5-SPEED MANUAL TRANSAXLE

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GENERAL INFORMATION

Description

The QR523 five-speed transaxle is a constant-mesh manual transaxle that is synchronized in all gear ranges, including reverse.

The transaxle consists of three major sub-assemblies:

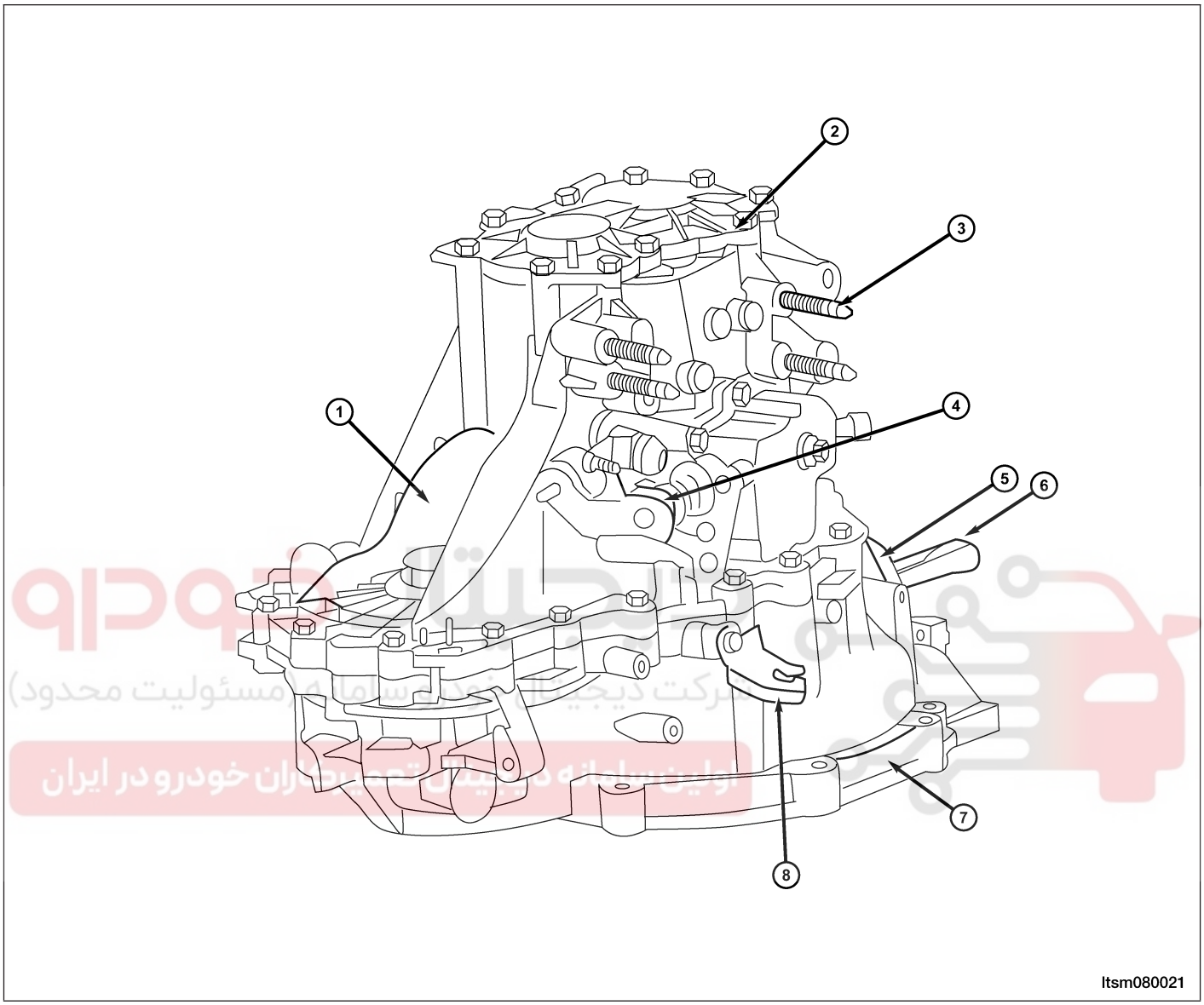
- Input shaft
- Output shaft
- Differential transaxle assembly

The transaxle shift system consists of the following components:

- Mechanical shift cover
- Shift rails
- Shift forks

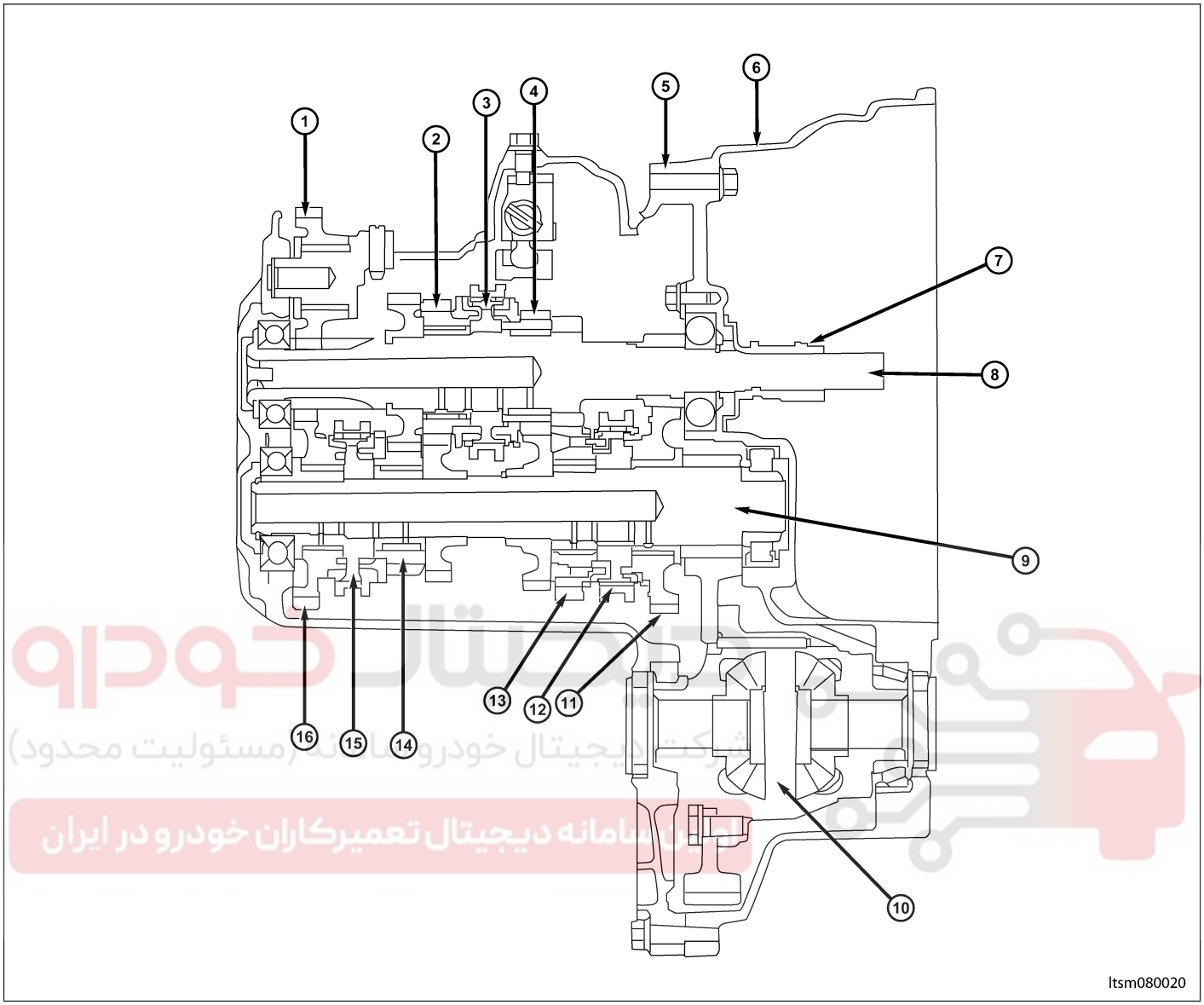
- Shift cables

QR523 External View



1 - Transaxle Housing Assembly	5 - Release Fork Dust Boot
2 - Bearing Cap Assembly	6 - Release Fork
3 - Stud Bolt	7 - Clutch Housing Assembly
4 - Gear-Shifting Mechanism Assembly	8 - Hydraulic Clutch Line Bracket

QR523 Internal View



1 - Idler Assembly	9 - Output Shaft
2 - Pinion Gear, 4th Gear	10 - Differential Assembly
3 - 3rd-4th Gear Synchronizer	11 - Driven Gear of 1st Gear
4 - Pinion Gear, 3rd Gear	12 - 1st-2nd Gear Synchronizer
5 - Transaxle Housing	13 - Driven Gear, 2nd Gear
6 - Clutch Housing	14 - Driven Gear, 5th Gear
7 - Release Bearing Saddle	15 - Synchronizer of 5th-Gear and Reserve Gear
8 - Input Shaft	16 - Gear, Reverse Gear

Operation

The following are the details of the manual transaxle:

Neutral

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. Since no synchronizers are engaged on either the input or output shafts, power is not transmitted to the output shafts, power is not transmitted to the output shaft and the differential does not turn.

1st Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft first gear is integral to the input shaft, and is in constant mesh with the intermediate shaft first speed gear. Because of this constant mesh, the output shaft first speed gear freewheels until first gear is selected. As the gearshift lever is moved to the first gear position, the 1-2 fork moves the 1-2 synchronizer sleeve towards first gear on the output shaft. The synchronizer sleeve engages the first gear clutch teeth, engaging the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

2nd Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft second gear is integral to the input shaft, and is in constant mesh with the output shaft second speed gear. Because of this constant mesh, the output shaft second speed gear freewheels until second gear is selected. As the gearshift lever is moved to the second gear position, the 1-2 fork moves the 1-2 synchronizer sleeve towards second gear on the output shaft. The synchronizer sleeve engages the second gear clutch teeth, engaging the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

3rd Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft third speed gear is in constant mesh with the output shaft 3-4 cluster gear which is fixed to the output shaft. Because of this constant mesh, the input shaft third speed gear freewheels until third gear is selected. As the gearshift lever is moved to the third gear position, the 3-4 fork moves the 3-4 synchronizer sleeve towards third gear on the input shaft. The synchronizer sleeve engages the third gear clutch teeth, engaging the gear to the input shaft, and allowing power to transmit through the output shaft to the differential.

4th Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft fourth speed gear is in constant mesh with the output shaft 3-4 cluster gear which is fixed to the output shaft. Because of this constant mesh, the input shaft fourth speed gear freewheels until fourth gear is selected. As the gearshift lever is moved to the fourth gear position, the 3-4 fork moves the 3-4 synchronizer sleeve towards fourth gear on the input shaft. The synchronizer sleeve engages the fourth gear clutch teeth, engaging the gear to the input shaft, and allowing power to transmit through the output shaft to the differential.

5th Gear

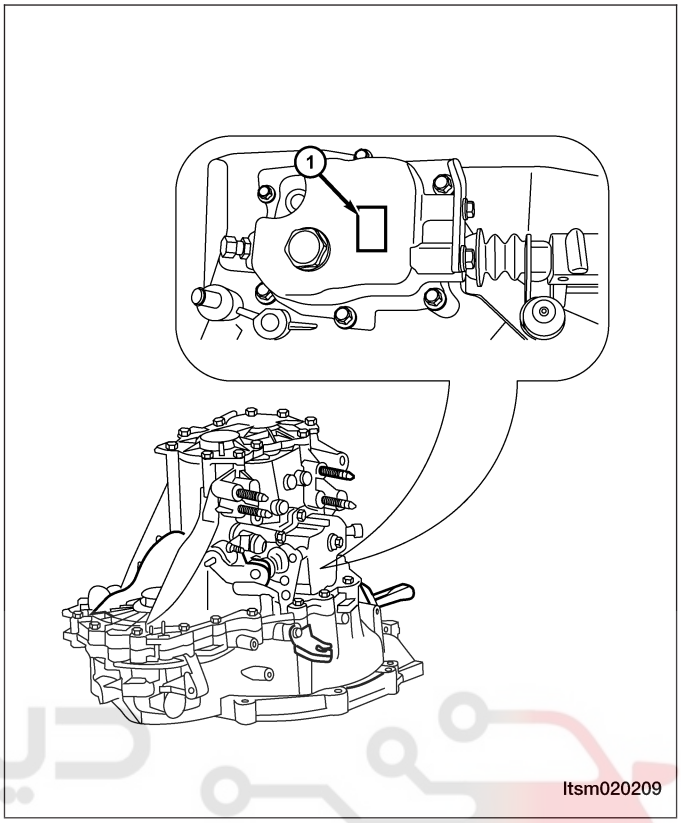
Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft fifth speed gear is pressed on to the input shaft, and is in constant mesh with the output shaft fifth speed gear. Because of this constant mesh, the output shaft fifth speed gear freewheels until fifth gear is selected. As the gearshift lever is moved to the fifth gear position, the 5-R fork moves the 5-R synchronizer sleeve towards the output shaft fifth speed gear. The synchronizer sleeve engages the fifth gear clutch teeth, engaging the gear to the input shaft, and allowing power to transmit through the output shaft to the differential.

Reverse Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft reverse gear is integral to the input shaft, and is in constant mesh with the reverse idler gear. The reverse idler gear, which reverses the rotation of the output shaft, is in constant mesh with the output shaft reverse gear. Because of this constant mesh, the output shaft reverse gear freewheels until reverse gear is selected. As the gearshift lever is moved to the reverse gear position, the 5-R fork moves the 5-R synchronizer sleeve towards the output shaft reverse gear. The synchronizer sleeve engages the reverse gear clutch teeth, engaging the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

Transaxle Identification Number

The transaxle serial number can be found on a metal tag (1) fastened to the transaxle case on the clutch housing. The third row data is the transaxle serial number.



Specifications

Maintenance Specifications

DESCRIPTION	ALLOWABLE RANGE (mm)	LIMIT VALUE (mm)
Axial Clearance Of Input Shaft Front Bearing	-0.01 - 0.21	-
Axial Clearance Of Input Shaft Rear Bearing	-0.01 - 0.12	-
Axial Clearance Of Input Shaft Fifth Gear	-0.01 - 0.09	-
Axial Clearance Of Output Shaft Front Bearing	-0.01 - 0.12	-
Axial Clearance Of Output Shaft Rear Bearing	-0.01 - 0.09	-
Axial Clearance Of Output Shaft Third Gear	-0.01 - 0.09	-
Back Clearance Of Differential Case Planetary Gear	0.025 - 0.150	-
Clearance Between The Gear And The Back Of Synchronizer Ring	-	0.05
Pretension Of Differential Case	0.05 - 0.11	-

Sealants and Adhesives

DESCRIPTION	SPECIFIED SEALANTS AND ADHESIVES
Clutch Housing to Transaxle Housing	Three Arrow 1216E
Control Case to Transaxle Housing	
Lower Head to Transaxle Housing	

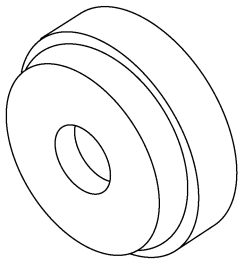
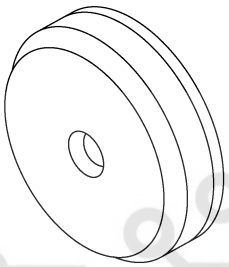
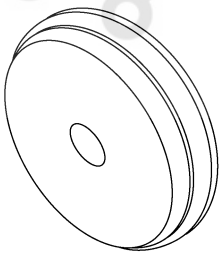
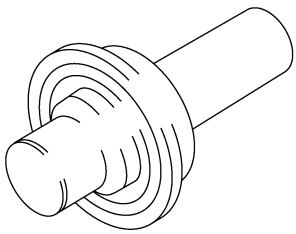
Torque Specifications

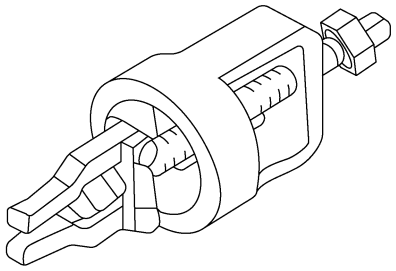
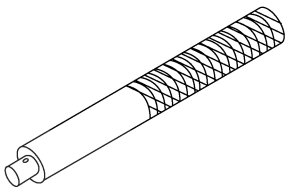
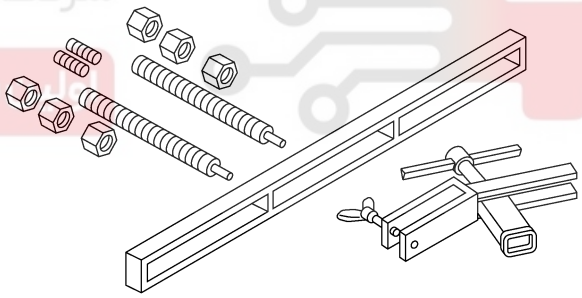
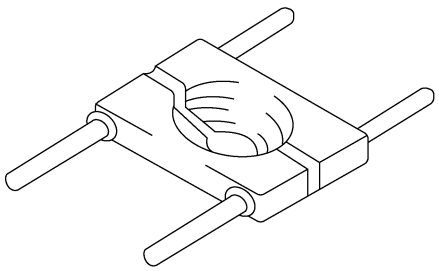
DESCRIPTION	TORQUE (N·m)
Bottom Cover-Transaxle Installation Bolts	6.2 - 7.6
Backup Lamp Switch	28.7 - 35.3
Clutch Housing-Transaxle Housing Installation Bolts	39.5 - 48.5
Clutch Release Bearing Saddle Retainer Installation Bolts	8.8 - 10.8
Gear-Shifting Mechanism Assembly Installation Bolts	16.1 - 19.9
Gear-Shifting Staying Wire Bracket Installation Bolts	16.1 - 19.9
Idling Gear Assembly Installation Bolts	43.1 - 52.9
Main Gearbox Driven Gear Installation Bolts	118.5 - 145.5
Speedometer Gear Installation Bolts	3.5 - 4.3

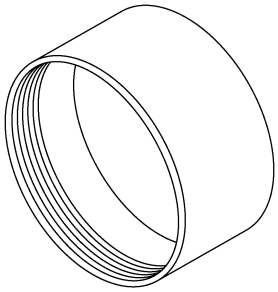
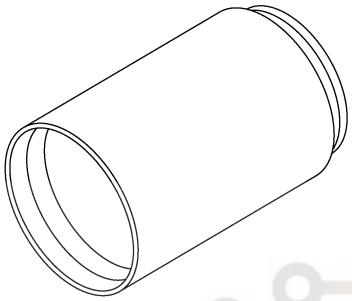
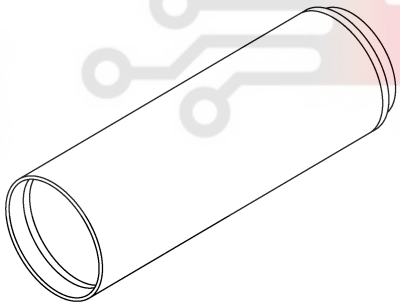
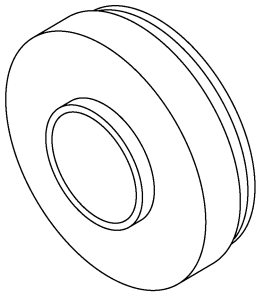
Technical Data

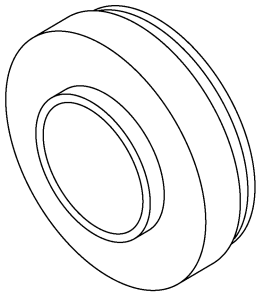
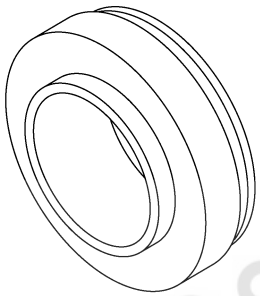
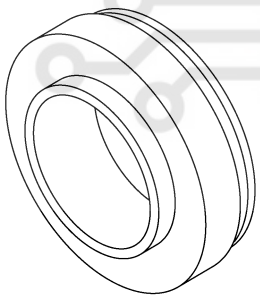
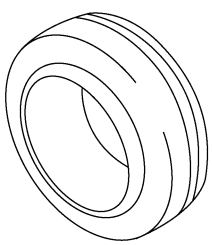
TYPE	MECHANICAL GEAR COUPLING	
Gear Position	Transaxle Ratio	Gear Ratio
1st	3.583	43/12
2nd	1.947	37/19
3rd	1.379	40/29
4th	1.030	34/33
5th	0.820	32/39
Reverse	3.363	37/11
Final Drive	4.313	69/16
Transaxle Fluid Type	GL-4 75W-90	
Transaxle Fluid Quantity	2.2 L	
Rated Torque	230 N·m	
Rated Speed	5500 RPM	
Rated Power	100 KW	
Center Distance	204 mm	
Input Shaft Spline	Tooth number	20
	Module	1.0583
	Pressure angle	30°
	External diameter	ϕ22.224 mm (0/-0.3)
	Inner diameter	ϕ19.675 mm (0/-0.2)
Physical Dimension	398.5×522×355.7	

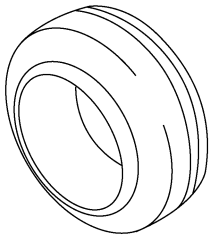
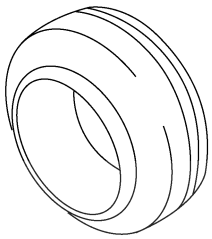
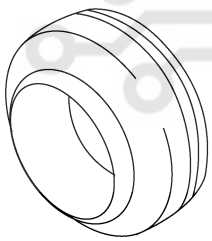
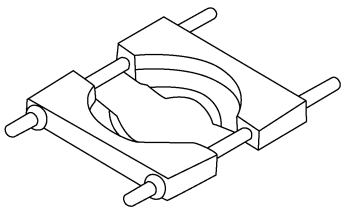
Special Tools

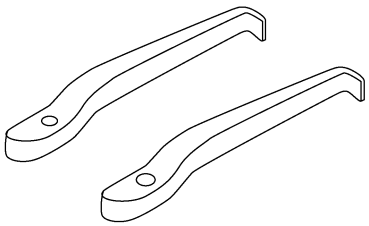
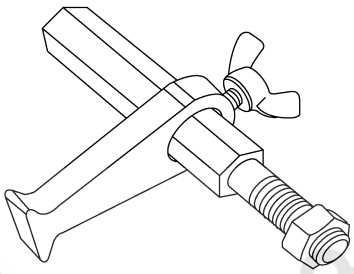
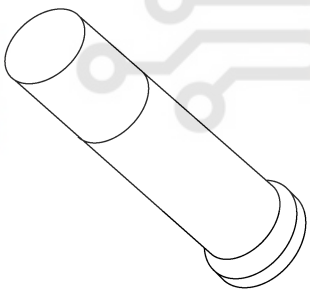
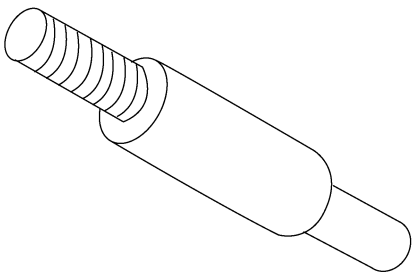
Installer Connector MB-990926	 ltsm080001
Installer Connector MB-990934	 ltsm080002
Installer Connector MB-990935	 ltsm080003
Fluid Seal/Differential Installer MB-998325	 ltsm080004

Bearing Outer Race Remover MB-998346	 ltsm080005
Handle MB-990938	 ltsm020026
Valve Spring Compressor MB-998772	 ltsm020012
Bearing Remover MB-998801	 ltsm080006

Installer Cap MB-998812	 ltsm080007
Installer (100) MB-998813	 ltsm080008
Installer Connector (200) MB-998814	 ltsm080009
Installer Connector (30) MB-998816	 ltsm080010

Installer Connector (34) MB-998817	 ltsm080011
Installer Connector (38) MB-998818	 ltsm080012
Installer Connector (40) MB-998819	 ltsm080013
Installer Connector (46) MB-998822	 ltsm080014

Installer Connector (48) MB-998823	 ltsm080015
Installer Connector (50) MB-998824	 ltsm080016
Installer Connector (52) MB-998825	 ltsm080017
Bearing Remover MB-998917	 ltsm080018

Hook MB-999566	 Itsm080019
Flywheel Fixture CH-20043	 Itsm020211
Bearing Installer CH-30028	 Itsm020213
Bearing Extractor 09917-58010	 Itsm020212

DIAGNOSIS & TESTING

Abnormal Noise

Transaxle noise is most often a result of worn or damaged components. Chipped, broken gear or synchronizer teeth, and worn bearings all cause noise.

Inspect the following:
- Insufficient lubrication
- Incorrect lubricant
- Mis-assembled or damaged internal components
- Improper operation

Symptom Diagnostics

Hard Shifting
- Hard shifting may be caused by a mis-adjusted crossover cable. If hard shifting is accompanied by gear clash, synchronizer clutch and stop rings or gear teeth may be worn or damaged.

Slips Out Of Gear
- Transaxle disengagement may be caused by misaligned or damaged shift components, or worn teeth on the drive gears or synchronizer components. Incorrect transaxle assembly also causes gear disengagement.

Low Lubricant Level
- Insufficient transaxle lubricant is usually the result of leaks, or inaccurate fluid level check or refill method. Vehicle must be level to accurately check fluid level. Leakage is evident by the presence of fluid around the leak point. If leakage is not evident, the condition is probably the result of an under fill.
- If air-powered lubrication equipment is used to fill a transaxle, be sure the equipment is properly calibrated. Equipment out of calibration can lead to an under fill condition.

Clutch Problems
- Worn, damaged, or misaligned clutch components can cause difficult shifting, gear clash, and noise.
- A worn or damaged clutch disc, pressure plate, or a faulty slave cylinder can cause hard shifting and gear clash.

Abnormal Noise
- Transaxle noise is most often a result of worn or damaged components. Chipped, broken gear or synchronizer teeth, and worn bearings all cause noise.

Inspect the following:

  – Insufficient lubrication
  – Incorrect lubricant
  – Improperly assembled or damaged internal components

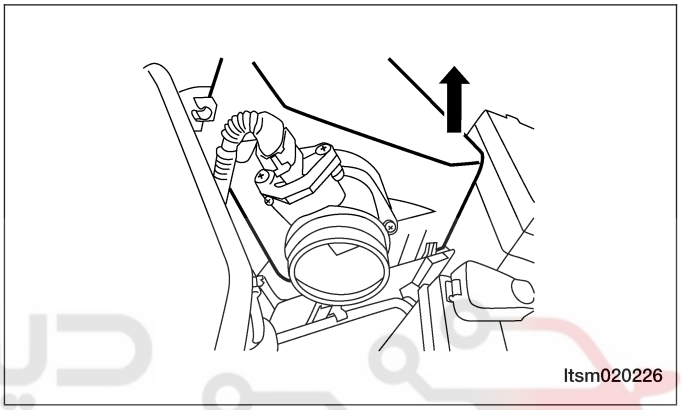
ON-VEHICLE SERVICE

Manual Transaxle Assembly

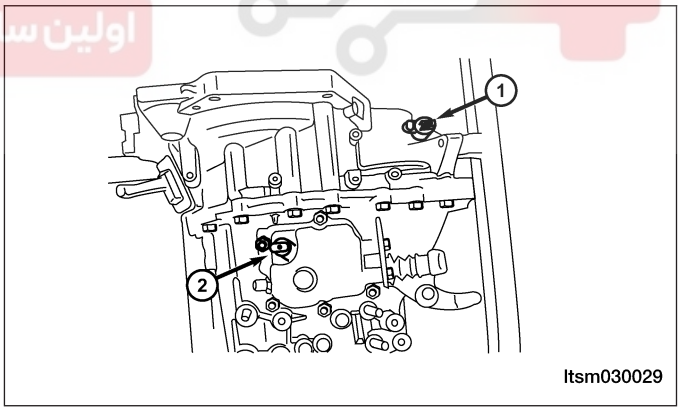
Removal & Installation

NOTE :
The following special tools are required to perform the repair procedure:
- MB-990938 - Handle
- MB-990935 - Installer Connector

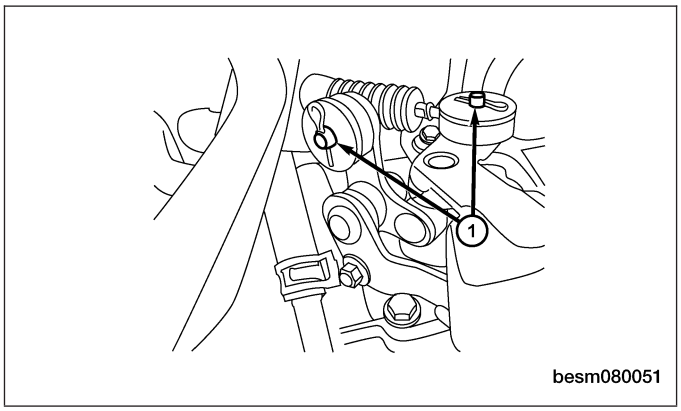
1. Raise and support the vehicle.
2. Disconnect the negative battery cable.
3. Remove the battery and battery tray (See Battery Removal & Installation in Section 05 Starting & Charging).
4. Remove air cleaner and air duct.



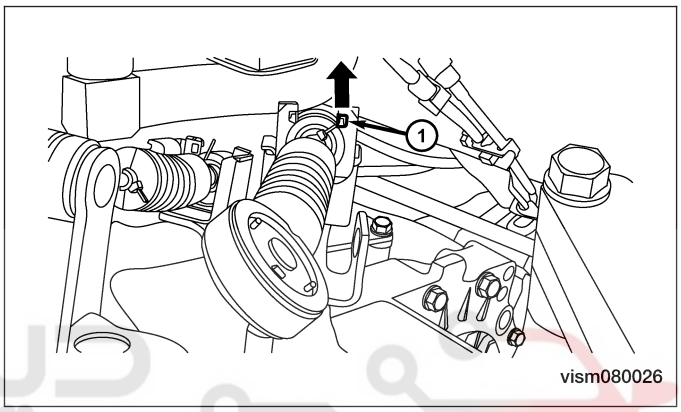
5. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
6. Remove the base mounting of the air cleaner housing assembly.
7. Remove the backup lamp switch (2) and vehicle speed sensor (1).



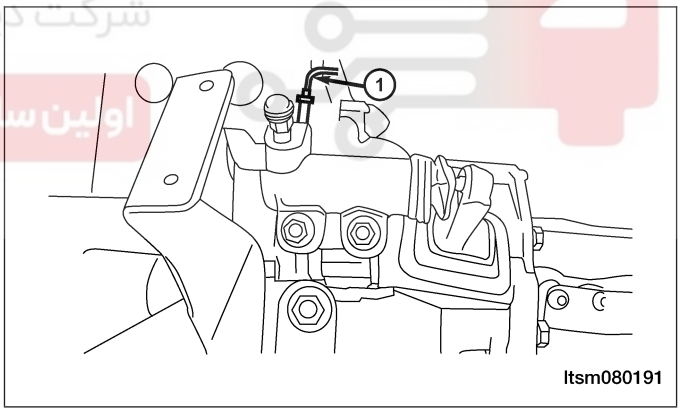
8. Remove the two shift cables (1) from the transaxle.



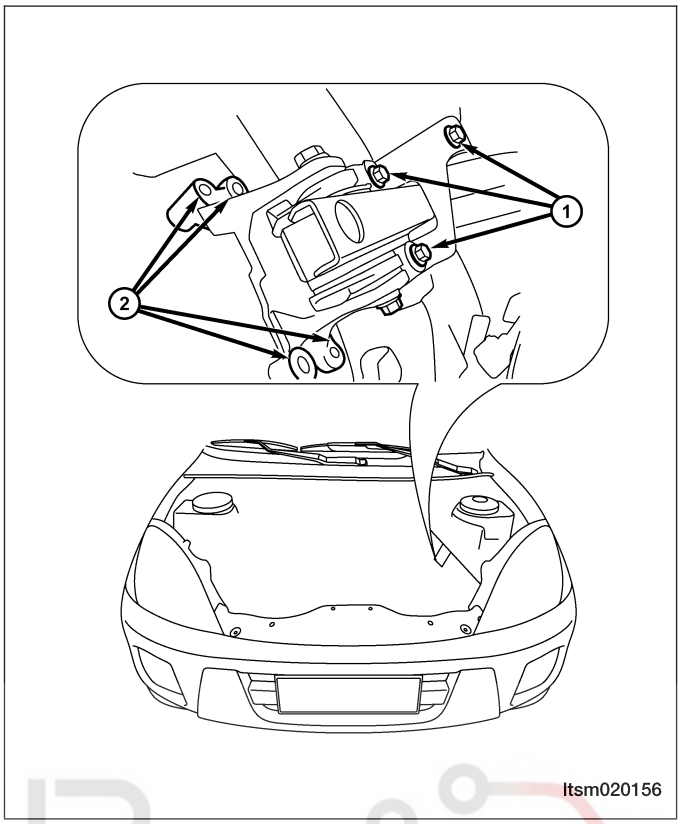
9. Remove the shift cable clamp (1) from the shift cable bracket.



10. Remove the clutch master cylinder outlet pipe (1) from the clutch slave cylinder.
    (Tighten: Outlet pipe bolt to 17 ± 1 N·m)
11. Remove the starter motor (See Starter Removal & Installation in Section 05 Starting & Charging).
12. Support the engine using an engine support fixture or suitable jack.
13. Remove the engine to transaxle upper bolts and remove the bracket.
    (Tighten: Engine to transaxle upper bolts to 80 N·m)



14. Remove transaxle mount nuts (2) and the transaxle mount bracket bolts (1).
(Tighten: Transaxle mount nuts to 120 N·m)



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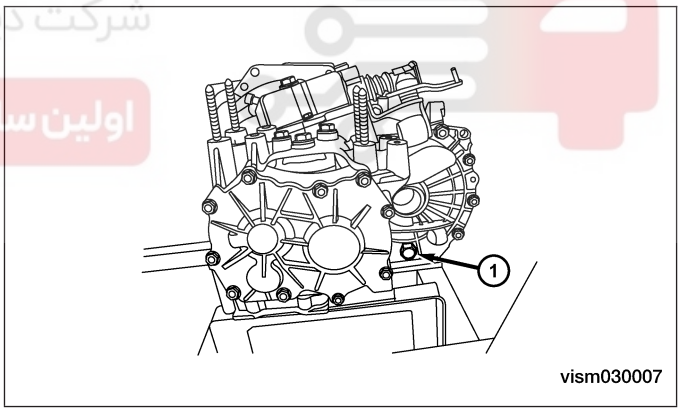
15. Raise the vehicle.
16. Remove the transaxle drain plug (1) and drain the transaxle fluid.



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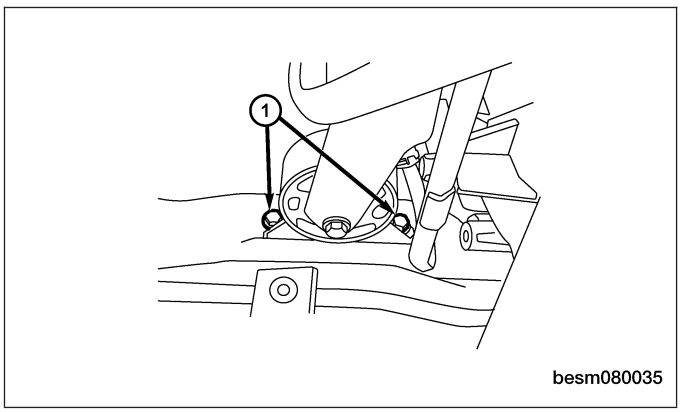
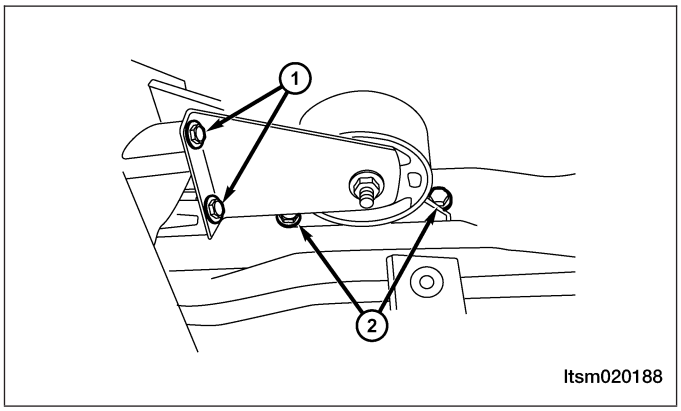
17. Remove both front axle shafts (See Front Axle Shaft Removal & Installation in Section 09 Driveline & Axle).
18. Remove the engine undercover and splash shields.
19. Remove the front engine mount bolts (1).
(Tighten: Front mount bolts to 60 N·m)



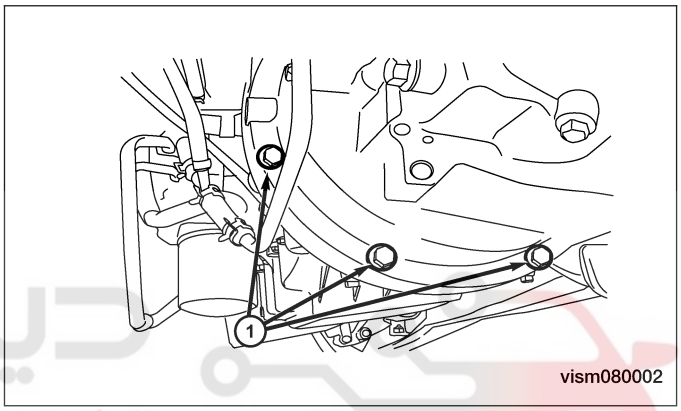
besm080035

20. Remove the rear engine mount bolts (2) and the rear engine mount bracket bolts (1).
(Tighten: Rear mount bolts to 40 N·m)



ltsm020188

21. Remove the sub-frame assembly (See Sub-Frame Assembly Removal & Installation in Section 10 Suspension).
22. Remove the engine to transaxle lower bolts (1).
(Tighten: Transaxle mount bolts to 40 N·m)
23. Separate the transaxle from the engine and remove it from the vehicle.



vism080002

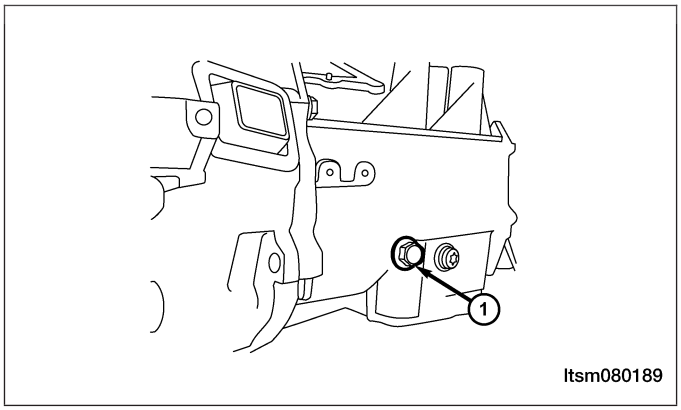
WARNING!

Support the transaxle with a suitable jack while removing the transaxle.

24. Installation is in the reverse order of removal.

Installation Notes:

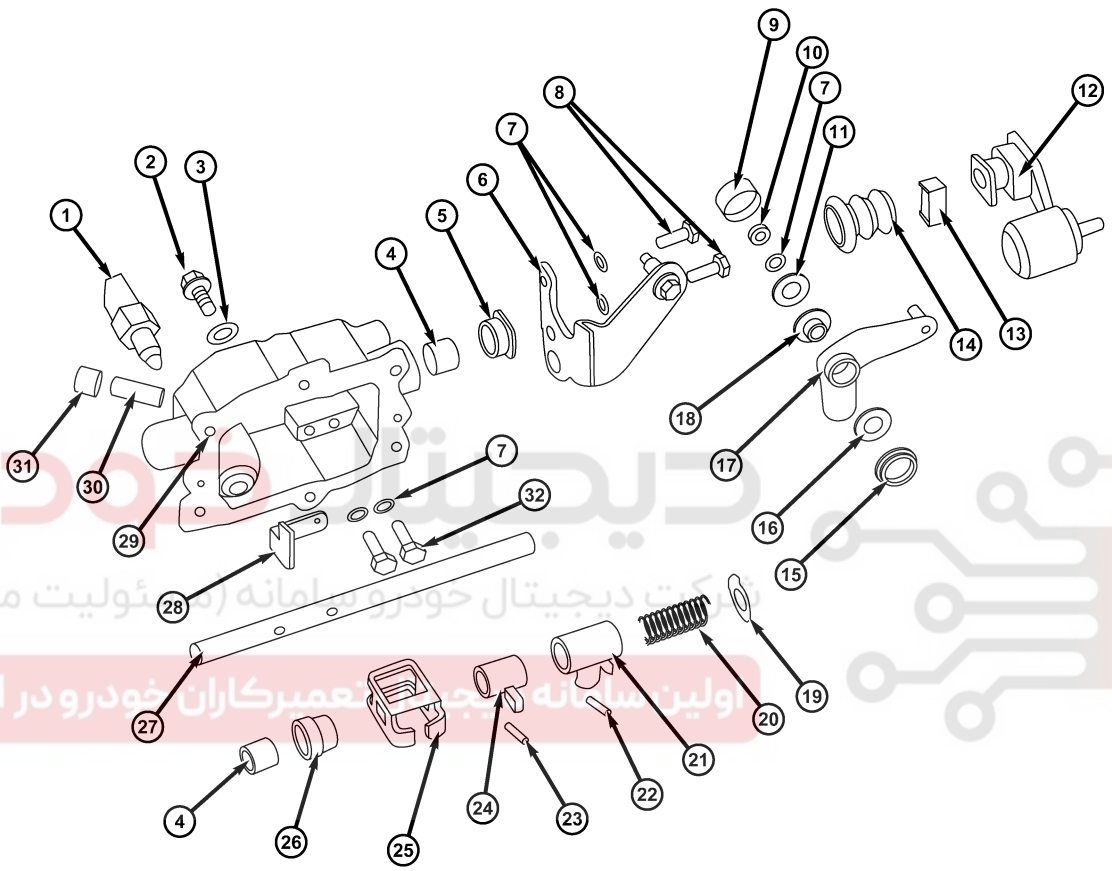
- Refill 2.2L transaxle fluid through the fill hole (1) until the fluid starts to leak from the fill hole.
- After installation, check for any fluid leakage and verify the transaxle fluid level is correct.



ltsm080189

Gear Selector & Shifter Assembly

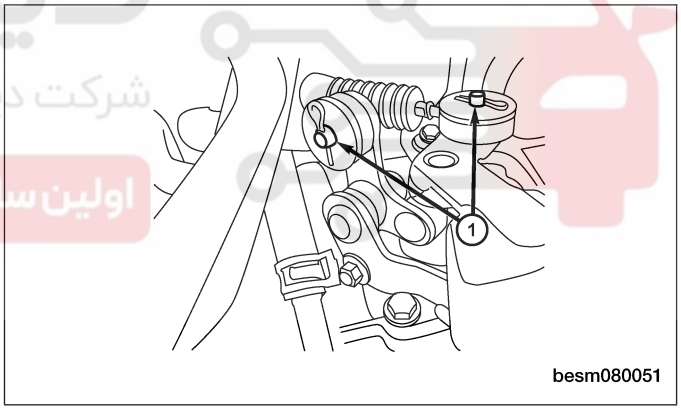
Removal & Installation



ltsm080087

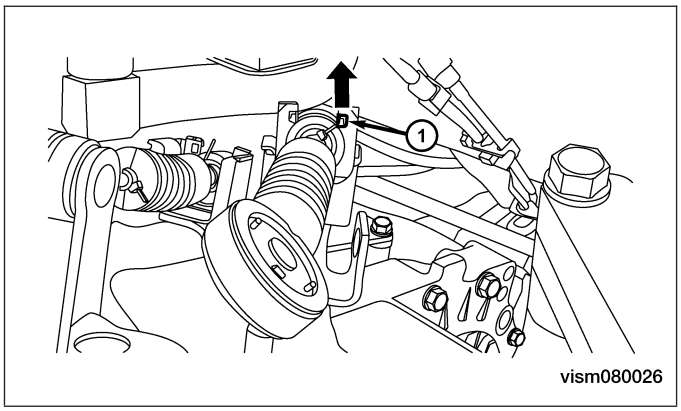
1 - Backup Lamp Switch Assembly	17 - Gear Selecting Arm Assembly
2 - Limit Stop Screw-Interlocking Plate	18 - Upper Bushing-Gear Selecting Arm
3 - Plain Washer-Interlocking Plate Limit Stop Screw	19 - Baffle-Rear Neutral Position Return Spring
4 - Bearing-Gear Shift Mechanism	20 - Rear Neutral Retracting Spring
5 - Lower Lining - Selector Lever	21 - Reverse Gear Lock Assembly
6 - Selector Lever Assembly	22 - Reverse Gear Lock Assembly Pin
7 - Washer	23 - Selector Finger Pin
8 - Bolt	24 - Selector Finger
9 - Upper Dust Boot - Selector Lever	25 - Interlock Plate Assembly
10 - Nut	26 - Front Neutral Retracting Spring Assembly
11 - Plain Washer-Gear Selecting Arm Nu	27 - Gearshift Shaft
12 - Gear Shifting Arm Assembly	28 - Retainer-Reverse Gear Lock
13 - Gear Shifting Drive Slider	29 - Gear Shift Mechanism Housing
14 - Dust Cap-Gear Shifting Shaft Fluid Seal	30 - Air Duct
15 - Lower Dust Cap-Gear Selecting Arm	31 - Air Duct Cap
16 - Lower Bushing-Gear Selecting Arm	32 - Bolt

1. Disconnect the negative battery cable.
2. Remove the air cleaner housing assembly.
3. Remove the two shift cables (1) from the transaxle.



besm080051

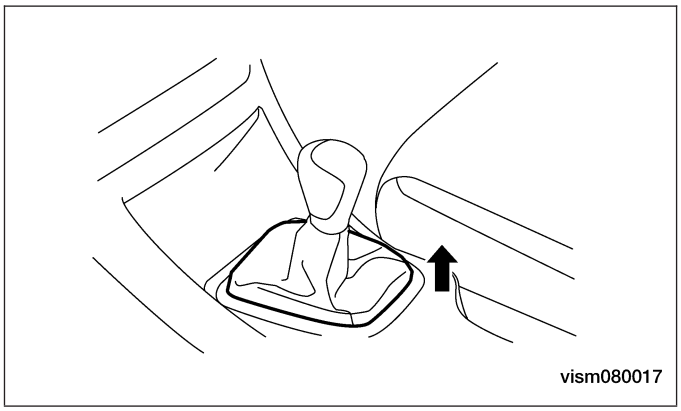
4. Remove the shift cable clamp (1) from the shift cable bracket.



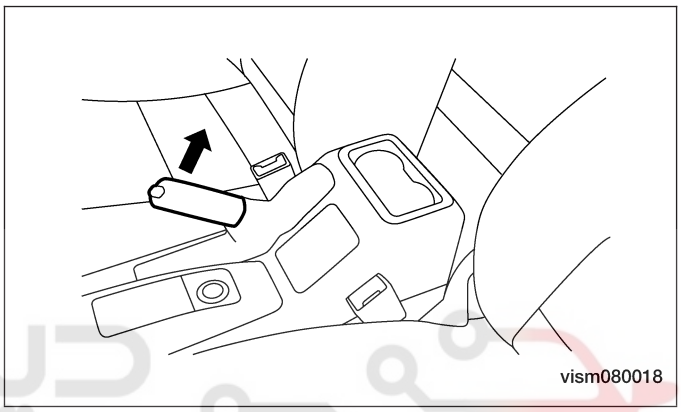
vism080026

5. Raise and support the vehicle.

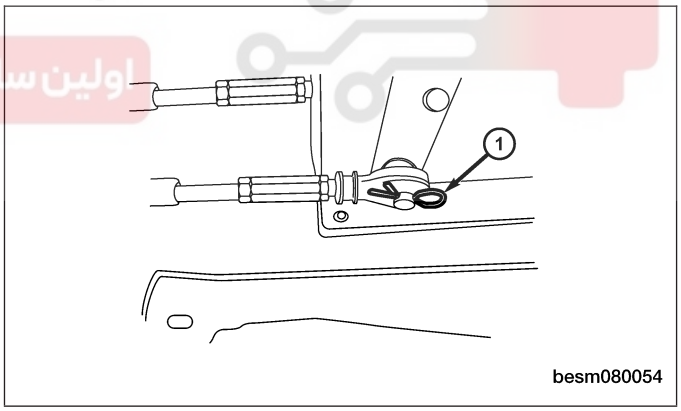
6. Remove the gearshift knob.
7. Remove the gearshift boot from the lower console.


vism080017

8. Apply the parking brake (apply parking brake handle to clear lower console upon removal).

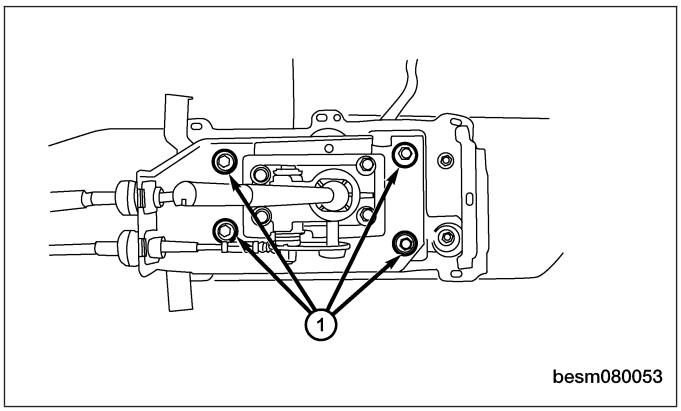

vism080018

9. Remove the lower console (See Lower Console Removal & Installation in Section 15 Body & Accessories).
10. Remove the clip on the gearshift mechanism and then remove the crossover cable and the selector cable (1) from the gearshift mechanism.



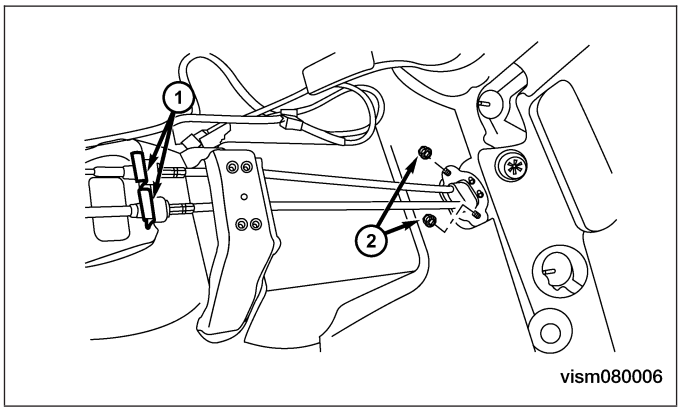
besm080054

11. Remove the four bolts (1) and then remove the gearshift mechanism from the bracket.

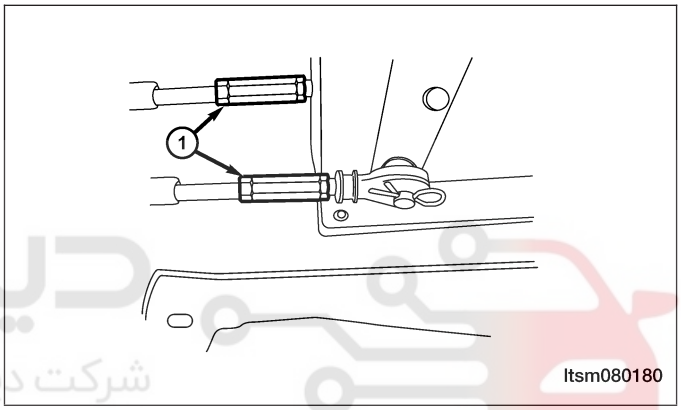


besm080053

12. Remove the selector cable clamps (1) and bracket retaining bolts (2).
13. Remove the gear selector & shifter assembly.
14. Installation is in the reverse order of removal.

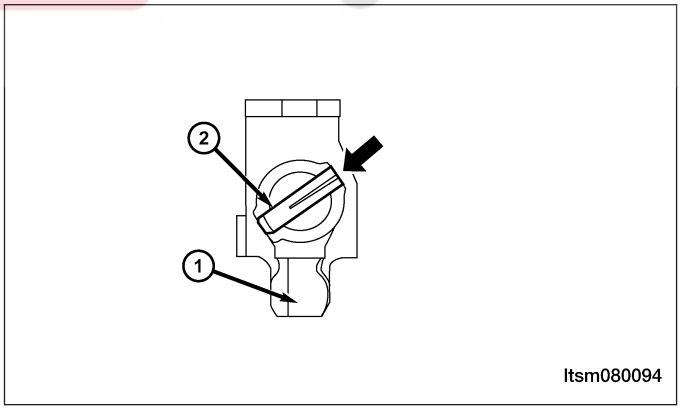


NOTE :
Selector cable can be adjusted with the adjusting bolt (1). Adjust bolts as needed to obtain proper cable adjustment.



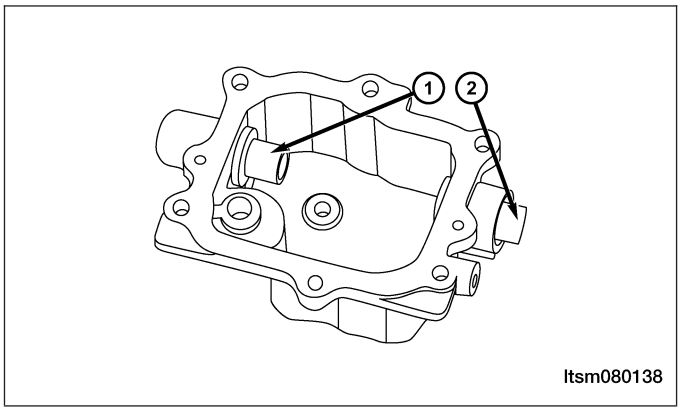
Disassembly

1. Drive out the locking selector finger (1) pin following the direction as shown in the diagram.
2. Drive out the locking pin (2) reverse gear lock assembly pin.
3. Remove all of the components from shaft.
4. Thoroughly clean and check all parts, replace any worn parts as necessary.



Assembly

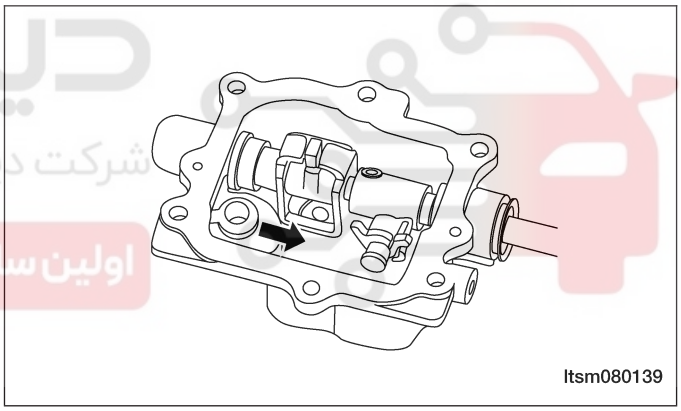
1. Carefully press and fit two gear shift mechanism (1) & (2) bearings to the corresponding position on the gear shift mechanism housing. The bearing (1) should be pressed to the end, both end faces of the bearing should align with the hole end faces of the housing bearing. The side of the bearing with letters should be placed outwards.



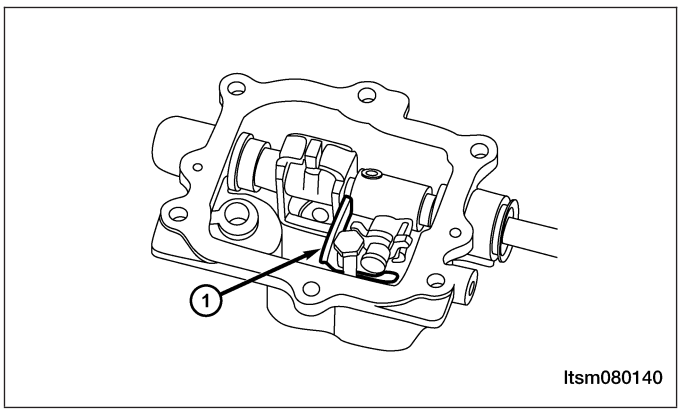
2. Press the air duct into the housing orifice to ensure the air duct is in the proper position.
3. Press and fit the fluid seal of the gearshift shaft into the fluid seal hole of the housing, ensure the fluid seal is pressed and fitted in position.

NOTE :
Apply transaxle fluid to the fluid lip seal.

4. Install the gearshift shaft through the fluid seal and into the housing of gear shift mechanism.
5. Following the direction of the arrow, install the rear neutral return spring stop, rear neutral return spring, reverse gear lock assembly, selector finger and interlock plate assembly, front neutral return spring assembly onto the gearshift shaft (as shown in the figure). Check the turn-down rims of rear neutral return spring stop, and ensure they have entered into corresponding vent groove of the housing. One end of main body of reverse gear lock with blind hole shall face rear neutral return spring stop. And the small end face of front neutral return spring assembly shall face towards selector finger.



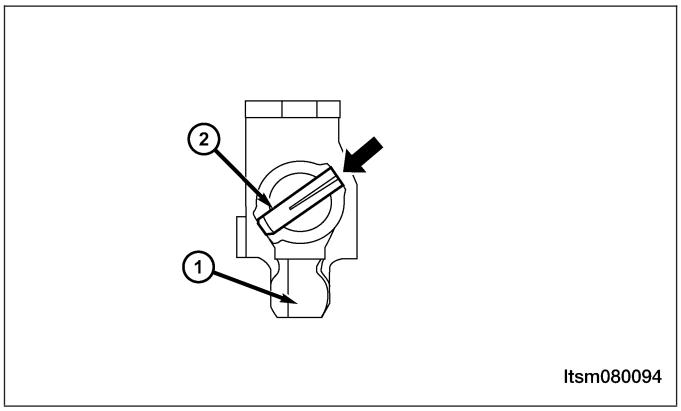
6. Insert the gearshift shaft into the bearing.
7. Install the reverse gear limiter lock mechanism (1) (as shown in the figure).
(Tighten: Reverse gear limiter bolt to 22 N·m)



8. Install the gearshift fluid seal dust boot to the gearshift shaft fluid seal.
9. Install the gearshift lever assembly to the gearshift shaft, then press it in the pin hole of gearshift lever assembly, finally install the pin.

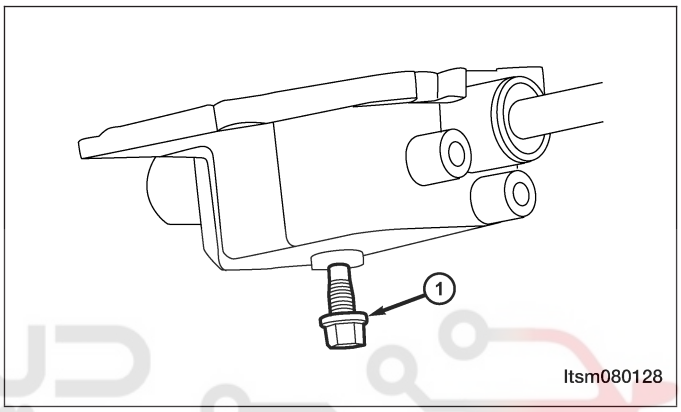
NOTE :
Neither end of the pin is allowed to protrude beyond the two end surfaces of the pin holes.

10. Align the selector finger (1) and fork shaft spring pin (2), install the spring pin of selector finger (as shown by the arrow in the figure).



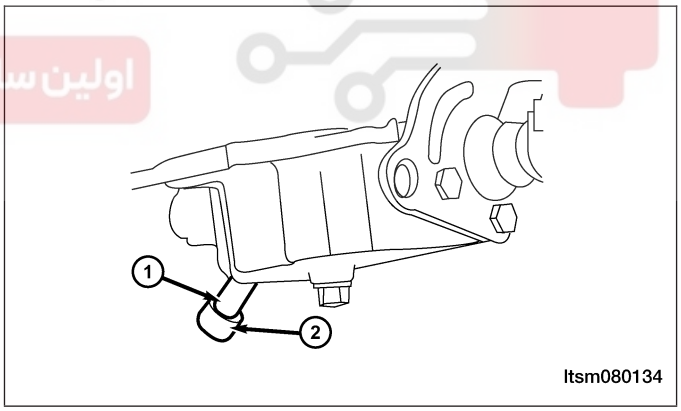
ltsm080094

11. Tighten the interlock plate limit bolt (1) together with the shim to the housing (as shown in the figure). The tightening torque of the bolt is 30 N·m. Check front end circular cylinder of the bolt to ensure it is in the corresponding groove of selector finger.



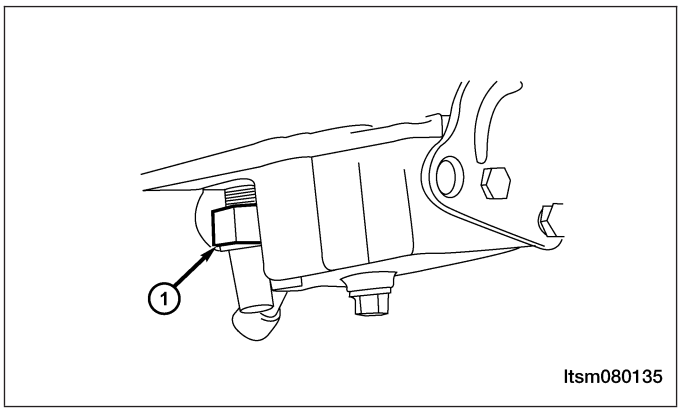
ltsm080128

12. Check the gearshift shaft to ensure it is able to rotate and perform axial movement freely.
13. Install air duct (1) and air duct cap (2). Apply sealant to the surface of the inserted part of air duct.



ltsm080134

14. Install the backup light switch assembly (1). (Tighten: Backup light switch to 32 N·m)



ltsm080135

MANUAL TRANSAXLE UNIT REPAIR

Transaxle

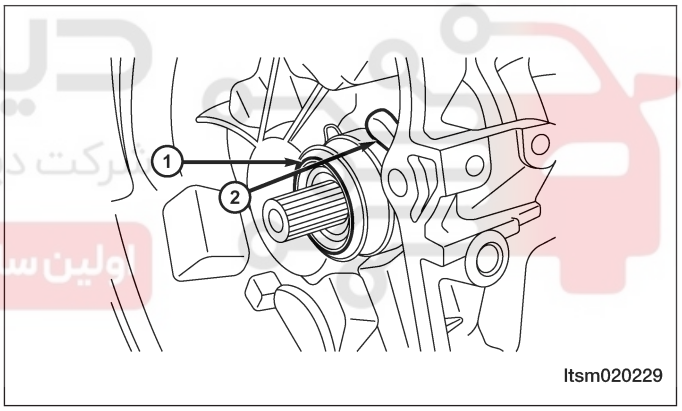
Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Gear Shift Mechanism Housing Bolt	18
Gear Positions Self-Locking Bolt	35
Reverse Gear Bolt	20
Reverse Gear Cap Bolt	20
Rear Transaxle Bearing End-Plate Bolt	6.9
Transaxle To Clutch Housing Bolt	44
Bearing Input Shaft Bolt	18

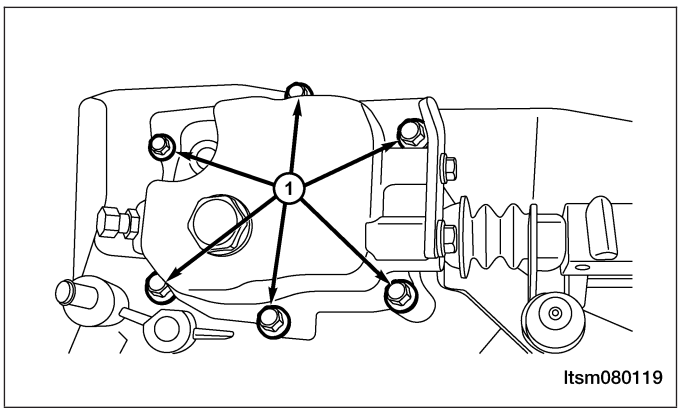
Disassembly

1. Place the transaxle on a workbench.
2. Remove the clutch fork (2) and remove the release bearing (1).
   NOTE: The release bearing (1) is not serviceable.



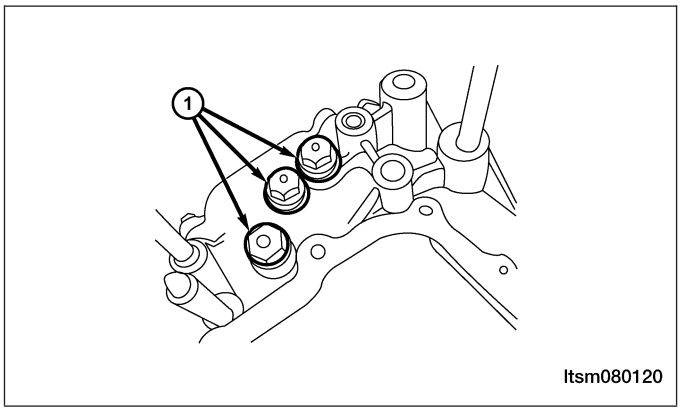
ltsm020229

3. Set the transaxle gear in the neutral position. Remove the gear shift mechanism housing retaining bolts (1), and remove the gear shift mechanism housing.
   (Tighten: Gear shift mechanism housing bolts to 18 N·m)

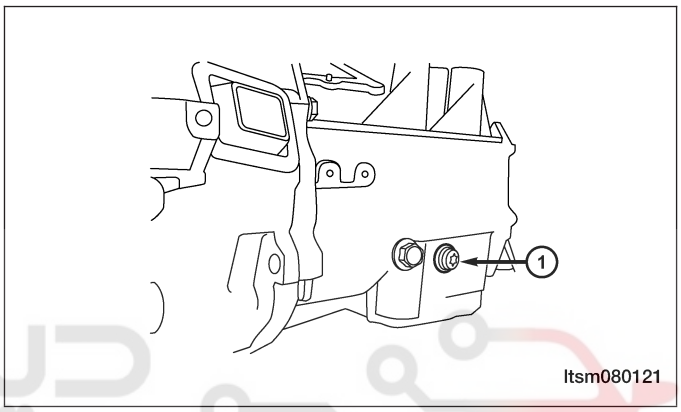


ltsm080119

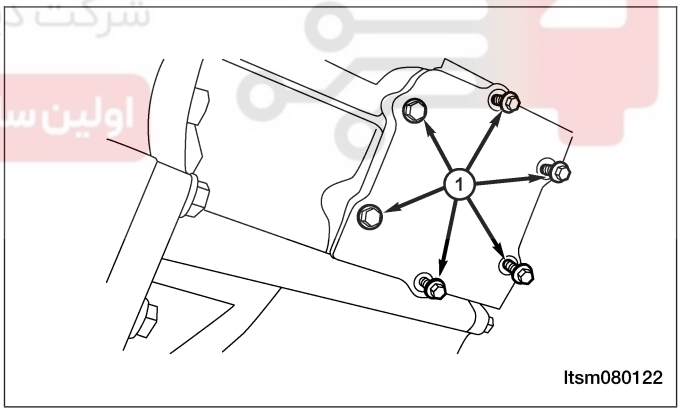
4. Remove the three gear positions self-locking bolts (1).
   (Tighten: Three gear positions self-locking bolts to 35 N·m)



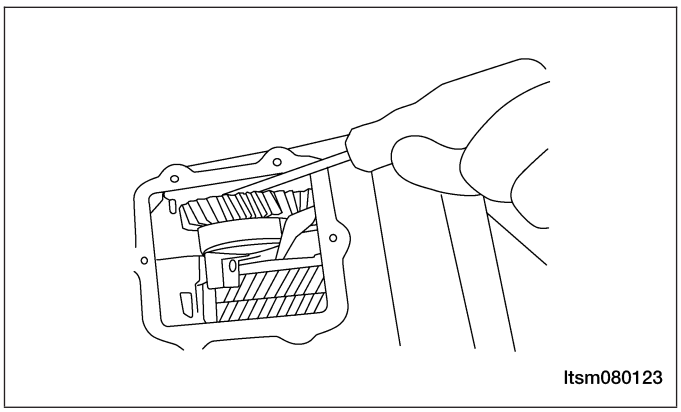
5. Remove the reverse gear bolt (1).
   (Tighten: Reverse gear bolt to 20 N·m)



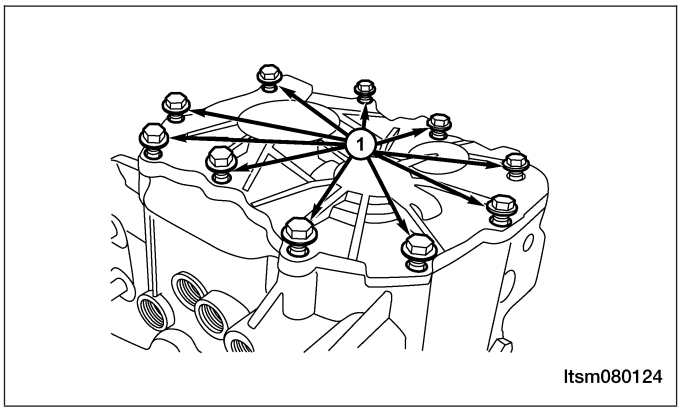
6. Remove the 6 reverse gear cap bolts (1), and remove the cap.
   (Tighten: Reverse gear cap bolts to 20 N·m)



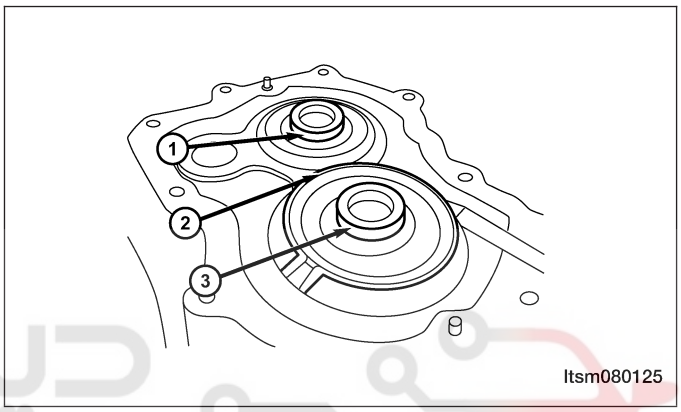
7. Gently pry the idler gear downward using a screwdriver, and then remove the idler gear assembly.



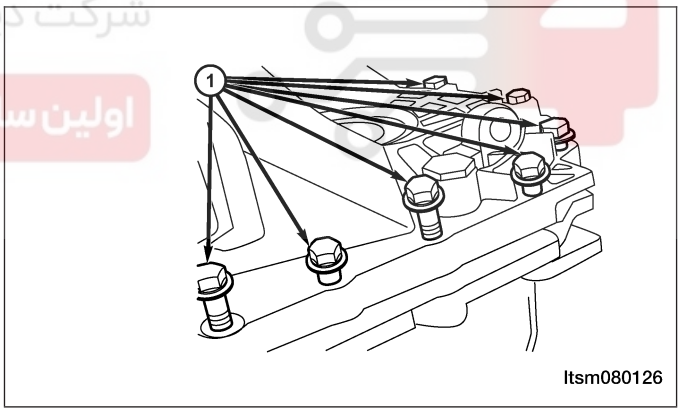
8. Remove the 10 rear transaxle bearing end-plate bolts (1), and then remove the bearing cap.
(Tighten: Rear transaxle bearing end-plate bolts to 6.9 N·m)



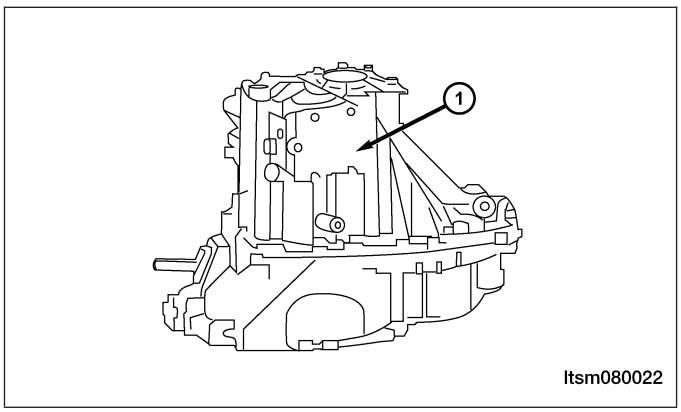
9. Remove shaft clip (3) and shaft clip (1) from the shafts, and then remove bearing collar (2).



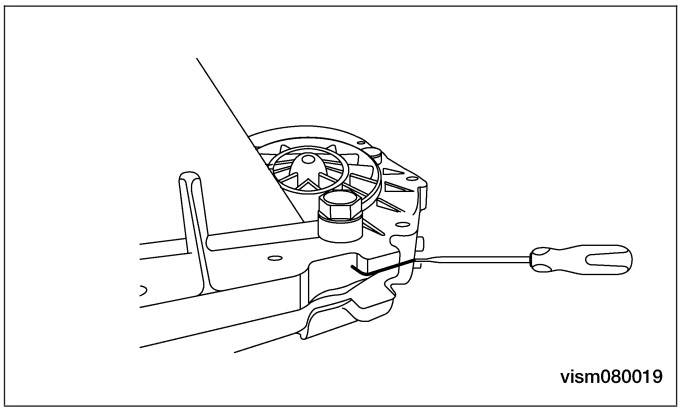
10. Remove the transaxle to clutch housing bolts (1), and then use a pry bar to remove the transaxle housing.
(Tighten: Transaxle to clutch housing bolts to 44 N·m)



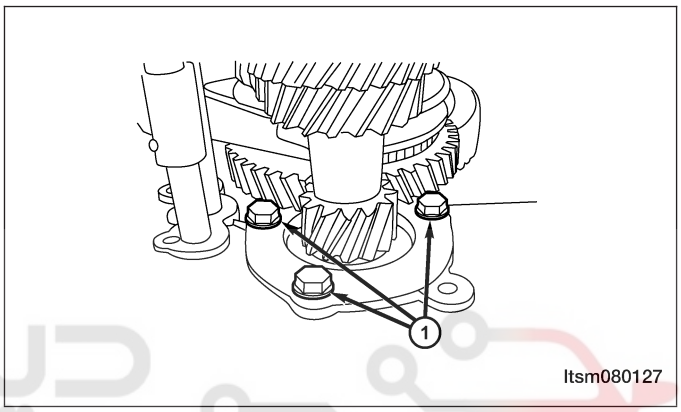
11. Perform the following steps to remove the transaxle housing (1).



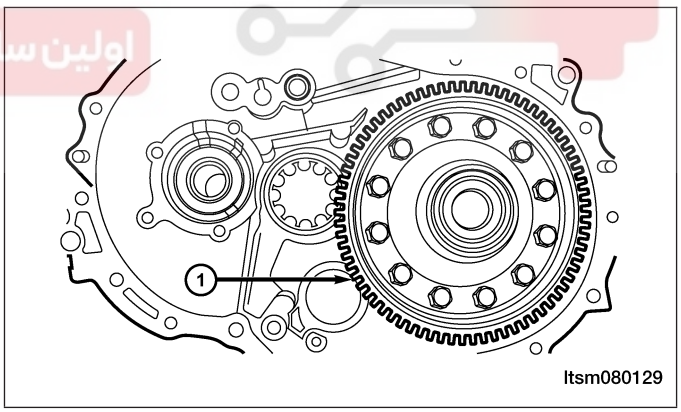
12. Tap the transaxle housing and use a suitable tool to remove the transaxle housing.



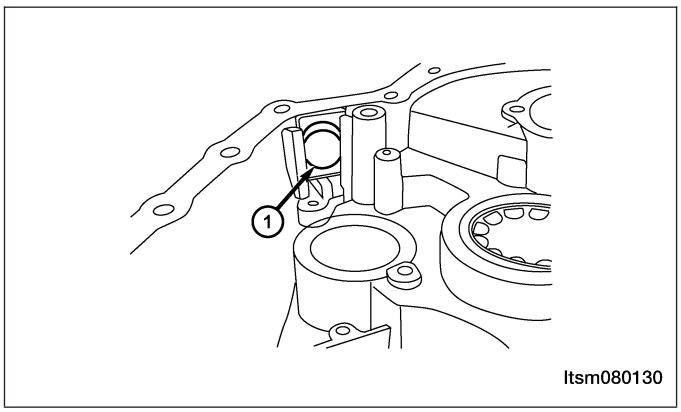
13. Remove the 3 front bearing input shaft bolts (1). (Tighten: Bearing input shaft bolts to 18 N·m)



14. Grasp the input shaft assembly, output shaft assembly, 1st-2nd shift fork, 3rd-4th shift fork and 5th-reverse fork shaft together and remove.
15. Remove the differential assembly (1) upward (as shown in the figure).
    NOTE: Pre-tighten the shim of the differential cone bearing.

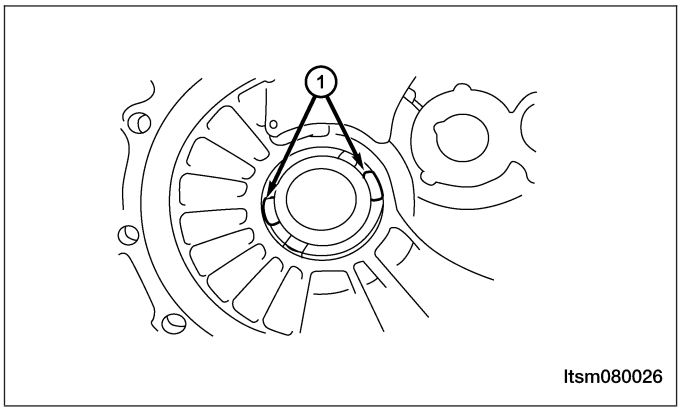


16. Remove the magnet (1) and wipe the magnet clean.



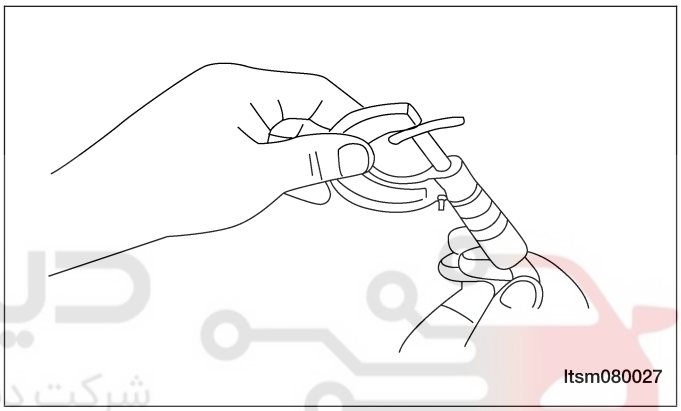
Inspection

1. Place a tin solder sheet (1) (approximate length is 10 mm and diameter is 1.6 mm) on the specified part of the transaxle housing, and then install the differential outer bearing race.
2. Install the clutch housing, and tighten the bolts to the specified torque.
3. Replace the tin solder sheets with thicker tin solder sheets.

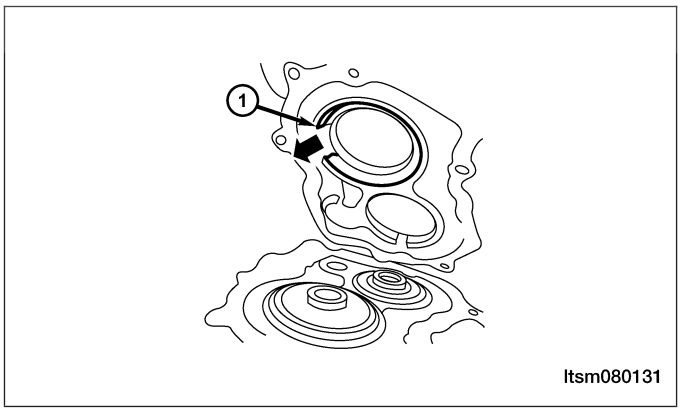


ltsm080026

4. With a micrometer, measure the thickness (T) of the flattened tin solder sheet.
   - Select the thickness of the shim to be installed according to the following equation.
     – Thickness of washer: (T + 0.005 mm) - (T + 0.11 mm)

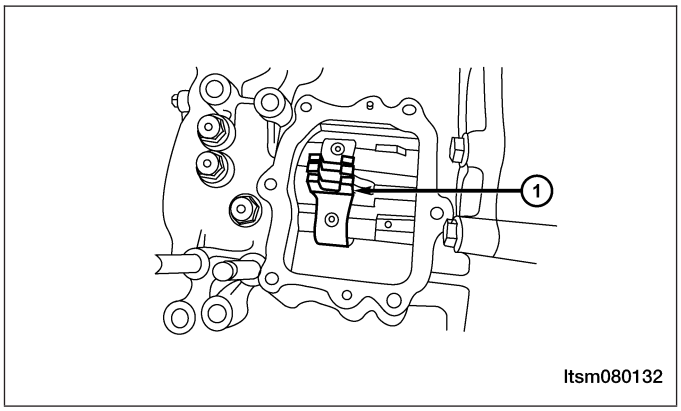

ltsm080027

5. Do not clean the release bearing.
6. Clean the sealing surface of all contaminates, remove all old sealant, and clean all bolt holes.
7. Check all parts for damage, replace any damaged parts if necessary.
8. Always align the bearing cap (1) with the shaft opening. Align the bearing collar to the bearing cap opening (as the two circular rings indicate in the figure).



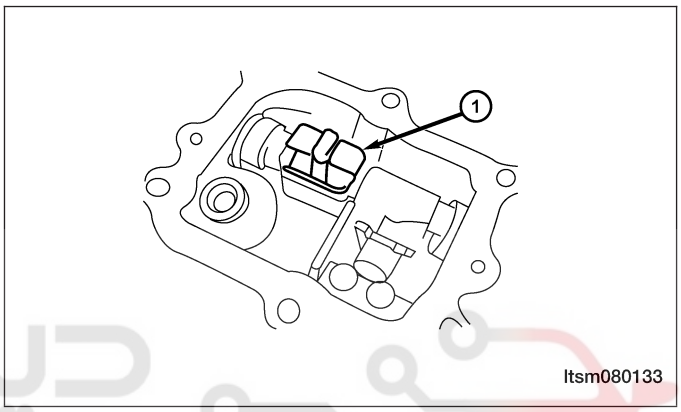
ltsm080131

9. Place the transaxle in the neutral position when installing the self-locking bolts for the gear positions. The notches (1) of the shift fork guide block should align in the same line.



ltsm080132

10. Place the transaxle in the neutral position (1) when the gear shift mechanism housing assemble is in the position of the selector finger in the gear shift mechanism housing assembly shown in the figure.

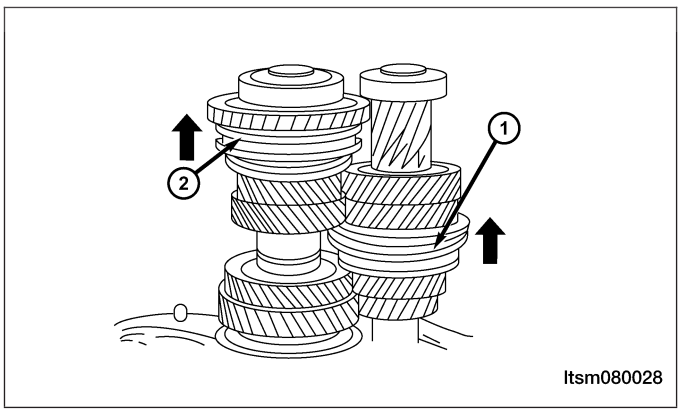


ltsm080133

11. Alternate tightening each bolt to the specified torque.

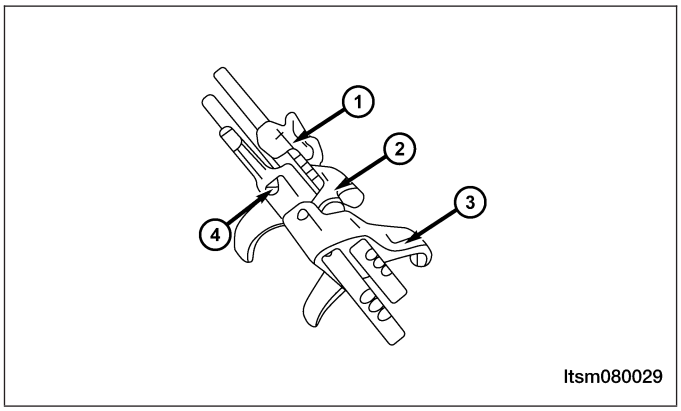
Assembly

1. Install the input shaft together with the output shaft.
2. Install the 5th-reverse gear shifting fork/fork stalk-5th-reverse gear fork/3rd-4th gear shifting fork/fork stalk–3rd-4th fork.
3. Move the gear bushing-3rd-4th gear (1) and the gear bushing-5th-reverse gear (2) in the direction shown in the figure.



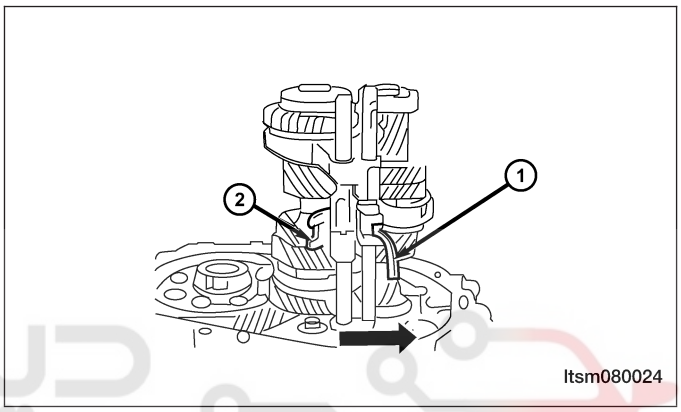
ltsm080028

4. Install the 3rd-4th gear shifting fork (2) and its fork stalk (1) and the 5th-reverse gear shifting fork (3) and its stalk (4).



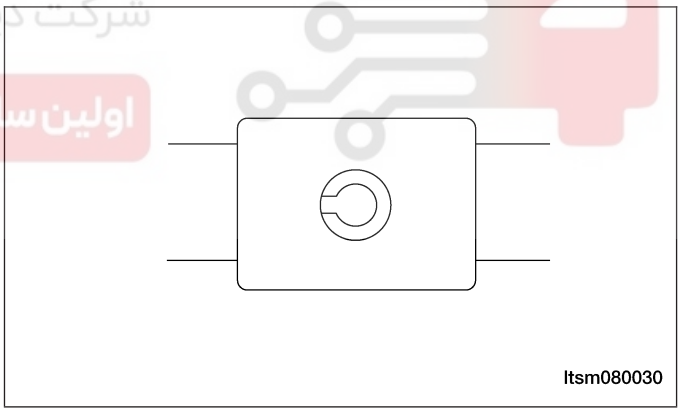
ltsm080029

5. Install all gear shifting forks into the gear hub, and at the same time, move the fork stalks (1) & (2) in the direction shown in the figure.

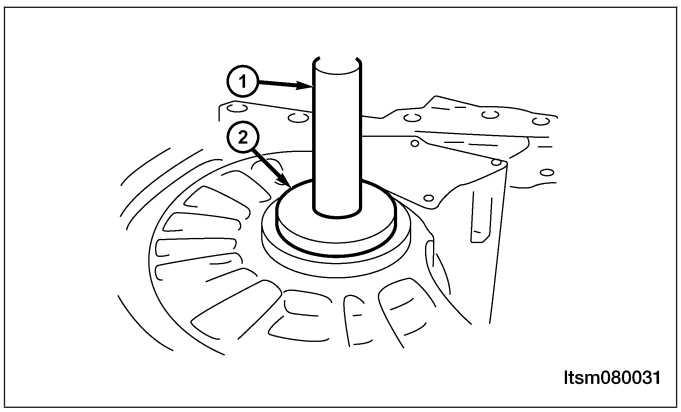


ltsm080024

6. Install the locking pin.


ltsm080030

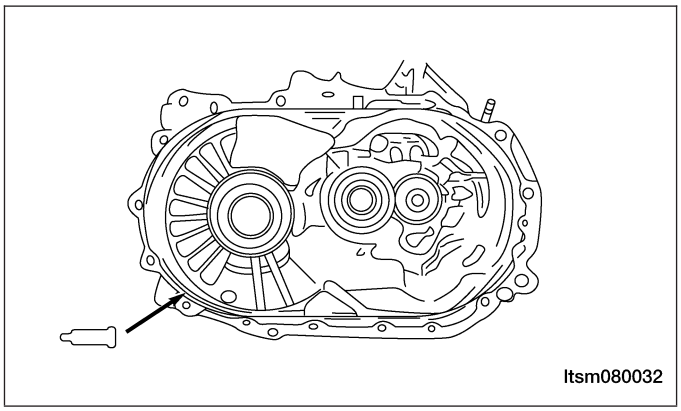
7. Using special tools MB-990938 (1) and MB-990935 (2), install the outer bearing race.



ltsm080031

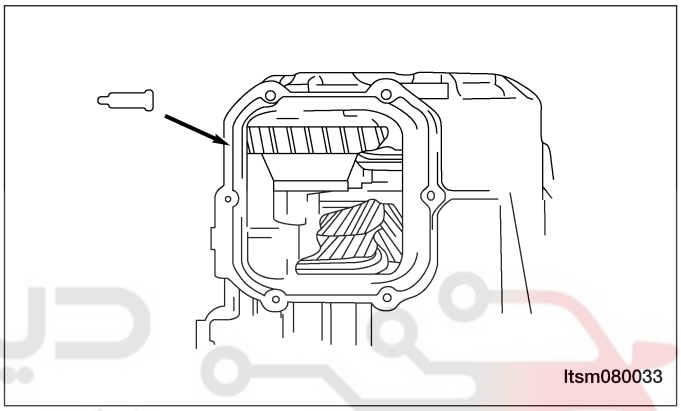
8. Install the transaxle housing.
9. Apply a 1 mm to 1.2 mm diameter of sealant on the specified position of the transaxle housing.

CAUTION:
The sealant line applied should be uniform and continuous and without breaks.

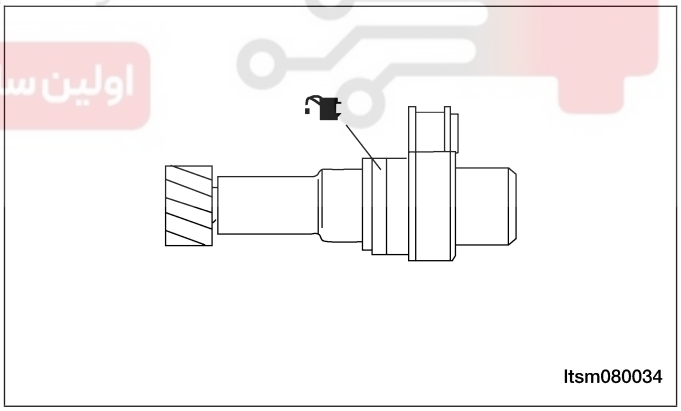


10. Tighten the transaxle housing bolts to the specified torque.
11. Install the bottom transaxle cover.
12. Apply a 1 mm to 1.2 mm diameter of sealant on the specified position of the transaxle housing.

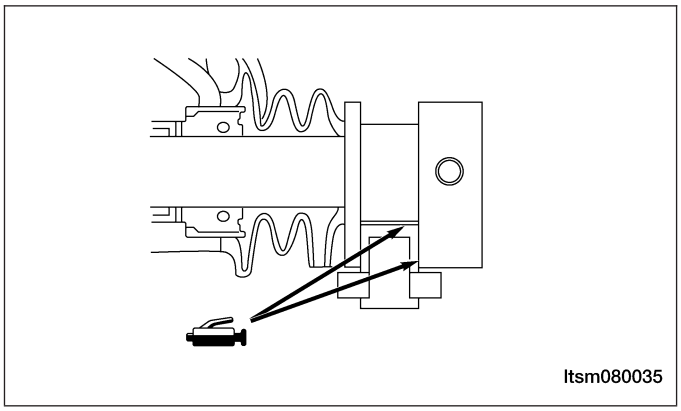
CAUTION:
The sealant line applied should be uniform and continuous and without breaks.

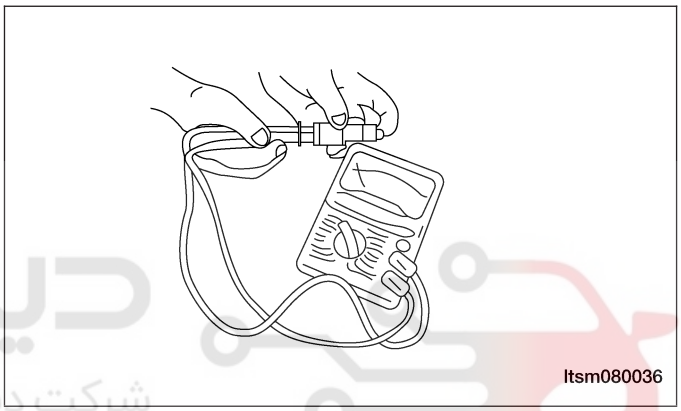


13. Apply transaxle fluid to the O-ring of speed sensor. (Transaxle fluid: 75W-90)



14. Install the vehicle speed sensor.
15. Install the gear shifting arm assembly. Apply lubricating fluid on the contact surface of the gear shifting drive slider and the gear shifting arm assembly. (The specified lubricating fluid: Mobilux Ep2)





STATUS OF SWITCH	CIRCUIT
Pressed	Off
Released	On

16. Inspect the backup lamp switch. Inspect the switch for broken terminal or an open circuit.

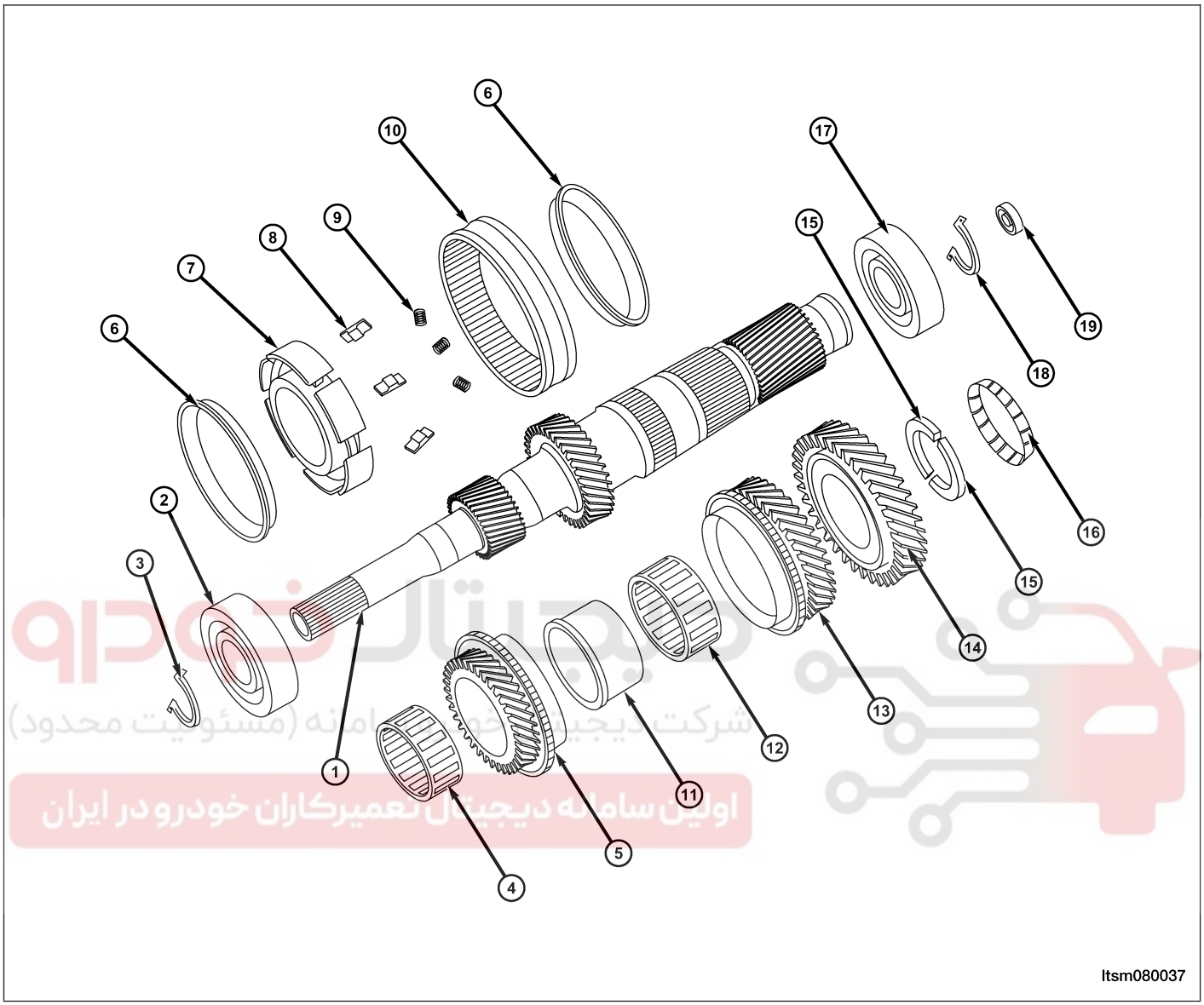
Input Shaft

Specifications

Clearance Specifications

SYNCHRONIZER RING	VALUE OF A (mm)	WEARING LIMIT
1st-2nd Gear	1.10 - 1.17	0.05 mm
3rd-4th Gear	1.35 - 1.90	0.05 mm
5th Gear	1.10 - 1.17	0.05 mm

Disassemble

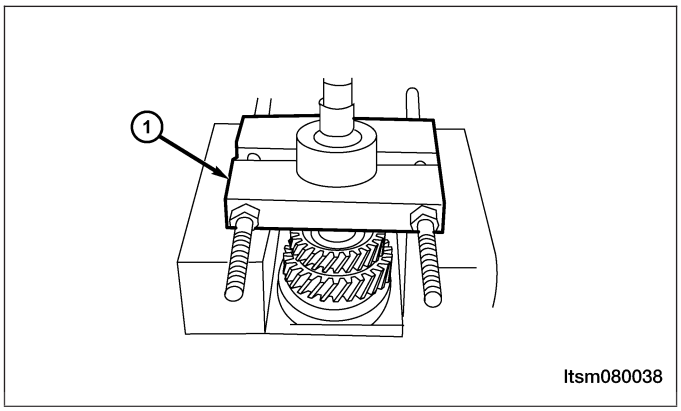


1 - Input Shaft	11 - Gear Bushing-4th Gear
2 - Input Shaft Front Bearing	12 - Needle Bearing-2nd-4th Gear
3 - Snap Ring	13 - 4th Driving Gear Assembly
4 - Needle Bearing-3rd Gear	14 - 5th Driving Gear
5 - 3rd Driving Gear Assembly	15 - Thrust Ring-5th Driving Gear
6 - Synchronizer Ring-3rd-4th Gear	16 - Clip-5th Driving Gear Thrust Plate
7 - Gear Hub-3rd-4th Gear	17 - Input Shaft Rear Bearing
8 - Guide Block	18 - Snap Ring-Input Shaft Rear Bearing
9 - Spring-3rd-4th Gear Synchronizer	19 - Seal-Input Shaft Fluid-Collecting Hole
10 - Hub Sleeve-3rd-4th Gear	

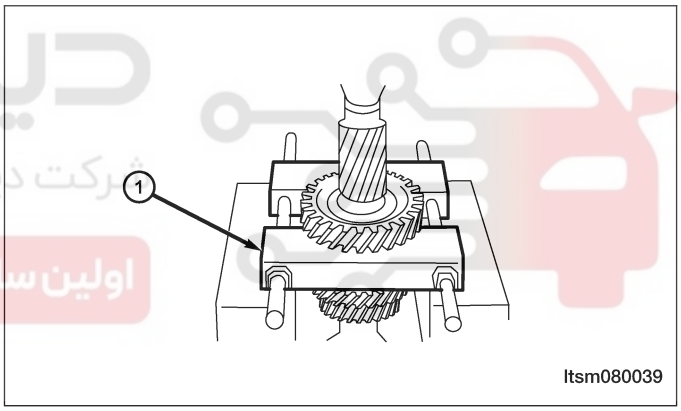
NOTE :
The following special tools are required to perform the repair procedure:

- MB-998801 - Bearings Remover
- MB-998812 - Installer Cap
- MB-998813 - Installer (100 mm)
- MB-998816 - Installer Connector (30 mm)
- MB-998825 - Installer Connector (52 mm)
- MB-998824 - Installer Connector (50 mm)

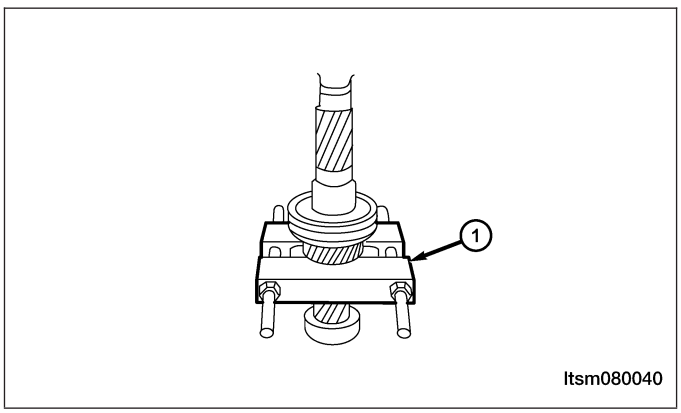
1. Using special tool MB-998801 (1), disassemble the input shaft rear bearing.



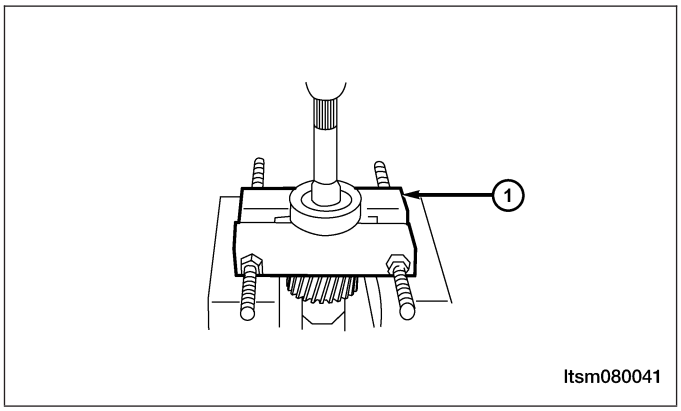
2. Using special tool MB-998801 (1), disassemble the 5th driving gear.



3. Disassemble the sleeve-4th gear.
   Mount special tool MB-998801 (1) on the 3rd driving gear to disassemble the sleeve-4th gear.

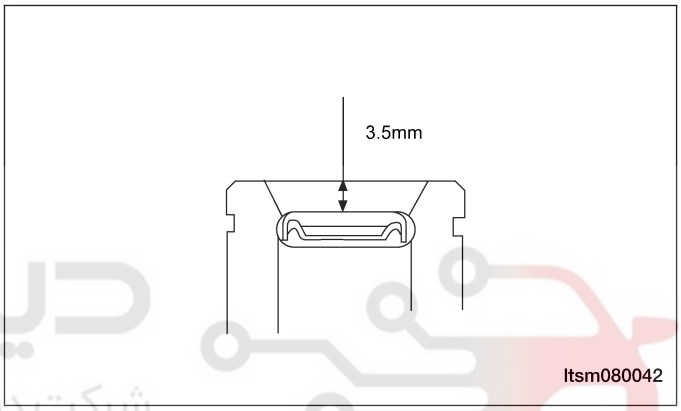


4. Using special tool MB-998801 (1), disassemble the input shaft front bearing.

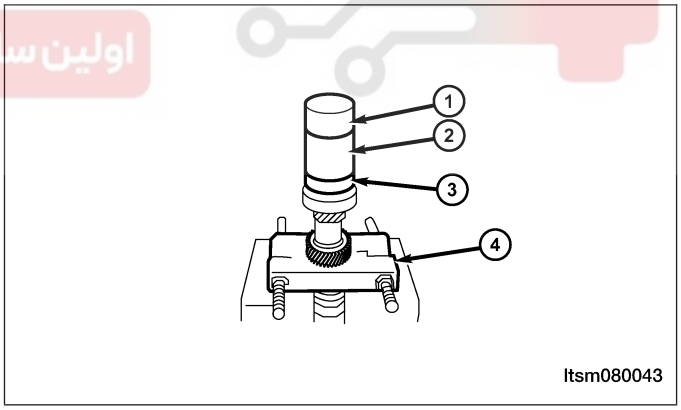


Assemble

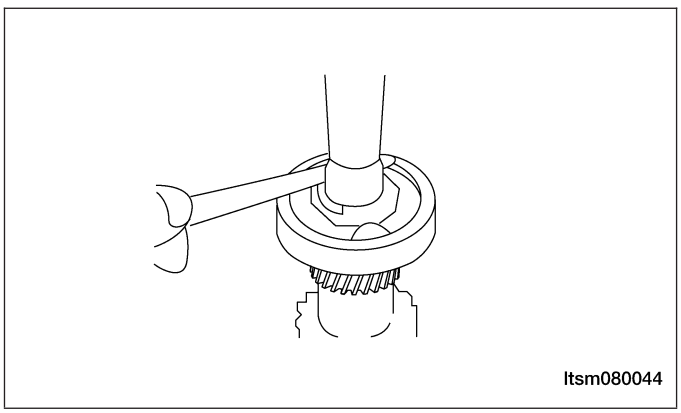
1. Install the input shaft seal.
   Press the seal in until the dimension shown in the figure is obtained.



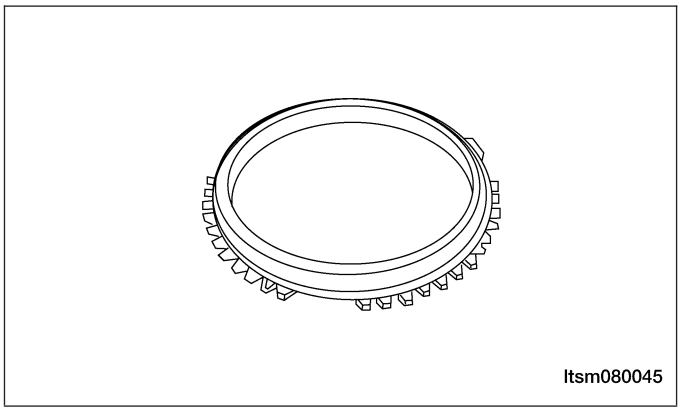
2. Using special tools MB-998801 (4), MB-998812 (1), MB-998813 (2) and MB-998816 (3), install the input shaft front bearing.



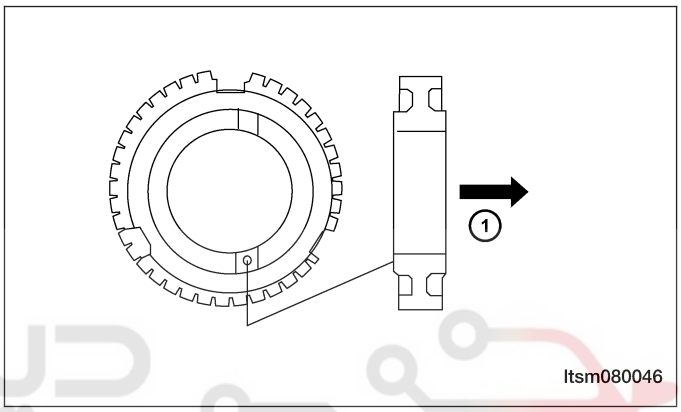
3. Install the input shaft front shaft snap ring.
   Select a snap ring to maintain the axial clearance standard.
   (The standard value: 0.01 mm - 0.12 mm)



4. Install the synchronizer spring.
   Install the synchronizer spring in the specified position of the synchronizer ring, shown in the figure.

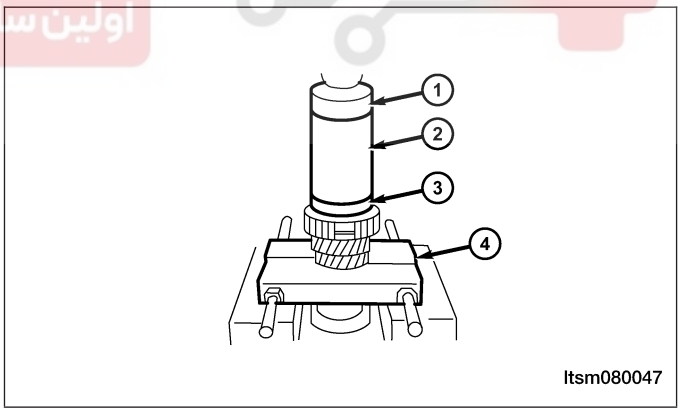


5. Install the gear hub-3rd-4th gear.
   Install the gear hub-3rd-4th gear in the direction shown in the figure.

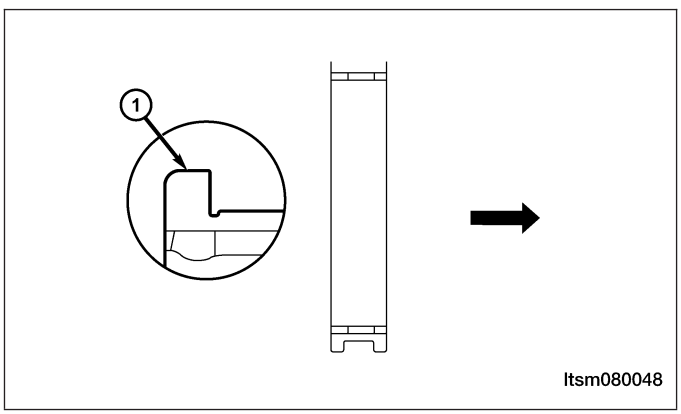


CAUTION:
Ensure that the synchronizer ring is not locked when installing the gear hub.

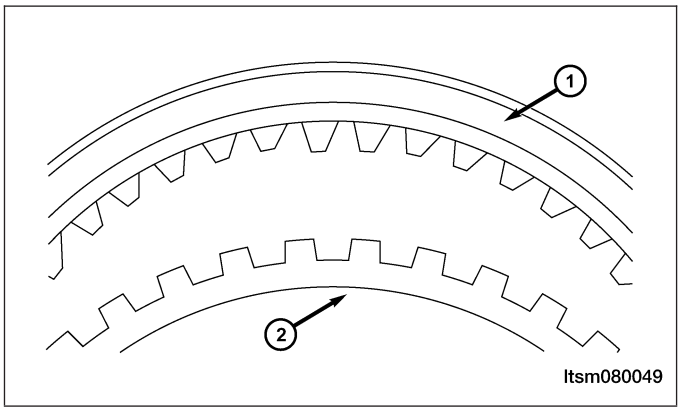
6. Using special tools MB-998801 (4), MB-998812 (1), MB-998813 (2) and MB-998825 (3), install the gear bushing-3rd-4th gear.



7. Install the hub sleeve in the direction shown in the figure.



8. Ensure that these two deep tooth spaces of gear hub (1) & (2) are correctly aligned with the two high racks of the gear hub during the installation of gear bushing.



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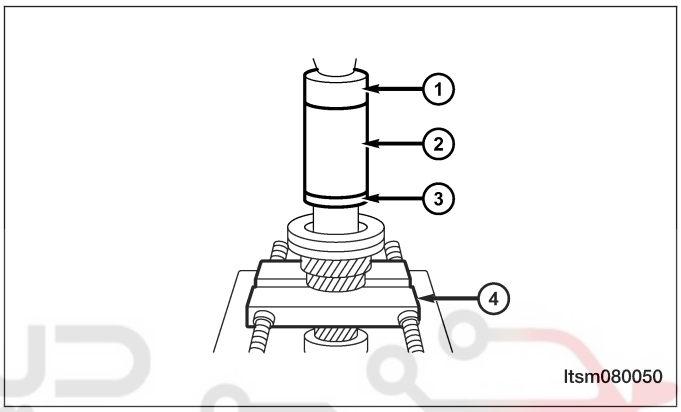
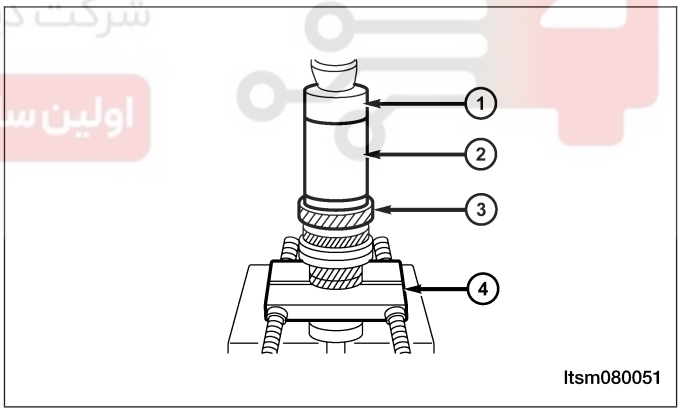
9. Using special tools MD-998801 (4), MD-998812 (1), MD-998813 (2), and MD-998824 (3), install the sleeve-4th gear.



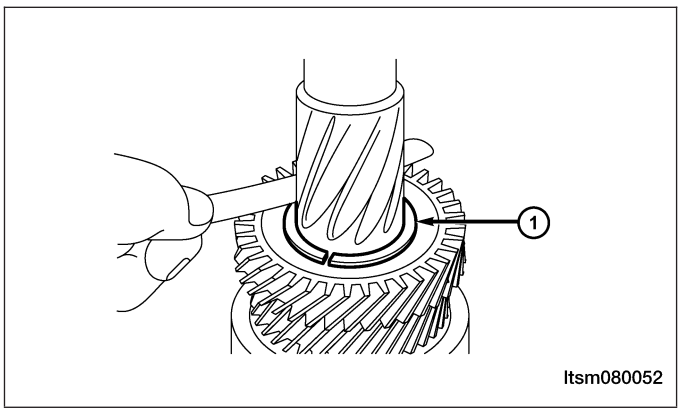
ltsm080050

10. Using special tools MD-998801 (4), MD-998812 (1), MD-998813 (2), and MD-998824 (3), install the 5th driving gear.



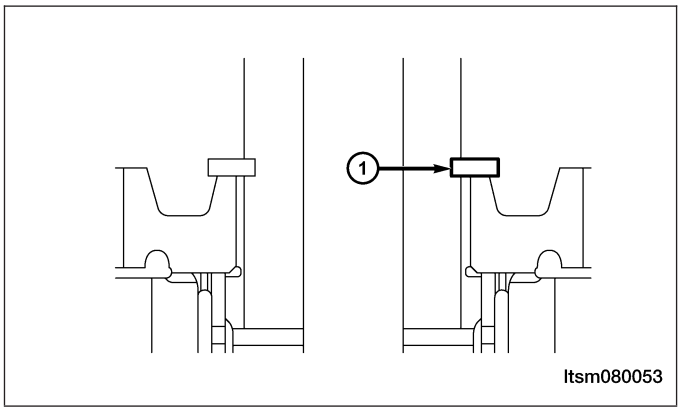
ltsm080051

11. Installation of transaxle housing assembly.
Select the thickness of the thrust plate (1) 5th driving gear to maintain the proper axial clearance of input shaft 5th driving gear shaft.
(The Standard Value: 0.01 mm to 0.09 mm)

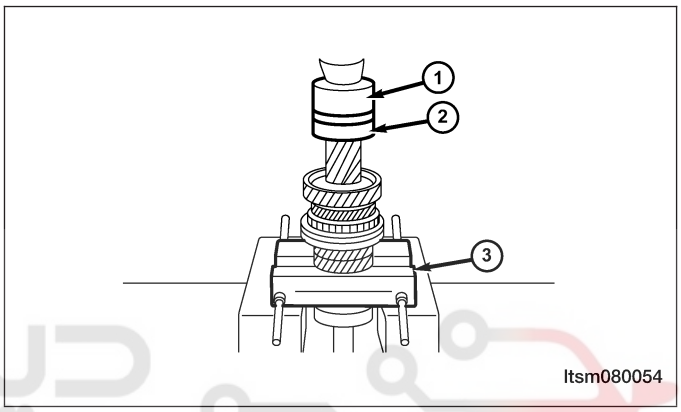


ltsm080052

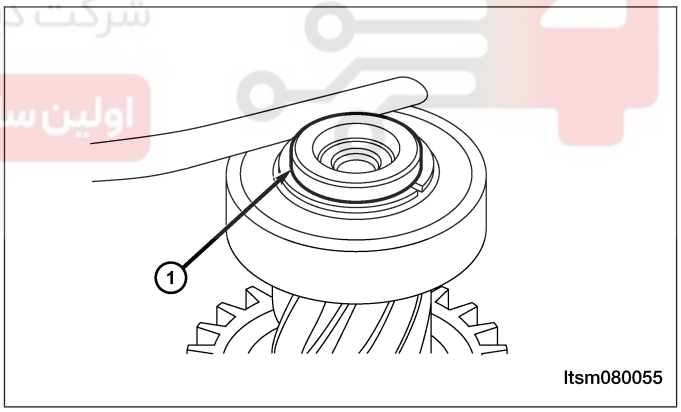
12. Install the clip-5th driving gear thrust plate (1). Ensure that the thrust plate doesn't tilt when installing the clip.



13. Using special tools MD-998801 (3), MD-998812 (1) and MD-998818 (2), install the input shaft rear bearing.

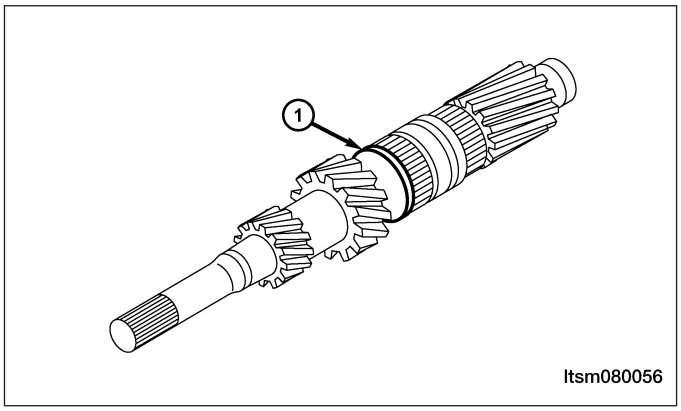


14. Install the snap ring.
Select the thickness of snap ring (1) to maintain the proper axial clearance of input shaft rear bearing.
(Standard Value: 0.01 mm to 0.12 mm)

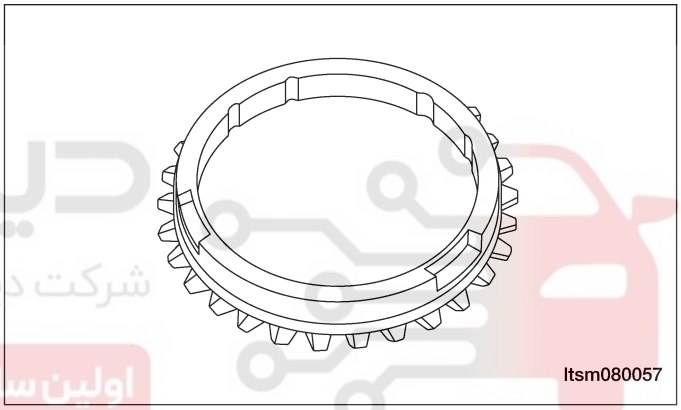


Inspection

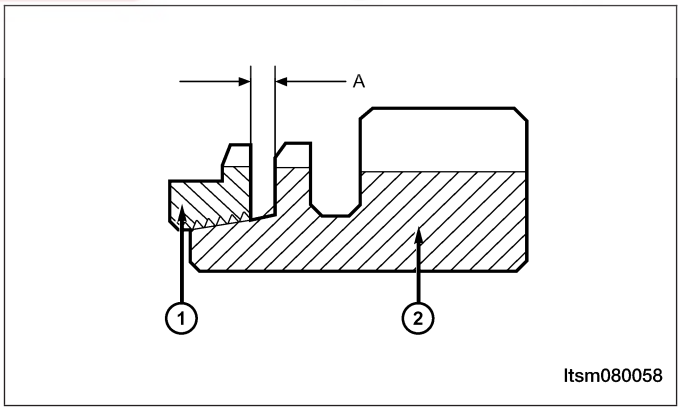
1. Input Shaft
   - Inspect the external surface of the input shaft and needle bearings (1) for any damage or excessive wear.
   - Inspect the input shaft spline for any damage or excessive wear.



2. Needle Bearing
   Inspect the input shaft and gears for smooth operation.
3. Synchronizer Ring
   - Inspect the synchronizer rings for any damage or signs of breakage in the surface of synchronizer rings.



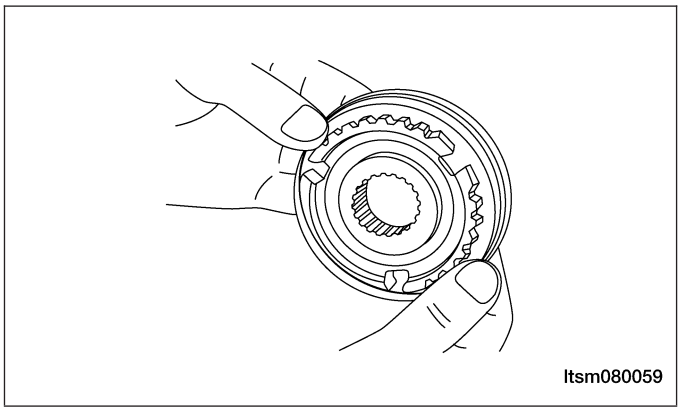
   - Press synchronizer ring (1) 3rd-4th gear (2), and then examine the clearance “A”. If the “A” is less than the limit value, the synchronizer ring and 3rd-4th gear should be replaced.(Limit Value: 0.5 mm)



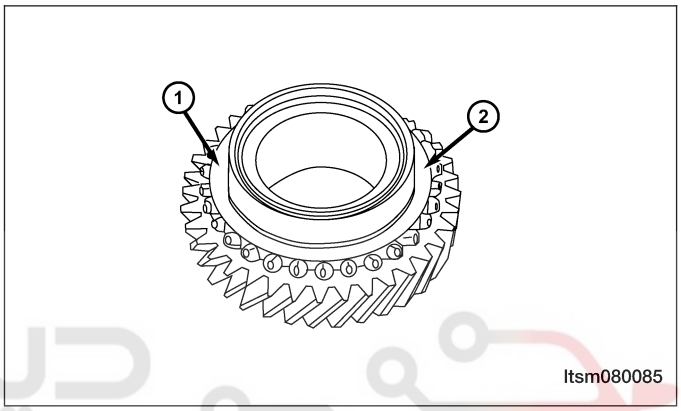
1 - Synchronizer Ring
2 - Gear

4. Gear Hub and Hub of Synchronizer
   - Assemble the gear bushing together with the gear hub of synchronizer, and then inspect for smooth operation without lockup.
   - Inspect the front/rear of the interior surface of the gear bushing for any damage.
   - Inspect the synchronizer springs for any weak springs or damage.

     NOTE: If it is necessary to replace the gear bushing and gear hub of the synchronizer, they are only serviced as a complete set.

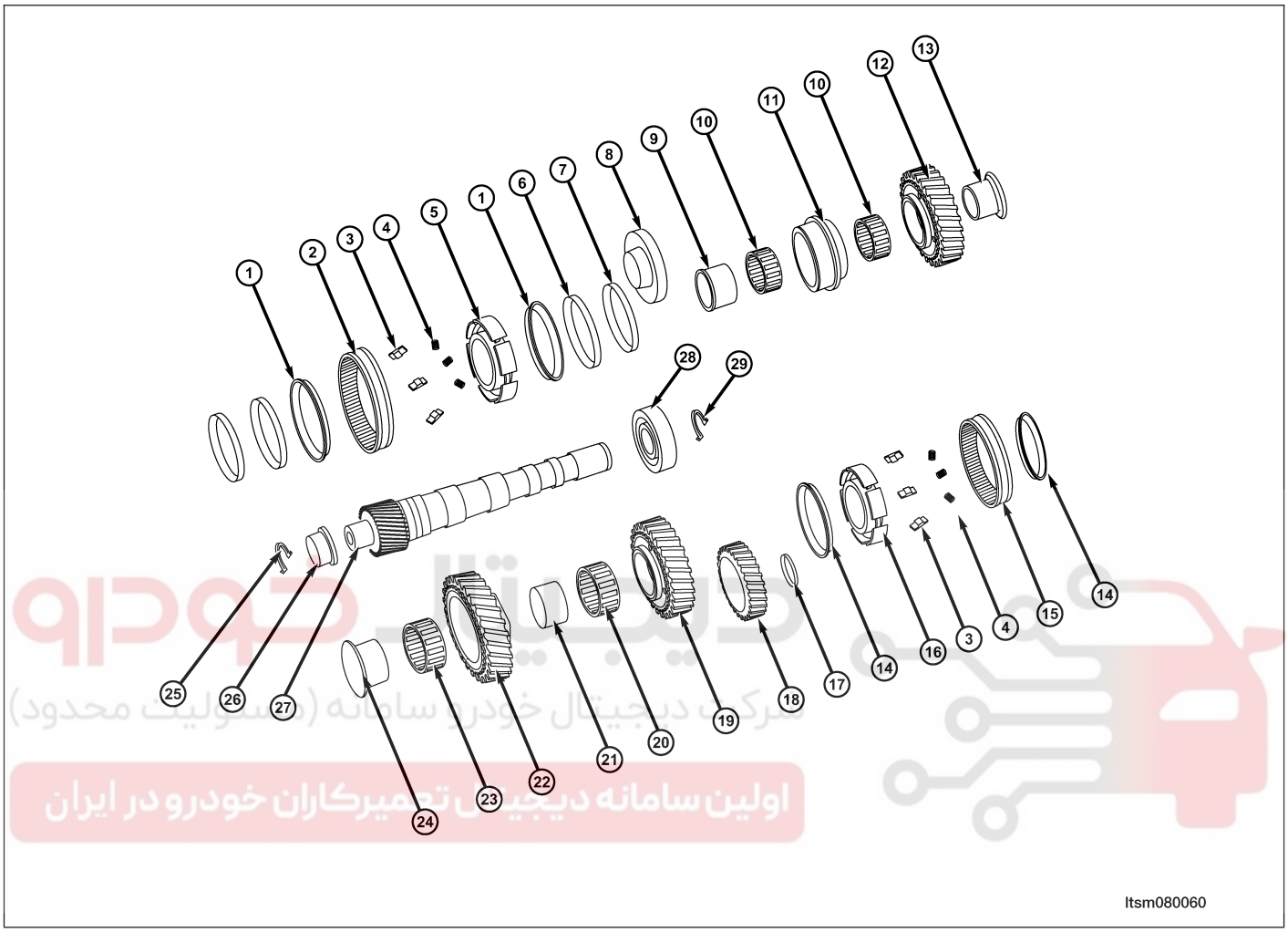


5. 3rd-4th Driven Gear
   - Inspect the gear surface of the skew gear and clutch gear (1) for any damage.
   - Inspect the conical surface of the synchronizer (2) for thickening, damage or wear.
   - Inspect the internal diameter of the front/rear surface of the gear.



Output Shaft

Disassemble

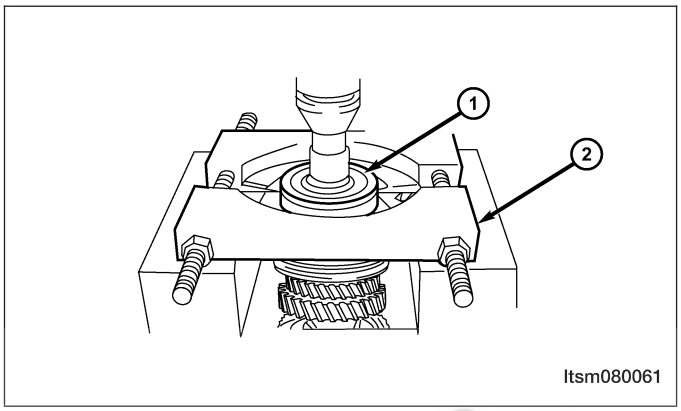


1 - Outer Ring-1st-2nd Synchronization Ring	16 - Gear Hub-5th-Reverse Gear
2 - Gear Hub Sleeve-1st-2nd Synchronizer	17 - Snap Ring-3rd Driven Gear
3 - Guide Block	18 - 3rd Driven Gear
4 - Spring-1st-2nd Gear And 5th-Reverse Gear Synchronizer	19 - 2nd Driven Gear Assembly
5 - Gear Hub-1st-2nd Gear	20 - Needle Bearing-2nd Gear
6 - Steel Ring-1st-2nd Synchronization Ring	21 - Sleeve-2nd Gear
7 - Inner Ring-1st-2nd Synchronization Ring	22 - 1st Driven Gear Assembly
8 - 4th Driven Gear	23 - Needle Bearing-1st Gear
9 - Gear Bushing-5th Gear	24 - Sleeve-1st Gear
10 - Needle Bearing-Reverse Gear	25 - Snap Ring-Output Shaft Front Bearing
11 - 5th Driven Gear Assembly	26 - Output Shaft Front Bearing
12 - Reverse Driven Gear Assembly	27 - Output Shaft
13 - Sleeve-Reverse Gear	28 - Output Shaft Rear Bearing
14 - Synchronization Ring-3rd-4th Gear And 5th-Reverse Gear	29 - Snap Ring-Output Shaft Rear Bearing
15 - Gear Hub Sleeve-5th-Reverse Gear	

NOTE :
The following special tools are required to perform the repair procedure:

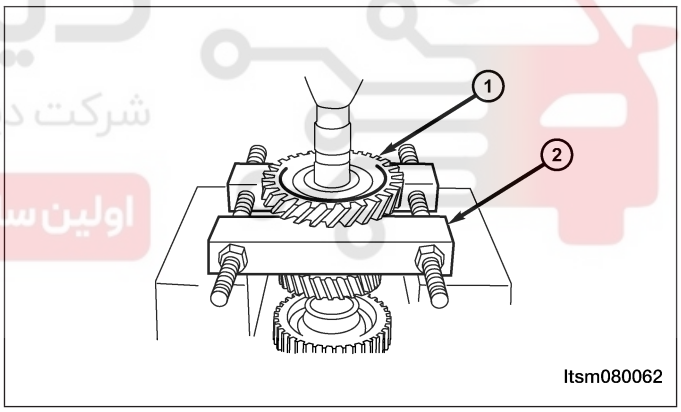
- MB-998801 - Bearing Remover
- MB-998812 - Installer Cap
- MB-998814 - Installer Connector (200 mm)
- MB-998813 - Installer (100)
- MB-998818 - Installer Connector (38 mm)
- MB-998819 - Installer Connector (40 mm)
- MB-998822 - Installer Connector (46 mm)
- MB-998825 - Installer Connector (52 mm)

1. Using special tool MB-998917 (2), disassemble the output shaft rear bearing (1).



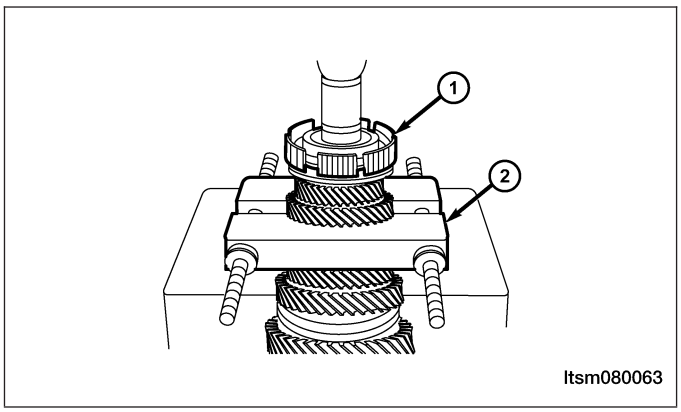
ltsm080061

2. Disassemble the reverse gear sleeve (1).
Install special tool MB-998801 (2) on the reverse driven gear, and then disassemble the sleeve.



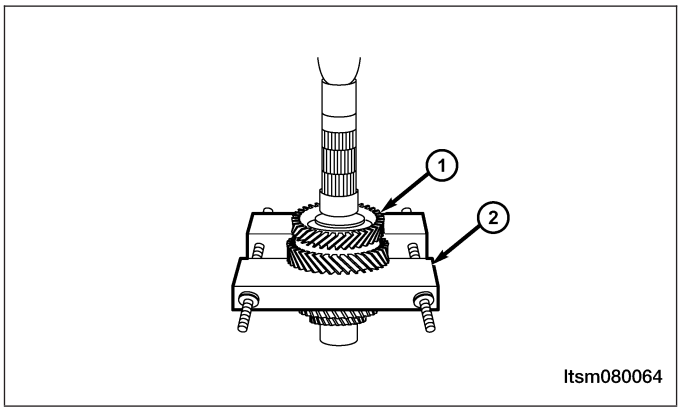
ltsm080062

3. Disassemble the 5th-reverse gear synchronizer hub (1).
Install special tool MB-998801 (2) on the 4th driven gear, and then disassemble the gear hub-5th-reverse gear.



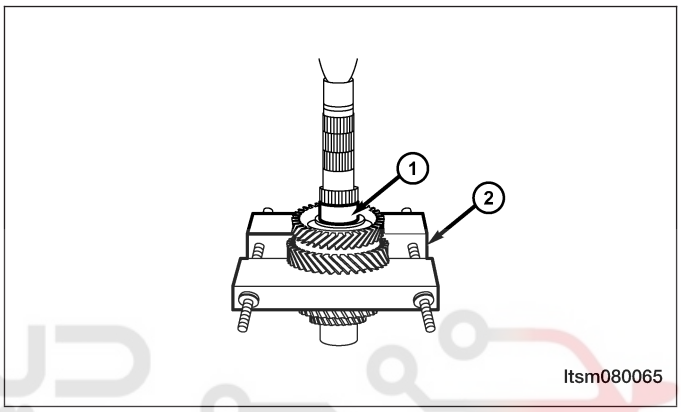
ltsm080063

4. Disassemble the 3rd driven gear (1).
   Install special tool MB-998917 (2) on the 2nd driven gear, and then disassemble the 3rd driven gear.



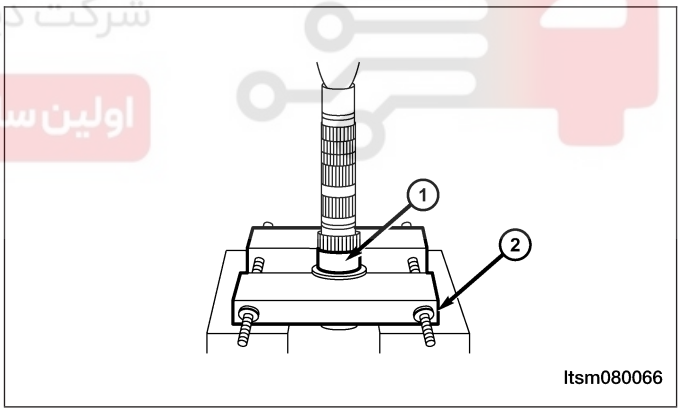
ltsm080064

5. Disassemble the sleeve-2nd gear (1).
   Install special tool MB-998917 (2) on the 1st driven gear, and then disassemble the sleeve-2nd gear.



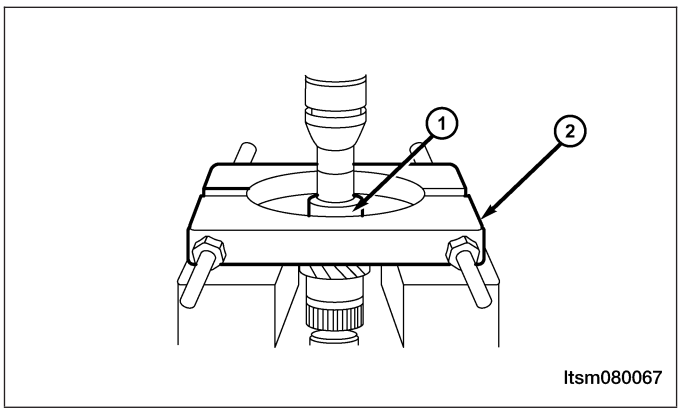
ltsm080065

6. Using special tool MB-998801 (2), disassemble the sleeve-1st gear (1).



ltsm080066

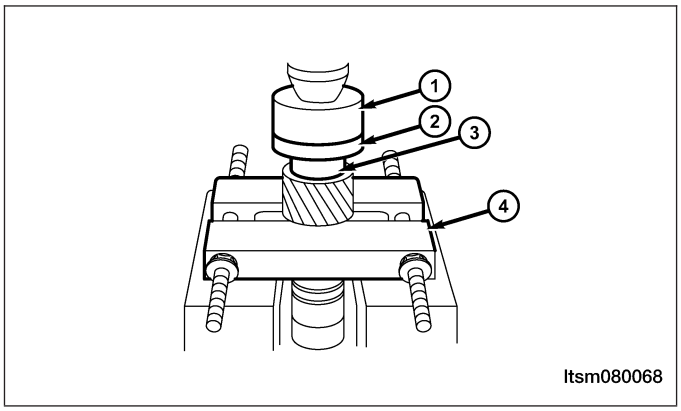
7. Using special tool MB-998917 (2), disassemble the output shaft front bearing race (1).



ltsm080067

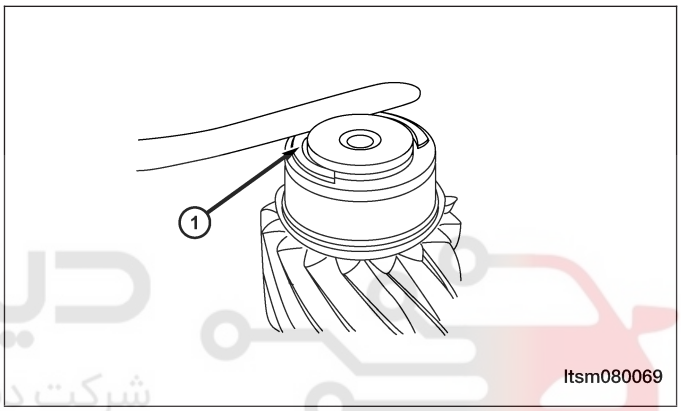
Assemble

1. Using special tools MB-998801 (4), MB-998812 (1) and MB-998818 (2), install the output shaft front bearing race (3).



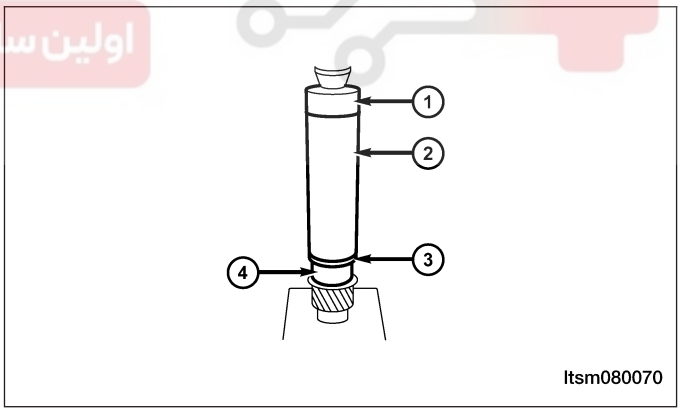
ltsm080068

2. Install the snap ring-output shaft front bearing (1). Select the snap ring and install it to maintain the proper axial clearance of the output shaft front bearing.
(Standard Value: 0.01 mm to 0.12 mm)



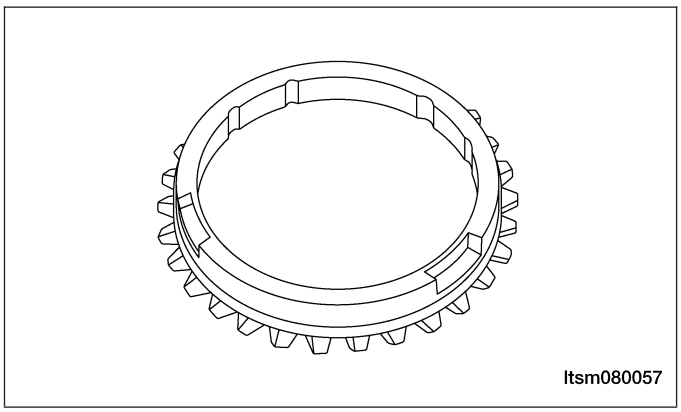
ltsm080069

3. Using special tools MB-998812 (1), MB-998814 (2) and MB-998825 (3), install the sleeve-1st gear (4).

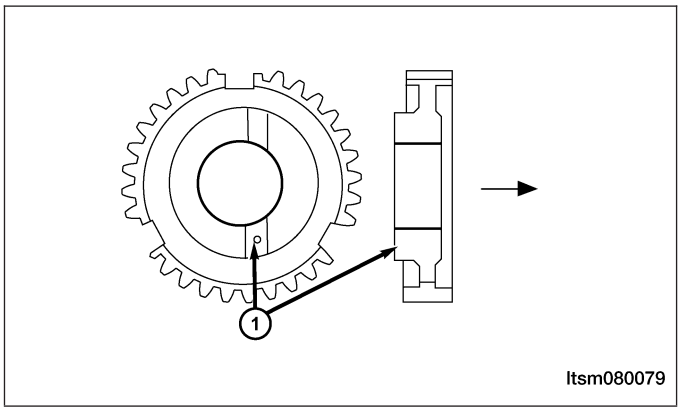


ltsm080070

4. Install the 1st-2nd gear synchronization ring.
Install the 1st-2nd gear synchronizer ring correctly on the specified position of synchronizer ring shown in the figure.

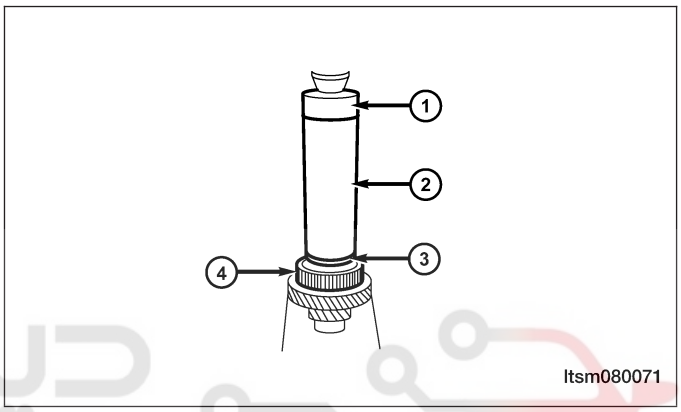

ltsm080057

5. Install the gear hub-1st-2nd gear.
   Install the gear hub-1st-2nd gear in the position (1) shown in the figure.



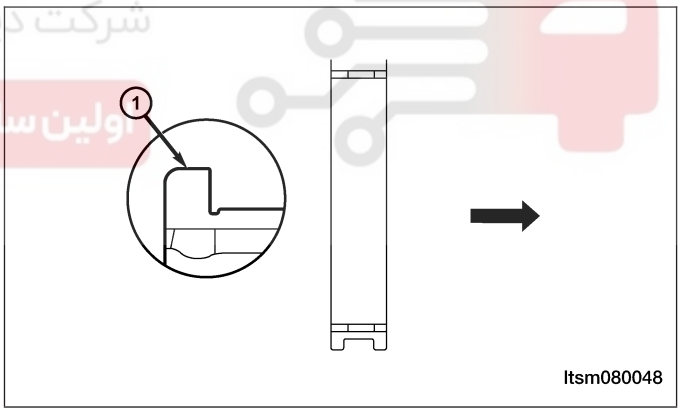
ltsm080079

CAUTION:
Using special tools MD-998814 (1), MD-998815 (2) and MD-998825 (3), install the synchronizer ring (4). Ensure that the synchronizer ring is not locked when installing the gear hub.



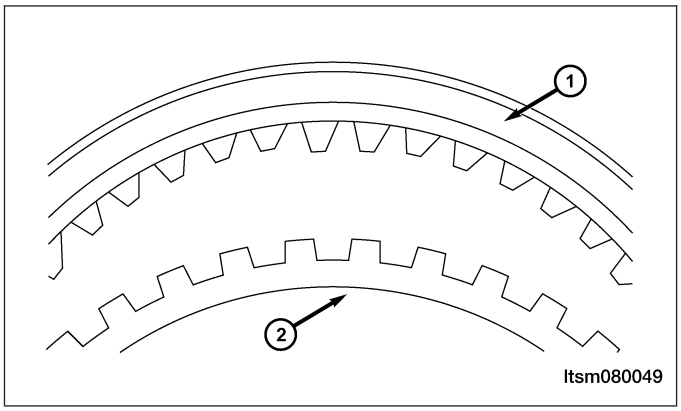
ltsm080071

6. Install the gear hub sleeve-1st-2nd gear synchronizer.
   - Install the gear bushing on the position (1) shown in the figure.



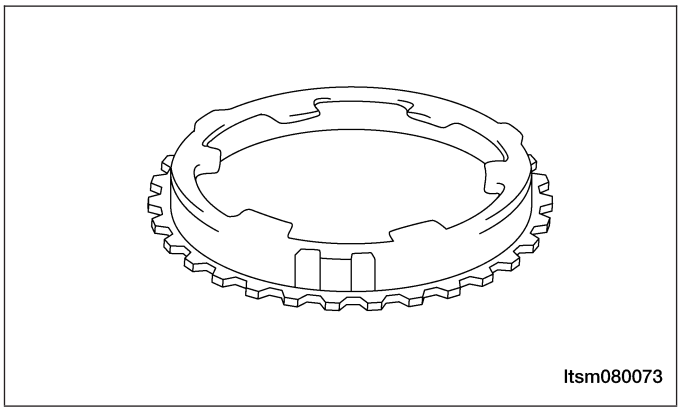
ltsm080048

   - Ensure that the two deep tooth spaces of the gear hub (1) are correctly aligned with the two high racks of the gear hub during the installation of gear bushing.

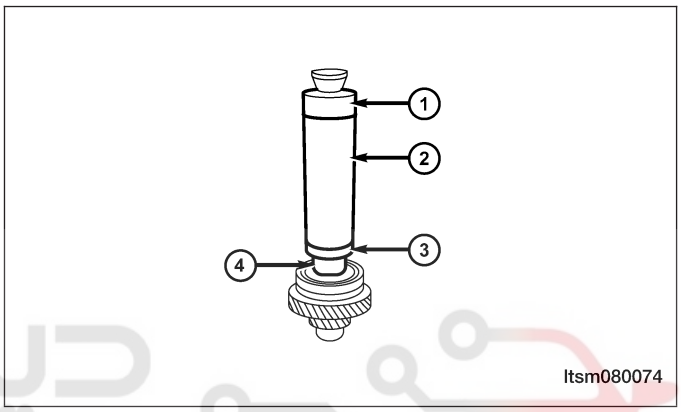


ltsm080049

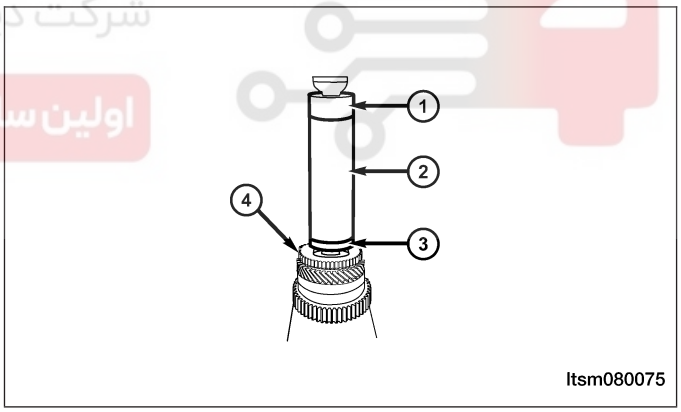
7. Install the synchronizer Ring.



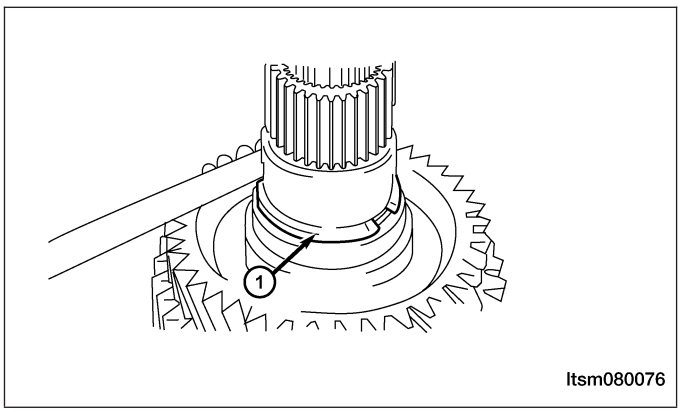
8. Using special tools MB-998812 (1), MB-998814 (2) and MB-998822 (3), install the sleeve-2nd gear (4).



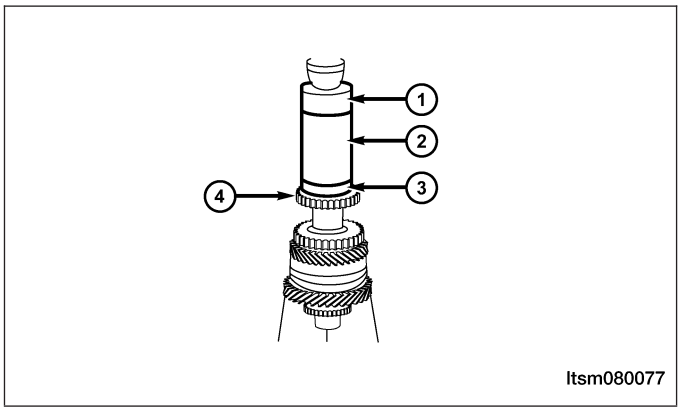
9. Using special tools MB-998812 (1), MB-998814 (2) and MB-998822 (3), install the 3rd driven gear (4).



10. Install the snap ring-3rd driven gear (1). Install the snap ring to maintain the proper axial clearance of the output shaft 3rd driven gear.
(Standard Value: -0.01 mm to 0.09 mm)

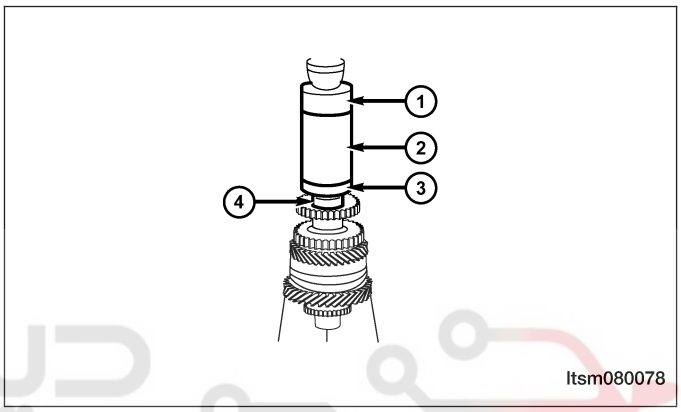


11. Using special tools MB-998812 (1), MB-998813 (2) and MB-998819 (3), install the 4th driven gear (4).



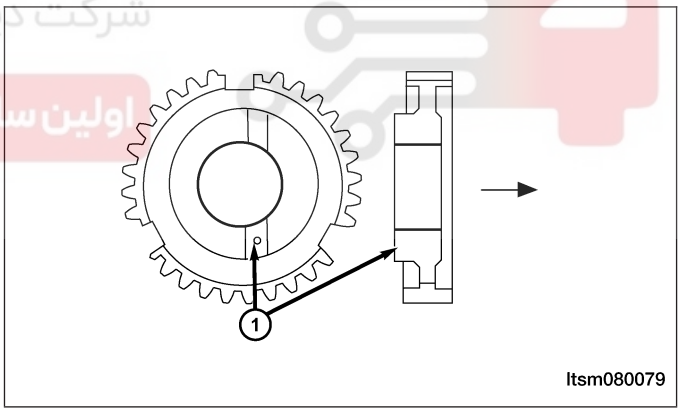
ltsm080077

12. Using special tools MB-998812 (1), MB-998813 (2) and MB-998819 (3), install the sleeve-5th gear (4).



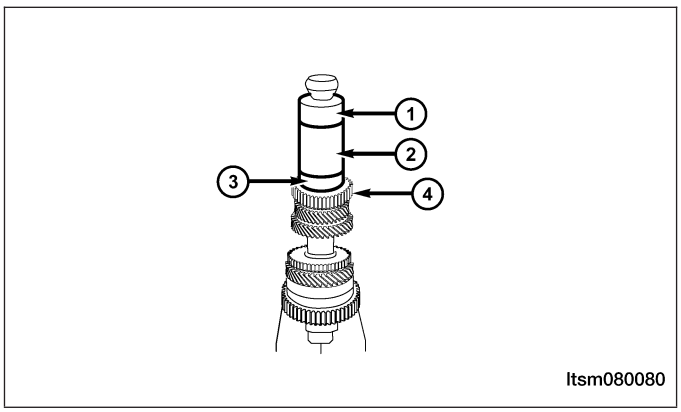
ltsm080078

13. Install the gear hub-5th-reverse gear.
Install the gear hub-5th-reverse gear in the position (1) shown in the figure.



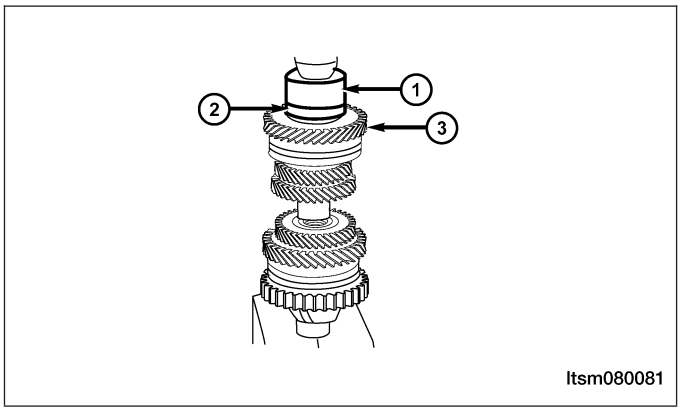
ltsm080079

CAUTION:
Using special tools MD-998812 (1), MD-998813 (2) and MD-998819 (3), install the synchronizer ring (4). Ensure that the synchronizer ring is not locked when installing the gear hub-5th-reverse gear.



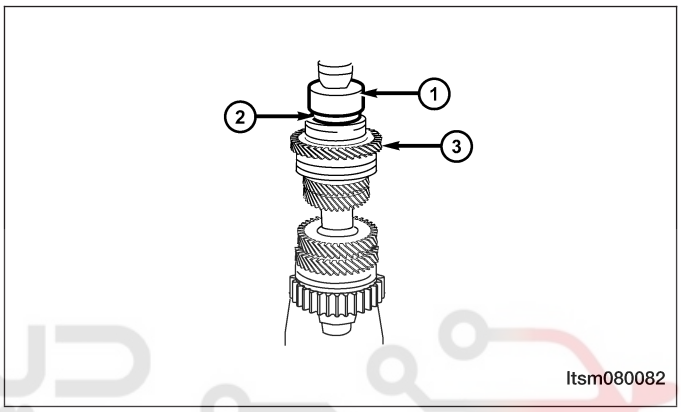
ltsm080080

14. Using special tools MB-998812 (1) and MB-998818 (2), install the reverse driven gear/needle bearing-reverse gear/sleeve-reverse gear (3).



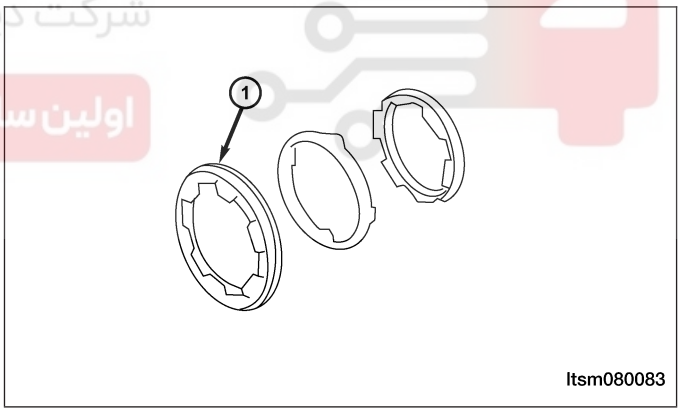
ltsm080081

15. Using special tools MB-9988112 (1) and MB-998818 (2), install the input shaft rear bearing (3).



ltsm080082

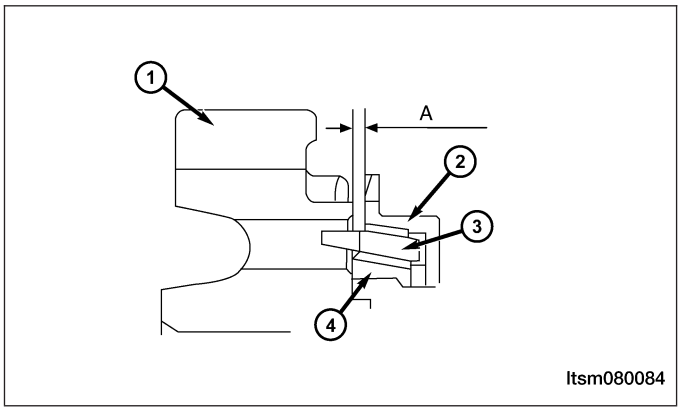
16. Install the outer ring-1st-2nd gear synchronizer ring/steel ring-1st-2nd gear synchronization ring/inner ring-1st-2nd gear synchronization ring (1).
    - Inspect the conical surface of the clutch gear for any damage or breakage on the gear surface.



ltsm080083

    - Install the outer ring (2) and inner ring (4), and then press them down to the gear (1) to measure the clearance “A”. If “A” is less than the limit value, the rings (3) should be replaced-.Limit Value: 0.5 mm

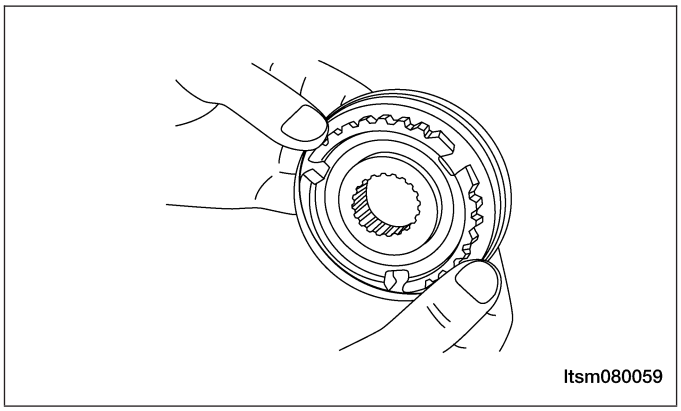
CAUTION:
The outer ring, inner ring or steel, are replaced as a complete set.



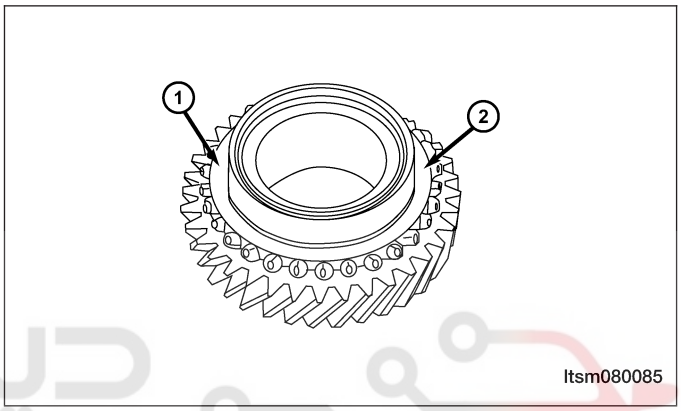
ltsm080084

17. Install the gear bushing and hub of synchronizer:
    - Assemble the gear bushing together with the gear hub of synchronizer, and then inspect for smooth operation without lockup.
    - Inspect the front/rear of the interior surface of the gear bushing for any damage.
    - Inspect the synchronizer springs for any weak springs or damage.

    CAUTION: The gear bushing or gear hub of the synchronizer are replaced as a complete set.

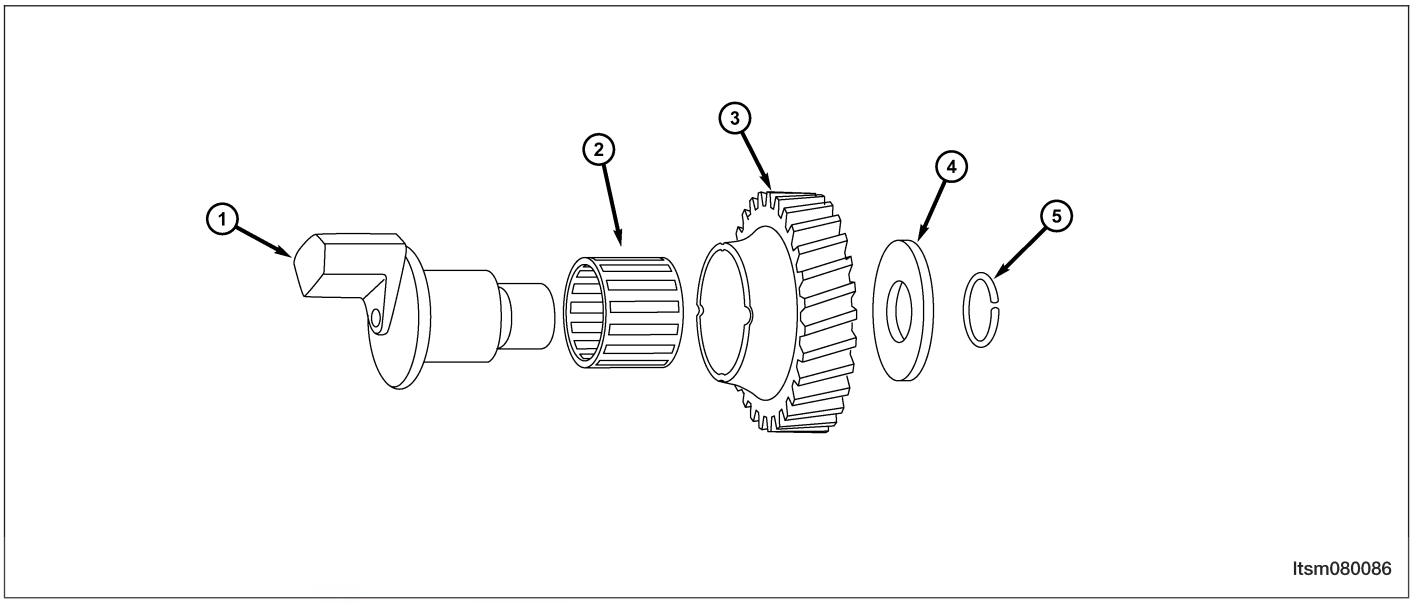


18. Install the transaxle gear:
    - Inspect the gear surface of the skew gear and clutch gear (1) for any damage.
    - Inspect the conical surface of the synchronizer (2) for thickening, damage or wear.
    - Inspect the internal diameter of the front/rear surface of the gear.



Output Gear For Reverse Gear

Disassemble



1 - Idler Gear Shaft	4 - Thrust Plate
2 - Needle Bearing	5 - Thrust Plate Snap Ring
3 - Reverse Gear	

1. Remove the thrust plate snap ring (5)
2. Separate the thrust plate (4) and the reverse gear (3).
3. Separate the needle bearing (2) and idle gear shaft (1).

Inspection

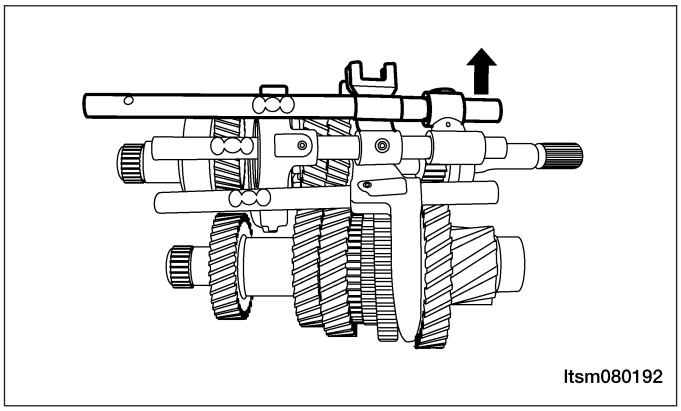
Needle Bearing

- Assemble the shaft together with the gear, and then examine whether they can slide smoothly without sagging or noise.
- Inspect the bearing cage for any damage.

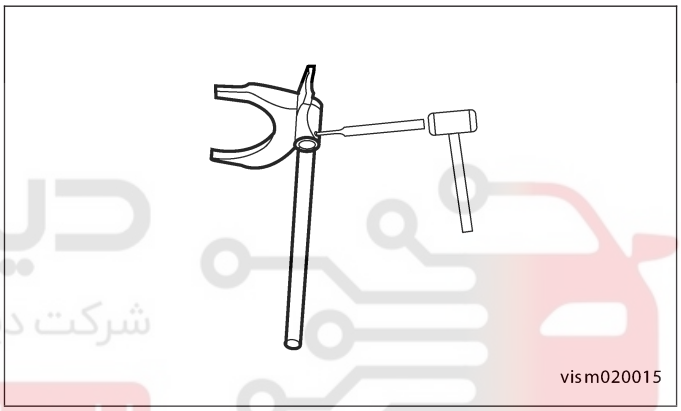
5th-Reverse Gear Shift Fork

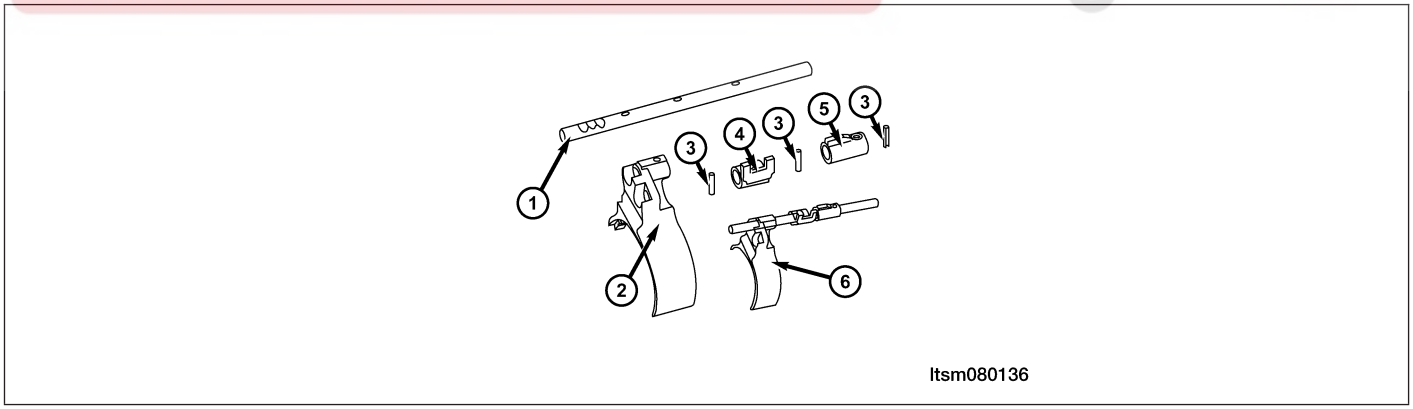
Disassemble

1. Separate the 5th-Reverse shift fork from the shift fork assembly.



2. Use a suitable tool to remove the shift fork spring pin from the shift fork and the shift fork shaft.





1 - 5th Shift Fork Shaft	4 - Reverse Fork Rack
2 - 5th Shift Fork	5 - Driving Block - Backup Light Switch
3 - Spring Pin for Fork Shaft	6 - 5th-Reverse Shift Fork Shaft Assembly

3. Remove the spring pins (3) from the 5th shift fork shaft (1).
4. Separate the 5th shift fork (2) and the reverse fork rack (4) from the 5th shift fork shaft (1).
5. Separate the backup lamp switch driving block (5) from the 5th shift fork shaft (1).

Assemble

Assemble in the reverse order of disassembly.

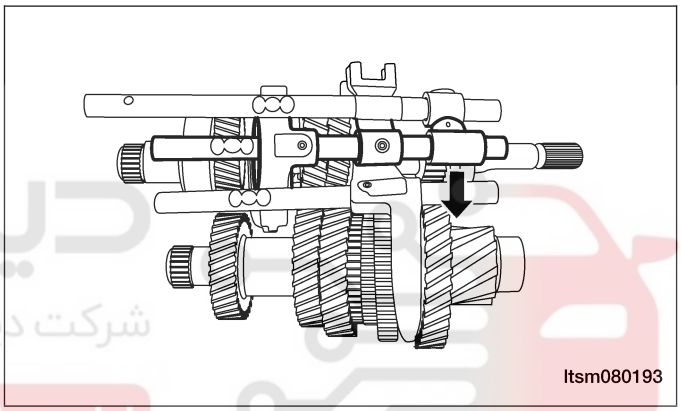
NOTE :

- Check and ensure the shift fork is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure the fork rack is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure backup light driving block is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check the fork shaft surface for any damage.
- Check the position of the three spring pins, ensure the pins are in proper alignment. The extension of both ends of the three spring pins should not exceed 3 mm.

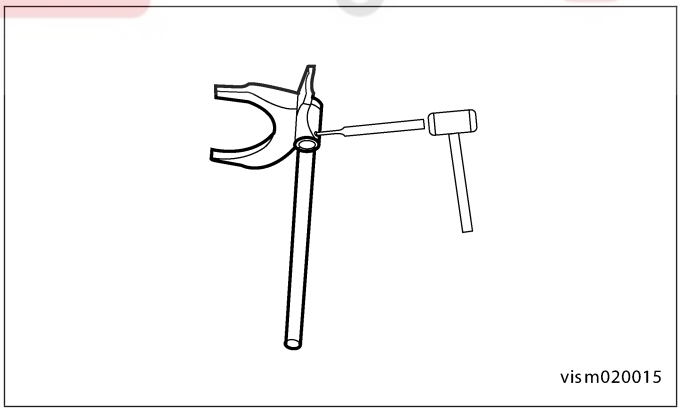
3rd-4th Gear Shift Fork

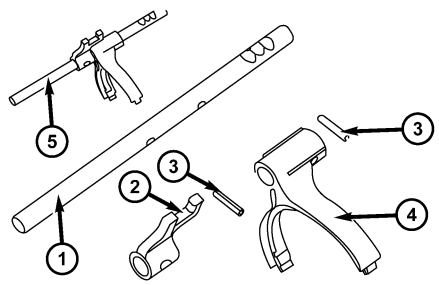
Disassemble

1. Separate the 3rd-4th shift fork from the shift fork assembly.



2. Use a suitable tool to remove the shift fork spring pin from the shift fork and the shift fork shaft.





ltsm080137

1 - 3rd-4th Shift Fork Shaft	4 - 3rd-4th Shift Fork
2 - Fork Rack - 3rd-4th Gear Shift Fork	5 - 3rd-4th Shift Fork Shaft Assembly
3 - Spring Pin for Fork Shaft	

3. Remove the spring pins (3) from the 3rd-4th shift fork shaft (1).
4. Separate the 5th shift fork (4) and the fork rack (2) from the 3rd-4th shift fork shaft (1).

Assemble

Assemble in the reverse order of disassembly.

NOTE :

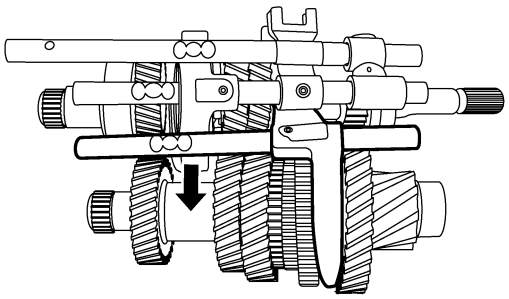
- Check and ensure the shift fork is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure the fork rack is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check the fork shaft surface for any damage.
- Check the position of the three spring pins, ensure the pins are in proper alignment. The extension of both ends of the three spring pins should not exceed 3 mm.

08

1st-2nd Gear Shift Fork

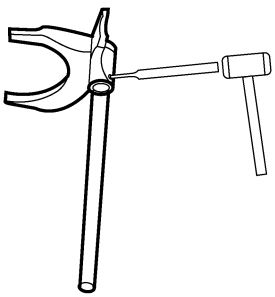
Disassemble

1. Separate the 1st-2nd shift fork from the shift fork assembly.

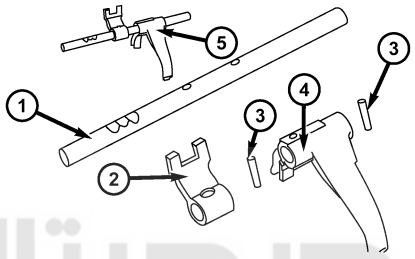


vism020016

2. Use a suitable tool to remove the shift fork spring pin from the shift fork and the shift fork shaft.



vism020015



ltsm080141

1 - 1st-2nd Shift Fork Shaft	4 - 1st-2nd Shift Fork
2 - Fork Rack - 1st-2nd Gear Shift Fork	5 - 1st-2nd Shift Fork Shaft Assembly
3 - Spring Pin for Fork Shaft	

3. Remove the spring pins (3) from the 1st-2nd shift fork shaft (1).
4. Separate the 1st-2nd shift fork (4) and the fork rack (2) from the 1st-2nd shift fork shaft (1).

Assembly

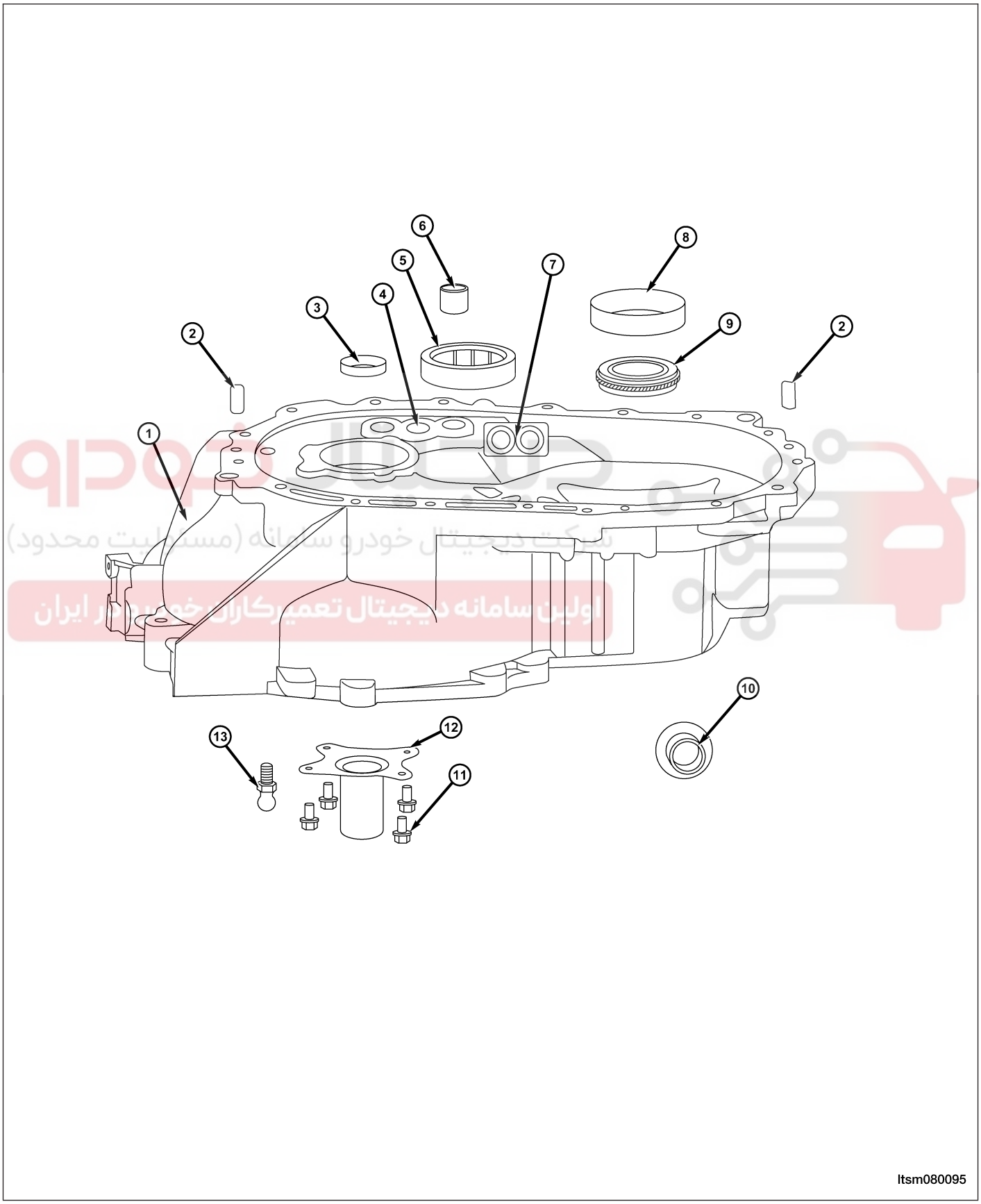
Assemble in the reverse order of disassembly.

NOTE :

- Check and ensure the shift fork is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure the fork rack is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check the fork shaft surface for any damage.
- Check the position of the three spring pins, ensure the pins are in proper alignment. The extension of both ends of the three spring pins should not exceed 3 mm.

Transaxle Clutch Housing Assembly

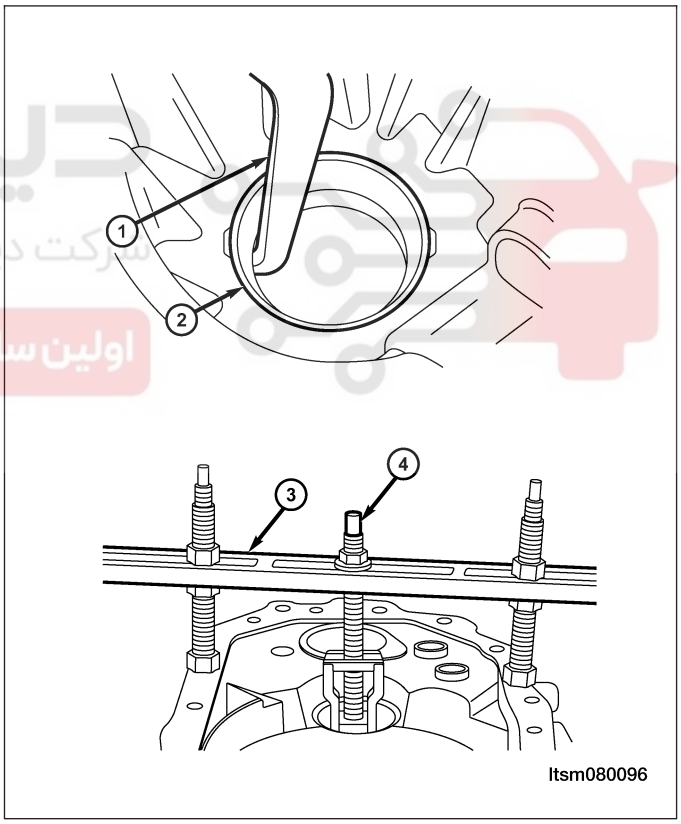
Disassemble



1 - Clutch Housing	8 - Front/Rear Bearing Of Differential
2 - Pin GB119 A10×20	9 - Fluid Seal-Differential
3 - Fluid Seal-Input Shaft	10 - Speedometer Banking Cover
4 - Bushing-Gear Shifting Mechanism	11 - Bolt GB5787 M6×12
5 - Output Shaft Front Bearing	12 - Release Bearing Race
6 - Bearing-Gear Shifting Mechanism	13 - Buttonhead-Seat Release Fork
7 - Magnetic Assembly	

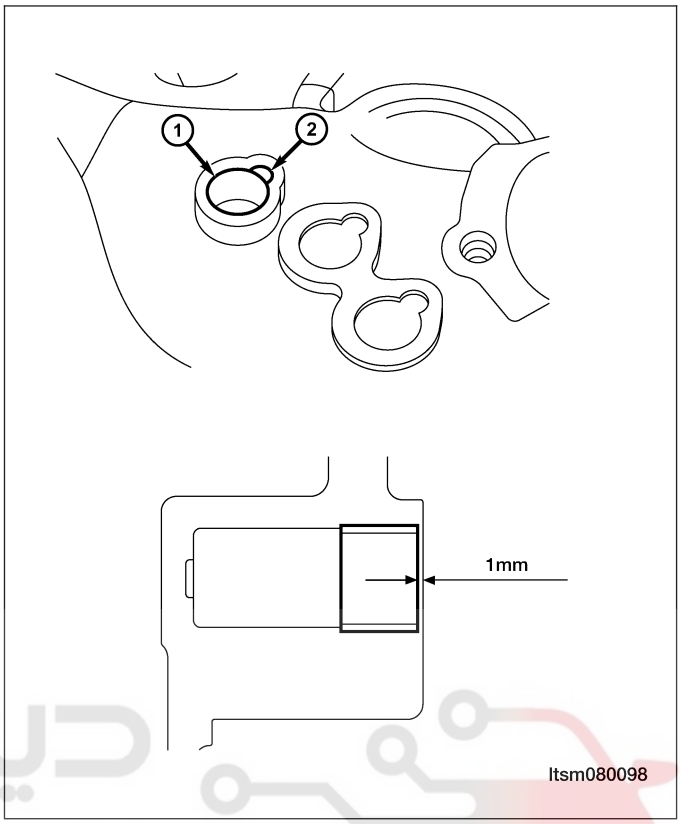
NOTE :
The following special tools are required to perform the repair procedure:
- MB-998772 - Valve Spring Compressor
- MB-999566 - Hook
- MB-990938 - Handle
- MB-990935 - Installer Connector
- MB-990934 - Installer Connector
- MB-998325 - Fluid Seal Installer
- MB-990926 - Installer Connector

1. Using special tools MB-999566 (1), MB-996772 (3), and MD-998348 (4), disassemble the outer race of the front/rear bearing (2) of the differential.

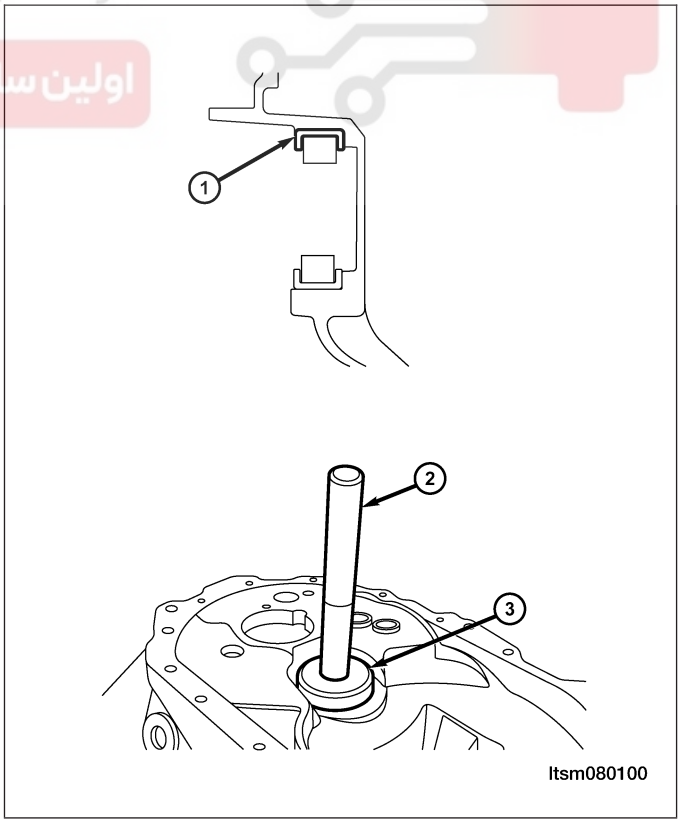


Assembly

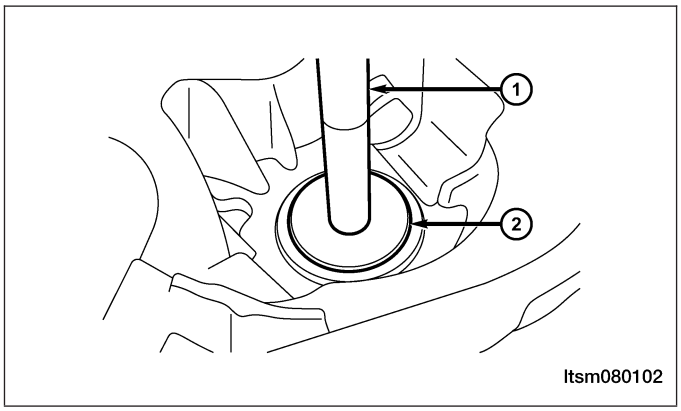
1. Install the bushing.
   Press the bushing (1) into position (2) as shown in the figure.



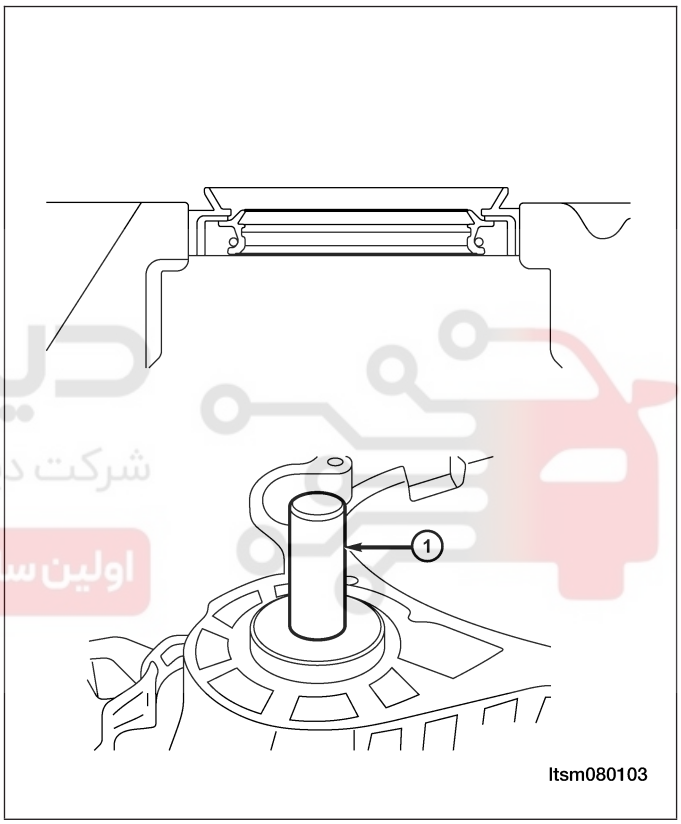
2. Using special tools MB-990938 (2) and MB-990934 (3), install the outer race-output shaft bearing (1).
   Install the outer race with the stamped side in the position shown in the figure.



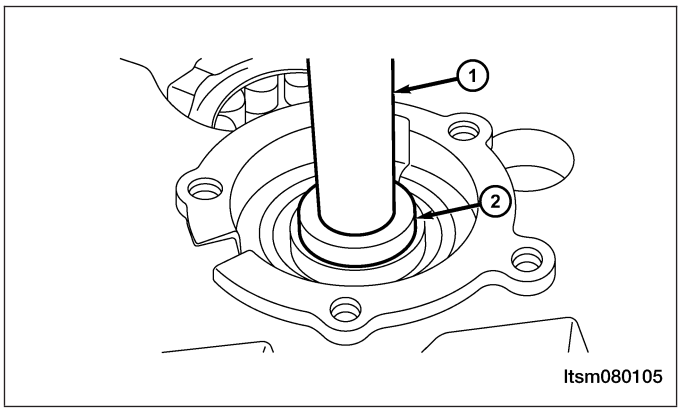
3. Using special tools MB - 990938 (1), and MB - 990935 (2), install the race-differential bearing.



4. Using special tools MB-998325 (1), install the fluid seal-differential.
   Apply transaxle fluid on the fluid seal lip.
   (Specified fluid: 75W-90)

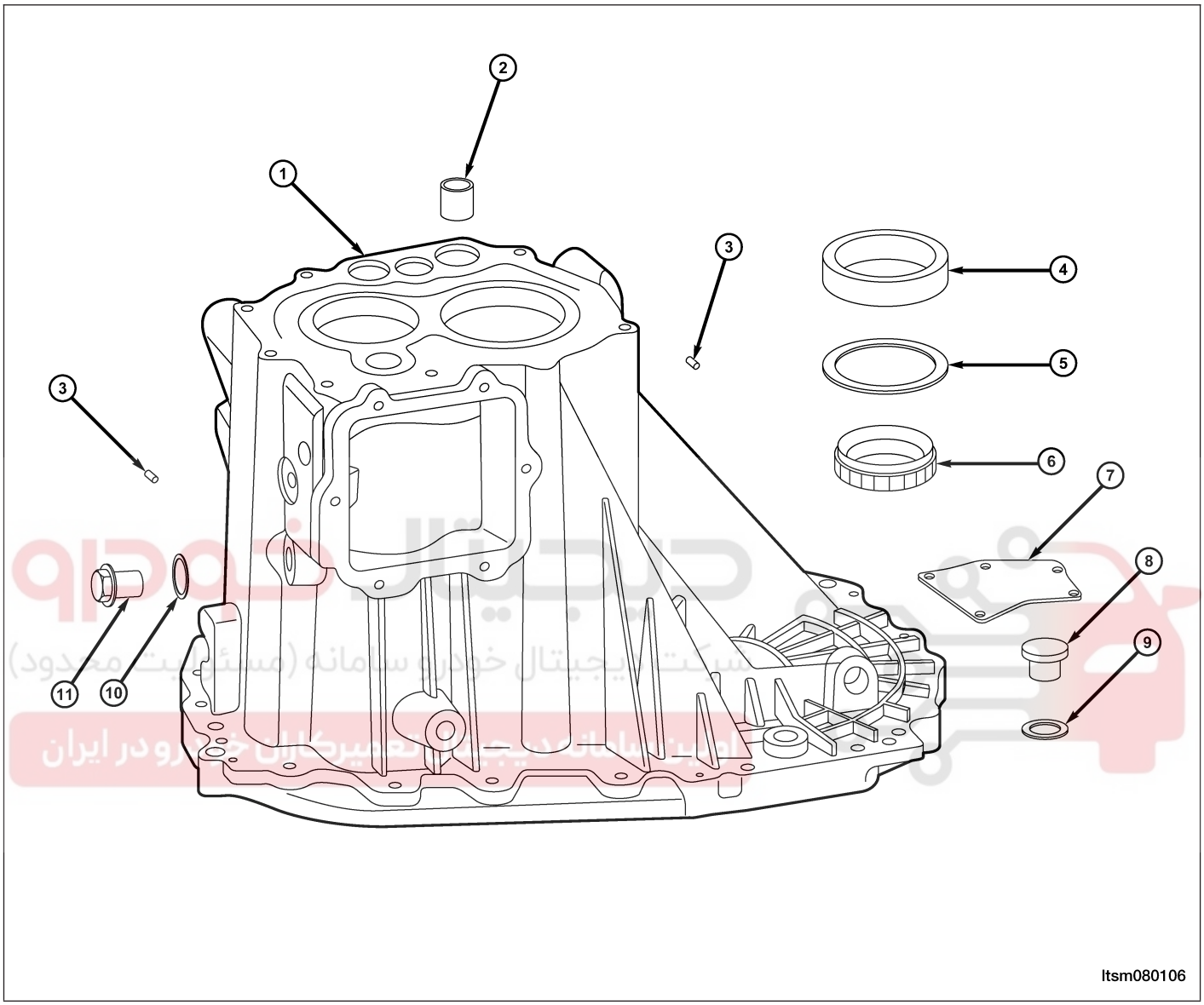


5. Using special tool MB-990938 (1) and MB-990926 (2), install the input shaft fluid seal.
   Apply the lubricating grease on the fluid seal lip.
   (Specified lubricating grease: Mobilux Ep2 or equivalents)



Transaxle Main Housing Assembly

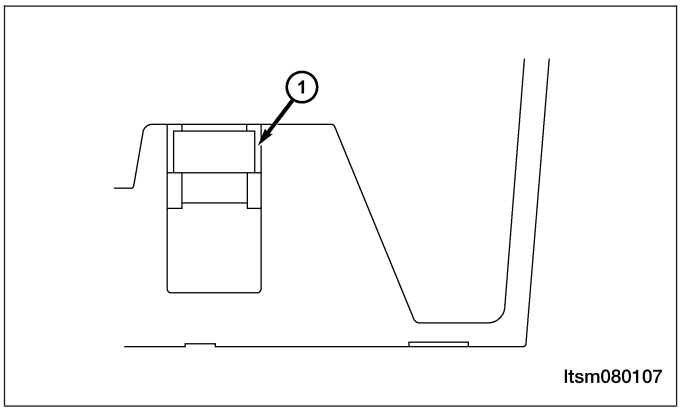
Assembly



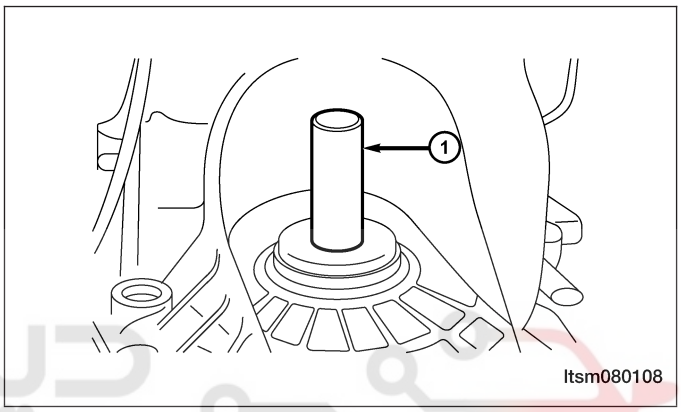
1 - Transaxle Housing	7 - Fluid Baffle
2 - Bearing-Gear Shifting Mechanism	8 - Fluid Draining Screw Plug
3 - Pin GB119	9 - Plain Washer-Fluid Draining Screw Plug
4 - Outer Race Of Front/Rear Bearing Of Differential	10 - Plain Washer-Fluid Limiting Screw Plug
5 - Adjustment Gasket-Differential Rear Bearing	11 - Fluid Limiting Screw Plug
6 - Fluid Seal-Differential	

NOTE :
The following special tools are required to perform the repair procedure:
- MD-998325 - Fluid Installer

1. Install the bearing-gear shifting mechanism (1). Press the bearing in until it is flush with the surface of housing.



2. Install the differential fluid seal.
Inspect the fluid seal for damage. Apply lubricating grease on the external diameter and inner lip of the fluid seal, and then use special tool MD-998325 (1) to install the seal into position.
(Lubricating grease: Mobilux Ep2)



FRONT DIFFERENTIAL

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- Specifications 08-310
- Special Tools 08-310

DIFFERENTIAL UNIT REPAIR 08-312

Differential Carrier 08-312
- Removal & Installation 08-312
- Inspection 08-313
- Assembly 08-313

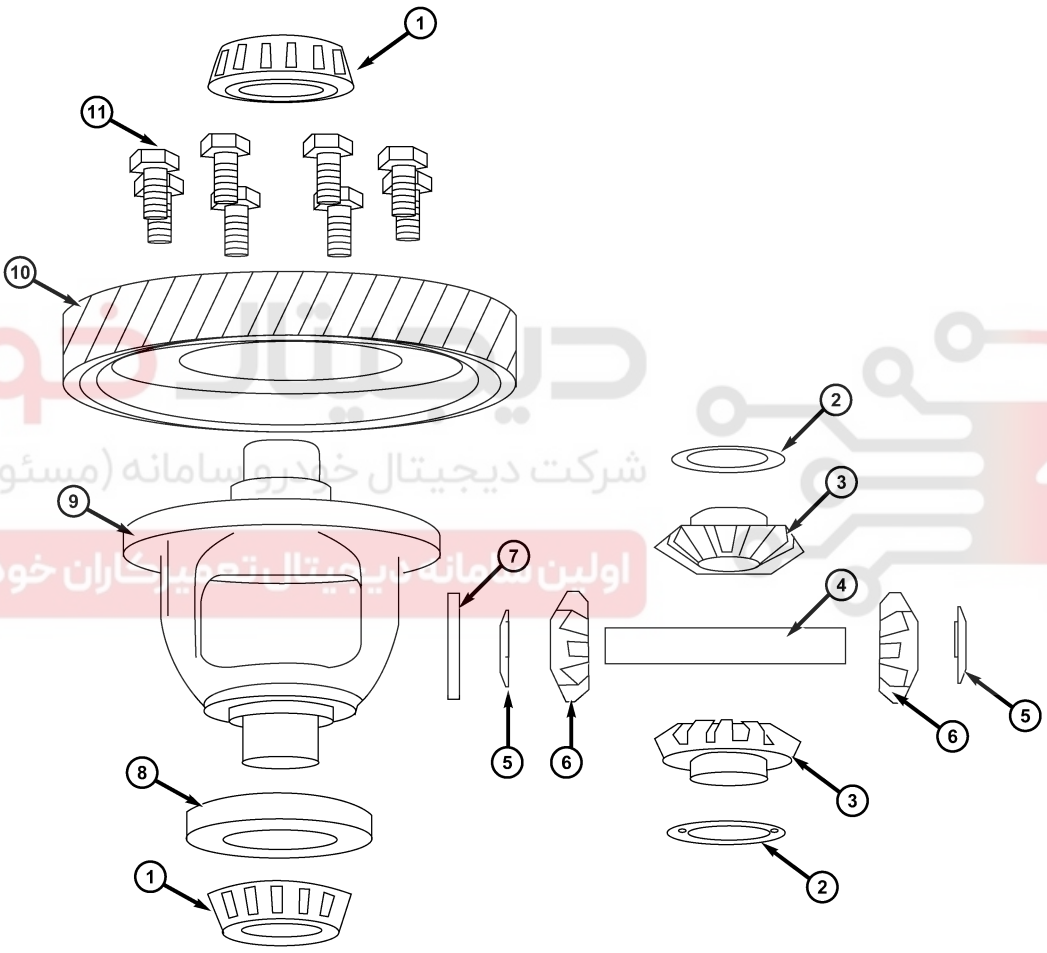
GENERAL INFORMATION

Description

The differential includes the differential side gears and the shaft mounted differential pinion gears. Direct contact between the gears and the differential case is prevented by the differential side gear thrust washers installed under the gears. The differential pinion shaft is held in position by a differential pinion shaft lock pin that extends through the end of the differential pinion shaft and the differential case.

The differential transaxle assembly consists of the following components:

- Differential case (part of the final drive carrier)
- 2 pinion gears supported by a pinion shaft
- 2 side gears supported by the differential case and half-shafts



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1 - Front/Rear Bearing Of Differential	7 - Anchor Pin-Planetary Gear Shaft
2 - Adjustment Gasket-Axle Shaft Gear	8 - The Driving Gear-Speedometer
3 - Axle Shaft Gear	9 - Differential Housing
4 - Planetary Gear Shaft	10 - The Driven Gear Of Main Reducing Gear
5 - Thrust Washer	11 - Bolt-The Driven Gear Of Main Reducing Gear And The Differential Housing
6 - Spherical Washer-Planetary Gear	

Operation

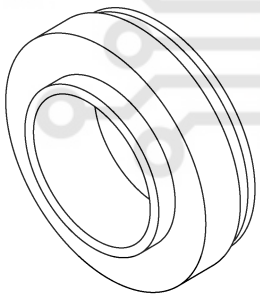
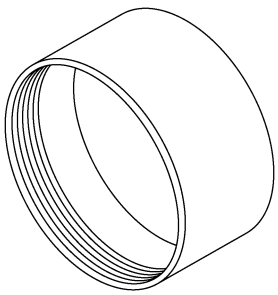
The differential operates through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears. The side gears are connected to the axle shafts.

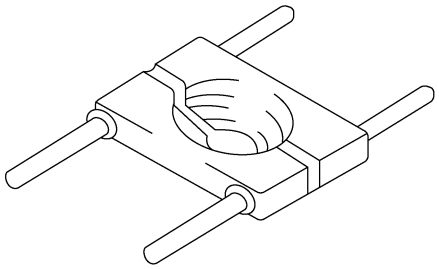
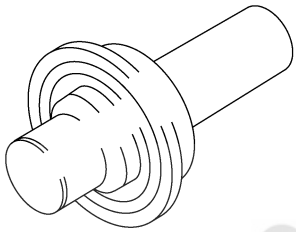
Specifications

Clearance Specifications

Clearance Between Side Gear And Planetary Gear	0.028 - 0.150 mm
Adjusting Washer	0.93 - 1.00 mm

Special Tools

Installer Connector (40 mm) MD-998819	 ltsm080013
Installer Cap MD-998812	 ltsm080007

Bearing Remover MD-998801	 ltsm080006
Fluid Installer MD-998325	 ltsm080004

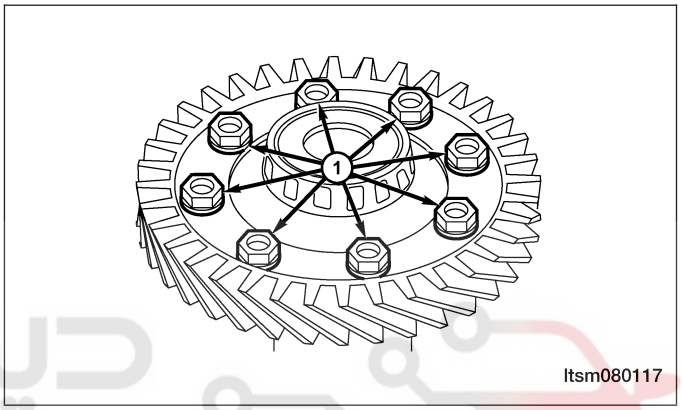
DIFFERENTIAL UNIT REPAIR

Differential Carrier

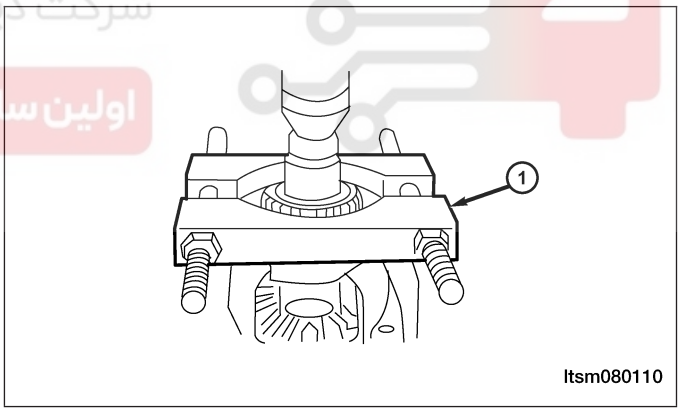
Removal & Installation

NOTE :
The following special tools are required to perform the repair procedure:
- MD-998801 - Bearing Remover

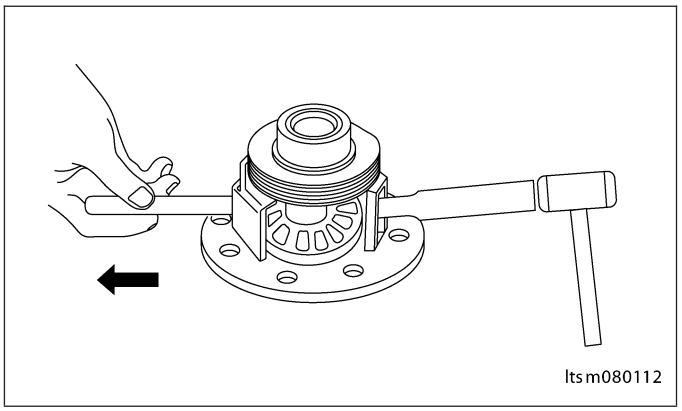
1. Remove the transaxle input shaft assembly, transaxle output shaft assembly, 1st-2nd shift fork, 3rd-4th shift fork and 5th-reverse fork shaft together as a unit (See Transaxle Assembly Unit Repair in Section 08 Transaxle).
2. Remove the transaxle differential assembly.
3. Mount the differential in a vice.
4. Remove the drive gear bolts (1).



5. Using special tool MD-998801 (1), disassemble the differential-front/rear shaft bearing.



6. Tap the drive gear off the differential case assembly using a suitable tool.
7. Remove the pinion mate shaft use a suitable tool.



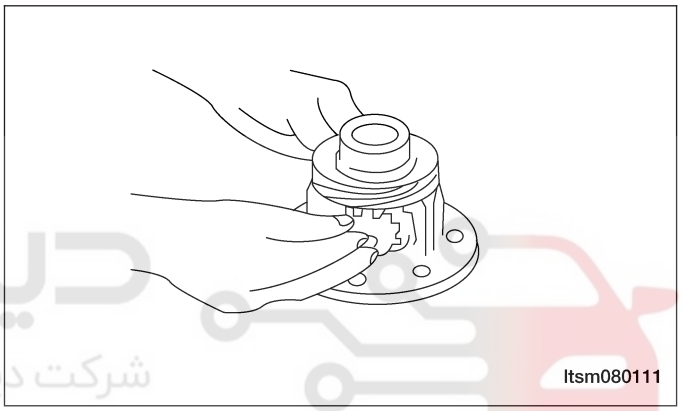
8. Turn the pinion mate gear, then remove the pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from the differential case.

Inspection

1. Clean all components.
2. Inspect the following components for wear:
   - Ring gear
   - Adjusting washers
   - Side gears
   - Spherical washers
   - Planetary gears
   - Planetary gear shaft

Assembly

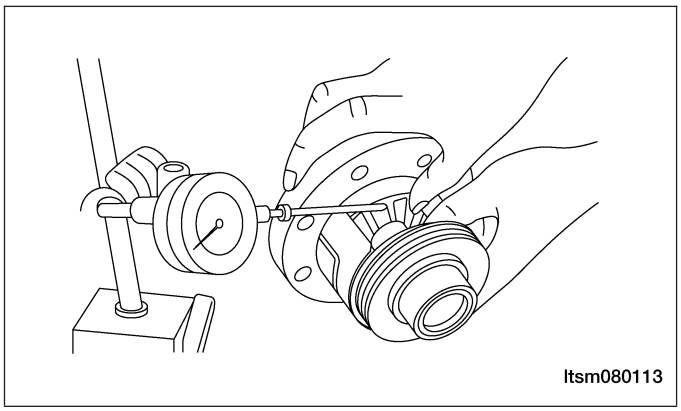
1. Install the adjustment shim-axle shaft gear/axle shaft gear/spherical washer-planetary gear/planetary gear/planetary gear shaft.
2. Assemble the spherical washer on the back of axle shaft gear, and then install the axle shaft gear on the differential.



NOTE :
The adjustment shim with intermediate thickness (0.93 to 1.00 mm) shall be assembled when a new axle shaft gear is installed.

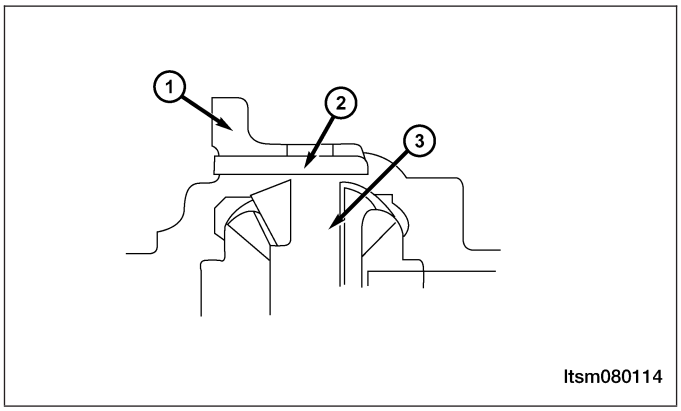
3. Place the spherical washer on the back of any planetary gear to make two planetary gears engage simultaneously with the axle shaft gear. Turn these gears, and at the same time, install them in their proper positions.
4. Insert and install the planetary gear shaft.
5. Measure the gear clearance between the axle shaft gear and the planetary gear.
   (Standard value: 0.08 to 0.15 mm)
6. If the measured gear clearance doesn't conform to the standard value, select and install the adjustment shim, and then measure the gear clearance again.

NOTE :
Adjust the gear clearance until the gear clearance of both sides is the same as each other.



7. Install the lock pin (2).
8. Install the lock pin in the position shown in the figure.

CAUTION:
After the lock pin is taped in, the axle shaft gear and the planetary gear should operate normally.



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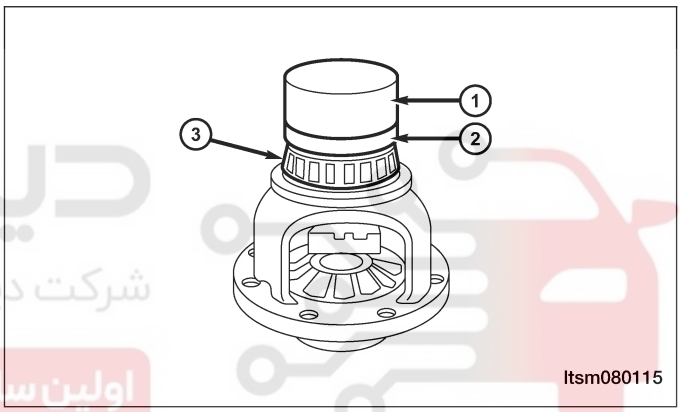
1 - Differential Housing
2 - Lock Pin
3 - Pinion Shaft

9. Using special tools MD-998812 (1) and MB-998819 (2), install the differential front/rear bearing (3).



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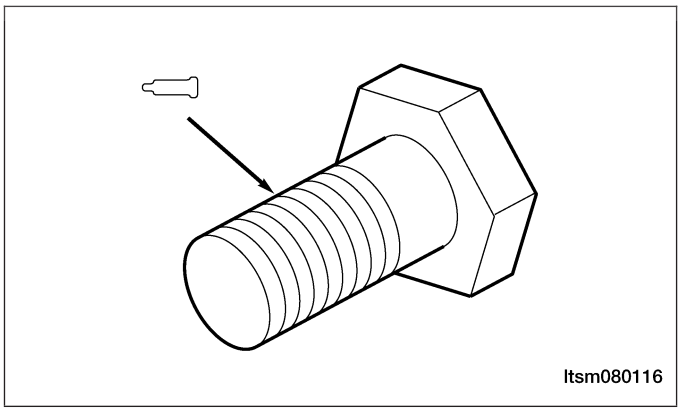
10. Install the driven gear of main reducing gear.
11. Apply thread sealant to the threads of all bolts.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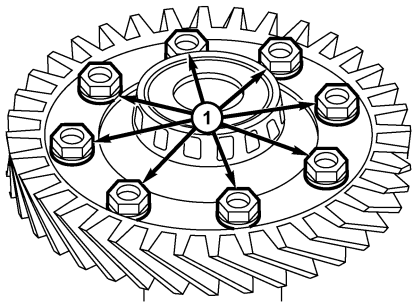
12. Tighten the ring gear bolts (1) in the sequence shown in the figure.
(Tighten: Ring gear bolts to 132 N·m)



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CLUTCH SYSTEM

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CLUTCH ASSEMBLY SERVICE 08-319

Clutch and Pressure Plate 08-319
- Removal & Installation 08-319
- Clutch Pedal Height 08-321
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Clutch Master Cylinder 08-322
- Description 08-322
- Operation 08-322
- Removal & Installation 08-322

Clutch Slave Cylinder 08-324
- Removal & Installation 08-324

Bleeding Hydraulic Clutch 08-325
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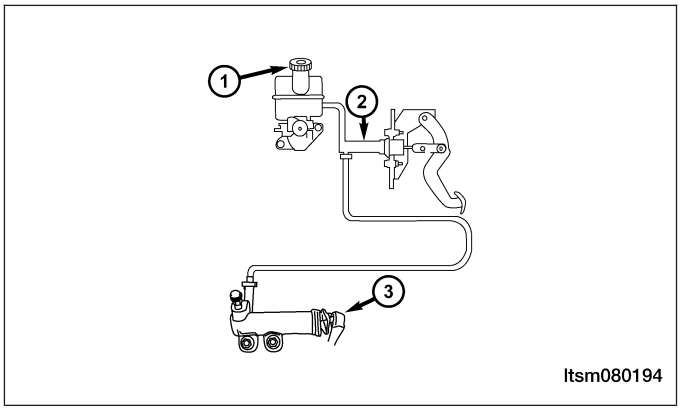
GENERAL INFORMATION

Description

The hydraulic clutch system consists of a clutch master cylinder (2), slave cylinder (3), and an interconnecting hydraulic fluid line. Hydraulic fluid is supplied by the clutch system from the clutch master cylinder reservoir (1).



Operation

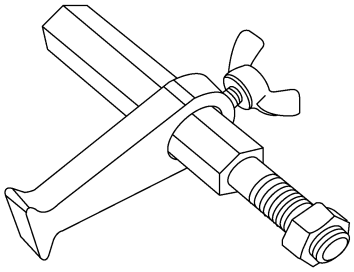
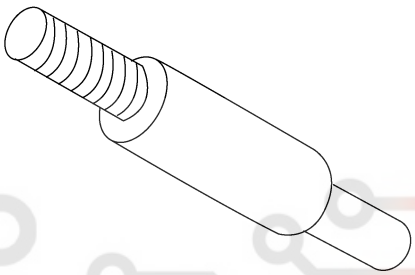
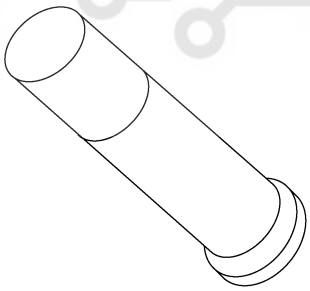
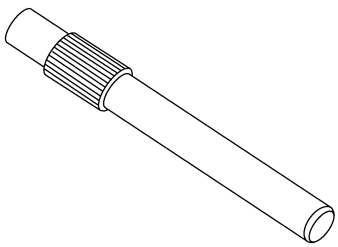
The hydraulic clutch system is responsible for engaging and disengaging the clutch. Depressing the clutch pedal develops fluid pressure in the clutch master cylinder. This pressure is transmitted to the integral release bearing which is in contact with the pressure plate diaphragm spring. As additional force is applied, the bearing depresses the diaphragm spring fingers inward on the fulcrums. The action moves the pressure plate rearward, relieving clamping force on the clutch disc.

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Transaxle Mounting Bolts	6.9
Clutch Housing Mounting Bolts	44
Clutch Release Bearing Seat Retainer Mounting Bolts	9.8
Gear Shift Mechanism Assembly Mounting Bolts	18
Shift Gear Control Cable Bracket Mounting Bolts	18
Speedometer Gear Mounting Bolts	3.9
Final Drive Driven Gear Mounting Bolts	132
Back Up Lamp Switch	32
Idler Gear Assembly Mounting Bolt	48
Clutch Slave Cylinder Mounting Bolts	11 ± 1

Special Tools

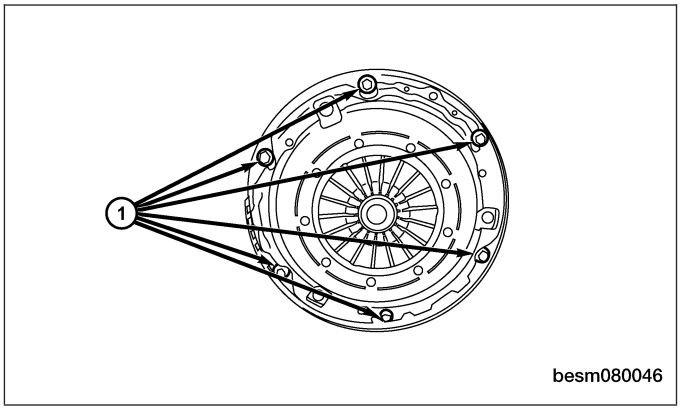
Flywheel Fixture 09924 - 17810	 ltsm020211
Bearing Extractor 09917 - 58010	 ltsm020212
Input Shaft Bearing Mounting Device 09925 -98210	 ltsm020213
Clutch Pressure Plate Installer CH-20014	 besm080041

CLUTCH ASSEMBLY SERVICE

Clutch and Pressure Plate

Removal & Installation

1. Remove the transaxle assembly (See Transaxle Assembly Removal & Installation in Section 08 Transaxle).
2. Remove the clutch pressure plate bolts (1).
   (Tighten: Clutch pressure plate bolts to 25 N·m)
3. Remove the modular clutch assembly.



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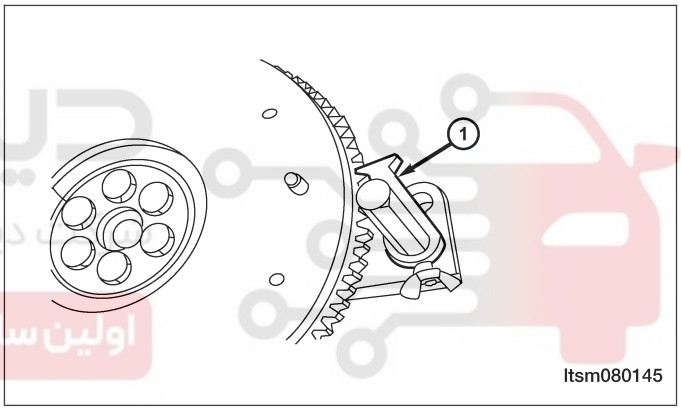
4. Using special tool CH-20043 (1), hold the flywheel.



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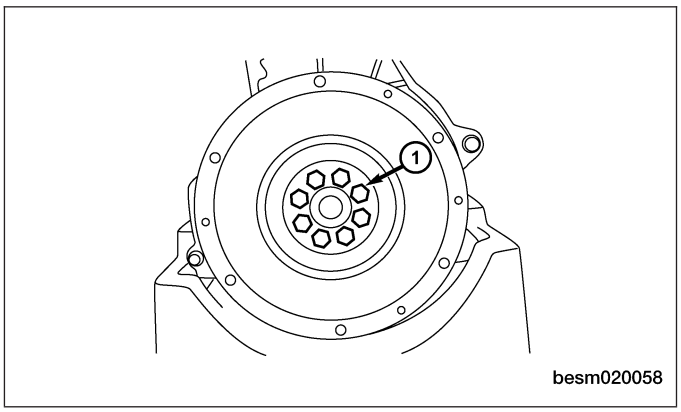
5. Remove the flywheel-to-crankshaft bolts (1) and remove flywheel assembly (if necessary for resurfacing).
   (Tighten: Flywheel-to-crankshaft bolts to 75 N·m)



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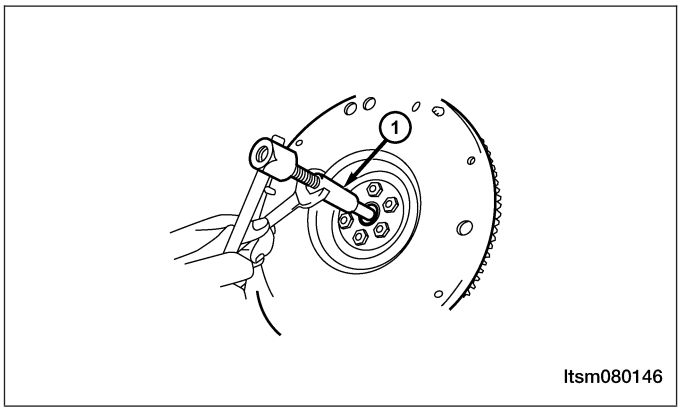
6. Remove the input shaft bearing using special tool 09917-58010 (1) and spanner, as shown in the figure.



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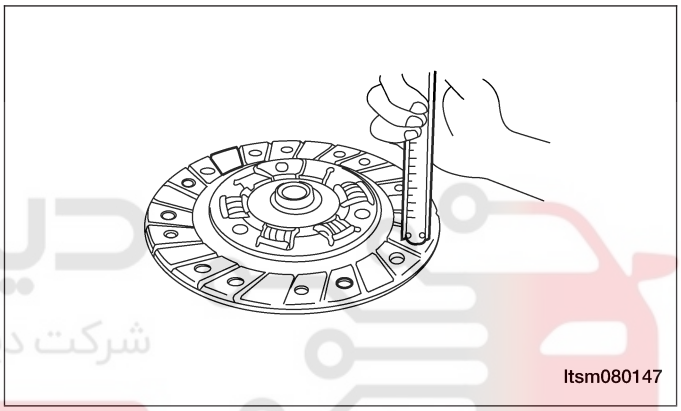
Inspect

- Check the input shaft bearing to ensure it is able to rotate freely, replace the bearing if necessary.
- Measure the depth of the recesses of the clutch friction lining rivet head, i.e., the distance between rivet head and friction lining surface (as shown in the figure).
  If the depth of any hole comes to the limit, replace friction lining assembly.
  - Standard: 1.2 mm
  - Limit: 0.5 mm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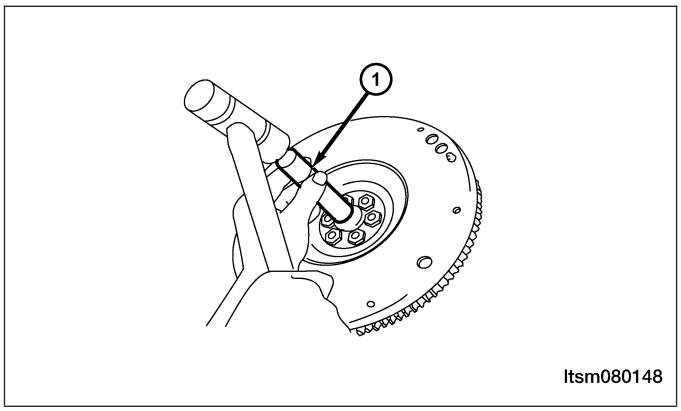
- Check clutch pressure plate diaphragm spring for irregular wear or damage.
- Check clutch pressure plate for wear or hot spots.
- If found abnormal, replace the clutch plate assembly. Never separate the clutch plate assembly into the diaphragm spring and clutch plate.
- Check the contact surface of the flywheel and friction lining for irregular wear or hot spots. Repair or replace if necessary.

Installation

- Prior to assembling, check the flywheel surface and clutch plate surface to ensure they are clean and dry.
- Using special tools CH-30028 (1), install the input shaft bearing to the crankshaft (as shown in the figure). Align the clutch friction lining assembly and flywheel center using special tools (as shown in the figure), and then install the clutch plate assembly and bolts,
  Tighten the bolts to the specified torque. (Tighten: Clutch pressure plate bolts to 25 N·m)



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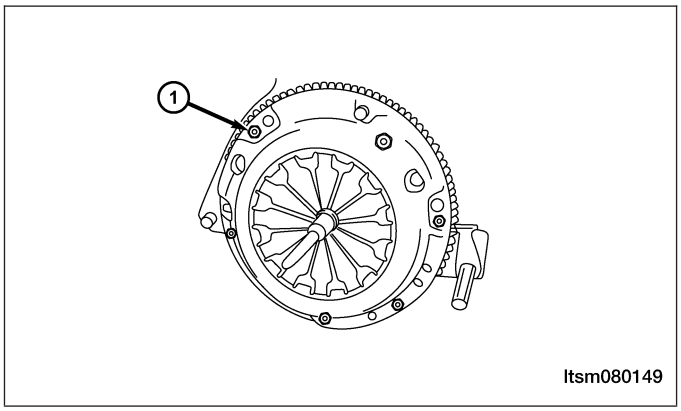
NOTE :
When tightening the clutch pressure plate bolts (1), tighten by hand until the friction lining assembly is properly aligned.

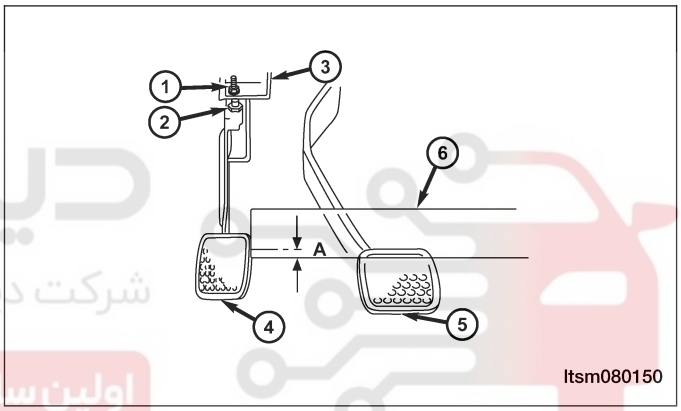


- Apply a thin layer of grease to the input shaft, and then assemble the transaxle and engine.

  NOTE: Turn the splines when installing the transaxle input shaft into the clutch friction lining assembly until the splines are engaged.

Clutch Pedal Height

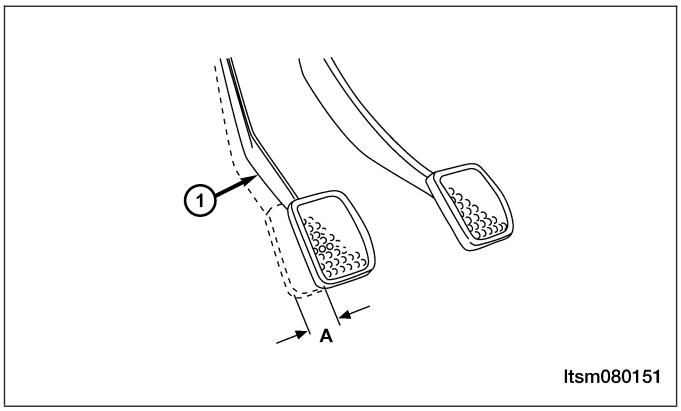
Adjust the clutch pedal height using the adjusting bolts (1) on the pedal bracket (3) in accordance with the following requirements. When the clutch pedal (4) is approximately 8 mm higher than the brake pedal (5), the clutch pedal height is normal.



Clutch Pedal Free Travel

Depress the clutch pedal (1) until the clutch resistance can be felt. Stop accordingly and measure the distance (clutch pedal free travel A). The free travel should be within 15 - 25 mm.

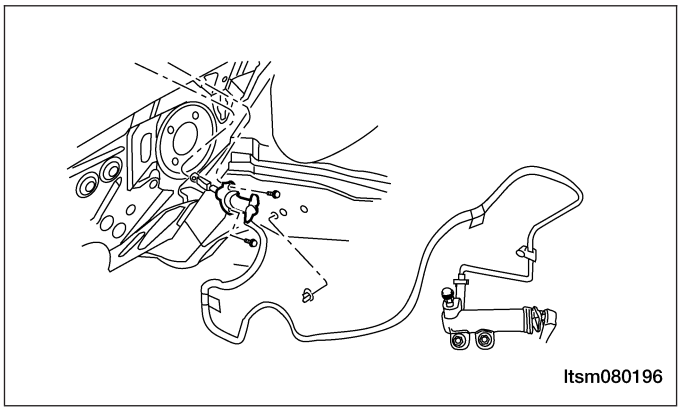
After checking clutch pedal free travel, check the clutch to ensure it is in normal working condition while the engine is running.



Clutch Master Cylinder

Description

The clutch master cylinder mounts to the clutch pedal and consists of a piston and cylinder housing, an actuating push rod, and an interconnecting hydraulic line. Fluid is supplied to the clutch master cylinder via the brake fluid reservoir.

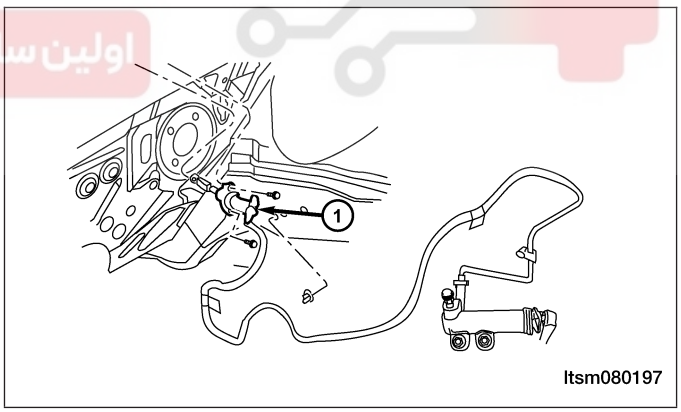


Operation

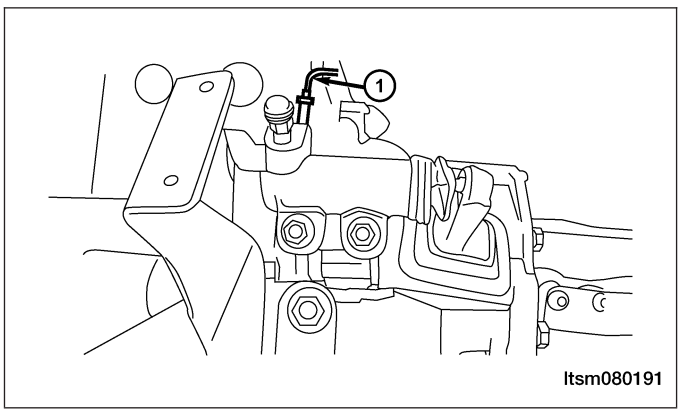
When the clutch pedal is depressed, the push rod moves the piston in the master cylinder, displacing fluid through the hydraulic line and into the release bearing. The release bearing is extended and forces the fingers of the clutch diaphragm springs to move. As the fingers move, they release the clamping pressure on the clutch disc between the clutch pressure plate and the flywheel. The clutch becomes disengaged as this pressure is released. When the clutch pedal is released, the system hydraulic pressure is released. This allows the force of the clutch diaphragm springs to return themselves to their original position, re-clamping the clutch disc between the flywheel and the clutch pressure plate. Also, the release bearing is forced to return, which reverses the movement of the hydraulic system and returns the pedal to its original position against the up stop.

Removal & Installation

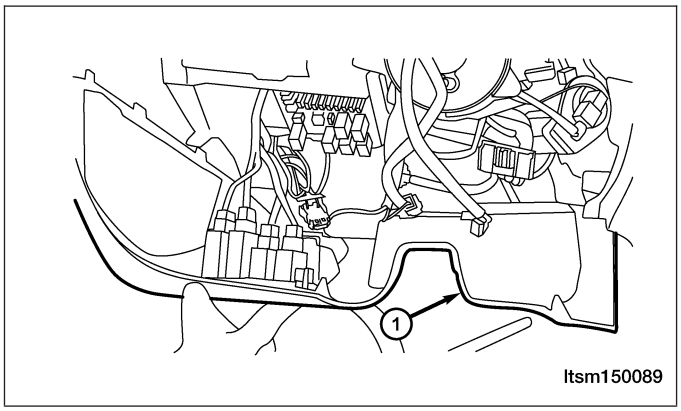
1. Disconnect hydraulic supply line to clutch master cylinder (1) to completely drain clutch master cylinder and tubing.



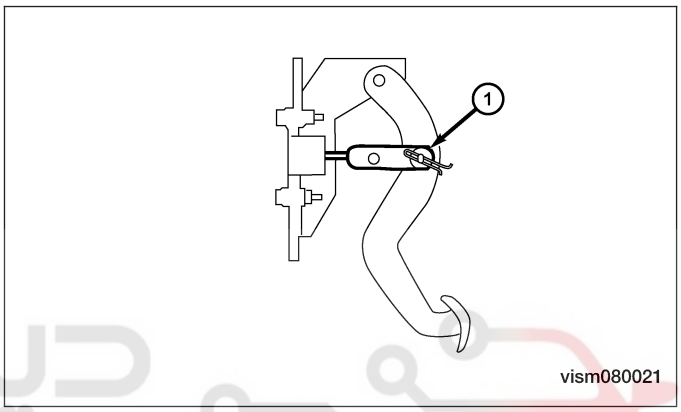
2. Disconnect hydraulic line (1) and drain fluid into suitable container.



3. Remove instrument panel lower trim panel (1) (See Instrument Panel Removal & Installation in Section 15 Body & Accessories).



4. Disconnect clutch master cylinder push-rod (1) from clutch pedal.

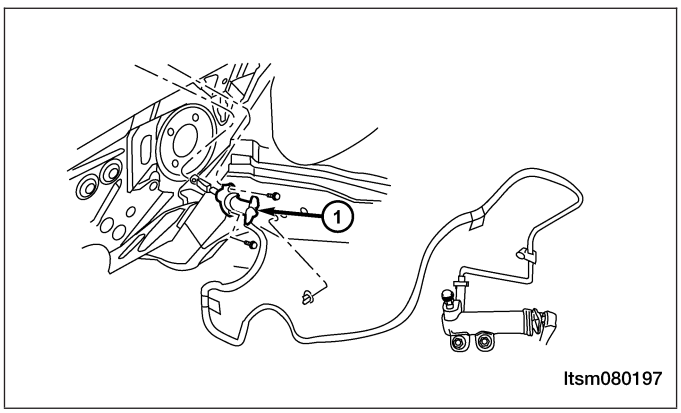


5. Remove hydraulic line from rail retainer.
6. Release master cylinder by rotating to disengage from pedal bracket assembly.

CAUTION:
Use care when removing clutch master cylinder from engine compartment. Aggressive handling can result in a damaged hydraulic line and improper clutch release operation upon reassembly.

CAUTION:
Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surfaces, wash it off immediately with water.

7. Remove the master cylinder assembly (1) from the mounting position and carefully maneuver the hydraulic pipe from the engine compartment.



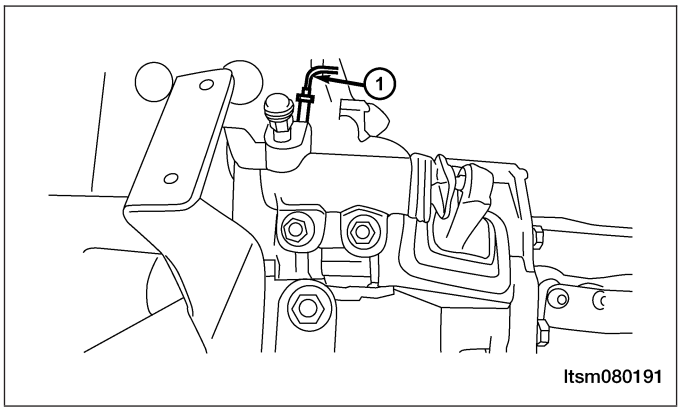
8. Installation is in the reverse order of removal.

Clutch Slave Cylinder

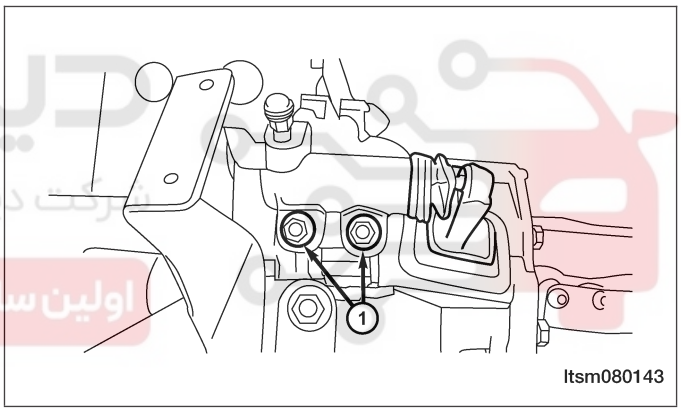
Removal & Installation

NOTE :
After replacing the slave cylinder, it is necessary to make sure brake master cylinder fluid level is full and the reservoir cap is installed tightly.

1. Remove the clutch master cylinder outlet pipe (1) from the clutch slave cylinder.
   (Tighten: Outlet pipe bolt to 17 ± 1 N·m)



2. Remove the clutch slave cylinder bolts (1) from the transaxle housing.
   (Tighten: Clutch slave cylinder bolts to 11 ± 1 N·m)

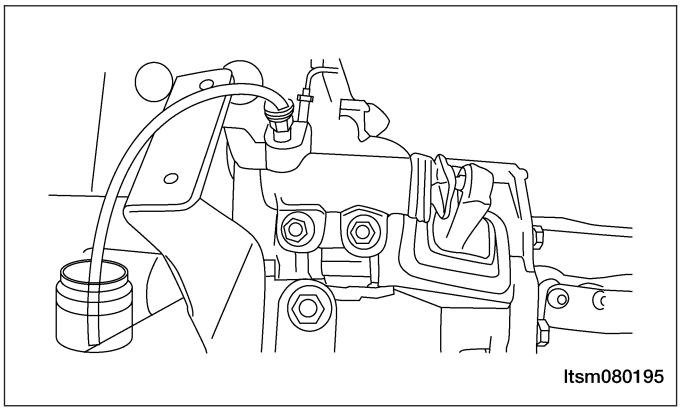


3. Installation is in the reverse order of removal.
4. Bleed the hydraulic clutch (See Bleeding Hydraulic Clutch in Section 08 Transaxle).
   NOTE: Check pipes for leakage of brake fluid.

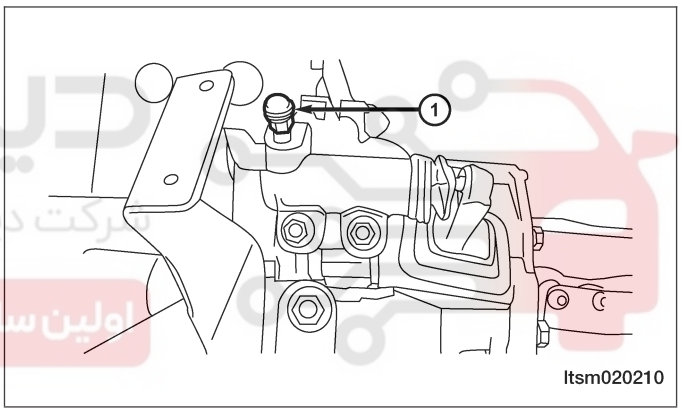
Bleeding Hydraulic Clutch

Operation

1. Verify fluid level in brake master cylinder. Top off with DOT 4 brake fluid as necessary. Leave cap off.



2. Raise the vehicle on hoist.
3. Remove the bleed port protective cap and install a suitable size and length of clear hose to monitor and divert fluid into a suitable container.
4. Loosen the bleed port (1).



5. Actuate the clutch pedal until the brake master cylinder fluid drains from the bleed port.
6. Depress the clutch pedal, tighten the bleed port.
7. From driver's seat, actuate the clutch pedal until the hydraulic clutch system has pressure.
8. Depress the clutch pedal, loosen the bleed port and bleed the brake master cylinder fluid.
9. Repeat steps 6 to 8 several times until there is no air in the hydraulic clutch system.

NOTE :
Do not allow clutch master cylinder to run dry while fluid exits bleed port.

10. Close the hydraulic bleed port, remove the drain hose and replace the dust cap on the bleed port.
11. Top off the brake master cylinder fluid level with DOT 4 brake fluid as necessary.

CAUTION:
During the bleeding process, make sure the brake master cylinder fluid is always full.

TRANSFER CASE (4X4)

GENERAL INFORMATION 08-327
Description 08-327
Operation 08-327

ON-VEHICLE SERVICE 08-328

Transfer Case 08-328
Removal & Installation 08-328

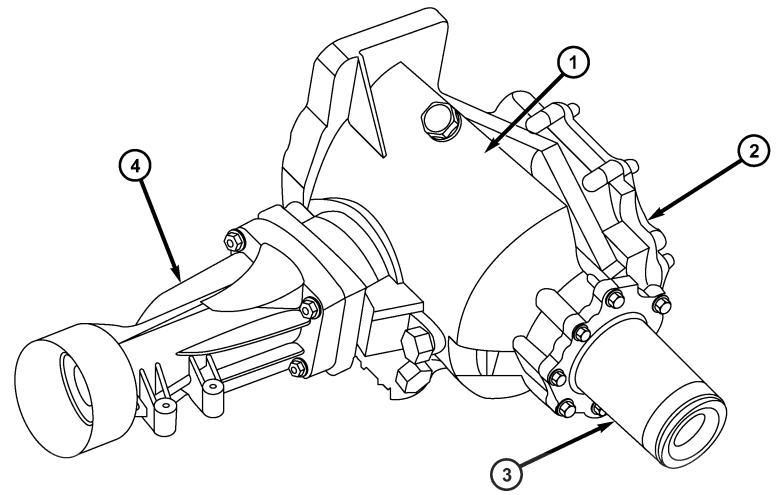
TRANSFER CASE UNIT REPAIR 08-329

Transfer Case 08-329
Disassembly 08-329
Assembly 08-331

GENERAL INFORMATION

Description

Transfer case is attached to the transaxle housing.



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1 - Transaxle Housing	3 - Axle Shaft Guide
2 - Rear Transaxle Cover	4 - Front Different Housing

Operation

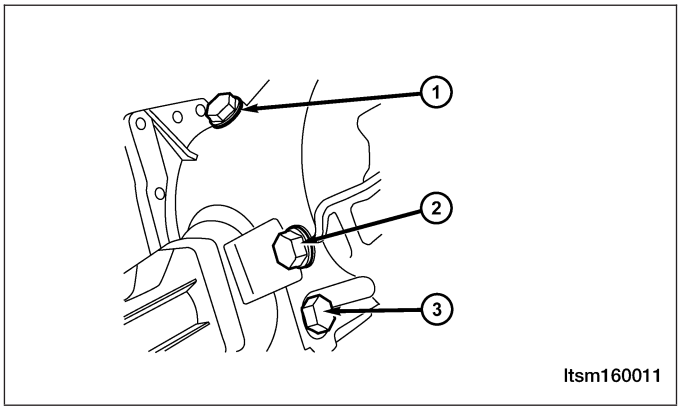
The transfer case transfers the torque output from the transaxle to the ITM controller.

ON-VEHICLE SERVICE

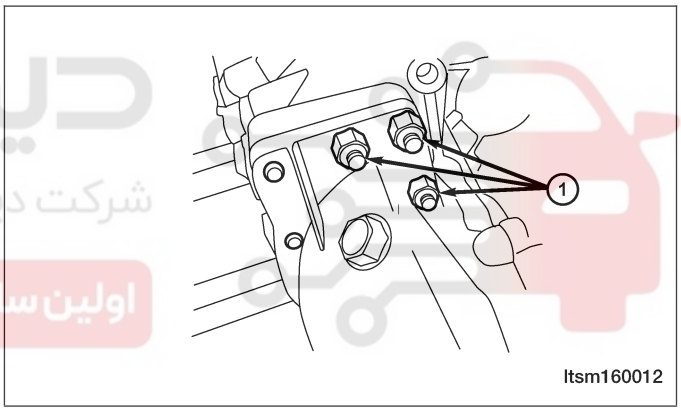
Transfer Case

Removal & Installation

1. Drain the gear fluid from the transfer case.
   - Fluid-filling plug (1)
   - Fluid-limiting plug (2)
   - Fluid-drain plug (3)



2. Remove the front intermediate drive shaft assembly.
3. Remove the sub-frame assembly.
4. Remove the left and right front axle shaft mounting bolts (1).



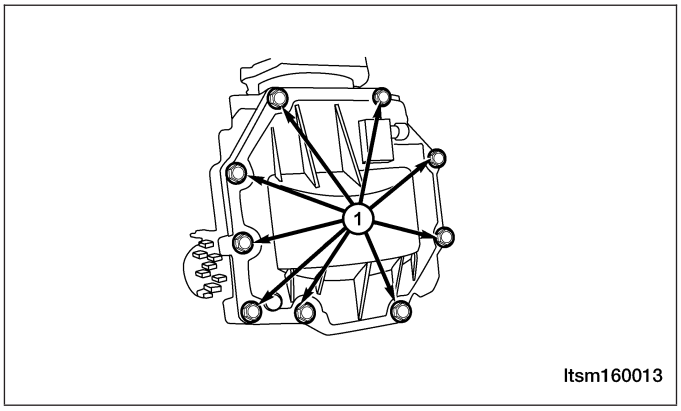
5. Remove the transaxle and transfer case assembly (See Transaxle Assembly Removal & Installation in Section 08 Transaxle).
6. Remove the transfer case from the transaxle (8 bolts). (Tighten: Transaxle and transfer case bolts to 80 N·m)
7. Installation is in the reverse order of removal.

TRANSFER CASE UNIT REPAIR

Transfer Case

Disassembly

1. Remove the front housing. Loosen 9 bolts (1) of the housing, then remove the housing.
(Tighten: Transfer case front housing bolts to 35 N·m)



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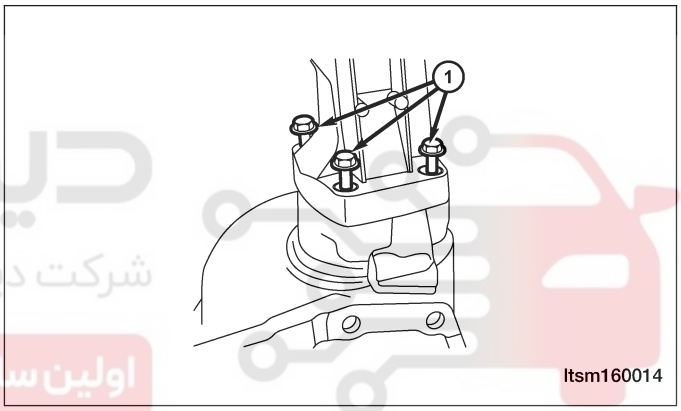
2. Remove the small rear housing components. Loosen the 4 bolts (1) and remove the rear housing components.
(Tighten: Rear intermediate shaft and rear differential bolts to 65 ± 6 N·m)



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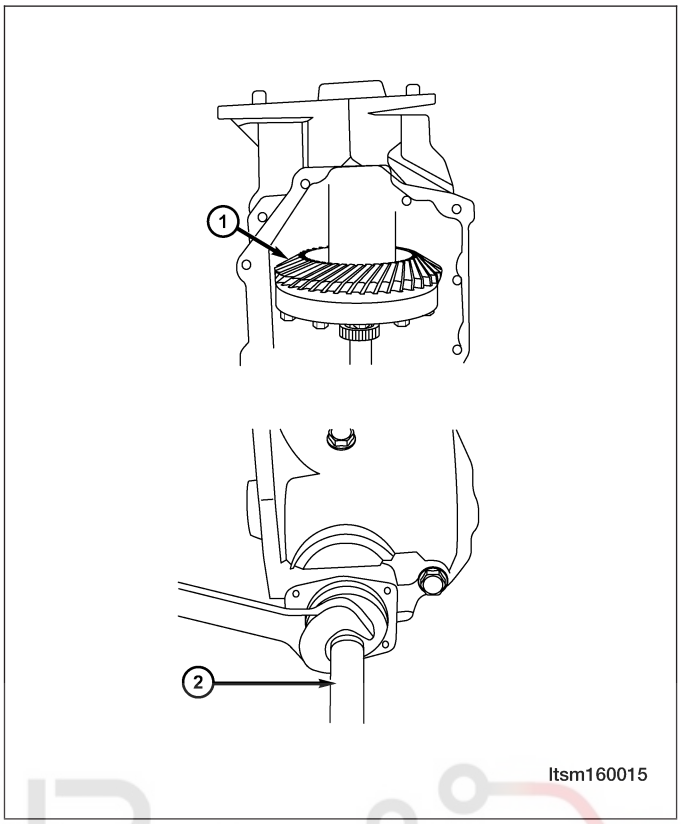
3. Lock up the drive gear (1) and loosen the driven gear axle (2) locking nut.



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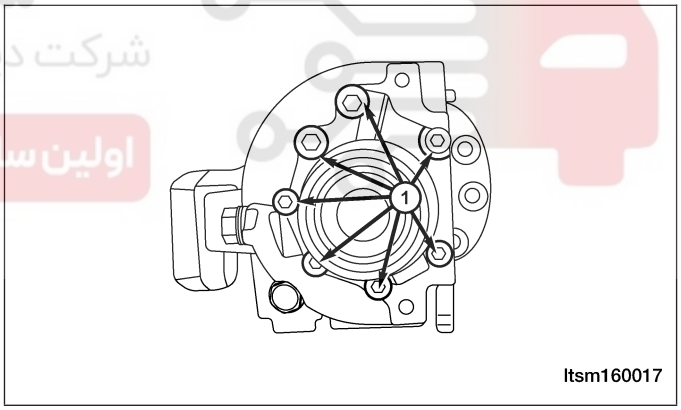
4. Loosen the 7 bolts (1) and remove the right bearing support components.
(Tighten: Transfer case right bearing support bolts to 35 N·m)



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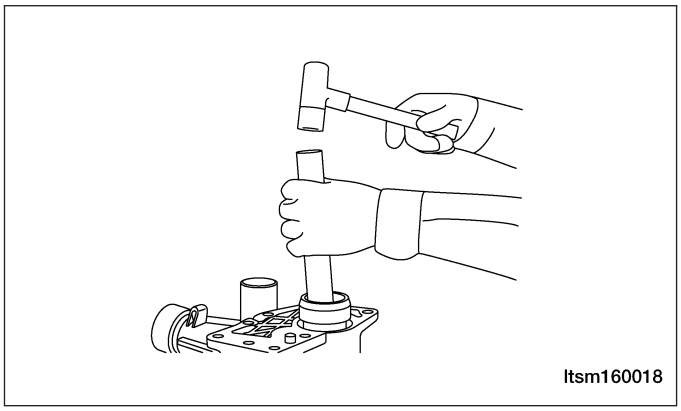
5. Remove the input clutch and the drive gear.
Remove the retainer ring of the input clutch with snap-ring pliers; punch the output end out of the input clutch with a copper punch, and remove the input clutch and the drive gear.



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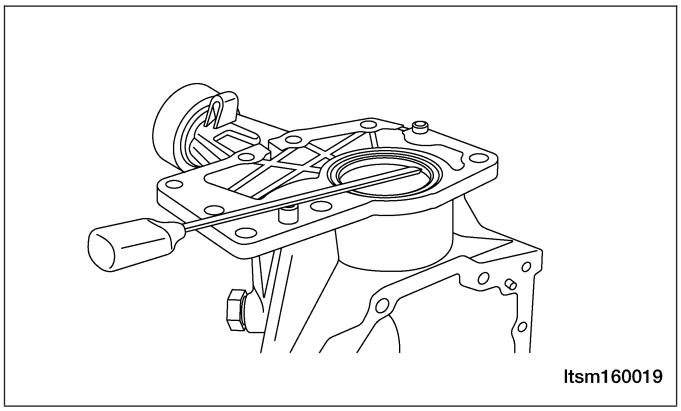
6. Remove the fluid seal of the input clutch.
   Pry out the fluid seal with a slotted screwdriver.



Assembly

1. Put a standard-sized 1.4 mm adjusting shim from the front bearing driven gear axle into the transfer case housing. Press in the front outer bearing race of the driven gear axle, then the rear outer bearing race, and press the front bearing of the driven gear axle into the driven gear axle; then put it into the collar and press in the rear inner bearing race. Attach the locknut, and adjust the tightening torque of the driven gear by adjusting the locknut until the driven gear axle can be driven with a torque of 1.0-1.5 N·m.
2. Assemble the flange axle.
   Link the drive gear ring of the transfer case to the flange axle with a mounting bolt, tighten the bolt to 110 N·m. Install the bearing to the left of the flange axle and the bearing to the left of the right bearing seat.
3. Choose the 2.4 mm standard-sized adjusting shim for the left bearing for the flange axle. Put the adjusting shim for the right bearing for the flange axle, the outer bearing race to the left of the flange axle and the flange axle into the transfer case.
   Measure the distance (A) from the contact surface of the right bearing seat and the transfer case to the right bearing seat and the left bearing's right end surface.
   Measure the distance (B) from the contact surface of the right bearing seat and the transfer case to the place where the right and left bearings on the right bearing seat.
4. Calculate the thickness value of the adjusting gasket S = A - B.
5. Select the adjusting gasket: S + (0.05 - 0.10) mm.
6. Assembly of the right bearing seat.
   Assemble the right bearing to the right bearing seat, install the retainer ring of the right bearing to the right bearing seat, install the fluid seals to the left and right of the right bearing seat, install the O-ring and link the right bearing seat to the transfer case housing with the bolt. Tighten the bolt to 35 N·m. The subassembly should be able to rotate with 3.0-5.0 N·m torque.
7. Adjust the hypoid gear engagement: first, spread red lead powder on the teeth of the driven bevel gear so that there will appear red prints on both working sides of the gear teeth of the driving bevel gear when turning it by hand. If the gear pattern prints on both engaging sides of the drive gear ring is higher than the center of the gear height near to the small end and occupy over 60% of the gear tooth width, then the pattern is correct; and the backlash between various gear teeth should fall between 0.13 mm and 0.18 mm.
   A: If the clearance between one lateral side of a tooth and that of the adjacent tooth are not correct, choose bearing shims to the left and right of the flange axle, repeat procedures 3, 4 and 5 to measure the clearance between one lateral side of a tooth and that of the adjacent tooth on the hypoid gear until the adjustment is correct.
   B: If the gear pattern print leans to the tooth tip, replace the adjusting shim from the front bearing of the driven gear to a thicker 1 mm; If the gear pattern print leans to the tooth root, then get the adjusting shim of the front bearing of driven gear axle needs to be subtracted by 1 mm. Examine the gear pattern print, repeat procedures 3, 4, 5, 6, and 7 until the gear pattern is correct.
8. Assemble the transfer case front shell, and tighten to 35 N·m.
9. Assemble the transfer case small rear housing onto the transfer case, and tighten to 35 N·m.
10. Assemble the input clutch fluid seal, O-ring, retainer ring and the input clutch; install the transfer case onto the transaxle and tighten to 80 N·m.

    NOTE: When assembling bearings and fluid seals, it is necessary to apply lubricating grease. The sealing surface of the housing must have sealant applied.