

621 MHB

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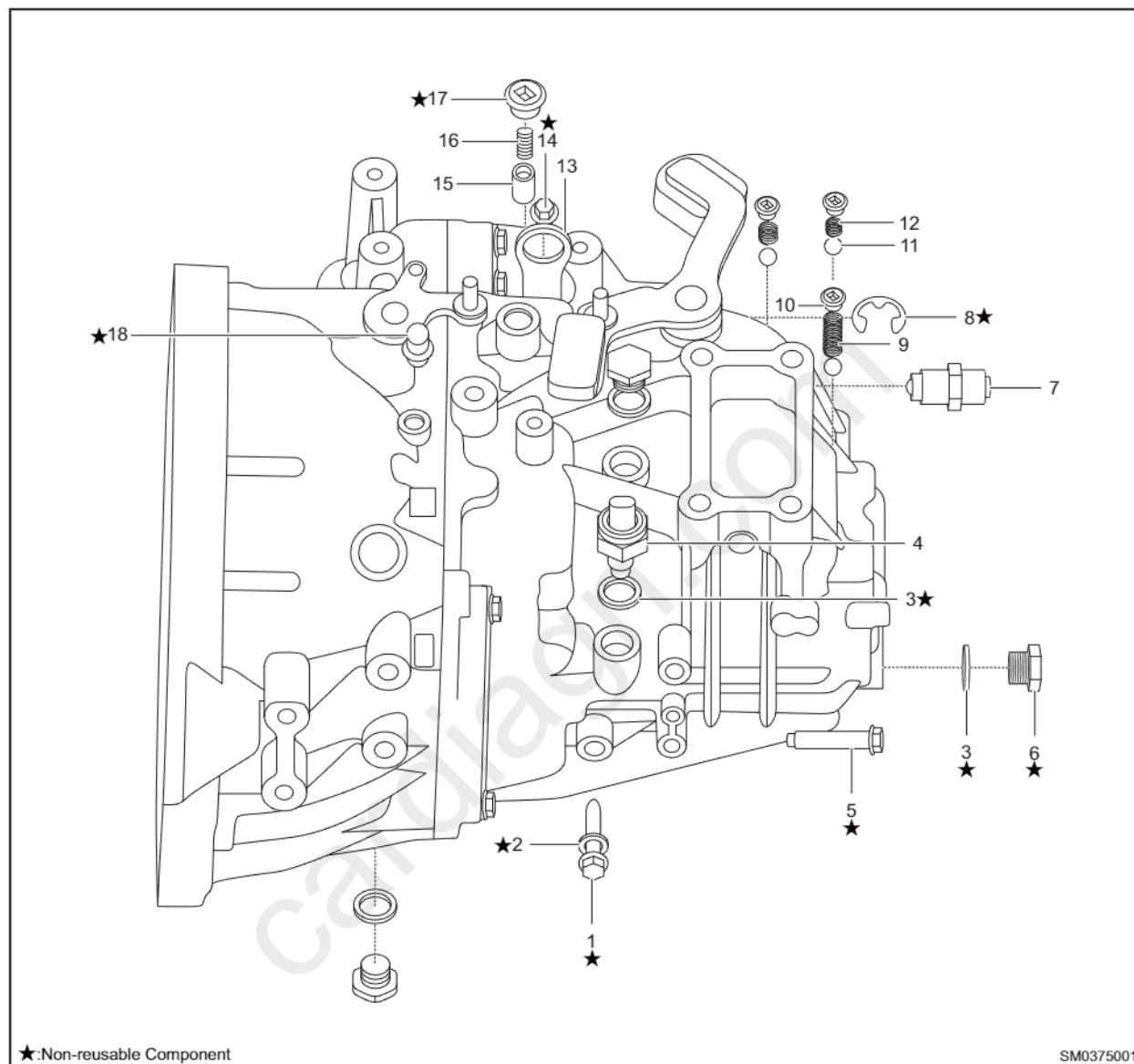


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GENERAL INFORMATION

Overview

Transmission Outside Component

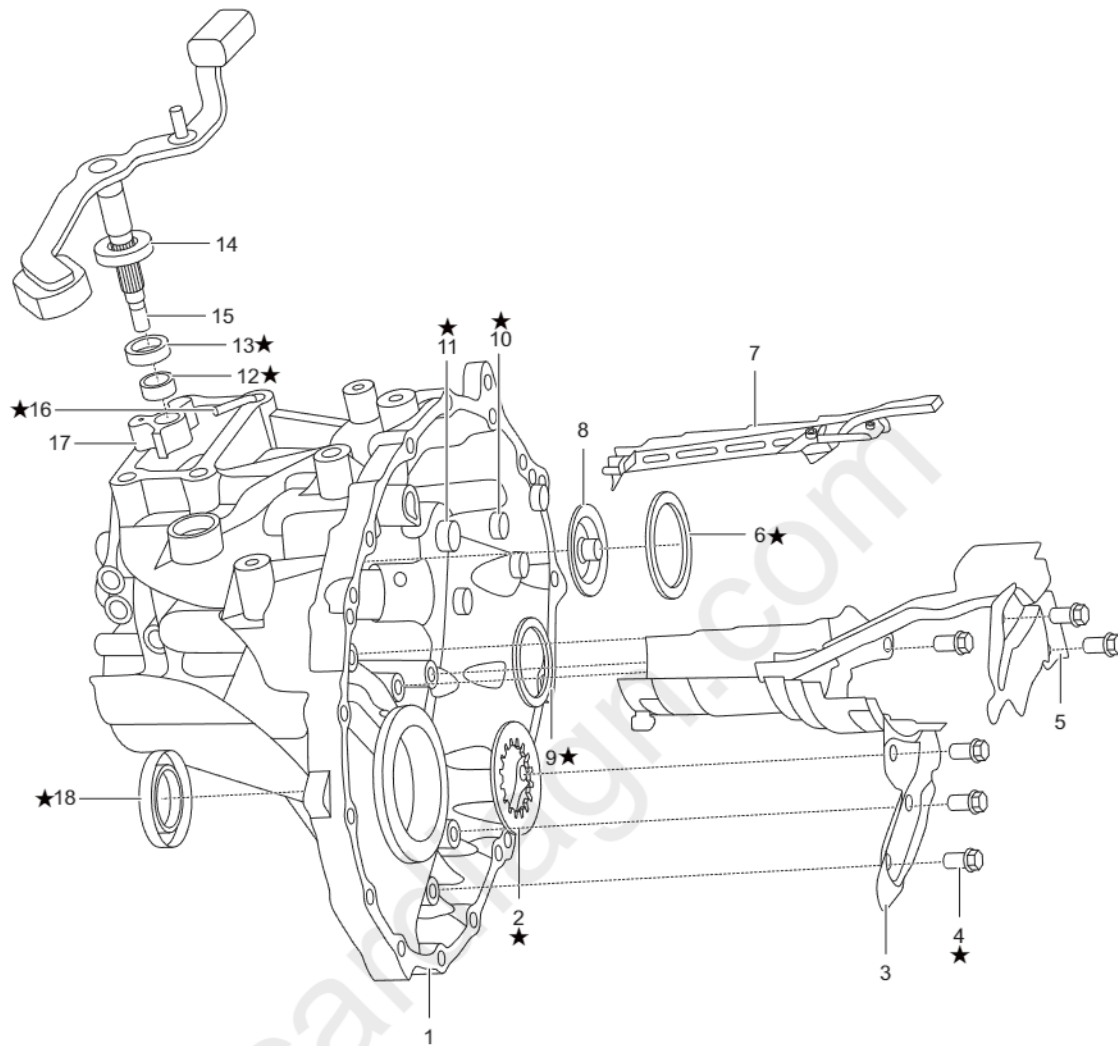


1 - Flange Bolt ★	2 - Washer ★
3 - Washer ★	4 - Reverse Switch Assembly
5 - Flange Bolt ★	6 - Hexagon Head Bolt ★
7 - Locating Mechanism Set	8 - E Type Retainer ★
9 - Self-locking Spring	10 - Self-locking Plug
11 - Steel Ball	12 - Self-locking Plug
13 - Lifting Eye	14 - Flange Bolt ★
15 - Steel Ball Dowel Pin	16 - Spring
17 - Hexagon Socket Head Plug ★	18 - Breather Plug Sub-assembly ★

★ indicates that it is a non-reusable part.



Transmission Case



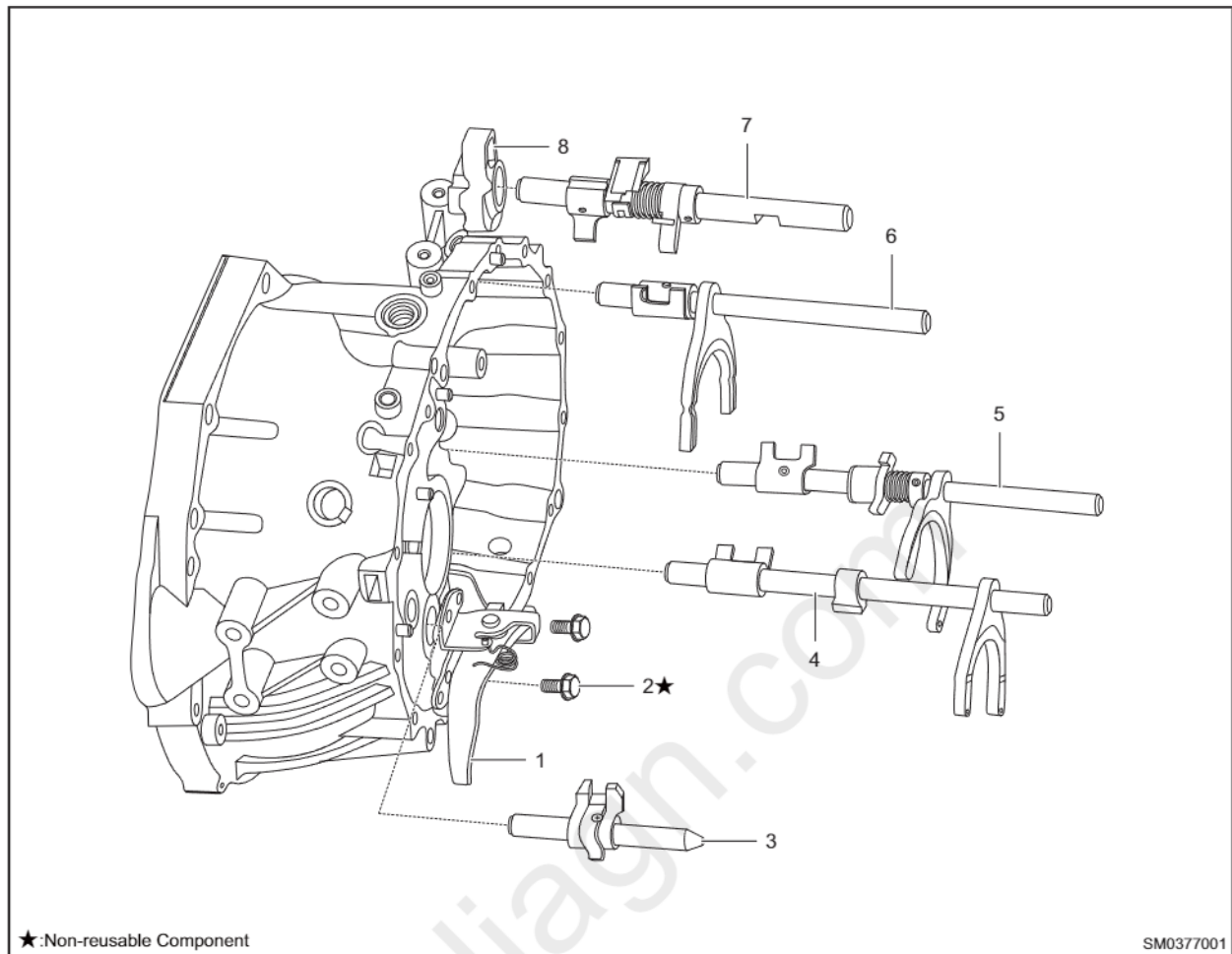
★:Non-reusable Component

SM0376001

1 - Transmission Case	2 - Adjusting Washer ★
3 - Oil Separator	4 - Flange Bolt ★
5 - Oil Separator	6 - Adjusting Washer ★
7 - Oil Guide	8 - Input Shaft Oil Guide Nozzle
9 - Adjusting Washer ★	10 - Bushing ★
11 - Bushing ★	12 - Compound Bushing ★
13 - S Type Oil Seal ★	14 - Spacer
15 - Outer Shift Lever	16 - Elastic Cylindrical Pin ★
17 - Shift Guide Block	18 - T Type Oil Seal ★

★ indicates that it is a non-reusable part.

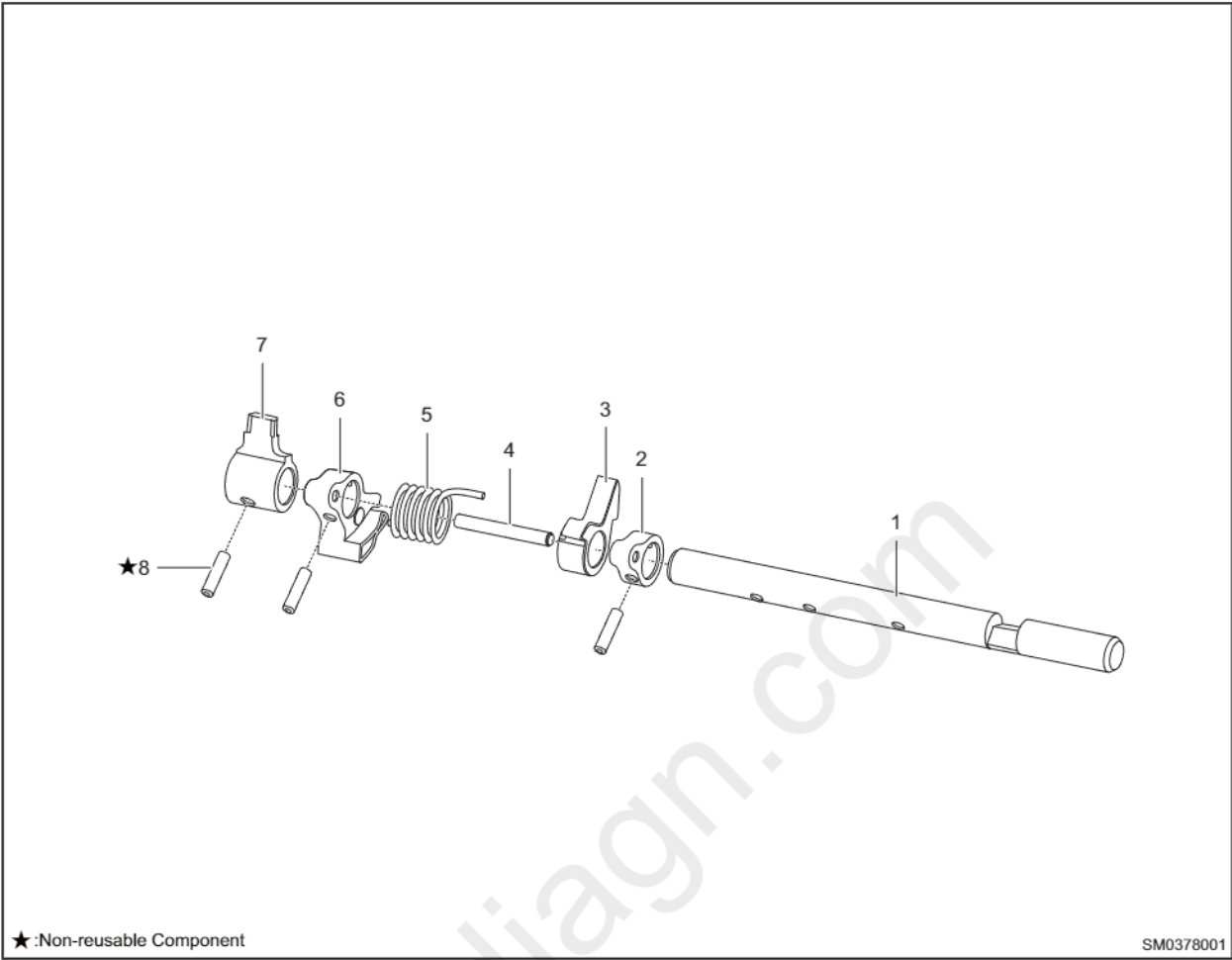
Fork Shaft



1 - Reverse Gear Arm Bracket Set	2 - Flange Bolt ★
3 - Reverse Gear Fork Set	4 - No.3 Fork Shaft Sub-assembly
5 - No.2 Fork Shaft Sub-assembly	6 - No.1 Fork Shaft Sub-assembly
7 - Select and Shift Shaft Sub-assembly	8 - Lock Plate

★ indicates that it is a non-reusable part.

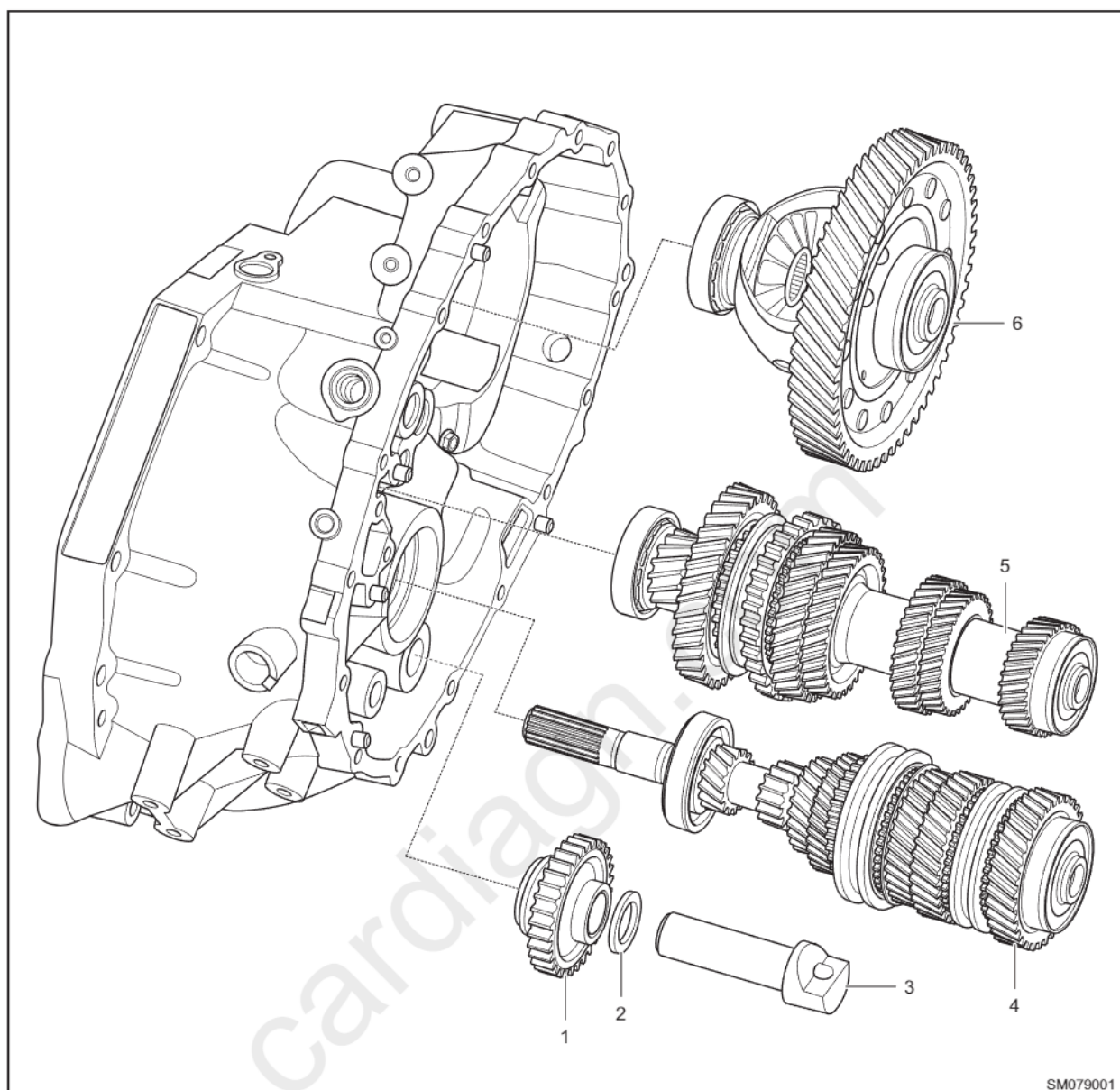
Select and Shift Shaft Sub-assembly



1 - Select and Shift Shaft	2 - Select Stopper
3 - Select and Shift Block	4 - Straight Pin
5 - Torsion Spring	6 - Inner Shift Lever
7 - Interlock Block	8 - Elastic Cylindrical Pin ★

★ indicates that it is a non-reusable part.

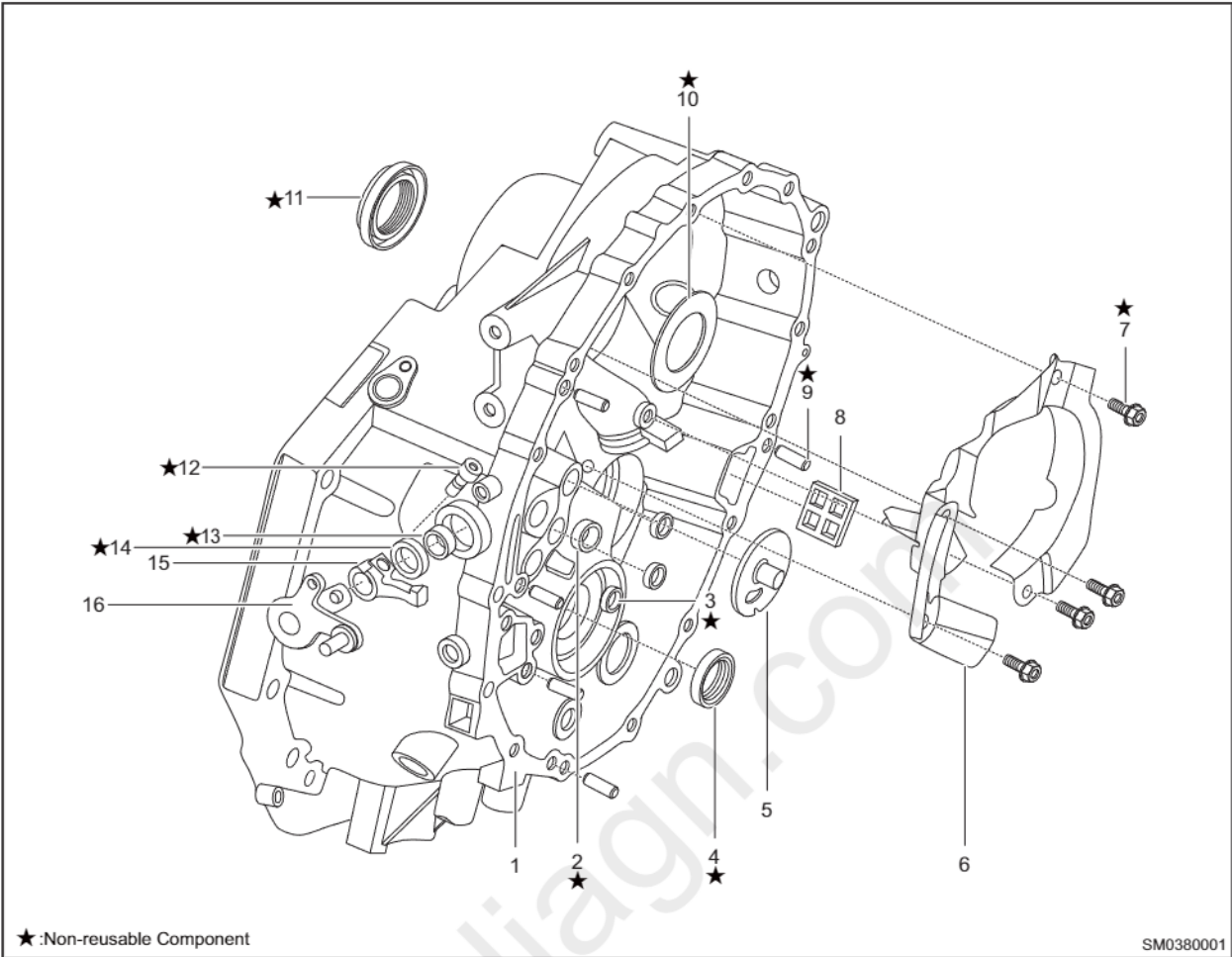
Shaft Set



SM079001

1 - Reverse Idler Gear Set	2 - Idler Gear Thrust Washer
3 - Reverse Idler Gear Shaft	4 - Input Shaft Sub-assembly
5 - Output Shaft Sub-assembly	6 - Differential Sub-assembly

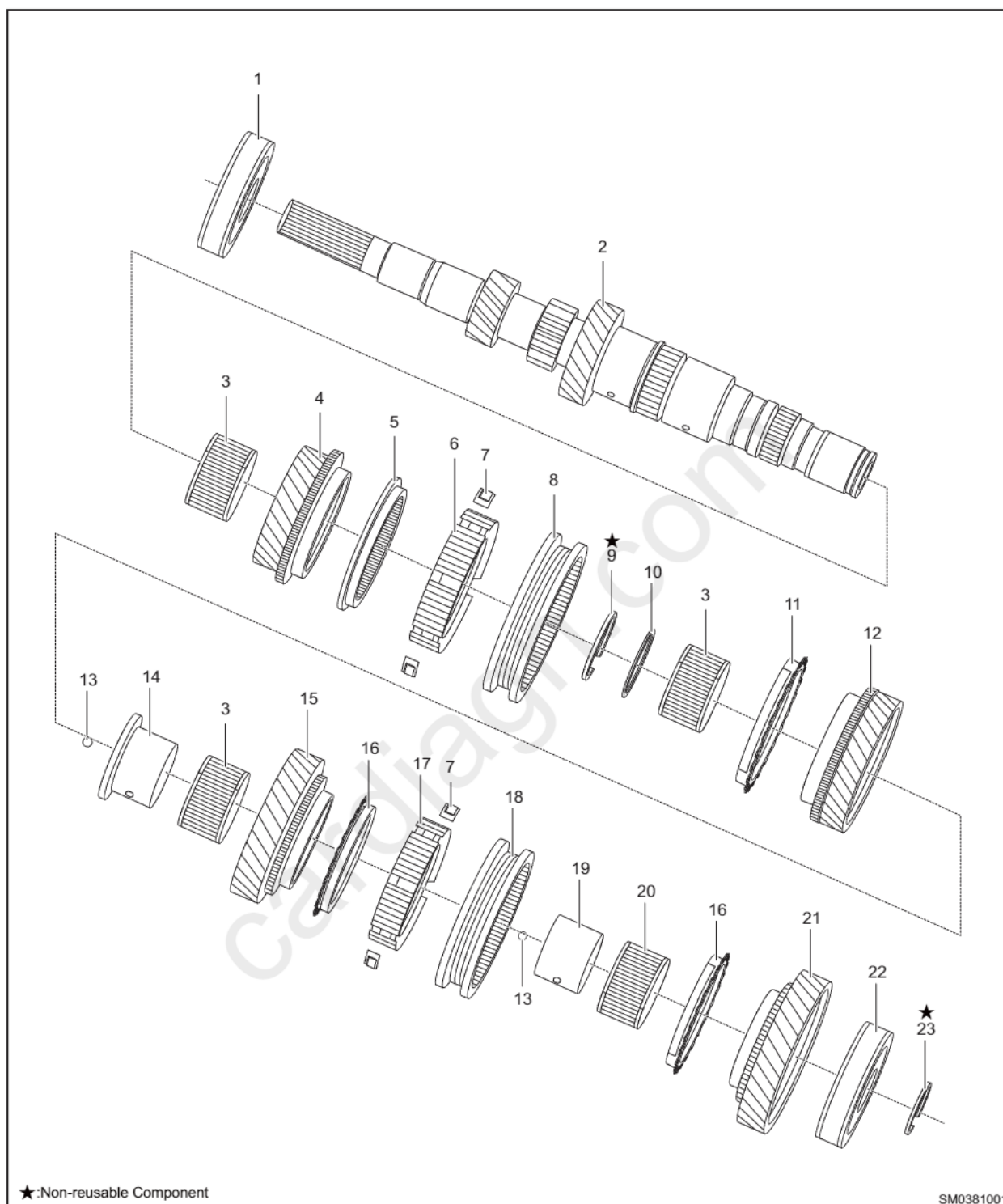
Clutch Case



1 - Clutch Case	2 - Bushing ★
3 - Bushing ★	4 - T Type Oil Seal ★
5 - Output Shaft Oil Guide Nozzle	6 - Oil Separator
7 - Flange Bolt ★	8 - Magnet
9 - Cylindrical Pin ★	10 - Oil Seal Deflector ★
11 - T Type Oil Seal ★	12 - Hexagon Head Bolt ★
13 - Compound Bushing ★	14 - S Type Oil Seal ★
15 - Inner Select Lever	16 - Outer Select Lever

★ indicates that it is a non-reusable part.

Input Shaft Sub-assembly



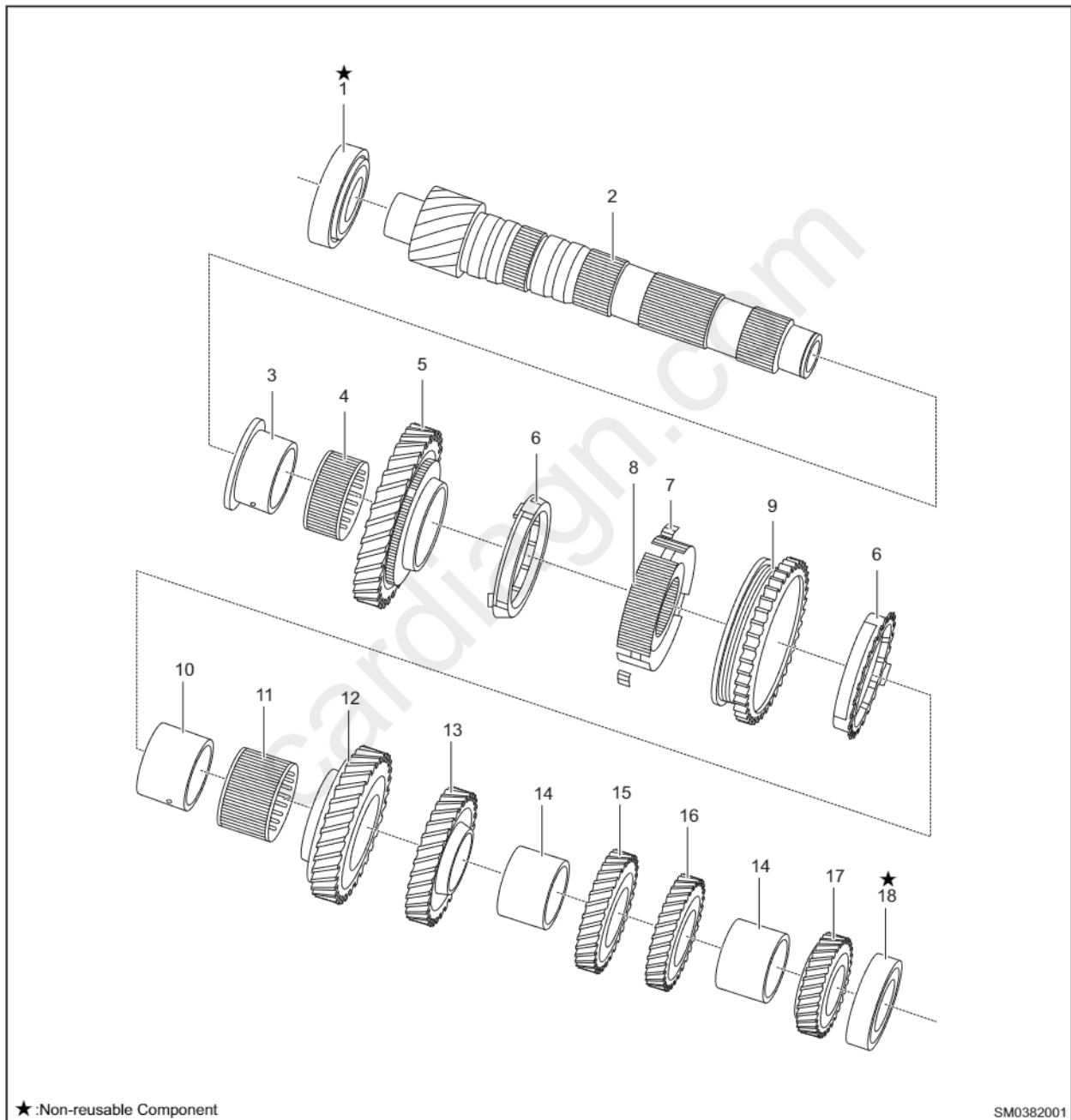
1 - Input Shaft Front Bearing	2 - Input Shaft
3 - Needle Roller Bearing	4 - 3rd Gear Set
5 - No.3 Synchronizer Gear Ring	6 - No.2 Synchronizer Gear Hub
7 - No.1 Synchronizer Slider	8 - No.2 Synchronizer Gear Sleeve
9 - Shaft Retainer ★	10 - Spacer
11 - No.4 Synchronizer Gear Ring	12 - 4th Gear Set
13 - Steel Ball	14 - 5th Gear Shaft Bushing



15 - 5th Gear Set	16 - No.5 Synchronizer Gear Ring
17 - No.3 Synchronizer Gear Hub	18 - No.3 Synchronizer Gear Sleeve
19 - 6th Gear Shaft Bushing	20 - Needle Roller Bearing
21 - 6th Gear Set	22 - Input Shaft Rear Bearing
23 - Shaft Retainer ★	

★ indicates that it is a non-reusable part.

Output Shaft Sub-assembly



1 - Output Shaft Front Bearing ★	2 - Output Shaft
3 - 1st Gear Shaft Bushing	4 - Needle Roller Bearing
5 - 1st Gear	6 - No.1 Synchronizer Gear Set
7 - No.1 Synchronizer Slider	8 - No.1 Synchronizer Gear Hub

9 - No.1 Synchronizer Gear Sleeve	10 - 2nd Gear Shaft Bushing
11 - Needle Roller Bearing	12 - 2nd Gear
13 - 3rd Driven Gear	14 - Output Shaft Spacer
15 - 4th Driven Gear	16 - 5th Driven Gear
17 - 6th Driven Gear	18 - Output Shaft Rear Bearing ★

★ indicates that it is a non-reusable part.

Operation

This transmission has six forward gears and one reverse gear, which is achieved by three sets of synchronizers and two shafts (input shaft and output shaft). All forward gears use conventional engagement, and reverse gear uses a sliding idler gear device. Corresponding gear will engage with gear hub separately when transmission is shifted to each different gear position, thus realizing the power transmission. Drive gear of final drive, which is on output shaft, rotates driven gear of final drive and differential assembly, thus propeller shaft is driven to turn wheels. All forward gears use inertial synchronizer gearshift mechanism, thus providing smooth and easy gear shifting and longevity. Shift fork adopts alloy steel material and resinous material to achieve high wear resistance. Gearshift mechanism of transmission makes gearshift flexible, accurate and clear by equipped with locating steel ball and spring. In addition, pre-synchronizing mechanism is used for reverse gear, enhancing the ride comfort and reliability.

Specifications

Torque Specifications

Description	Torque (N·m)
Coupling Bolt Between Differential Gear Ring and Differential Case	106 ± 6
Coupling Bolt Between Oil Separator and Clutch Case	17 ± 6.8
Coupling Bolt Between Oil Separator and Transmission Case	17 ± 6.8
Coupling Bolt Between Oil Separator Set and Transmission Case	17 ± 6.8
Reverse Gear Arm Bracket Set Bolt	17 ± 3.4
Coupling Bolt Between Clutch Case and Transmission Case	29.4 ± 5.9
Locating Bolt Between Reverse Idler Gear Shaft and Transmission Case	30 ± 9
Coupling Bolt Between Inner Select Lever and Outer Select Lever	28 ± 5.6
Locating Bolt Between Locating Mechanism Set and Transmission Case	29.4 ± 8.8
Transmission Case Hexagon Socket Head Plug	24.5 ± 7.4
Transmission Case Self-locking Plug	22.0 ± 6.6
Fixing Bolt Between Hexagon Head Plug and Clutch Case	39 ± 11
Fixing Bolt Between Hexagon Head Plug and Transmission Case	39 ± 11
Reverse Switch Sub-assembly	44 ± 8.8
Neutral Switch x Transmission Case	7 ± 2.8

621MHA Transmission Gear Ratio

Type	621 MHB
Gear position	1st
	2nd
	3rd
	4th
	5th
	6th
	Reverse
	Final Drive Ratio
	3.538
	1.913
	1.310
	0.971
	0.818
	0.658
	3.333
	3.944



Proper Use and Maintenance for Transmission

Correct Operation for Transmission

1. Gently shift the shift lever and never apply excessive force.
2. Never start off at high speed.
3. Do not always put hand on shift lever during driving, to prevent premature wear of shift fork.

Transmission Oil Standard

Transmission oil selection standard

Transmission Oil Type	Viscosity	Standard Capacity
FUCHS GL - 4	75W - 90	2.5 ± 0.1 L

Clearance After Assembling Synchronizer Gear Ring and Gear Set

Gear position	Clearance (mm)
1st	1.385 ± 0.470
2nd	1.390 ± 0.470
3rd	1.180 ± 0.400
4th	1.180 ± 0.400
5th	1.130 ± 0.400
6th	1.130 ± 0.400

Axial Clearance for Each Gear

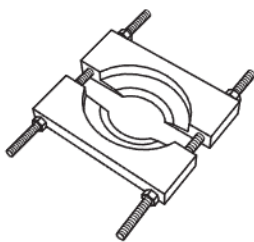
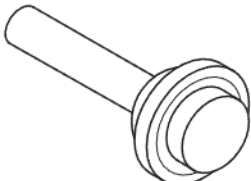
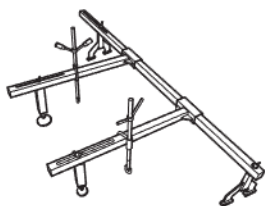
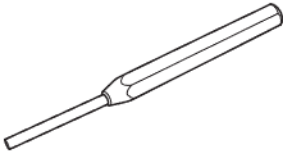
Gear position	Axial Clearance (mm)
1st	0.20 - 0.38
2nd	0.15 - 0.33
3rd	0.15 - 0.43
4th	0.15 - 0.56
5th	0.15 - 0.43
6th	0.15 - 0.43

Assembly Standards and Precautions for Transmission

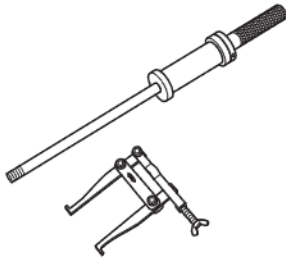
1. Wash all parts (except for rubber part, gasket, oil seal and bearing) before assembly.
2. Various oil seals, shaft retainers and elastic pins cannot be reused.
3. Apply lubricant to all friction surfaces and apply grease to oil seal lips.
4. Never transmit pressure through rolling body when assembling each bearing.
5. Never tilt when assembling lip oil seal.
6. Opening of spring expander on both sides should be staggered when assembling synchronizer set.
7. There should be no lubricant leakage when transmission is in operation position.

Tools

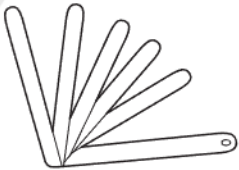
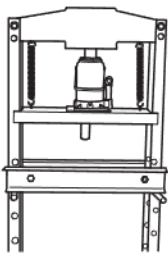
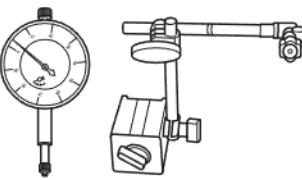
Special Tools

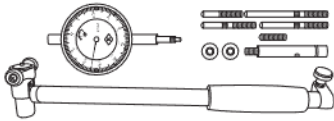
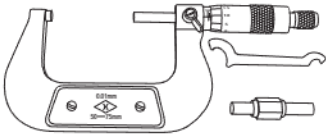
Bearing Remover	CH-30057	 011
Input Shaft Oil Seal Installer	CH-30041	 008
Differential Oil Seal Installer	CH-30002	 009
Engine Equalizer	CH-2005	 026
Punch	CH-30040	 073



Puller and Puller Adapter	CH-30042 CH-30043	 059
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General Tools

Transmission Carrier	 005
Feeler Gauge	 060
Hydraulic Press	 012
Dial Indicator	 023

Cylinder Gauge	 065
Micrometer	 064

DIAGNOSIS & TESTING

Diagnosis Content

Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair or adjust faulty components, or replace as necessary.

Symptom	Possible Cause	Troubleshooting Method
Noise	Oil level (too low)	Add oil to specified level
	Oil grade (incorrect)	Replace with specified oil
	Clutch release bearing (worn or damaged)	Check or replace
	Clutch disc (worn or damaged)	Check or replace
	Synchronizer gear ring (output shaft) (worn or damaged)	Replace
	Synchronizer gear ring (input shaft) (worn or damaged)	Replace
	Gear (input shaft) (worn or damaged)	Replace
	Gear (output shaft) (worn or damaged)	Replace
	Bearing (input shaft) (worn or damaged)	Replace
	Bearing (output shaft) (worn or damaged)	Replace
	Bearing (differential) (worn or damaged)	Replace
Oil leakage	Oil level (high)	Adjust oil to specified level
	Washer (damaged)	Replace
	Oil seal (worn or damaged)	Replace
Hard shifting or impossible to shift	Oil (incorrect)	Replace with specified oil
	Clutch (stuck)	Check or adjust
	Select and shift shaft sub-assembly (worn or damaged)	Check or replace
	Control cable (malfunction) (select)	Check or adjust
	Control cable (malfunction) (shift)	Check or adjust
	Shift fork (input shaft) (worn)	Replace
	Shift fork (output shaft) (worn)	Replace
	Synchronizer gear ring (input shaft) (worn or damaged)	Replace
	Synchronizer gear ring (output shaft) (worn or damaged)	Replace
	Synchronizer slider spring (input shaft) (worn or damaged)	Replace synchronizer slider
	Synchronizer slider spring (output shaft) (worn or damaged)	Replace synchronizer slider
	Gear (input shaft) (worn or damaged)	Replace
	Gear (output shaft) (worn or damaged)	Replace
	Synchronizer gear sleeve (input shaft) (worn or damaged)	Replace
	Synchronizer gear sleeve (output shaft) (worn or damaged)	Replace
Gear jumping or excessive shift lever movement	Shift fork (input shaft) (worn)	Replace
	Shift fork (output shaft) (worn)	Replace
	Synchronizer gear sleeve (input shaft) (worn or damaged)	Replace
	Synchronizer gear sleeve (output shaft) (worn or damaged)	Replace
	Gear (input shaft) (worn or damaged)	Replace
	Gear (output shaft) (worn or damaged)	Replace
	Bearing (input shaft) (worn or damaged)	Replace
	Bearing (output shaft) (worn or damaged)	Replace

Caution:

- To guarantee the service quality of transmission, perform operations carefully and keep each component clean.

- Select appropriate or special tools.
- Transmission can achieve a good operation condition only when strictly performing service according to technical requirements of assembly or adjustment.

On-vehicle Inspection

Transmission Oil Level Inspection

1. Raise vehicle with a lift.

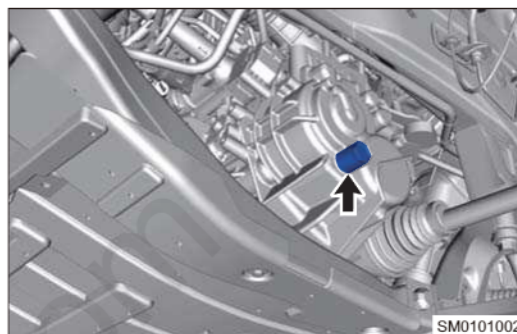
Warning:

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing or inspecting the lifted vehicle.

2. Remove transmission filler plug (arrow) and bolt washer.

Caution:

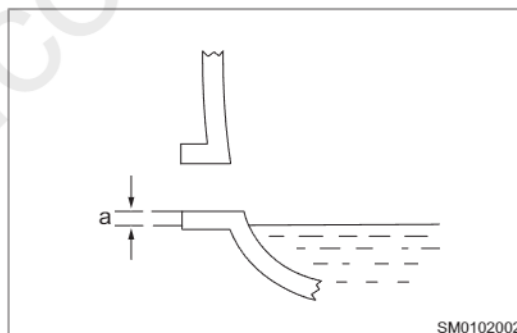
- Drain plug and plug washer are non-reusable components, and replace them after removal.



3. Check that oil level is 0 to 5 mm below lower lip of limit plug opening.

Caution:

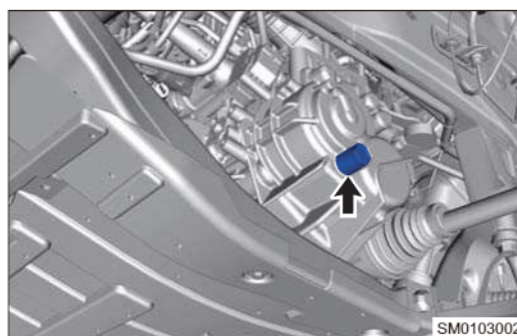
- If oil level is too low, inspect oil for leakage.



4. Install new plug washer and filler plug (arrow).

Tightening torque

$39 \pm 11 \text{ N}\cdot\text{m}$



ON-VEHICLE SERVICE

Transmission Oil Replacement

Drain the transmission oil

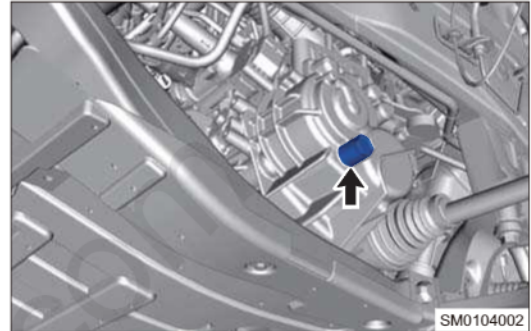
Warning / Caution / Hint:

- Replace transmission oil only when engine stops and transmission cools down.
- Replace drain/limit plug washers with new ones before installation.

1. Turn off all electrical equipment and the ignition switch.
2. Raise vehicle to a proper height.
3. Place a recovering container under transmission drain hole.
4. Use a tool to remove transmission limit plug (arrow), and remove plug washer.

Caution:

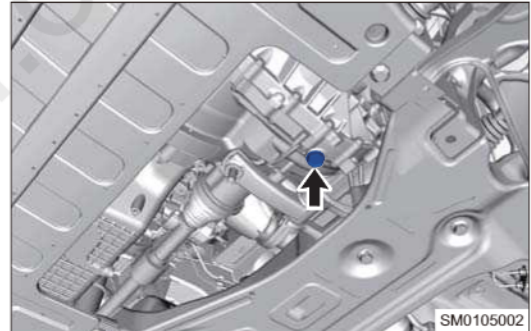
- Limit plug and plug washer are non-reusable components, and replace them after removal.



5. Use a tool to remove transmission drain plug (arrow), and remove plug washer. Replace drain plug washer and tighten drain plug after draining transmission oil.

Tightening torque

39 ± 11 N·m



Caution:

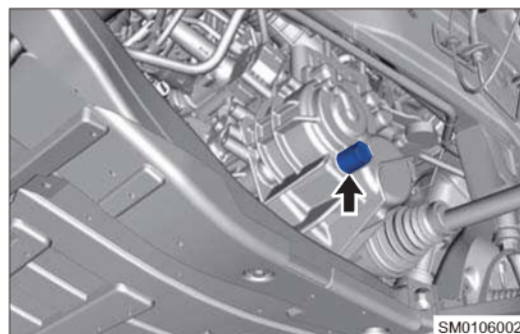
- Drained transmission oil should be collected with a recovering container.
- Only use transmission oil approved by Chery Automobile Co., Ltd.
- Drain plug and plug washer are non-reusable components, and replace them after removal.

Transmission Oil Filling

1. Make sure that drain plug is tightened in place.
2. Use a socket wrench to remove transmission filler plug (arrow), and remove plug washer.

Caution:

- Filler plug and plug washer are non-reusable components, and replace them after removal.

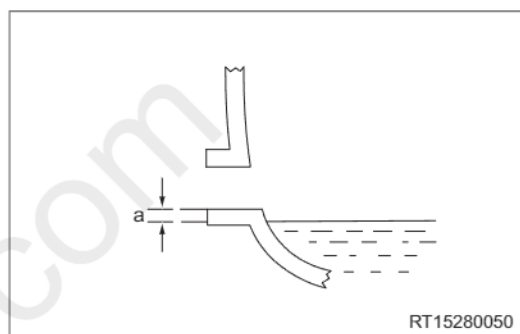


3. Add lubricant through filler plug port until oil level is 0 to 5 mm from lower lip of limit plug opening.

Transmission Oil Type	Viscosity	Standard Capacity
FUCHS GL - 4	75 W - 90	2.5 ± 0.1 L

Caution:

- An excessively large or small amount of oil may affect proper functioning of transmission.
- After filling oil, run vehicle and then check oil level.



4. After filling oil, replace filler plug washer and tighten filler plug

Tightening torque

39 ± 11 N·m



Differential Oil Seal

Removal

Warning / Caution / Hint:

Caution:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

1. Raise vehicle with a lift

Warning:

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing or inspecting the lifted vehicle.

2. Drain the transmission oil.

- (a) Remove transmission filler plug and plug washer.

Caution:

- Filler plug and plug washer are non-reusable components, and replace them after removal.

- (b) Remove transmission drain plug and plug washer, then drain transmission oil.

Caution:

- Drained transmission oil should be collected with a recovering container.
- Drain plug and plug washer are non-reusable components, and replace them after removal.

- (c) Install new plug washer and drain plug.

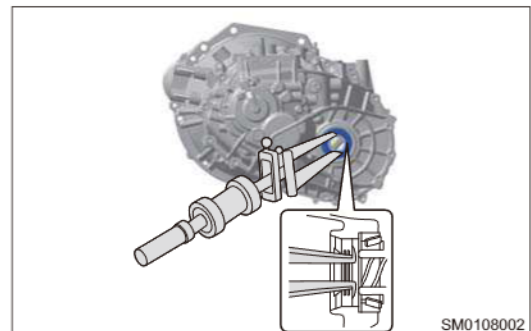
Tightening torque

$39 \pm 11 \text{ N}\cdot\text{m}$

3. Remove the front left wheel ([See page 24-8](#)).
4. Remove the left drive shaft ([See page 20-5](#)).
5. Use a special tool to remove left drive shaft oil seal from transmission assembly.

Caution:

- Drive shaft oil seal is a non-reusable component, and replace it after removal.

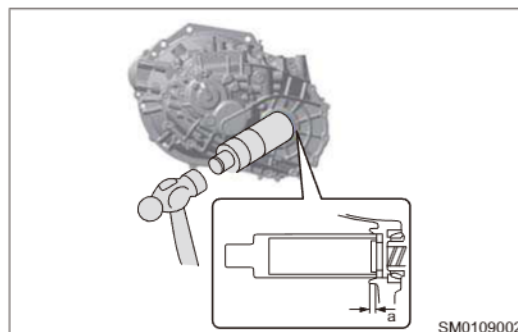


Installation

1. Apply a proper amount of MP grease to new oil seal lip.
2. Use special tool and hammer to install left drive shaft oil seal to transmission assembly.

Caution:

- Do not damage oil seal lip during installation.
- Drive shaft oil seal is a non-reusable component, and replace it after removal.



3. Other procedures are in the reverse order of removal.
4. Add specified transmission oil.

Select and Shift Cable, Shift Control Mechanism

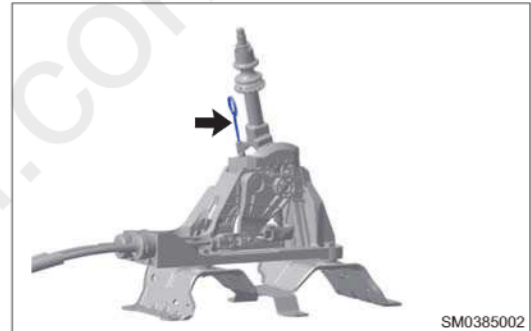
Removal

Warning / Caution / Hint:

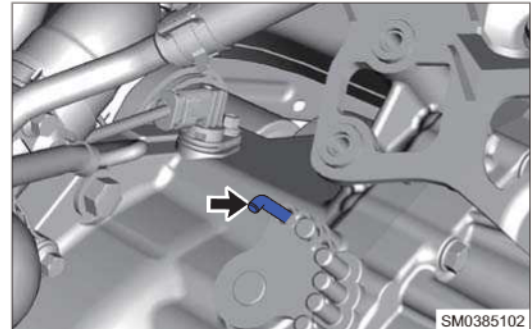
- Shift gear select and shift mechanism of transmission to 1st and secure it with dowel pin.
- Stand at engine compartment, clamp gear select cable on left side (connector is smaller) and clamp gear shift cable on right side (connector is larger), never allow cables cross.
- Openings of 2 lock pins face the same direction and need to be locked in place.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery (See page 16-12).
4. Remove the air filter assembly (See page 10-8).
5. Remove the battery tray (See page 16-15).
6. Rotate shift lever knob counterclockwise along shift lever to remove it.
7. Remove the boot assembly.
8. Remove the auxiliary fascia console assembly (See page 47-7).
9. Shift shift lever to 1st and install dowel pin.

- (a) Install the shift control mechanism dowel pin (arrow).

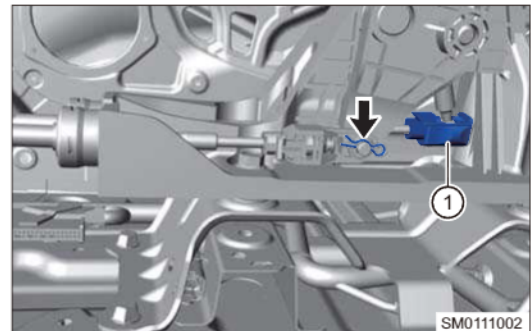


- (b) Install the transmission 1st gear dowel pin (arrow).

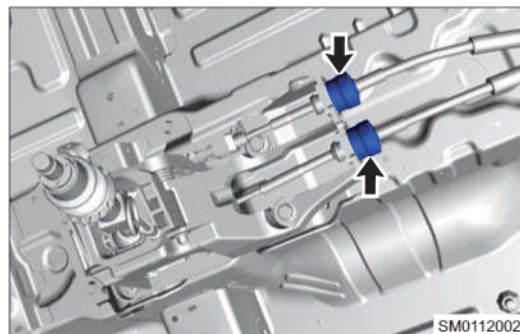


10. Remove select and shift cable from gear shift control mechanism.

- (a) Disconnect connection (1) between shift cable connector and shift lever knob, remove cotter pin (arrow) between select cable of shift control mechanism and select swing arm of control mechanism, then disconnect connection.

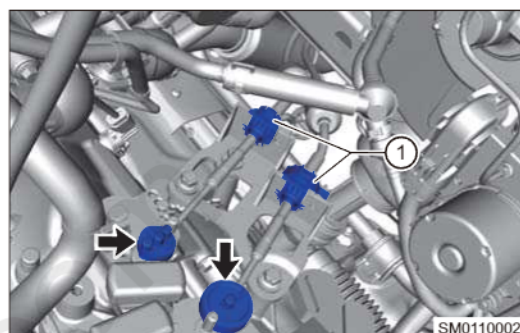


- (b) Remove dampers (arrow) between select and shift cable and shift control mechanism.



11. Disconnect connection between select and shift cable and transmission.

- (a) Remove lock pin and disconnect connection (arrow) between shift cable and transmission shift swing arm; remove lock pin and disconnect connection (arrow) between select cable and transmission select swing arm, disengage select and shift cable dampers (1) from flexible shaft bracket limit hole.



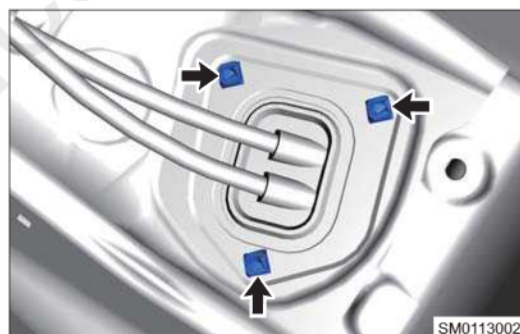
Warning:

- White marks on both connectors face downward (face towards transmission) during installation.

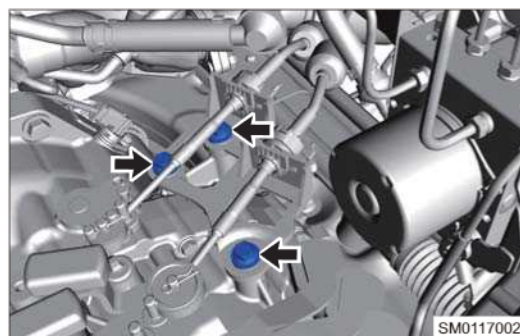
12. Raise vehicle to a proper position, remove 3 fixing bolts (arrow) between select and shift cable and body dash panel.

Tightening torque

$9 \pm 1 \text{ N}\cdot\text{m}$



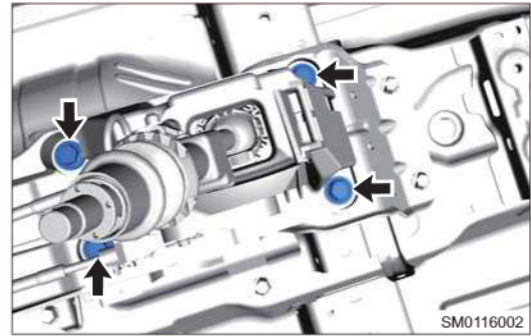
13. Remove select and shift cable from body.
14. Remove 3 fixing bolt and plate washer assemblies (arrow) between transmission and flexible shaft.



15. Remove 4 fixing bolt (arrow) between shift control mechanism and body, then remove shift control mechanism.

Tightening torque

$20 \pm 3 \text{ N}\cdot\text{m}$



Installation

Warning / Caution / Hint:

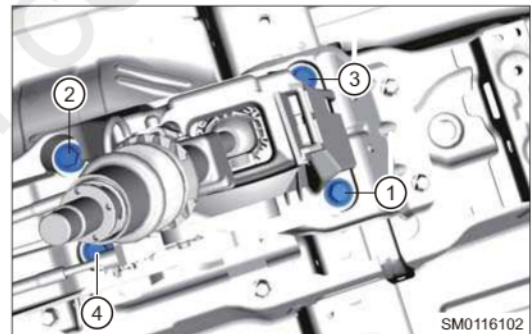
- Make sure that transmission is at 1st when installing select and shift cable.
 - Be sure to push out select cable connector adjusting block and keep it unlocked before and after assembling cable.
 - DO NOT install select and shift cable in reverse position during installation.
 - Red cable (shift cable) and green cable (select cable) must pass through the bottom of insulator cross recess.
 - Red cable (shift cable) crosses with green cable (select cable), and red cable (shift cable) is at lower position.
1. Secure shift control mechanism on body, and install and tighten 4 fixing bolts (1, 2, 3 and 4).

Tightening torque

$20 \pm 3 \text{ N}\cdot\text{m}$

Installation sequence

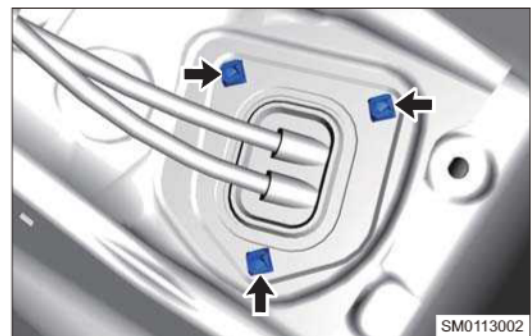
(1)-(2)-(3)-(4)



2. After raising vehicle to a proper height, pass select and shift cable through slot on body dash panel under auxiliary fascia console, and insert it into a proper position in vehicle from outside.
3. Install select and shift assembly plug, install and tighten 3 fixing bolts (arrow), and secure select and shift cable to body dash panel.

Specified torque

$9 \pm 1 \text{ N}\cdot\text{m}$



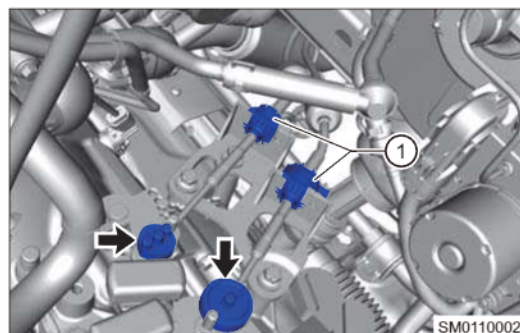
4. Install select and shift cable flexible shaft bracket and 3 fixing bolts.

5. Install select and shift cable to transmission assembly.

- (a) Install select and shift cable damper to flexible shaft bracket limit hole (1), then install select and shift cable connector to transmission swing arm and tighten it with lock pin (arrow).

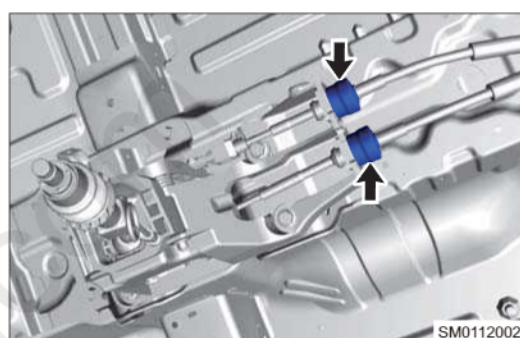
Caution:

- Be sure to clamp damper locating device into flexible shaft bracket locating hole when installing select and shift cable damper to flexible shaft bracket.
- White marks on both connectors face downward (face towards transmission) during installation.



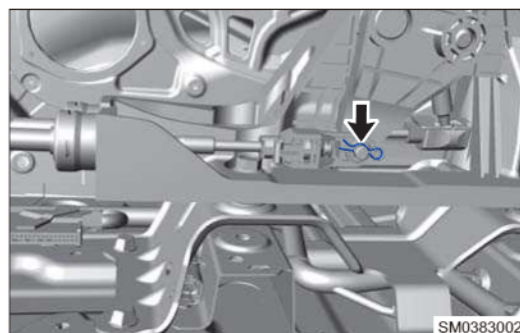
6. Install select and shift cable to shift control mechanism.

- (a) Respectively clamp select and shift cable dampers into corresponding slots (arrow) on shift control mechanism.



- (b) Push out select cable adjusting block and keep it unlocked.

- (c) Pull out select lock pin, drag select cable connector until select cable pin hole aligns with select arm pin shaft, assemble cable connector and mechanism pin shaft, then insert lock pin (arrow) into small hole of select arm.



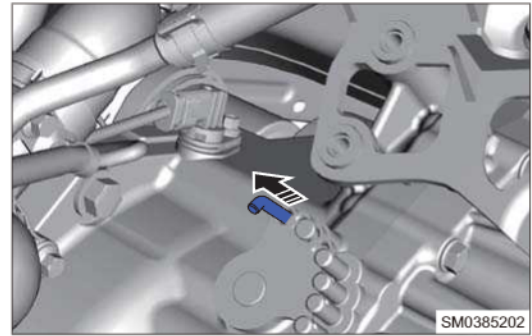
- (d) Push in and lock select cable adjusting block.



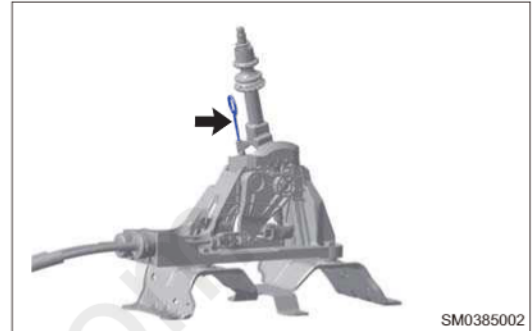
7. Remove the transmission 1st gear dowel pin (arrow).

Warning:

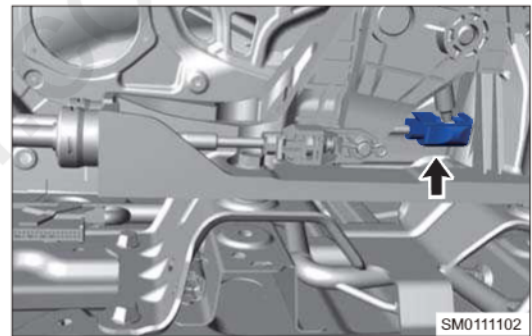
- 1st gear dowel pin is a metal pin (diameter: 5.95° - 0.07 mm), it can be ordered in service station and metal pin with same specification can be used.



8. Remove shift control mechanism 1st gear dowel pin (arrow), and shift the shift lever to neutral.



9. Connect shift cable connector and shift lever knob.



10. Install the battery tray (See page 16-15).
11. Install the air filter assembly (See page 10-8).
12. Install battery and connect battery cable.

Shift Lever and Boot Assembly

Removal

1. Remove the shift lever.
 - (a) Rotate shift lever knob counterclockwise until shift lever is removed.
2. Remove the shift lever boot assembly.
 - (a) Using an interior crow plate, separate shift lever boot assembly and auxiliary fascia console.
 - (b) Move shift lever boot assembly upward until it separates with shift control mechanism R gear slider, then remove shift lever boot assembly.

Installation

1. Cover boot assembly on conical surface of shift control mechanism lever, then clamp boot on auxiliary fascia console vertically.
2. Rotate shift lever knob clockwise along shift lever, face word on knob ball straight-ahead when rotating force becomes large obviously, then stop rotating.

Caution:

- Clamp boot assembly and auxiliary fascia console in place.
- Face word on shift lever knob straight-ahead.
- After assembling shift lever knob, be sure to raise the lever to maximum stroke, then release it, observe if lever interferences with knob internal surface, if it moves smoothly after repeating for 5 times, it is qualified.



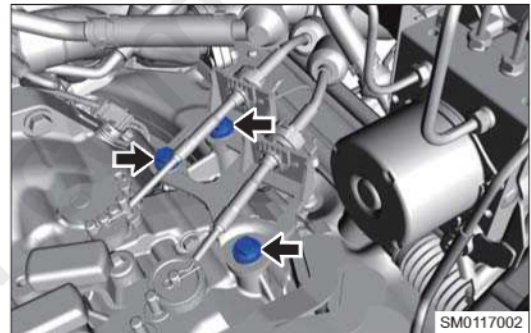
Transmission Assembly

Removal

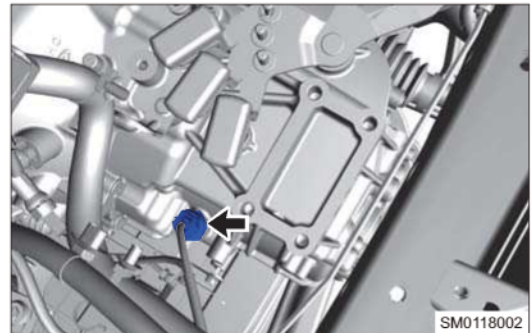
Warning / Caution / Hint:

Caution:

- Installation is in the reverse order of removal.
- 1. Turn off all electrical equipment and the ignition switch.
- 2. Disconnect the negative battery cable.
- 3. Remove the battery ([See page 16-12](#)).
- 4. Remove the air filter assembly ([See page 10-8](#)).
- 5. Remove the battery tray ([See page 16-15](#)).
- 6. Remove the engine lower protector ([See page 50-23](#)).
- 7. Remove front left and right tires ([See page 24-8](#)).
- 8. Drain the transmission oil ([See page 18-144](#)).
- 9. Remove ground wire above transmission case.
- 10. Remove 3 coupling bolts (arrow) between select and shift cable fixing bracket and transmission case.

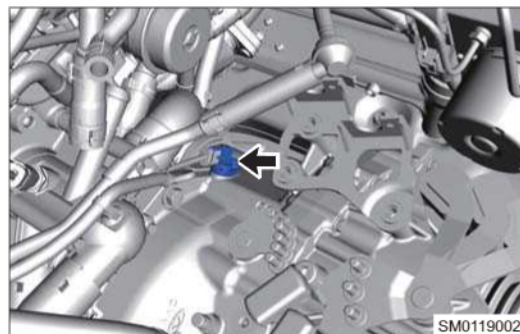


11. Disconnect the reverse switch connector (arrow).

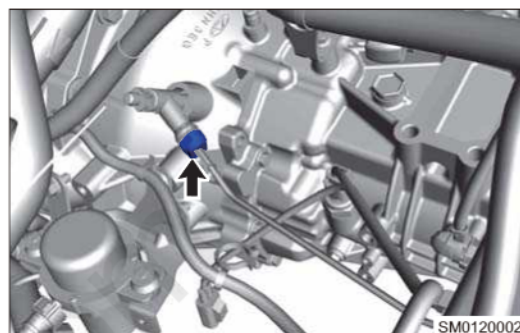


12. Remove the turbocharger intake pipe ([See page 11-10](#)).
13. Remove the vacuum pump.
14. Remove the starter ([See page 15-9](#)).
15. Remove the crankshaft position sensor.
 - (a) Disconnect the crankshaft position sensor connector.

- (b) Remove fixing bolt (arrow) and crankshaft position sensor.



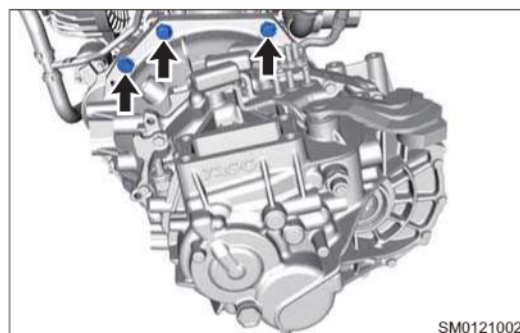
16. Using a tool, pry off clip (arrow) from clutch release bearing joint to separate clutch pipe and transmission.



17. Remove front left and right tires (See page 24-8).
 18. Remove the drive shaft (See page 20-5).
 19. Remove the left side rail welding assembly.
 20. Remove the rear mounting (See page 07-57).
 21. Use an engine equalizer to hang the engine.
 22. Remove the left mounting (See page 07-59).
 23. Remove the transmission.

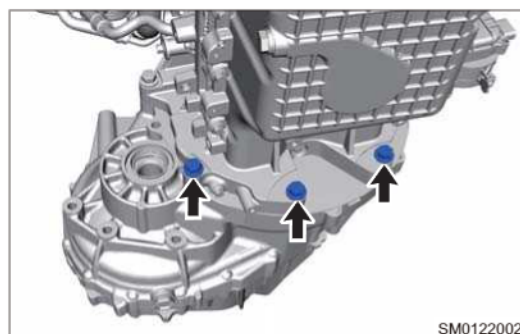
- (a) Remove 3 coupling bolts (arrow) from upper part of transmission.

Tightening torque
 $50 \pm 5 \text{ N}\cdot\text{m}$



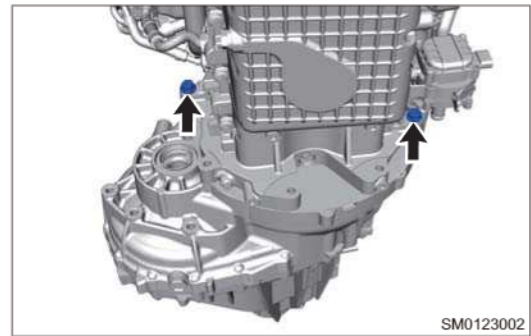
- (b) Raise vehicle and use a transmission carrier to support transmission assembly.
 (c) Remove 3 coupling bolts (arrow) from lower part of transmission, and remove sealing plate.

Tightening torque
 $60 \pm 5 \text{ N}\cdot\text{m}$



- (d) Remove 2 coupling bolts (arrow) between engine and transmission from both sides.

Tightening torque
 $60 \pm 5 \text{ N}\cdot\text{m}$



- (e) Pull transmission to separate it from engine.

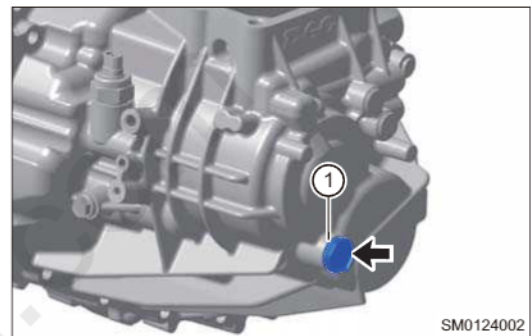
Disassembly

1. Remove the filler plug.

- (a) Remove filler plug (arrow) and plug washer (1) from transmission case.

Caution:

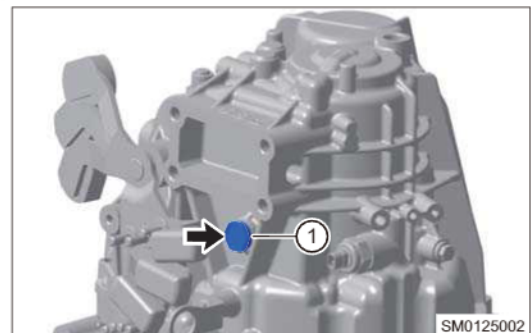
- Filler plug and plug washer are non-reusable components, and replace them after removal.



- (b) Remove limit plug (arrow) and plug washer (1) from transmission case.

Caution:

- Limit plug and plug washer are non-reusable components, and replace them after removal.



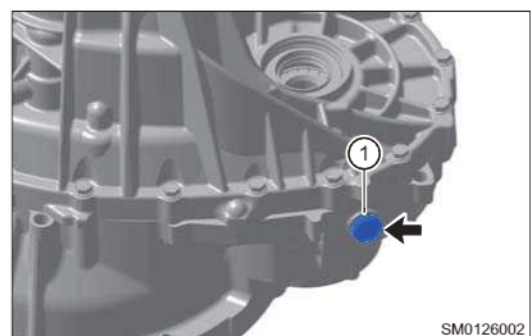
17

2. Remove the drain plug.

- (a) Remove drain plug (arrow) and plug washer (1) from clutch case.

Caution:

- Drain plug and plug washer are non-reusable components, and replace them after removal.

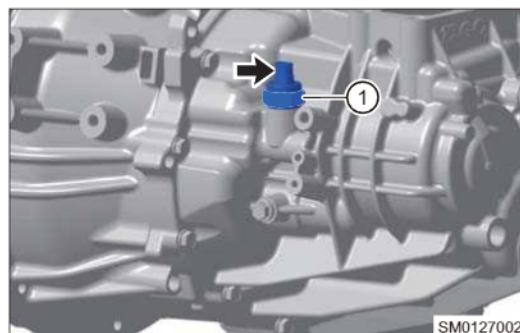


3. Remove the reverse switch.

- (a) Using a tool, remove reverse switch (arrow) and plug washer (1) from transmission case.

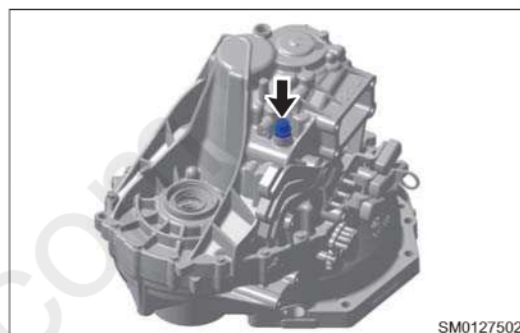
Caution:

- Reverse switch plug washer is a non-reusable component, and replace it after removal.



4. Remove the locating mechanism set.

- (a) Remove locating mechanism set (arrow) from transmission case.

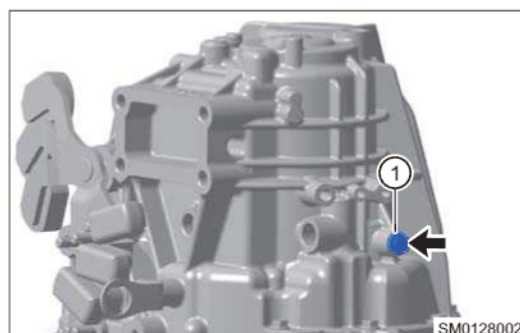


5. Remove the reverse idler gear shaft bolt.

- (a) Remove reverse idler gear shaft bolt (arrow) and bolt washer (1) from transmission case.

Caution:

- Reverse idler gear shaft bolt and bolt washer are non-reusable components, and replace them after removal.

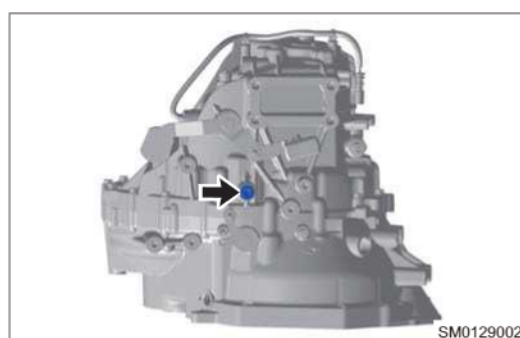


6. Remove the steel ball dowel pin.

- (a) Remove hexagon socket head plug (arrow) from transmission case.

Caution:

- Hexagon socket head plug is a non-reusable component, and replace it after removal.



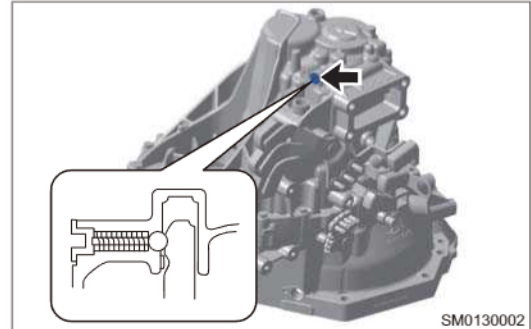
- (b) Remove spring and steel ball dowel pin from transmission case.

7. Remove the self-locking set.

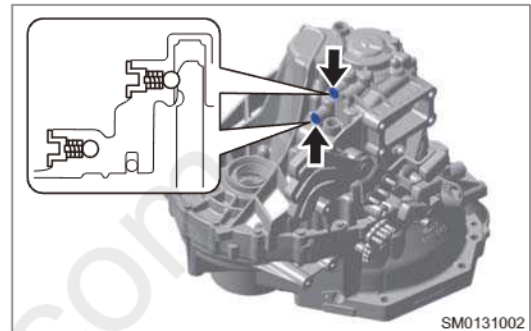
- (a) Remove self-locking plug (arrow) from transmission case.

Caution:

- Self-locking plug is a non-reusable component, and replace it after removal.



- (b) Remove self-locking spring and self-locking steel ball from transmission case.



8. Remove the outer shift lever E type retainer.

- (a) Remove E type retainer (arrow) from outer shift lever.

Caution:

- E type retainer is a non-reusable component, and replace it after removal.



9. Remove the transmission case.

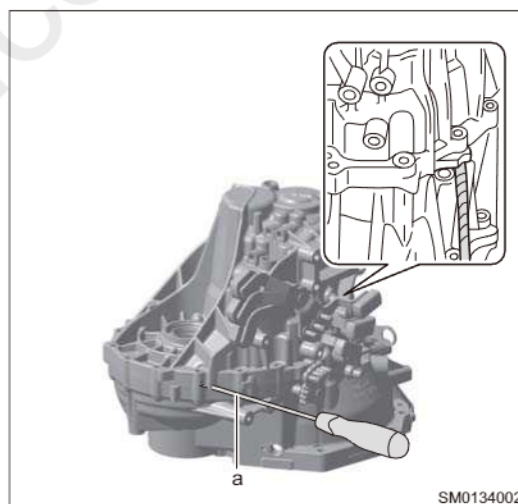
- (a) Remove 16 coupling bolts (arrow) from transmission case.



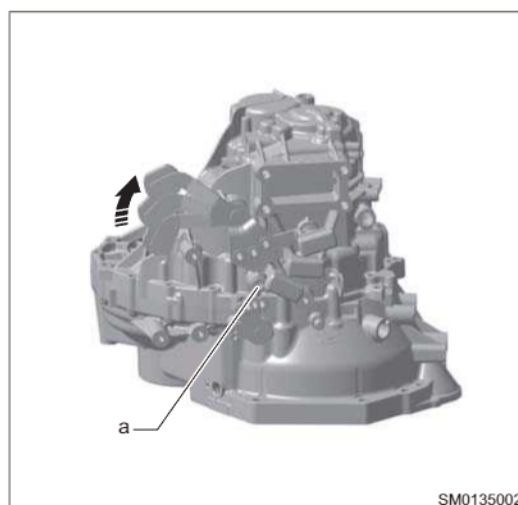
- (b) Using a screwdriver (a) wrapped with protective tape, separate transmission case.

Warning:

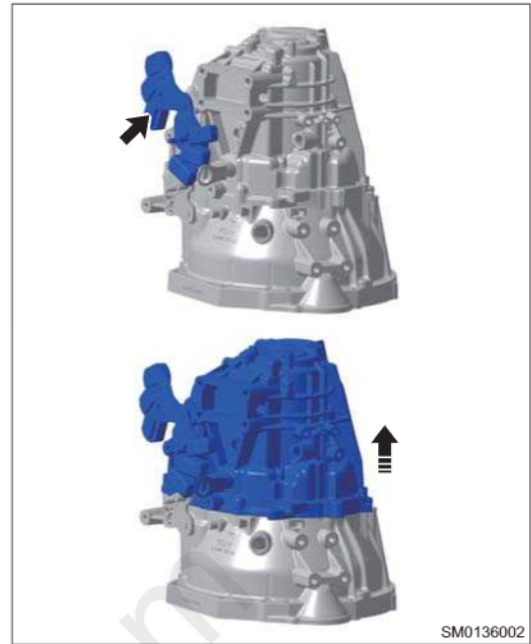
- DO NOT damage transmission case and clutch case.



- (c) Rotate outer shift lever clockwise until it contacts with boss (a).

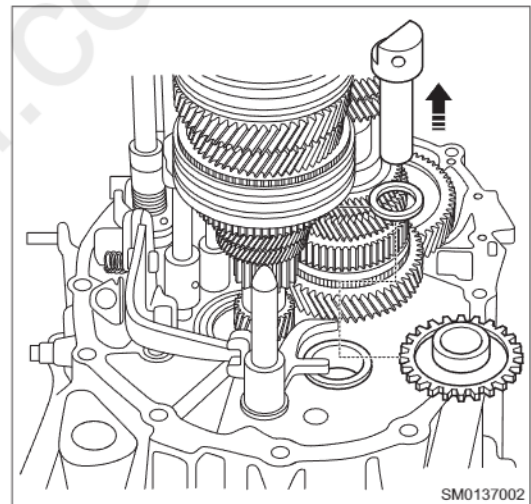


- (d) Push outer shift lever and remove transmission case.



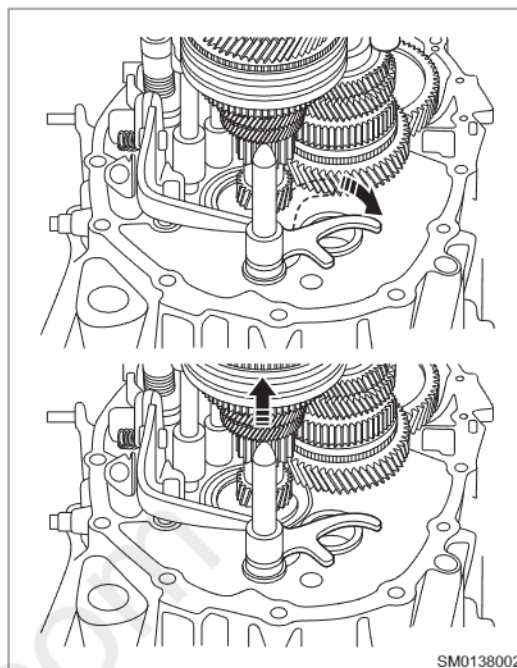
10. Remove the reverse idler gear set.

- (a) Remove reverse idler gear set, idler gear thrust washer and reverse idler gear shaft from clutch case.



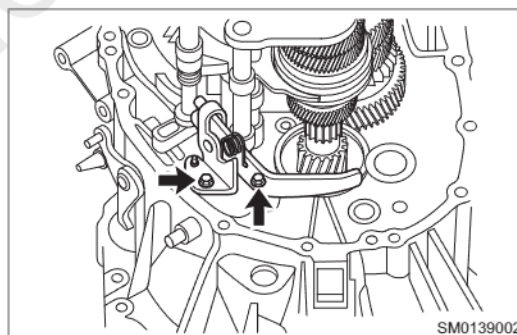
11. Remove the reverse gear fork set.

- (a) Rotate reverse gear fork set clockwise and remove it from clutch case.



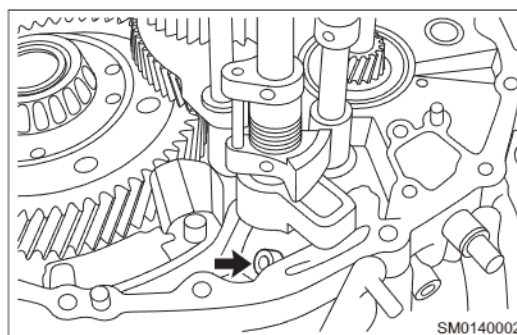
12. Remove the reverse gear arm bracket set.

- (a) Remove 2 bolts (arrow) and reverse gear arm bracket set from clutch case.



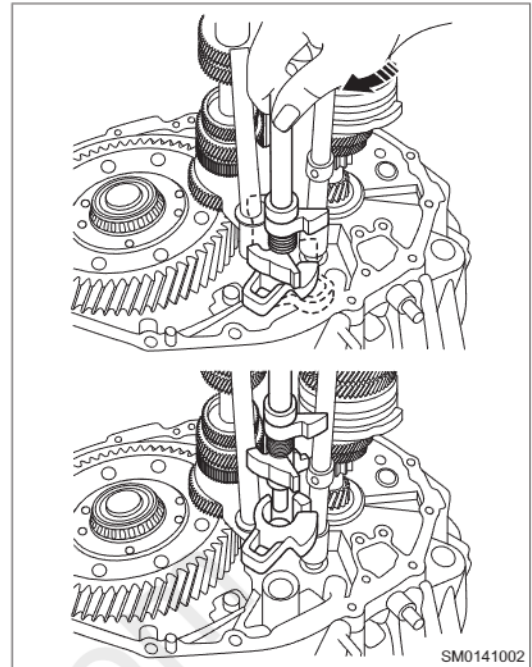
13. Remove the select and shift shaft assembly.

- (a) Using a hexagon wrench, remove inner select lever fixing bolt (arrow).



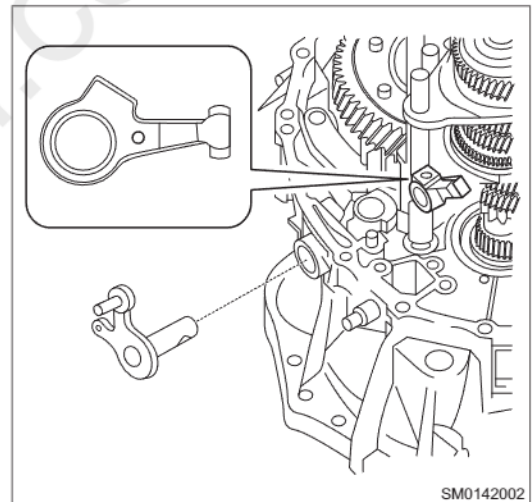
- (b) Rotate select and shift shaft sub-assembly clockwise and remove it from clutch case.

- (c) Remove lock plate from clutch case.



14. Remove the outer select lever.

- (a) Remove outer select lever and inner select lever from clutch case.

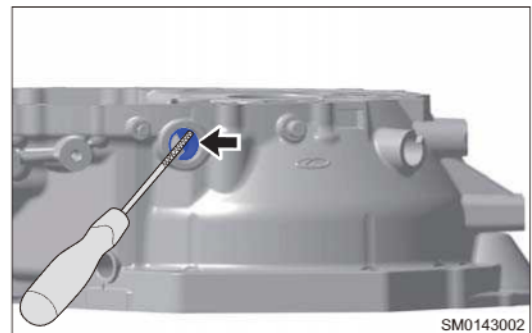


15. Remove the outer select lever oil seal.

- (a) Using a screwdriver wrapped with protective tape, remove outer select lever oil seal (arrow) from clutch case.

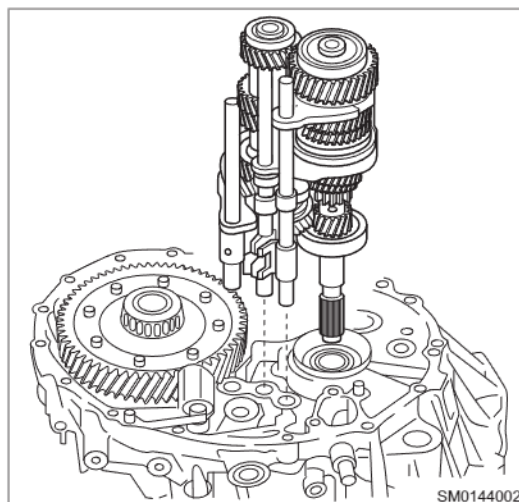
Warning:

- DO NOT damage the installation surface.
- Outer select lever oil seal is a non-reusable component, and replace it after removal.



16. Remove the shaft set.

- (a) Remove input shaft sub-assembly, output shaft sub-assembly, No.1 fork shaft sub-assembly, No.2 fork shaft sub-assembly and No.3 fork shaft sub-assembly from clutch case.



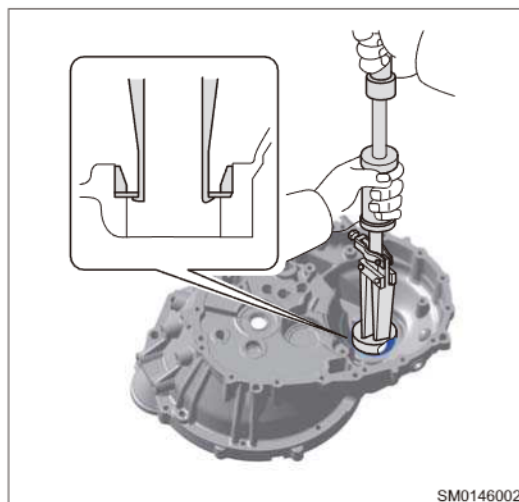
17. Remove the differential sub-assembly.

- (a) Remove differential sub-assembly (arrow) from clutch case.

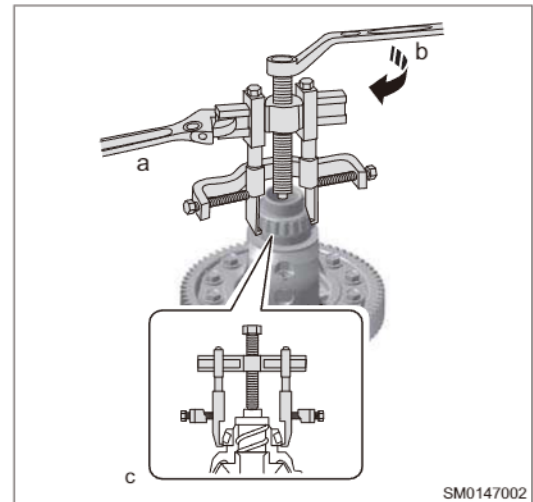


18. Remove the differential right bearing outer race.

- (a) Using a special tool, remove differential right bearing outer race and oil seal deflector from clutch case.

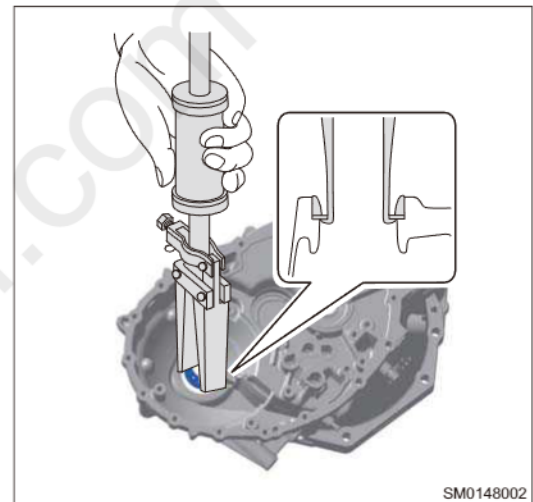


- (b) Install special tools, hold (a) and rotate (b), to remove right bearing inner race from differential sub-assembly.

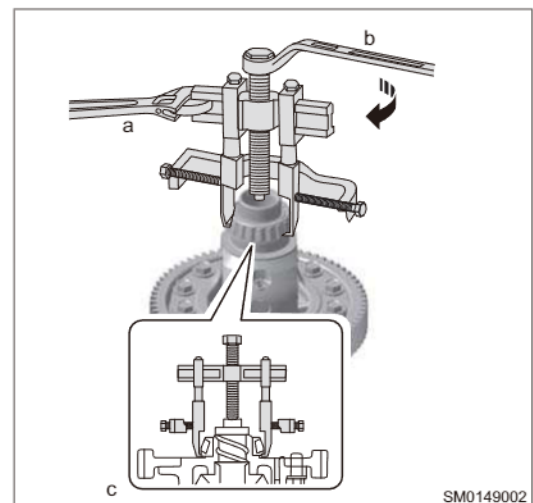


19. Remove the differential left bearing outer race.

- (a) Using a special tool, remove differential left bearing outer race and adjusting shim from clutch case.

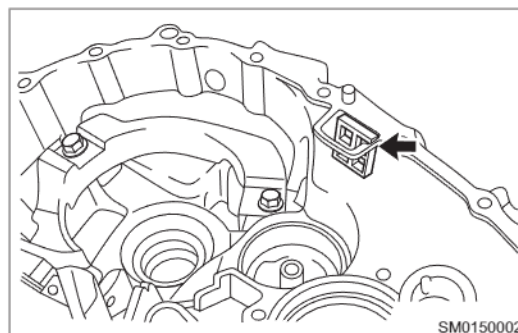


- (b) Using special tools, hold (a) and rotate (b), to remove left bearing inner race from differential sub-assembly.



20. Remove the transmission magnet.

- (a) Remove magnet (arrow) from clutch case.

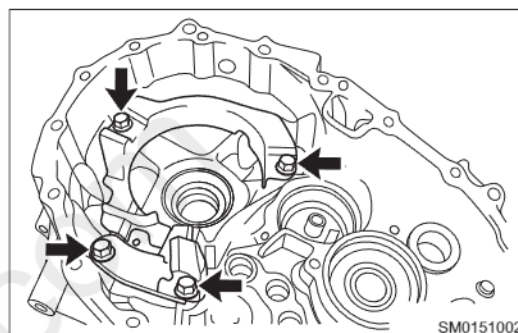


21. Remove oil separator from clutch case.

- (a) Remove 4 bolts (arrow) and oil separator from clutch case.

Caution:

- 4 oil separator fixing bolts are non-reusable components, and replace them after removal.

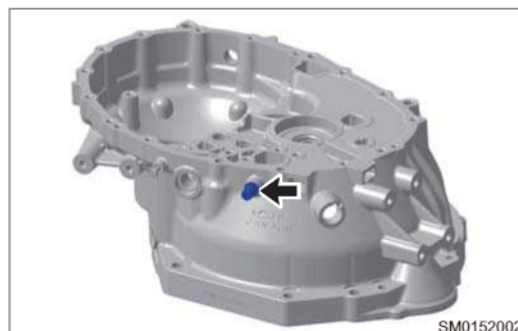


22. Remove the breather plug.

- (a) Remove breather plug (arrow) from clutch case.

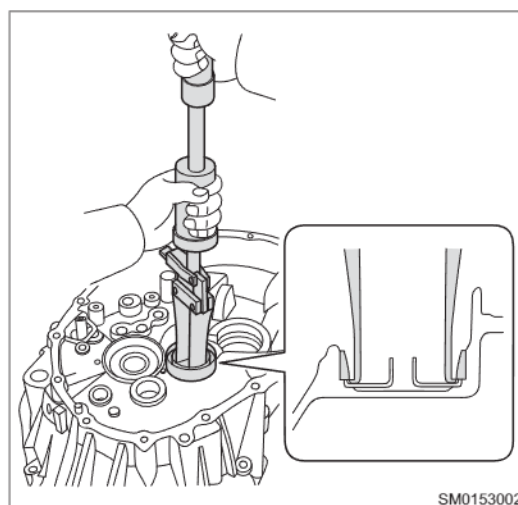
Caution:

- Breather plug is a non-reusable component, and replace it after removal.

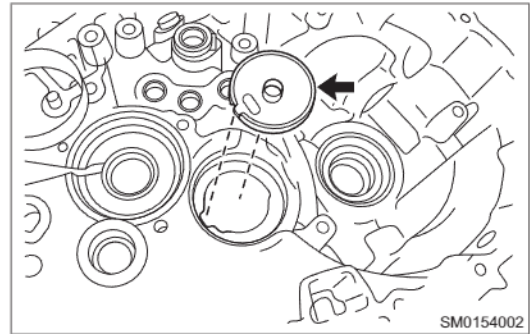


23. Remove the output shaft front bearing outer race.

- (a) Using a special tool, remove output shaft front bearing outer race from clutch case.



- (b) Remove output shaft oil guide nozzle (arrow) from clutch case.

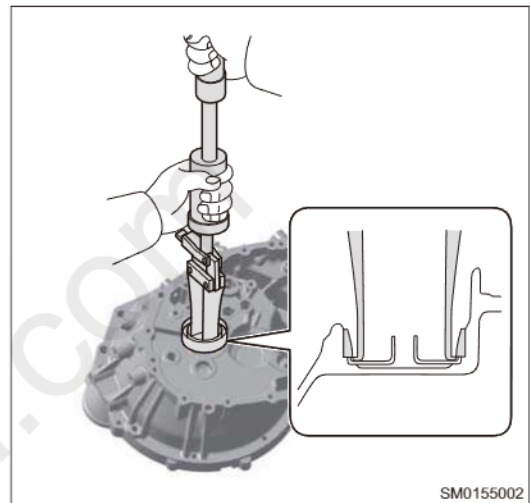


24. Remove the input shaft oil seal.

- (a) Using special tool and hammer, remove input shaft oil seal from clutch case.

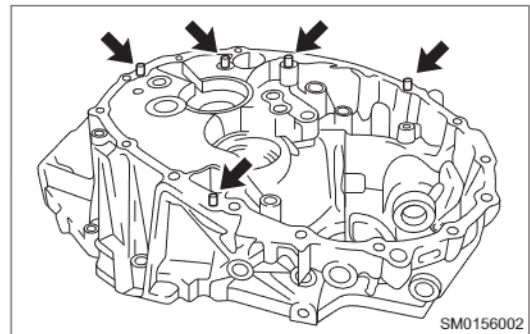
Caution:

- Input shaft oil seal is a non-reusable component, and replace it after removal.



25. Remove the dowel pin.

- (a) Remove 5 dowel pins (arrow) from clutch case.

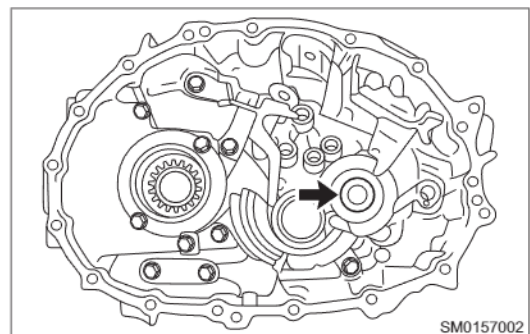


26. Remove the input shaft adjusting shim.

- (a) Remove input shaft adjusting shim (arrow) from transmission case.

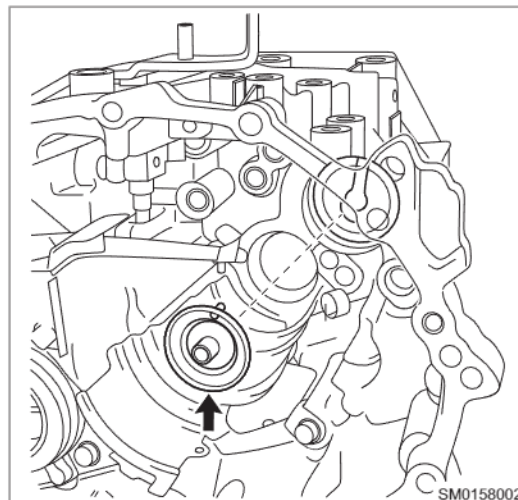
Caution:

- Adjusting shim is a non-reusable component, and replace it after removal.



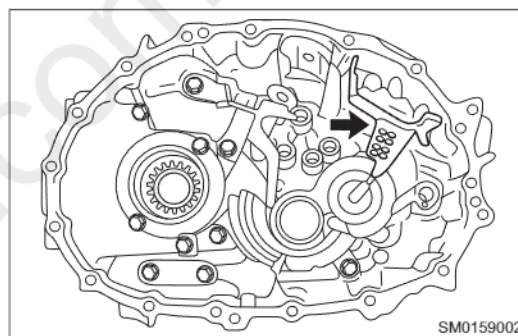
27. Remove the input shaft oil guide nozzle.

- (a) Remove input shaft oil guide nozzle (arrow) from transmission case.



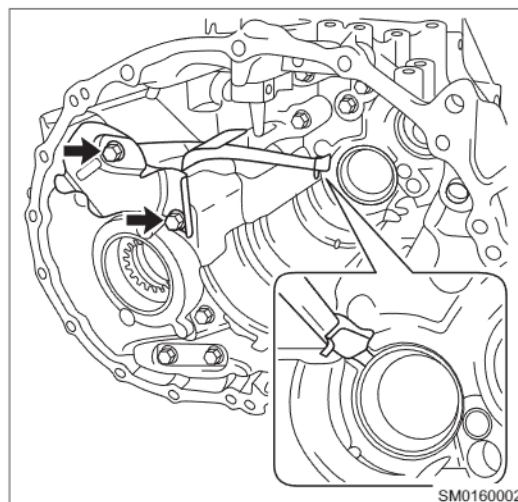
28. Remove the oil guide.

- (a) Remove oil guide (arrow) from transmission case.



29. Remove the oil separator.

- (a) Remove 2 bolts (arrow) and oil separator from transmission case.

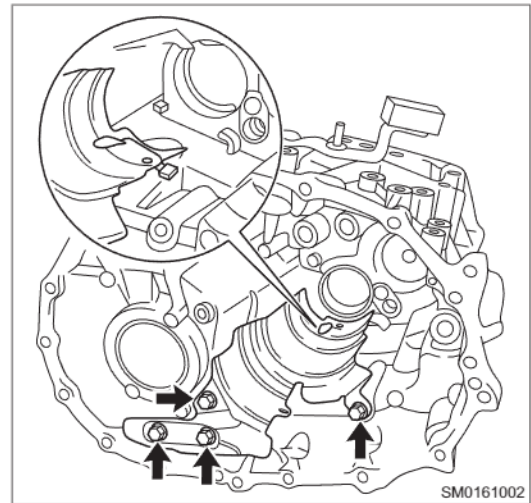


30. Remove the oil separator set.

- (a) Remove 4 bolts (arrow) and oil separator set from transmission case.

Caution:

- 4 oil separator fixing bolts are non-reusable components, and replace them after removal.

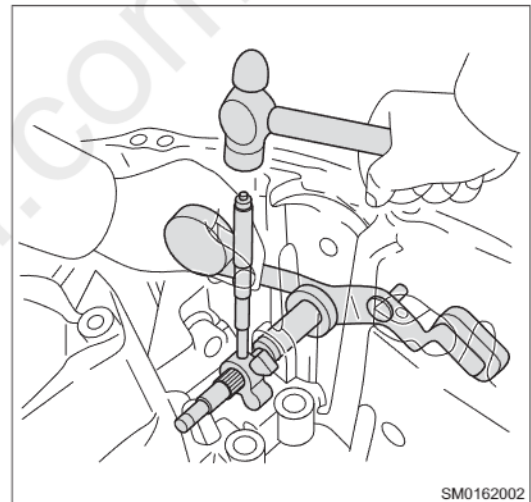


31. Remove the outer shift lever.

- (a) Using 5 mm pin punch and hammer, remove elastic cylindrical pin from shift guide block.

Warning:

- Elastic cylindrical pin should be aligned with installation hole of locating mechanism set when removing elastic cylindrical pin.
- Elastic cylindrical pin is a non-reusable component, and replace it after removal.



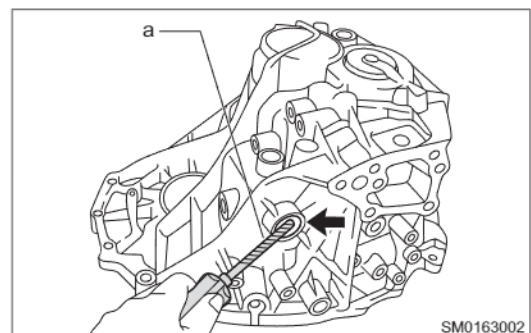
- (b) Remove shift guide block, spacer and outer shift lever from transmission case.

32. Remove the outer shift lever oil seal.

- (a) Using a screwdriver (a) wrapped with protective tape, remove outer shift lever oil seal (arrow) from transmission case.

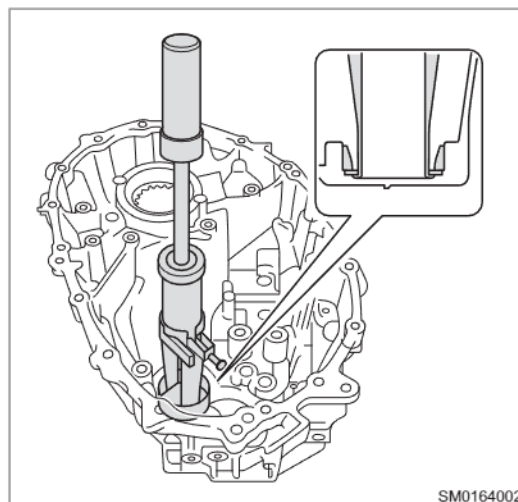
Warning:

- DO NOT damage the installation surface.
- Outer shift lever oil seal is a non-reusable component, and replace it after removal.



33. Remove the output shaft rear bearing outer race.

- (a) Using a special tool, remove output shaft rear bearing outer race and adjusting shim from transmission case.

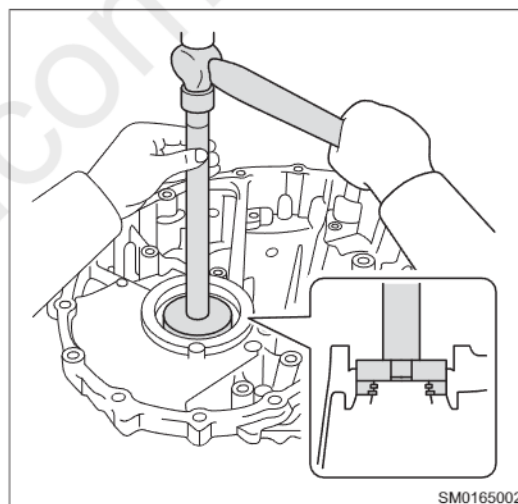


34. Remove the differential oil seal (left).

- (a) Using special tool and hammer, remove differential oil seal from transmission case.

Caution:

- Differential oil seal is a non-reusable component, and replace it after removal.

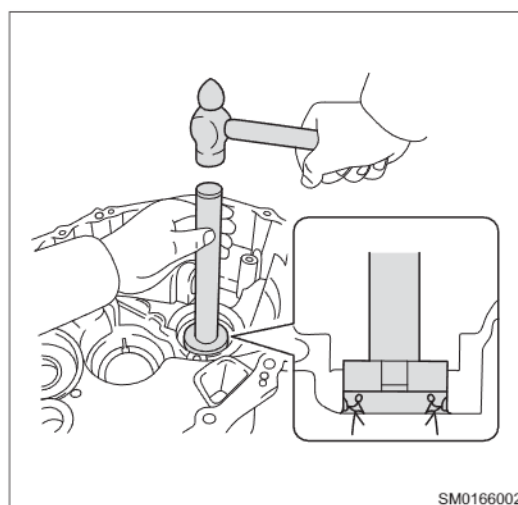


35. Remove the differential oil seal (right).

- (a) Using special tool and hammer, remove differential oil seal from transmission case.

Caution:

- Differential oil seal is a non-reusable component, and replace it after removal.



Reverse Idler Gear Set Inspection

- Using a feeler gauge, check reverse idler gear set.

Standard inner diameter

25.056 - 25.074 mm

Maximum inner diameter

25.074 mm

If inner diameter is more than maximum value, replace reverse idler gear set.

- Using a micrometer, check reverse idler gear shaft.

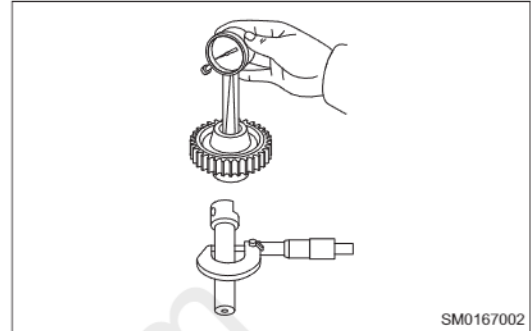
Standard outer diameter

24.984 - 25.000 mm

Minimum outer diameter

24.984 mm

If outer diameter is less than minimum value, replace reverse idler gear shaft.



SM0167002

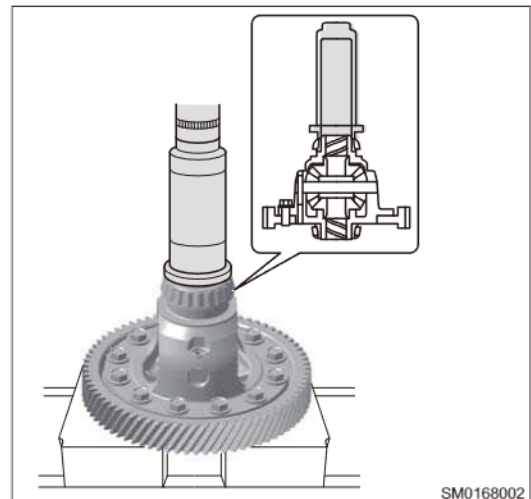
Assembly

Warning / Caution / Hint:

Caution:

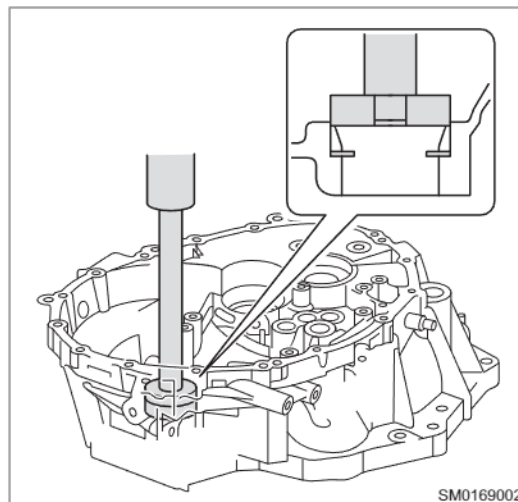
- Before assembling components, wash them clean.
 - Remove seal gum residues from cases.
 - Make sure that joint surface of cases is clean and free of oil, then uniformly apply seal gum.
 - Make sure joint surface of case and shift assembly is clean and free of oil, then uniformly apply seal gum.
 - Tighten bolts to specified torque.
- Install the differential right bearing inner race.

- Using special tool and press, install new differential right bearing inner race to differential sub-assembly.



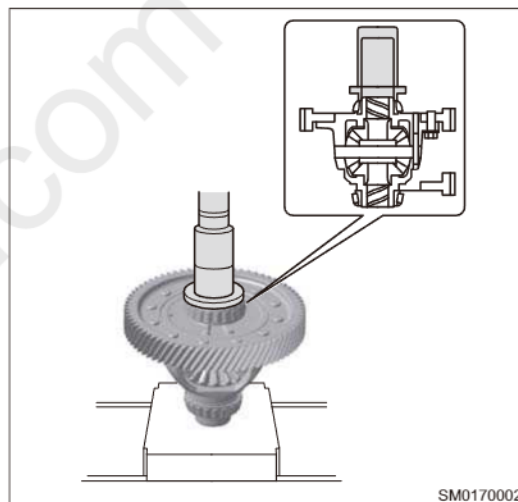
SM0168002

- (b) Using special tool and press, install oil seal deflector together with differential right bearing outer race to clutch case.

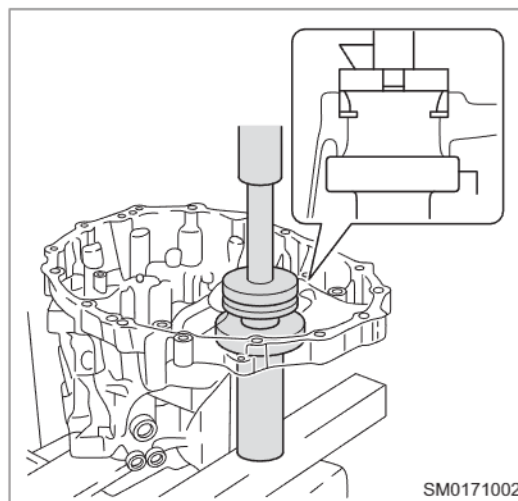


2. Install the differential left bearing inner race.

- (a) Using special tool and press, install new differential left bearing inner race to differential sub-assembly.



- (b) Using special tool and press, install adjusting shim together with differential left bearing outer race to clutch case.



3. Adjust the differential bearing preload.

- (a) Apply gear oil to differential sub-assembly (arrow) and install it to clutch case.



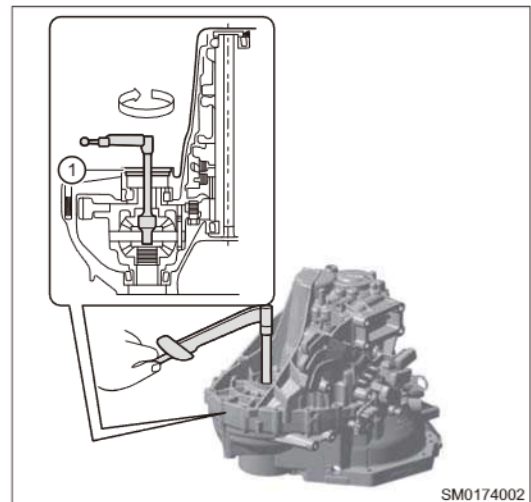
- (b) Install transmission case with 16 bolts (arrow).

Tightening torque

$29.4 \pm 5.9 \text{ N}\cdot\text{m}$



- (c) Using special tool and torque wrench, rotate differential sub-assembly clockwise and counterclockwise for 2 to 3 times to seat the bearing.



- (d) Using special tool and torque wrench, measure preload.

Preload for new bearing

0.98 - 1.69 N·m

Preload for used bearing

0.795 ± 1.372 N·m

If preload is not as specified, replace adjusting shim with different thickness which can make preload within specified range.

Mark	Thickness (mm)	Mark	Thickness (mm)
10	2.100	26	2.500
11	2.125	27	2.525
12	2.150	28	2.550
13	2.175	29	2.575
14	2.200	30	2.600
15	2.225	31	2.625
16	2.250	32	2.650
17	2.275	33	2.675
18	2.300	34	2.700
19	2.325	35	2.725
20	2.350	36	2.750
21	2.375	37	2.775
22	2.400	38	2.800
23	2.425	39	2.825
24	2.450		

Warning:

- Select thicker adjusting shim to add preload, and select thinner adjusting shim to reduce preload.
- Make a record, since torque value is needed when adjusting output shaft bearing preload.

- (e) Remove 16 coupling bolts from transmission and separate transmission case.

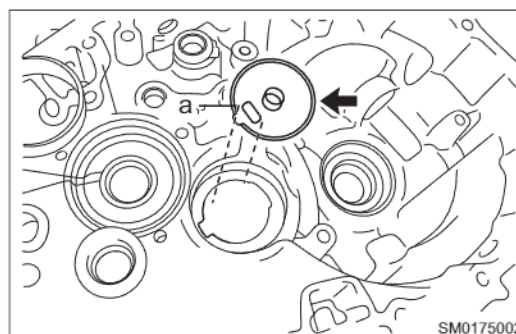
- (f) Remove differential sub-assembly from clutch case.

4. Install the output shaft front bearing outer race.

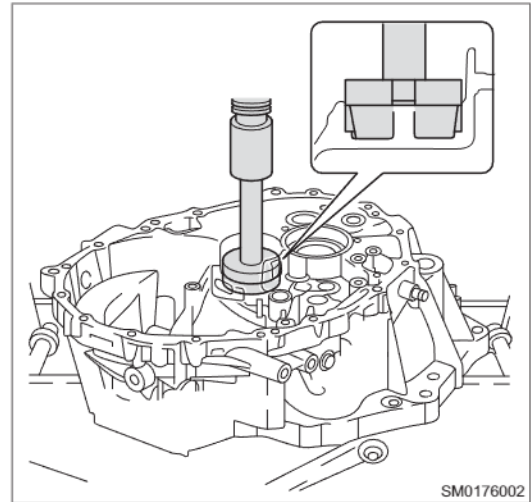
- (a) Install output shaft oil guide nozzle (arrow) to clutch case.

Caution:

- Align output shaft oil guide nozzle boss (a) with groove on clutch case.

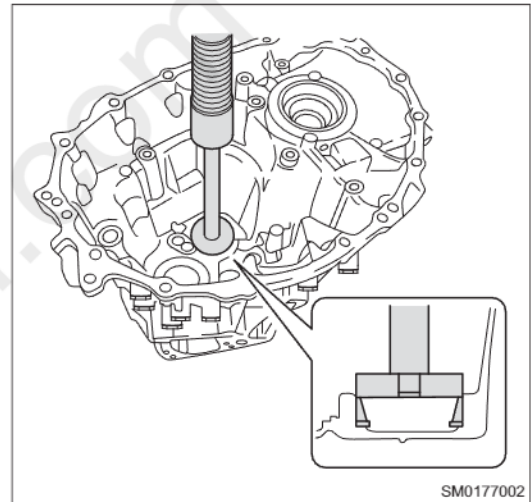


- (b) Using special tool and press, install new output shaft front bearing outer race to clutch case.



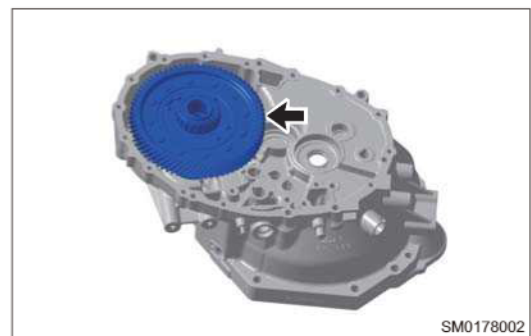
5. Install the output shaft rear bearing outer race.

- (a) Using special tool and press, install adjusting shim and new output shaft rear bearing outer race to transmission case.

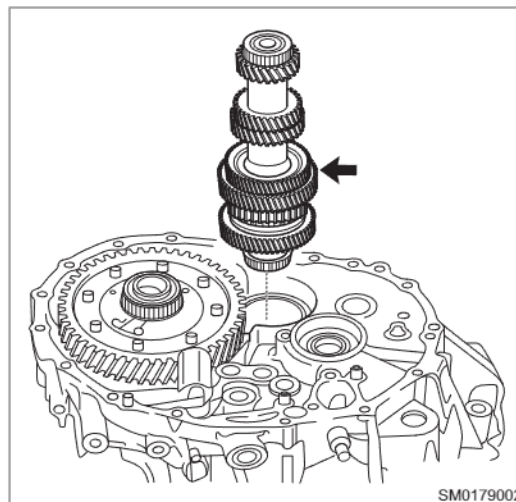


6. Adjust the output shaft bearing preload.

- (a) Apply gear oil to differential case (arrow) and install it to clutch case.



- (b) Apply gear oil to output shaft sub-assembly (arrow) and install it to clutch case.

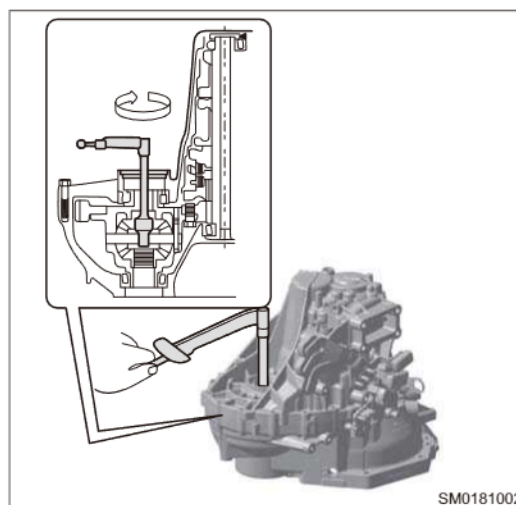


- (c) Install transmission case with 16 bolts (arrow).

Specified torque
 $29.4 \pm 5.9 \text{ N}\cdot\text{m}$



- (d) Using special tool and torque wrench, rotate differential sub-assembly clockwise and counterclockwise for 2 to 3 times to seat the bearing.



- (e) Using special tool and torque wrench, measure preload.

Preload for new bearing

0.98 - 1.69 N·m

Preload for used bearing

0.795 ± 1.372 N·m

If preload is not as specified, replace adjusting shim with different thickness which can make preload within specified range.

Mark	Thickness (mm)	Mark	Thickness (mm)
50	1.750	72	2.300
51	1.775	73	2.325
52	1.800	74	2.350
53	1.825	75	2.375
54	1.850	76	2.400
55	1.875	77	2.425
56	1.900	78	2.450
57	1.925	79	2.475
58	1.950	80	2.500
59	1.975	81	2.525
60	2.000	82	2.550
61	2.025	83	2.575
62	2.050	84	2.600
63	2.075	85	2.625
64	2.100	86	2.650
65	2.125	87	2.675
66	2.150	88	2.700
67	2.175	89	2.725
68	2.200	90	2.750
69	2.225	91	2.775
70	2.250		

Caution:

- Select thicker adjusting shim to add preload, and select thinner adjusting shim to reduce preload.

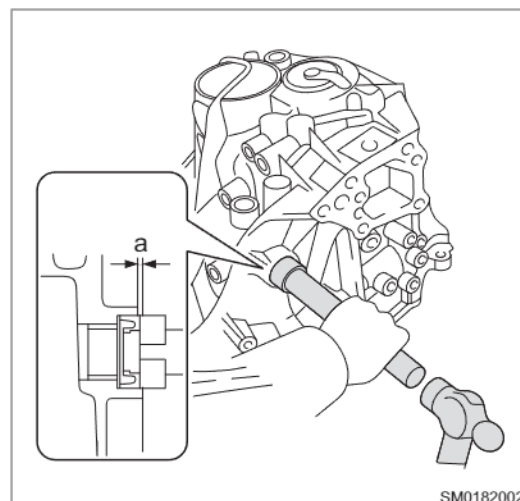
7. Install the outer shift lever oil seal.

- (a) Using special tool and hammer, install new outer shift lever oil seal to transmission case.

Standard depth

0.5 - 1.0 mm

- (b) Apply MP grease to outer shift lever oil seal lip.



SM0182002

8. Install the outer shift lever.

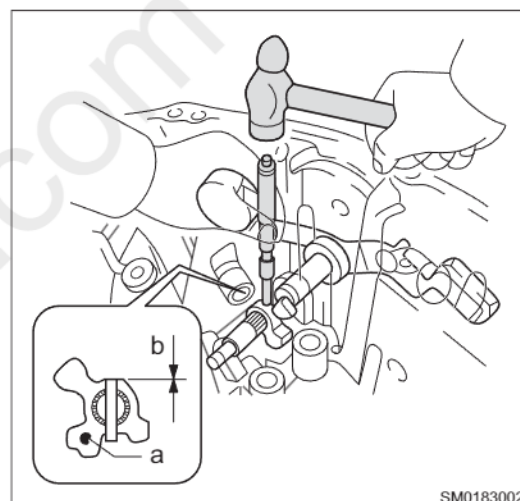
- (a) Install shift guide block, spacer and outer shift lever to transmission case, and secure them with elastic cylindrical pin.

Standard depth

- 0.5 - 0.5 mm

Caution:

- Install shift guide block with its mark face outside of transmission case.



SM0183002

- (b) Using 5 mm pin punch and hammer, secure shift guide block and outer shift lever with elastic cylindrical pin.

9. Install the oil separator set.

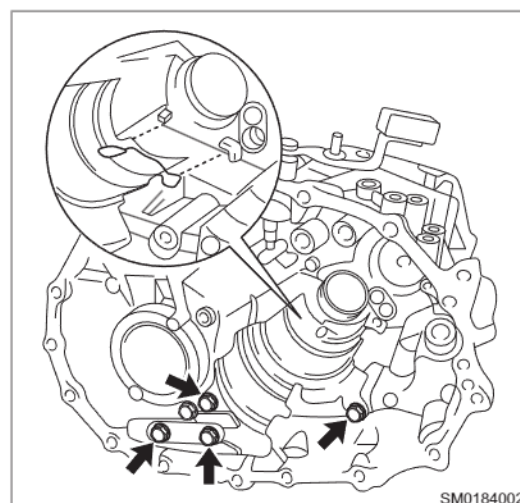
- (a) Install oil separator set to transmission case, then install 4 fixing bolts (arrow).

Specified torque

$17 \pm 6.8 \text{ N}\cdot\text{m}$

Warning:

- Make sure that sealing plug on end of oil separator set is inserted into groove on transmission case.
- 4 oil separator fixing bolts are non-reusable components, and replace them after removal.



SM0184002

10. Install the oil separator.

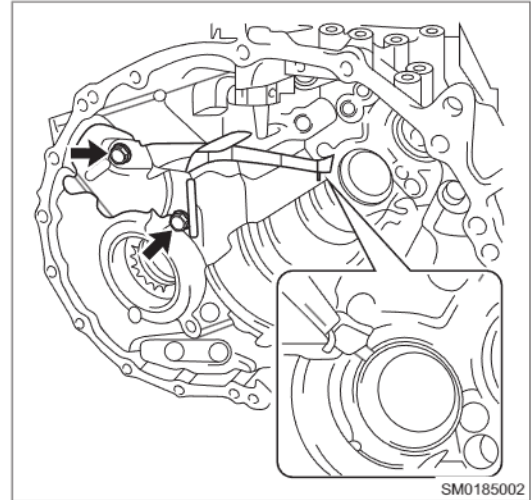
- (a) Install oil separator set to transmission case, then install 2 fixing bolts (arrow).

Specified torque

$17 \pm 6.8 \text{ N}\cdot\text{m}$

Warning:

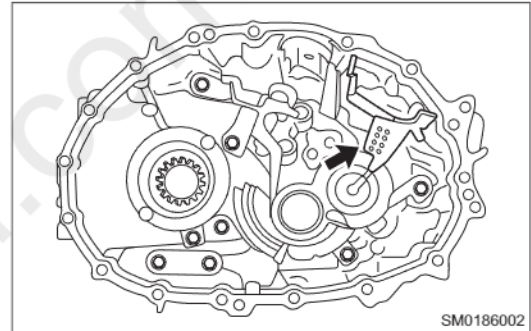
- Make sure that sealing plug on end of oil separator set is inserted into groove on transmission case.
- 2 oil separator fixing bolts are non-reusable components, and replace them after removal.



SM0185002

11. Install the oil guide.

- (a) Install oil guide (arrow) to transmission case.



SM0186002

12. Install the dowel pin.

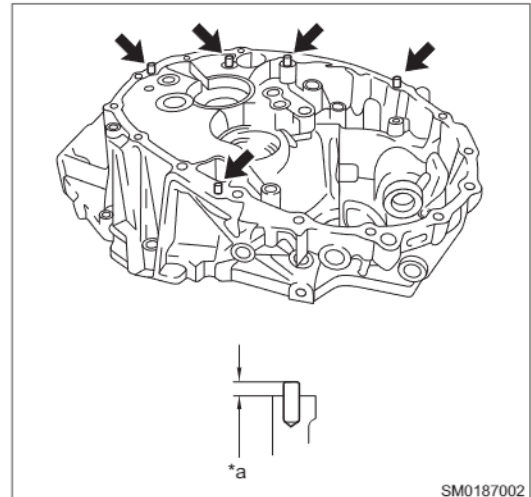
- (a) Using a rubber hammer, install 5 new dowel pins (arrow) to clutch case until it reaches specified protrusion height.

Protrusion height

8.5 - 9.5 mm

Warning:

- Cylindrical pin is a non-reusable component, and replace it after removal.



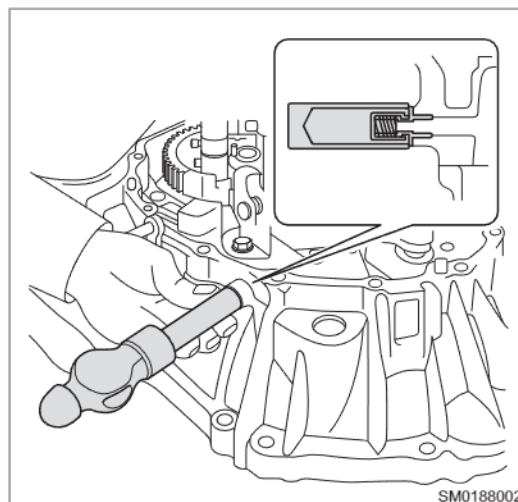
SM0187002

13. Install the breather plug.

- (a) Using special tool and hammer, install breather plug to clutch case.

Warning:

- Breather plug is a non-reusable component, and replace it after removal.



14. Install the oil separator.

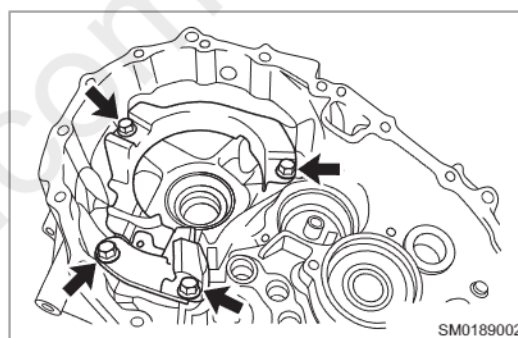
- (a) Install oil separator to clutch case and secure it with 4 fixing bolts.

Specified torque

$17 \pm 6.8 \text{ N}\cdot\text{m}$

Warning:

- 4 oil separator fixing bolts are non-reusable components, and replace them after removal.



15. Install the input shaft oil seal.

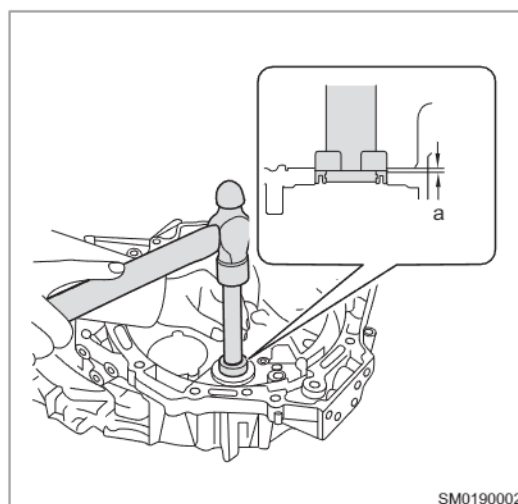
- (a) Apply MP grease to input shaft oil seal lip.
(b) Using special tool and hammer, install new input shaft oil seal to clutch case.

Standard depth

1.0 - 2.0 mm

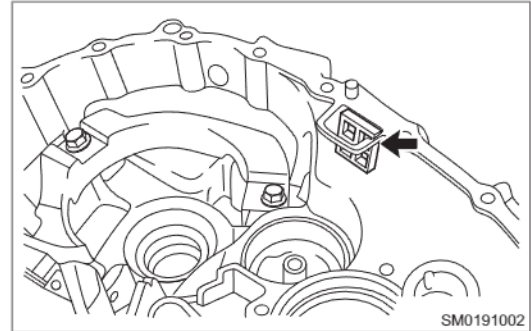
Warning:

- Input shaft oil seal is a non-reusable component, and replace it after removal.



16. Install the magnet.

- (a) Clean magnet (arrow) and install it to clutch case.

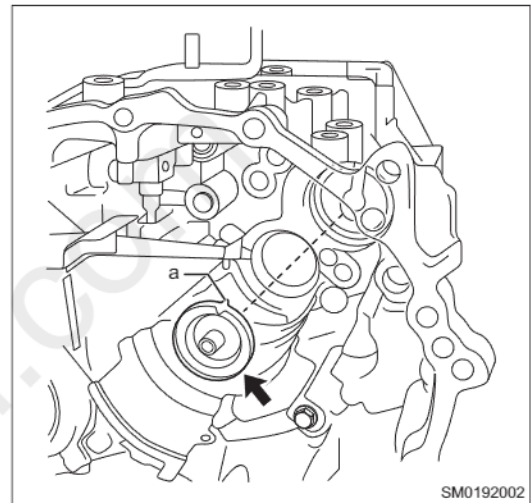


17. Install the input shaft oil guide nozzle.

- (a) Install input shaft oil guide nozzle (arrow) to transmission case.

Caution:

- Insert boss of input shaft oil guide nozzle into groove on transmission case.

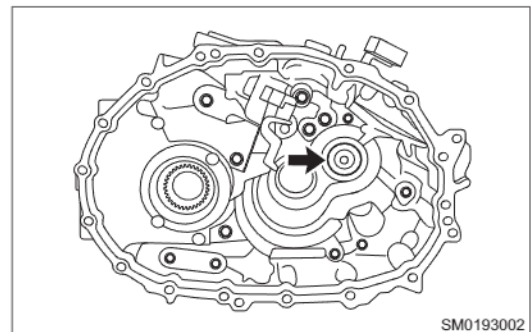


18. Install the adjusting shim.

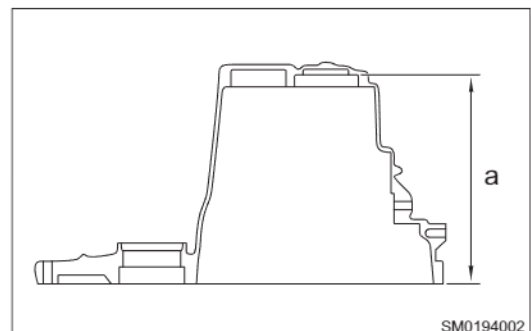
- (a) Install adjusting shim (arrow) to transmission case.

Caution:

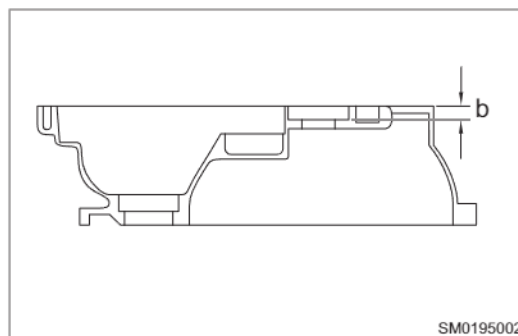
- Apply MP grease to adjusting shim to prevent it dropping from transmission case during reassembly.
- Adjusting shim is a non-reusable component, and replace it after removal.
- Select adjusting shim with proper thickness.



- (b) Measure distance (dimension a) between transmission case joint surface and adjusting shim installation surface.



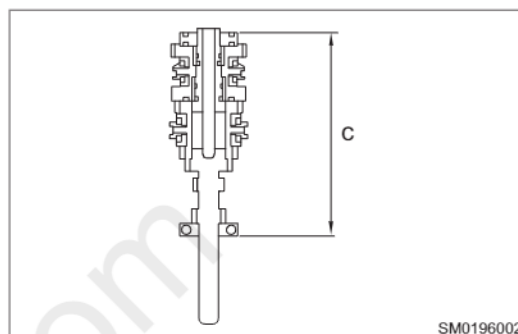
- (c) Measure distance (dimension b) between clutch case joint surface and input shaft right bearing installation surface.



- (d) Measure distance (dimension c) between two input shaft bearings.

Caution:

- Measure dimension c when there is no axial clearance for each bearing.



- (e) Calculate thickness value of adjusting shim with following formula, select adjusting shim which can make preload within specified range.

Formula

(Dimension a + dimension b) - Dimension c - Adjusting shim thickness = 0.02 - 0.14 mm

Adjusting Shim Selection

Mark	Thickness (mm)	Mark	Thickness (mm)
08	1.30	14	1.60
09	1.35	15	1.62
10	1.40	16	1.70
11	1.45	17	1.75
12	1.50	18	1.80

If preload is not as specified, replace adjusting shim with different thickness.

- (f) Apply MP grease to adjusting shim and install it to transmission case.

Caution:

- DO NOT apply MP grease to oil groove.
- Clean adjusting shim before assembly.

19. Install the outer select lever oil seal.

- (a) Apply MP grease to outer select lever oil seal lip.



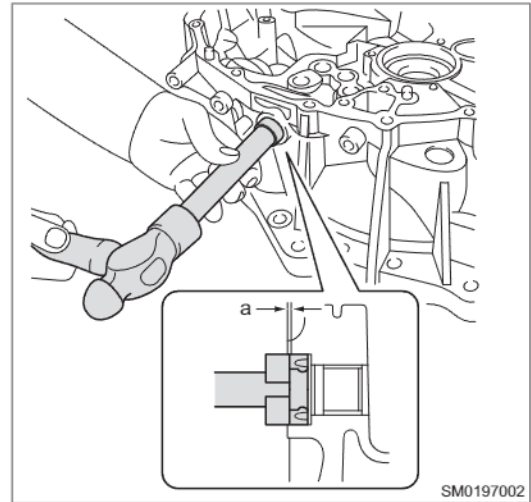
- (b) Using special tool and hammer, install new outer select lever oil seal to clutch case.

Standard depth

0.5 - 1.0 mm

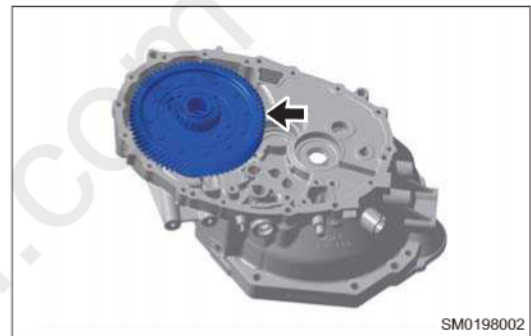
Warning:

- Outer select lever oil seal is a non-reusable component, and replace it after removal.



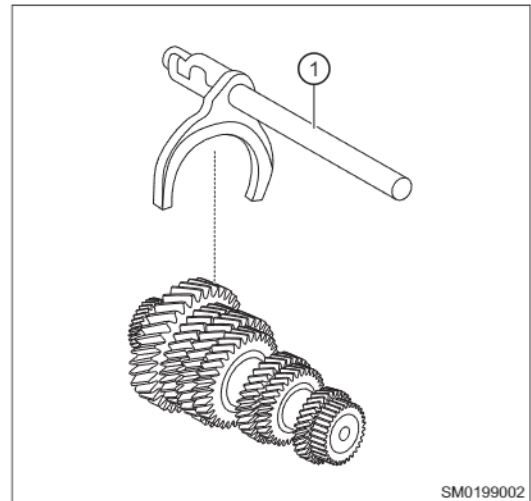
20. Install the differential sub-assembly.

- (a) Apply gear oil to differential case (arrow) and install it to clutch case.

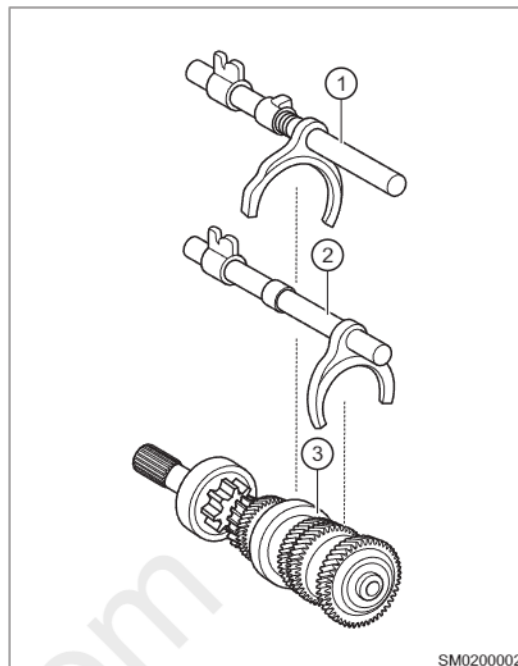


21. Install shaft set and fork shaft.

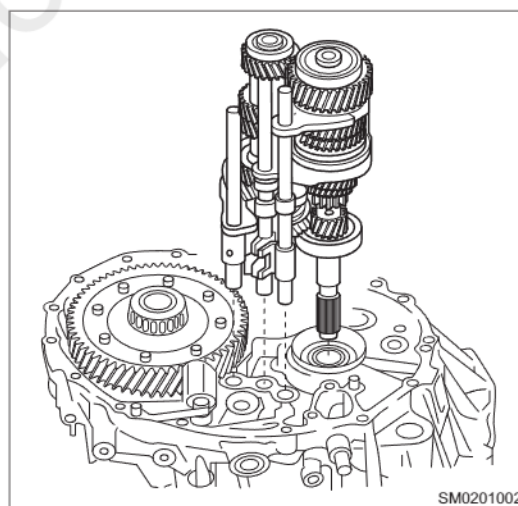
- (a) Apply gear oil to all sliding and rotating parts.
(b) Apply gear oil to No.1 fork shaft sub-assembly and install it to output shaft sub-assembly.



- (c) Apply gear oil to No.2 fork shaft sub-assembly (1) and No.3 fork shaft sub-assembly (2), then install them to output shaft sub-assembly (3).



- (d) Temporarily install output shaft sub-assembly, input shaft sub-assembly, No.1 fork shaft sub-assembly, No.2 fork shaft sub-assembly and No.3 fork shaft sub-assembly.
- (e) Install output shaft sub-assembly, input shaft sub-assembly, No.1 fork shaft sub-assembly, No.2 fork shaft sub-assembly and No.3 fork shaft sub-assembly to clutch case.

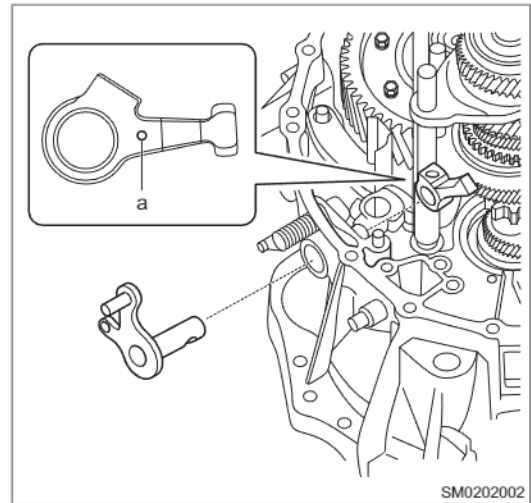


22. Install the outer select lever.

- (a) Install outer select lever and inner select lever to clutch case.

Caution:

- Install inner select lever with its mark face outside of clutch case.

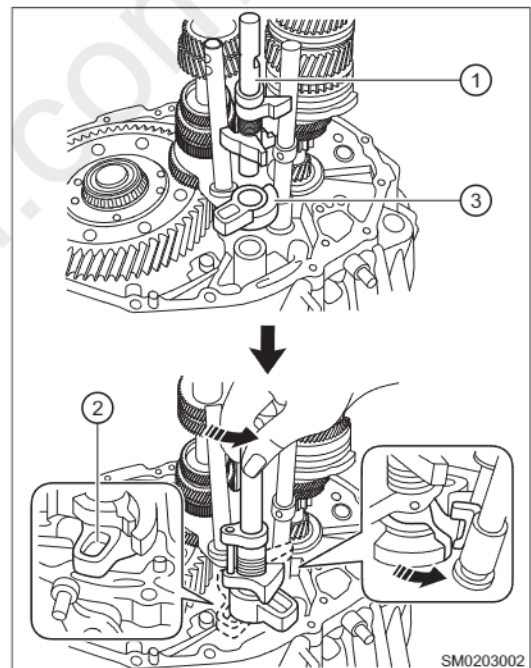


23. Install the select and shift shaft sub-assembly.

- (a) Rotate select and shift shaft sub-assembly (1) and lock plate (3) counterclockwise, then install them to clutch case.

Caution:

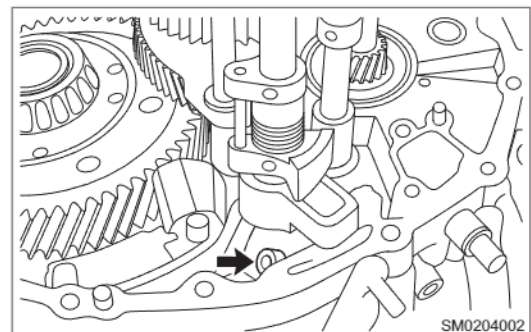
- Make sure that inner select lever (2) is connected with lock plate during installation.



- (b) Using 6 mm hexagon wrench, install bolt (arrow) and secure inner select lever and outer select lever.

Specified torque

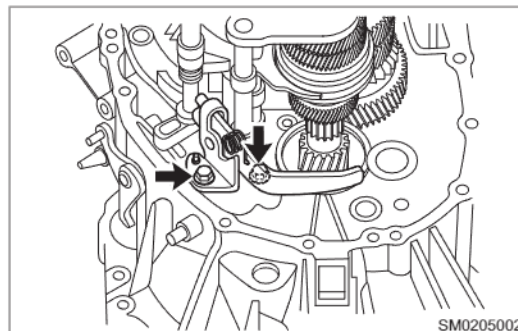
$28 \pm 5.6 \text{ N}\cdot\text{m}$



24. Install the reverse gear arm bracket set.

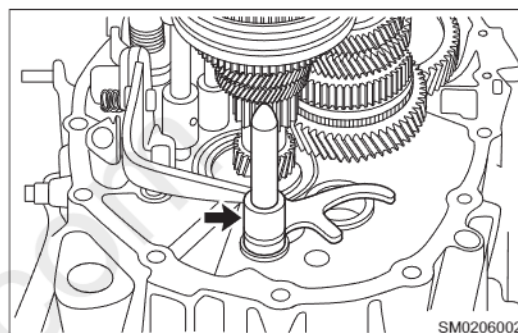
- (a) Install reverse gear arm bracket set to clutch case with fixing bolts (arrow).

Specified torque
 $17 \pm 3.4 \text{ N}\cdot\text{m}$



25. Install the reverse gear fork set.

- (a) Apply gear oil to reverse gear fork set (arrow) and install it to clutch case.

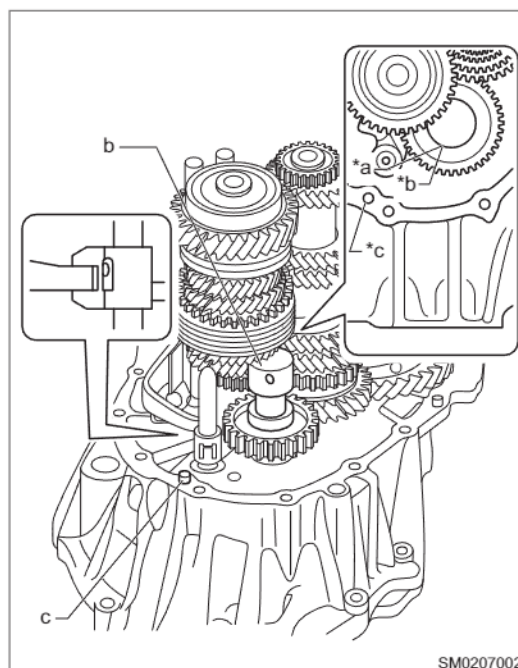


26. Install the reverse idler gear set.

- (a) As shown in illustration, apply gear oil to reverse idler gear set, idler gear thrust washer and reverse idler gear shaft, then install them to clutch case.

Caution:

- Make sure that notch (a) plane on reverse idler gear shaft is aligned with dowel pin (c) on clutch case.
- Lift up edge of reverse gear arm bracket set and install it to reverse gear fork set.

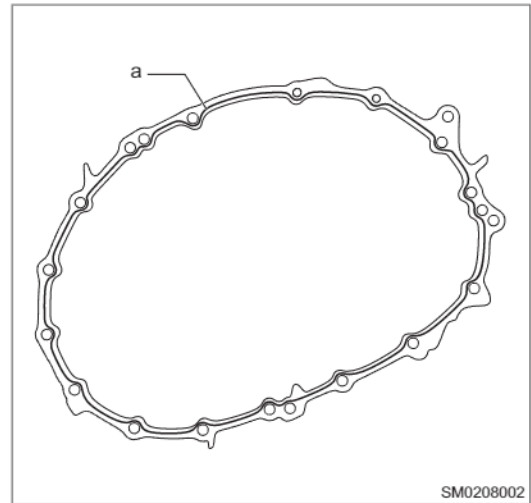


27. Install the transmission case.

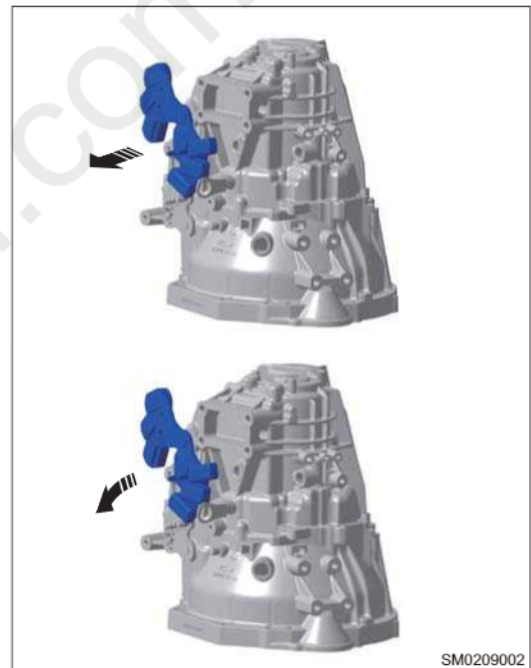
- (a) As shown in illustration, apply seal gum to joint surface (a) between transmission case and clutch case.

Warning:

- Remove any oil from contact surfaces.
- Install parts within 10 minutes after application. Otherwise, it is necessary to remove seal gum and reapply.



- (b) Push out shift lever and temporarily install transmission case.
- (c) Pull out outer shift lever and rotate it counterclockwise.



- (d) Install transmission case with 16 bolts (arrow).

Tightening torque

$29.4 \pm 5.9 \text{ N}\cdot\text{m}$



SM0210002

28. Install the outer shift lever E type retainer.

- (a) Install E type retainer (arrow) to outer shift lever.

Caution:

- E type retainer is a non-reusable component, and replace it after removal.



SM0211002

29. Install the self-locking set.

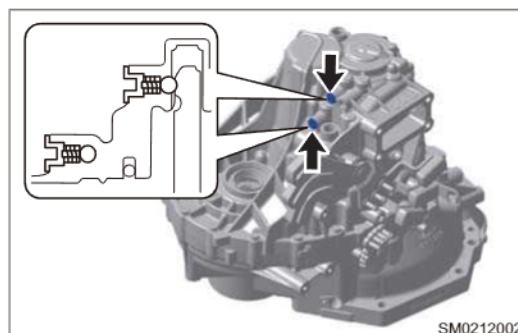
- (a) Install 2 steel balls and 2 self-locking springs to transmission case.
 (b) Using a hexagon wrench, install 2 self-locking plugs (arrow) to transmission case.

Tightening torque

$22.0 \pm 6.6 \text{ N}\cdot\text{m}$

Caution:

- Be careful not to drop steel ball into transmission.



SM0212002

- (c) Install 1 steel ball and 1 self-locking spring to transmission case.

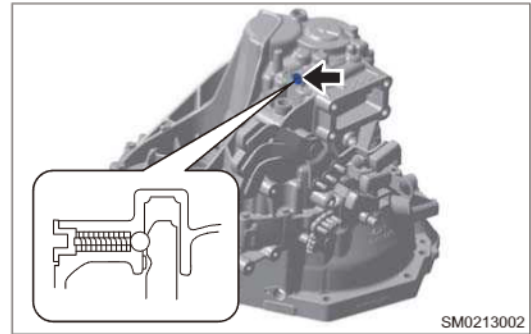
- (d) Using a hexagon wrench, install 1 self-locking bolt (arrow) to transmission case.

Tightening torque

$22.0 \pm 6.6 \text{ N}\cdot\text{m}$

Caution:

- Be careful not to drop steel ball into transmission.

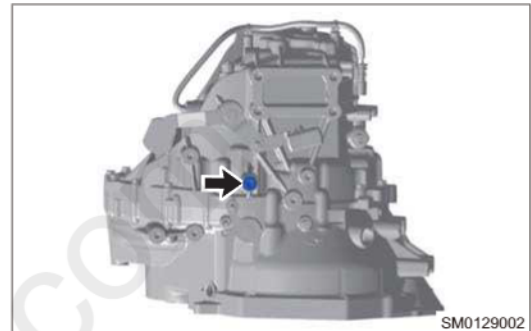


30. Install the steel ball dowel pin.

- (a) Install steel ball dowel pin and spring to transmission case.
 (b) Using a tool, install hexagon socket head plug (arrow) to transmission case.

Tightening torque

$24.5 \pm 7.4 \text{ N}\cdot\text{m}$



31. Install the reverse idler gear shaft bolt.

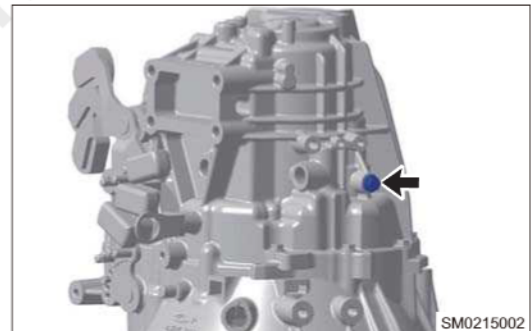
- (a) Install new bolt washer and reverse idler gear shaft bolt (arrow) to transmission case.

Tightening torque

$30 \pm 9 \text{ N}\cdot\text{m}$

Caution:

- Reverse idler gear shaft bolt and bolt washer are non-reusable components, and replace them after removal.

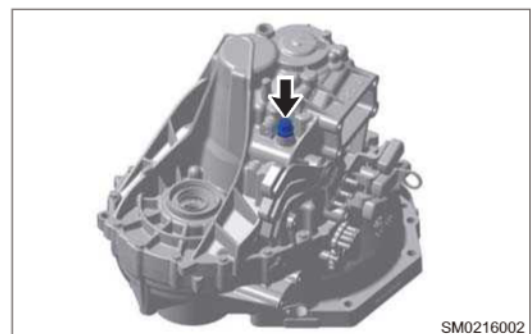


32. Install the locating mechanism set.

- (a) Install new locating mechanism set to transmission case.

Tightening torque

$29.4 \pm 8.8 \text{ N}\cdot\text{m}$



33. Install the reverse switch.

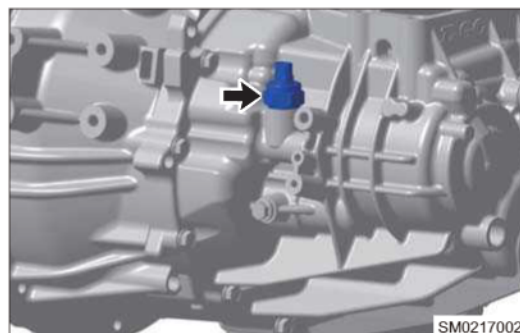
- (a) Using a tool, install new bolt washer and reverse switch (arrow) to transmission case.

Tightening torque

$44 \pm 8.8 \text{ N}\cdot\text{m}$

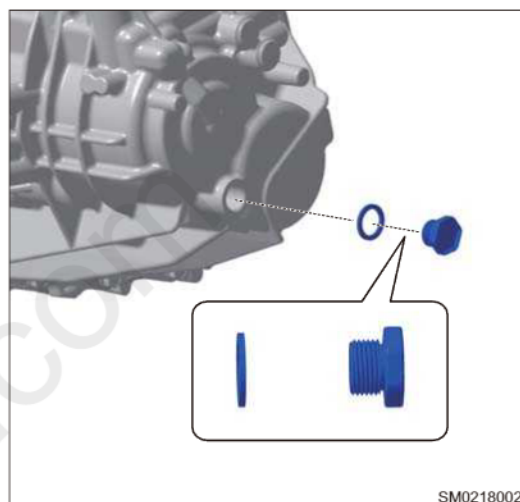
Caution:

- Reverse switch bolt washer is a non-reusable component, and replace it after removal.



SM0217002

34. Install filler plug and limit plug.



SM0218002

- (a) Install 2 new plug washers and 2 new hexagon socket head plugs to transmission case.

Tightening torque

$39 \pm 11 \text{ N}\cdot\text{m}$

Caution:

- Filler plug and limit plug are non-reusable components, and replace them after removal.



SM0219002

35. Install the drain plug.

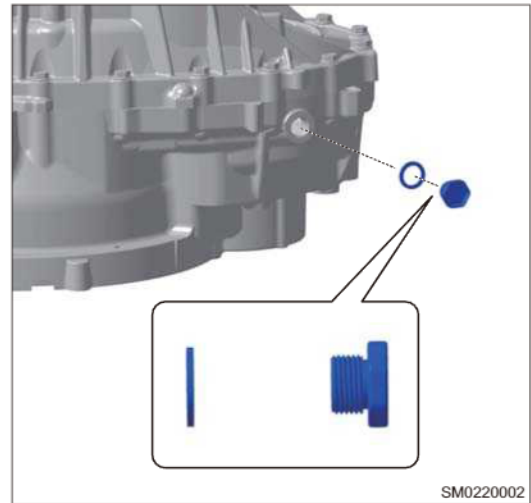
- (a) Install new plug washer and new hexagon socket head plug to clutch case.

Tightening torque

$39 \pm 11 \text{ N}\cdot\text{m}$

Caution:

- Drain plug and plug washer are non-reusable components, and replace them after removal.



36. Install the differential oil seal (left).

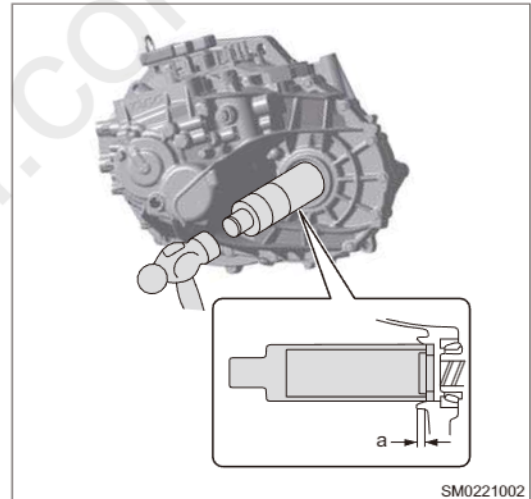
- (a) Apply MP grease to oil seal lip.
- (b) Using special tool and hammer, install new differential oil seal to transmission case.

Standard depth

9.6 - 10.2 mm

Caution:

- DO NOT damage the oil seal lip.
- Differential oil seal is a non-reusable component, and replace it after removal.



17

37. Install the differential oil seal (right).

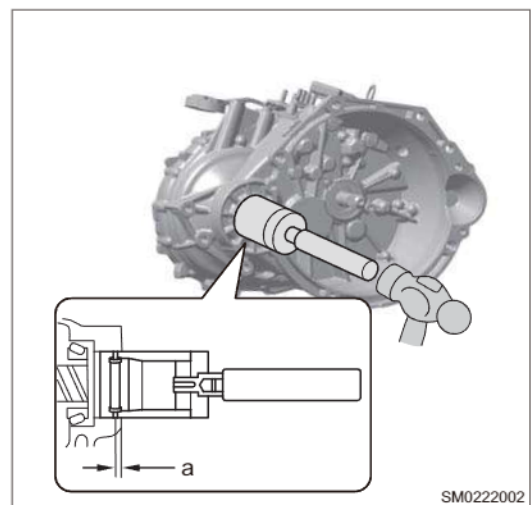
- (a) Apply MP grease to oil seal lip.
- (b) Using special tool and hammer, install new differential oil seal to transmission case.

Standard depth

3.9 - 4.5 mm

Caution:

- DO NOT damage the oil seal lip.
- Differential oil seal is a non-reusable component, and replace it after removal.



Installation

1. Installation is in the reverse order of removal.

Caution:

- After installation, add transmission oil and check transmission oil level.
2. Perform self-learning after installing transmission assembly.

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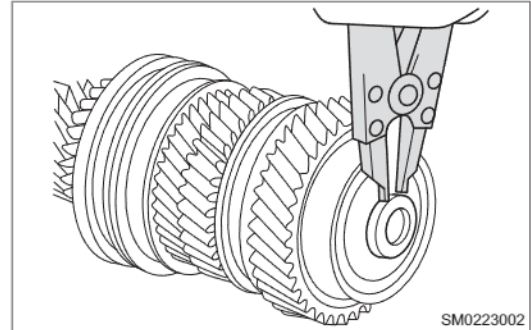
Input Shaft Sub-assembly

Disassembly

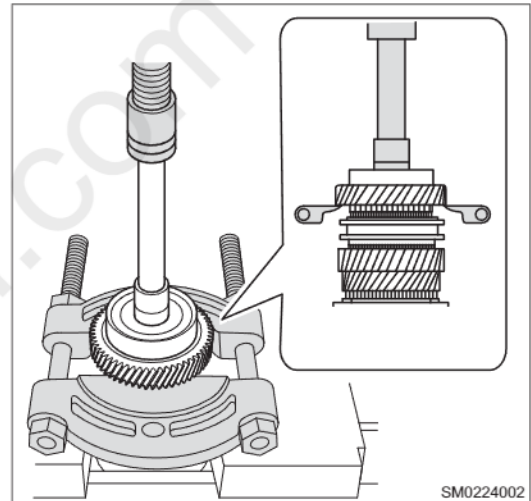
1. Remove the shaft retainer.
 - (a) Using a snap ring expander, remove shaft retainer from input shaft rear bearing.

Caution:

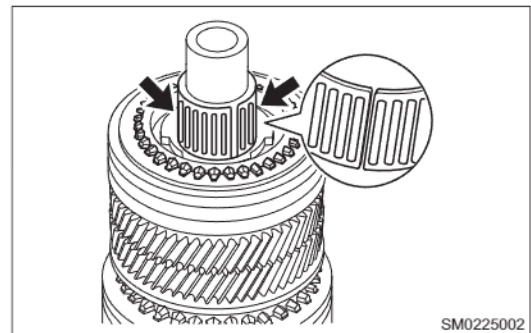
- Input shaft retainer is a non-reusable component, and replace it after removal.



2. Remove the 6th gear set.
 - (a) Using special tool and press, remove input shaft rear bearing and 6th gear set from input shaft.

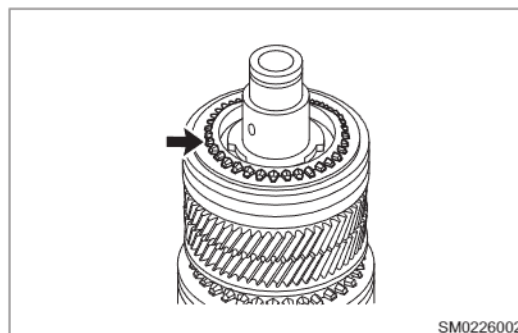


3. Remove the 6th gear needle roller bearing.
 - (a) Remove 6th gear needle roller bearing (arrow) from 6th gear shaft bushing.



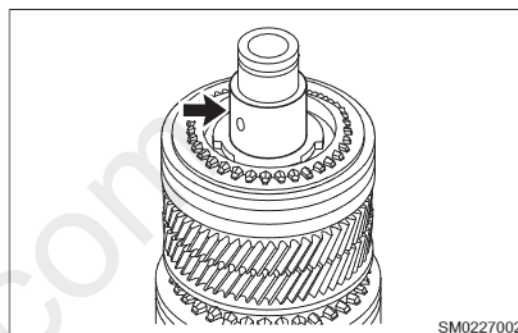
4. Remove the No.5 synchronizer gear ring (6th gear side).

- (a) Remove No.5 synchronizer gear ring (6th gear side) (arrow) from No.3 synchronizer gear hub.



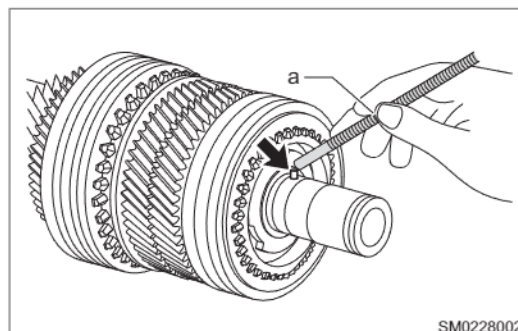
5. Remove the 6th gear shaft bushing.

- (a) Remove 6th gear shaft bushing (arrow) from input shaft.



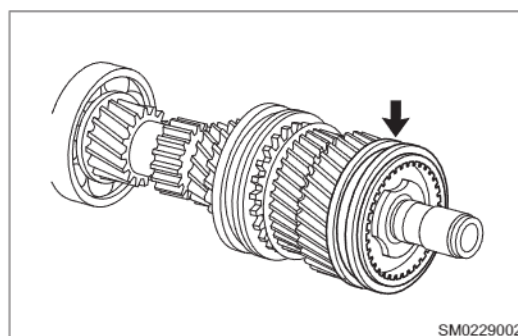
6. Remove the 6th gear shaft bushing locking ball.

- (a) Using a magnetic finger (a), remove 6th gear shaft bushing locking ball (arrow) from input shaft.



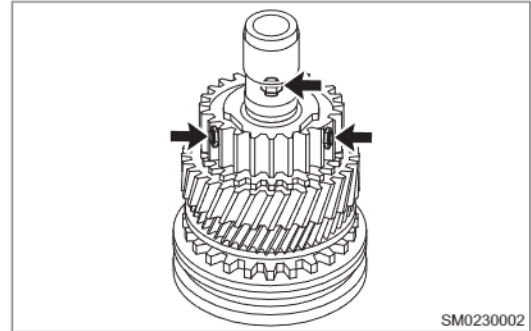
7. Remove the No.3 synchronizer gear sleeve.

- (a) Remove No.3 synchronizer gear sleeve (arrow) from No.3 synchronizer gear hub.



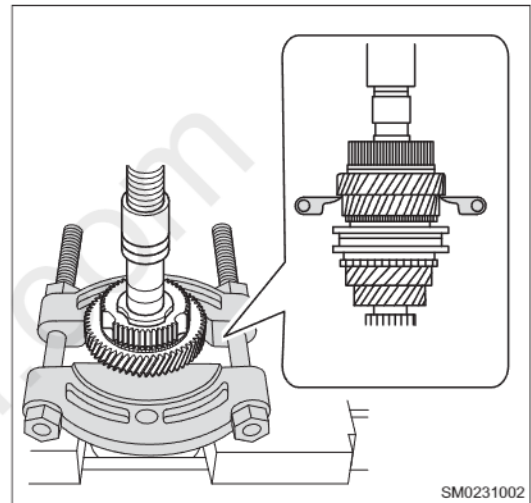
8. Remove the synchronizer slider.

- (a) Remove 3 synchronizer sliders (arrow) from No.3 synchronizer gear hub.



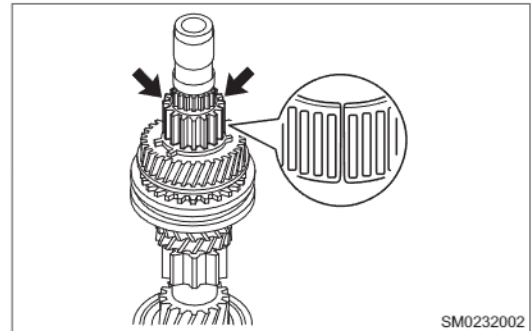
9. Remove the 5th gear set.

- (a) Using special tool and press, remove No.3 synchronizer gear hub, No.3 synchronizer gear ring (5th gear side) and 5th gear set from input shaft.



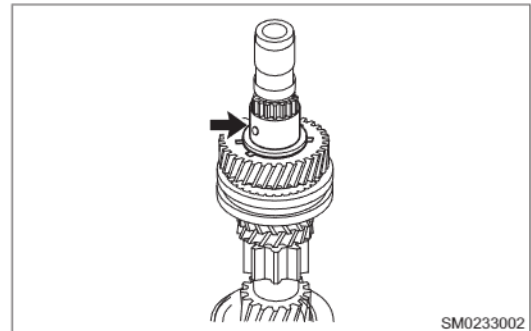
10. Remove the 5th gear needle roller bearing.

- (a) Remove 5th gear needle roller bearing (arrow) from 5th gear shaft bushing.

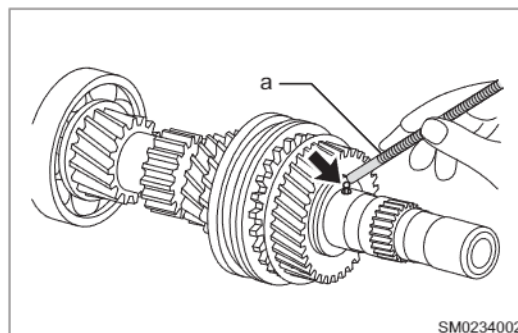


11. Remove the 5th gear shaft bushing.

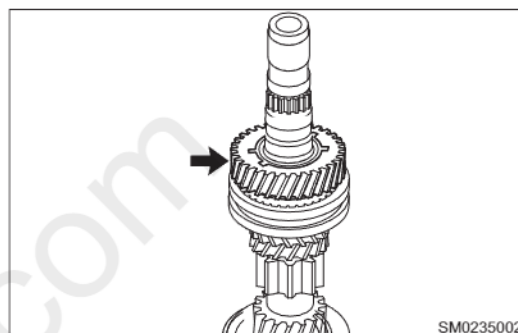
- (a) Remove 5th gear shaft bushing (arrow) from input shaft.



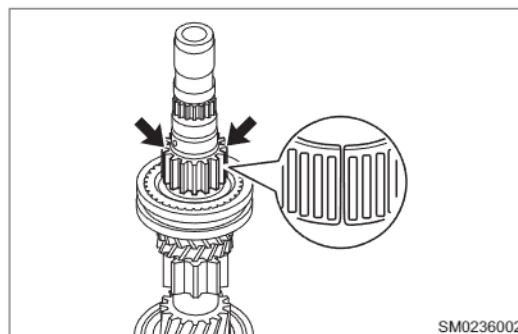
12. Remove the 5th gear shaft bushing locking ball.
- (a) Using a magnetic finger (a), remove 5th gear shaft bushing locking ball (arrow) from input shaft.



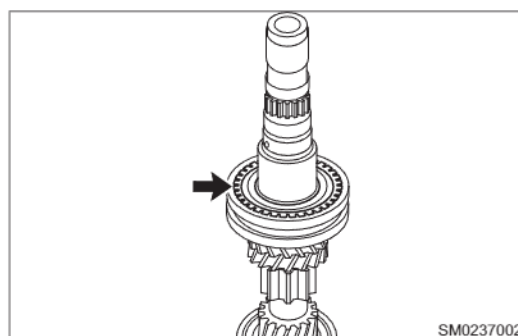
13. Remove the 4th gear set.
- (a) Remove 4th gear set (arrow) from input shaft.



14. Remove the 4th gear needle roller bearing.
- (a) Remove 4th gear needle roller bearing (arrow) from input shaft.

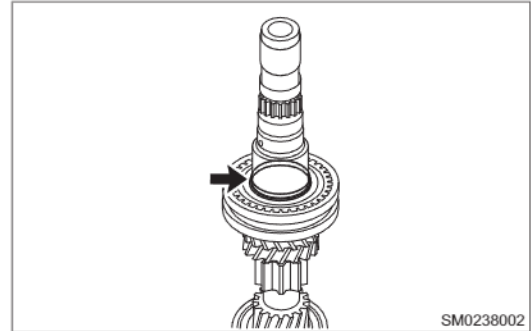


15. Remove the No.2 synchronizer gear ring.
- (a) Remove No.2 synchronizer gear ring (arrow) from No.2 synchronizer gear hub.



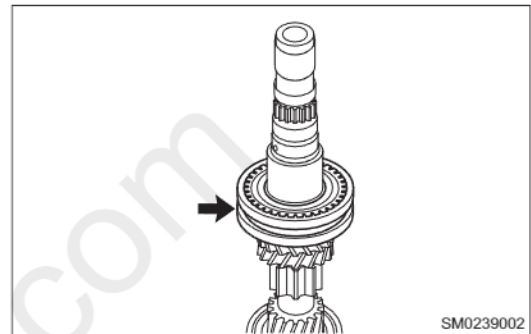
16. Remove the spacer.

- (a) Remove spacer (arrow) from No.2 synchronizer gear hub.



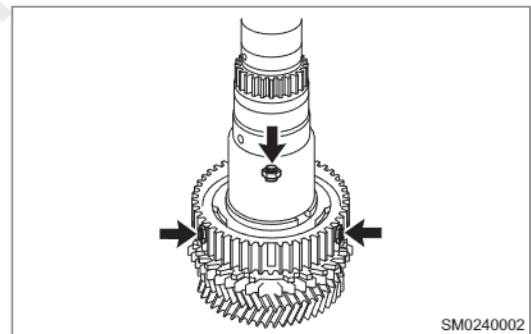
17. Remove the No.2 synchronizer gear sleeve.

- (a) Remove No.2 synchronizer gear sleeve (arrow) from No.2 synchronizer gear hub.



18. Remove the synchronizer slider.

- (a) Remove 3 synchronizer sliders (arrow) from No.2 synchronizer gear hub.



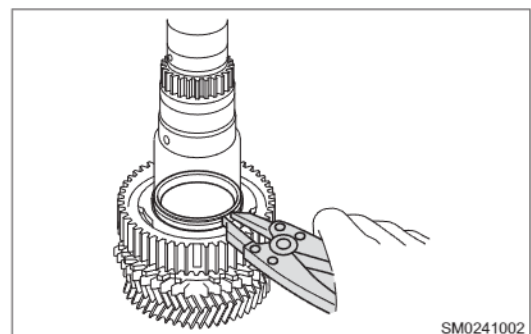
17

19. Remove the shaft retainer.

- (a) Using a snap ring expander, remove shaft retainer from No.2 synchronizer gear hub.

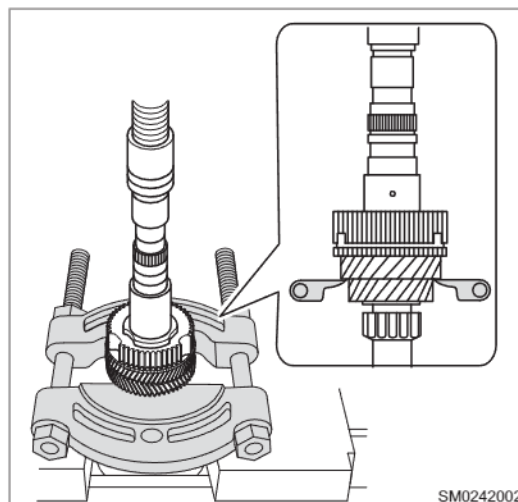
Caution:

- Input shaft retainer is a non-reusable component, and replace it after removal.



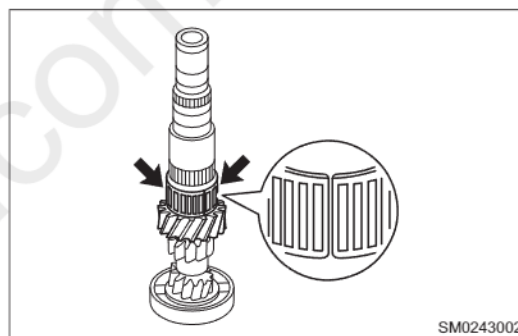
20. Remove the 3rd gear set.

- (a) Using special tool and press, remove No.2 synchronizer gear hub, No.2 synchronizer gear ring and 3rd gear set from input shaft.



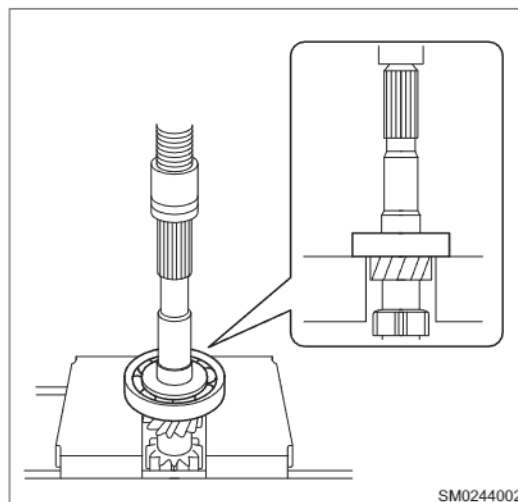
21. Remove the 3rd gear needle roller bearing.

- (a) Remove 3rd gear needle roller bearing (arrow) from input shaft.



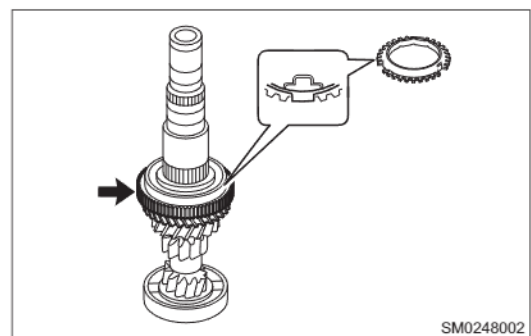
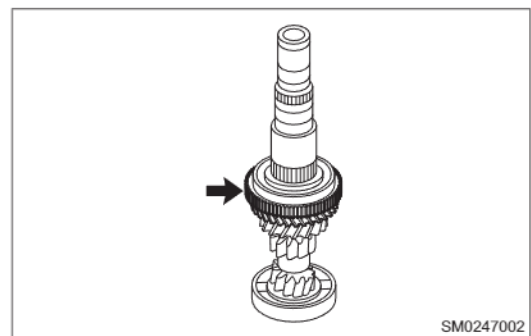
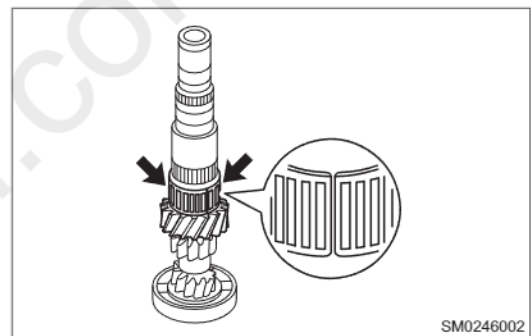
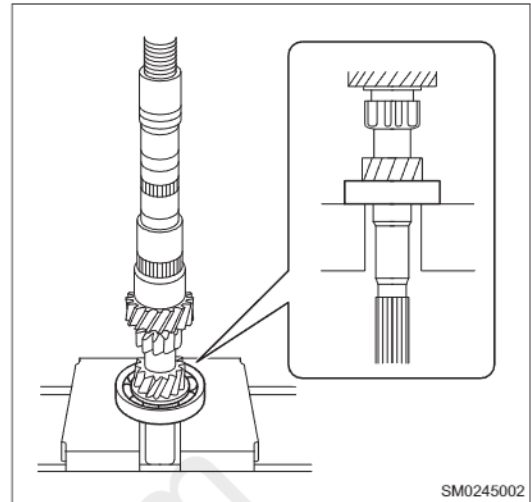
22. Remove the input shaft front bearing.

- (a) Using a press, remove front bearing from input shaft.



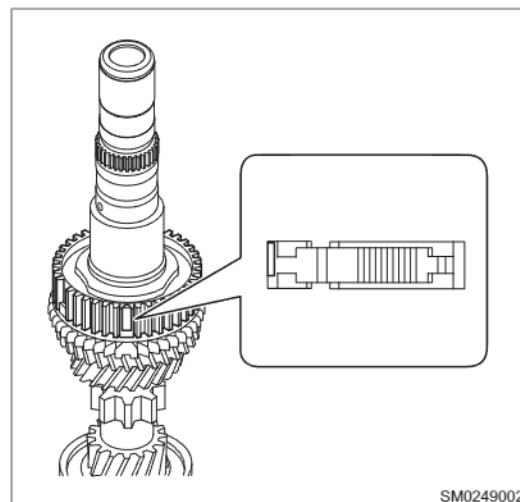
Assembly

1. Install the input shaft front bearing.
 - (a) Using a press, install input shaft front bearing to input shaft.
2. Install the 3rd gear needle roller bearing.
 - (a) Apply gear oil to 3rd gear needle roller bearing, and install it to input shaft.
3. Install the 3rd gear set.
 - (a) Apply gear oil to 3rd gear set, and install it to input shaft.
4. Install the No.2 synchronizer gear ring.
 - (a) Apply gear oil to No.2 synchronizer gear ring, and install it to 3rd gear.



5. Install the No.2 synchronizer gear hub.

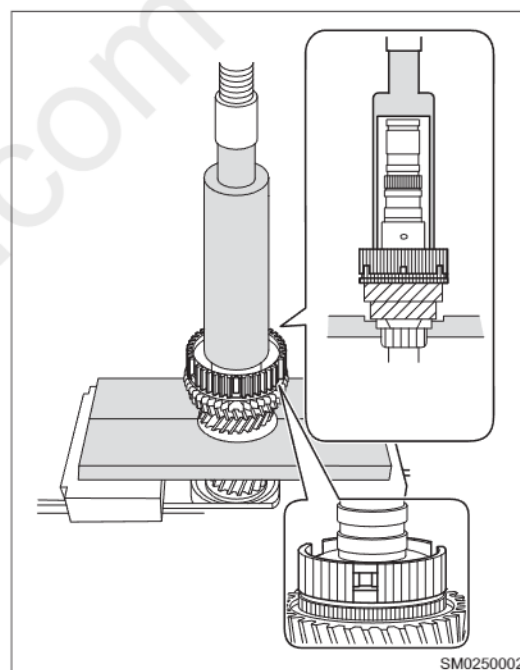
- (a) Apply gear oil to No.2 synchronizer gear hub, and install it to input shaft.



- (b) Using special tool and press, install No.2 synchronizer gear hub to input shaft.

Caution:

- When installing No.2 synchronizer gear hub, align boss of No.2 synchronizer gear ring with notch of No.2 synchronizer gear hub.



6. Install the shaft retainer.

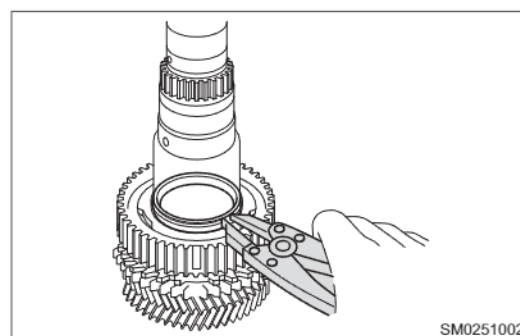
- (a) Select a new shaft retainer that allows minimal axial clearance.

Standard clearance

Less than 0.1 mm

- (b) Using a snap ring expander, install a new shaft retainer.

Mark	Thickness (mm)	Mark	Thickness (mm)
0	2.27	4	2.47
1	2.32	5	2.52
2	2.37	6	2.57
3	2.42	7	2.62

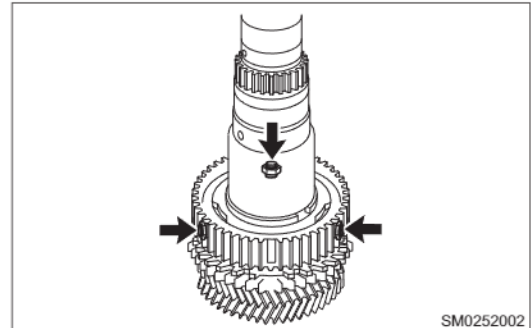


Caution:

- Be sure to properly install shaft retainer because it is easy to expand.
- DO NOT damage journal surface of shaft retainer.
- Input shaft retainer is a non-reusable component, and replace it after removal.

7. Install the synchronizer slider.

- (a) Install 3 synchronizer sliders (arrow) to No.2 synchronizer gear hub.

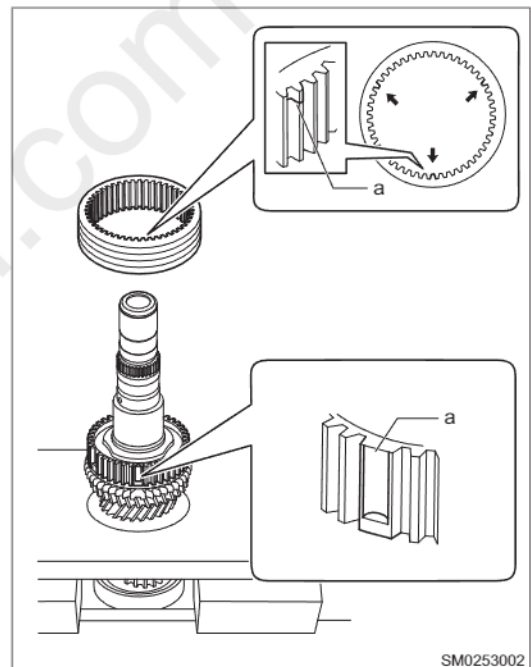


8. Install the No.2 synchronizer gear sleeve.

- (a) Apply gear oil to No.2 synchronizer gear sleeve, and install it to No.2 synchronizer gear hub.

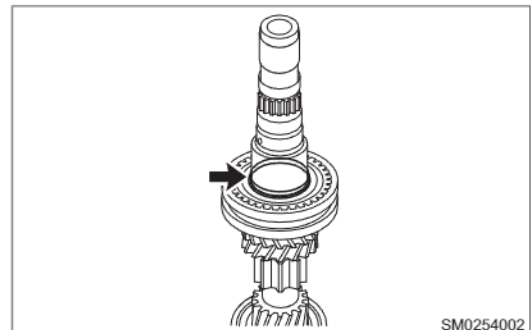
Caution:

- When installing No.2 synchronizer gear sleeve, align its missing teeth part with notch (a) of No.2 synchronizer gear hub.



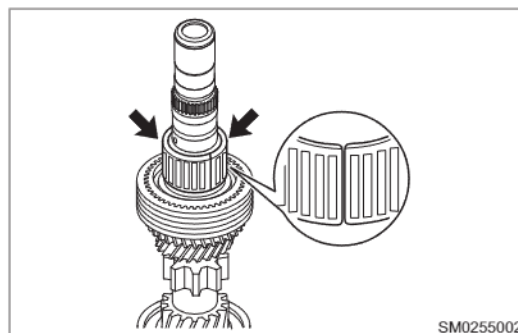
9. Install the spacer.

- (a) Install spacer (arrow) to No.2 synchronizer gear hub.



10. Install the 4th gear needle roller bearing.

- (a) Apply gear oil to 4th gear needle roller bearing and spacer, and install 4th gear needle roller bearing (arrow) to input shaft.

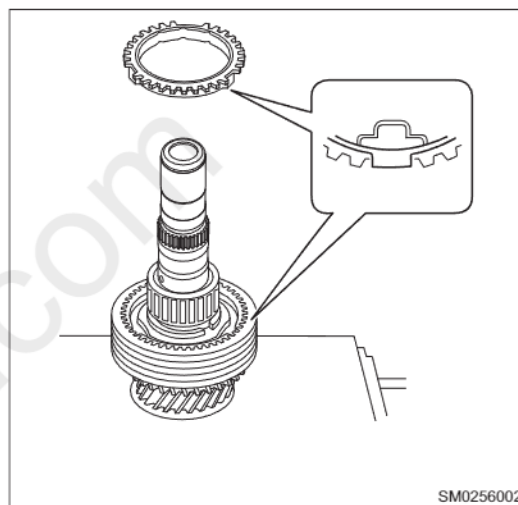


11. Install the No.2 synchronizer gear ring.

- (a) Apply gear oil to No.2 synchronizer gear ring, and install it to No.2 synchronizer gear hub.

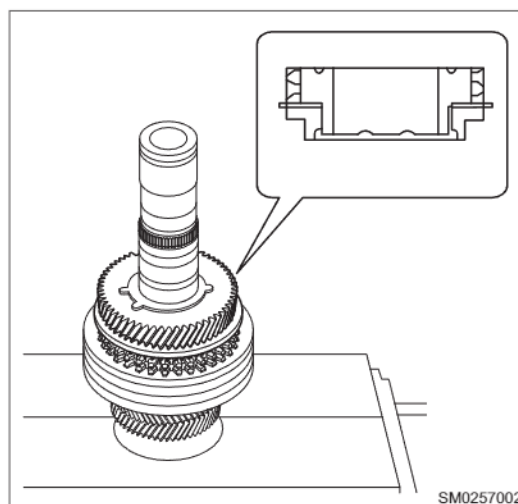
Caution:

- When installing No.2 synchronizer gear ring, align its boss with notch of No.2 synchronizer gear hub.

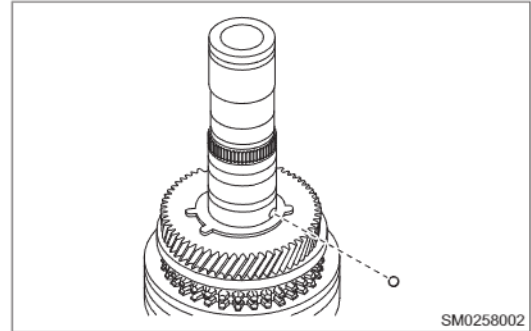


12. Install the 4th gear set.

- (a) Apply gear oil to 4th gear set, and install it to input shaft.



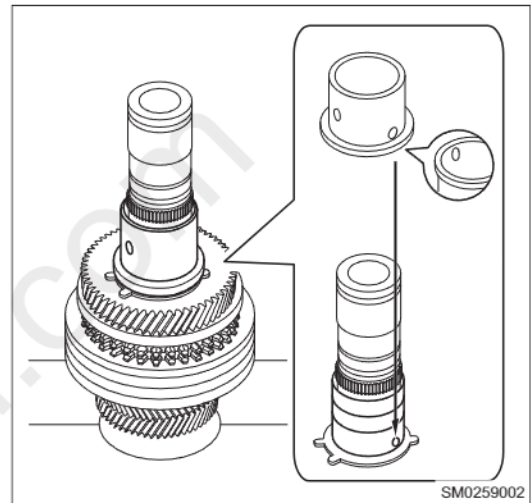
13. Install the 5th gear shaft bushing locking ball.
 - (a) Apply gear oil to ball, and install it to input shaft.



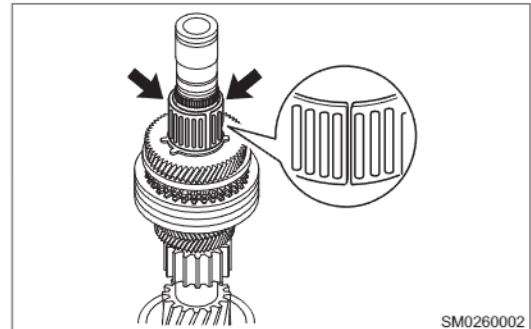
14. Install the 5th gear shaft bushing.
 - (a) Apply gear oil to 5th gear shaft bushing, and install it to input shaft.

Caution:

 - Align groove of 5th gear shaft bushing with ball.

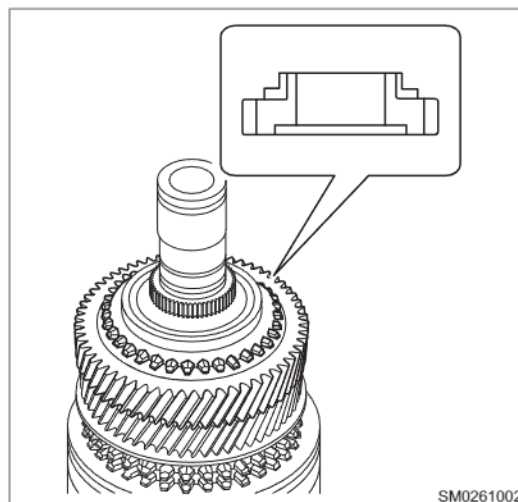


15. Install the 5th gear needle roller bearing.
 - (a) Apply gear oil to 5th gear needle roller bearing (arrow), and install it to 5th gear shaft bushing.



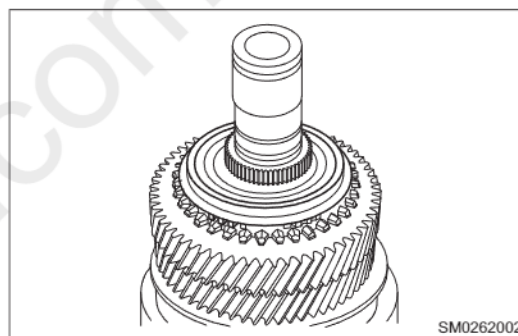
16. Install the 5th gear set.

- (a) Apply gear oil to 5th gear set, and install it to input shaft.



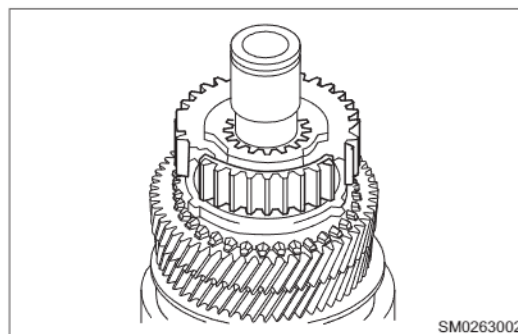
17. Install the No.3 synchronizer gear ring (5th gear side).

- (a) Apply gear oil to No.3 synchronizer gear ring, and install it to 5th gear set.



18. Install the No.3 synchronizer gear hub.

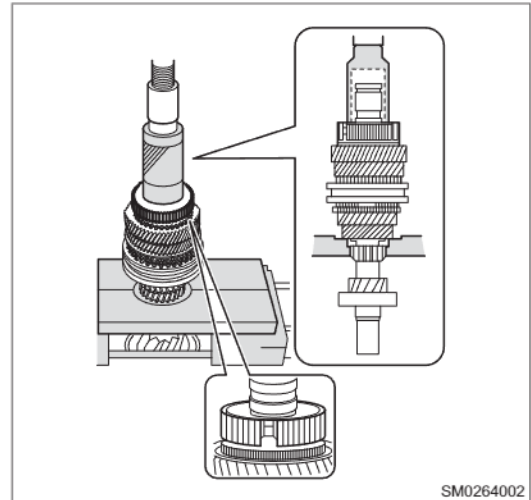
- (a) Apply gear oil to No.3 synchronizer gear hub, and install it to input shaft.



- (b) Using special tool and press, install No.3 synchronizer gear hub to input shaft.

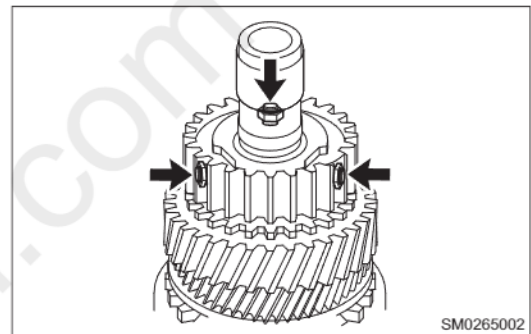
Caution:

- When installing No.3 synchronizer gear hub, align boss of No.3 synchronizer gear ring (5th gear side) with notch of No.3 synchronizer gear hub.



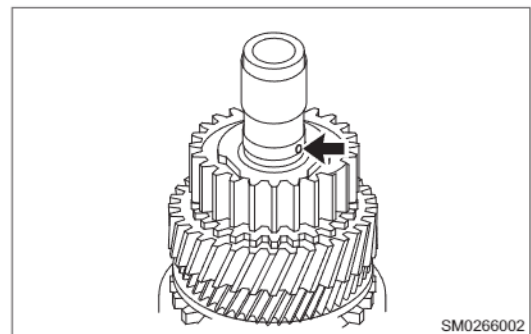
19. Install the synchronizer slider.

- (a) Install 3 synchronizer sliders (arrow) to No.3 synchronizer gear hub.



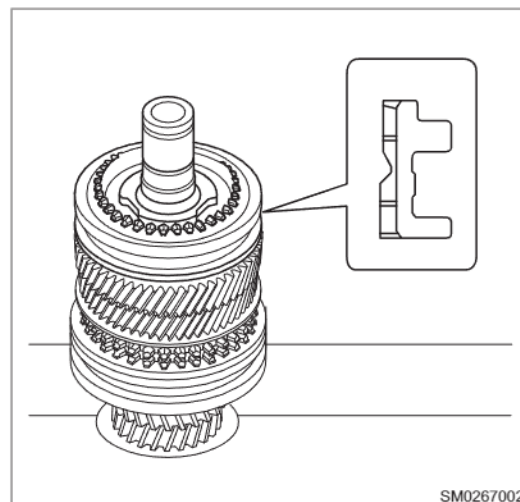
20. Install the 6th gear shaft bushing locking ball.

- (a) Apply gear oil to ball (arrow), and install it to input shaft.



21. Install the No.3 synchronizer gear sleeve.

- (a) Apply gear oil to No.3 synchronizer gear sleeve, and install it to No.3 synchronizer gear hub.

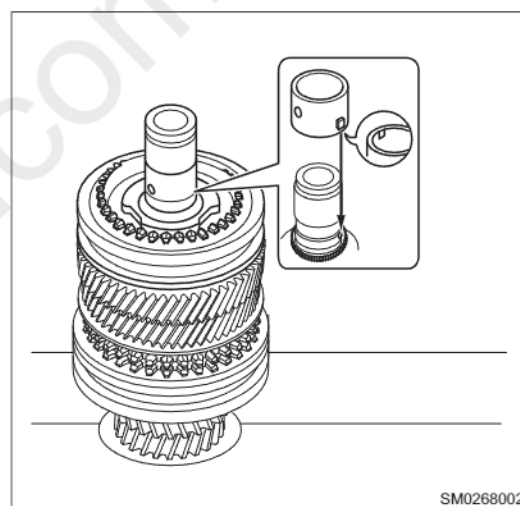


22. Install the 6th gear shaft bushing.

- (a) Apply gear oil to 6th gear shaft bushing, and install it to input shaft.

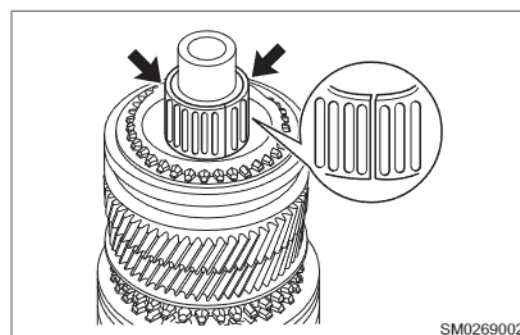
Caution:

- Align groove of 6th gear shaft bushing with ball.



23. Install the 6th gear needle roller bearing.

- (a) Apply gear oil to 6th gear needle roller bearing (arrow), and install it to 6th gear shaft bushing.

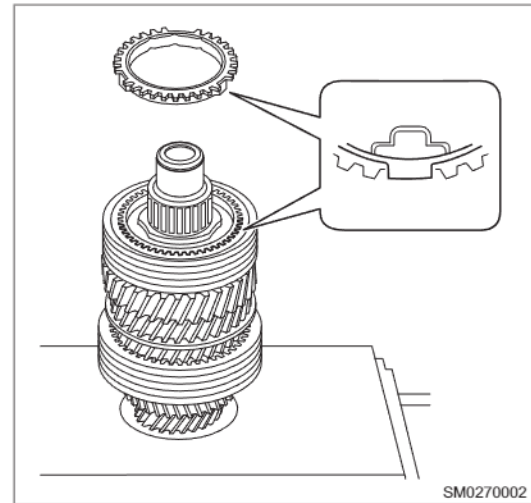


24. Install the No.3 synchronizer gear ring (6th gear side).

- (a) Apply gear oil to No.3 synchronizer gear ring, and install it to 6th gear set.

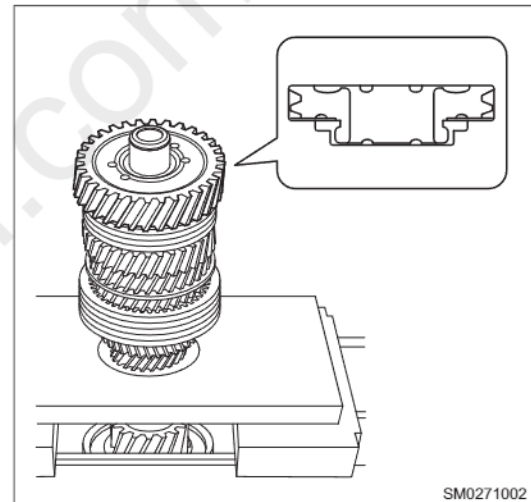
Caution:

- When installing No.3 synchronizer gear ring (6th gear side), align its boss with notch of No.3 synchronizer gear hub.



25. Install the 6th gear set.

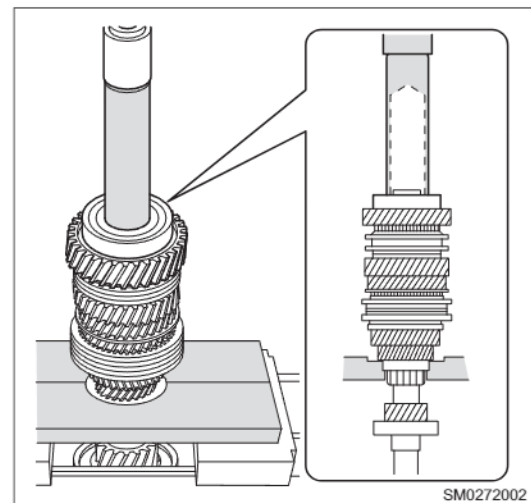
- (a) Apply gear oil to 6th gear set, and install it to input shaft.



17

26. Install the input shaft rear bearing.

- (a) Using special tool and press, install input shaft rear bearing to input shaft.

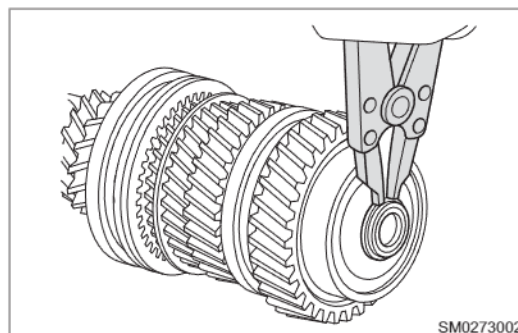


27. Install the shaft retainer.

- (a) Select a new shaft retainer that allows minimal axial clearance.

Standard clearance
Less than 0.1 mm

Mark	Thickness (mm)	Mark	Thickness (mm)	Mark	Thickness (mm)
A	1.65	F	1.90	L	2.15
B	1.70	G	1.95	M	2.20
C	1.75	H	2.00	N	2.25
D	1.80	J	2.05	P	2.30
E	1.85	K	2.10		



SM0273002

- (b) Using a snap ring expander, install a new shaft retainer.

Caution:

- Be sure to properly install shaft retainer because it is easy to expand.
- Input shaft retainer is a non-reusable component, and replace it after removal.

Input Shaft Sub-assembly Inspection

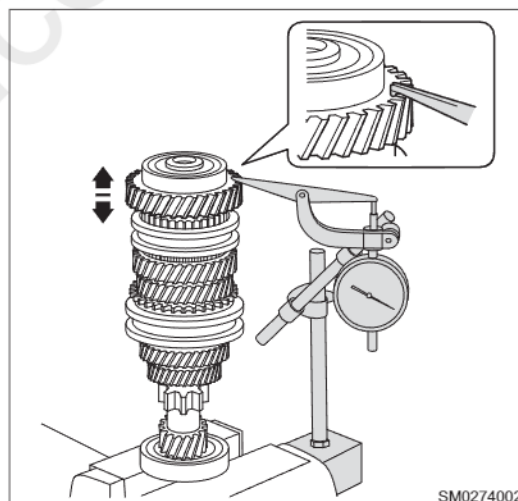
1. Check the 6th gear axial clearance.

- (a) Using a dial indicator, measure 6th gear axial clearance.

Standard clearance
0.15 - 0.43 mm

Maximum clearance
0.43 mm

If clearance is more than the maximum, replace No.3 synchronizer gear hub, 6th gear set or input shaft.



SM0274002

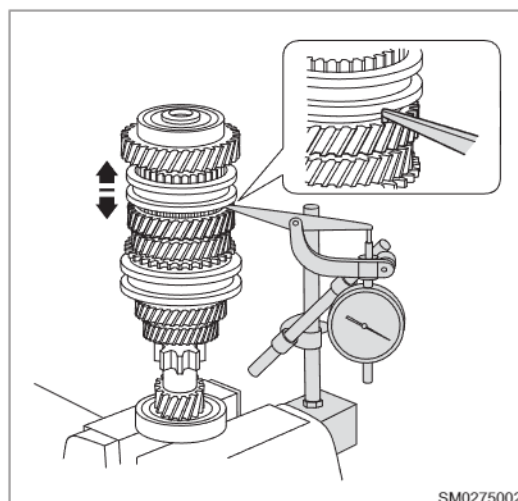
2. Check the 5th gear axial clearance.

- (a) Using a dial indicator, measure 5th gear axial clearance.

Standard clearance
0.15 - 0.43 mm

Maximum clearance
0.43 mm

If clearance is more than the maximum value, replace No.3 synchronizer gear hub, 5th gear set or input shaft.



SM0275002



3. Check the 4th gear axial clearance.

- (a) Using a dial indicator, measure 4th gear axial clearance.

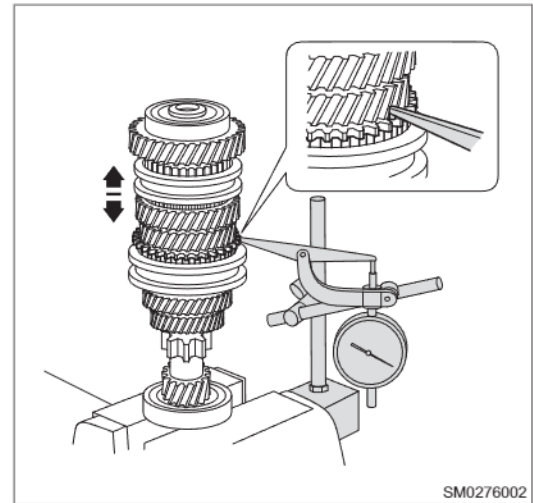
Standard clearance

0.15 - 0.56 mm

Maximum clearance

0.56 mm

If clearance is more than the maximum value, replace No.2 synchronizer gear hub, 4th gear set or input shaft.



4. Check the 3rd gear axial clearance.

- (a) Using a dial indicator, measure 3rd gear axial clearance.

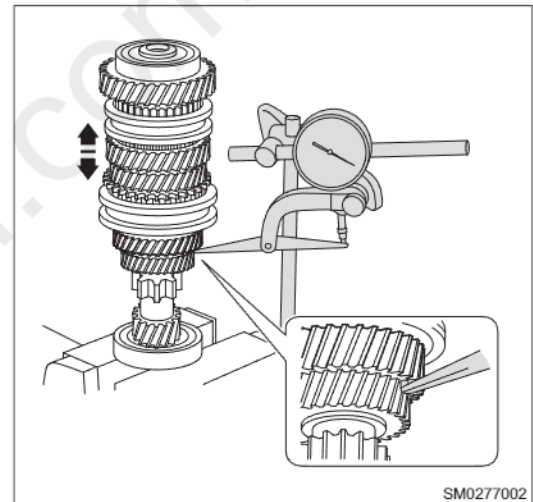
Standard clearance

0.15 - 0.43 mm

Maximum clearance

0.43 mm

If clearance is more than the maximum value, replace No.2 synchronizer gear hub, 3rd gear set or input shaft.



17

5. Check the 6th gear radial clearance.

- (a) Using a dial indicator, measure 6th gear radial clearance between 6th gear set and input shaft.

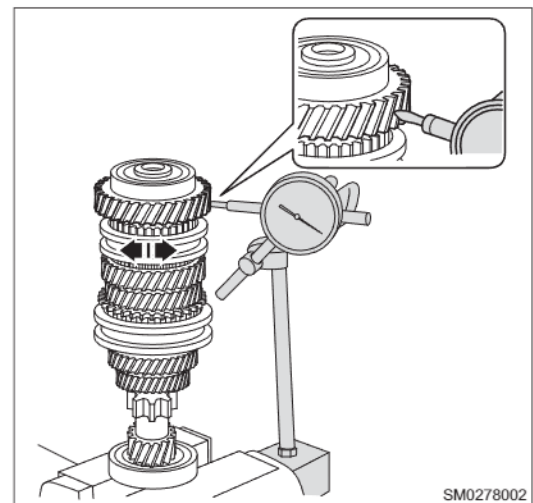
Standard clearance

0.009 - 0.045 mm

Maximum clearance

0.045 mm

If clearance is more than the maximum value, replace 6th gear bearing, 6th gear shaft bushing or input shaft.



6. Check the 5th gear radial clearance.

- (a) Using a dial indicator, measure 5th gear radial clearance between 5th gear set and input shaft.

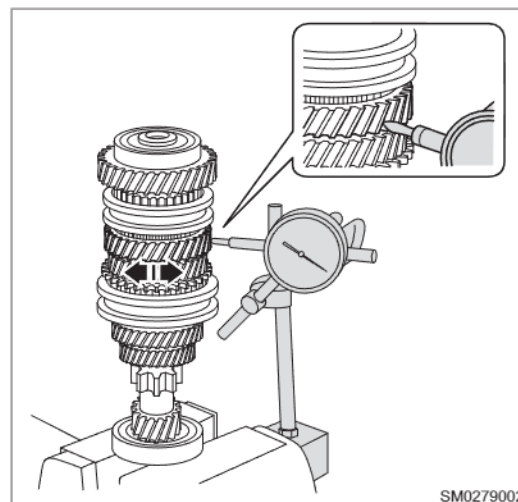
Standard clearance

0.009 - 0.045 mm

Maximum clearance

0.045 mm

If clearance is more than the maximum value, replace 5th gear set, 5th gear needle roller bearing, 5th gear shaft bushing or input shaft.



SM0279002

7. Check the 4th gear radial clearance.

- (a) Using a dial indicator, measure 4th gear radial clearance between 4th gear set and input shaft.

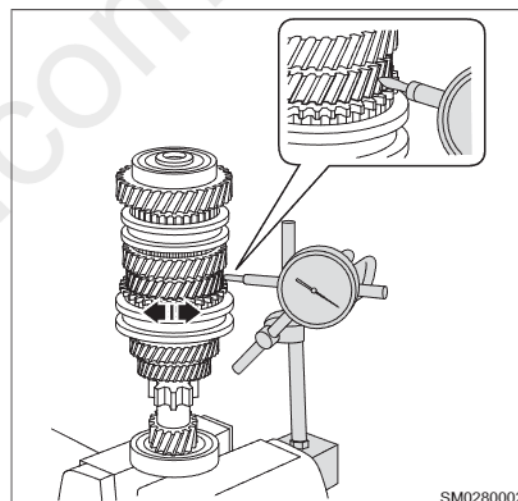
Standard clearance

0.009 - 0.050 mm

Maximum clearance

0.050 mm

If clearance is more than the maximum value, replace 4th gear set, 4th gear needle roller bearing, 4th gear shaft bushing or input shaft.



SM0280002

8. Check the 3rd gear radial clearance.

- (a) Using a dial indicator, measure 3rd gear radial clearance between 3rd gear set and input shaft.

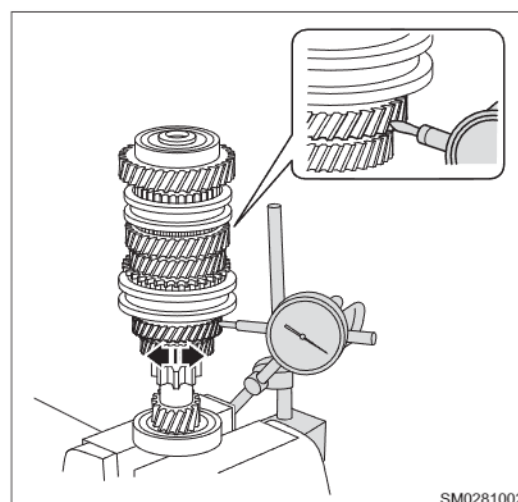
Standard clearance

0.009 - 0.050 mm

Maximum clearance

0.050 mm

If clearance is more than the maximum value, replace 3rd gear set, 3rd gear needle roller bearing, 3rd gear shaft bushing or input shaft.



SM0281002

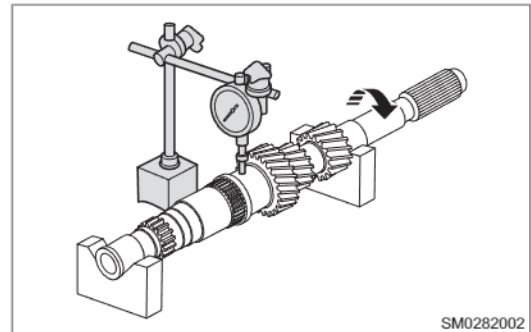
9. Check the input shaft.

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

Maximum runout

0.03 mm

If runout is more than the maximum, replace input shaft.

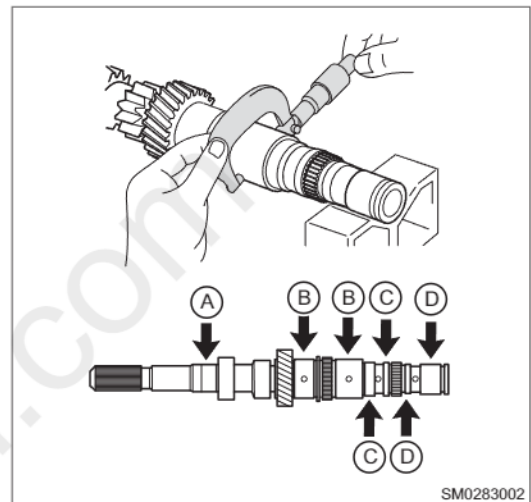


SM0282002

- (b) Using a micrometer, measure outer diameter of input shaft journal surface at specified locations.

Part	Standard outer diameter	Minimum outer diameter
A	25.002 - 25.017 mm	25.002 mm
B	37.485 - 37.500 mm	37.485 mm
C	31.690 - 31.700 mm	31.690 mm
D	27.990 - 28.000 mm	27.990 mm

If outer diameter of any location is less than the minimum value, replace input shaft.



SM0283002

10. Check the 6th gear shaft bushing.

- (a) Using a micrometer, measure outer diameter of 6th gear shaft bushing.

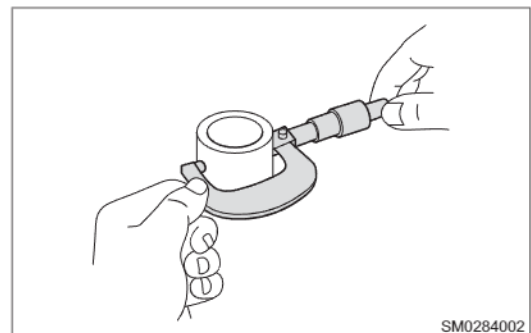
Standard outer diameter

35.09 - 35.10 mm

Minimum outer diameter

35.09 mm

If outer diameter is less than the minimum value, replace 6th gear shaft bushing.



SM0284002

- (b) Using a cylinder gauge, measure inner diameter of 6th gear shaft bushing.

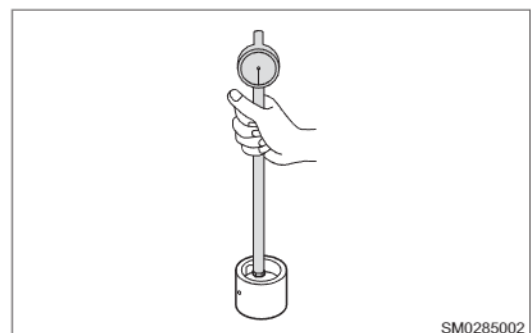
Standard inner diameter

28.005 - 28.020 mm

Maximum inner diameter

28.020 mm

If inner diameter is more than the maximum value, replace 6th gear shaft bushing.



SM0285002

11. Check the 5th gear shaft bushing.

- (a) Using a micrometer, measure outer diameter of 5th gear shaft bushing.

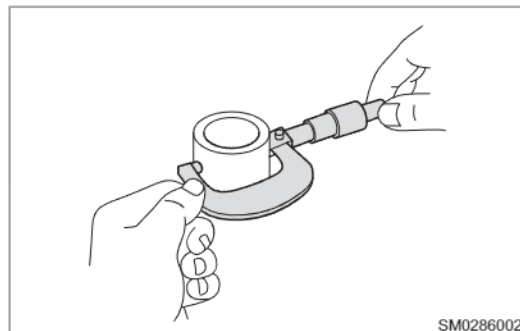
Standard outer diameter

37.49 - 37.50 mm

Minimum outer diameter

37.49 mm

If outer diameter is less than the minimum value, replace 5th gear shaft bushing.



SM0286002

- (b) Using a cylinder gauge, measure inner diameter of 5th gear shaft bushing.

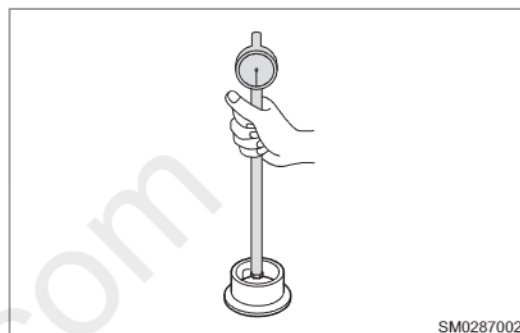
Standard inner diameter

31.705 - 31.720 mm

Maximum inner diameter

31.720 mm

If inner diameter is more than the maximum value, replace 5th gear shaft bushing.



SM0287002

12. Check the 6th gear set.

- (a) Using a cylinder gauge, measure inner diameter of 6th gear set.

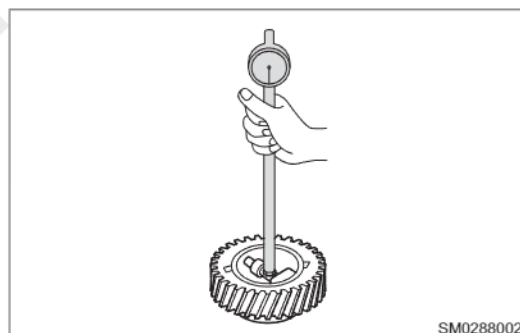
Standard inner diameter

40.109 - 40.125 mm

Maximum inner diameter

40.125 mm

If inner diameter is more than the maximum value, replace 6th gear set.



SM0288002

13. Check the 5th gear set.

- (a) Using a cylinder gauge, measure inner diameter of 5th gear shaft bushing.

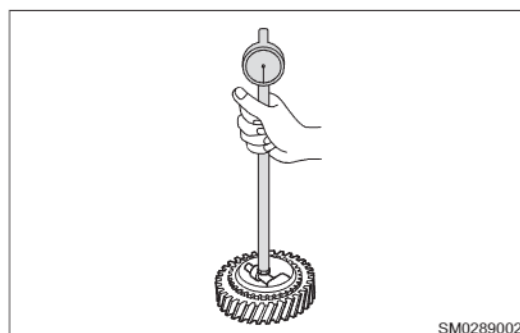
Standard inner diameter

42.509 - 42.525 mm

Maximum inner diameter

42.525 mm

If inner diameter is more than the maximum value, replace 5th gear set.



SM0289002



14. Check the 4th gear set.

- (a) Using a cylinder gauge, measure inner diameter of 4th gear set.

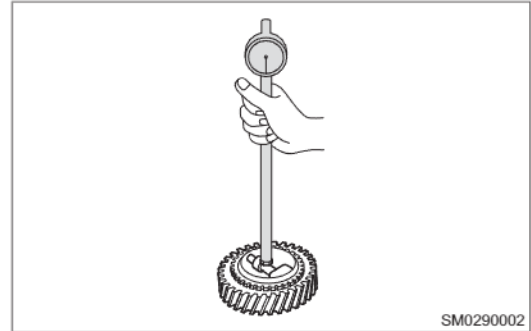
Standard inner diameter

42.509 - 42.525 mm

Maximum inner diameter

42.525 mm

If inner diameter is more than the maximum value, replace 4th gear set.



SM0290002

15. Check the 3rd gear set.

- (a) Using a cylinder gauge, measure inner diameter of 3rd gear set.

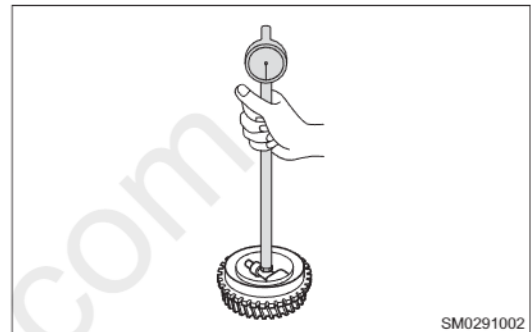
Standard inner diameter

42.509 - 42.525 mm

Maximum inner diameter

42.525 mm

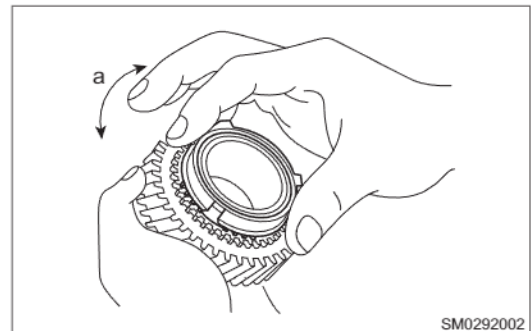
If inner diameter is more than the maximum value, replace 3rd gear set.



SM0291002

16. Check the No.3 synchronizer gear ring.

- (a) Check for wear and damage.
 (b) Apply gear oil to 5th gear cone.
 (c) Turn No.3 synchronizer gear ring in one direction while pushing it into 5th gear cone.
 (d) Check that the gear ring locks. If No.3 synchronizer gear ring does not lock, replace it.



SM0292002

- (e) Using a feeler gauge, measure clearance between No.3 synchronizer gear ring and spline gear end.

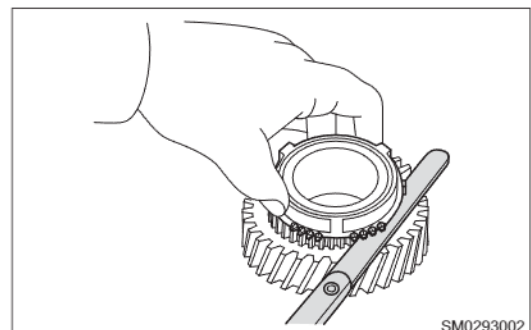
Standard clearance

0.73 - 1.53 mm

Minimum clearance

0.73 mm

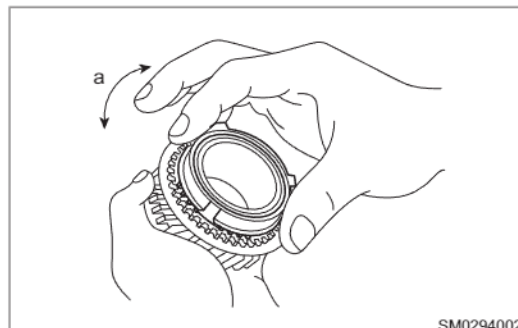
If clearance is less than the minimum value, replace No.5 synchronizer gear ring.



SM0293002

17. Check the No.4 synchronizer gear ring.

- (a) Check for wear and damage.
- (b) Apply gear oil to 4th gear cone.
- (c) Turn No.4 synchronizer gear ring in one direction while pushing it into 4th gear cone.
- (d) Check that the gear ring locks. If No.4 synchronizer gear ring does not lock, replace it.



SM0294002

- (e) Using a feeler gauge, measure clearance between No.4 synchronizer gear ring and spline gear end.

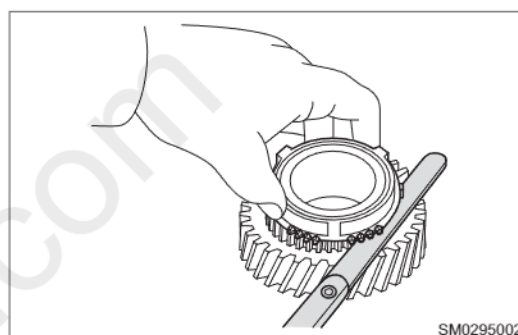
Standard clearance

0.78 - 1.58 mm

Minimum clearance

0.78 mm

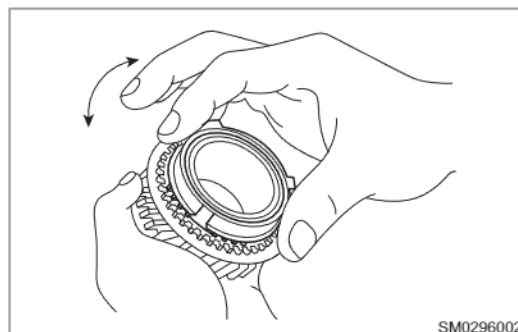
If clearance is less than the minimum value, replace No.4 synchronizer gear ring.



SM0295002

18. Check the No.3 synchronizer gear ring.

- (a) Check for wear and damage.
- (b) Apply gear oil to 3rd gear cone.
- (c) Turn No.3 synchronizer gear ring in one direction while pushing it into 3rd gear cone.
- (d) Check that the gear ring locks. If No.3 synchronizer gear ring does not lock, replace it.



SM0296002

- (e) Using a feeler gauge, measure clearance between No.3 synchronizer gear ring and spline gear end.

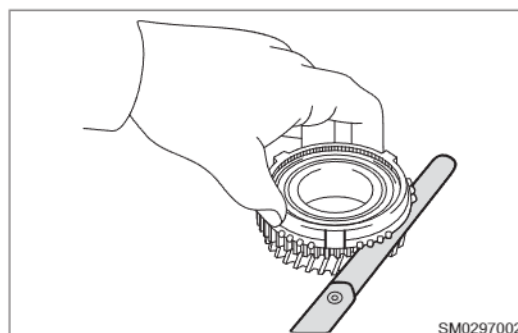
Standard clearance

0.78 - 1.58 mm

Minimum clearance

0.78 mm

If clearance is less than the minimum value, replace No.3 synchronizer gear ring.

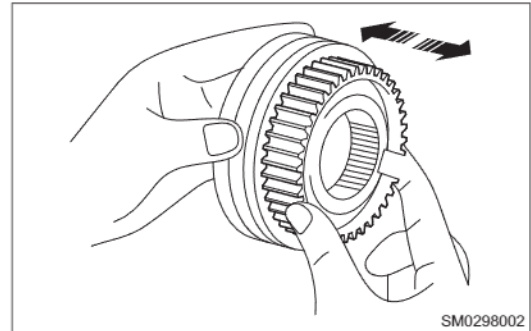


SM0297002



19. Check the No.2 synchronizer gear sleeve.

- (a) Check sliding condition between No.2 synchronizer gear sleeve and No.2 synchronizer gear hub.
- (b) Check that spline edges of No.2 synchronizer gear sleeve are not worn.

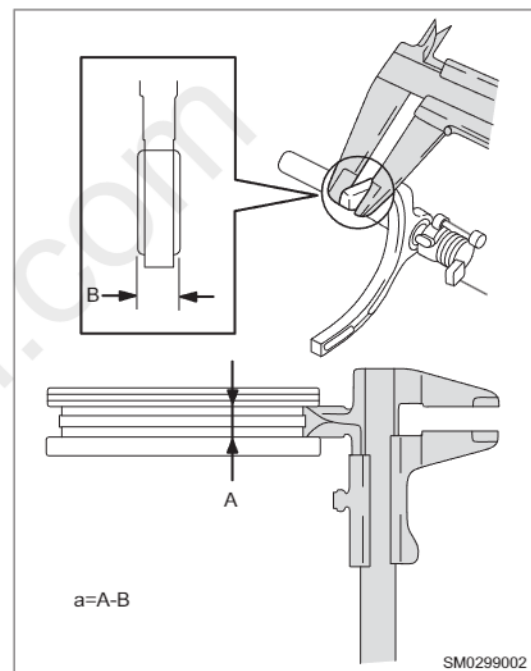


- (c) Using vernier calipers, measure width (A) of fork groove of No.2 synchronizer gear sleeve and thickness (B) of fork claw of No.2 fork shaft sub-assembly, then calculate clearance.

Standard clearance (A) - (B)

0.1 - 0.5 mm

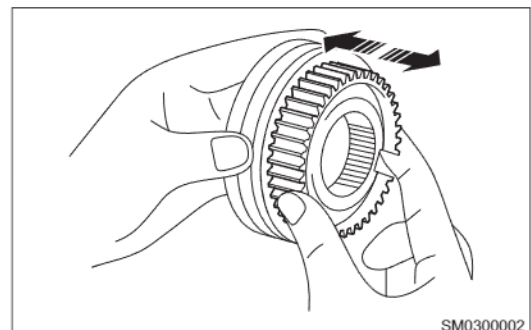
If clearance is not as specified, replace No.2 synchronizer gear sleeve and No.2 fork shaft sub-assembly.



17

20. Check the No.3 synchronizer gear sleeve.

- (a) Check sliding condition between No.3 synchronizer gear sleeve and No.3 synchronizer gear hub.
- (b) Check that spline edges of No.3 synchronizer gear sleeve are not worn.

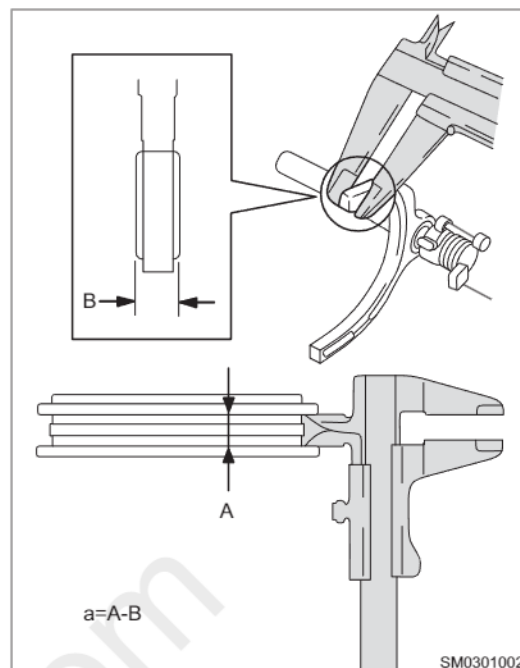


- (c) Using vernier calipers, measure width (A) of fork groove of No.3 synchronizer gear sleeve and thickness (B) of fork claw of No.3 fork shaft sub-assembly, then calculate clearance.

Standard clearance (A) - (B)

0.1 - 0.5 mm

If clearance is not as specified, replace No.3 synchronizer gear sleeve and No.3 fork shaft sub-assembly.



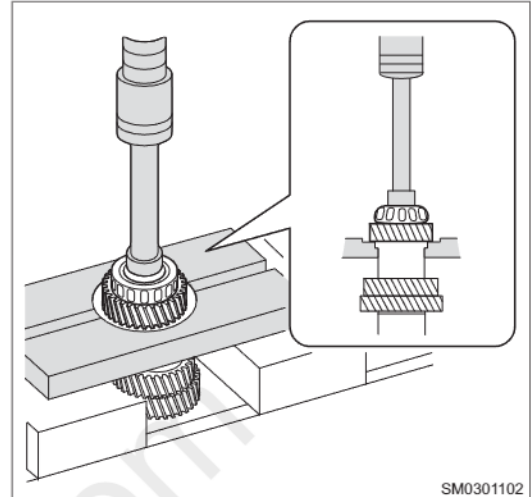
Output Shaft Sub-assembly

Disassembly

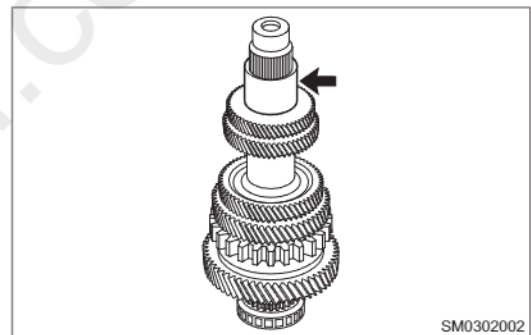
1. Remove the 6th driven gear.
 - (a) Using special tool and press, remove output shaft rear bearing and 6th driven gear from output shaft.

Caution:

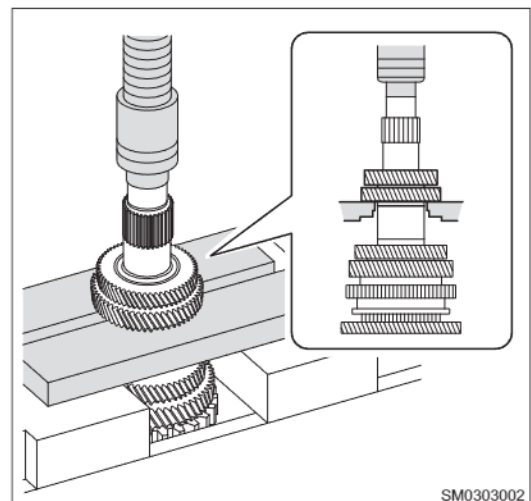
- Output shaft rear bearing is a non-reusable component, and replace it after removal.



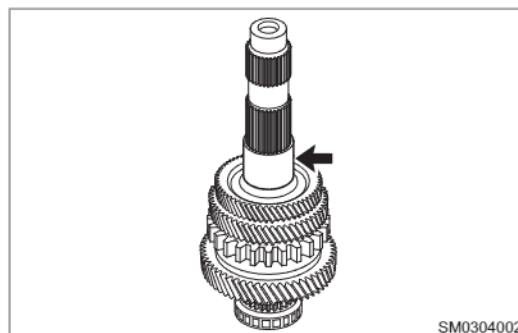
2. Remove the output shaft spacer.
 - (a) Remove output shaft spacer (arrow) from output shaft.



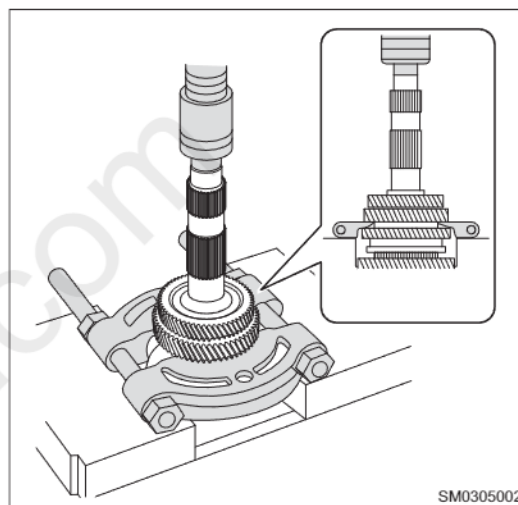
3. Remove 5th and 4th driven gears.
 - (a) Using special tool and press, remove 5th driven gear and 4th driven gear from output shaft.



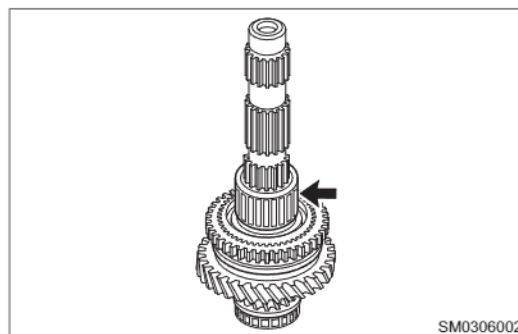
4. Remove the gear shaft.
 - (a) Remove gear shaft bushing (arrow) from output shaft.



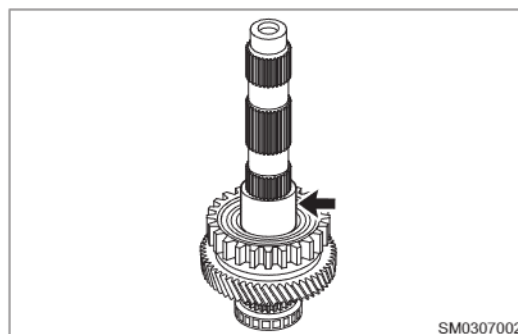
5. Remove 3rd and 2nd gears.
 - (a) Using special tool and press, remove 3rd driven gear and 2nd gear from output shaft.



6. Remove the 2nd gear needle roller bearing.
 - (a) Remove 2nd gear needle roller bearing (arrow) from 2nd gear shaft bushing.

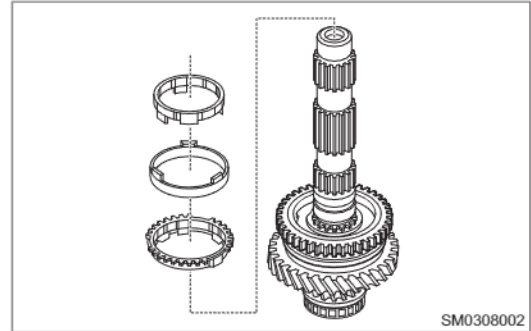


7. Remove the 2nd gear shaft bushing.
 - (a) Remove 2nd gear shaft bushing (arrow) from output shaft.



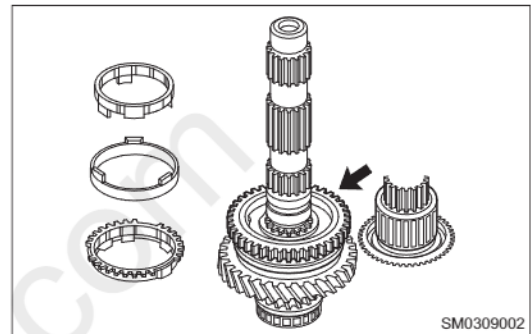
8. Remove the No.1 synchronizer gear ring set (2nd gear side).

- (a) Remove No.1 synchronizer gear ring set (2nd gear side) from No.1 synchronizer gear hub.



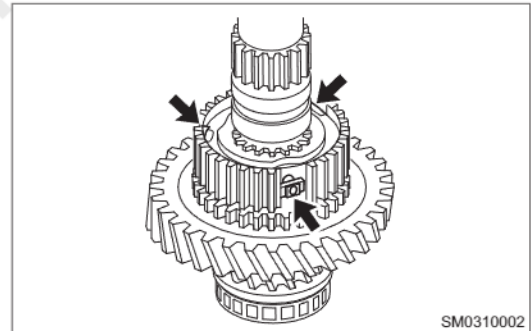
9. Remove the No.1 synchronizer gear sleeve.

- (a) Remove No.1 synchronizer gear sleeve (arrow) from No.1 synchronizer gear hub.



10. Remove the synchronizer slider.

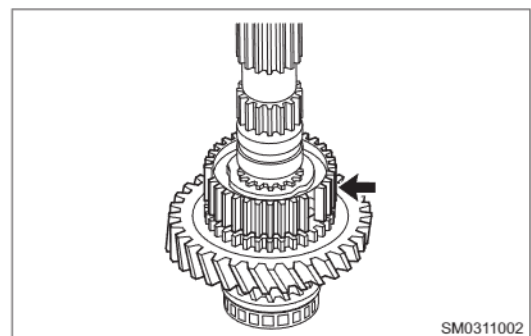
- (a) Remove 3 synchronizer sliders (arrow) from No.1 synchronizer gear hub.



17

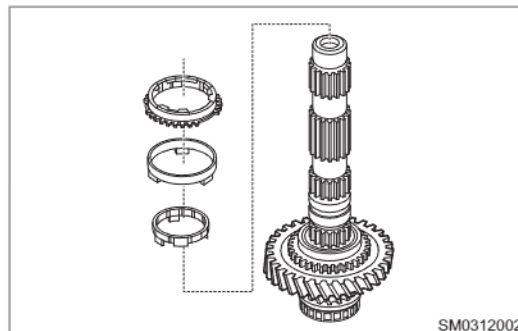
11. Remove the No.1 synchronizer gear hub.

- (a) Remove No.1 synchronizer gear hub (arrow) from output shaft.



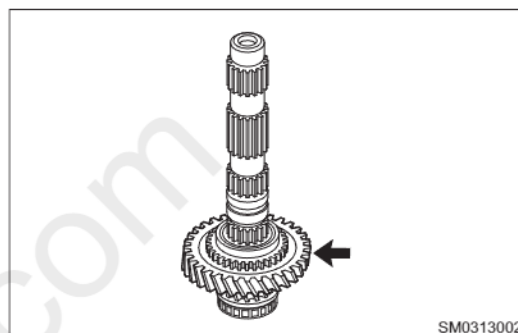
12. Remove the No.1 synchronizer gear ring set (1st gear side).

- (a) Remove No.1 synchronizer gear ring set (1st gear side) from No.1 synchronizer gear hub.



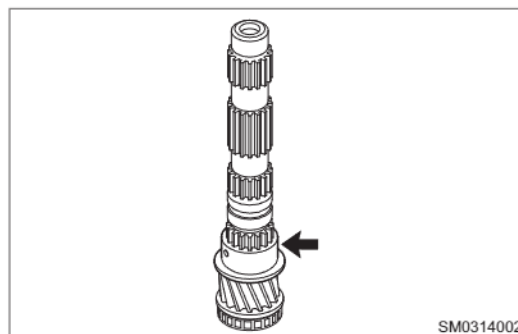
13. Remove the 1st gear.

- (a) Remove 1st gear (arrow) from output shaft.



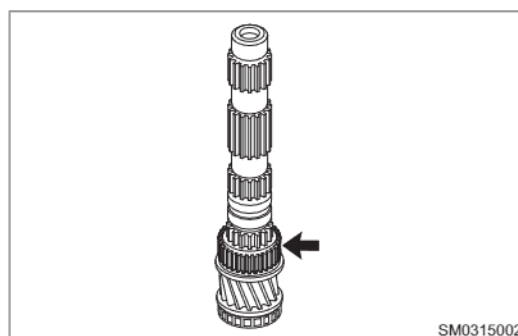
14. Remove the 1st gear needle roller bearing.

- (a) Remove 1st gear needle roller bearing (arrow) from 1st gear shaft bushing.



15. Remove the 1st gear shaft bushing.

- (a) Remove 1st gear shaft bushing (arrow) from output shaft.

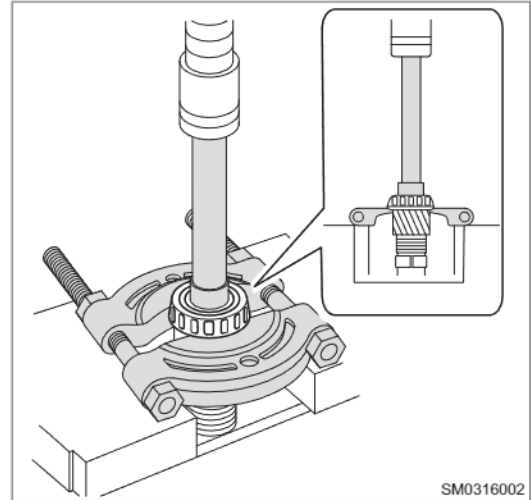


16. Remove the output shaft front bearing.

- (a) Using special tool and press, remove output shaft front bearing from output shaft.

Caution:

- Output shaft front bearing is a non-reusable component, and replace it after removal.

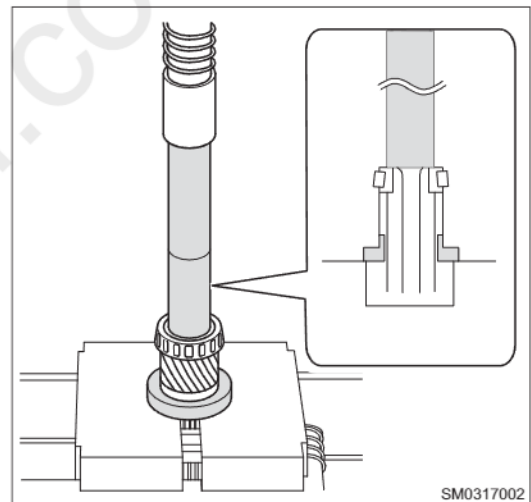
**Assembly**

1. Install the output shaft front bearing inner race.

- (a) Using special tool and press, install new output shaft front bearing inner race to output shaft.

Caution:

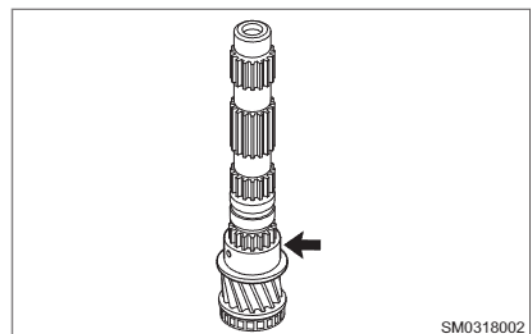
- Output shaft front bearing is a non-reusable component, and replace it after removal.



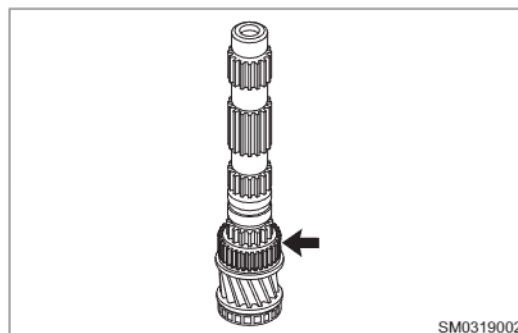
17

2. Install the 1st gear shaft bushing.

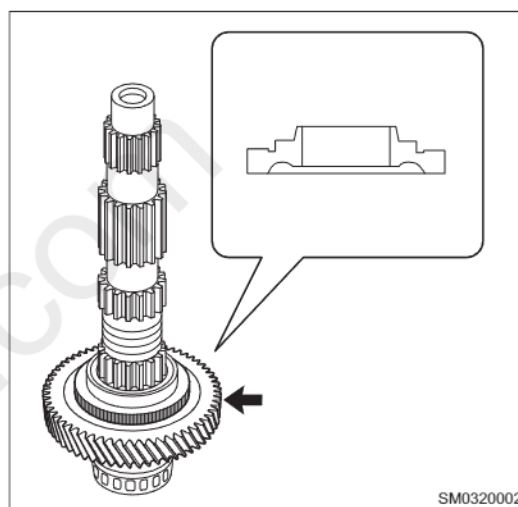
- (a) Apply gear oil to 1st gear shaft bushing (arrow), and install it to output shaft.



3. Install the 1st gear needle roller bearing.
 - (a) Apply gear oil to 1st gear needle roller bearing (arrow), and install it to output shaft.



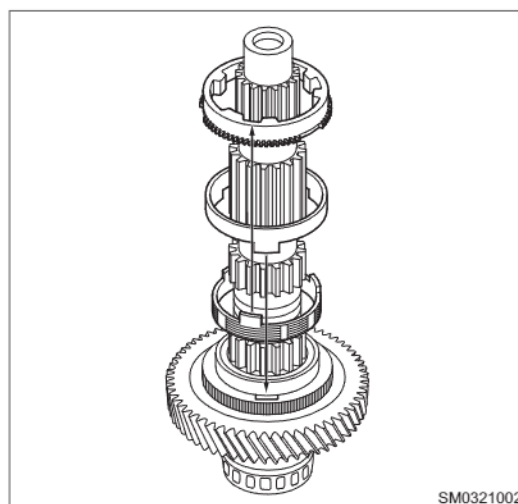
4. Install the 1st gear.
 - (a) Apply gear oil to 1st gear (arrow), and install it to output shaft.



5. Install the No.1 synchronizer gear ring set (1st gear side).
 - (a) Apply gear oil to 1st gear cone and No.1 synchronizer set (inner ring, middle ring and outer ring), and install inner ring, middle ring and outer ring to 1st gear in sequence.

Caution:

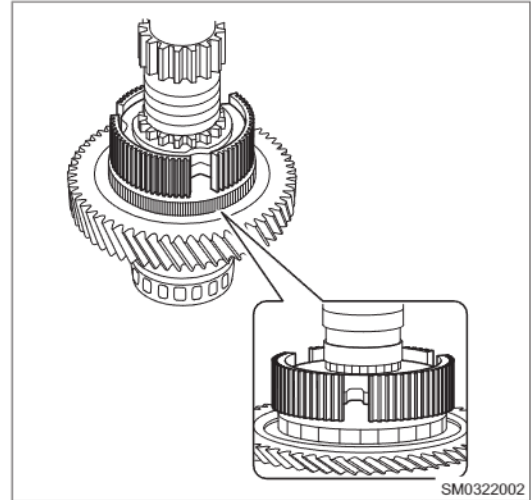
- Install claws of middle ring to grooves of 1st gear.
- Align claw of inner ring with groove of outer ring before installing outer ring.



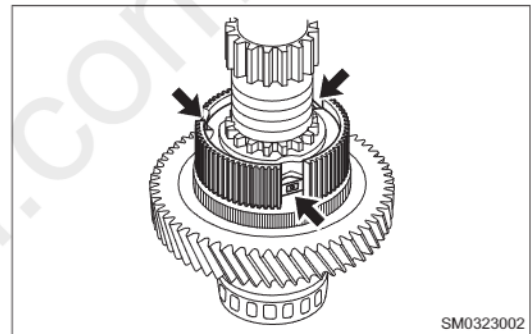
6. Install the No.1 synchronizer gear hub.
 (a) Install No.1 synchronizer gear hub to output shaft.

Caution:

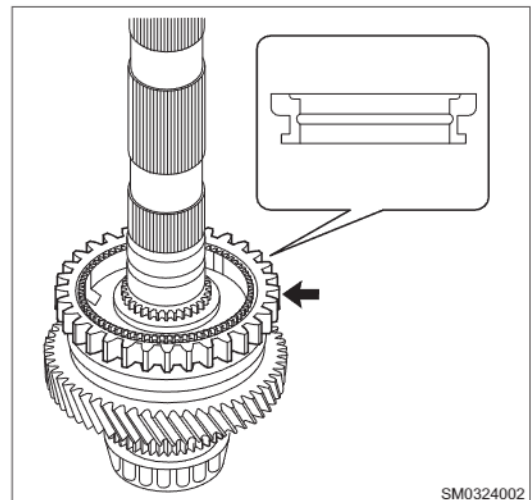
- Align notch of No.1 synchronizer gear hub with boss of outer ring.



7. Install the synchronizer slider.
 (a) Install 3 synchronizer sliders (arrow) to No.1 synchronizer gear hub.



8. Install the No.1 synchronizer gear sleeve.
 (a) Apply gear oil to No.1 synchronizer gear sleeve and No.1 synchronizer gear hub, and install No.1 synchronizer gear sleeve (arrow) to No.1 synchronizer gear hub.

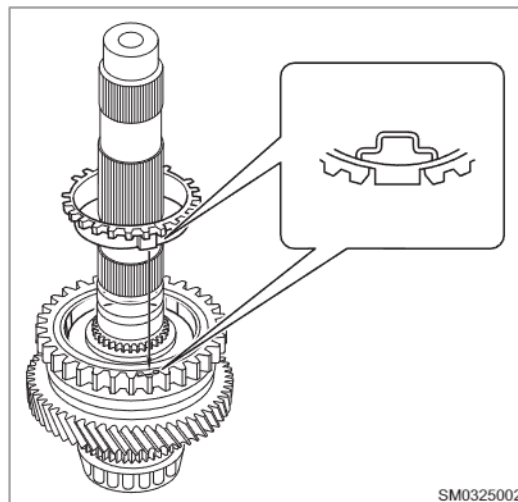


9. Install the No.1 synchronizer gear ring set (2nd gear side).
 (a) Apply gear oil to No.1 synchronizer gear ring set (inner ring, middle ring and outer ring).

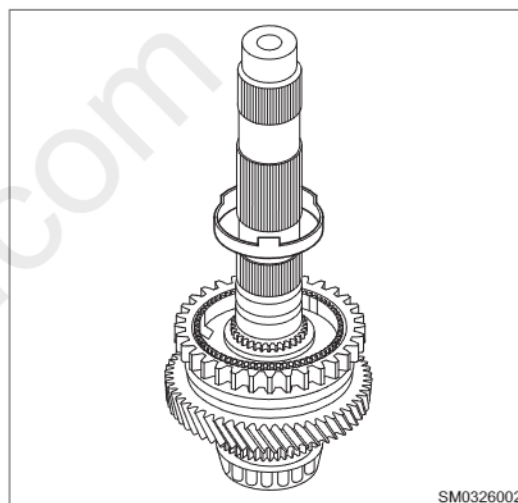
- (b) Install outer ring to No.1 synchronizer gear hub.

Caution:

- Align boss of outer ring with notch of No.1 synchronizer gear hub before installing outer ring.



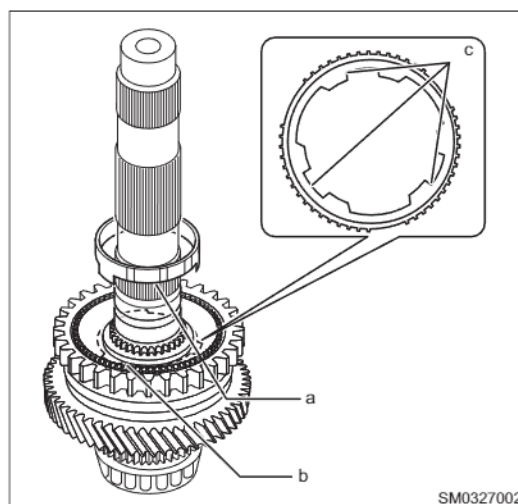
- (c) Install middle ring to outer ring.



- (d) Install inner ring to middle ring.

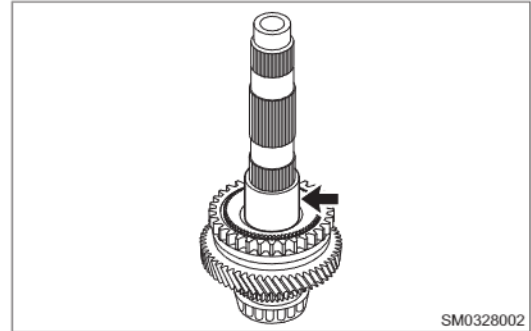
Caution:

- Align notch (c) of outer ring (b) with boss of inner ring before installing inner ring (a).



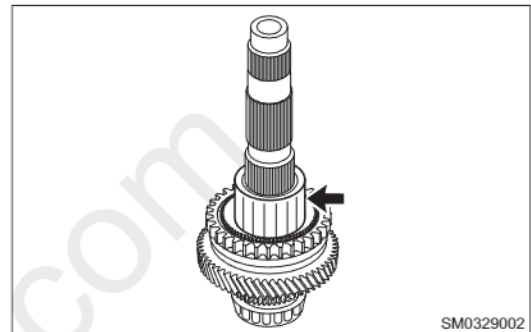
10. Install the 2nd gear shaft bushing.

- (a) Apply gear oil to 2nd gear shaft bushing (arrow), and install it to output shaft.



11. Install the 2nd gear needle roller bearing.

- (a) Apply gear oil to 2nd gear needle roller bearing (arrow), and install it to output shaft.

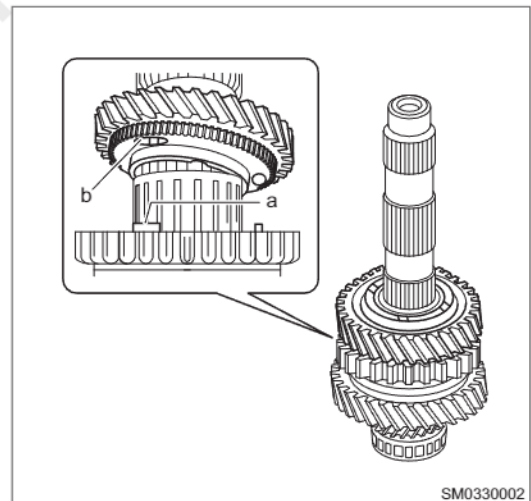


12. Install the 2nd gear.

- (a) Apply gear oil to 2nd gear, and install it to output shaft.

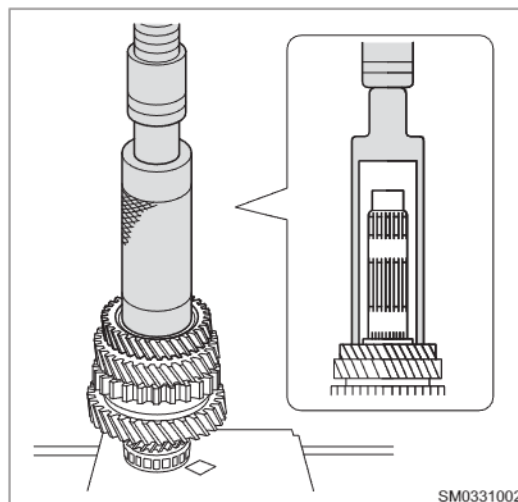
Caution:

- Align claw (a) of middle ring with groove (b) of 2nd gear before installing 2nd gear.



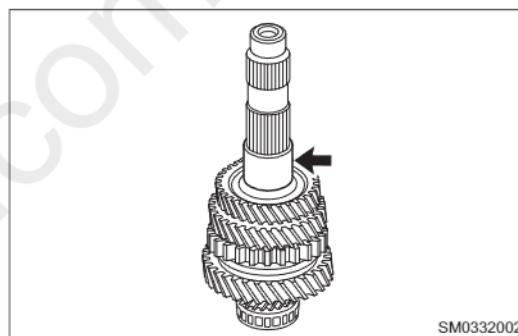
13. Install the 3rd driven gear.

- (a) Using special tool and press, install 3rd driven gear to output shaft.



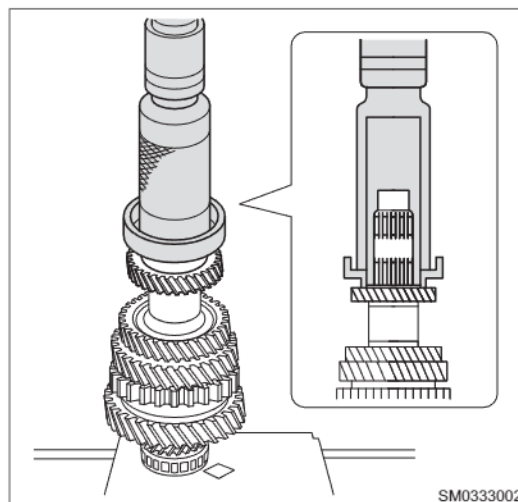
14. Install the output shaft spacer.

- (a) Install output shaft spacer (arrow) to output shaft.



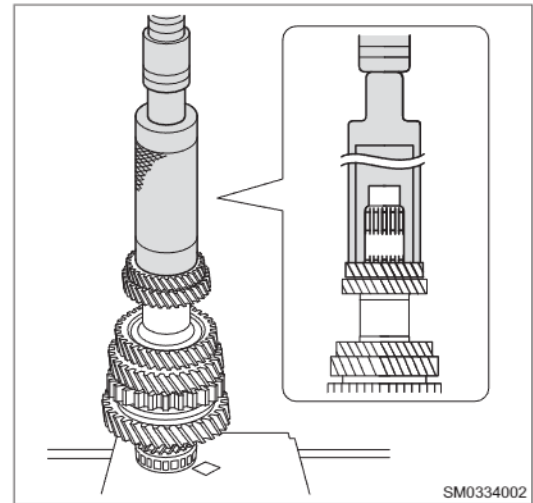
15. Install the 4th driven gear.

- (a) Using special tool and press, install 4th driven gear to output shaft.



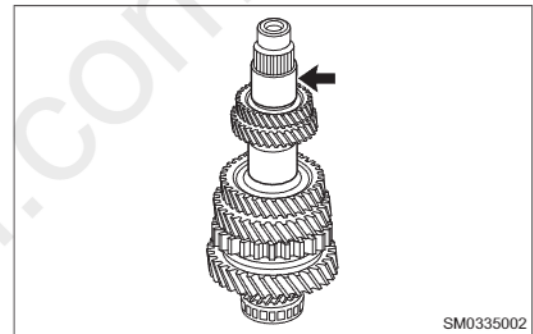
16. Install the 5th driven gear.

- (a) Using special tool and press, install 5th driven gear to output shaft.



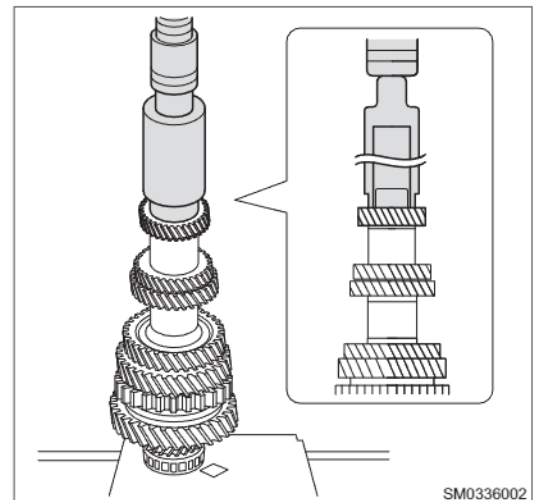
17. Install the output shaft spacer.

- (a) Install output shaft spacer (arrow) to output shaft.



18. Install the 6th driven gear.

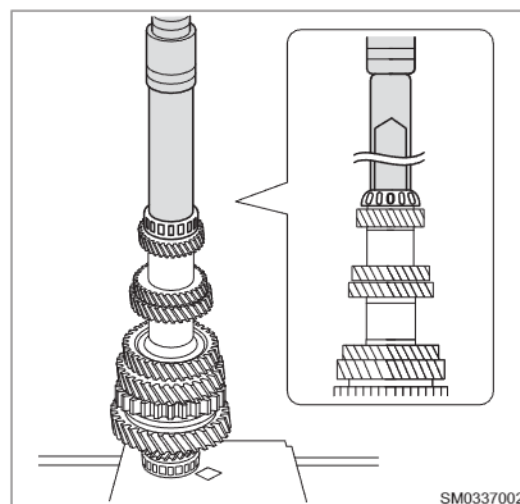
- (a) Using special tool and press, install 6th driven gear to output shaft.



19. Install the output shaft rear bearing.
- (a) Using special tool and press, install new output shaft rear bearing to output shaft.

Caution:

- Output shaft rear bearing is a non-reusable component, and replace it after removal.



Output Shaft Sub-assembly Inspection

1. Check the 1st gear axial clearance.
- (a) Check the 1st gear axial clearance.

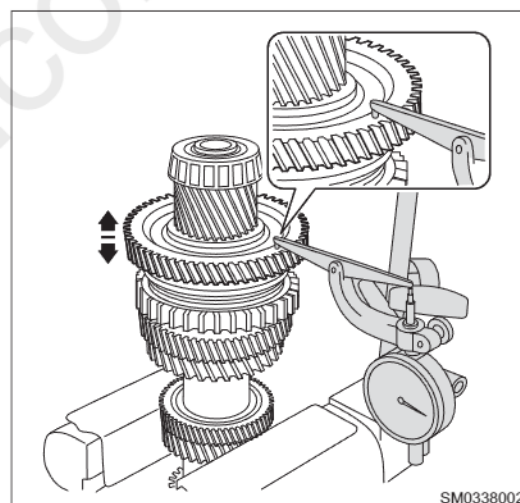
Standard clearance

0.20 - 0.38 mm

Maximum clearance

0.38 mm

If clearance is more than the maximum value, replace No.1 synchronizer gear hub, 1st gear shaft bushing or 1st gear.



2. Using a dial indicator, measure 2nd gear axial clearance.

- (a) Using a dial indicator, measure 2nd gear axial clearance.

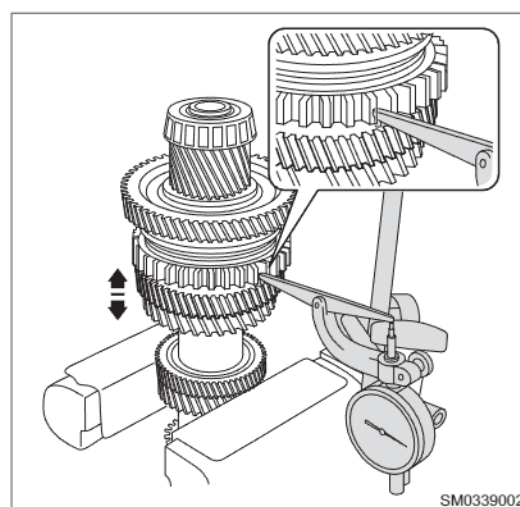
Standard clearance

0.15 - 0.33 mm

Maximum clearance

0.33 mm

If clearance is more than the maximum value, replace No.1 synchronizer gear hub, 2nd gear shaft bushing, 2nd gear or 3rd driven gear.



3. Using a dial indicator, measure 1st gear radial clearance.

- (a) Using a dial indicator, measure 1st gear radial clearance.

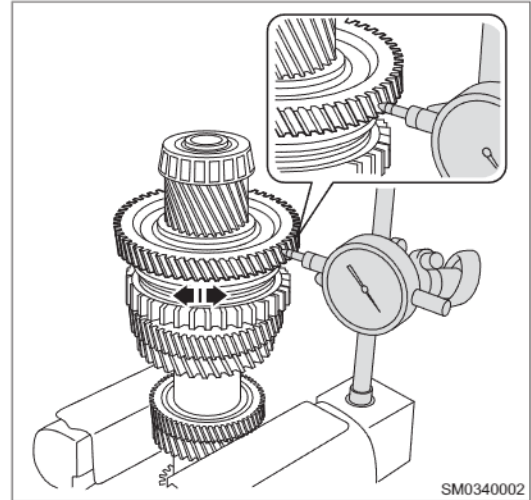
Standard clearance

0.009 - 0.047 mm

Maximum clearance

0.047 mm

If clearance is more than the maximum value, replace 1st gear, 1st gear needle roller bearing or output shaft.



4. Check the 2nd gear radial clearance.

- (a) Using a dial indicator, measure 2nd gear radial clearance.

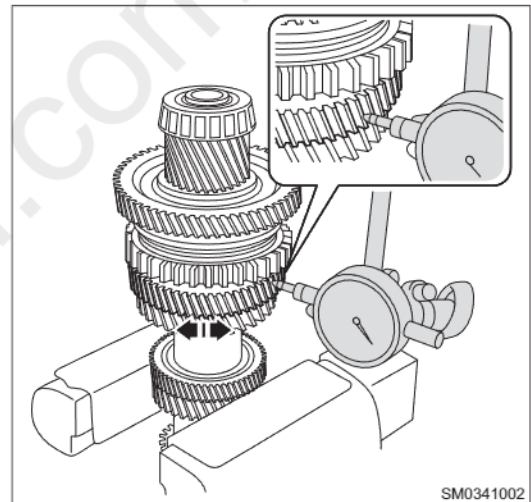
Standard clearance

0.009 - 0.047 mm

Maximum clearance

0.047 mm

If clearance is more than the maximum value, replace 2nd gear, 2nd gear needle roller bearing or output shaft.



17

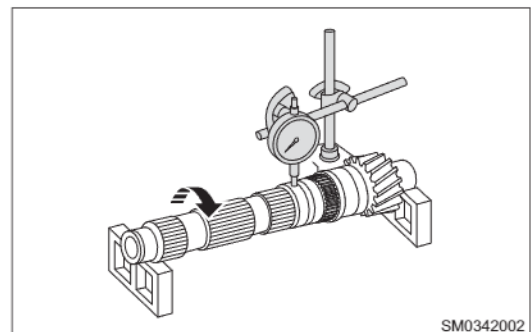
5. Check the output shaft.

- (a) Using a dial indicator and 2 V-blocks, check output shaft runout.

Maximum runout

0.03 mm

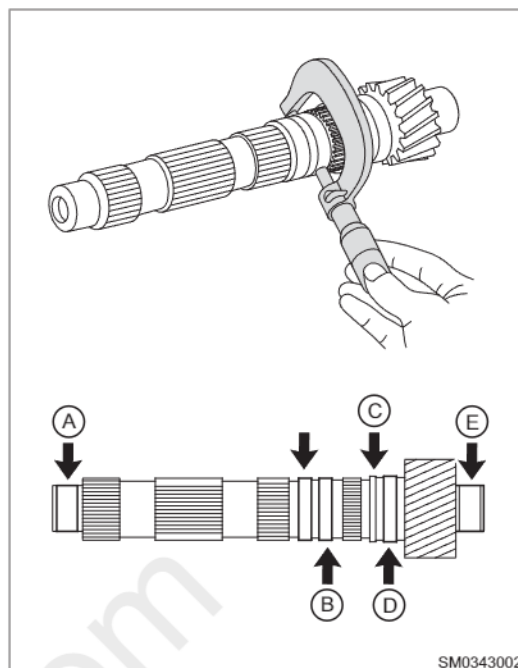
If runout is more than the maximum value, replace output shaft.



- (b) Using a micrometer, measure outer diameter of output shaft journal surface at specified locations.

Part	Standard outer diameter	Minimum outer diameter
A	30.002 - 30.017 mm	30.002 mm
B	37.990 - 38.000 mm	37.990 mm
C	40.790 - 40.800 mm	40.790 mm
D	40.790 - 40.800 mm	40.790 mm
E	28.002 - 28.017 mm	28.002 mm

If outer diameter of any location is less than the minimum value, replace output shaft.



SM0343002

6. Check the 1st gear.

- (a) Using a cylinder gauge, measure inner diameter of 1st gear.

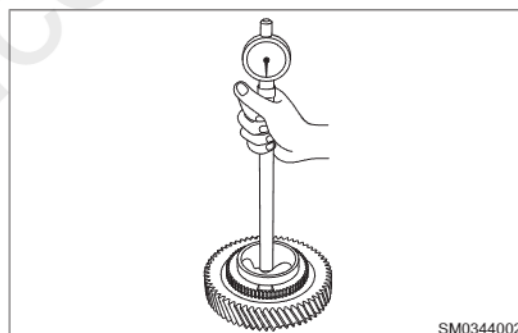
Standard inner diameter

52.909 - 52.925 mm

Maximum inner diameter

52.925 mm

If inner diameter is more than the maximum value, replace 1st gear.



SM0344002

7. Check the 2nd gear.

- (a) Using a cylinder gauge, measure inner diameter of 2nd gear.

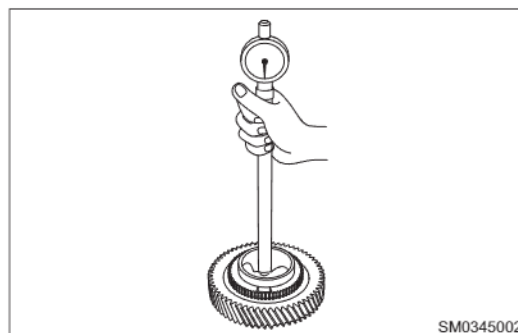
Standard inner diameter

52.909 - 52.925 mm

Maximum inner diameter

52.925 mm

If inner diameter is more than the maximum value, replace 2nd gear shaft bushing.



SM0345002

8. Check the 1st gear shaft bushing.

- (a) Using a micrometer, measure outer diameter of 1st gear shaft bushing.

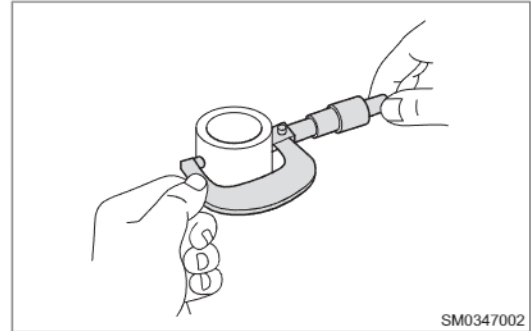
Standard outer diameter

47.89 - 47.90 mm

Minimum outer diameter

47.89 mm

If outer diameter is less than the minimum value, replace 1st gear shaft bushing.



- (b) Using a cylinder gauge, measure inner diameter of 1st gear shaft bushing.

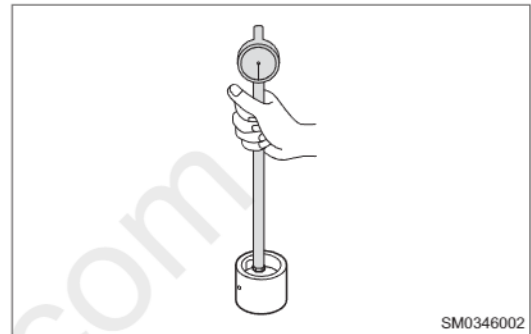
Standard inner diameter

40.805 - 40.820 mm

Maximum inner diameter

40.820 mm

If inner diameter is more than the maximum value, replace 1st gear shaft bushing.



9. Check the 2nd gear shaft bushing.

- (a) Using a micrometer, measure outer diameter of 2nd gear shaft bushing.

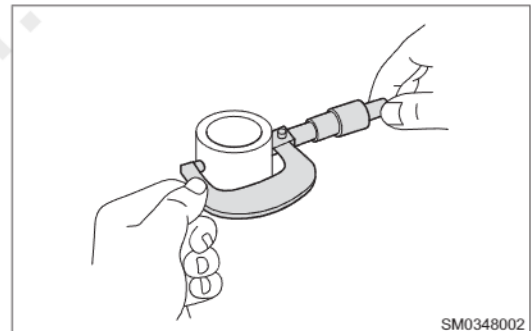
Standard outer diameter

47.89 - 47.90 mm

Minimum outer diameter

47.89 mm

If outer diameter is less than the minimum value, replace 2nd gear shaft bushing.



- (b) Using a cylinder gauge, measure inner diameter of 2nd gear shaft bushing.

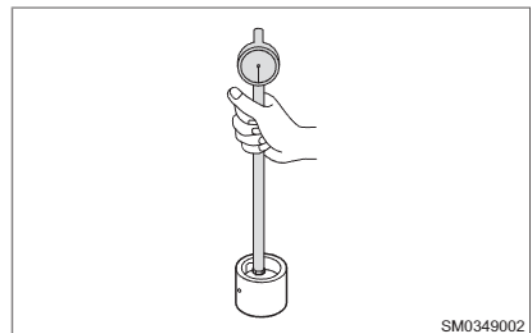
Standard inner diameter

38.005 - 38.020 mm

Maximum inner diameter

38.020 mm

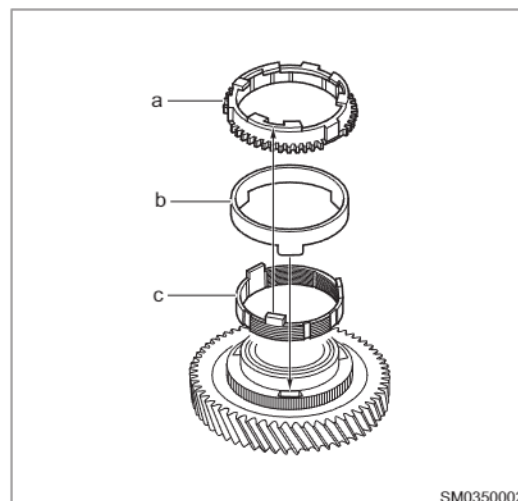
If inner diameter is more than the maximum value, replace 2nd gear shaft bushing.



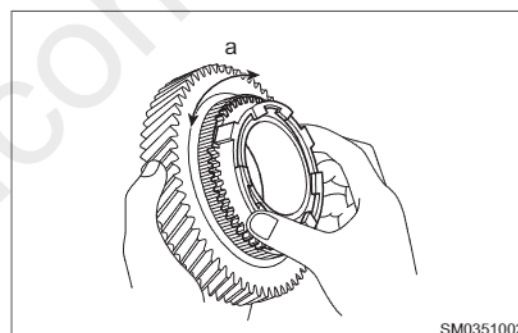
10. Check the No.1 synchronizer gear ring set (1st gear).

- Apply gear oil to 1st gear cone and No.1 synchronizer gear ring set (inner ring, middle ring and outer ring).
- Install inner ring (a) to 1st gear.
- Install middle ring (b) to 1st gear.

- (d) Install outer ring (c) to 1st gear.



- (e) Check for wear and damage.
 (f) Turn No. 1 synchronizer gear ring set (inner ring, middle ring and outer ring) in one direction while pushing it against 1st gear cone.
 (g) Check that No.1 synchronizer gear ring set (inner ring, middle ring and outer ring) locks. If No.1 synchronizer gear ring set (inner ring, middle ring and outer ring) does not lock, replace it.



- (h) Using a feeler gauge, measure clearance between No.1 synchronizer gear ring set (inner ring, middle ring and outer ring) and spline end.

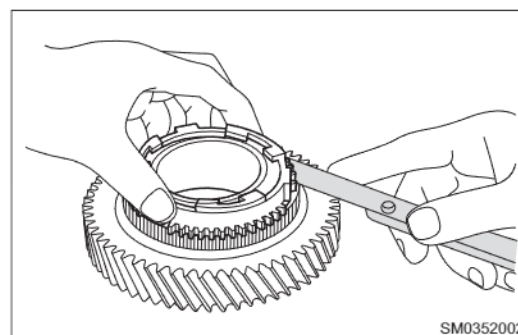
Standard clearance

0.915 - 1.855 mm

Minimum clearance

0.915 mm

If clearance is less than the minimum value, replace No.1 synchronizer gear ring set (inner ring, middle ring and outer ring).

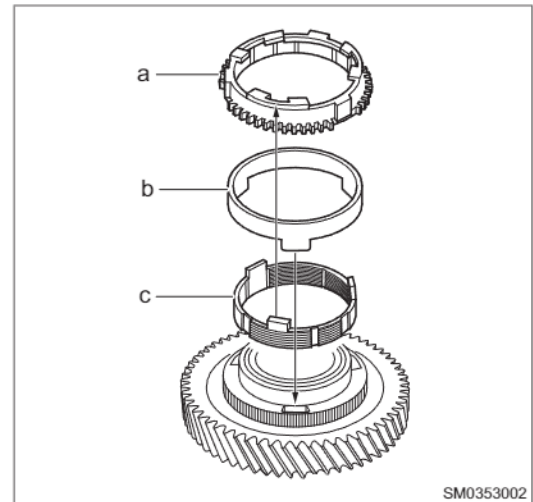


11. Check the No.1 synchronizer gear ring set (2nd gear).

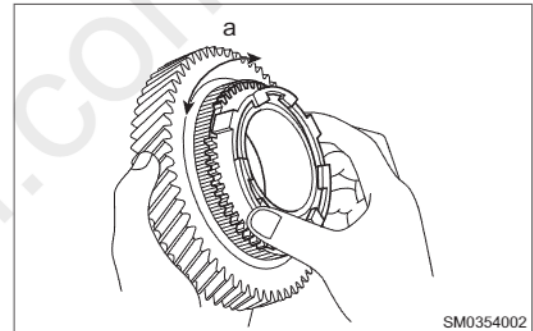
- (a) Apply gear oil to 2nd gear cone and No.1 synchronizer gear ring set (inner ring, middle ring and outer ring).
 (b) Install inner ring (a) to 2nd gear.
 (c) Install middle ring (b) to 2nd gear.



- (d) Install outer ring (c) to 2nd gear.



- (e) Check for wear and damage.
 (f) Turn No. 1 synchronizer gear ring set (inner ring, middle ring and outer ring) in one direction while pushing it against 2nd gear cone.
 (g) Check that No.1 synchronizer gear ring set (inner ring, middle ring and outer ring) locks. If No.1 synchronizer gear ring set (inner ring, middle ring and outer ring) does not lock, replace it.



- (h) Using a feeler gauge, measure clearance between No.1 synchronizer gear ring set (inner ring, middle ring and outer ring) and spline end.

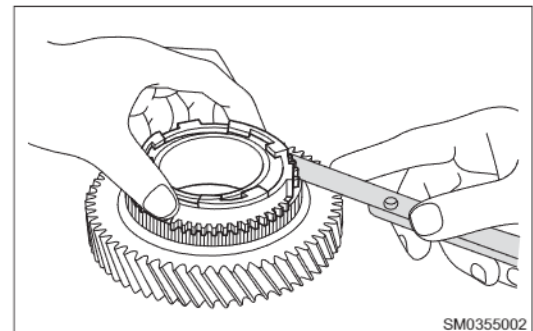
Standard clearance

0.92 - 1.86 mm

Minimum clearance

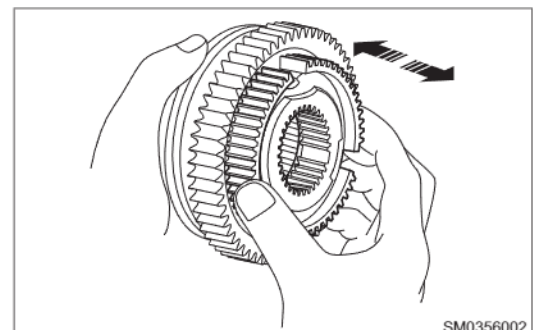
0.92 mm

If clearance is less than the minimum value, replace No.1 synchronizer gear ring set (inner ring, middle ring and outer ring).



12. Check the No.1 synchronizer gear sleeve.

- (a) Check sliding condition (arrow) between No.1 synchronizer gear sleeve and No.1 synchronizer gear hub.
 (b) Check that spline edges of No.1 synchronizer gear sleeve are not worn.

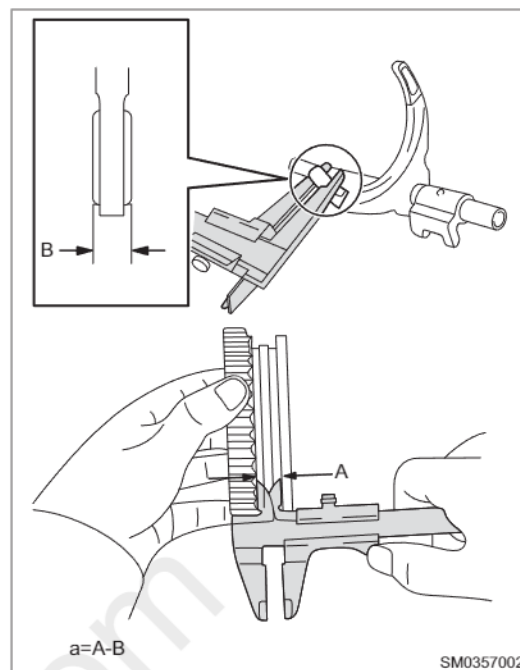


- (c) Using vernier calipers, measure width (A) of fork groove of No.1 synchronizer gear sleeve and thickness (B) of fork claw of No.1 fork shaft sub-assembly, then calculate clearance.

Standard clearance (A) - (B)

0.1 - 0.5 mm

If clearance is not as specified, replace No.1 synchronizer gear sleeve and No.1 fork shaft sub-assembly.



Select and Shift Shaft Assembly

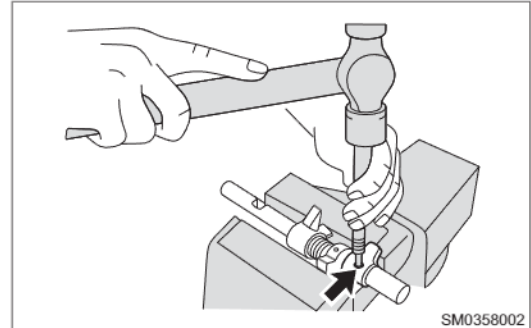
Removal

1. Remove the interlock block.

- (a) Using 5 mm pin punch and hammer, remove elastic cylindrical pin and inner interlock block (arrow) from select and shift shaft.

Caution:

- Select and shift shaft elastic cylindrical pin is a non-reusable component, and replace it after removal.

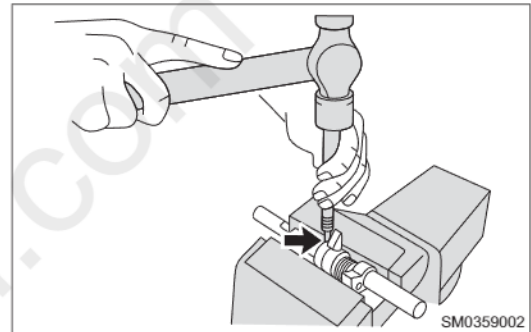


2. Remove the straight pin.

- (a) Using 5 mm pin punch and hammer, remove elastic cylindrical pin (arrow) from select limit block.

Caution:

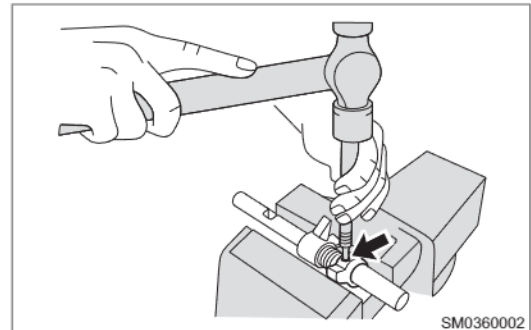
- Select and shift shaft elastic cylindrical pin is a non-reusable component, and replace it after removal.



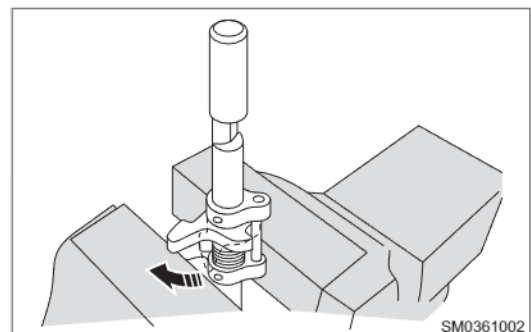
- (b) Using 5 mm pin punch and hammer, remove elastic cylindrical pin (arrow) from inner shift lever.

Caution:

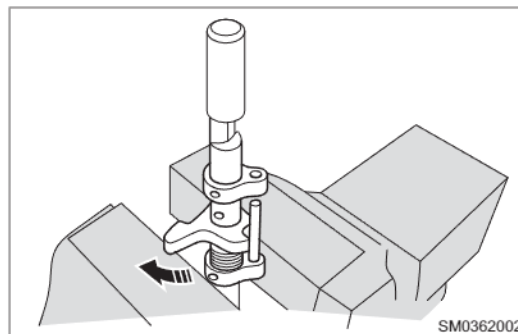
- Select and shift shaft elastic cylindrical pin is a non-reusable component, and replace it after removal.



- (c) Rotate select and shift block clockwise.

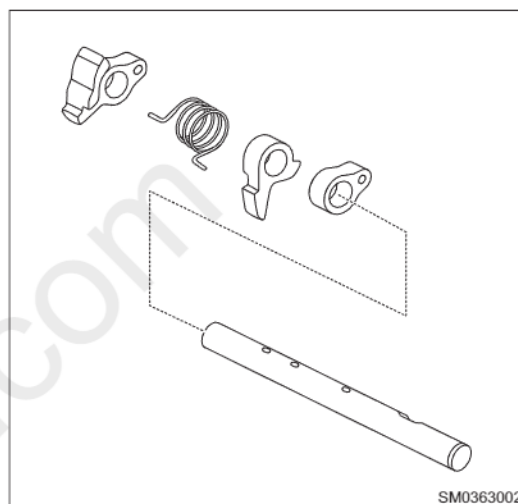


- (d) Slide select limit block upward, and remove straight pin from inner shift lever.



3. Remove the select limit block.

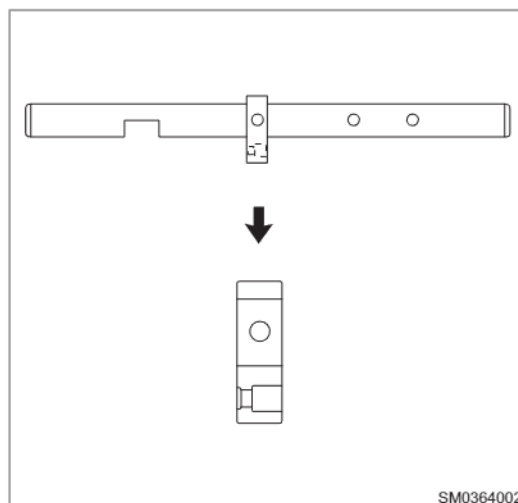
- (a) Remove inner shift lever, torsion spring, select and shift block and select limit block from select and shift shaft.



Installation

1. Install the select limit block.

- (a) Apply gear oil to select limit block, and install it in direction of arrow as shown in illustration.



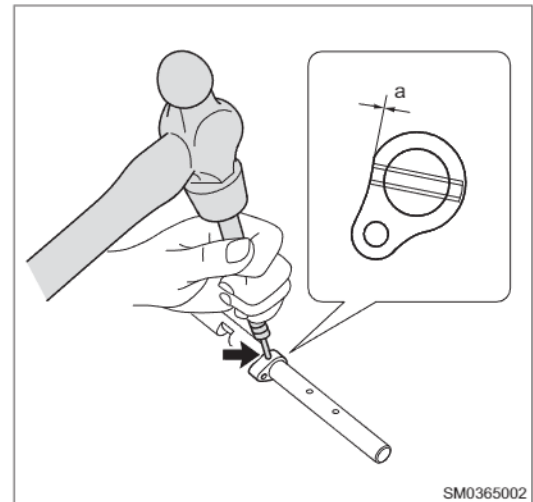
- (b) Using 5 mm pin punch and hammer, install elastic cylindrical pin and select limit block to select and shift shaft.

Standard depth

-0.2 - 0.8 mm

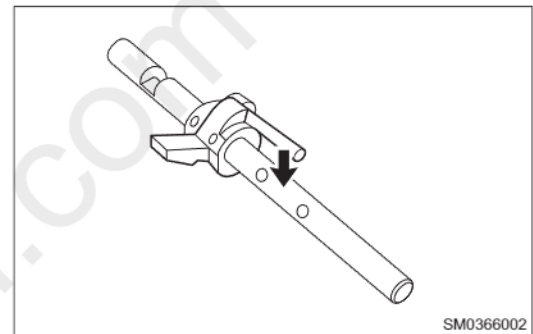
Caution:

- Select and shift shaft elastic cylindrical pin is a non-reusable component, and replace it after removal.

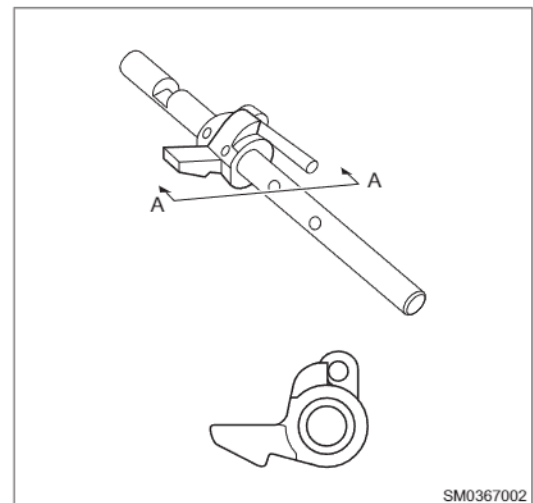


2. Install the straight pin

- (a) Install straight pin (arrow) to select limit block.

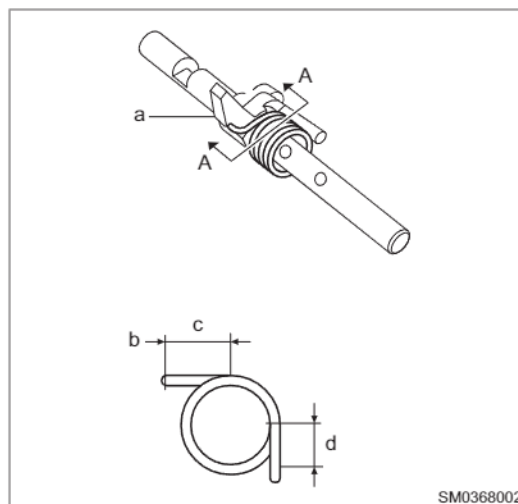


- (b) Apply gear oil to select and shift block, and install it as shown in illustration.



(c) Install torsion spring as shown in illustration.

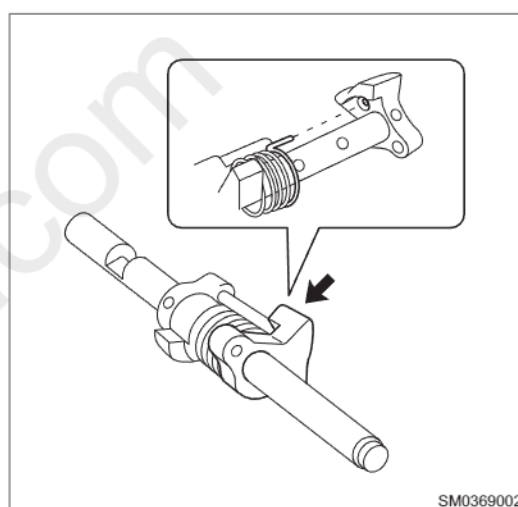
- (1) a: Hook
- (2) b: Hook side
- (3) c: 14.5 - 15.5 mm
- (4) d: 8.3 - 9.3 mm



(d) Apply gear oil to inner shift lever, and install it in direction of arrow as shown in illustration.

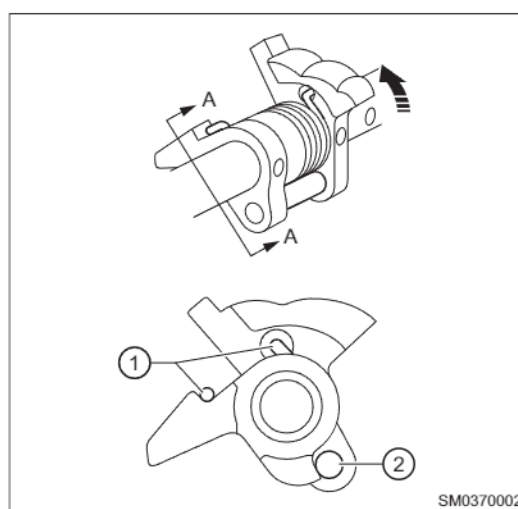
Caution:

- Insert torsion spring into installation hole of inner shift lever.



(e) Turn inner shift lever counterclockwise to align it with installation hole of straight pin for installation.

- (1) Torsion spring
- (2) Straight pin



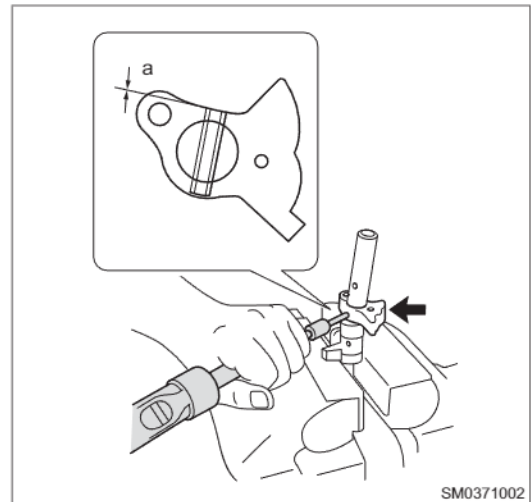
- (f) Using a 5 mm pin punch and hammer, install elastic cylindrical pin and inner shift lever (arrow) to select and shift shaft.

Standard depth

-0.2 - 0.8 mm

Caution:

- Select and shift shaft elastic cylindrical pin is a non-reusable component, and replace it after removal.



3. Install the interlock block.

- (a) Apply gear oil to interlock block.

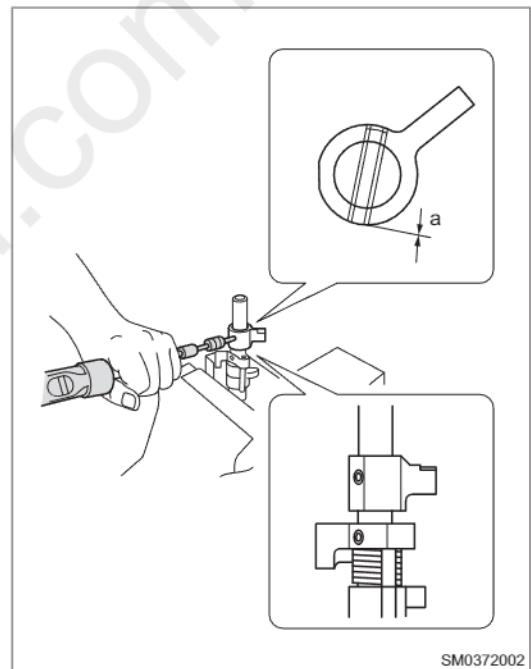
- (b) Using a 5 mm pin punch and hammer, install elastic cylindrical pin and interlock block to select and shift shaft.

Standard depth (a)

0 - 0.6 mm

Caution:

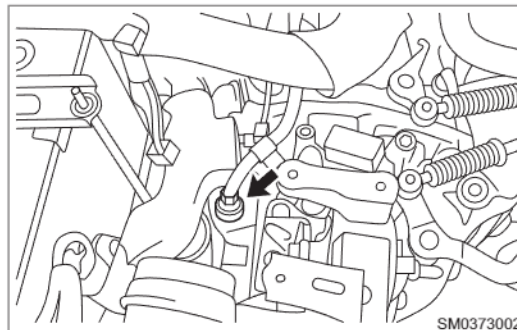
- Select and shift shaft elastic cylindrical pin is a non-reusable component, and replace it after removal.



Transmission External Accessory

Removal

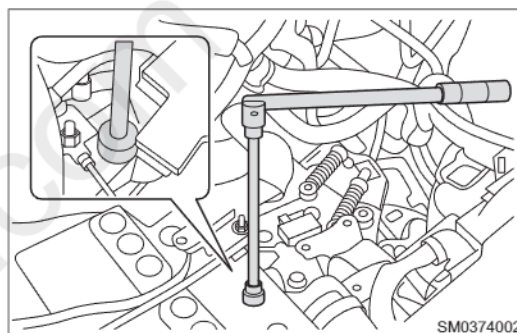
1. Remove the back-up light switch connector.
 - (a) Remove back-up light switch (arrow) from transmission.



2. Remove the reverse switch assembly.
 - (a) Using a tool, remove reverse switch assembly and bolt washer from transmission assembly.

Caution:

- Reverse switch bolt washer is a non-reusable component, and replace it after removal.



Installation

1. Installation is in the reverse order of removal

Tightening torque

$44 \pm 8.8 \text{ N}\cdot\text{m}$

Caution:

Apply thread adhesive to threads before installation.

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