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# SECTION **MT**

## MANUAL TRANSMISSION

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# PRECAUTIONS

[FS5R30A]

## PRECAUTIONS

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### Service Notice or Precautions

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- Do not reuse transmission oil once it has been drained.
- Check oil level or replace oil with vehicle on level surface.
- 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 matching marks are required, be certain they do not interfere with the function of the parts they are applied to.
- In principle, tighten nuts and bolts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, use it.
- Be careful not to damage sliding surfaces and mating surfaces.

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# PREPARATION

**[FS5R30A]**

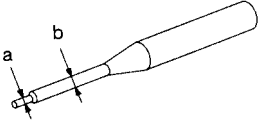
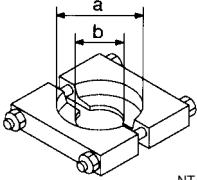
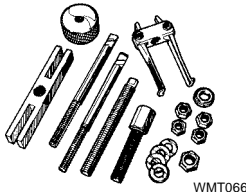
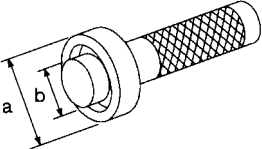
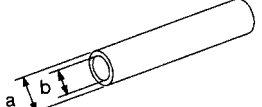
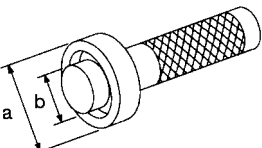
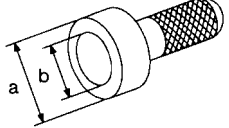
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## PREPARATION

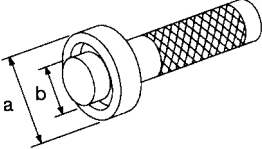
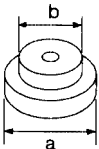
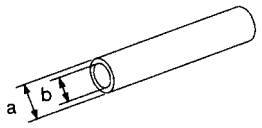
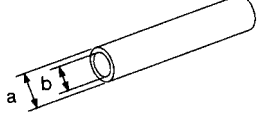
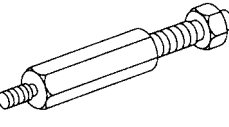
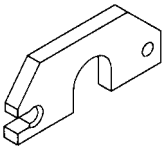
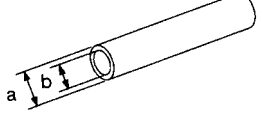
### Special Service Tools

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
ST23540000 (J-25689-A) Pin punch	Removing and installing retaining pin <b>a: 2.3 mm (0.091 in) dia.</b> <b>b: 4 mm (0.16 in) dia.</b>
 <p style="text-align: center;">NT442</p>	
ST30031000 (J-22912-01) Puller	<ul style="list-style-type: none"> <li>● Removing 1st and 2nd synchronizer assembly</li> <li>● Removing counter gear rear thrust bearing</li> <li>● Removing main drive bearing</li> <li>● Inspecting baulk ring wear</li> </ul> <b>a: 90 mm (3.54 in) dia.</b> <b>b: 50 mm (1.97 in) dia.</b>
 <p style="text-align: center;">NT411</p>	
ST33290001 (J-34286) Puller	Removing rear oil seal
 <p style="text-align: center;">WMT066</p>	
ST33230000 ( — ) Drift	Removing counter gear <b>a: 51 mm (2.01 in) dia.</b> <b>b: 28.5 mm (1.122 in) dia.</b>
 <p style="text-align: center;">NT084</p>	
ST22350000 (J-25678-01) Drift	Removing counter gear front bearing (Use with KV38100300) <b>a: 34 mm (1.34 in) dia.</b> <b>b: 28 mm (1.10 in) dia.</b>
 <p style="text-align: center;">NT065</p>	
KV38100300 (J-25523) Drift	<ul style="list-style-type: none"> <li>● Removing counter gear front bearing (Use with ST22350000)</li> <li>● Installing counter gear rear bearing</li> </ul> <b>a: 54 mm (2.13 in) dia.</b> <b>b: 32 mm (1.26 in) dia.</b>
 <p style="text-align: center;">NT084</p>	
ST30720000 1. ( — ) 2. (J-25405) Drift	<ul style="list-style-type: none"> <li>● Removing and installing mainshaft front bearing</li> <li>● Installing rear oil seal</li> </ul> <b>a: 77 mm (3.03 in) dia.</b> <b>b: 55.5 mm (2.185 in) dia.</b>
 <p style="text-align: center;">NT115</p>	

# PREPARATION

[FS5R30A]

Tool number (Kent-Moore No.) Tool name	Description
ST33210000 1. (J-25523) 2. (J-25803-01) Drift	 ● Installing counter gear front bearing ● Installing front cover oil seal <b>a: 44 mm (1.73 in) dia.</b> <b>b: 24.5 mm (0.965 in) dia.</b>
ST30613000 (J-25742-3) Drift	 Installing main drive gear bearing <b>a: 72 mm (2.83 in) dia.</b> <b>b: 48 mm (1.89 in) dia.</b>
ST37750000 1. (J-25863-01) 2. (J-34332) 3. (J-34334) 4. (J-25679-01) Drift	 ● Removing counter gear rear bearing ● Installing OD gear bushing ● Installing reverse cone ● Installing reverse counter gear ● Installing counter gear rear end bearing <b>a: 40 mm (1.57 in) dia.</b> <b>b: 31 mm (1.22 in) dia.</b>
ST22452000 (J-34337) Drift	 Installing reverse synchronizer hub <b>a: 45 mm (1.77 in) dia.</b> <b>b: 36 mm (1.42 in) dia.</b>
— (J-26349-3) Puller leg	 Installing mainshaft and counter gear (Use with J-34328)
— (J-34328) Puller	 Installing mainshaft and counter gear (Use with J-26349-3)
— (J-34342) Drift	 ● Installing OD main gear ● Installing reverse gear bushing <b>a: 44.5 mm (1.752 in) dia.</b> <b>b: 40.5 mm (1.594 in) dia.</b>

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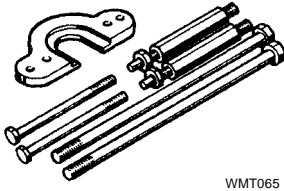
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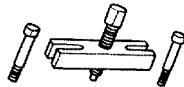
# PREPARATION

[FS5R30A]

Tool number (Kent-Moore No.) Tool name	Description
— (J-26349-A) Bearing Remover and Installer Set	Removing and installing mainshaft rear bearing (Use with J-25726-B)
— (J-25726-B) Puller	Removing and installing mainshaft rear bearing (Use with J-26349-A)



WMT065

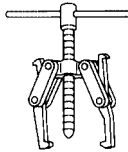


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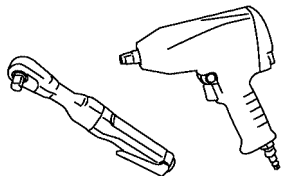
## Commercial Service Tool

UCS003ZG

Tool name	Description
Puller	<ul style="list-style-type: none"> <li>● Removing counter gear rear end bearing</li> <li>● Removing reverse synchronizer hub</li> <li>● Removing reverse cone</li> <li>● Removing reverse gear bushing</li> <li>● Removing reverse counter gear</li> </ul>
Power tool	Loosening bolts and nuts



NT077



PBIC0190E

# NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

[FS5R30A]

## NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

### NVH Troubleshooting Chart

UCS003ZH

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

Reference page	<u>MT-9</u>			<u>MT-17</u>			<u>MT-23</u>			<u>MT-19</u>		
SUSPECTED PARTS (Possible cause)	OIL (Level low)	OIL (Wrong)	OIL (Level too high)	GASKET (Damaged)	OIL SEAL (Worn or damaged)	O-RING (Worn or damaged)	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)
Symptom	Noise	1	2						3	3		
	Oil leakage		3	1	2	2	2					
	Hard to shift or will not shift		1	1							2	2
	Jumps out of gear							1	2	2		

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# DESCRIPTION

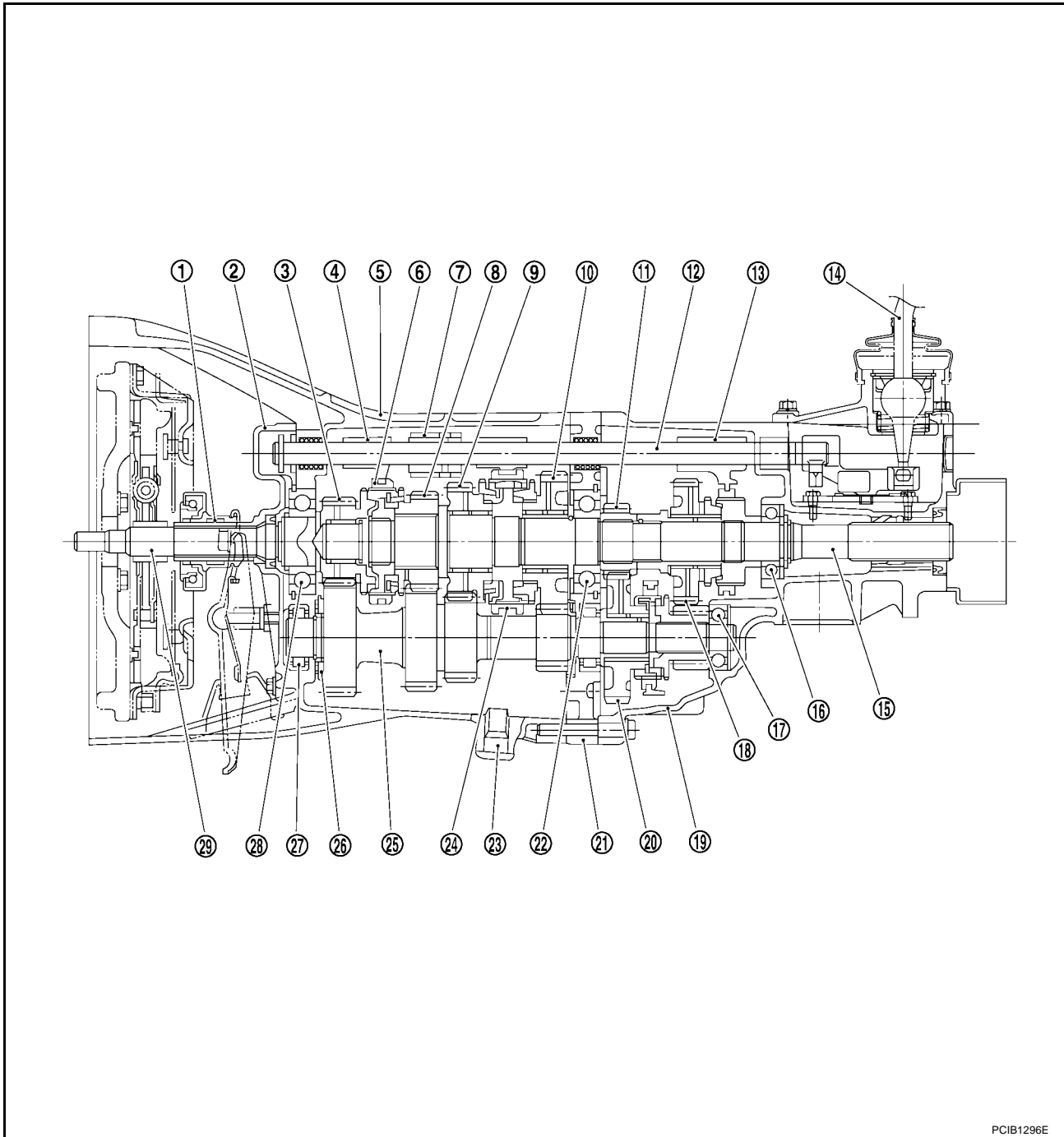
[FS5R30A]

## DESCRIPTION

PFP:00000

### Description CROSS-SECTIONAL VIEW

UCS003Z1



PCIB1296E

- |                             |                                   |                                 |
|-----------------------------|-----------------------------------|---------------------------------|
| 1. Release bearing sleeve   | 2. Front cover                    | 3. Main drive gear              |
| 4. 3rd and 4th shift fork   | 5. Transmission case              | 6. 3rd and 4th coupling sleeve  |
| 7. Striking interlock       | 8. 3rd main gear                  | 9. 2nd main gear                |
| 10. 1st main gear           | 11. OD main gear                  | 12. Striking rod                |
| 13. Reverse shift fork      | 14. Shift lever                   | 15. Mainshaft                   |
| 16. Mainshaft rear bearing  | 17. Counter gear rear end bearing | 18. Reverse main gear           |
| 19. Rear extension          | 20. OD counter gear               | 21. Adapter plate               |
| 22. Mainshaft front bearing | 23. Drain plug                    | 24. 1st and 2nd coupling sleeve |
| 25. Counter gear            | 26. Sub-gear bracket              | 27. Counter gear front bearing  |
| 28. Main gear bearing       | 29. Main drive gear               |                                 |



M/T OIL

PFM:KLD20

UCS0040V

Changing DRAINING

1. Start the engine and let it run to warm up the transmission.
2. Stop the engine. Remove the transmission drain plug and drain the oil.
3. Set a gasket on the drain plug and install it to the transmission. Tighten the drain plug to the specified torque. Refer to [MT-17, "CASE COMPONENTS"](#) .

**CAUTION:**  
Do not reuse gasket.

FILLING

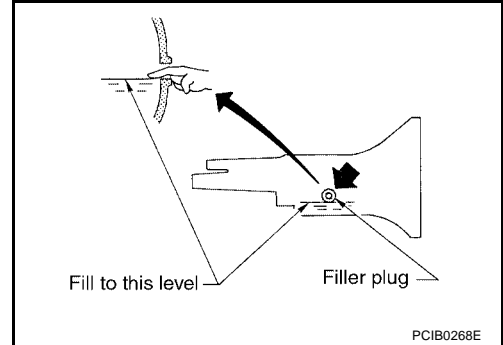
1. Remove the filler plug. Fill with new oil until oil level reaches the specified limit near the filler plug hole.

**Oil grade and Viscosity:**  
Refer to [MA-11, "Fluids and Lubricants"](#) .

**Oil capacity:**  
Refer to [MA-11, "Fluids and Lubricants"](#) .

2. After refilling the oil, check oil level. Set a gasket to the filler plug, then install it to the transmission. Tighten the filler plug to the specified torque. Refer to [MT-17, "CASE COMPONENTS"](#) .

**CAUTION:**  
Do not reuse gasket.



Checking OIL LEAKAGE AND OIL LEVEL

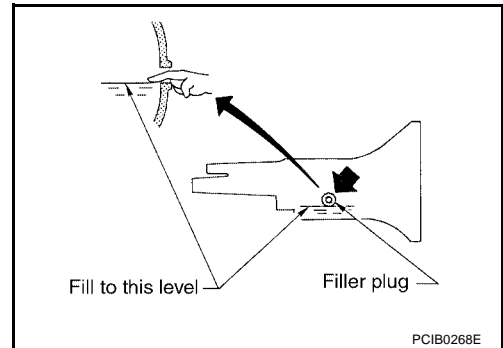
UCS0040W

1. Make sure that oil is not leaking from the transmission or around it.
2. Check oil level from the filler plug hole as shown.

**CAUTION:**  
Do not start engine while checking oil level.

3. Set a gasket on the filler plug and install it to the transmission. Tighten the filler plug to the specified torque. Refer to [MT-17, "CASE COMPONENTS"](#) .

**CAUTION:**  
Do not reuse gasket.



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## REAR OIL SEAL

### Removal and Installation

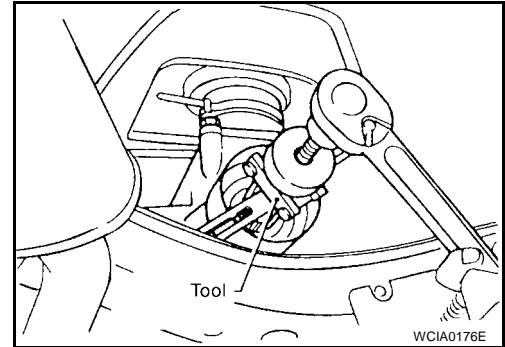
#### REMOVAL

1. Remove the rear propeller shaft. Refer to [PR-10, "Removal and Installation"](#).
2. Remove the rear oil seal using Tool.

**Tool number** : ST33290001 (J-34286)

**CAUTION:**

Do not reuse rear oil seal.



#### INSTALLATION

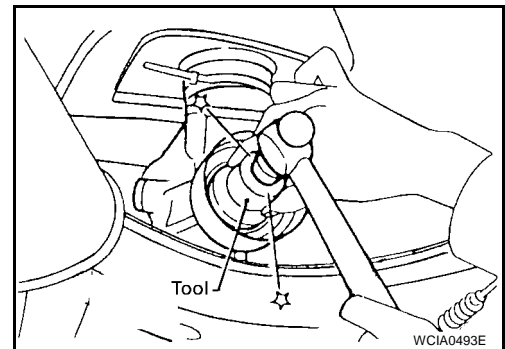
Installation is the reverse order of removal.

- Drive the new oil seal straight until it stops using Tool.

**Tool number** : ST30720000 (J-25405)

**CAUTION:**

- Do not reuse rear oil seal.
  - Apply multi-purpose grease to oil seal lips before installing.
  - Do not incline rear oil seal during installation.
- Check the transmission oil level after installation. Refer to [MT-9, "Checking"](#).

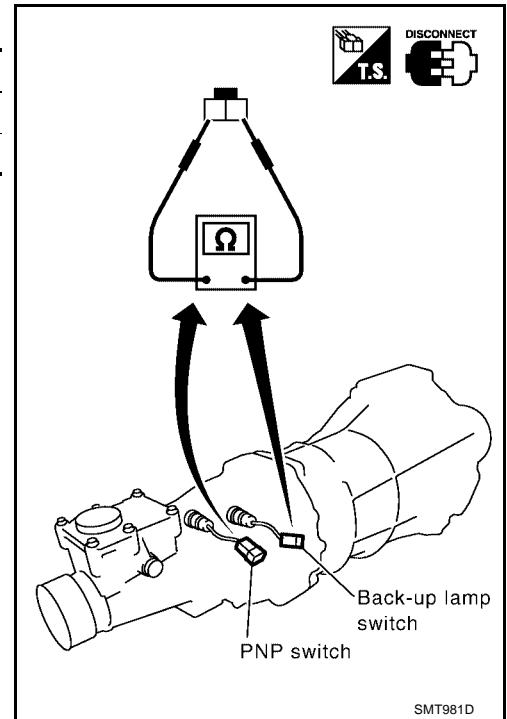


## POSITION SWITCH

### Checking BACK-UP LAMP SWITCH

- Check continuity.

Gear position	Continuity
Reverse	Yes
Except reverse	No



### PARK/NEUTRAL POSITION SWITCH

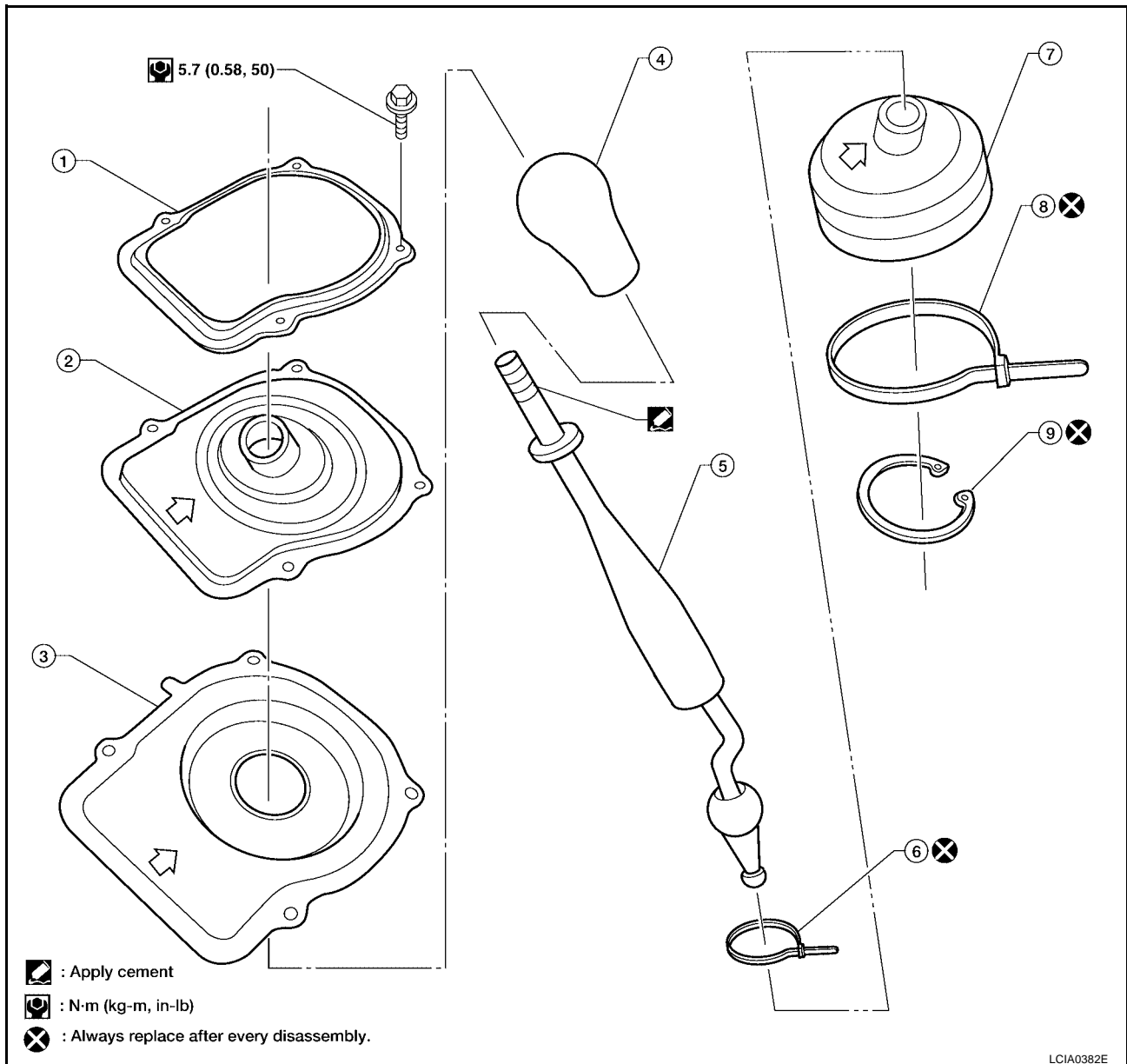
- Check continuity.

Gear position	Continuity
Neutral	Yes
Except neutral	No

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## SHIFT CONTROL

### Removal and Installation COMPONENTS



- |                    |                            |                            |
|--------------------|----------------------------|----------------------------|
| 1. Retaining plate | 2. Dust boot cover (upper) | 3. Dust boot cover (lower) |
| 4. Shift knob      | 5. Shift lever assembly    | 6. Clip (A)                |
| 7. Boot            | 8. Clip (B)                | 9. Snap ring               |

### REMOVAL

1. Remove the shift knob.
2. Remove the cup holder finisher and shift bezel. Refer to [IP-10, "Removal and Installation"](#).
3. Remove the retaining plate and dust boot covers.
4. Remove the clip (B) and then separate the boot from the control housing.
5. Remove the snap ring.
6. Remove the shift lever assembly from the transmission.

### INSTALLATION

Installation is the reverse order of removal.

# SHIFT CONTROL

[FS5R30A]

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**CAUTION:**

- Do not reuse the clip and snap ring.
- Apply cement to threads of the shift lever assembly.
- When shift lever assembly is shifted to each position, make sure there is no binding or disconnection in either boot.

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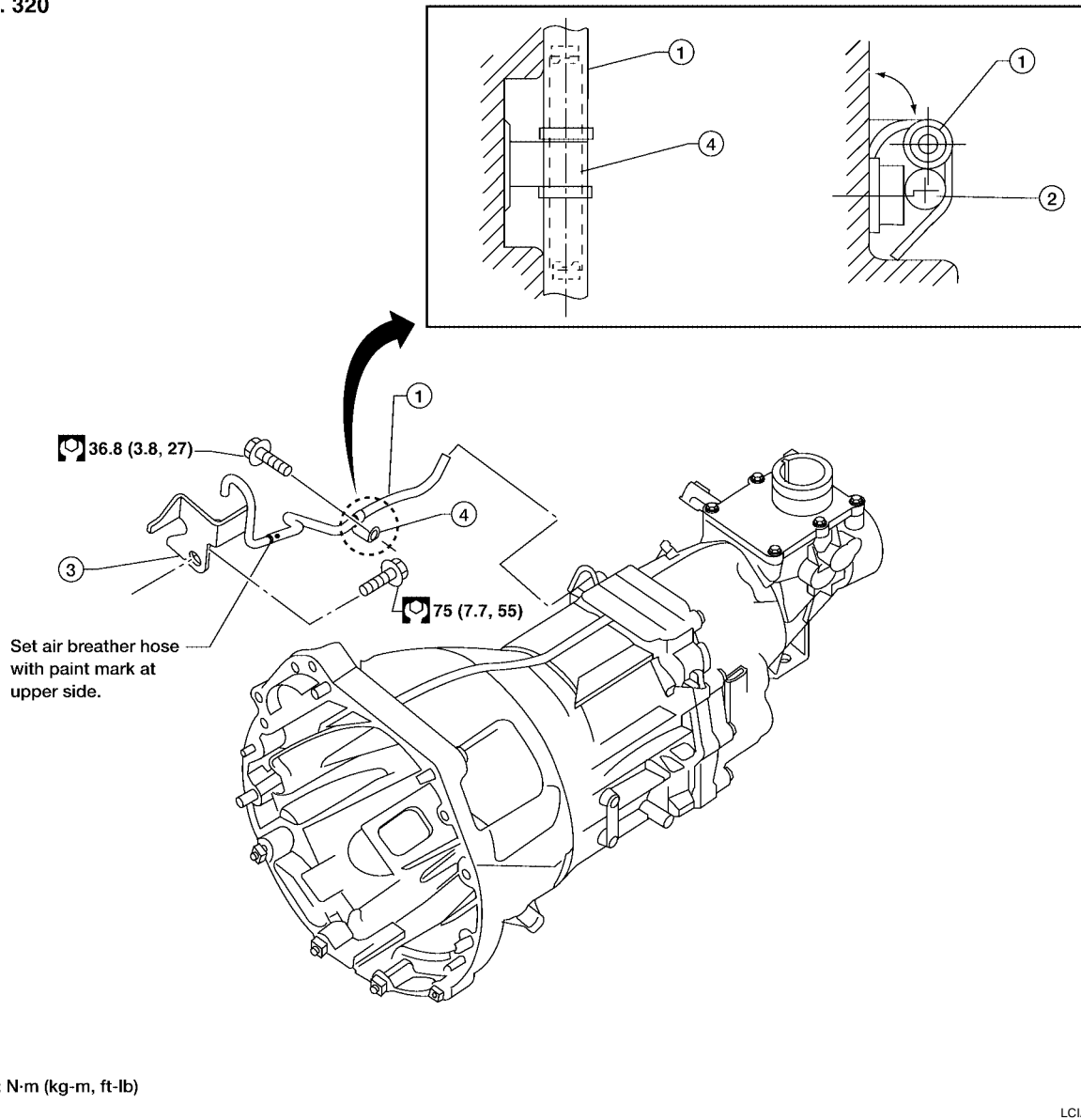
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## AIR BREATHER HOSE

### Removal and Installation

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

SEC. 320



: N·m (kg-m, ft-lb)

LCIA0380E

- 1. Air breather hose
- 2. Harness
- 3. Breather tube
- 4. Clip

#### CAUTION:

- Make sure there are no pinched or blocked areas on the air breather hose after installation.
- When inserting the air breather hose, be sure to insert it fully until its end reaches the end of the tube radius.
- Install the air breather hose with the paint mark side up.
- Install the air breather hose and harness to the clip to prevent separation.
- Push the harness so that it contacts with the interlocking bolt.

# TRANSMISSION ASSEMBLY

[FS5R30A]

## TRANSMISSION ASSEMBLY

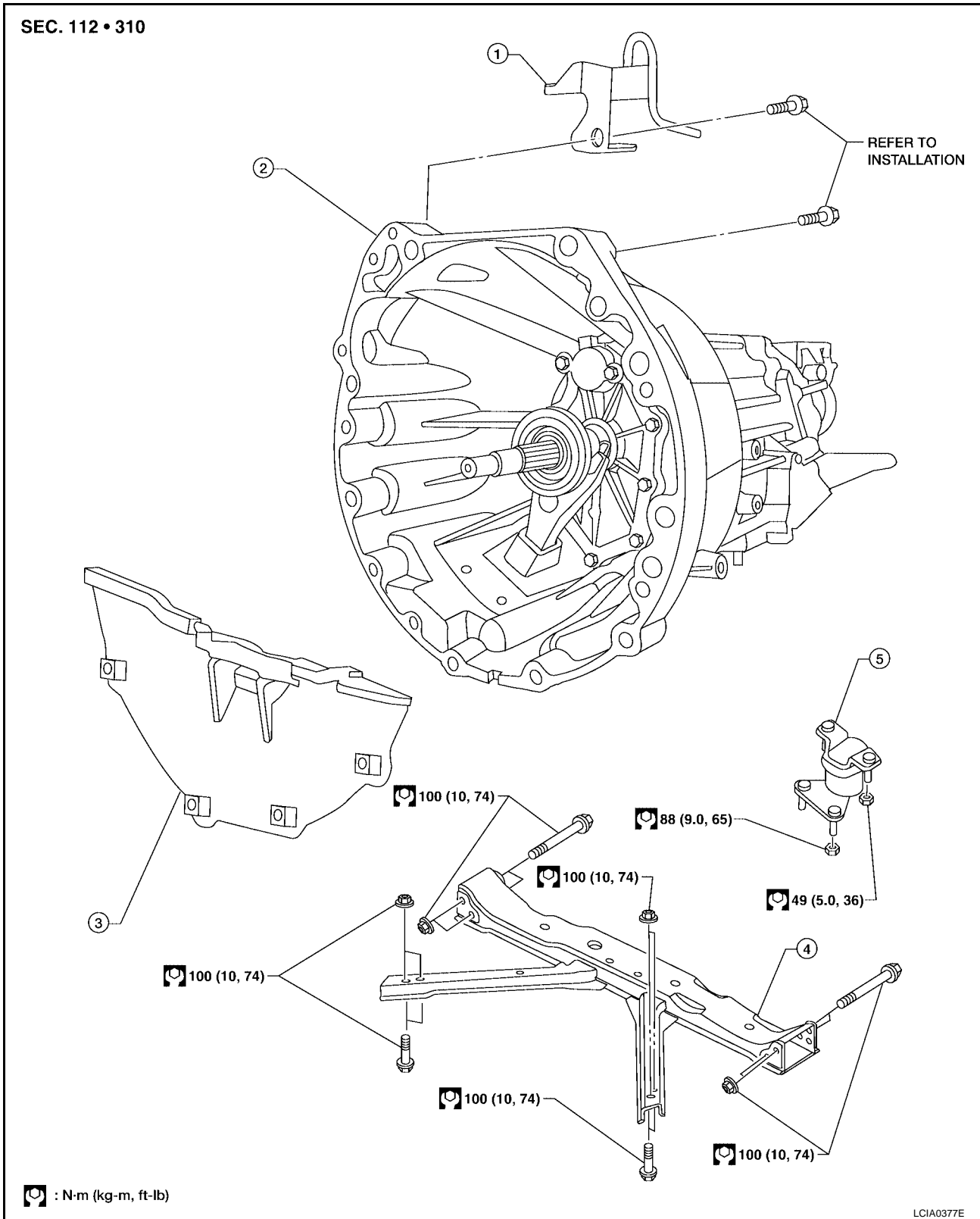
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### Removal and Installation from Vehicle COMPONENTS

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SEC. 112 • 310



- 1. Breather hose
- 2. Transmission assembly
- 3. Dust cover
- 4. Crossmember
- 5. Insulator

## REMOVAL

1. Drain the transmission fluid. Refer to [MT-9, "DRAINING"](#) .
2. Disconnect the battery cable from the negative terminal.
3. Remove the shift lever assembly. Refer to [MT-12, "Removal and Installation"](#) .
4. Remove the rear propeller shaft. Refer to [PR-10, "Removal and Installation"](#) .
5. Remove the gusset.
6. Disconnect the heated oxygen sensor connector and remove wire harness from transmission.
7. Disconnect the back-up lamp switch and park/neutral position (PNP) switch connectors.
8. Remove the clutch operating cylinder from the transmission. Refer to [CL-11, "Removal and Installation"](#) .
9. Remove the starter motor. Refer to [SC-23, "Removal and Installation"](#) .
10. Support the transmission using a suitable jack.
11. Remove the transmission dust cover.
12. Remove the transmission to engine bolts.
13. Remove the nuts securing the insulator to the crossmember.
14. Remove the transmission crossmember using power tool.

**WARNING:**

**Support the transmission using suitable jack.**

15. Remove the air breather hose and breather tube. Refer to [MT-14, "Removal and Installation"](#) .
16. Separate the transmission from the engine and remove it from the vehicle.

**WARNING:**

**Support manual transmission while removing it using suitable jack.**

## INSTALLATION

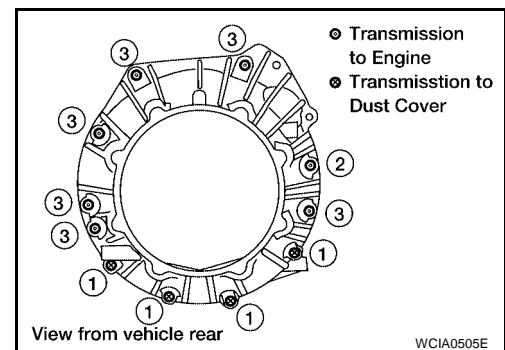
Installation is the reverse order of removal.

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

Bolt No.	1	2	3
Quantity	4	1	6
Bolt length "ℓ" mm (in)	60 (2.36)		65 (2.56)
Tightening torque N·m (kg·m, ft·lb)	34.3 (3.5, 25)		75 (7.7, 55)

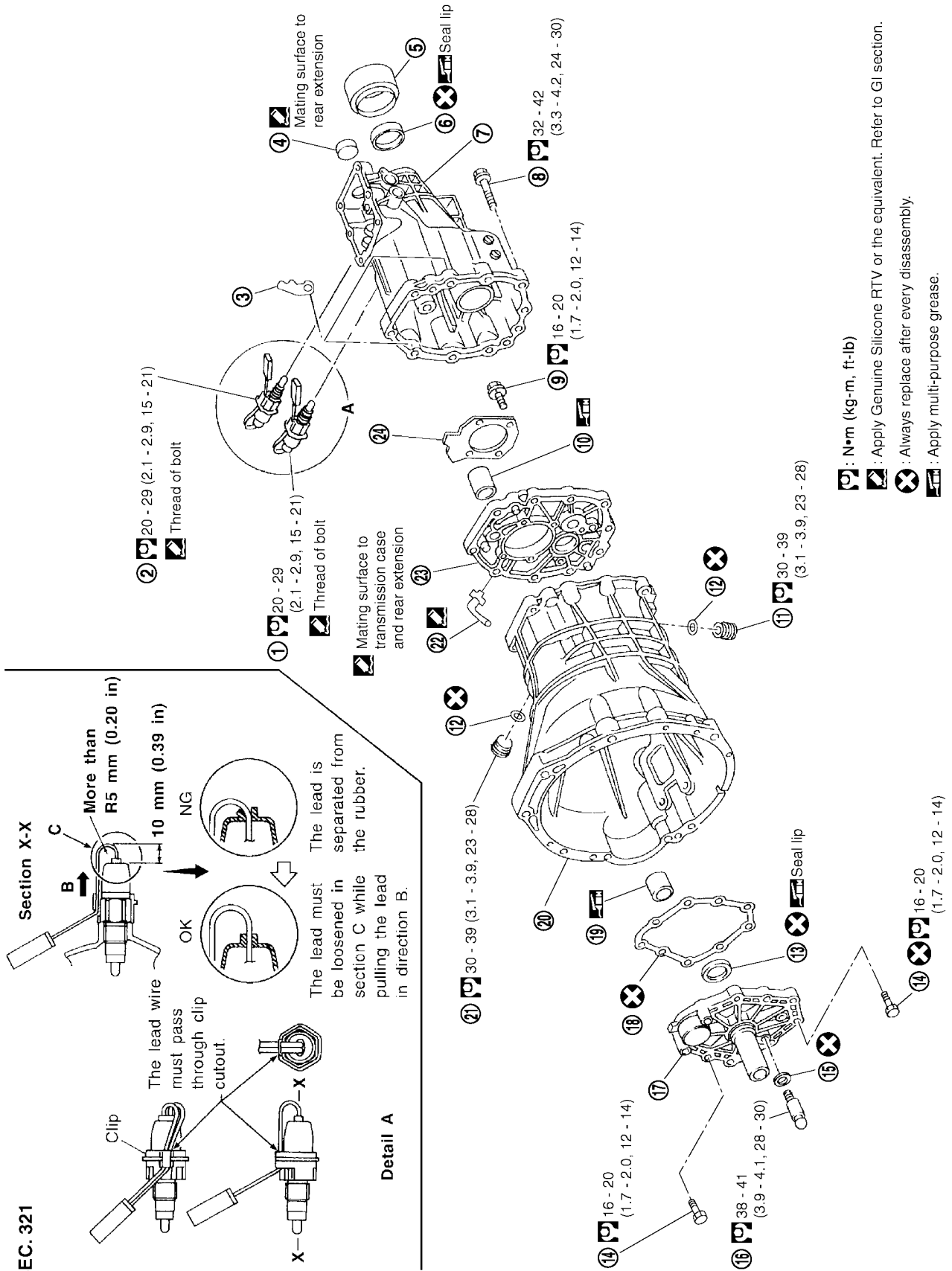
**CAUTION:**

- When installing be careful to avoid interference between transmission main drive gear and clutch cover.
- When replacing an engine or transmission you must make sure the dowels are installed correctly during re-assembly.
- Improper alignment caused by missing dowels may cause vibration oil leaks or breakage of drivetrain components.
- After installation, check for oil leakage and oil level. Refer to [MT-9, "Checking"](#) .





### Overhaul CASE COMPONENTS



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# TRANSMISSION ASSEMBLY

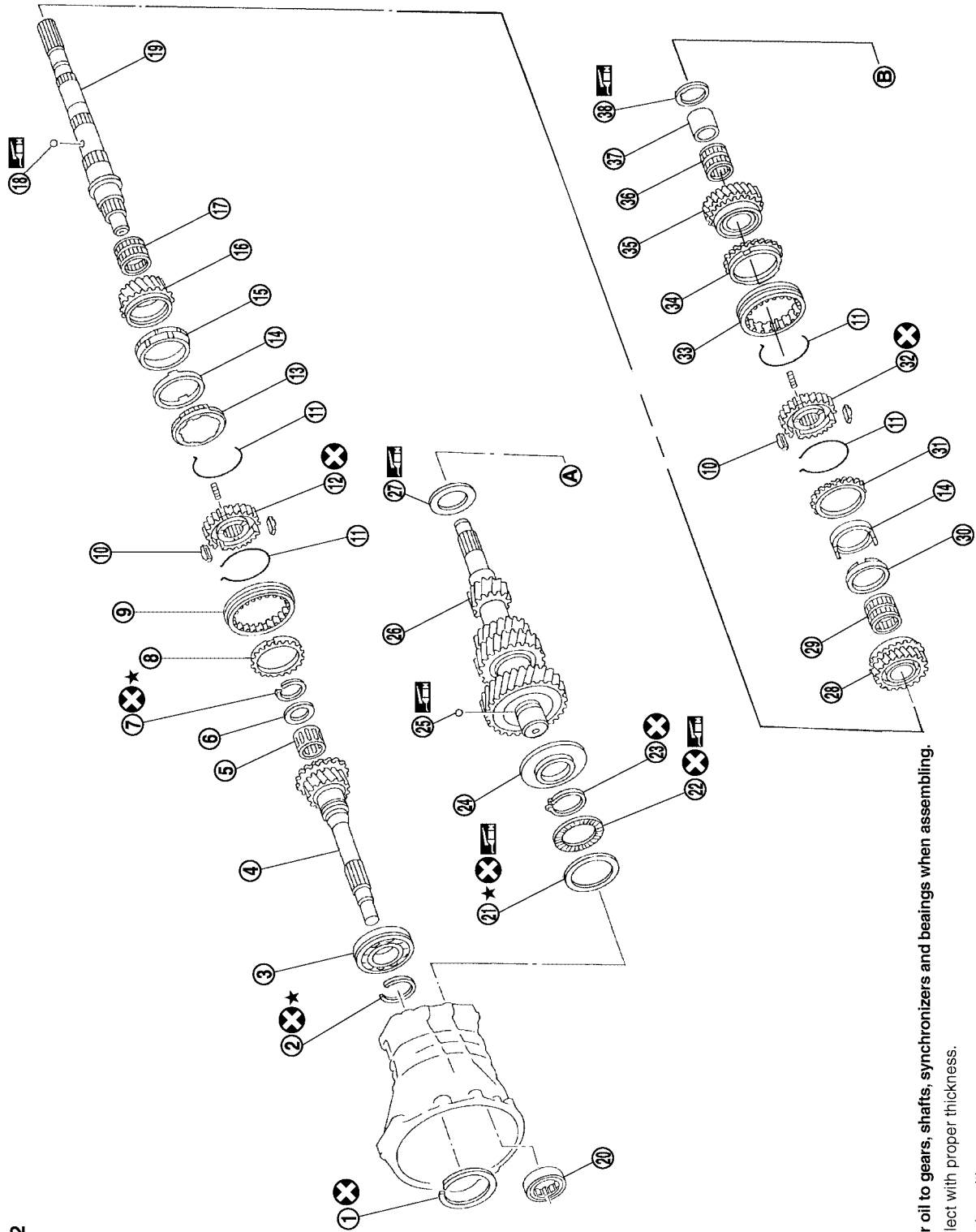
[FS5R30A]

- 
- |                          |                                       |                          |
|--------------------------|---------------------------------------|--------------------------|
| 1. Back-up lamp switch   | 2. Park/neutral position (PNP) switch | 3. Clip                  |
| 4. Plug                  | 5. Dust cover                         | 6. Rear oil seal         |
| 7. Rear extension        | 8. Rear extension bolt                | 9. Bearing retainer bolt |
| 10. Slide ball bearing   | 11. Drain plug                        | 12. Gasket               |
| 13. Front cover oil seal | 14. Front cover bolt                  | 15. Washer               |
| 16. Ball pin             | 17. Front cover                       | 18. Gasket               |
| 19. Slide ball bearing   | 20. Transmission case                 | 21. Filler plug          |
| 22. Air breather         | 23. Adapter plate                     | 24. Bearing retainer     |

# TRANSMISSION ASSEMBLY

[FS5R30A]

## GEAR COMPONENTS



SEC. 322

Apply gear oil to gears, shafts, synchronizers and bearings when assembling.

★ : Select with proper thickness.

: Apply multi-purpose grease.

⊗ : Always replace after every disassembly.

- 1. Main drive gear bearing snap ring
- 2. Main drive gear snap ring
- 3. Main drive gear bearing
- 4. Main drive gear
- 5. Pilot bearing
- 6. Spacer

- 7. Intermediate gear bearing
- 8. Intermediate gear
- 9. Intermediate gear bearing
- 10. Intermediate gear
- 11. Intermediate gear bearing
- 12. Intermediate gear
- 13. Intermediate gear bearing
- 14. Intermediate gear
- 15. Intermediate gear bearing
- 16. Intermediate gear
- 17. Intermediate gear bearing
- 18. Intermediate gear
- 19. Intermediate gear bearing

- 20. Input shaft
- 21. Output shaft
- 22. Input shaft bearing
- 23. Input shaft bearing
- 24. Input shaft bearing
- 25. Input shaft bearing
- 26. Input shaft bearing
- 27. Input shaft bearing
- 28. Input shaft bearing
- 29. Input shaft bearing
- 30. Input shaft bearing
- 31. Input shaft bearing
- 32. Input shaft bearing
- 33. Input shaft bearing
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- 35. Input shaft bearing
- 36. Input shaft bearing
- 37. Input shaft bearing
- 38. Input shaft bearing
- 39. Input shaft bearing

PCIB1282E

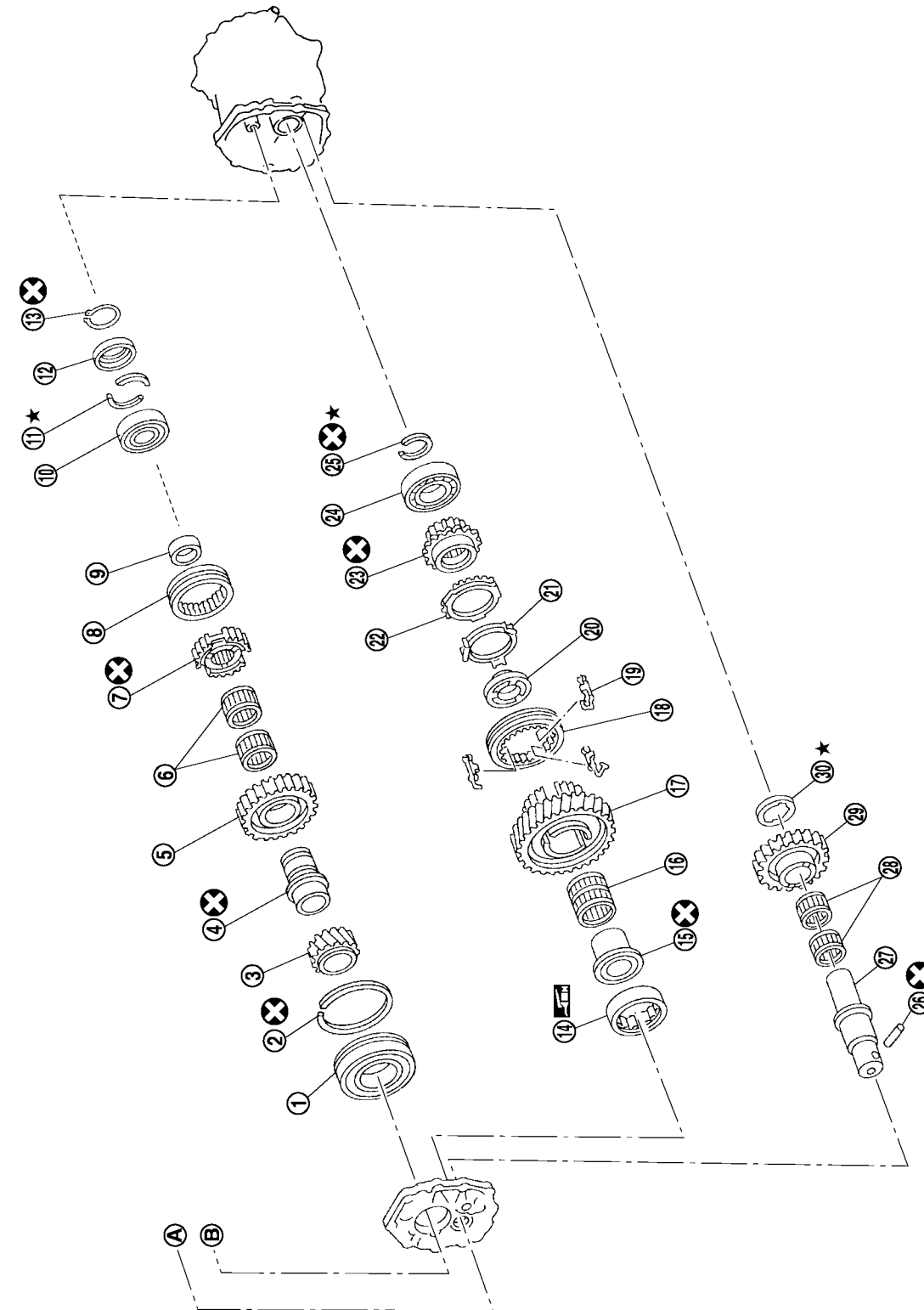
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# TRANSMISSION ASSEMBLY

[FS5R30A]

- 
- |                                       |                                  |                                      |
|---------------------------------------|----------------------------------|--------------------------------------|
| 7. Mainshaft front snap ring          | 8. 4th baulk ring                | 9. 3rd and 4th coupling sleeve       |
| 10. Shifting insert                   | 11. Spread spring                | 12. 3rd and 4th synchronizer hub     |
| 13. 3rd outer baulk ring              | 14. Synchronizer cone            | 15. 3rd inner baulk ring             |
| 16. 3rd main gear                     | 17. 3rd gear needle bearing      | 18. Steel ball (For 1st gear washer) |
| 19. Mainshaft                         | 20. Counter gear front bearing   | 21. Counter gear front bearing shim  |
| 22. Counter gear front thrust bearing | 23. Sub-gear snap ring           | 24. Sub-gear bracket                 |
| 25. Steel ball                        | 26. Counter gear                 | 27. Counter gear rear thrust bearing |
| 28. 2nd main gear                     | 29. 2nd gear needle bearing      | 30. 2nd inner baulk ring             |
| 31. 2nd outer baulk ring              | 32. 1st and 2nd synchronizer hub | 33. 1st and 2nd coupling sleeve      |
| 34. 1st baulk ring                    | 35. 1st main gear                | 36. 1st gear needle bearing          |
| 37. 1st gear bushing                  | 38. 1st gear washer              |                                      |

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SEC. 322

Apply gear oil to gears, shafts, synchronizers and bearings when assembling.

- ★ : Select with proper thickness.
- ⊗ : Always replace after every disassembly.
- ⊠ : Apply multi-purpose grease.

PCIB1283E

- |                             |                                      |                                 |
|-----------------------------|--------------------------------------|---------------------------------|
| 1. Mainshaft front bearing  | 2. Mainshaft front bearing snap ring | 3. OD main gear                 |
| 4. Reverse gear bushing     | 5. Reverse main gear                 | 6. Reverse gear needle bearings |
| 7. Reverse synchronizer hub | 8. Reverse coupling sleeve           | 9. Mainshaft spacer             |

# TRANSMISSION ASSEMBLY

[FS5R30A]

- 
- |                                   |                               |                                   |
|-----------------------------------|-------------------------------|-----------------------------------|
| 10. Mainshaft rear bearing        | 11. Mainshaft C-ring          | 12. C-ring holder                 |
| 13. Mainshaft rear snap ring      | 14. Counter gear rear bearing | 15. OD gear bushing               |
| 16. OD gear needle bearing        | 17. OD counter gear           | 18. OD coupling sleeve            |
| 19. Spring insert                 | 20. Reverse cone              | 21. Reverse baulk ring            |
| 22. OD baulk ring                 | 23. Reverse counter gear      | 24. Counter gear rear end bearing |
| 25. Counter gear rear snap ring   | 26. Retaining pin             | 27. Reverse idler shaft           |
| 28. Reverse idler needle bearings | 29. Reverse idler gear        | 30. Reverse idler thrust washer   |



# TRANSMISSION ASSEMBLY

[FS5R30A]

- 
- |                                 |                                 |                             |
|---------------------------------|---------------------------------|-----------------------------|
| 7. Boot                         | 8. Lower boot retainer          | 9. Control housing bolt     |
| 10. Washer                      | 11. Control housing             | 12. Bushing                 |
| 13. Return spring               | 14. Check ball                  | 15. Select check plunger    |
| 16. Select check spring (small) | 17. Select check spring (large) | 18. Select check plug       |
| 19. Select check spring         | 20. Retaining pin               | 21. Guide plate bolt        |
| 22. Guide plate                 | 23. Striking arm                | 24. O-ring                  |
| 25. Reverse check sleeve        | 26. Reverse check sleeve bolt   | 27. OD rod bracket          |
| 28. OD shift fork               | 29. OD fork rod                 | 30. 1st and 2nd shift fork  |
| 31. Striking interlock          | 32. Striking lever              | 33. 3rd and 4th shift fork  |
| 34. Stopper ring                | 35. Interlock stopper bolt      | 36. Clip                    |
| 37. Interlock stopper           | 38. Striking rod                | 39. OD and reverse fork rod |
| 40. Reverse shift fork          |                                 |                             |



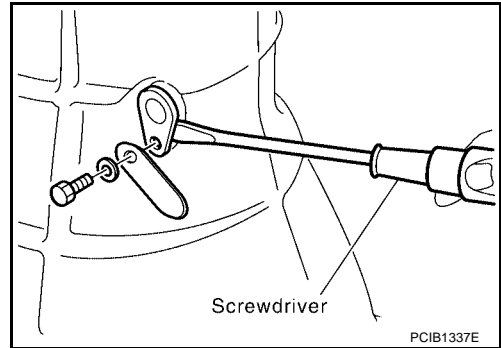
CASE COMPONENTS

PF3:32100

UCS003ZV

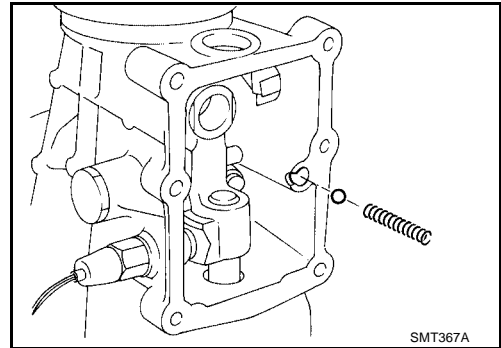
Disassembly

1. Remove interlock stopper bolt, washer and clip and then remove interlock stopper using suitable tool.



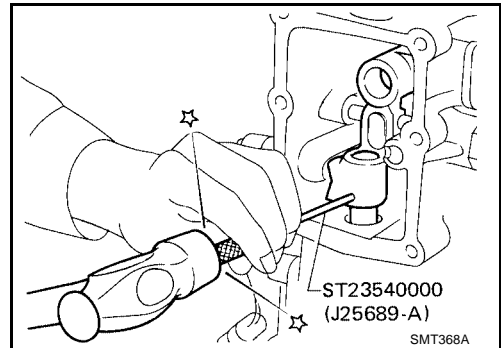
2. Remove control housing, return spring and check ball.

**CAUTION:**  
Do not lose check ball.

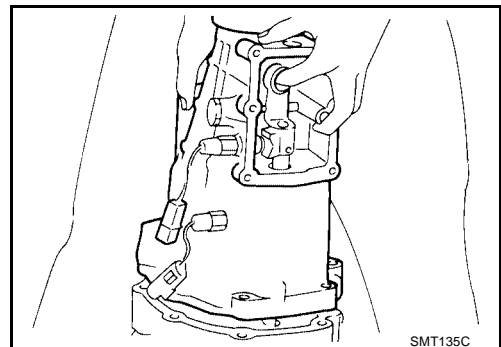


3. Drive out retaining pin from striking arm using Tool.

**Tool number : ST23540000 (J-25689-A)**



4. Remove rear extension together with striking arm by tapping lightly.

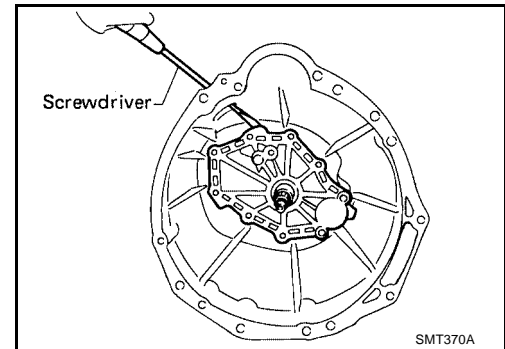


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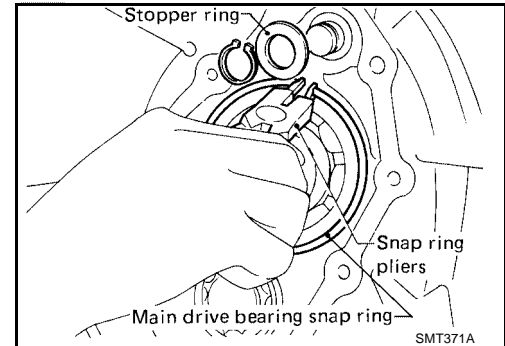
## CASE COMPONENTS

[FS5R30A]

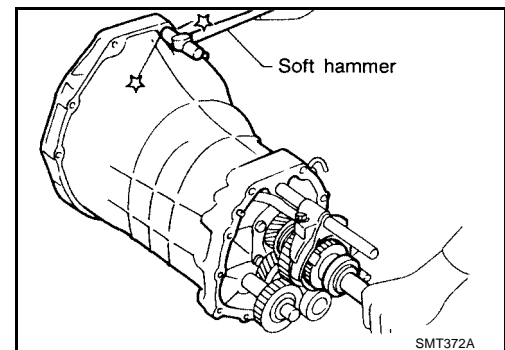
5. Remove front cover and gasket using suitable tool.



6. Remove stopper ring and main drive bearing snap ring using suitable tool.

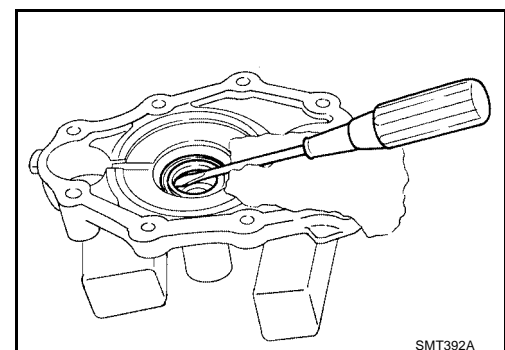


7. Remove transmission case by tapping lightly using suitable tool.  
8. Remove counter gear front bearing shim and counter gear front bearing.



9. Remove front cover oil seal using suitable tool.

**CAUTION:**  
**Do not damage front cover.**



### Assembly

1. Install new front cover oil seal using Tool.

**Tool number : ST33210000 (J-25803-01)**

**CAUTION:**

- Apply multi-purpose grease to seal lip.
- Do not reuse front cover oil seal.

2. Install selected counter gear new front bearing shim onto transmission case.

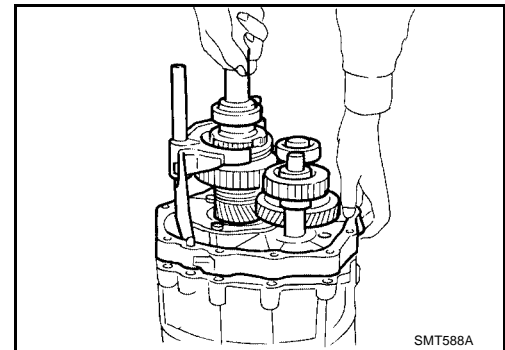
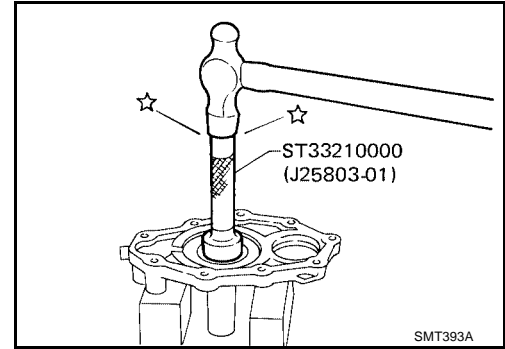
**CAUTION:**

- Apply multi-purpose grease to counter gear front bearing shim and counter gear front bearing.
- Do not reuse counter gear front bearing and counter gear front bearing shim.

3. Apply sealant to mating surface of transmission case.

- Use **Genuine Silicone RTV** or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).

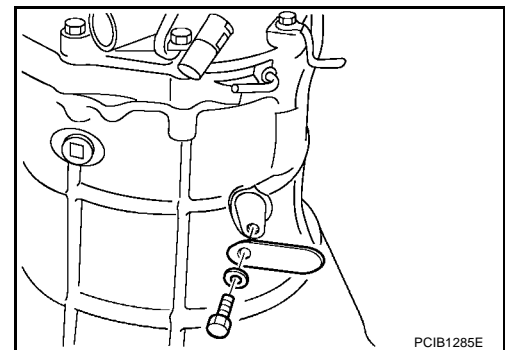
4. Install gear assembly onto transmission case.



5. Install interlock stopper to transmission case.

6. Install clip and washer to interlock stopper bolt, and then install to transmission case. Tighten to the specified torque.

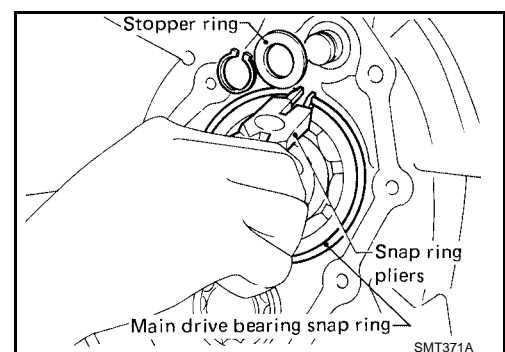
**Interlock stopper bolt : 30 - 39 N·m (3.1 - 3.9 kg·m, 23 - 28 lb·ft)**



7. Install stopper ring, new snap ring and new main drive bearing snap ring using suitable tool.

**CAUTION:**

- Do not reuse the snap rings.



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# CASE COMPONENTS

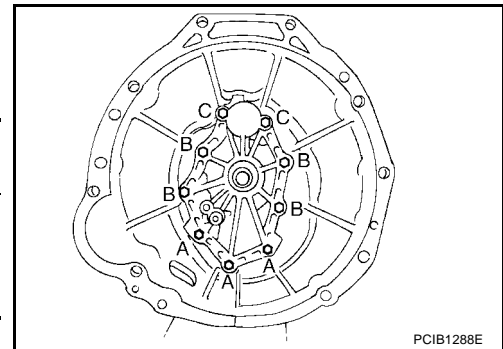
[FS5R30A]

8. Install front cover and gasket.

**CAUTION:**

**Do not reuse bolts indicated as A in the figure.**

Bolt symbol	Bolt length "ℓ" mm (in)	Tightening torque N·m (kg·m, ft·lb)
A	35 (1.38)	16-20 (1.6-2.1, 12-15)
B	30 (1.18)	
C	50 (1.97)	

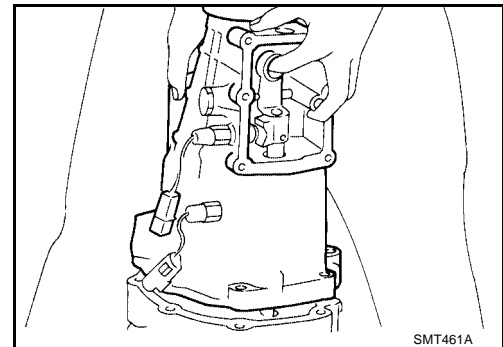


9. Apply sealant to mating surface of adapter plate.

- Use Genuine Silicone RTV or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).

10. Install rear extension together with striking arm.

**Rear extension bolts : 32 - 42 N·m (3.3 - 4.2 kg·m, 24 - 30 lb·ft)**

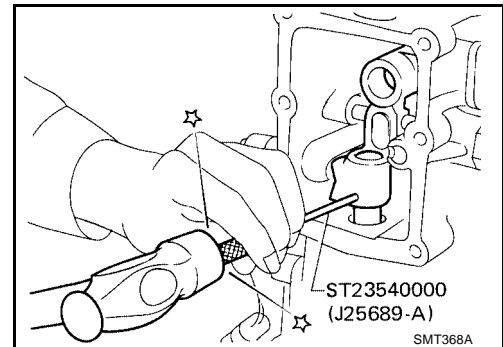


11. Install new retaining pin into striking arm using Tool.

**Tool number : ST23540000 (J-25689-A)**

**CAUTION:**

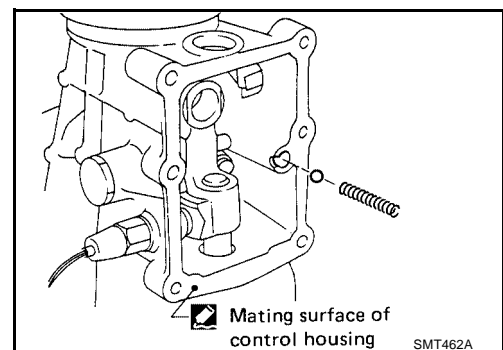
**Do not reuse retaining pin.**



12. Install check ball and return spring.

13. Apply sealant to mating surface of rear extension, and then install control housing.

- Use Genuine Silicone RTV or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).



# CASE COMPONENTS

[FS5R30A]

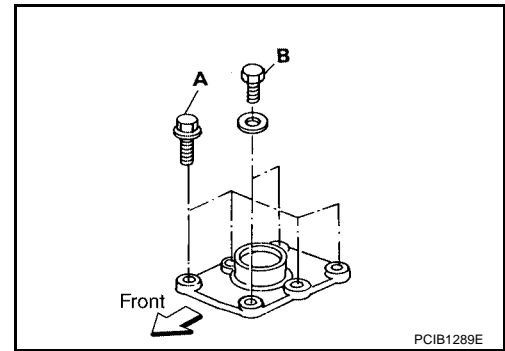
14. Tighten control housing bolts to the specified torque.

**Bolt head size**

**A bolts** : 12 mm (0.47 in)

**B bolts** : 13 mm (0.51 in)

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



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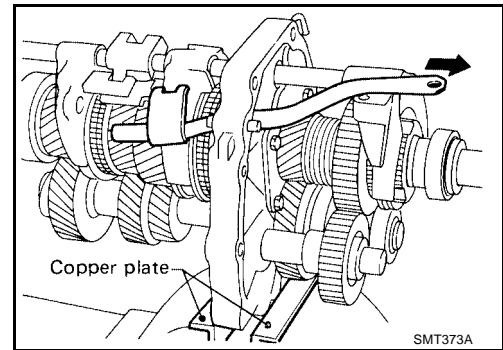
### SHIFT CONTROL COMPONENTS

PFP:32982

UCS003ZP

#### Disassembly

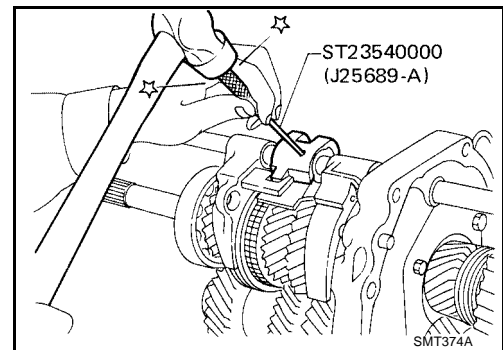
1. Mount adapter plate on vise using copper plates to protect adapter plate.
2. Remove OD and reverse fork rod.



3. Drive out retaining pin from striking lever using Tool.

**Tool number : ST23540000 (J-25689-A)**

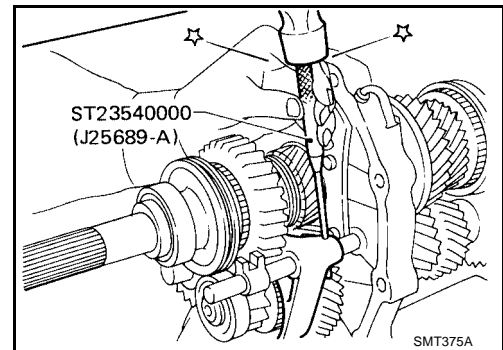
4. While pulling out striking rod, remove striking lever and striking interlock. Then remove 1st and 2nd, 3rd and 4th, and reverse shift forks.



5. Drive out retaining pin from OD shift fork using Tool.

**Tool number : ST23540000 (J-25689-A)**

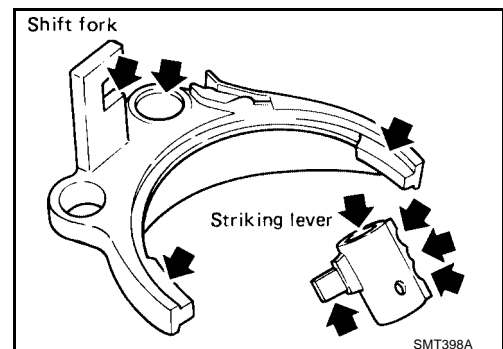
6. Pull out OD fork rod and then remove OD shift fork.



#### Inspection

UCS003ZQ

- Check contact surface and sliding surface for wear, scratches, projections or other damage.

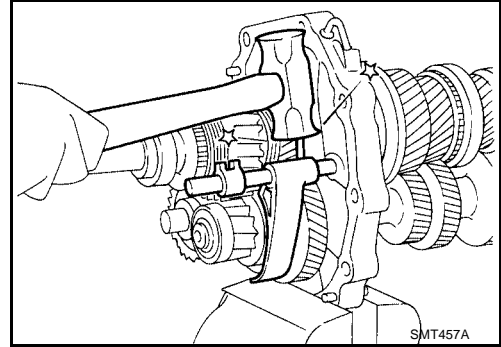


### Assembly

1. Install OD fork rod and OD shift fork. Then install new retaining pin into OD shift fork.

**CAUTION:**

**Do not reuse retaining pin.**



2. Install 1st and 2nd, 3rd and 4th, and reverse shift forks onto coupling sleeve.
3. Install striking rod into hole of shift forks, striking lever and interlock and then install new retaining pin into striking lever using Tool.

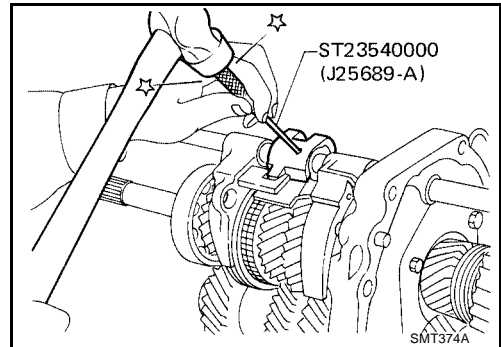
**Tool number : ST23540000 (J-25689-A)**

**CAUTION:**

- Make sure that striking rod moves smoothly.
- Do not reuse retaining pin.

4. Apply sealant to thread of OD and reverse fork rod bolt, and then install OD and reverse fork rod.

**OD and reverse fork rod bolt : 25 - 29 N·m (2.6 - 2.9 kg-m, 19 - 21 lb-ft)**



- Use Genuine Medium Strength Thread Locking Sealant or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).

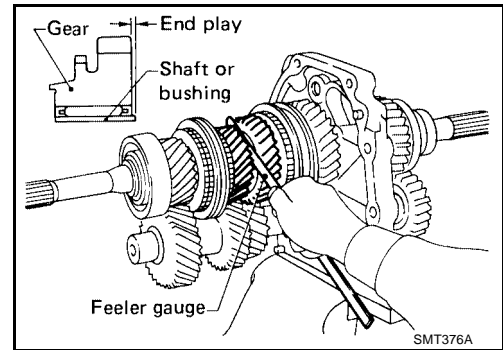
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### GEAR COMPONENTS

#### Disassembly

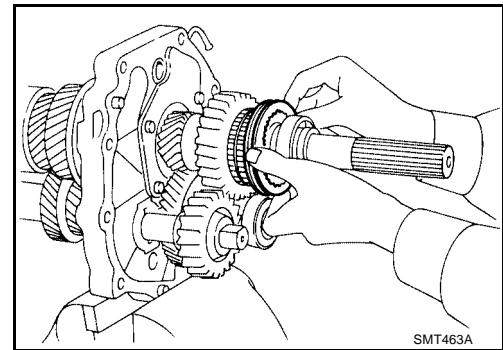
1. Before removing gears and shafts, measure each gear end play. Refer to [MT-48, "Gear End Play"](#).

- If not within specification, disassemble and check contact surface of gear to hub, washer, bushing, needle bearing and shaft.



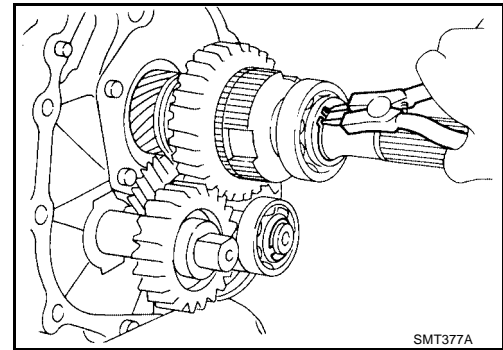
2. Remove rear side components on mainshaft and counter gear.

a. Remove reverse coupling sleeve.



b. Remove mainshaft rear snap ring and counter gear rear snap ring using suitable tool.

c. Remove C-ring holder and mainshaft C-rings from mainshaft using suitable tool.

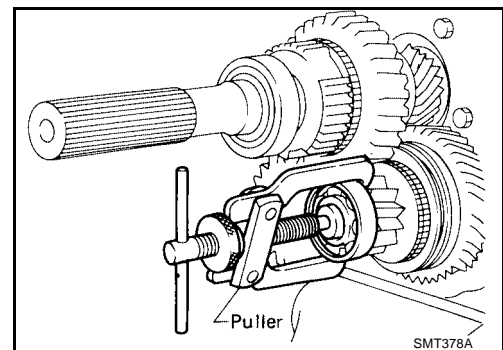


d. Remove counter gear rear end bearing using suitable tool.

e. Remove reverse idler thrust washer, reverse idler gear and reverse idler needle bearings.

f. Remove mainshaft rear bearing using Tools.

**Tool number** : — (J-26349-A)  
 : — (J-25726-B)

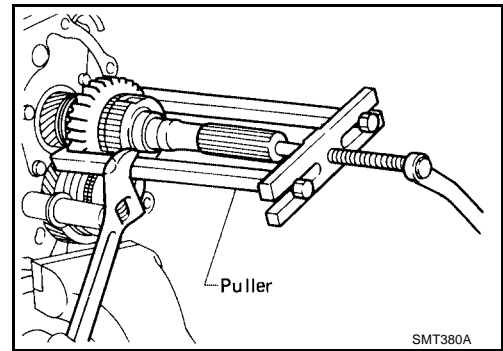




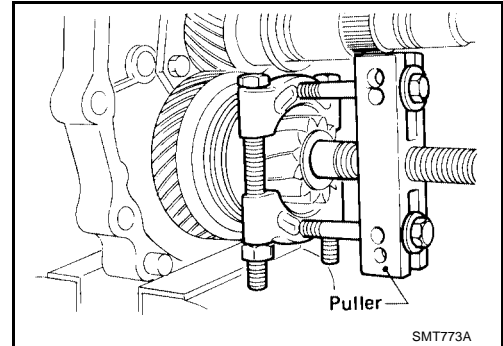
# GEAR COMPONENTS

[FS5R30A]

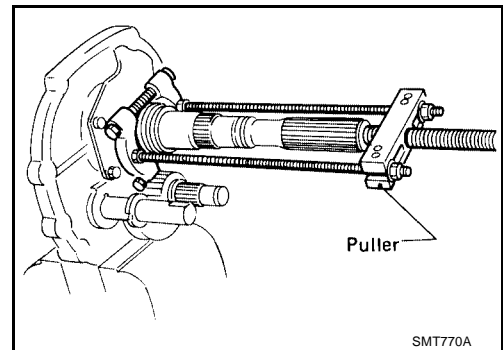
- g. Remove reverse main gear together with mainshaft spacer and reverse synchronizer hub using suitable tool. Then remove reverse gear needle bearings.



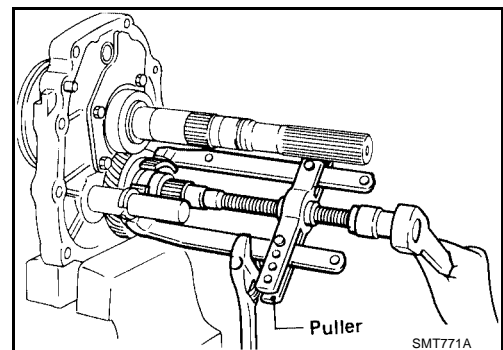
- h. Remove reverse counter gear using suitable tool.
- i. Remove OD coupling sleeve together with OD baulk ring, reverse baulk ring and spring inserts.



- j. Remove reverse gear bushing using suitable tool.



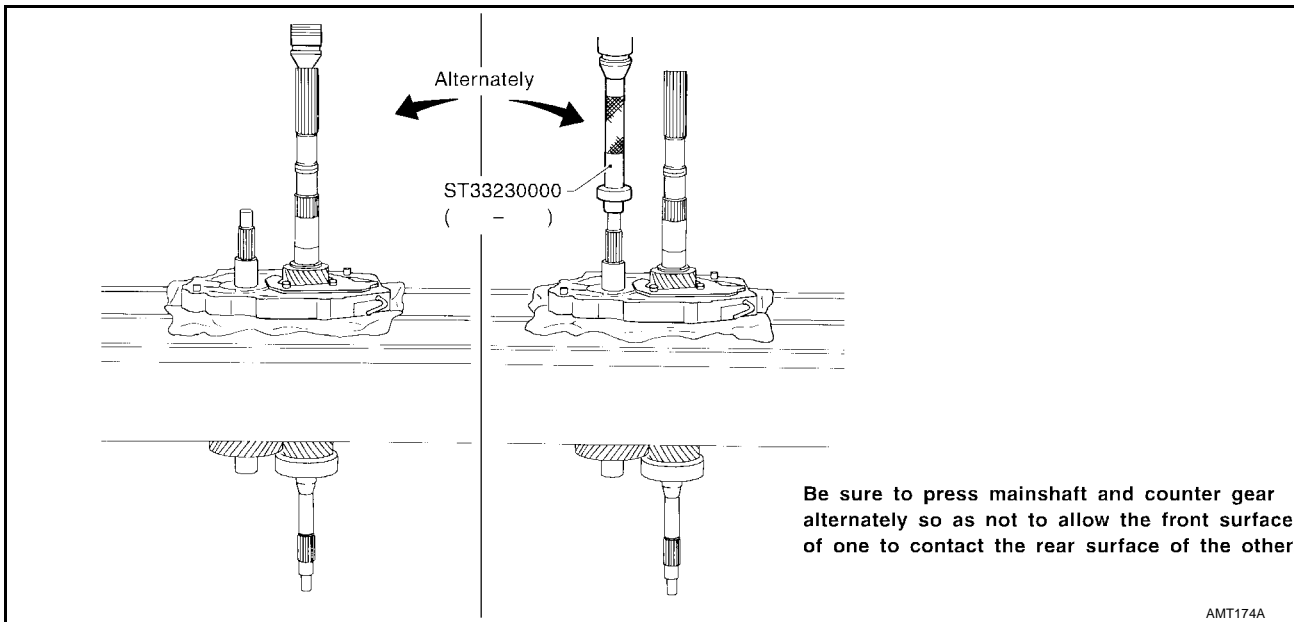
- k. Remove OD counter gear and reverse cone using suitable tool.
- l. Remove OD gear needle bearing.
- m. Remove reverse idler shaft.



- 3. Press out mainshaft, OD main gear, OD gear bushing and counter gear alternately using Tool.

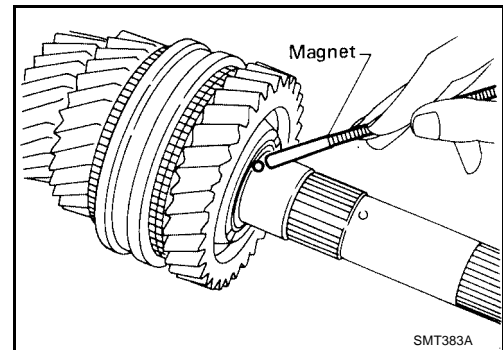
**Tool number** : **ST33230000 ( — )**

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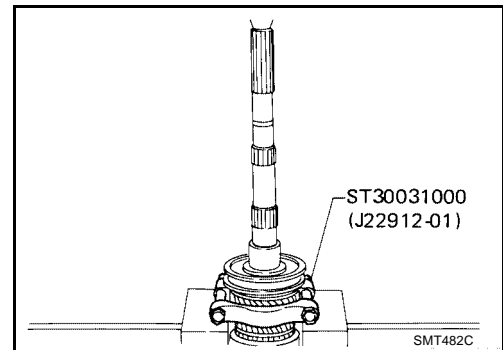
4. Remove front side components on mainshaft.
  - a. Remove 1st gear washer and steel ball using suitable tool.
 

**CAUTION:**  
Be careful not to lose steel ball.
  - b. Remove 1st main gear and 1st gear needle bearing.

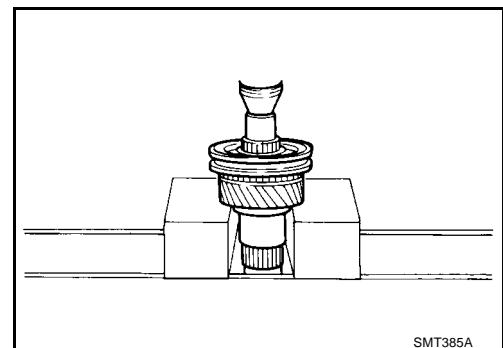


- c. Press out 2nd main gear together with 1st gear bushing and 1st and 2nd synchronizer assembly using Tool.
 

**Tool number : ST30031000 (J-22912-01)**
    - d. Remove 2nd gear needle bearing.
    - e. Remove mainshaft front snap ring.



- f. Press out 3rd main gear together with 3rd and 4th synchronizer assembly.
      - g. Remove 3rd gear needle bearing.

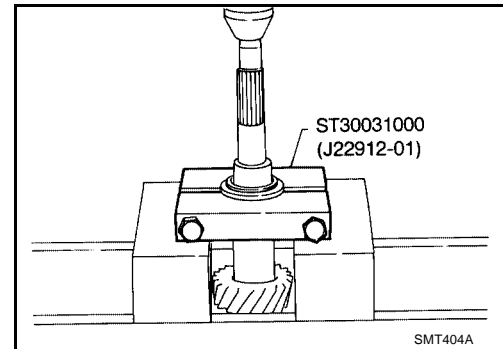


# GEAR COMPONENTS

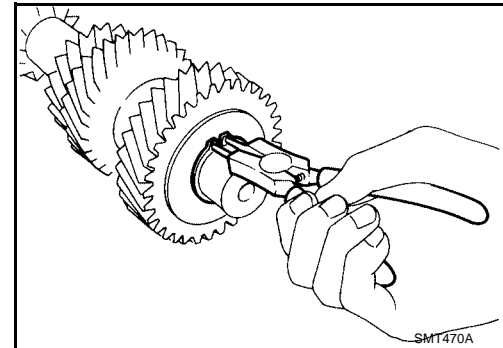
[FS5R30A]

5. Remove front side components on counter gear.
- a. Remove counter gear rear thrust bearing using Tool.

**Tool number : ST30031000 (J-22912-01)**

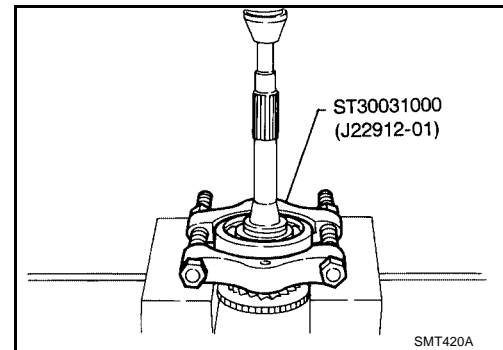


- b. Remove sub-gear snap ring, sub-gear bracket and steel ball using suitable tool.



6. Remove main drive gear bearing.
- a. Remove spacer and pilot bearing.
- b. Remove main drive gear snap ring.
- c. Press out main drive gear bearing using Tool.

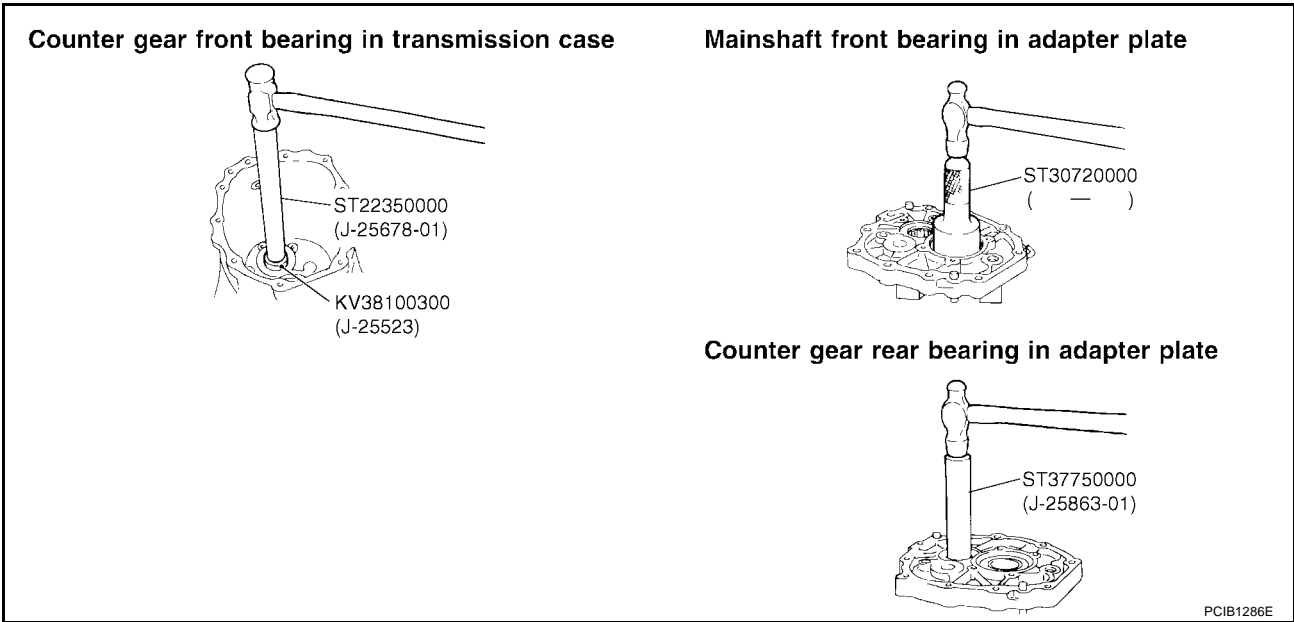
**Tool number : ST30031000 (J-22912-01)**



7. Remove bearing retainer.
8. Remove bearings from case components using Tools.

**Tool number : ST22350000 (J-25678-01)**  
**: KV38100300 (J-25523)**  
**: ST30720000 ( — )**  
**: ST37750000 (J-5863-01)**

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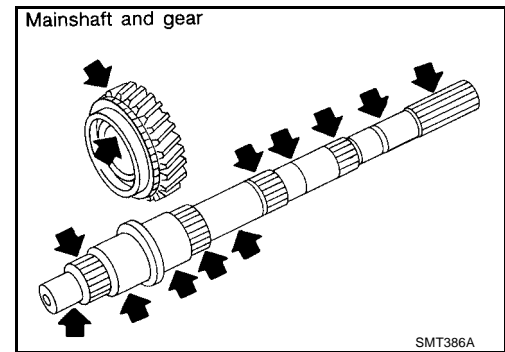


9. Remove mainshaft front bearing snap ring from mainshaft front bearing.

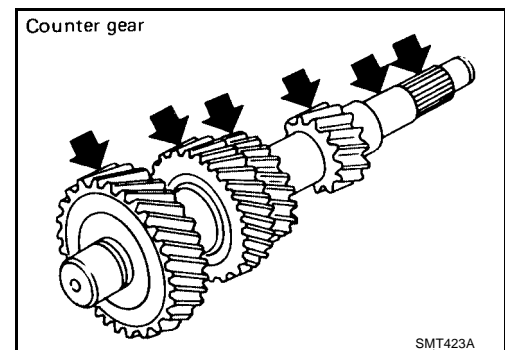
## Inspection GEARS AND SHAFTS

UCS003ZT

- Check shafts for cracks, wear or bending.

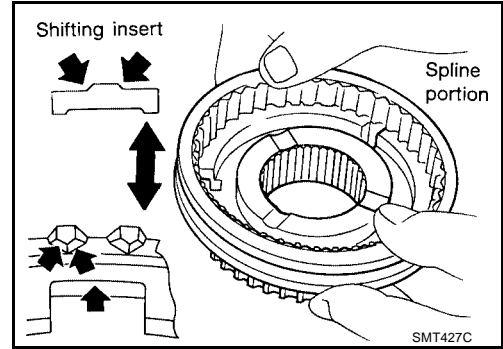


- Check gears for excessive wear, chips or cracks.

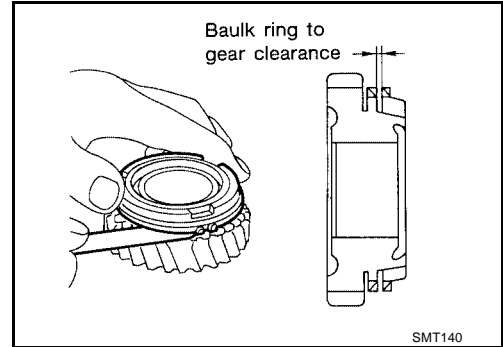


## SYNCHRONIZERS

- Check spline portion of coupling sleeves, hubs, and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check shifting inserts for wear or deformation.
- Check insert springs for deformation.



- Measure wear of main drive, 1st and OD baulk rings. Refer to [MT-49, "Baulk Ring Clearance"](#).
- If the clearance is smaller than the wear limit, replace baulk ring.



- Measure wear of 2nd and 3rd double baulk rings using Tool.

**Tool number : ST30031000 (J-22912-01)**

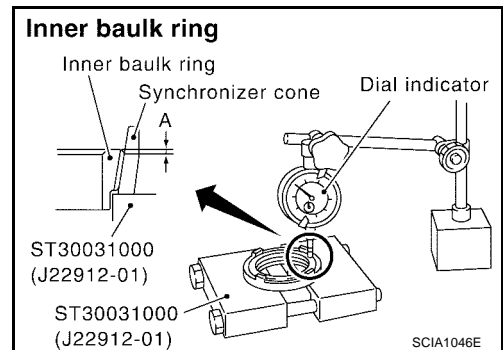
- Place baulk rings in position on synchronizer cone.
- While holding baulk rings against synchronizer cone as far as it will go, measure the dimensions "A" and "B".

**Standard**

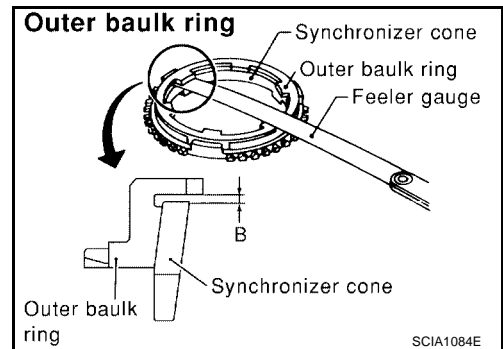
**Dimension "A" : 0.7 - 0.9 mm (0.028 - 0.035 in)**

**Dimension "B" : 0.6 - 1.1 mm (0.024 - 0.043 in)**

**Wear limit : 0.2 mm (0.008 in)**



- If the dimension "A" or "B" is smaller than the wear limit, replace outer baulk ring, inner baulk ring and synchronizer cone as a set.



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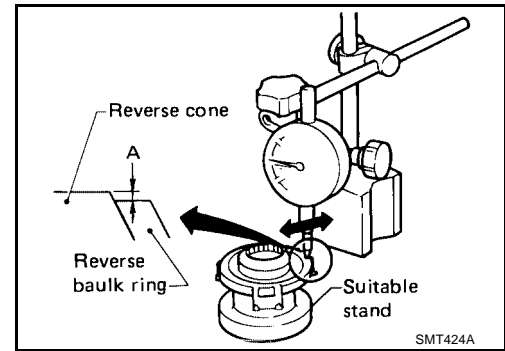
- Measure wear of reverse baulk ring.
- Place baulk ring in position on reverse cone.
- While holding baulk ring against reverse cone as far as it will go, measure the dimension "A" with dial indicator.

**Standard**

**Dimension "A" : 0.35 - 0.95 mm (0.0138 - 0.0374 in)**

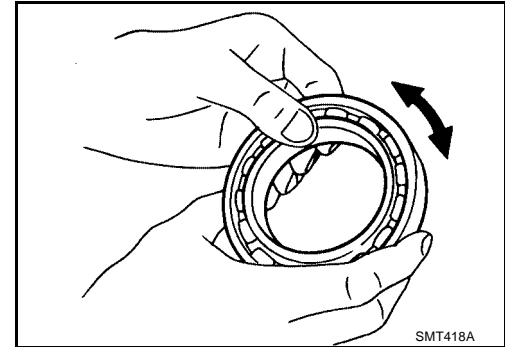
**Wear limit : 1.1 mm (0.043 in)**

- If the dimension "A" is larger than the wear limit, replace baulk ring.



**BEARINGS**

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.

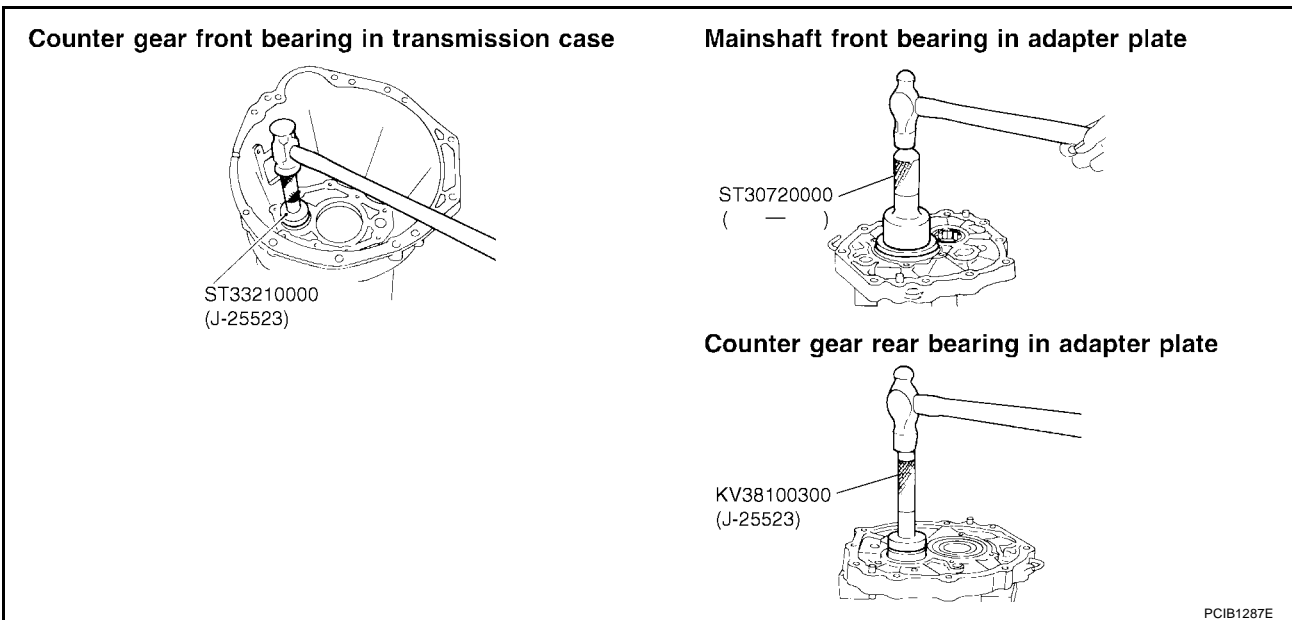


**Assembly**

1. Install mainshaft front bearing snap ring to mainshaft front bearing.
2. Install bearings into case components using Tools.

**Tool number : ST33210000 (J-25523)**  
**: ST30720000 ( — )**  
**: KV38100300 (J-25523)**

UCS003ZU



3. Install bearing retainer. Tighten bearing retainer bolts to the specified torque.

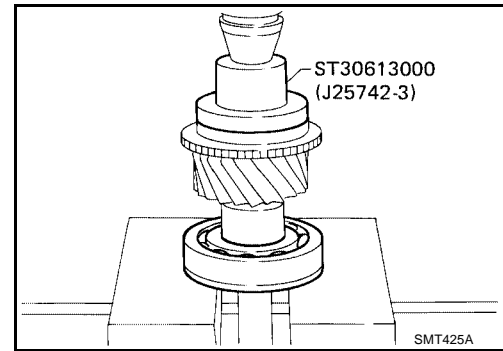
**Bearing retainer bolts : 16 - 20 N·m (1.6 - 2.1 kg·m, 12 - 15 lb·ft)**

# GEAR COMPONENTS

[FS5R30A]

4. Install main drive gear bearing.
- a. Press main drive gear bearing using Tool.

**Tool number** : **ST30613000 (J-25742-3)**



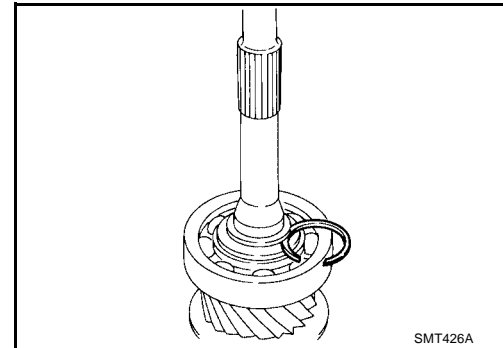
- b. Select proper main drive gear snap ring to minimize clearance of groove. Refer to [MT-49, "MAIN DRIVE GEAR SNAP RING"](#).

**End play** : **0 - 0.1 mm (0 - 0.004 in)**

**CAUTION:**

**Do not reuse main drive gear snap ring.**

- c. Install selected new main drive gear snap ring on main drive gear.

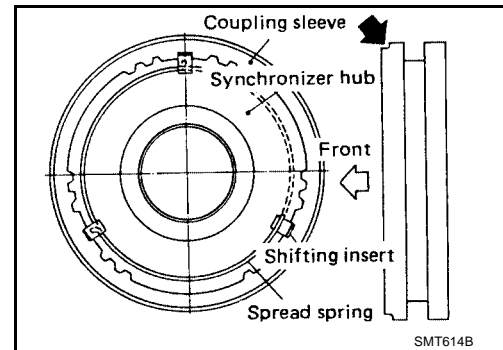


5. Install front side components on mainshaft.

- a. Assemble 1st and 2nd synchronizer.

**CAUTION:**

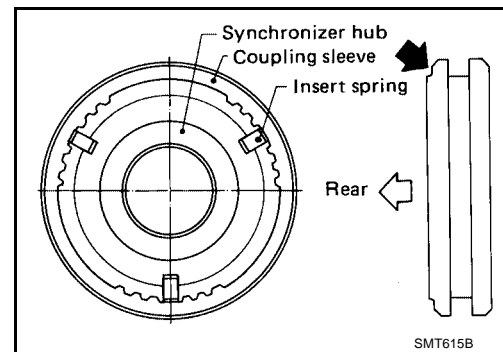
**Do not reuse 1st and 2nd synchronizer hub.**



- b. Assemble 3rd and 4th synchronizer.

**CAUTION:**

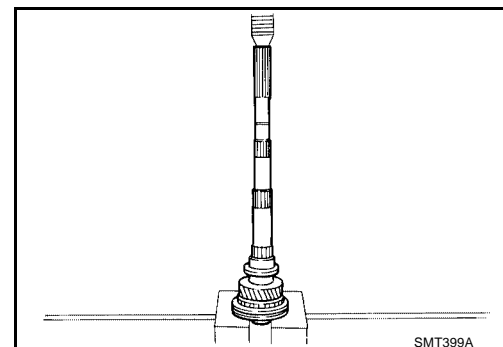
**Do not reuse 3rd and 4th synchronizer hub.**



- c. Press on 3rd and 4th synchronizer assembly together with 3rd main gear and 3rd gear needle bearing.

**CAUTION:**

**Pay attention to direction of synchronizer assembly.**



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# GEAR COMPONENTS

[FS5R30A]

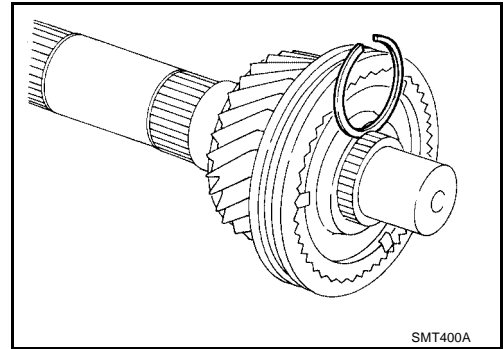
- d. Select proper mainshaft front snap ring to minimize clearance of groove. Refer to [MT-49, "MAINSHAFT FRONT SNAP RING"](#).

**End play : 0 - 0.1 mm (0 - 0.004 in)**

**CAUTION:**

**Do not reuse mainshaft front snap ring.**

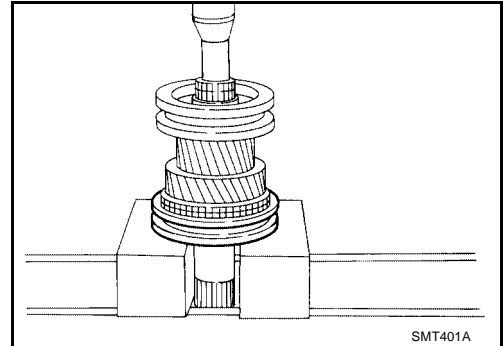
- e. Install selected new mainshaft front snap ring on mainshaft.



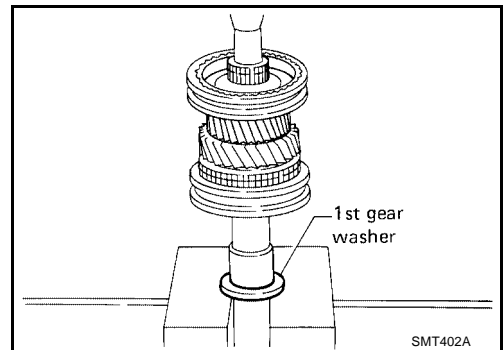
- f. Press on 1st and 2nd synchronizer assembly together with 2nd main gear and 2nd gear needle bearing.

**CAUTION:**

**Pay attention to direction of synchronizer assembly.**



- g. Press on 1st gear bushing using 1st gear washer.

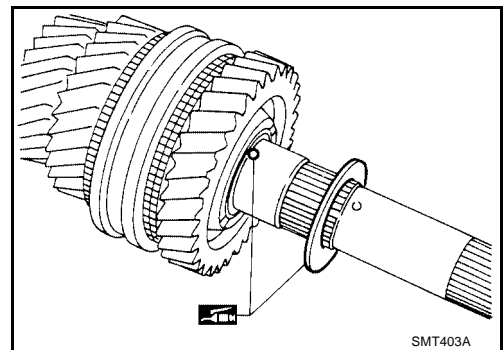


- h. Install 1st main gear and 1st gear needle bearing.

- i. Install steel ball and 1st gear washer.

**CAUTION:**

**Apply multi-purpose grease to steel ball and 1st gear washer before installing.**



6. Install components on counter gear.

- a. Install steel ball, sub-gear bracket and new sub-gear snap ring.

**CAUTION:**

- **Apply multi-purpose grease to steel ball.**
- **Do not reuse sub-gear snap ring.**



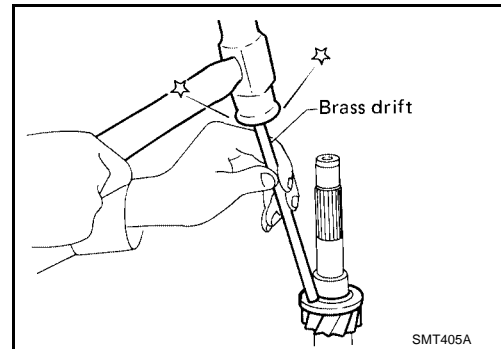
# GEAR COMPONENTS

[FS5R30A]

- b. Install counter gear rear thrust bearing using a brass drift.

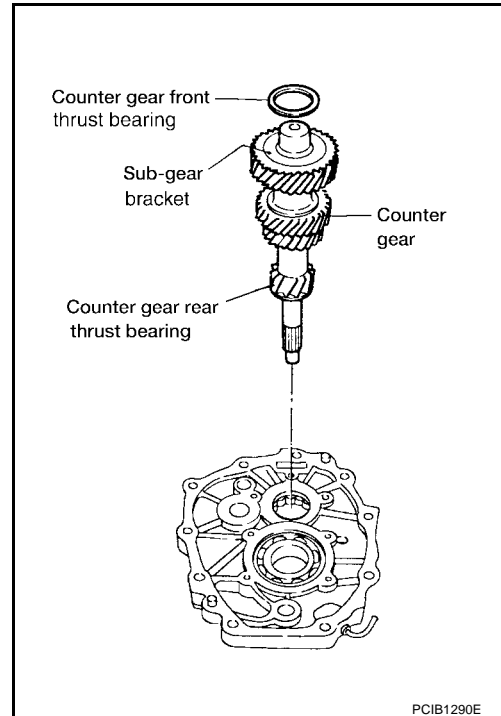
**CAUTION:**

**Be careful not to damage counter gear rear thrust bearing.**



7. Select proper counter gear front bearing shim when replacing transmission case, counter gear, counter gear rear thrust bearing or sub-gear bracket.

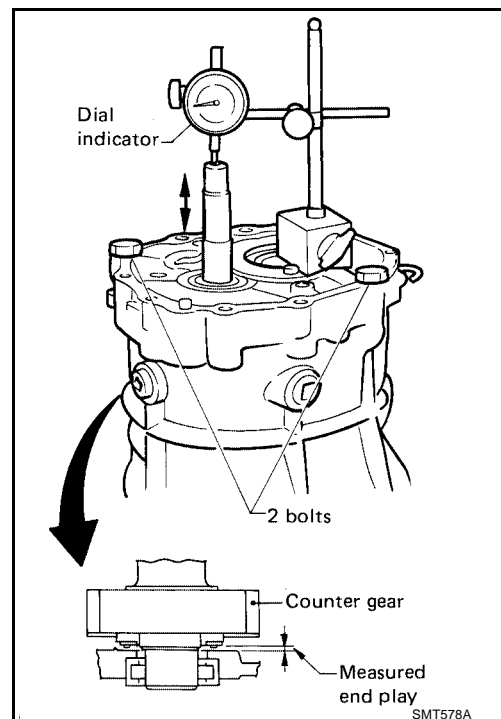
- a. Install counter gear, counter gear front thrust bearing and counter gear rear thrust bearing on adapter plate.
- b. Place adapter plate and counter gear assembly in transmission case (case inverted).



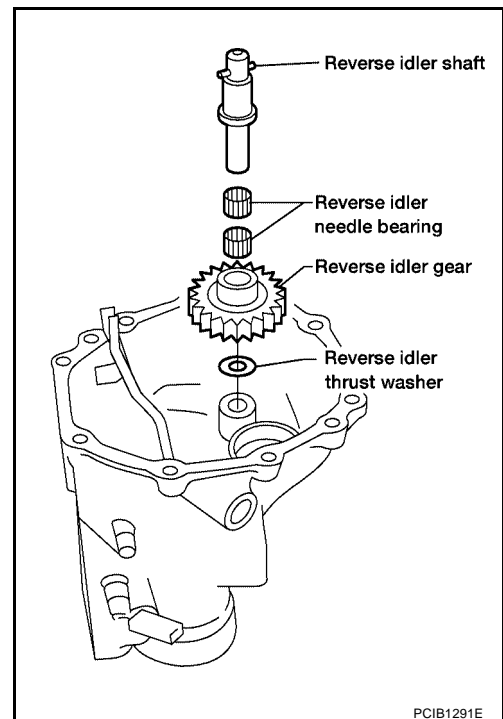
- c. Tighten adapter plate to transmission case using 2 bolts.
- d. Place dial indicator on rear end of counter gear.
- e. Move counter gear up and down and measure dial indicator deflection.
- f. Select proper counter gear front bearing shim using the table as a guide. Refer to [MT-50, "TABLE FOR SELECTING PROPER COUNTER GEAR FRONT BEARING SHIM"](#).

**End play : 0.10 - 0.26 mm (0.0039 - 0.0102 in)**

- g. Separate adapter plate and transmission case.
- h. Remove counter gear assembly.

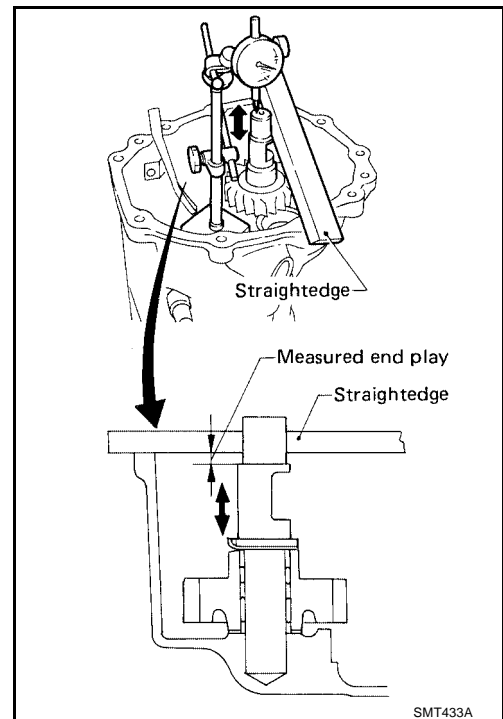


8. Select proper reverse idler thrust washer when replacing rear extension, reverse idler gear or reverse idler shaft.
  - a. Install reverse idler thrust washer, reverse idler gear, reverse idler needle bearings and reverse idler shaft into rear extension.
    - **When replacing reverse idler thrust washer, install either A or B. Refer to [MT-50, "REVERSE IDLER THRUST WASHER"](#) .**

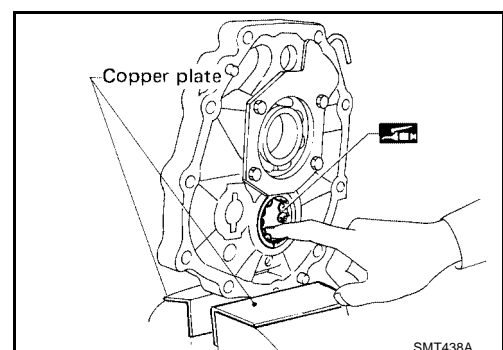


- b. Place dial indicator on front end of reverse idler shaft.
- c. Put straightedge on front surface of rear extension as a stopper of reverse idler shaft.
- d. Move reverse idler shaft up and down and measure end play.
 

**End play : 0.30 - 0.53 mm (0.0118 - 0.0209 in)**
- e. If not within specification, replace reverse idler thrust washer with the other (A or B) and check again.



9. Install mainshaft and counter gear on adapter plate and main drive gear on mainshaft.
  - a. Mount adapter plate on vise and apply multi-purpose grease to counter gear rear bearing.



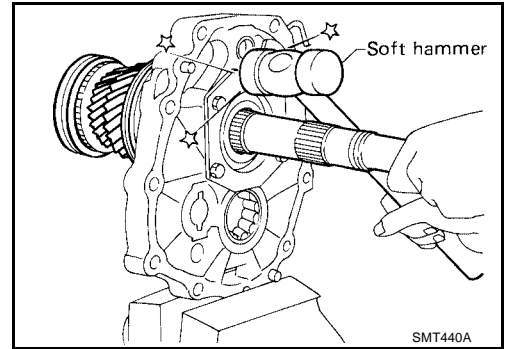
# GEAR COMPONENTS

[FS5R30A]

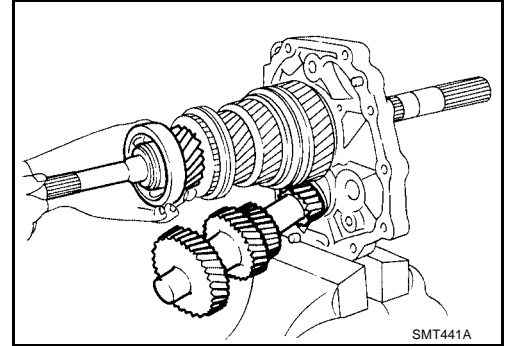
- b. Partially install mainshaft on mainshaft front bearing using suitable tool.

**CAUTION:**

To allow for installation of counter gear, do not install mainshaft completely.

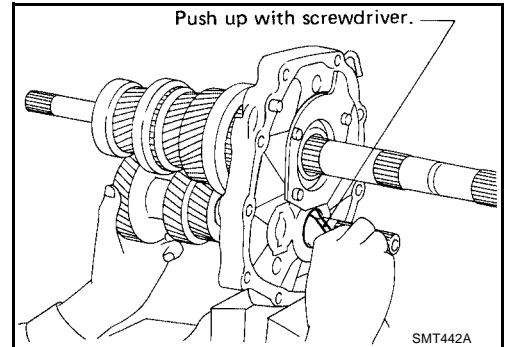


- c. Install counter gear in counter gear rear bearing and install main drive gear, pilot bearing and spacer on mainshaft.



**NOTE:**

When installing counter gear into counter gear rear bearing, push up on upper roller of counter gear rear bearing using suitable tool.

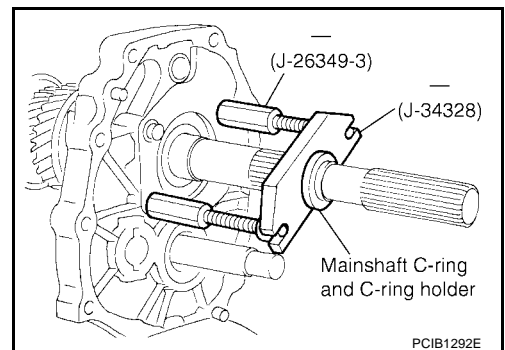


- d. Install Tool onto adapter plate and mainshaft C-ring and C-ring holder on mainshaft.

**Tool number** : — (J-26349-3)

- e. Install Tool on mainshaft.

**Tool number** : — (J-34328)

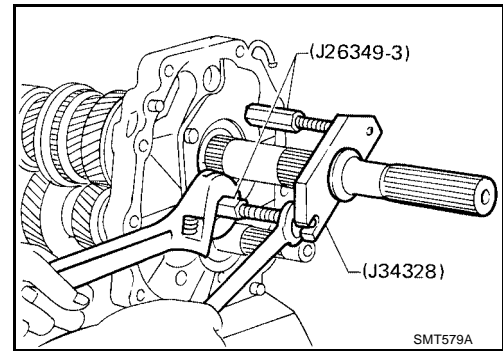


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# GEAR COMPONENTS

[FS5R30A]

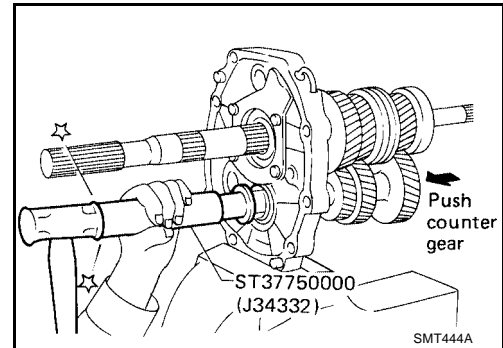
- f. Install mainshaft and counter gear completely by extending length of Tool.



10. Install rear side components on mainshaft and counter gear.  
a. Install new OD gear bushing using Tool while pushing on the front of counter gear.

**Tool number** : ST37750000 (J-34332)

**CAUTION:**  
Do not reuse OD gear bushing.

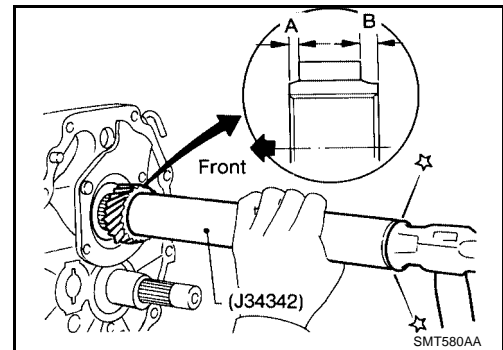


- b. Install OD main gear using Tool.

**Tool number** : — (J-34342)

**CAUTION:**  
Pay attention to direction of OD main gear. (B is wider than A as shown.)

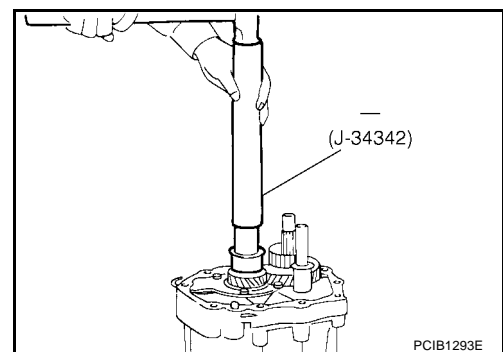
- c. Install adapter plate with gear assembly onto transmission case.  
d. Install OD gear needle bearing and then install OD counter gear and reverse idler shaft.



- e. Install new reverse gear bushing using Tool.

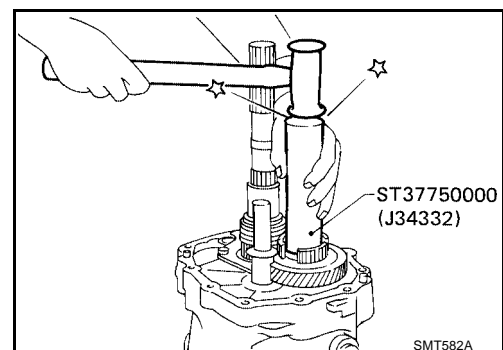
**Tool number** : — (J-34342)

**CAUTION:**  
Do not reuse reverse gear bushing.



- f. Install reverse cone using Tool.

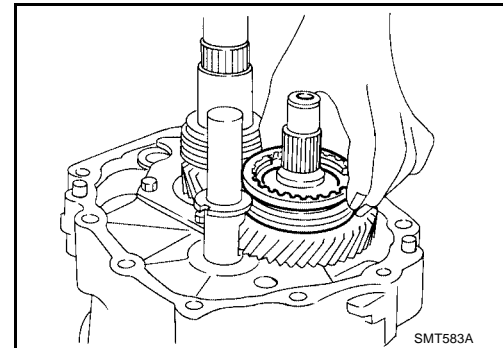
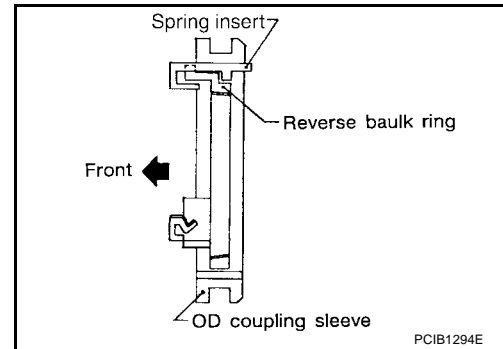
**Tool number** : ST37750000 (J-34332)



- g. Install spring inserts and reverse baulk ring on OD coupling sleeve. Then install them and OD baulk ring on OD counter gear.

**CAUTION:**

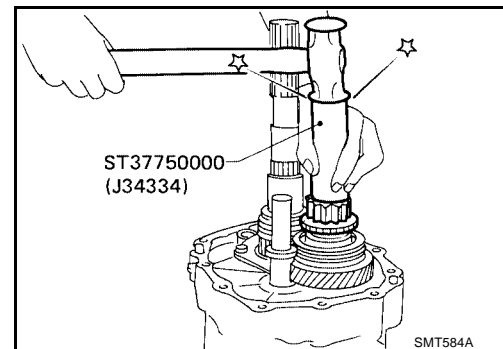
Pay attention to direction of OD coupling sleeve.



- h. Install reverse counter gear using Tool.

**Tool number : ST37750000 (J-34334)**

- i. Install reverse gear needle bearings, reverse idler needle bearings and then install reverse main gear, reverse idler gear and selected reverse idler thrust washer.



- j. Install new reverse synchronizer hub using Tool.

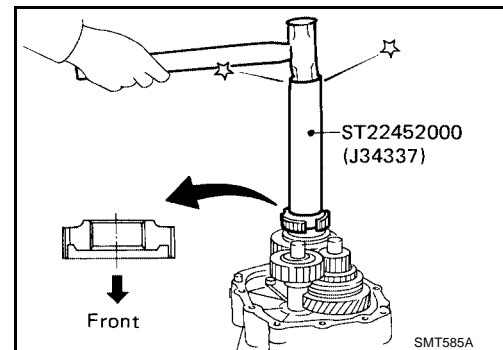
**Tool number : ST22452000 (J-34337)**

**CAUTION:**

- Pay attention to direction of reverse synchronizer hub.
- Do not reuse reverse synchronizer hub.

- k. Install mainshaft spacer and mainshaft rear bearing using Tools.

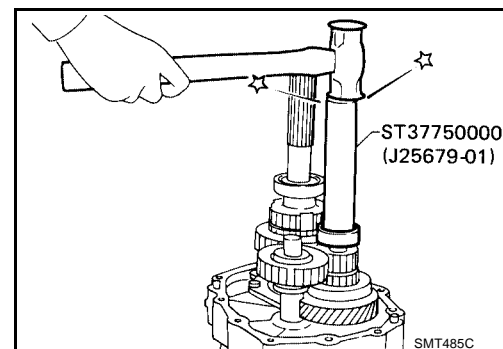
**Tool number : — (J-26349-A)**  
**: — (J-25726-B)**



- l. Install counter gear rear end bearing using Tool.

**Tool number : ST37750000 (J-25679-01)**

- m. Separate adapter plate from transmission case and mount adapter plate on vise again.



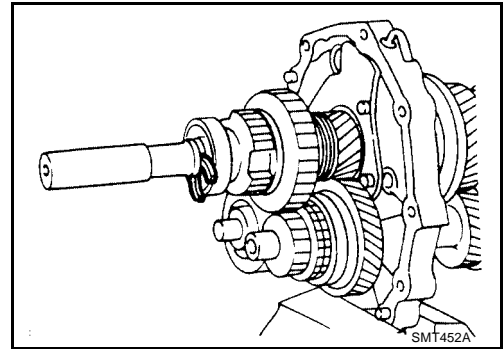
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# GEAR COMPONENTS

[FS5R30A]

- n. Select proper mainshaft C-ring to minimize clearance of groove. Refer to [MT-50, "MAINSHAFT C-RING"](#).

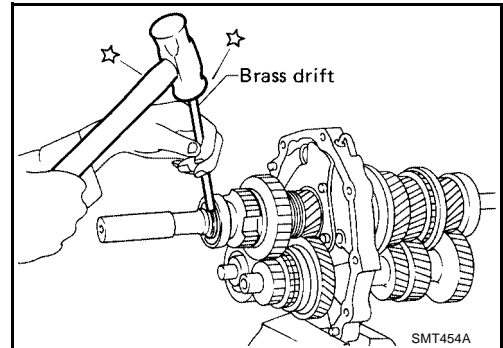
**End play** : 0 - 0.1 mm (0 - 0.004 in)



- o. Install selected mainshaft C-ring, C-ring holder and new mainshaft rear snap ring using suitable tool.

**CAUTION:**

**Do not reuse mainshaft rear snap ring.**

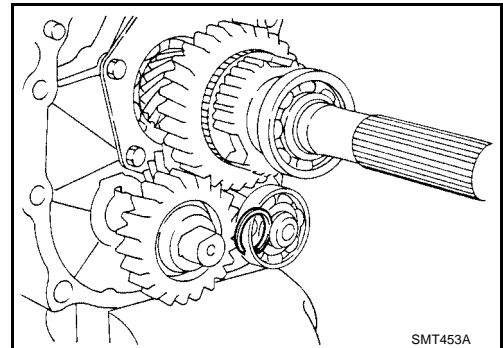


- p. Select proper counter gear rear snap ring to minimize clearance of groove. Refer to [MT-49, "COUNTER GEAR REAR SNAP RING"](#).

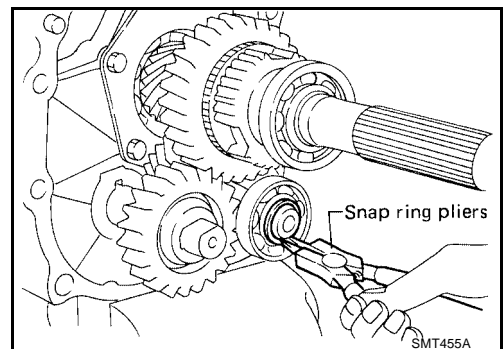
**End play** : 0 - 0.1 mm (0 - 0.004 in)

**CAUTION:**

**Do not reuse counter gear rear snap ring.**



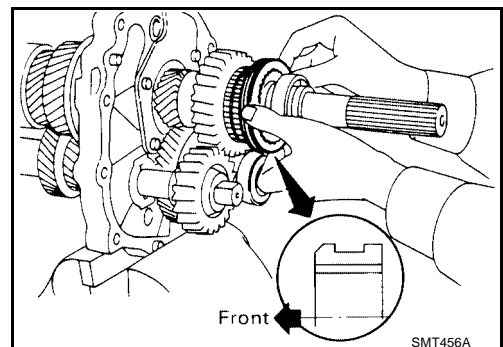
- q. Install selected new counter gear rear snap ring using suitable tool.



- r. Install reverse coupling sleeve.

**CAUTION:**

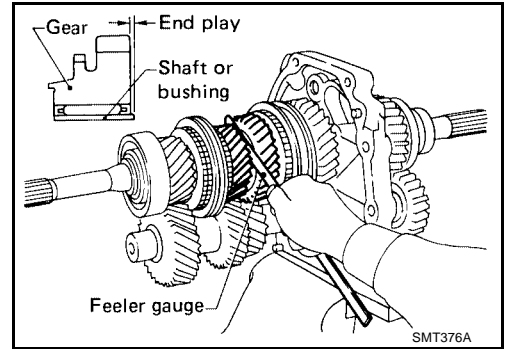
**Pay attention to direction of reverse coupling sleeve.**



# GEAR COMPONENTS

[FS5R30A]

- s. Measure each gear end play as a final check. Refer to [MT-48](#), "[Gear End Play](#)".



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# SERVICE DATA AND SPECIFICATIONS (SDS)

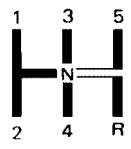
**[FS5R30A]**

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### General Specifications

UCS0049M

Engine			QR25DE
Transmission model			FS5R30A
Model code number			EA000
Number of speed			5
Synchromesh type			Warner
Shift pattern			 <p style="text-align: center; font-size: small;">SCIA0821E</p>
Gear ratio	1st	3.580	
	2nd	2.077	
	3rd	1.360	
	4th	1.000	
	OD	0.811	
	Reverse	3.636	
Number of teeth	Main gear	Drive	22
		1st	32
		2nd	30
		3rd	29
		4th	—
		OD	24
		Reverse	30
	Counter gear	Drive	32
		1st	13
		2nd	21
		3rd	31
		4th	—
		OD	43
		Reverse	12
Reverse idler gear		22	
Oil capacity (Approx.)	$\ell$ (US qt, Imp qt)	2.89 (3, 2-1/2)	
Remarks	Reverse synchronizer	Installed	
	Double-cone synchronizer	2nd and 3rd	

### Gear End Play

UCS0049N

Unit: mm (in)

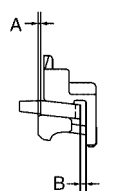
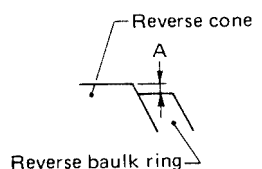
Gear	End play
1st main gear	0.23 - 0.33 (0.0091 - 0.0130)
2nd main gear	0.23 - 0.33 (0.0091 - 0.0130)
3rd main gear	0.06 - 0.16 (0.0024 - 0.0063)
OD counter gear	0.23 - 0.33 (0.0091 - 0.0130)
Reverse main gear	0.33 - 0.43 (0.0130 - 0.0169)



**Baulk Ring Clearance**

UCS00490

Unit: mm (in)

Measurement point		Standard value	Limit value
2nd and 3rd (Double-cone synchronizer)	Clearance between synchronizer cone and inner baulk ring end face "A"	0.7 - 0.9 (0.028 - 0.035)	0.2 (0.008)
	Clearance between outer baulk ring pawl and synchronizer cone "B"	0.6 - 1.1 (0.024 - 0.043)	0.2 (0.008)
 PCIB0249E			
1st		1.05 - 1.3 (0.041 - 0.051)	0.7 (0.028)
Main drive		1.05 - 1.3 (0.041 - 0.051)	0.7 (0.028)
OD		1.05 - 1.3 (0.041 - 0.051)	0.7 (0.028)
Reverse	Clearance between reverse cone and revers baulk ring end face "A"	0.35 - 0.95 (0.0138 - 0.0374)	1.1 (0.043)
 SMT428C			

**Available Snap Rings  
MAIN DRIVE GEAR SNAP RING**

UCS0049P

End play		0 - 0.1 mm (0 - 0.004 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
1.89 (0.0744)	32204 01G60	2.03 (0.0799)	32204 01G63
1.95 (0.0768)	32204 01G61	2.07 (0.0815)	32204 01G64
1.99 (0.0783)	32204 01G62	2.11 (0.0831)	32204 01G65

\*: Always check with the Parts Department for the latest parts information.

**MAINSHAFT FRONT SNAP RING**

End play		0 - 0.1 mm (0 - 0.004 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
1.99 (0.0783)	32204 01G62	2.11 (0.0831)	32204 01G65
2.03 (0.0799)	32204 01G63	2.15 (0.0846)	32204 01G66
2.07 (0.0815)	32204 01G64	2.19 (0.0862)	32204 01G67

\*: Always check with the Parts Department for the latest parts information.

**COUNTER GEAR REAR SNAP RING**

End play		0 - 0.1 mm (0 - 0.004 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
1.32 (0.0520)	32236 01G00	1.56 (0.0614)	32236 01G04
1.38 (0.0543)	32236 01G01	1.62 (0.0638)	32236 01G05
1.44 (0.0567)	32236 01G02	1.68 (0.0661)	32236 01G06
1.50 (0.0591)	32236 01G03	1.74 (0.0685)	32236 01G07

\*: Always check with the Parts Department for the latest parts information.

# SERVICE DATA AND SPECIFICATIONS (SDS)

[FS5R30A]

## Available C-Rings MAINSHAFT C-RING

UCS0049Q

End play		0 - 0.1 mm (0 - 0.004 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
2.63 (0.1035)	32348 01G15	3.19 (0.1256)	32348 01G07
2.70 (0.1063)	32348 01G00	3.26 (0.1283)	32348 01G08
2.77 (0.1091)	32348 01G01	3.33 (0.1311)	32348 01G09
2.84 (0.1118)	32348 01G02	3.40 (0.1339)	32348 01G10
2.91 (0.1146)	32348 01G03	3.47 (0.1366)	32348 01G11
2.98 (0.1173)	32348 01G04	3.54 (0.1394)	32348 01G12
3.05 (0.1201)	32348 01G05	3.61 (0.1421)	32348 01G13
3.12 (0.1228)	32348 01G06	3.68 (0.1449)	32348 01G14

\*: Always check with the Parts Department for the latest parts information.

## Available Thrust Washer REVERSE IDLER THRUST WASHER

UCS0049R

End play		0.30 - 0.53 mm (0.0118 - 0.0209 in)	
Thickness mm (in)		Part number*	
A	1.97 (0.0776)	32284 01G20	
B	2.07 (0.0815)	32284 01G21	

\*: Always check with the Parts Department for the latest parts information.

## Available Shims TABLE FOR SELECTING PROPER COUNTER GEAR FRONT BEARING SHIM

UCS0049S

End play 0.10 - 0.26 mm (0.0039 - 0.0102 in)		
Dial indicator deflection mm (in)	Thickness of proper shim mm (in)	Part number*
0.93 - 1.02 (0.0367 - 0.0401)	0.80 (0.0315)	32218 01G00
1.01 - 1.10 (0.0398 - 0.0433)	0.88 (0.0346)	32218 01G11
1.09 - 1.18 (0.0430 - 0.0464)	0.96 (0.0378)	32218 01G12
1.17 - 1.26 (0.0461 - 0.0496)	1.04 (0.0409)	32218 01G13
1.25 - 1.34 (0.0493 - 0.0527)	1.12 (0.0441)	32218 01G14
1.33 - 1.42 (0.0524 - 0.0559)	1.20 (0.0472)	32218 01G04
1.41 - 1.50 (0.0556 - 0.0590)	1.28 (0.0504)	32218 01G15
1.49 - 1.58 (0.0587 - 0.0622)	1.36 (0.0535)	32218 01G16
1.57 - 1.66 (0.0619 - 0.0653)	1.44 (0.0567)	32218 01G17

\*: Always check with the Parts Department for the latest parts information.

# PRECAUTIONS

[FS6R31A]

## PRECAUTIONS

PFP:00001

### Service Notice or Precautions

UCS00406

- Do not reuse transmission oil once it has been drained.
- Check oil level or replace oil with vehicle on level surface.
- 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 matching marks are required, be certain they do not interfere with the function of the parts they are applied to.
- In principle, tighten nuts and bolts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, use it.
- Be careful not to damage sliding surfaces and mating surfaces.

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# PREPARATION

[FS6R31A]

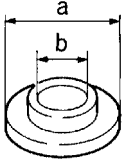
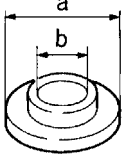
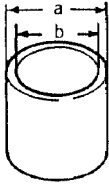
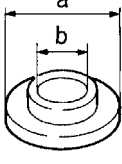
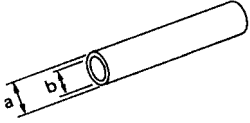
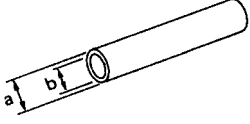
PFP:00002

UCS00407

## PREPARATION

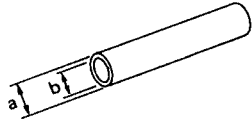
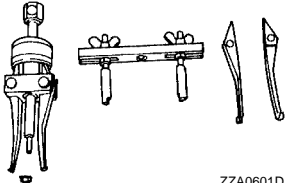
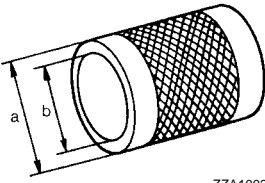
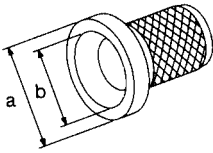
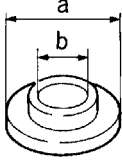
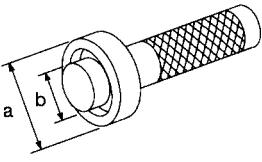
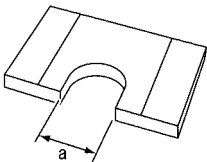
### Special Service Tools

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 ( — ) Inserter	 <p style="text-align: right; font-size: small;">ZZA0920D</p> <ul style="list-style-type: none"> <li>● Installing mainshaft bearing</li> <li>● Installing 5th-6th synchronizer hub assembly</li> <li>● Installing reverse main gear bushing</li> <li>● Installing 3rd gear bushing</li> <li>● Installing 3rd-4th synchronizer hub assembly</li> </ul> <p><b>a: 98 mm (3.86 in) dia.</b> <b>b: 40 mm (1.57 in) dia.</b></p>
ST30022000 ( — ) Inserter	 <p style="text-align: right; font-size: small;">ZZA0920D</p> <ul style="list-style-type: none"> <li>● Installing 3rd main gear</li> <li>● Installing 4th main gear</li> </ul> <p><b>a: 110 mm (4.33 in) dia.</b> <b>b: 46 mm (1.81 in) dia.</b></p>
ST27861000 ( — ) Support ring	 <p style="text-align: right; font-size: small;">ZZA0832D</p> <ul style="list-style-type: none"> <li>● Installing 1st-2nd synchronizer hub assembly</li> <li>● Installing 1st gear bushing</li> </ul> <p><b>a: 62 mm (2.44 in) dia.</b> <b>b: 52 mm (2.05 in) dia.</b></p>
ST30032000 (J-26010-01) Inserter	 <p style="text-align: right; font-size: small;">ZZA0920D</p> <p>Installing counter rear bearing inner race  <b>a: 80 mm (3.15 in) dia.</b>  <b>b: 31 mm (1.22 in) dia.</b></p>
KV32102700 ( — ) Drift	 <p style="text-align: right; font-size: small;">ZZA0534D</p> <p>Installing main drive gear bearing  <b>a: 48 mm (1.89 in) dia.</b>  <b>b: 41 mm (1.61 in) dia.</b></p>
ST23860000 ( — ) Drift	 <p style="text-align: right; font-size: small;">ZZA0534D</p> <p>Installing reverse counter gear  <b>a: 38 mm (1.50 in) dia.</b>  <b>b: 33 mm (1.30 in) dia.</b></p>

# PREPARATION

[FS6R31A]

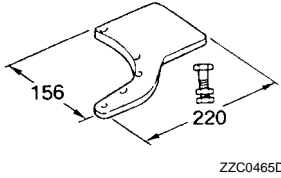
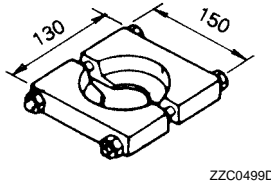
Tool number (Kent-Moore No.) Tool name	Description
ST01530000 ( — ) Drift  ZZA0534D	Installing reverse synchronizer hub assembly <b>a: 50 mm (1.97 in) dia.</b> <b>b: 41 mm (1.61 in) dia.</b>
KV381054S0 (J-34286) Puller  ZZA0601D	Removing rear oil seal
ST33200000 (J-26082) Drift  ZZA1002D	<ul style="list-style-type: none"> <li>● Installing counter rear bearing</li> <li>● Installing rear oil seal</li> </ul> <b>a: 60 mm (2.36 in) dia.</b> <b>b: 44.5 mm (1.752 in) dia.</b>
KV38100500 ( — ) Drift  S-NT086	Installing dust seal (for 2WD models) <b>a: 80 mm (3.15 in) dia.</b> <b>b: 60 mm (2.36 in) dia.</b>
KV40100630 (J-26092) Inserter  ZZA0920D	Installing 4th counter gear thrust washer <b>a: 67 mm (2.64 in) dia.</b> <b>b: 38 mm (1.50 in) dia.</b>
KV38102100 (J-25803-01) Drift  NT084	Installing front cover oil seal <b>a: 44 mm (1.73 in) dia.</b> <b>b: 28 mm (1.10 in) dia.</b>
KV32103300 (J-46529) Press plate  PCIB0165J	Installing reverse synchronizer hub assembly <b>a: 73 mm (2.87 in)</b>

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# PREPARATION

[FS6R31A]

Tool number (Kent-Moore No.) Tool name	Description
ST30031000 (J-22912-01) Puller	Measuring wear of inner baulk ring
ST22490000 ( — ) Adapter setting plate	Holding a adapter plate

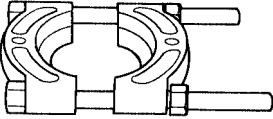

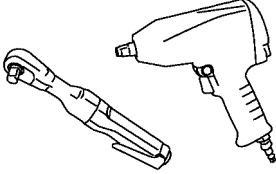
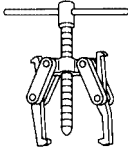
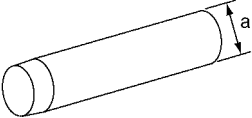


# PREPARATION

[FS6R31A]

## Commercial Service Tools

UCS00408

Tool name	Description
<p>Puller</p>  <p style="text-align: right;">ZZB0823D</p>	<p>Removing each bearing, gear and bushing</p>
<p>Pin punch Tip diameter: 6.0 mm (0.236 in) dia.</p>  <p style="text-align: right;">ZZA0815D</p>	<p>Removing and installing each retaining pin</p>
<p>Power tool</p>  <p style="text-align: right;">PBIC0190E</p>	<p>Loosening bolts and nuts</p>
<p>Puller</p>  <p style="text-align: right;">NT077</p>	<ul style="list-style-type: none"> <li>● Removing reverse synchronizer hub assembly</li> <li>● Removing reverse counter gear</li> <li>● Removing reverse main gear</li> </ul>
<p>Drift</p>  <p style="text-align: right;">LCIA0362E</p>	<p>Removing counter end bearing <b>a: 32 mm (1.26 in) dia.</b></p>

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# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

[FS6R31A]

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

### NVH Troubleshooting Chart

UCS00409

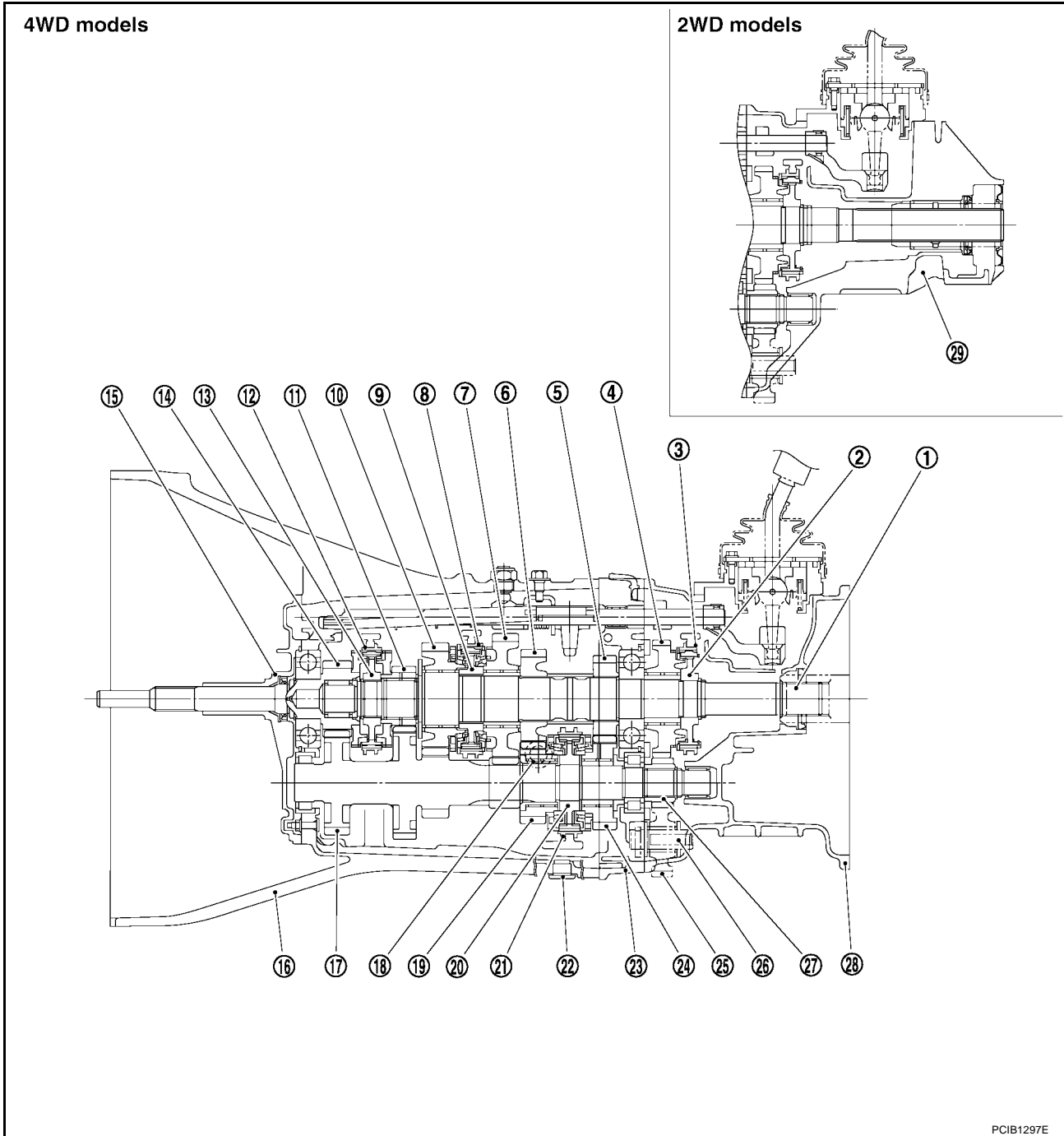
Use the chart below to help you find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

Reference page		<a href="#">MT-59</a>		<a href="#">MT-71</a>		<a href="#">MT-63</a>		<a href="#">MT-75</a>		<a href="#">MT-73</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			



DESCRIPTION

Cross-Sectional View



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

PCIB1297E

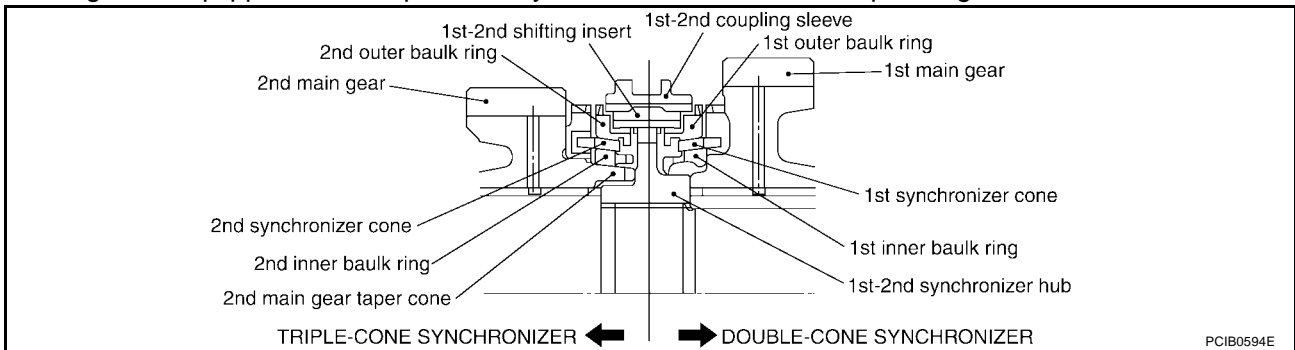
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## DOUBLE-CONE SYNCHRONIZER

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

## TRIPLE-CONE SYNCHRONIZER

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



**M/T OIL****Changing  
DRAINING**

1. Start the engine and let it run to warm up the transmission.
2. Stop the engine. Remove the transmission drain plug and drain the oil.
3. Set a gasket on the drain plug and install it to the transmission. Tighten the drain plug to the specified torque. Refer to [MT-71, "Case Components"](#) .

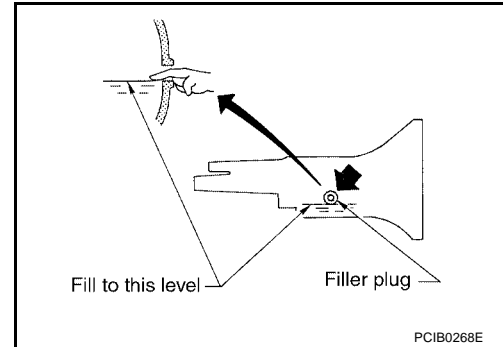
**CAUTION:****Do not reuse gasket.****FILLING**

1. Remove the filler plug. Fill with new oil until oil level reaches the specified limit near the filler plug hole.

**Oil grade and Viscosity** : Refer to [MA-11, "Fluids and Lubricants"](#) .

**Oil capacity** : Refer to [MA-11, "Fluids and Lubricants"](#) .

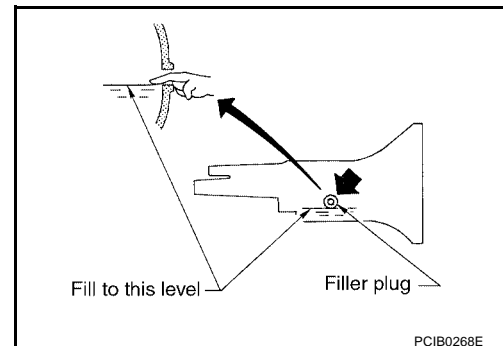
2. After refilling the oil, check oil level. Set a gasket to the filler plug, then install it to the transmission. Tighten the filler plug to the specified torque. Refer to [MT-71, "Case Components"](#) .

**CAUTION:****Do not reuse gasket.****Checking****OIL LEAKAGE AND OIL LEVEL**

1. Make sure that oil is not leaking from the transmission or around it.
2. Check oil level from the filler plug hole as shown.

**CAUTION:****Do not start engine while checking oil level.**

3. Set a gasket on the filler plug and install it to the transmission. Tighten the filler plug to the specified torque. Refer to [MT-71, "Case Components"](#) .

**CAUTION:****Do not reuse gasket.**

## REAR OIL SEAL

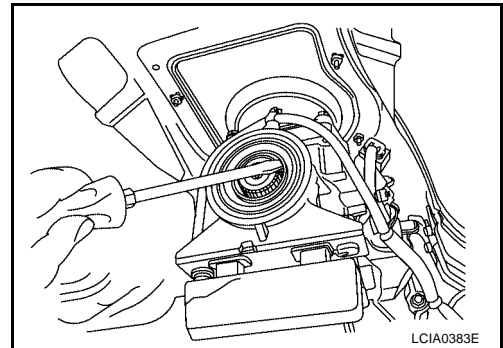
### Removal and Installation REMOVAL

#### For 2WD Models

1. Remove rear propeller shaft. Refer to [PR-10, "Removal and Installation"](#).
2. Remove dust seal and rear oil seal using suitable tool.

**CAUTION:**

Do not damage rear extension.



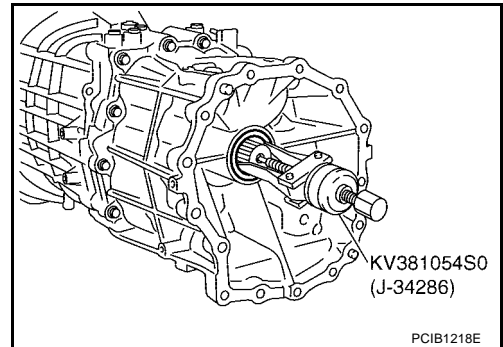
#### For 4WD Models

1. Remove front and rear propeller shafts. Refer to [PR-5, "Removal and Installation"](#) (front) and [PR-10, "Removal and Installation"](#) (rear).
2. Remove transfer assembly. Refer to [TF-111, "Removal and Installation"](#).
3. Remove rear oil seal using Tool.

**Tool number** : KV381054S0 (J-34286)

**CAUTION:**

Do not damage OD gear case.



## INSTALLATION

Installation is the reverse order of removal.

#### For 2WD Models

- Drive the new rear oil seal (1) and new dust seal (2) using Tools.

**Tool number** : ST33200000 (J-26082)

: KV38100500 ( — )

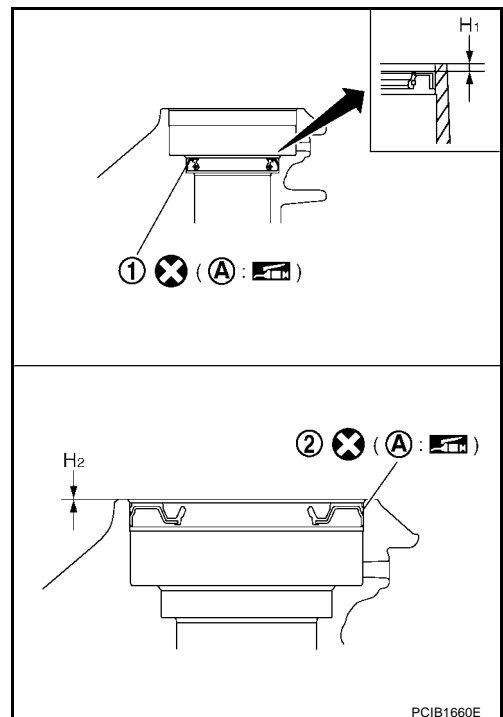
**Dimension "H1"** : 1.2 - 2.2 mm (0.047 - 0.087 in)

**Dimension "H2"** : 0.5 - 1.5 mm (0.020 - 0.059 in)

**CAUTION:**

Do not incline the dust seal and rear oil seal during installation.

(A): Seal lip



# REAR OIL SEAL

[FS6R31A]

## For 4WD Models

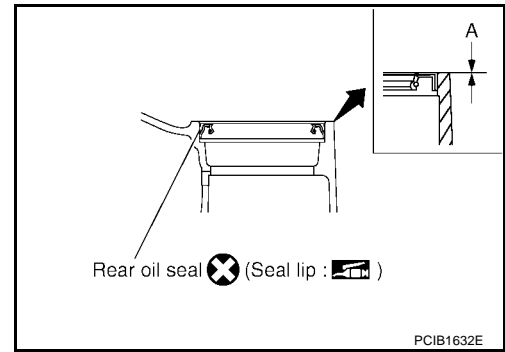
- Drive the rear oil seal using Tool.

**Tool number** : ST33200000 (J-26082)

**Dimension "A"** : -0.5 - 0.5 mm (-0.020 - 0.020 in)

**CAUTION:**

**Do not incline the rear oil seal during installation.**



- Check the transmission oil level after installation. Refer to [MT-59, "Checking"](#) .

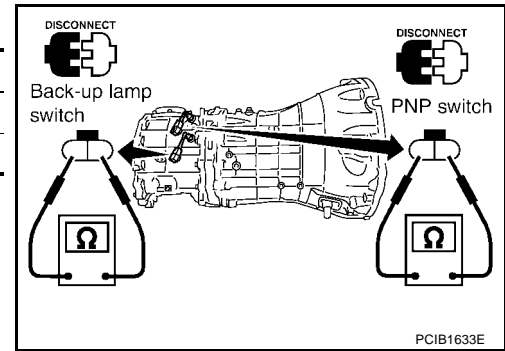
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## POSITION SWITCH

### Checking BACK-UP LAMP SWITCH

- Check continuity.

Gear position	Continuity
Reverse	Yes
Except reverse	No



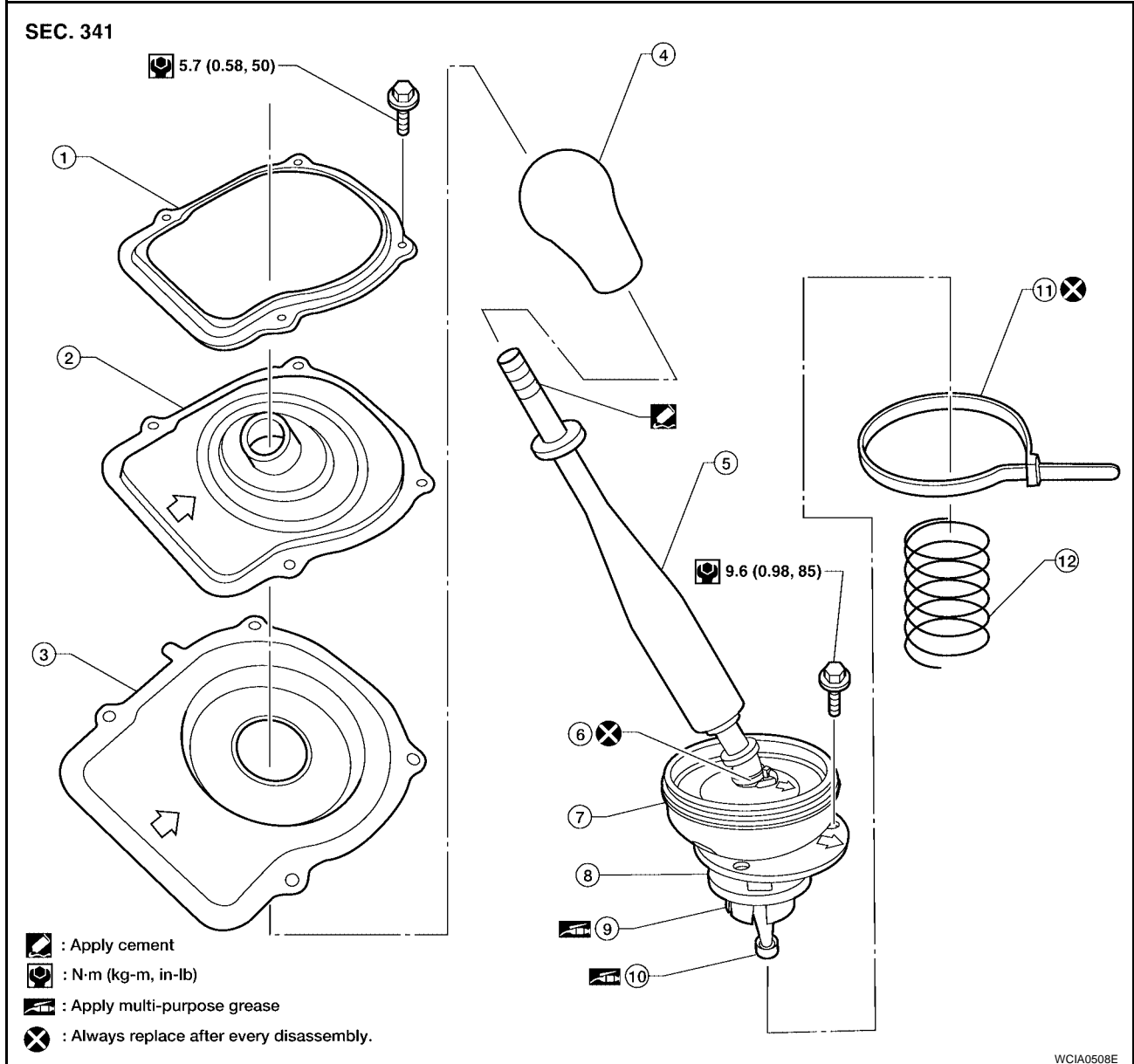
### PARK/NEUTRAL POSITION SWITCH

- Check continuity.

Gear position	Continuity
Neutral	Yes
Except neutral	No

### SHIFT CONTROL

### Removal and Installation COMPONENTS



- |                    |                            |                            |
|--------------------|----------------------------|----------------------------|
| 1. Retaining plate | 2. Dust boot cover (upper) | 3. Dust boot cover (lower) |
| 4. Shift knob      | 5. Shift lever assembly    | 6. Clip (A)                |
| 7. Boot            | 8. Guide plate             | 9. Socket                  |
| 10. Bushing        | 11. Clip (B)               | 12. Spring                 |

### REMOVAL

1. Remove the shift knob.
2. Remove the cup holder finisher and shift bezel. Refer to [IP-10, "Removal and Installation"](#).
3. Remove the retaining plate and dust boot covers.
4. Remove the clip (B) and then separate the boot from the control housing.
5. Remove the guide plate bolts and then separate the guide plate.
6. Remove the shift lever assembly and spring from the transmission.

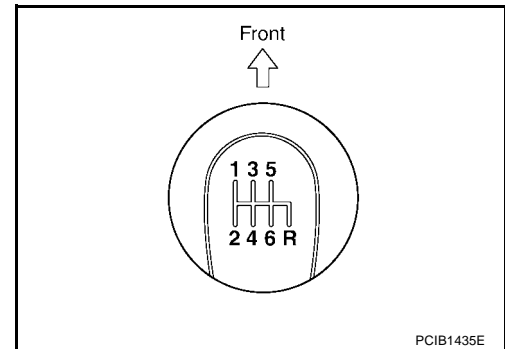
## INSTALLATION

Installation is the reverse order of removal.

- Install shift knob according to the following.
  - Apply cement to threads of control lever assembly.
  - Tighten shift knob until increased tension is felt. Then align shift knob to the position as shown within one turn.

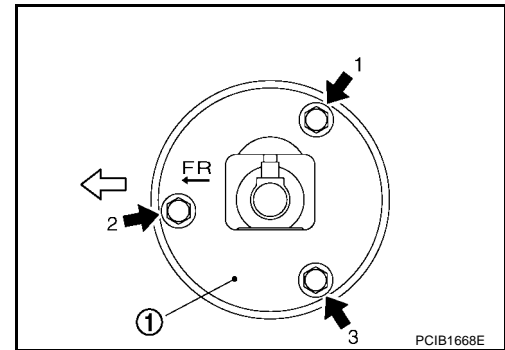
**CAUTION:**

**Do not adjust shift knob by loosening it.**

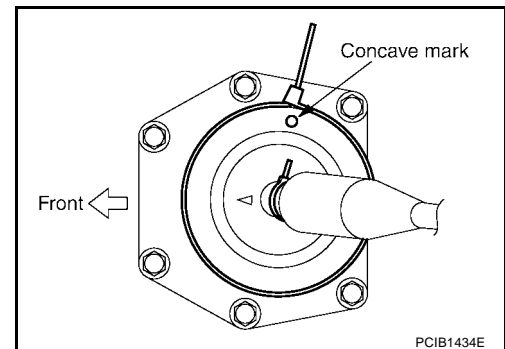


**CAUTION:**

- Apply multi-purpose grease to socket and bushing.
- Insert bushing of control lever assembly as far as it will go into the hole of striking arm.
- Tighten guide plate (1) bolts to the specified torque in order as shown.



- Do not reuse clip.
- Position clip as shown.
- Be careful with the orientation of control lever boot and insulator.



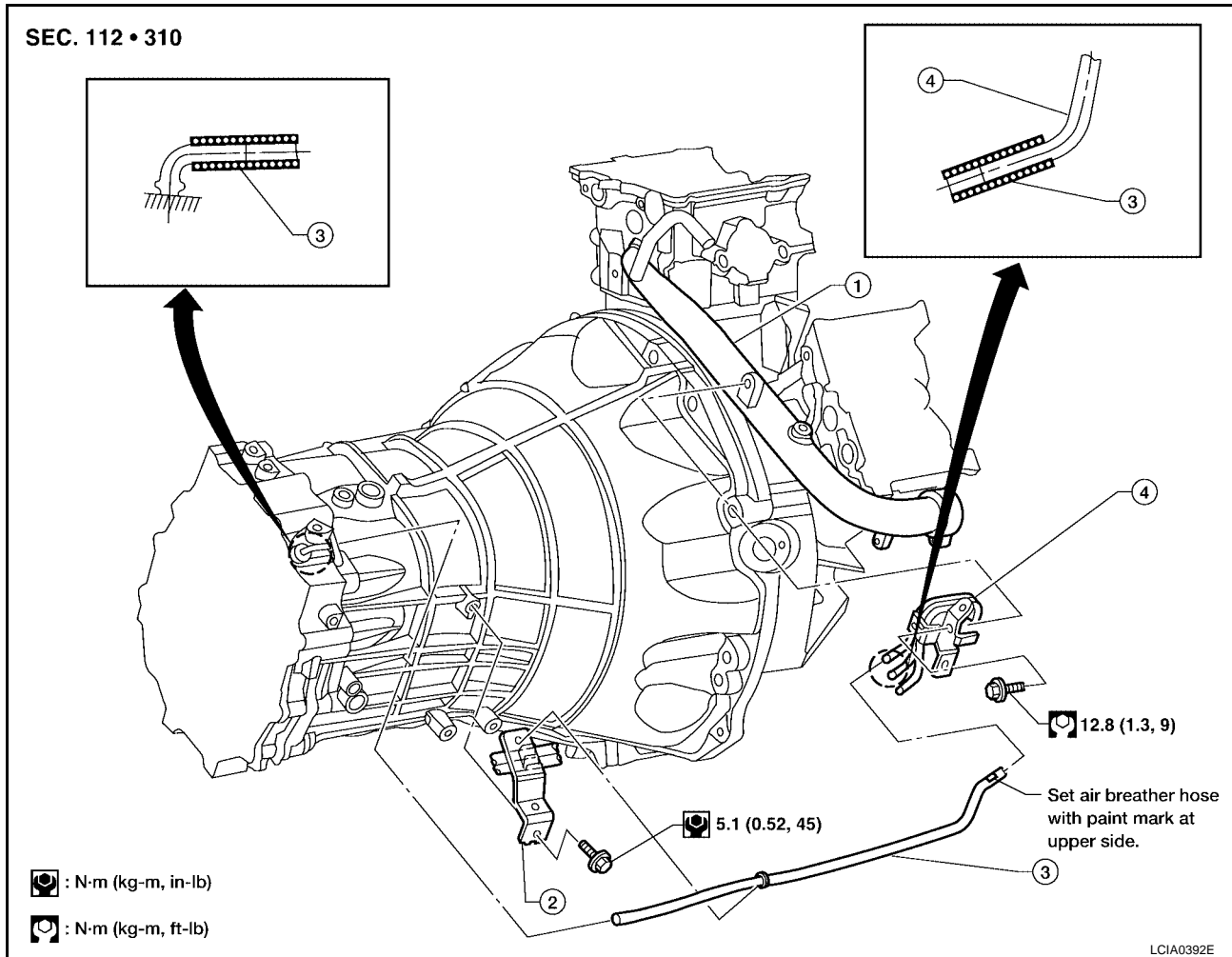
## INSPECTION AFTER INSTALLATION

- Tighten guide plate bolts to the specified torque. Refer to [MT-63, "COMPONENTS"](#).
- When shift lever assembly is shifted to each position, make sure there is no binding or disconnection in either boot.
- When shifted to each position, make sure there is no noise, bending, and backlash. Especially when shift lever assembly is shifted to 5th, 6th without pressing downward, check for bending.
- When shift lever assembly is shifted to 1st, 2nd side and 5th, 6th side, confirm shift lever assembly returns to neutral position smoothly.
- In any position other than reverse, confirm that shift lever assembly can be pressed downward.
- With shift lever assembly pressed downward, confirm that it can be shifted to reverse.
- When shifted from reverse to neutral position, confirm shift lever assembly returns to neutral position smoothly with spring power.
- Without shift lever assembly pressed downward, confirm that it cannot be shifted to reverse.



## AIR BREATHER HOSE Removal and Installation

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



1. Water outlet pipe
2. Bracket
3. Air breather hose
4. Breather tube

### CAUTION:

- Make sure there are no pinched or blocked areas on the air breather hose after installation.
- When inserting the air breather hose, be sure to insert it fully until its end reaches the end of the tube radius.
- Install the air breather hose with the paint mark side up.

# TRANSMISSION ASSEMBLY

[FS6R31A]

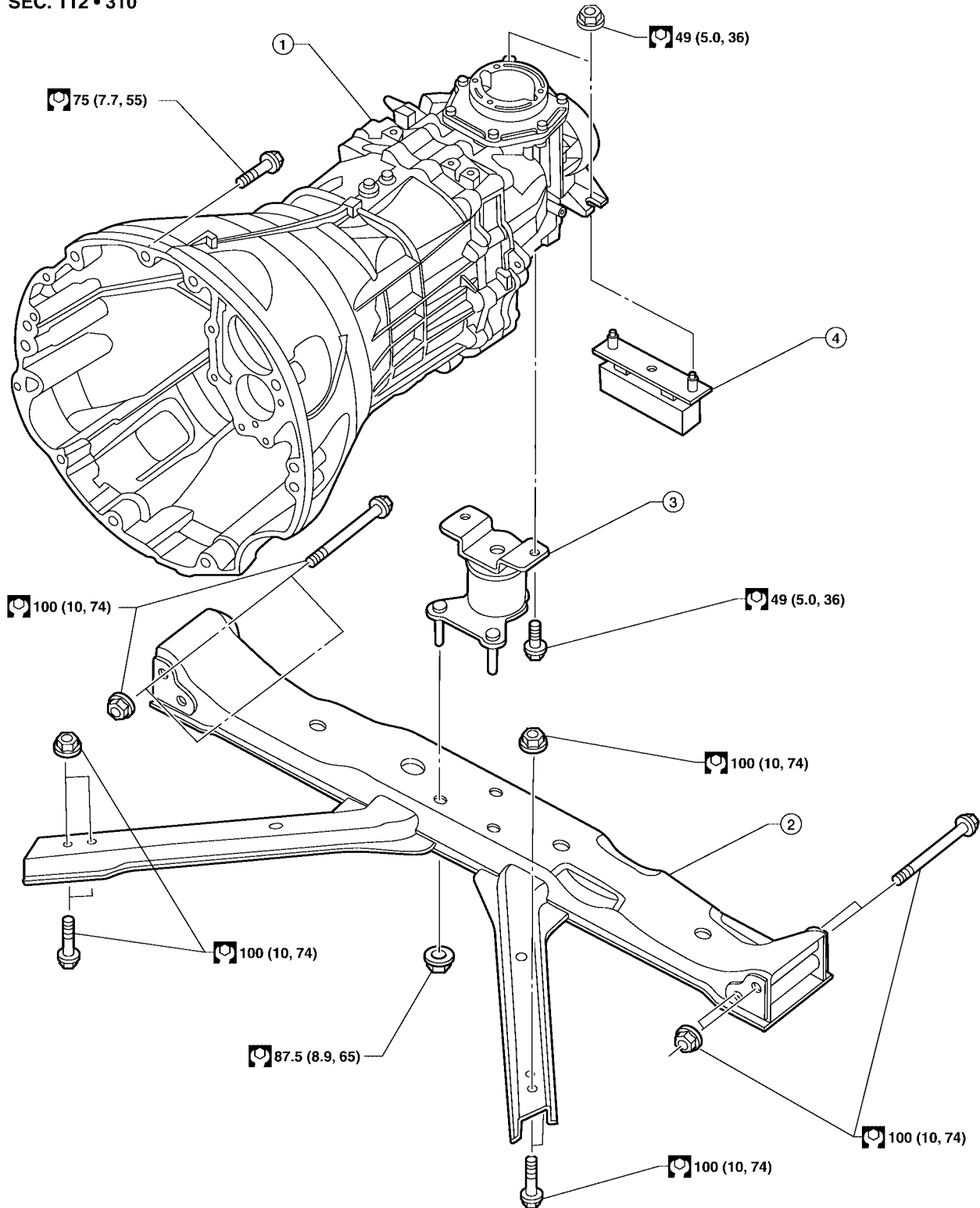
## TRANSMISSION ASSEMBLY

PF3:32010

### Removal and Installation from Vehicle (For 2WD Models) COMPONENTS

UCS0049T

SEC. 112 • 310



- 1. Transmission assembly
- 4. Dynamic damper

- 2. Crossmember

- 3. Insulator

WCIA0576E

## REMOVAL

1. Drain transmission oil. Refer to [MT-59, "DRAINING"](#) .
2. Disconnect the battery cable from the negative terminal.
3. Remove the shift lever assembly. Refer to [MT-63, "Removal and Installation"](#) .
4. Remove the LH fender protector. Refer to [EI-22, "FENDER PROTECTOR"](#) .
5. Remove the crankshaft position sensor (POS) from M/T assembly.

**CAUTION:**

**Do not damage the sensor edge.**

6. Remove the undercovers using power tool.
7. Remove the front crossmember using power tool.
8. Remove the starter motor. Refer to [SC-23, "Removal and Installation"](#) .
9. Remove the rear propeller shaft. Refer to [PR-10, "Removal and Installation"](#) .
10. Remove the left and right front exhaust tubes. Refer to [EX-5, "Removal and Installation"](#) .
11. Remove the clutch operating cylinder from the transmission. Refer to [CL-11, "Removal and Installation"](#) .
12. Support the transmission using a suitable jack.
13. Remove the nuts securing the insulator to the crossmember.
14. Remove the crossmember using power tool.

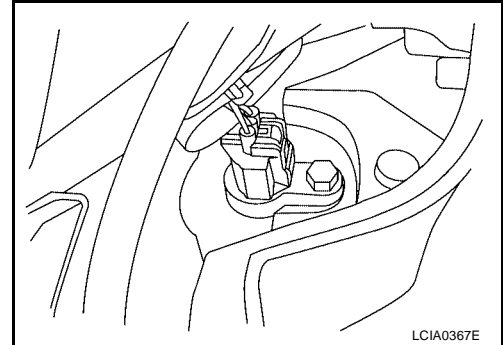
**WARNING:**

**Support the transmission using suitable jack.**

15. Tilt the transmission slightly to gain clearance between the body and the transmission, then disconnect the air breather hoses. Refer to [MT-65, "Removal and Installation"](#) .
16. Disconnect the following:
  - Back-up lamp switch connector
  - Park/neutral position (PNP) switch connector
17. Remove the wiring harness from the retainers.
18. Remove the transmission to engine bolts using power tool.
19. Separate the transmission from the engine and remove it from the vehicle.

**WARNING:**

**Support the transmission while removing it using suitable jack.**



## INSTALLATION

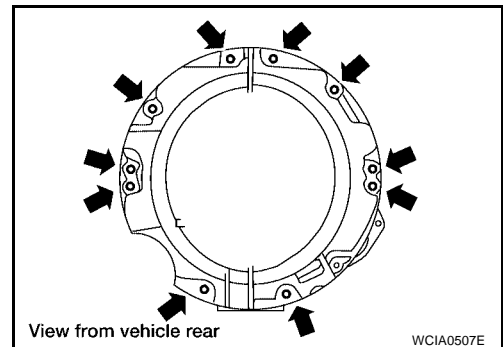
Installation is the reverse order of removal.

- When installing the transmission to the engine, tighten the bolts to the specified torque.

Quantity	10
Bolt length "ℓ" mm (in)	65 (2.56)
Tightening torque N·m (kg-m, ft-lb)	75 (7.7, 55)

**CAUTION:**

- When installing be careful to avoid interference between transmission main drive gear and clutch cover.
- If flywheel is removed, align dowel pin with the smallest hole of flywheel. Refer to [EM-80, "ASSEMBLY"](#) .
- When replacing an engine or transmission you must make sure the dowels are installed correctly during re-assembly.
- Improper alignment caused by missing dowels may cause vibration, oil leaks or breakage of drive train components.



# TRANSMISSION ASSEMBLY

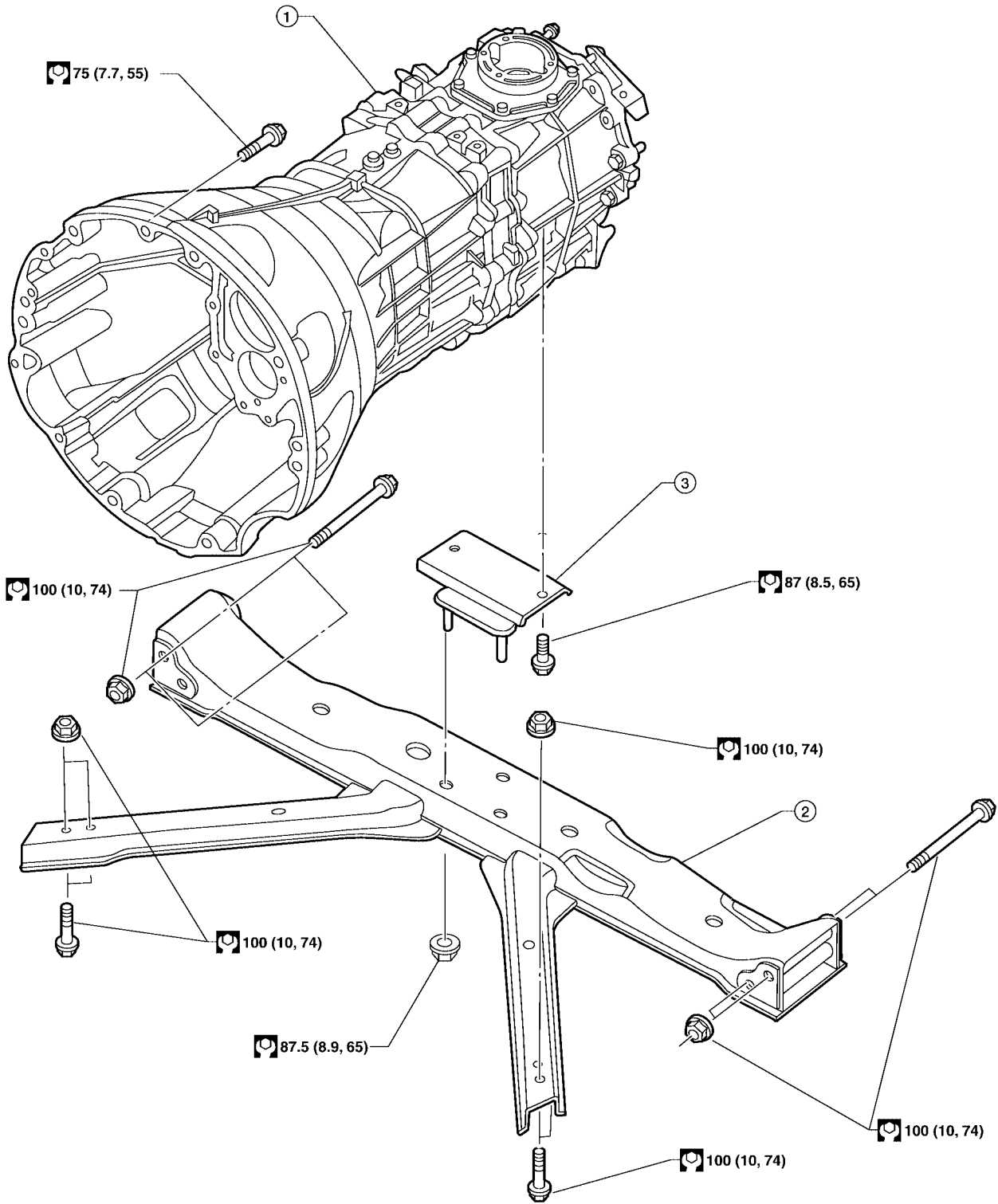
[FS6R31A]

- After installation, check for oil leakage and oil level. Refer to [MT-59, "Checking"](#).

## Removal and Installation from Vehicle (For 4WD Models) COMPONENTS

UCS00415

SEC. 112 • 310



1. Transmission assembly

2. Crossmember

3. Insulator

WCIA0577E

## REMOVAL

### NOTE:

To prevent oil spills, drain transmission oil before removing transmission or insert plug into rear oil seal after removing propeller shaft.

1. Disconnect the battery cable from the negative terminal.
2. Remove the shift lever assembly. Refer to [MT-63, "Removal and Installation"](#) .
3. Remove the LH fender protector. Refer to [EI-22, "FENDER PROTECTOR"](#) .
4. Remove the crankshaft position sensor (POS) from the M/T assembly.

### CAUTION:

Do not damage the sensor edge.

5. Remove the undercovers using power tool.
6. Remove the front crossmember using power tool.
7. Remove the starter motor. Refer to [SC-23, "Removal and Installation"](#) .
8. Remove the front and rear propeller shafts. Refer to [PR-5, "Removal and Installation"](#) and [PR-10, "Removal and Installation"](#) .
9. Remove the left and right front exhaust tubes. Refer to [EX-5, "Removal and Installation"](#) .
10. Remove the clutch operating cylinder from the transmission. Refer to [CL-11, "Removal and Installation"](#) .
11. Support the transmission using a suitable jack.
12. Remove the nuts securing the insulator to the crossmember.
13. Remove the crossmember using power tool.

### WARNING:

Support the transmission using suitable jack.

14. Tilt the transmission slightly to gain clearance between the body and the transmission, then disconnect the air breather hoses. Refer to [MT-65, "Removal and Installation"](#) .
15. Disconnect the following:
  - Back-up lamp switch connector
  - Park/neutral position (PNP) switch connector
  - ATP switch connector
  - Neutral 4LO switch connector
  - Wait detection switch connector
  - Transfer control device connector

16. Remove the wiring harness from the retainers.
17. Remove the transmission to engine bolts using power tool.
18. Separate the transmission from the engine and remove it from the vehicle.

### WARNING:

Support manual transmission while removing it.

## INSTALLATION

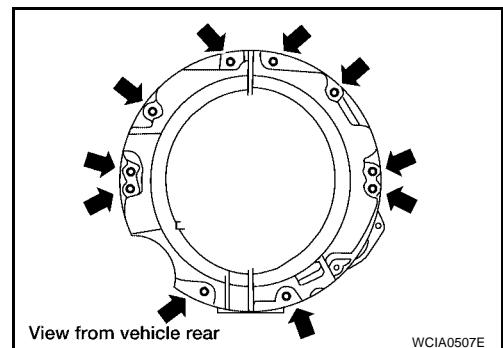
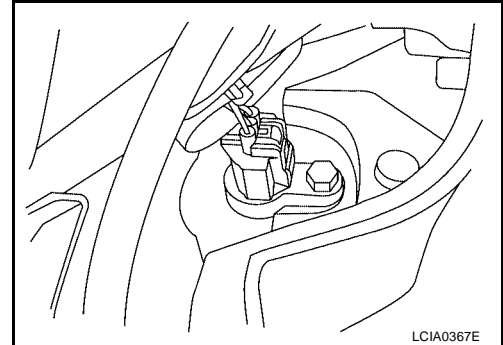
Installation is the reverse order of removal.

- When installing the transmission to the engine, tighten the bolts to the specified torque.

Quantity	10
Bolt length "ℓ" mm (in)	65 (2.56)
Tightening torque N·m (kg·m, ft·lb)	75 (7.7, 55)

### CAUTION:

- When installing be careful to avoid interference between transmission main drive gear and clutch cover.



## TRANSMISSION ASSEMBLY

[FS6R31A]

- 
- If flywheel is removed, align dowel pin with the smallest hole of flywheel. Refer to [EM-222, "ASSEMBLY"](#).
  - When replacing an engine or transmission you must make sure the dowels are installed correctly during re-assembly.
  - Improper alignment caused by missing dowels may cause vibration oil leaks or breakage of drivetrain components.
  - After installation, check for oil leakage and oil level. Refer to [MT-59, "Checking"](#).

# TRANSMISSION ASSEMBLY

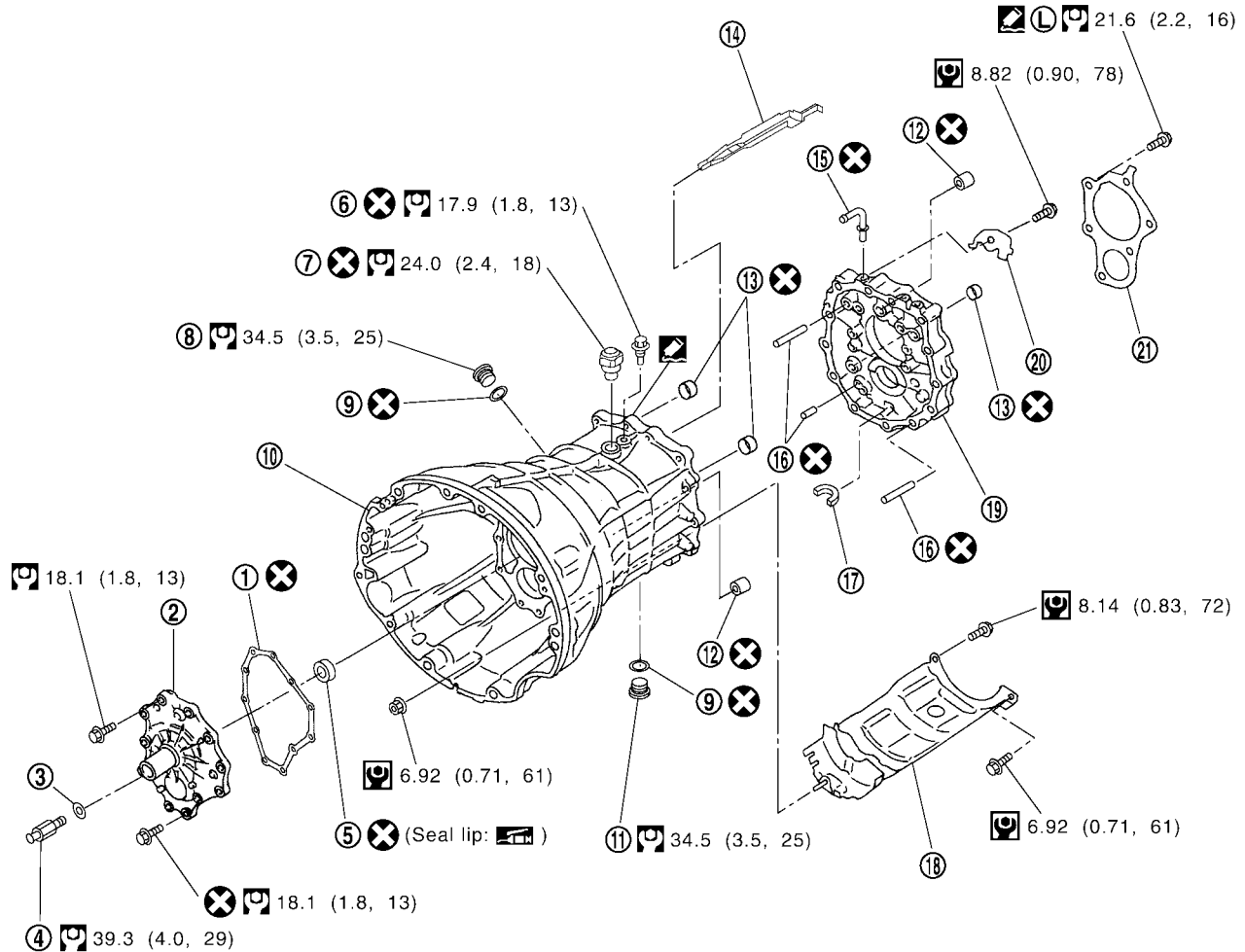
[FS6R31A]

UCS00418

## Disassembly and Assembly COMPONENTS

### Case Components

SEC.321



: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

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

: Apply Genuine Medium Strength Thread Locking Sealant or the equivalent. Refer to GI section.

: Apply multi-purpose grease.

: Always replace after every disassembly.

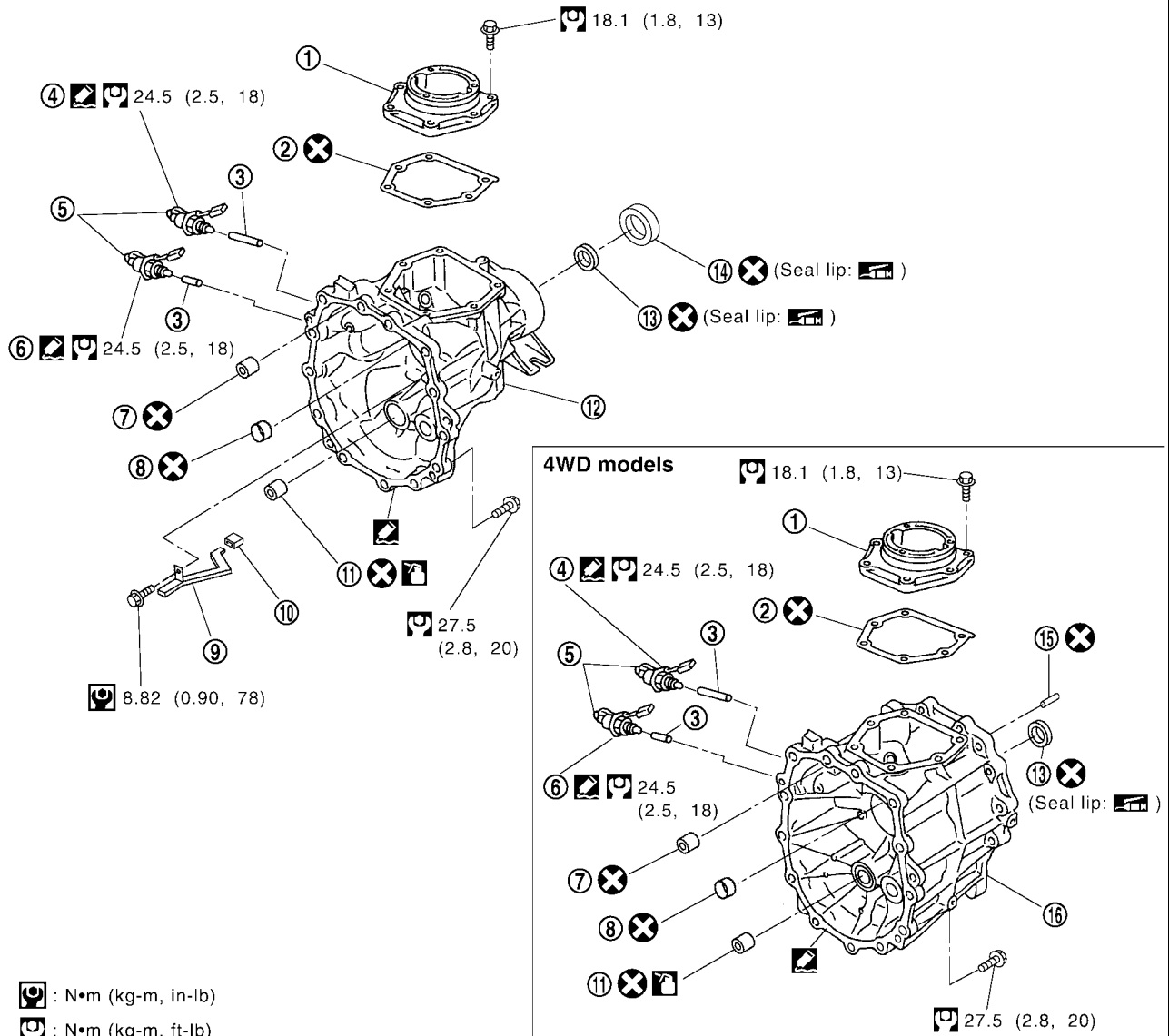
PCIB1208E

- |                              |                         |                          |
|------------------------------|-------------------------|--------------------------|
| 1. Front cover gasket        | 2. Front cover          | 3. Washer                |
| 4. Withdrawal lever ball pin | 5. Front cover oil seal | 6. Pivot bolt            |
| 7. Check shift pin           | 8. Filler plug          | 9. Gasket                |
| 10. Transmission case        | 11. Drain plug          | 12. Sliding ball bearing |
| 13. Bushing                  | 14. Oil gutter          | 15. Breather             |
| 16. Dowel pin                | 17. Magnet              | 18. Baffle plate         |
| 19. Adapter plate            | 20. Baffle plate        | 21. Bearing retainer     |

# TRANSMISSION ASSEMBLY

[FS6R31A]

## SEC.321

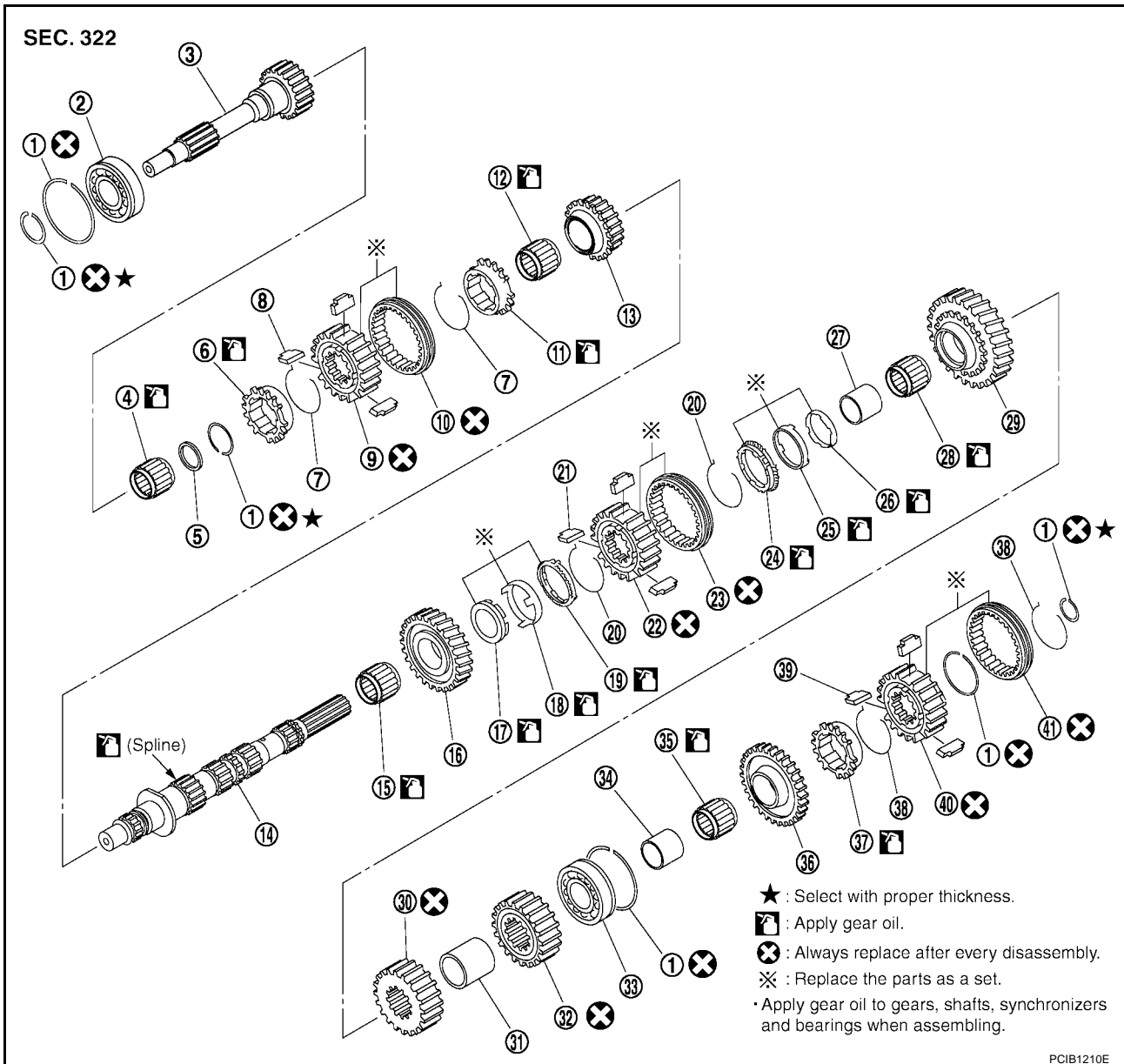


PCIB1209E

- |                                       |                         |                              |
|---------------------------------------|-------------------------|------------------------------|
| 1. Control housing                    | 2. Gasket               | 3. Plunger                   |
| 4. Park/neutral position (PNP) switch | 5. Clip                 | 6. Back-up lamp switch       |
| 7. Sliding ball bearing               | 8. Bushing              | 9. Rear extension oil gutter |
| 10. Cap                               | 11. Counter end bearing | 12. Rear extension           |
| 13. Rear oil seal                     | 14. Dust seal           | 15. Dowel pin                |
| 16. OD gear case                      |                         |                              |



## Gear Components

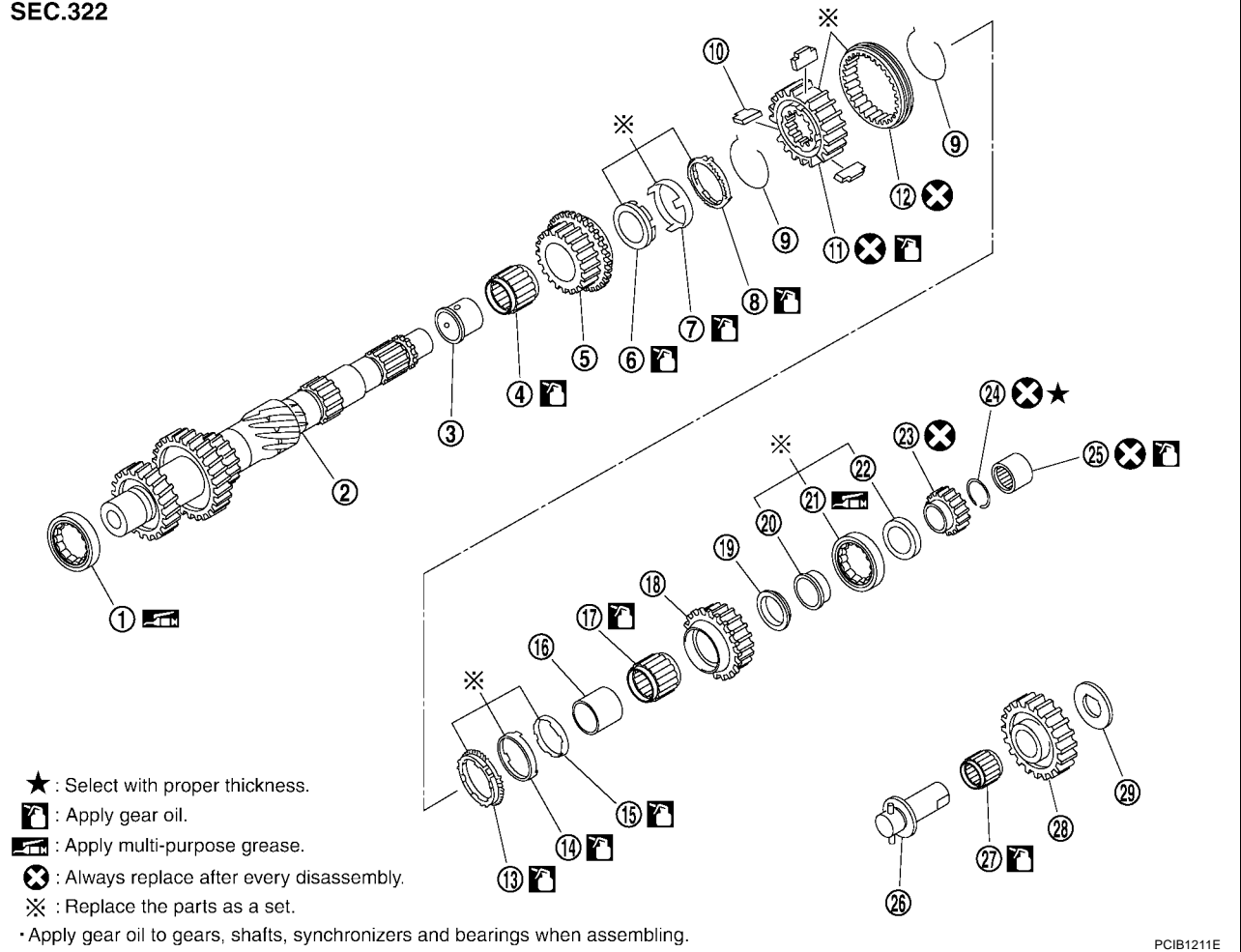


- |                               |                                 |                             |
|-------------------------------|---------------------------------|-----------------------------|
| 1. Snap ring                  | 2. Main drive gear bearing      | 3. Main drive gear          |
| 4.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

# TRANSMISSION ASSEMBLY

[FS6R31A]

SEC.322



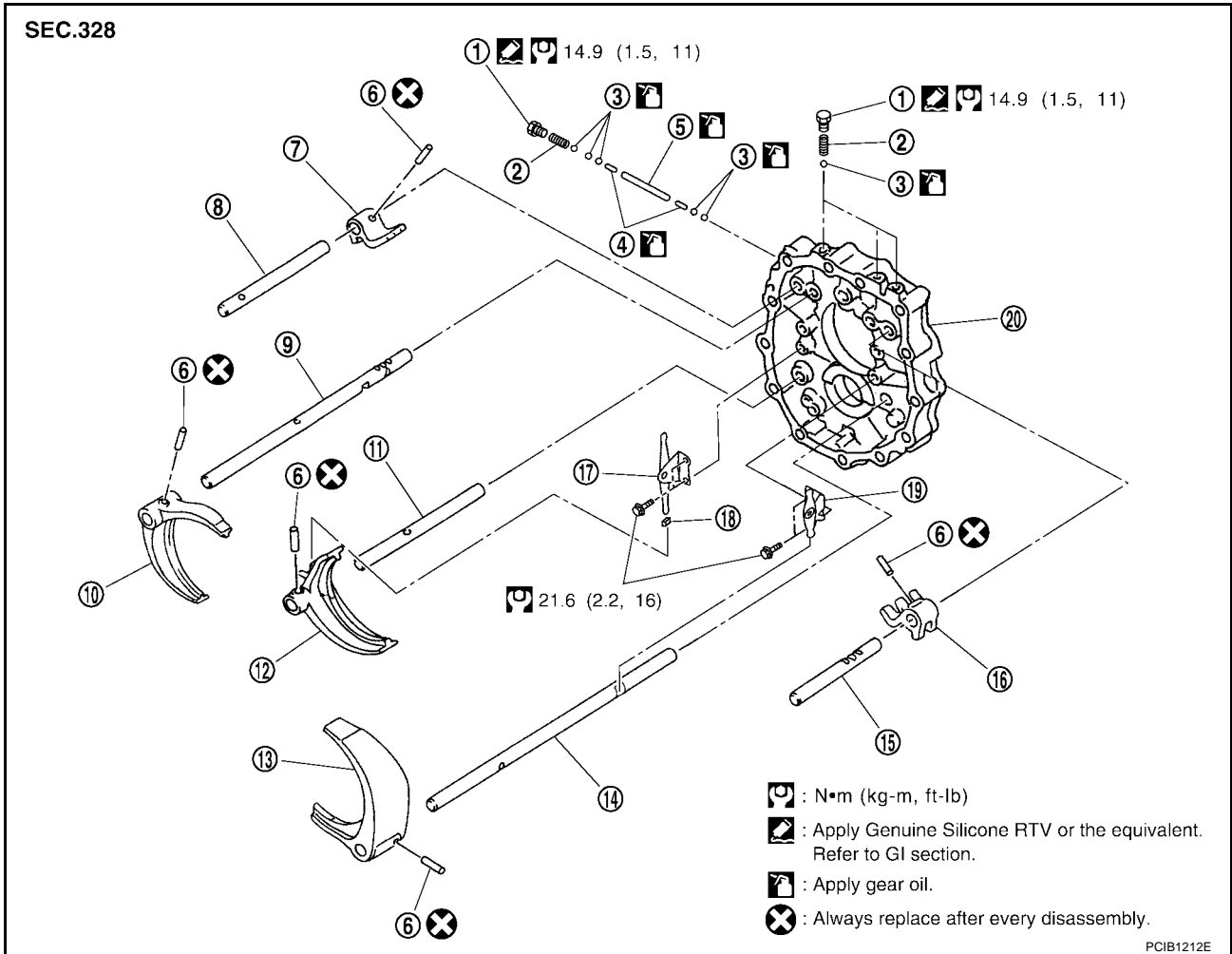
PCIB1211E

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

# TRANSMISSION ASSEMBLY

[FS6R31A]

## Shift Control Components



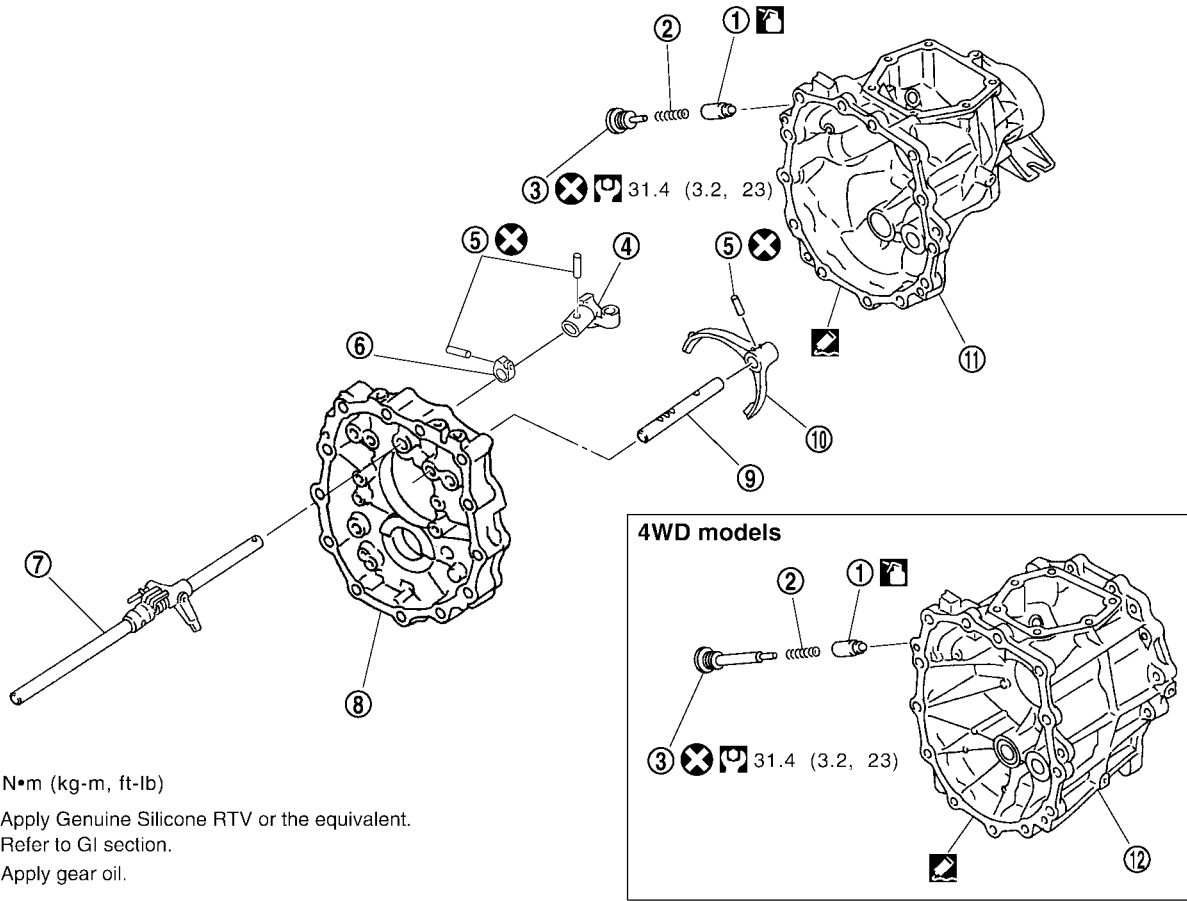
- |                              |                                      |                        |
|------------------------------|--------------------------------------|------------------------|
| 1. Check ball plug           | 2. Check ball spring                 | 3. Check ball          |
| 4. Interlock pin             | 5. Interlock plunger                 | 6. Retaining pin       |
| 7. 3rd-4th fork rod bracket  | 8. 3rd-4th fork rod                  | 9. 1st-2nd fork rod    |
| 10. 1st-2nd shift fork       | 11. 3rd-4th fork rod (reversal side) | 12. 3rd-4th shift fork |
| 13. 5th-6th shift fork       | 14. 5th-6th fork rod (reversal side) | 15. 5th-6th fork rod   |
| 16. 5th-6th fork rod bracket | 17. 3rd-4th control lever            | 18. Shifter cap        |
| 19. 5th-6th control lever    | 20. Adapter plate                    |                        |

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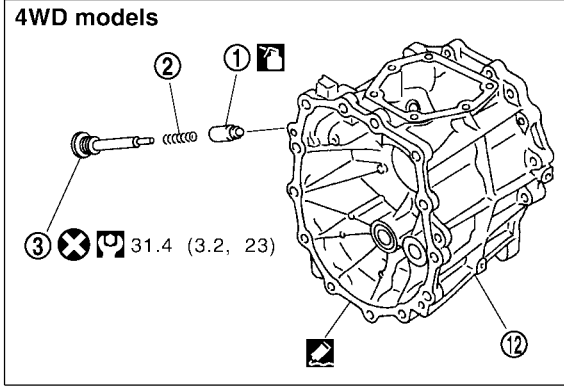
# TRANSMISSION ASSEMBLY

[FS6R31A]

SEC.328



- : N•m (kg-m, ft-lb)
- : Apply Genuine Silicone RTV or the equivalent. Refer to GI section.
- : Apply gear oil.
- : Always replace after every disassembly.



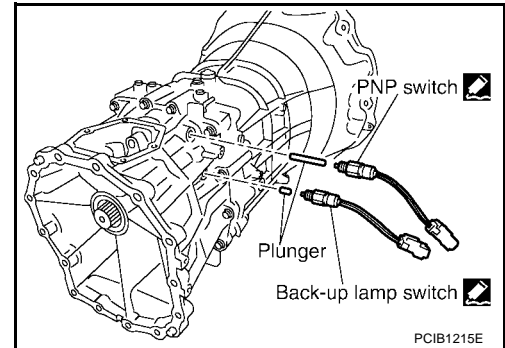
PCIB1213E

- |                          |                    |                       |
|--------------------------|--------------------|-----------------------|
| 1. Return spring plunger | 2. Return spring   | 3. Return spring plug |
| 4. Striking arm          | 5. Retaining pin   | 6. Stopper ring       |
| 7. Striking rod assembly | 8. Adapter plate   | 9. Reverse shift fork |
| 10. Reverse shift fork   | 11. Rear extension | 12. OD gear case      |

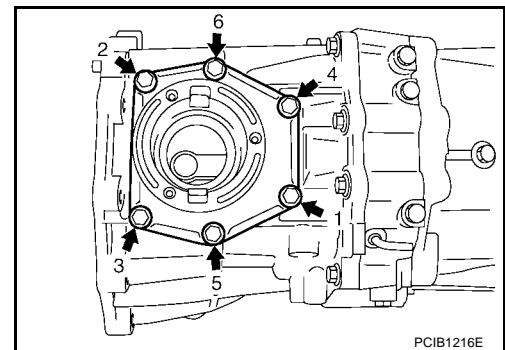
### DISASSEMBLY

#### Case Components

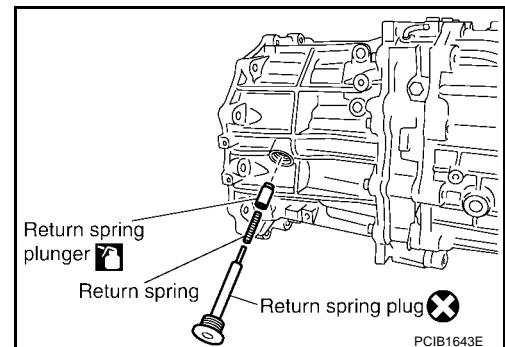
1. Remove clips from PNP switch and back-up lamp switch.
2. Remove PNP switch, back-up lamp switch and plungers from rear extension (or OD gear case).



3. Remove control housing bolts, and then remove control housing and gasket from rear extension (or OD gear case).



4. Remove return spring plug, return spring and return spring plunger from rear extension (or OD gear case).

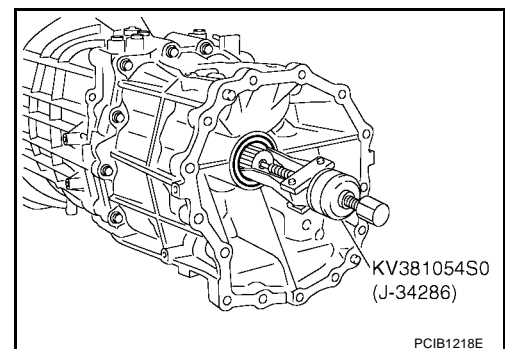


5. Remove rear oil seal from OD gear case using Tool (For 4WD models).

**Tool number** : KV381054S0 (J-34286)

**CAUTION:**

**Be careful not to damage OD gear case.**

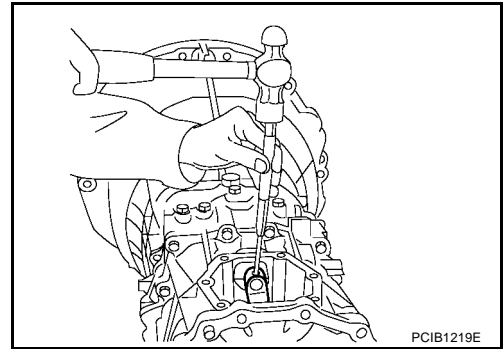


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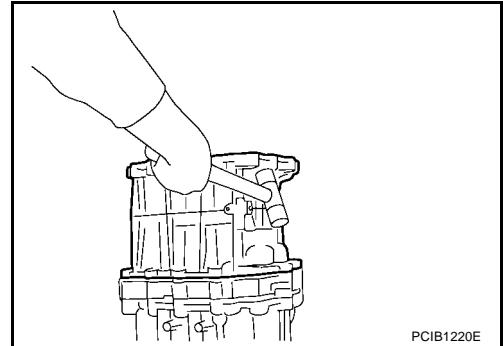
# TRANSMISSION ASSEMBLY

[FS6R31A]

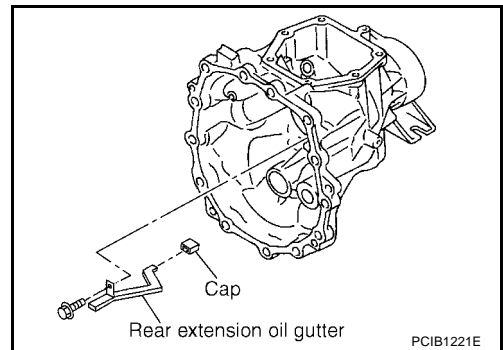
6. Remove retaining pin using suitable tool, and then remove striking arm from striking rod assembly.



7. Remove rear extension (or OD gear case) bolts, and then remove rear extension (or OD gear case) from adapter plate using suitable tool.

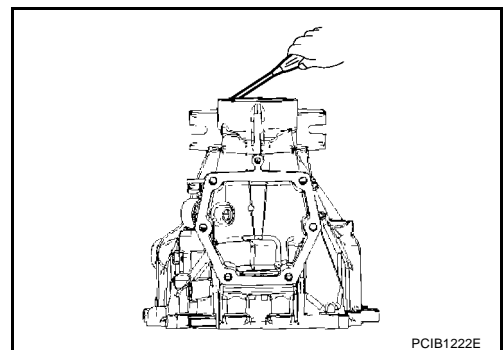


8. Remove rear extension oil gutter bolt, and then remove rear extension oil gutter and cap from rear extension (for 2WD models).



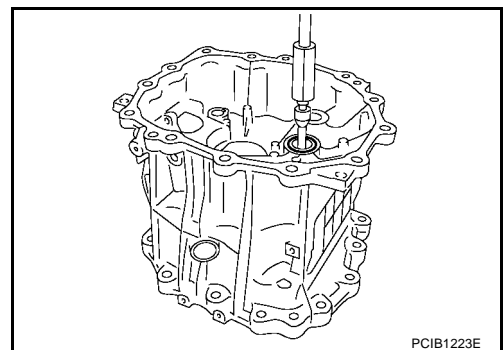
9. Remove dust seal and rear oil seal from rear extension using suitable tool (for 2WD models).

**CAUTION:**  
Be careful not to damage rear extension.



10. Remove counter end bearing from rear extension (or OD gear case) using suitable tool.

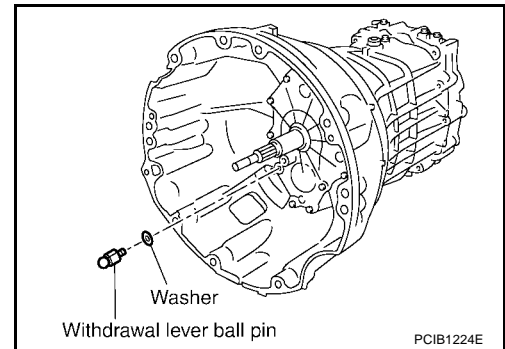
**CAUTION:**  
Be careful not to damage rear extension (or OD gear case).



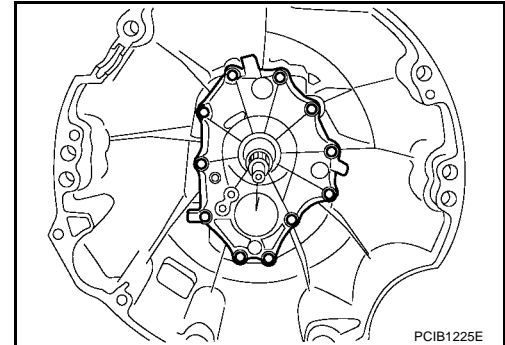
# TRANSMISSION ASSEMBLY

[FS6R31A]

11. Remove withdrawal lever ball pin and washer from front cover.



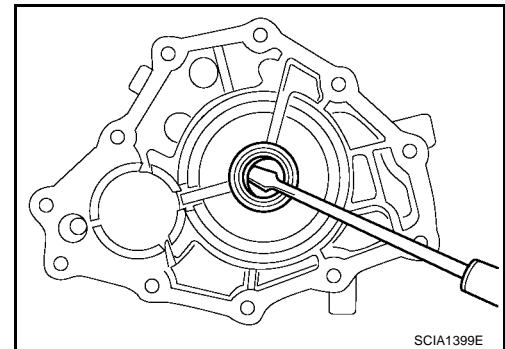
12. Remove front cover bolts, and then remove front cover and front cover gasket from transmission case.



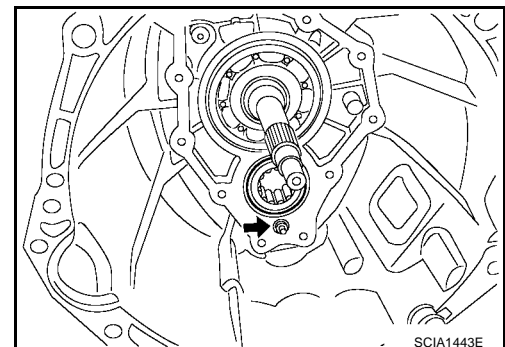
13. Remove front cover oil seal from front cover using suitable tool.

**CAUTION:**

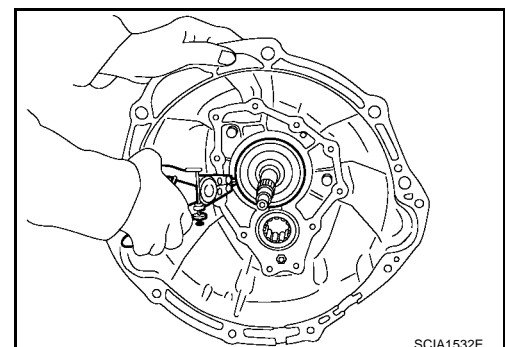
**Be careful not to damage front cover.**



14. Remove baffle plate nut from transmission case.



15. Remove snap ring from main drive gear bearing using suitable tool.

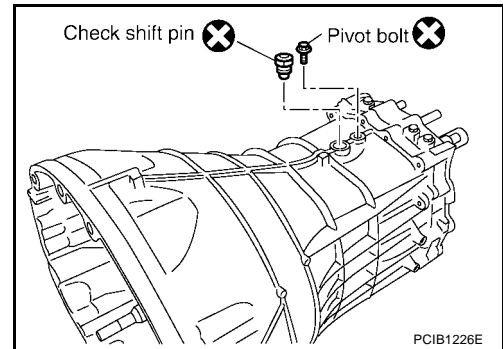


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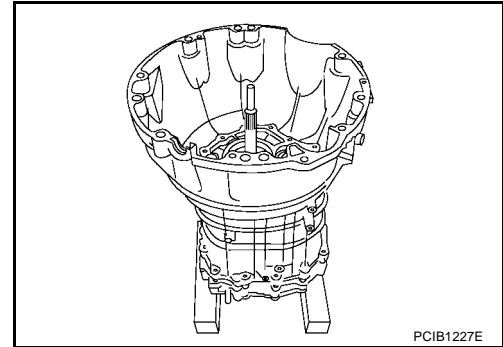
# TRANSMISSION ASSEMBLY

[FS6R31A]

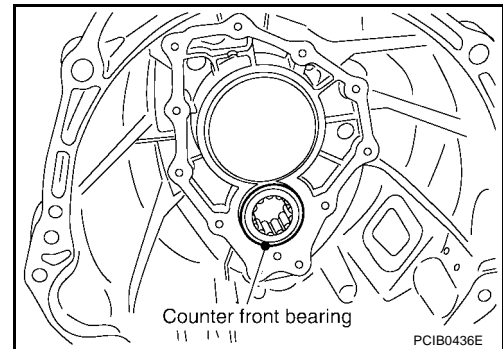
16. Remove pivot bolt and check shift pin from transmission case.



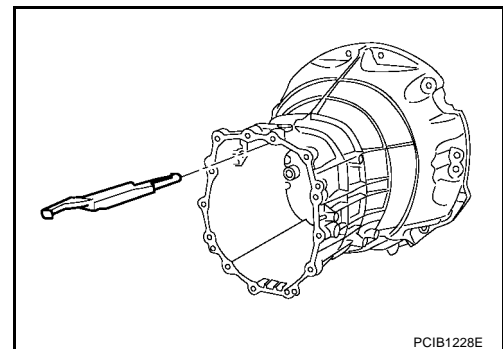
17. Remove transmission case from adapter plate.



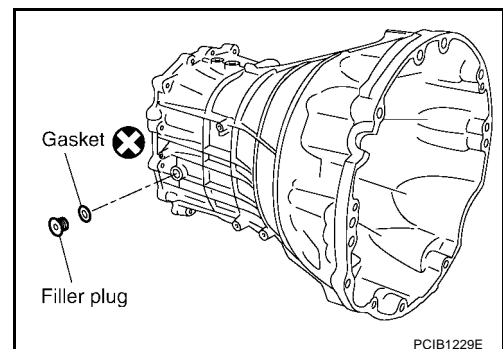
18. Remove counter front bearing from transmission case.



19. Remove oil gutter from transmission case.



20. Remove filler plug and gasket from transmission case.





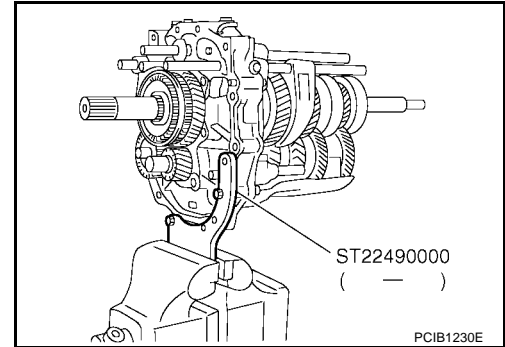
## Shift Control Components

1. Remove rear extension (or OD gear case) and transmission case. Refer to [MT-77, "Case Components"](#).
2. Install Tool to adapter plate, then position in a vise.

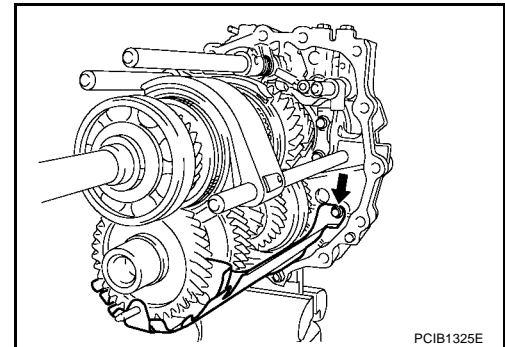
**Tool number** : ST22490000 ( — )

**CAUTION:**

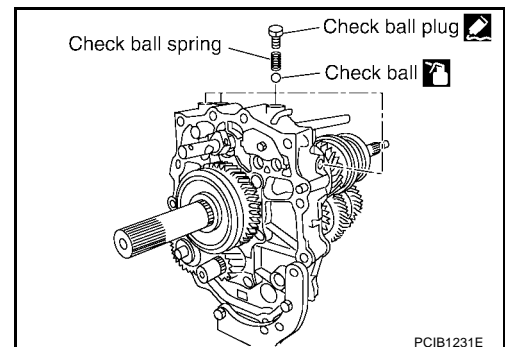
Do not directly secure mating surface of adapter plate in a vise.



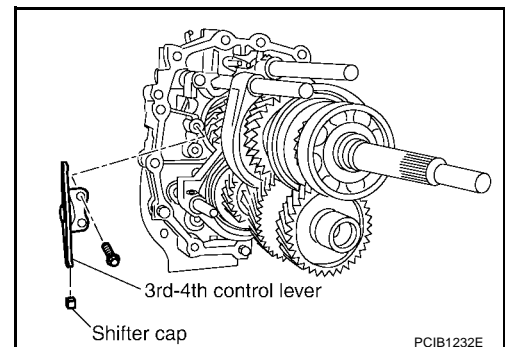
3. Remove baffle plate bolts, and then remove baffle plate from adapter plate.



4. Remove check ball plugs, check ball springs and check balls from adapter plate.



5. Remove 3rd-4th control lever bolts, and then remove 3rd-4th control lever and shifter cap from adapter plate.

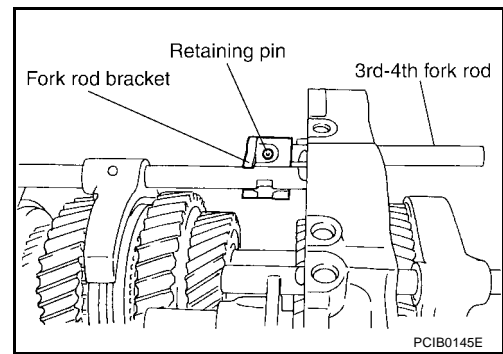


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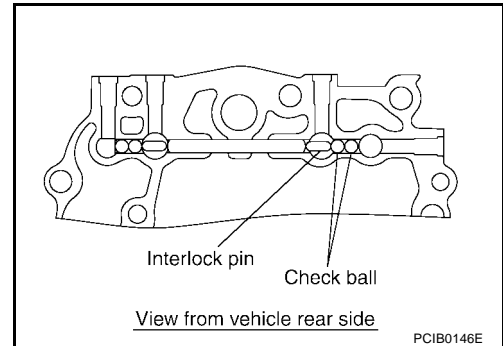
# TRANSMISSION ASSEMBLY

[FS6R31A]

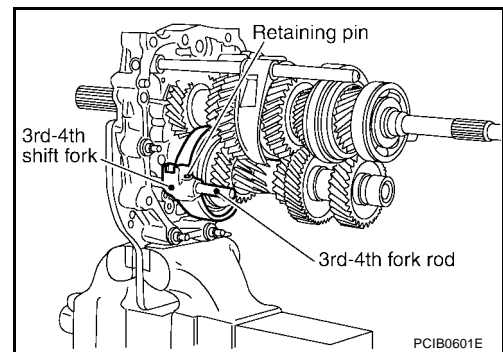
6. Remove retaining pin using suitable tool, and then remove 3rd - 4th fork rod bracket and 3rd-4th fork rod from adapter plate.



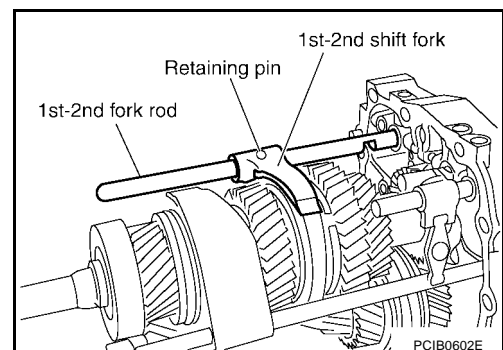
7. Remove check balls and interlock pin from adapter plate.



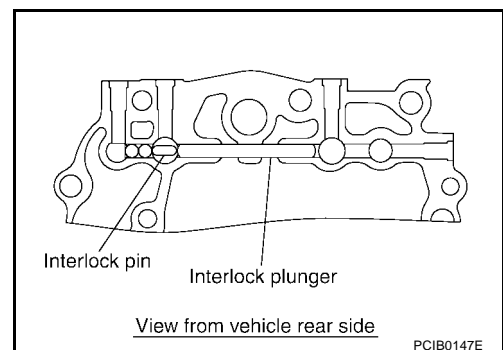
8. Remove retaining pin using suitable tool, and then remove 3rd-4th shift fork and 3rd-4th fork rod (reversal side) from adapter plate.



9. Remove retaining pin using suitable tool, and then remove 1st-2nd shift fork and 1st-2nd fork rod from adapter plate.



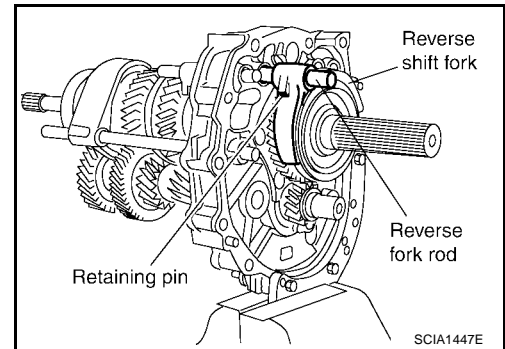
10. Remove interlock plunger and interlock pin from adapter plate.



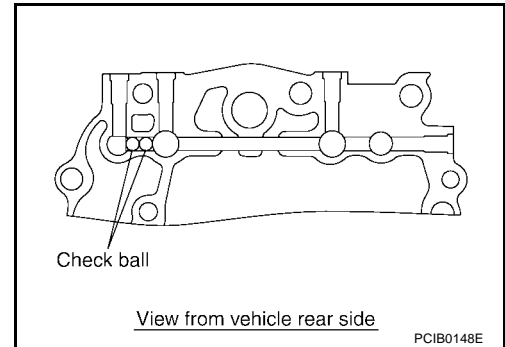
# TRANSMISSION ASSEMBLY

[FS6R31A]

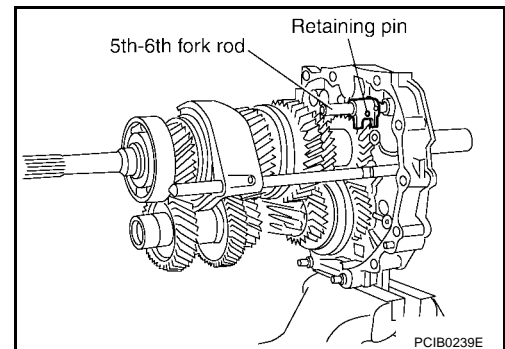
11. Remove retaining pin using suitable tool, and then remove reverse shift fork and reverse fork rod from adapter plate.



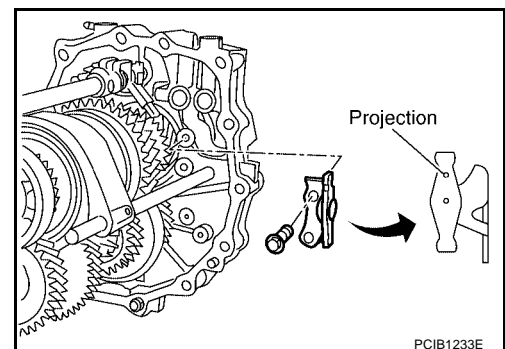
12. Remove check balls from adapter plate.



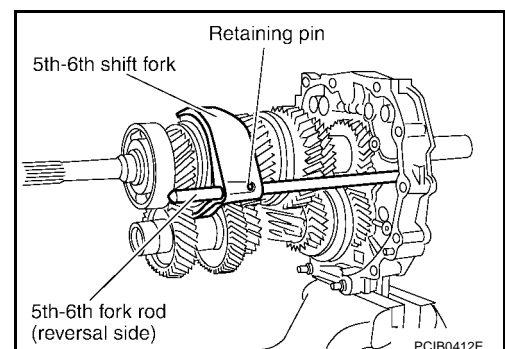
13. Remove retaining pin using suitable tool, and then remove 5th-6th fork rod bracket and 5th-6th fork rod from adapter plate.



14. Remove 5th-6th control lever bolts, and then remove 5th-6th control lever from adapter plate.

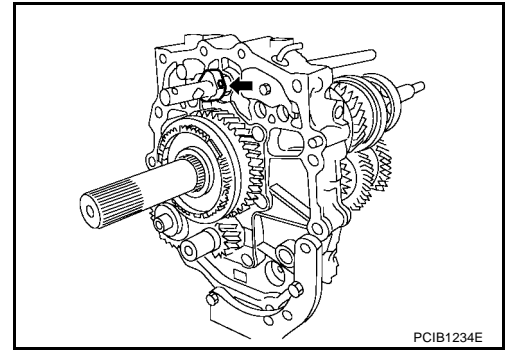


15. Remove retaining pin using suitable tool, and then remove 5th-6th shift fork and 5th-6th fork rod (reversal side) from adapter plate.

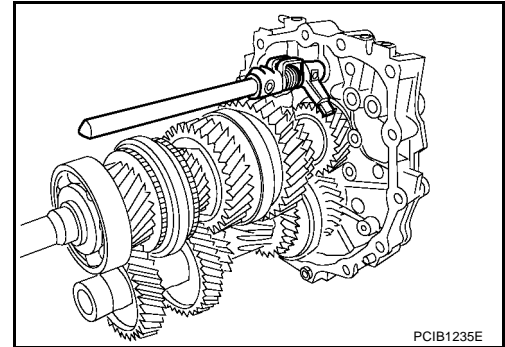


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- Remove retaining pin using suitable tool, and then remove stopper ring from striking rod assembly.



- Remove striking rod assembly from adapter plate.

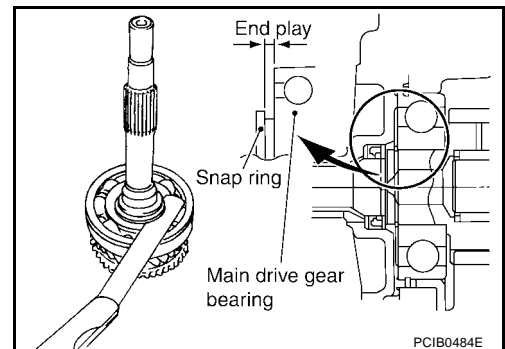


## Gear Components

- Remove rear extension (or OD gear case) and transmission case. Refer to [MT-77, "Case Components"](#).
- Remove shift forks and fork rods. Refer to [MT-81, "Shift Control Components"](#).
- Before disassembling, measure the end play for each position. If the end play is outside the standards, disassemble and inspect.

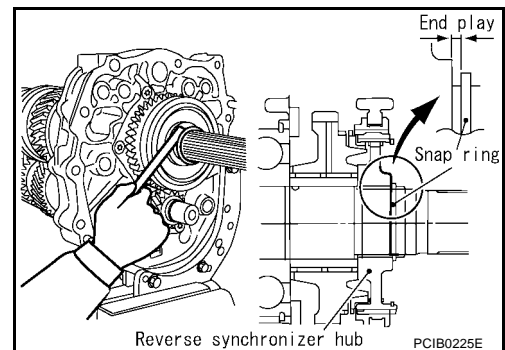
- Main drive gear

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



- Mainshaft (Rear side)

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

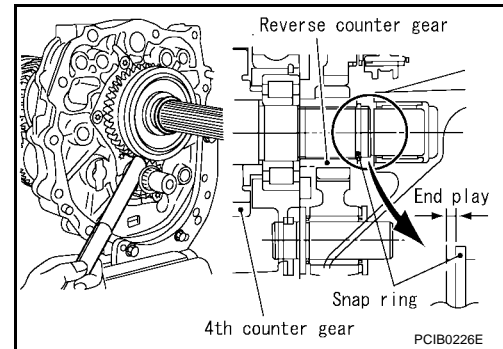


# TRANSMISSION ASSEMBLY

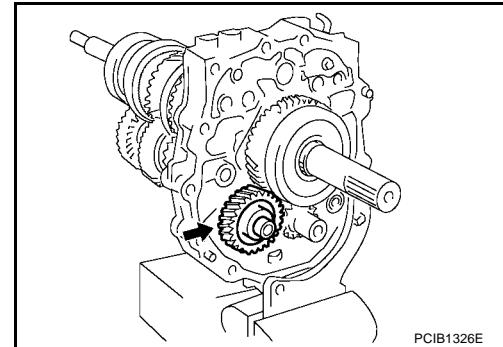
[FS6R31A]

- Counter gear

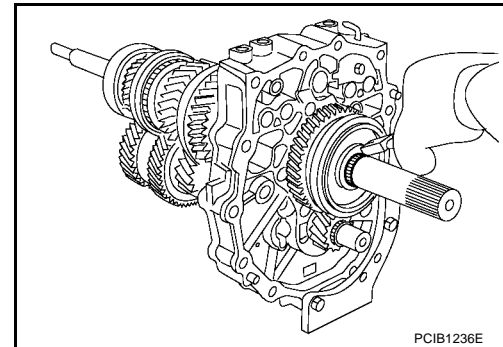
**End play : 0 - 0.10 mm (0 - 0.004 in)**



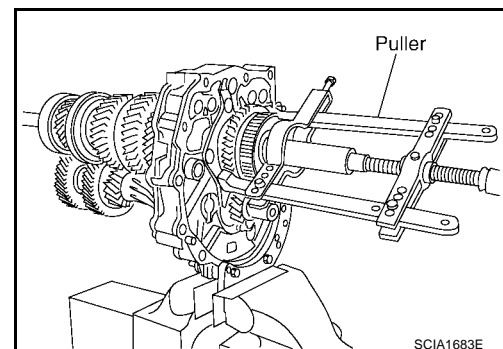
4. Remove reverse idler gear according to the following.
  - a. Remove reverse idler shaft assembly from adapter plate.
  - b. Remove reverse idler thrust washer, reverse idler gear and reverse idler needle bearing from reverse idler shaft.



5. Remove reverse main gear and reverse synchronizer hub assembly according to the following.
  - a. Remove snap ring from mainshaft using suitable tool.



- b. Remove reverse main gear and reverse synchronizer hub assembly using suitable tool.
- c. Remove reverse main needle bearing from mainshaft.



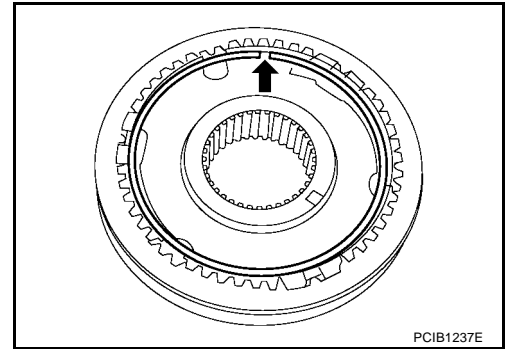
6. Remove reverse coupling sleeve according to the following.

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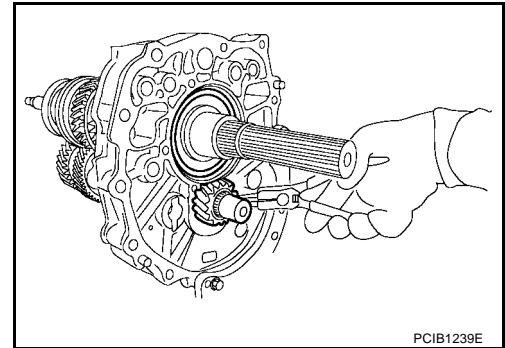
# TRANSMISSION ASSEMBLY

[FS6R31A]

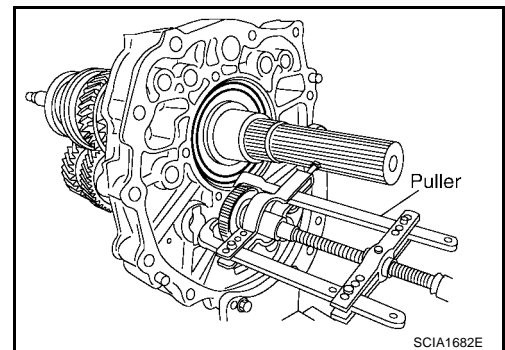
- a. Remove snap ring from reverse synchronizer hub.
- b. Remove spread springs and shifting inserts from reverse synchronizer hub.
- c. Remove reverse coupling sleeve from reverse synchronizer hub.



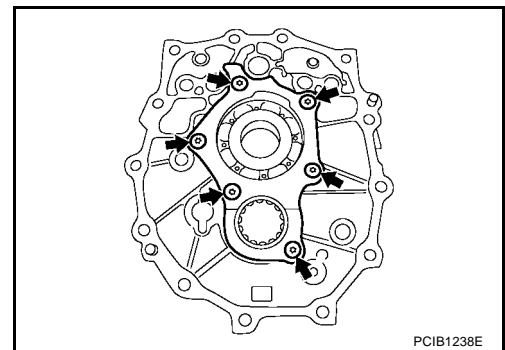
7. Remove reverse counter gear according to the following.
  - a. Remove snap ring from counter gear using suitable tool.



- b. Remove reverse counter gear using suitable tool.
8. Remove counter rear bearing spacer from counter gear.



9. Remove bearing retainer bolts, and then remove bearing retainer.

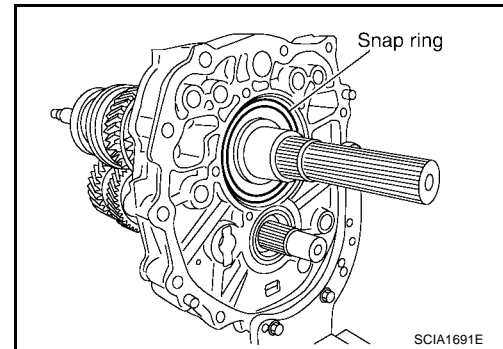


10. Remove main drive gear assembly, mainshaft assembly and counter gear assembly according to the following.

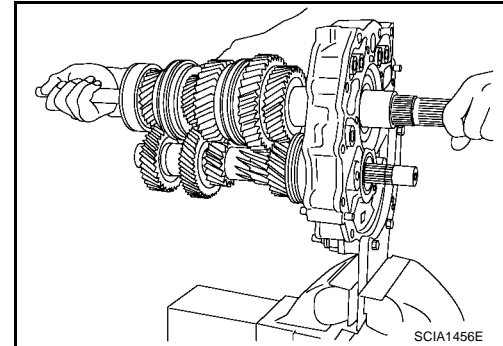
# TRANSMISSION ASSEMBLY

[FS6R31A]

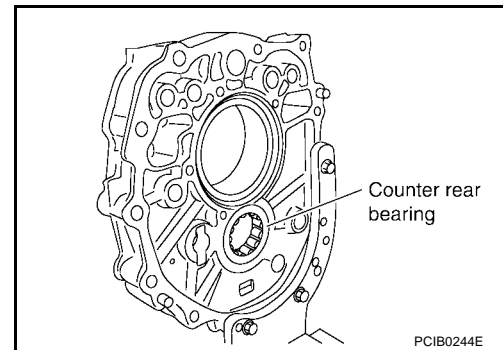
- a. Remove snap ring from mainshaft bearing using suitable tool.



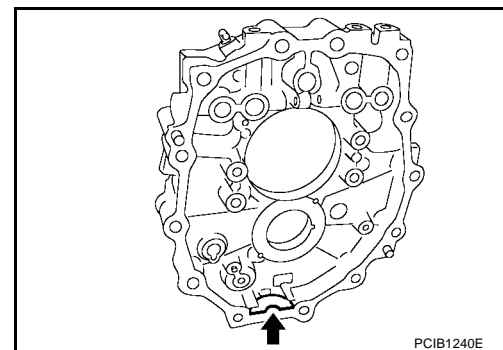
- b. Carefully tap mainshaft using suitable tool, and then remove main drive gear assembly, mainshaft assembly and counter gear assembly from adapter plate.  
c. Remove main pilot bearing, pilot bearing spacer from mainshaft.  
d. Remove 5th baulk ring from main drive gear.



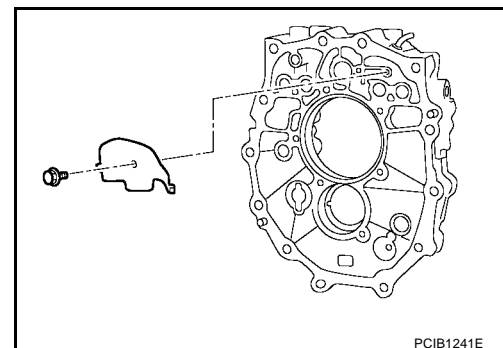
11. Remove counter rear bearing from adapter plate.



12. Remove magnet from adapter plate.



13. Remove baffle plate bolt, and then remove baffle plate from adapter plate.

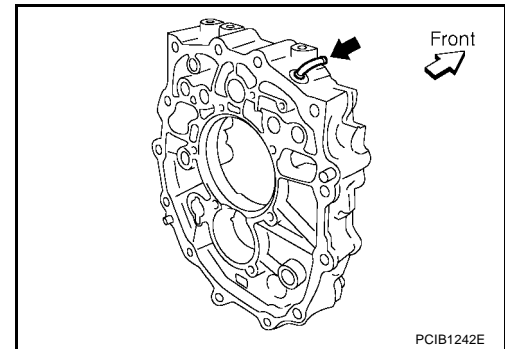


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# TRANSMISSION ASSEMBLY

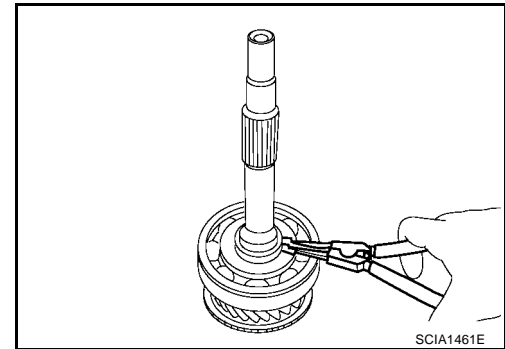
[FS6R31A]

14. Remove breather from adapter plate.

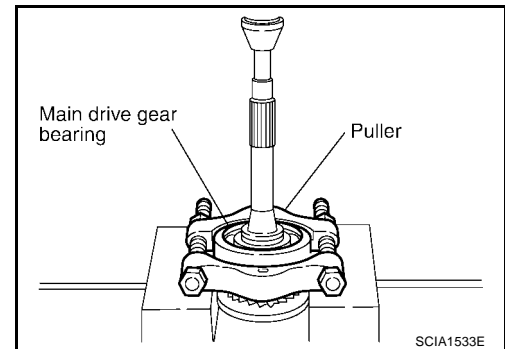


15. Remove main drive gear bearing according to the following.

a. Remove snap ring from main drive gear using suitable tool.

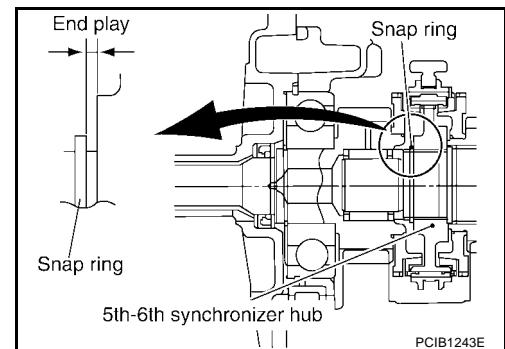


b. Press out main drive gear bearing using suitable tool.



16. Before disassembling, measure the end play for mainshaft (Front side). If the end play is outside the standards, disassemble and inspect.

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

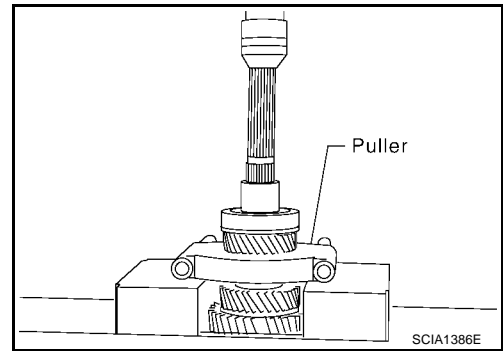




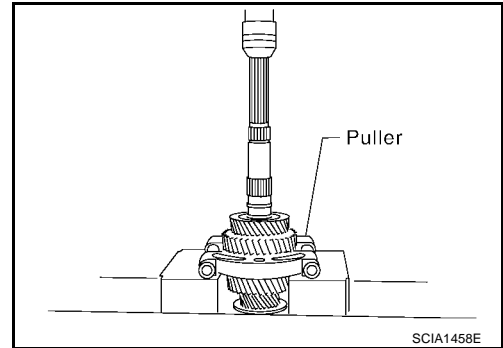
# TRANSMISSION ASSEMBLY

[FS6R31A]

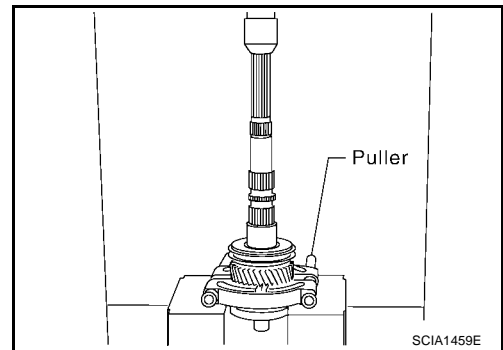
17. Press out reverse main gear bushing, mainshaft bearing and 4th main gear using suitable tool.
18. Remove 3rd-4th main spacer from mainshaft.



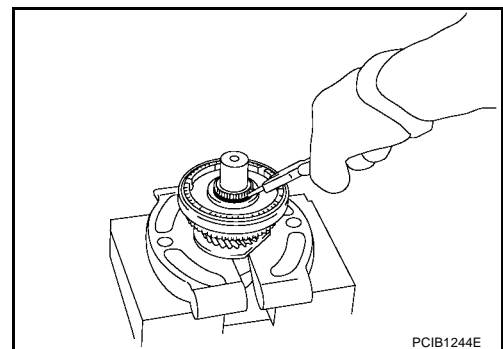
19. Remove 3rd main gear and 1st main gear according to the following.
  - a. Press out 3rd main gear and 1st main gear using suitable tool.  
**CAUTION:**  
**Be careful not to damage 1st outer baulk ring.**
  - b. Remove 1st needle bearing from mainshaft.



20. Remove 1st-2nd synchronizer hub assembly and 2nd main gear according to the following.
  - a. Press out 1st gear bushing, 1st-2nd synchronizer hub assembly and 2nd main gear using suitable tool.  
**CAUTION:**  
**Be aware that when using the press, if mainshaft gear positioner catches on the V-block, etc., mainshaft could be damaged.**
  - b. Remove 2nd needle bearing from mainshaft.
21. Remove 1st-2nd coupling sleeve according to the following.
  - a. Remove spread springs and shifting inserts from 1st-2nd synchronizer hub.
  - b. Remove 1st-2nd coupling sleeve from 1st-2nd synchronizer hub.



22. Remove 6th main gear and 5th-6th synchronizer hub assembly according to the following.
  - a. Remove snap ring from mainshaft using suitable tool.

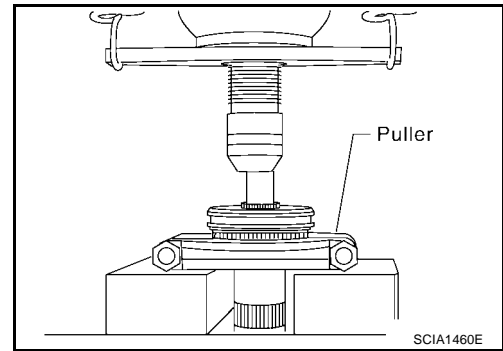


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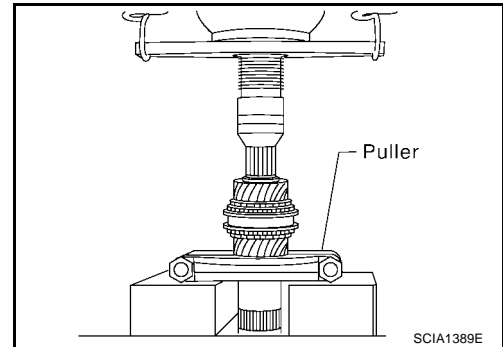
# TRANSMISSION ASSEMBLY

[FS6R31A]

- b. Press out 6th main gear and 5th-6th synchronizer hub assembly using suitable tool.
  - c. Remove 6th needle bearing from mainshaft.
23. Remove 5th-6th coupling sleeve according to the following.
- a. Remove spread springs and shifting inserts from 5th-6th synchronizer hub.
  - b. Remove 5th-6th coupling sleeve from 5th-6th synchronizer hub.



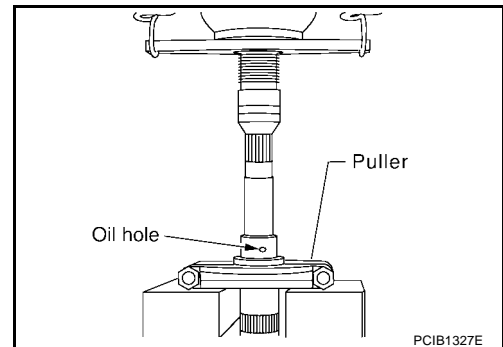
24. Remove 3rd counter gear, 3rd-4th synchronizer hub assembly, 4th counter gear according to the following.
- a. Press out 3rd counter gear, 3rd-4th synchronizer hub assembly, 4th counter gear, 4th needle bearing, 4th gear bushing, 4th counter gear thrust washer, and counter rear bearing inner race using suitable tool.
  - b. Remove 3rd needle bearing from counter gear.
25. Remove 3rd-4th coupling sleeve according to the following.
- a. Remove spread springs and shifting inserts from 3rd-4th synchronizer hub.
  - b. Remove 3rd-4th coupling sleeve from 3rd-4th synchronizer hub.



26. Press out 3rd gear bushing using suitable tool.

**CAUTION:**

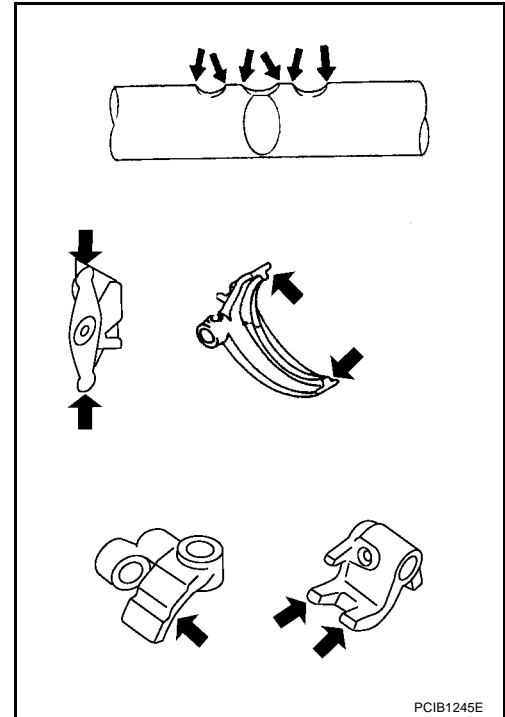
**Do not use oil hole of 3rd gear bushing when press out.**



## INSPECTION AFTER DISASSEMBLY

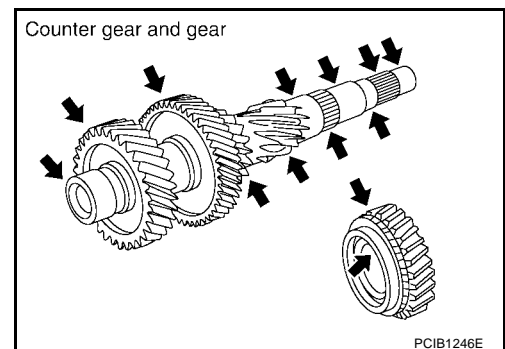
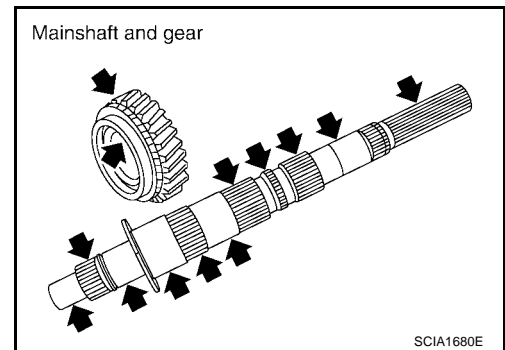
### Shift Control

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



### Gear and Shaft

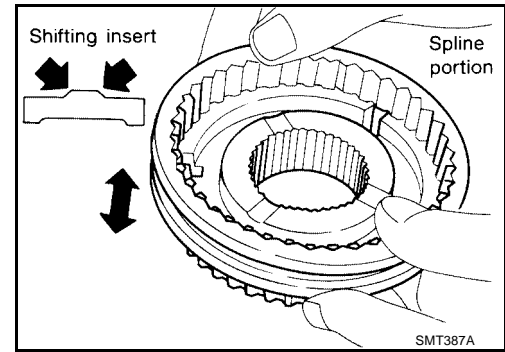
If the contact surface on each gear, mainshaft, main drive gear, and counter gear, etc., has damage, peeling, abrasion, dent, bent, or any other damage, replace the components.



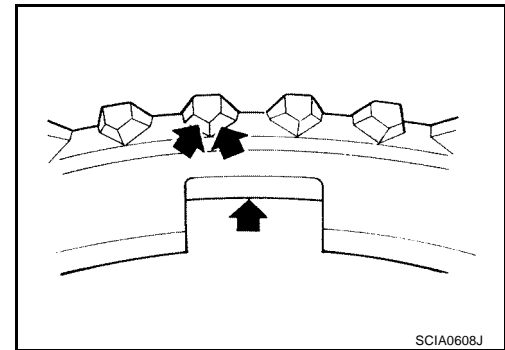
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## Synchronizer

- 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 spread spring damaged, replace with a new one.



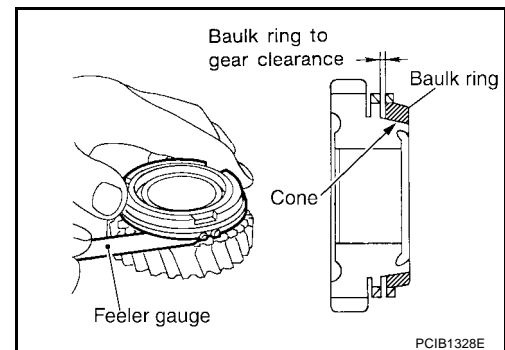
## Baulk Ring Clearance

- **Single Cone Synchronizer (5th and 6th)**  
Push baulk ring on the cone, and measure the clearance between baulk ring and cone. If the measurement is below limit, replace it with a new one.

**Clearance**

**Standard value : 0.7 - 1.35 mm (0.028 - 0.0531 in)**

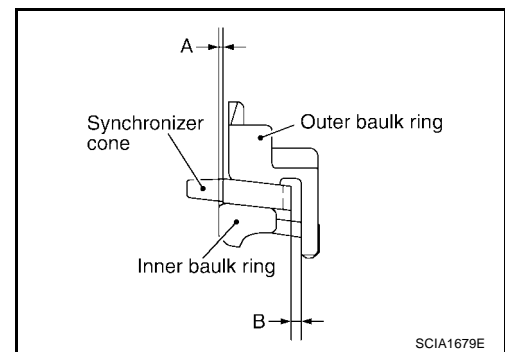
**Limit value : 0.5 mm (0.020 in)**



- **Double Cone Synchronizer (1st, 3rd and 4th)**  
Check the clearance between outer baulk ring, synchronizer cone, and inner baulk ring as follows.

**CAUTION:**

The clearances "A" and "B" are controlled with outer baulk ring, synchronizer cone, and inner baulk ring as a set. Replace them as a set if the clearances are outside the limit value.



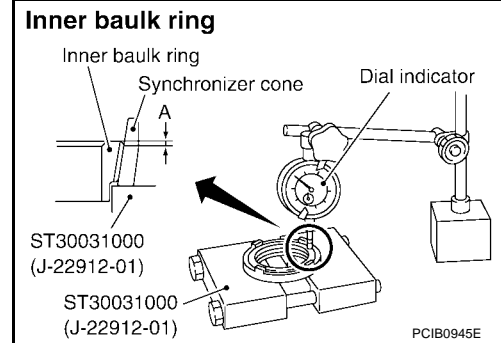
1. Measure the clearance "A" at 2 points or more diagonally opposite using a dial indicator and Tool. Then calculate the mean value.

**Tool number** : ST30031000 (J-22912-01)

**Clearance "A"**

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

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



2. Measure the clearance "B" at 2 points or more diagonally opposite. Then calculate the mean value.

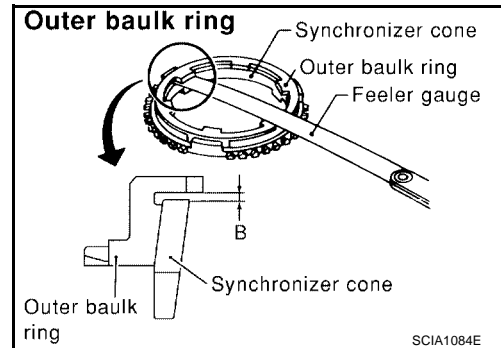
**Clearance "B"**

**Standard value**

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

**3rd,4th** : 0.85 - 1.35 mm (0.0335 - 0.0531 in)

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

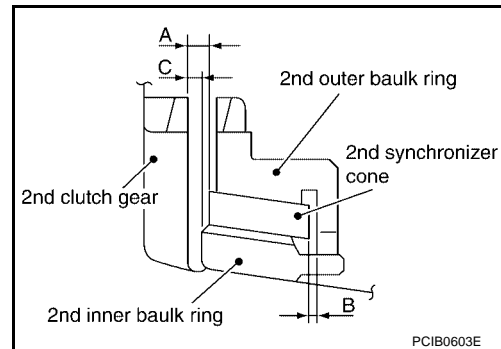


- **Triple Cone Synchronizer (2nd)**

Check the clearance between outer baulk ring, synchronizer cone, and inner baulk ring as follows.

**CAUTION:**

The clearances "A", "B" and "C" are controlled with outer baulk ring, synchronizer cone, and inner baulk ring as a set. Replace them as a set if the clearances are outside the limit value.

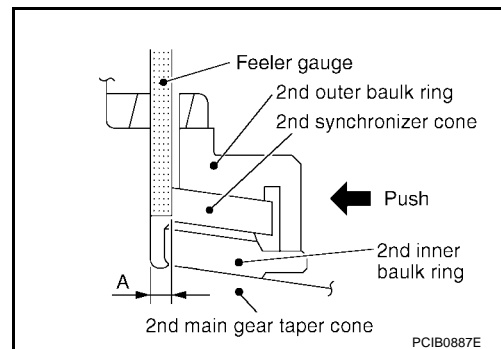


1. Measure the clearance "A" at 2 points or more diagonally opposite when pressing baulk ring toward clutch gear taper cone. Then calculate the mean value.

**Clearance "A"**

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

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

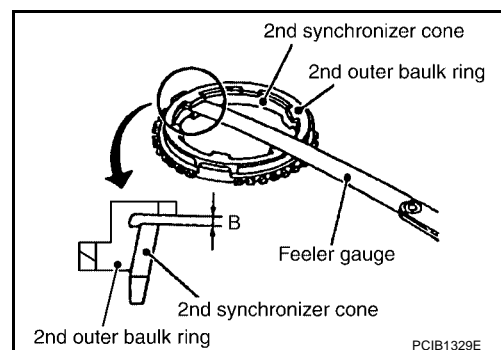


2. Measure the clearance "B" at 2 points or more diagonally opposite. Then calculate the mean value.

**Clearance "B"**

**Standard value** : 0.85 - 1.35 mm (0.0335 - 0.0531 in)

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

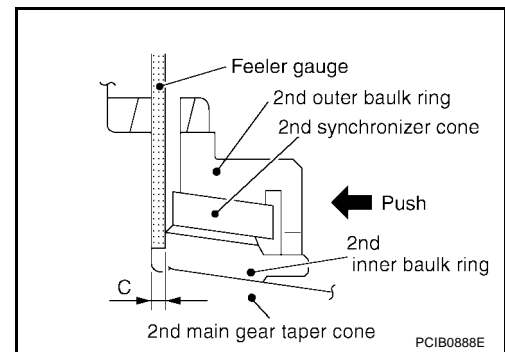


3. Measure the clearance "C" at 2 points or more diagonally opposite when pressing baulk ring toward clutch gear taper cone. Then calculate the mean value.

**Clearance "C"**

**Standard value : 0.7 - 1.25 mm (0.028 - 0.0492 in)**

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



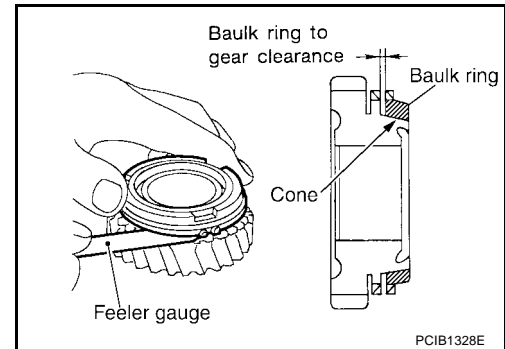
- **Reverse Synchronizer**

Push baulk ring on the cone, and measure the clearance between baulk ring and cone. If the measurement is below limit, replace it with a new one.

**Clearance**

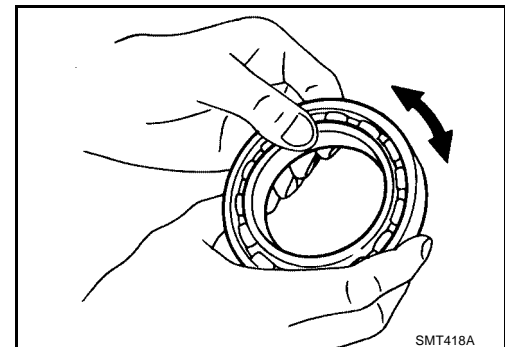
**Standard value : 0.75 - 1.2 mm (0.0295 - 0.047 in)**

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



**Bearing**

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



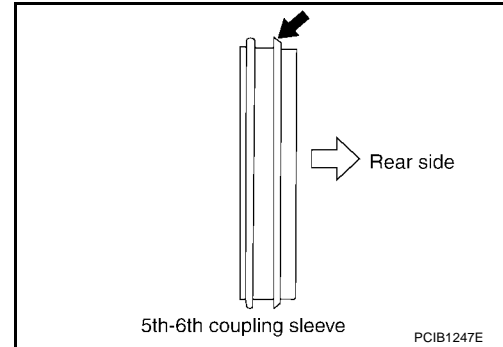
## ASSEMBLY

### Gear Components

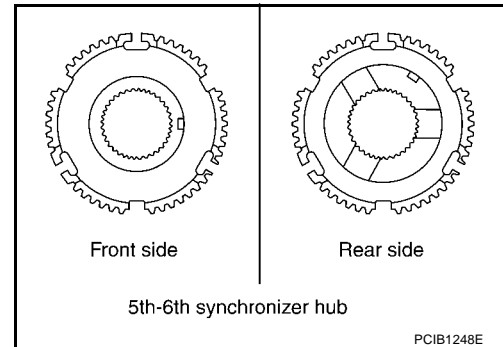
1. Install 5th-6th synchronizer hub assembly according to the following.
  - a. Install 5th-6th coupling sleeve to 5th-6th synchronizer hub.

**CAUTION:**

- Do not reuse 5th-6th synchronizer hub and 5th-6th coupling sleeve.
- Replace 5th-6th synchronizer hub and 5th-6th coupling sleeve as a set.
- Be careful with the orientation 5th-6th coupling sleeve.



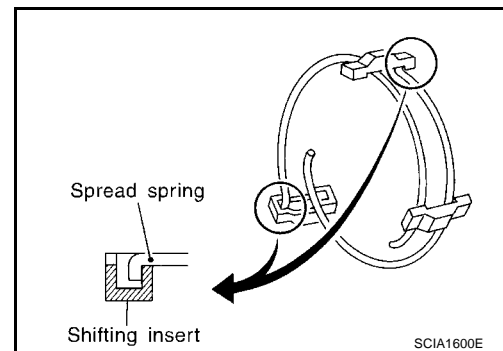
- Be careful with the orientation 5th-6th synchronizer hub.



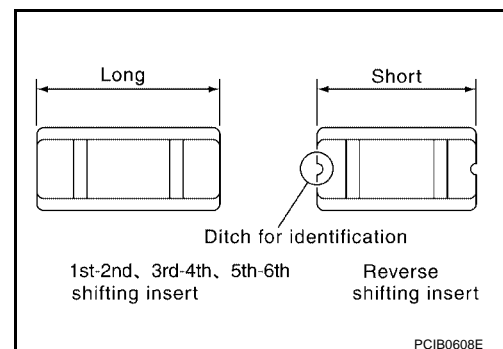
- b. Install shifting inserts and spread springs to 5th-6th synchronizer hub.

**CAUTION:**

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



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



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# TRANSMISSION ASSEMBLY

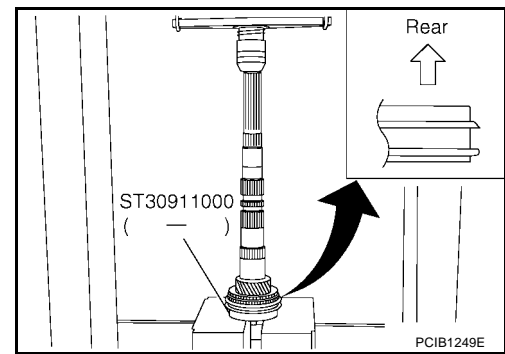
[FS6R31A]

- c. Press in 5th-6th synchronizer hub assembly, 6th baulk ring, 6th main gear and 6th needle bearing using Tool.

**Tool number** : ST30911000 ( — )

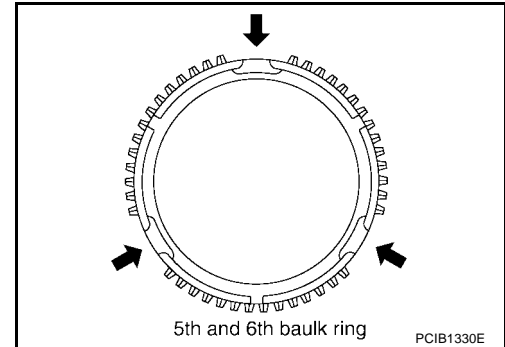
**CAUTION:**

- Apply gear oil to 6th baulk ring and 6th needle bearing.
- Be careful with the orientation 5th-6th coupling sleeve.



**NOTE:**

5th and 6th baulk rings have three spaces that four gear teeth are missing as shown.

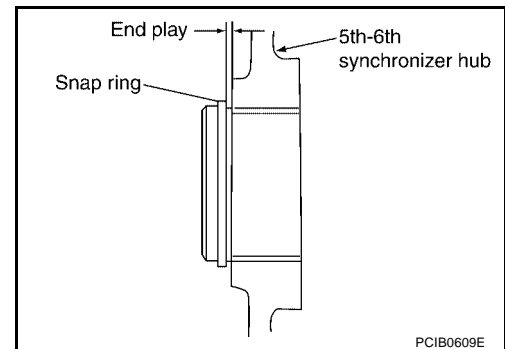


2. Select and install a snap ring so that the end play comes within the standard value. Refer to [MT-119, "Snap Rings"](#) .

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

**CAUTION:**

Do not reuse snap ring.

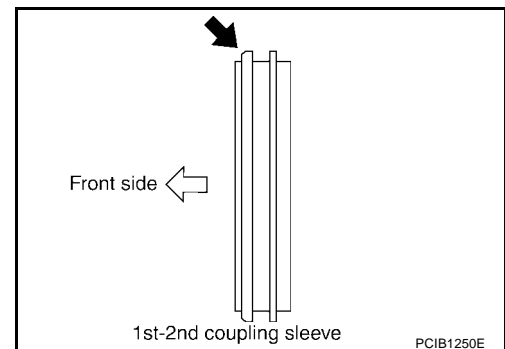


3. Install 1st-2nd synchronizer hub assembly according to the following.

- a. Install 1st-2nd coupling sleeve to 1st-2nd synchronizer hub.

**CAUTION:**

- Do not reuse 1st-2nd coupling sleeve and 1st-2nd synchronizer hub.
- Replace 1st-2nd synchronizer hub and 1st-2nd coupling sleeve as a set.
- Be careful with the orientation 1st-2nd coupling sleeve.

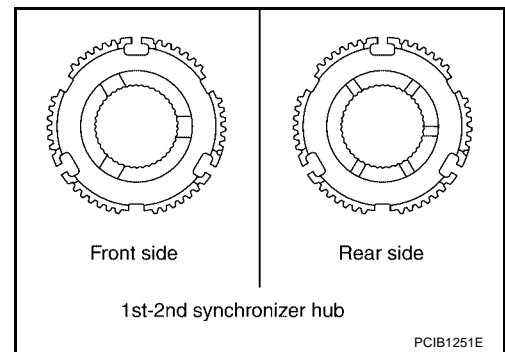




# TRANSMISSION ASSEMBLY

[FS6R31A]

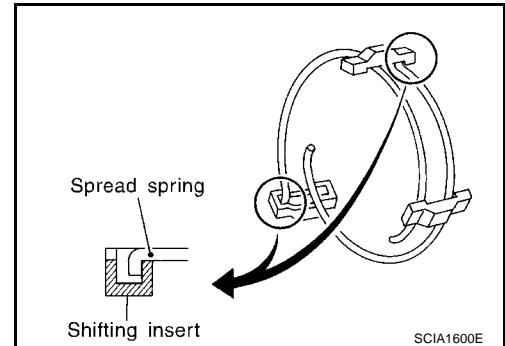
- Be careful with the orientation 1st-2nd synchronizer hub.



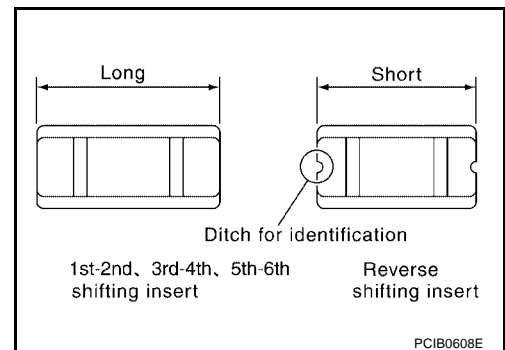
- b. Install spread springs and shifting inserts to 1st-2nd synchronizer hub.

**CAUTION:**

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



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

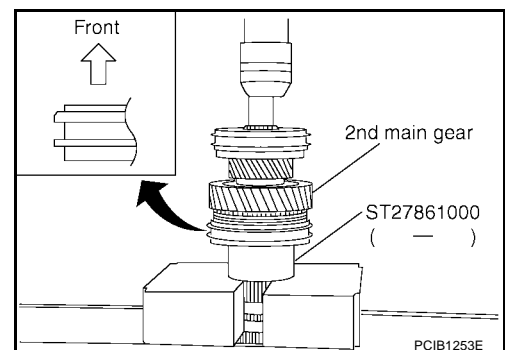


- c. Press in 1st-2nd synchronizer hub assembly, 2nd inner baulk ring, 2nd synchronizer cone and 2nd outer baulk ring, 2nd main gear and 2nd needle bearing using Tool.

Tool number : ST27861000 ( — )

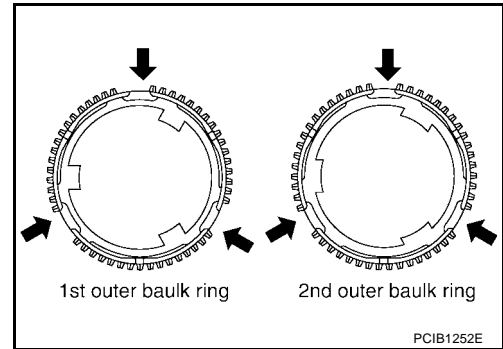
**CAUTION:**

- Apply gear oil to 2nd needle bearing, 2nd inner baulk ring, 2nd synchronizer cone and 2nd outer baulk ring, 1st-2nd synchronizer hub spline of mainshaft.
- Replace 2nd inner baulk ring, 2nd synchronizer cone and 2nd outer baulk ring as a set.
- Be careful with the orientation 1st-2nd coupling sleeve.



**NOTE:**

1st outer baulk ring has three spaces that three gear tooth is missing and 2nd outer baulk ring has three spaces that two gear teeth are missing.



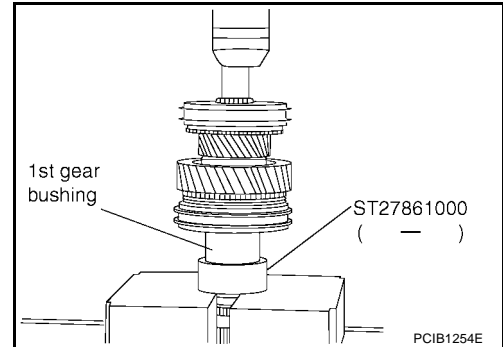
4. Press in 1st gear bushing using Tool.

**Tool number** : ST27861000 ( — )

5. Install 1st outer baulk ring, 1st synchronizer cone, 1st inner baulk ring, 1st needle bearing and 1st main gear to mainshaft.

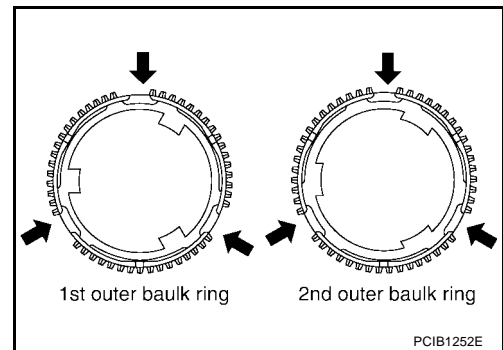
**CAUTION:**

- Apply gear oil to 1st outer baulk ring, 1st synchronizer cone, 1st inner baulk ring and 1st needle bearing.
- Replace 1st outer baulk ring, 1st synchronizer cone and 1st inner baulk ring as a set.



**NOTE:**

1st outer baulk ring has three spaces that three gear tooth is missing and 2nd outer baulk ring has three spaces that two gear teeth are missing.

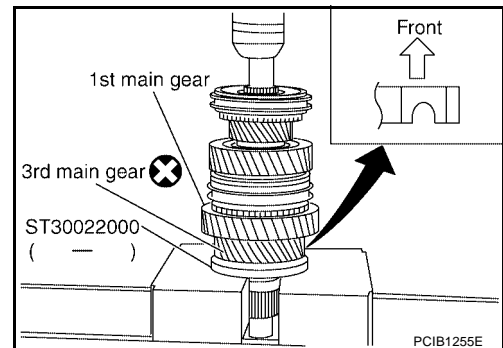


6. Press in 3rd main gear using Tool.

**Tool number** : ST30022000 ( — )

**CAUTION:**

- Do not reuse 3rd main gear.
- Be careful with the orientation 3rd main gear.



# TRANSMISSION ASSEMBLY

[FS6R31A]

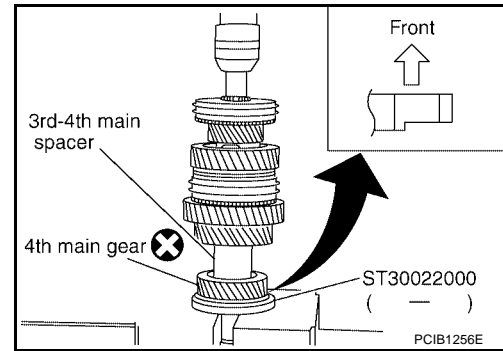
7. Install 3rd-4th main spacer to mainshaft.

8. Press in 4th main gear using Tool.

**Tool number** : ST30022000 ( — )

**CAUTION:**

- Do not reuse 4th main gear.
- Be careful with the orientation 4th main gear.

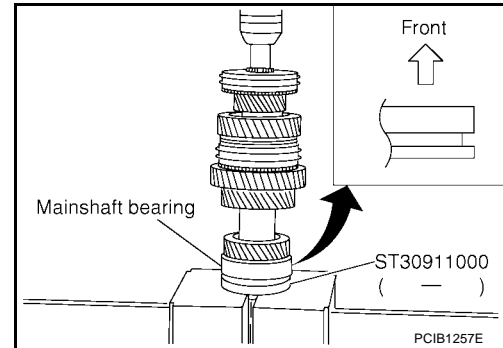


9. Press in mainshaft bearing using Tool.

**Tool number** : ST30911000 ( — )

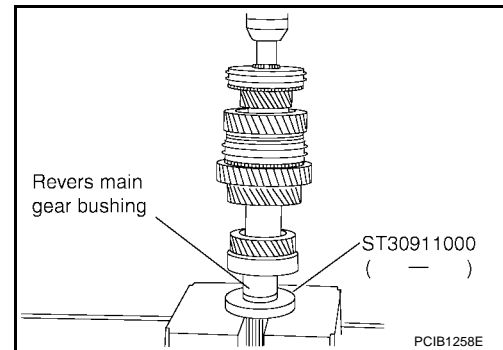
**CAUTION:**

Be careful with the orientation mainshaft bearing.



10. Press in reverse main gear bushing using Tool.

**Tool number** : ST30911000 ( — )



11. Press in 3rd gear bushing using Tool.

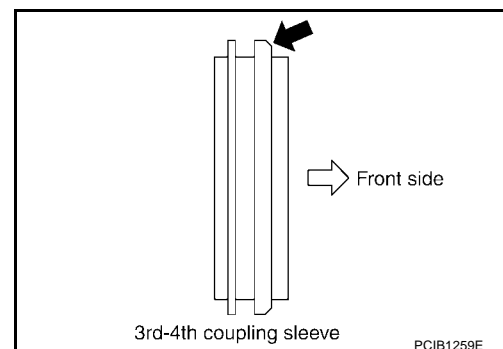
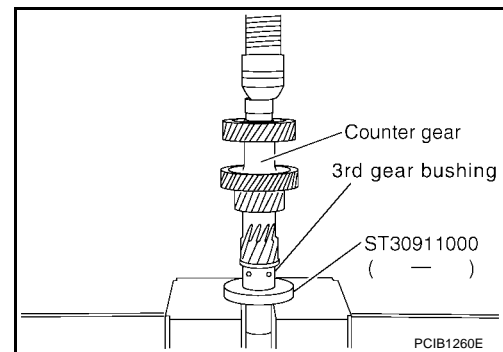
**Tool number** : ST30911000 ( — )

12. Install 3rd-4th synchronizer hub assembly according to the following.

a. Install 3rd-4th coupling sleeve to 3rd-4th synchronizer hub.

**CAUTION:**

- Do not reuse 3rd-4th synchronizer hub and 3rd-4th coupling sleeve.
- Replace 3rd-4th synchronizer hub and 3rd-4th coupling sleeve as a set.
- Be careful with the orientation 3rd-4th coupling sleeve.



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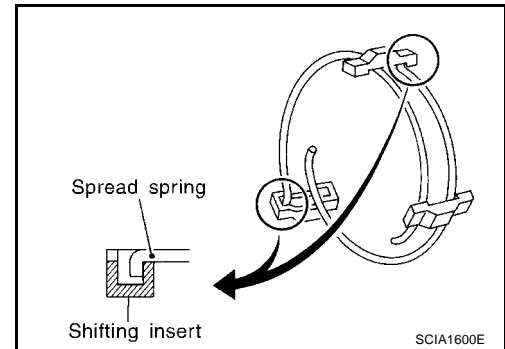
# TRANSMISSION ASSEMBLY

[FS6R31A]

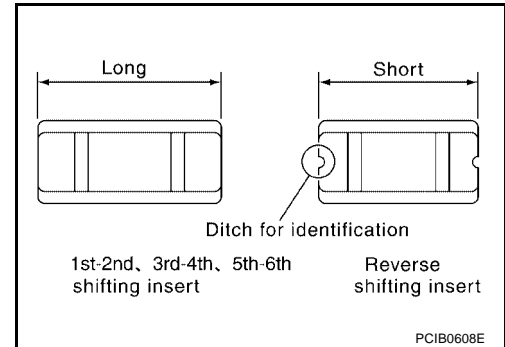
- b. Install spread springs and shifting inserts to 3rd-4th synchronizer hub.

**CAUTION:**

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



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

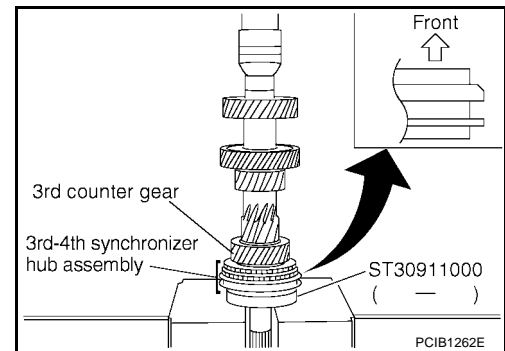


- c. Press in 3rd-4th synchronizer hub assembly, 3rd inner baulk ring, 3rd synchronizer cone, 3rd outer baulk ring, 3rd counter gear and 3rd needle bearing using Tool.

Tool number : ST30911000 ( — )

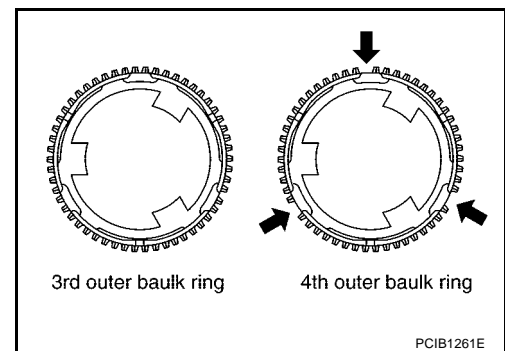
**CAUTION:**

- Apply gear oil to 3rd inner baulk ring, 3rd synchronizer cone, 3rd outer baulk ring and 3rd needle bearing, hole spline of 3rd-4th synchronizer hub.
- Replace 3rd inner baulk ring, 3rd synchronizer cone and 3rd outer baulk ring as a set.
- Be careful with the orientation 3rd-4th coupling sleeve.



**NOTE:**

4th baulk ring has three spaces that one gear tooth is missing but 3rd baulk ring doesn't.



# TRANSMISSION ASSEMBLY

[FS6R31A]

13. Press in 4th counter gear thrust washer, 4th gear bushing, 4th needle bearing, 4th counter gear, 4th outer baulk ring, 4th synchronizer cone and 4th inner baulk ring using Tool.

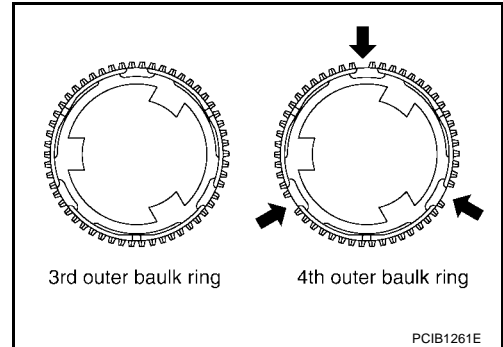
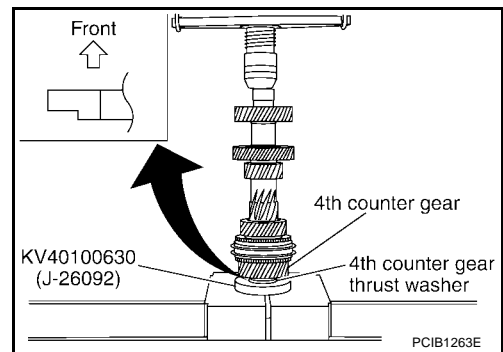
**Tool number** : KV40100630 (J-26092)

**CAUTION:**

- Apply gear oil to 4th needle bearing, 4th outer baulk ring, 4th synchronizer cone and 4th inner baulk ring.
- Replace 4th outer baulk ring, 4th synchronizer cone and 4th inner baulk ring as a set.
- Be careful with the orientation 4th counter gear thrust washer.

**NOTE:**

4th baulk ring has three spaces that one gear tooth is missing but 3rd baulk ring doesn't.

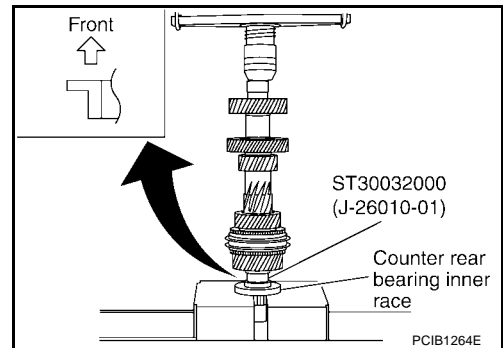


14. Press in counter rear bearing inner race using Tool.

**Tool number** : ST30032000 (J-26010-01)

**CAUTION:**

Be careful with the orientation counter rear bearing inner race.



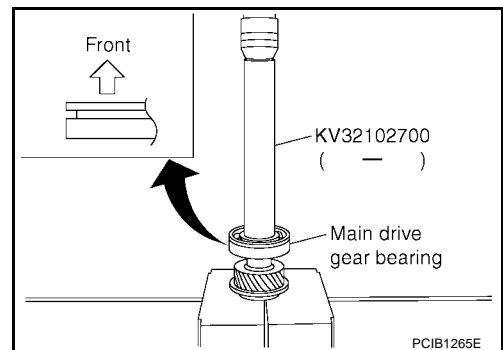
15. Install main drive gear bearing according to the following.

- a. Press in main drive gear bearing using Tool.

**Tool number** : KV32102700 ( — )

**CAUTION:**

Be careful with the orientation main drive gear bearing.



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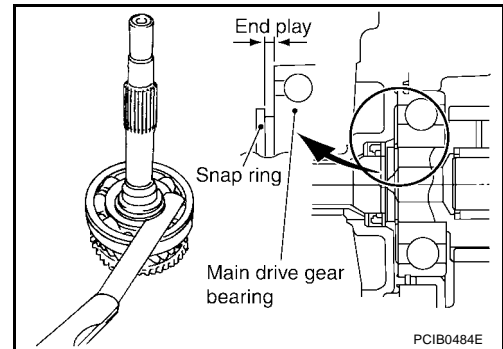
# TRANSMISSION ASSEMBLY

[FS6R31A]

- b. Select and install a snap ring to main drive gear bearing so that the end play comes within the standard value. Refer to [MT-119, "Snap Rings"](#).

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

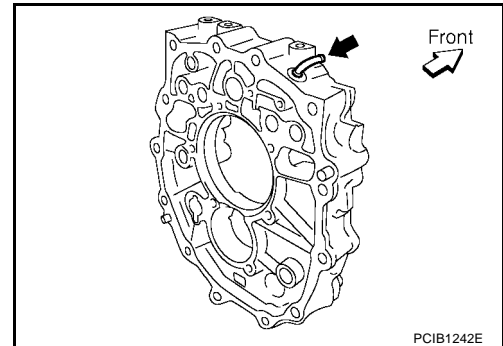
**CAUTION:**  
Do not reuse snap ring.



16. Install breather to adapter plate.

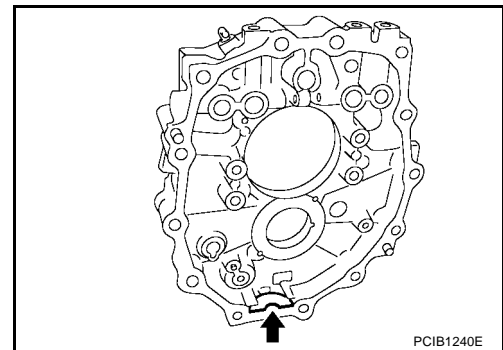
**CAUTION:**

- Do not reuse breather.
- Be careful with the orientation breather.

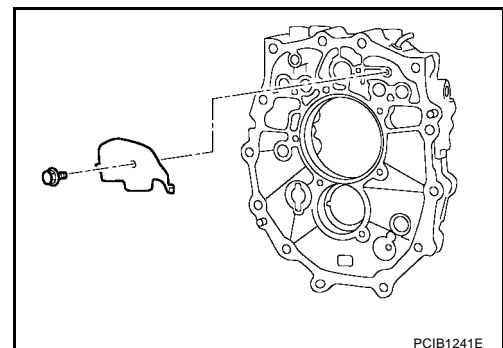


17. Install magnet to adapter plate.

**CAUTION:**  
Be careful with the orientation magnet.



18. Install baffle plate to adapter plate, and then tighten bolt to the specified torque. Refer to [MT-71, "Case Components"](#).

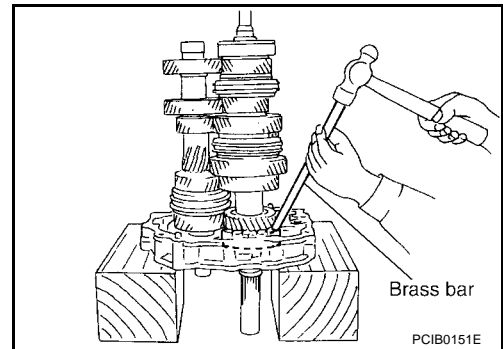


19. Install main drive gear assembly, mainshaft assembly and counter gear assembly according to the following.

# TRANSMISSION ASSEMBLY

[FS6R31A]

- a. Install main pilot bearing, pilot bearing spacer and 5th baulk ring to main drive gear.
- b. Install main drive gear assembly, mainshaft assembly and counter gear assembly combined in one unit to adapter plate using brass bar.

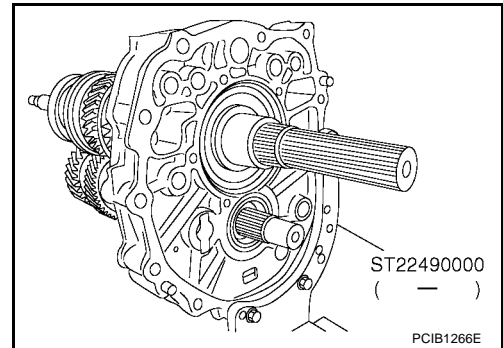


20. Install Tool to adapter plate, then position in a vise.

**Tool number** : ST22490000 ( — )

**CAUTION:**

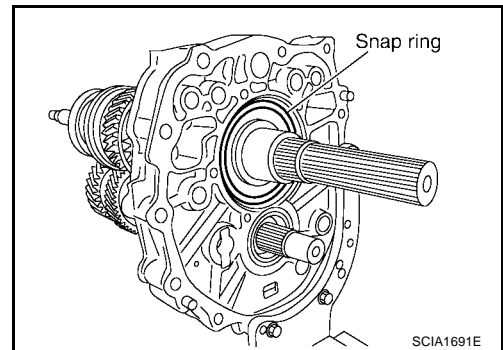
**Do not directly secure mating surface of adapter plate in a vise.**



21. Install snap ring to mainshaft bearing.

**CAUTION:**

**Do not reuse snap ring.**



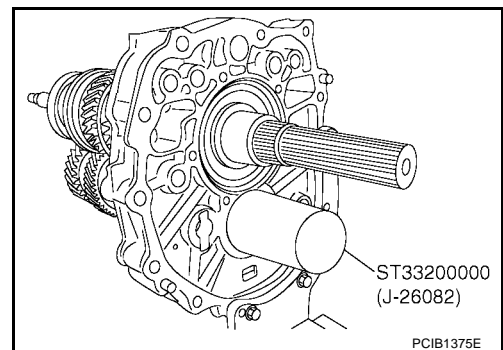
22. Install counter rear bearing to adapter plate using Tool.

**Tool number** : ST33200000 (J-26082)

23. Install counter rear bearing spacer to counter gear.

**CAUTION:**

**When installing counter rear bearing spacer, groove should face to the rear side.**



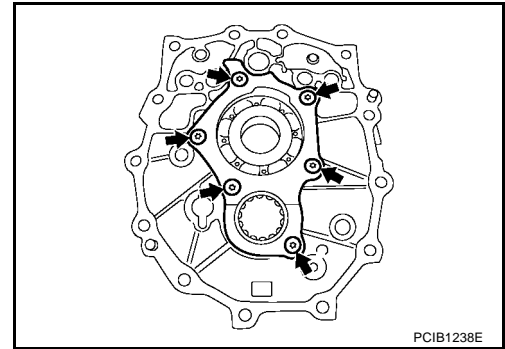
24. Install bearing retainer according to the following.

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# TRANSMISSION ASSEMBLY

[FS6R31A]

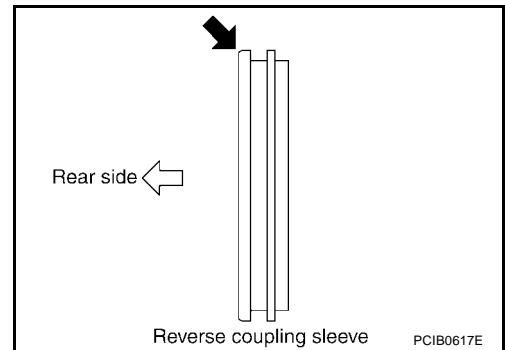
- a. Instal bearing retainer to adapter plate.
- b. Apply recommended thread locking sealant to threads of bolts, and then tighten bolts to the specified torque. Refer to [MT-71, "Case Components"](#).
  - Use Genuine Medium Strength Thread Locking Sealant or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).



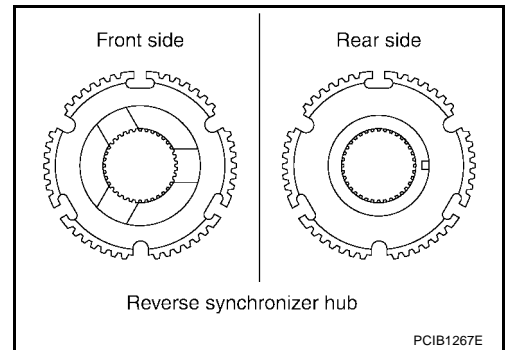
25. Install reverse synchronizer hub assembly according to the following.
  - a. Install reverse coupling sleeve to reverse synchronizer hub.

**CAUTION:**

- Do not reuse reverse coupling sleeve and reverse synchronizer hub.
- Replace reuse reverse coupling sleeve and reverse synchronizer hub as a set.
- Be careful with the orientation reverse coupling sleeve.



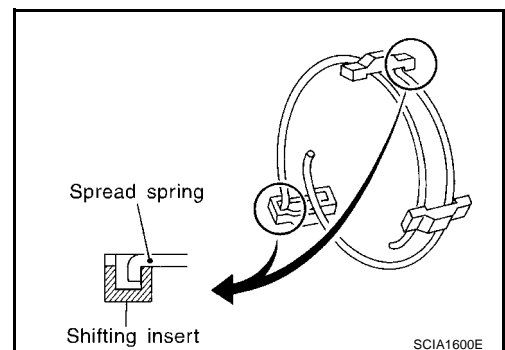
- Be careful with the orientation reverse synchronizer hub.



- b. Install spread springs to shifting inserts to reverse synchronizer hub.

**CAUTION:**

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

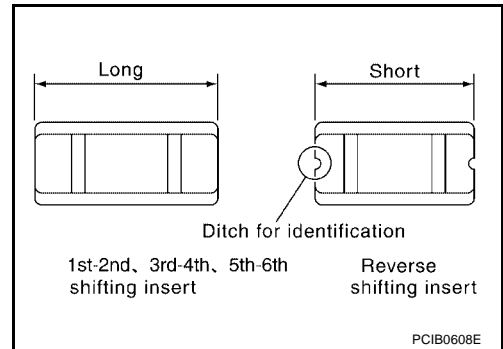




# TRANSMISSION ASSEMBLY

[FS6R31A]

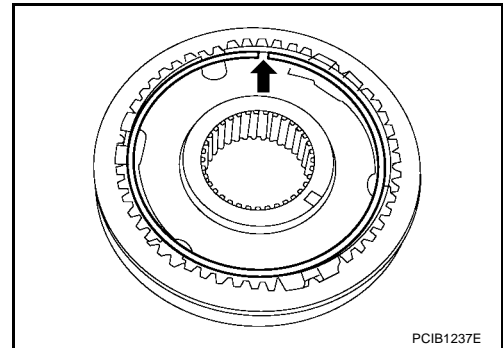
- Be careful with the shape of 1st-2nd, 3rd-4th and 5th-6th shifting insert to avoid misassembly.



- c. Install snap ring to reverse synchronizer hub.

**CAUTION:**

- Do not reuse snap ring.
- Do not align the snap ring notch with synchronizer hub groove when assembling.

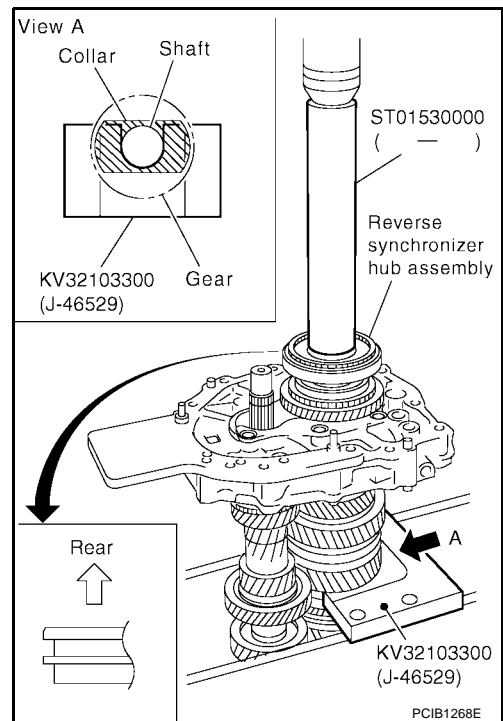


- d. Press in reverse synchronizer hub assembly, reverse baulk ring, reverse main gear and reverse main needle bearing using Tools.

Tool number : ST01530000 ( — )  
: KV32103300 (J-46529)

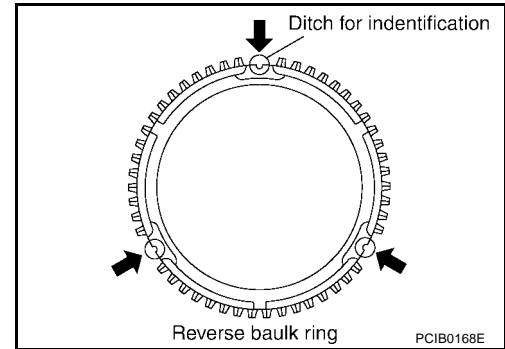
**CAUTION:**

Apply gear oil to reverse baulk ring and reverse main needle bearing.



**NOTE:**

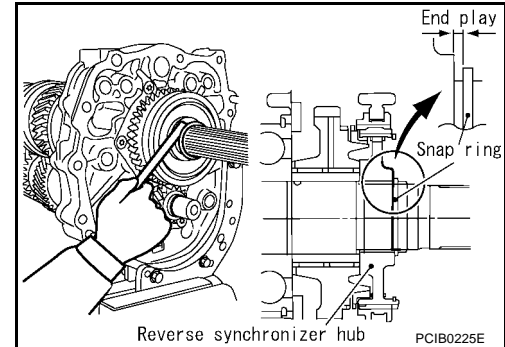
Reverse baulk ring has three spaces that two gear teeth are missing, and each space has small ditch for identification as shown.



26. Select and install a snap ring so that the end play comes within the standard value. Refer to [MT-119, "Snap Rings"](#).

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

**CAUTION:**  
Do not reuse snap ring.

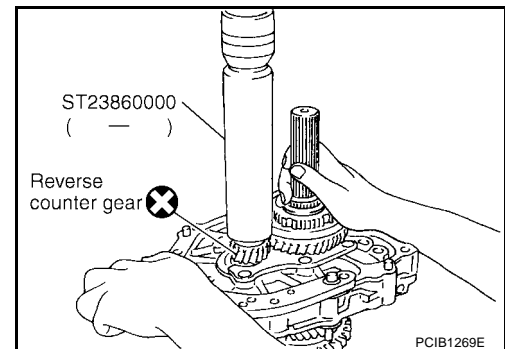


27. Press in reverse counter gear using Tool.

**Tool number** : ST23860000 ( — )

**CAUTION:**

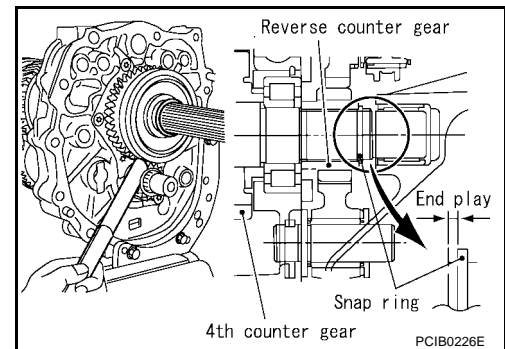
- Do not reverse counter gear.
- Be careful with the orientation counter gear.



28. Select and install a snap ring so that the end play comes within the standard value. Refer to [MT-119, "Snap Rings"](#).

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

**CAUTION:**  
Do not reuse snap ring.

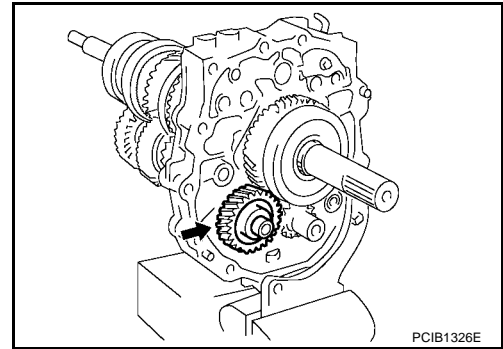


29. Install reverse idler shaft assembly according to the following.

- a. Install reverse idler needle bearing, reverse idler gear and reverse idler thrust washer to reverse idler shaft.

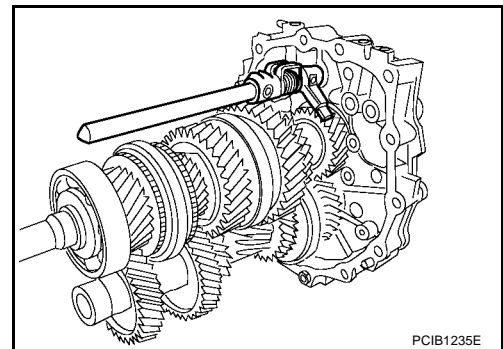
**CAUTION:**  
Apply gear oil to reverse idler needle bearing.

- b. Install reverse idler shaft assembly to adapter plate.



### Shift Control Components

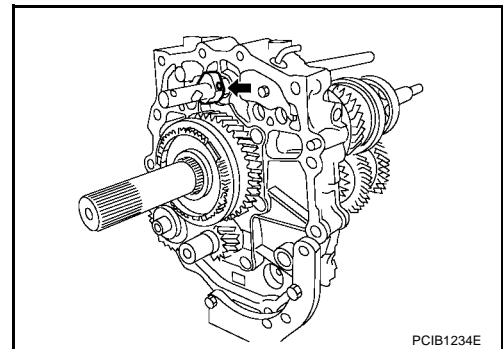
1. Install main drive gear assembly, mainshaft assembly, counter gear assembly and reverse idler shaft assembly. Refer to [MT-95, "Gear Components"](#).
2. Install striking rod assembly according to the following.
  - a. Install striking rod assembly to adapter plate.



- b. Install stopper ring to striking rod assembly.
- c. Install retaining pin onto stopper ring using suitable tool.

**CAUTION:**

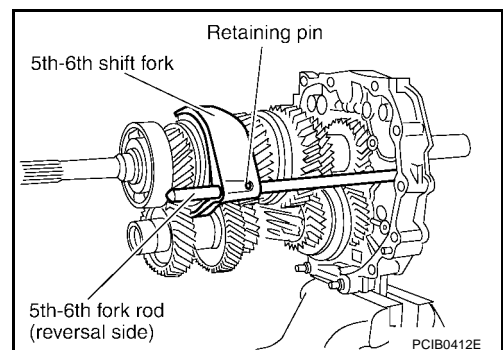
**Do not reuse retaining pin.**



3. Install 5th-6th fork rod (reversal side) according to the following.
  - a. Install 5th-6th shift fork to 5th-6th coupling sleeve.
  - b. Install 5th-6th fork rod (reversal side) to 5th-6th shift fork.
  - c. Install retaining pin onto 5th-6th shift fork using suitable tool.

**CAUTION:**

**Do not reuse retaining pin.**



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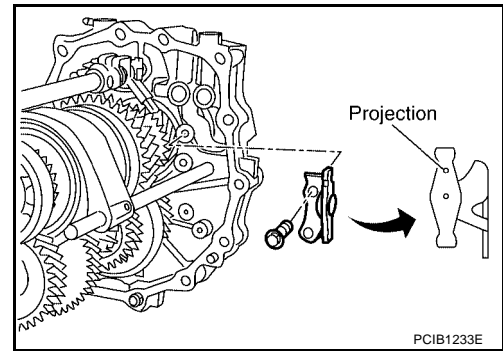
# TRANSMISSION ASSEMBLY

[FS6R31A]

4. Install 5th-6th control lever to adapter plate, and then tighten bolts to the specified torque. Refer to [MT-75, "Shift Control Components"](#).

**CAUTION:**

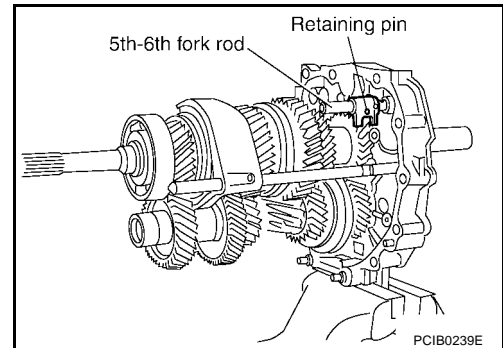
Install 5th-6th control lever with projection side at upward.



5. Install 5th-6th fork rod according to the following.
  - a. Install 5th-6th fork bracket and 5th-6th fork rod to adapter plate.
  - b. Install retaining pin onto 5th-6th fork bracket using suitable tool.

**CAUTION:**

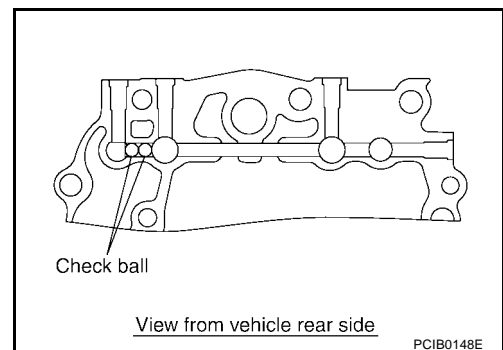
Do not reuse retaining pin.



6. Install check balls to adapter plate.

**CAUTION:**

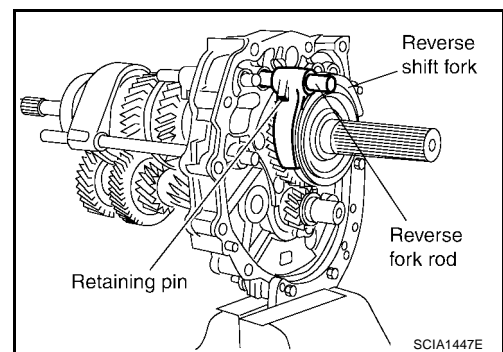
Apply gear oil to check balls.



7. Install reverse fork rod according to the following.
  - a. Install reverse shift fork to reverse coupling sleeve.
  - b. Install reverse fork rod to reverse shift fork.
  - c. Install retaining pin onto reverse shift fork using suitable tool.

**CAUTION:**

Do not reuse retaining pin.



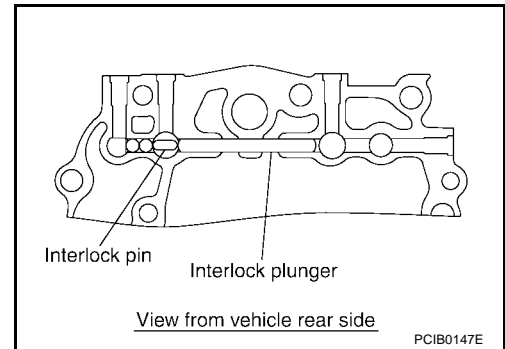
# TRANSMISSION ASSEMBLY

[FS6R31A]

8. Install interlock pin and interlock plunger to adapter plate.

**CAUTION:**

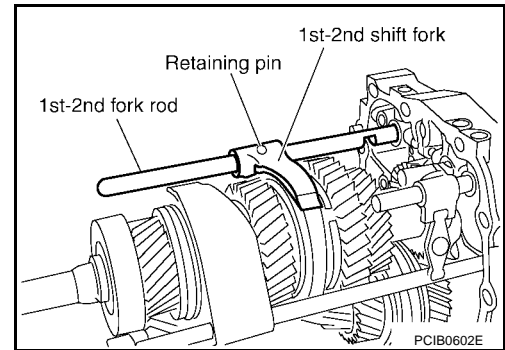
Apply gear oil to interlock pin and interlock plunger.



9. Install 1st-2nd fork rod according to the following.
- Install 1st-2nd shift fork to 1st-2nd coupling sleeve.
  - Install 1st-2nd fork rod to 1st-2nd shift fork.
  - Install retaining pin onto 1st-2nd shift fork using suitable tool.

**CAUTION:**

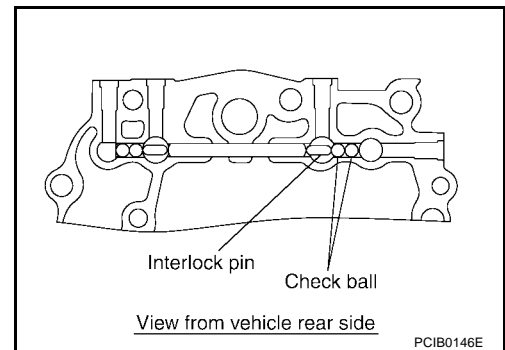
Do not reuse retaining pin.



10. Install interlock pin and check balls to adapter plate.

**CAUTION:**

Apply gear oil to interlock pin and check balls.

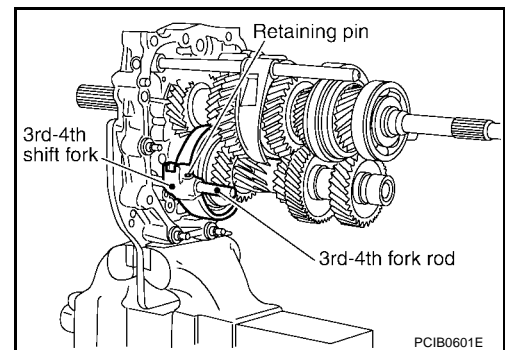


11. Install 3rd-4th fork rod (reversal side) according to the following.

- Install 3rd-4th shift fork to 3rd-4th coupling sleeve.
- Install 3rd-4th fork rod (reversal side) to 3rd-4th shift fork.
- Install retaining pin onto 3rd-4th shift fork using suitable tool.

**CAUTION:**

Do not reuse retaining pin.



12. Install 3rd-4th fork rod according to the following.

A  
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K

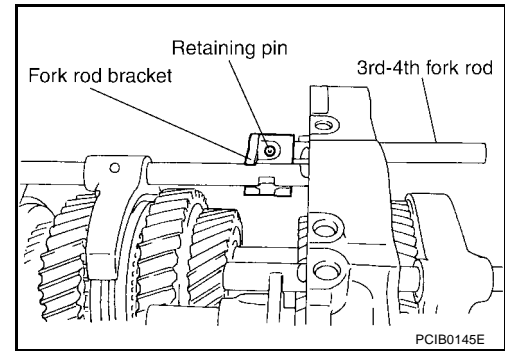
L

M

- a. Install 3rd-4th fork rod to adapter plate.
- b. Install 3rd-4th fork rod bracket to 3rd-4th fork rod.
- c. Install retaining pin onto 3rd-4th fork rod bracket using suitable tool.

**CAUTION:**

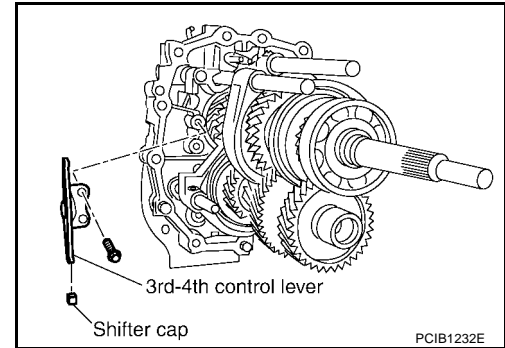
**Do not reuse retaining pin.**



13. Install 3rd-4th control lever according to the following.
  - a. Install shifter cap to 3rd-4th control lever.
  - b. Install 3rd-4th control lever to adapter plate, and then tighten bolts to the specified torque. Refer to [MT-75, "Shift Control Components"](#).

**CAUTION:**

**Be careful with the orientation 3rd-4th control lever.**

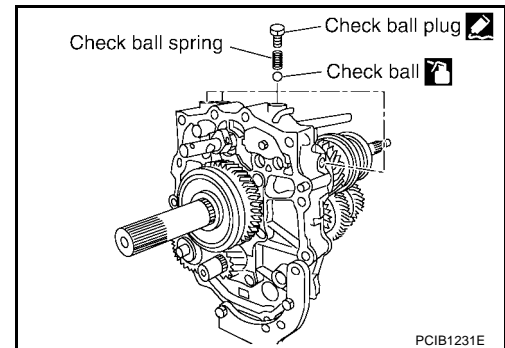


14. Install check ball plug according to the following.
  - a. Install check balls, check ball springs to adapter plate.

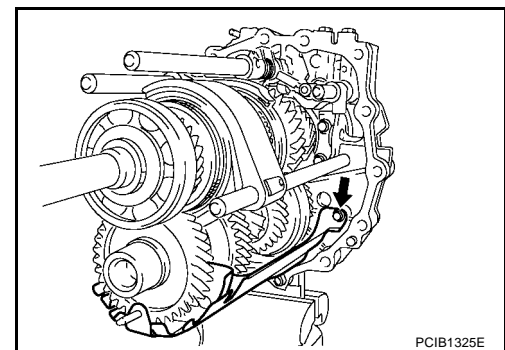
**CAUTION:**

**Apply gear oil to check ball.**

- b. Apply recommended sealant to threads of check ball plugs, and tighten check ball plugs to the specified torque. Refer to [MT-75, "Shift Control Components"](#).
  - **Use Genuine Silicone RTV or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).**



15. Install baffle plate to adapter plate, and then tighten bolt to the specified torque. Refer to [MT-71, "Case Components"](#).



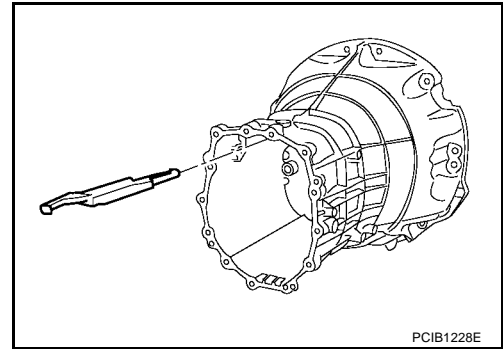
### Case Components

1. Install main drive gear assembly, mainshaft assembly, counter gear assembly and reverse idler shaft assembly. Refer to [MT-95, "Gear Components"](#).
2. Install fork rods and shift forks. Refer to [MT-107, "Shift Control Components"](#).

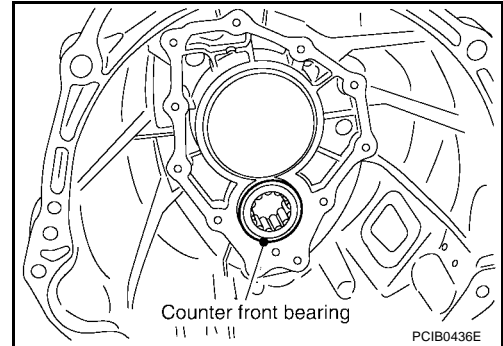
# TRANSMISSION ASSEMBLY

[FS6R31A]

3. Install oil gutter to transmission case.



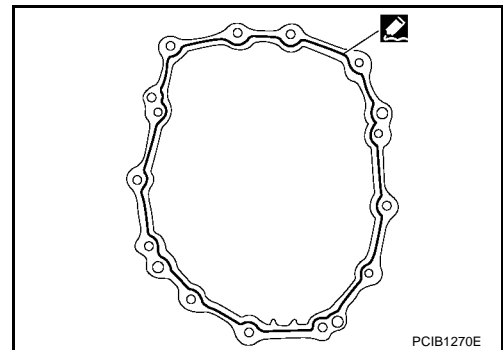
4. Install counter front bearing to transmission case.  
**CAUTION:**  
Apply multi-purpose grease to counter front bearing.



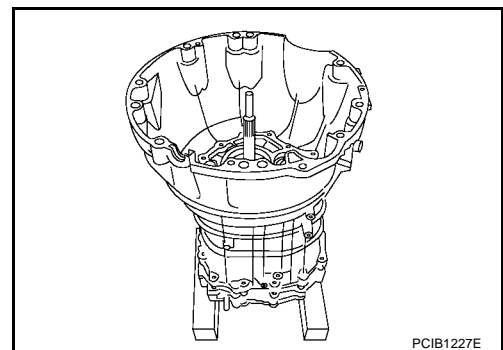
5. Apply recommended sealant to mating surface of transmission case as shown.

- Use Genuine Silicone RTV or the equivalent. Refer to [GL-48, "Recommended Chemical Products and Sealants"](#).

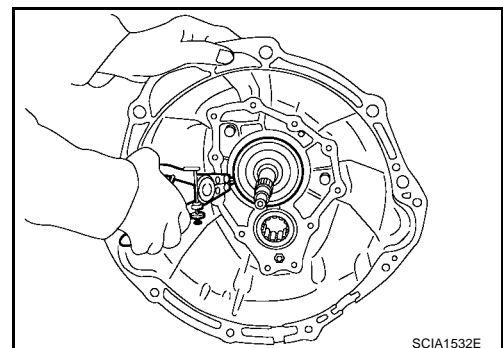
**CAUTION:**  
Remove old sealant adhering to the mating surfaces. Also remove any moisture, oil, or foreign material adhering to both mating surfaces.



6. Install transmission case to adapter plate assembly.



7. Install snap ring to main drive gear bearing using suitable tool.  
**CAUTION:**  
Do not reuse snap ring.

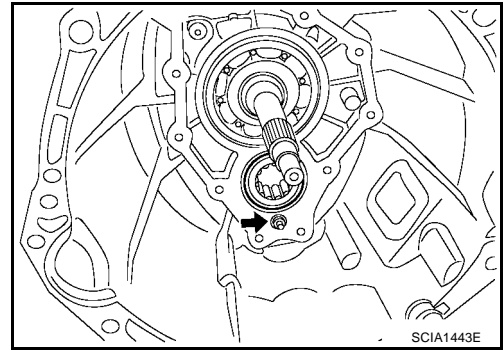


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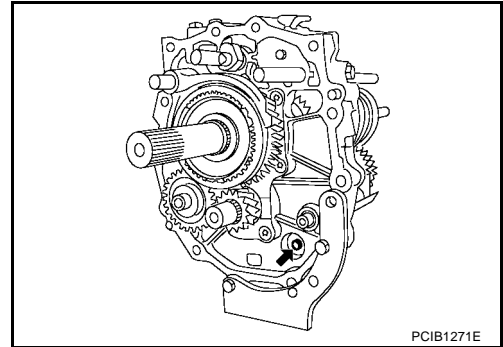
# TRANSMISSION ASSEMBLY

[FS6R31A]

8. Tighten baffle plate nut to the specified torque. Refer to [MT-71](#), "[Case Components](#)".



9. Tighten baffle plate bolt to the specified torque. Refer to [MT-71](#), "[Case Components](#)".



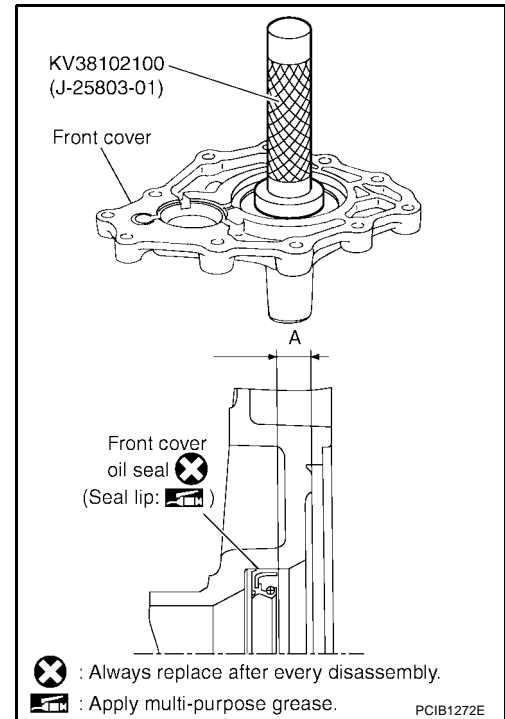
10. Install front cover oil seal to front cover using Tool.

**Tool number** : KV38102100 (J-25803-01)

**Dimension A** : 8.55 - 9.55 (0.336 - 0.376 in)

**CAUTION:**

- Do not reuse front cover oil seal.
- Apply multi-purpose grease onto oil seal lip.
- When installing, do not incline front cover oil seal.



11. Install front cover according to the following.



# TRANSMISSION ASSEMBLY

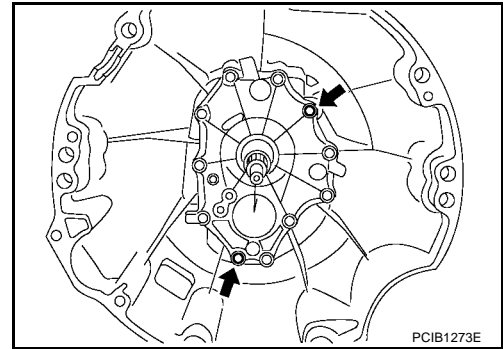
[FS6R31A]

- a. Install front cover gasket and front cover to transmission case.

**CAUTION:**

**Do not reuse front cover gasket.**

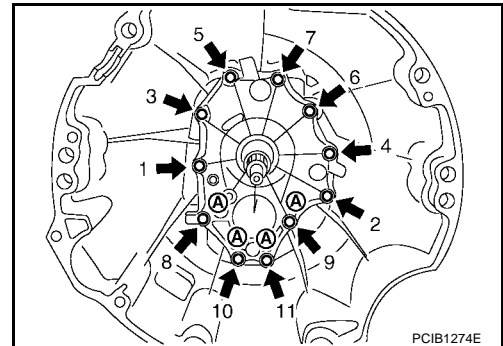
- b. Temporarily tighten 2 bolts in the positions shown.  
c. Temporarily tighten remaining 9 bolts.



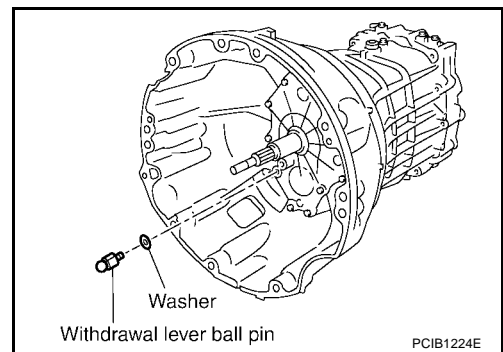
- d. Tighten bolts to the specified torque in order as shown. Refer to [MT-71, "Case Components"](#).

**CAUTION:**

**Do not reuse bolts indicated as A in the figure.**



12. Install washer to withdrawal lever ball pin, and then install it to front cover. Tighten withdrawal lever ball pin to the specified torque. Refer to [MT-71, "Case Components"](#).

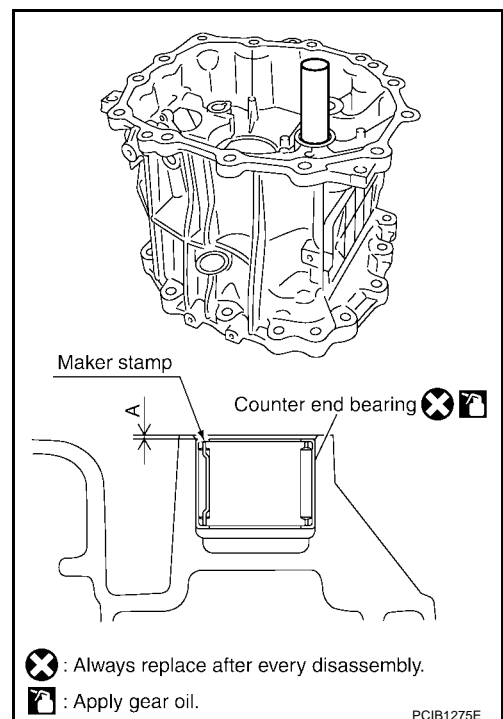


13. Install counter end bearing to rear extension (or OD gear case) using suitable tool [32 mm (1.26 in) dia.].

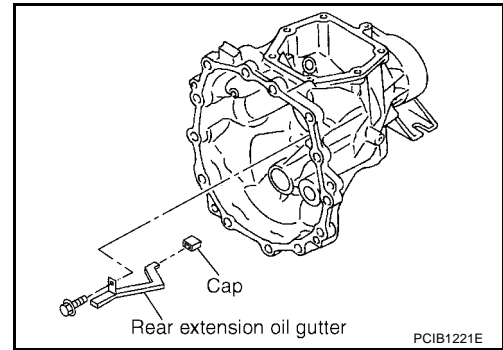
**Dimension A : 0.5 - 1.5 (0.020 - 0.059 in)**

**CAUTION:**

- Do not reuse counter end bearing.
- Apply gear oil to counter end bearing.
- Install counter end bearing with maker stamp at upper side.



14. Install rear extension oil gutter according to the following (for 2WD models).
  - a. Install cap to rear extension oil gutter.
  - b. Install rear extension oil gutter to rear extension, and then tighten bolt to specified torque. Refer to [MT-71, "Case Components"](#).



15. Install rear oil seal (1) to rear extension (or OD gear case) using Tool A.

**Tool number** : ST33200000 (J-26082)

**Dimension H1**

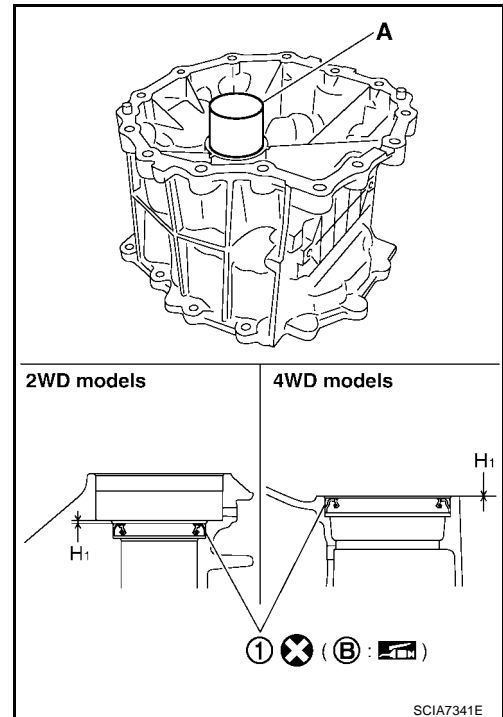
**2WD models** : 1.2 - 2.2 mm (0.047 - 0.087 in)

**4WD models** : -0.5 - 0.5 mm (-0.020 - 0.020 in)

**CAUTION:**

**When installing, do not incline rear oil seal.**

(B): Seal lip



16. Install dust seal (1) to rear extension using Tool A (for 2WD models).

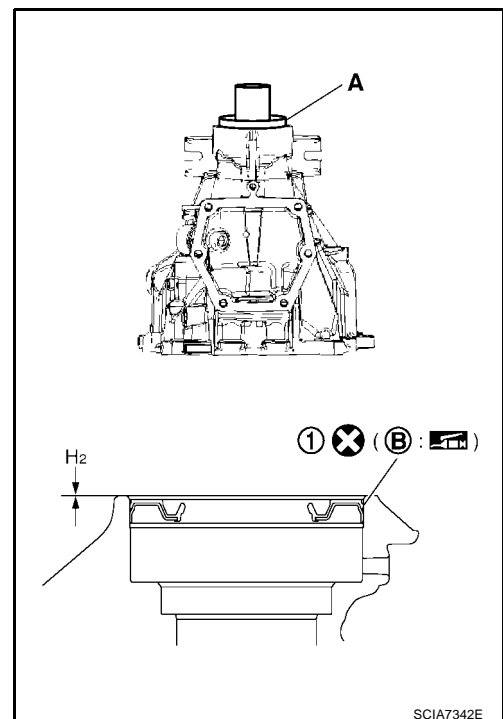
**Tool number** : KV38100500 ( — )

**Dimension H2** : 0.5 - 1.5 mm (0.020 - 0.059 in)

**CAUTION:**

**When installing, do not incline dust seal.**

(B): Seal lip



# TRANSMISSION ASSEMBLY

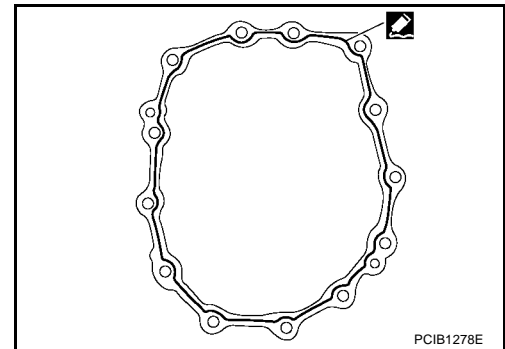
[FS6R31A]

17. Apply recommended sealant to mating surface of rear extension as shown.

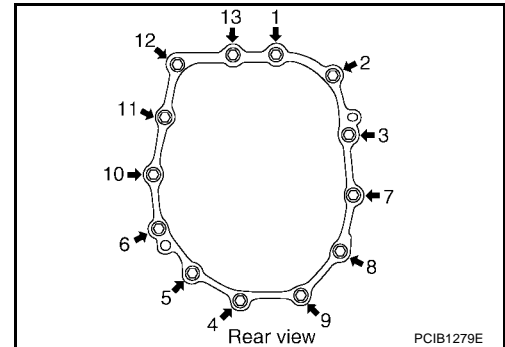
- Use Genuine Silicone RTV or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).

**CAUTION:**

Remove old sealant adhering to the mating surfaces. Also remove any moisture, oil, or foreign material adhering to both mating surfaces.



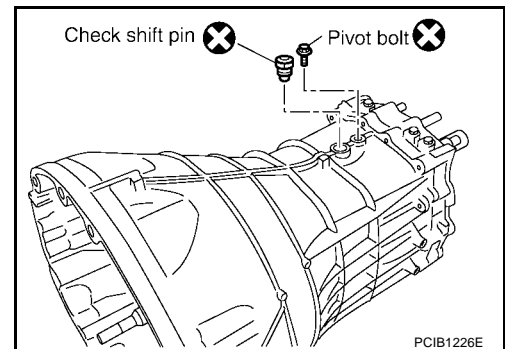
18. Install rear extension (or OD gear case) to adapter plate, and then tighten bolts to the specified torque in order as shown. Refer to [MT-71, "Case Components"](#).



19. Install check shift pin and pivot bolt to transmission case, and then tighten them to the specified torque. Refer to [MT-71, "Case Components"](#).

**CAUTION:**

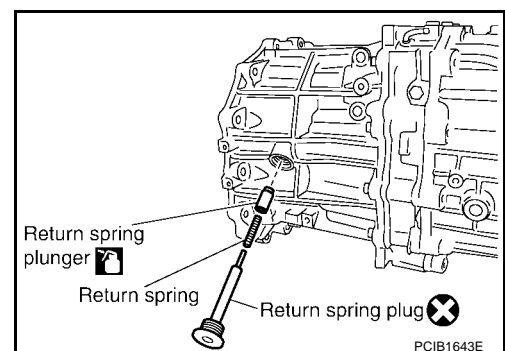
Do not reuse check shift pin and pivot bolt.



20. Install return spring plunger, return spring and return spring plug to rear extension (or OD gear case), and then tighten return spring plug to the specified torque. Refer to [MT-75, "Shift Control Components"](#).

**CAUTION:**

- Do not reuse return spring plug.
- Apply gear oil to return spring plunger.



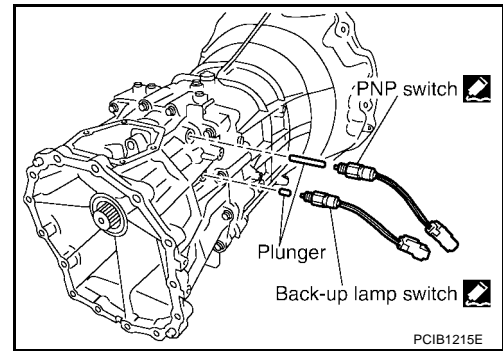
21. Install PNP switch and back-up lamp switch according to the following.

A  
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# TRANSMISSION ASSEMBLY

[FS6R31A]

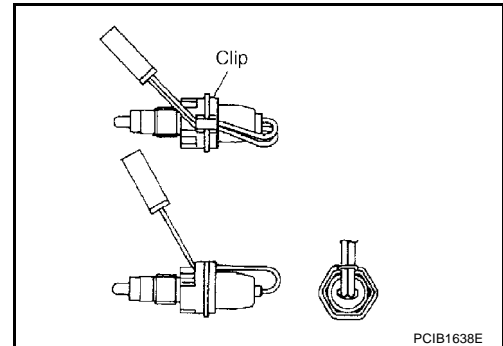
- a. Install plunger to rear extension (or OD gear case).
- b. Apply recommended sealant to threads of PNP switch and back-up lamp switch.
  - Use Genuine Silicone RTV or the equivalent. Refer to [GI-48, "Recommended Chemical Products and Sealants"](#).
- c. Install PNP switch and back-up lamp switch to rear extension (or OD gear case), and tighten them to the specified torque. Refer to [MT-71, "Case Components"](#).



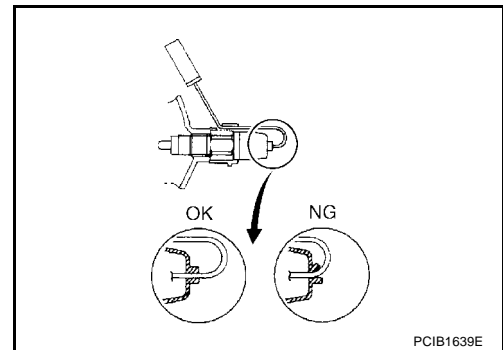
22. Install clips to PNP switch and back-up lamp switch.

**CAUTION:**

- Thread harness through the notch of clip.



- Thread the harness as shown.

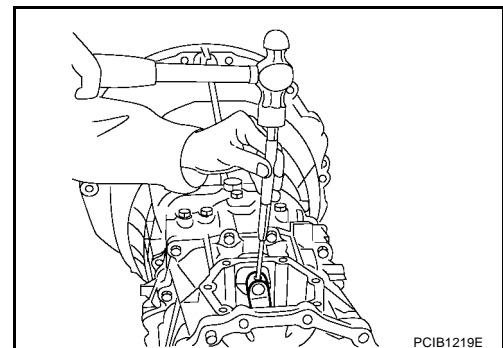


23. Install striking arm according to the following.

- a. Install striking arm to striking rod assembly.
- b. Install retaining pin to striking arm using suitable tool.

**CAUTION:**

- Do not reuse retaining pin.



24. Install control housing according to the following.

# TRANSMISSION ASSEMBLY

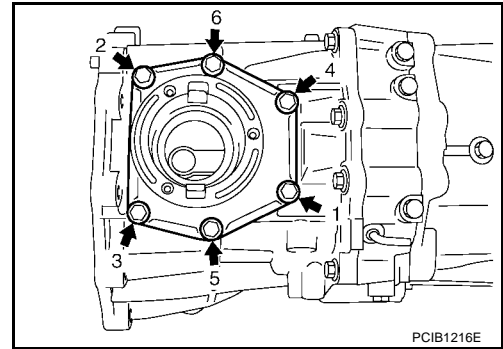
[FS6R31A]

- a. Install gasket and control housing to rear extension (or OD gear case).

**CAUTION:**

**Do not reuse gasket.**

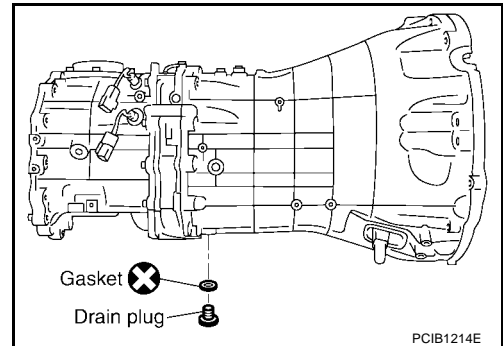
- b. Tighten bolts to the specified torque in order as shown. Refer to [MT-71, "Case Components"](#).



25. Install gasket to drain plug, and then install it to transmission case. Tighten drain plug to the specified torque. Refer to [MT-71, "Case Components"](#).

**CAUTION:**

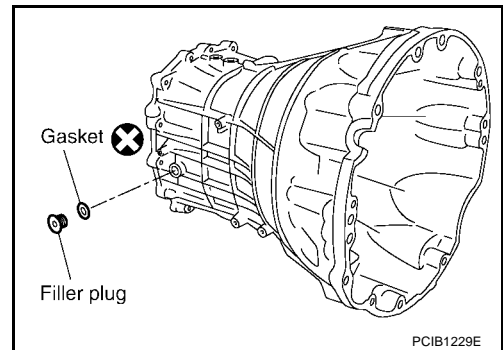
**Do not reuse gasket.**



26. Install gasket to filler plug, and then install it to transmission case. Tighten filler plug to the specified torque. Refer to [MT-71, "Case Components"](#).

**CAUTION:**

- Do not reuse gasket.
- After oil is filled, tighten filler plug to specified torque.



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# SERVICE DATA AND SPECIFICATIONS (SDS)

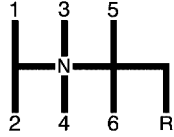
**[FS6R31A]**

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### General Specifications

UCS0040K

Engine		VQ40DE	
Transmission model		FS6R31A	
Axle type		2WD	4WD
Number of speed		6	
Synchromesh type		Warner	
Shift pattern		 <p style="text-align: right; font-size: small;">SCIA0955E</p>	
Gear ratio	1st	4.368	
	2nd	2.518	
	3rd	1.743	
	4th	1.283	
	5th	1.000	
	6th	0.769	
	Reverse	3.966	
Main gear (Number of teeth)	Drive	24	
	1st	37	
	2nd	32	
	3rd	32	
	4th	29	
	6th	25	
	Reverse	42	
Counter gear (Number of teeth)	Drive	34	
	1st	12	
	2nd	18	
	3rd	26	
	4th	32	
	6th	46	
	Reverse	15	
Reverse idler gear (Number of teeth)		26	
Oil capacity (Approx.)		$\ell$ (US qt, Imp qt)	3.98 (4-1/4, 3-1/2)      4.18 (4-3/8, 3-5/8)
Remarks	Reverse synchronizer	Installed	
	Double cone synchronizer	1st, 3rd and 4th	
	Triple cone synchronizer	2nd	

# SERVICE DATA AND SPECIFICATIONS (SDS)

[FS6R31A]

## Gear End Play

UCS0040L

Unit: mm (in)

Item	Standard value
Counter gear	0 - 0.10 (0 - 0.004)
Main drive gear	0 - 0.10 (0 - 0.004)
Mainshaft (Front side)	0 - 0.10 (0 - 0.004)
Mainshaft (Rear side)	0 - 0.10 (0 - 0.004)

## Snap Rings

UCS0040M

Unit: mm (in)

Selective parts	Thickness	Part number*	
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 gear	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		
Mainshaft	Front side	2.08 (0.0819)	32204 CD000
		2.14 (0.0843)	32204 CD001
		2.20 (0.0866)	32204 CD002
	Rear side	2.26 (0.0890)	32204 CD003
		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		

\*: Always check with the Parts Department for the latest parts information.

# SERVICE DATA AND SPECIFICATIONS (SDS)

[FS6R31A]

UCS0040N

Unit: mm (in)

## Baulk Ring Clearance

Measurement point		Standard value	Limit value
1st, 3rd and 4th (Double-cone synchronizer)	Clearance between synchronizer cone and inner baulk ring end face "A"	0.5 - 0.7 (0.020 - 0.028)	0.3 (0.012)
	Clearance between outer baulk ring pawl and synchronizer cone "B"	1st : 1.0 - 1.5 (0.039 - 0.059) 3rd, 4th : 0.85 - 1.35 (0.0335 - 0.0531)	0.7 (0.028) 0.7 (0.028)
2nd (Triple-cone synchronizer)	Clearance between synchronizer and clutch gear end face "A"	0.6 - 1.3 (0.024 - 0.051)	0.3 (0.012)
	Clearance between outer baulk ring pawl and synchronizer cone "B"	0.85 - 1.35 (0.0335 - 0.0531)	0.7 (0.028)
	Clearance between inner baulk ring and clutch gear end face "C"	0.7 - 1.25 (0.028 - 0.0492)	0.3 (0.012)
5th and 6th		0.7 - 1.35 (0.028 - 0.0531)	0.5 (0.020)
Reverse		0.75 - 1.2 (0.0295 - 0.047)	0.5 (0.020)

