AUTOMATIC TRANSMISSION SYSTEM

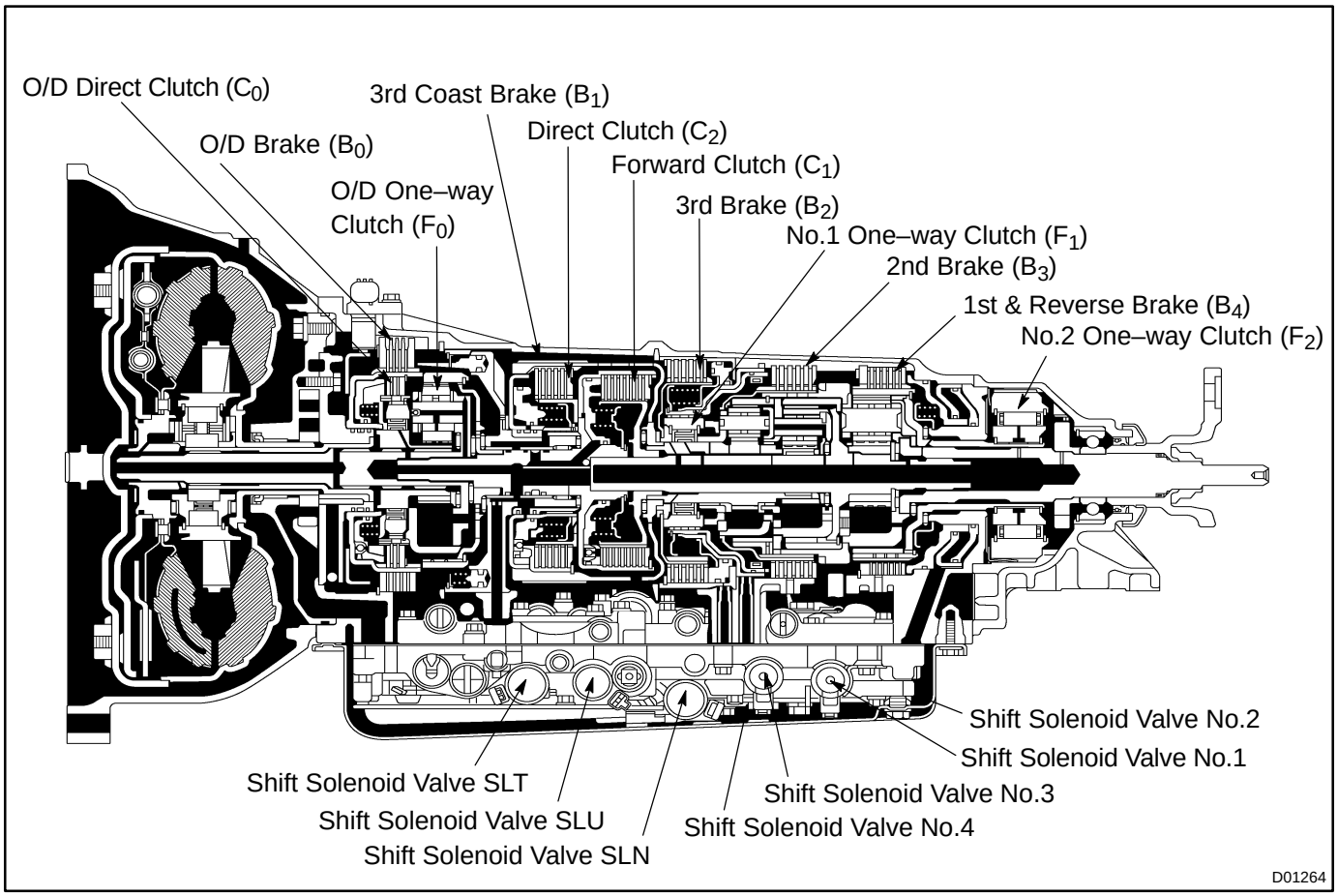
AT033–01

PRECAUTION

If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section.

AT034–01

OPERATION



Shift Lever Position	Gear Position	S1	S2	S3	S4	C_0	C_1	C_2	B_0	B_1	B_2	B_3	B_4	F_0	F_1	F_2
P	Park	ON	OFF	ON	OFF	○										
R	Reverse	ON	OFF	OFF	OFF			○	○				○			
N	Neutral	ON	OFF	ON	OFF	○										
D	1st	ON	OFF	OFF	OFF	○	○							○		○
	2nd	ON	ON	OFF	OFF	○	○					○		○		
	3rd	OFF	ON	OFF	OFF	○	○				○			○	○	
	4th	OFF	OFF	ON	OFF	○	○	○			○			○		
	5th	OFF	OFF	OFF	ON		○	○	○		○					
4	1st	ON	OFF	OFF	OFF	○	○							○		○
	2nd	ON	ON	OFF	OFF	○	○					○		○		
	3rd	OFF	ON	OFF	OFF	○	○				○			○	○	
	4th	OFF	OFF	ON	OFF	○	○	○			○			○		
3	1st	ON	OFF	OFF	OFF	○	○							○		○
	2nd	ON	ON	OFF	OFF	○	○					○		○		
	3rd	OFF	ON	ON	OFF	○	○			○	○			○	○	
2	1st	ON	OFF	ON	OFF	○	○							○		○
	2nd	ON	ON	OFF	OFF	○	○					○		○		
L	1st	ON	OFF	OFF	OFF	○	○						○	○		○

○ : Operating

EXTENSION HOUSING OIL SEAL

AT035–01

ON–VEHICLE REPAIR

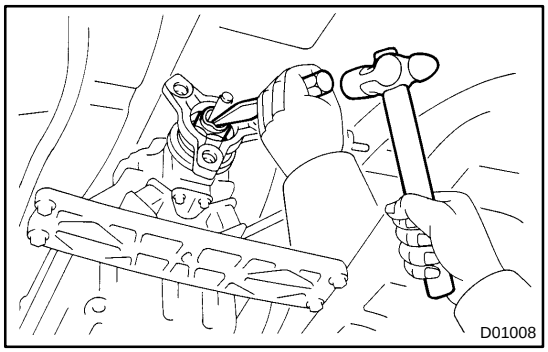
1. DRAIN ATF

2. REMOVE FRONT EXHAUST PIPE AND HEAT INSULATOR

(See page AT–16)

3. REMOVE PROPELLER SHAFT

(See page PR–3)

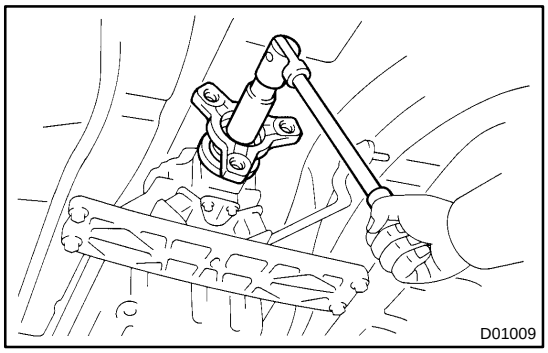


4. REMOVE TRANSMISSION OUTPUT FLANGE

(a) Using a chisel and hammer, loosen the staked part of the nut.

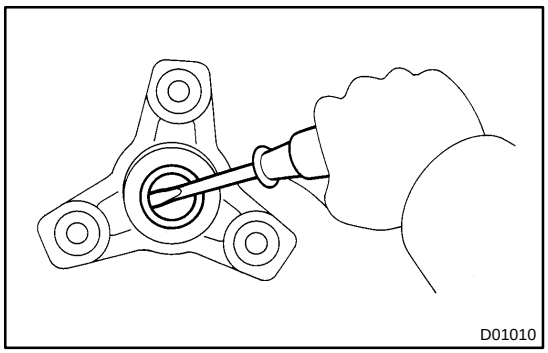
HINT:

Shift the shift lever to the P position.



(b) Using a 30 mm deeper socket wrench, remove the nut.

(c) Tap the output flange with a plastic hammer to remove it.

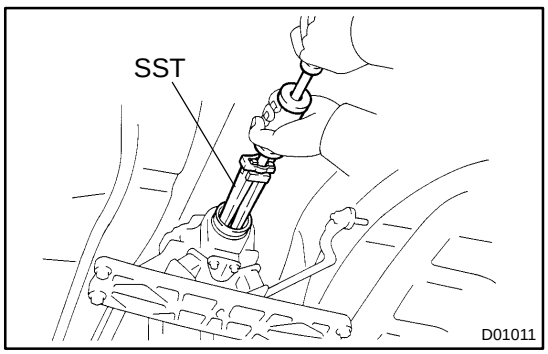


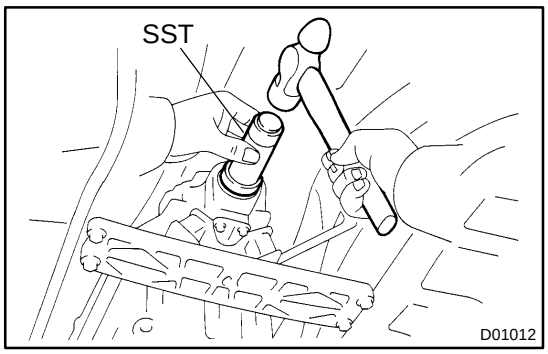
(d) Using a screwdriver, remove the oil seal from the output flange.

5. REMOVE EXTENSION HOUSING REAR OIL SEAL

Using SST, remove the oil seal.

SST 09308–00010





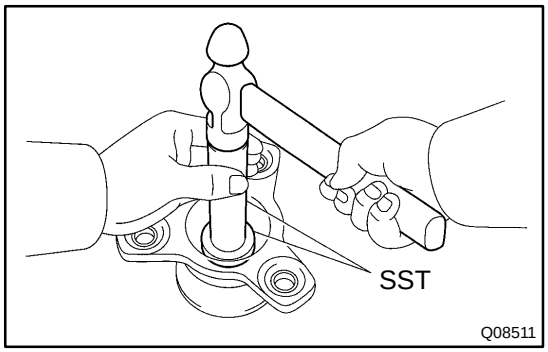
6. INSTALL EXTENSION HOUSING REAR OIL SEAL

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

(b) Using SST and a hammer, drive in the oil seal with the lip facing downward.

SST 09309–37010

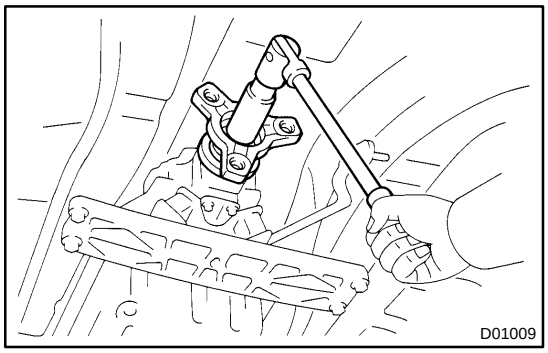
Oil seal depth from flat end: 2.0 mm (0.079 in.)



7. INSTALL TRANSMISSION OUTPUT FLANGE

(a) Using SST and a hammer, drive in a new oil seal.

SST 09950–60010 (09951–00350), 09950–70010 (09951–07100)



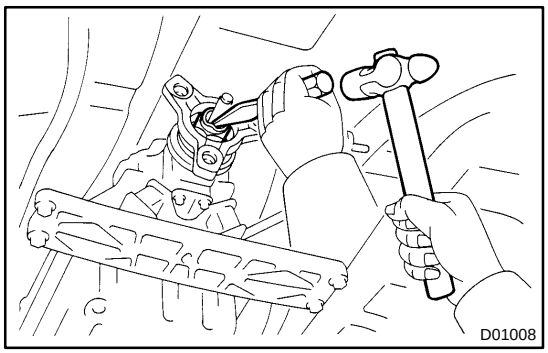
(b) Install the output flange.

(c) Using a 30 mm deeper socket wrench, install and torque a new nut.

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

HINT:

Shift the shift lever to P position.



(d) Using a chisel and hammer, stake the nut.

8. INSTALL PROPELLER SHAFT
(See page PR–9)

9. INSTALL FRONT EXHAUST PIPE AND HEAT INSULATOR
(See page AT–16)

10. FILL AND CHECK FLUID LEVEL
(See page DI–173)

ATF TEMPERATURE SENSOR

AT036–01

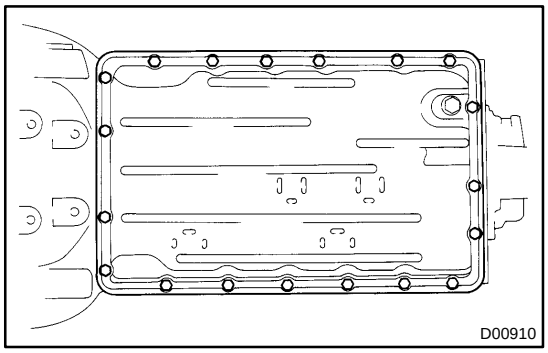
ON–VEHICLE REPAIR

CAUTION:

When working with FIPG material, you must observe the following items.

- **Using a razor blade and gasket scraper, remove all the old 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 FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

1. REMOVE DRAIN PLUG WITH GASKET AND DRAIN ATF

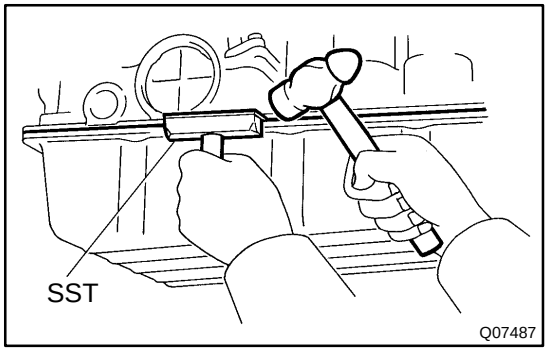


2. REMOVE OIL PAN

NOTICE:

Some fluid will remain in the oil pan.

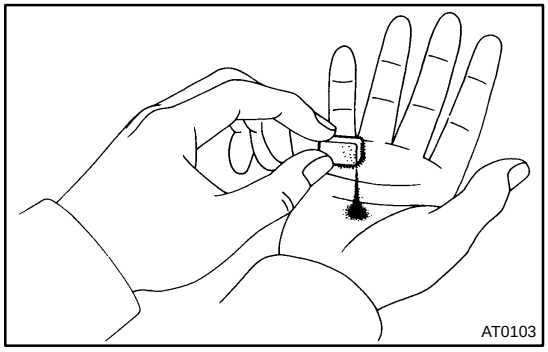
(a) Remove the 19 bolts.



(b) Install the blade of SST between the transmission case and oil pan, cut off applied sealer, and remove the oil pan.
SST 09032 – 00100

NOTICE:

When removing the oil pan, be careful not to damage the oil pan flange.

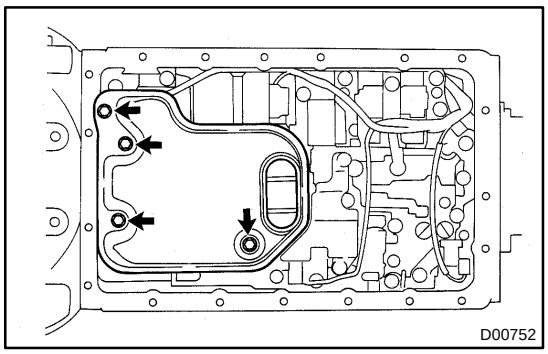


3. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect steel particles. Carefully look at the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.

Steel (magnetic) ... bearing, gear and clutch plate wear

Brass (non–magnetic) ... bushing wear

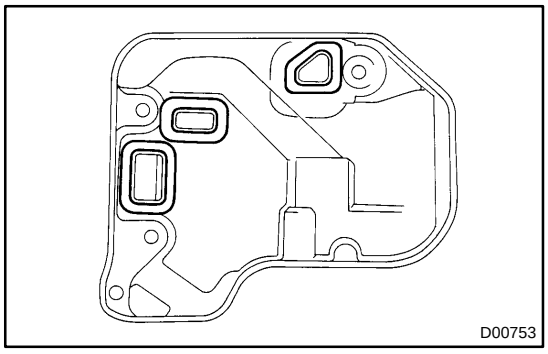


4. REMOVE OIL STRAINER

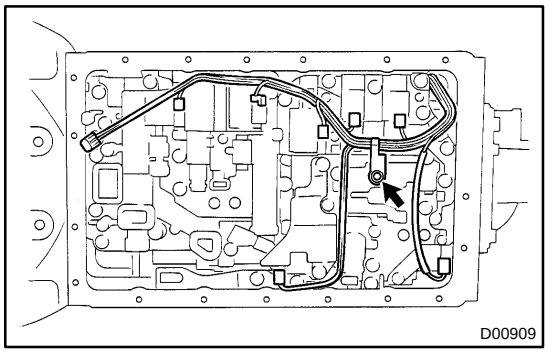
NOTICE:

Be careful as some fluid will come out of the oil strainer.

(a) Remove the 4 bolts and oil strainer.



(b) Remove the 3 gaskets from the oil strainer.

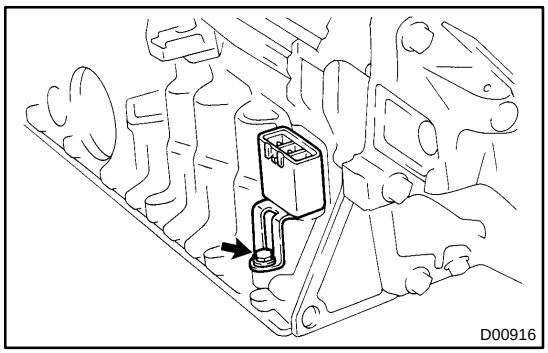


5. REMOVE SOLENOID WIRING WITH ATF TEMPERATURE SENSOR

(a) Disconnect the ATF temperature sensor.

(b) Remove the bolt and clamp.

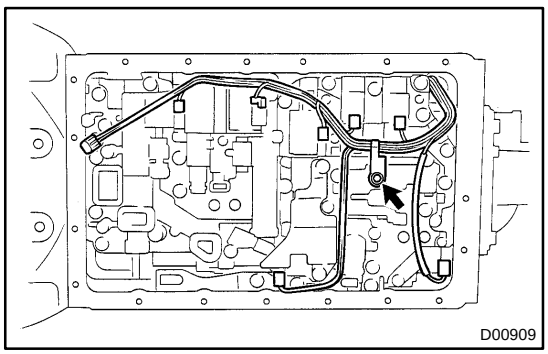
(c) Disconnect the 7 connectors from the solenoid valves.



(d) Remove the bolt and pull out the solenoid connector.

6. INSTALL SOLENOID WIRING WITH ATF TEMPERATURE SENSOR

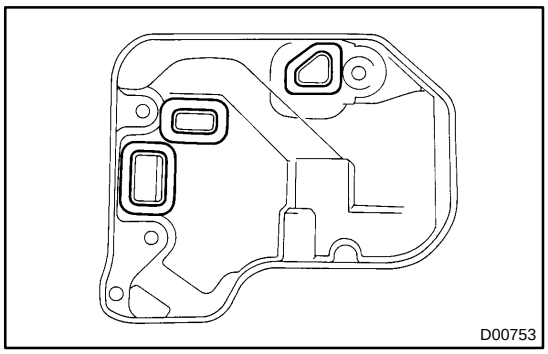
(a) Install the solenoid connector with the bolt.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



(b) Connect the 7 connectors to the solenoid valves.

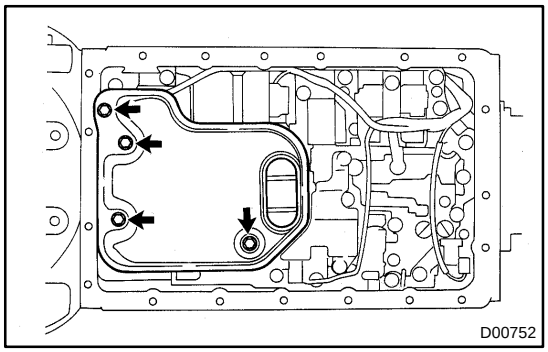
(c) Install the clamp with the bolt.
Torque: 6.4 N·m (65 kgf·cm, 56 in.·lbf)

(d) Connect the ATF temperature sensor.

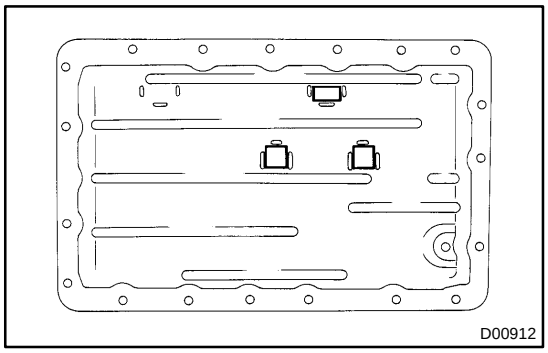


7. INSTALL OIL STRAINER

(a) Install 3 new gaskets.

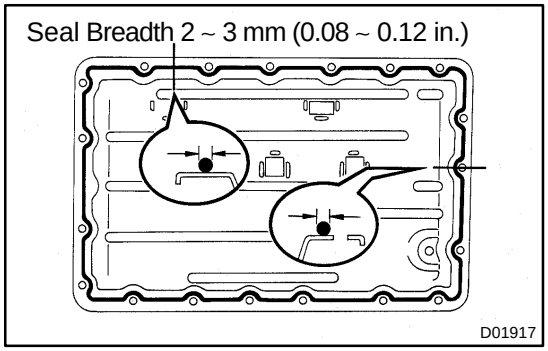


(b) Install the oil strainer with the 4 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



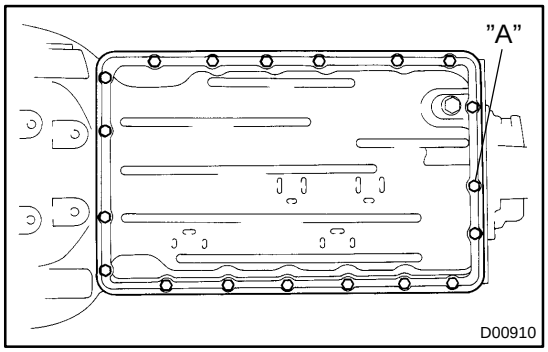
8. INSTALL OIL PAN

(a) Install the 3 magnets in the indications of the oil pan.



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

(c) Apply FIPG to the oil pan.
FIPG:
Part No. 08826 – 00090, THREE BOND 1281 or equivalent



(d) Install the oil pan with the 19 bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

HINT:
Replace the only "A" bolt with a new one.

9. INSTALL DRAIN PLUG WITH NEW GASKET
Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

10. FILL FLUID AND CHECK FLUID
(See page DI–173)

VALVE BODY ASSEMBLY

AT037–01

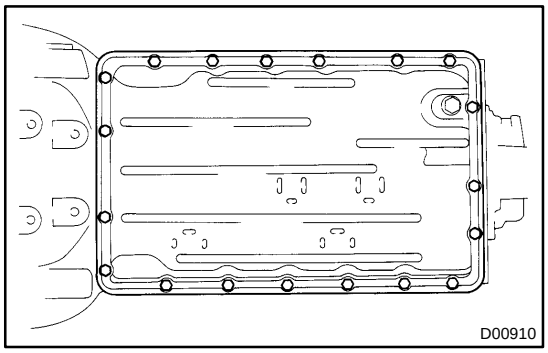
ON–VEHICLE REPAIR

CAUTION:

When working with FIPG material, you must observe the following items.

- **Using a razor blade and gasket scraper, remove all the old 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 FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

1. REMOVE DRAIN PLUG WITH GASKET AND DRAIN ATF

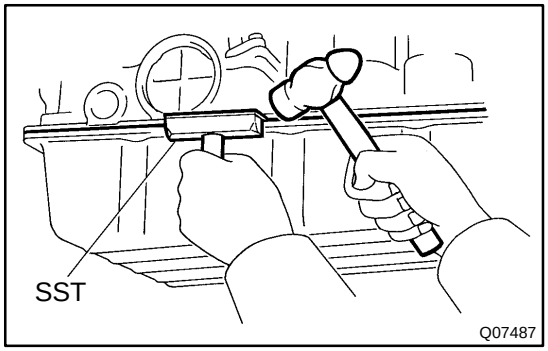


2. REMOVE OIL PAN

NOTICE:

Some fluid will remain in the oil pan.

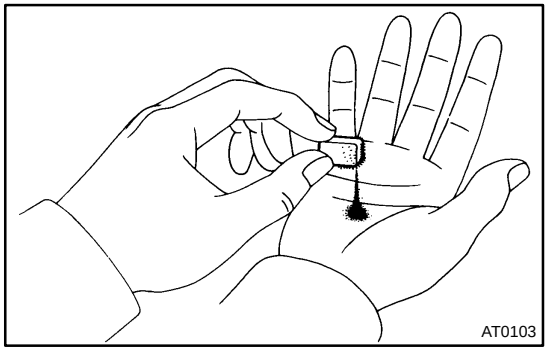
(a) Remove the 19 bolts.



(b) Install the blade of SST between the transmission case on oil pan, cut off applied sealer, and remove the oil pan.
SST 09032 – 00100

NOTICE:

When removing the oil pan, be careful not to damage the oil pan flange.

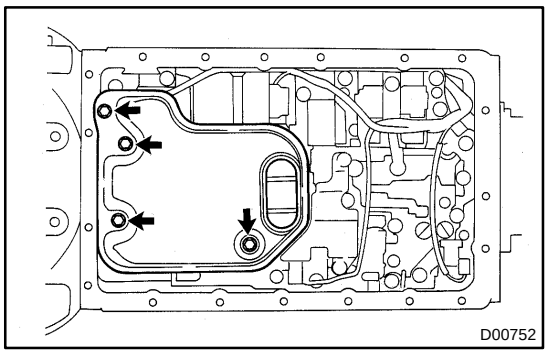


3. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect steel particles. Carefully look at the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.

Steel (magnetic) ... bearing, gear and clutch plate wear

Brass (non–magnetic) ... bushing wear

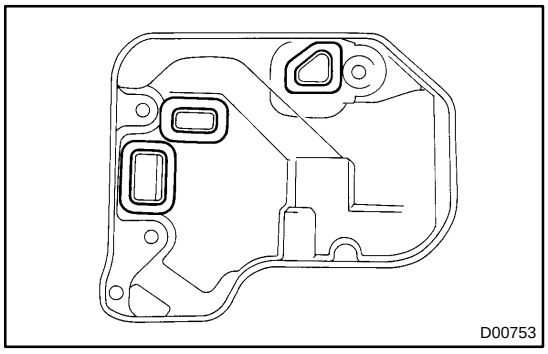


4. REMOVE OIL STRAINER

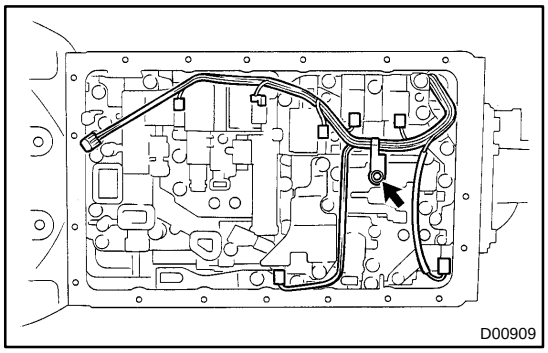
NOTICE:

Be careful as some fluid will come out of the oil strainer.

(a) Remove the 4 bolts and oil strainer.



(b) Remove the 3 gaskets from the oil strainer.

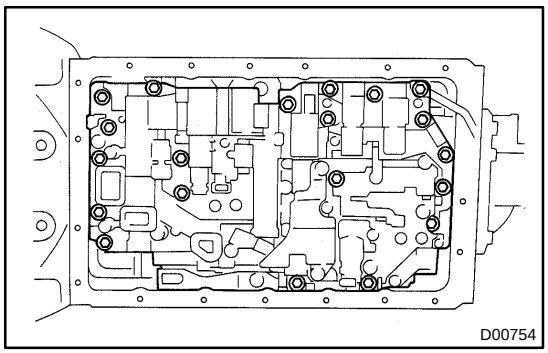


5. REMOVE SOLENOID WIRING

(a) Disconnect the ATF temperature sensor.

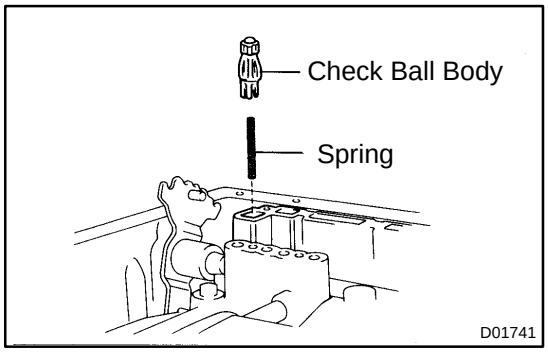
(b) Remove the bolt and clamp.

(c) Disconnect the 7 connectors from the solenoid valves.



6. REMOVE VALVE BODY

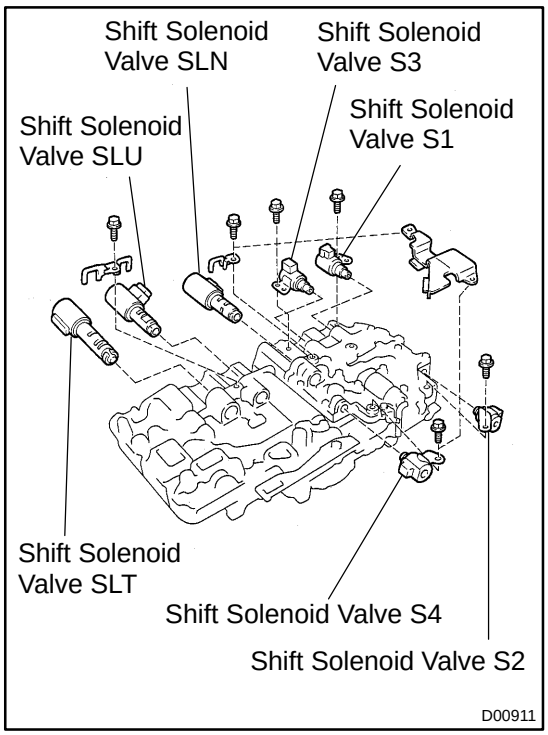
Remove the 21 bolts and valve body.



7. REMOVE CHECK BALL BODY AND SPRING

NOTICE:

Do not drop the check ball body and spring.



8. REMOVE SOLENOID VALVE

(a) Remove the 3 bolts and shift solenoid valve No.1, No.2 and No.3.

(b) Remove the 2 bolts, oil guide plate, lock plate, shift solenoid valve SLN and No.4.

(c) Remove the 6 O–rings from each shift solenoid valve.

(d) Remove the bolt, lock plate and shift solenoid valve SLU and SLT.

9. INSTALL SOLENOID VALVE

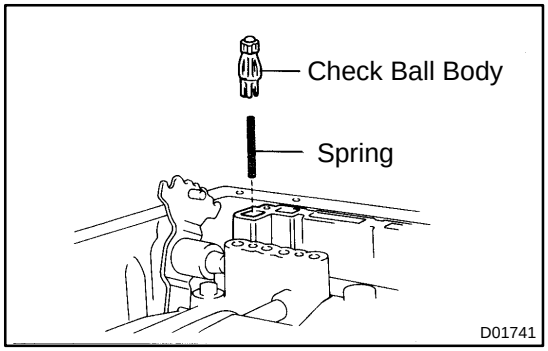
(a) Install the shift solenoid valve SLU and SLT and the lock plate with the bolt.
Torque: 6.4 N·m (65 kgf·cm, 56 in.·lbf)

(b) Coat 6 new O–rings with ATF.

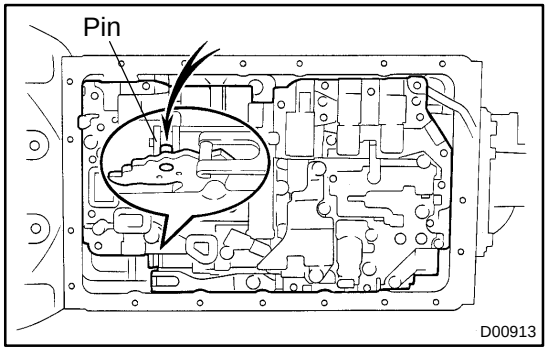
(c) Install the 6 O–rings to the each solenoid valve.

(d) Install the shift solenoid valve SLN, No.4, lock plate and oil guide plate with the 2 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(e) Install the shift solenoid valve No.1, No.2 and No.3 with the 3 bolts.
Torque:
Shift solenoid valve No.1 and No.3:
6.4 N·m (65 kgf·cm, 56 in.·lbf)
Shift solenoid valve No.2:
10 N·m (100 kgf·cm, 7 ft·lbf)

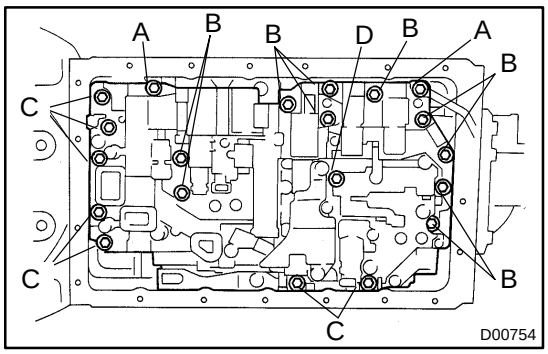


10. INSTALL CHECK BALL BODY AND SPRING

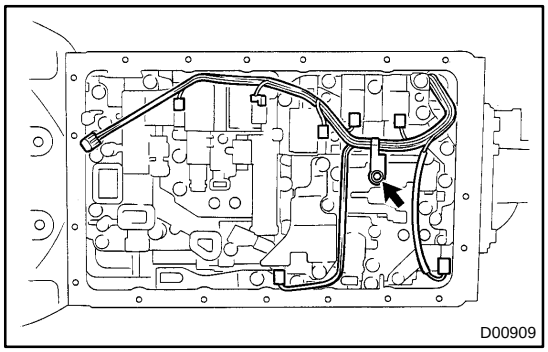


11. INSTALL VALVE BODY

(a) Align the groove of the manual valve to pin of the lever.

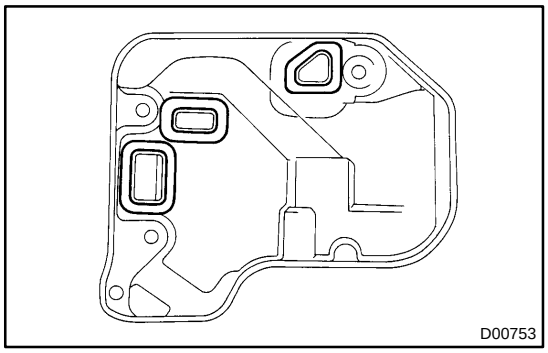


(b) Install the 21 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt length:
Bolt A: 23 mm (0.91 in.)
Bolt B: 28 mm (1.10 in.)
Bolt C: 36 mm (1.42 in.)
Bolt D: 55 mm (2.17 in.)



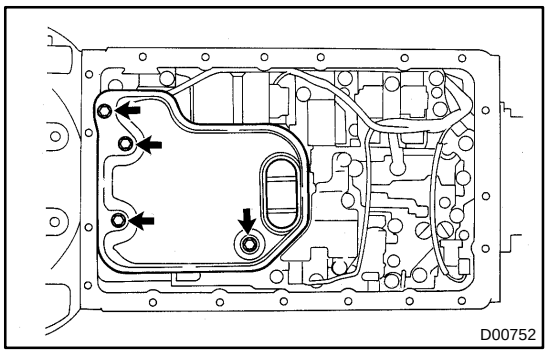
12. INSTALL SOLENOID WIRING

(a) Connect the 7 connectors to the solenoid valves.
(b) Install the clamp with the bolt.
Torque: 6.4 N·m (65 kgf·cm, 56 in.·lbf)
(c) Connect the ATF temperature sensor.

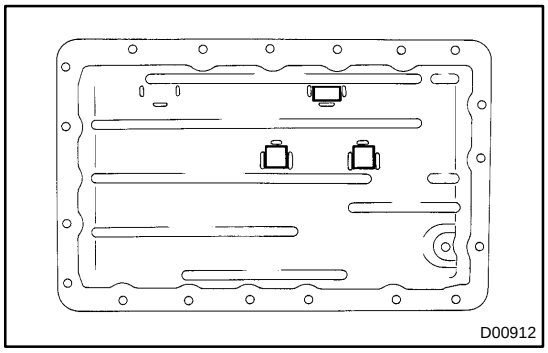


13. INSTALL OIL STRAINER

(a) Install 3 new gaskets.

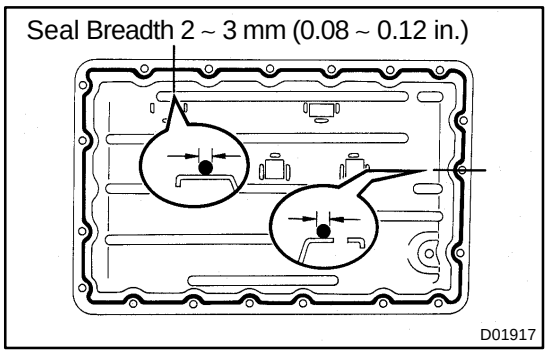


(b) Install the oil strainer with the 4 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



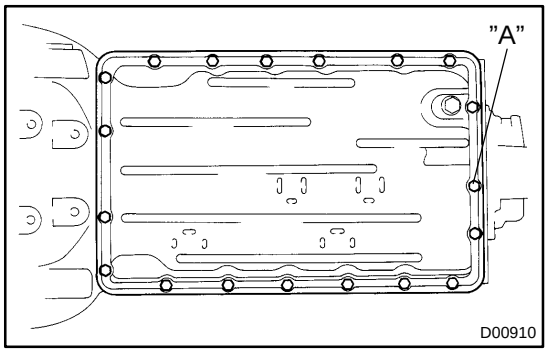
14. INSTALL OIL PAN

(a) Install the 3 magnets in the indications of the oil pan.



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

(c) Apply FIPG to the oil pan.
FIPG:
Part No. 08826 – 00090, THREE BOND 1281 or equivalent



(d) Install the oil pan with the 19 bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

HINT:
Replace the only "A" bolt with a new one.

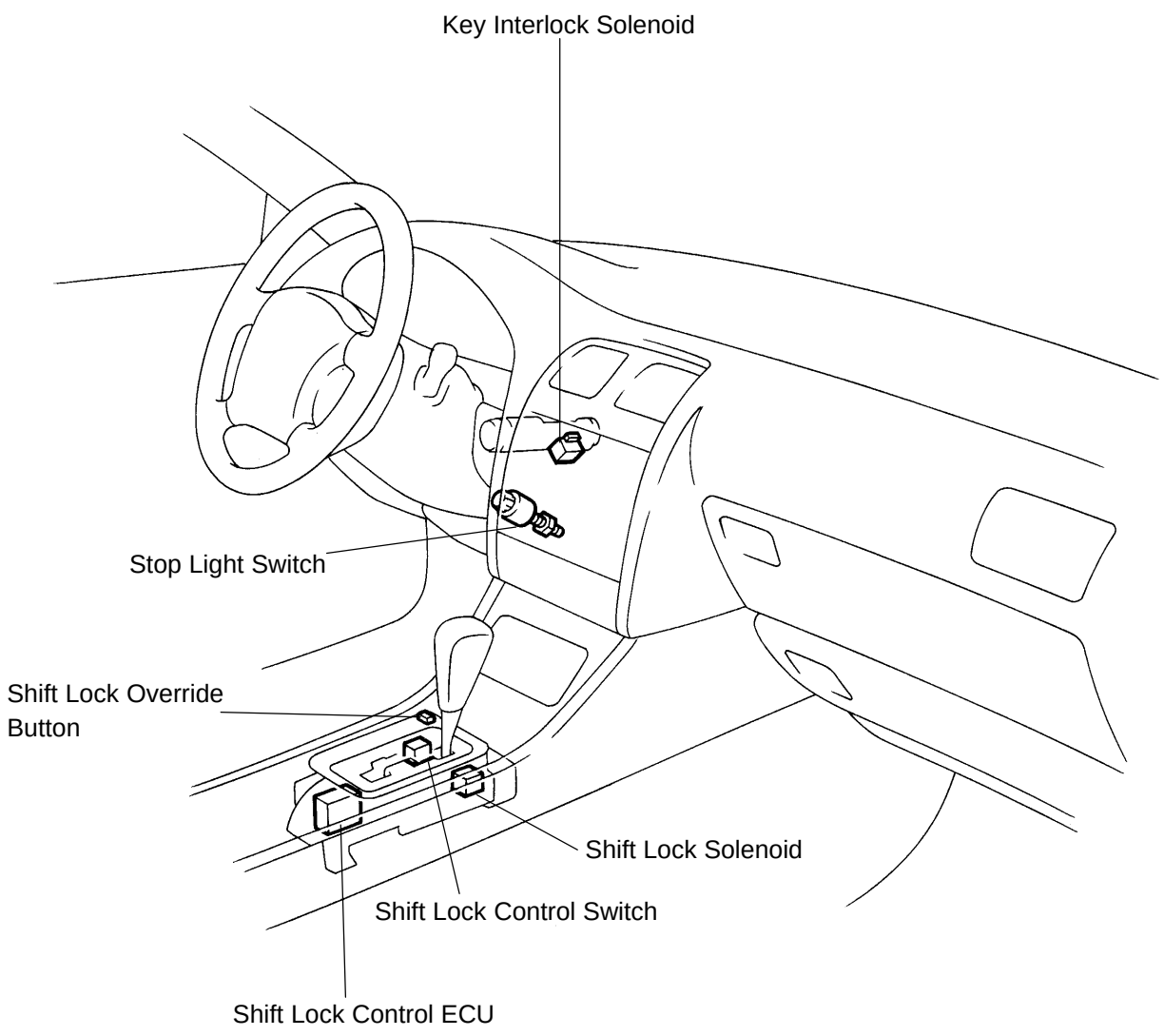
15. INSTALL DRAIN PLUG WITH NEW GASKET
Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

16. FILL FLUID AND CHECK FLUID
(See page DI–173)

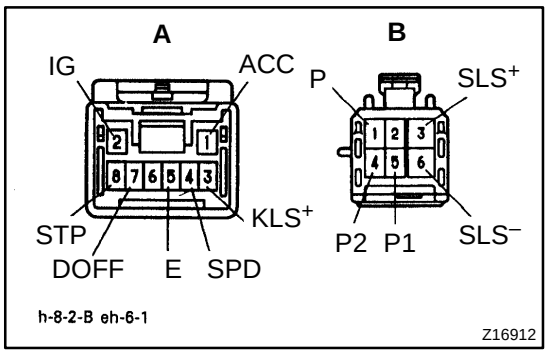
SHIFT LOCK SYSTEM

AT038–01

LOCATION



AT039–01



INSPECTION

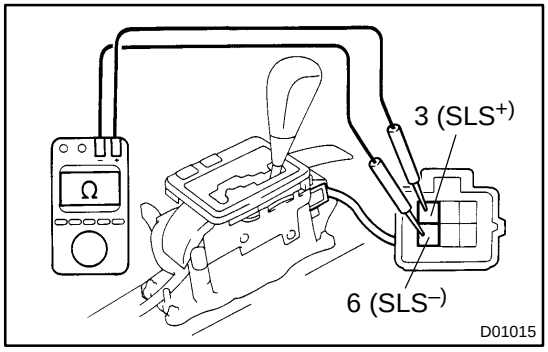
1. INSPECT SHIFT LOCK CONTROL ECU

Using a voltmeter, measure the voltage at each terminal.

HINT:

Do not disconnect the ECU connector.

Terminal	Measuring Condition	Voltage (V)
A, 1 – A, 5 (ACC – E)	IG SW ACC	10 – 14
A, 2 – A, 5 (IG – E)	IG SW ON	10 – 14
A, 8 – A, 5 (STP – E)	Depress brake pedal	10 – 14
A, 3 – A, 5 (KLS^+ – E)	(1) IG SW ACC and shift lever P position	Below 1.5
	(2) IG SW ON and shift lever R, N, D, 3, 2, L position	8.5 – 10.5
	(3) IG SW ON and shift lever R, N, D, 3, 2, L position (after 1 second)	7.0 – 8.5
A, 4 – A, 5 (SPD – E)	(1) IG SW ON, shift lever D or 3 position and vehicle speed more than 11 km/h (6.8 mph)	Below 2
	(2) IG SW ON, shift lever D or 3 position and vehicle speed less than 11 km/h (6.8 mph)	10 – 14
A, 7 – A, 5 (DOFF – E)	(1) IG SW ON and shift lever D, 3 position	10 – 14
	(2) IG SW ON and shift lever P, R, N, 2, L position	0
B, 3 – B, 6 (SLS^+ – SLS–)	(1) IG SW ON and shift lever P position	0
	(2) IG SW ON and depress brake pedal	8.8 – 12.5
	(3) IG SW ON and depress brake pedal (after 20 seconds)	6.5 – 9.2
	(4) IG SW ON and shift lever D, 3, 2, L position	0
B, 5 – B, 1 (P1 – P)	(1) IG SW ON and shift lever P position	0
	(2) IG SW ON and shift lever R, N, D, 3, 2, L position	10 – 14
B, 4 – B, 1 (P2 – P)	(1) IG SW ACC and shift lever P position	10 – 14
	(2) IG SW ACC and shift lever R, N, D, 3, 2, L position	0



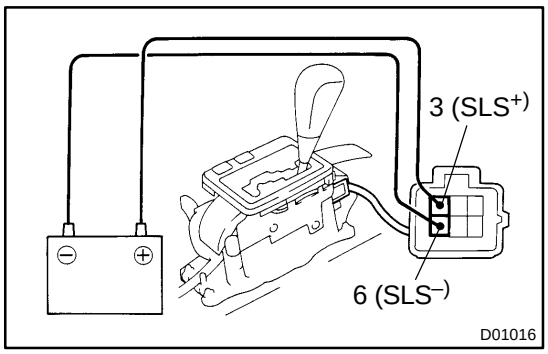
2. INSPECT SHIFT LOCK SOLENOID

(a) Disconnect the solenoid connector.

(b) Using an ohmmeter, measure the resistance between terminals 3 and 6.

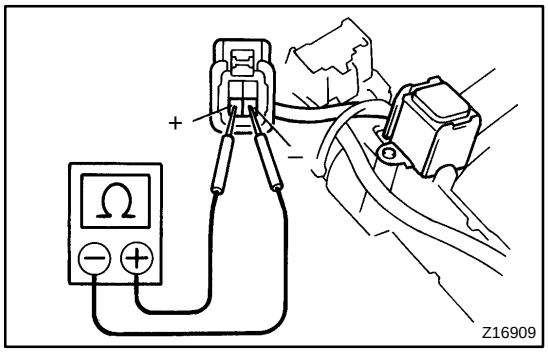
Standard resistance: 20 – 28 Ω

If the resistance is not as specified, replace the solenoid.



(c) Apply the battery voltage between terminals 3 and 6. At this time, confirm that the solenoid operates.

If the operation is not as specified, replace the solenoid.



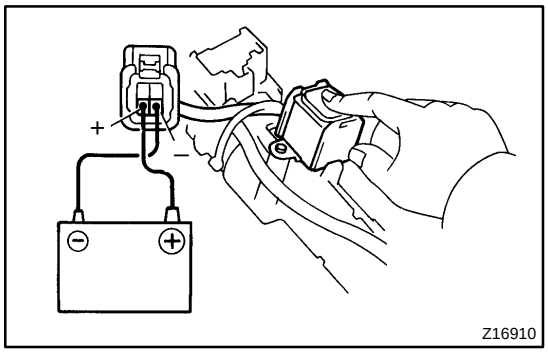
3. INSPECT KEY INTERLOCK SOLENOID

(a) Disconnect the solenoid connector.

(b) Using an ohmmeter, measure the resistance between terminals 3 and 4.

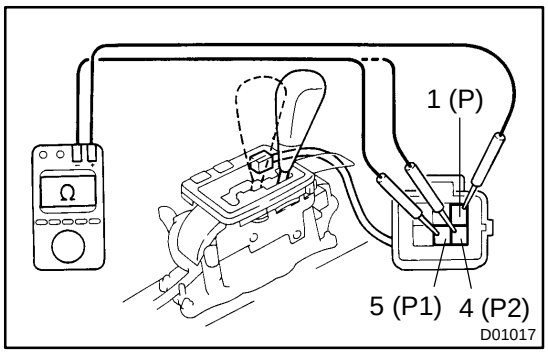
Standard resistance: 12 – 17 Ω

If the resistance value is not as specified, replace the solenoid.



(c) Touch the solenoid with your finger and check that the solenoid operation can be felt when battery voltage is applied intermittently to terminals 3 and 4.

If the operation is not as specified, replace the solenoid.



4. INSPECT SHIFT LOCK CONTROL SWITCH

Inspect that there is continuity between each terminal.

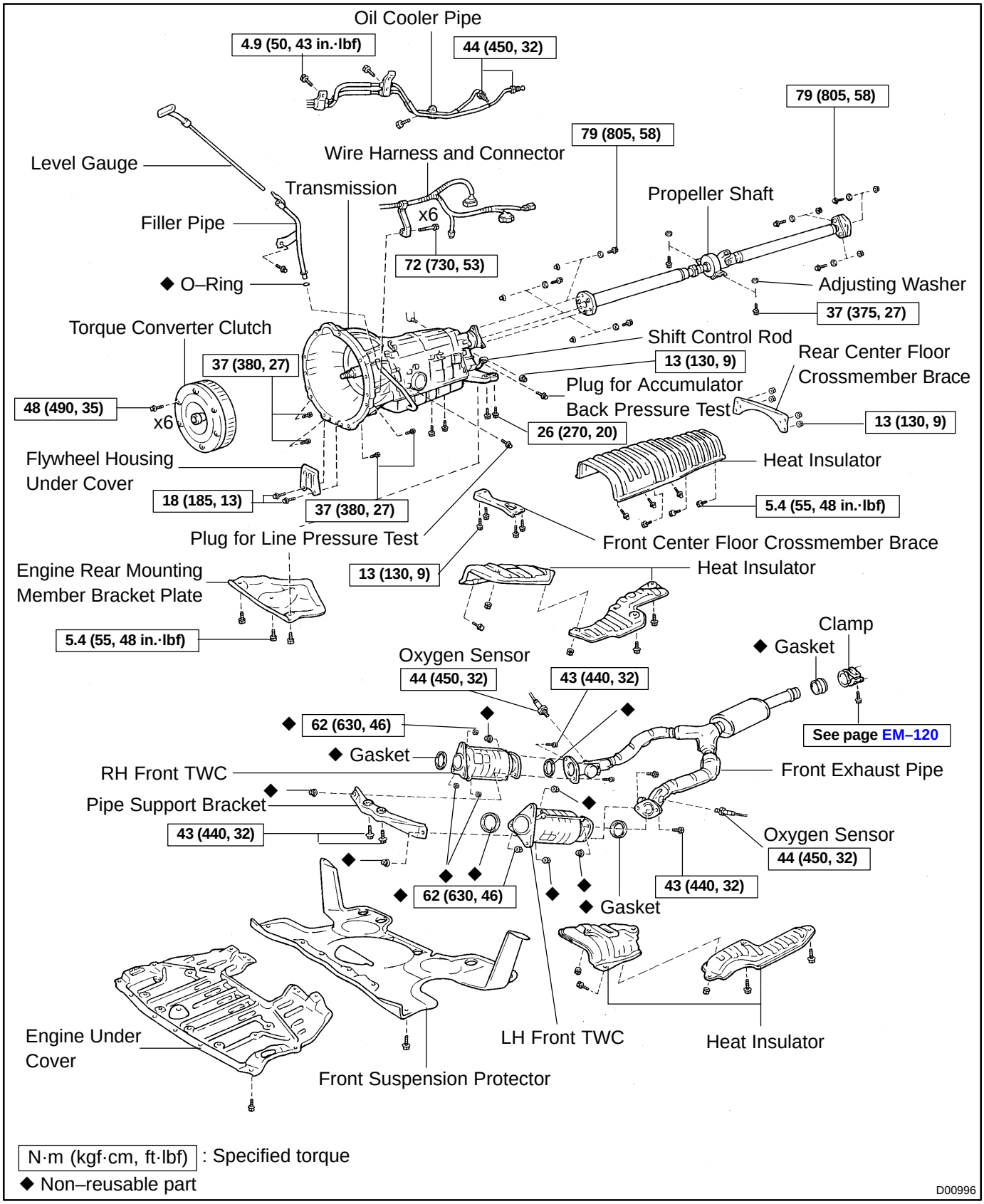
Shift position	Tester condition	Specified value
P position (Shift lever at left side)	5 – 1 (P1 – P)	Continuity
P position (Shift lever at right side)	5 – 1 (P1 – P) 4 – 1 (P2 – P)	Continuity
R, N, D, 3, 2, L position	4 – 1 (P2 – P)	Continuity

If the continuity is not as specified, replace the switch.

AUTOMATIC TRANSMISSION UNIT

AT03A–01

COMPONENTS



AT03B–01

REMOVAL

1. REMOVE LEVEL GAUGE

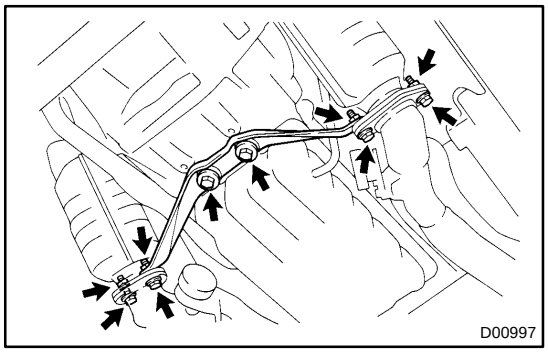
2. RAISE VEHICLE

NOTICE:

Make sure that the vehicle is securely supported.

3. REMOVE ENGINE UNDER COVER

4. REMOVE FRONT SUSPENSION PROTECTOR



5. REMOVE FRONT EXHAUST PIPE

(a) Disconnect the 2 heated oxygen sensors.

Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

HINT:

At the time of installation, please refer to the following items.

- Before installing the heated oxygen sensor, twist the sensor wire counterclockwise 3 and 1/2 turns.
- After installing the heated oxygen sensor wire is not twisted. If it is twisted, remove the heated oxygen sensor and reinstall it.

(b) Remove the 4 bolts, nuts and 2 gaskets from the LH and RH front TWC.

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

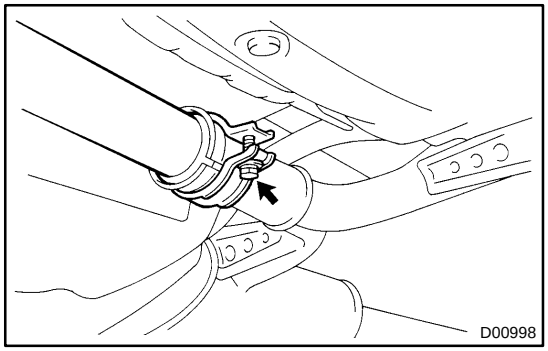
HINT:

At the time of installation, please refer to the following item.

Replace the used nuts and gaskets with new ones.

(c) Remove the 2 bolts and support bracket.

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



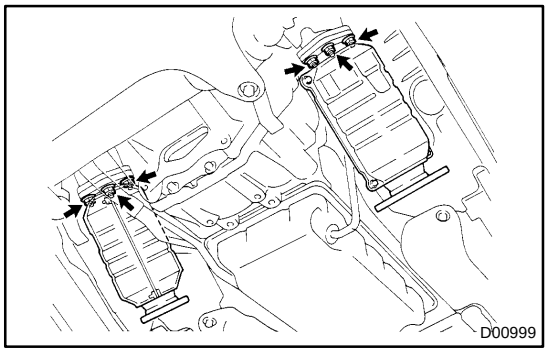
(d) Remove the pipe clamp set bolt and gasket.
(See page EM–120)

HINT:

At the time of installation, please refer to the following item.

Replace the used gasket with a new one.

(e) Remove the front exhaust pipe.



6. REMOVE LH AND RH FRONT TWC

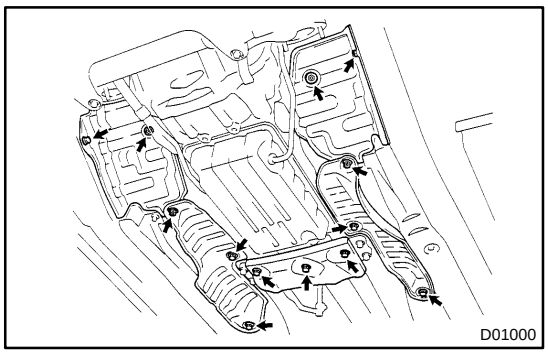
Remove the 6 nuts, 2 gaskets, LH and RH front TWC.

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

HINT:

At the time of installation, please refer to the following item.

Replace the used nuts and gaskets with new ones.



7. REMOVE HEAT INSULATOR AND ENGINE REAR MOUNTING MEMBER BRACKET PLATE

(a) Remove the 4 nuts, 6 bolts and heat insulators.

(b) Remove the 3 bolts and bracket plate.

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

8. REMOVE BOLT AND FILLER PIPE

HINT:

At the time of installation, please refer to the following item.

Replace the used O–ring with a new one.

9. REMOVE HEAT INSULATOR

Remove the 6 bolts and heat insulator.

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

10. REMOVE CROSSMEMBER BRACE

(a) Remove the 4 bolts and front center floor crossmember brace.

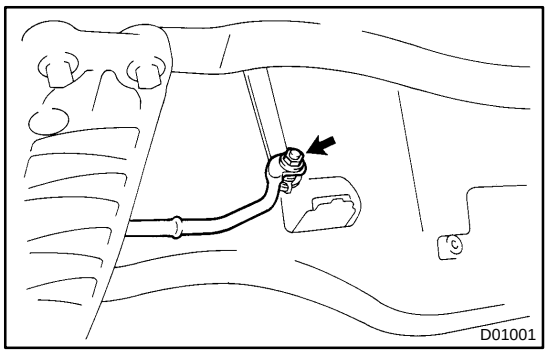
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Remove the 4 nuts and rear center floor crossmember brace.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

11. REMOVE PROPELLER SHAFT

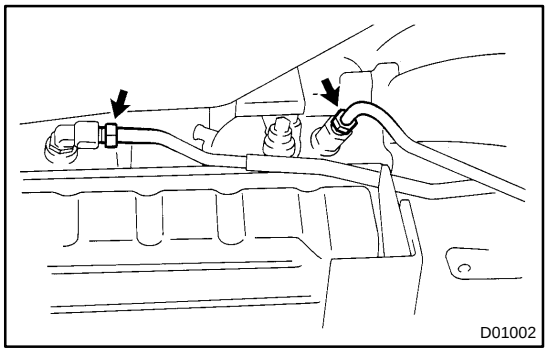
(See page PR–3)



12. REMOVE SHIFT CONTROL ROD

Remove the nut and disconnect the rod.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



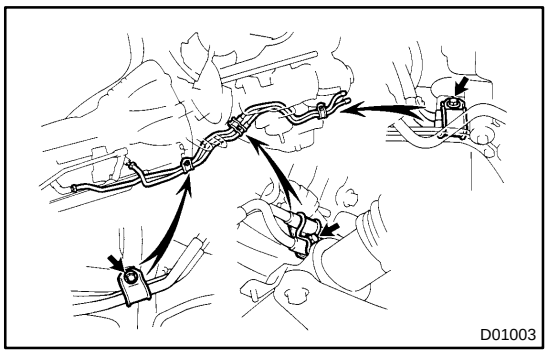
13. DISCONNECT OIL COOLER PIPE

(a) Loosen the 2 union nuts from the transmission.

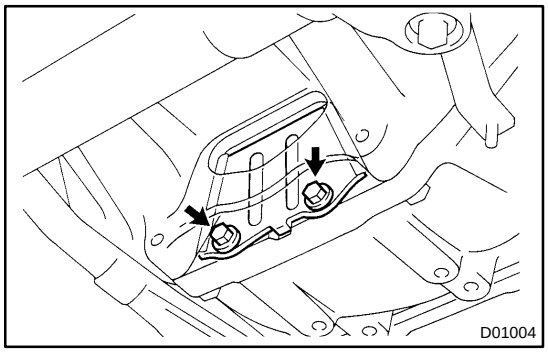
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

NOTICE:

Be careful no to damage the oil cooler pipe.

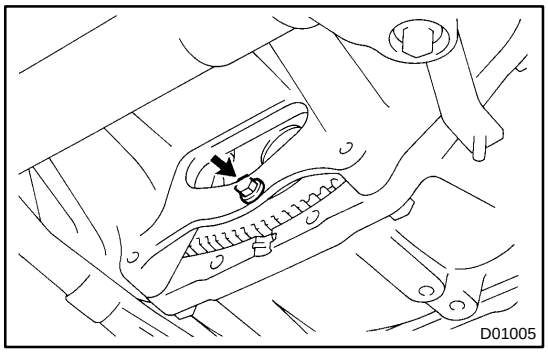


(b) Disconnect the 3 set bolts of the clamp.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)
(c) Disconnect the 2 oil cooler pipes from the transmission.



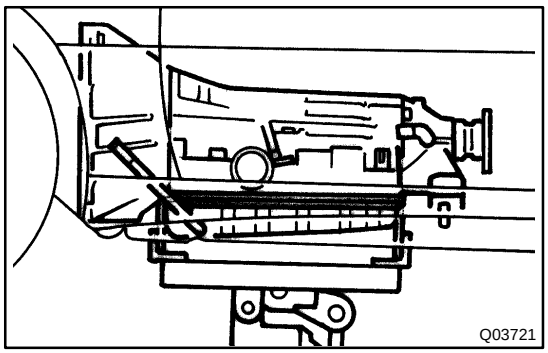
14. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLT

(a) Remove the 2 bolts and flywheel housing under cover.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

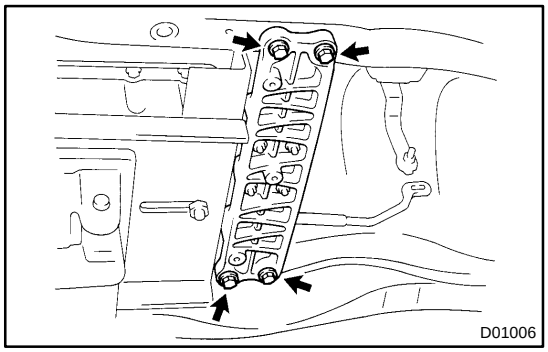


(b) Turn the crankshaft to gain access to each bolt.
(c) Hold the crankshaft pulley nut with a wrench and remove the 6 bolts.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

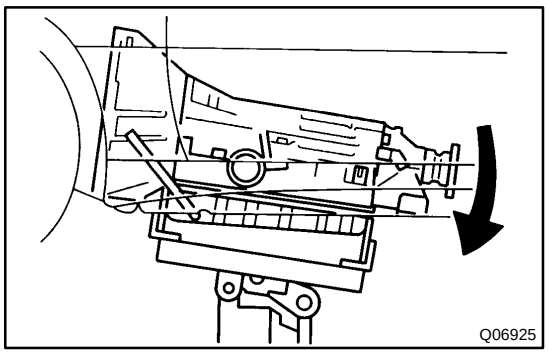
HINT:
At the time of installation, please refer to the following item.
First install black colored bolt and then the 5 other bolts.



15. SUPPORT TRANSMISSION WITH JACK



16. REMOVE ENGINE REAR MOUNTING 4 SET BOLTS
Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)



17. DISCONNECT CONNECTORS AND WIRE HARNESS

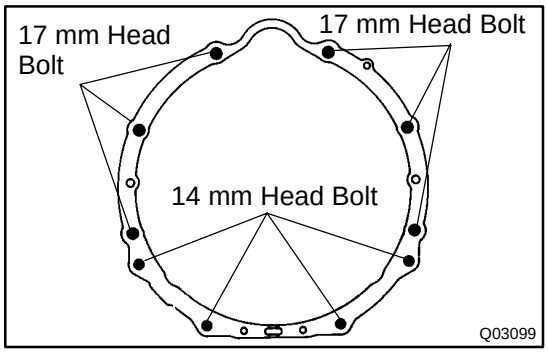
(a) Tilt down the transmission.

NOTICE:

Take care so that the cooling fan does not come in contact with the fan shroud.

(b) Disconnect the following connectors:
  (1) O/D direct clutch speed sensor connector
  (2) Vehicle speed sensor connector
  (3) Park/neutral position switch connector
  (4) Solenoid connector

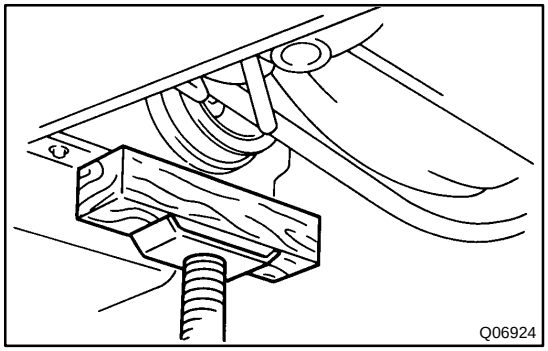
(c) Disconnect the wire harness from the clamp on transmission.



18. REMOVE TRANSMISSION

Remove the 10 bolts and transmission.

Torque:
14 mm head bolt: 37 N·m (380 kgf·cm, 27 ft·lbf)
17 mm head bolt: 72 N·m (730 kgf·cm, 53 ft·lbf)



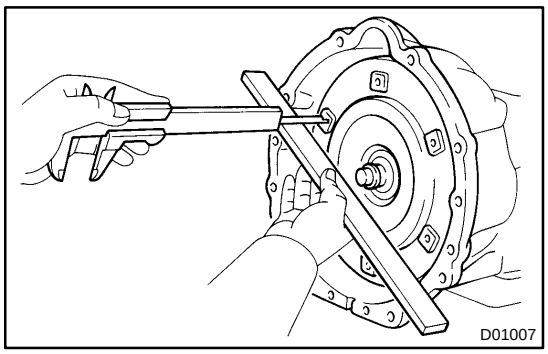
HINT:

At the time of installation, please refer to the following item.

Lift the engine front side.

AT03C–01

INSTALLATION



1. CHECK TORQUE CONVERTER CLUTCH INSTALLATION

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

Correct distance: More than 17.1 mm (0.673 in.)

If the distance is less than the standard, check for an improper installation.

2. INSTALL TRANSMISSION

Installation is in the reverse order of removal.
(See page AT–17)

HINT:

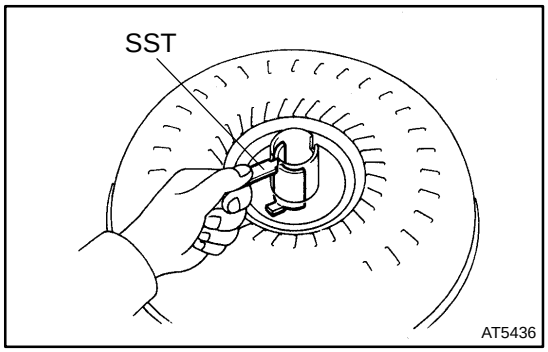
After installation, check and inspect items as follows.

- Adjust the shift lever position. (See page DI–173)
- Check fluid level. (See page DI–173)
- Do the road test. (See page DI–173)

TORQUE CONVERTER CLUTCH AND DRIVE PLATE

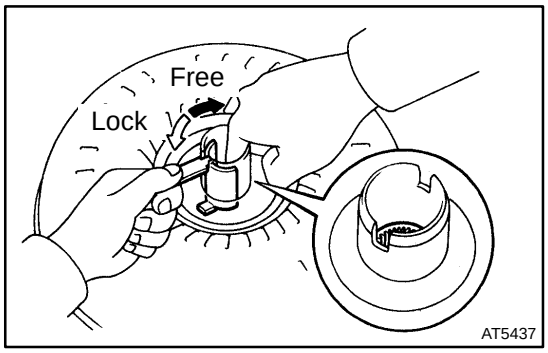
AT03D–01

INSPECTION

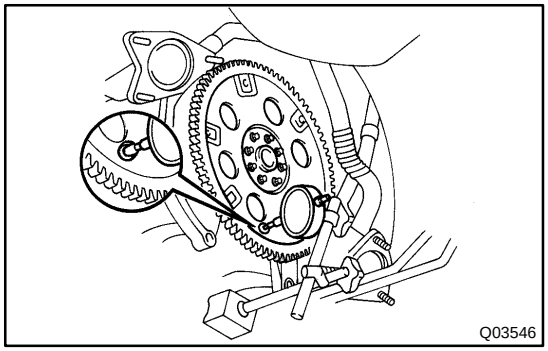


1. INSPECT ONE–WAY CLUTCH

(a) Install SST so that it fits in the notch of the converter hub and outer race of the one–way clutch.
SST 09350–30020 (09351–32020)



(b) Press on the serrations of starter with a finger and rotate it.
Check if it rotates smoothly when turned clockwise and locks up when turned counterclockwise.



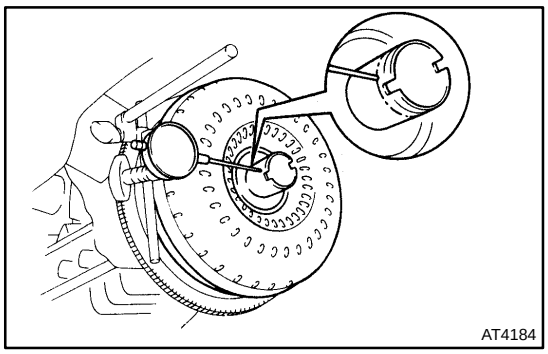
2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator and measure the drive plate runout.

Maximum runout: 0.20 mm (0.0079 in.)

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 indictor.

Maximum runout: 0.30 mm (0.0118 in.)

If runout exceeds 0.30 mm (0.0118 in.), try to correct by reorienting the installation of the torque converter clutch.

If excessive runout cannot be corrected, replace the torque converter clutch.

HINT:

Mark the position of the torque converter clutch to ensure correct installation.

(b) Remove the torque converter clutch.