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# SECTION **MT**

## MANUAL TRANSMISSION

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# PRECAUTIONS

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## PRECAUTIONS

PFP:00001

### Caution

ACS003SV

- 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.
- Check for the correct installation status prior to removal or disassembly. If mating marks are required, be certain they do not interfere with the function of the parts they are applied to.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, observe it.
- Be careful not to damage sliding surfaces and mating surfaces.

# PREPARATION

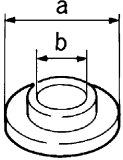
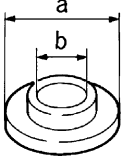
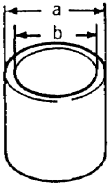
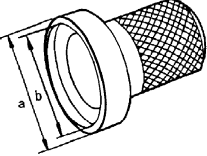
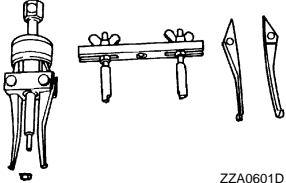
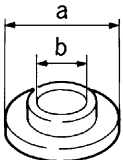
## PREPARATION

PFP:00002

### Special Service Tools

ACS003L6

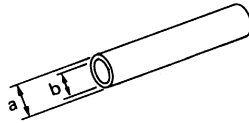
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST30911000 ( — ) a: 98 mm (3.86 in) dia. b: 40 mm (1.57 in) dia. Inserter	 <p style="text-align: center;">ZZA0920D</p> <ul style="list-style-type: none"> <li>● Main shaft bearing installation</li> <li>● 5th - 6th synchronizer assembly installation</li> <li>● Reverse main gear bushing installation</li> <li>● 3rd gear bushing installation</li> <li>● 3rd-4th synchronizer assembly installation</li> </ul>
ST30022000 ( — ) a: 110 mm (4.33 in) dia. b: 46 mm (1.81 in) dia. Inserter	 <p style="text-align: center;">ZZA0920D</p> <ul style="list-style-type: none"> <li>● 3rd main gear installation</li> <li>● 4th main gear installation</li> </ul>
ST27861000 ( — ) a: 62 mm (2.44 in) dia. b: 52 mm (2.05 in) dia. Support ring	 <p style="text-align: center;">ZZA0832D</p> <ul style="list-style-type: none"> <li>● 1st - 2nd synchronizer assembly installation</li> <li>● 1st gear bushing installation</li> </ul>
ST33400001 (J26082) a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia. Drift	 <p style="text-align: center;">ZZA0814D</p> <p>Rear oil seal installation</p>
KV381054S0 ( — ) Oil seal puller	 <p style="text-align: center;">ZZA0601D</p> <p>Remove rear oil seal</p>
ST30032000 (J26010-01) a: 80 mm (3.15 in) dia. b: 31 mm (1.22 in) dia. Inserter	 <p style="text-align: center;">ZZA0920D</p> <p>Counter rear bearing inner race installation</p>

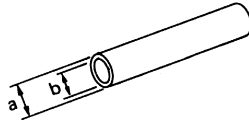
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# PREPARATION

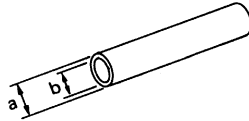
Tool number (Kent-Moore No.) Tool name	Description
KV32102700 ( — ) a: 48 mm (1.89 in) dia. b: 41 mm (1.61 in) dia. Drift	Main drive gear ball bearing installation
ST23860000 ( — ) a: 38 mm (1.50 in) dia. b: 33 mm (1.30 in) dia. Drift	Reverse counter gear installation
ST01530000 ( — ) a: 50 mm (1.97 in) dia. b: 41 mm (1.61 in) dia. Drift	Reverse synchronizer assembly installation
ST35291000 ( — ) a: 40 mm (1.57 in) dia. b: 29.5 mm (1.161 in) dia. c: 22.5 mm (0.886 in) dia. Drift	Control shaft oil seal installation
KV40100630 (J26092) a: 67 mm (2.64 in) dia. b: 38 mm (1.50 in) dia. Inserter	4th counter shaft rear thrust washer installation
KV38102100 (J25803-01) a: 44 mm (2.36 in) dia. b: 28 mm (1.10 in) dia. Drift	Front cover oil seal installation
KV32103300 (J46529) Press plate	Reverse main gear installation



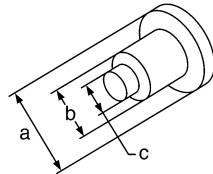
ZZA0534D



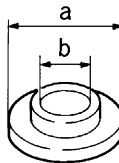
ZZA0534D



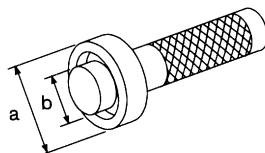
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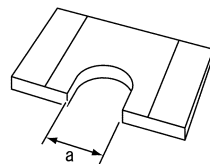
SCIA1575E



ZZA0920D



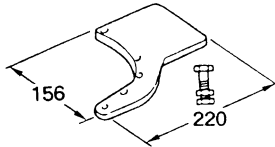
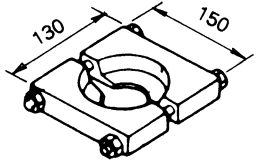
NT084



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# PREPARATION

Tool number (Kent-Moore No.) Tool name	Description
ST30031000 (J22912-01) Puller	Inner baulk ring support
ST224490000 ( — ) Adapter plate	Hold a adapter

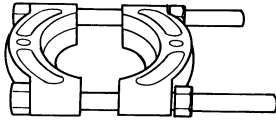

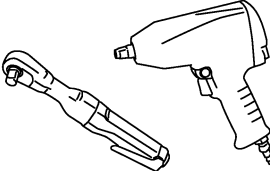
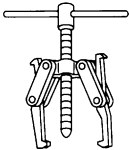


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# PREPARATION

## Commercial Service Tools

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Tool name	Description
<p>Puller</p>  <p>ZZB0823D</p>	<p>Each bearing gear and bushing removal</p>
<p>Pin punch Tip diameter: 6.0 mm (0.24 in) dia.</p>  <p>ZZA0815D</p>	<p>Each retaining pin removal and installation</p>
<p>Power tool</p>  <p>PBIC0190E</p>	<p>Loosening bolts and nuts</p>
<p>Puller</p>  <p>NT077</p>	<p>Reverse synchronizer assembly removal Reverse counter gear removal Reverse main gear removal</p>

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PF0:00003

### NVH Troubleshooting Chart

ACS003L8

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	<a href="#">MT-10</a>	<a href="#">MT-10</a>	<a href="#">MT-10</a>	<a href="#">MT-22</a>	<a href="#">MT-22</a>	<a href="#">MT-13</a>	<a href="#">MT-25</a>	<a href="#">MT-25</a>	<a href="#">MT-23</a>	<a href="#">MT-23</a>	<a href="#">MT-23</a>	<a href="#">MT-23</a>
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	2	2						
	Hard to shift or will not shift		1	1		2					2	2
	Jumps out of gear					1	1	2	2			

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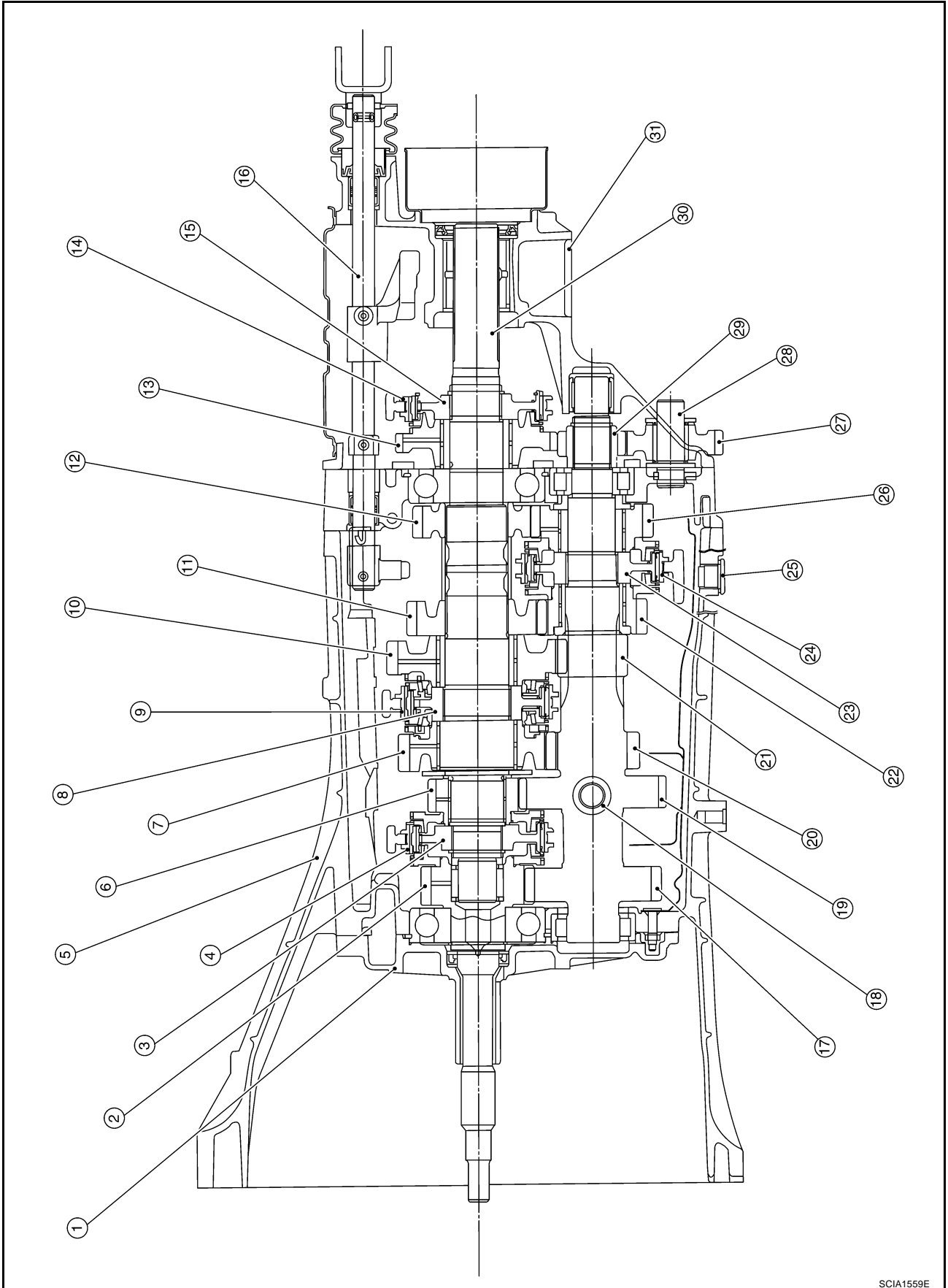
# DESCRIPTION

## DESCRIPTION

PFP:00000

### Cross-Sectional View

ACS003L9



SCIA1559E



# 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. Control rod              | 17. Counter shaft              | 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. Main shaft                |
| 31. Rear extension case      |                                |                               |

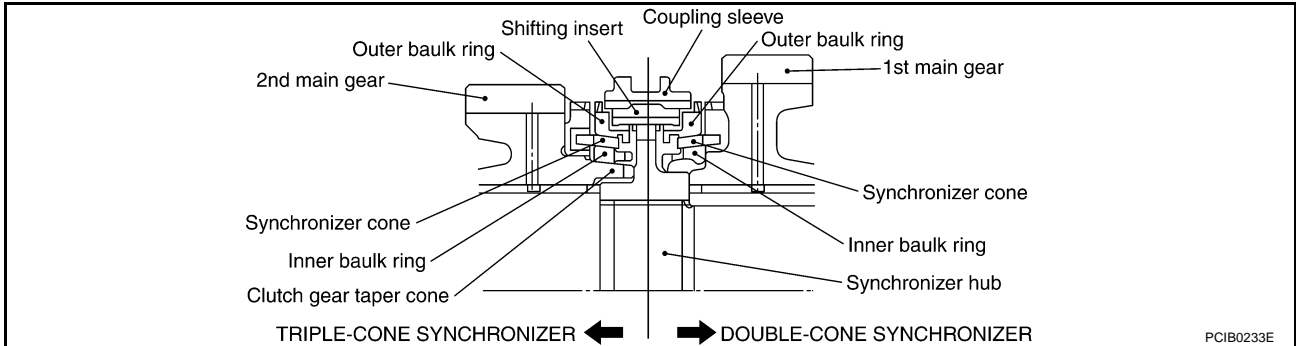
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## DOUBLE-CONE SYNCHRONIZER

The 1st and 3rd, 4th gears is equipped with a double-cone synchronizer to reduce the operating force of the shift lever as shown.

## TRIPLE-CONE SYNCHRONIZER


The 2nd gear is equipped with a triple-cone synchronizer to reduce the operating force of the shift lever as shown.



**M/T OIL****Replacement  
DRAINING**

1. Start the engine and warm up the transmission unit sufficiently.
2. After stopping engine, remove filler plug and drain plug and then drain fluid.
3. After replace a new gasket on drain plug, screw drain plug into transmission body and tighten to the specified torque.

**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 (3-1/8 US qt, 2-1/2 Imp qt)

2. After filling, check fluid level, replace a new gasket on filler plug, screw filler plug into transmission body, and tighten to the specified torque.

**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**

ACS003LB


- 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.**

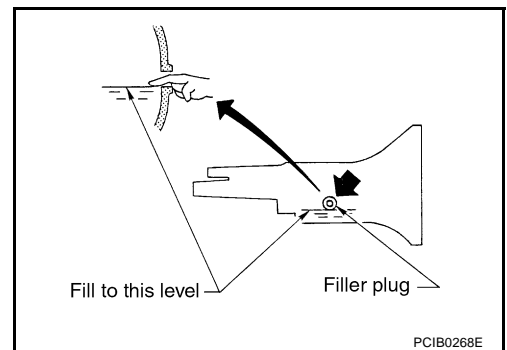
- When screwing in filler plug with a new gasket, first screw into the transmission by hand, then tighten to the specified torque.

**Filler plug:**

 : 30 - 39 N-m (3.1 - 3.9 kg-m, 23 - 28 ft-lb)

**CAUTION:**

**Gaskets are not reusable. Never reuse them.**



# REAR OIL SEAL

## REAR OIL SEAL

PFP:33140

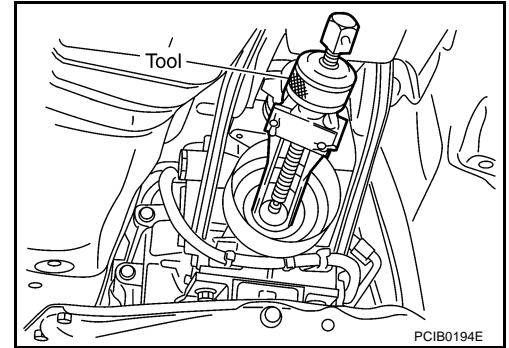
### Removal and Installation

ACS003LC

#### REMOVAL

1. Remove propeller shaft. Refer to [PR-5, "REMOVAL"](#) .
2. Using oil seal puller, remove oil seal.

**Tool number** : KV381054S0 ( — )



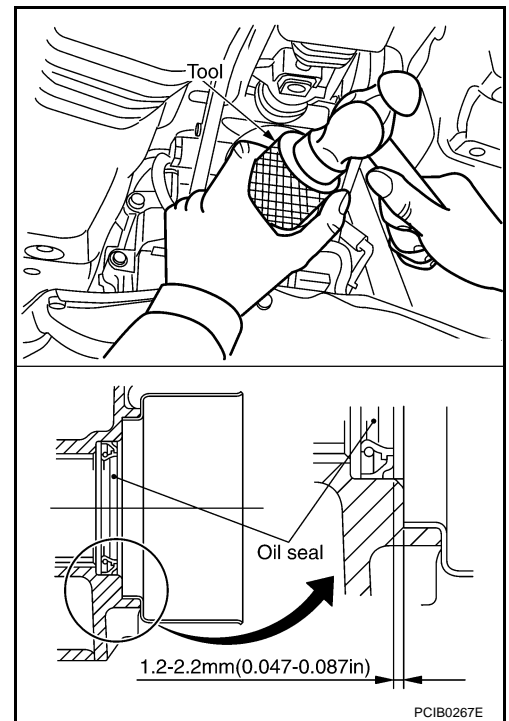
#### INSTALLATION

1. Apply multi-purpose grease to oil seal lip. Using a drift, drive in oil seal until the edge is approximately 1.2 - 2.2 mm (0.047 - 0.087 in) above the boss edge.

**Tool number** : ST33400001 (J26082)

#### CAUTION:

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



2. Install propeller shaft. Refer to [PR-4, "Removal and Installation"](#) .

#### CAUTION:

- If lubricant leak has occurred, after finishing work, check oil level. Refer to [MT-10, "Checking"](#) .

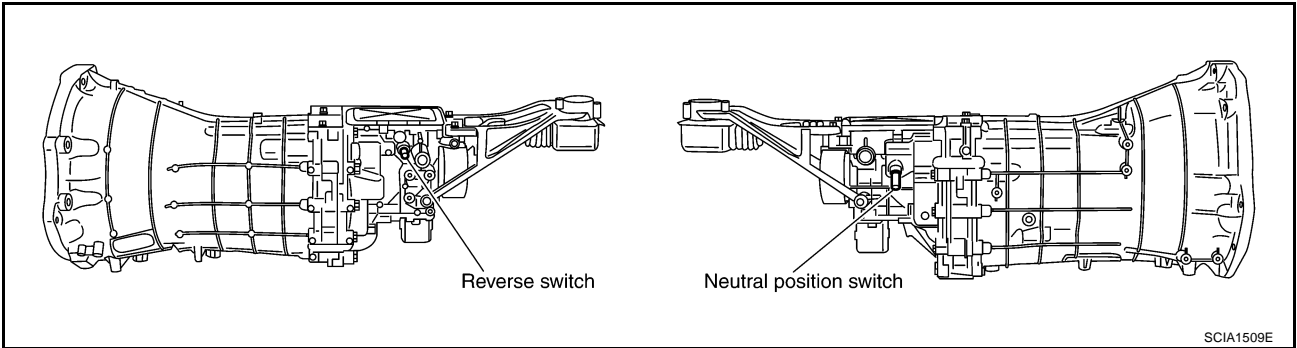
# POSITION SWITCH

PFP:32005

ACS003LD

## POSITION SWITCH

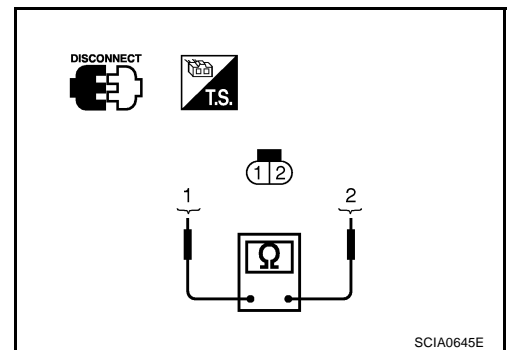
### Checking COMPONENT LOCATION



### REVERSE SWITCH

- Check continuity.

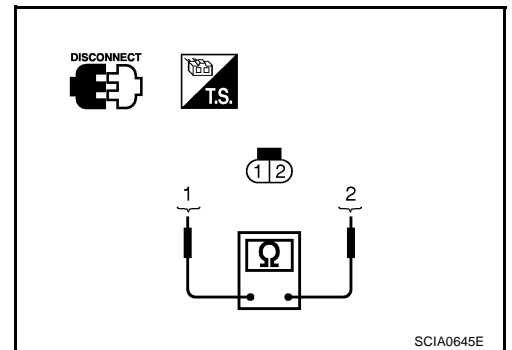
Gear position	Continuity
Reverse	Yes
Except reverse	No



### NEUTRAL POSITION SWITCH

- Check continuity.

Gear position	Continuity
Neutral	Yes
Except neutral	No



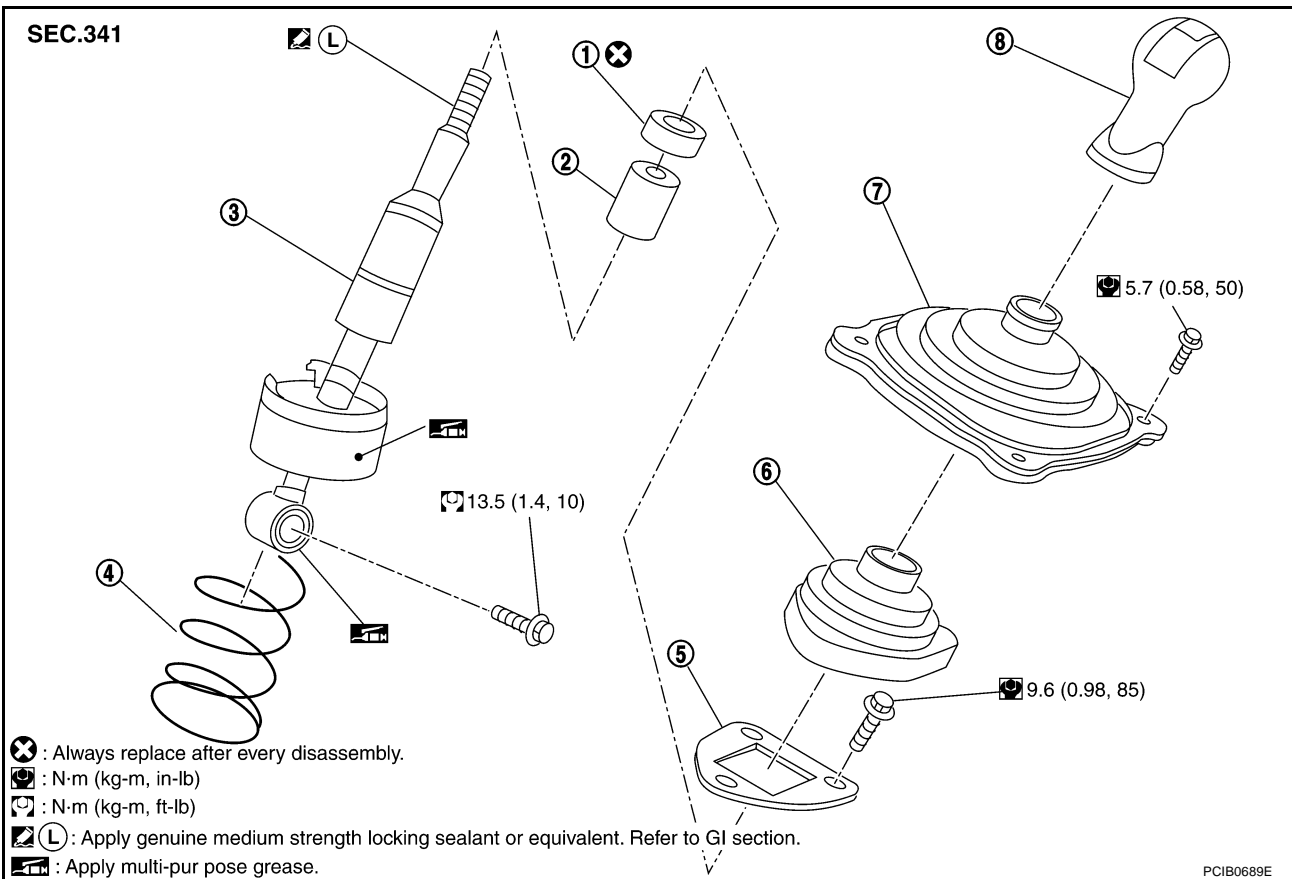
# SHIFT CONTROL

## SHIFT CONTROL

PPF:34103

### Removal and Installation of Control Lever Assembly

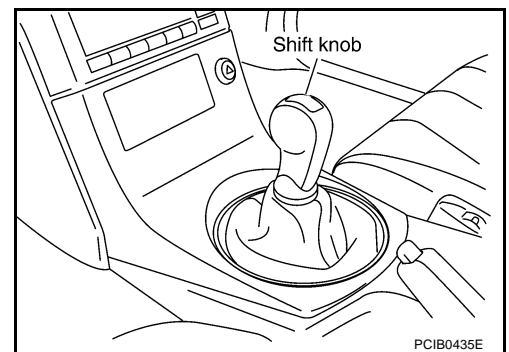
ACS003LE



- |                |                  |                         |
|----------------|------------------|-------------------------|
| 1. Shift knob  | 2. Hole cover    | 3. Control lever boot   |
| 4. Guide plate | 5. Control lever | 6. Control lever spring |
| 7. Insulator   | 8. Seat          |                         |

### REMOVAL

1. Remove the shift knob with the following procedure.
  - a. Disconnect console boot from center console. Refer to [IP-10](#), "[Component Parts Drawing](#)".

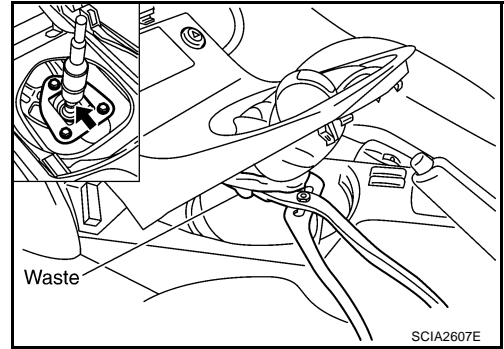


## SHIFT CONTROL

- b. Lift console boot, and push down hole cover. Set water pump plier and others to control lever assembly.

**CAUTION:**

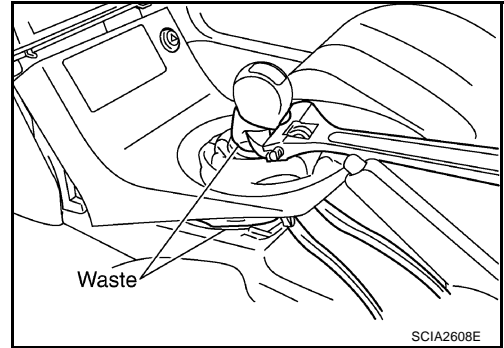
Put waste cloth between water pump plier and control lever assembly to avoid damaging control lever assembly.



- c. Set monkey wrench to shift knob.

**CAUTION:**

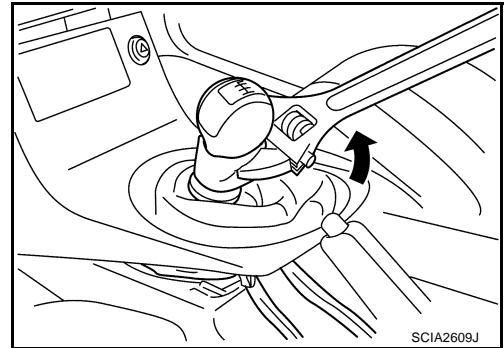
Put waste cloth between shift knob and suitable plier to avoid damaging shift knob.



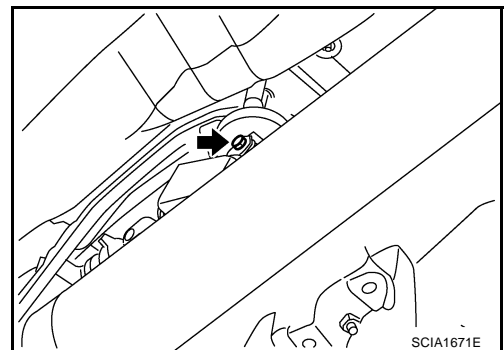
- d. Turn monkey wrench with water pump plier and others fixed. Loosen shift knob, and remove shift knob from control lever assembly.

**NOTE:**

Remove shift knob from control assembly with water pump plier and others fixed. Because a certain power to turn shift knob is necessary even after adhesive is peeled.

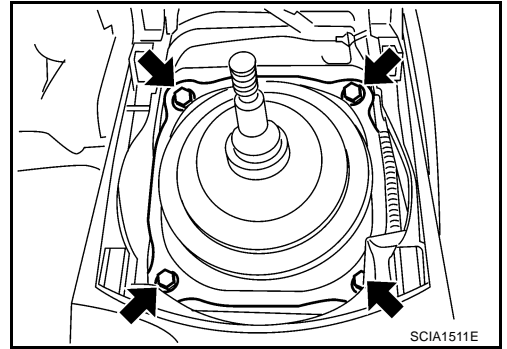


2. Loosen the shift knob to remove the control lever.  
3. Remove console boot. Refer to [IP-11, "Removal and Installation"](#).  
4. Push back the boot, remove control lever assembly mounting bolt, and separate control lever and control rod assembly.

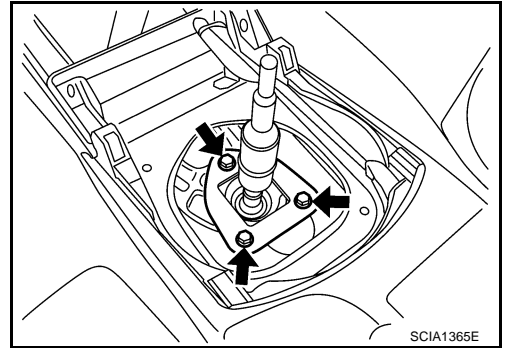


# SHIFT CONTROL

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



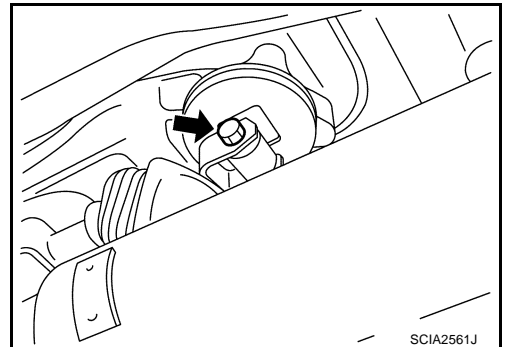
7. Remove guide plate mounting bolts, and then remove control lever assembly and control lever spring.



## INSTALLATION

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

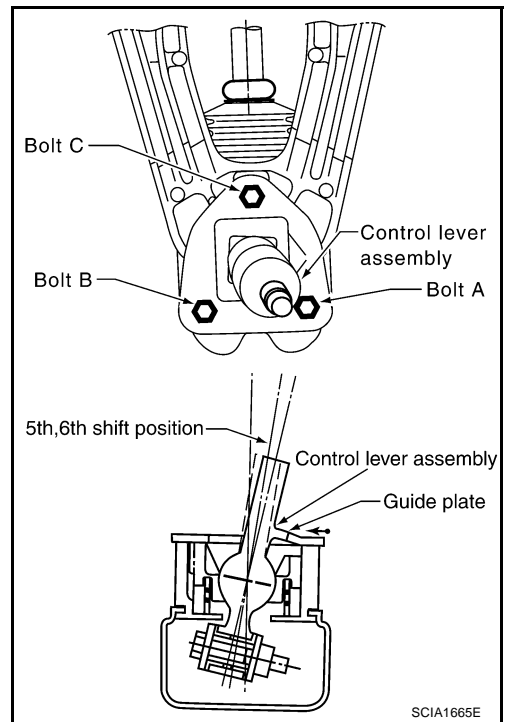
 : 13 - 14 N·m (1.3 - 1.5 kg·m, 9.4 - 10.8 ft·lb)




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# 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.

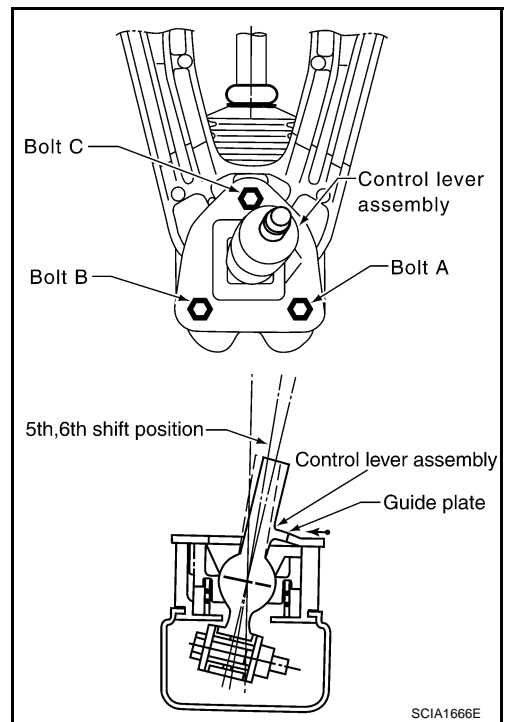
 : 8.4 - 10 N·m (0.86 - 1.0 kg-m, 75 - 88 in-lb)

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 boot. Refer to [IP-11, "Removal and Installation"](#).

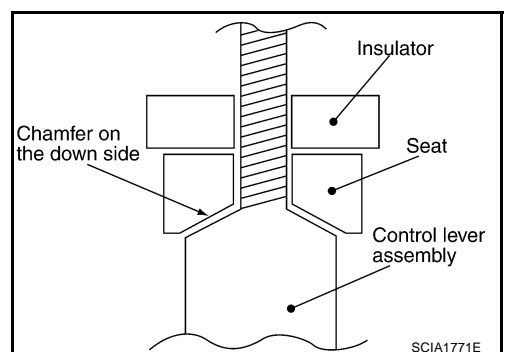


11. As shown in the figure, assemble seat and insulator to control lever assembly.

**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.





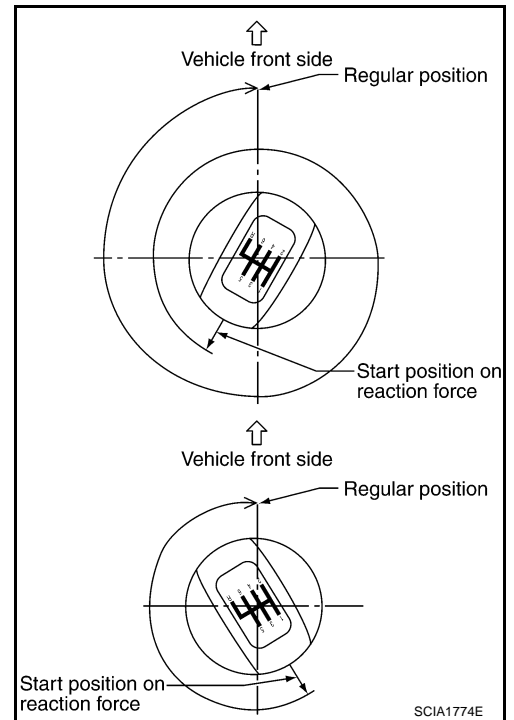
# SHIFT CONTROL

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 loosing.
- After adjusting to regular position, until 30 minute 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

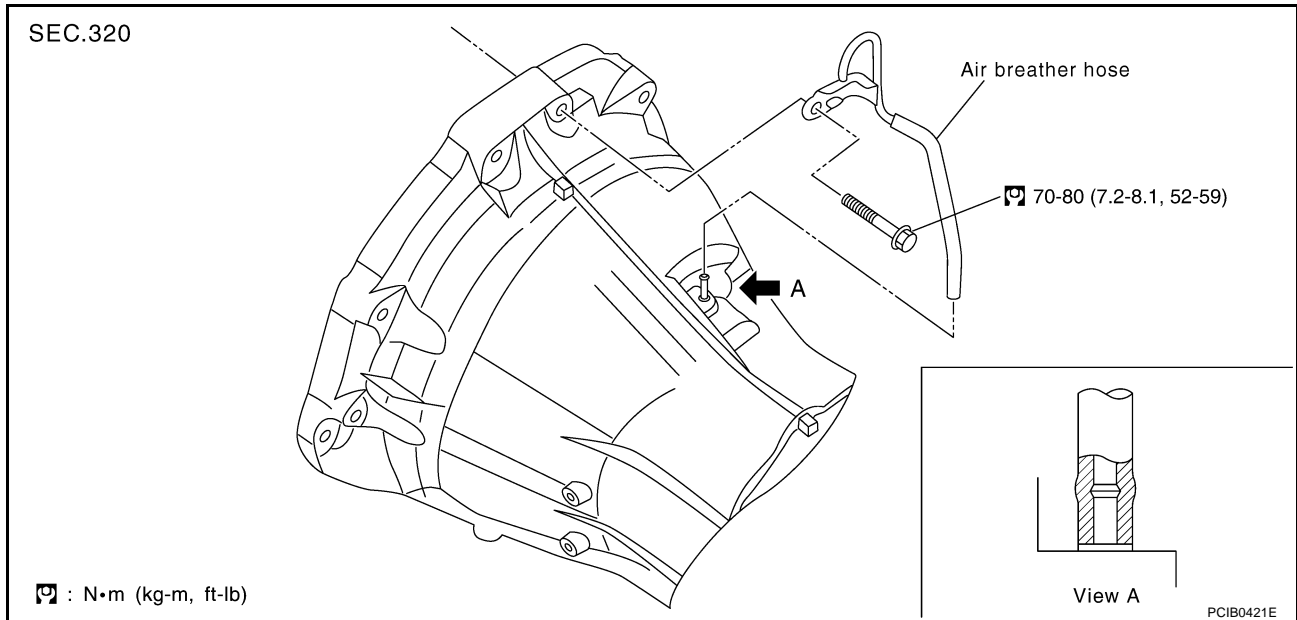
## AIR BREATHER HOSE

PFP:31098

### Removal and Installation

ACS003LF

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.
- Insert overlap width of air breather hose as far as it will go.

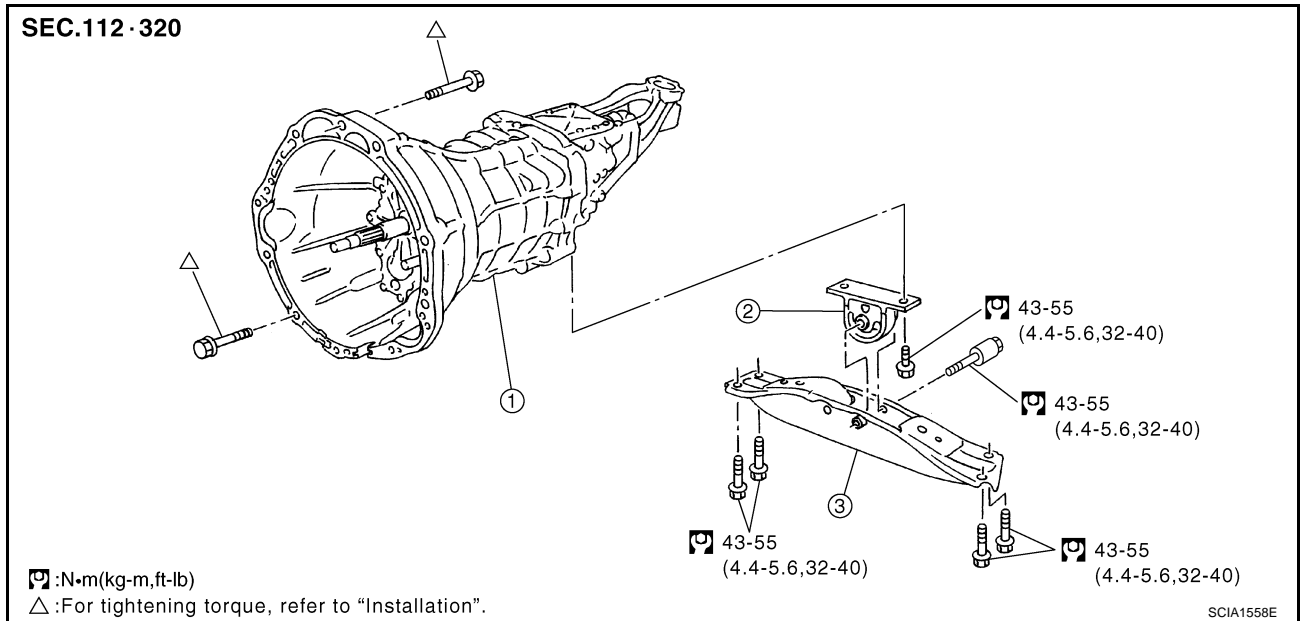
# TRANSMISSION ASSEMBLY

## TRANSMISSION ASSEMBLY

PF3:32010

### Removal and Installation from Vehicle

ACS003LG



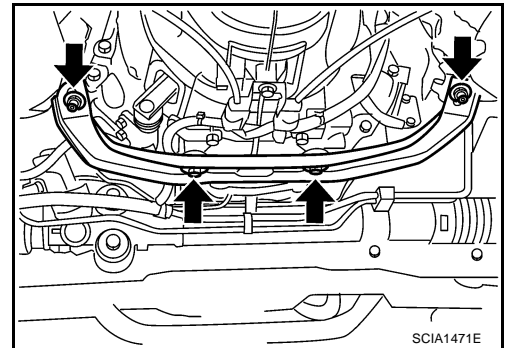
1. Transmission case

2. Insulator

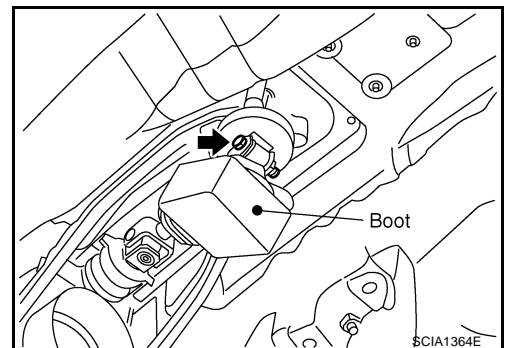
3. Rear engine mounting member

### REMOVAL

1. Disconnect battery negative cable.
2. Remove catalytic converter stay mounting nuts and bolts, and then remove catalytic converter bracket. Refer to [EX-3, "Removal and Installation"](#) .

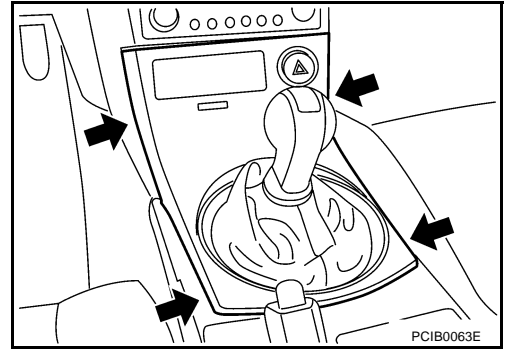


3. Remove nut connecting catalytic converter to exhaust manifold, and then remove catalytic converter and exhaust front tube as one unit.
4. Remove propeller shaft. Refer to [PR-4, "Removal and Installation"](#) .
5. Remove control rod mounting bolts and then separate shift lever assembly from the control rod assembly.

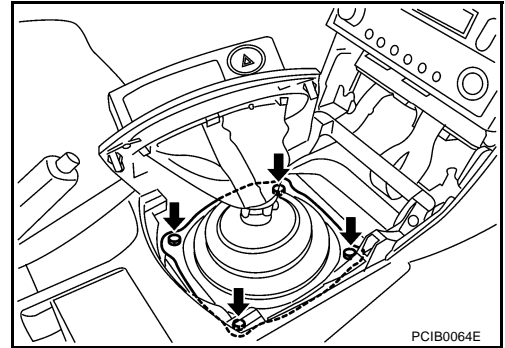


# TRANSMISSION ASSEMBLY

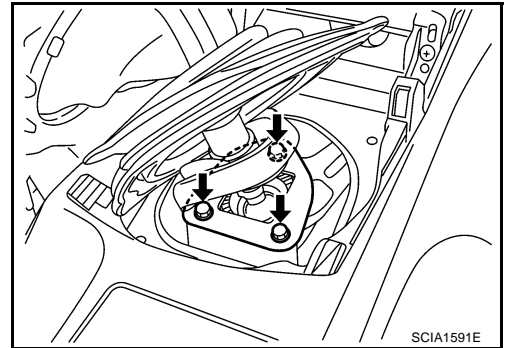
6. Using a screwdriver wrapped in tape to remove claw and then separate console boot from the center console. Refer to [IP-11, "Removal and Installation"](#).



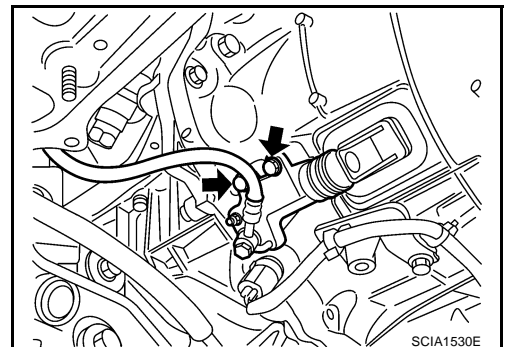
7. Remove hole cover mounting bolts and then separate hole cover from the floor panel.  
8. Separate control lever boot from the guide plate.



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



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

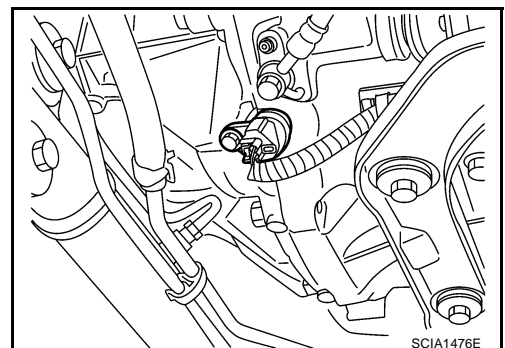


11. Remove crankshaft position sensor (POS).

**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.

12. Disconnect neutral switch and reverse switch.



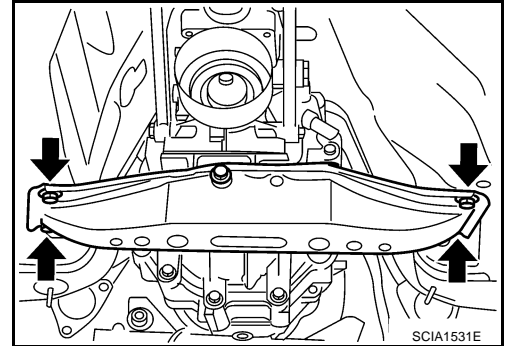
# TRANSMISSION ASSEMBLY

13. Separate heated oxygen sensor 2 wire harness, crankshaft position sensor (POS). Wire harness, back-up lamp switch wire harness, PNP switch wire harness from the transmission.
14. Remove starter motor. Refer to [SC-19, "Removal and Installation"](#) .
15. Set transmission jack to the transmission.

**CAUTION:**

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

16. Remove rear engine mounting member. Refer to [EM-98, "Removal and Installation"](#) .
17. Remove engine and transmission mounting bolts with power tool.
18. Remove transmission from the vehicle.

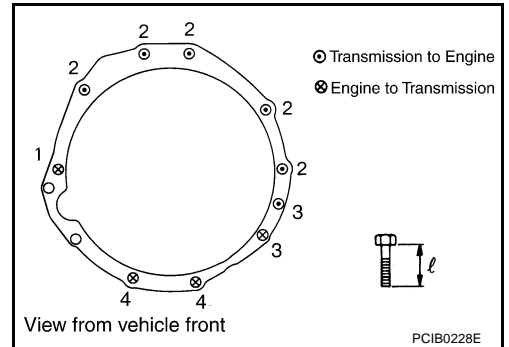


## INSTALLATION

Install in the reverse order of 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 (7.1 - 8.1, 52 - 59)		49 - 61 (5.0 - 6.2, 37 - 44)	42 - 52 (4.3 - 5.3, 31 - 38)



**CAUTION:**

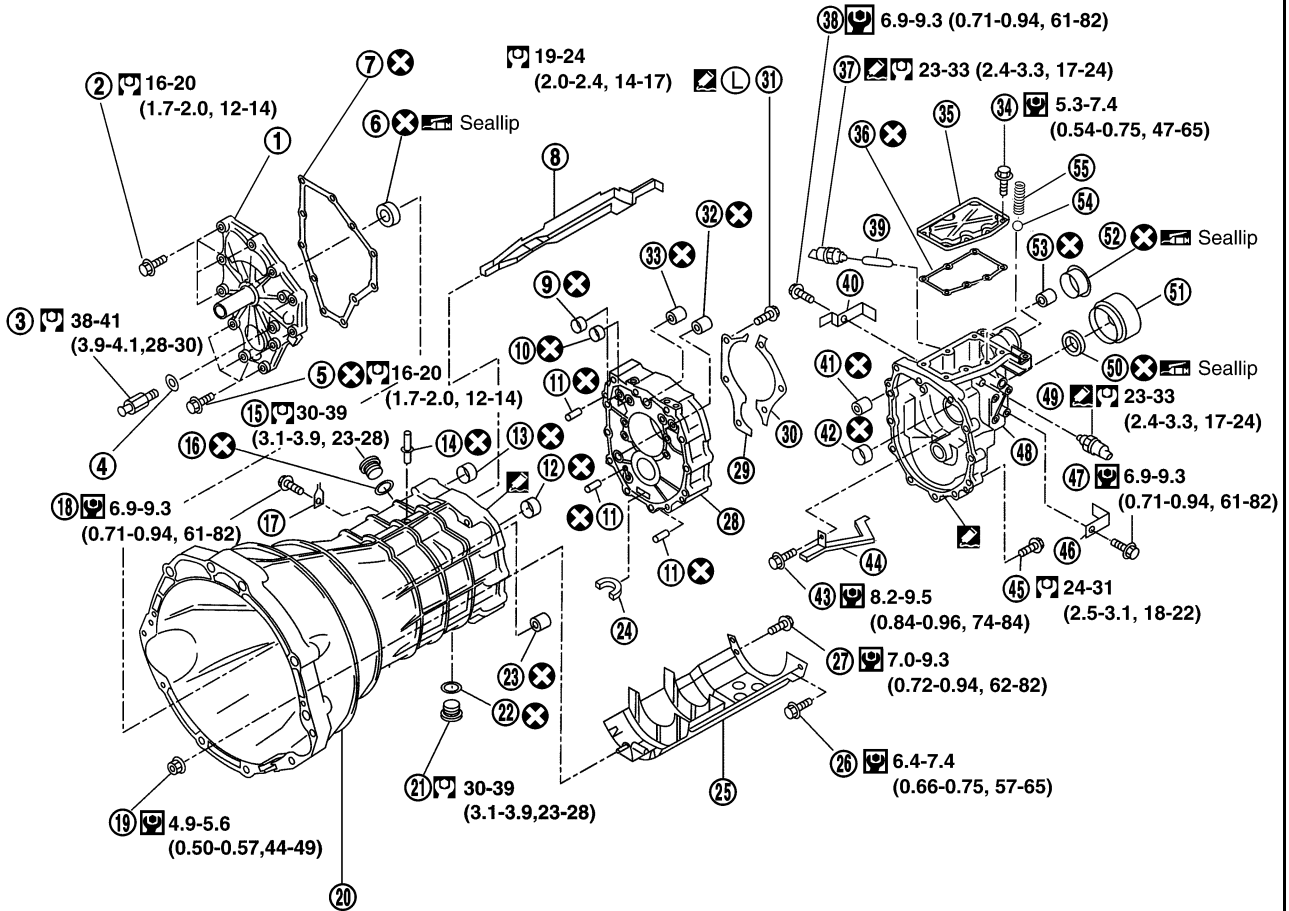
- When installing, be careful to avoid interference between transmission main drive shaft and clutch cover.
- Refer to [MT-15, "INSTALLATION"](#) and [MT-17, "INSPECTION AFTER INSTALLATION"](#) for control lever installation information.
- After installation, check oil level, and oil leaks and loose mechanisms.

# TRANSMISSION ASSEMBLY

AC5003LH

## Component Parts Drawing CASE COMPONENTS

SEC.321



- : N•m (kg-m, in-lb)
- : N•m (kg-m, ft-lb)
- : Apply Genuine Silicone RTV, or equivalent. Refer to GI section.
- : Apply Genuine Medium Strength Locking Sealant or equivalent. Refer to GI section.
- : Apply multi-purpose grease.
- : Always replace after every disassembly.

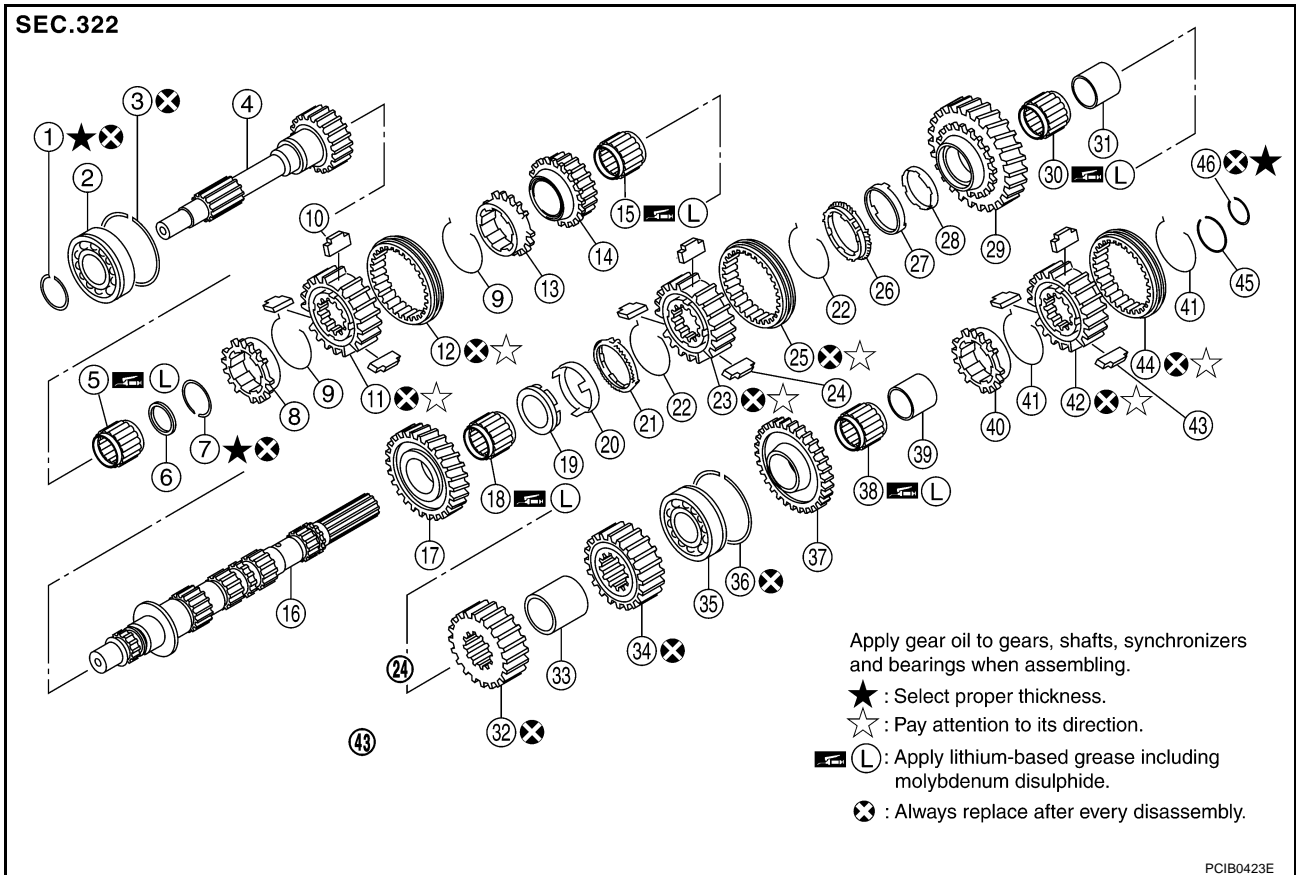
PCIB0920E

- |                       |                                 |                                 |
|-----------------------|---------------------------------|---------------------------------|
| 1. Front cover        | 2. Bolt                         | 3. Withdrawal lever ball pin    |
| 4. Washer             | 5. Bolt                         | 6. Front cover oil seal         |
| 7. Front cover gasket | 8. Oil gutter                   | 9. Bushing                      |
| 10. Bushing           | 11. Dowel pin                   | 12. Bushing                     |
| 13. Bushing           | 14. Breather                    | 15. Filler plug                 |
| 16. Gasket            | 17. Bracket                     | 18. Bolt                        |
| 19. Nut               | 20. Transmission case           | 21. Drain plug                  |
| 22. Gasket            | 23. Sliding ball bearing        | 24. Magnet                      |
| 25. Baffle plate      | 26. Bolt                        | 27. Bolt                        |
| 28. Adapter plate     | 29. Main shaft bearing retainer | 30. Main shaft bearing retainer |
| 31. Bolt              | 32. Sliding ball bearing        | 33. Sliding ball bearing        |

# TRANSMISSION ASSEMBLY

- |                            |                                |                                       |
|----------------------------|--------------------------------|---------------------------------------|
| 34. Bolt                   | 35. Rear extension upper cover | 36. Rear extension upper cover gasket |
| 37. Neutral switch         | 38. Bolt                       | 39. Plunger                           |
| 40. Bracket                | 41. Sliding ball bearing       | 42. Bushing                           |
| 43. Bolt                   | 44. Rear extension oil gutter  | 45. Bolt                              |
| 46. Bracket                | 47. Bolt                       | 48. Rear extension                    |
| 49. Reverse switch         | 50. Rear oil seal              | 51. Rear extension dust cover         |
| 52. Control shaft oil seal | 53. Sliding ball bearing       | 54. Check ball                        |
| 55. Check select spring    |                                |                                       |

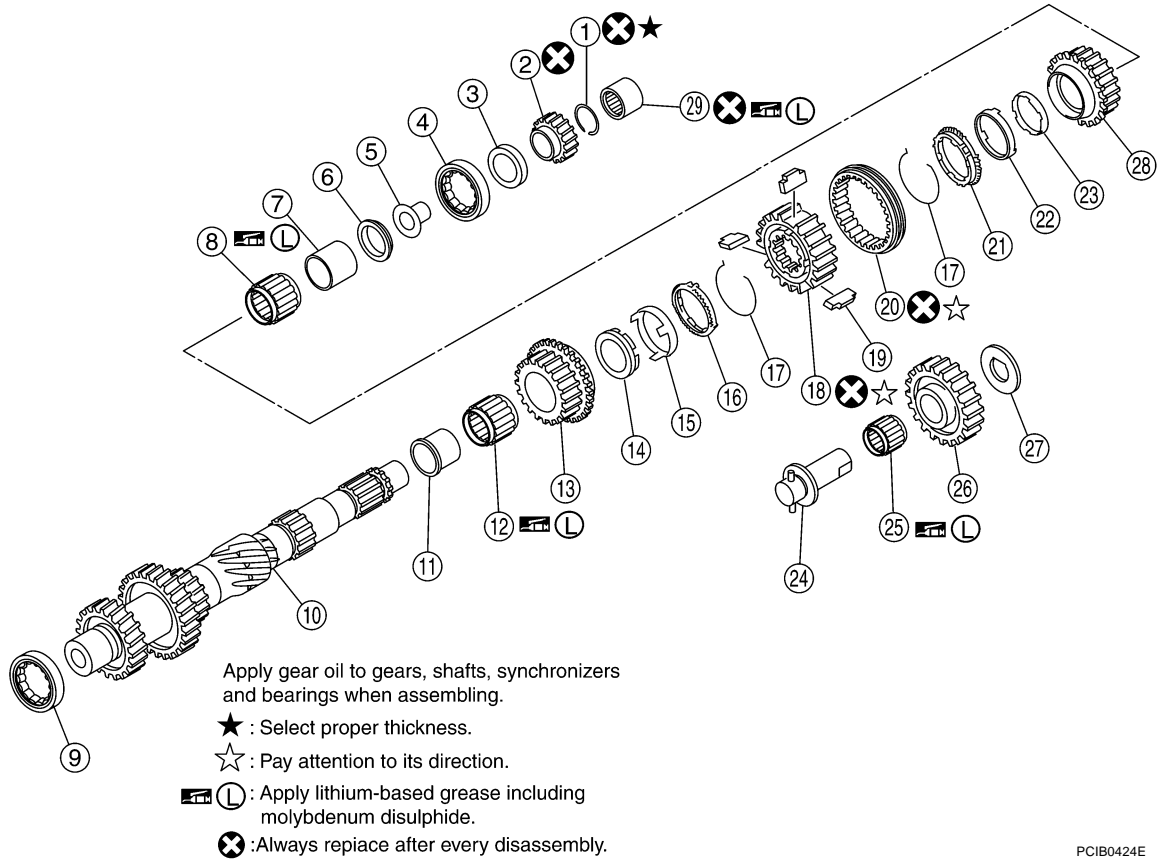
## GEAR COMPONENTS



- |                               |                                 |                               |
|-------------------------------|---------------------------------|-------------------------------|
| 1. Snap ring                  | 2. Main drive gear bearing      | 3. Snap ring                  |
| 4. Main drive gear            | 5. Main pilot bearing           | 6. Pilot bearing spacer       |
| 7. Snap ring                  | 8. 5th baulk ring               | 9. 5th - 6th spread spring    |
| 10. 5th - 6th shifting insert | 11. 5th - 6th synchronizer hub  | 12. 5th - 6th coupling sleeve |
| 13. 6th baulk ring            | 14. 6th main gear               | 15. 6th needle bearing        |
| 16. Main shaft                | 17. 2nd main gear               | 18. 2nd needle bearing        |
| 19. 2nd inner baulk ring      | 20. 2nd synchronizer cone       | 21. 2nd outer baulk ring      |
| 22. 1st - 2nd spread spring   | 23. 1st - 2nd synchronizer hub  | 24. 1st - 2nd shifting insert |
| 25. 1st - 2nd coupling sleeve | 26. 1st outer baulk ring        | 27. 1st synchronizer cone     |
| 28. 1st inner baulk ring      | 29. 1st main gear               | 30. 1st needle bearing        |
| 31. 1st gear bushing          | 32. 3rd main gear               | 33. 3rd - 4th main spacer     |
| 34. 4th main gear             | 35. Main shaft bearing          | 36. Snap ring                 |
| 37. Reverse main gear         | 38. Reverse main needle bearing | 39. Reverse main gear bushing |
| 40. Reverse baulk ring        | 41. Reverse spread spring       | 42. Reverse synchronizer hub  |
| 43. Reverse shifting insert   | 44. Reverse coupling sleeve     | 45. Snap ring                 |
| 46. Snap ring                 |                                 |                               |

# TRANSMISSION ASSEMBLY

SEC.322



PCIB0424E

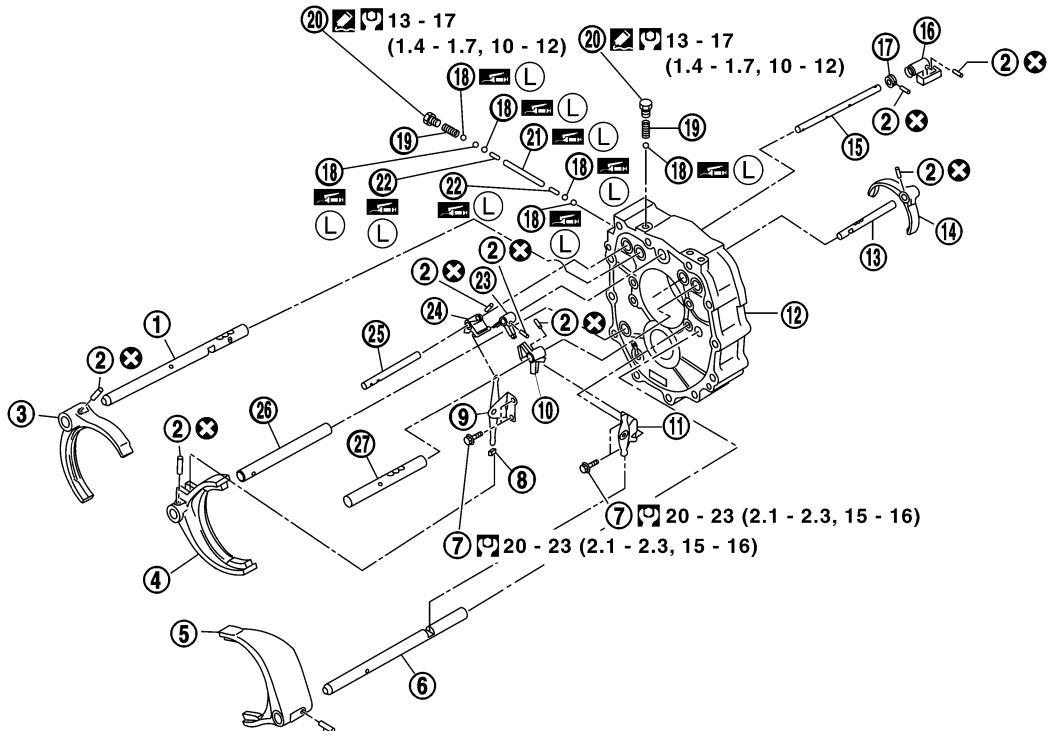
- |                                    |                                    |                                     |
|------------------------------------|------------------------------------|-------------------------------------|
| 1. Snap ring                       | 2. Reverse counter gear            | 3. Counter rear bearing spacer      |
| 4. Counter rear bearing outer race | 5. Counter rear bearing inner race | 6. Counter shaft rear thrust washer |
| 7. 4th gear bushing                | 8. 4th needle bearing              | 9. Counter front bearing            |
| 10. Counter shaft                  | 11. 3rd gear bushing               | 12. 3rd needle bearing              |
| 13. 3rd counter gear               | 14. 3rd inner baulk ring           | 15. 3rd synchronizer cone           |
| 16. 3rd outer baulk ring           | 17. 3rd - 4th spread spring        | 18. 3rd - 4th synchronizer hub      |
| 19. 3rd - 4th shifting insert      | 20. 3rd - 4th coupling sleeve      | 21. 4th outer baulk ring            |
| 22. 4th synchronizer cone          | 23. 4th inner baulk ring           | 24. Reverse idler shaft             |
| 25. Reverse idler bearing          | 26. Reverse idler gear             | 27. Reverse idler thrust washer     |
| 28. 4th counter gear               | 29. Counter end bearing            |                                     |



# TRANSMISSION ASSEMBLY

## SHIFT CONTROL COMPONENTS

SEC.322



:N·m (kg-m, ft-lb)

: Apply Genuine Silicone RTV, or equivalent. Refer to GI section.

(L) : Apply lithium-based grease including molybdenum disulphide.

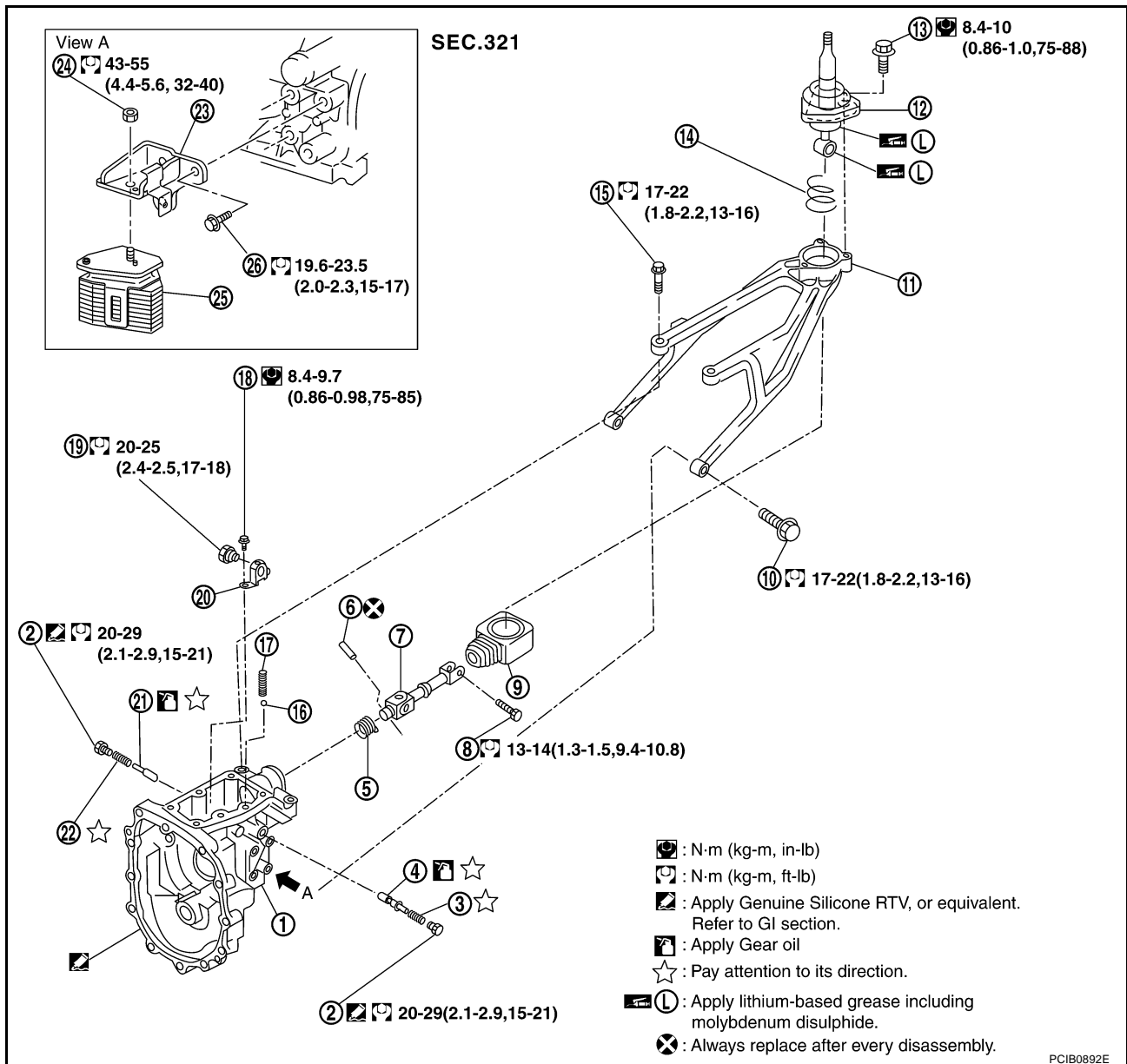
: Always replace after every disassembly.

PCIB0891E

- |                                |  |                                       |
|--------------------------------|--|---------------------------------------|
| 1. 1st - 2nd fork rod          | 2. Retaining pin                       | 3. 1st - 2nd shift fork               |
| 4. 3rd - 4th shift fork        | 5. 5th - 6th shift fork                | 6. 5th - 6th fork rod (reversal side) |
| 7. Bolt                        | 8. Shifter cap                         | 9. 3rd - 4th control lever            |
| 10. 5th - 6th fork rod bracket | 11. 5th - 6th control lever            | 12. Adapter plate                     |
| 13. Reverse fork rod           | 14. Reverse shift fork                 | 15. Striking rod                      |
| 16. Low/high control lever     | 17. Stopper ring                       | 18. Check ball                        |
| 19. Check ball spring          | 20. Check ball plug                    | 21. Interlock plunger                 |
| 22. Interlock pin              | 23. Striking lever                     | 24. 3rd - 4th fork rod bracket        |
| 25. 3rd - 4th fork rod         | 26. 3rd - 4th fork rod (reversal side) | 27. 5th - 6th fork rod                |

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# TRANSMISSION ASSEMBLY



- |                          |                            |                           |
|--------------------------|----------------------------|---------------------------|
| 1. Rear extension        | 2. Return spring plug      | 3. Return spring          |
| 4. Return spring plunger | 5. Boot                    | 6. Retaining pin          |
| 7. Control rod           | 8. Bolt                    | 9. Boot                   |
| 10. Bolt                 | 11. Control lever housing  | 12. Control lever         |
| 13. Bolt                 | 14. Control lever spring   | 15. Bolt                  |
| 16. Check ball           | 17. Check select spring    | 18. Bolt                  |
| 19. Check shift pin      | 20. Control bracket        | 21. Return spring plunger |
| 22. Return spring        | 23. Dynamic damper bracket | 24. Nut                   |
| 25. Dynamic damper       | 26. Bolt                   |                           |

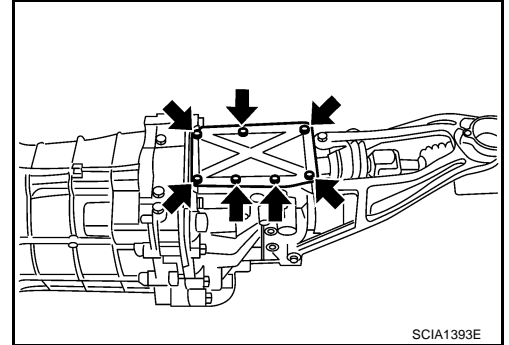
# TRANSMISSION ASSEMBLY

## Disassembly and Assembly DISASSEMBLY

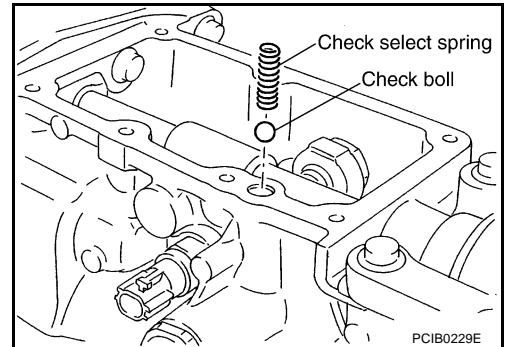
ACS003LI

### Case Components

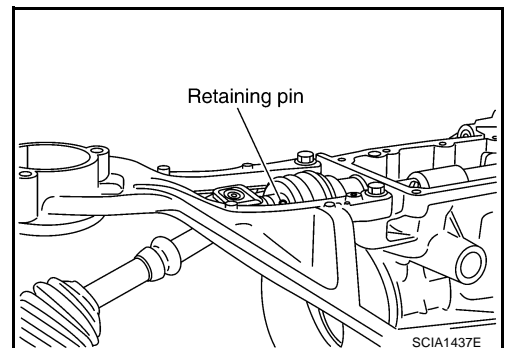
1. Remove rear extension upper cover mounting bolts.
2. Remove rear extension upper cover and rear extension upper cover gasket.



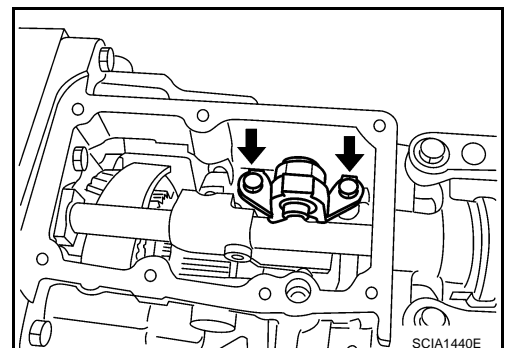
3. Remove check select spring and check ball from the rear extension.



4. Using a pin punch [6 mm (0.24 in) dia.] to knock out retaining pin and then remove control rod.
5. Remove neutral switch, plunger and reverse switch from the rear extension.



6. Remove control bracket mounting bolts. Then remove check shift pin and control bracket as one unit.



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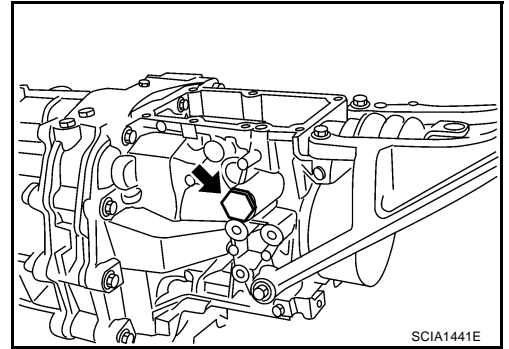
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# TRANSMISSION ASSEMBLY

7. Remove right and left return spring plug. Then remove return spring and return spring plunger from the rear extension.

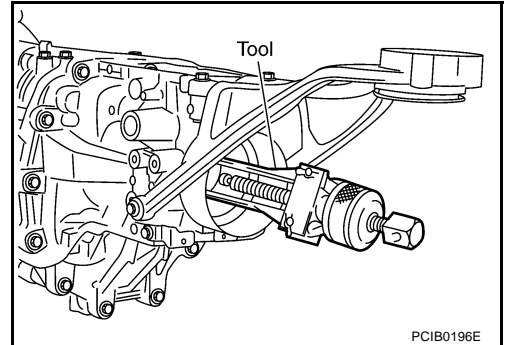
**CAUTION:**

Return spring and return spring plunger have different lengths for right and left sides. Identify right and left side and then store.

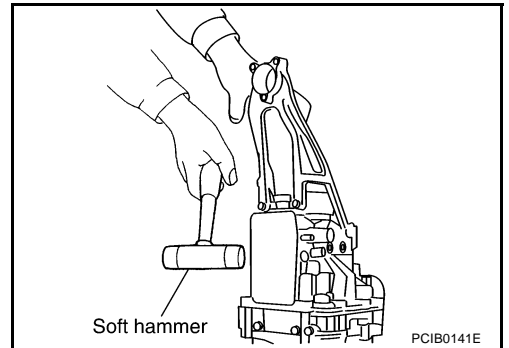


8. Using oil seal puller, remove rear oil seal.

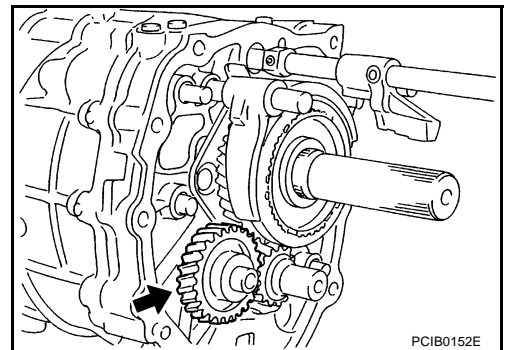
Tool number : KV381054S0 ( — )



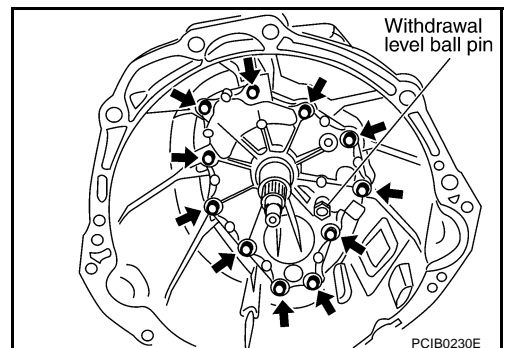
9. Remove rear extension case mounting bolt. Using a soft hammer, tap rear extension assembly to remove.
10. Remove control lever housing mounting bolts, and remove control lever housing.
11. Remove control shaft oil seal. Refer to [MT-22, "CASE COMPONENTS"](#) .
12. Remove oil gutter. Refer to [MT-22, "CASE COMPONENTS"](#) .



13. Remove reverse idler thrust washer, reverse idler gear, reverse idler needle bearing from the reverse idler shaft.
14. Remove reverse idler shaft.



15. Remove withdrawal lever ball pin and washer from the front cover.
16. Remove front cover mounting bolt, then remove front cover and front cover gasket.

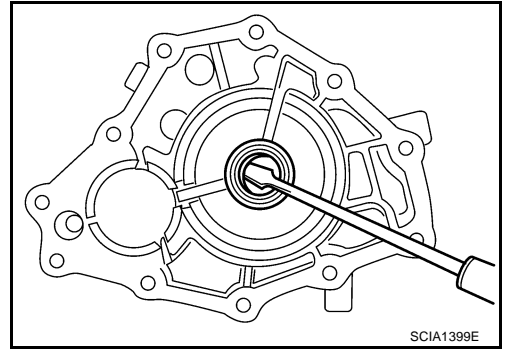


# TRANSMISSION ASSEMBLY

17. Remove front cover oil seal, using a flat-bladed screwdriver.

**CAUTION:**

**Be careful not to damage front cover mating surface.**

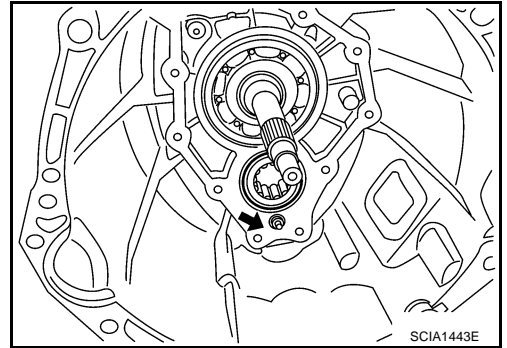


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18. Remove baffle plate nut.



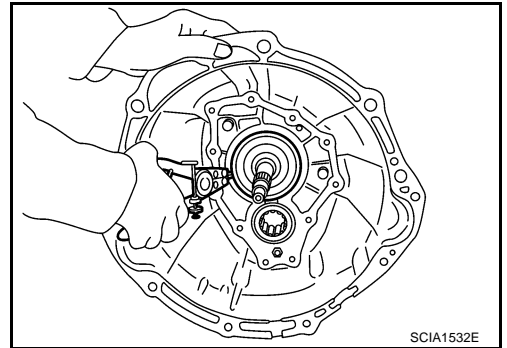
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19. Using snap ring pliers, remove snap ring from the main drive gear bearing.



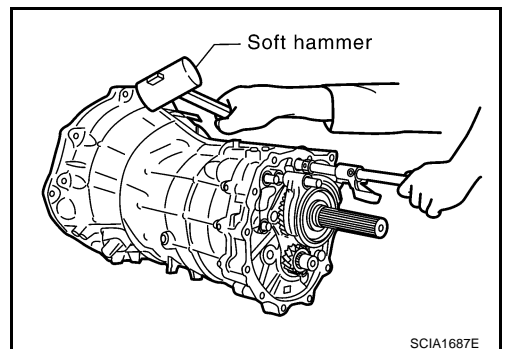
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20. Using a soft hammer to carefully tap main shaft and counter shaft from the transmission case side, and then separate adapter plate and transmission case.

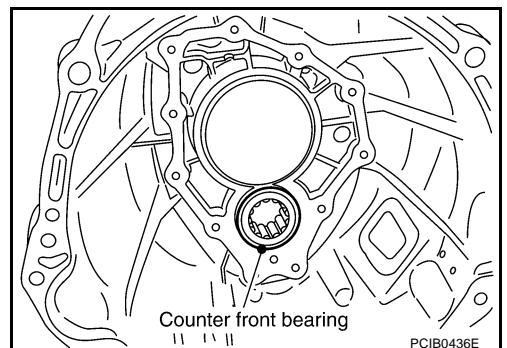


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21. Remove counter front bearing from the transmission case.

22. Remove oil gutter from the transmission case.



# TRANSMISSION ASSEMBLY

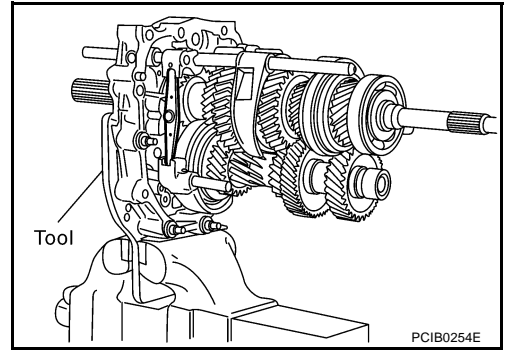
## Shift Control Components

1. Using a vise, secure the adapter plate.

**Tool number** : ST224490000 ( — )

**CAUTION:**

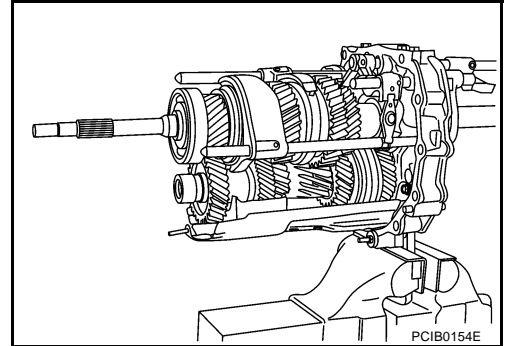
Do not directly secure the surface in a vise.



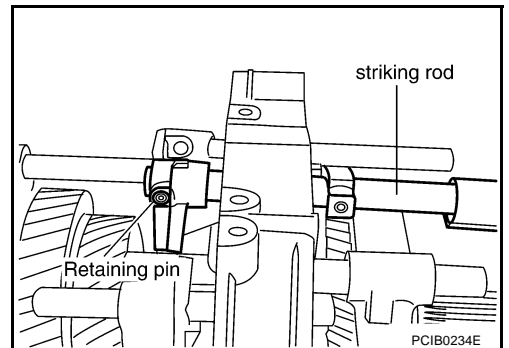
2. Remove baffle plate mounting bolts, and remove baffle plate.

**NOTE:**

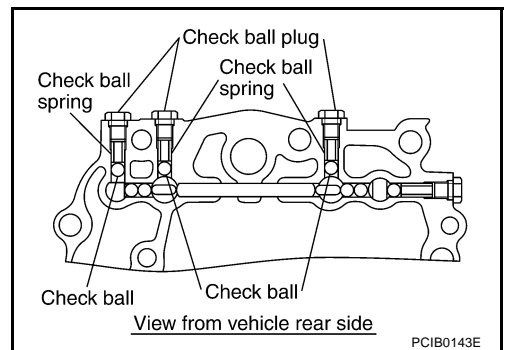
A mounting bolt is installed both from the front side and the reverse side of adapter plate.



3. Knock out retaining pin, using a pin punch [6 mm (0.24 in) dia.]. Then remove striking rod and striking lever.

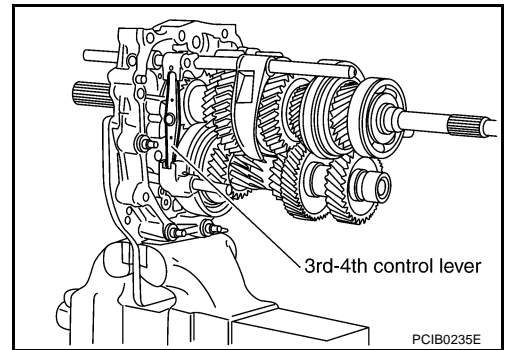


4. Remove check ball plug then remove check ball spring and check ball, from the adapter plate.



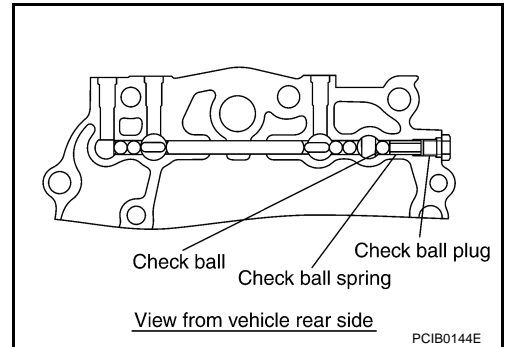
# TRANSMISSION ASSEMBLY

5. Remove 3rd - 4th control lever mounting bolts then remove 3rd - 4th control lever.



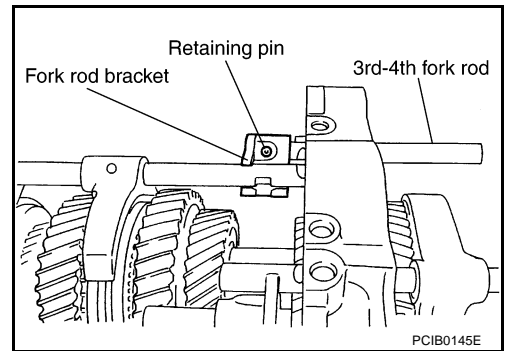
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6. Remove check ball plug and then remove check ball spring and check ball, from the adapter plate.



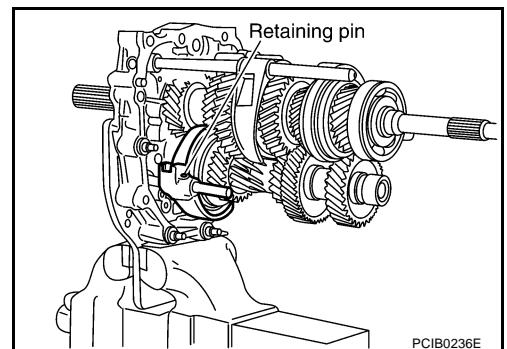
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7. Using a pin punch [6 mm (0.24 in) dia.] to knock out retaining pin of 3rd - 4th fork rod bracket and then remove 3rd - 4th fork rod from the adapter plate.



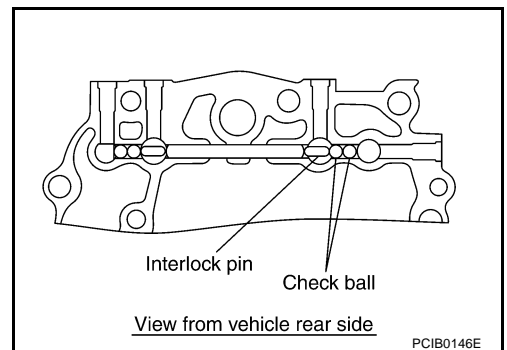
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8. Using a pin punch [6 mm (0.24 in) dia.] to knock out retaining pin, and then remove 3rd - 4th fork rod (reversal side) and shift fork.



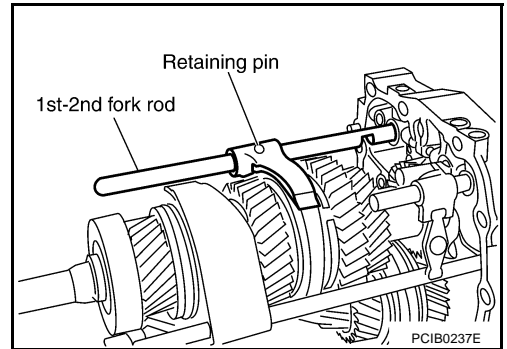
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9. Remove check ball and interlock pin from the adapter plate.

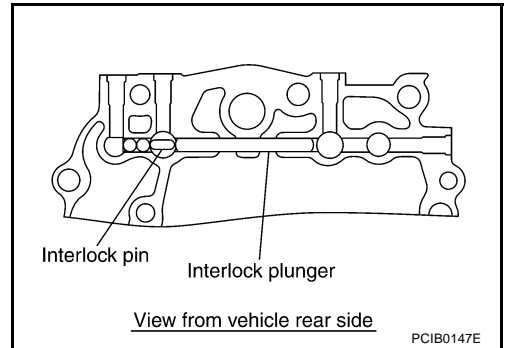


# TRANSMISSION ASSEMBLY

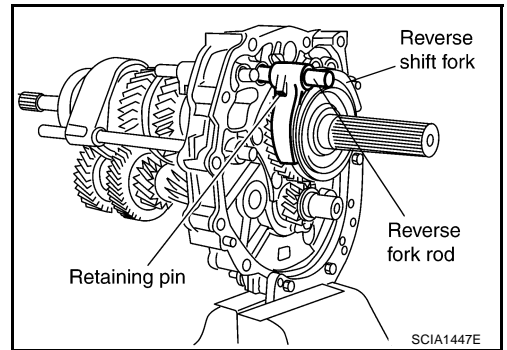
10. Using a pin punch [6 mm (0.24 in) dia.] to knock out retaining pin, and then remove 1st - 2nd fork rod and shift fork.



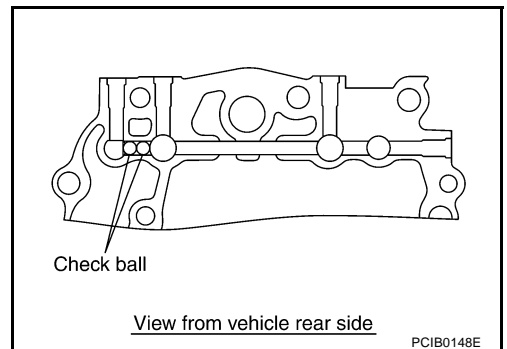
11. Remove interlock plunger and interlock pin from the adapter plate.



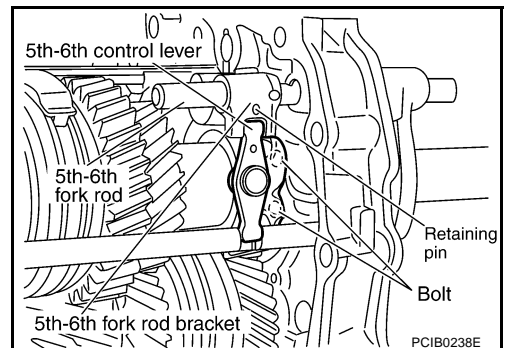
12. Using a pin punch [6 mm (0.24 in) dia.] to knock out retaining pin, and then remove reverse fork rod and shift fork.



13. Remove check ball from the adapter plate.



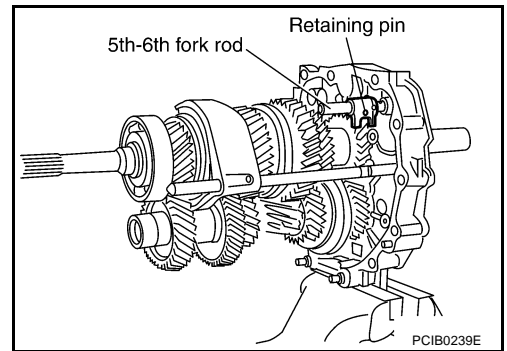
14. Remove 5th - 6th control lever mounting bolts and then remove 5th - 6th control lever assembly.



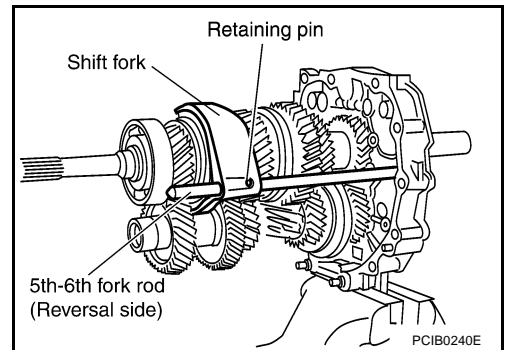


# TRANSMISSION ASSEMBLY

15. Using a pin punch [6 mm (0.24 in) dia.] to knock out retaining pin of 5th - 6th fork rod bracket and then remove 5th - 6th fork rod.



16. Using a pin punch [6 mm (0.24 in) dia.] to knock out retaining pin, and then remove 5th - 6th fork rod (reversal side) and shift fork.

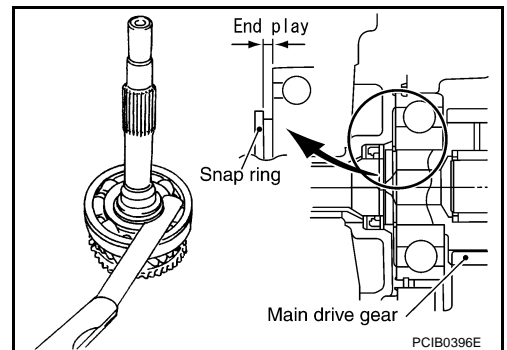


## Gear Components

1. Before disassembly, measure end play for each position. If the end play or backlash is outside the standards, disassemble and inspect.

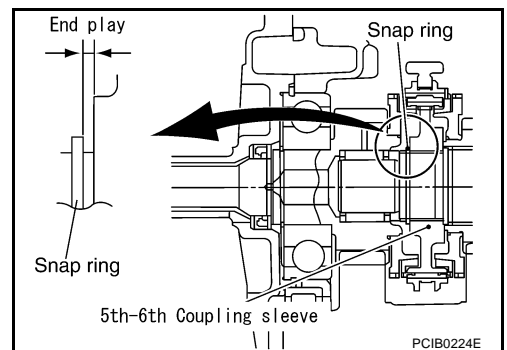
- Main drive gear.

**End play : 0 - 0.10mm (0 - 0.004in)**



- Main shaft front

**End play : 0 - 0.10mm (0 - 0.004in)**

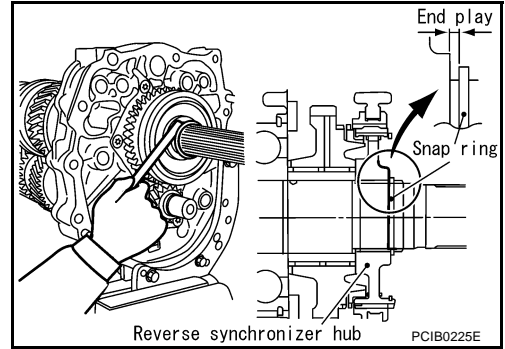


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# TRANSMISSION ASSEMBLY

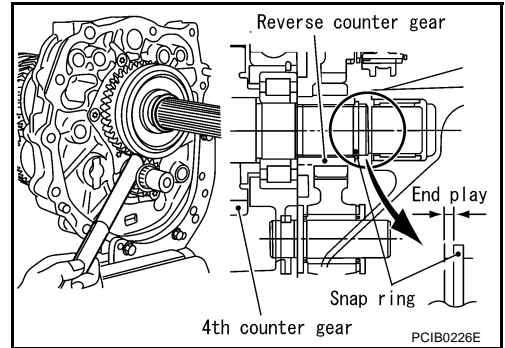
- Main shaft rear

**End play : 0 - 0.10mm (0 - 0.004in)**

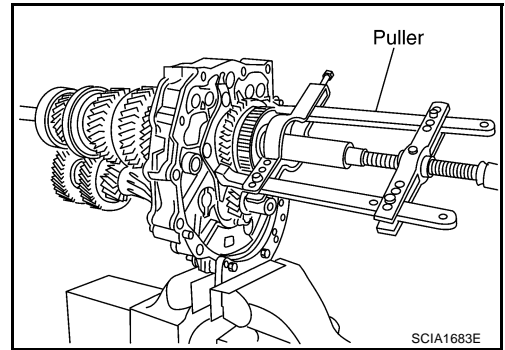


- Counter gear

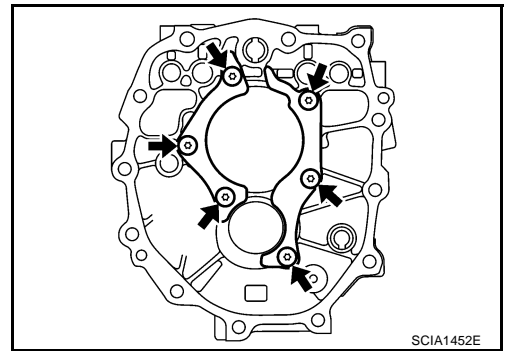
**End play : 0 - 0.10mm (0 - 0.004in)**



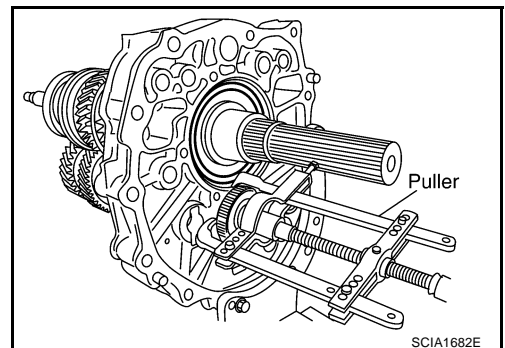
2. After removing snap ring, using puller to remove reverse main gear and reverse synchronizer assembly.
3. Remove reverse main needle bearing.



4. Remove bolts shown in the figure and then remove main shaft bearing retainer.



5. After removing snap ring, using the puller to remove reverse counter gear and counter rear bearing spacer.

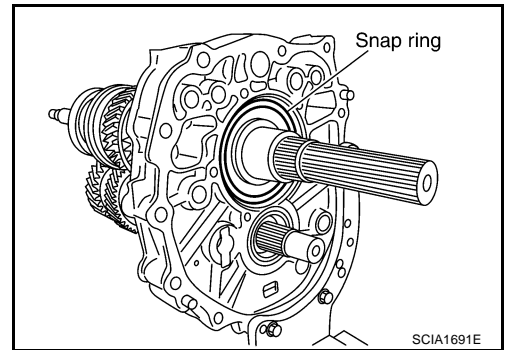


# TRANSMISSION ASSEMBLY

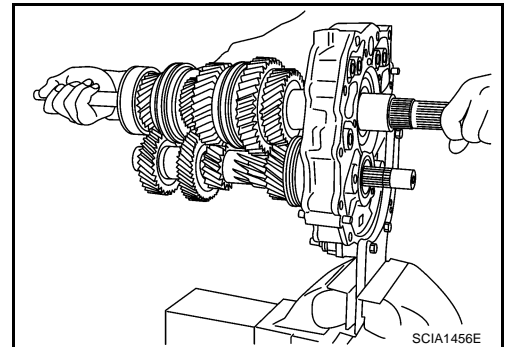
6. Remove snap ring from the main shaft bearing.

**NOTE:**

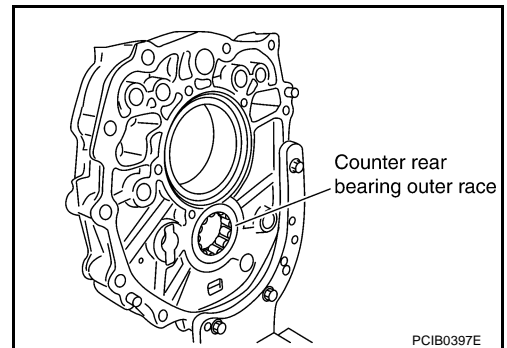
If it is hard to remove snap ring, hammer main shaft bearing slightly with brass bar into the position that the removal is available.



7. Carefully tap main shaft with a plastic hammer and then remove main shaft, main drive gear, and counter shaft from the adapter plate.

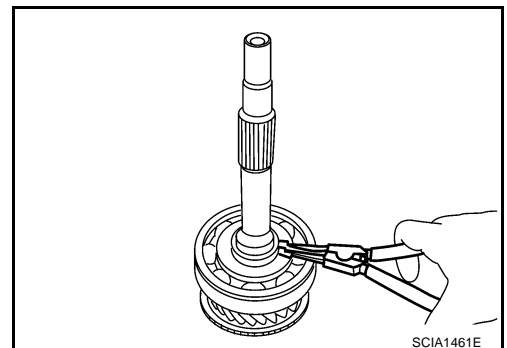


8. Remove counter rear bearing outer race from the adapter plate.



9. Remove pilot bearing spacer and main pilot bearing.

10. Remove snap ring from main drive gear, using snap ring pliers.



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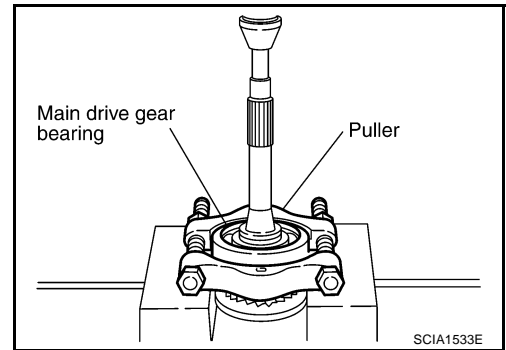
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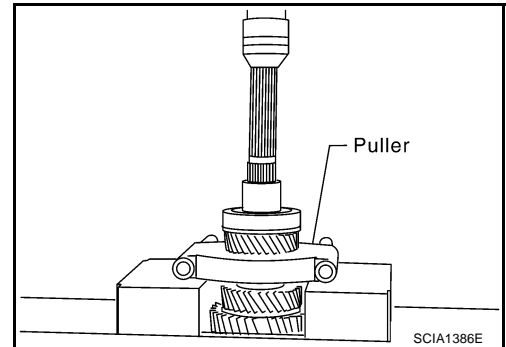
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# TRANSMISSION ASSEMBLY

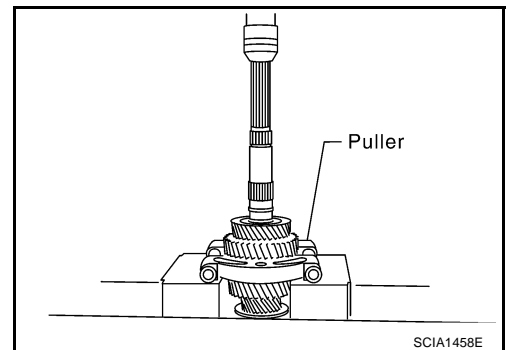
11. Set the suitable puller on the main drive gear and then using a press to remove main drive gear bearing from the main drive gear.



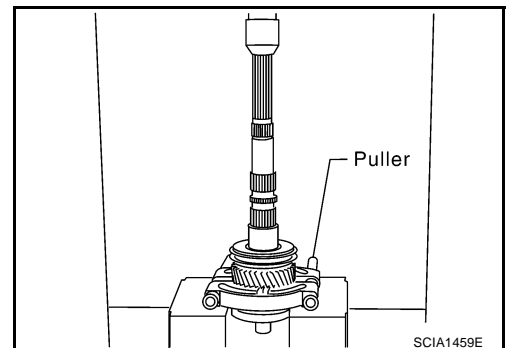
12. Using a press to remove the reverse main gear bushing, main shaft bearing, and 4th main gear.



13. Remove 3rd - 4th main spacer.
14. Using a press to remove 1st main gear and 3rd main gear.  
**CAUTION:**  
**Be careful not to damage the baulk ring.**
15. Remove 1st needle bearing.

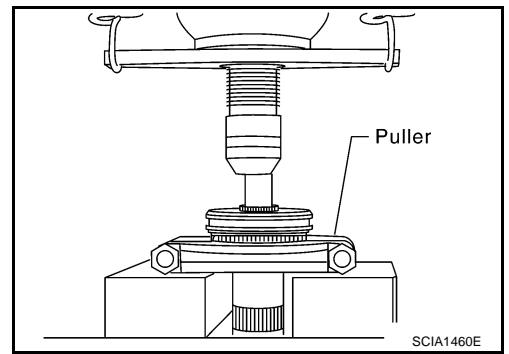


16. Using a press to remove 1st gear bushing, 1st - 2nd synchronizer assembly, and 2nd main gear.  
**CAUTION:**  
**Be aware that when using the press, if the main shaft gear positioner catches on the V-block, etc., the main shaft could be damaged.**
17. Remove 2nd needle bearing.

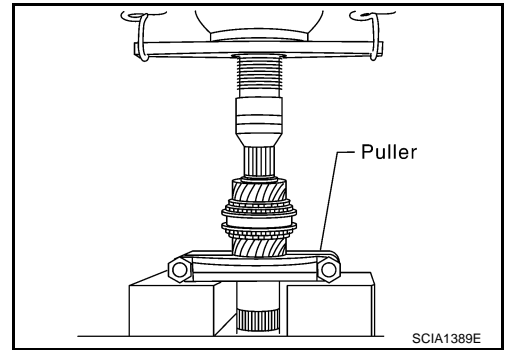


# TRANSMISSION ASSEMBLY

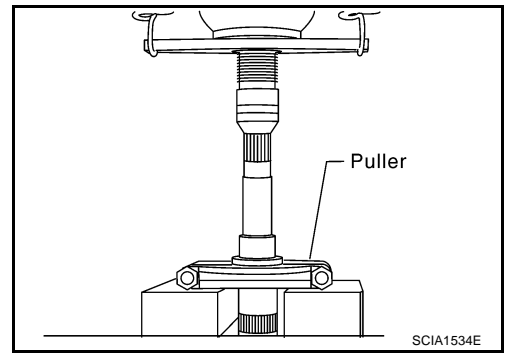
18. After removing snap ring, using a press to remove 6th main gear and 5th - 6th synchronizer assembly.
19. Remove 6th needle bearing.



20. Using a press to remove the 3rd counter gear, 3rd - 4th synchronizer assembly, 4th counter gear, 4th needle bearing, 4th gear bushing, counter shaft rear thrust washer and counter rear bearing inner race.
21. Remove 3rd needle bearing.



22. Using a press to remove the 3rd gear bushing.



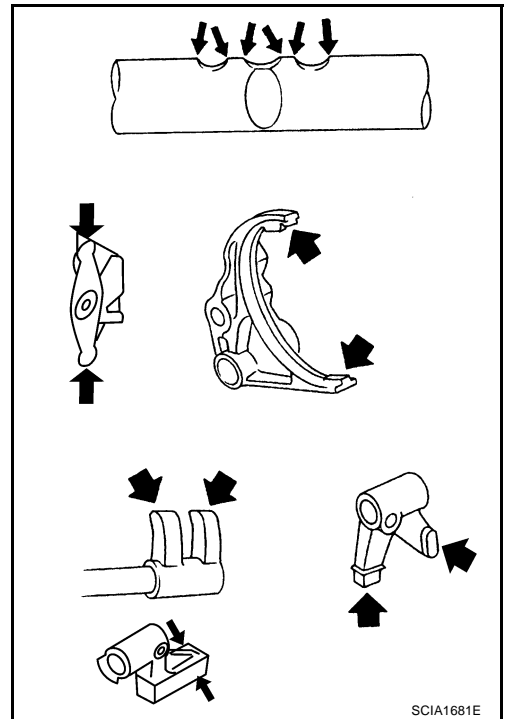
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# TRANSMISSION ASSEMBLY

## INSPECTION AFTER DISASSEMBLY

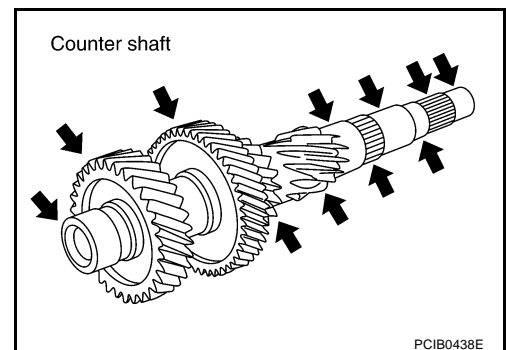
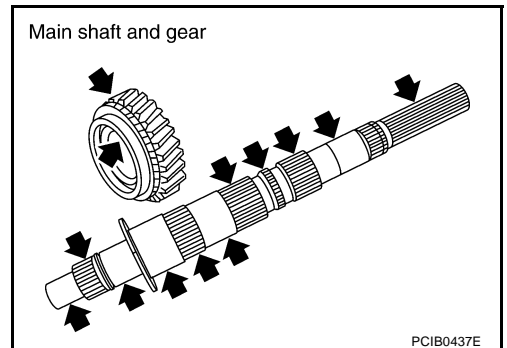
### Shift Control

If the contact surface on striking lever, fork rod, fork, etc. has excessive wear, abrasion, bend, or any other damage, replace the components.



### Gear and Shaft

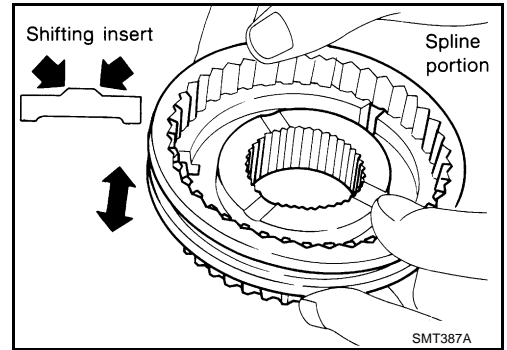
If the contact surface on each gear, main shaft, main drive gear and counter shaft, etc. has damage, peeling, abrasion, dent, bent, or any other damage, replace the components.



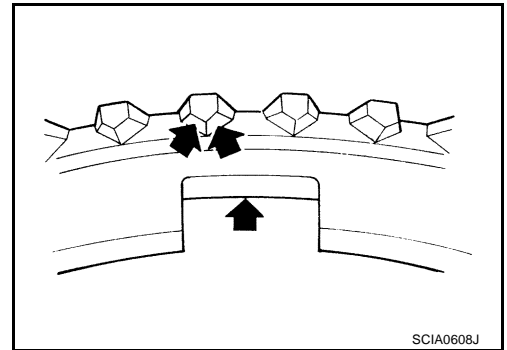
# TRANSMISSION ASSEMBLY

## Synchronizer

- If the contact surface on coupling sleeve, synchronizer hub, and shifting insert has damage or abrasion, replace the components.
- Coupling sleeve and synchronizer hub shall move smoothly.



- If the cam surface on baulk ring or contact surface on insert has damage or excessive wear, replace with a new one.
- If insert spring is damaged, replace with a new one.



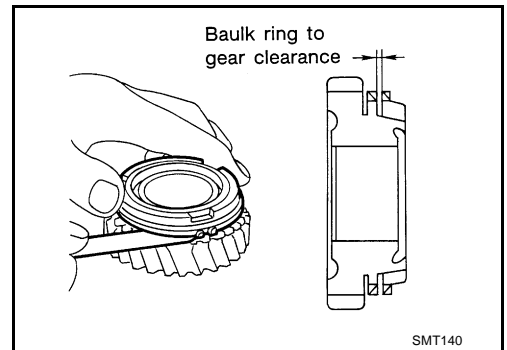
## Single Cone Synchronizer (5th & 6th)

- Push baulk ring on the cone and measure baulk ring back surface clearance at two locations or more on opposite sides, find the average value, and replace it if it is outside the limit value.

### Clearance

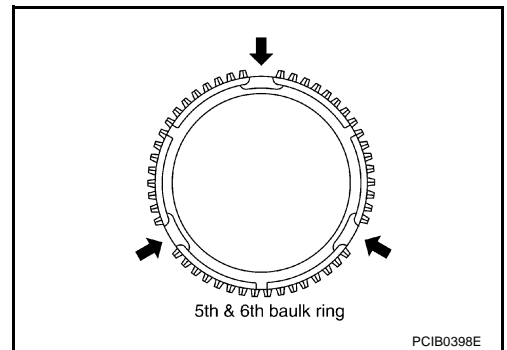
**Standard** : 0.70 - 1.25 mm (0.028 - 0.049 in)

**Limit value** : 0.5 mm (0.020 in) or less



### NOTE:

- 5th and 6th baulk rings have three spaces that two gear teeth are missing as shown in the figure.



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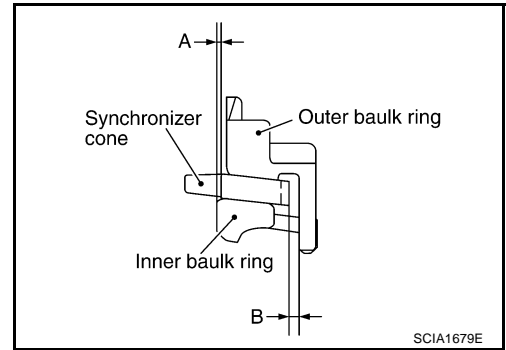
# TRANSMISSION ASSEMBLY

## Double Cone Synchronizer (1st & 3rd & 4th)

Follow the instructions below and inspect the clearance of the 1st, 3rd and 4th gear outer baulk ring, synchronizer cone, inner baulk ring.

### CAUTION:

Clearances "A" and "B" of the outer baulk ring, synchronizer cone, and inner baulk ring are controlled as a set, so if the clearance is outside the limit value, replace the synchronizer assembly.



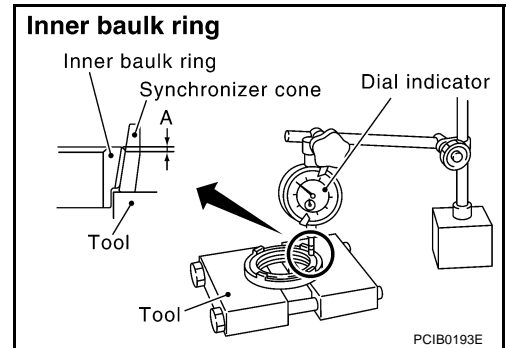
1. Using a dial gauge, measure clearance A at 2 or more points diagonally opposite, and calculate mean value.

### Clearance A

**Standard** :0.5 - 0.7 mm (0.020 - 0.028 in)

**Limit value** :0.3 mm (0.012 in) or less

**Tool number** : ST30031000 (J22912 - 01)



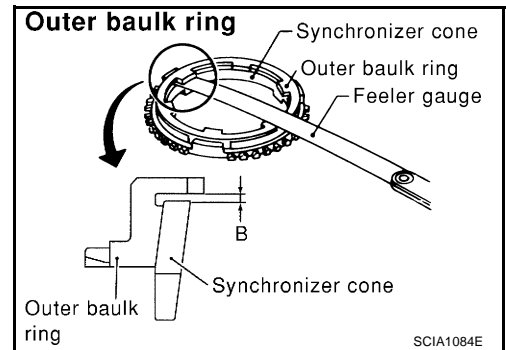
2. Using a feeler gauge, measure clearance B at 2 or more points diagonally opposite, and calculate mean value.

### Clearance B

**Standard 1st** : 1.0 - 1.5 mm (0.039 - 0.059 in)

**3rd, 4th** : 0.85 - 1.35 mm (0.033 - 0.053 in)

**Limit value** : 0.7 mm (0.028 in) or less

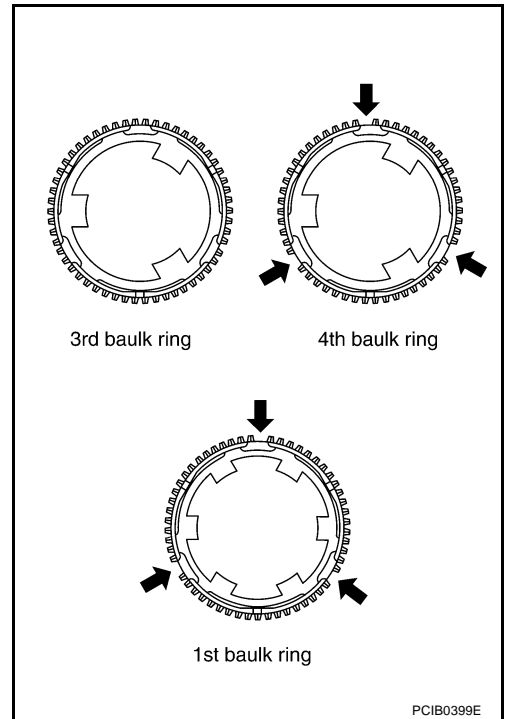




# TRANSMISSION ASSEMBLY

**NOTE:**

1st and 4th baulk ring has three spaces that one gear tooth is missing as shown in the figure.



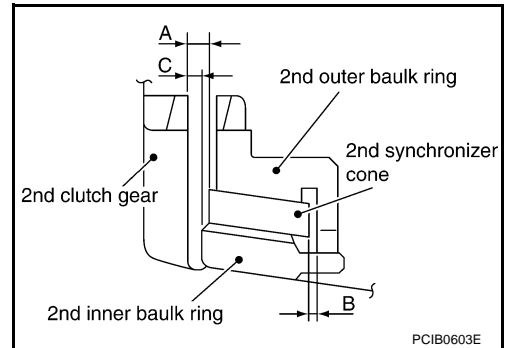
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**Triple Cone Synchronizer (2nd)**

Check clearance for 2nd outer baulk ring, 2nd synchronizer cone and 2nd inner baulk ring of 2nd triple cone synchronizer following the direction.

**NOTE:**

2nd outer baulk ring, 2nd synchronizer cone and 2nd inner baulk ring, three control "clearance A, B and C" as a three - piece suite. If the value exceeds the limit value, replace them as a three - piece suite.



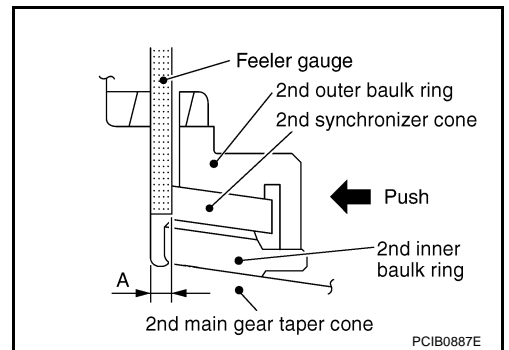
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- Using feeler gauge put and press synchronizer on 2nd main gear taper cone. and then measure "clearance A" at more than 2 diagonal points, and calculate the average.

**Clearance A**

**Reference value : 0.6 - 1.3 mm (0.024 - 0.051 in)**

**Limit value : 0.3 mm (0.012 in) or less**



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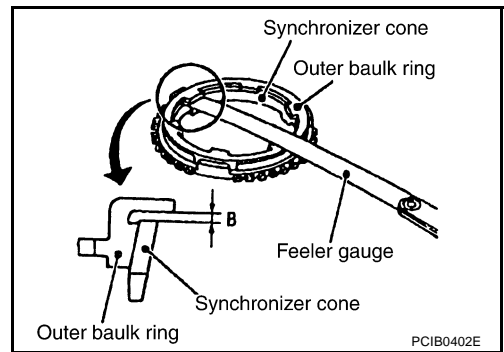
# TRANSMISSION ASSEMBLY

2. Using feeler gauge measure "clearance B" at more than 2 diagonal positions, and calculate the average.

## Clearance B

**Reference value** : 0.85 - 1.35 mm (0.033 - 0.053 in)

**Limit value** : 0.7 mm (0.028 in) or less

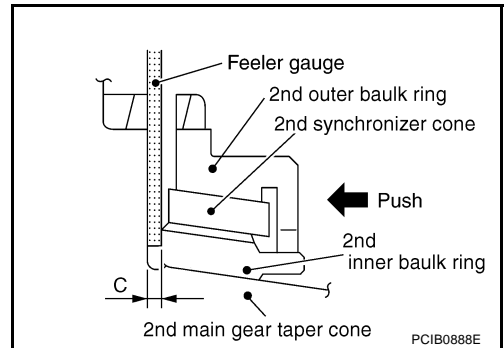


3. Using filler gauge put and press synchronizer on 2nd main gear taper cone. and then measure "clearance C" at more than 2 diagonal points, and calculate the average.

## Clearance C

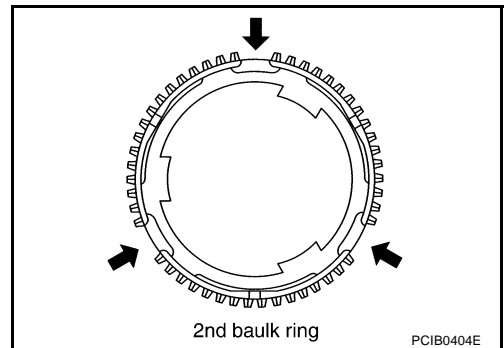
**Reference value** : 0.7 - 1.25 mm (0.028 - 0.049 in)

**Limit value** : 0.3 mm (0.012 in) or less



## NOTE:

2nd baulk ring has three spaces that one gear tooth is missing as shown in the figure.



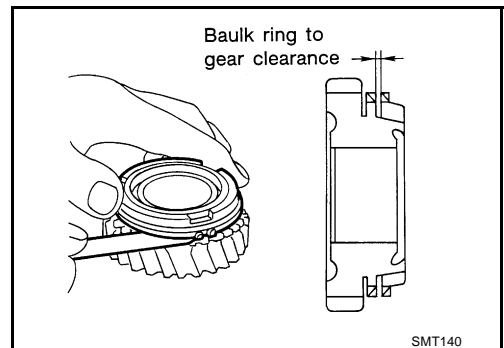
## Reverse Synchronizer

Push baulk on the cone and measure baulk ring back surface clearance at two locations or more on opposite sides, find the average value, and replace if it is outside the limit value.

## Clearance

**Standard** : 0.75 - 1.2 mm (0.030 - 0.047 in)

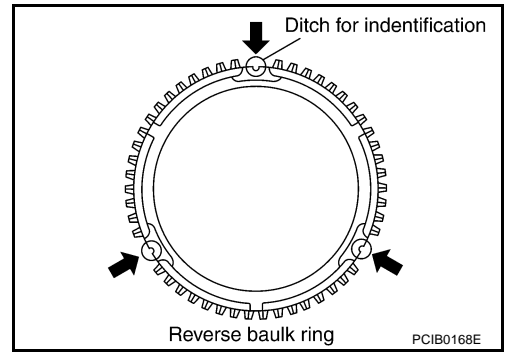
**Limit value** : 0.5 mm (0.020 in) or less



# TRANSMISSION ASSEMBLY

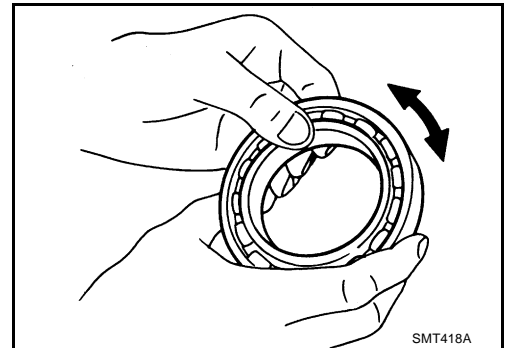
## NOTE:

Reverse baulk ring has three spaces that two gear teeth are missing, and each space has small ditch for identification as shown in the figure.



## Bearing

If the bearing does not rotate smoothly or the contact surface on ball or race is damaged or peeled, replace with new ones.



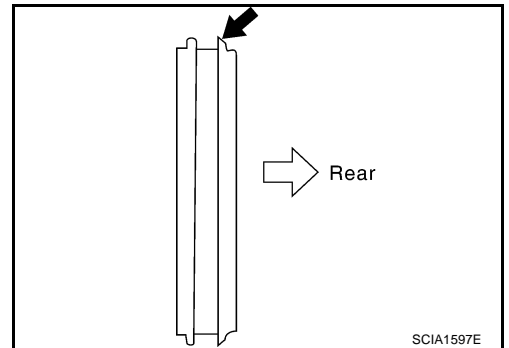
## ASSEMBLY

### Gear Components

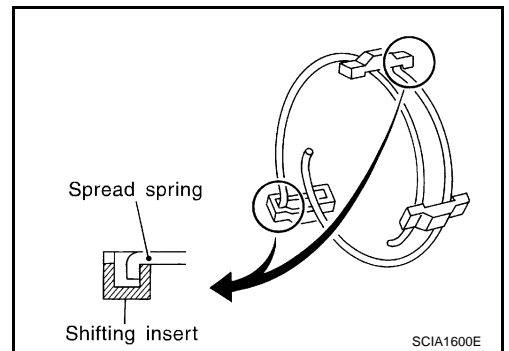
1. Install coupling sleeve and shifting insert in the 5th-6th synchronizer hub.

### CAUTION:

Install coupling sleeve with the larger chamfer on the rear side.



2. Install spread spring in the shifting insert.



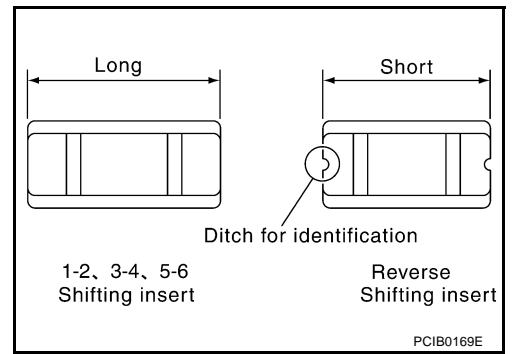
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# TRANSMISSION ASSEMBLY

- Be careful with the shape of shifting insert to avoid misassembly.

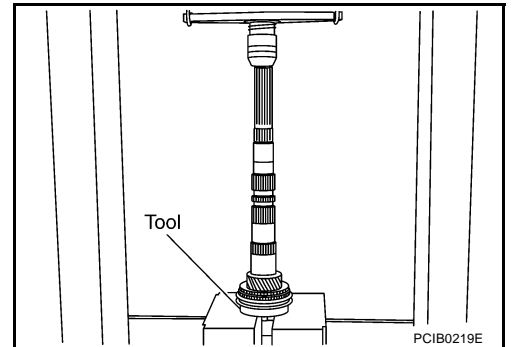
**CAUTION:**

**Do not install spread spring hook onto the same shifting insert.**



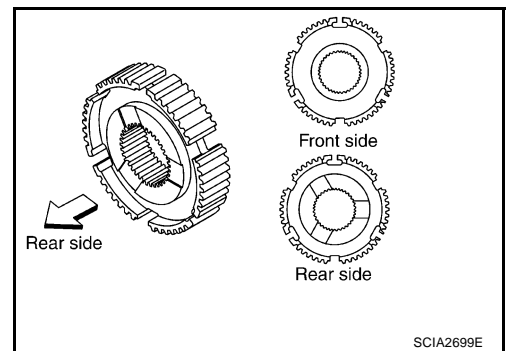
3. After installing the 6th needle bearing and 6th main gear, 6th baulk ring on the main shaft, using an inserter and a press to press fit the 5th - 6th synchronizer assembly.

**Tool number : ST30911000 ( — )**



**CAUTION:**

- The synchronizer hub is not reusable. Never reuse it.
- When press fitting, install with the side having the three boss edge oil grooves facing the rear side.

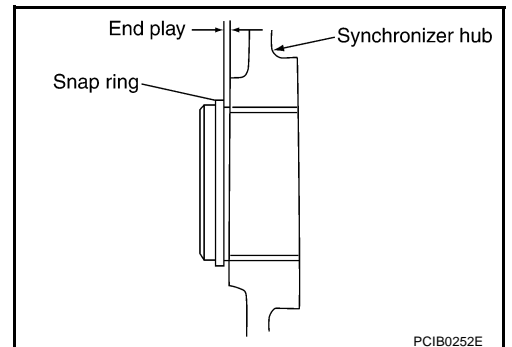


4. Select and install a snap ring so that the end play comes within the standard value.

**End play : 0 - 0.10 mm (0 - 0.004 in)**

**CAUTION:**

**Snap rings are not reusable. Never reuse them.**



### Main shaft Snap Ring (Front Side)

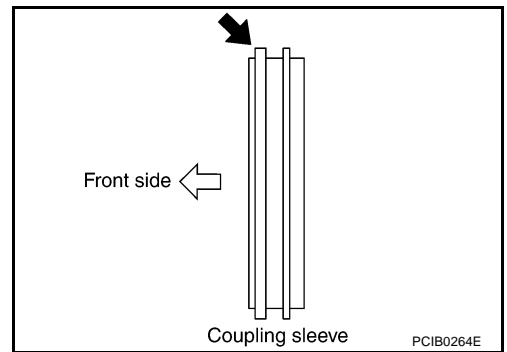
Thickness	Part No.
2.08 mm (0.0819 in)	32204 CD000
2.14 mm (0.0843 in)	32204 CD001
2.20 mm (0.0866 in)	32204 CD002
2.26 mm (0.0890 in)	32204 CD003

# TRANSMISSION ASSEMBLY

5. Install coupling sleeve and shifting insert into the 1st - 2nd synchronizer hub.

**CAUTION:**

**Install 1st-2nd coupling sleeve with the thicker flange faced the front side.**

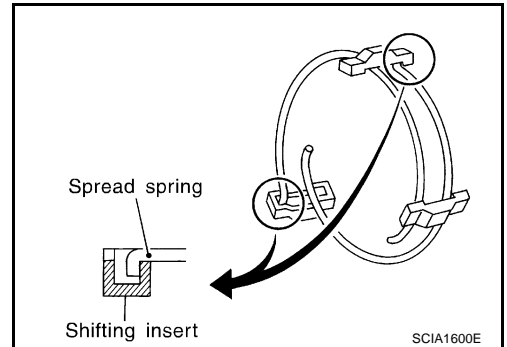


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6. Install spread spring in the shifting insert.



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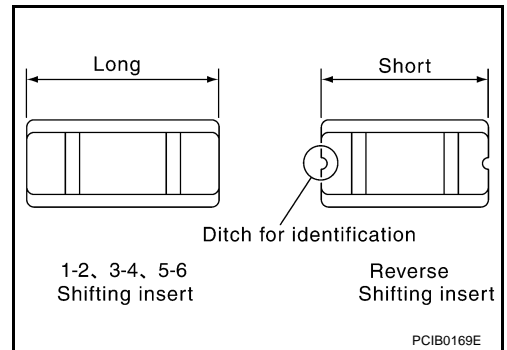
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- Be careful with the shape of shifting insert to avoid misassembly.

**CAUTION:**

**Do not install spread spring hook onto the same shifting insert.**



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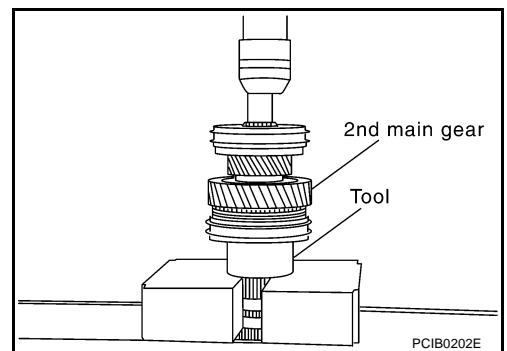
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7. Install 2nd needle bearing, 2nd main gear, 2nd inner baulk ring, 2nd synchronizer cone, 2nd outer baulk ring on the main shaft and then using a support ring and a press to press fit the 1st - 2nd synchronizer assembly.

**Tool number : ST27861000 ( — )**



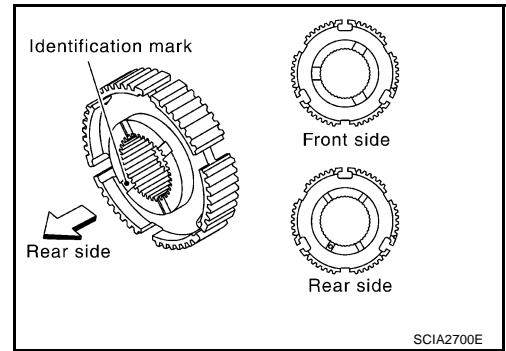
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# TRANSMISSION ASSEMBLY

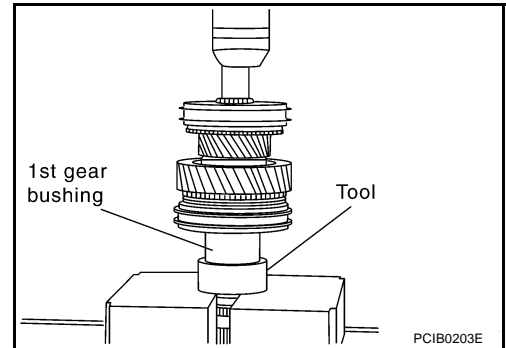
**CAUTION:**

- The synchronizer hub is not reusable. Never reuse it.
- When press fitting, install with the side having the three boss edge oil grooves facing the front side.



8. Using a support ring and a press to press fit the 1st gear bushing.

**Tool number** : ST27861000 ( — )

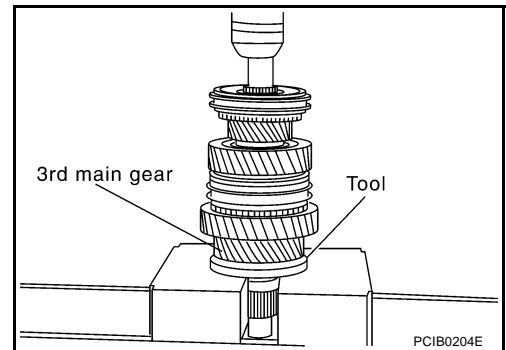


9. Install 1st outer baulk ring, 1st synchronizer cone, 1st inner baulk ring, 1st needle bearing and 1st main gear on the main shaft and then using the inserter and a press to press fit the 3rd main gear.

**Tool number** : ST30022000 ( — )

**CAUTION:**

3rd main gear is not reusable. Never reuse it.

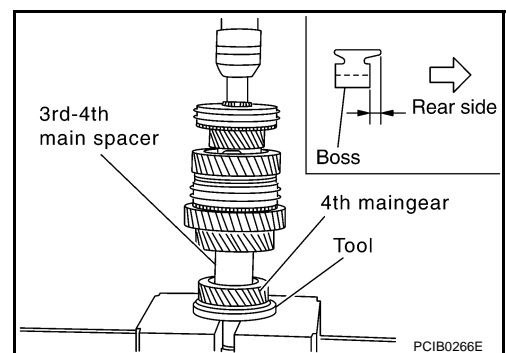


10. Install 3rd - 4th main spacer on the main shaft and then using the inserter and a press to press fit the 4th main gear.

**Tool number** : ST30022000 ( — )

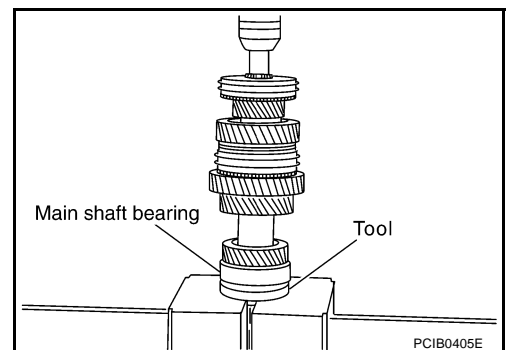
**CAUTION:**

- 4th main gear is not reusable. Never reuse it.
- When installing, set boss to rear side.



11. Using the inserter and a press to press fit the main shaft bearing onto the main shaft.

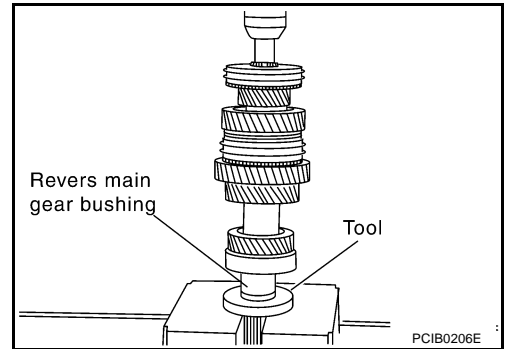
**Tool number** : ST30911000 ( — )



# TRANSMISSION ASSEMBLY

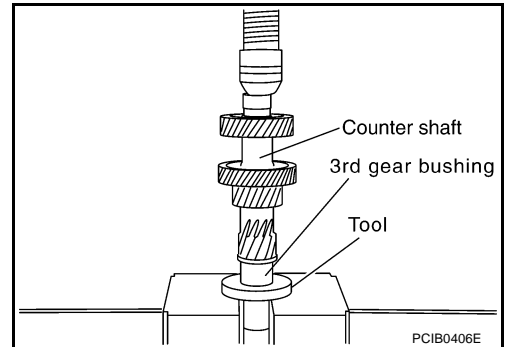
12. Using the inserter and a press to press fit the reverse main gear bushing onto the main shaft.

**Tool number** : ST30911000 ( — )



13. Using the inserter to press fit the 3rd gear bushing onto the counter shaft.

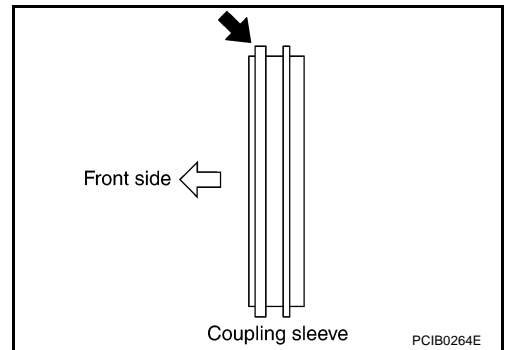
**Tool number** : ST30911000 ( — )



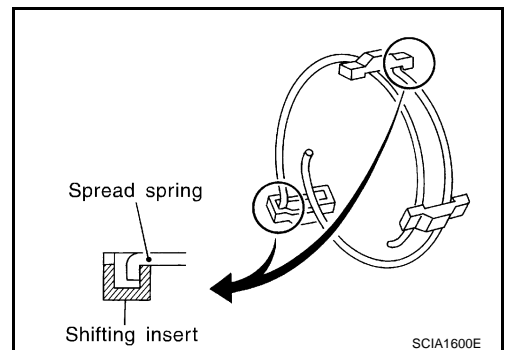
14. Install coupling sleeve and shifting insert into the 3rd - 4th synchronizer hub.

**CAUTION:**

**Install 3rd-4th coupling sleeve with the thicker flange faced the front side.**



15. Install spread spring in the shifting insert.  
Install coupling sleeve with the identification groove side facing the rear side.



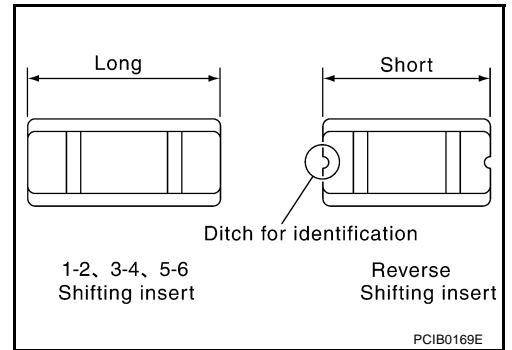
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# TRANSMISSION ASSEMBLY

- Be careful with the shape of shifting insert to avoid misassembly.

**CAUTION:**

**Do not install spread spring hook onto the same shifting insert.**

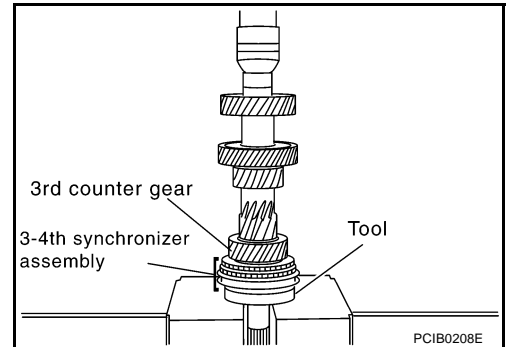


16. Install 3rd needle bearing, 3rd counter gear, 3rd inner baulk ring, 3rd synchronizer cone, 3rd outer baulk ring on the counter shaft and then using the drift and a press to press fit the 3rd - 4th synchronizer assembly

**Tool number : ST30911000 ( — )**

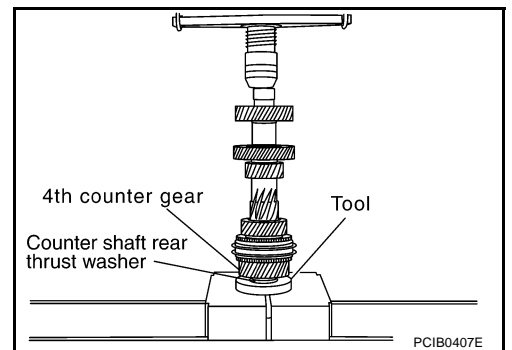
**CAUTION:**

- **The synchronizer hub is not reusable. Never reuse it.**



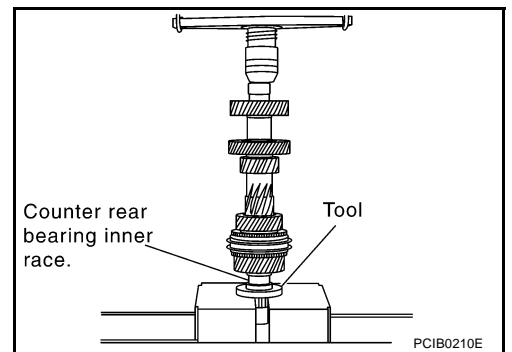
17. Install 4th outer baulk ring, 4th synchronizer cone, 4th gear bushing, 4th needle bearing, 4th counter gear onto the counter shaft and then using the drift and a press to press fit the counter shaft rear thrust washer.

**Tool number : KV40100630 (J26029)**



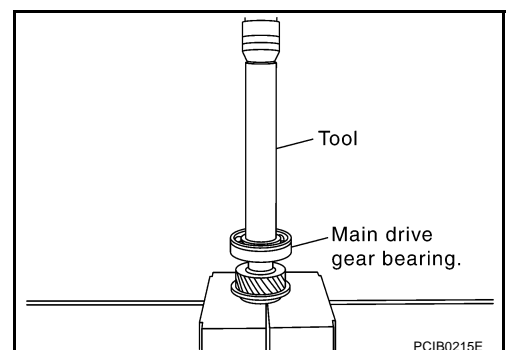
18. Using the drift and a press to press fit the counter rear bearing inner race onto the counter shaft.

**Tool number : ST30032000 (J26010-1)**



19. Using the drift and a press to press fit the main drive gear bearing onto the main drive gear.

**Tool number : KV32102700 ( — )**



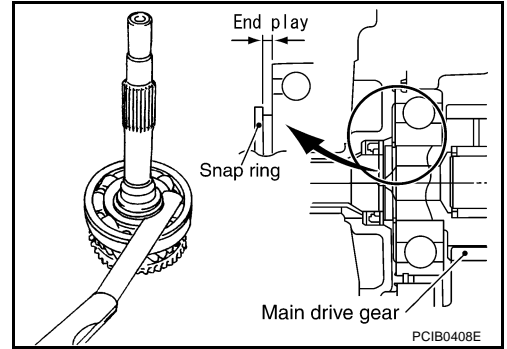


# TRANSMISSION ASSEMBLY

20. Select and install a snap ring to the main drive gear so that the end play comes within the standard value.

**End play : 0 - 0.10 mm (0 - 0.004 in)**

**CAUTION:**  
Snap rings are not reusable. Never reuse them.



## Main drive gear

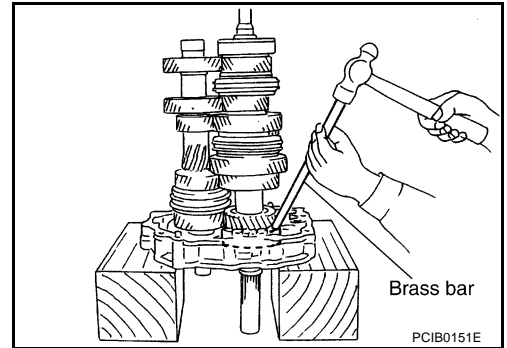
Thickness	Part No.
1.89 mm(0.0744 in)	32204 01G60
1.95 mm(0.0768 in)	32204 01G61
1.99 mm(0.0783 in)	32204 01G62
2.03 mm(0.0799 in)	32204 01G63
2.07 mm(0.0815 in)	32204 01G64
2.11 mm(0.0831 in)	32204 01G65

21. Install 5th baulk ring, main pilot bearing, pilot bearing spacer, main drive gear onto the main shaft.

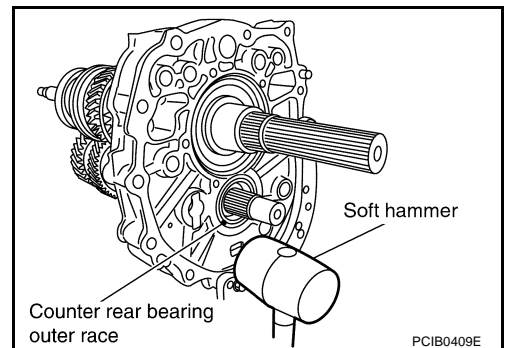
22. Install main shaft and counter shaft combined in one unit to adapter plate, and fix bearing with snap ring.

- Hammer main shaft bearing slightly via brass bar or the equivalent to install snap ring.
- After installing snap ring, hammer snap ring and adapter plate slightly in the reverse direction to make them in contact with each other.


**CAUTION:**  
Snap rings are not reusable. Never reuse them.

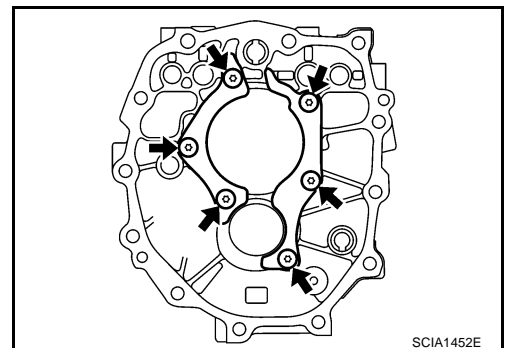


23. Install counter rear bearing outer race onto the adapter plate using soft hammer or the equivalent.



24. Apply genuine medium strength locking sealant or equivalent refer to GI section to the end of the bolt (first 3 to 4 threads), screw the bolt into the main shaft bearing retainer and tighten it to the specified torque.

 : 19 - 24 N·m (2.0 - 2.4 kg·m, 14 - 17 ft·lb)



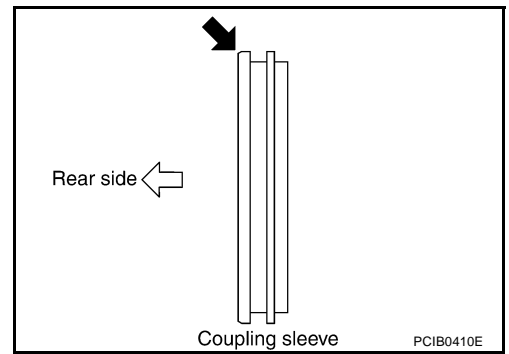
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# TRANSMISSION ASSEMBLY

25. Install reverse coupling sleeve and reverse shifting insert into the reverse synchronizer hub.

**CAUTION:**

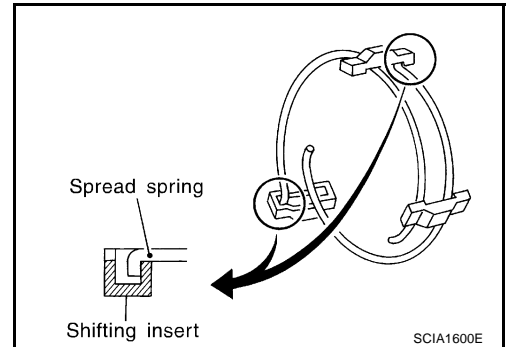
**Install reverse coupling sleeve with the flat flange on the rear side.**



26. Install spread spring in the shifting insert.

**CAUTION:**

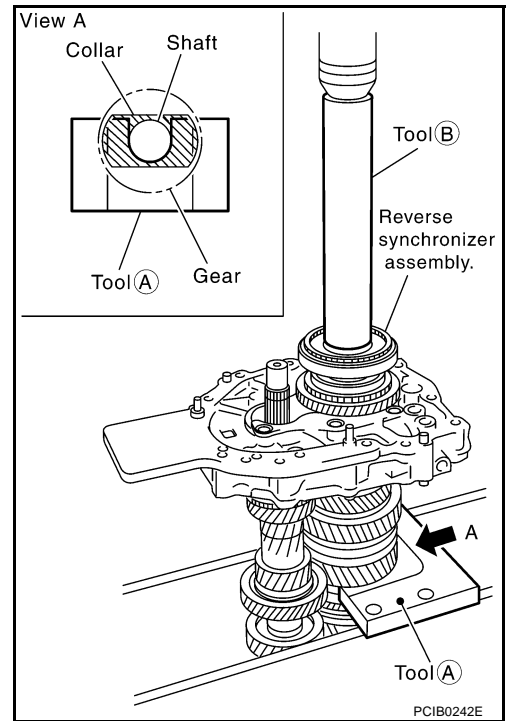
**Do not install spread spring hook onto the same shifting insert.**



27. After installing the reverse main needle bearing, reverse main gear and reverse baulk ring onto the main shaft, using the drift and install the reverse synchronizer assembly.

**Tool number (A) : KV32103300 (J46529)**

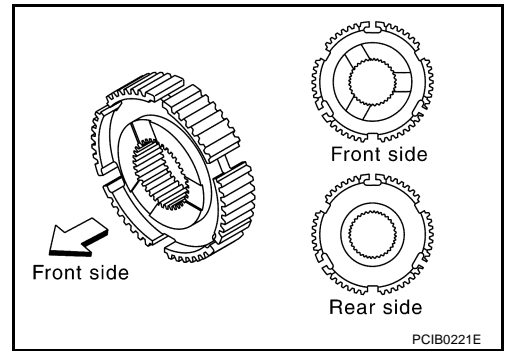
**Tool number (B) : ST01530000 ( — )**



# TRANSMISSION ASSEMBLY

**CAUTION:**

- The synchronizer hub is not reusable. Never reuse it.
- When installing, face the side with three ditches to the front side.

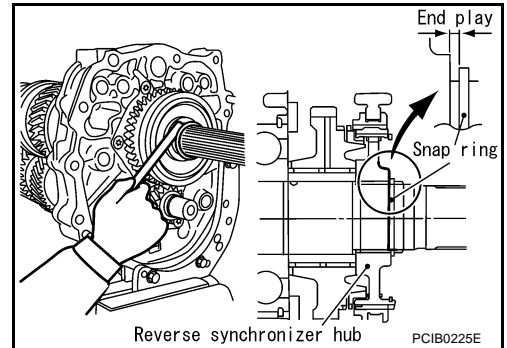


28. Select and install a snap ring to the main shaft so that the end play comes within the standard value.

**End play : 0 - 0.10 mm (0 - 0.004 in)**

**CAUTION:**

Snap rings are not reusable. Never reuse them.



### Main shaft Snap Ring (Shaft rear end)

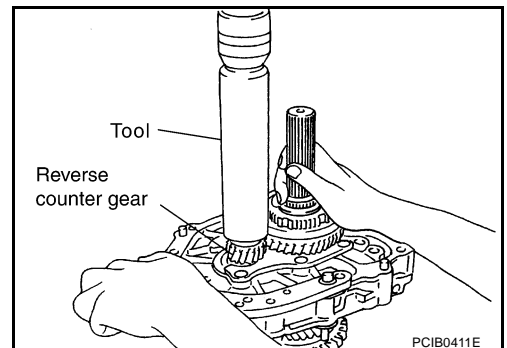
Thickness	Part No.
2.08 mm (0.0819 in)	32204 CD000
2.14 mm (0.0843 in)	32204 CD001
2.20 mm (0.0866 in)	32204 CD002
2.26 mm (0.0890 in)	32204 CD003
2.32 mm (0.0913 in)	32204 CD004
2.38 mm (0.0937 in)	32204 CD005
2.44 mm (0.0961 in)	32204 CD006
2.50 mm (0.0984 in)	32204 CD007
2.56 mm (0.1008 in)	32204 CD008
2.62 mm (0.1031 in)	32204 CD009
2.68 mm (0.1055 in)	32204 CD010
2.74 mm (0.1079 in)	32204 CD011
2.80 mm (0.1102 in)	32204 CD012
2.86 mm (0.1126 in)	32204 CD013
2.92 mm (0.1150 in)	32204 CD014
2.98 mm (0.1173 in)	32204 CD015

29. After installing counter rear bearing spacer to counter shaft, press reverse counter gear to counter shaft using drift and press.

**Tool number : ST23860000 ( — )**

**CAUTION:**

- Reverse counter gear is not reusable. Never reuse it.
- When installing counter rear bearing spacer, maker's stamp should face to the rear.



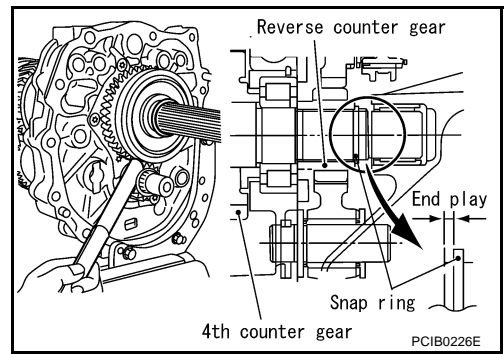
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# TRANSMISSION ASSEMBLY

30. Select and install a snap ring to the counter shaft so that the end play comes within the standard value.

**End play : 0 - 0.10 mm (0 - 0.004 in)**

**CAUTION:**  
Snap rings are not reusable. Never reuse them.



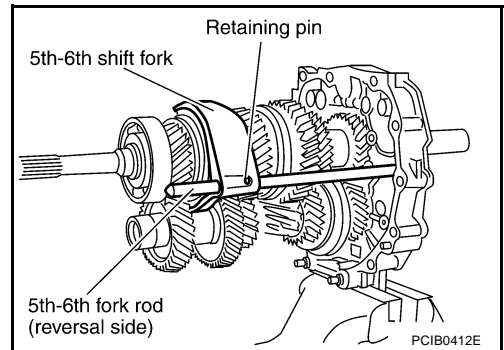
## Counter shaft

Thickness	Part No.
1.96 mm (0.0772 in)	32236 CD000
2.02 mm (0.0795 in)	32236 CD001
2.08 mm (0.0819 in)	32236 CD002
2.14 mm (0.0843 in)	32236 CD003
2.20 mm (0.0866 in)	32236 CD004
2.26 mm (0.0890 in)	32236 CD005
2.32 mm (0.0913 in)	32236 CD006
2.38 mm (0.0937 in)	32236 CD007
2.44 mm (0.0961 in)	32236 CD008
2.50 mm (0.0984 in)	32236 CD009
2.56 mm (0.1008 in)	32236 CD010
2.62 mm (0.1031 in)	32236 CD011

## Shift Control Components

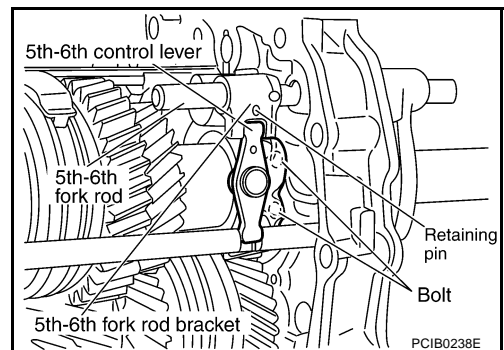
1. Install 5th-6th shift fork to 5th-6th coupling sleeve.
2. Install 5th-6th fork rod (reversal side) to 5th-6th shift fork.
3. Using a pin punch [6 mm (0.24in) dia.] to tap the retaining pin into the 5th - 6th shift fork.

**CAUTION:**  
Retaining pins are not reusable. Never reuse them.




4. Install 5th-6th fork rod to adapter plate.
5. Install 5th-6th fork rod bracket to 5th-6th fork rod.
6. Using a pin punch [6 mm (0.24in) dia.] to tap the retaining pin into the 5th - 6th fork rod bracket.

**CAUTION:**  
Retaining pins are not reusable. Never reuse them.

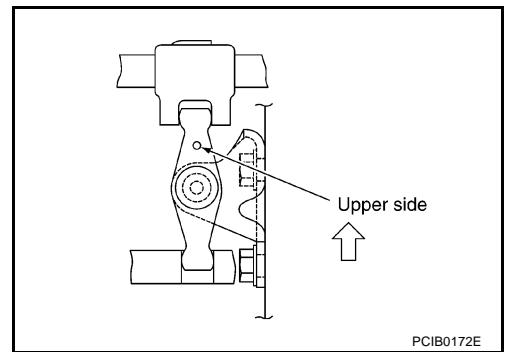


# TRANSMISSION ASSEMBLY

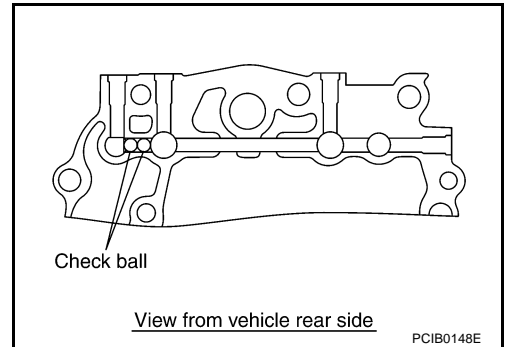
7. Install 5th - 6th control lever to adapter plate, and then tighten mounting bolts to the specified torque.

 : 20 - 23 N·m (2.1 - 2.3 kg·m, 15 - 16 ft·lb)

**CAUTION:**  
Set the projection upward.

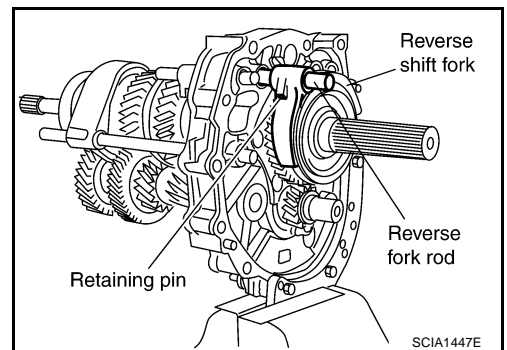


8. Insert check ball to adapter plate.

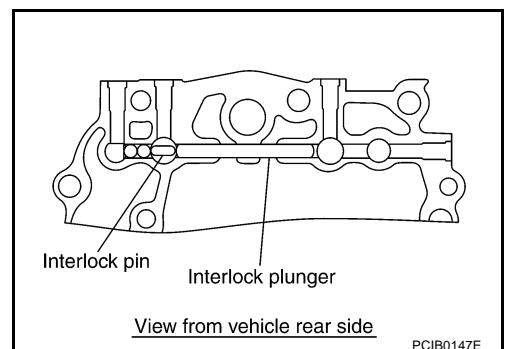


9. Install reverse shift fork to reverse coupling sleeve.  
10. Insert reverse fork rod to reverse shift fork.  
11. Using a pin punch [6 mm (0.24 in) dia.] to tap the retaining pin into the reverse shift fork.

**CAUTION:**  
Retaining pins are not reusable. Never reuse them.

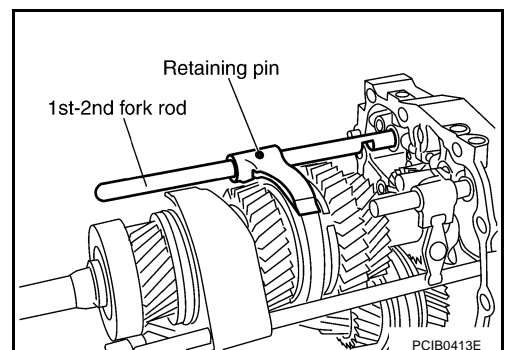


12. Insert interlock pin and interlock plunger to adapter plate.



13. Install 1st-2nd shift fork to 1st-2nd coupling sleeve.  
14. Install 1st-2nd fork rod to 1st-2nd shift fork.  
15. Using a pin punch [6 mm (0.24 in) dia.] to tap the retaining pin into the 1st - 2nd shift fork.

**CAUTION:**  
Retaining pins are not reusable. Never reuse them.



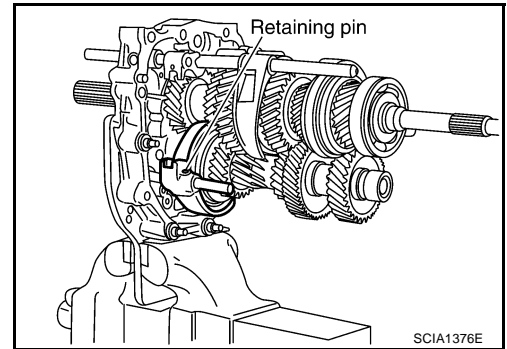
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# TRANSMISSION ASSEMBLY

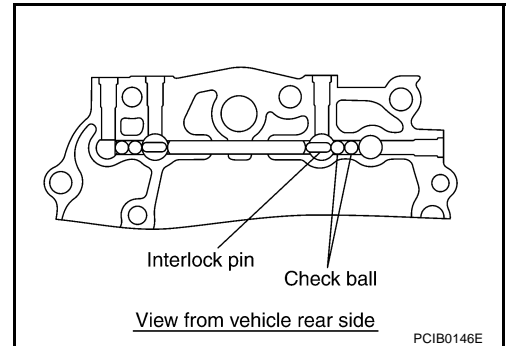
16. Install 3rd-4th shift fork to 3rd-4th coupling sleeve.
17. Install 3rd-4th fork rod (reversal side) to 3rd-4th shift fork.
18. Using a pin punch [6 mm (0.24 in) dia.] to tap the retaining pin into the 3rd - 4th shift fork (reversal side).

**CAUTION:**

**Retaining pins are not reusable. Never reuse them.**



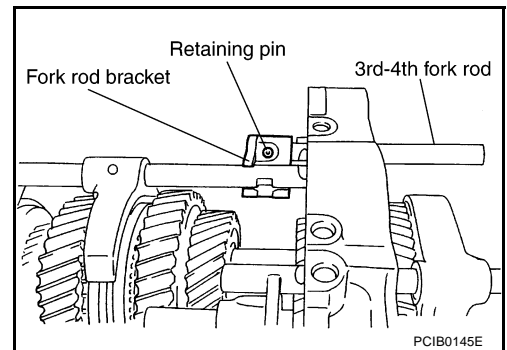
19. Insert interlock pin and check ball to adapter plate.



20. Install 3rd-4th fork rod to adapter plate.
21. Install 3rd-4th fork rod bracket to 3rd-4th fork rod.
22. Using a pin punch [6 mm (0.24 in) dia.] to tap the retaining pin into the 3rd - 4th fork rod bracket.

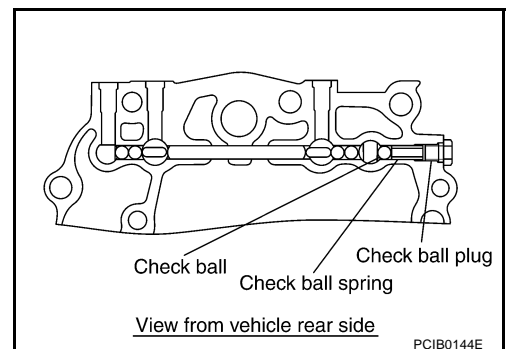
**CAUTION:**

**Retaining pins are not reusable. Never reuse them.**




23. Install check ball, check ball spring into the adapter plate, apply genuine silicone RTV or equivalent refer to GI section to the check ball plug threads, and tighten to the specified torque.

 : 13 - 17 N·m (1.4 - 1.7 kg-m, 10 - 12 ft-lb)

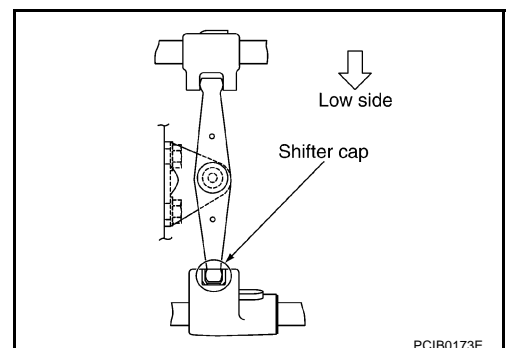


24. Install 3rd - 4th control lever to adapter plate, and then tighten mounting bolts to the specified torque.

 : 20 - 23 N·m (2.1 - 2.3 kg-m, 15 - 16 ft-lb)


**CAUTION:**

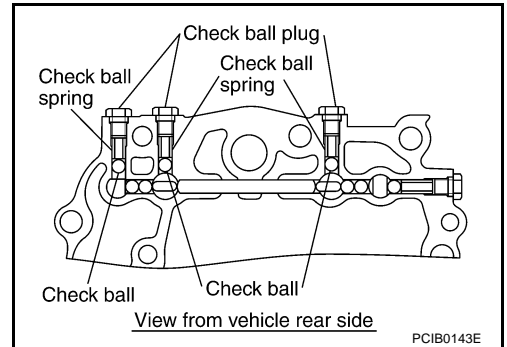
**Make sure the top and bottom are oriented correctly.**



# TRANSMISSION ASSEMBLY

25. Insert check ball spring, check ball into the adapter plate, apply genuine silicone RTV or equivalent refer to GI section to the check ball plug threads, and tighten to the specified torque.

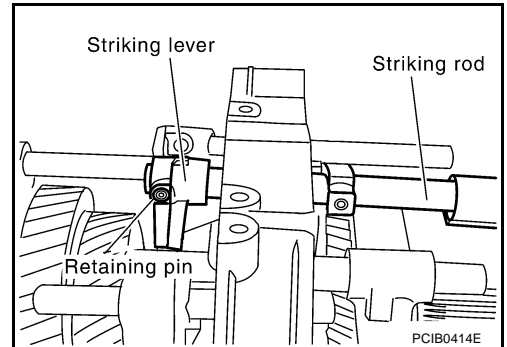
 : 13 - 17 N·m (1.4 - 1.7 kg-m, 10 - 12 ft-lb)



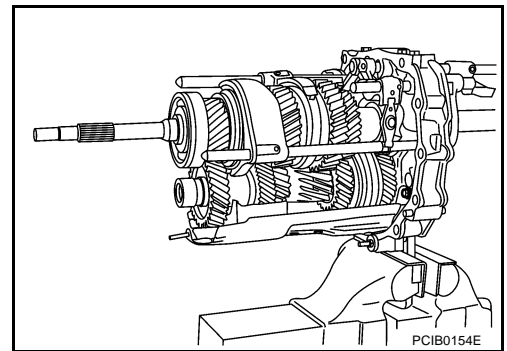
26. Install striking rod to adapter plate.  
27. install striking lever to striking rod.  
28. Using a pin punch [6 mm (0.24 in) dia.] to tap the retaining pin into the striking lever.

**CAUTION:**

**Retaining pins are not reusable. Never reuse them.**

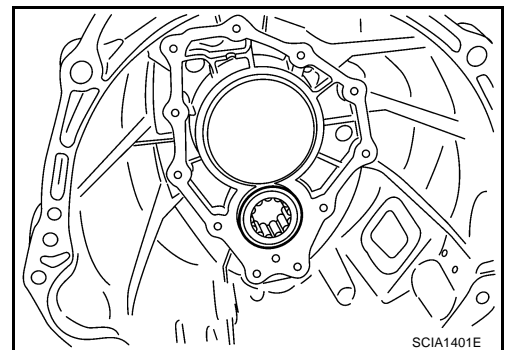


29. Install baffle plate to adapter plate, and then tighten mounting bolts to the specified torque.



## Case Components

1. Install counter front bearing in the transmission case.
2. Install oil gutter to transmission case.



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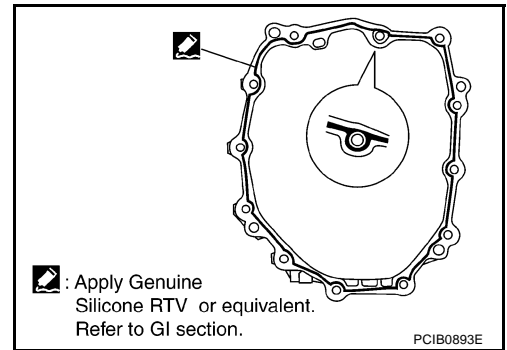
# TRANSMISSION ASSEMBLY

3. Apply genuine silicone RTV or equivalent refer to GI section to the transmission case adapter plate mounting surface as shown in the figure.

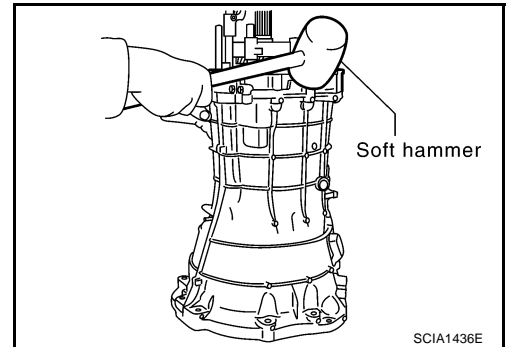
**CAUTION:**

**Complete remove all moisture and oil, etc., from the transmission case and adapter plate mounting surfaces.**

4. Install magnet to adapter plate.



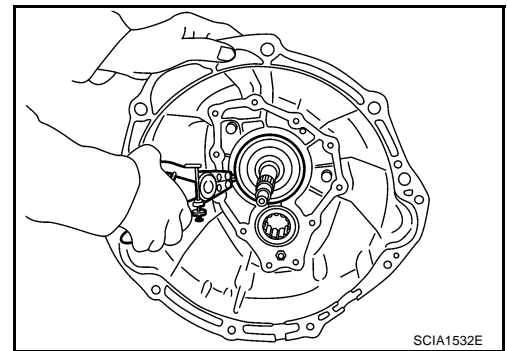
5. Place the adapter plate in the transmission case, using a plastic hammer to tap the adapter plate to install it into the transmission case.



6. Install snap ring to main drive gear bearing, using snap ring pliers.

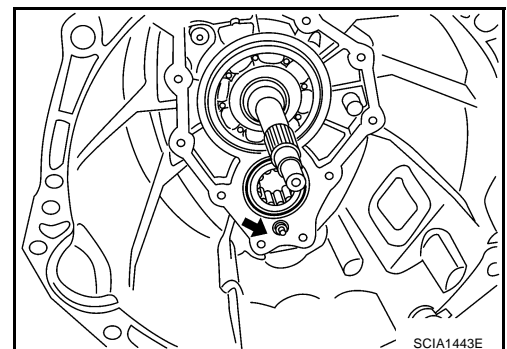
**CAUTION:**

**Snap rings are not reusable. Never reuse them.**



7. Tighten baffle plate mounting nut to the specified torque.

**4.9 - 5.6 N-m (0.50 - 0.57 kg-m, 44 - 49 in-lb)**





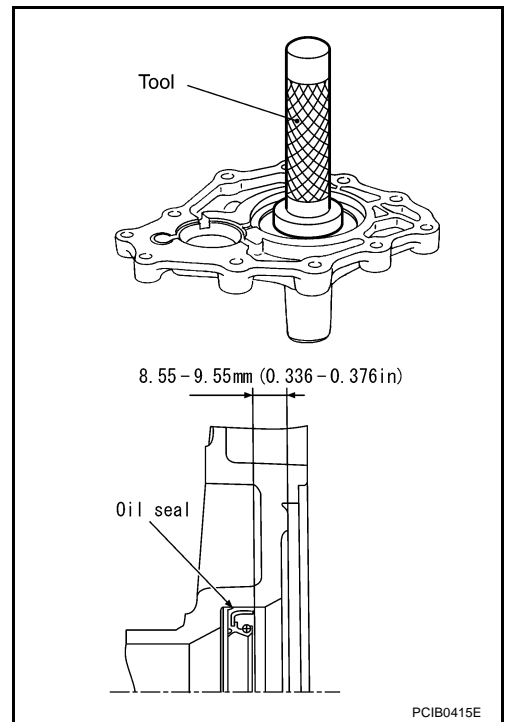
# TRANSMISSION ASSEMBLY

8. Apply multi-purpose grease to the lip of the oil seal. Using a drift, to install oil seal approx. 8.55-9.55 mm (0.336-0.376 in) above from the front cover edge surface.


**Tool number : KV38102100 (J25803-01)**

**CAUTION:**

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



9. Install washer to withdrawal lever ball pin, and install it to front cover. Tighten withdrawal lever ball pin to the specified torque.

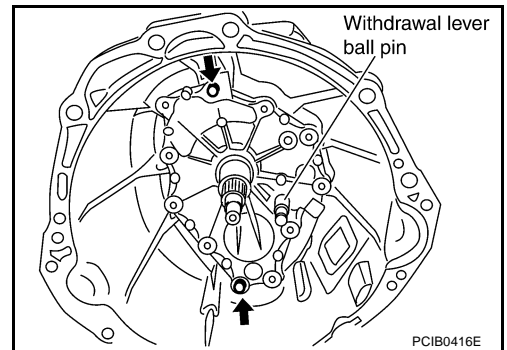
 : 38 - 41 N·m (3.9 - 4.1 kg-m, 28 - 30 ft-lb)

10. Install front cover gasket and front cover to transmission case.

**CAUTION:**

**Gasket is not reusable, Never reuse them.**

11. Temporary tightening 2 bolts in the positions shown in the figure.

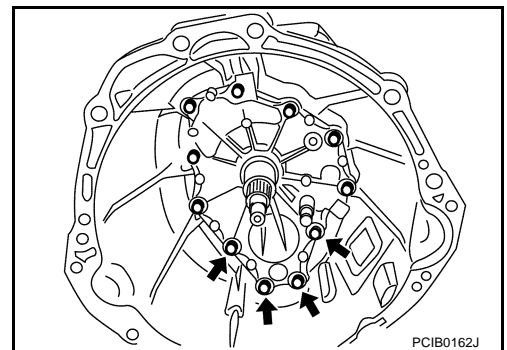


12. Temporary tightening remaining 9 bolts, tighten them to the specified torque.

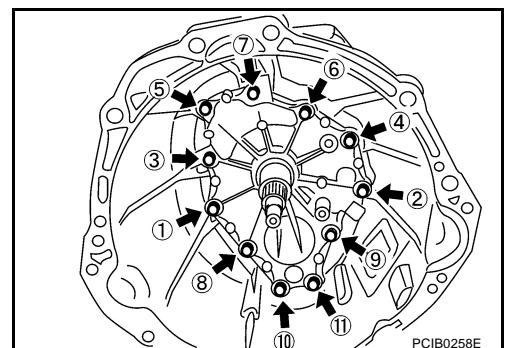
 : 16 - 20 N·m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)

**CAUTION:**

**Four bolts pointed by arrows in the figure are not reusable.**



13. Tighten bolts to the specified torque in order as shown on the figure.



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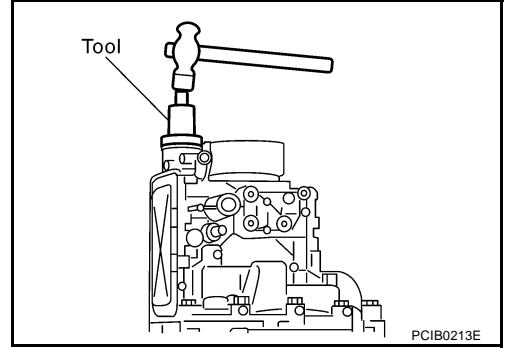
# TRANSMISSION ASSEMBLY

14. Install rear extension oil gutter to rear extension, and then tighten bolt to specified torque.
15. Install reverse idler shaft, reverse idler needle bearing, reverse idler gear, reverse thrust washer to adapter plate.
16. Apply multi-purpose grease to the lip of the control shaft oil seal. Using the drift, to install control shaft oil seal.

**Tool number** : ST35291000 ( — )

**CAUTION:**

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

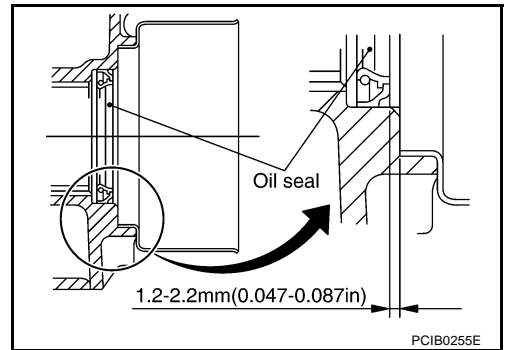


17. Apply multi - purpose grease to the lip of the rear oil seal. Using a drift, to install rear oil seal. 1.2-2.2 mm (0.047-0.087 in) above from the rear extension edge surface.

**Tool number** : ST33400001 (J26082)

**CAUTION:**

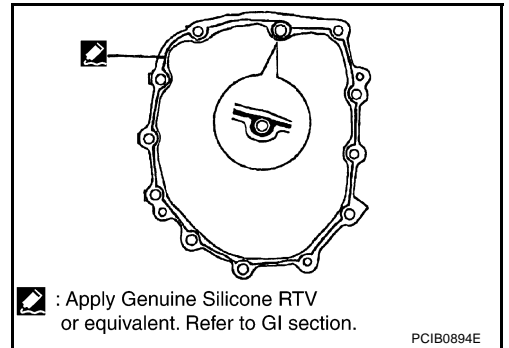
- Rear oil seals are not reusable. Never reuse them.
- When installing, do not incline the rear oil seal.



18. Place shift forks in neutral position.
19. Apply genuine silicone RTV or equivalent refer to GI section to the adapter plate rear extension mounting surface as shown in the figure.

**CAUTION:**


**Completely remove all moisture, oil, etc., from the adapter plate and rear extension mounting surfaces.**

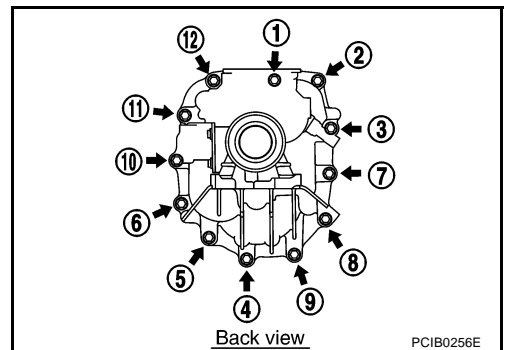


20. Install extension case to transmission case, tighten mounting bolts to the specified torque in order as shown on the figure.

 : 24 - 31 N-m (2.5 - 3.1 kg-m, 18 - 22 ft-lb)

21. Install control lever housing to rear extension, and then mounting bolts to specified torque.


 : 17 - 22 N-m (1.8 - 2.2 kg-m, 13 - 16 ft-lb)



# TRANSMISSION ASSEMBLY

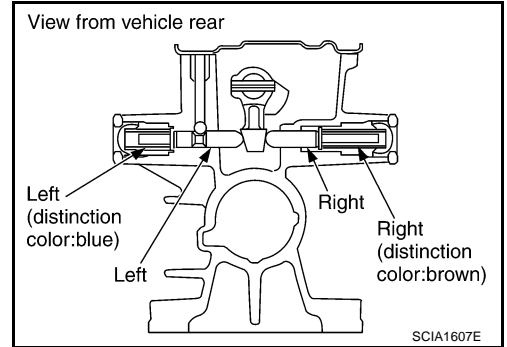
22. Insert return spring and plunger into the rear extension, apply genuine silicone RTV or equivalent refer to GI section to the return spring plug threads, and then tighten to the specified torque.

	Return spring identification mark	Plunger notch
RH	Brown	No
LH	Blue	Yes

 : 20 - 29 N·m (2.1 - 2.9 kg-m, 15 - 21 ft-lb)

**CAUTION:**

The right and left return springs and plungers are different, so make sure they are installed correctly.

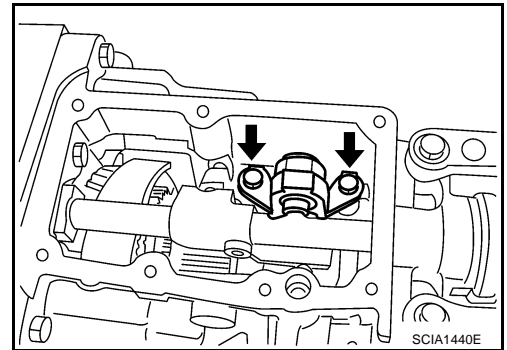


23. Install shift check pin as a one unit with the control bracket to rear extension, and then mounting bolts to specified torque.

 : 8.4 - 9.7 N·m (0.86 - 0.98 kg-m, 75 - 85 in-lb)

24. After screwing plunger neutral switch and reverse switch to rear extension with 1-2 pitches, apply genuine silicone RTV or equivalent refer to GI section to the switch threads, and tighten them to the specified torque.

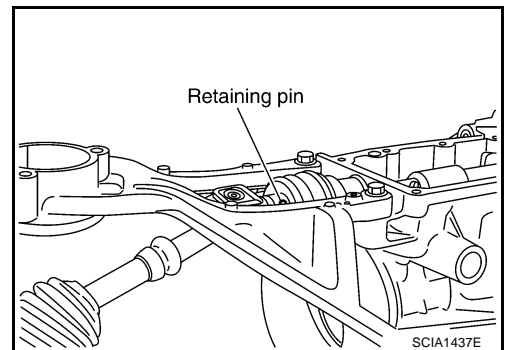
 : 23 - 33 N·m (2.4 - 3.3 kg-m, 17 - 24 ft-lb)



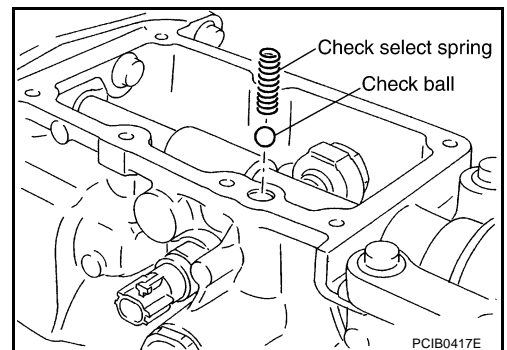
25. Install retaining pin into the control rod, using a pin punch [6 mm (0.24 in) dia.].

**CAUTION:**

Retaining pins are not reusable. Never reuse them.



26. Insert check select spring and check ball into the rear extension.



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## TRANSMISSION ASSEMBLY

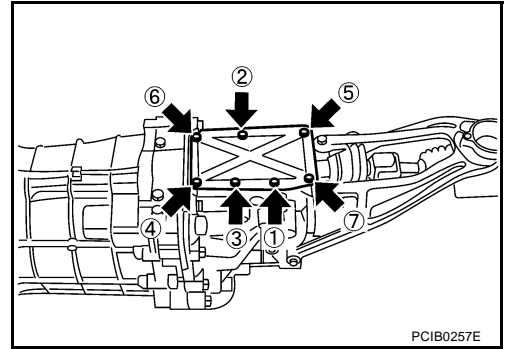
27. Install rear extension upper cover gasket and rear extension upper cover to rear extension.

**CAUTION:**

- Gaskets are not reusable. Never reuse them.
- Avoid tangling check select spring.

28. Tighten rear extension upper cover bolts to specified torque in order as shown on the figure.

 : 5.3 - 7.4 N·m (0.54 - 0.75 kg-m, 47 - 65 in-lb)



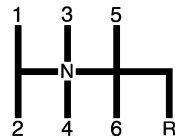
# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### General Specifications

ACS003LJ

Applied model		VQ35DE
Transmission		FS6R31A
Number of speed		6
Shift pattern		 <p style="text-align: center; font-size: small;">SCIA0955E</p>
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
Main gear (Number of teeth)	Drive	26
	1st	37
	2nd	34
	3rd	33
	4th	31
	6th	31
	Reverse	42
Counter 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 (US qt, Imp qt)		Approx. 2.9 (3-1/8, 2-1/2)
Remarks	Reverse synchronizer	Installed
	Double cone synchronizer	1st, 3rd, 4th
	Triple cone synchronizer	2nd

### End Play

ACS003LL

Unit: mm (in)

Item	Standard
Counter gear	0 - 0.1 (0 - 0.004)
Main drive gear	0 - 0.1 (0 - 0.004)

# SERVICE DATA AND SPECIFICATIONS (SDS)

Item	Standard
Main shaft front	0 - 0.1 (0 - 0.004)
Main shaft rear	0 - 0.1 (0 - 0.004)

## Snap Rings

ACS003LM

Unit: mm (in)

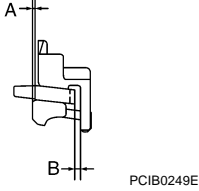
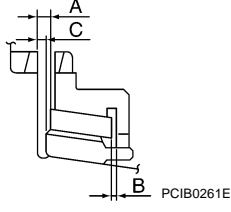
Selective parts	Thickness	Part No.	
Main drive gear	1.89 (0.0744)	32204 01G60	
	1.95 (0.0768)	32204 01G61	
	1.99 (0.0783)	32204 01G62	
	2.03 (0.0799)	32204 01G63	
	2.07 (0.0815)	32204 01G64	
	2.11 (0.0831)	32204 01G65	
Counter shaft	1.96 (0.0772)	32236 CD000	
	2.02 (0.0795)	32236 CD001	
	2.08 (0.0819)	32236 CD002	
	2.14 (0.0843)	32236 CD003	
	2.20 (0.0866)	32236 CD004	
	2.26 (0.0890)	32236 CD005	
	2.32 (0.0913)	32236 CD006	
	2.38 (0.0937)	32236 CD007	
	2.44 (0.0961)	32236 CD008	
	2.50 (0.0984)	32236 CD009	
	2.56 (0.1008)	32236 CD010	
2.62 (0.1031)	32236 CD011		
Main shaft	Front side	2.08 (0.0819)	32204 CD000
		2.14 (0.0843)	32204 CD001
		2.20 (0.0866)	32204 CD002
		2.26 (0.0890)	32204 CD003
	Shaft rear-end	2.08 (0.0819)	32204 CD000
		2.14 (0.0843)	32204 CD001
		2.20 (0.0866)	32204 CD002
		2.26 (0.0890)	32204 CD003
		2.32 (0.0913)	32204 CD004
		2.38 (0.0937)	32204 CD005
		2.44 (0.0961)	32204 CD006
		2.50 (0.0984)	32204 CD007
		2.56 (0.1008)	32204 CD008
		2.62 (0.1031)	32204 CD009
		2.68 (0.1055)	32204 CD010
2.74 (0.1079)	32204 CD011		
2.80 (0.1102)	32204 CD012		
2.86 (0.1126)	32204 CD013		
2.92 (0.1150)	32204 CD014		
2.98 (0.1173)	32204 CD015		

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Baulk Ring Clearance

ACS003LN

Unit: mm (in)

Measurement point	Standard	Limit value
1st & 3rd & 4th (Double - cone synchronizer)	Inner baulk ring clearance "A" Outer baulk ring clearance "B"	A: 0.50 - 0.70 (0.020 - 0.028) B (1st): 1.00 - 1.50 (0.039 - 0.059) B (3rd, 4th): 0.85 - 1.35 (0.033 - 0.053)
		
2nd (Triple - cone synchronizer)	Inner baulk ring clearance "A" Outer baulk ring clearance "B" main gear taper corn clearance "C"	A: 0.60 - 1.30 (0.024 - 0.051) B: 0.85 - 1.35 (0.033 - 0.053) C: 0.70 - 1.25 (0.028 - 0.049)
		
5th & 6th		0.70 - 1.25 (0.028 - 0.049)
Reverse		0.75 - 1.20 (0.030 - 0.047)

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# SERVICE DATA AND SPECIFICATIONS (SDS)

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