

SECTION **MT**
MANUAL TRANSMISSION

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PRECAUTIONS

PRECAUTIONS

PFP:00001

Caution

ACS0015D

- If any malfunctions occur in the FS6R31A model transmission, replace the entire transmission assembly.
- Do not reuse transmission oil, once it has been drained.
- Check oil level or replace oil with vehicle on level ground.
- During removal or installation, keep inside of transmission clear of dust or dirt.

Precautions for Battery Service

ACS001MA

This vehicle is equipped with the automatic window adjusting function. When a door is opened, the window automatically lowers slightly to avoid contact between the window and the side roof panel. After the door is closed, the window will automatically raise slightly.

On vehicles equipped with the automatic window adjusting function, lower both the driver and front passenger side windows before disconnecting the battery cables. This will prevent interference between the side window and the roof panel when either door is opened/closed.

CAUTION:

After the battery cables are disconnected, do not open/close the driver and/or front passenger door with the window in the full up position. The automatic window adjusting function will not work and the side roof panel may be damaged.

PREPARATION

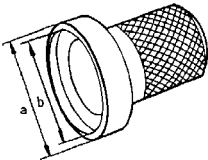
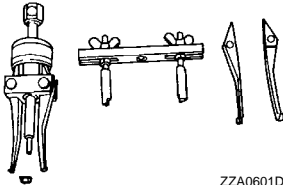
PREPARATION

PFP:00002

Special Service Tools

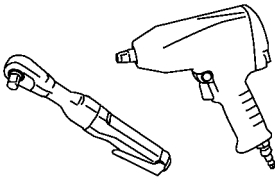
ACS0015E

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST33400001 (J26082) Drift a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.  ZZA0814D	Rear oil seal installation
Oil seal puller KV381054S0 (—)  ZZA0601D	Rear oil seal removal

Commercial Service Tool

ACS0015F

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ACS0015G

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

MANUAL TRANSMISSION

Reference page		MT-7	MT-7	MT-7	—	MT-8	MT-10	—	—	—	—	—	—
SUSPECTED PARTS (Possible cause)		OIL (Oil level is low.)	OIL (Wrong oil.)	OIL (Oil level is high.)	GASKET (Damaged)	OIL SEAL (Worn or damaged)	SHIFT CONTROL LINKAGE (Worn)	CHECK PLUG RETURN SPRING AND CHECK BALL (Worn or damaged)	SHIFT FORK (Worn)	GEAR (Worn or damaged)	BEARING (Worn or damaged)	BAULK RING (Worn or damaged)	INSERT SPRING (Damaged)
Symptoms	Noise	1	2							3	3		
	Oil leakage		3	1	4	2							
	Hard to shift or will not shift		1	1			2					3	3
	Jumps out of gear						1	2	3	3			

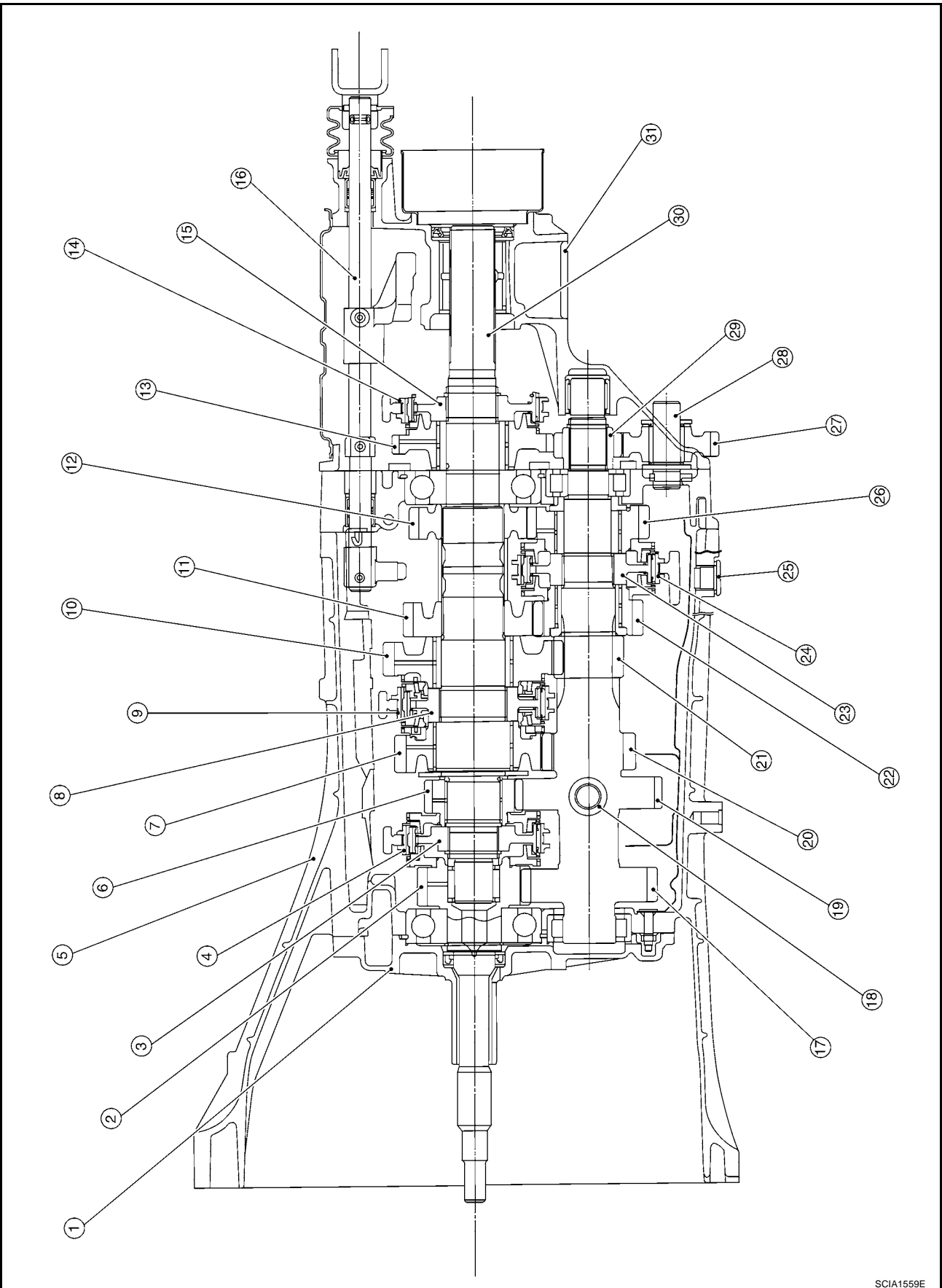
DESCRIPTION

DESCRIPTION

PFP:00000

Cross-Sectional View

ACS0015H



SCIA1559E

MT-5

A

B

MT

D

E

F

G

H

I

J

K

L

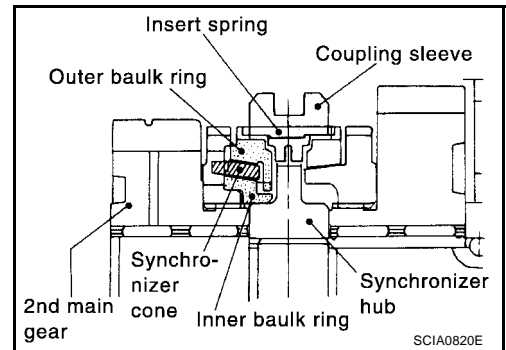
M

DESCRIPTION

- | | | |
|------------------------------|--------------------------------|-------------------------------|
| 1. Front cover | 2. Main drive gear | 3. 5th - 6th synchronizer hub |
| 4. 5th - 6th coupling sleeve | 5. Transmission case | 6. 6th main gear |
| 7. 2nd main gear | 8. 1st - 2nd synchronizer hub | 9. 1st - 2nd coupling sleeve |
| 10. 1st main gear | 11. 3rd main gear | 12. 4th main gear |
| 13. Reverse main gear | 14. Reverse coupling sleeve | 15. Reverse synchronizer hub |
| 16. Striking rod | 17. Counter drive gear | 18. Filler plug |
| 19. 6th counter gear | 20. 2nd counter gear | 21. 1st counter gear |
| 22. 3rd counter gear | 23. 3rd - 4th synchronizer hub | 24. 3rd - 4th coupling sleeve |
| 25. Drain plug | 26. 4th counter gear | 27. Reverse idler gear |
| 28. Reverse idler shaft | 29. Reverse counter gear | 30. Mainshaft |
| 31. Rear extension | | |

DOUBLE-CONE SYNCHRONIZER

Double-cone synchronizer is adopted for 1st and 2nd gears to reduce operating force of the shift lever.



M/T OIL


PFP:KLD20

Replacement
DRAINING

ACS0015I

1. Start the engine and warm up the transmission unit sufficiently.
2. Stop the engine, remove filler plug and drain plug and then drain fluid.
3. Set a new gasket on drain plug and install it to the transmission.

Drain plug:

 **30 - 39 N-m (3.1 - 3.9 kg-m, 23 - 28 ft-lb)****CAUTION:****Gaskets are not reusable. Never reuse them.**


FILLING

1. Remove filler plug. Fill new oil into the transmission to the level of the filler plug mounting hole.

Oil grade: **API GL-4**Viscosity: **Refer to [MA-11, "Fluids and Lubricants"](#) .**Oil capacity: **Approx. 2.9 ℓ (3-1/4 US qt, 2-3/4 Imp qt)**

2. After filling, check fluid level, Set a new gasket on filler plug and install it to the transmission.

Filler plug:

 **30 - 39 N-m (3.1 - 3.9 kg-m, 23 - 28 ft-lb)****CAUTION:****Gaskets are not reusable. Never reuse them.**

Checking

OIL LEAKAGE AND OIL LEVEL


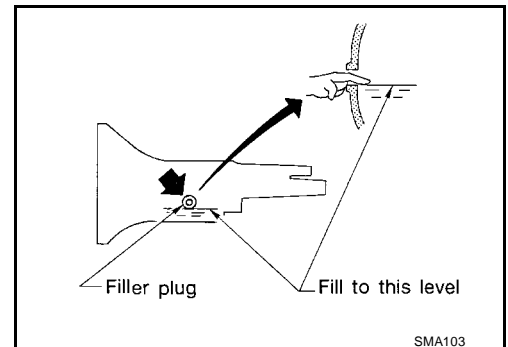
ACS0015J

- Check if oil is leaking from transmission or around it.
- Check oil level from filler plug mounting hole as shown in the figure.

CAUTION:**Never start engine while checking oil level.**

- Set a new gasket on filler plug and install it to the transmission.

Filler plug:

 **30 - 39 N-m (3.1 - 3.9 kg-m, 23 - 28 ft-lb)****CAUTION:****Gaskets are not reusable. Never reuse them.**

SMA103

REAR OIL SEAL

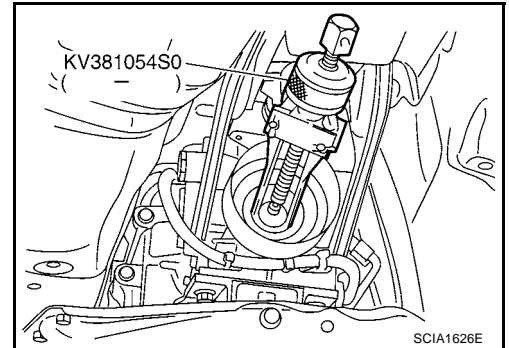
REAR OIL SEAL

PFP:33140

Removal and Installation REMOVAL

ACS001KT

1. Remove propeller shaft.
Refer to [PR-7, "Removal and Installation"](#) .
CAUTION:
Do not impact or damage propeller shaft tube.
2. Using oil seal puller (special service tool), remove oil seal.



INSTALLATION

1. Apply multi-purpose grease to oil seal lip. Using a drift (special service tool), drive in oil seal until the edge is approximately 1.7 mm (0.067 in) above the boss edge.

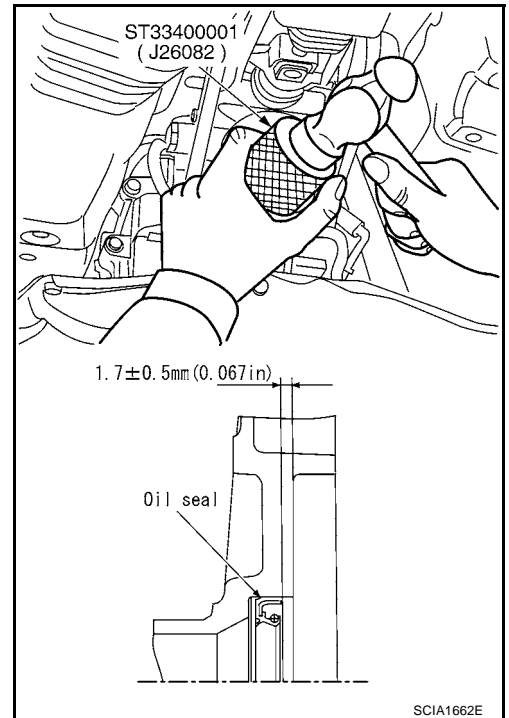
CAUTION:

- Oil seals are not reusable. Never reuse them.
- When installing, do not incline the oil seal.

2. Install propeller shaft. Refer to [PR-8, "INSTALLATION"](#) .

CAUTION:

- Do not impact or damage propeller shaft tube.
- If lubricant leak has occurred, after finishing work, check oil level. Refer to [MT-7, "Checking"](#) .



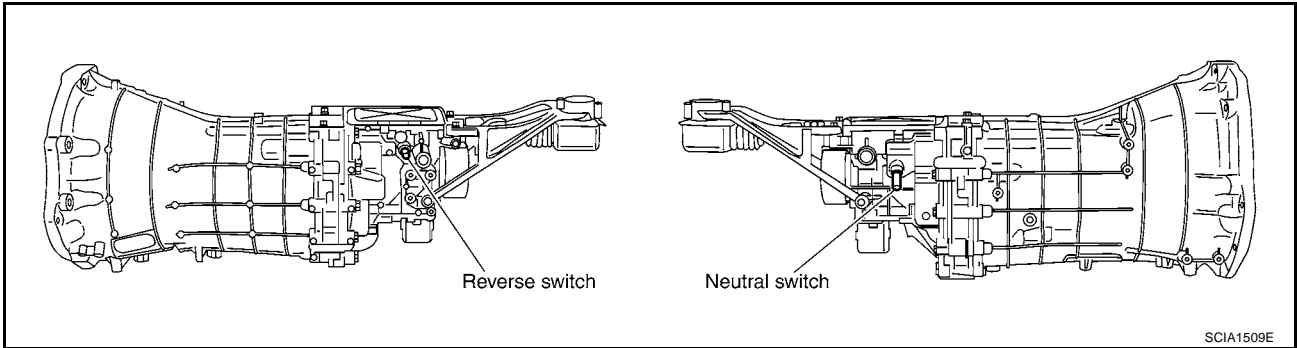
POSITION SWITCH

POSITION SWITCH

PFP:32005

Checking COMPONENT LOCATION

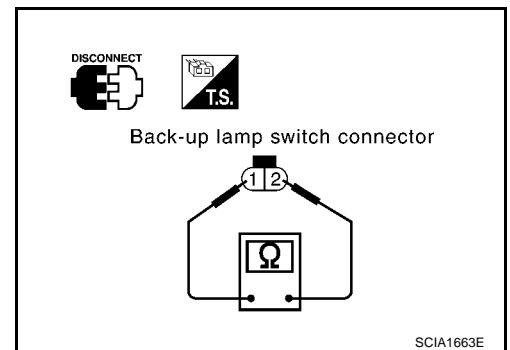
ACS0015L



BACK-UP LAMP SWITCH

- Check continuity.

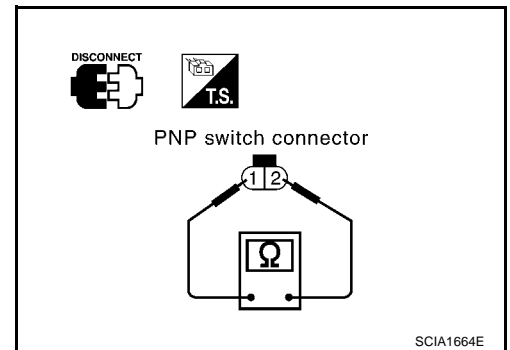
Gear position	Continuity
Reverse	Yes
Except reverse	No



PARK/NEUTRAL POSITION SWITCH

- Check continuity.

Gear position	Continuity
Neutral	Yes
Except neutral	No



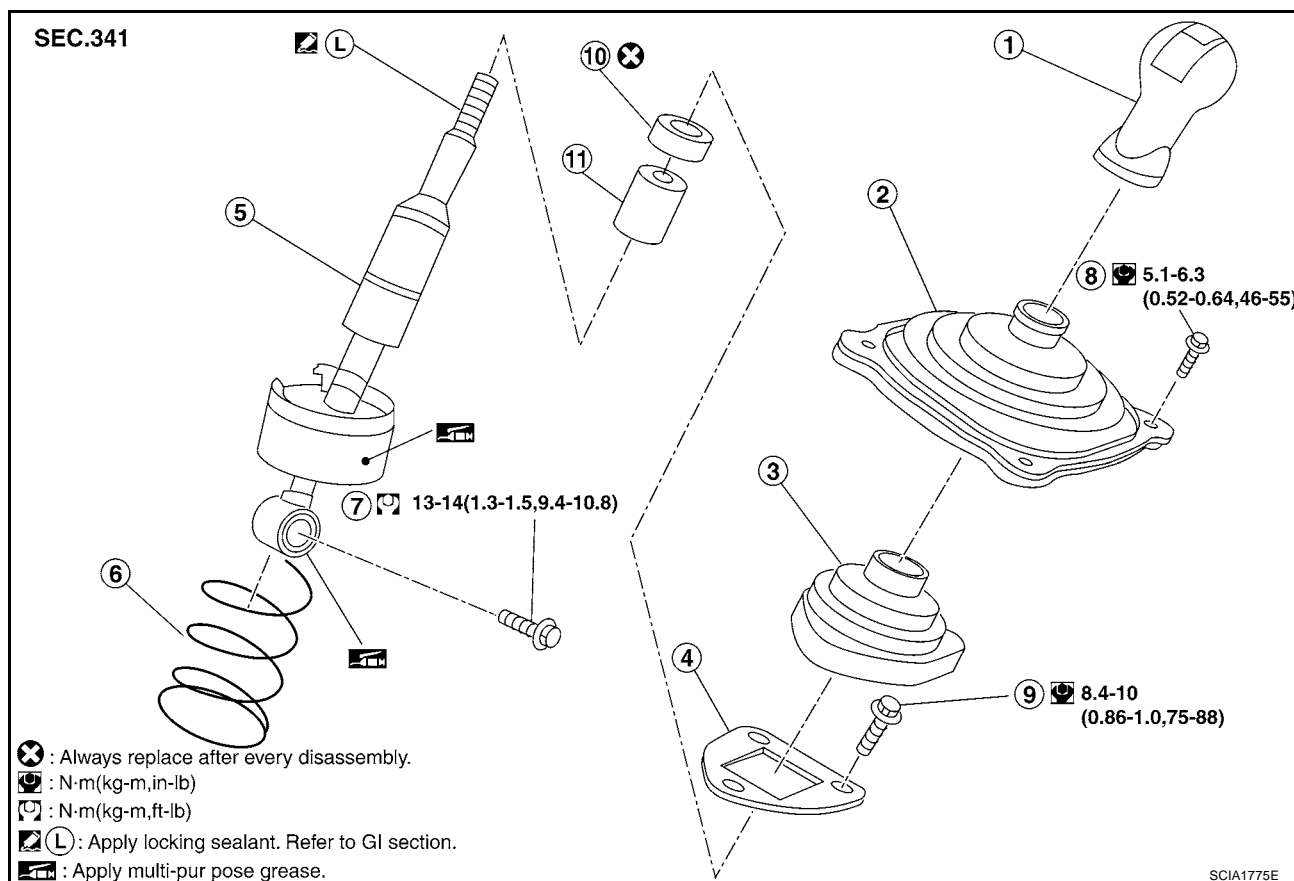
SHIFT CONTROL

SHIFT CONTROL

PFP:34103

Removal and Installation of Control Lever Assembly

ACS0029K



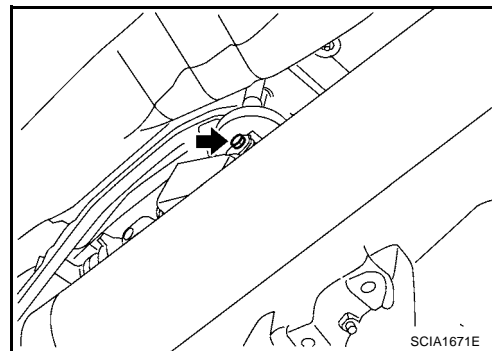
REMOVAL

1. Loosen the shift knob to remove the control lever.

CAUTION:

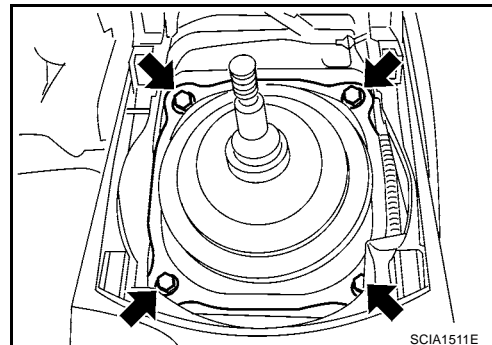
Be careful not to damage the shift knob.

2. Push back the boot, remove control lever assembly mounting bolt, and separate control lever assembly and control rod assembly.
3. Remove console finisher. Refer to [IP-12, "Removal and Installation"](#).

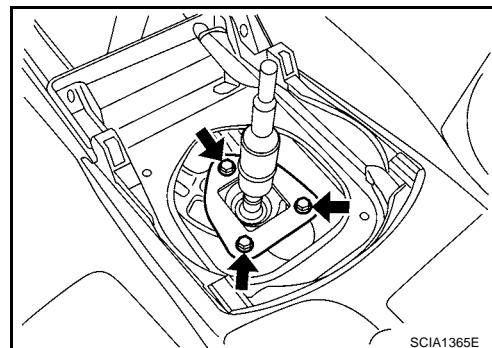


SHIFT CONTROL

4. Remove the mounting bolts to remove the hole cover.
5. Remove the control lever boot.



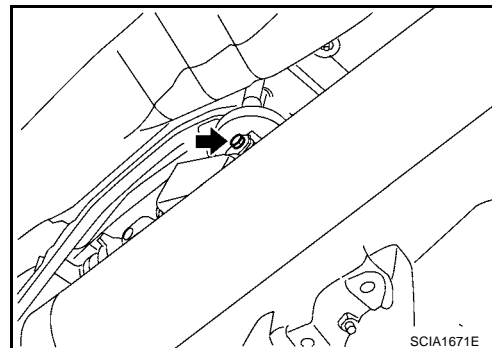
6. Remove guide plate mounting bolts, and then remove control lever assembly and control lever spring.



INSTALLATION

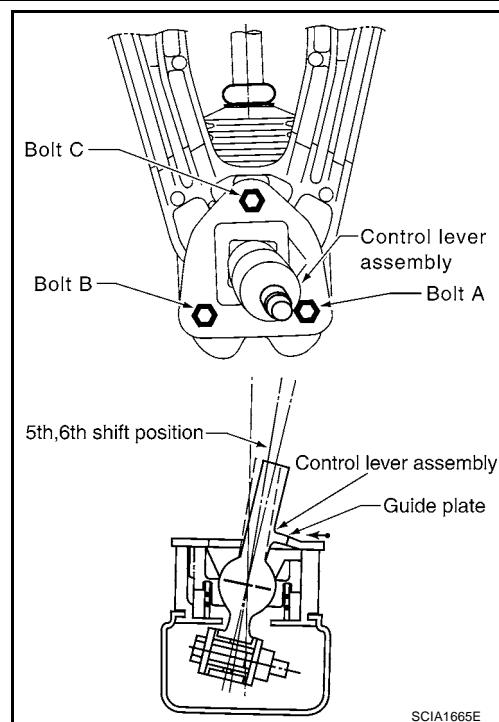
1. Set control lever assembly and control lever spring in the control lever housing assembly and loosely mount the guide plate.
2. After installing control lever assembly in the control rod assembly, tighten bolts to the specified torque.

: 13 - 14 N·m (1.3 - 1.5 kg-m, 9.4 - 10.8 ft-lb)



SHIFT CONTROL

3. Shifting control lever assembly to 6th gear, the control lever assembly is light pressed to the reverse side.
4. At the point where the control lever assembly stops, bring the guide plate closer until guide plate stopper contacts control lever assembly claw, and then loosely tighten mounting bolt A.



5. Shifting control lever assembly to 5th gear, the control lever assembly light pressed to the reverse side.
6. At the point where control lever assembly stops, bring guide plate closer until the guide plate stopper contacts control lever assembly claw, and then loosely tighten mounting bolt C.

: **8.4 - 10 N·m (0.86 - 1.0 kg-m, 75 - 88 in-lb)**

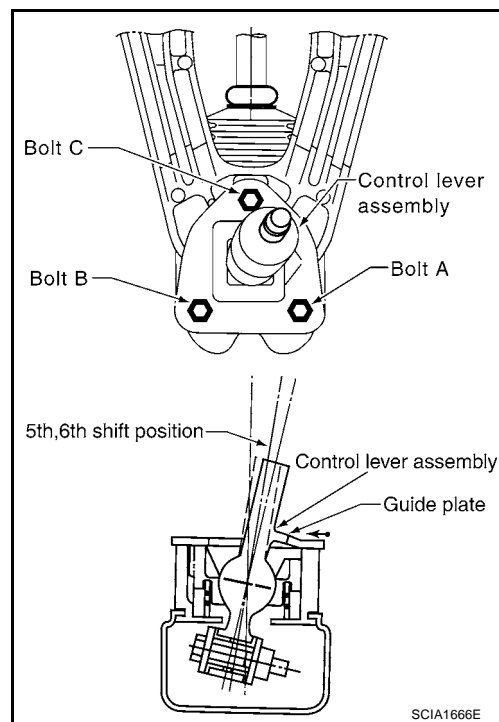
7. Tighten guide plate bolts A and B to the specified torque.

: **8.4 - 10 N·m (0.86 - 1.0 kg-m, 75 - 88 in-lb)**

8. Install control lever boot.
9. Install hole cover.

: **5.1 - 6.3 N·m (0.52 - 0.64 kg-m, 46 - 55 in-lb)**

10. Install console finisher. Refer to [IP-12, "Removal and Installation"](#).



11. As shown in the figure, assemble seat and insulator to control lever assembly.

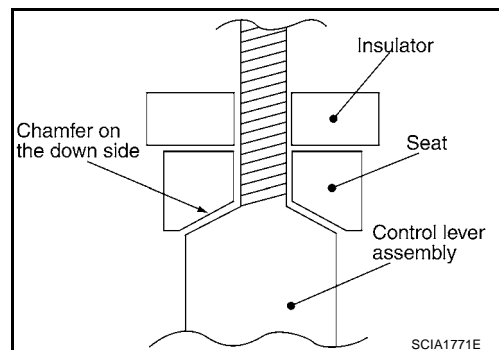
CAUTION:

Do not reuse the insulator.

12. Apply locking sealant to control lever threads, install shift knob.

CAUTION:

Remove the remaining adhesive on control lever and shift knob threads.



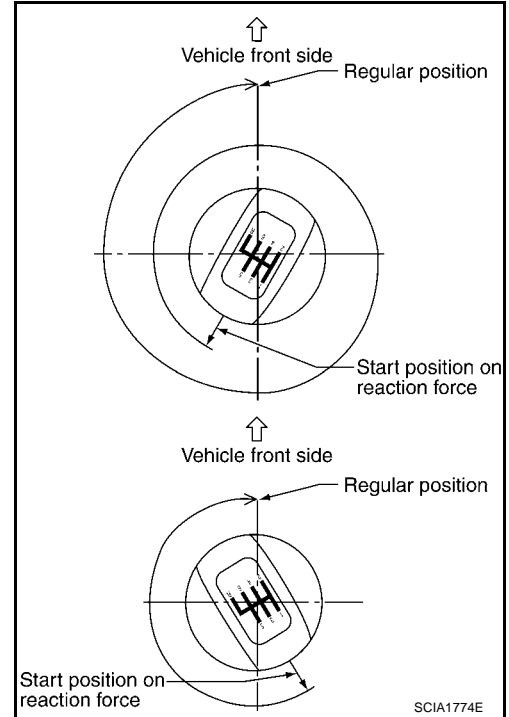
SHIFT CONTROL

13. Put the shift knob in the correct position as the following indicates.

- When tightening shift knob, if shift knob position is the correct position a less than 1/2 rotation from starting resistance, tighten 1 more rotation and set the correct position again.
- If shift knob position is the correct position more than 1/2 rotation from starting resistance, tighten and set the correct position.

CAUTION:

- Do not adjust the knob with loosening.
- After adjusting to regular position, until 30 hours passes since a locking sealant because stiff. Do not operate the shift intensely such as screwing or turning the shift knob to opposite direction.



INSPECTION AFTER INSTALLATION

After installing, confirm the following items:

- When control lever assembly is shifted to each position, make sure there is no binding or disconnection in each boot.
- When shifted to each position, make sure there is no noise, bending, and backlash. Especially when control lever assembly is shifted to 5th, 6th without pressing downward, check for bending.
- When control lever assembly is shifted to 1st, 2nd side and 5th, 6th side, confirm control lever assembly returns to neutral position smoothly.
- In any position other than reverse, confirm that control lever assembly can be pressed downward.
- With control lever assembly pressed downward, confirm that it can be shifted to reverse.
- When shifted from reverse to neutral position, confirm control lever assembly returns to neutral position smoothly with spring power.
- Without control lever assembly pressed downward, confirm that it cannot be shifted to reverse.

AIR BREATHER HOSE

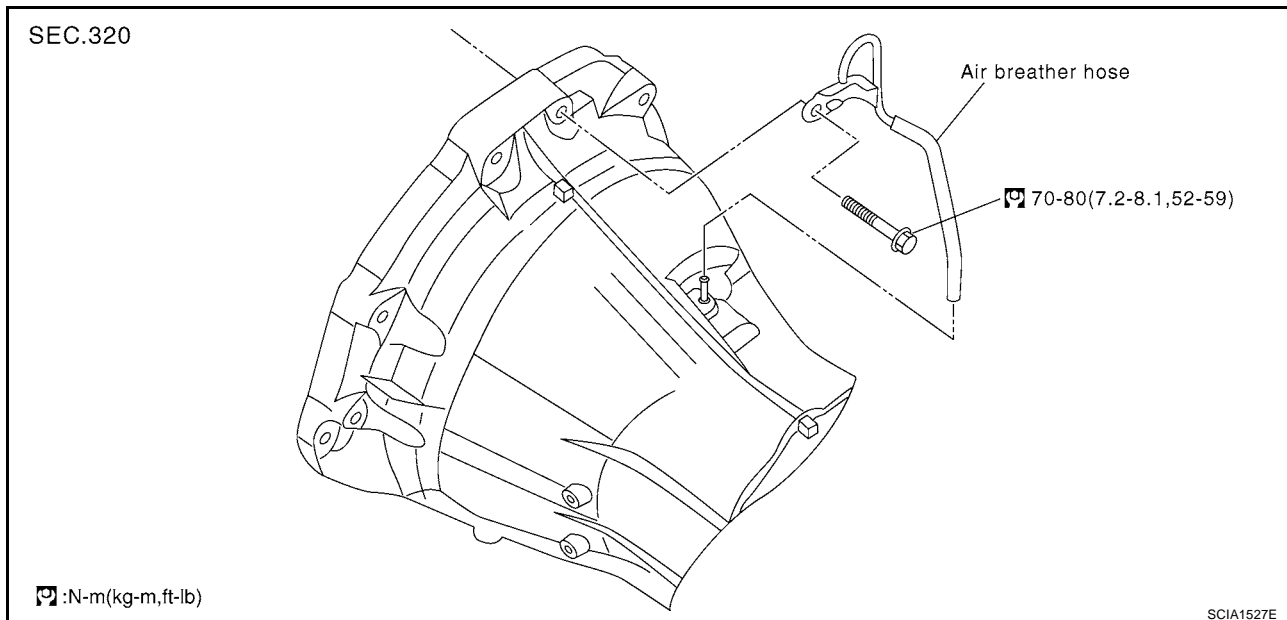
AIR BREATHER HOSE

PFP:31098

Removal and Installation

ACS0015P

Refer to the figure for air breather hose removal and installation information.



CAUTION:

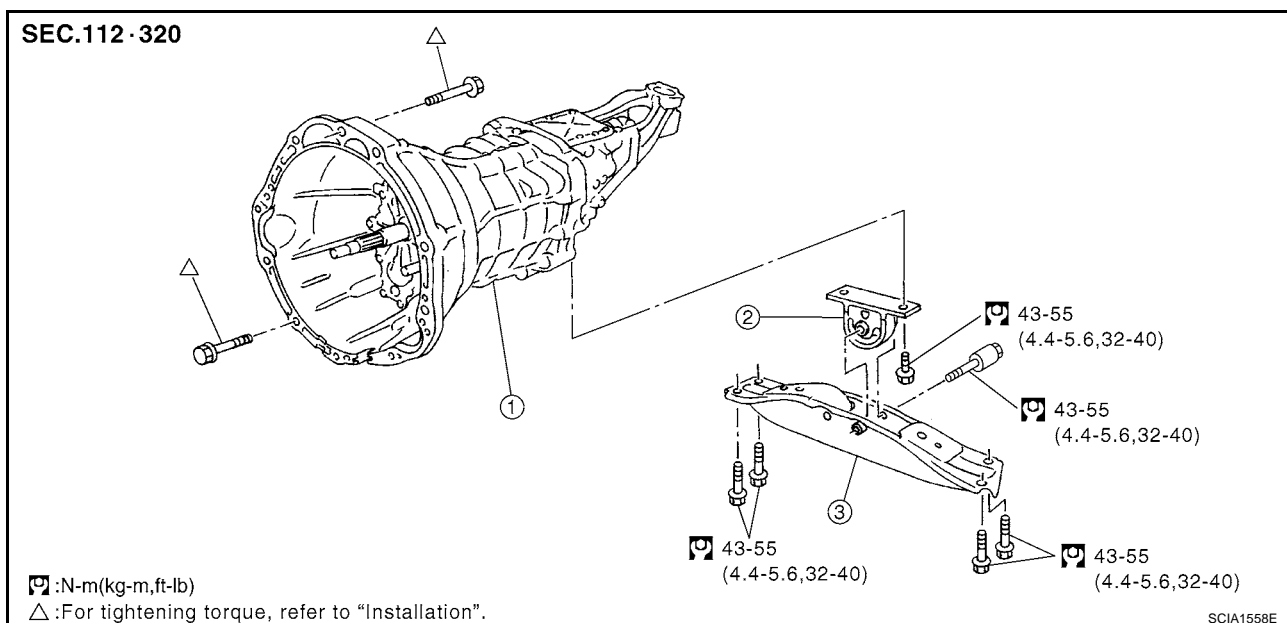
- Make sure there are no pinched or blocked areas on the air breather hose caused by bending or winding when installing it.
- Be sure to insert the hose until the overlap area reaches the tube edge or the pressing part of spool, insulator, etc.

TRANSMISSION ASSEMBLY

PFP:32010

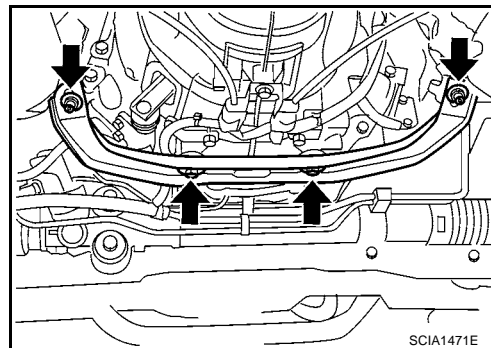
Removal and Installation from Vehicle

ACS0015Q



REMOVAL

1. Disconnect battery negative cable.
2. Remove tower bar with power tool. Refer to [FSU-20, "Removal and Installation"](#).
3. Remove front cross bar with power tool. Refer to [FSU-19, "Removal and Installation"](#).
4. Remove catalytic converter stay mounting nuts and bolts, and then remove catalytic converter bracket. Refer to [EX-3, "Removal and Installation"](#).

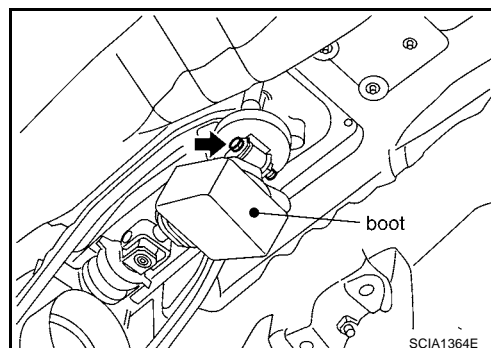


5. Remove nut connecting catalytic converter to exhaust manifold, and then remove catalytic converter and exhaust front tube as one unit.
6. Remove propeller shaft. Refer to [PR-7, "Removal and Installation"](#)

CAUTION:

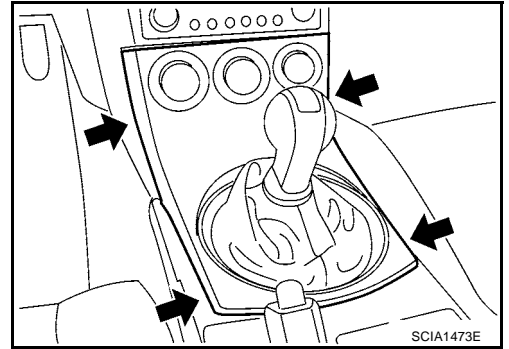
Do not impact or damage propeller shaft tube.

7. Remove control rod mounting bolts and then separate shift lever assembly from the control rod assembly.

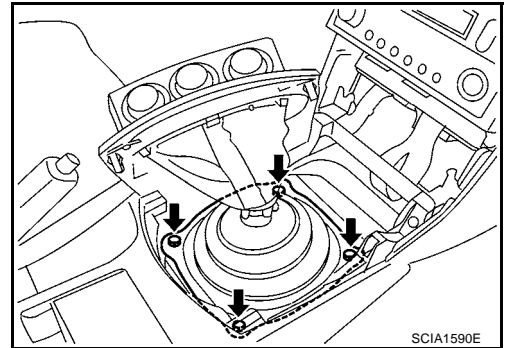


TRANSMISSION ASSEMBLY

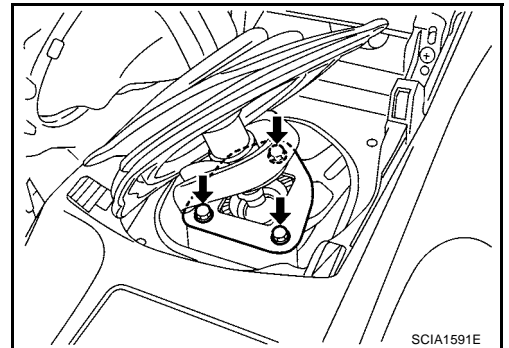
8. Use a screwdriver wrapped in tape to remove claw and then separate console finisher from the center console. Refer to [IP-12, "Removal and Installation"](#).



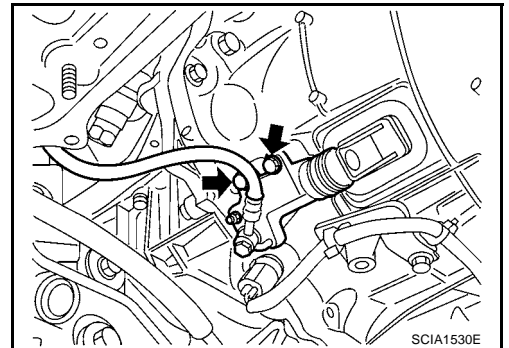
9. Remove hole cover mounting bolts and then separate hole cover from the floor panel.
10. separate control lever boot from the guide plate.



11. Remove guide plate mounting bolts and then separate shift lever assembly from the shift lever housing assembly.



12. Remove clutch operating cylinder mounting bolts and then separate clutch operating cylinder from the transmission case.



TRANSMISSION ASSEMBLY

13. Remove POS sensor.

CAUTION:

- Do not subject it to impact by dropping or hitting.
- Do not disassemble.
- Do not allow metal filings, etc., to get on the sensor's front edge magnetic area.
- Do not place in an area affected by magnetism.

14. Disconnect neutral switch and reverse switch.

15. Separate heated oxygen sensor 2 wire harness, POS sensor wire harness, back-up lamp switch wire harness, PNP switch wire harness from the transmission.

16. Remove starter motor. Refer to [SC-18, "Removal and Installation"](#) .

17. Set jack to the transmission.

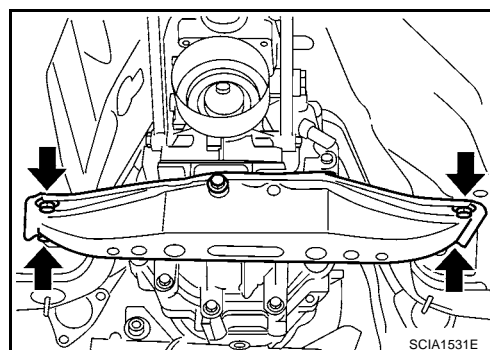
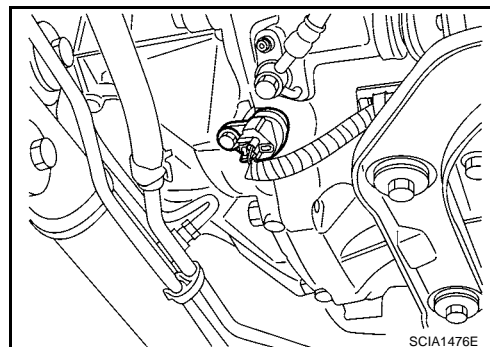
CAUTION:

When setting jack, be careful not to contact with the switch.

18. Remove rear member. Refer to [EM-89, "Removal and Installation"](#) .

19. Remove engine and transmission mounting bolts with power tool.

20. Remove transmission from the vehicle.

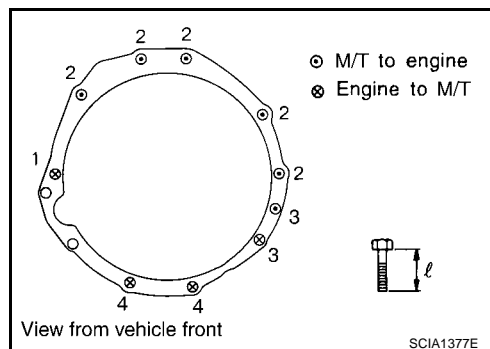


INSTALLATION

To install, reverse the removal procedure, following the cautions below:

- When installing transmission to the engine, install mounting bolts in accordance with the standards below.

Bolt No.	1	2	3	4
Quantity	1	5	2	2
"ℓ" mm (in)	55 (2.17)	65 (2.56)	56 (1.97)	35 (1.38)
Tightening torque N-m (kg-m, ft-lb)	70 - 80 (7.2 - 8.1, 52 - 59)		49 - 61 (5.0 - 6.2, 37 - 44)	42 - 52 (4.3 - 5.3, 31 - 38)



CAUTION:

- When installing, be careful to avoid interference between transmission main drive shaft and clutch cover.
- Do not impact or damage propeller shaft tube.
- Refer to [MT-11, "INSTALLATION"](#) [MT-13, "Inspection after installation"](#) for control lever installation information.
- After installation, check oil level, and oil leaks and loose mechanisms.

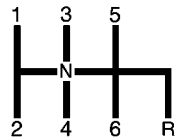
SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ACS0015T

Applied model		VQ35DE
Transmission		FS6R31A
Number of speed		6
Shift pattern		 SCIA0955E
Synchronmesh type		Warner
Gear ratio	1st	3.794
	2nd	2.324
	3rd	1.624
	4th	1.271
	5th	1.000
	6th	0.794
	Reverse	3.446
Mainshaft (Number of teeth)	Drive	26
	1st	37
	2nd	34
	3rd	33
	4th	31
	6th	31
	Reverse	42
Countershaft gear (Number of teeth)	Drive	32
	1st	12
	2nd	18
	3rd	25
	4th	30
	6th	48
	Reverse	15
Reverse idler gear (Number of teeth)		26
Oil capacity ℓ		Approx. 2.9 (3-1/4 US qt, 2-3/4 Imp qt)
Remarks	Reverse synchronizer	Installed
	Double cone synchronizer	1st; 2nd
	Sub-gear	Counter drive gear & reverse idler gear