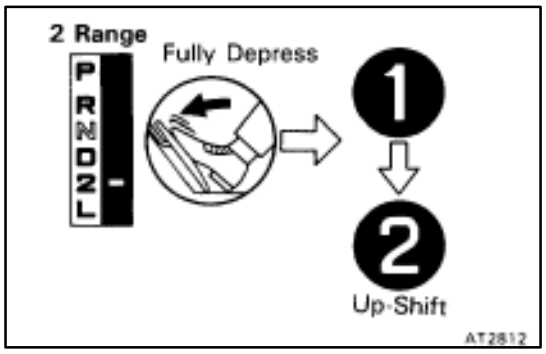


(f) Check for the lock–up mechanism.

(1) Drive in D range, O/D gear, at a steady speed (lockup ON) of about 56 km/h (35 mph) in “NORM” pattern or 65 km/h (40 mph) in “PWR” pattern.

(2) Lightly depress the accelerator pedal and check that the engine rpm does not change abruptly.

If there is a big jump in engine rpm, there is no lock–up.

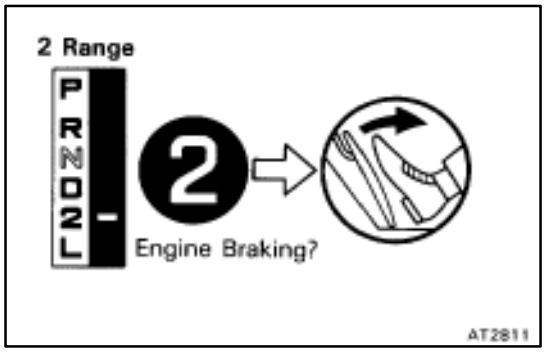


2. 2 RANGE TEST

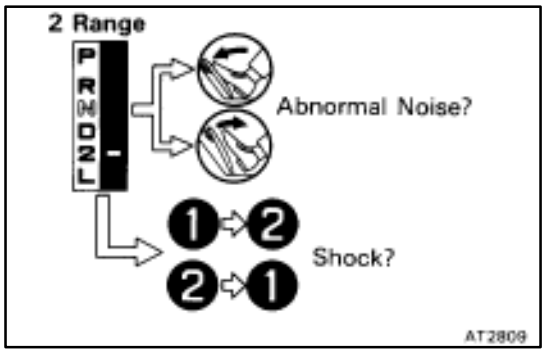
Shift into the 2 range and, while driving with the accelerator pedal held constantly at the full throttle valve opening position, push in one of the pattern selectors and check on the following points.

(a) Check up–shift operation, check to see that the 1 2 upshift takes place and that the shift point conforms to the automatic shift schedule. (See page AX–55)

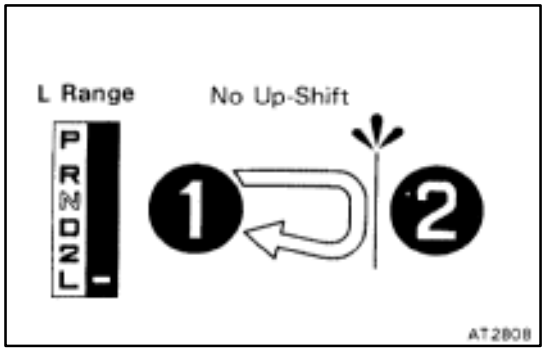
HINT: There in no O/D up–shift and lock–up in the 2 range.



(b) Check engine braking while running in the 2 range and 2nd gear, release the accelerator pedal and check the engine braking effect.



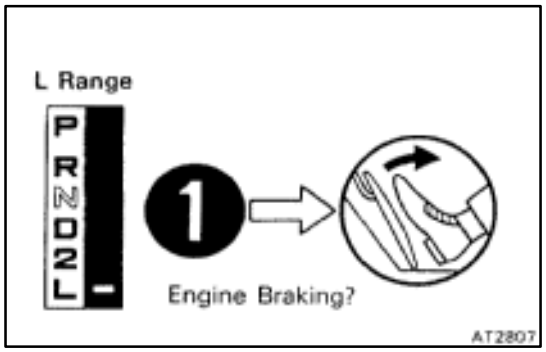
(c) Check for abnormal noise at acceleration and deceleration, and for shock at up–shift and down–shift.



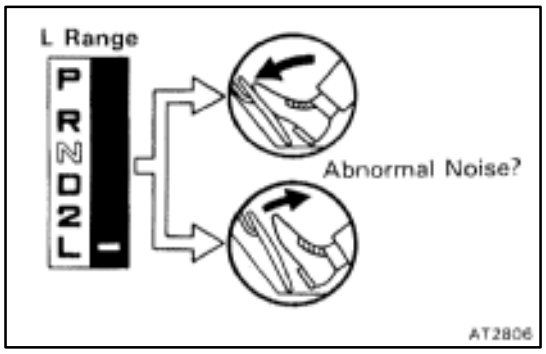
3 L RANGE TEST

Shift into the L range an d while driving with the accelerator pedal held constantly at the full throttle valve opening position, push in one of the pattern selectors and check the following points:

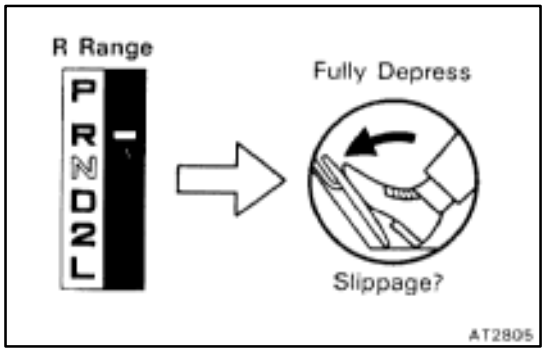
(a) Check no up–shift while running in the L range, check that there is no up–shift to 2nd gear.



(b) Check engine braking while running in the L range, release the accelerator pedal and check the engine braking effect.
If there is a big jump in engine rpm, there is no lock–up.

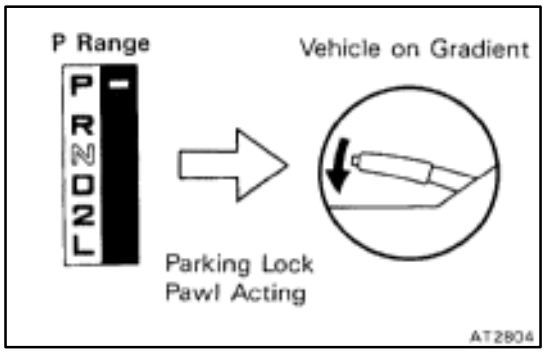


(c) Check for abnormal noise during acceleration and deceleration.



4. R RANGE TEST

Shift into the R range and while starting at full throttle, check for slipping.



5. P RANGE TEST

Stop n the vehicle on a gradient (more than 5%) and after shifting into the P range, release the parking brake.
Then check to see that the parking brake lock pawl holds the vehicle in place.

AUTOMATIC SHIFT SCHEDULE

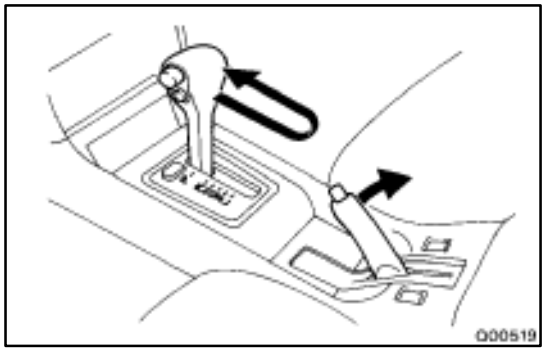
Shift range	Shift pattern	Throttle valve fully open [fully closed] km/h (mph)							
		1 2	2 3	3 O/D	[3 O/D]	O/D 3]	O/D 3	3 2	2 1
D range	NORM	51–61 (32–38)	97–105 (60–65)	153–164 (95–102)	36–41 (22–25)	19–23 (12–24)	149–160 (92–99)	92–100 (57–62)	42–47 (26–29)
	PWR	↑	↑	↑	↑	↑	↑	↑	↑
2 range	NORM PWR	↑	—	—	—	—	—	111–120 (69–75)	↑
L range	NORM PWR	—	—	—	—	—	—	97–105 (60–65)	49–55 (30–34)

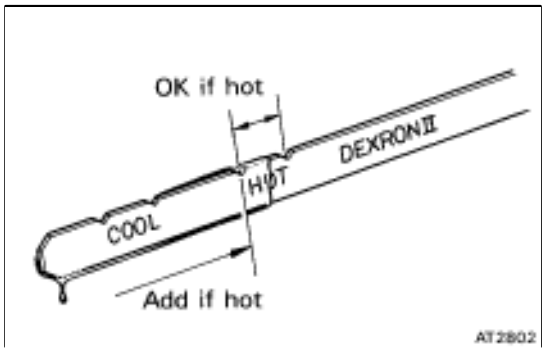
Shift Range		Throttle valve opening 5% km/h (mph)					
		Lock–up ON			Lock–up OFF		
	2nd	2nd	*3rd	O/D	2nd	*3rd	O/D
D range	NORM	—	73–80 (45–49)	53–59 (33–37)	—	65–71 (40–44)	48–53 (30–33)
	PWR	—	↑	62–68 (39–42)	—	↑	59–65 (37–40)

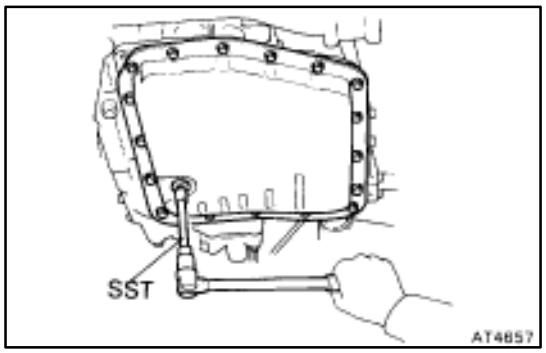
*: O/D main switch OFF

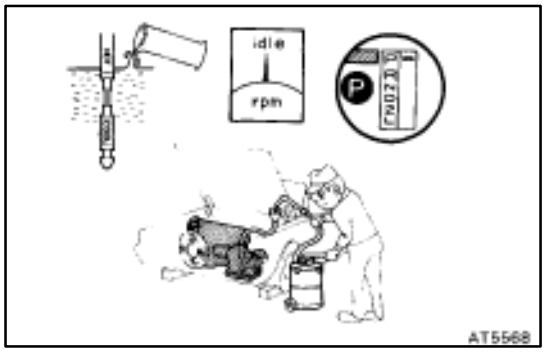
HINT:

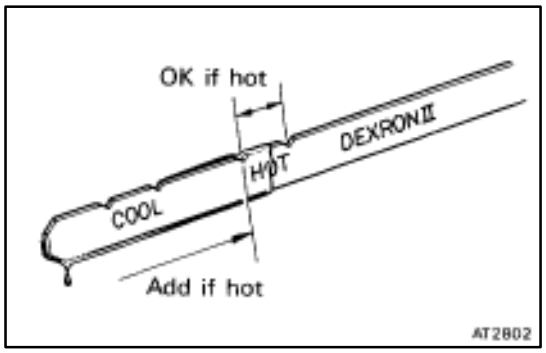
1. Lock–up will not occur in 2nd gear.
2. There is no lock–up in the 2 and L ranges.
3. In the following cases, the lock–up will be released regardless of the lock–up pattern.
   - When the throttle is completely closed.
   - When the brake light switch is ON.











PRELIMINARY CHECK

1. CHECK FLUID LEVEL

HINT:

- Drive the vehicle so that the engine and transaxle are at normal operating temperature.
  (Fluid temperature: 70 – 80°C or 158 – 176°F)
- Only use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.

(a) Park the vehicle on a level surface and set the parking brake.

(b) With the engine idling, and the brake pedal depressed, shift the shift lever into all positions from P to L position and return to P position.

(c) Pull out the transaxle dipstick and wipe it clean.

(d) Push it back fully into the tube.

(e) Pull it out and check that the fluid level is in the HOT range. If the level is at the low side, add fluid.

Fluid type: ATF DEXRON® II

NOTICE: Do not overfill.

2. CHECK FLUID CONDITION

If the fluid smells burnt or is black, replace it.

3. REPLACE TRANSAXLE FLUID

(a) Using SST, remove the drain plug and drain the fluid.
SST 09043–38100

(b) Reinstall the drain plug securely with new gasket.

(c) With the engine OFF, add new fluid through the oil filler tube.

Fluid type: ATF DEXRON® II

Capacity:

Total: 6.5 liters (6.9 US qts, 5.7 Imp. qts)

Drain and refill: 2.9 liters
(3.1 US qts, 2.6 Imp. qts)

(d) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.

(e) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.

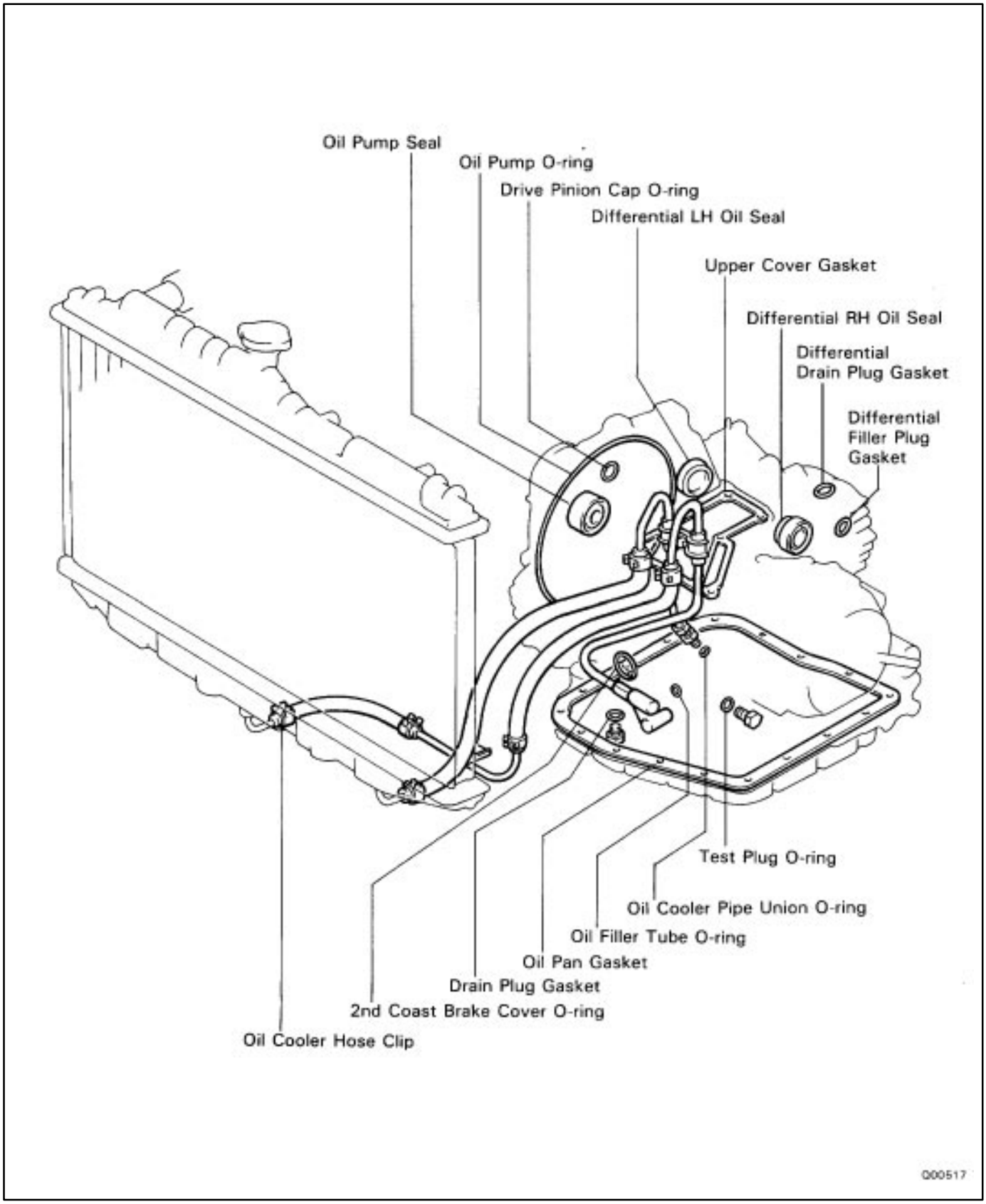
(f) Check the fluid level with the normal operating temperature (70–80°C or 158–176°F) and add as necessary.

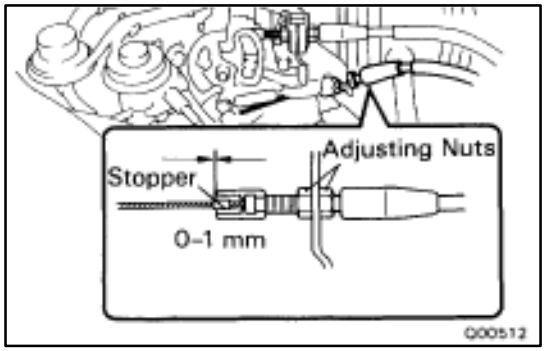
NOTICE: Do not overfill.

4. CHECK FLUID LEAKS

Check for leaks in the transaxle as shown below.

If there are leaks, it is necessary to repair or replace O–rings, seal packings, oilseals, plugs or other parts.





5. INSPECT AND ADJUST THROTTLE CABLE

(a) Check that the accelerator pedal is fully released.

(b) Check that the inner cable is not slack.

(c) Measure the distance between the outer cable end and stopper on the cable.

Standard Distance:

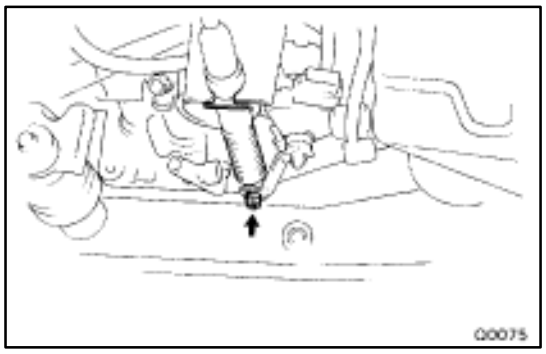
0–1 mm (0–0.04 in.)

If the distance is not standard, adjust the cable by the adjusting nuts.

6. INSPECT AND ADJUST SHIFT CABLE

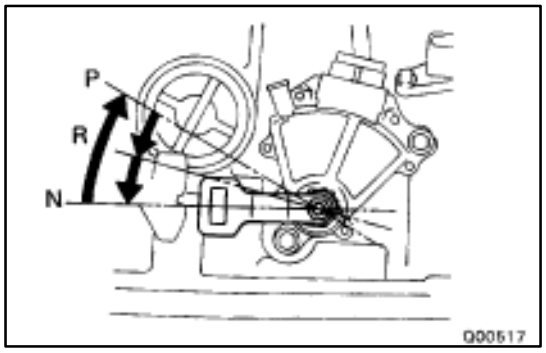
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator correctly indicates the position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.



(a) Loosen the swivel nut on the manual shift lever.

(b) Push the manual lever fully toward the right side of the vehicle.



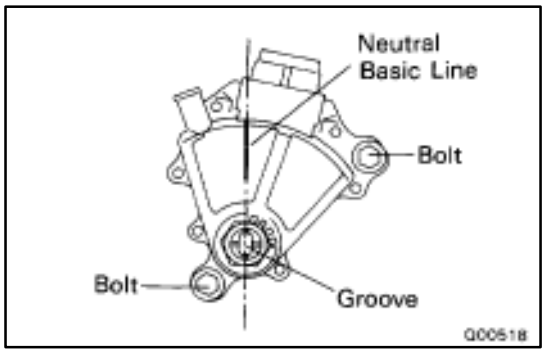
(c) Return the lever two notches to NEUTRAL position.

(d) Set the shift lever to N.

(e) While holding the lever lightly toward the R range side, tighten the swivel nut.

7. INSPECT PARK/NEUTRAL POSITION SWITCH

Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.



If not as stated above, carry out the following adjustment procedures.

(a) Loosen the park/neutral start switch bolt and set the shift lever to the N position.

(b) Align the groove and neutral basic line.

(c) Hold in position and tighten the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

8. INSPECT IDLE SPEED (N RANGE)

Idle speed: 650–750 rpm

MECHANICAL SYSTEM TEST
STALL TEST

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D and R ranges.

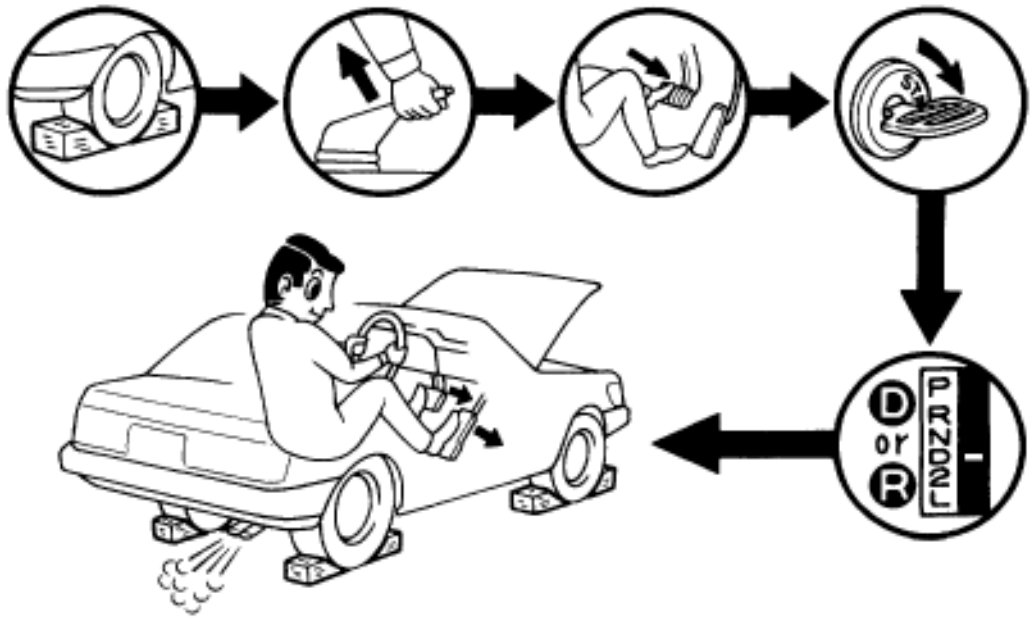
CAUTION:

- **Perform the test at normal operation fluid temperature (50–80°C or 122–176°F).**
- **Do not continuously run this test longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear, level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**

MEASURE STALL SPEED

(a) Check the front and rear wheels.
(b) Connect a tachometer to the engine.
(c) Fully apply the parking brake.
(d) Press down strongly on the brake pedal with your left foot.
(e) Start the engine.
(f) Shift into the D range. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.
Stall speed: 2,400 ± 150 rpm
(g) Perform the same test in R range.

STALL TEST



AT5343

EVALUATION

Problem		Possible cause
(a)	Stall speed low in D and R ranges	3Engine output may be insufficient 3Stator one–way clutch is not operating properly HINT: If more than 600 rpm below the specified value, the torque converter clutch could be faulty.
(b)	Stall speed high in D range	3 Line pressure too low 3Forward clutch slipping 3No.2 one–way clutch not operating properly 3O/D one–way clutch not operating properly
(c)	Stall speed high in R range	3Line pressure too low 3Direct clutch slipping 3First and reverse brake slipping 3O/D one–way clutch not operating properly
(d)	Stall speed high in D and R ranges	3Line pressure too low 3Improper fluid level 3O/D one–way clutch not operating properly

TIME LAG TEST

If the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, direct clutch and first and reverse brake.

NOTICE:

- **Perform the test at normal operating fluid temperature (50–80°C or 122–176°F).**
- **Be sure to allow a one minute interval between tests.**
- **Make three measurements and take the average value.**

MEASURE TIME LAG

(a) Fully apply the parking brake.

(b) Start the engine and check the idle speed.

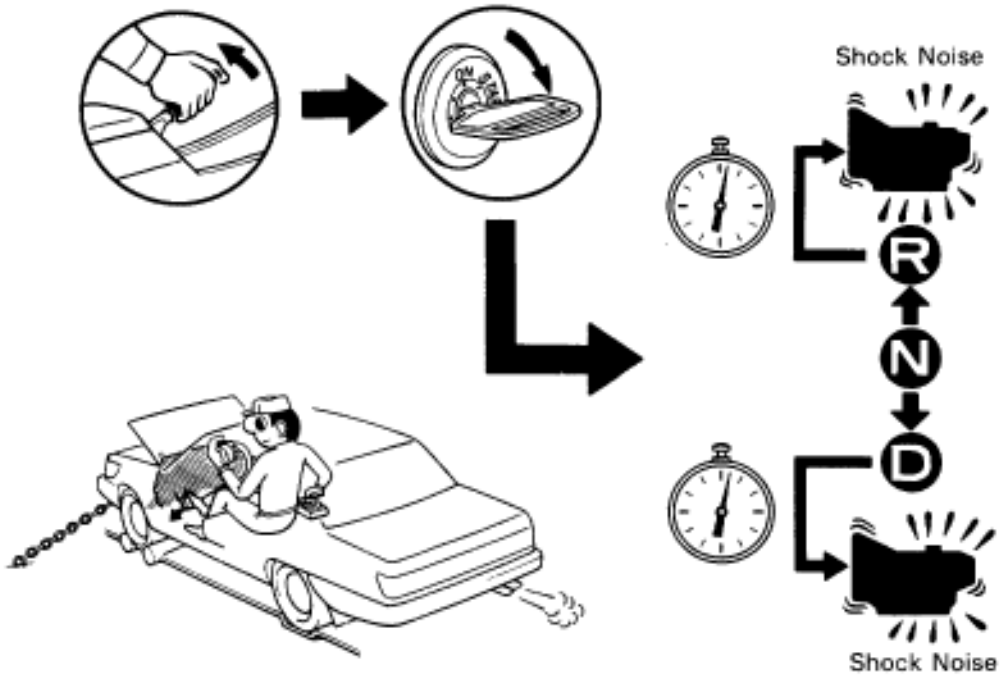
Idle speed (N range): 650–750 rpm

(c) Shift the shift lever from N to D position. Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.

In the same manner, measure the time lag for NR.

Time lag	N D	Less than 1.2 seconds
	N R	Less than 1.5 seconds

TIME LAG TEST



EVALUATION

If N D or N R time lag are longer than specified:

Problem	Possible cause
If N D time lag is longer than specified:	3Line pressure too low 3Forward clutch worn 3O/D one–way clutch not operating properly
If N R time lag is longer than specified:	3Line pressure too low 3Direct clutch worn 3First and reverse brake worn 3O/D one–way clutch not operating properly

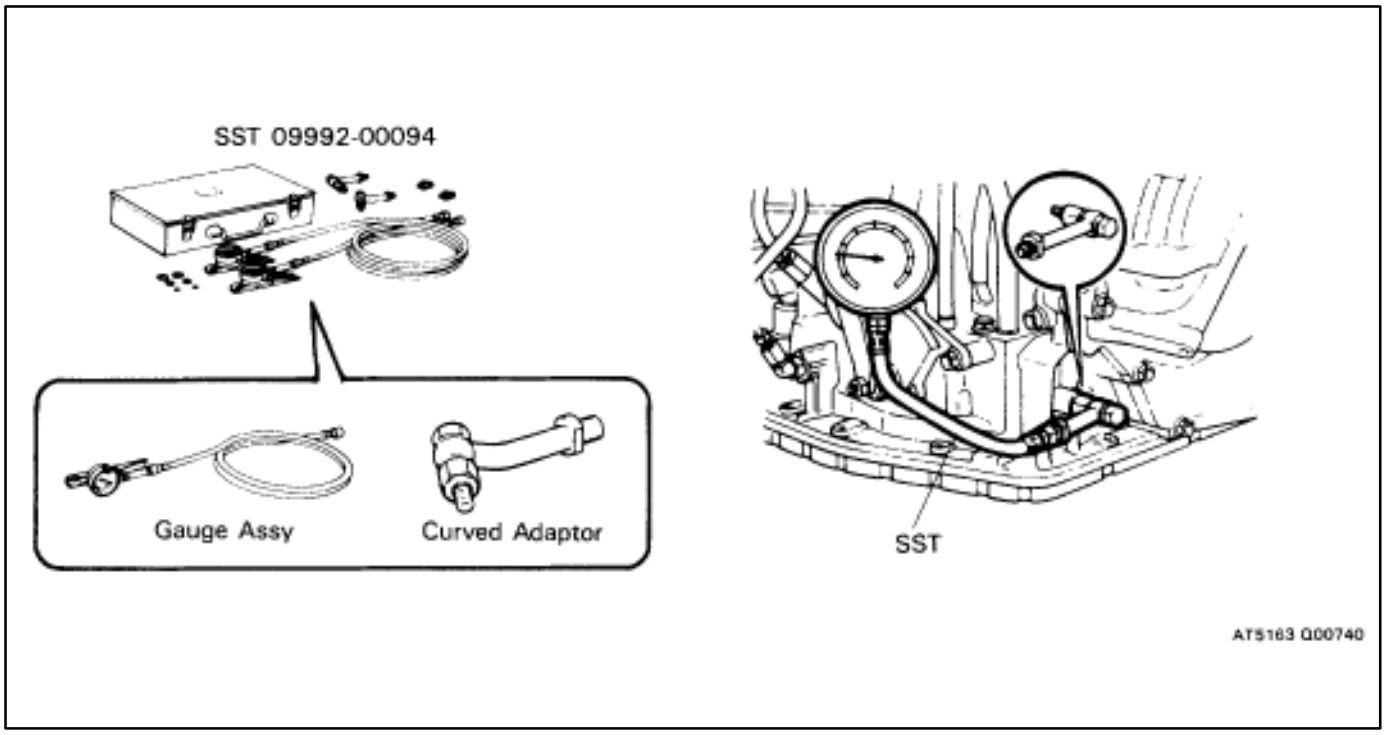
HYDRAULIC TEST
MEASURE LINE PRESSURE

NOTICE:

- **Perform the test at normal operating fluid temperature (50–80°C or 122–176°F).**
- **This line pressure test should always be carried out in pairs. One technician should observe the condition of wheels or wheel stoppers outside the vehicle while the other is performing the test.**

(a) Warm up the transaxle fluid.

(b) Remove the test plug on the transaxle case and connect the hydraulic pressure gauge. (SST)
SST 09992–00094 (Oil pressure Gauge)



(a) Fully apply the parking brake and chock the four wheels.

(b) Start the engine and check idling rpm.

(c) Press strongly on the brake pedal with your left foot and shift into D range.

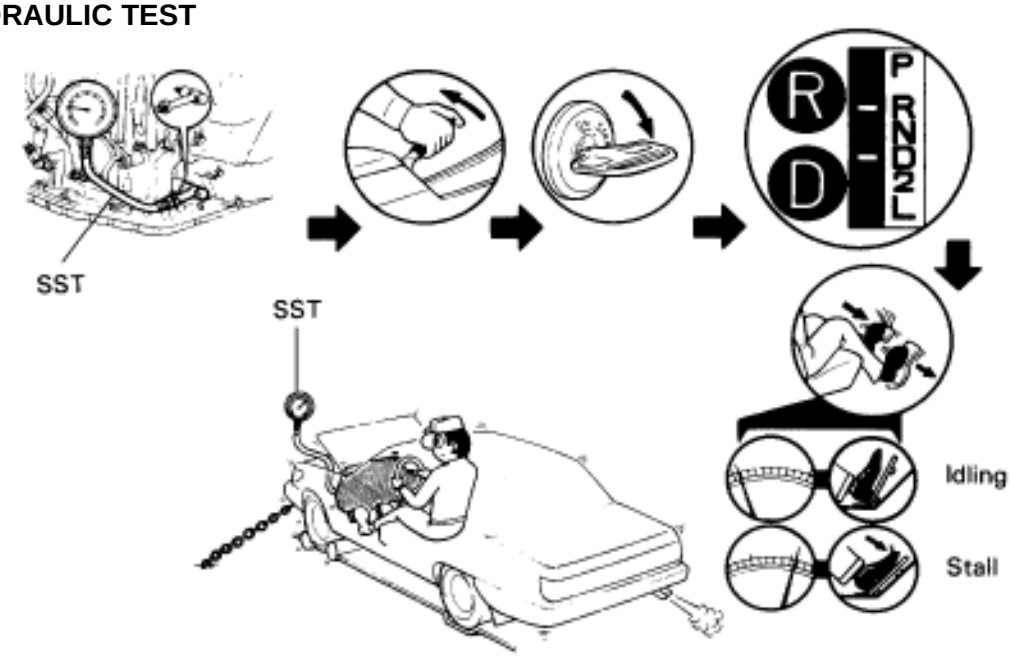
(d) Measure the line pressure when the engine is idling.

(e) Press the accelerator pedal all the way down. Quickly read the highest line pressure when reaches stall speed.

(f) In the same manner, perform the test in R range.

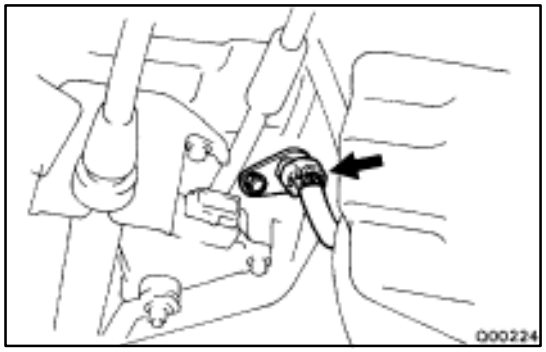
Range	D range		R range	
Engine speed	Idling	Stall	Idling	Stall
Line pressure kPa (kgf/cm^2, psi)	353–412 (3.6–4.2, 51–60)	892–1,040 (9.1–10.6, 129–151)	637–745 (6.5–7.6, 92–108)	1,608–1,837 (16.4–19.1, 233–272)

HYDRAULIC TEST



EVALUATION

Problem	Possible cause
If the measured values at all ranges are higher.	3Throttle cable out of adjustment 3Throttle valve defective 3Regulator valve defective
If the measured values at all ranges are lower	3Throttle cable out of adjustment 3Throttle valve defective 3Regulator valve defective 3Oil pump defective 3O/D direct clutch defective
If pressure is low in the D range only.	3D range circuit fluid leakage 3Forward clutch defective
If pressure is low in the R range only.	3R range circuit fluid leakage 3Direct clutch defective 3First and reverse brake defective



MANUAL SHIFTING TEST

HINT: With this test, it can be determined whether the trouble lies within the electrical circuit or is a mechanical problem in the transaxle.

1. DISCONNECT SOLENOID WIRE

2. INSPECT MANUAL DRIVING OPERATION

Check that the shift and gear positions correspond with the table below.

Shift position	D range	2 range	L range	R range	P range
Gear position	O/D	O/D	1st	Reverse	Pawl Lock

HINT: If the L, 2 and D range gear positions are difficult to distinguish, perform the following road test.

- While driving, shift through the L, 2 and D ranges. Check that the gear change corresponds to the shift position.

If any abnormality is found in the above test, the problem lies in the transaxle itself.

3. CONNECT SOLENOID WIRE

4. CANCEL OUT DIAGNOSTIC TROUBLE CODE

(See page AX–50)

REFERENCE: Possible gear positions in accordance with solenoid operating conditions.

	NORMAL			NO.1 SOLENOID MALFUNCTIONING			NO.2 SOLENOID MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING		
	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear
Range	No.1	No.2	Position	No.1	No.2	Position	No.1	No.2	Position	No.1	No.2	Position
D range	ON	OFF	1st	x	ON (OFF)	3rd (O/D)	ON	x	1st	x	x	O/D
	ON	ON	2nd	x	ON	3rd	OFF (ON)	x	O/D (1st)	x	x	O/D
	OFF	ON	3rd	x	ON	3rd	OFF	x	O/D	x	x	O/D
	OFF	OFF	O/D	x	OFF	O/D	OFF	x	O/D	x	x	O/D
2 range	ON	OFF	1st	x	ON (OFF)	3rd (O/D)	ON	x	1st	x	x	O/D
	ON	ON	2nd	x	ON	3rd	OFF (ON)	x	O/D (1st)	x	x	O/D
	OFF	ON	3rd	x	ON	3rd	OFF	x	O/D	x	x	O/D
L range	ON	OFF	1st	x	OFF	1st	ON	x	1st	x	x	1st
	ON	ON	2nd	x	ON	2nd	ON	x	1st	x	x	1st

( ): No fail–safe function x: Malfunctions

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the diagnostic trouble code check, check the circuit listed for that code in the table below and proceed to the page given:

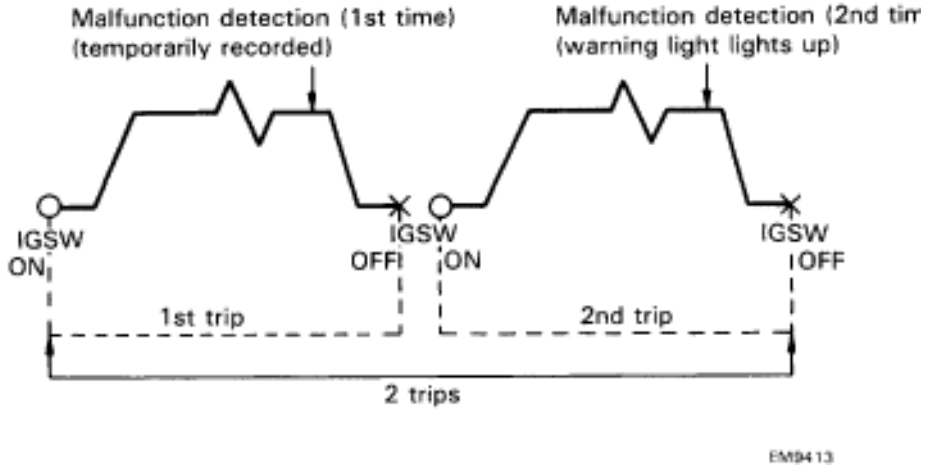
The circuits indicated by * on the code chart can be inspected using the ECT checker.

Code No.	Blinking Pattern	Circuit	Diag. Trouble Code Detection Condition
42	 BE3934	No.1 speed Sensor	All conditions below are detected for 4 secs. or more (2-trip detection logic)*3 (a) No No.1 speed sensor signal in 16 pulses of No.2 speed sensor signal. (b) Vehicle speed: 9 km/h (5.6 MPH) or more (c) Park/neutral position switch: OFF (other than P or N range)
61	BE3935	No.2 Speed Sensor	All conditions below are detected for 4 sec. or more (2-trip detection logic)*3 (a) No No.2 speed sensor signal in 4 pulses of No.1 speed sensor signal. (b) Vehicle speed: 9 km/h (5.6 MPH) or more (c) Park/neutral position switch: OFF (other than P or N range)
62	 BE3936	No.1 Solenoid Valve	(1) Solenoid resistance is 8 Ω or less when No.1 solenoid is energized 8 times or more. (2) Solenoid resistance is 100 kΩ or more when No.1 solenoid is energized 8 times or more.
63	 BE3936	No.2 Solenoid Valve	(1) Solenoid resistance is 8 Ω or less when No.2 solenoid is energized 8 times or more. (2) Solenoid resistance is 100 kΩ or more when No.2 solenoid is energized 8 times or more.
64	 BE3936	SL Solenoid Valve	(1) Solenoid resistance is 8 Ω or less when No.3 solenoid is energized once or more (2) Solenoid resistance is 100 kΩ or more when No.3 solenoid is energized once or more

*1: "O" mark means "O/D OFF" light blinks once per two seconds.
"X" mark means "O/D OFF" light never blinks.

*2: "O" mark means the ECU memorizes the malfunction code if the ECU detects the diag. trouble code detection condition.

*3: This indicates items for which "2 trip detection logic" is used. With this logic, when a logic malfunction is first detected, the malfunction is temporarily stored in the ECU memory. If the same malfunction is detected again during the second drive test, this second detection causes the "O/D OFF" light to blink.
The 2 trip repeats the same mode a 2nd time. (However, the IG switch must be turned OFF between the 1st trip and 2nd trip.)



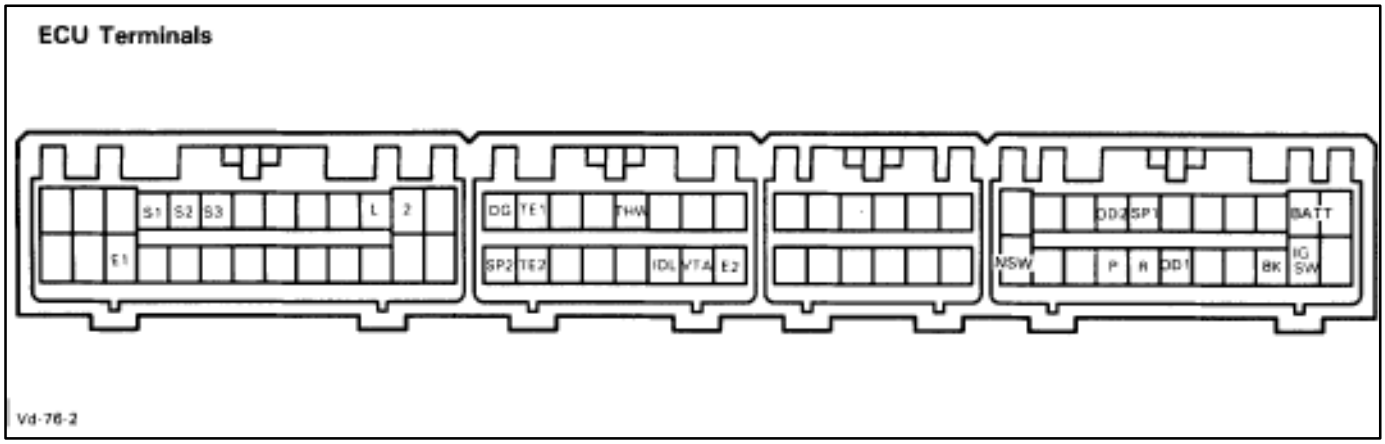
EM9413

Trouble Area	O/D OFF Light Blinks*1	Memory*2	See Page
Harness or connector between No.1 speed sensor and ECU No.1 speed sensor Combination meter ECU	O	O	AX–81
Harness or connector between No.2 speed sensor and ECU No.2 Speed Sensor ECU	O	O	AX–83
Harness or connector between No.1 solenoid and ECU No.1 solenoid ECU	O	O	AX–85
Harness or connector between No.2 solenoid and ECU No.2 solenoid ECU	O	O	AX–85
Harness or connector between No.3 solenoid and ECU No.3 solenoid ECU	x	O	AX–89

HINT: If the malfunction returns to normal while a malfunction warning is being output, the “O/D OFF” indicator light stops blinking and goes off.
However, the malfunction code is retained in memory until it is cleared from memory.

- If the diagnosis system outputs a malfunction code even though the ”O/D OFF” indicator was not blinking, there is intermittent trouble.
- Check all the connectors in the circuits corresponding to that code.
- If speed sensors No.1 and No.2 happen to fail simulaneously, the ECU will neither alert the driver by blinking the “O/D OFF” indicator none record any diagnostic trouble code. It will, however, decide that the vehicle can be driven only in 1st and none of the other gears, so shifting upward will be prohibited.
- Codes 46, 62, 63 and 64 are limited to short or open circuits in the electrical system comprised of the solenoids, wire harnesses and connectors. The ECU is unable to detect mechanical trouble (sticking, for example) in the solenoid valves.

STANDARD VALUE OF ECU TERMINAL



Symbols	Wiring Color	Condition		Standard Value
S_1–E_1	LG BR	IG OFF		11–15
		IG ON		10–14 V
		Vehicle driving under 2nd gear position		10–14 V
S_2–E_1	W–R BR	IG OFF		11–15
		IG ON		Below 1 V
		Vehicle driving under 2nd gear position		10–14 V
SL–E_1	LG BR	IG OFF		11–15
		IG ON		Below 1 V
		Vehicle driving under lock–up position		10–14 V
P–E	L–R BR	IG ON	Pattern select SW: PWR	10–14 V
			Pattern select SW: NORM	Below 1 V
BK–E_1	G–W BR	IG ON	Brake pedal is depressed	10–14 V
			Brake pedal is released	Below 1 V
THW–E_2	G BR	IG ON	Engine coolant temp. 176°F (80°C)	0.1–1.0 V
IDL–E_2	L BR	IG ON	Accel. pedal is released	Below 1 V
			Accel. pedal is depressed	10–14 V
VTA–E_2	B BR	IG ON	Accel. pedal is released	Below 1.5 V
			Accel. pedal is depressed	3–5.5 V
OD_1–E_1	Y–B BR	IG ON		10–14 V
OD_2–E_1	G–O BR	IG ON	OD main SW: ON	10–14 V
			OD main SW: OFF	Below 1 V
SP_1–E_1	V–Y BR	IG ON Disconnect following connectors: ⋇Cruise control ECU ⋇PPS ECU	Standing still	Below 1 V
			Turn the one front wheel slowly.	Plus signal is output Below 1 V 4 ~ 5 V
SP_2–E_1	LG BR	IG ON	Standing still	Below 1 V or 4 ~ 5 V
			Turn the one front wheel slowly	Puls signal is output Below 1 V 4 ~ 5 V
R–E_1	R–B BR	IG ON	R range	10–14 V
			Except R range	Below 1 V
NSW–E_1	B–W BR	IG ON	P or N range	10–14 V
			P and N range	Below 1 V
2–E	O BR	IG ON	2 range	10–14 V
			Except 2 range	Below 1 V
L–E_1	Y–L BR	IG ON	L range	10–14 V
			Except L range	Below 1 V

MATRIX CHART OF PROBLEM SYMPTOMS

If a normal code is displayed during the diagnostic trouble code check but the trouble still occurs, check the circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.

The Matrix Chart is divided into 3 chapters.

Chapter 1: Electronic Circuit Matrix Chart.

Chapter 2: On–vehicle Repair Matrix Chart.

Chapter 3: Off–vehicle Repair Matrix Chart.

When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 1 to proceed to Chapter 2 or 3, proceed as instructed.

1. If the instruction “Proceed to next circuit inspection shown on matrix chart” is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
2. If the trouble still occurs even through there are no abnormalities in any of the other circuits, then check or replace the ECM.
3. The circuits indicated by “⁎” on the Chapter 1 matrix chart can be inspected using the ECT checker.

Chapter 1. Electronic Circuit

See page / Suspect Area / Symptom		AX–81 AX–83	AX–85	AX–89	AX–91	EG–412	AX–93	AX–95
		No.1, No.2 speed sensor circuit	No.1, No.2 solenoid circuit	No.3 Solenoid circuit	Throttle position sensor circuit	IDL switch circuit	Park/neutral position switch circuit	Stop light circuit
Vehicle does not move in any forward range and reverse range								
Vehicle does not move in particular range or ranges								
No up-shift	1st → 2nd	3	2		1			
	2nd → 3rd	3	2		1			
	3rd → O/D	4	3					
No down-shift	O/D → 3rd	2	1					
	3rd → 2nd	2	1		3			
	2nd → 1st	2	1		3			
No lock-up		3		1	2			5
No lock-up off				1	2	3		4
Shift point too high or too low		2		3	1			
Up-shifts to 2nd while in L range Up-shifts to 3rd while in L range							1	
Up-shifts to O/D from 3rd while O/D switch is OFF								
Up-shifts to O/D from 3rd while engine is cold								
Harsh engagement	N → D							
	Lock-up			1				
	Any driving range							
Slip or Shudder	Forward and reverse							
	Particular range							
No engine braking								
Poor acceleration		2	1					
No kick-down		2	1					
No pattern select		2						
Large shift shock or Engine stalls when starting off or stopping.								

Pattern select switch circuit AX–97	O/D switch and O/D OFF indicator switch circuit AX–101	O/D cancel signal circuit AX–107	Engine Coolant Temperature sensor circuit EG–374	ECM IN–32	On-Vehicle repair matrix chart AX–72	OFF-Vehicle repair matrix chart AX–74
					1	2
					1	2
				4	5	6
				4	5	6
	1	2	5	6	7	8
		3		4	5	–
				4	5	–
				4	5	6
		4	6	7	8	9
			5	6	7	8
5		4		6	–	–
				2	–	–
	1			2	–	–
			1	2	3	4
					1	2
				2	3	4
					1	2
					1	2
					1	2
					1	2
				3	–	4
				3	4	–
1				3	–	–
					–	1

Chapter 2. On–Vehicle Repair

See page / Suspect Area / Symptom		AX–13	★	★	★	★	★	★	★
		Oil strainer	Parking lock pawl	Manual valve	1–2 shift valve	2–3 shift valve	3–4 shift valve	C_1 accumulator	B_2 accumulator
Vehicle does not move in R range					1	2			
Vehicle does not move in any forward range or reverse range				1					
No lock-up									
No lock-up OFF									
No kick-down					1	2	3		
No engine braking	1st								
	2nd								
No up-shift	1st → 2nd				1				
	2nd → 3rd					1			
	3rd → O/D						1		
No down-shift	O/D → 3rd						1		
	3rd → 2nd					1			
	2nd → 1st				1				
Harsh engagement	N → R								
	N → D							1	
	N → L								
	1st → 2nd (D range)								1
	1st → 2nd (2 range)								
	1st → 2nd → 3rd								
	1st → 2nd → 3rd → O/D								
	2nd → 3rd								
	3rd → O/D								
	O/D → 3rd								
	3rd → 2nd								1
Sliper shudder in forward and reverse (Directry after E/G start)		2							

*: Refer to '92 A540E Automatic Transaxle Repair Manual (Pub. No. RM245U)

*	*	*	*	*	*	*	*	*	AX–74
C_2 accumulator	B_0 accumulator	C_0 accumulator	No.1 and No.2 accumulator control valve	Low coast modulator valve	2nd coast modulator valve	Throttle modulator valve	Lock-up relay valve	Pressure relief valve	OFF-Vehicle repair matrix chart
									3
									2
							1		2
							1		2
				1					2
					1				2
									2
									2
									2
									2
			1						2
									2
				1					
									2
					1				
			2			1			
			1						
1									
	1								2
	2	1							
	3	2			4				5
								1	3

Chapter 3. Off–Vehicle Repair

Suspect Area / Symptom		See page	Torque converter clutch	Parking lock pawl	O/D direct clutch (C_0)	Forward clutch (C_1)	Direct clutch (C_2)	O/D brake (B_0)
		AX–35	★	★	★	★	★	★
Vehicle does not move in any forward range						1	6	
Vehicle does not move in reverse range					5		4	
Vehicle does not move in any forward range and reverse range				1	3			4
No lock-up			1					
No lock-up OFF			1					
Large shock during lock-up			1					
E/G stalls when starting off and stopping			1					
No up-shift	1st → 2nd							
	2nd → 3rd						1	
	3rd → O/D							1
No down shift 2nd → 1st								
Harsh engagement	N → R						1	
	N → D					1		
	1st → 2nd (D range)							
	2nd → 3rd							
	3rd → O/D				1			2
Slip on shudder	Forward and reverse (After warm-up)		1		3			
	Forward and reverse (Directly after E/G start)		1					
	R range				2		1	
	1st					1		
	2nd							
	2nd → 3rd (Up-shift)						1	
	3rd						1	
	O/D							1
No engine braking	1st ~ 3rd				1			
	1st							
	2nd							
Poor acceleration	All ranges		1					
	O/D				1			
	Other than O/D							1
	Other than 2nd							
	1st and 2nd							1
	1st and R range							
	R range					1		

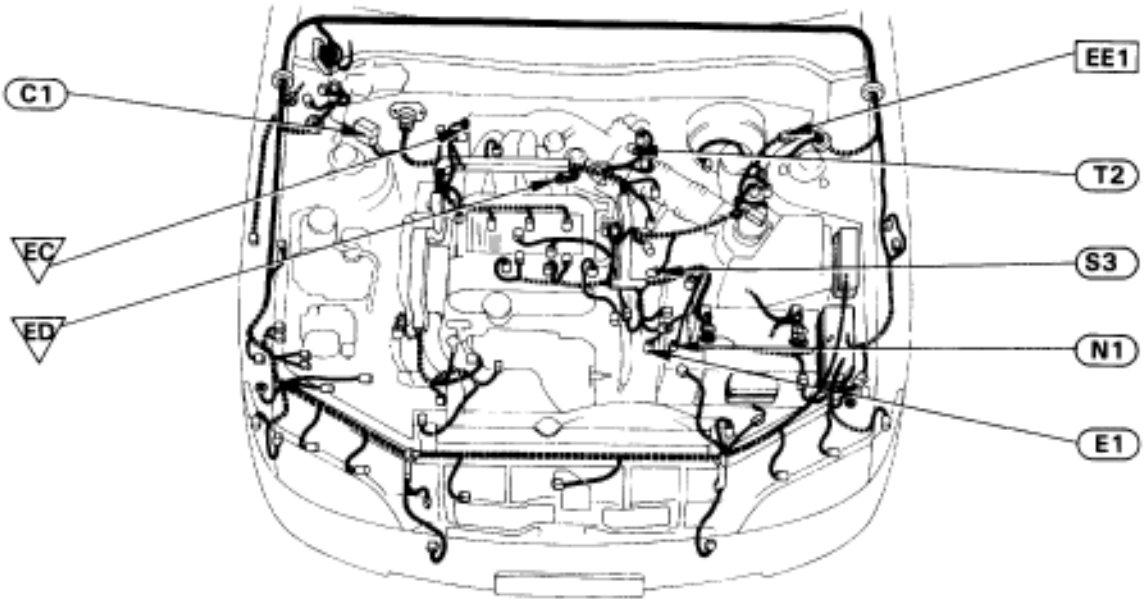
* :

Refer to '92 A540E Automatic Transaxle Repair Manual (Pub. No. RM245U)

★	★	★	★	★	★	★	★	★
2nd coast brake (B_1)	Second brake (B_2)	1st and reverse brake (B_3)	O/D one-way clutch (F_0)	No.1 one-way clutch (F_1)	No.2 one-way clutch (F_2)	O/D planetary gear	Front planetary gear	Rear planetary gear
4	5	3			2			
1		6					2	3
			2			7	5	6
	1			2				
1								
		2						
		1						
1								
						3		
				2				
			3					
					2			
	1			2				
		1						
1								
						2		
						2		
1	2							
		1						

CONNECTORS LOCATION

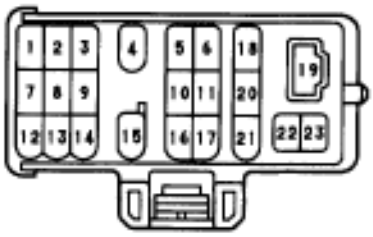
Connectors Location in Engine Compartment



BE6660

C1

DCL1



loj-23-1-A

E1

ECT Solenoid

le-3-1-G

N1

Park/Neutral Start Switch

SH-9-1-A

S3

No.2 Speed Sensor

IS-2-1-A

T2

Throttle Position Sensor

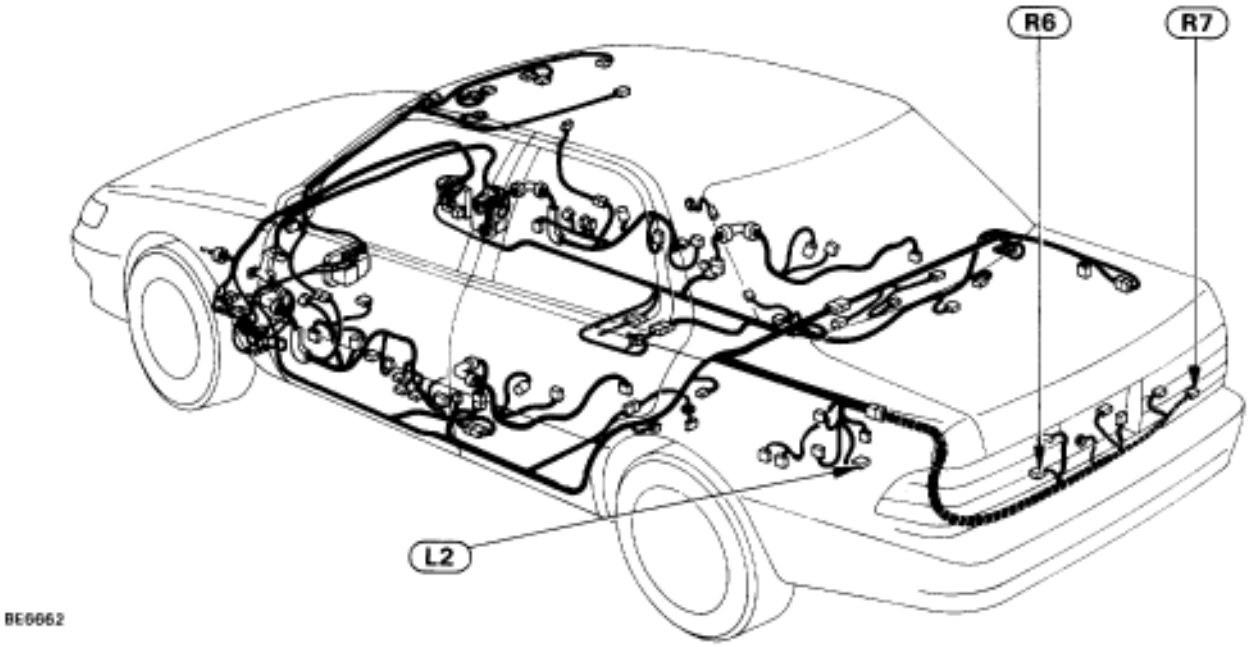
IS-4-1-C

EE1

lfg-4-1

lfg-4-2

Connectors Location in Body



L2

Light Failure Sensor

e-12-1

R6

Stop Light LH

e-6-2

R7

Stop Light RH

e-6-2

O4

O/D Main Switch

s-4-2-B

J1

Junction Connector

e-22-1-A

J2

Junction Connector

e-14-1-A

S14

Stop Light Switch

eg-4-1

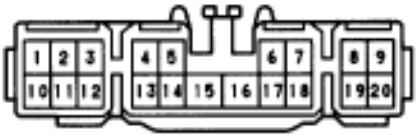
T3

DCL2

s-17-1

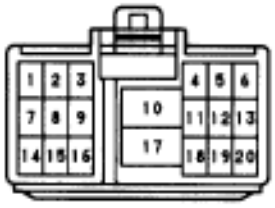
T4

Theft Deterrent and Door Lock ECU

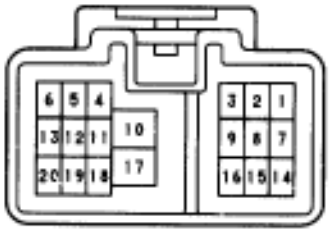


e-20-1

IH2

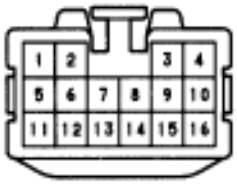


e-20-1-B

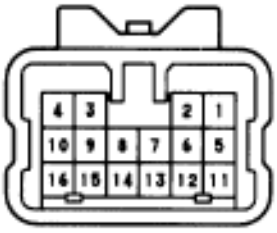


e-20-2-B

IH3

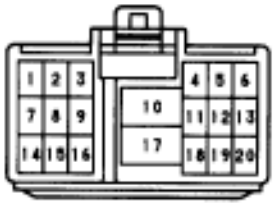


e-16-1

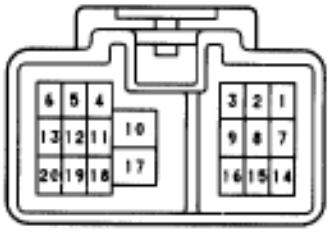


e-16-2

IM1



e-20-1-B



e-20-2-B

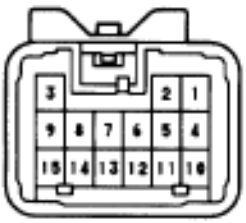
IM3

ef-19-1

ef-19-2

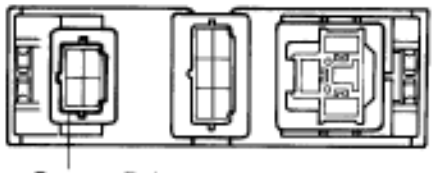
IN1

e-15-1



e-15-2

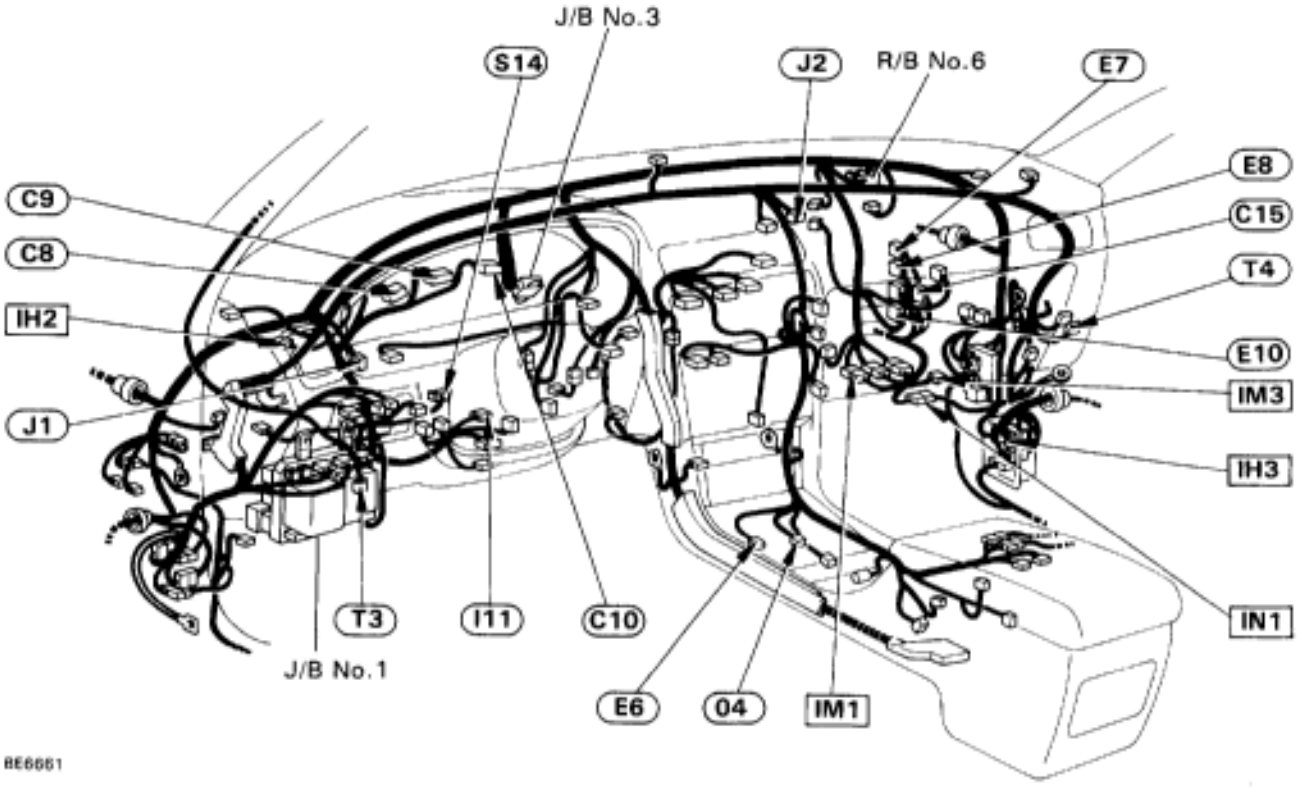
R/B No.6



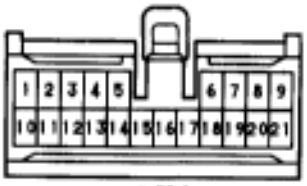
Starter Relay

BE6670

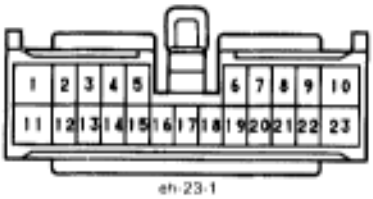
Connectors Location in Instrument Panel



C8
Combination Meter

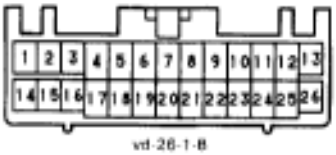


C9
Meter Assembly



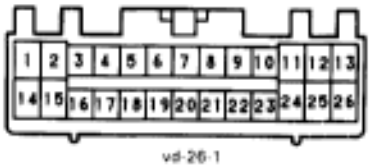
C10
Combination Meter

C15
Cruise Control ECU

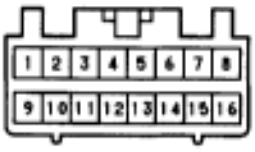


E6
Pattern
Select Switch

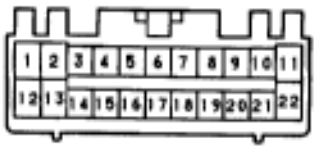
E7
ECM



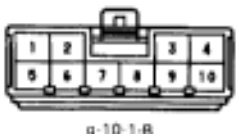
E8
ECM



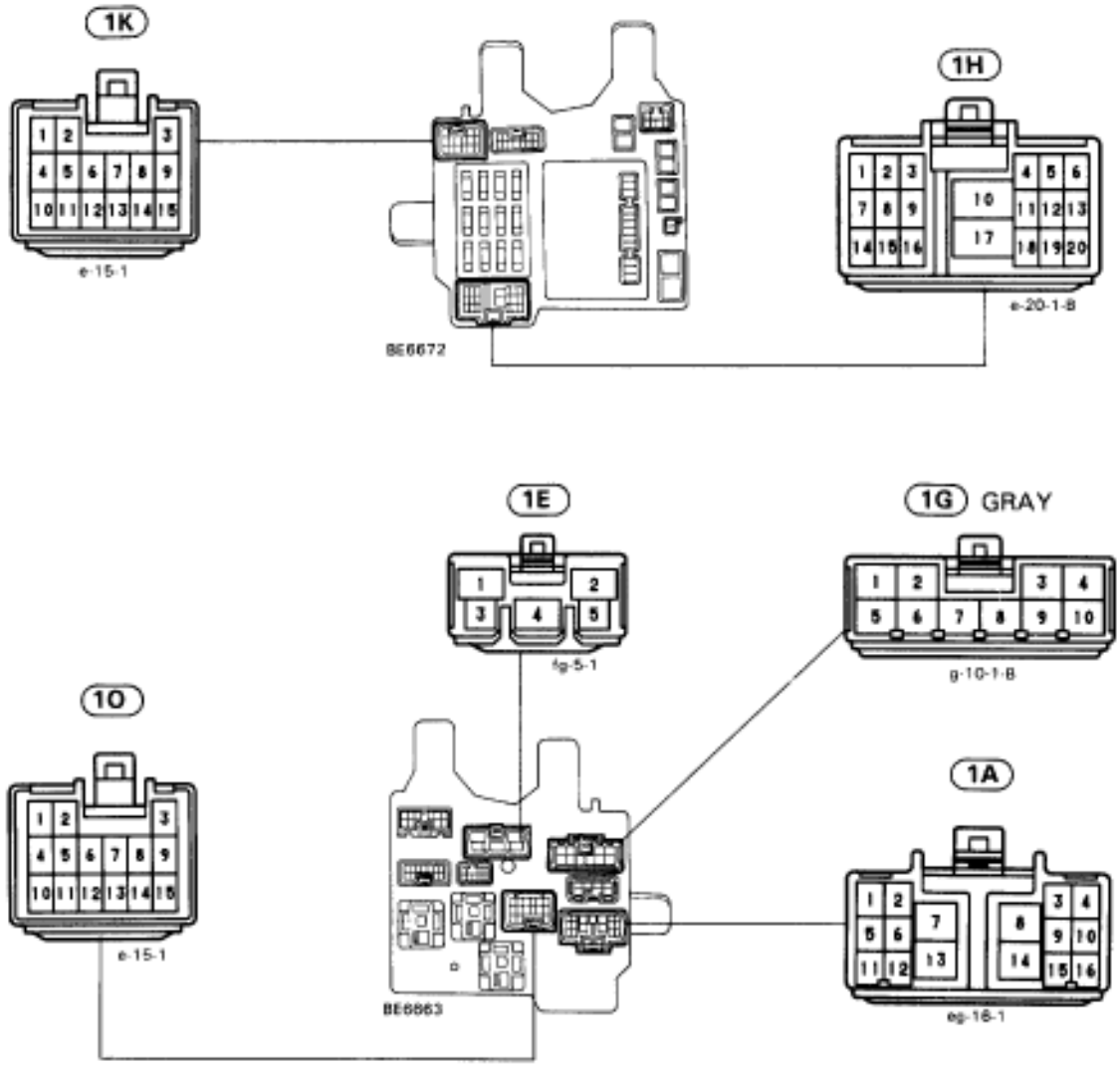
E10
ECM



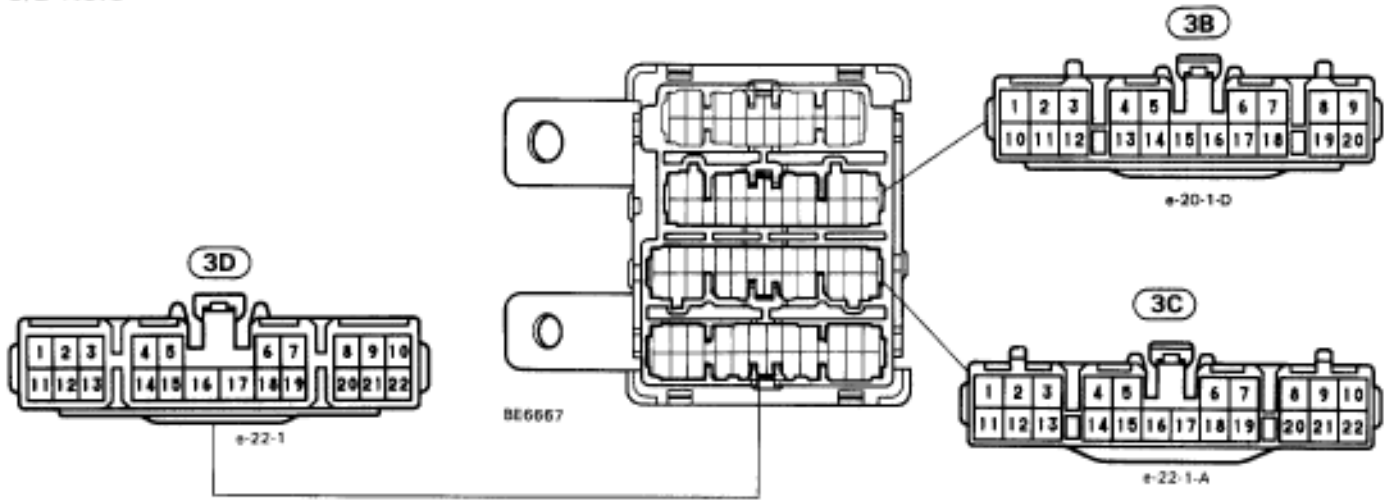
I11
Ignition Switch



J/B No.1


1K
e-15-1
BE6672
1H
e-20-1-B
1E
fg-5-1
1G GRAY
g-10-1-B
1O
e-15-1
BE6663
1A
eg-16-1

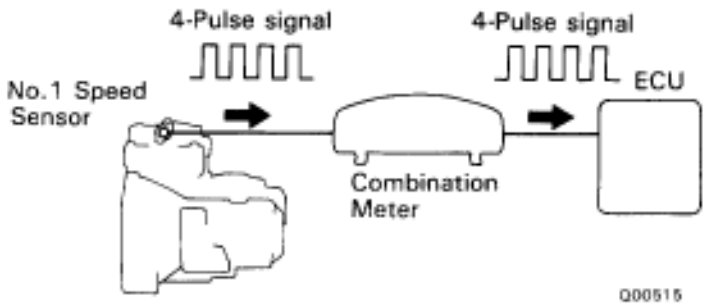
J/B No.3

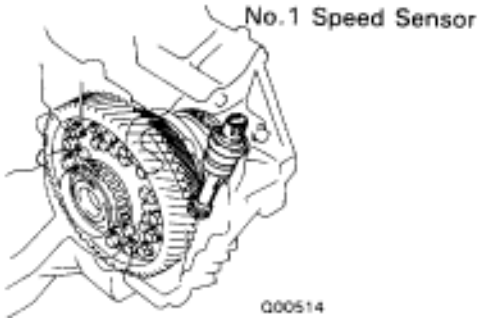

3B
e-20-1-D
3D
e-22-1
BE6667
3C
e-22-1-A

DTC	42	No. 1 Speed Sensor Circuit (Back–up Sensor)

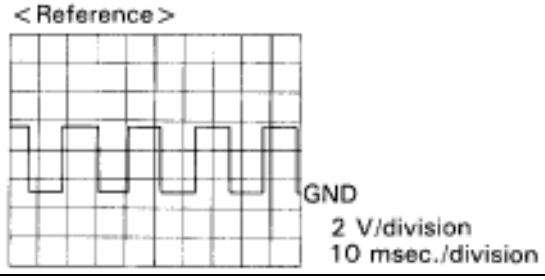
CIRCUIT DESCRIPTION

The No. 1 speed sensor outputs a 4–pulse signal for every revolution of the differential case.
After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the engine and TCM.



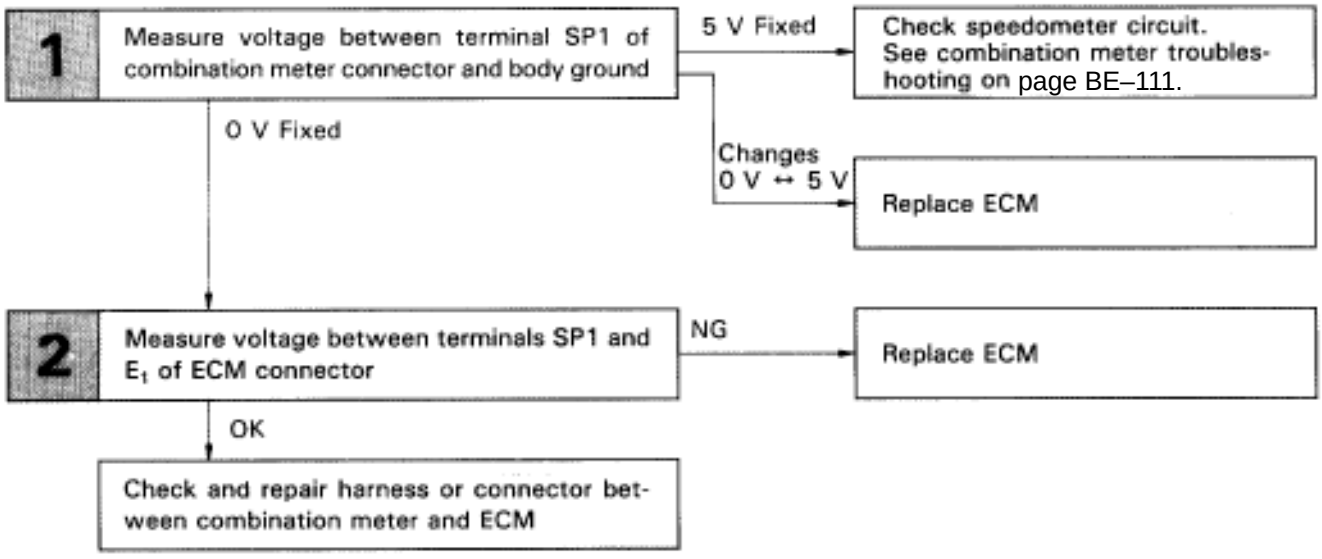


Code No.	Diag. Trouble Code Detection Condition	Trouble Area
42	All conditions below are detected for 4 secs. or more (2 trip detection logic)* (c) No No. 1 speed sensor signal in 16 pulses of No. 2 speed sensor signal. (d) Vehicle speed: 9 km/h (5.6 MPH) or more (e) Park/neural position switch: OFF (Other than P or N range)	⋊No. 1 speed sensor ⋊Combination meter ⋊Harness or connector between No. 1 speed sensor and ECU ⋊ECU



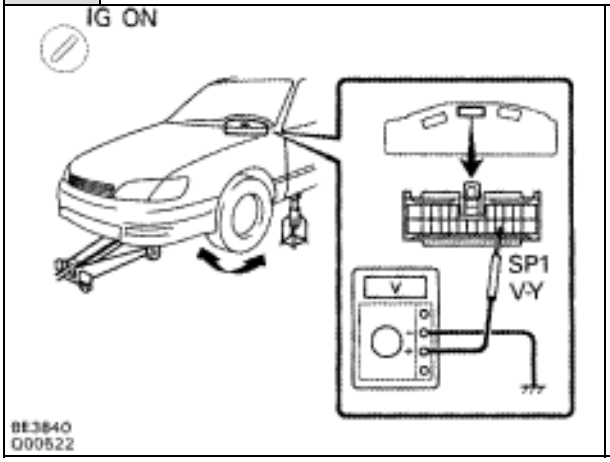
⋊Waveform between terminals SP1 and E_1, when vehicle speed is about 60 k/h (37 MPH).
HINT: The greater the vehicle speed, the greater the number of SP1 signals is produced.

DIAGNOSTIC CHART



INSPECTION PROCEDURE

1 **Measure voltage between terminal SP1 of combination meter connector and body ground.**



P
(a) Shift the shift lever to N range.
(b) Jack up the front wheel on one side.
(c) Disconnect the cruise control ECU and PPS connectors.
(d) Turn IG switch ON.

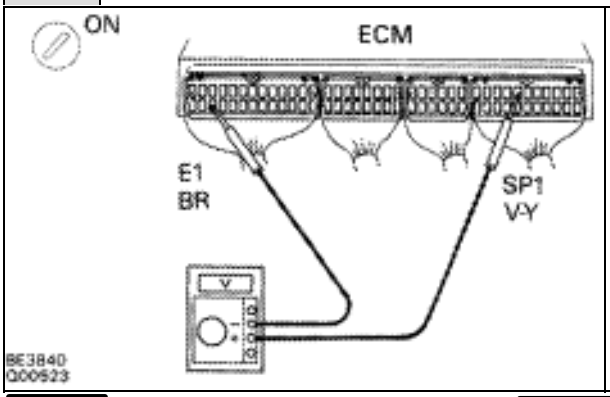
C Measure voltage between terminal SP1 of combination meter connector and body ground then turn the one front wheel slowly.

Voltage: **Constantly 0 V ..... Go to Next Step**
Constantly 4 – 6 V ... Go to NG1
Changes 0 V 4 6 V .. Go to NG2

NG1 **Check combination meter circuit. See combination meter troubleshooting on page BE–111.**

NG2 **Replace ECM**

2 **Measure voltage between terminals SP1 and E_1 of engine and ECT ECU**



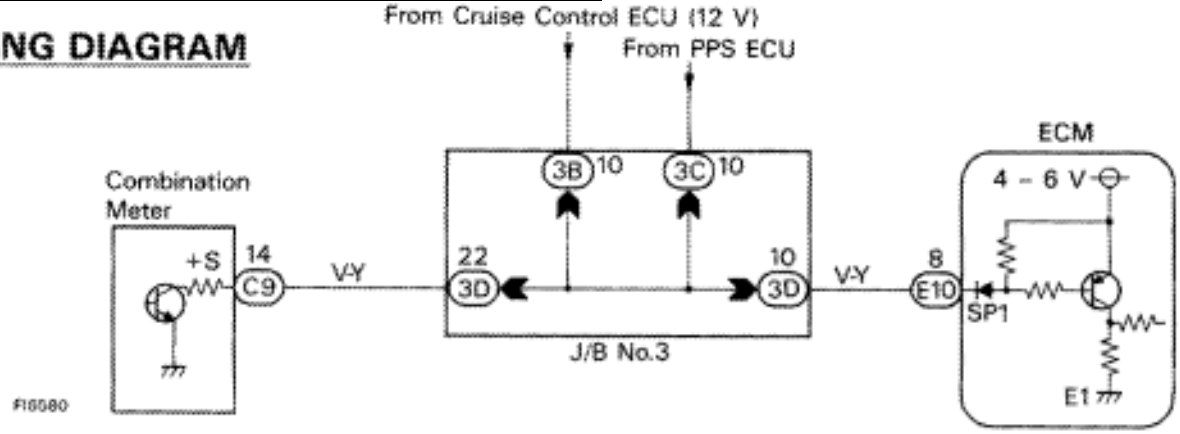
P
3. Disconnect combination meter and cruise control computer connections.
4. Turn IG switch ON.
5. Measure voltage between terminals SP1 and E_1 of ECM connector.

OK **Voltage:** **4 – 6 V**

OK **NG** **Replace ECM**

Check and repair harness or connector between combination meter and ECM.

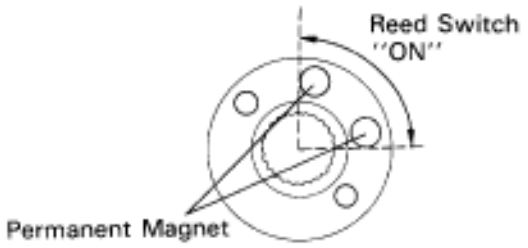
WIRING DIAGRAM

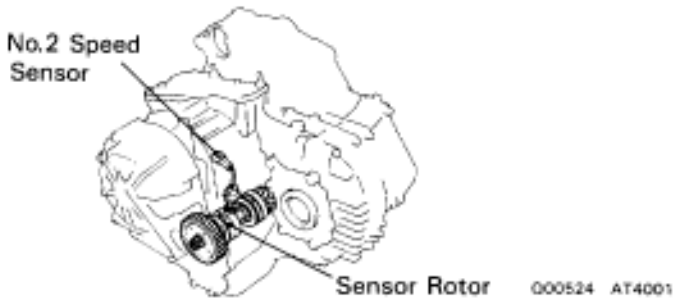


DTC 61 No. 2 Speed Sensor Circuit (Main Sensor)

CIRCUIT DESCRIPTION

A rotor with built in permanent magnet is mounted on the differential drive pinion. Every time the differential drive pinion (and thus the rotor) makes one complete revolution, the permanent magnet activates the reed switch, which is built into the No.2 speed sensor, causing it to generate a signal. This signal, which corresponds to the governor pressure in a conventional automatic transaxle, is sent to the ECM, which uses it in controlling the shift points and the operation of the lock–up clutch. This sensor outputs one pulse for every one revolution of the differential drive pinion.

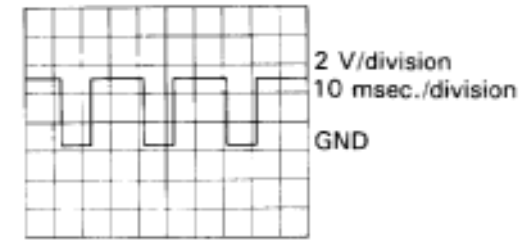




Code No.	Diag. Trouble Code Detection Condition	Trouble Area
61	All conditions below are detected for 4 secs. or more (2 trip detection logic)* (a) No No.2 speed sensor signal in 4 pulses of No.1 speed sensor signal (b) Vehicle speed: 9 km/h (5.6 MPH) or more (c) Park/neutral position switch OFF (other than P or N range)	›No. 2 speed sensor ›Harness or connector between No. 2 speed sensor and ECU ›ECU

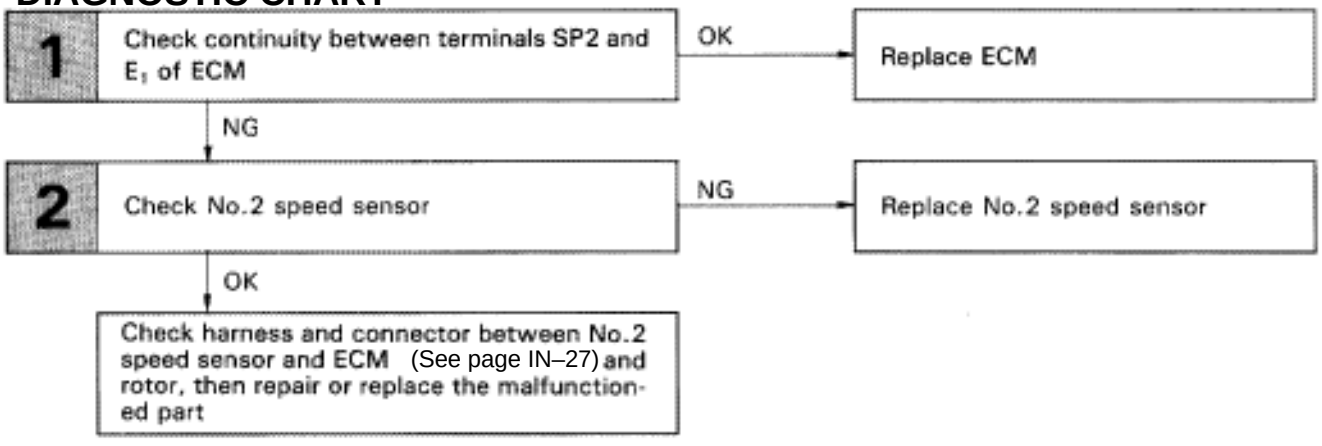
* See page AX–66

<Reference>



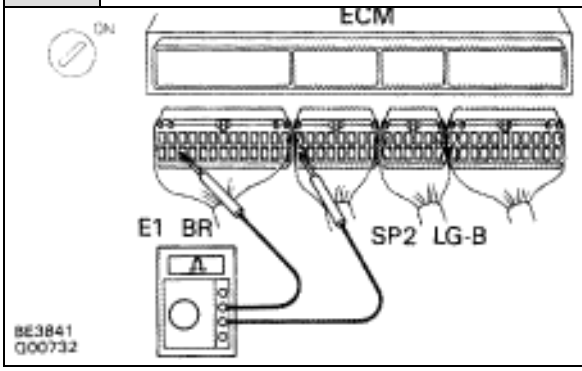
›Waveform between terminals SP2 and E_1 when vehicle speed is approx. 60 km/h (37 MPH).

DIAGNOSTIC CHART



INSPECTION PROCEDURE

1 **Check continuity between terminals SP2 and E_1 of ECM connector.**



P 1. Disconnect connector (16P) from the ECM.
2. Shift the shift lever to N range.
3. Jack up the front wheel on one side.

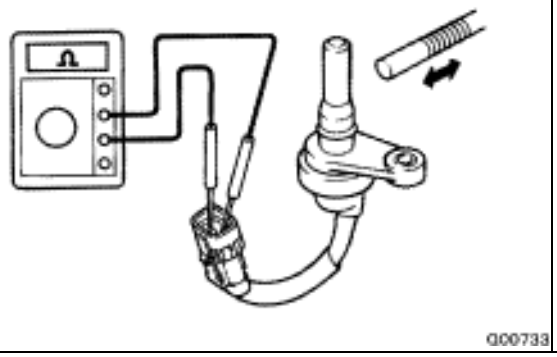
C Check that there is continuity between terminals between SP2 and E_1 of the ECM connector (16P) while slowly turning the jacked–up wheel by hand.

OK Resistance changes between 0 and ∞

NG

OK **Replace ECM**

2 **Check No. 2 speed sensor**



P Remove No. 2 speed sensor from transaxle.

C Check that there is continuity between terminals of No. 2 speed sensor connector when a magnet is put close to is as shown in the illustration.

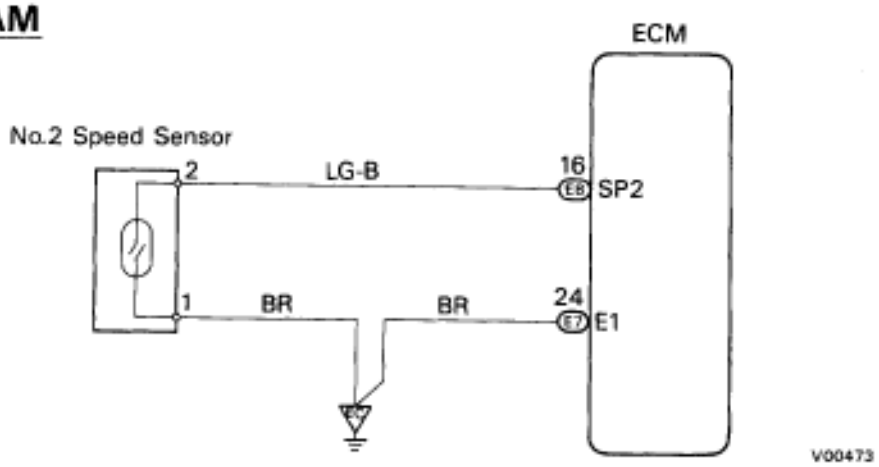
OK Resistance changes between 0 and ∞

OK

NG **Replace No. 2 speed sensor.**

Check harness and connector between No. 2 speed sensor and ECM (See page IN–27) and rotor, then repair or replace the malfunctioned part.

WIRING DIAGRAM



DTC 62, 63 No. 1, No. 2 Solenoid Valve Circuit

— CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the No.1 and No.2 solenoid valves controlled by the ECU. If an open or short circuit occurs in either of the solenoid valves, the ECU controls the remaining normal solenoid to allow the vehicle to be operated smoothly (Fail safe function).

Fail Safe Function

If either of the solenoid valve circuits develops a short or an open, the ECU turns the other solenoid ON and OFF to shift to the gear positions shown in the table below. The ECU also turns the lock–up solenoid valve OFF at this time. If both solenoids malfunction, hydraulic control cannot be performed electronically and must be done manually.

Manual shifting as shown in the following table must be done. (In the case of a short circuit, the ECU stops sending current to the short circuited solenoid).

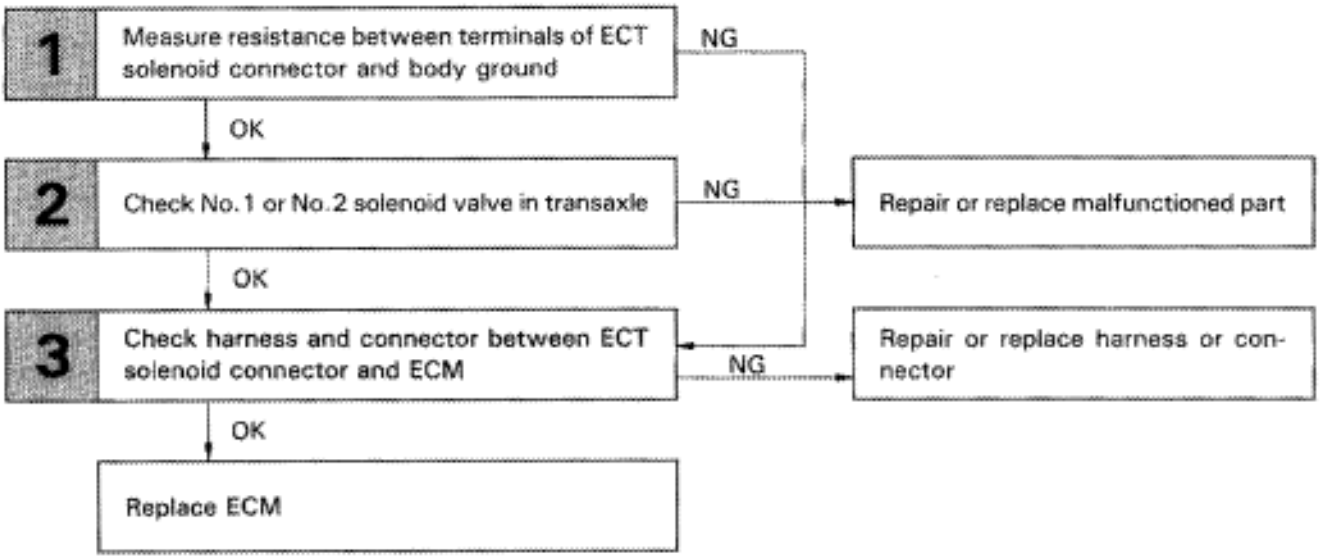
Range	NORMAL			No.1 SOLENOID MALFUNCTIONING			No.2 SOLENOID MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	No.1	No.2		No.1	No.2		No.1	No.2		
D	ON	OFF	1st	x	ON	3rd	ON	x	1st	O/D
	ON	ON	2nd	x	ON	3rd	OFF	x	O/D	O/D
	OFF	ON	3rd	x	ON	3rd	OFF	x	O/D	O/D
	OFF	OFF	O/D	x	OFF	O/D	OFF	x	O/D	O/D
2	ON	OFF	1st	x	ON	3rd	ON	x	1st	O/D
	ON	ON	2nd	x	ON	3rd	OFF	x	O/D	O/D
	OFF	ON	3rd	x	ON	3rd	OFF	x	O/D	O/D
L	ON	OFF	1st	x	OFF	1st	ON	x	1st	1st
	ON	ON	2nd	x	ON	2nd	ON	x	1st	1st

x: Malfunctions

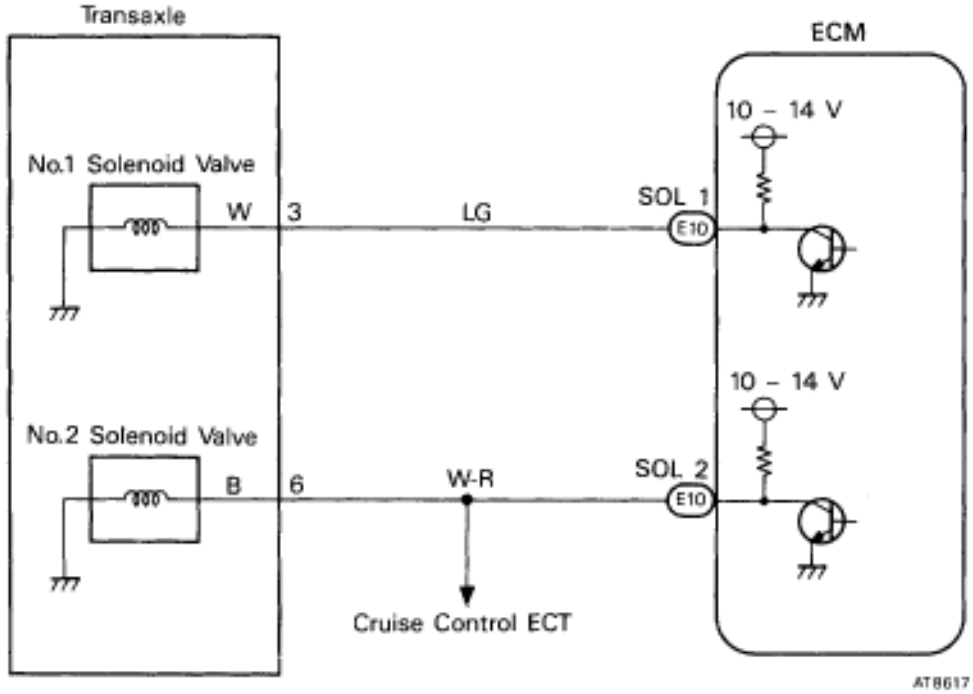
Check the No.1 solenoid when diagnostic trouble code 62 is output and check the No.2 solenoid when diagnostic trouble code 63 is output.

Code No.	Diag. Trouble Code Detection Condition	Trouble Area
62, 63	(a) Solenoid resistance is 8 or lower (short circuit) when solenoid is energized. (b) Solenoid resistance is 100 k or higher (open circuit) when solenoid is not energized. The ECU checks for an open or short circuit in the No. 1 and No. 2 solenoid circuit when it changes gear position. The ECU records diag. trouble code 62 or 63 if condition (a) or (b) is detected once, but it does not blink the O/D OFF indicator light. After the ECU detects condition (a) or (b) continuously 8 times or more in one–trip*, it causes the O/D OFF indicator light to blink until condition (a) or (b) disappears. After that, if the ECU detects condition (a) or (b) once, it starts blinking the O/D OFF indicator light again. *One–trip (See page AX–66)	1. No. 1 or No. 2 solenoid valve 2. Harness or connector between No. 1 and No. 2 solenoid valve and ECM connector 3. ECU

DIAGNOSTIC CHART

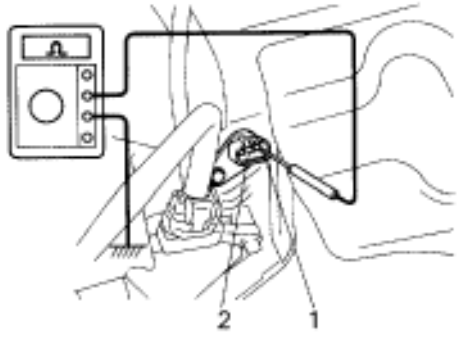


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Measure resistance between terminals of ECT solenoid connector and body ground.**



P Disconnect ECT solenoid connector.

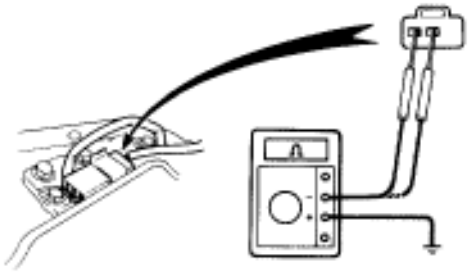
C Measure resistance between terminals of ECT solenoid connector and body ground as shown in the illustration.

OK **Resistance: 1, 2 – Body ground 11 – 15 Ω**

NG

OK → **Go to step ✳**

2 **Check No. 1 or No. 2 solenoid in transaxle**



P
1. Jack up the vehicle.
2. Remove oil pan.

C
1. Check connector connection of No. 1 and No. 2 solenoids.
2. Measure resistance between No. 1 and No. 2 solenoid connector terminals and body ground.

OK **Resistance: 11 – 15 Ω**

C Check for operation sound of solenoids sound when you apply battery positive voltage to No. 1 and No. 2 solenoid connector terminals and body ground.

C Check continuity of solenoid wire.

OK **Continuity (Below 1 Ω)**

OK

NG → **Repair or replace malfunctioned part**

3 **Check harness and connector among ECT solenoid connector, ECM connector and cruise control computer**

OK

NG → **Repair or replace harness or connector.**

Replace ECM

–MEMO–

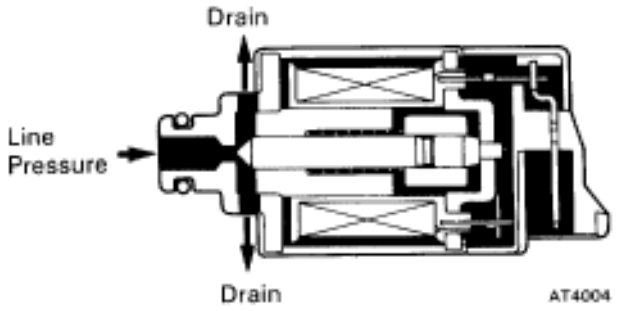
DTC 64 No. 3 Solenoid Valve Circuit

CIRCUIT DESCRIPTION

The No.3 solenoid valve is turned ON and OFF by signals from the ECM to control the hydraulic pressure acting on the lock–up relay valve, which then controls operation of the lock up clutch.If a malfunction occurs in this circuit and diagnostic trouble code 64 is stored in memory, the O/D OFF indicator light does not blink.

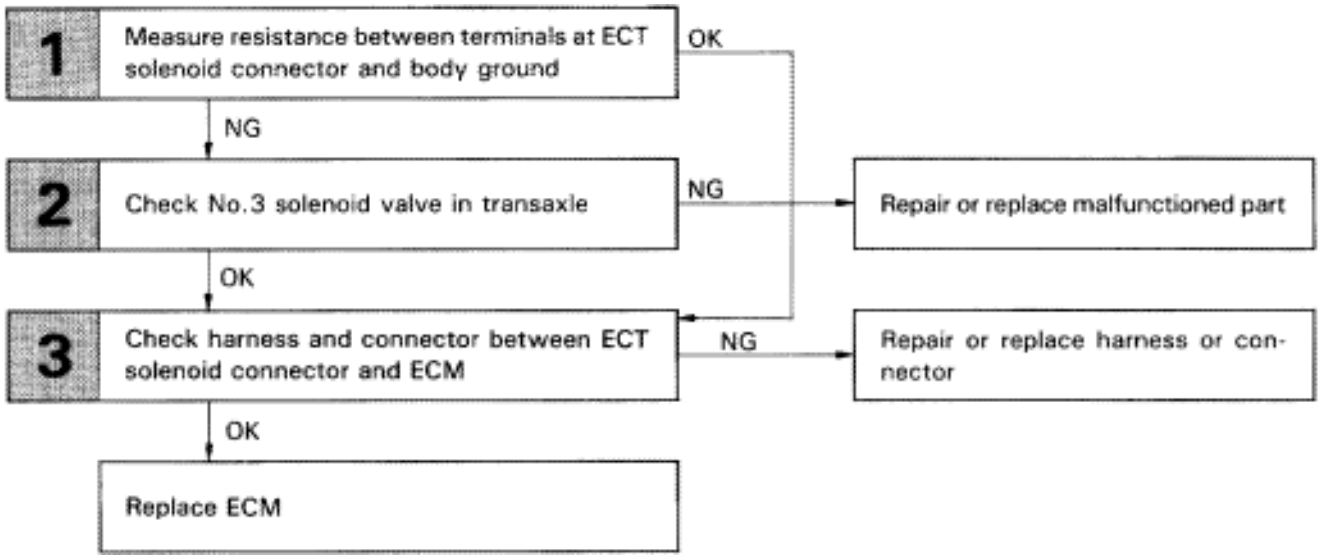
Fail Safe Function

If the ECU detects a malfunction, it turns the lock–up solenoid valve OFF.

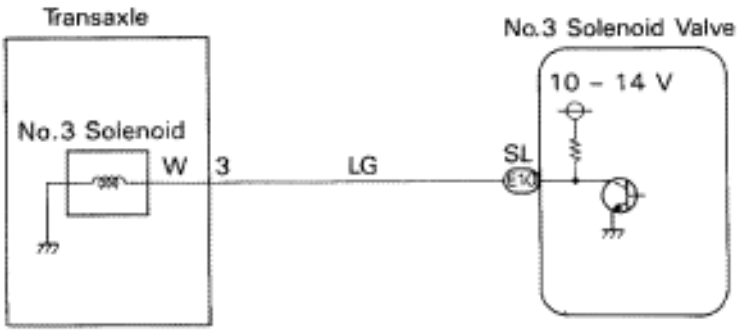


Code No.	Diag. Trouble Code Detection Condition	Trouble Area
64	(a) Solenoid resistance is 8 or lower (short circuit) when solenoid energized. (b) Solenoid resistance is 100 k or higher (open circuit) when solenoid is not energized. ECU memorizes diag. code 64 is above (a) or (b) condition is detected once or more, but ECU does not start O/D OFF indicator light blinking.	1 No. 3 solenoid valve 2 Harness or connector between No. 3 solenoid valve and ECU 3 ECU

DIAGNOSTIC CHART

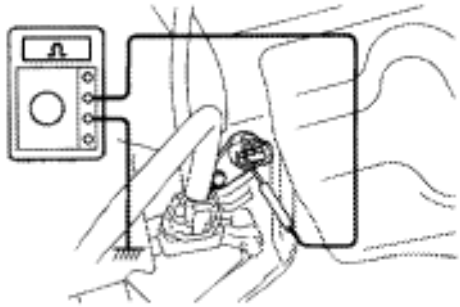


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Measure resistance between terminals of ECT solenoid connector and body ground.**



P Disconnect ECT connector

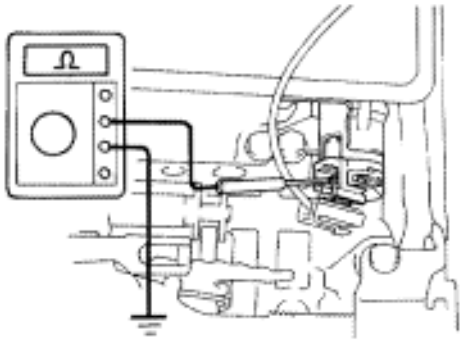
C Measure resistance between terminals of ECT solenoid connector terminal 3 and body ground.

OK **Resistance: 3 – Body ground 11 – 15 Ω**

NG

OK → **Go to step ✳**

2 **Check No. 3 solenoid valve in transaxle**



P
1. Jack up the vehicle
2. Remove oil pan

C
1. Check No. 3 solenoid connector connection
2. Measure resistance between No. 3 solenoid connector terminals and body ground

OK **Resistance: 11 – 15 Ω**

C Check that No. 3 solenoid valve makes operation sound when apply battery positive voltage to No. 3 solenoid connector terminal and body ground.

C Check continuity of solenoid wire

OK **Continuity (Below 1 Ω)**

OK

NG → **Repair or replace malfunctioned part**

3 **Check harness and connector between ECT solenoid connector and ECM.**

OK

NG → **Repair or replace harness or connector.**

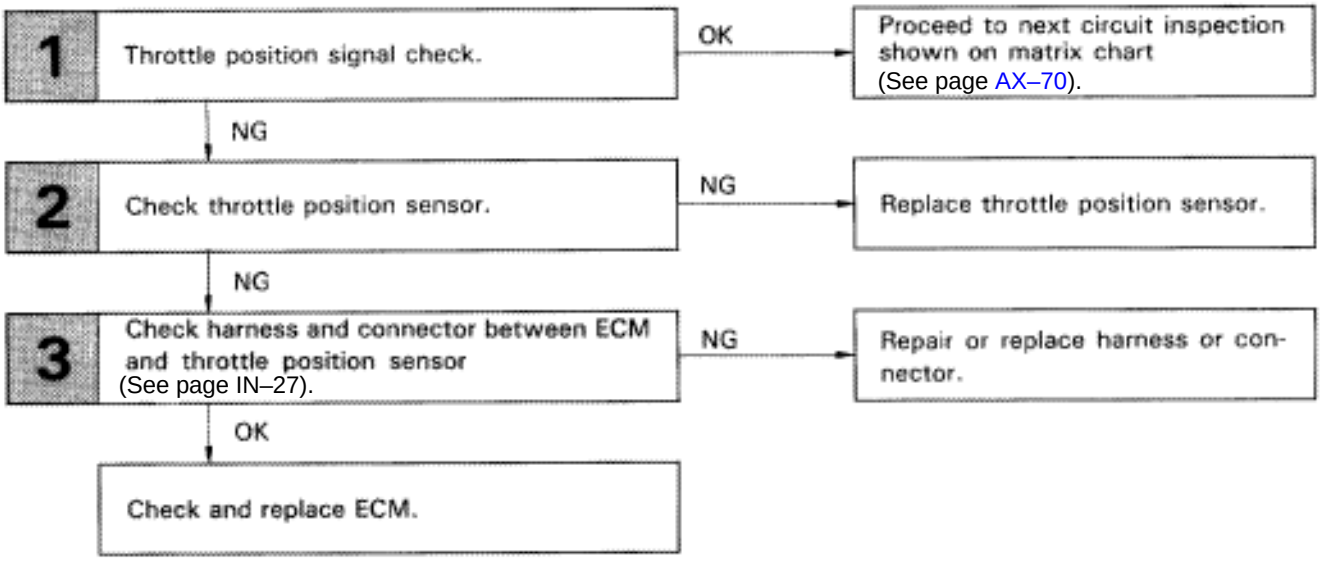
Replace ECM

Throttle Position Sensor Circuit

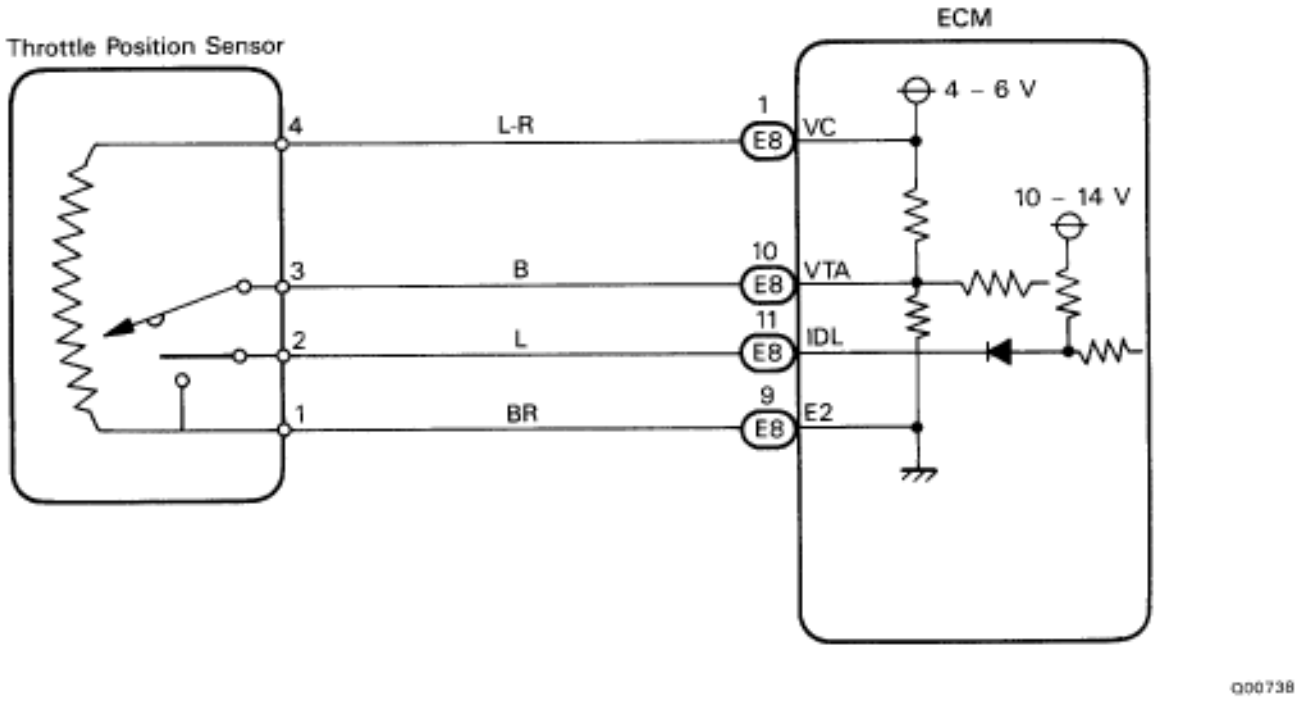
CIRCUIT DESCRIPTION

The throttle position sensor detects the throttle valve opening angle and sends signals to the ECU.

DIAGNOSTIC CHART

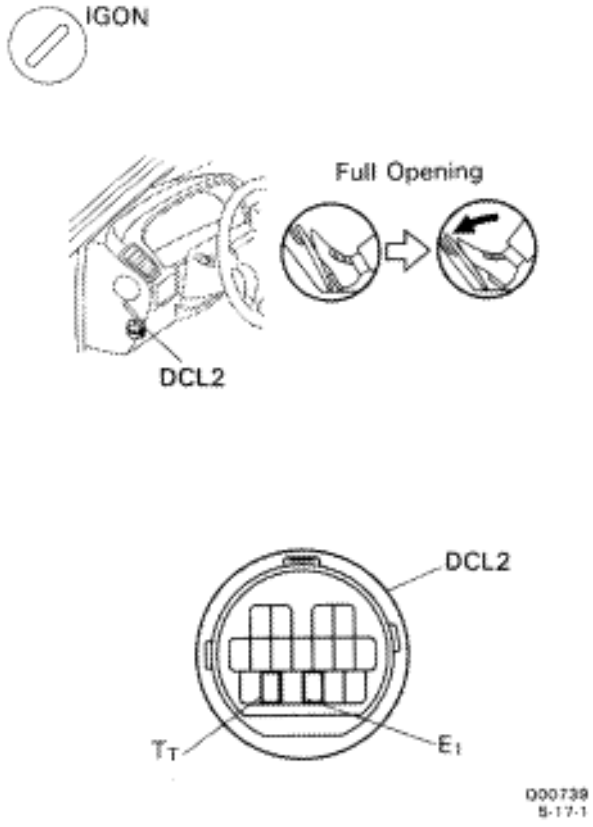


WIRING DIAGRAM



INSPECTION PROCEDURE

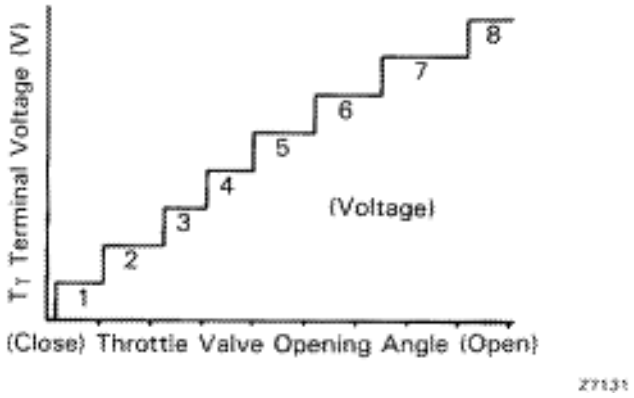
1 **Throttle position signal check.**



P Turn ignition switch ON (Do not start the engine).

C Check voltage at terminal T_T of the DCL2 while gradually depressing the accelerator pedal from the fully closed position to the fully opened position.

OK **Voltage changes from 0 V to 8 V by stages.**



Hint Do not depress the brake pedal during this test. The voltage will stay at 0 V if it is depressed.

NG

OK **Proceed to next circuit inspection shown on matrix chart (See page AX–70).**

2 **Check throttle position sensor.**

See engine troubleshooting section on page EG–392.

OK

NG **Replace throttle position sensor.**

3 **Check harness and connector between ECM and throttle position sensor (See page IN–27)**

OK

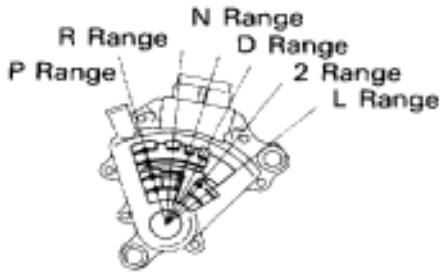
NG **Repair or replace harness or connector.**

Check and replace ECM

Park/Neutral Position Switch

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECU.
The ECU receives signals (R, PNP, 2 and L) from the park/neutral position switch. When the signal is not sent to the ECM from the park/neutral position switch, the ECU judges that the shift lever is in the D range.



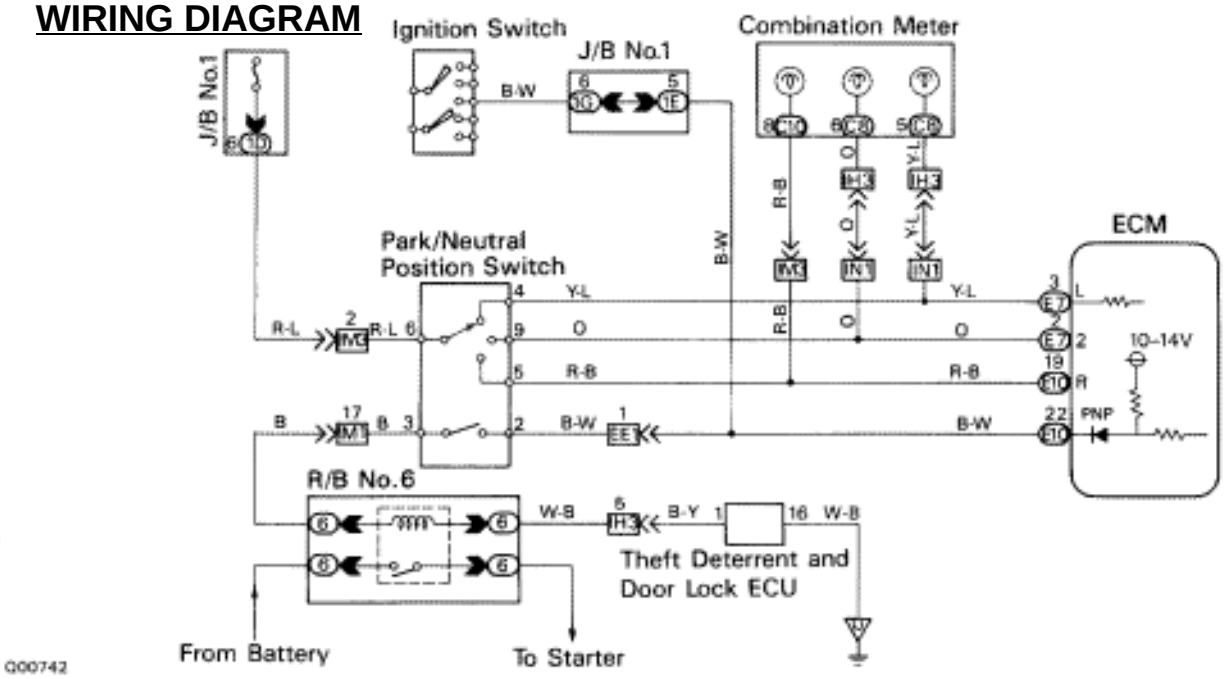
G00741

DIAGNOSTIC CHART

1	Check voltage between terminals R, NSW, 2, L of engine & TCM connector and body ground.	OK	Proceed to next circuit inspection shown on matrix chart (See page AX–70).
2	Check park/neutral position switch.	NG	Replace park/neutral position switch.
3	Check harness and connector between ECM and park/neutral position switch, park/neutral position switch and battery (See page IN–27).	NG	Repair or replace harness or connector.

OK (1 → 2)
OK (2 → 3)
OK (3 → Check and replace ECM.)

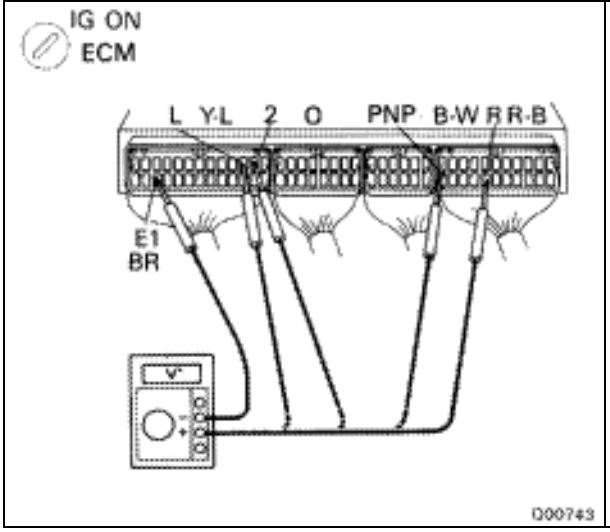
WIRING DIAGRAM



G00742

INSPECTION PROCEDURE

1 **Check voltage between terminals R, PNP, 2, L of ECM connector.**



P Turn ignition switch ON.

C Measure voltage between terminals R, PNP, 2, L of ECM connector and body ground when the shift lever is put in the following ranges.

OK

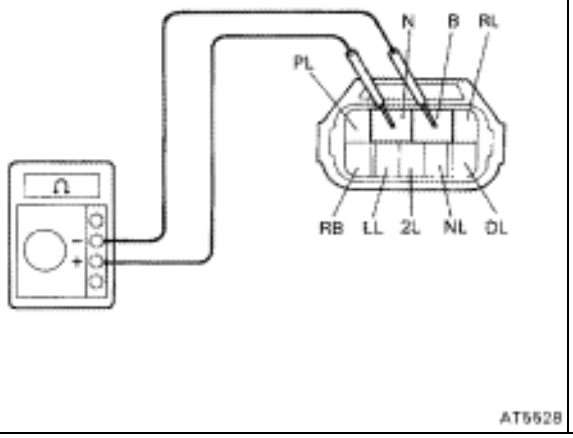
Range	R-body ground	NSW-body ground	2-body ground	L-body ground
P,N	Below 1 V	Below 1 V	Below 1 V	Below 1 V
R	10–14 V*	10–14 V*	Below 1 V	Below 1 V
D	Below 1 V	10–14 V	Below 1 V	Below 1 V
2	Below 1 V	10–14 V	10–14 V	Below 1 V
L	Below 1 V	10–14 V	Below 1 V	10–14 V

*: The voltage will drop slightly due to lighting up of the back up light.

NG

OK **Proceed to next circuit inspection shown on matrix chart (See page AX–70).**

2 **Check park/neutral position switch.**



P Remove park/neutral position switch.

C Check continuity between each terminal shown below when the shift lever is put in each range.

Shift Position \ Terminal	B	N	RB	PL	RL	NL	DL	2L	LL
P	○	○	○	○					
R			○		○				
N	○	○	○			○			
D			○				○		
2			○					○	
L			○						○

OK

NG **Replace park/neutral position switch.**

3 **Check harness and connector between ECM and park/neutral position switch, park/neutral position switch and battery (See page IN–27).**

OK

NG **Repair or replace harness or connector.**

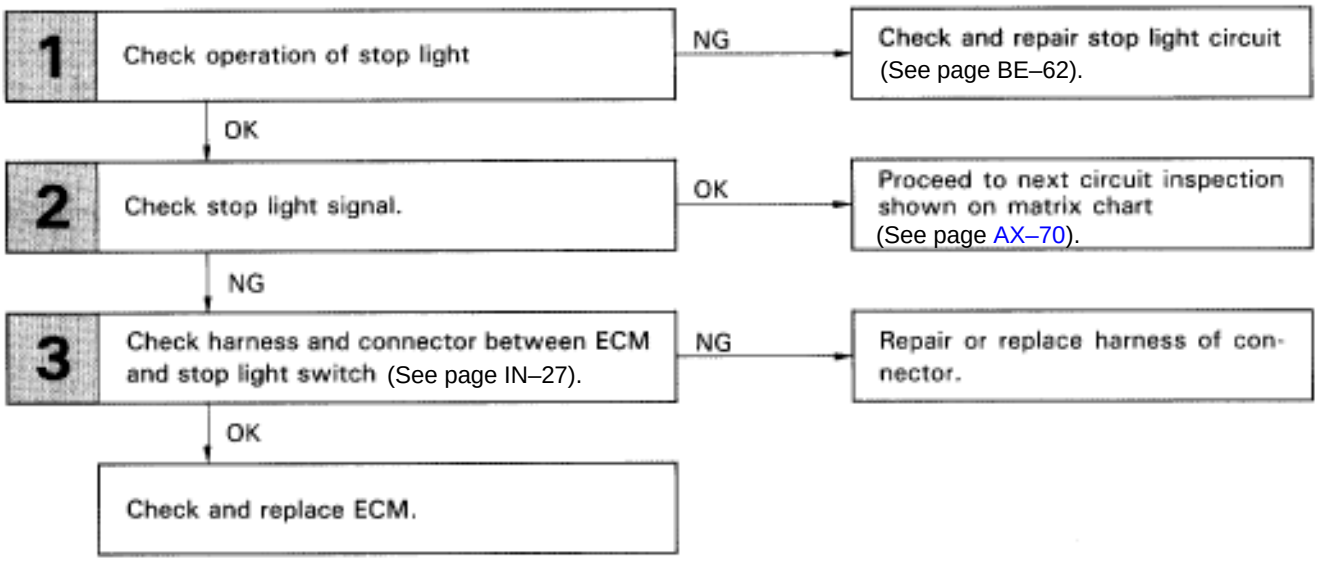
Check and replace ECM.

Stop Light Circuit

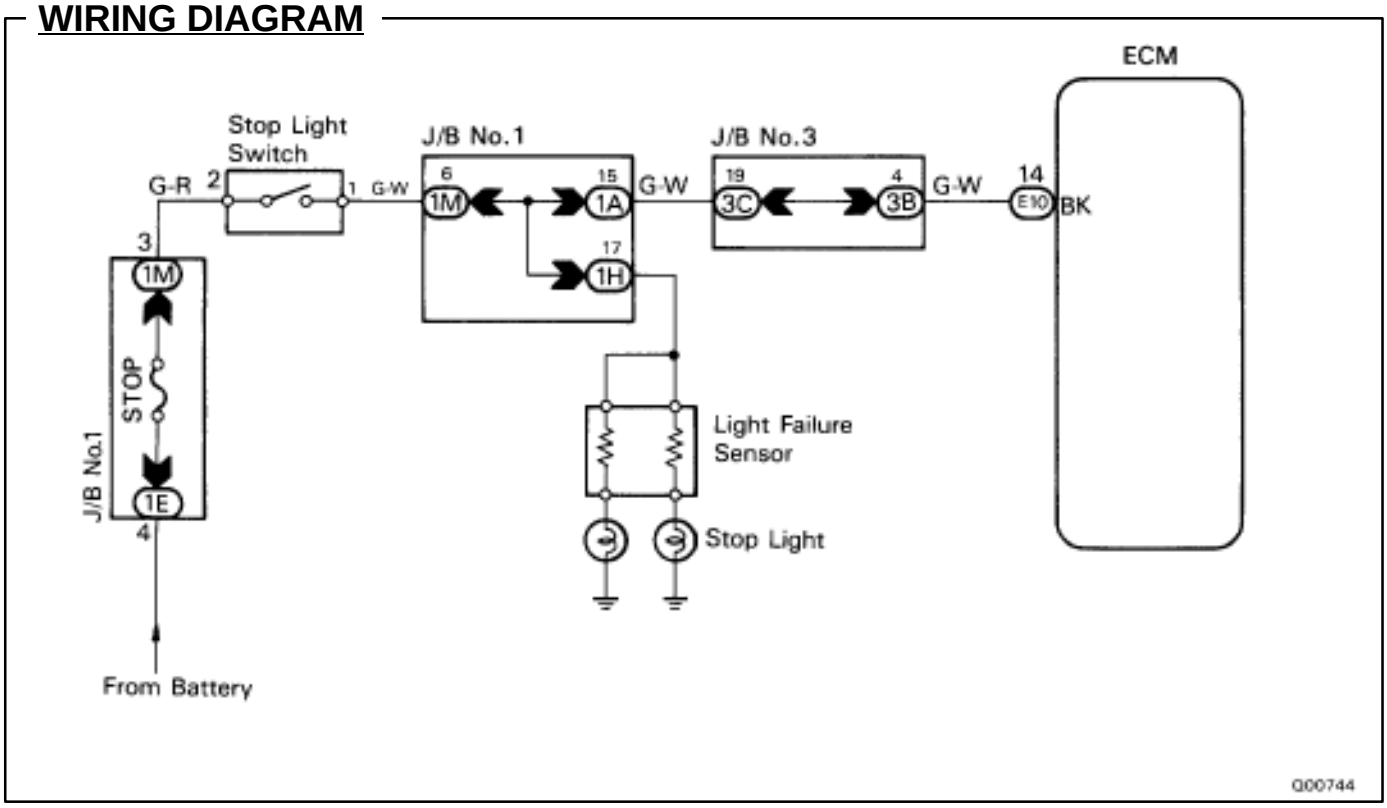
CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling when the brakes are suddenly applied while driving in lock–up condition.
When the brake pedal is operated, this switch sends a signal to the ECU. Then the ECU cancels operation of the lock–up clutch while braking is in progress.

DIAGNOSTIC CHART



WIRING DIAGRAM

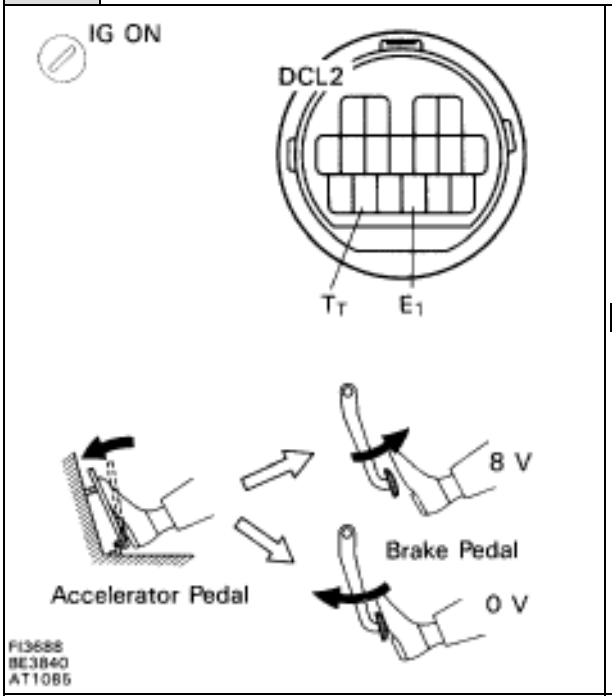


INSPECTION PROCEDURE

1	Check operation of stop light.
C	Check if the stop light goes on and off normally when the brake pedal is depressed and released.

NG → **Check and repair stop light circuit (See page BE–62)**

2	Check stop light signal.



C
1. Connect voltmeter to terminals T_T and E_1 of the DCL2.
2. Turn ignition switch ON (Do not start the engine.)
3. Fully depress the accelerator pedal until the voltmeter indicates 8 V and hold it.
4. Depress and release the brake pedal and check the voltage.

OK

Brake pedal	Voltage
Depressed	0 V
Released	8 V

NG

OK → **Proceed to next circuit inspection shown on matrix chart (See page AX–70)**

3	Check harness and connector between ECM and stoplight switch (See page IN–27).

OK

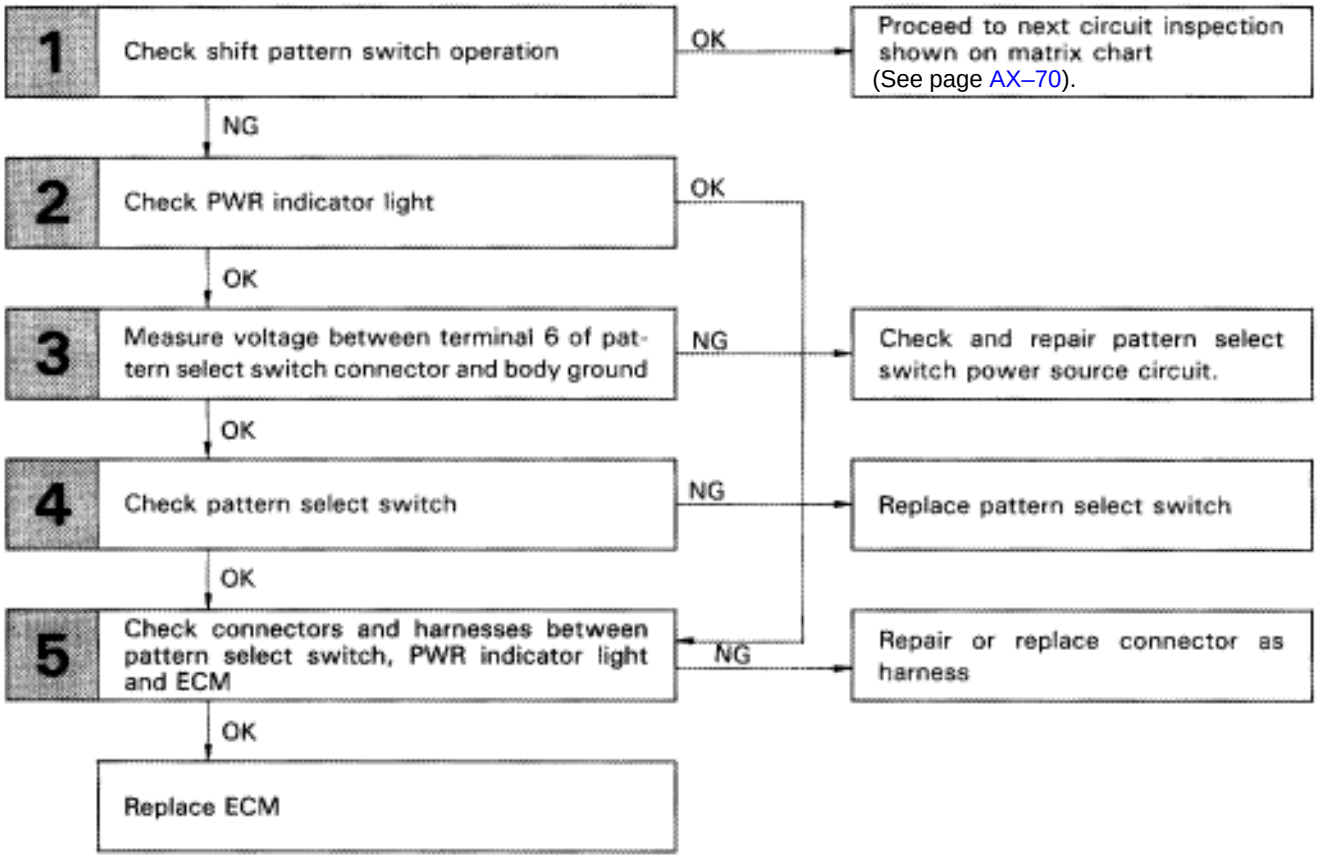
NG → **Repair or replace harness or connector.**

Check and replace ECM.

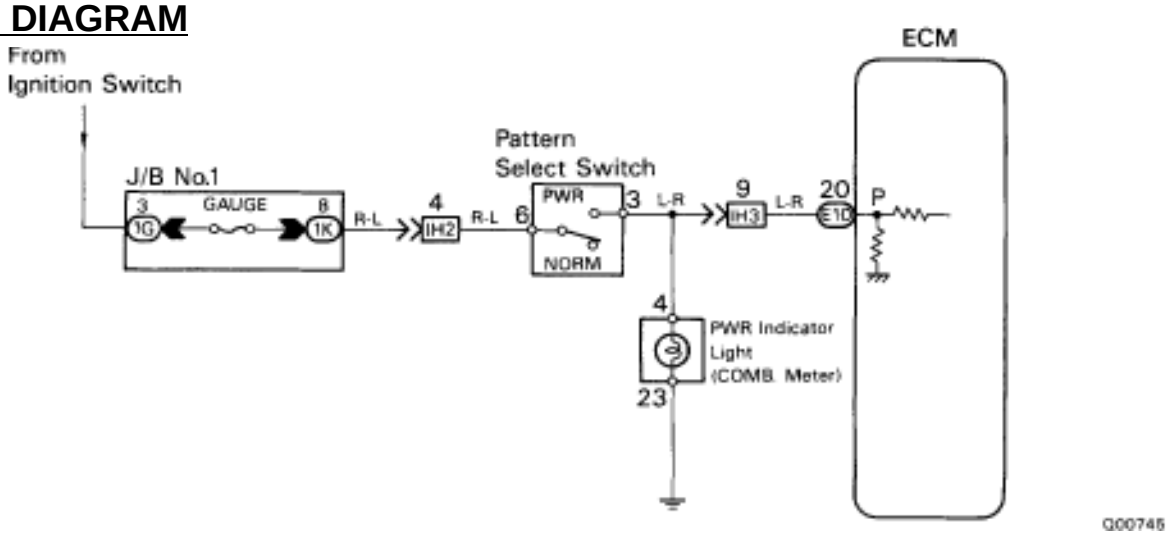
Pattern Select Switch Circuit

The ECM has stored in its memory the gear shift patterns for D range, 2nd range and L range, and also the lock–up pattern for D range. Two types of gear shifting pattern and lock–up pattern are recorded for D range; for POWER use and NORMAL use. The ECM & TCM selects the D range gear shift pattern and lock–up pattern in accordance with the signal from the pattern select switch.

DIAGNOSTIC CHART



WIRING DIAGRAM



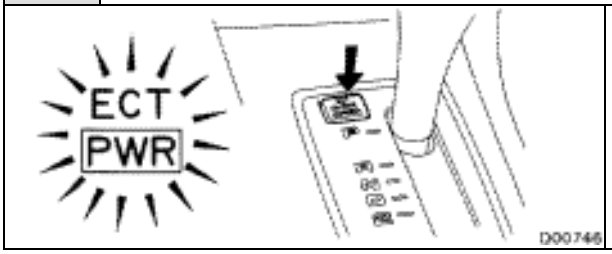
INSPECTION PROCEDURE

1	Check shift pattern switch operation.
C	Check that the shift point changes when the pattern select switch is operated.

NG

OK → **Proceed to next circuit inspection shown on matrix chart (See page AX–70).**

2	Check PWR indicator light



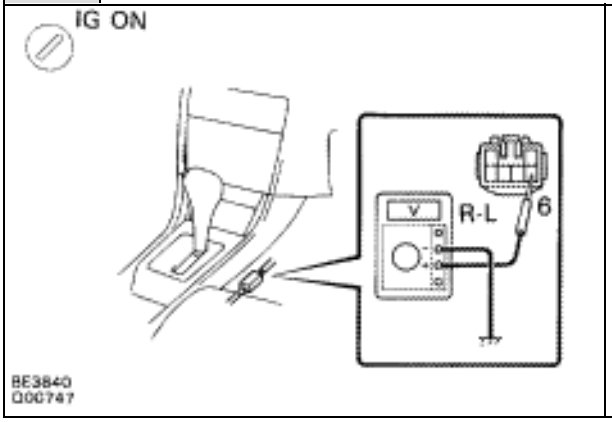
P Turn IG switch on.

C Check that the PWR indicator light lights up when you push the pattern select switch to PWR.

NG

OK → **Go to step ✳**

3	Measure voltage between terminal 6 of pattern select switch and body ground.



P
1. Push pattern select switch to NORMAL.
2. Turn IG switch on

C Measure voltage between terminal 6 of pattern select switch connector and body ground.

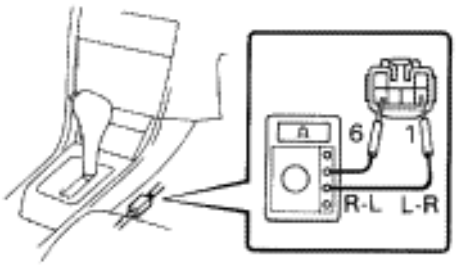
OK **Voltage: 10 – 14 V**

OK

NG → **Check and repair pattern select switch power source circuit.**

INSPECTION PROCEDURE

4 **Check pattern select switch.**



Q00748

P Disconnect pattern select switch connector.

C Measure resistance between terminals 3 and 6 of pattern select switch connector when the select switch is set to PWR and NORMAL positions.

OK

Pattern	Resistance
PWR	0 Ω (continuity)
NORM	∞ Ω (open)

OK → **5** **Check connector and harness between patter select switch, PWR indicator light and ECM**

NG → **Replace pattern select switch.**

OK → **Replace ECM**

NG → **Repair or replace harness or connector,**

–MEMO–

O/D Main Switch and O/D Off Indicator LIght Circuit

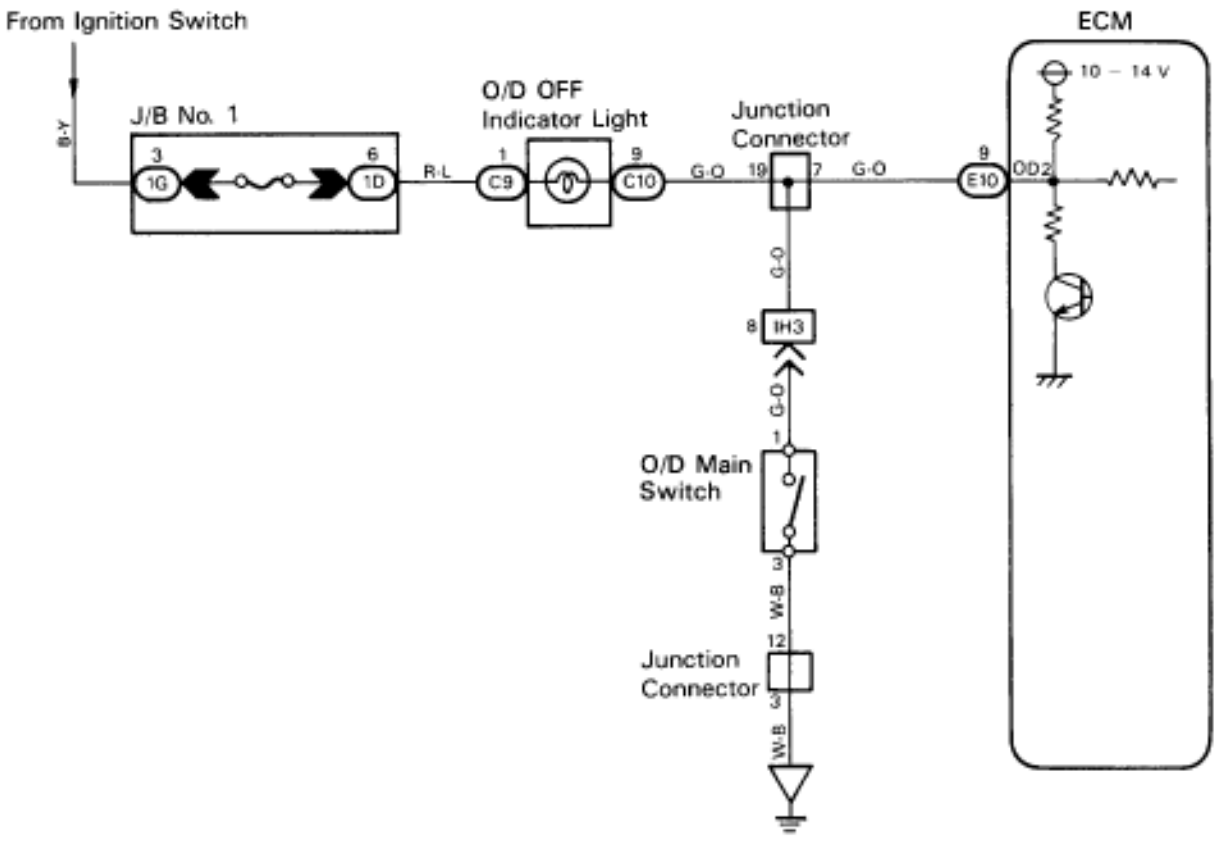
CIRCUIT DESCRIPTION

The O/D main switch contacts go off when the switch is pushed in and come on when it is pushed out. In O/D main switch OFF position, the O/D OFF indicator lights up, and the ECM prohibits shifting to overdrive. The ECM also causes the O/D OFF indicator light to blink when a malfunction is detected. However, when the O/D main switch is OFF, the O/D indicator light does not blink, but stays on. In this case, connecting the terminals in the DCL2 or DCL1 can display the malfunction code.

DIAGNOSTIC CHART

See next page.

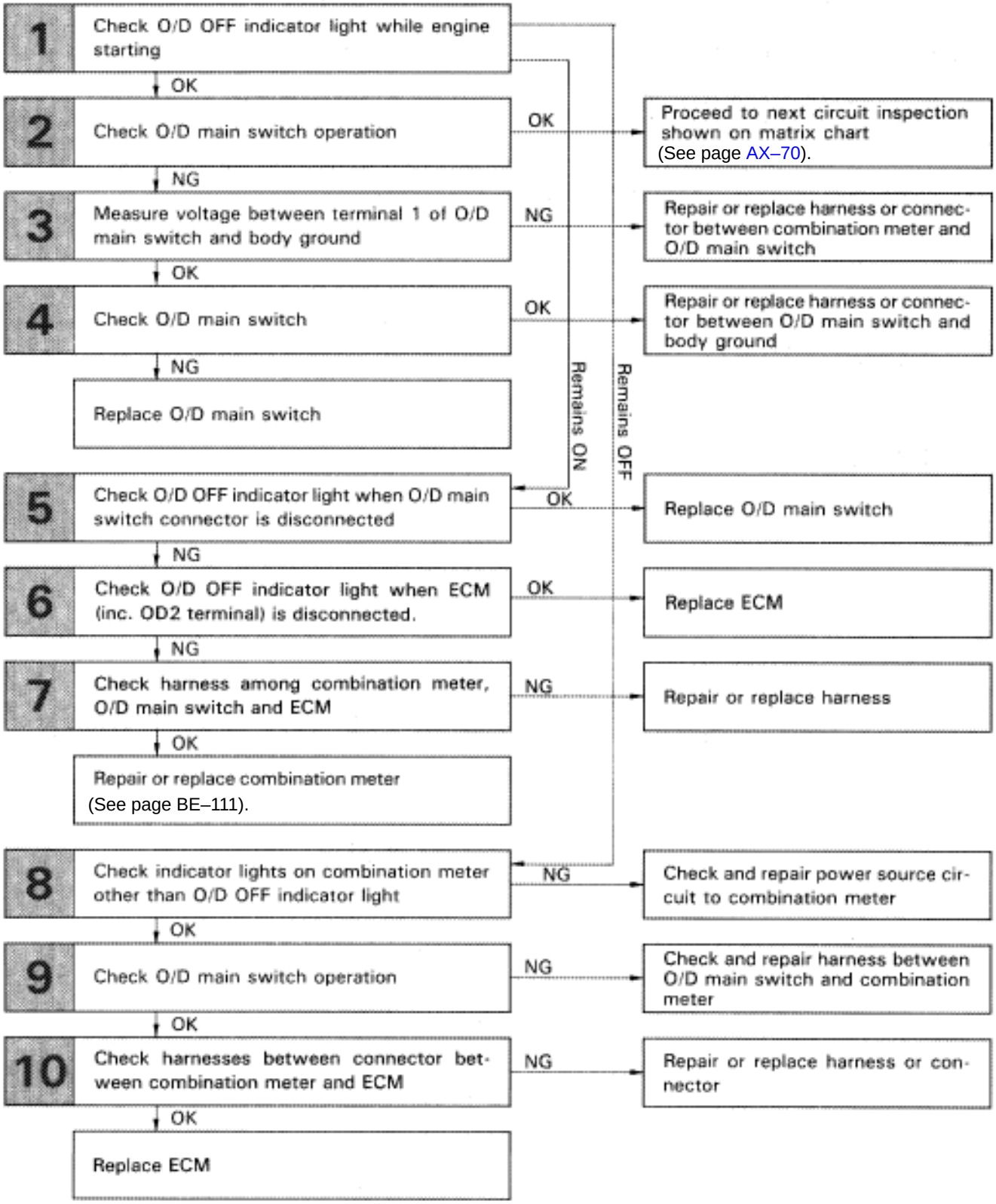
WIRING DIAGRAM



(*) O/D Main Switch
Contacts go off with switch pushed in.
Contacts go on with switch pushed out.

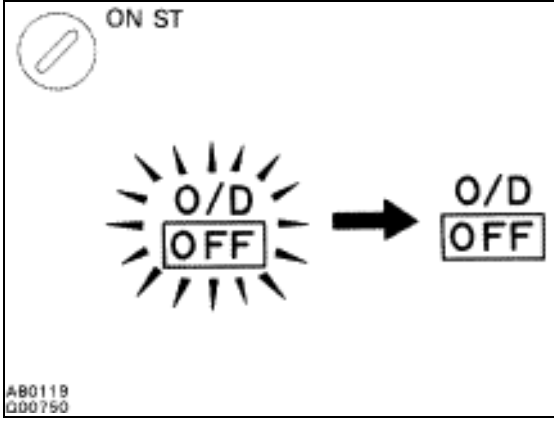
G00749

DIAGNOSTIC CHART



INSPECTION PROCEDURE

1 Check O/D OFF indicator light when starting the engine.



P When starting the engine, check the operating condition of the O/D OFF indicator light.

OK **O/D OFF indicator light immediately after the engine is started.**
Remains ON NG1
Remains OFF ...NG2

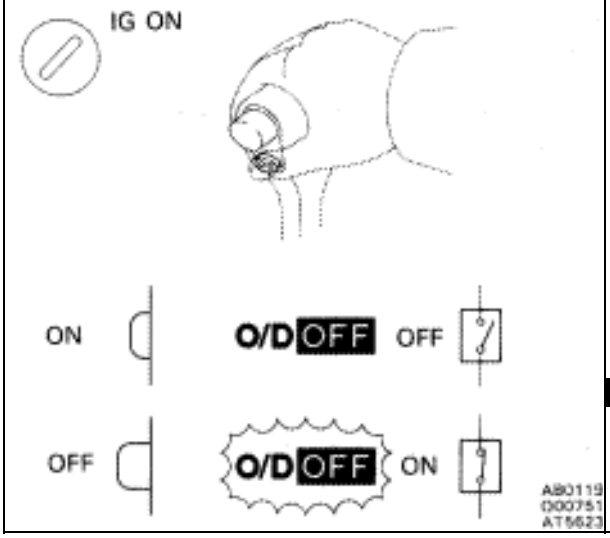
Hint If the O/D OFF indicator light keeps blinking, check the diag. trouble code and repair the problem.

OK

NG1 **Go to step ✳**

NG2 **Go to step** 3

2 Check O/D main switch operation



C 1. Turn ignition switch ON.
2. Check “O/D OFF” light when O/D main switch is pushed in to ON.
3. Start the engine.

OK **“O/D OFF” light goes off.**

C 4. Check “O/D OFF” light when O/D main switch is pushed again, to OFF.

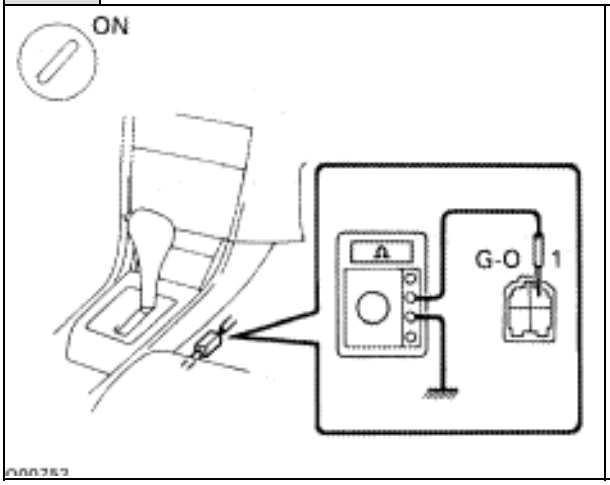
OK **“O/D OFF” light lights up.**

Hint If the “0/D OFF” light blinks when the O/D main switch is pushed in to ON, a malfunction is occurring in the system.
Check the diagnostic trouble code.

OK

NG **Proceed to next circuit inspection shown on matrix chart (See page AX–70).**

3	Measure voltage between terminal 1 of O/D main switch connector and body ground



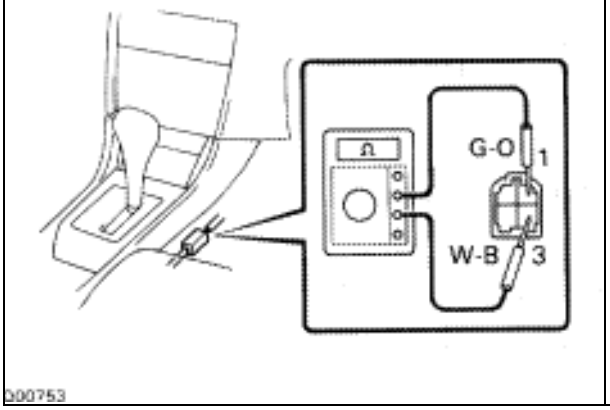
P 1. Disconnect O/D main switch connector.
2. Turn IG switch ON.

C Measure voltage between terminal 1 of O/D main switch harness side connector and body ground.

OK **Voltage: 10 – 14 V**

OK → **NG** → **Repair or replace harness or connector between combination meter and O/D main switch.**

4	Check continuity of O/D main switch



P Disconnect O/D main switch connector.

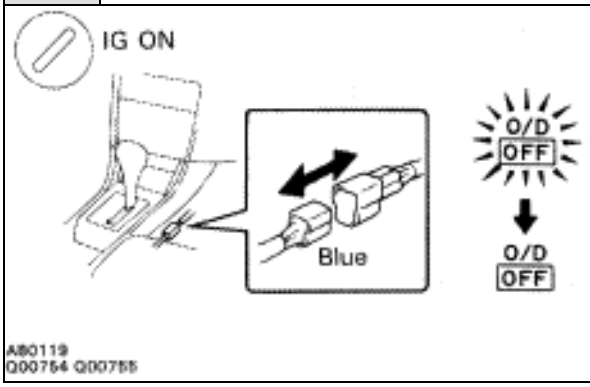
C Check continuity between terminals 1 and 3 of O/D main switch connector.

OK **ON Position: No continuity (More than 10kΩ)**
OFF Position: Continuity (Below 1 Ω)

OK → **NG** → **Replace O/D main switch**

Repair or replace harness or connector between O/D main switch and body ground.

5	Check O/D OFF indicator light when you disconnect O/D main switch connector.

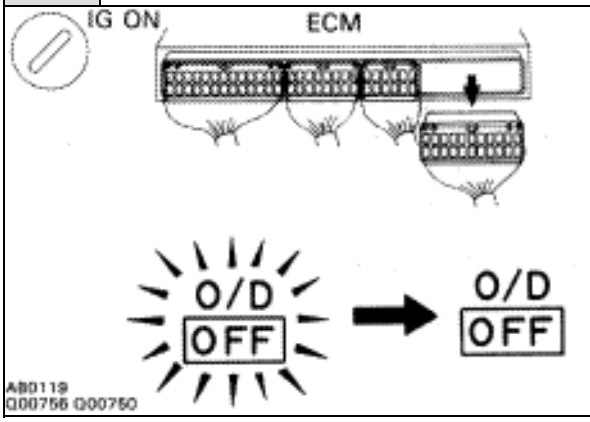


P Turn IG switch ON

C Check that the O/D OFF indicator light goes off when you disconnect the O/D main switch connector.

OK → **NG** → **Replace O/D main switch.**

6	Check O/D OFF indicator light when you disconnect ECM connector (inc. OD2 terminal).



P Turn IG switch ON.

C Check that the O/D OFF indicator light goes off when you disconnect the ECM connector (inc. OD2 terminal)

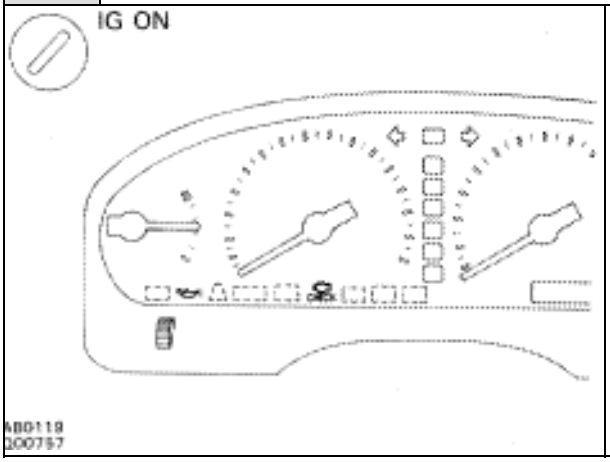
NG → **OK** → **Replace ECM**

7	Check harness between combination meter, O/D main switch and ECM.

OK → **NG** → **Repair or replace harness**

Repair or replace combination meter (See page BE–111).

8	Check indicator lights on combination meter other than O/D OFF indicator light



P Turn IG switch ON

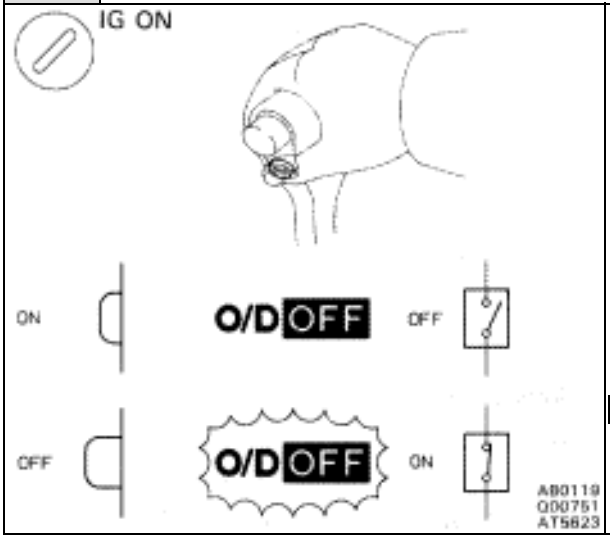
C Check the following indicator lights on combination meter:

- Check Engine Light
- Low Oil Pressure Warning Light
- ABS Warning LIght etc.

OK **Above indicator lights light up.**

OK → **NG** → **Check and repair power source circuit to combination meter, or combination meter**

9	Check O/D main switch operation



C 1. Turn switch ON.
2. Check “O/D OFF” light when O/D main switch is pushed in to ON.
3. Start the engine.

OK **“O/D OFF” light goes off.**

C 4. Check “O/D OFF” light when O/D main switch is pushed again, to OFF.

OK **“O/D OFF” light lights up.**

Hint If the “O/D OFF” light blinks when the O/D main switch is pushed into ON, a malfunction is occurring in the system.
Check the diagnostic trouble code.

OK → **NG** → **Check and repair harness between O/D main switch and combination meter.**

10	Check harness and connector between combination meter and ECM.

OK → **NG** → **Repair or replace harness or connector.**

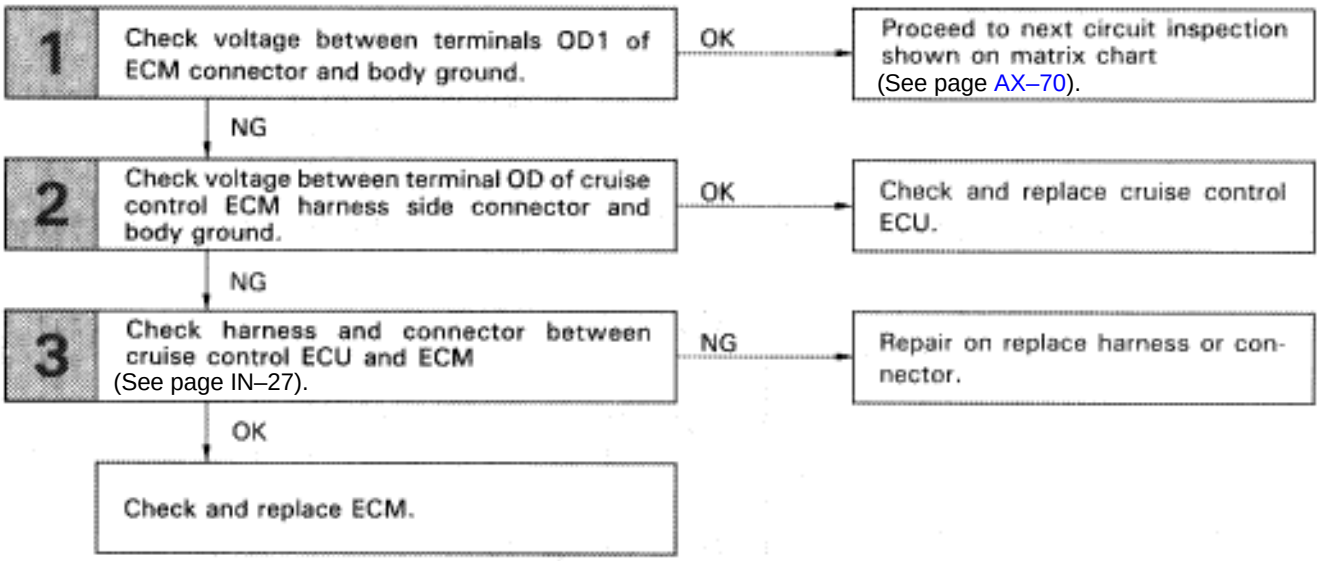
Replace ECM.

O/D Cancel Signal Circuit

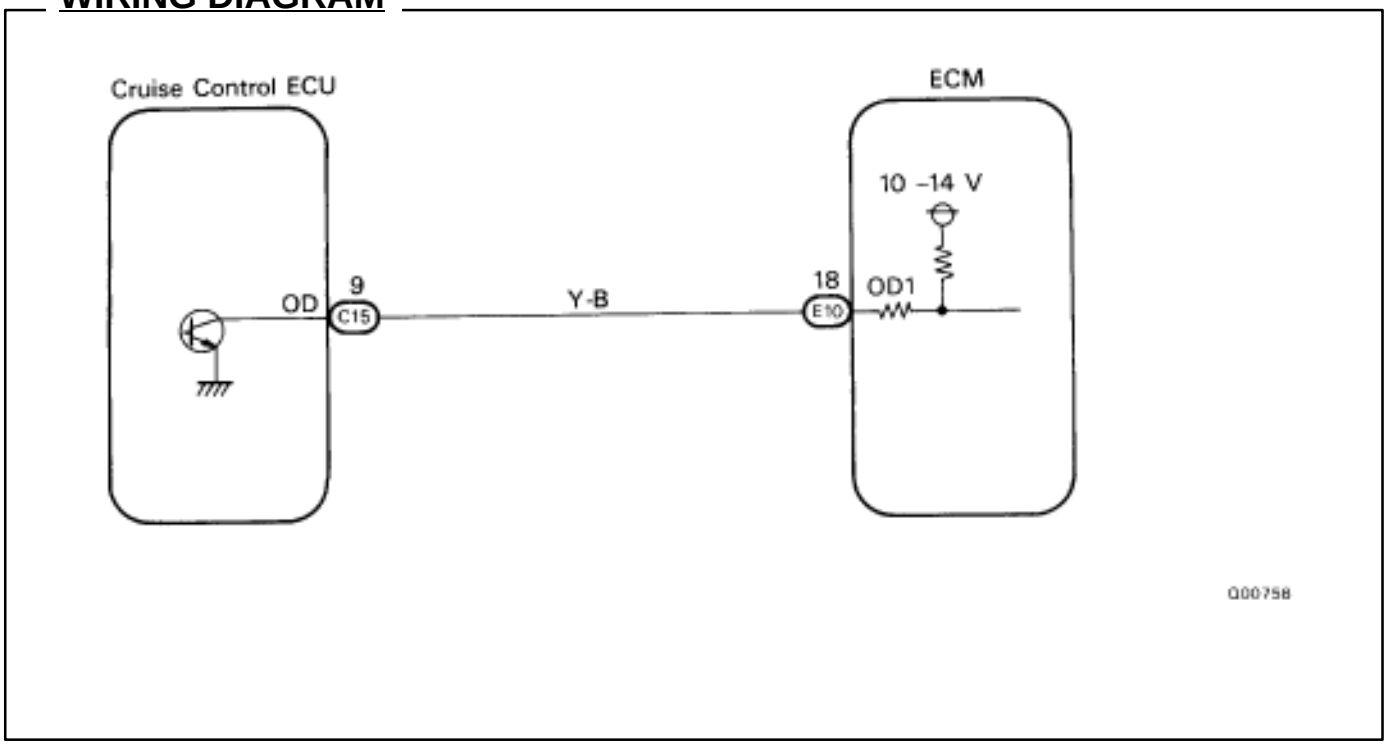
CIRCUIT DESCRIPTION

While driving with cruise control activated, in order to minimize gear shifting and provide smooth cruising uphill, overdrive may be prohibited temporarily in some conditions.
The cruise control ECM sends OD cut signals to the ECM as necessary and the ECM cancels overdrive shifting until these signals are discontinued.
(For details, see the Cruise Control section, page BE–390).

DIAGNOSTIC CHART

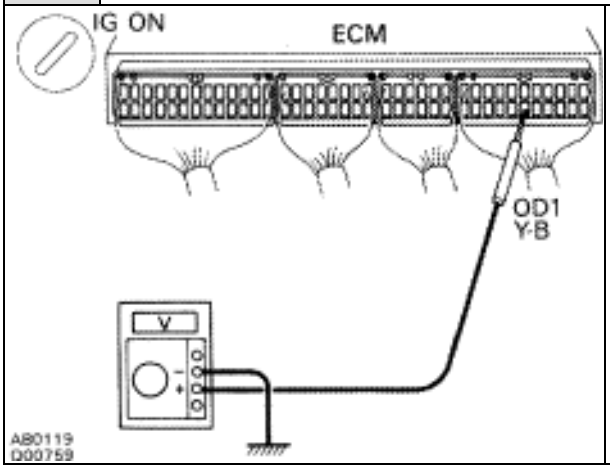


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminal OD1 of ECM connector and body ground.**



P Turn ignition switch ON.

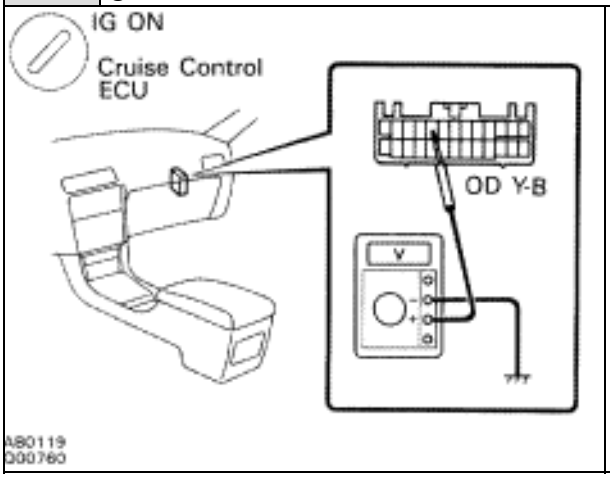
C Measure voltage between terminal OD1 of ECM connector and body ground.

OK **Voltage: 10 – 14 V**

NG

OK → **Proceed to next circuit inspection shown on matrix chart (See page AX–70).**

2 **Check voltage between terminal OD of cruise control ECU harness side connector and body ground.**



P
1. Disconnect cruise control ECU connector.
2. Turn ignition switch ON.

C Measure voltage between terminal OD of cruise control ECU harness side connector and body ground.

OK **Voltage: 10 – 14 V**

NG

OK → **Check and replace cruise control ECU.**

3 **Check harness or connector between cruise control ECU and ECM (See page IN–27).**

OK

NG → **Repair or replace harness or connector.**

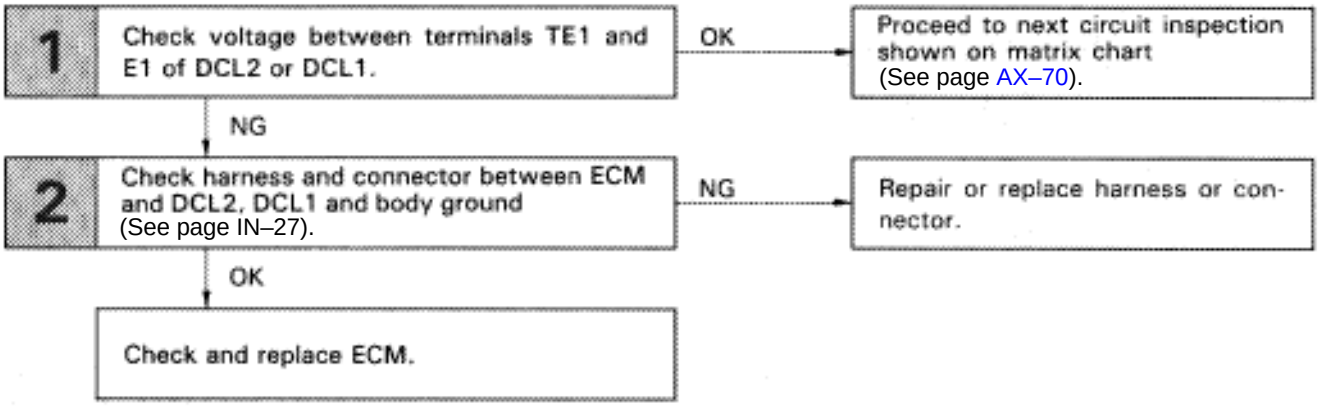
Check and replace ECM.

TE1 Terminal Circuit

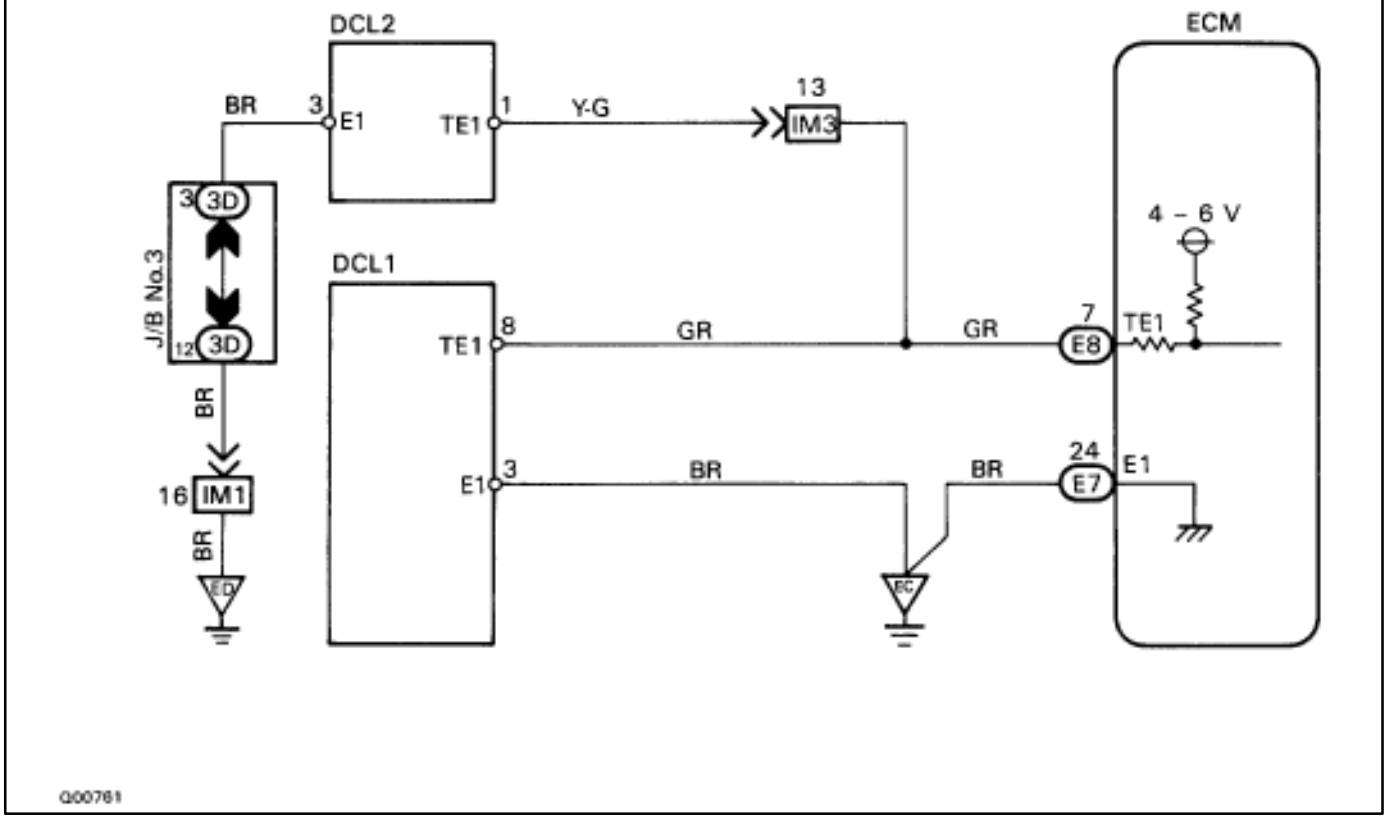
CIRCUIT DESCRIPTION

The ECU displays diagnostic trouble codes using the O/D OFF indicator light when terminals TE 1 and E 1 of the DCL 2 or DCL 1 are connected.

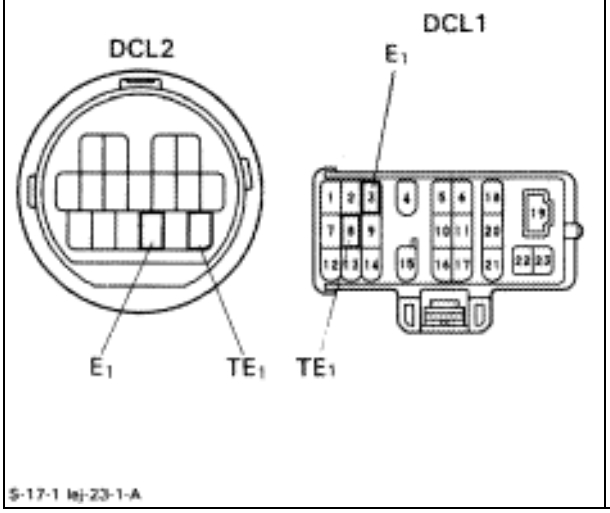
DIAGNOSTIC CHART



WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals TE_1 and E_1 of DCL2 or DCL1.
	C Measure voltage between terminals TE_1 and E_1 of DCL2 or DCL1. OK **Voltage: 4 – 6 V**

NG

OK **Proceed to next circuit inspection shown on matrix chart (See page AX–70).**

2	Check harness and connector between ECM and DCL2, DCL1 and body ground (See page IN–27).

OK

NG **Repair or replace harness or connector.**

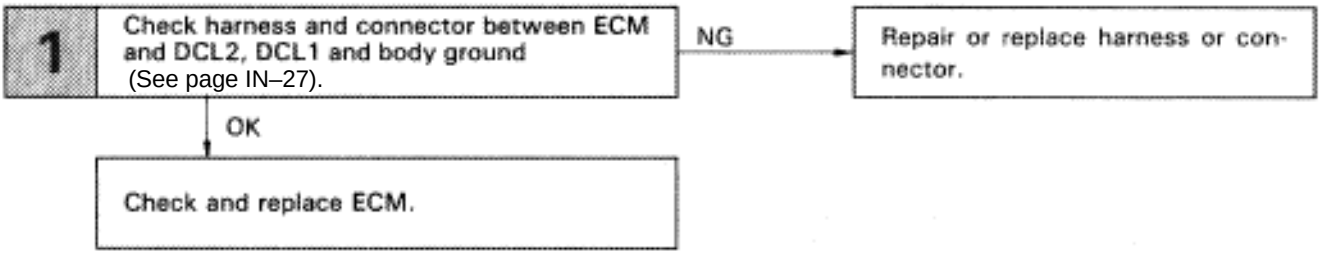
Check and replace ECM.

T_T Terminal Circuit

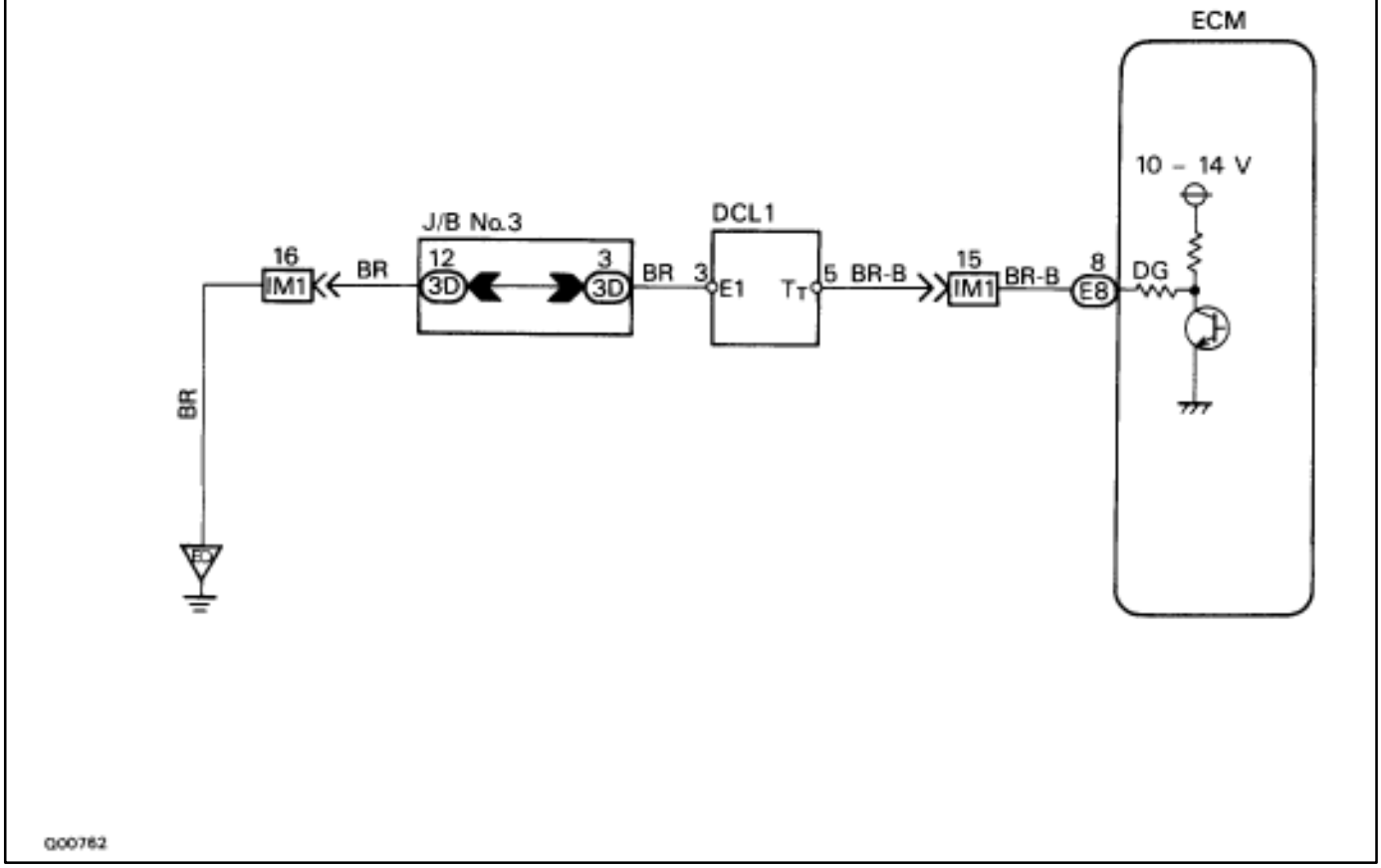
CIRCUIT DESCRIPTION

Checks of ECM input and output signals related to the throttle position sensor, brakes, shift position and other circuits can be performed by measuring the voltages at terminal T_1 of the DCL 1.

DIAGNOSTIC CHART



WIRING DIAGRAM



SERVICE SPECIFICATIONS

SERVICE DATA

AX01N–01

Line pressure (wheel locked)				
Engine idling		D range	353–412 kPa 3.6–4.2 kgf/cm^2 51 – 60 psi	
		R range	637–745 kPa 6.5–7.6 kgf/cm^2 92–108 psi	
AT stall		D range	892–1,040 kPa 9.1–10.6 kgf/cm^2 129–151 psi	
		R range	1,608–1,873kPa 16.4–19.1 kgf/cm^2 233–272 psi	
Engine stall revolution			2,400 ± 150 rpm	
Time lag	N range ↑ D range		Less than 1.2 seconds	
	N range ↑ R range		Less than 1.5 seconds	
Engine idle speed (Cooling fan and A/C OFF)				
	N range		700 rpm	
Throttle cable adjustment				
Throttle valve fully opened			Between boot end face and inner cable stopper	
			0–1 mm	0–0.04 in.
Torque converter runout		Limit	0.30 mm	0.0118 in.
Drive plate runout		Limit	0.20 mm	0.0079 in.

Shift point km/h(mph)			Throttle valve fully open [fully closed]							
			1 ↑ 2	2 ↑ 3	3 ↑ O/D	[3↑ O/D]	[O/D↑ 3]	O/D ↑ 3	3 ↑ 2	2 ↑ 1
	D range	NORM	51–56 (32–35)	97–105 (60–65)	153–164 (95–102)	36–41 (22–25)	19–23 (12–14)	149–160 (93–99)	92–100 (57–62)	42–47 (26–29)
		PWR	—	—	—	—	—	—	—	—
	2 range	NORM	—	–	–	–	–	–	111–120 (69–75)	—
		PWR								
	L range	NORM	–	–	–	–	–	–	97–105 (60–65)	49–55 (30–34)
		PWR								

Lock–up point km/h (mph)			Throttle valve opening 5%					
			Lock–up ON			Lock–up OFF		
			2nd	*3rd	O/D	2nd	*3rd	O/D
	D range	NORM	–	73–80 (45–50)	53–59 (33–37)	–	65–71 (40–44)	48–53 (30–33)
		PWR	–	—	62–68 (39–42)	–	—	59–65 (37–40)

* O/D switch OFF

V00520

TORQUE SPECIFICATIONS

AX05C–01

Part tightened	N·m	kgf·cm	ft·lbf
Engine front mounting bracket X Front suspension member	80	820	59
Engine rear mounting bracket X Front suspension member	66	670	48
LH transaxle mounting	52	530	38
Transaxle X Engine 12mm bolt	64	650	47
Transaxle X Engine 10mm bolt	46	470	34
Torque converter clutch X Drive plate	27	280	20
Valve body X Transaxle case	11	110	8
Oil strainer	11	110	8
Oil pan	4.9	50	43 in.·lbf
Oil pan drain plug	49	500	36
Testing plug	7.4	75	65 in.lb
Transaxle rear cover X Transaxle case	37	380	27
Park/neutral position switch X Transaxle case (bolt)	5.4	55	48 in.·lbf
Park/neutral position switch (nut)	6.9	70	61 in.·lbf
B3 apply tube retainer	11	110	8
Manual valve body	11	110	8
Detent spring	11	110	8
Oil tube	5.4	55	43 in.·lbf
Oil tube bracket	10	100	7
Steering gear housing X Front suspension Member	181	1850	134
Stabilizer bar bracket	19	195	14