

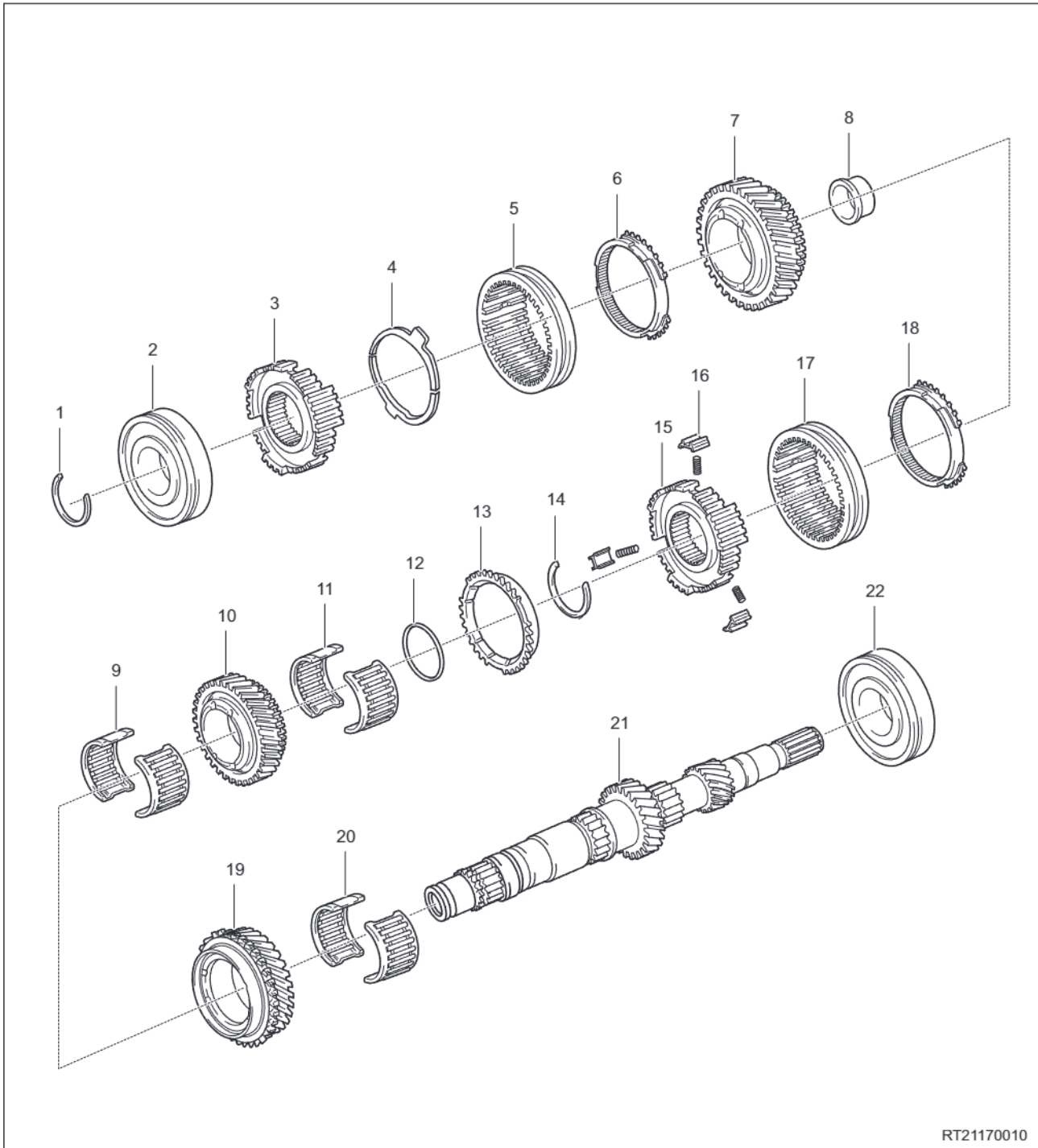
QR525MHE TRANSMISSION

GENERAL INFORMATION	17-3	Disassembly	17-22
Description	17-3	Assembly	17-27
Operation	17-8	Installation	17-32
Specifications	17-8	Gear Shift Mechanism	17-33
Daily Maintenance	17-9	Disassembly	17-33
Tools	17-9	Assembly	17-34
DIAGNOSIS & TESTING	17-12	Shift Fork	17-35
Problem Symptoms Table	17-12	Disassembly	17-35
On-vehicle Inspection	17-13	Inspection	17-37
ON-VEHICLE SERVICE	17-14	Assembly	17-37
Transmission Oil	17-14	Input Shaft	17-38
Replacement	17-14	Disassembly	17-38
Differential Oil Seal	17-16	Assembly	17-42
Removal	17-16	Inspection	17-47
Installation	17-16	Output Shaft	17-48
Select and Shift Cable	17-18	Disassembly	17-48
Removal	17-18	Assembly	17-52
Installation	17-19	Inspection	17-56
Gear Shift Control Mechanism	17-20	Transmission External Accessory	17-57
Removal	17-20	Removal	17-57
Installation	17-20	Installation	17-58
Transmission Assembly	17-21	Transmission Case	17-60
Removal	17-21	Disassembly	17-60
		Assembly	17-63

GENERAL INFORMATION

Description

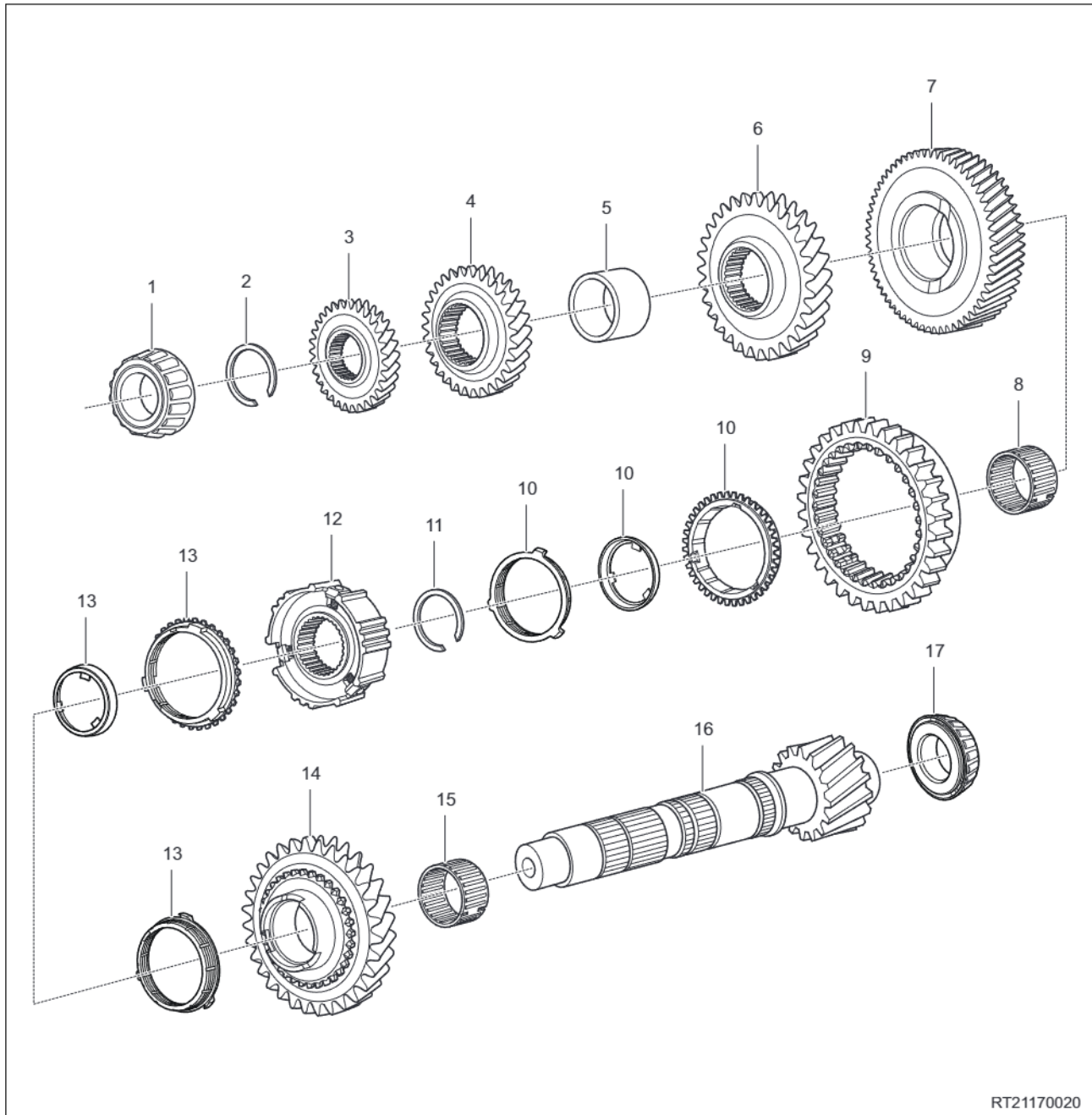
Input Shaft



17

1 - Input Shaft Rear Bearing Snap Ring	2 - Input Shaft Rear Bearing
3 - 5th Synchronizer Gear Hub	4 - 5th Synchronizer Meshing Plate
5 - 5th Synchronizer Outer Race	6 - 5th Synchronizer Ring
7 - 5th Drive Gear	8 - 5th Gear Shaft Bushing
9 - 5th Needle Roller Bearing	10 - 4th Drive Gear
11 - 4th Needle Roller Bearing	12 - 4th Gear Gasket
13 - 4th Synchronizer Ring	14 - Snap Ring
15 - 3rd-4th Synchronizer Gear Hub	16 - 3rd-4th Synchronizer Meshing Key and Spring
17 - 3rd-4th Synchronizer Outer Race	18 - 3rd Synchronizer Ring
19 - 3rd Drive Gear	20 - 3rd Needle Roller Bearing
21 - Input Shaft	22 - Input Shaft Front Bearing

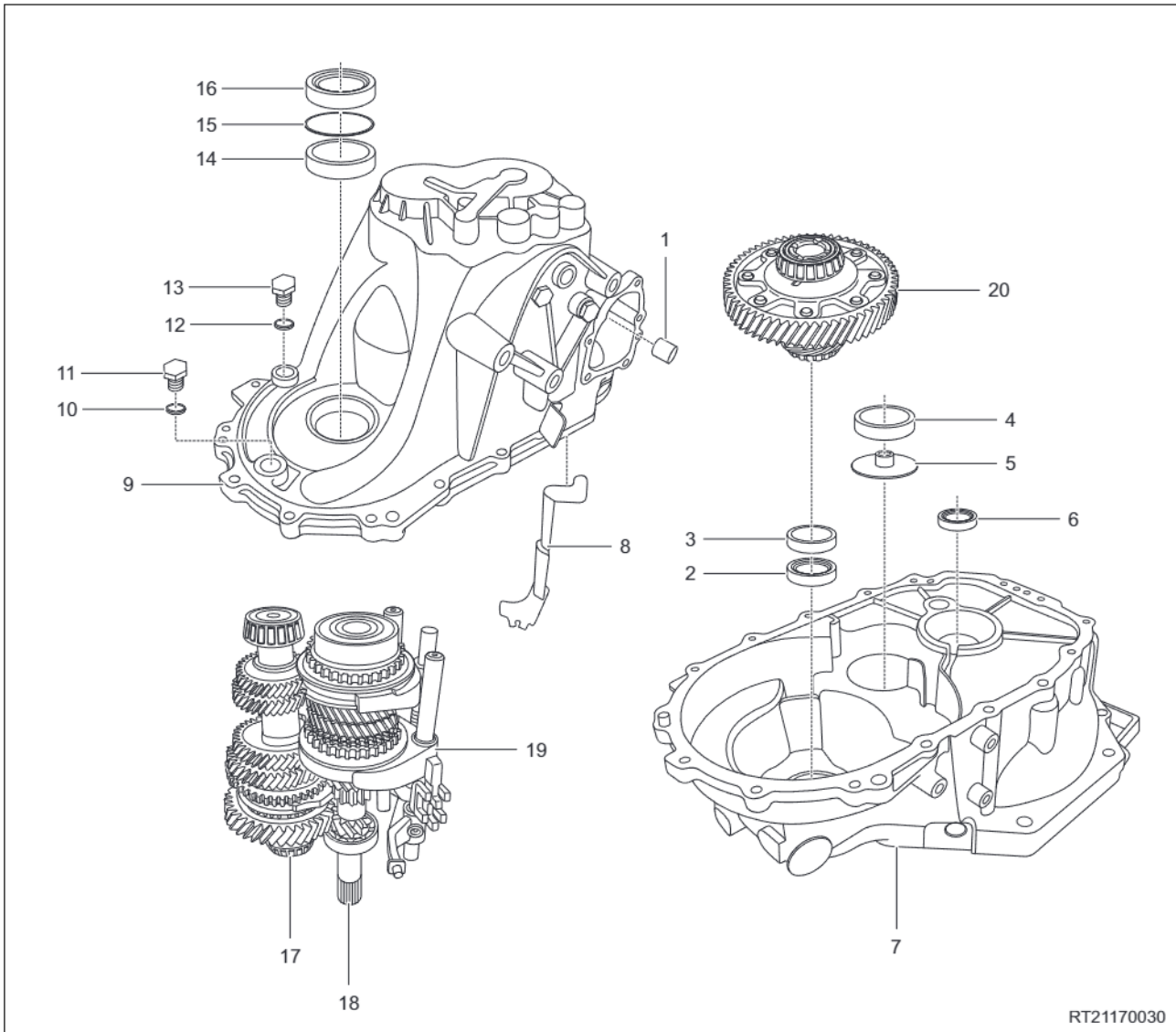
Output Shaft



17

1 - Output Shaft Rear Bearing	2 - Snap Ring
3 - 5th Driven Gear	4 - 4th Driven Gear
5 - Gear Shaft Bushing	6 - 3rd Driven Gear
7 - 2nd Driven Gear	8 - 2nd Needle Roller Bearing
9 - 1st-2nd Synchronizer Outer Race	10 - 2nd Synchronizer Ring Set
11 - Snap Ring	12 - 1st-2nd Synchronizer Gear Hub
13 - 1st Synchronizer Ring Set	14 - 1st Driven Gear
15 - 1st Needle Roller Bearing	16 - Output Shaft
17 - Output Shaft Front Bearing	

Transmission and Clutch Cases



RT21170030

17

1 - Linear Bearing	2 - Differential Oil Seal
3 - Bearing Outer Race	4 - Bearing Outer Race
5 - Oil Deflector	6 - Input Shaft Oil Seal
7 - Clutch Case	8 - Oil Guide
9 - Transmission Case	10 - Washer
11 - Transmission Retaining Bolt	12 - Washer
13 - Drain Plug	14 - Bearing Outer Race
15 - Adjustment Washer	16 - Differential Oil Seal

Operation

This transmission has five 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. 1st-2nd synchronizer is installed on the output shaft and 3rd-4th and 5th synchronizers are installed on the input shaft. The transmission will engage with its corresponding gear hub separately when it is shifted to each different gear position, thus realizing the transmission of power. Drive gear of final drive, which is on the output shaft, rotates driven gear of final drive and differential assembly, thus propeller shaft is driven to turn wheels.

Specifications

Torque Specifications

Description	Torque (N·m)
Coupling Bolt Between Clutch Case and Transmission Case	25 ± 2
Reverse Idler Gear Shaft Locating Bolt	40 ± 4
Coupling Bolt Between Gear Shift Mechanism and Transmission Case	25 ± 2
Gear Shift Mechanism Locating Bolt	35 ± 5.25
Back-up Light Switch	20 ± 2
Shift Shaft Locating Bolt	35 ± 5.25
Gear Shift Control Mechanism Fixing Bolt	23 ± 2
Drain/Retaining Plug	40 ± 6
Shift Arm Bracket Bolt	25 ± 2
Reverse Lock Mechanism Fixing Bolt	18 ± 2
Reverse Gear Fork Fixing Bolt	25 ± 2
Transmission Lower Coupling Bolt	50 ± 5
Transmission Upper Coupling Bolt	60 ± 5
Engine Side Coupling Bolt	60 ± 5

17

Transmission Gear Ratio Table

Gear	Gear Ratio	Type	QR525MHE
			Gear Ratio
	1st		3.583
	2nd		2.053
	3rd		1.379
	4th		1.03
	5th		0.821
	Reverse		3.417
	Final Drive		4.313
	Speedometer		0.806

Daily Maintenance

Generally, it is not necessary to take special maintenance for transmission case. The commonest maintenance is to change transmission oil. Gear lubricant for QR525MHE series transmission case must be equivalent to GL-4 75W-90 grade or above. Applying incorrect lubricant will cause serious damage to the transmission. Never use engine lubricant instead of transmission case lubricant. Please note that the lubricant filling capacity is also strictly specified.

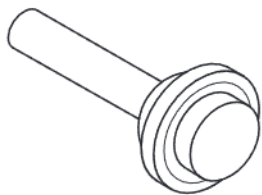
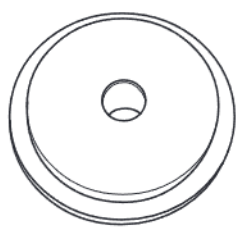
Filling method:

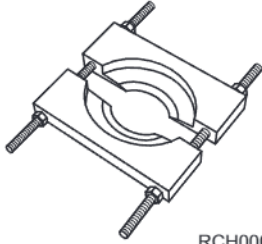
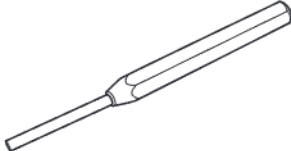
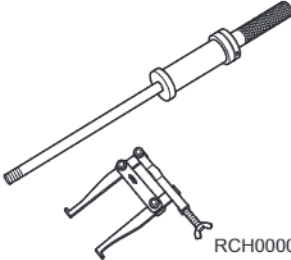
Park vehicle on service platform or lifter levelly without removing the transmission. Prepare a container to recover used lubricant. Remove the transmission drain plug, and then drain the used lubricant completely. Be sure to tighten the drain plug firmly after draining.

Loosen the retaining plug of transmission, add lubricant to QR525 transmission with a special filling device until the lubricant is flowing out from the retaining plug, and then tighten the retaining plug.

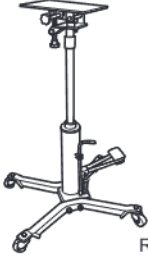
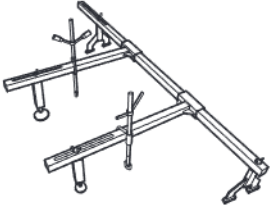
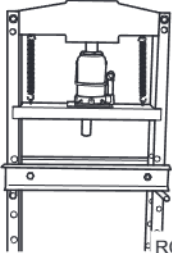
Tools

Special Tools

Input Shaft Oil Seal Installer	 RCH0000008
Differential Oil Seal Installer	 RCH0000009
Installer Joint	 RCH0000010

Bearing Remover	 RCH0000011
Punch	 RCH0000015
Puller	 RCH0000059

General Tools

Transmission Carrier	 RCH0000005
Engine Equalizer	 RCH0000026
Hydraulic Press	 RCH0000012

DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Symptom	Suspected Area	See page
Noise	Oil level (too low)	17-14
	Oil wrong grade	17-14
	Gear (worn or damaged)	-
	Bearing (worn or damaged)	-
	Gear thrust position and clearance improper	-
Oil leakage	Drain plug	-
	Drain plug gasket	-
	Differential oil seal	17-16
	Joint surface damaged and not trimmed in time	-
Hard shifting or impossible to shift	Oil level (too low)	17-14
	Gear (worn or damaged)	-
	Synchronizer ring (worn or damaged)	-
	Shift key spring (worn or damaged)	-
Jumps out of gear	Detent ball spring	-
	Shift fork (worn)	17-35
	Gear (worn or damaged)	-
	Bearing (worn or damaged)	-
Bearing irregular damaged	Lubricant contains metal impurities	-
	Insufficient lubrication or lubricant does not conform to standard	-
	Irregular bearing	-
Release fork makes a "click" sound when clutch pedal is depressed	Insufficient lubrication at joint surface of release fork and hydraulic sub cylinder or joint surface of release fork and ball joint housing	-
No shift	Shift drive train (loose)	-
	Driver rocker arm (loose)	-

CAUTION

- To guarantee the service quality of transmission, perform operations carefully and keep each component of transmission clean.
- Select appropriate or special tools.
- Transmission can achieve a good operation condition only when strictly performing service according to the technical requirements of assembly or adjustment.

On-vehicle Inspection

Transmission Oil

Check transmission oil level.

1. Raise the vehicle with a lifter

WARNING

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lifter is locked when performing vehicle lift repair and inspection.

2. Remove the transmission retaining plug and washer.
3. Check if oil level is at the opening of retaining plug.

Transmission oil type:

GL-4

Viscosity:

75W-90

Standard capacity:

2.2 L $\pm$ 0.1 L

CAUTION

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

ON-VEHICLE SERVICE

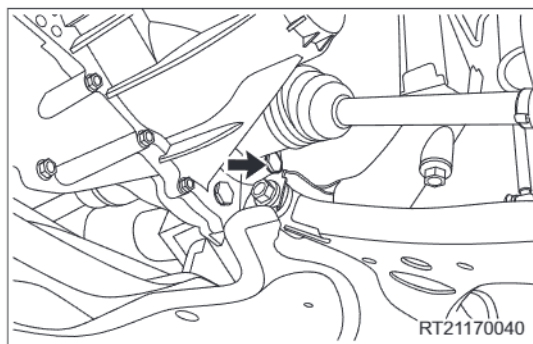
Transmission Oil

Replacement

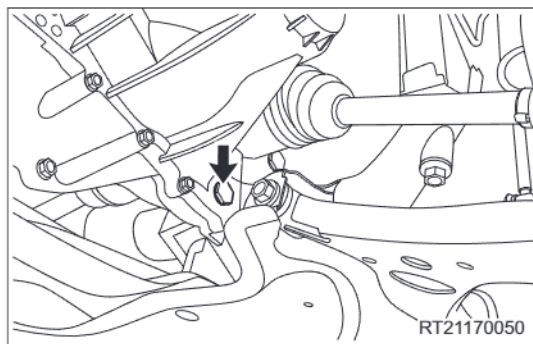
CAUTION

- Replace transmission oil only when engine stops and transmission cools down.
- Before installation, replace drain/retaining plug washer with a new one.

1. Turn off all the electrical equipment and ignition switch.
2. Raise the vehicle to a proper height.
3. Place a recovering container under the transmission drain hole.
4. Using a wrench, loosen the transmission retaining plug (arrow).



5. Using a wrench, loosen the transmission filler plug (arrow). Replace the drain plug washer and tighten the drain plug after draining transmission oil. (Tightening torque: $40 \pm 6 \text{ N}\cdot\text{m}$)



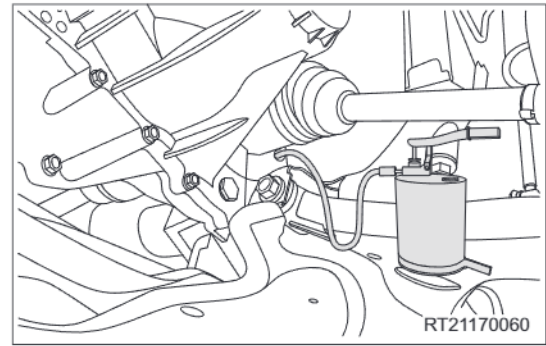
6. Fill transmission oil.

CAUTION

- Only use transmission oil approved by Chery Automobile Co., Ltd.

- a. Make sure that transmission drain plug has been tightened in place.

- b. Using a filling tool, fill transmission oil to the transmission filler until it overflows.



- c. Replace the retaining plug washer and tighten the retaining plug after filling.
(Tightening torque: $40 \pm 6 \text{ N}\cdot\text{m}$)

Transmission Oil Type

Model	1.5 L MT
Transmission Oil Type	API GL-4, 75W-90
Filling Capacity	2.2 L $\pm$ 0.1 L

Differential Oil Seal

Removal

Use the same procedures for the right side and left side.

Procedures listed below are for the left side.

1. Raise the vehicle with a lifter.

WARNING

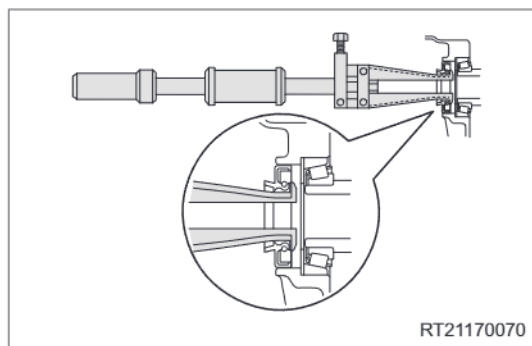
- Make sure to wear safety equipment to prevent accidents.
- Check if safety lock of lifter is locked when performing vehicle lift repair and inspection.

2. Drain transmission oil.
 - a. Remove the retaining plug and washer.
 - b. Remove the drain plug and washer, and drain the transmission oil.

ENVIRONMENTAL PROTECTION

- Drained transmission oil should be collected with a recovering tool.

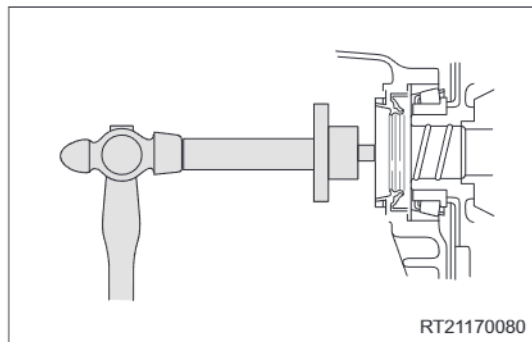
- c. Install the new washer and drain plug.
(Tightening torque: 40 ± 6 N·m)
3. Remove the front left wheel (See page 24-9).
 4. Remove the left drive shaft (See page 20-5).
 5. Pull out the oil seal with a puller.



17

Installation

1. Apply an appropriate amount of transmission oil to the lip of new oil seal.
2. Using a special tool and a hammer, tap in the oil seal.



 CAUTION

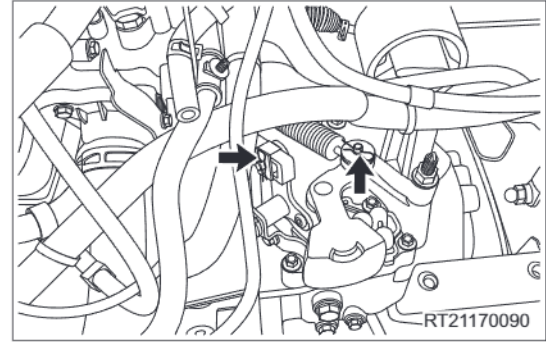
- DO NOT damage the oil seal during installation.

3. Fill transmission oil.
Other procedures are in the reverse order of removal.

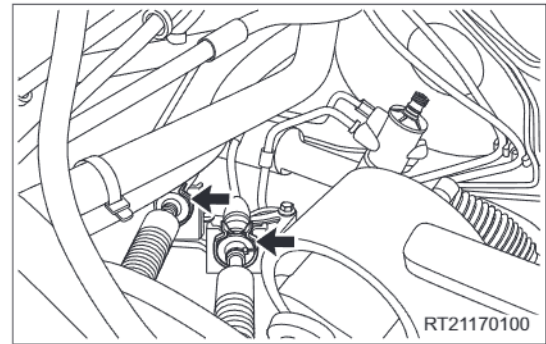
Select and Shift Cable

Removal

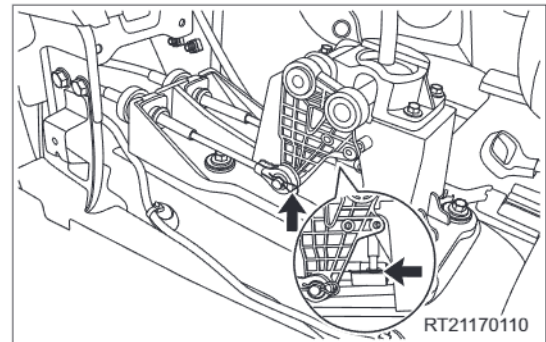
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery ([See page 16-7](#)).
4. Remove the air filter assembly ([See page 10-17](#)).
5. Disconnect the select and shift cable from the transmission.
 - a. Remove the cotter pins (arrow) connecting select and shift cable with transmission gear shift mechanism.



- b. Remove the flexible shaft clamps (arrow) and select and shift cable.



6. Remove the auxiliary fascia console ([See page 45-9](#)).
7. Remove the fixing bolts between gear select and shift cable and body.
8. Disconnect the select and shift cable from gear shift control mechanism.
 - a. Remove the flexible shaft clamps and cotter pins connecting select and shift cable with gear shift control mechanism.



9. Remove the gear select and shift cable.

Installation

Installation is in the reverse order of removal.

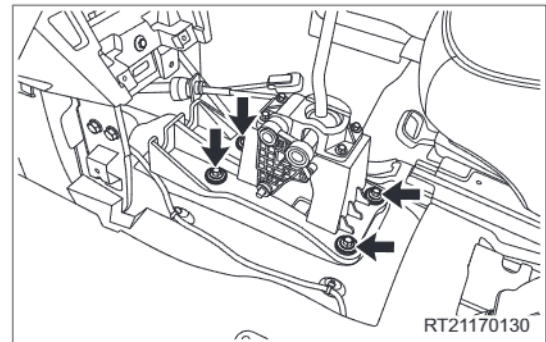
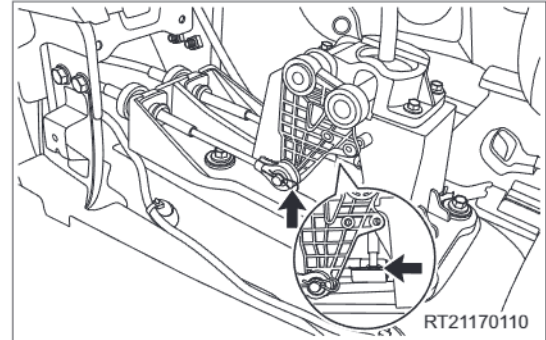
CAUTION

- DO NOT install the select and shift cable in reverse position during installation.

Gear Shift Control Mechanism

Removal

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the auxiliary fascia console (See page 45-9).
4. Remove the gear shift control mechanism.
 - a. Remove the flexible shaft clamps and cotter pins connecting select and shift cable with gear shift control mechanism.
 - b. Remove the fixing bolts from gear shift control mechanism, and remove the gear shift control mechanism.
(Tightening torque: $23 \pm 2 \text{ N}\cdot\text{m}$)



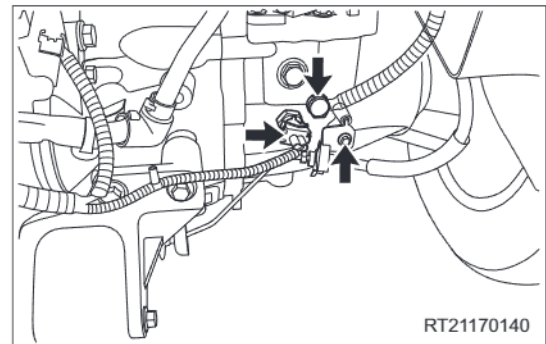
Installation

Installation is in the reverse order of removal.

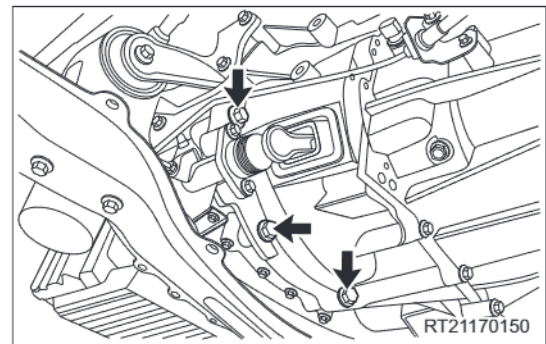
Transmission Assembly

Removal

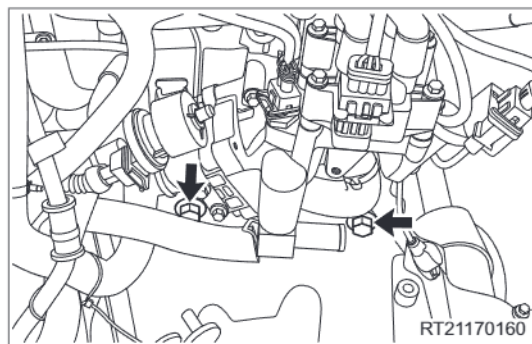
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery ([See page 16-7](#)).
4. Remove the battery bracket ([See page 16-9](#)).
5. Remove the air filter assembly ([See page 10-17](#)).
6. Drain transmission oil.
7. Remove the front wheels ([See page 24-9](#)).
8. Remove the drive shaft([See page 20-5](#)).
9. Use an engine equalizer to hang the engine.
- 10.Remove the flexible shaft clamps and cotter pins connecting select and shift cable with gear shift mechanism.
- 11.Disconnect the back-up light switch connector, ground wire and clutch line bracket II.



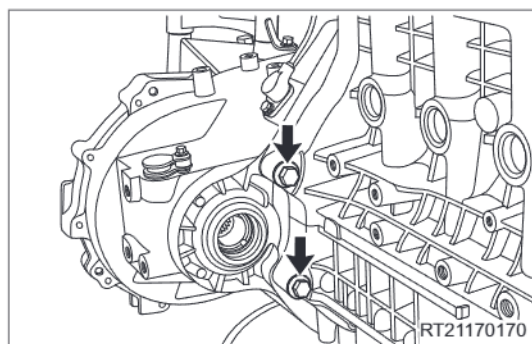
- 12.Remove the crankshaft position sensor.
 - a. Remove the fixing bolt from crankshaft position sensor, and remove the crankshaft position sensor.
- 13.Remove the left mounting ([See page 07-67](#)).
- 14.Remove the front mounting ([See page 07-66](#)).
- 15.Remove the rear mounting ([See page 07-64](#)).
- 16.Remove the clutch release cylinder from transmission ([See page 19-12](#)).
- 17.Remove the starter ([See page 15-64](#)).
- 18.Remove the transmission.
 - a. Support the transmission assembly with a transmission carrier.
 - b. Remove the transmission lower coupling bolts, and remove the seal plate.
(Tightening torque: $50 \pm 5 \text{ N}\cdot\text{m}$)



- c. Remove the transmission upper coupling bolts.
(Tightening torque: 60 ± 5 N·m)

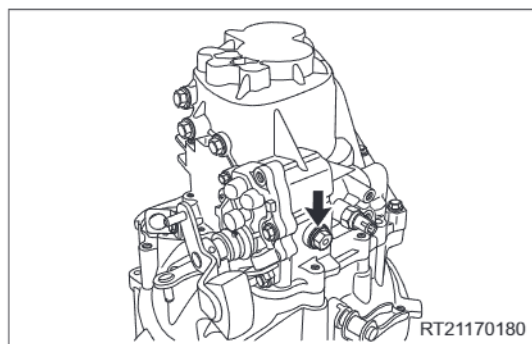


- d. Remove the coupling bolts from engine side and pull the transmission to separate it from the engine.
(Tightening torque: 60 ± 5 N·m)

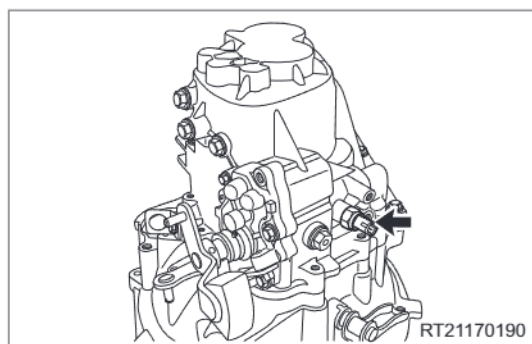


Disassembly

1. Remove the gear shift mechanism locating bolt.
 - a. Remove the gear shift mechanism locating bolt (arrow) from transmission assembly.

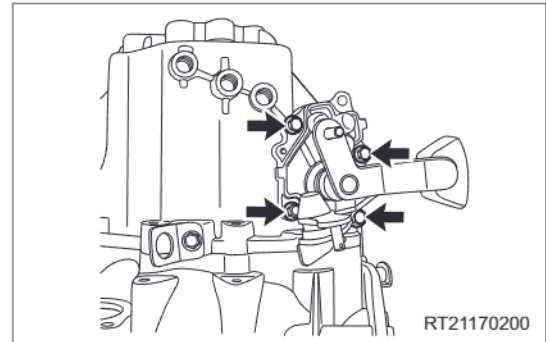


2. Remove the back-up light switch.
 - a. Remove the back-up light switch (arrow) from transmission assembly.



3. Remove the gear shift mechanism.

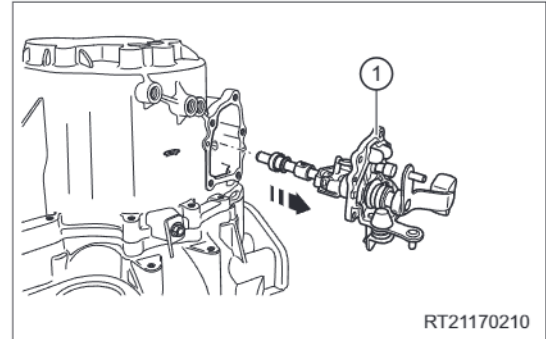
- a. Remove the gear shift mechanism fixing bolts (arrow).



- b. Remove the gear shift mechanism (1) in the direction of arrow.

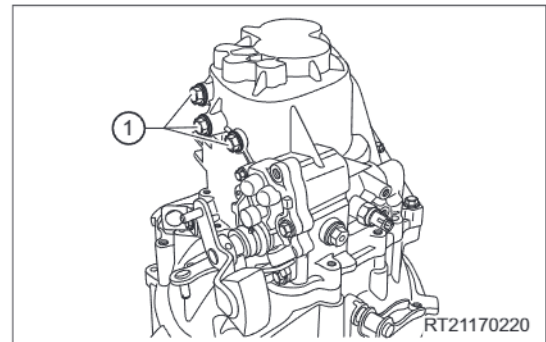
HINT:

Tap the protrusion part of gear shift mechanism case side with a rubber hammer, as the seal gum makes difficulty to remove gear shift mechanism.



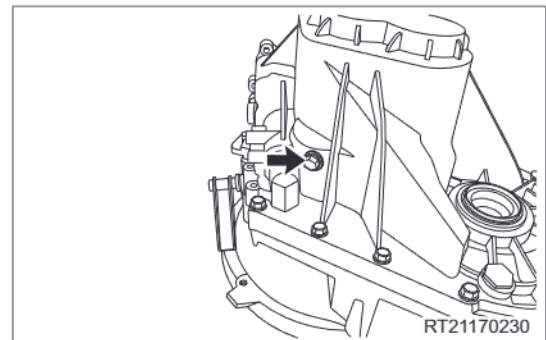
4. Remove the shift shaft locating bolt.

- a. Remove the shift shaft locating bolts (1) from transmission assembly.



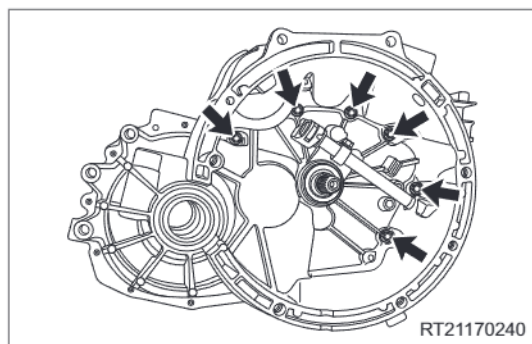
5. Remove the reverse idler gear shaft locating bolt.

- a. Remove the reverse idler gear shaft locating bolt (arrow) from transmission assembly.

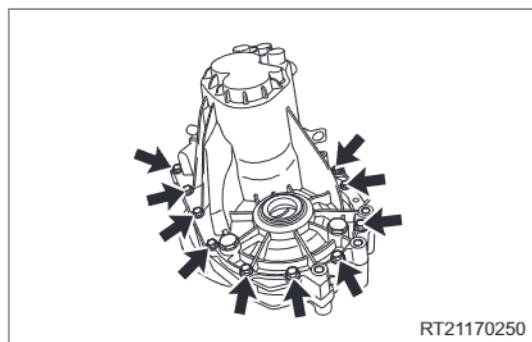


6. Remove the transmission case.

- Remove the clutch case fixing bolts (arrow) from transmission assembly.



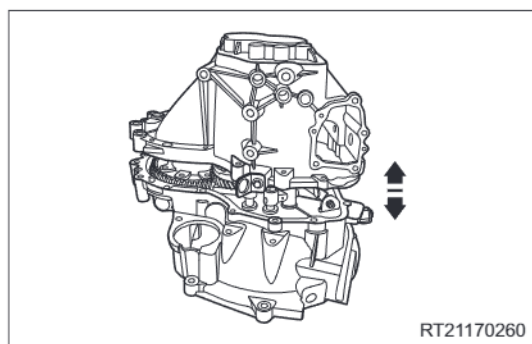
- Remove the transmission case fixing bolts (arrow) from transmission assembly.



- Separate the transmission case and clutch case, and remove the transmission case.

HINT:

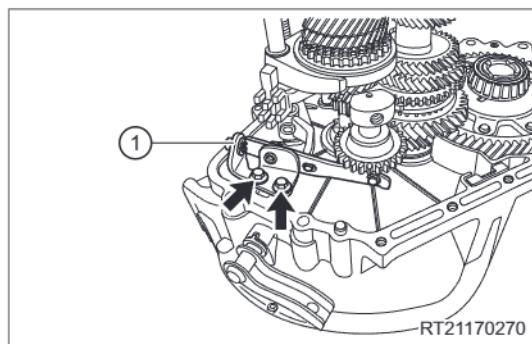
Tap the protrusion part of transmission case side with a rubber hammer or equivalent for easy removal, as the seal gum makes difficulty to remove transmission case.



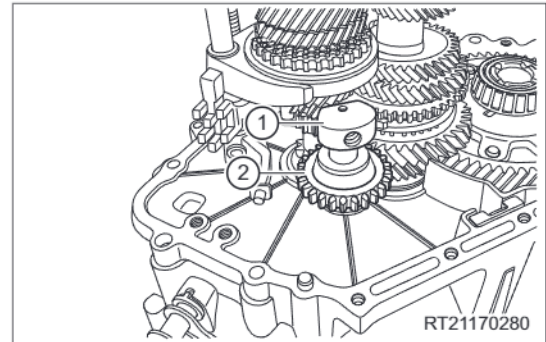
17

7. Remove the reverse gear fork.

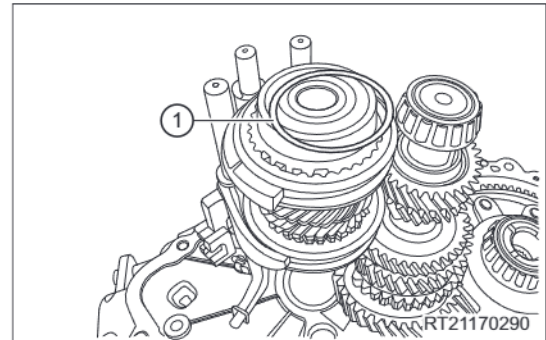
- Remove the fixing bolts (arrow) from reverse gear fork, and remove the reverse gear fork (1).



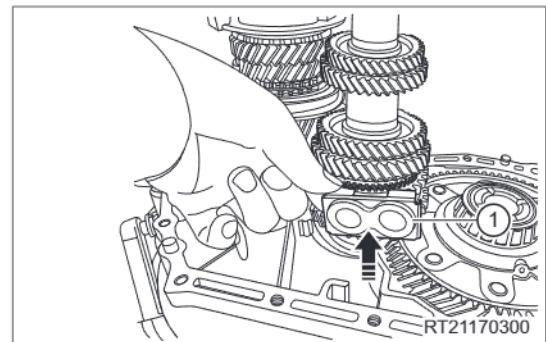
8. Remove the reverse gear shaft and reverse gear.
 - a. Remove the reverse gear shaft (1) and reverse gear (2) together from clutch case.



9. Remove the input shaft rear washer.
 - a. Remove the input shaft rear washer (1) from input shaft.



10. Remove the magnet.
 - a. Remove the magnet (1) from clutch case.

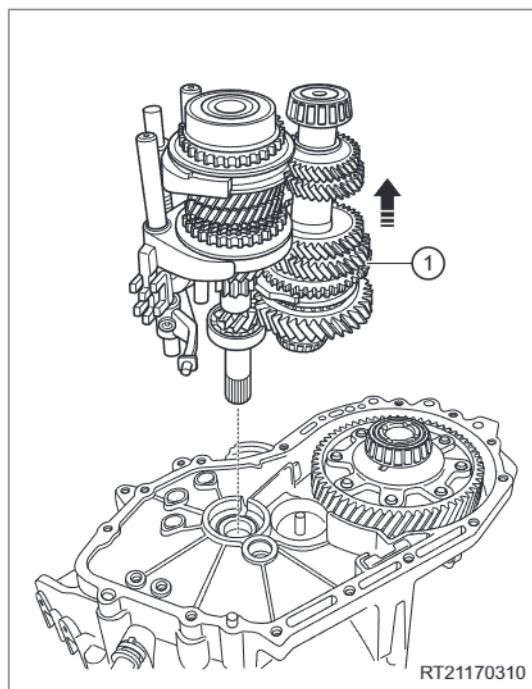


11. Remove the input shaft, output shaft and fork mechanism.

- a. Remove the input shaft, output shaft and fork mechanism (1) together from clutch case.

HINT:

Gently jiggle them during removal.

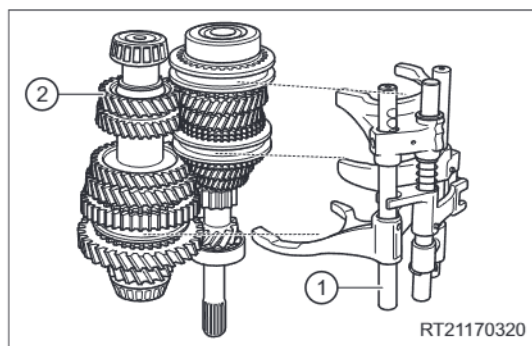


CAUTION

- Prevent input shaft spline from damaging input shaft front oil seal during removal.
- Prevent interference between output shaft bearing cage and differential big ring gear and avoid damaging bearing cage during removal.

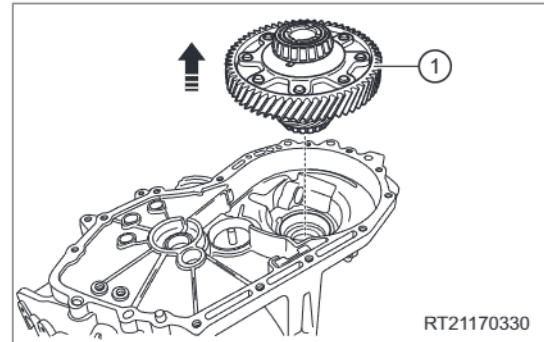
12. Remove the gear fork assembly.

- a. Remove the shift fork assembly (1) from input shaft and output shaft (2).



13. Remove the differential assembly.

- a. Remove the differential assembly (1) from clutch case.



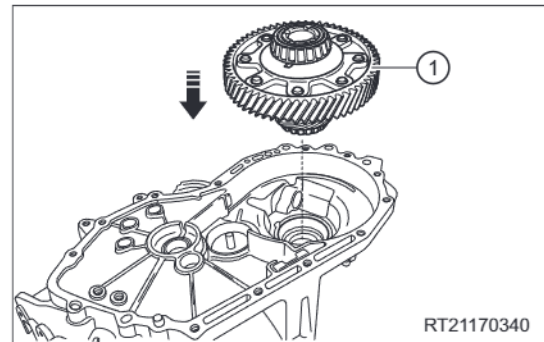
Assembly

CAUTION

- Before assembling the components, wash them clean.
- Remove the seal gum residues from the case.
- Make sure the joint surface of case is free of oil, and uniformly apply seal gum.
- Make sure the joint surface of case and shift assembly is free of oil, and uniformly apply seal gum.
- Tighten bolts to the specified torque.

1. Install the differential assembly.

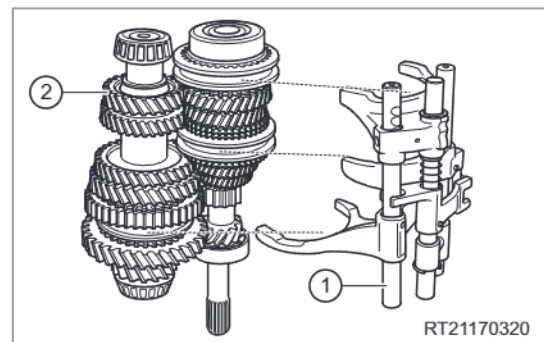
- a. Apply transmission oil to the each slide part of differential, and install the differential (1) to the clutch case in the direction of arrow.



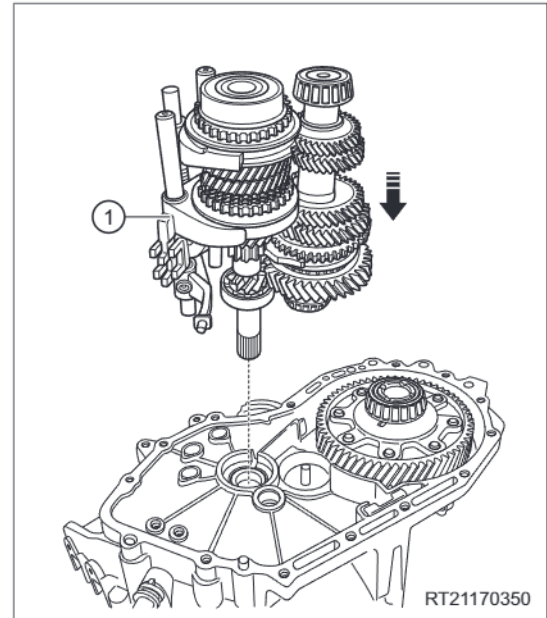
17

2. Install the shift fork assembly.

- a. Install the shift fork assembly (1) to the input shaft and output shaft (2).



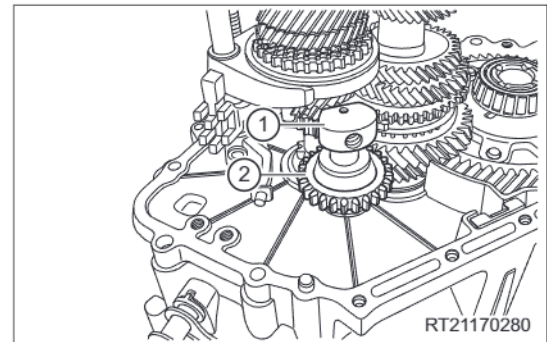
3. Install the input shaft, output shaft and fork mechanism.
 - a. Apply transmission oil to each slide part of input shaft and output shaft, and install the input shaft, output shaft and fork mechanism (1) together to the clutch case in the direction of arrow.



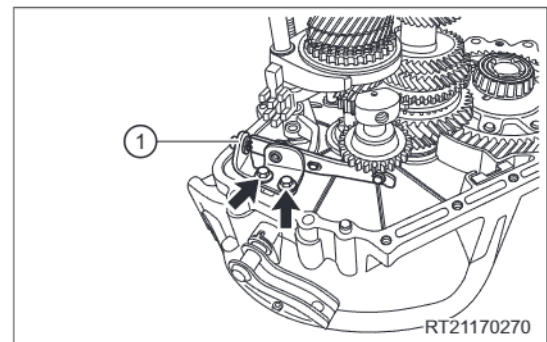
CAUTION

- Prevent input shaft spline from damaging input shaft front oil seal during installation.

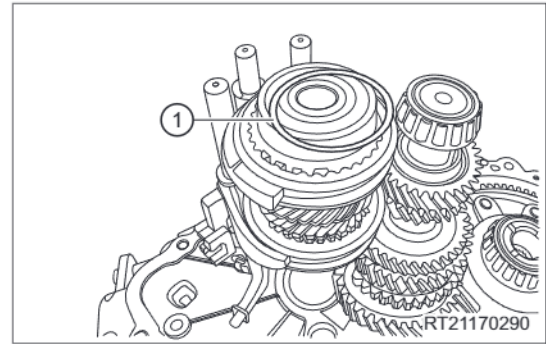
4. Install the reverse idler gear and reverse gear.
 - a. Apply transmission oil to each slide part of reverse gear and reverse gear shaft, and install the reverse idler gear (1) and reverse gear (2) together to the clutch case.



5. Install the reverse gear fork.
 - a. Install the reverse gear fork (1) to the clutch case, and tighten the reverse gear fork fixing bolts (arrow). (Tightening torque: 25 ± 2 N·m)



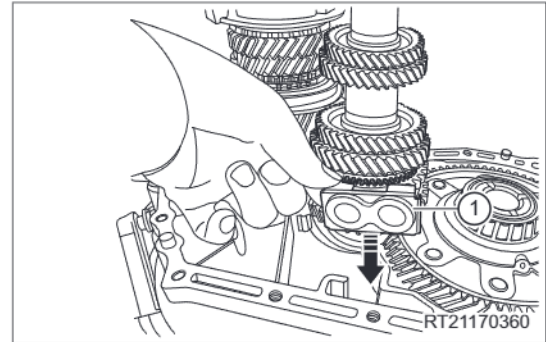
6. Install the input shaft rear washer.
 - a. Apply an appropriate amount of transmission oil to the input shaft rear washer, and put the input shaft rear washer (1) onto the input shaft rear bearing.



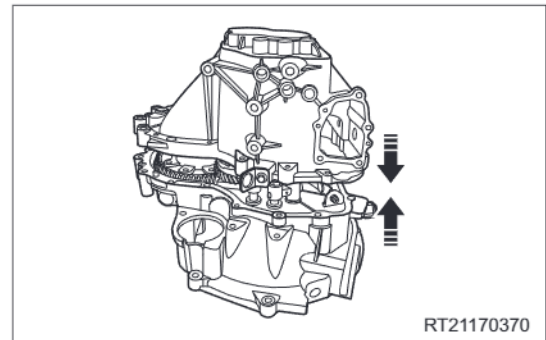
CAUTION

- Evenly put the input shaft rear washer onto the input shaft rear bearing without the washer edge out of the input shaft rear bearing.

7. Install the magnet.
 - a. Install the magnet (1) to the clutch case in the direction of arrow.



8. Install the transmission case.
 - a. Install the transmission case to the clutch case.

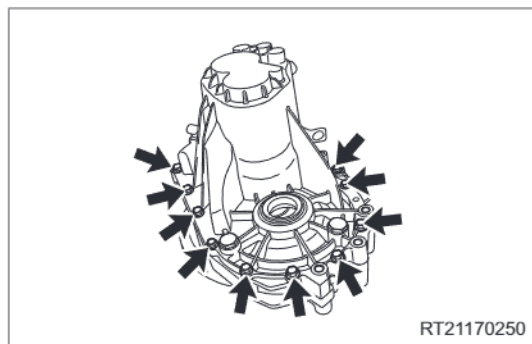


17

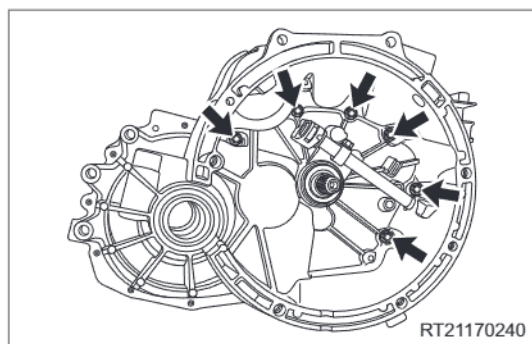
CAUTION

- Remove the seal gum residues from the case.
- Make sure the joint surface of case is free of oil, and uniformly apply seal gum.

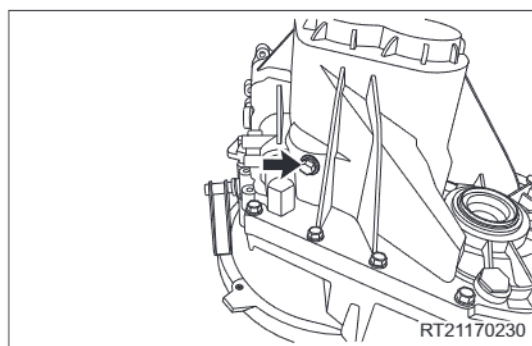
- b. Install the transmission case fixing bolts (arrow) and tighten them.
(Tightening torque: 25 ± 2 N·m)



- c. Install the clutch case fixing bolts (arrow) and tighten them.
(Tightening torque: 25 ± 2 N·m)

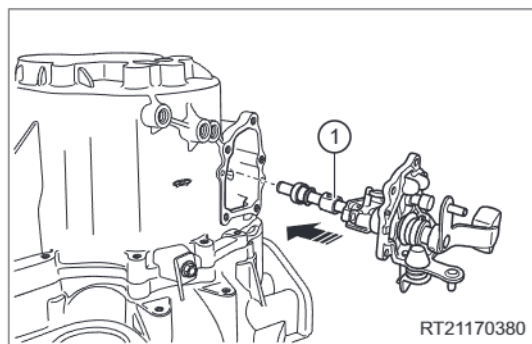


9. Install the reverse idler gear shaft locating bolt.
 - a. Install the reverse idler gear shaft locating bolt (arrow) to the transmission case.
(Tightening torque: 40 ± 4 N·m)



17

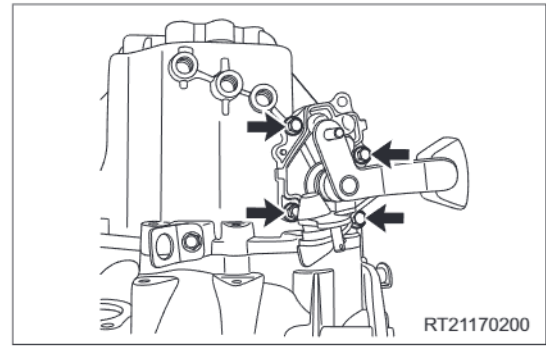
10. Install the gear shift mechanism.
 - a. Install the gear shift mechanism (1) to the transmission case.



CAUTION

- Clean the engagement portion of shifter case and transmission case, and apply seal gum evenly.

- b. Install the coupling bolts (arrow) between gear shift mechanism and transmission case.
(Tightening torque: $25 \pm 2 \text{ N}\cdot\text{m}$)

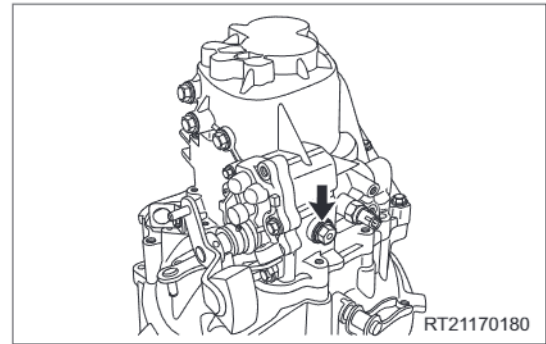


11. Install the gear shift mechanism locating bolt.

HINT:

Apply thread adhesive to thread before installation.

- a. Install the gear shift mechanism locating bolt (arrow) to the transmission case.
(Tightening torque: $35 \pm 5.25 \text{ N}\cdot\text{m}$)

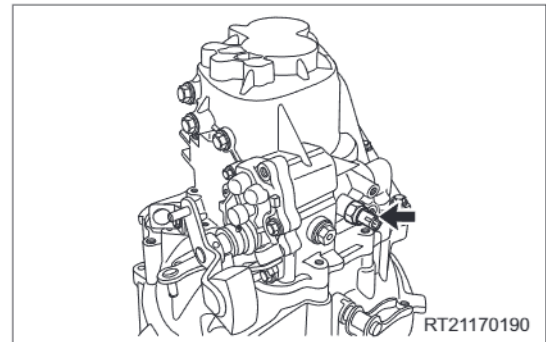


12. Install the back-up light switch.

HINT:

Apply thread adhesive to thread before installation.

- a. Install the back-up light switch (arrow) to the transmission case.
(Tightening torque: $20 \pm 2 \text{ N}\cdot\text{m}$)

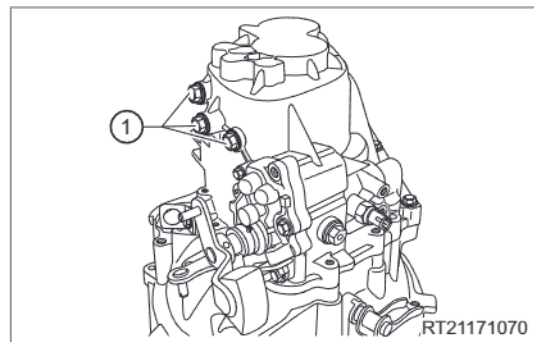


13. Install the shift shaft locating bolt.

HINT:

Apply thread adhesive to thread before installation.

- a. Install the shift shaft locating bolts (1) to the transmission case.
(Tightening torque: 35 ± 5.25 N·m)



Installation

Installation is in the reverse order of removal.

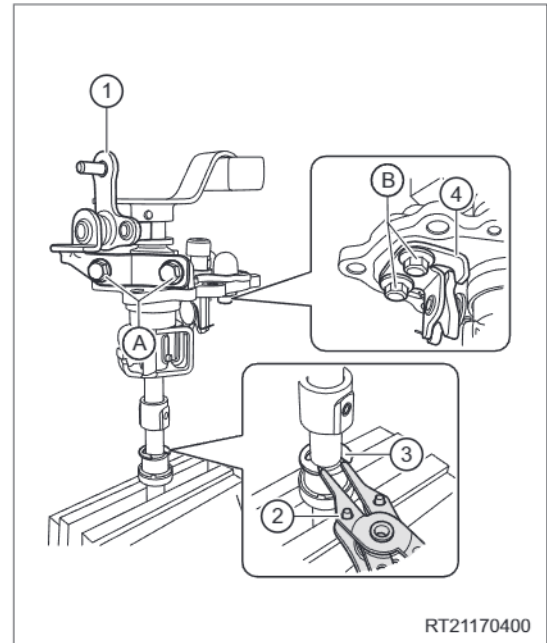
 CAUTION

- After installation, add transmission oil and check the oil level.

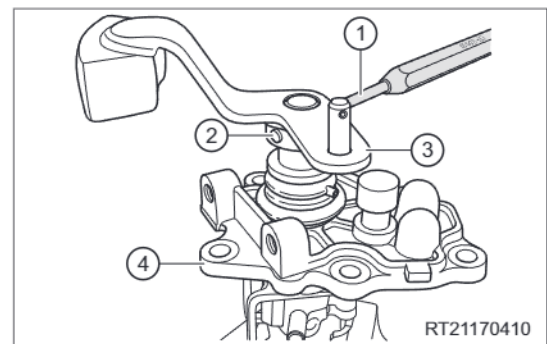
Gear Shift Mechanism

Disassembly

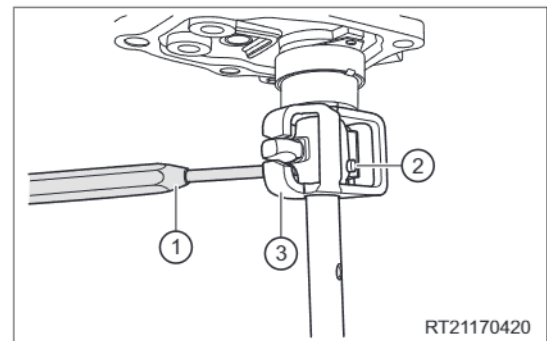
1. Loosen the shift arm bracket bolts (A).
(Tightening torque: $25 \pm 2 \text{ N}\cdot\text{m}$)
2. Remove the shift arm bracket (1).
3. Using snap spring calipers (2), remove the snap ring (3).
4. Loosen the fixing bolts (B) of reverse gear lock mechanism.
(Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$)
5. Remove the reverse gear lock mechanism (4).



6. Tap out the dowel pin (2) with a punch (1).
7. Remove the shift arm (3) and plate (4).



8. Tap out the dowel pin (2) with a punch (1).
9. Remove the shift finger (3).



Assembly

Assembly is in the reverse order of disassembly.

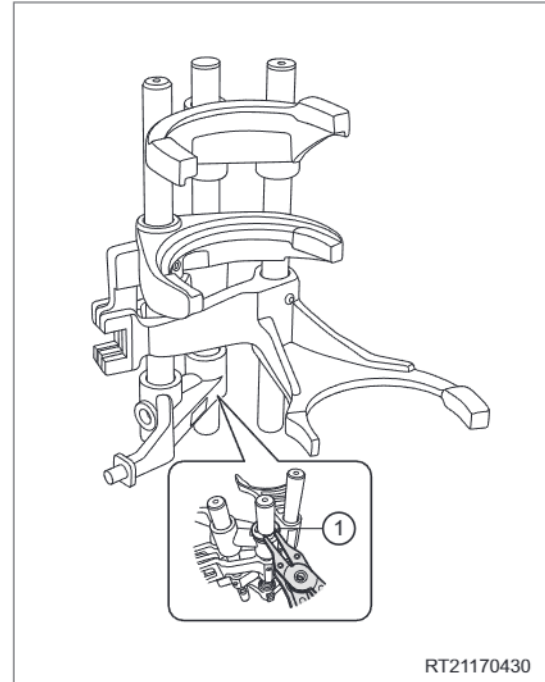
CAUTION

- Tighten bolts to the specified torque.
- Replace damaged dowel pins.

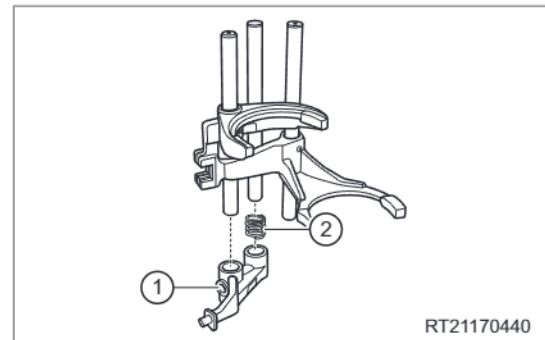
Shift Fork

Disassembly

1. Remove the reverse gear fork.
 - a. Using snap spring calipers, remove the snap ring (1).

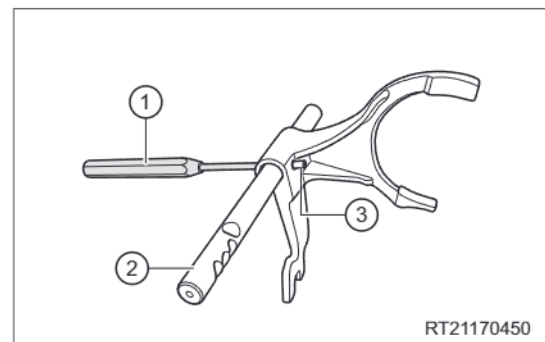


- b. Remove the reverse gear fork (1) and return spring (2).

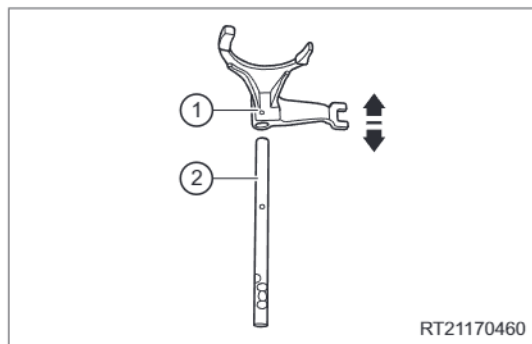


17

2. Remove the 3rd-4th gear shift fork.
 - a. Using a punch (1), tap out the dowel pin (3) from 3rd-4th gear shift shaft (2).

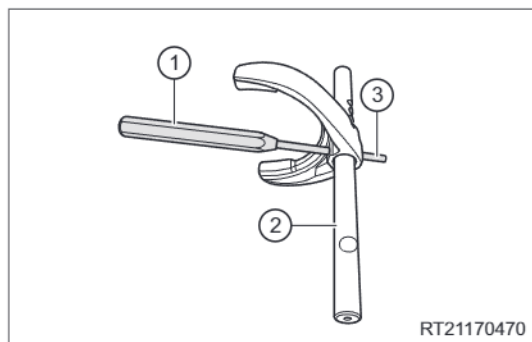


- b. Separate the 3rd-4th gear shift fork (1) from the shift shaft (2).

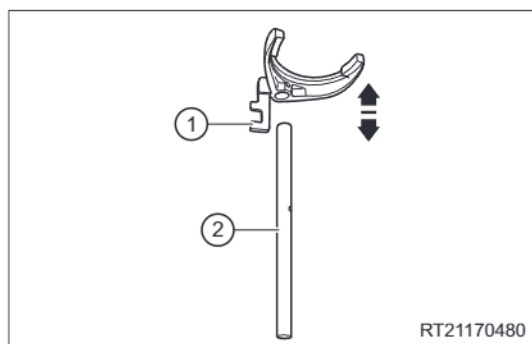


3. Remove the 1st-2nd gear shift fork.

- a. Using a punch (1), tap out the dowel pin (3) from the gear shift shaft (2).



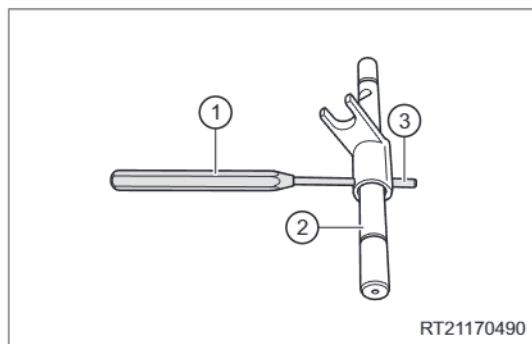
- b. Separate the 1st-2nd gear shift fork (1) from gear shift shaft (2).



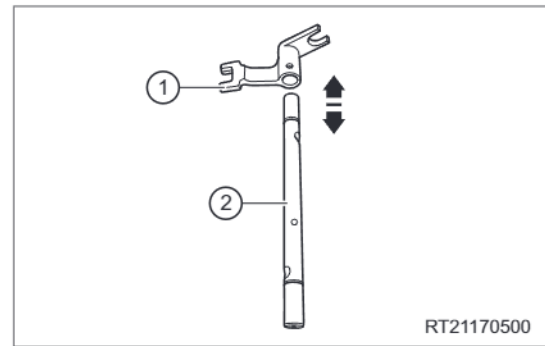
17

4. Remove the fork.

- a. Using a punch (1), tap out the dowel pin (3) from gear shift shaft (2).



- b. Separate the fork (1) from the gear shift shaft (2).



Inspection

1. Check gear shift shaft for excessive wear or damage. Replace if it is damaged.
2. Check release fork for excessive wear or damage. Replace if it is damaged.

Assembly

Assembly is in the reverse order of disassembly.

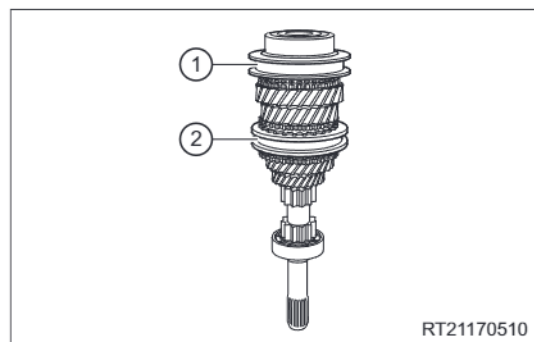
CAUTION

- When installing dowel pin, if there is excessive wear or damage, replace with a new one.

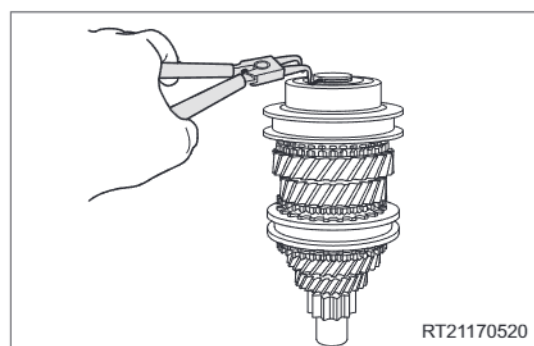
Input Shaft

Disassembly

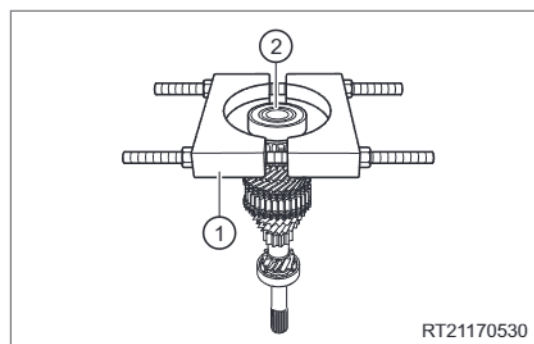
1. Remove the input shaft ([See page 17-22](#)).
2. Remove the 5th synchronizer outer race and 3rd-4th synchronizer outer race.
 - a. Remove the 5th synchronizer outer race (1) and 3rd-4th synchronizer outer race (2) from input shaft.



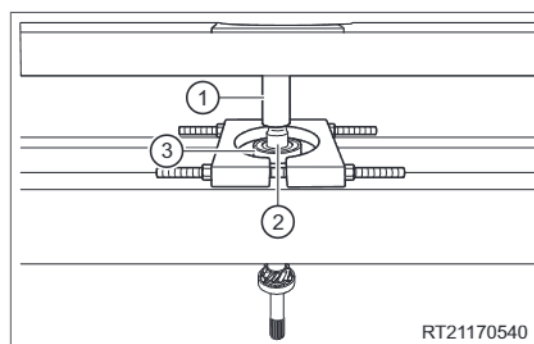
3. Remove the input shaft rear bearing snap ring.
 - a. Using snap spring calipers, remove the input shaft rear bearing snap ring.



4. Remove the input shaft rear bearing.
 - a. Using a special tool (1), secure the input shaft rear bearing (2).

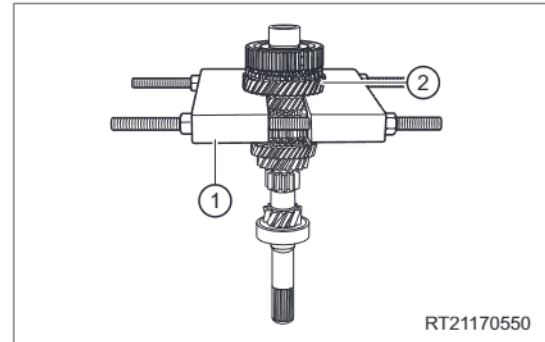


- b. Using a hydraulic press (1), press the input shaft rear bearing (3) out of input shaft (2) and remove the input shaft rear bearing.

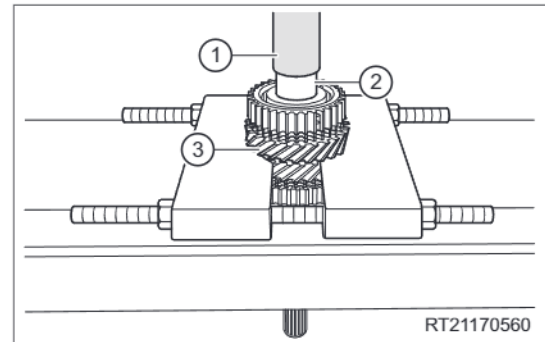


5. Remove the 5th drive gear and 5th synchronizer gear hub.

- a. Using a special tool (1), secure the 5th drive gear (2).

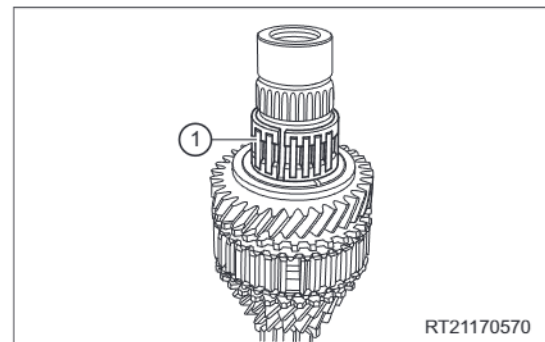


- b. Using a hydraulic press (1), press the 5th drive gear and 5th synchronizer gear hub (3) out of input shaft (2), and remove the 5th drive gear and 5th synchronizer gear hub.



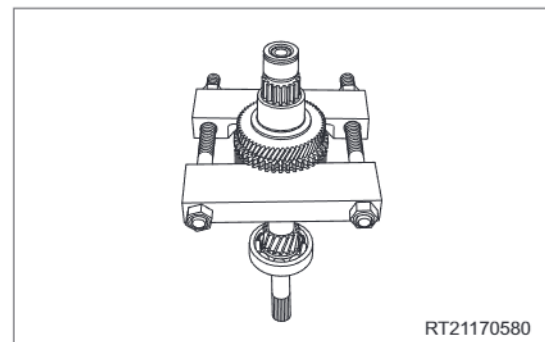
6. Remove the 5th needle roller bearing.

- a. Remove the 5th needle roller bearing (1) from input shaft.

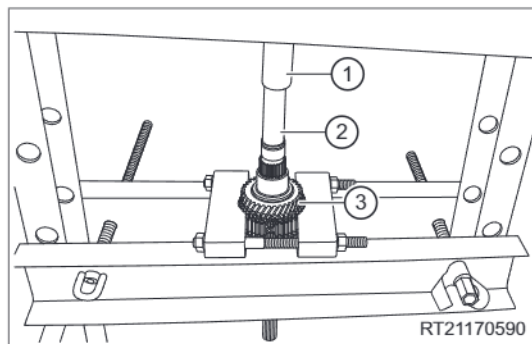


7. Remove the 5th drive gear needle roller bearing bushing and 4th drive gear.

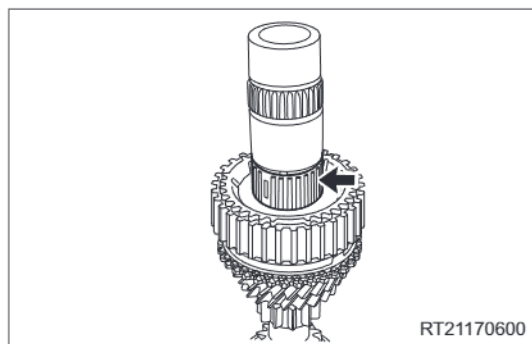
- a. Install a special tool.



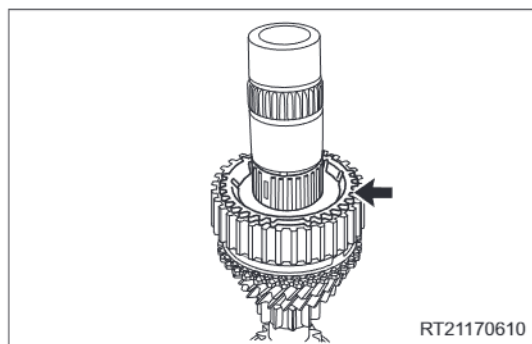
- b. Using a hydraulic press (1), press the 5th drive gear needle roller bearing bushing and 4th drive gear (3) out of input shaft (2), and remove the 5th drive gear needle roller bearing bushing and 4th drive gear.



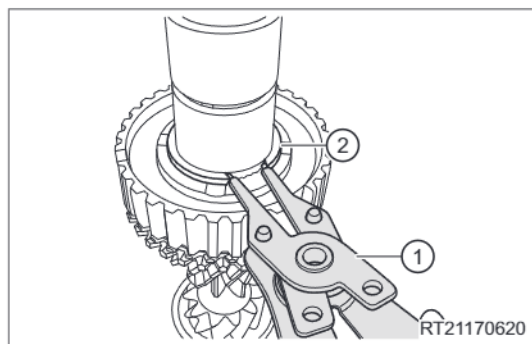
8. Remove the 4th needle roller bearing.
 - a. Remove the 4th needle roller bearing (arrow) from input shaft.



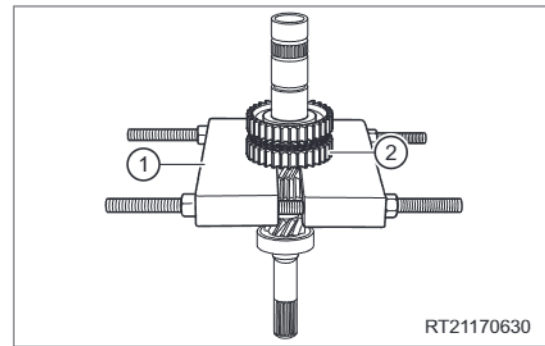
9. Remove the 3rd drive gear and 3rd-4th synchronizer gear hub.
 - a. Remove the synchronizer ring (arrow) from 3rd-4th synchronizer gear hub.



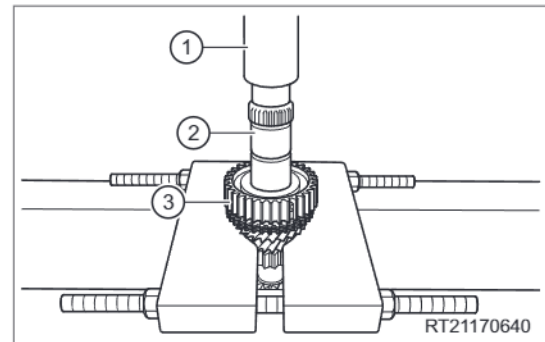
- b. Using snap spring calipers (1), remove the snap ring (2).



- c. Using a special tool (1), secure the 3rd drive gear (2).

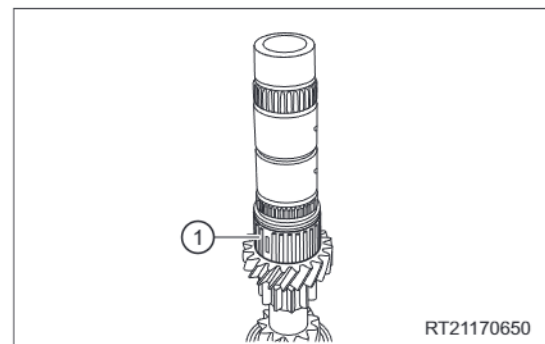


- d. Using a hydraulic press (1), press the 3rd drive gear and 3rd-4th synchronizer gear hub (3) out of input shaft (2), and remove the 3rd drive gear and 3rd-4th synchronizer gear hub.



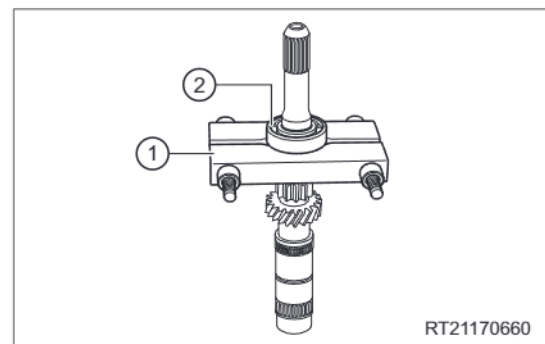
10. Remove the 3rd needle roller bearing.

- a. Remove the 3rd needle roller bearing (1) from input shaft.

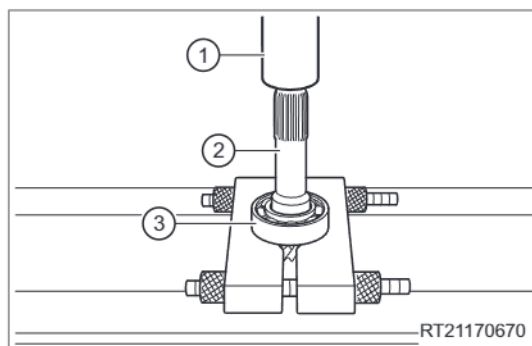


11. Remove the input shaft front bearing.

- a. Using a special tool (1), secure the input shaft front bearing (2).

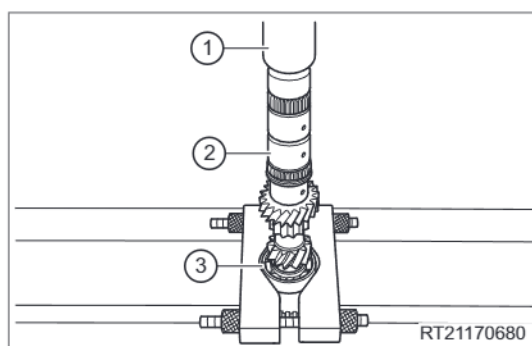


- b. Using a hydraulic press (1), press the input shaft front bearing (3) out of input shaft (2), and remove the input shaft front bearing.



Assembly

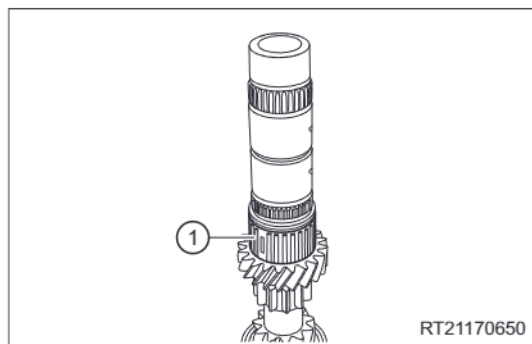
1. Install the input shaft front bearing.
- a. Using a hydraulic press (1), press the input shaft front bearing (3) into input shaft (2).



CAUTION

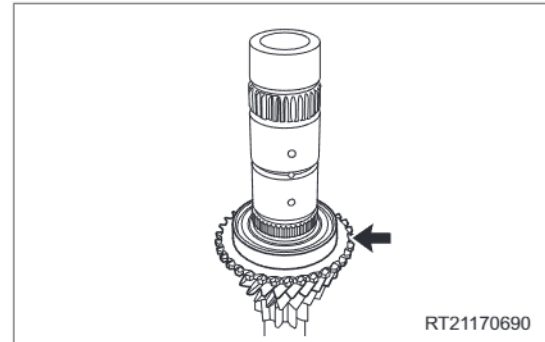
- When pressing input shaft front bearing, make sure that pressure is applied to the bearing inner race as the bearing may be damaged due to uneven force.

2. Install the 3rd needle roller bearing.
- a. Apply transmission oil to the needle roller bearing (1), and install it to the input shaft.



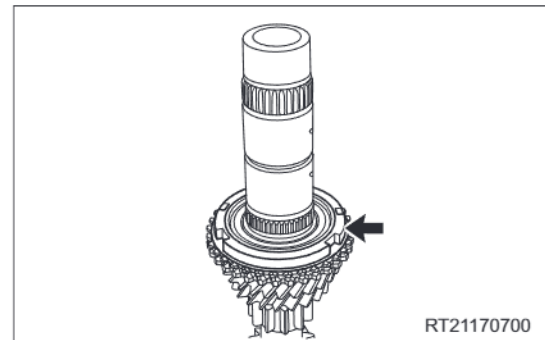
3. Install the 3rd drive gear.

- a. Apply transmission oil to the 3rd drive gear (arrow), and install it to the input shaft.



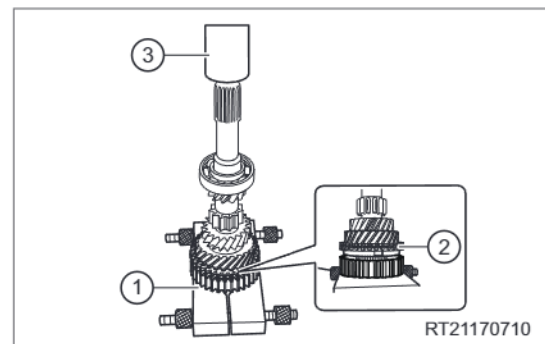
4. Install the 3rd synchronizer ring.

- a. Apply transmission oil to the 3rd synchronizer ring (arrow), and install it to the input shaft.



5. Install the 3rd-4th synchronizer gear.

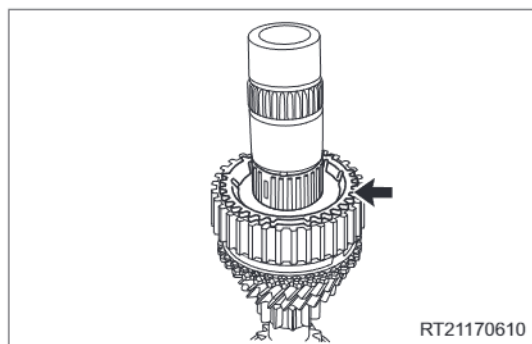
- a. Using a hydraulic press (3), press the 3rd-4th synchronizer gear (1) into the input shaft.


CAUTION

- When pressing synchronizer gear, prevent the 3rd drive gear (2) from disengaging.

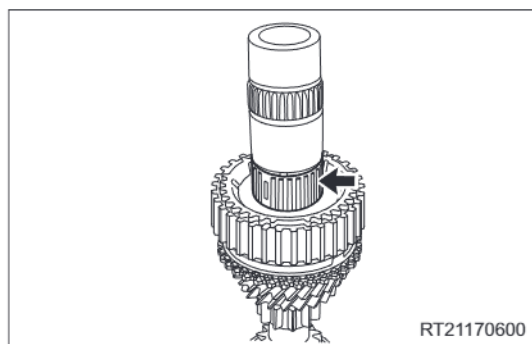
6. Install the 4th synchronizer ring.

- a. Apply transmission oil to the 4th synchronizer ring (arrow), and install it to the input shaft.



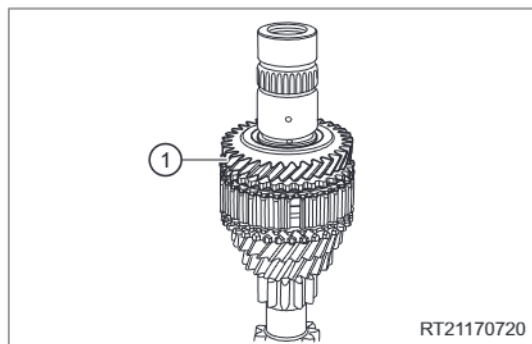
7. Install the 4th needle roller bearing.

- a. Apply transmission oil to the 4th needle roller bearing (arrow), and install it to the input shaft.



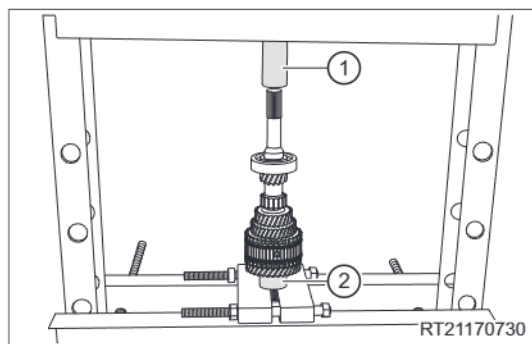
8. Install the 4th drive gear.

- a. Apply transmission oil to the 4th drive gear (1), and install it to the input shaft.



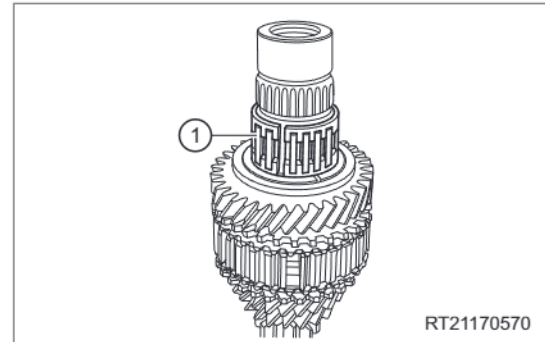
9. Install the 5th drive gear needle roller bearing bushing.

- a. Using a hydraulic press (1), press the 5th drive gear needle roller bearing bushing (2) into the input shaft.



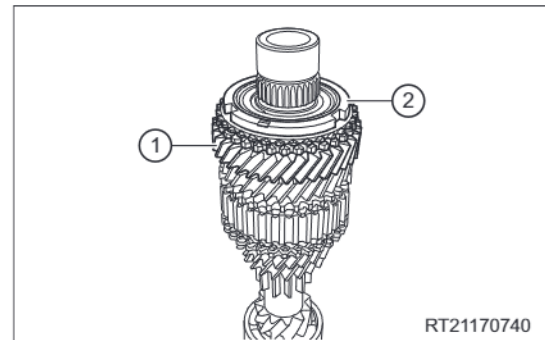
10. Install the 5th needle roller bearing.

- a. Apply transmission oil to the 5th needle roller bearing (1), and install it to the input shaft.



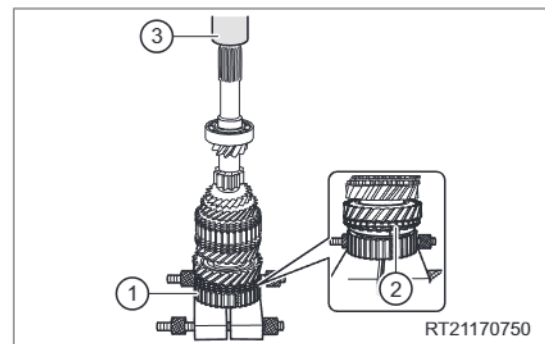
11. Install the 5th drive gear and 5th synchronizer ring.

- a. Apply transmission oil to the 5th drive gear (1) and 5th synchronizer ring (2), and install them to the input shaft.



12. Install the 5th synchronizer gear hub.

- a. Using a hydraulic press (3), press the 5th synchronizer gear (2) and 5th synchronizer gear hub (1) together into the input shaft.

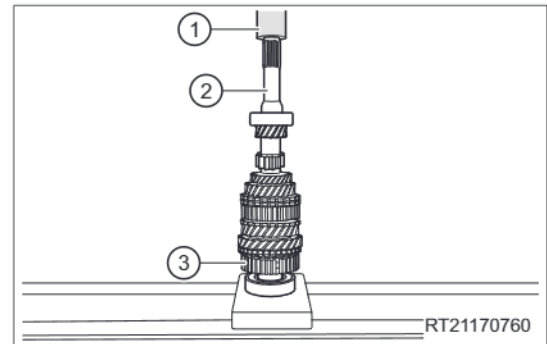


CAUTION

- When pressing synchronizer gear hub, prevent the 5th drive gear from disengaging.

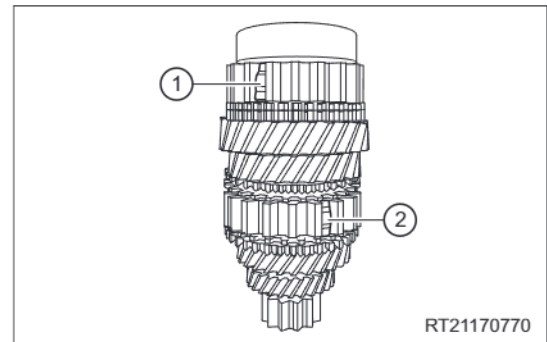
13. Install the input shaft rear bearing.

- a. Using a hydraulic press (1), press the input shaft rear bearing (3) into the input shaft (2).

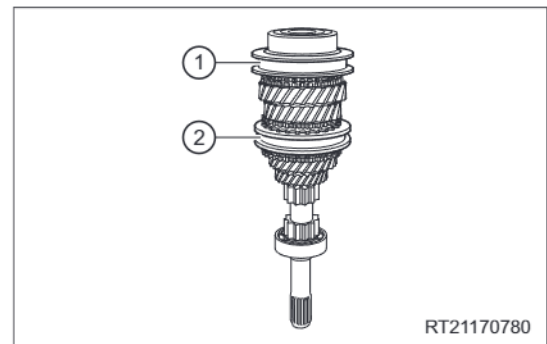


14. Install the 5th synchronizer outer race and 3rd-4th synchronizer outer race.

- a. Apply transmission oil to the 5th synchronizer meshing key and spring (1) and 3rd-4th synchronizer meshing key and spring (2), and install them to the synchronizer gear hubs.

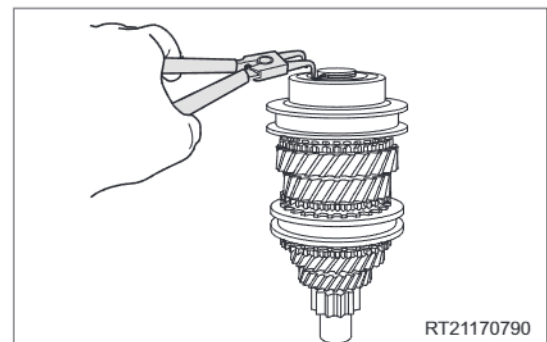


- b. Apply transmission oil to 5th synchronizer outer race (1) and 3rd-4th synchronizer outer race (2), and install them to the input shaft.



15. Install the input shaft rear bearing snap ring.

- a. Using snap spring calipers, install the rear bearing snap ring.

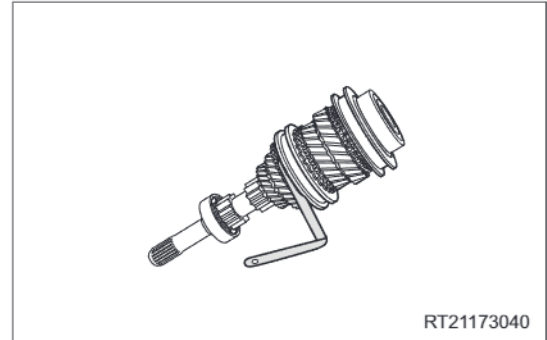


CAUTION

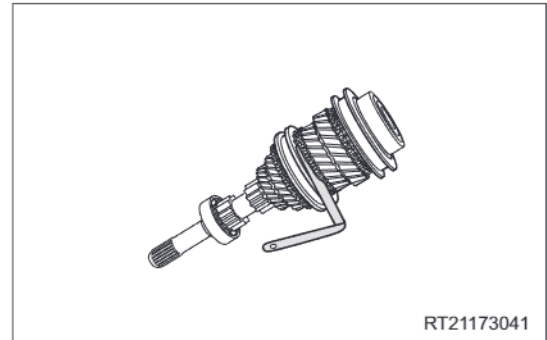
- Check gears on the input shaft for smooth rotation after installation.
- Check engagement of gears on the input shaft for looseness or sticking.

Inspection

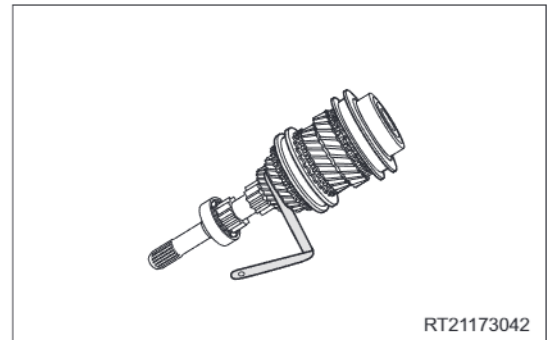
1. Using a feeler gauge, measure clearance between 3rd drive gear and synchronizer ring.
Standard value: 1.35 mm
Limit value: 1.100 - 1.600 mm



2. Using a feeler gauge, measure clearance between 4th drive gear and synchronizer ring.
Standard value: 1.35 mm
Limit value: 1.100 - 1.600 mm



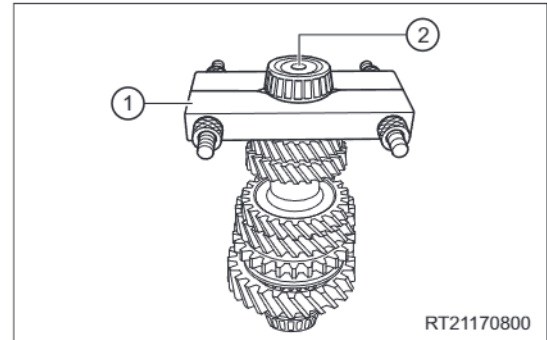
3. Using a feeler gauge, measure clearance between 2nd drive gear and 3rd drive gear.
Standard value: 0.65 mm
Limit value: 0.45 - 0.85 mm



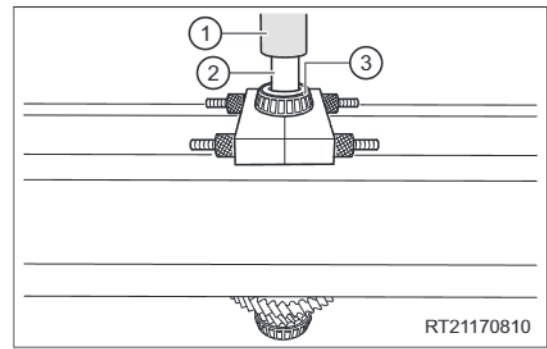
Output Shaft

Disassembly

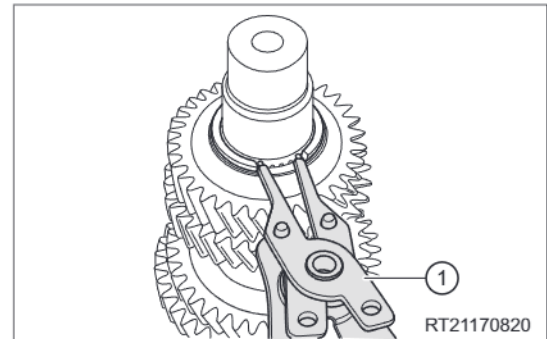
1. Remove the output shaft (See page 17-22).
2. Remove the output shaft rear bearing.
 - a. Using a special tool (1), secure the output shaft rear bearing (2).



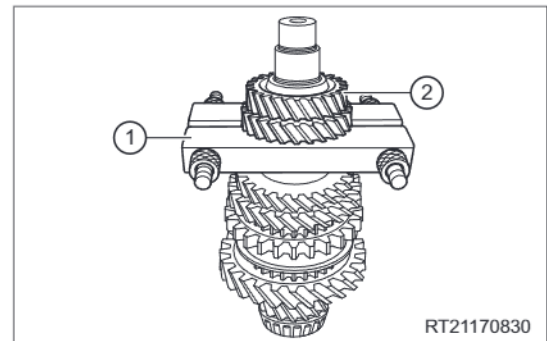
- b. Using a hydraulic press (1), press the output shaft rear bearing (3) out of output shaft (2), and remove the output shaft rear bearing.



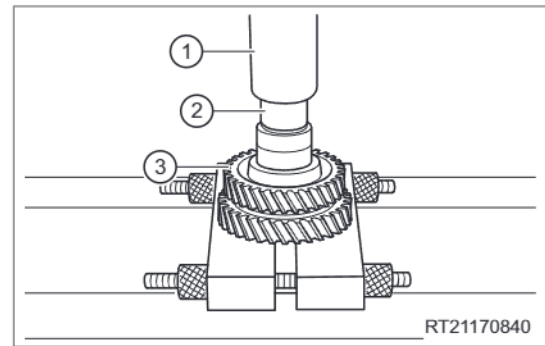
3. Remove the 5th driven gear and 4th driven gear.
 - a. Using snap spring calipers (1), remove the snap ring.



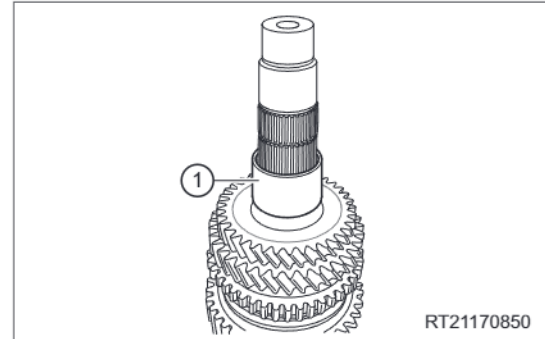
- b. Using a special tool (1), secure the 5th and 4th driven gear set (2).



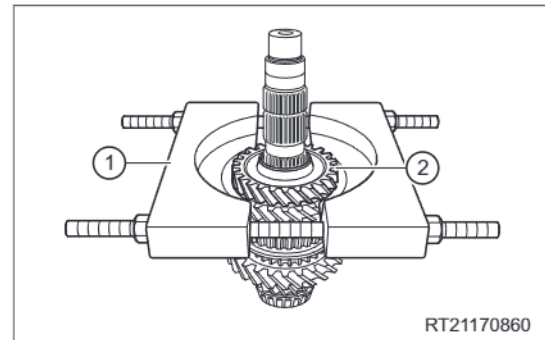
- c. Using a hydraulic press (1), press the 5th and 4th driven gear set (3) out of output shaft (2), and remove the 5th driven gear and 4th driven gear.



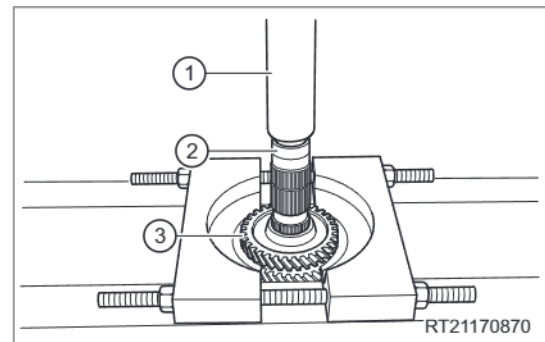
4. Remove the gear shaft bushing.
a. Remove the gear shaft bushing (1) from output shaft.



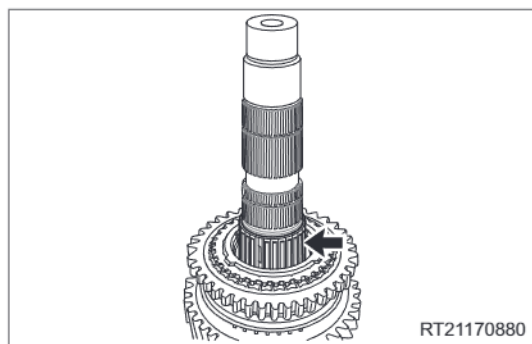
5. Remove the 2nd driven gear and 3rd driven gear.
a. Using a special tool (1), secure the 2nd driven gear (2).



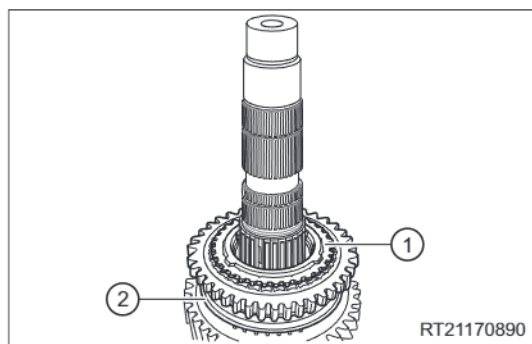
- b. Using a hydraulic press (1), press the 2nd and 3rd driven gears (3) out of output shaft (2), and remove the 2nd driven gear and 3rd driven gear.



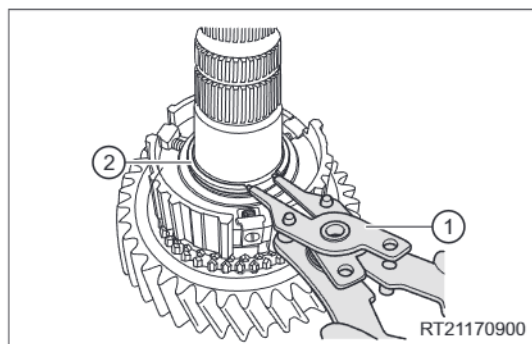
6. Remove the 2nd needle roller bearing.
 - a. Remove the 2nd needle roller bearing (1) from output shaft.



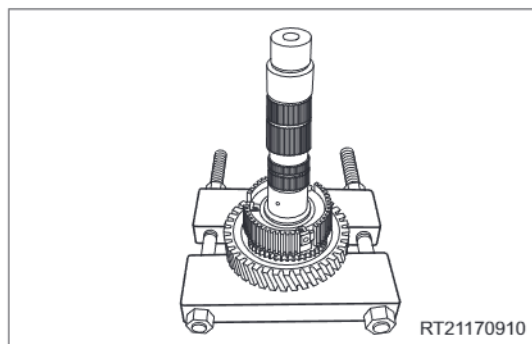
7. Remove the 1st driven gear and 1st-2nd synchronizer gear hub.
 - a. Remove the 1st-2nd synchronizer ring set (2).
 - b. Remove the 1st-2nd synchronizer outer race (1).



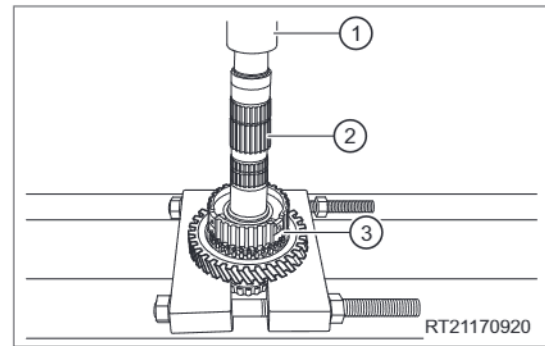
- c. Using snap spring calipers (1), remove the snap ring (2).



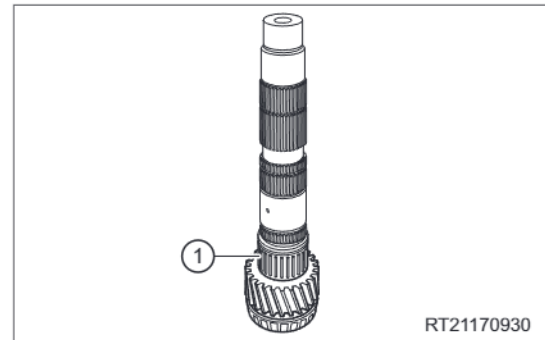
- d. Secure a special tool to the 1st driven gear.



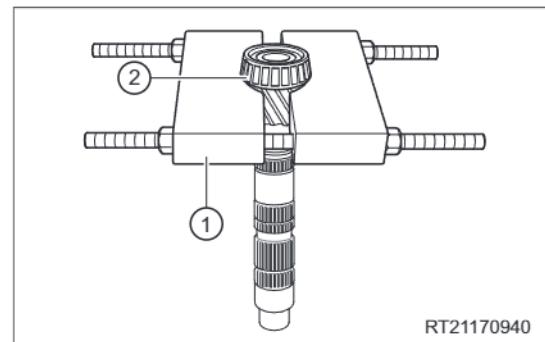
- e. Using a hydraulic press (1), press the 1st driven gear and 1st-2nd synchronizer (3) out of output shaft (2), and remove the 1st driven gear and 1st-2nd synchronizer.



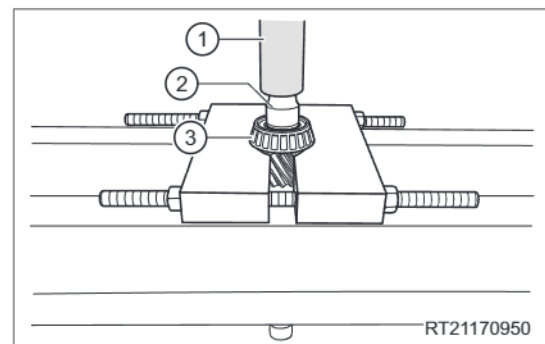
8. Remove the 1st needle roller bearing.
- a. Remove the 1st needle roller bearing (1) from output shaft.



9. Remove the output shaft front bearing.
- a. Using a special tool (1), secure the output shaft front bearing (2).

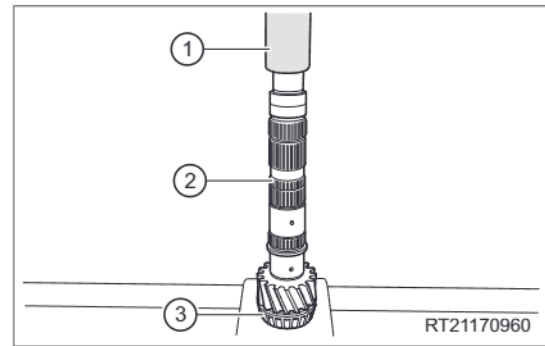


- b. Using a hydraulic press (1), press the output shaft front bearing (3) out of output shaft (2), and remove the output shaft front bearing.



Assembly

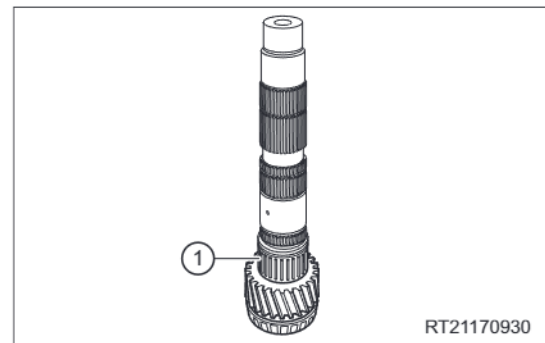
1. Install the output shaft front bearing.
 - a. Using a hydraulic press (1), press the output shaft front bearing (3) into the output shaft (2).



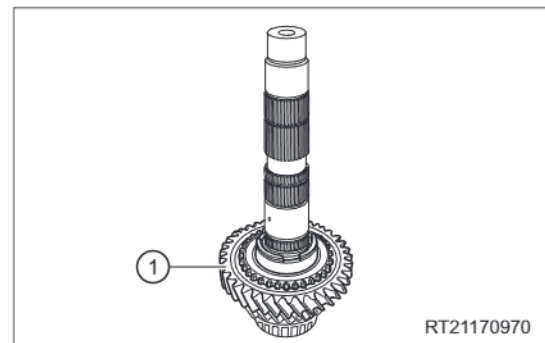
CAUTION

- When pressing the bearing, make sure that pressure is applied to bearing inner race as the bearing may be damaged due to uneven force.

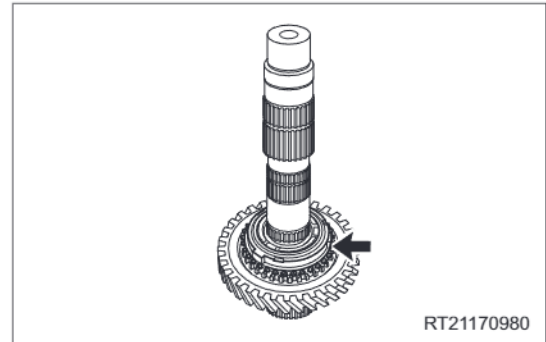
2. Install the 1st needle roller bearing.
 - a. Apply transmission oil to the 1st needle roller bearing (1), and install it to the output shaft.



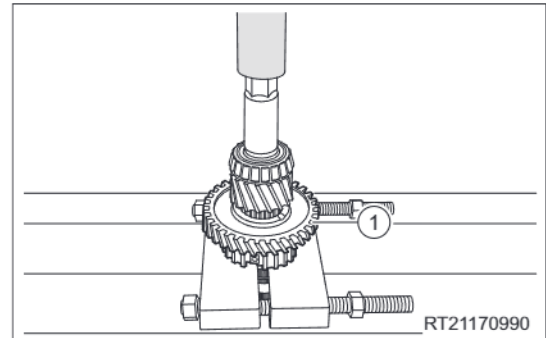
3. Install the 1st driven gear.
 - a. Apply transmission oil to the 1st driven gear (1), and install it to the output shaft.



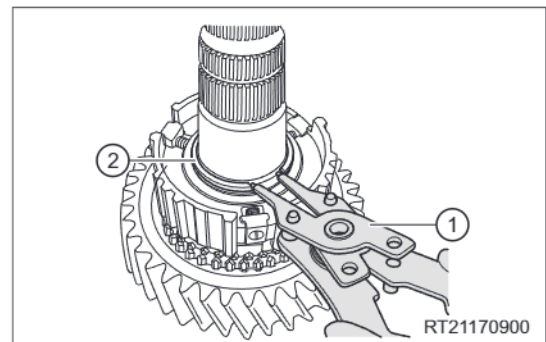
4. Install the 1st synchronizer ring set.
 - a. Apply transmission oil to the 1st synchronizer ring set (arrow), and install it to the output shaft.



5. Install the 1st-2nd synchronizer gear hub and 1st driven gear.
 - a. Place the 1st-2nd synchronizer gear hub (1) in place, and then press it into the output shaft with a hydraulic press.

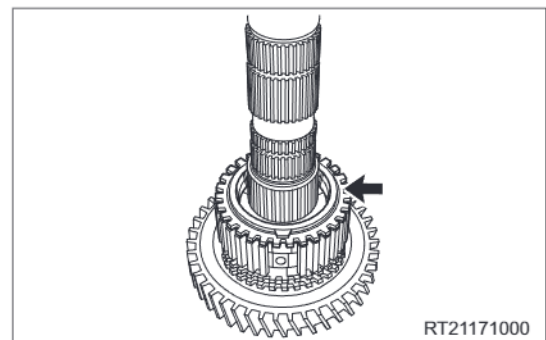


- b. Using snap spring calipers (1), install the snap ring (2).



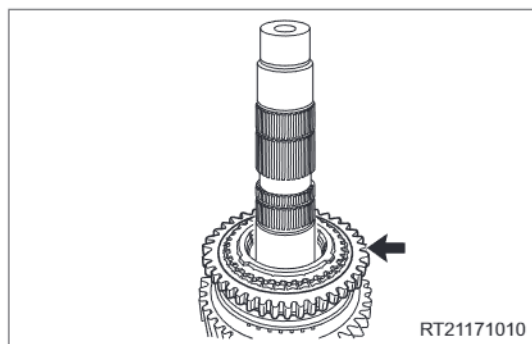
17

6. Install the synchronizer ring set.
 - a. Apply transmission oil to the synchronizer ring set (arrow), and install it to the output shaft.



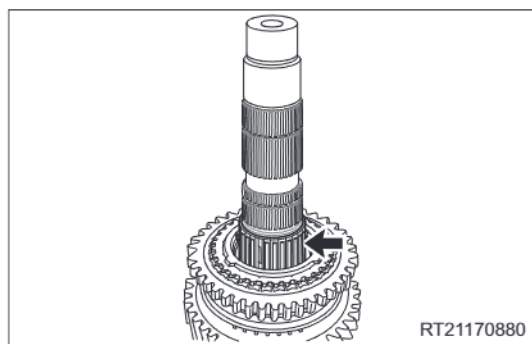
7. Install the synchronizer outer race.

- a. Apply transmission oil to the synchronizer outer race (arrow), and install it to the output shaft.



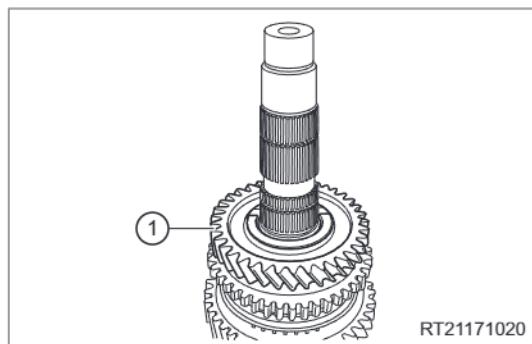
8. Install the 2nd needle roller bearing.

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



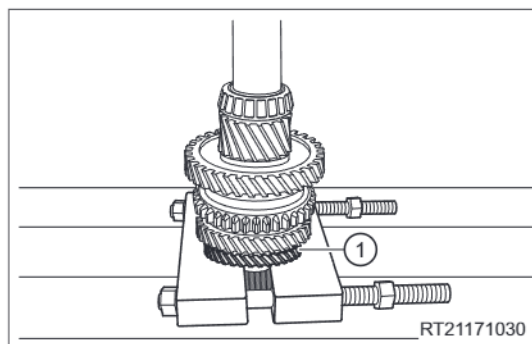
9. Install the 2nd driven gear.

- a. Apply transmission oil to the 2nd driven gear (1), and install it to the output shaft.



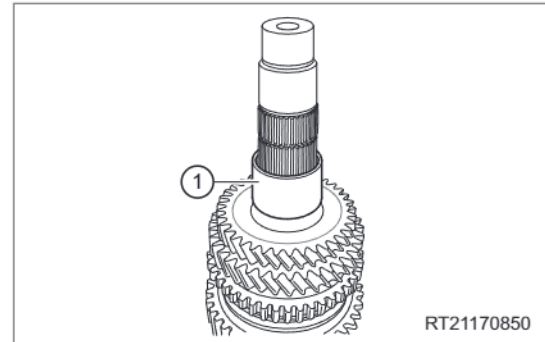
10. Install the 3rd driven gear.

- a. Using a hydraulic press, press the 3rd driven gear (1) into the output shaft.



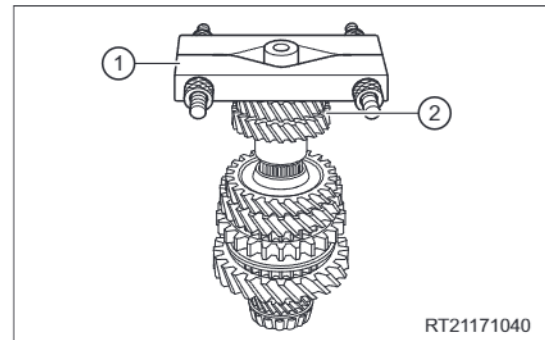
11. Install the gear shaft bushing.

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

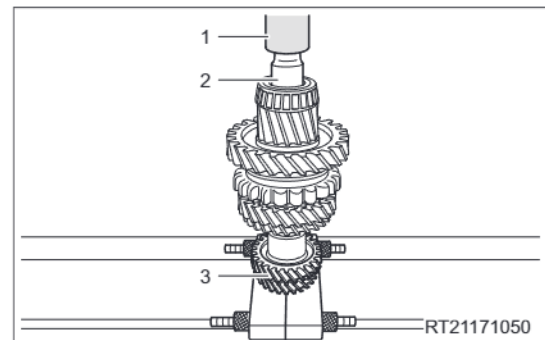


12. Install the 4th and 5th driven gears.

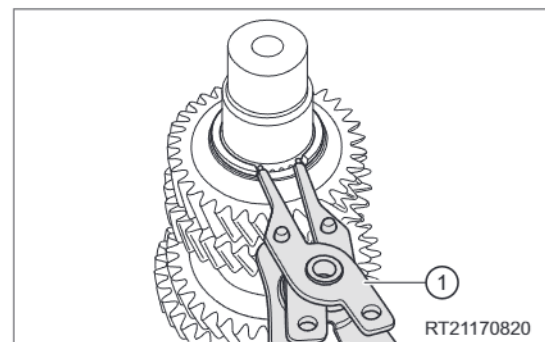
- a. Using a special tool (1), secure the 4th and 5th driven gears (2).



- b. Using a hydraulic press (1), press the 4th and 5th driven gears (3) into the output shaft (2).

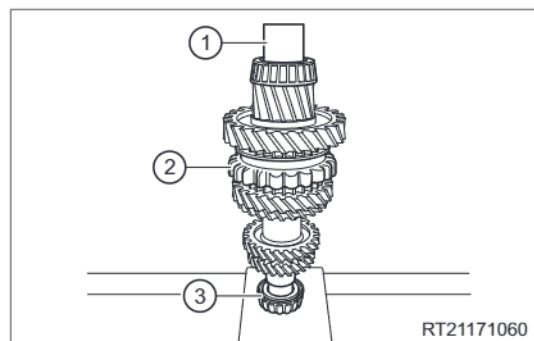


- c. Using snap spring calipers (1), install the snap ring.



13. Install the output shaft rear bearing.

- a. Using a hydraulic press (1), press the output shaft rear bearing (3) into the output shaft (2).



CAUTION

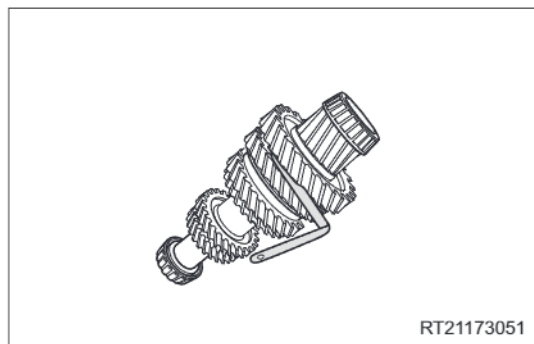
- Check gears on the output shaft for smooth rotation after installation.
- Check engagement of gears on the output shaft for looseness or sticking.

Inspection

1. Using a feeler gauge, measure clearance between 1st driven gear and synchronizer ring.

Standard value: 1.54 mm

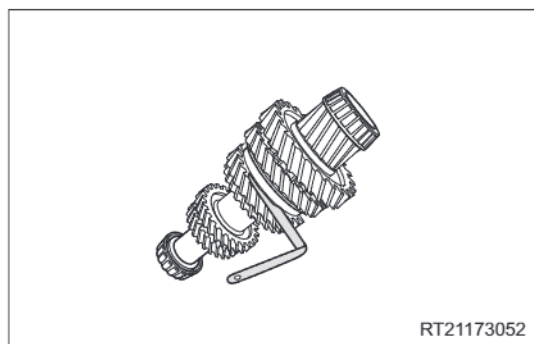
Limit value: 1.240 - 1.840 mm



2. Using a feeler gauge, measure clearance between 2nd driven gear and synchronizer ring.

Standard value: 1.54 mm

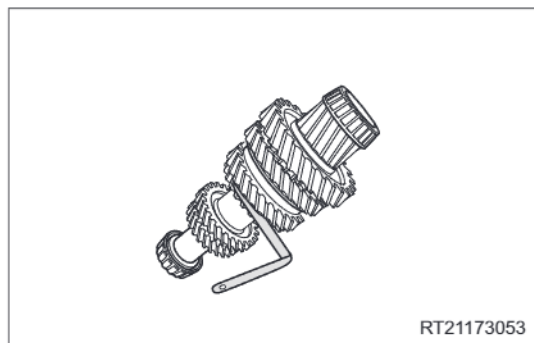
Limit value: 1.240 - 1.840 mm



3. Using a feeler gauge, measure clearance between 2nd driven gear and 3rd driven gear.

Standard value: 1.2 mm

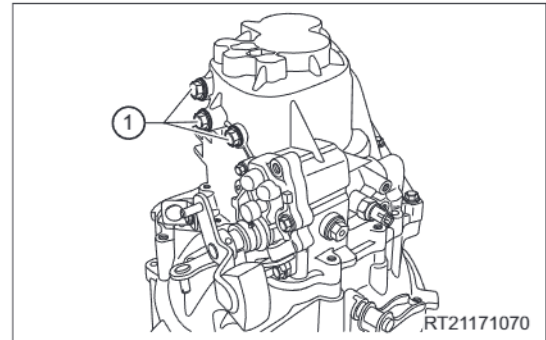
Limit value: 0.72 - 1.68 mm



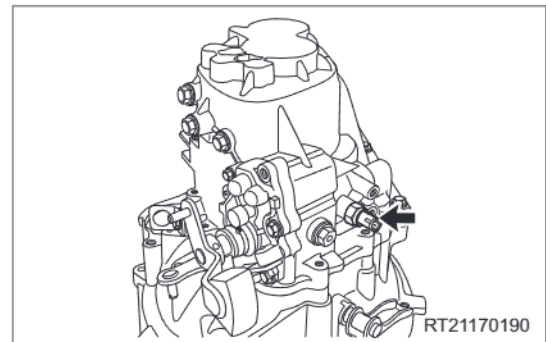
Transmission External Accessory

Removal

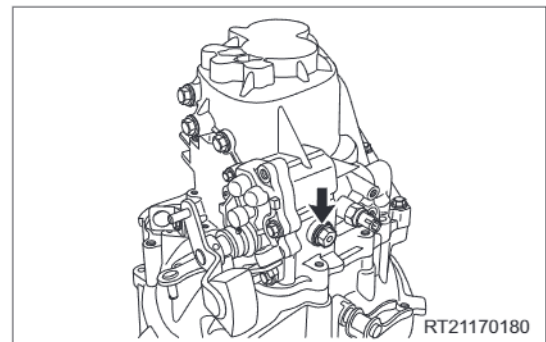
1. Shift transmission to the neutral position.
2. Remove the shift shaft locating bolt.
 - a. Remove the shift shaft locating bolts (1) from transmission case.



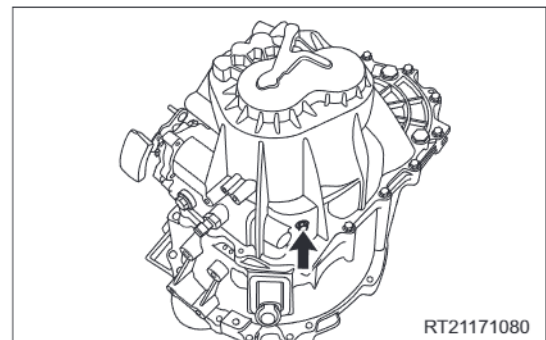
3. Remove the back-up light switch.
 - a. Remove the back-up light switch (arrow) from transmission case.



4. Remove the gear shift mechanism locating bolt.
 - a. Remove the gear shift mechanism locating bolt (arrow) from transmission case.

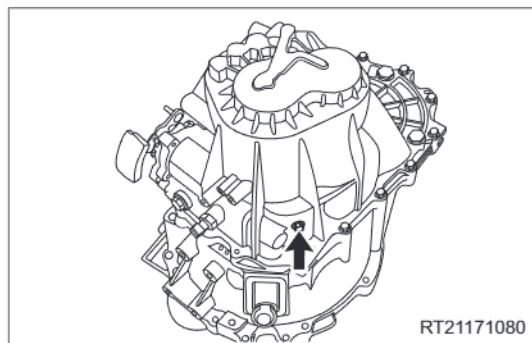


5. Remove the reverse idler gear shaft locating bolt.
 - a. Remove the reverse idler gear shaft locating bolt (arrow) from transmission case.



Installation

1. Install the reverse idler gear shaft locating bolt.
 - a. Install the reverse idler gear shaft locating bolt (arrow) to the transmission case.
(Tightening torque: $40 \pm 4 \text{ N}\cdot\text{m}$)

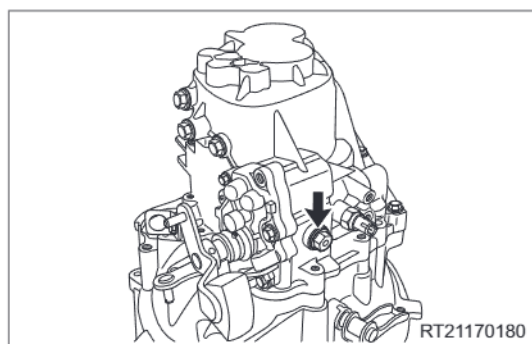


2. Install the gear shift mechanism locating bolt.

HINT:

Apply thread adhesive to thread before installation.

- a. Install the gear shift mechanism locating bolt (arrow) to the transmission case.
(Tightening torque: $35 \pm 5.25 \text{ N}\cdot\text{m}$)

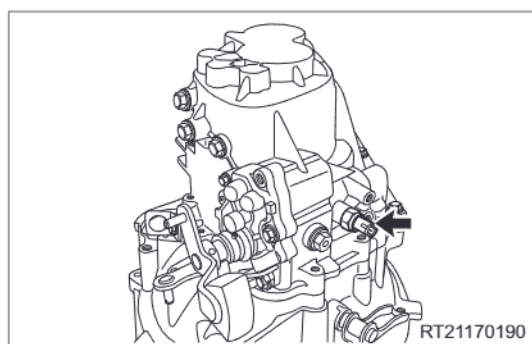


3. Install the back-up light switch.

HINT:

Apply thread adhesive to thread before installation.

- a. Install the back-up light switch (arrow) to the transmission case.
(Tightening torque: $20 \pm 2 \text{ N}\cdot\text{m}$)

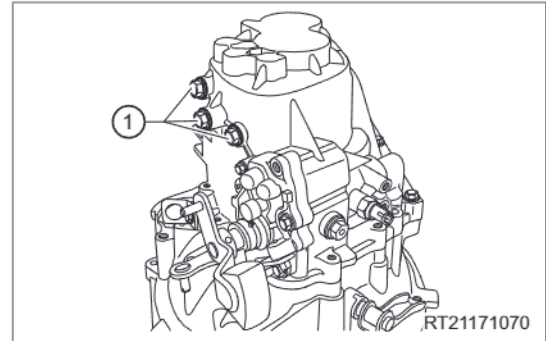


4. Install the shift shaft locating bolt.

HINT:

Apply thread adhesive to thread before installation.

- a. Install the shift shaft locating bolts (1) to the transmission case.
(Tightening torque: 35 ± 5.25 N·m)



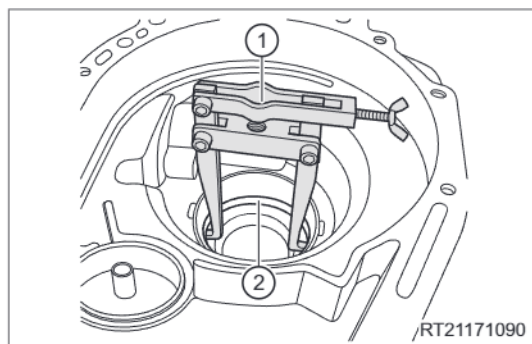
Transmission Case

Disassembly

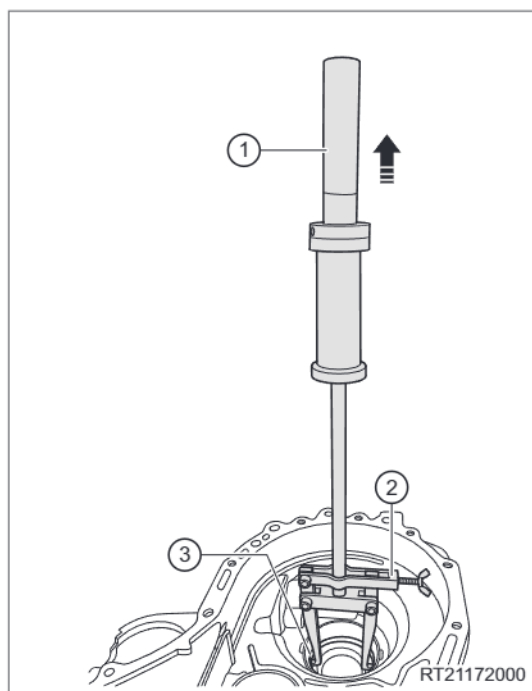
CAUTION

- Use the same removal procedures for the differential bearing out race of transmission case and clutch case and the oil seal.
- The oil seal cannot be reused. After removal, it must be replaced.

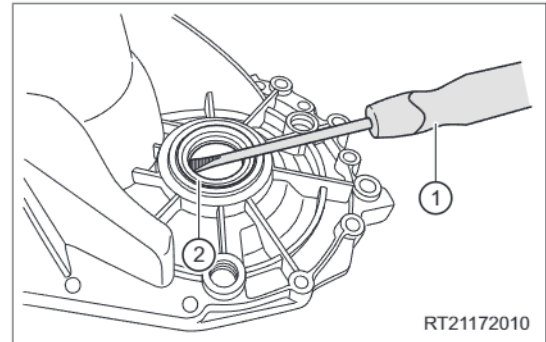
1. Remove the differential bearing outer race.
 - a. Secure the bearing outer race puller joint (1) to the bearing outer race (2).



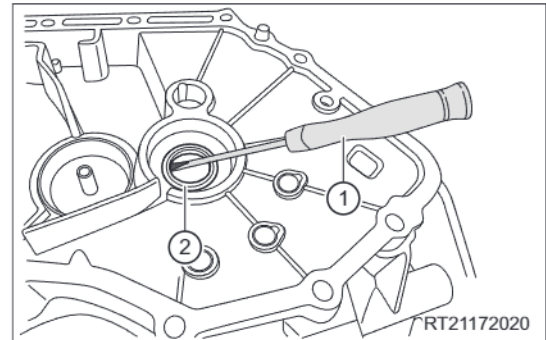
- b. Install the puller (1) to the bearing outer race remover (2), and pull out bearing outer race (3) with the puller.



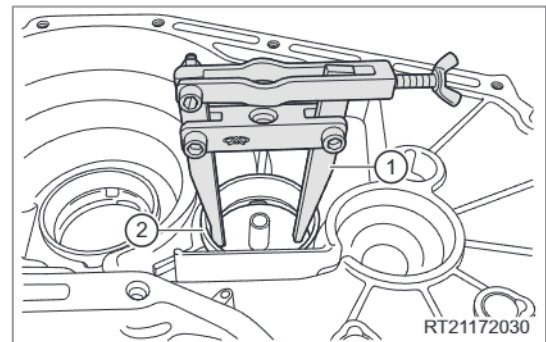
2. Remove the drive shaft oil seal.
 - a. Using a flat tip screwdriver (1), pry out the drive shaft oil seal (2).



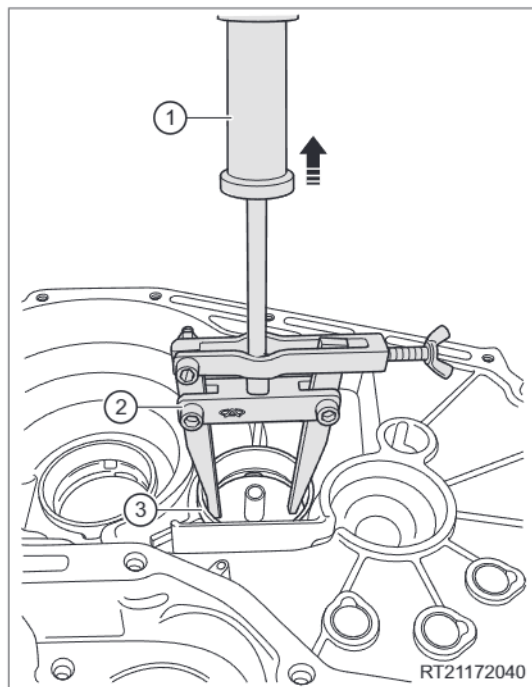
3. Remove the input shaft oil seal.
 - a. Using a flat tip screwdriver (1), pry out the input shaft oil seal (2).



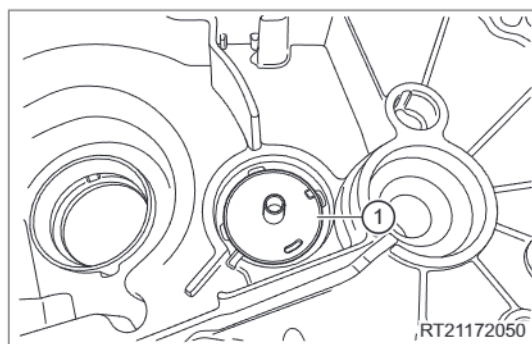
4. Remove the output shaft bearing outer race.
 - a. Secure the output shaft end bearing outer race puller joint (1) to the output shaft bearing outer race (2).



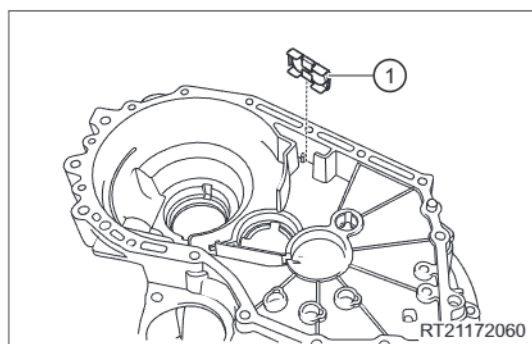
- b. Install the puller (1) to bearing outer race remover (2).
- c. Using the puller, pull out the output shaft bearing outer race (3).



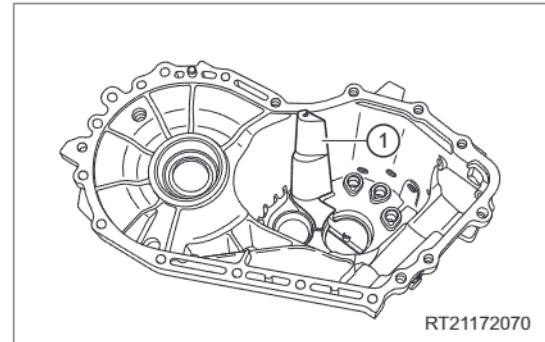
5. Remove the oil deflector.
 - a. Remove the oil deflector (1) from clutch case.



- 17**
6. Remove the magnet.
 - a. Remove the magnet (1) from clutch case.

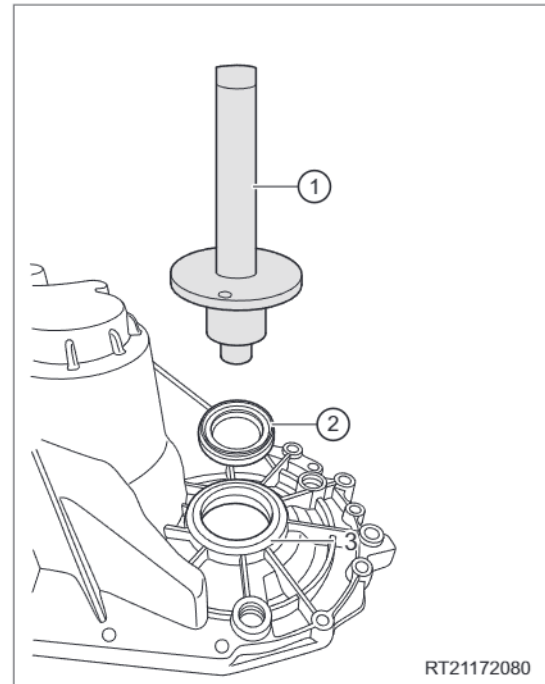


7. Remove the oil guide.
 - a. Remove the oil guide (1) from transmission case.



Assembly

1. Install the drive shaft oil seal.
 - a. Using a drive shaft oil seal installer (1), install the drive shaft oil seal (2) to the transmission case (3).

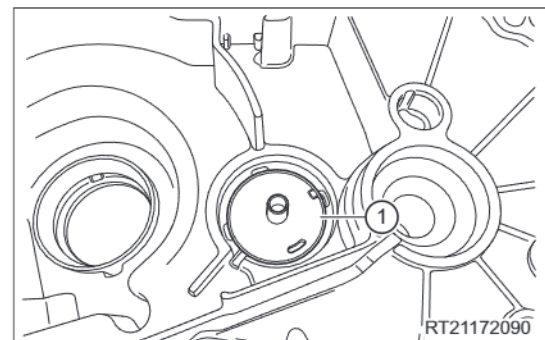


17

CAUTION

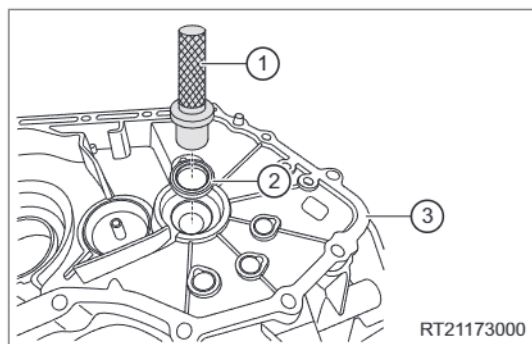
- Apply a proper amount of transmission oil to the lip when installing the oil seal.

2. Install the oil deflector.
 - a. Install the oil deflector (1) to the clutch case.



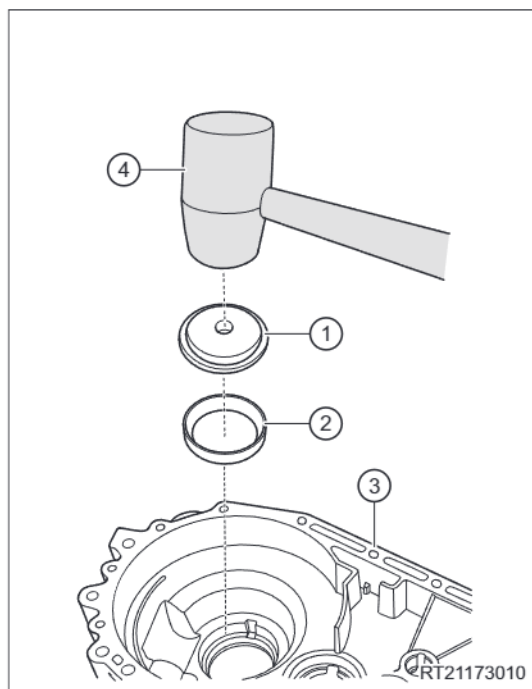
3. Install the input shaft oil seal.

- a. Using a input shaft oil seal installer (1), install the input shaft oil seal (2) to the clutch case (3).



4. Install the differential bearing outer race.

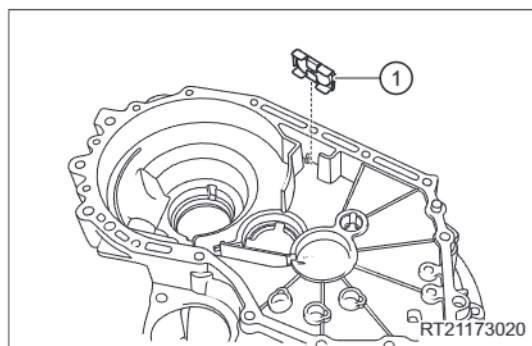
- a. Install the joint (1) to the bearing outer race (2), and install the bearing outer race (2) to the case (3) with a rubber hammer (4).



17

5. Install the magnet.

- a. Install the magnet (1) to the clutch case.



6. Install the oil guide.
 - a. Install the oil guide (1) to the transmission case.

