3.3 Manual Transmission/Transaxle/Cluth

2012 CS35

Table of Contents PAGE

Specifications

Material Specifications

Item	Specifications
Brake fluid (meeting GBGB12981-2003 standard)	HZY4
Transmission oil	MTF94

Component Specifications

Item	Specifications
External diameter of clutch driven disc	200 mm
Clutch driven disc internal diameter	137 mm
Clutch driven disc wear limit	1.7 mm

General Specifications

Item	Specifications
Clutch type	Dry clutch with diaphragm spring

Torque Specifications

Item	Nm	lb-ft	lb-in
Clutch pressure disc retaining bolts	23	17	-

General Procedures

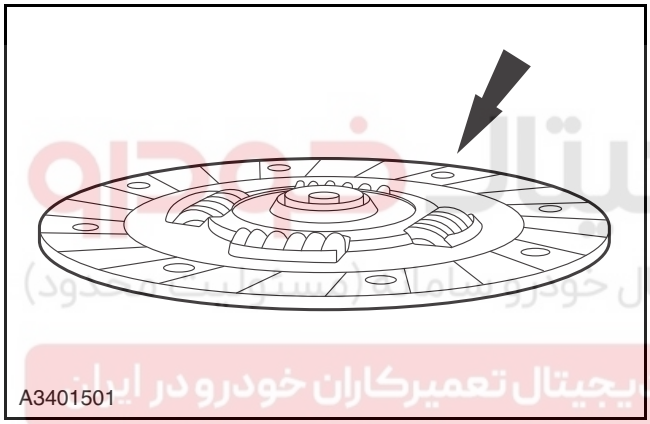
Clutch Driven Disc Inspection

WARNING: Do not use wax base cleaner and solvent to clean the clutch driven disc.

1. Clean the clutch driven disc.
2. Inspect whether the clutch driven disc has:
   - Oil stain
   - Scorch marks
   - Thickness

   Wear limit: 1.7 mm
   - Spring damage

Replace the clutch driven disc as necessary.



A3401501

Clutch Slave Cylinder Inspection

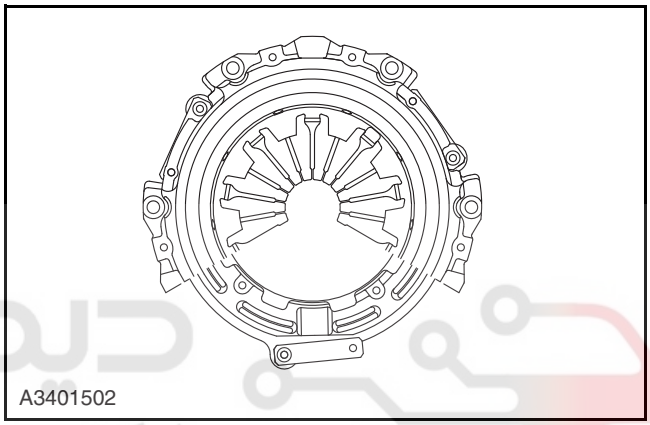
1. Inspect the clutch slave cylinder:
   - Leak
   - Retaining clip

WARNING: Do not clean the clutch pressure disc with wax-based cleaning agents or solvents.

Clutch Pressure Disc Inspection

1. Clean the clutch pressure disc.
2. Inspect the clutch pressure disc:
   - Diaphragm spring flap for damage or wear.
   - Scorch marks
   - Distortion
   - Flat

Replace the clutch pressure disc if necessary.



A3401502

Clutch System Bleeding

General Equipment

Brake fluid collector
Transparent hose

WARNING: Brake fluid includes alcohols and ethers. Keep it away from eyes. After operation in the brake system, clean hands thoroughly. If brake fluid has accidentally splashed into eyes, wash eyes immediately with abundant water for 15 min. If ache remains, go to hospital promptly. If brake fluid has been accidentally swallowed, drink abundant water to disgorge, and go promptly to hospital, or it may hurt body.

WARNING: The brake fluid should be washed away with clean water if it is splashed onto the paintwork.

CAUTION: Add completely clean brake fluid.

CAUTION: Do not reuse brake fluid.

CAUTION: Inspect the brake fluid level at any time in the system bleeding, and add as necessary.

1. Add HZY4 brake fluid up to the upper edge in the reservior.
   - Remove the protective cover of bleeding nozzle, connect transparent hose and connect the other end with brake fluid collector.
   - Depress the clutch pedal slowly and hold it.
   - Open bleeding nozzle. Brake fluid discharges from clutch slave cylinder during exhaust tube.
   - Close bleeding nozzle.
   - Release the clutch pedal and pull it up.
   - Reexhaust until the brake fluid is clean without air bubbles.
2. Exhaust of clutch system.
   - Fasten bleeding nozzle.
   - Remove hose, cover the portective cover.
   - Operate the clutch pedal for 10 times, and pull pedal to the normal release position by hands as necessary.
3. Inspect the brake fluid level.

CAUTION: Add completely clean brake fluid.

   - Keep the brake fluid level between "MIN" and "MAX" marks.
   - Add HZY4 brake fluid as necessary.
4. Cautions:
   - Clutch contol system is self-bleeding type. The layout of assembly can compress and discharge some gas in the system by itself.

CAUTION: Bleed the clutch system with appropriate brake system bleeding equipment.

5. Aspirate excess brake fluid from tank until the level reaches the lowest mark.

CAUTION: Place the fluid reservoir of special tools lower than bleeding nozzle. Install the connecting tube dead against bleeding nozzle.

CAUTION: Add completely clean brake fluid.

CAUTION: Shift the transmission into reverse gear carefully. Confirm clutch working properly.

   - Start the engine, depress the clutch pedal for 2 s; then shift into reverse gear carefully. If there is greater noise in the gearshift, depress the pedal fully for 4 ~ 5 times for self-bleeding.
   - After about 30 s, reinspect the working condition of the clutch. If there is still excessive noise, repeat the bleeding process.

Symptom Diagnosis and Testing

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious mechanical fault.
3. If the fault cause has been found, the problem must be solved before the next step.
4. If there is no obvious cause, refer to the Symptom Chart to verify the concern.
5. Place a 25 mm thick wood block under clutch pedal, and depress the clutch pedal at full stretch. If the transmission can be shifted into 1st and 2nd gear when the engine is running and the parking brake is working, the clutch works regularly. Otherwise, repair the clutch.

Symptom Chart

Symptom	Possible Sources	Action
Clutch slippage	• Clutch pedal free travel • Clutch pedal bonding • Diaphragm spring • Clutch pressure disc • Clutch driven disc assembly • The surface of clutch driven disc is excessively stiff or with oil stain • Flywheel	Refer to: Clutch Dragging Diagnosis (3.3.1 Manual Transimission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).
Clutch chatter or shudder	• Engine bracket • Oil stain of the surface of the driven disc • Diaphragm spring • Clutch pressure disc • Clutch driven disc assembly • Flywheel	Refer to: Clutch Chatter or Shudder Diagnosis (3.3.1 Manual Transmission/ Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).
Clutch dragging	• Insufficient brake fluid • Air in the hydraulic system • Clutch pedal free travel • Diaphragm spring • Clutch driven disc • Clutch driven disc assembly • Oil stain of the surface of the driven disc • Guide bearing	Refer to: Clutch Dragging Diagnosis (3.3.1 Manual Transimission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).
Clutch pedal pulsation	• Poor lubrication between clutch and brake pedal shaft • Flywheel • Fatigue of pressure disc spring	Refer to: Clutch Pedal Pulsation Diagnosis (3.3.1 Manual Transimission/ Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).

Symptom	Possible Sources	Action
Clutch vibration	• Engine components in contact with frame • Driving belt • Flywheel bolt • Flywheel • Unbalance of the clutch pressure disc	Refer to: Clutch Vibration Diagnosis (3.3.1 Manual Transimission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).
Difficult gearshift	• Insufficient brake fluid • Clutch pedal free travel • Manual transmission transaxle fault	Refer to: Difficult Gearshift Diagnosis (3.3.1 Manual Transimission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).
Excessive noise	• Clutch pedal free travel • Clutch release bearing • Poor lubrication of the clutch release bearing • Guide bearing • Excessive crankshaft axial clearance	Refer to: Excessive Noise Diagnosis (3.3.1 Manual Transimission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).
Fluid leakage	• Clutch master cylinder • Clutch slave cylinder • Hydraulic tube of clutch	Refer to: Fluid Leakage Diagnosis (3.3.1 Manual Transimission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).

Symptom	Possible Sources	Action
Guack-guack noise of clutch	• Inspect whether the return spring is too soft	• Replace the clutch pressure disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**
	• Inspect whether there is any oil on the driven disc	• Exclude the cause of engine oil leak, and replace driven disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**
	• Inspect whether damping spring of driven disc is damaged	• Replace the driven disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**

Symptom	Possible Sources	Action
Clutch seized (pedal is difficult to push)	• Incorrect hydraulic oil	• Inspect whether master cylinder oil is correct. • If hydraulic oil is incorrect, replace clutch master cylinder and working cylinder, wash hydraulic system and fill correct oil.
	• The hydraulic oil is polluted	• Inspect whether there is water in the hydraulic oil. • Inspect whether there are dust or chipping and scraping in hydraulic oil. • Inspect whether the clutch is polluted by uncorrect engine oil. If it's polluted, replace clutch master cylinder and working cylinder. If it polluted, replace the clutch master cylinder and slave cylinder. • Wash the hydraulic system and fill the correct oil.
	• Clutch hydraulic hose twisted or damaged	• Inspect whether hydraulic hose is twisted or damaged. • Repair and replace clutch hydraulic hose.
	• Clutch disc is worn too thin	• Replace the clutch assembly. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**

Symptom	Possible Sources	Action
Out of gear	• Gearshift control mechanism	• Adjust gearshift control mechanism, replace it as necessary. **Refer to: Gearshift Mechanism (3.3.4 Manual Transmission External Control, Removal and Installation).**
	• Self-locking mechanism • Synchronizer assembly • Gearshift mechanism	• Adjust or replace it. **Refer to: Disassembly of transmission (3.3.3 Manual Transmission, Disassembly and Assembly).**
	• Transmission or engine support	• Repair or replace the transmission or engine support.
Abnormal sound is heard while driving.	• Gear wheel • Input shaft bearing • Output shaft bearing • Differential bearing • Differential gear • Gear bearing • Clutch • Wheel bearing • Tire • Air leak • Universal joint	**Refer to: Abnormal Sound While Driving Diagnosis (3.3.1 Manual Transimission/ Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).**

Clutch Slippage Diagnosis

Test conditions	Details/Results/Actions
1. Verify the symptom	
	A.Inspect wheel and apply parking brake. B.Turn the ignition switch to "START" position. C.Depress the brake pedal. D.Start engine, shift transmission into fourth gear. E.Operate the engine at the speed of 2,000 rpm. F.Release the clutch pedal slowly. Does the engine misfire when the clutch pedal released completely? **Y** The clutch is normal. **N** Go to step 2.
2. Inspect the clutch pedal free travel	
	A.Press the clutch pedal with hands until feeling resistance. B.Inspect the pedal travel. Is the measured dimension less than 120 mm? **Y** Go to step 3. **N** Adjust the clutch pedal stroke or bleed air on the hydraulic system.
3. Clutch pedal maneuverability	
	A.Inspect the lubrication. Is the lubrication of clutch pedal shaft good? **Y** Go to step 4. **N** Lubricate the clutch pedal shaft.
4. Inspect whether clutch system fluid is polluted	
	A.Remove the transaxle. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect the clutch system for oil leak pollution. Is the clutch system polluted by oil leak? **Y** Repair the oil leak. **N** Go to step 5.

Test conditions	Details/Results/Actions
5.Inspect the clutch driven disc	
	A.Remove the transaxle. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect whether the driven disc has oil stain and is stiff or damaged, and inspect the thickness of the driven disc. **Refer to: Clutch Driven Disc Inspection (3.3.1 Manual Transmission/Transaxle, Clutch - General Information, General Procedures).** Inspect whether the clutch driven disc is normal? **Y** Go to step 6. **N** Replace a new clutch driven disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**
6. Inspect the flywheel	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect whether the flywheel appearances blue, has notch wear, or there is cracks on combined section. C.Inspect the face runout of the flywheel. If the flywheel is normal? **Y** Replace the clutch pressure disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).** **N** Repair or replace the flywheel. **Refer to: Main Bushing/Crankshaft and Cylinder (3.1.2 Mechanical System, Disassembly and Assembly).**

Clutch Chatter or Shudder Diagnosis

Test conditions	Details/Results/Actions
1. Inspect the clutch chatter and shudder	
	A.Turn the ignition switch to "START" position. B.Start the engine and shift the transmission into first gear. C.Operate the engine at speed range of 1,200 ~ 1,500 rpm. D.Release the clutch pedal slowly. Does the vehicle shudder at start? **Y** Go to step 2. **N** The clutch is normal.
2. Inspect the shock insulators and roll cage of the engine/transaxle	
	A.Inspect damages or bolt loose of the shock insulators and roll cages of the engine/transaxle. Are shock insulators and roll cages of the engine/transaxle loosed or damaged? **Y** Tighten or replace bolt if necessary. **N** Go to step 3.
3. Inspect the clutch pressure disc	
	A.Remove the clutch pressure disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).** Is there any wear on the clutch pressure disc? **Y** Install a new clutch pressure disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).** **N** Go to step 4.

Test conditions	Details/Results/Actions
4.Inspect the clutch driven disc	
	A.Inspect the clutch driven disc visually. **Refer to: Clutch Driven Disc Inspection (3.3.1 Manual Transmission/Transaxle, Clutch - General Information, General Procedures).** Does the clutch driven disc have any oil stain or scorch marks? **Y** Replace the clutch driven disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).** **N** Inspect the flywheel. **Refer to: Main Bushing/Crankshaft and Cylinder (3.1.2 Mechanical System, Disassembly and Assembly).**

Clutch Dragging Diagnosis

Test conditions	Details/Results/Actions
1. General inspection ⚠ CAUTION: Clutch fluid is from the brake master cylinder.	
	A.Inspect the brake fluid level, colour and smell. B.Inspect whether the clutch control oil pipe leak. Inspect whether the brake fluid and control mechanism are normal? **Y** Go to step 2. **N** Repair the fault, add or replace brake fluid.
2. Inspect the clutch pedal free travel	
	A.Inspect damages or bolt loose of the shock insulators and roll cages of the engine/transaxle. B.Measure the pedal travel. Is the measured result less than 120 mm? **Y** Go to step 3. **N** Repair the pedal fault.
3. Inspect the support backing ring of the clutch pressure disc diaphragm spring	
	A.Remove the transaxle. Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation). Are there any wear signs of the clutch pressure disc or diaphragm spring support backing ring? **Y** Install a new clutch pressure disc. Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation). **N** Go to step 4.

Test conditions	Details/Results/Actions
4. Inspect the splines of clutch driven disc and transmission input shaft	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect the splines of clutch driven disc and transmission input shaft. Are the clutch splines and the transmission input shaft spline normal? **Y** Go to step 5. **N** Repair or replace the clutch driven disc or input shaft. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).**
5. Inspect the guide bearing	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect the guide bearing. Is the guide bearing normal? **Y** Remove and dismantle to repair the transmission. **Refer to: Disassembly of Transmission (3.3.3 Manual Transmission, Disassembly and Assembly).** **N** Replace the guide bearing. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Disassembly and Assembly).**

Clutch Pedal Pulsation Diagnosis

Test conditions	Details/Results/Actions
1. Inspect the clutch pedal	
	A.Inspect the lubrication of clutch pedal mechanism. Is the lubrication of clutch pedal shaft good? Y Go to step 2. N Lubricate the clutch pedal shaft.
2. Inspect the clutch pressure disc	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect the face runout of the clutch pressure disc. C.Inspect the wear level of the clutch pressure disc release lever. Is the clutch pressure disc normal? **Y** Go to step 3. **N** Replace the clutch pressure disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**
3. Inspect the flywheel	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect the face runout of flywheel. C.Inspect whether the flywheel surface is cracking, blued or worn. If the flywheel is normal? **Y** Go to step 4. **N** Replace the flywheel. **Refer to: Main Bushing/Crankshaft and Cylinder (3.1.2 Mechanical System, Disassembly and Assembly).**

Test conditions	Details/Results/Actions
4.Inspect the clutch driven disc	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect whether the driven disc is stiff or distorted, and whether the thickness reaches the limit. C.Inspect the face runout of the clutch driven disc. Inspect whether clutch driven disc is normal? **Y** Replace the clutch release bearing. **Refer to: Clutch Driven Disc Assembly and pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).** **N** Replace the clutch driven disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**

Clutch Vibration Diagnosis

Test conditions	Details/Results/Actions
1. Inspect the interference between engine and vehicle body	
	A.Lift the vehicle. **Refer to: Lifting (1.1.3 Traction and Lifting, Description and Operation).** B.Inspect whether there is interference between linkage mechanism stalled in engine and vehicle body or frame. C.Inspect the bleed manifold or other engine components in interference with the vehicle body or frame. Is there any interference with the vehicle body or the frame? **Y** Repair, and replace when necessary. **N** Go to step 2.
2. Inspect the vibration caused by accessory drive	
	A.If the engine torque changes, inspect the accessory vibration when the clutch is released or combined. B.Loosen the accessory transmission belt to inspect the vibration. Does the vibration stop when the accessory transmission belt is removed? **Y** Repair or replace the accessory transmission belt. **Refer to: Accessory Drive Belt (3.1.2 Mechanical system, Removal and Installation).** **N** Go to step 3.
3.Inspect the noise of the release bearing	
	A.Turn the ignition switch to "START" position. B.Depress the clutch pedal and hold it. Is there any harsh grating? **Y** Replace the clutch slave cylinder. **N** Go to step 4.

Test conditions	Details/Results/Actions
4. Inspect the clutch pressure disc	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect the face runout of the clutch pressure disc. C.Inspect the wear level of the clutch pressure disc release lever. Is the clutch pressure disc normal? **Y** Go to step 5. **N** Replace the clutch pressure disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**
5.Inspect the clutch driven disc	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect whether the driven disc is stiff or distorted, and whether the thickness reaches the limit. C.Inspect the face runout of the clutch driven disc. Inspect whether the clutch driven disc is normal? **Y** Go to step 6. **N** Replace the clutch driven disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).**

Test conditions	Details/Results/Actions
6. Inspect the flywheel	
	A.Remove the transaxle. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect whether the flywheel bolts loosen. C.Inspect the loss of flywheel roundness. D.Inspect the face runout of the flywheel. If the flywheel is normal? **Y** Diagnose the engine vibration fault. **N** Fasten or replace the flywheel. **Refer to: Main Bushing/Crankshaft and Cylinder (3.1.2 Mechanical System, Disassembly and Assembly).**

Difficult Gearshift Diagnosis

Test conditions	Details/Results/Actions
1. Inspect the clutch system ⚠ **CAUTION: Clutch fluid is from brake master cylinder.**	
	A.Inspect whether the clutch system is completely released, combines reliably. **Refer to: Clutch Dragging Diagnosis (3.3.1 Manual Transimission/Transaxle, Clutch, Symptom Diagnosis and Testing).** Inspect whether the clutch system is normal? **Y** Go to step 2. **N** Repair the clutch system.
2.Inspect the gearshift control mechanism	
	A.Inspect the gearshift control mechanism. Is the gearshift control mechanism normal? Y Go to step 3. N Adjust or replace the gearshift mechanism. **Refer to: Gearshift Mechanism (3.3.4 Manual Transmission/Transaxle - External Control).**
3.Inspect the interior gearshift fork, fork shaft and synchronizer assembly, self-locking mechanism	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Disassemble the transmission. **Refer to: (3.3.3 Manual Transmission, Disassembly and Assembly).** C.Inspect whether the gearshift fork and fork shaft are normal. D.Inspect whether synchronizer assembly is normal. E.Inspect the self-lock mechanism. Inspect whether the interior gearshift fork, the fork shaft, the synchronizer assembly, and the self-lock mechanism are normal? **Y** Replace the engine or transmission supports. **N** Repair the interior fault of the transmission.

Excessive Noise Diagnosis

Test Conditions	Details/Results/Actions
1.General inspection	
	A.Inspect whether there is any craking, loss, and damage engine and transmission supports. B.Inspect whether transmission interferes with exhaust pipes or vehicle body, and whether transimission support has foreign material, such as stones. Is it normal? **Y** Go to step 2. **N** Repair the fault part.
2. Inspect the noise in the releasing infancy of the clutch	
	A.Start the engine. B.Depress the clutch pedal softly, but not to the bottom. Is there any noise? **Y** Replace the clutch release bearing. **N** Go to step 3.
3.Inspect the noise when the clutch is completely released	
	A.Start the engine. B.Depress the clutch pedal to the bottom. C.Control the accelerate pedal to change the engine speed. Is there any noise when the speed is changing? **Y** Replace the guide bearing. **N** Go to step 4.

Test Conditions	Details/Results/Actions
4. Inspect the noise when the clutch is combined	
	A.Remove the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation).** B.Inspect the wear of the torsion spring. Is there any wear signs? **Y** Install a new clutch driven disc. **Refer to: Clutch Driven Disc Assembly and Pressure Disc Assembly (3.3.2 Clutch, Removal and Installation).** **N** Go to step 5.
5. Inspect the noises at neutral and other positions **WARNING: Two people carry out the road test together to avoid the personnel injury due to misoperation and make sure the safe driving. Be sure to control steering wheel properly. Failure to follow these instructions may result in personal injury.**	
	A.Turn the ignition switch to "START" position. B.Start the engine at neutral gear. C.Inspect noises at neutral or other gears. Is there any noise of the transmission? **Y** Inspect and repair the transmission. **Refer to: Manual Transmission (3.3.3 Manual Transmission, Removal and Installation); (3.3.3 Manual Transmission, Disassembly and Assembly).** **N** Inspect the engine system noises. **Refer to: Abnormal Interior Noises Under the Engine Diagnosis (3.1.2 Mechanical System, Symptom Diagnosis and Testing).**

Oil Leakage Diagnosis

Test conditions	Details/Results/Actions
1. Inspect the clutch master cylinder	
	A.Inspect the oil leakage of the clutch master cylinder. Is the clutch master normal? **Y** Go to step 2. **N** Repair, and replace the clutch master cylinder when necessary.
2.Inspect the clutch slave cylinder	
	A.Inspect the oil leakage of the clutch slave cylinder. Is the clutch slave cylinder normal? **Y** Go to step 3. **N** Repair, and replace the clutch master cylinder when necessary.
3. Inspect the system oil pipe	
	A.Inspect the leakage caused by clutch pipe looseness or damage. Are the clutch oil pipes normal? **Y** Road test to verify the customer complaint. **N** Repair, and replace new components before a road test.

Abnormal Driving Noise Diagnosis

Test Conditions	Details/Results/Actions
1.General inspection	
	A.Lift the vehicle. **Refer to: Lifting (1.1.3 Traction and Lifting, Description and Operation).** B.Inspect the wheel tire pressure, the tire tread wear and the tire type. C.Inspect the retaining bolt of the suspension, the connection rubber bushing and the ball head. D.Inspect whether the universal joint is loose. Is it normal? **Y** Go to step 2. **N** Repair or replace the failed component.
2. Inspect the wind noise **WARNING: Two people carry out the road test together to avoid the personnel injury due to misoperation and make sure the safe driving. Be sure to control steering wheel properly. Failure to follow these instructions may result in personal injury.**	
	A.Carry out the vehicle road test. B.Inspect the wind noises following the speed change. Is there any wind noise changing with the speed? **Y** Repair fault of wind noises. **N** Go to step 3.
3. Inspect the clutch system	
	A.Start the engine, and keep it at the neutral position. B.Operate the clutch, and inspect whether there are abnormal noises at the combination or release of the clutch. Is the clutch normal? **Y** Go to step 4. **N** Repair, and replace new components before a road test.

Test Conditions	Details/Results/Actions
4. Inspect the transmission **WARNING: Two people carry out the road test together to avoid the personnel injury due to misoperation and make sure the safe driving. Be sure to control steering wheel properly. Failure to follow these instructions may result in personal injury.**	
	A.Carry out the vehicle road test. B.Inspect whether there is any impact noise of gear wheel when shifting. C.Inspect whether there is any abnormal noise at each gear. Is the transmission normal? **Y** **Refer to: Noise Diagnosis (1.1.5 Noise, Vibration and Harshness).** **N** Repair the transmission. **Refer to: (3.3.3 Manual Transmission, Disassembly and Assembly).**

Specifications

Material Specifications

Item	Specifications
Brake fluid (meeting GBGB12981-2003 standard)	HZY4

Component Specifications

Item	Specifications
Clutch driven disc external diameter	200 mm
Clutch driven disc internal diameter	137 mm
Clutch driven disc wear limit	1.7 mm

General Specifications

Item	Specifications
Clutch type	Dry clutch with diaphragm spring
Operation type	Hydraulic type

Torque Specifications

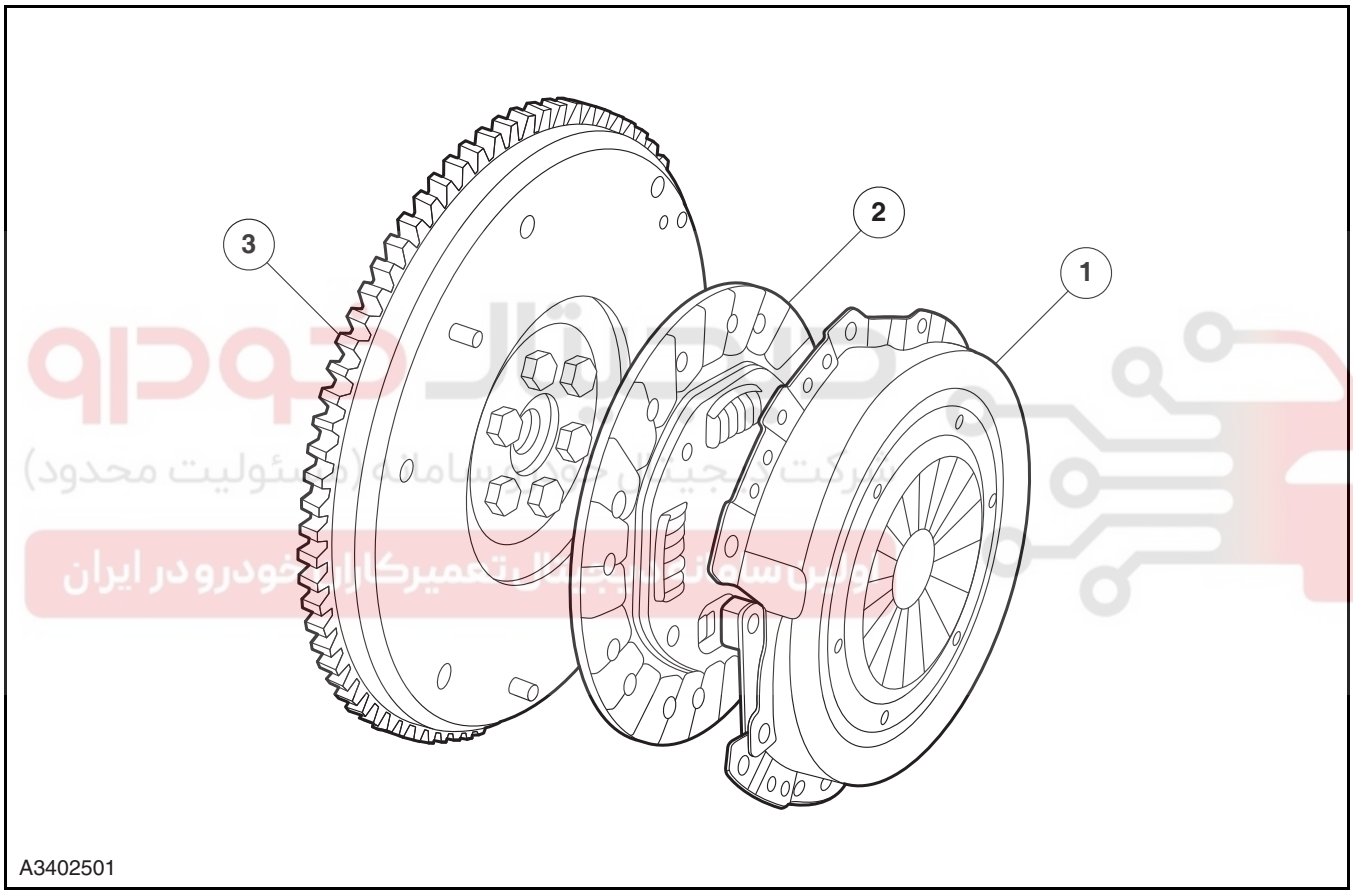
Item	Nm	lb-ft	lb-in
Clutch pressure disc retaining bolt	23	17	-
Clutch master cylinder retaining bolt	15	11	-
Clutch slave cylinder retaining bolt	22	16	-

Description and Operation

System Overview

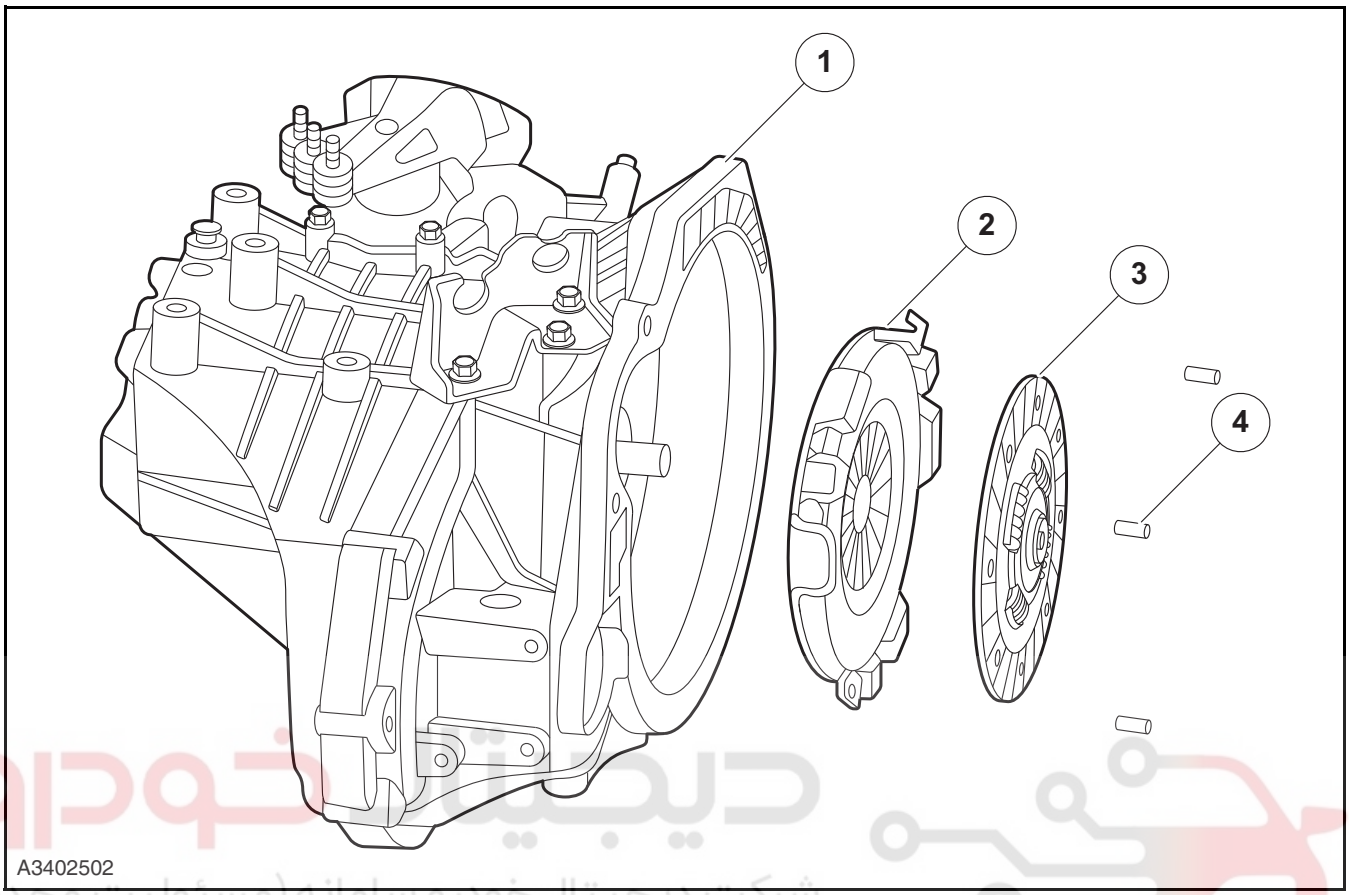
The clutch includes one clutch driven disc assembly and one pressure disc assembly fixed with the flywheel. In the normal working condition, the clutch driven disc assembly, under the pressure of the clutch pressure disc assembly, transfers the engine power to the transmission assembly through the flywheel ring gear assembly connection.

When the clutch pedal is depressed completely, the clutch driven disc assembly is separated from the clutch pressure disc assembly, and the clutch driven disc assembly can't transfer the engine power to the transmission assembly; When the pedal is completely released, the clutch pressure disc assembly compresses the clutch driven disc assembly, and the clutch driven disc assembly transfers the engine power to the transmission assembly.



Item	Description	Item	Description
1	Clutch pressure disc	3	Flywheel assembly
2	Clutch driven disc		

Exploded View



Item	Description	Qty.	Item	Description	Qty.
1	Transmission assembly	1	3	Clutch friction lining assembly	1
2	Clutch pressure disc assembly	1	4	pressure disc alignment pin	1

Symptom Diagnosis and Testing

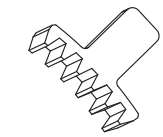
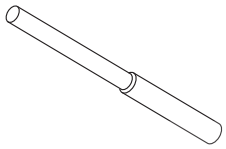
Refer to: Symptom Chart (3.3.1 Manual Transmission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).

Removal and Installation

Clutch Slave Driven Disc Assembly and Pressure Disc Assembly

Removal

Special tool

 CA301-028	Flywheel Locking Tool CA301-028
 CA301-024	Friction Disk Installing Shaft CA301-024

1. Disconnect the battery negative cable.

   Refer to: Battery (3.1.10 Charging System, Removal and Installation).

2. Remove the manual transmission assembly.

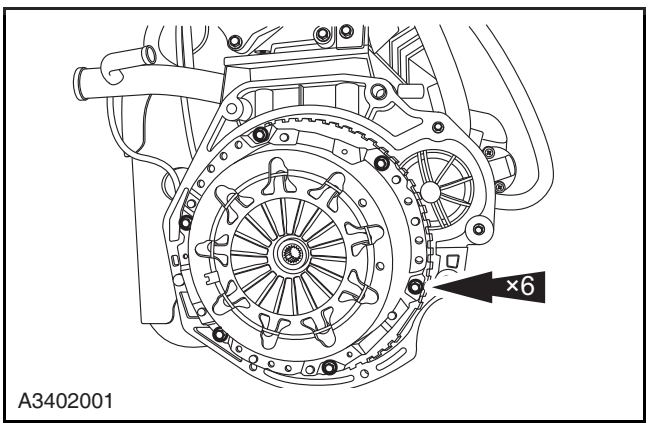
   Refer to: Manual Transmission Assembly (3.3.3 Manual Transmission, Removal and Installation).

3. Remove the clutch pressure disc and the slave driven plate assembly.

   1. Fix the flywheel assembly using special tools.

   Special Tool: CA301-028

   2. Remove 6 retaining bolts of the clutch pressure disc and the friction disc.



A3402001

Installation

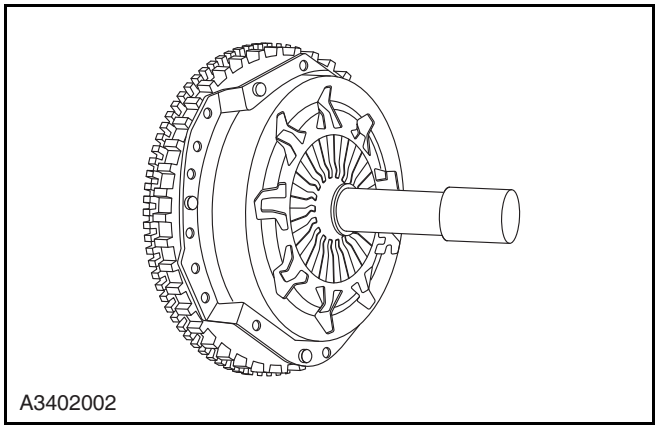
1. Inspect the contact surface of the flywheel and the friction disc.
2. Install the clutch pressure disc and the friction disc assembly.

   1. Fix the clutch friction disk using special tools.

   Special tool: CA301-024

   2. Install 6 retaining bolts of the clutch pressure disc and the friction disk.

   Torque: 23 Nm
3. Install the transmission assembly.
4. Install the battery.



A3402002

Specifications

General Specifications

Item	Specifications
Model	TM155FMB
Operation type	Single-disc, dry type
Transmission oil model	Castrol BOT 130 M
Transmission fuel filling capacity	1.7 ~ 1.9 L
First gear speed ratio	3.462
Second gear speed ratio	1.913
Third gear speed ratio	1.258
Fourth gear speed ratio	0.943
Fifth gear speed ratio	0.763
Reverse gear speed ratio	3.231
Final drive ratio	4.158

Torque Specifications

Item	Nm	lb-ft	lb-in
First and second gear retaining bolt	13	10	-
Reverse gear shift fork bolt	13	10	-
Fifth gearshift fork bolt	13	10	-
Speedometer mounting bolt	6	-	53
Reverse gear shaft bolt	13	10	-
Bearing pressure disc bolt	10	-	89
Intermediate shaft and input shaft nut	70	52	-
Closing bolt	22	16	-
Reverse lamp switch assembly	18	13	-
Oil filling plug	20	15	-
Oil drain plug	20	15	-
Gearshift box bolt	9	-	80
Left box cover bolt	22	16	-
Third/fourth gear retaining bolt	18	13	-
Release bearing mounting bolt M6×1.0×20	9	-	80
Cable support mounting bolt	22	16	-

Description and Operation

System Overview

Transmission TM155FMB is a mechanical transmission. It is a full-synchronization manual mechanical transmission with three synchronizer and three drive shafts (input shaft, intermediate shaft and reverse gear shaft), providing five forward gears and one reverse gear. All forward gears are normally mesh and the reverse gear is slide idle gear. The low speed synchronizer is installed on the intermediate shaft and the linkage with the first and second gear. The high speed synchronizer is installed on the input shaft and the linkage with the third and fourth gear. The fifth synchronizer of the input shaft is meshed with the fifth gear of the input shaft. The intermediate shaft drives the main reduction gear and differential device for driving the front drive shaft connected with the front wheel. For maintenance, seal gel or similar contents must be applied on the transmission aluminum house surface. Tighten the house retaining bolt by the torque wrench to the specified torque. In addition, clean all the parts with cleaning agent or fluid and dry air completely, which is important.

The appropriate speed of each forward gear of TM155FMB transmission:

Gear	First gear	Second gear	Third gear	Fourth gear	Fifth gear
km/h	10 ~ 40	20 ~ 70	30 ~ 100	40 ~ 130	50 ~ 170

CAUTION: The gear should be shifted within the speed range.

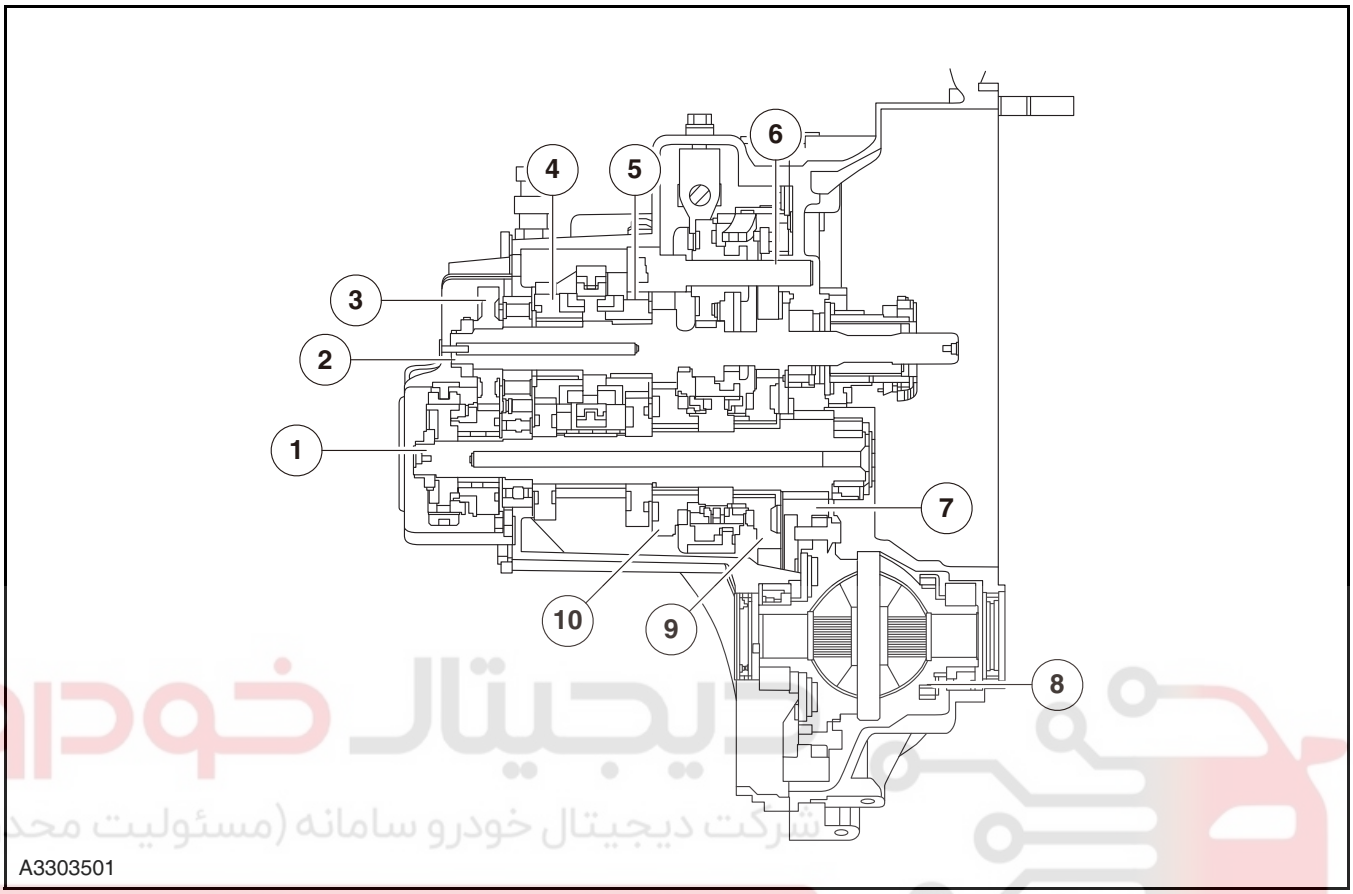
Gearshift Principle

As the vehicle is moving forward, you shall shift as following: the acceleration shift should be increased from the first gear to fifth gear gradually while deceleration shift should be reduced from the fifth gear to first gear; it is forbidden to shift into the reverse gear when moving forward. The transmission is equipped with reverse lock to avoid shifting from fifth gear to reverse gear by mistake in gearshift. In principle, the reverse gear should be shifted when the vehicle is still; don't shift into the reverse gear when the vehicle is moving forward and don't shift into the forward gear when the vehicle is reversing.

CAUTION: The gearshift principle of the transmission can be ignored in emergency when driving.

Location View

Transmission Structure Chart

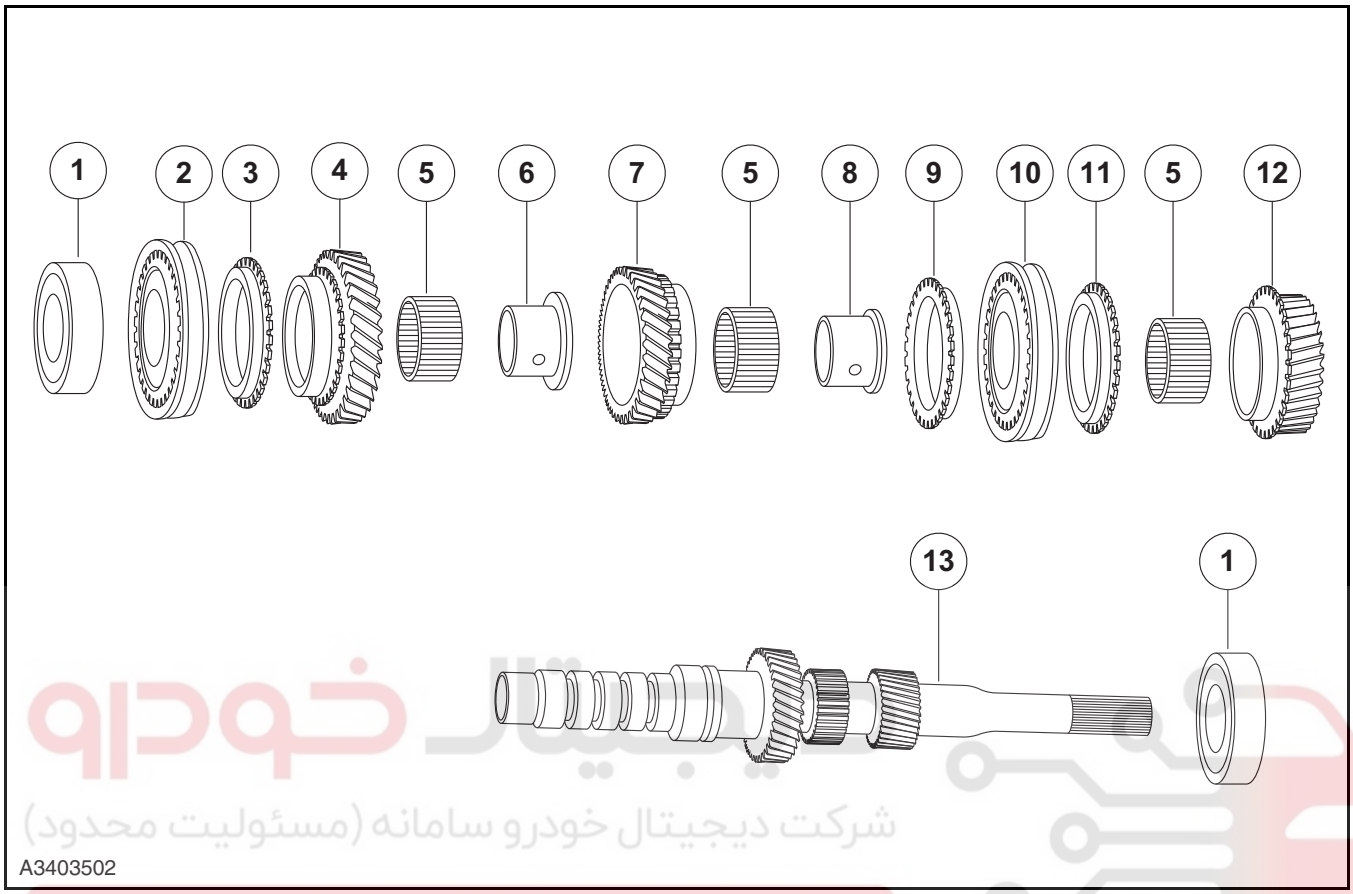


A3303501

Item	Description	Item	Description
1	Output shaft	6	Reverse shaft
2	Input shaft	7	Main deceleration gear
3	Fifth gear	8	Differential
4	Fourth gear	9	First gear
5	Third gear	10	Second gear

Exploded View

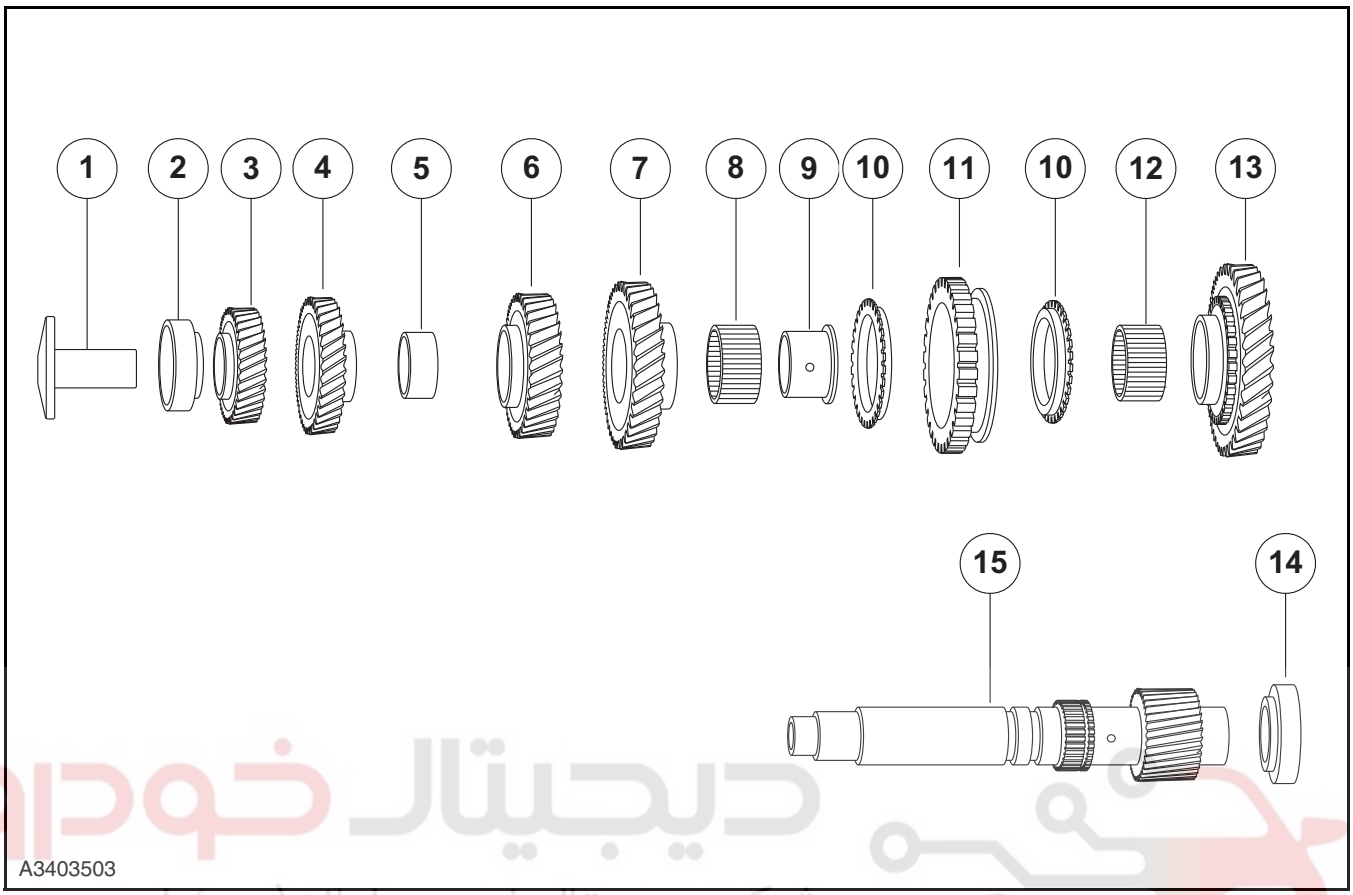
1. Input Shaft Component



A3403502

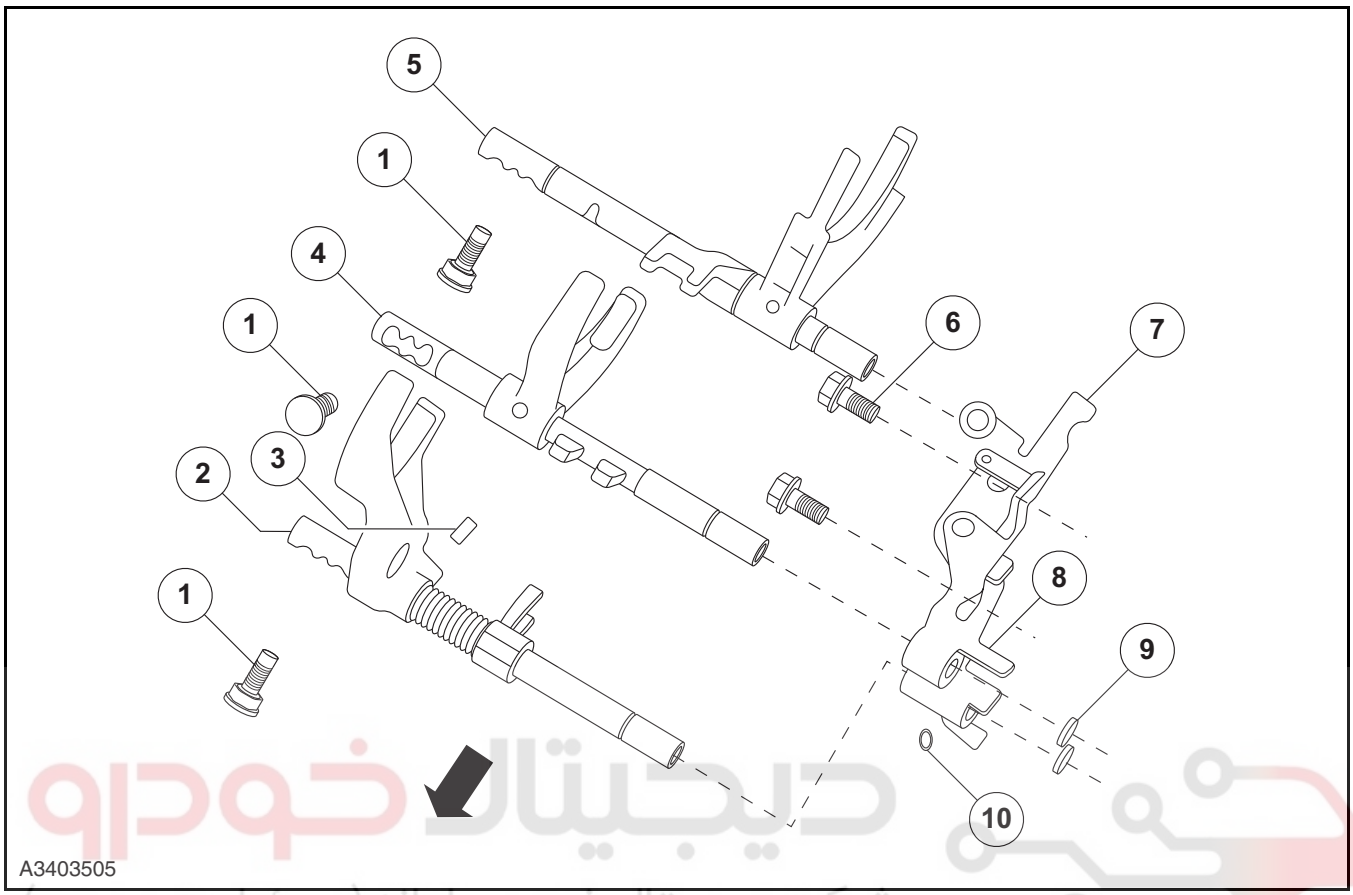
Item	Description	Qty.	Item	Description	Qty.
1	Input shaft bearing	2	8	Fourth gear shaft bushing	1
2	Fifth gear synchronizer component	1	9	Fourth gear synchronizer gear ring	1
3	Fifth gear synchronizer gear ring	1	10	High-speed synchronizer component	1
4	Input shaft fifth gear assembly	1	11	Third gear synchronizer gear ring	1
5	Needle bearing	3	12	Input shaft third gear assembly	1
6	Fifth-gear shaft bushing	1	13	Input shaft	1
7	Input shaft fourth gear assembly	1			

2. Intermediate Shaft Component



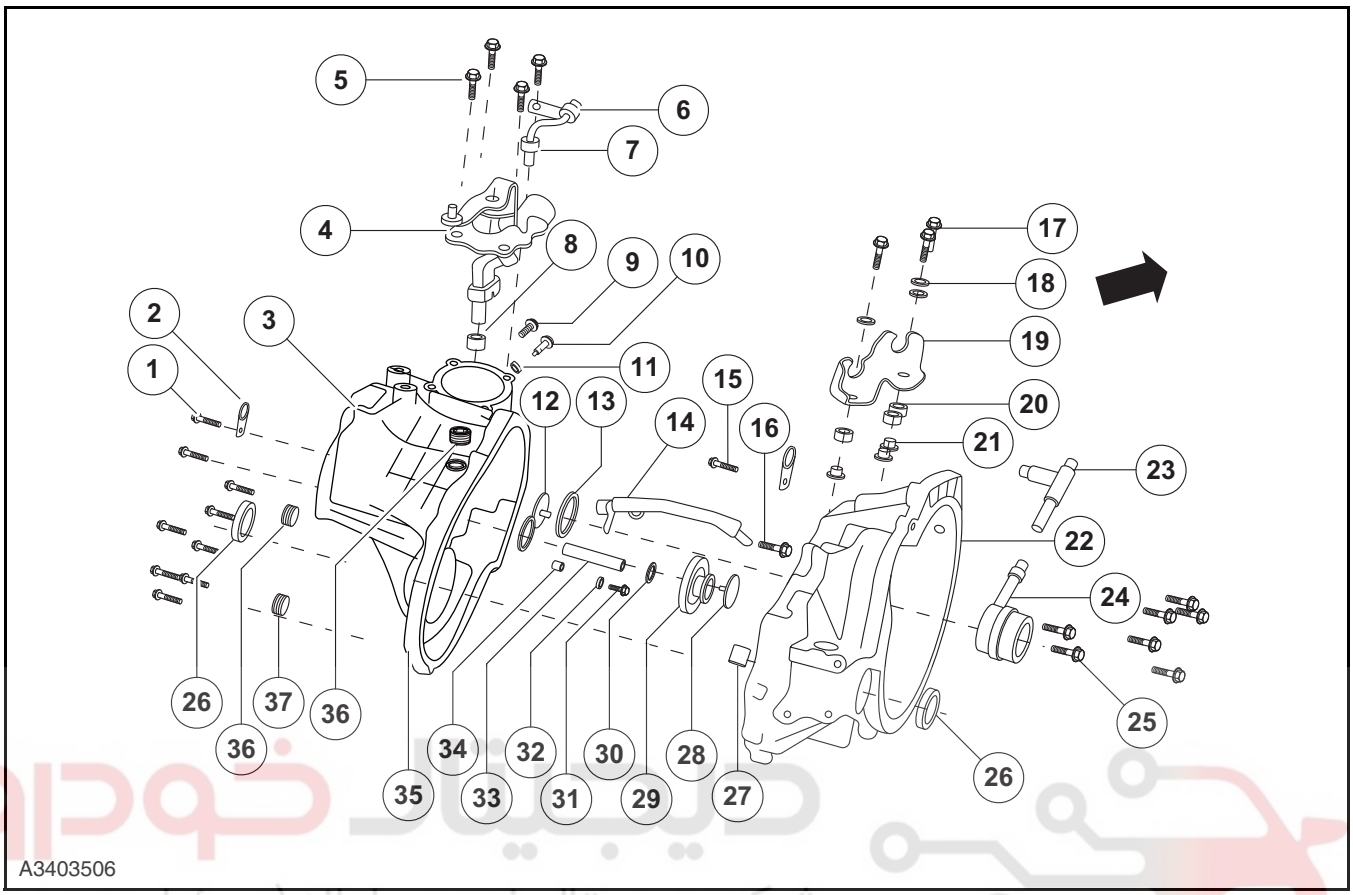
Item	Description	Item	Description
1	Locking screw	9	Second-gear shaft bushing
2	Intermediate shaft left bearing assembly	10	Low-speed synchronizer gear ring component
3	Intermediate shaft fifth gear	11	Low-speed synchronizer component
4	Intermediate shaft fourth gear	12	First gear needle bearing
5	Third and fourth gear sleeve	13	Intermediate shaft first gear assembly
6	Intermediate shaft third gear	14	Intermediate shaft right bearing assembly
7	Intermediate shaft second gear assembly	15	Intermediate shaft
8	Second gear needle bearing		

3. Gearshift Mechanism Component



Item	Description	Qty.	Item	Description	Qty.
1	First and second locking steel ball assembly	3	6	Reverse gear shift fork bolt	2
2	Fifth and reverse gearshift lever component	1	7	Reverse gearshift fork assembly	1
3	First and second gear interlock pin	1	8	Reverse gearshift arm	1
4	Third and fourth gearshift lever component	1	9	Gearshift lever snap ring	2
5	First and second gearshift lever component	1	10	Third and fourth gear interlock pin	1

4. Other Components



Item	Description	Qty.	Item	Description	Qty.
1	Closing bolt	14	20	Support cushion	3
2	Lifting lug	2	21	Cushion base cover	3
3	Left box	1	22	Right box	1
4	Gearshift position shift shaft component	1	23	Bleed valve adapter	1
5	Gearshift box bolt	4	24	Hydraulic release bearing	1
6	No.2 wiring harness support	1	25	Separate bearing installing bolt	2
7	Reverse lamp switch assembly	1	26	Differential oil seal	2
8	Dense ball bearing	1	27	Magnet	1
9	Gearshift locking bolt assembly	1	28	Intermediate shaft oil pan	1
10	Gearshift stop bolt	1	29	Reverse gear idling gear assembly	1
11	Gearshift stop pin gasket	1	30	Reverse gear shaft washer	1
12	Input shaft oil pan	1	31	Reverse gear shaft bolt	1
13	Input shaft gasket	1	32	Reverse gear shaft bolt washer	1
14	Oil fill groove	1	33	Reverse gear idling gear shaft	1
15	Lifting ring bolt	1	34	Left and right box closing pin	2
16	Oil fill pot bolt	1	35	Intermediate shaft gasket	1
17	Cable bracket bolt	3	36	Oil inlet plug	2
18	Support washer	3	37	Oil drain plug	1
19	Cable bracket	2			

General Procedures

Manual Transmission Maintenance Intervals

For early maintenance, maintain the transmission 5,000 km after running-in; then maintain it regularly. The maintenance should be carried out at authorized service station.

Regular maintenance interval is given in the following table:

KM	1×10^4	2×10^4	3×10^4	4×10^4	5×10^4	6×10^4	7×10^4	8×10^4
Month	6	12	18	24	30	36	42	48
Method	B	B	B	B	B	B	B	B

CAUTION:

1. The maintenance intervals should be decided by the mileage of the odometer or the month, whichever comes first. This table shows the regular maintenance in 8×10^4 kilometers and if it exceeds 8×10^4 kilometers, please maintain the transmission as the same interval.

2. This maintenance intervals is applicable for all the driving situation, including repeated short driving; uneven or muddy road driving; dusty road driving; driving in extremly cold weather or saline-alkaline road driving; repeated short driving in extremly cold weather.

3. B: Replace the transmission oil as necessary; H: Replace the transmission oil.

4. When carrying out other maintenance rather than oil replacement, inspect the transmission oil when lifting the vehicle.

Manual Transmission Oil Inspection

1. Confirm that the vehicle is horizontal so as to inspect the oil level;
2. Inspect the whether the transmission oil is leaking. If so, maintain the place where is leaking. Remove the oil filling plug. Repair the oil leakage if any. Remove the oil inlet plug;
3. Inspect the oil level. You can inspect the oil level approximately through the filling port; remove the oil inlet plug, if the oil flows out from the filling port or the oil reachs the filling port, the oil level is normal. Otherwise, fill required oil until it reaches the filling port.

Manual Transmission Oil Replacement

1. Stop the engine before replacing; lift the vehicle horizontally.

   Refer to: Lifting (1.1.3 Traction and Lifting, Description and Operation).

2. Inspect the oil level and leaking when lifting the vehicle. If so, maintain it;
3. Remove the oil drain plug and drain the waste oil;
4. Smear sealants on the oil drain plug and tighten it with specified torque;
5. Remove the oil inlet plug;
6. Fill specified transmission oil until to the filling port;
7. Smear sealants on the oil filling plug and tighten it with specified torque.

Symptom Diagnosis and Testing

Refer to: Symptom Chart (3.3.1 Manual Transmission/Transaxle, Clutch - General Information, Symptom Diagnosis and Testing).

Disassembly and Assembly

Transmission Disassembly

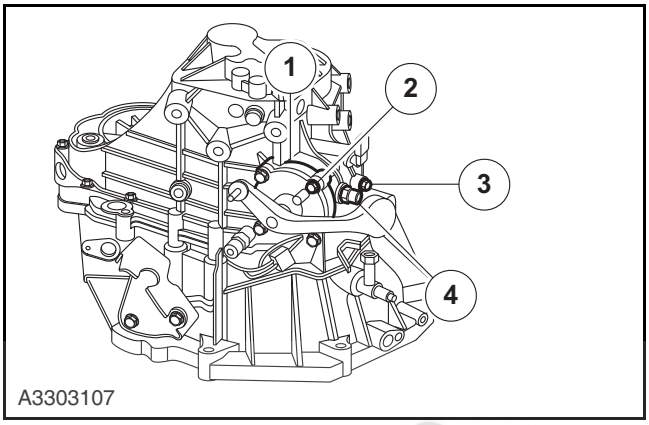
Disassembly

1. Remove the transmission assembly.

   Refer to: Manual Transmission (3.4.3 Manual Transmission, Removal and Installation).

2. Remove the gearshift actuator, the locking bolt assembly and the gearshift tank closing bolt and take out the gearshift box component.

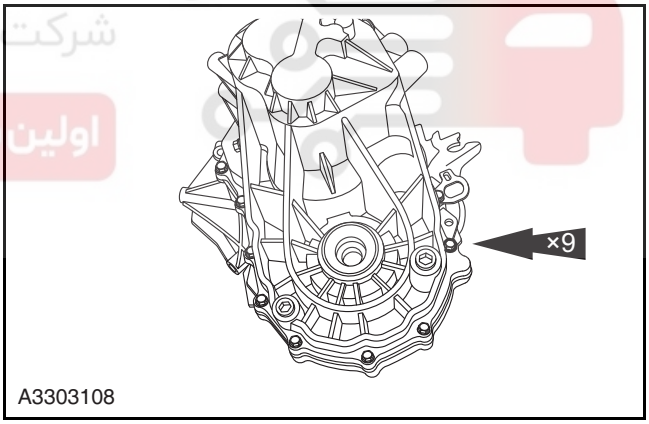
   1. Gearshift box component.
   2. Gearshift box bolt.
   3. Gearshift limit bolt.
   4. Gearshift locking bolt.



A3303107

CAUTION: Take out the gearshift box component only when the transmission is located in the neutral position.

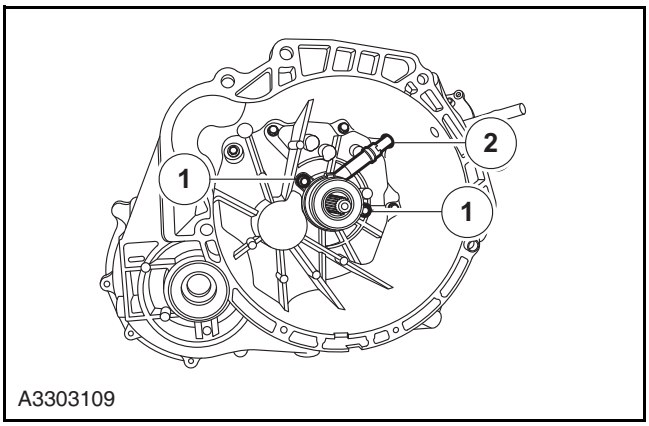
3. Remove the external closing retaining bolt of the transmission.



A3303108

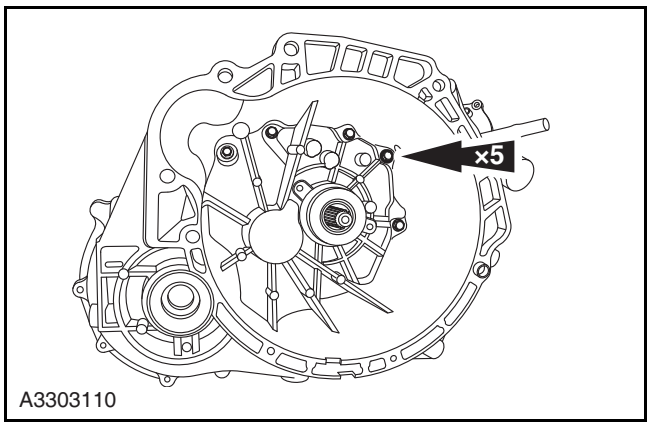
4. Remove the hydraulic release bearing.

   1. Remove the hydraulic release bearing retaining bolt.
   2. Remove the hydraulic release bearing retaining snap spring.



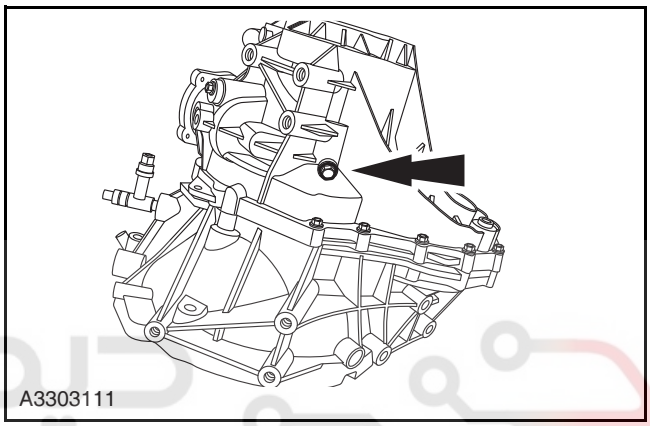
A3303109

5. Remove the inner closing retaining bolt of the transmission.



A3303110

6. Remove the reverse gear retaining bolt at the side of the transmission .

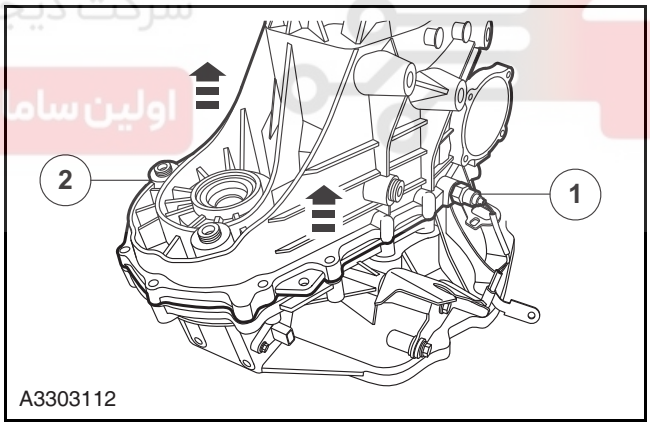

A3303111

7. Remove the left transmission box.

1. Remove the reverse lamp switch.

2. Knock the left box edge by the soft hammer and remove the left box from the opening upwards by suitable tools.

CAUTION: When removing the left transmission box, please take out the case slowly from the opening with suitable tools to prevent the transmission case damage.

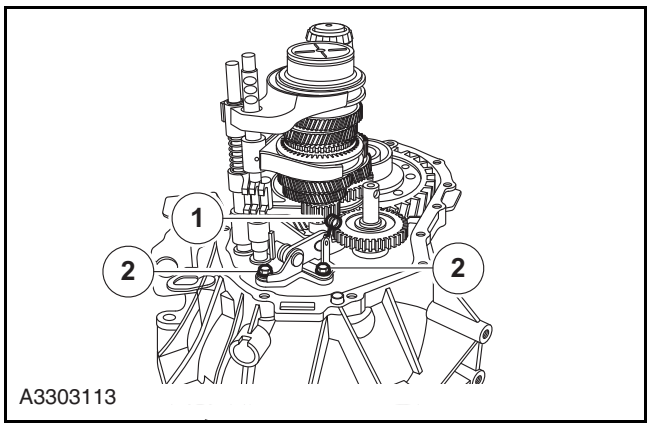


A3303112

8. Remove the reverse gearshift mechanism and the reverse gear.

1. Remove the reverse gearshift fork snap spring.

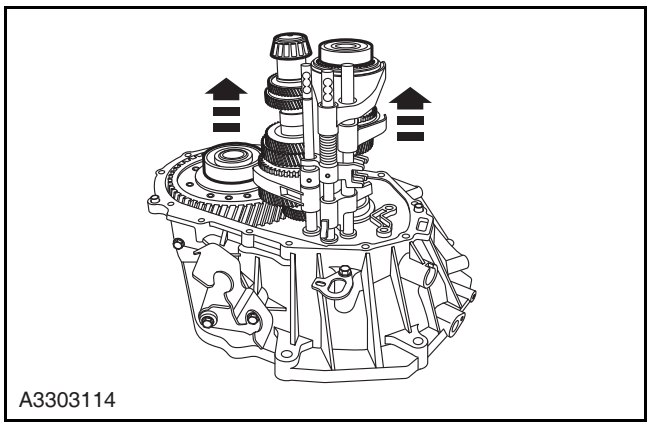
2. Remove the retaining bolt of the reverse gear shift fork retaining bolt.



A3303113

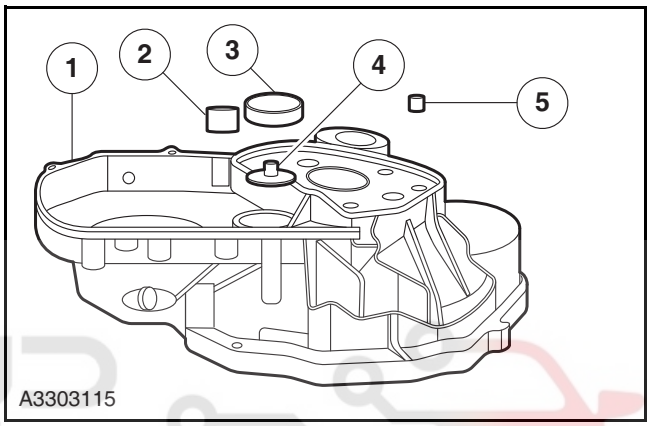
9. Knock the input shaft gently with the soft hammer.

Take out the differential, input shaft, main shaft, the first and second gear, the third and fourth gear, the fifth reverse gearshift components as a whole from the box.



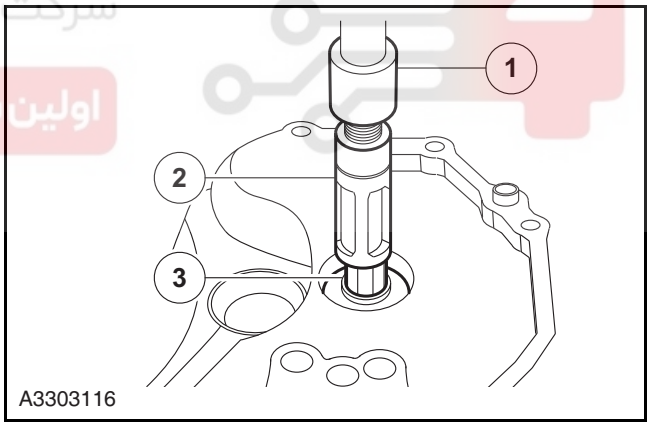
10. Remove other parts of the right box.

1. Right box
2. Magnet
3. Main shaft right bearing outer ring
4. Main shaft oil collecter
5. Closing pin



11. Remove the input shaft oil seal with special tools.

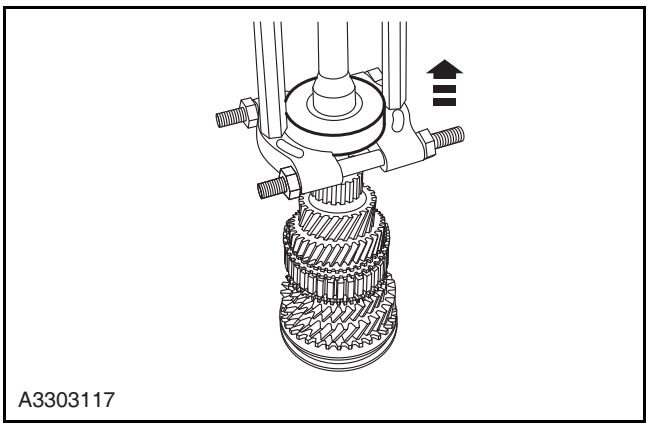
1. Sliding shaft
2. Oil seal remover
3. Input shaft oil seal



Input Shaft Disassembly

Disassembly

1. Remove the input shaft right bearing with bearing remover and the clamp.

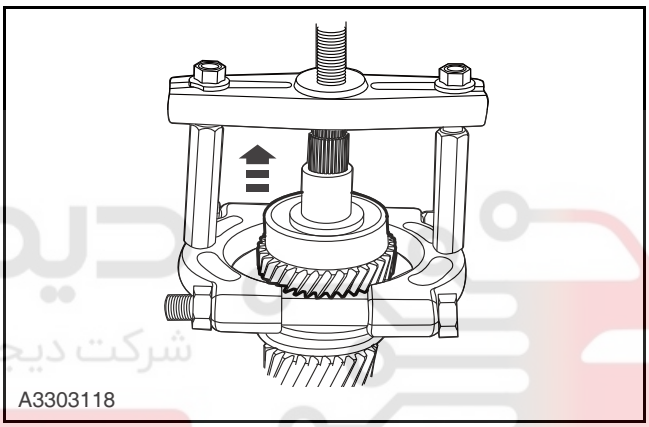

A3303117

CAUTION: Remove the gear or bearing with suitable tools.

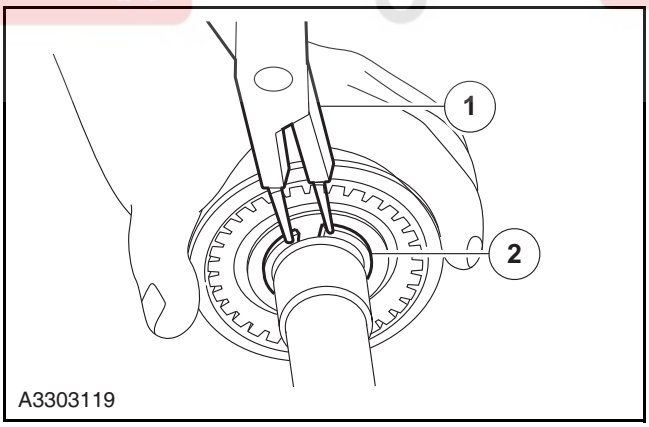
CAUTION: Use the vise holder protector all the time when using the vise.

CAUTION: All gears and bearings have directions. Do not use them wrongly.

2. Remove the left bearing, the fifth gear synchronizer and the fifith gear together with the remover and clamp.


A3303118

3. Use special tools to remove the snap ring.

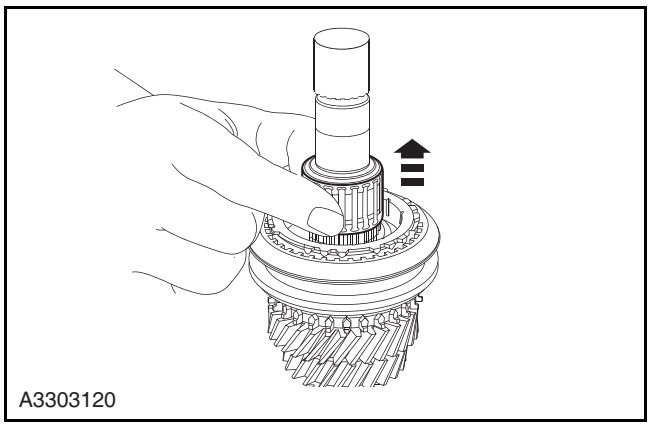


A3303119

1. Snap ring piler
2. Synchronizer snap ring

CAUTION: Be careful when removing to prevent damage by the elastic force of the snap spring.

4. Take out the input shaft fourth gear needle roller bearing.

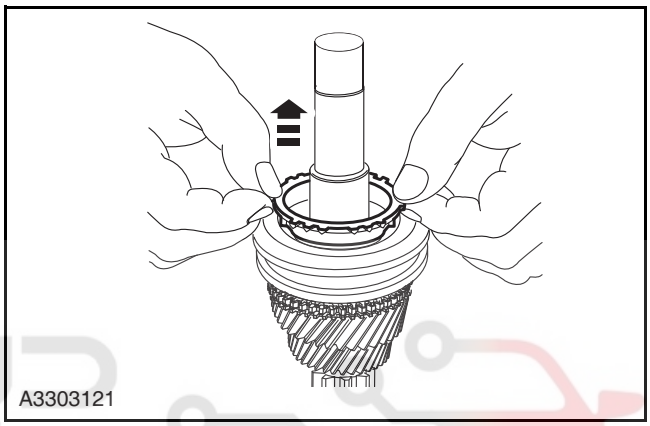


5. Take out the fourth gear synchronizer ring.

CAUTION: Make marks on the synchronizer ring and corresponding synchronizer wheel hub for easy assembly.

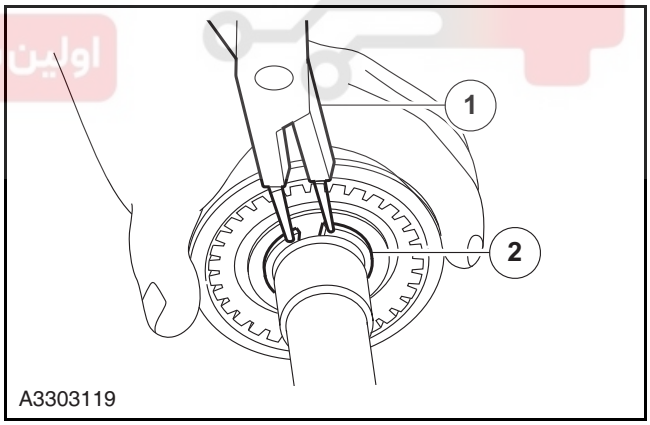
CAUTION: Be extremely careful as dismantling the gear ring from the synchronizer wheel hub, for the brake steel balls are supported by spring force.

CAUTION: Be extremely careful when taking out the inner synchronizer ring and the synchronizer taperred ring.

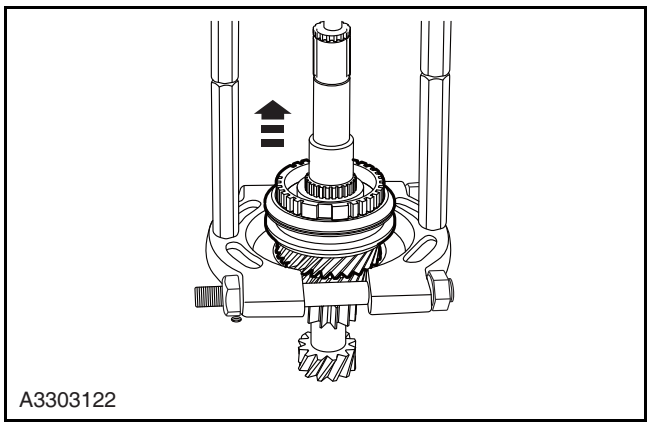


6. Use special tools to remove the snap ring.
   1. Snap ring piler
   2. Synchronizer snap ring

CAUTION: Be careful when removing to prevent damage by the elastic force of the snap spring.



7. Remove the high speed gear synchronizer component and the third gear assembly with the general bearing extractor.

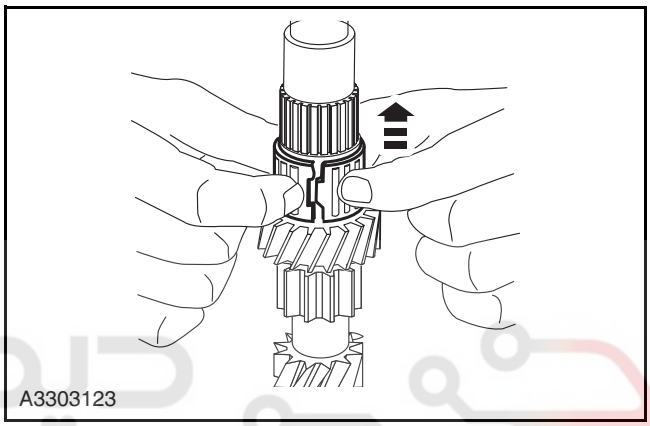

A3303122

CAUTION: Remove the gear or bearing with suitable tools.

CAUTION: Use the vise holder protector all the time when using the vise.

CAUTION: All gears and bearings have directions. Do not use them wrongly.

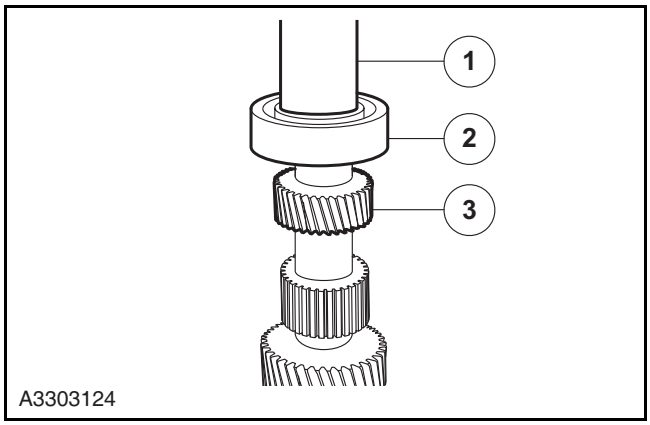
8. Remove the third gear needle roller bearing of the input shaft.


A3303123

Input Shaft Assembly

1. Install the input shaft right bearing.

1. Special tool: bearing installer
2. Input shaft right bearing
3. Input shaft

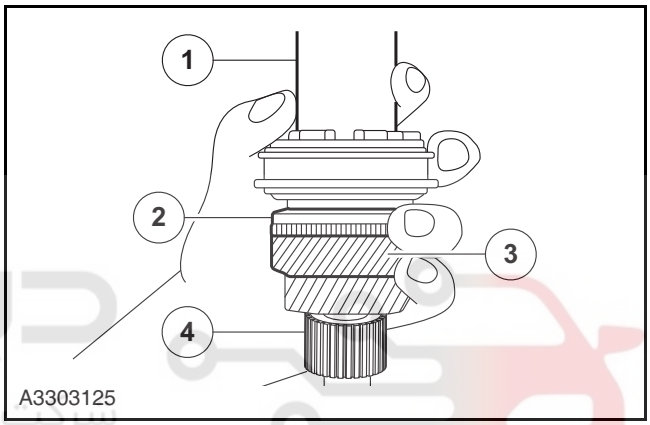


CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.

CAUTION: Use new bearing.

2. Install the third gear needle roller bearing and apply the grease to it, then install the third gear and the synchronizer ring and knock it into the high speed synchronizer assembly with special tools and the hammer.

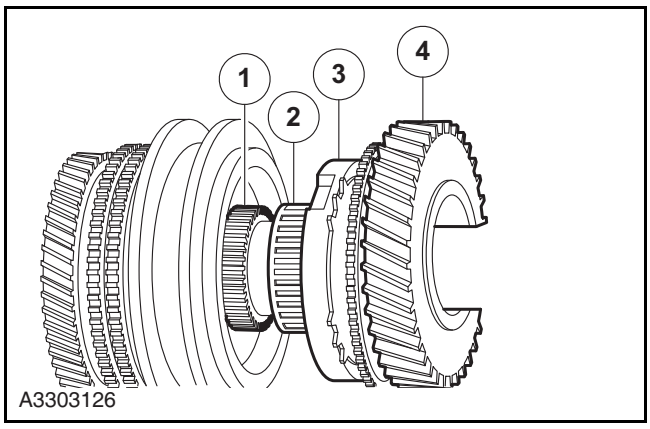
1. Special tool: bearing installer
2. The third gear synchronizer gear ring
3. Input shaft third gear assembly
4. Input shaft



CAUTION: When installing the gear case and the gear sleeve, make sure that the synchronizer gear ring key gear groove aligns with the synchronizer slider.
Inspect the third gear free rotation after the synchronizer component installed.

3. Install the snap ring and the needle roller bearing, apply the grease to the bearing and install the synchronizer gear ring and the fourth gear.

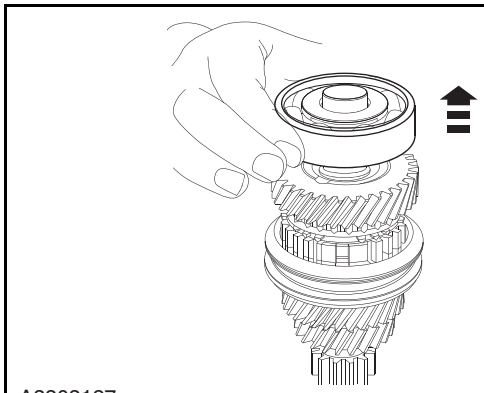
1. Snap ring
2. Needle roller bearing
3. The fourth gear synchroniser gear ring
4. Input shaft fourth gear assembly



CAUTION: Make sure the snap ring is fixed in the groove.

4. Install the snap ring, gasket and needle roller bearing, apply the grease to bearing and install the synchronizer gear ring and the fifth synchronizer.

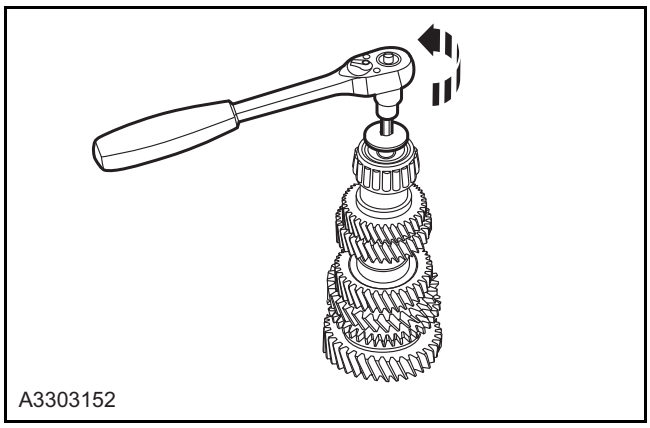
   Install the left bearing with the bearing installer and the hammer.


A3303127

Main Shaft Disassembly

Disassembly

1. Remove the main shaft locking screw sleeve.

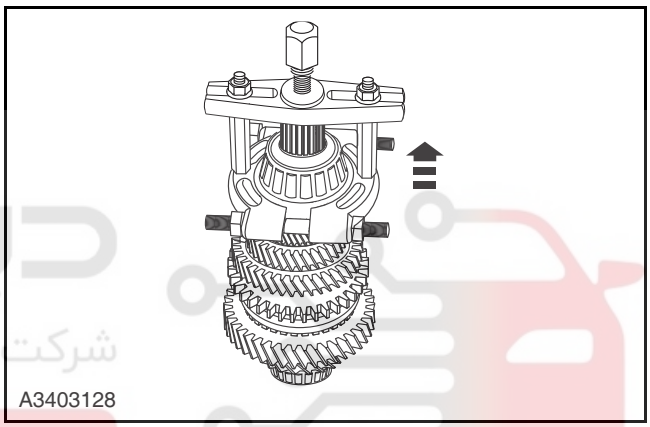

A3303152

2. Pull out the main shaft left bearing with the puller and the clamp.

CAUTION: Remove the gear or bearing with suitable tools.

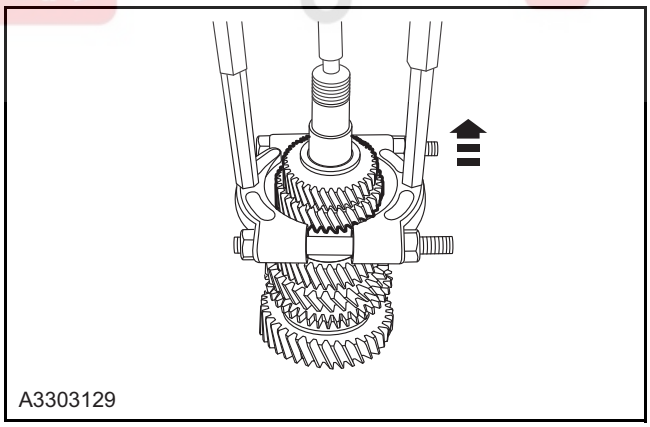
CAUTION: Use the vise holder protector all the time when using the vise.

CAUTION: All gears and bearings have directions. Do not use them wrongly.

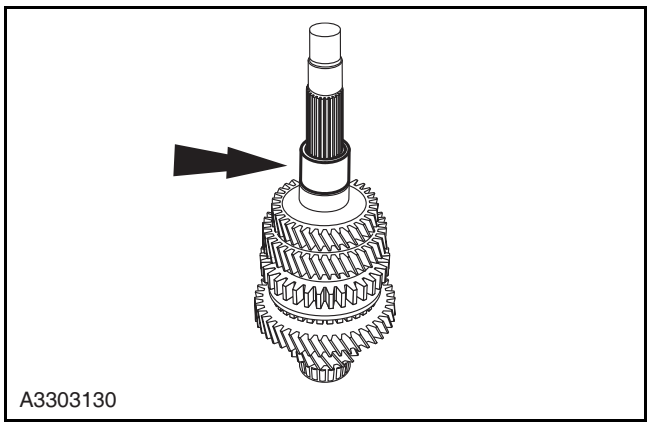

A3403128

3. Take out the fifth gear sleeve and pull out the fifth and fourth gear together with the puller and the clamp.

CAUTION: All gears and bearings have directions. Do not use them wrongly.


A3303129

4. Remove the third and fourth gear sleeve.

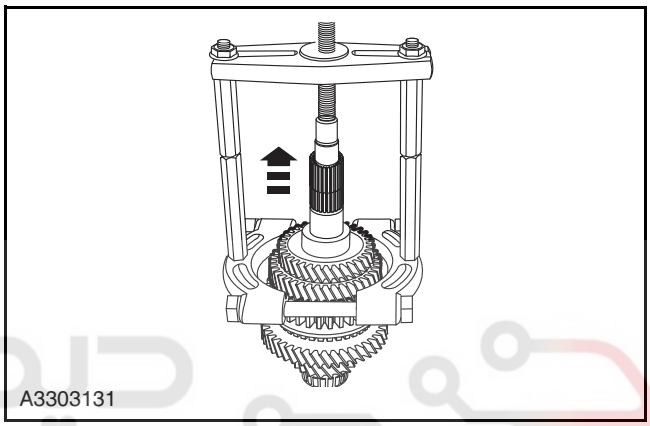

A3303130

5. Remove the third and second gear assembly and the second synchronizer ring.

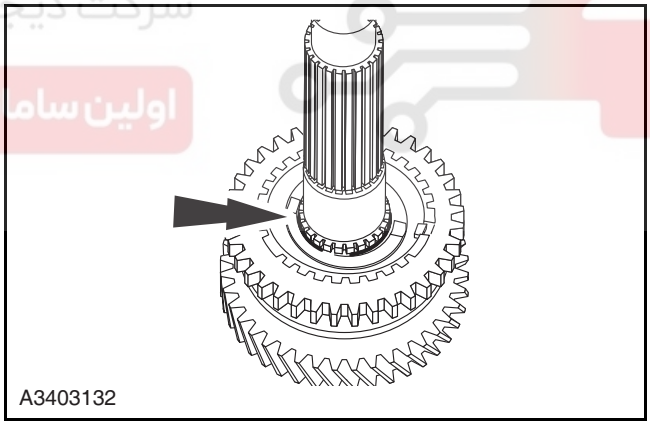
CAUTION: Remove the gear or bearing with suitable tools.

CAUTION: Use the vise holder protector all the time when using the vise.

CAUTION: All gears and bearings have directions. Do not use them wrongly.


A3303131

6. Remove the low speed gear synchronizer snap spring.


A3403132

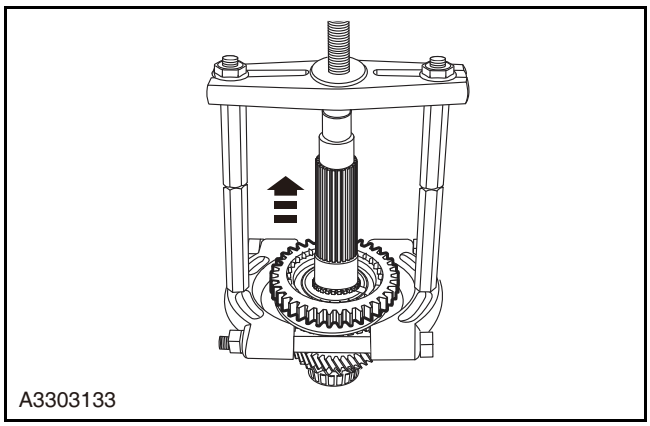
7. Remove the low speed gear synchronizer component.

CAUTION: Remove the gear or bearing with suitable tools.

CAUTION: Use the vise holder protector all the time when using the vise.

CAUTION: All gears and bearings have directions. Do not use them wrongly.

CAUTION: Make marks on the synchronizer ring and corresponding synchronizer wheel hub for easy assembly.

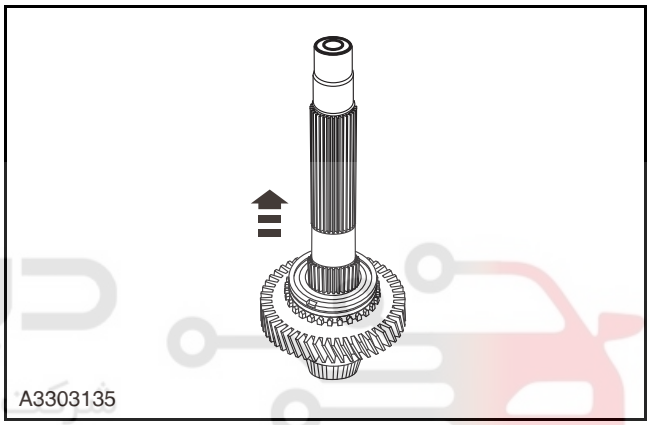

A3303133

8. Remove the synchronizer ring and the first gear assembly.

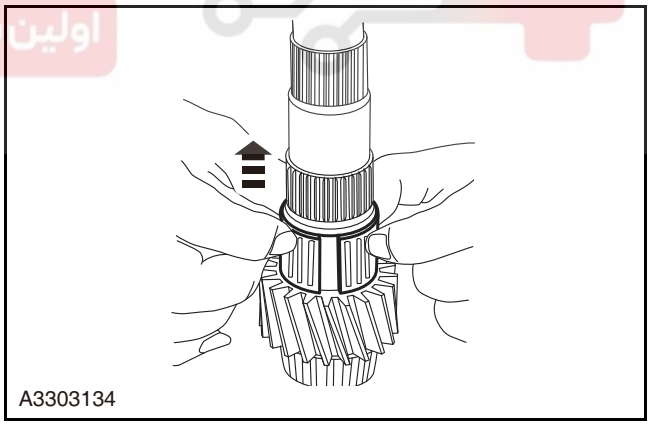
CAUTION: Remove the gear or bearing with suitable tools.

CAUTION: Use the vise holder protector all the time when using the vise.

CAUTION: All gears and bearings have directions. Do not use them wrongly.


A3303135

9. Remove the first gear needle roller bearing of the main shaft.

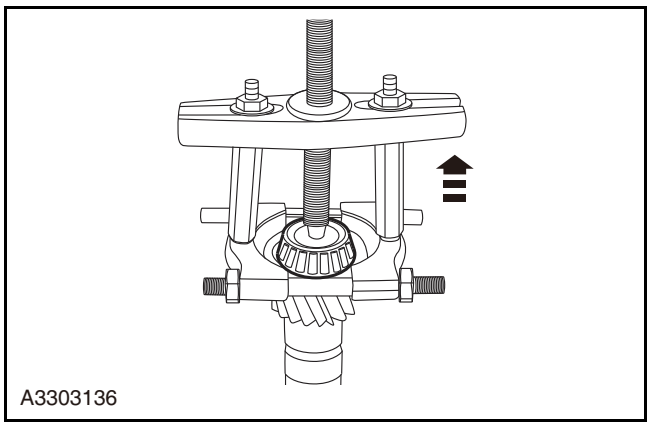

A3303134

10. Remove the main shaft right bearing.

CAUTION: Remove the gear or bearing with suitable tools.

CAUTION: Use the vise holder protector all the time when using the vise.

CAUTION: All gears and bearings have directions. Do not use them wrongly.



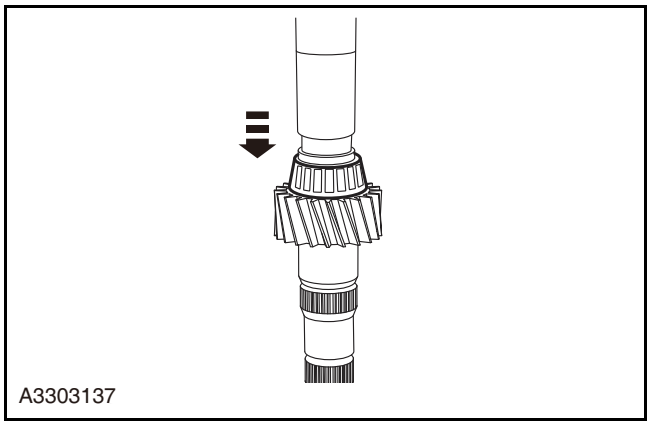
Main Shaft Assembly

1. Install the right bearing with suitable clamping lever.

CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.

CAUTION: Use the vise holder protector all the time when using the vise.

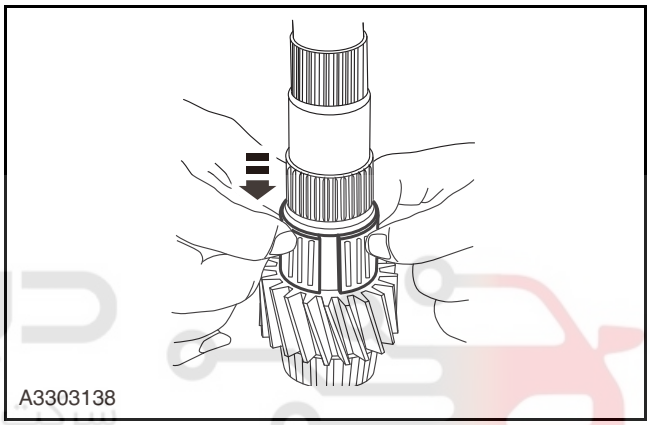
CAUTION: All gears and bearings have directions. Do not use them wrongly.


A3303137

2. Install the first gear needle roller bearing of the main shaft.

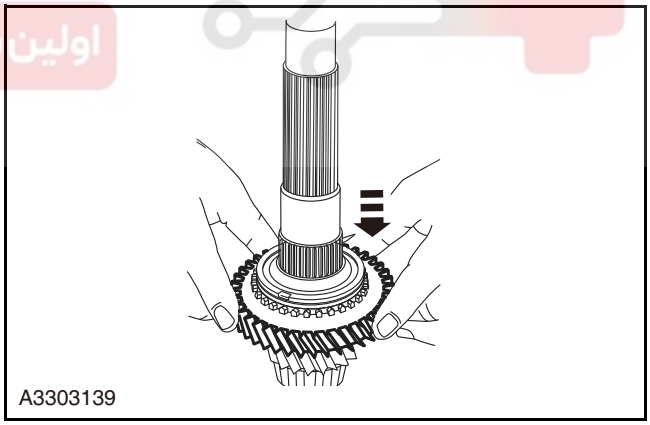
CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.

CAUTION: Use new needle roller bearing.


A3303138

3. Install the main shaft first gear.

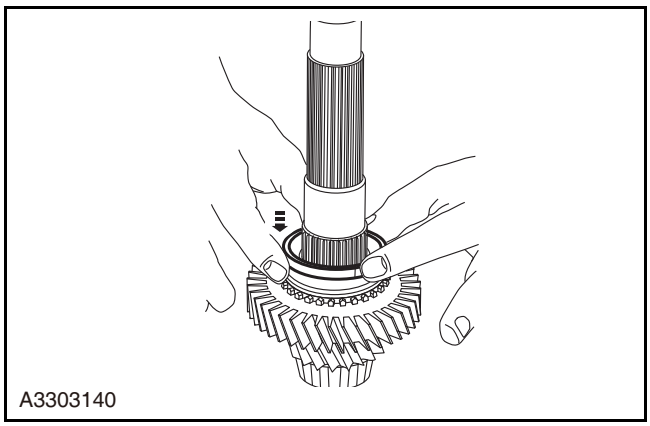
CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.


A3303139

4. Install the first gear synchronizer gear ring components.

CAUTION: Clean and inspect all the components carefully and lubricate them using manual transmission oil before assembling.

CAUTION: Inspect the synchronizer ring for wear.

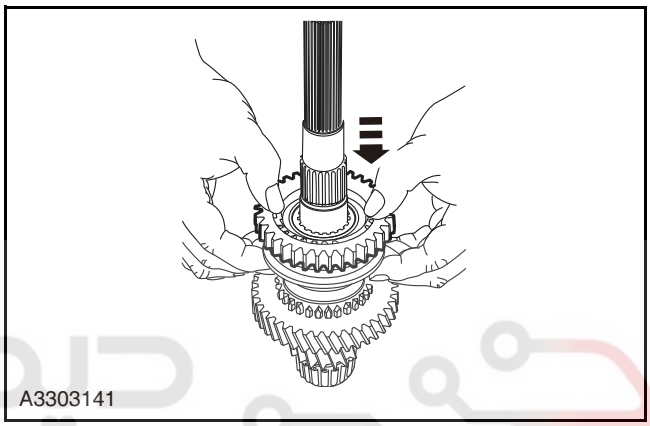

A3303140

5. Install the low speed gear synchronizer component.

CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.

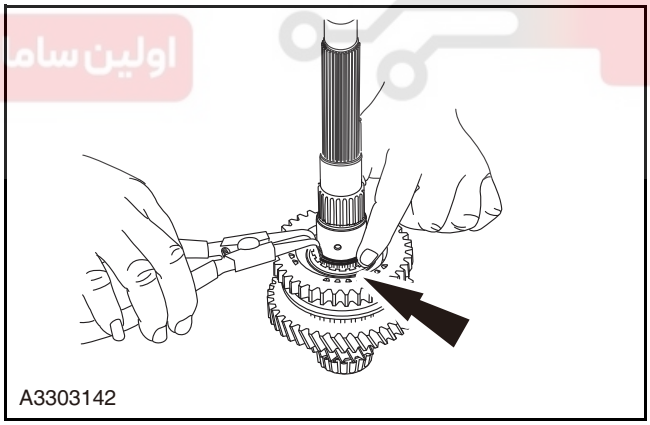
CAUTION: Install the low speed gear synchronizer and make the large conical surface face the first gear.

CAUTION: Inspect the sliding flexibility of the synchronizer components, repair or replace it if it is seized.


A3303141

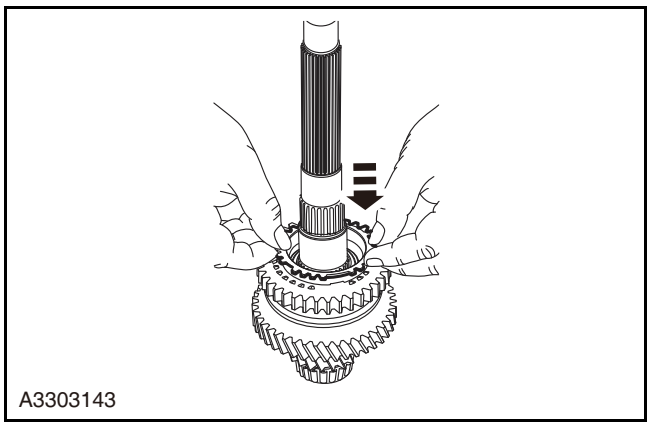
6. Install the low speed gear synchronizer snap ring.

CAUTION: Use new snap spring.


A3303142

7. Install the second gear synchronizer gear ring component.

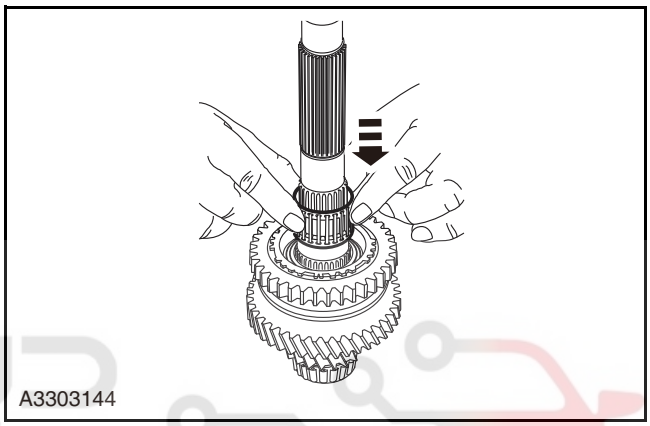
CAUTION: Clean and inspect all the components carefully and lubricate them using manual transmission oil before assembly.



8. Install the second gear needle roller bearing.

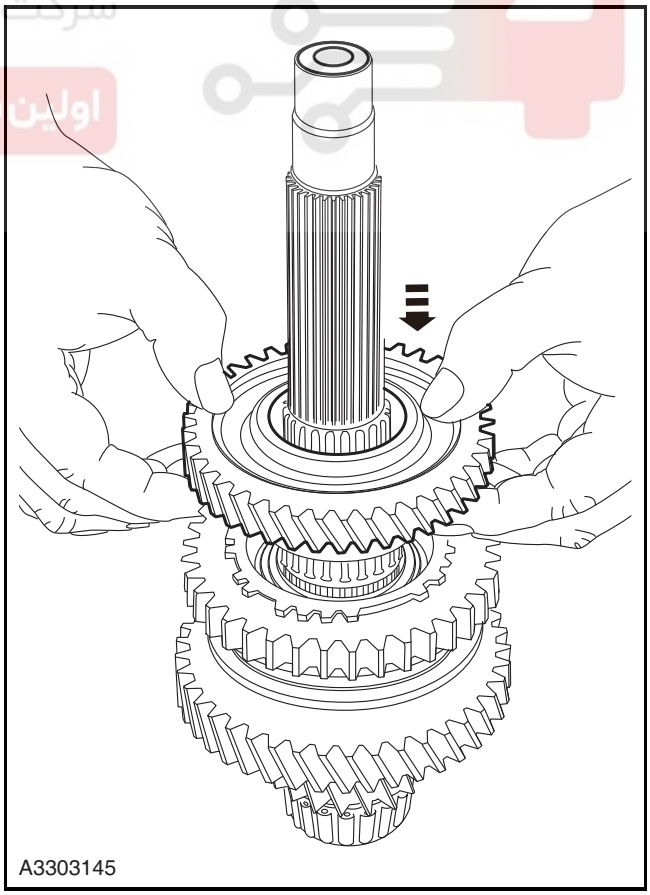
CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.

CAUTION: Use new needle roller bearing.



9. Install the second gear assembly of the main shaft.

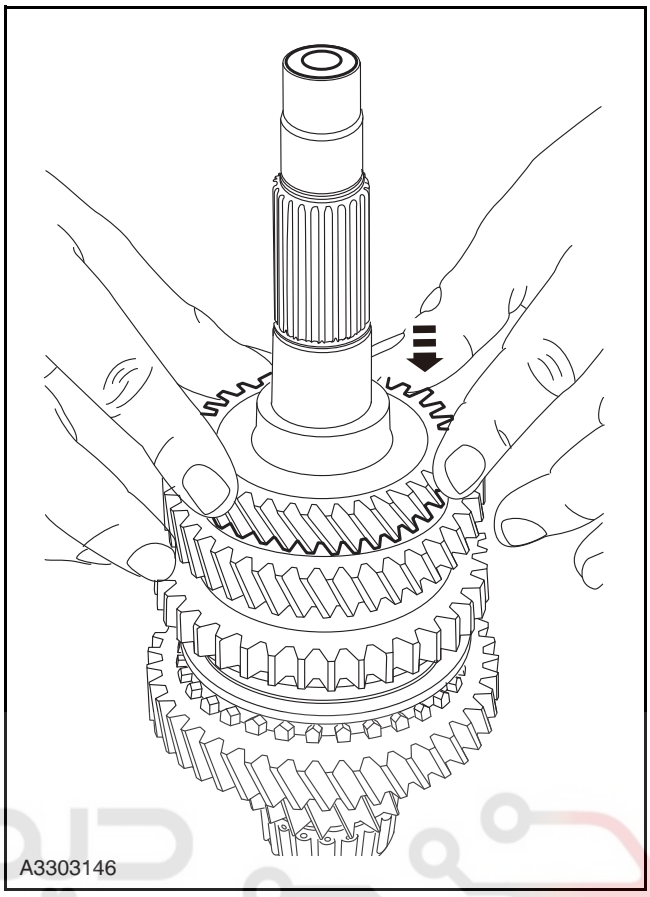
CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.



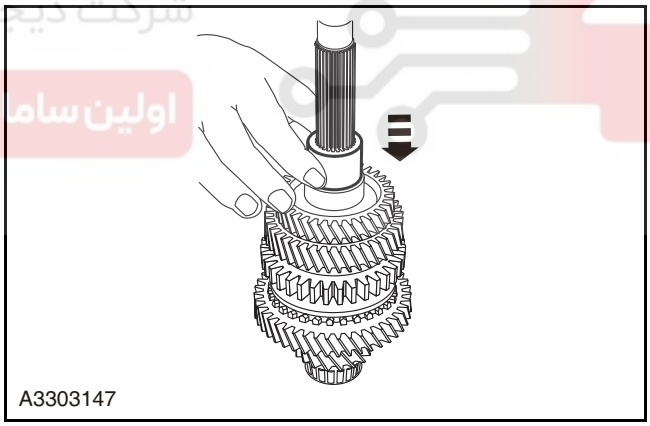
10. Install the third gear assembly of the main shaft.

CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.

CAUTION: The third gear boss shall face the fourth gear.

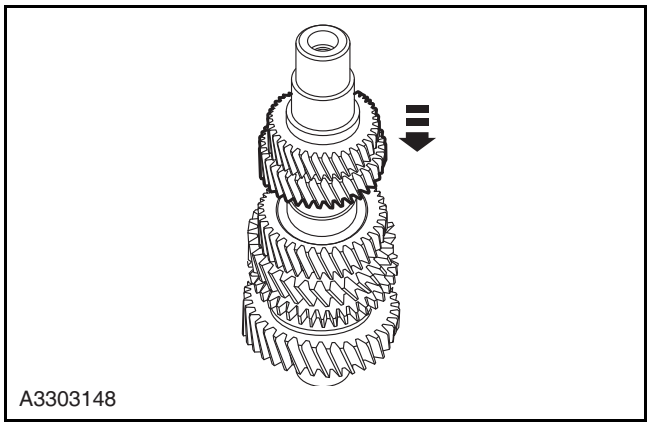


11. Install the third and fourth gear sleeve of the main shaft.

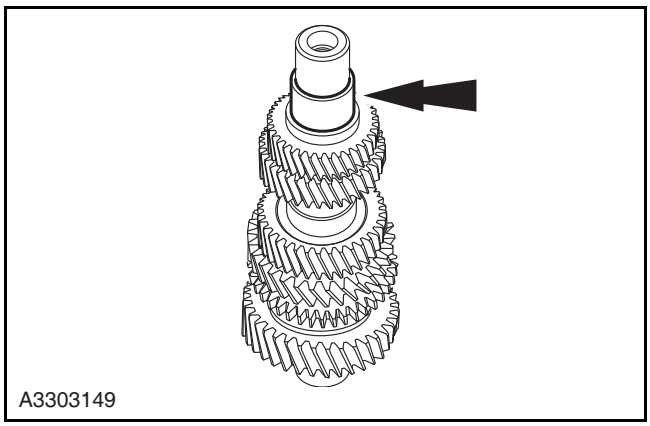


12. Install the fourth and fifth gear of the main shaft.

CAUTION: All gears and bearings have directions. Do not use them wrongly.



13. Install the fifth gear sleeve.

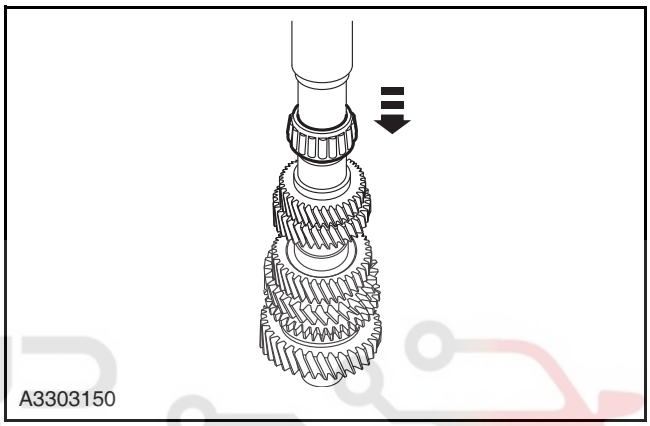


14. Install the intermediate shaft left bearing.

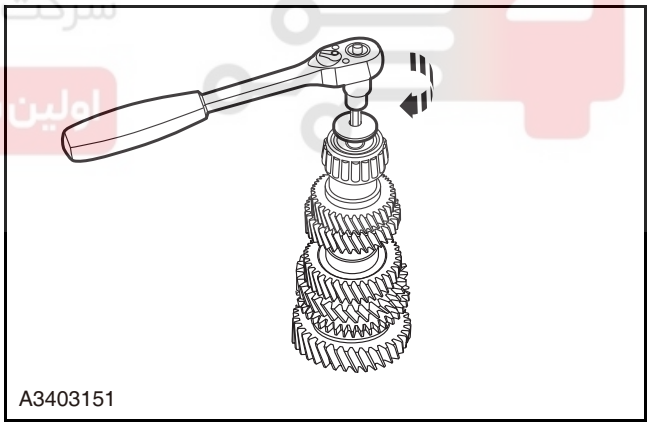
CAUTION: Install the main shaft left bearing with suitable tools.

CAUTION: Clean and inspect all components carefully and lubricate them using manual transmission oil before assembly.

CAUTION: Use new bearing.



15. Install the main shaft locking screw sleeve.

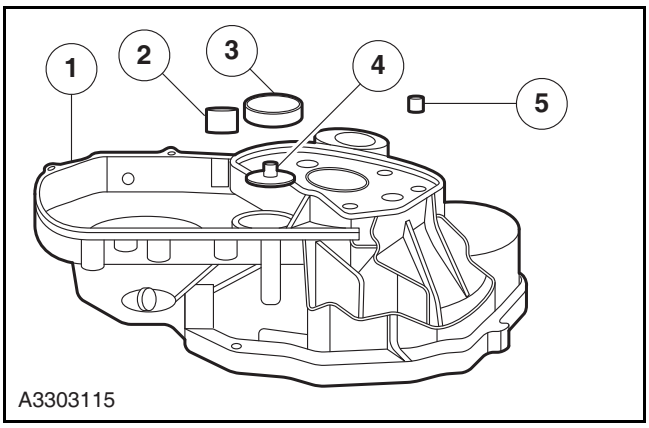


Transmission assembly

Assembly

1. Install other parts of the right box.

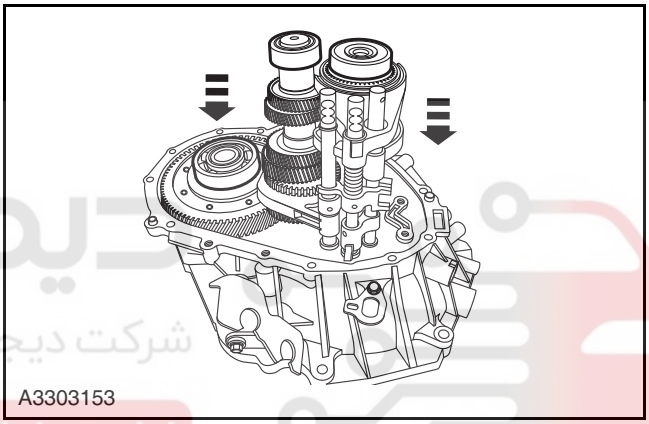
1. Right box
2. Magnet
3. Main shaft right bearing outer ring
4. Main shaft oil collecter
5. Closing pin



A3303115

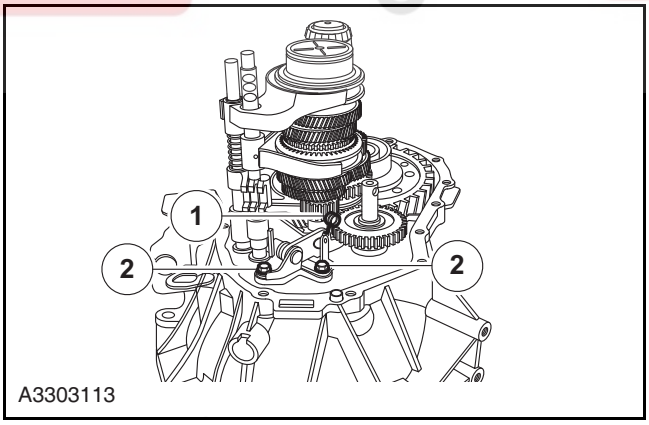
CAUTION: Replace the input shaft oil seal with a new one before installing the transmission.

2. Install the input shaft, main shaft and differential components together into the transmission case.


A3303153

3. Install the reverse gearshift mechanism and the reverse gear.

1. Install the reverse gearshift fork snap spring.
2. Install the reverse gearshift fork retaining bolt.

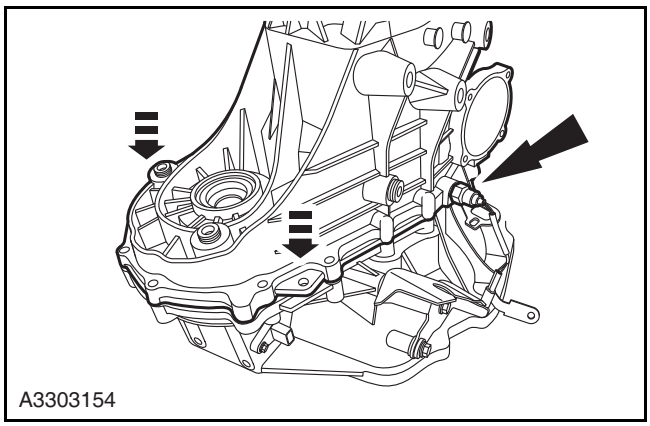


A3303113

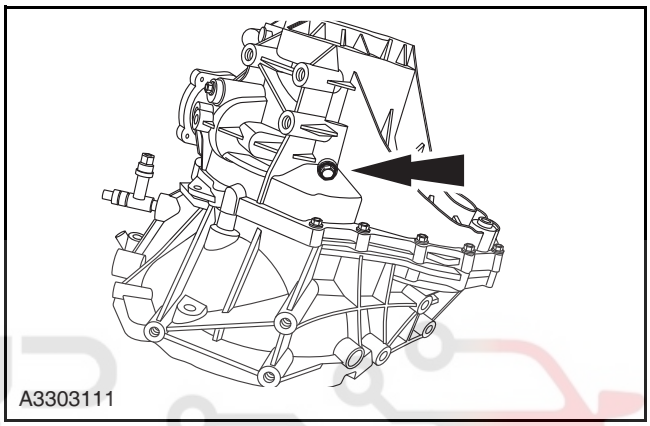
4. Install the left box.

1. Make sure the left box and the transmission right box installed in the right position.

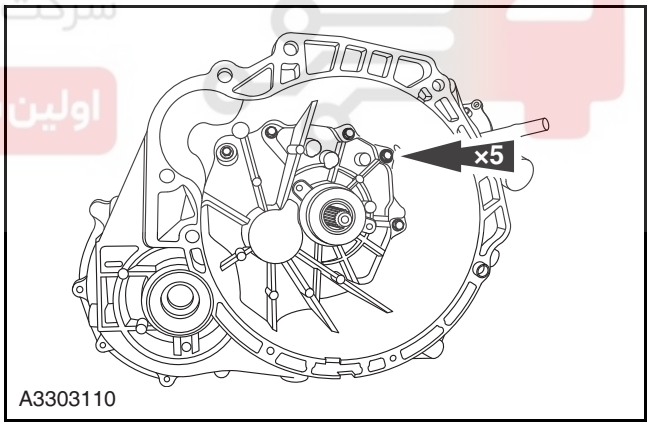
2. Install the reverse lamp switch.


A3303154

5. Install the reverse gear retaining bolt at the side of the transmission .


A3303111

6. Install the inner closing retaining bolt of the transmission.

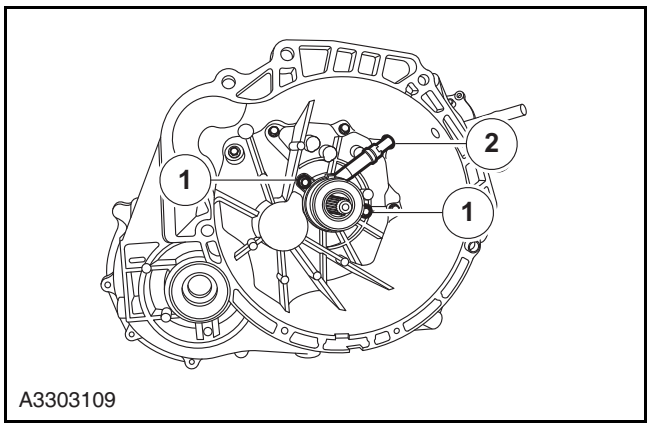


A3303110

7. Install the hydraulic release bearing.

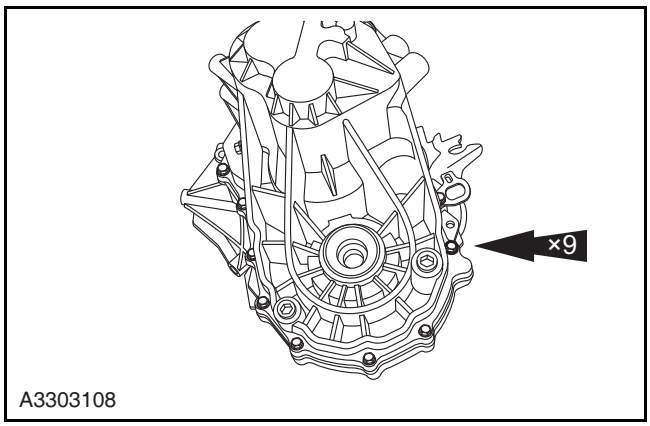
1. Remove the hydraulic release bearing retaining bolt.

2. Remove the hydraulic release bearing retaining snap spring.



A3303109

8. Install the external closing retaining bolt of the transmission.

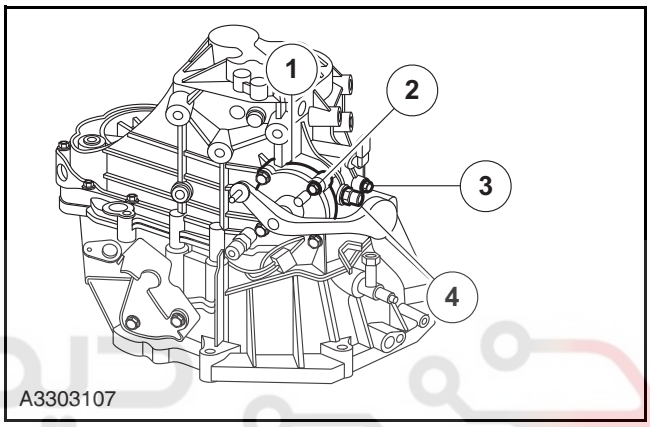


A3303108

9. Install the gearshift actuator.

   Install the locking bolt assembly and gearshift box closing bolt.

   1. Gearshift box component.
   2. Gearshift box bolt.
   3. Gearshift limit bolt.
   4. Gearshift locking bolt.



A3303107

CAUTION: Install the gearshift box component only when the transmission is located in the neutral position.

10. Install the transmission assembly.

Refer to: Manual Transmission Assembly (3.4.3 Manual Transmission, Removal and Installation).

Removal and Installation

Reverse Lamp Switch

Removal

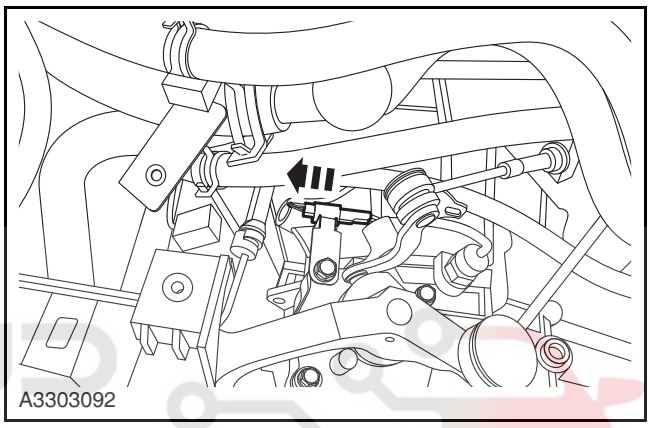
1. Disconnect the battery negative cable.

   Refer to: Battery Inspection (3.1.10 Charging System, General Procedures).

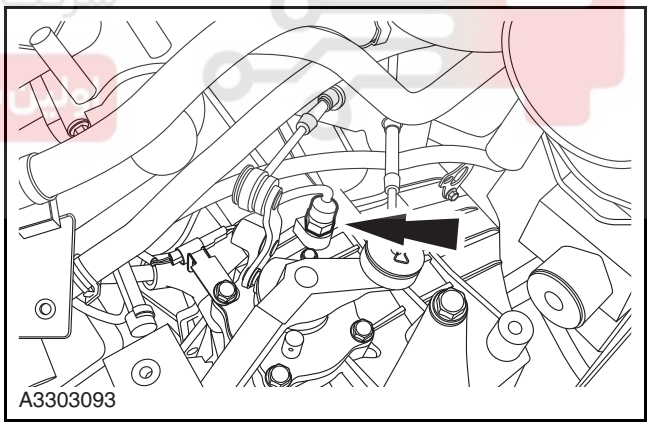
2. Remove the air filter assembly.

   Refer to: Air Filter (3.1.5 Intake System, Removal and Installation).

3. Disconnect the reverse lamp switch wiring harness connector.


A3303092

4. Remove the reverse lamp switch with suitable tools.


A3303093

Installation

1. To install, reverse the removal procedure.

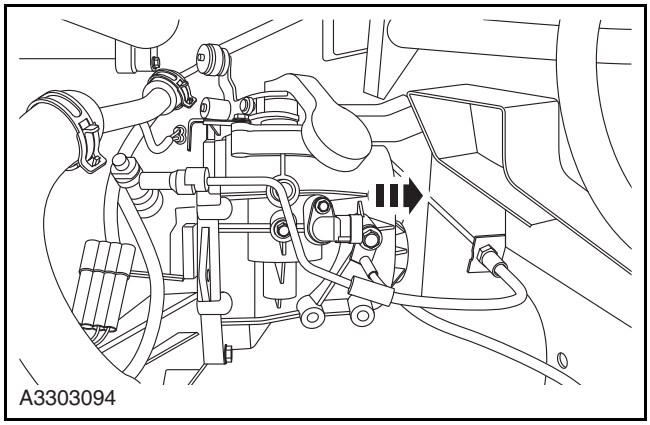
Neutral Sensor

Removal

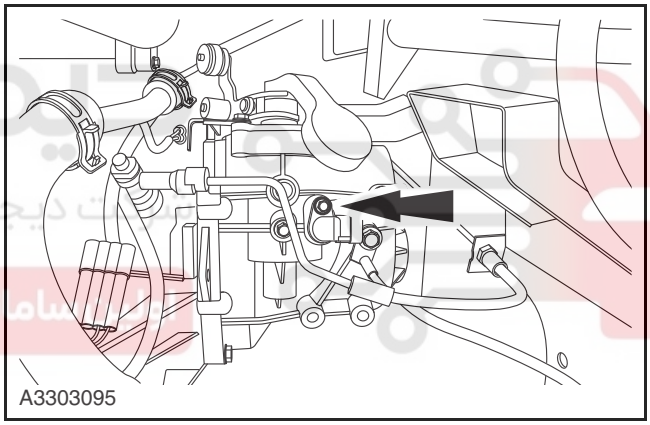
1. Disconnect the battery negative cable.

   Refer to: Battery Inspection (3.1.10 Charging System, General Procedures).

2. Disconnect the neutral sensor wiring harness connector.



3. Remove the neutral sensor with suitable tools.



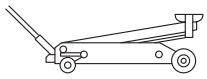
Installation

1. To install, reverse the removal procedure.

Manual Transmission

Removal

Special tool

 CA301-004	Engine Balancing Support CA301-004

General Equipment

Flat Jack

1. Disconnect the battery negative cable.

   Refer to: Battery Inspection (3.1.10 Charging System, General Procedures).

2. Remove the air filter assembly.

   Refer to: Air Filter (3.1.5 Intake System, Removal and Installation).

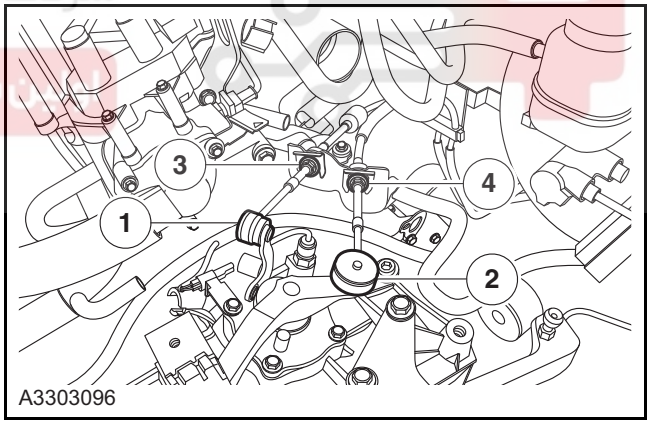
3. Separate the gearshift cable from the transmission.

   1. Remove gearselect cables circlip.

   2. Remove gearshift cables circlip.

   3. Remove the gearselect cable E clip and take out the gearselect cable.

   4. Remove the gearshift cable E clip and take out the gearshift cable.

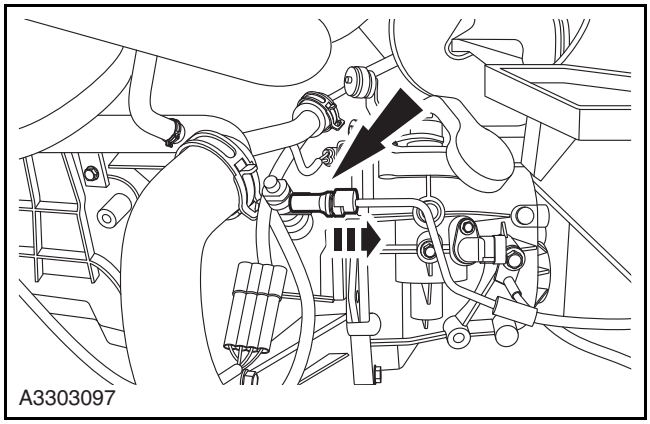


A3303096

4. Remove the clutch slave pump fuel inlet pipe snap spring and take out the fuel inlet pipe.

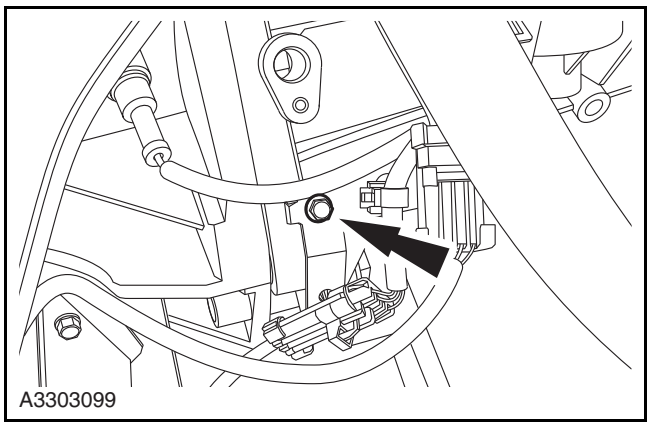
5. Remove the engine crankshaft position sensor.

   Refer to: Crankshaft Position Sensor (3.1.13 Electrical Control System - ME7, Removal and Installation).


A3303097

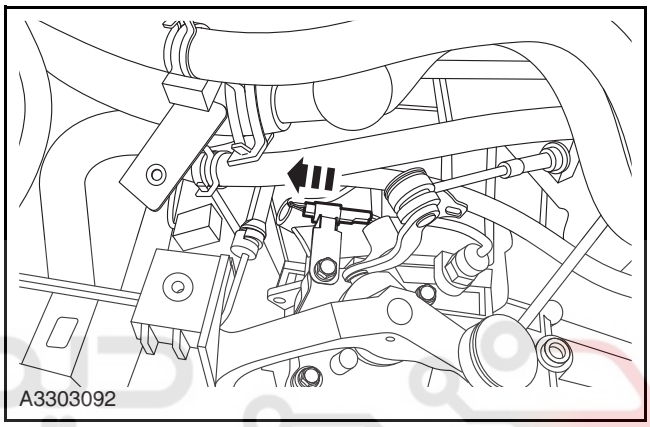
6. Remove the transmission wiring harness fixing support retaining bolt.

   Torque: 10 Nm


A3303099

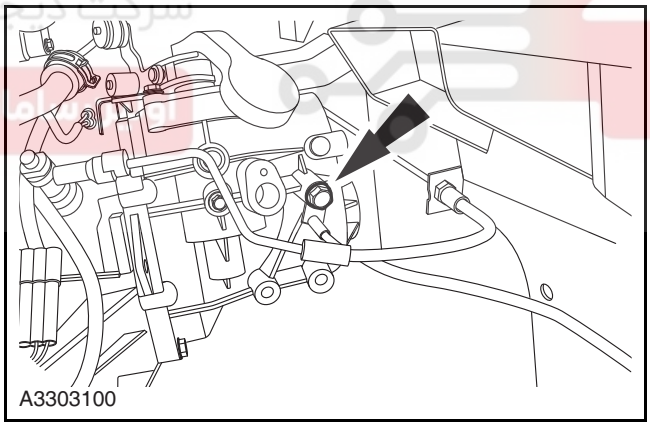
7. Disconnect the reverse lamp switch wiring harness connector.
8. Remove the neutral sensor.

   Refer to: Neutral Sensor (3.4.3 Manual Transmission, Removal and Installation).


A3303092

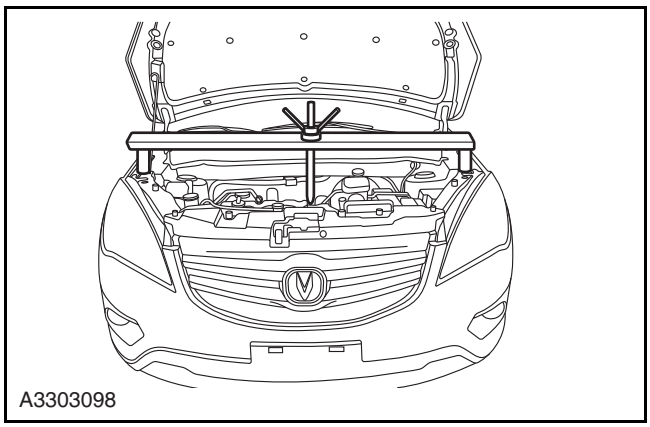
9. Remove the retaining bolt on the transmission earth cables.

   Torque: 23 Nm


A3303100

10. Install the engine balancing support.

    Special tool: CA301-004

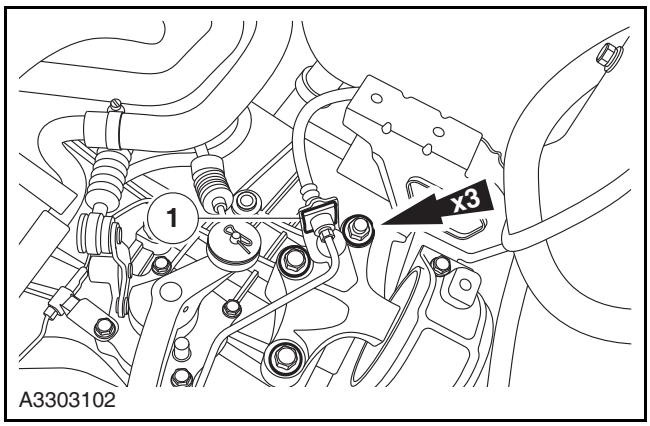

A3303098

11. Remove the transmission left support.

1. Remove the clutch slave pump fuel inlet pipe fixing support E clip.

2. Loosen connection bolts and nuts of the transmission left support.

CAUTION: Just loosen not remove the bolt.



A3303102

12. Remove 2 connecting bolts of the upper transmission and the engine.

Torque: 85 Nm

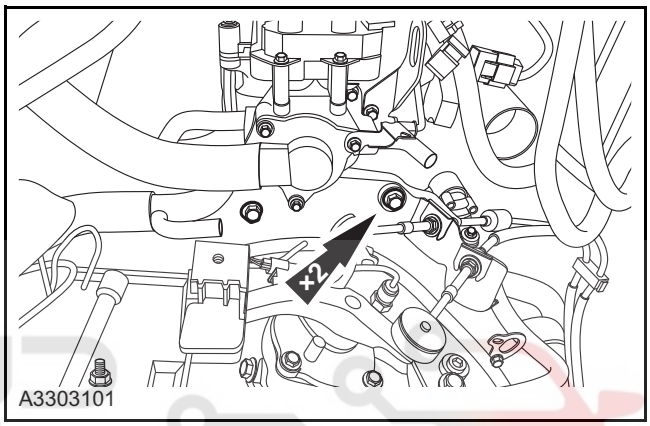
13. Lift the vehicle.

Refer to: Lifting (1.1.3 Traction and Lifting, Description and Operation).

14. Loosen and remove the oil drain bolt and drain the transmission oil.

15. Remove the halfshaft on both sides.

Refer to: Half Shaft (2.2.2 Half Shaft, Removal and installation).



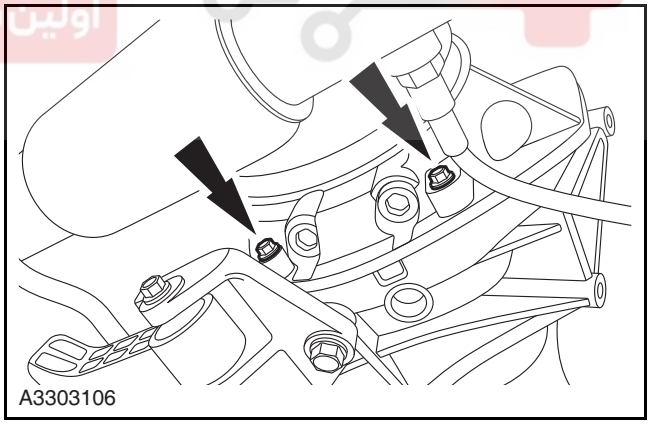
A3303101

16. Remove the lower retaining bolt of the transmission and the engine.

Torque: 23 Nm

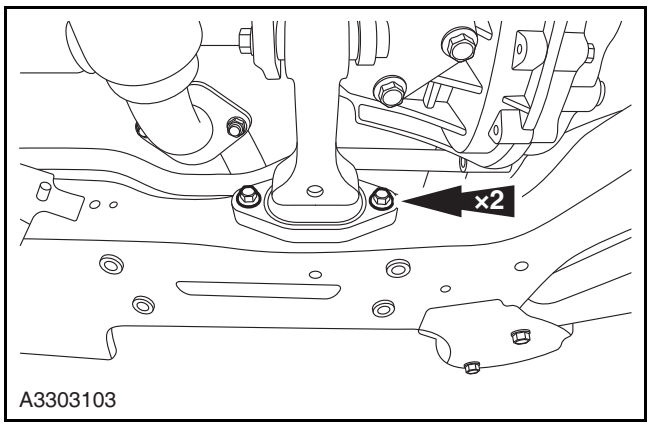
17. Support the transmission with the flat jack.

General Tool: Flat jack


A3303106

18. Remove the connection bolt between the transmission lower support and the engine sub - frame.

    Torque: 80 Nm



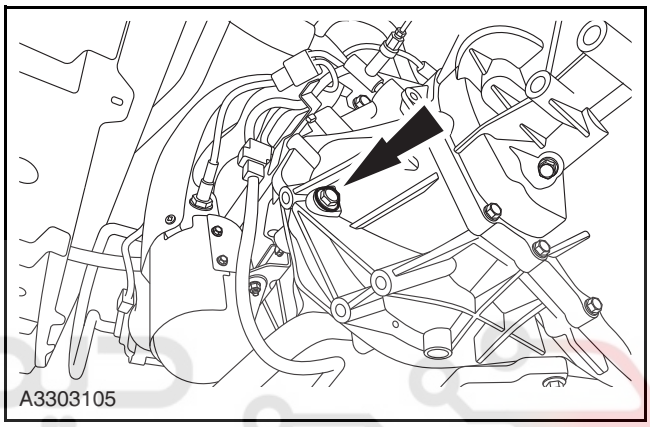
19. Remove the connection nut of the transmission front lower part and the cylinder body.

    Torque: 80 Nm

20. Remove the starter motor.

    Refer to: Starter Motor (3.1.9 Starting System, Removal and Installation).

21. Lower the flat jack slowly and remove the lower transmission assembly.



Installation

1. To install, reverse the removal procedure.
2. Fill the manual transmission oil and inspect the transmission oil level.

CAUTION: Manual Transmission Oil Inspection (3.3.3 Manual Transmission, General Procedures).

Specifications

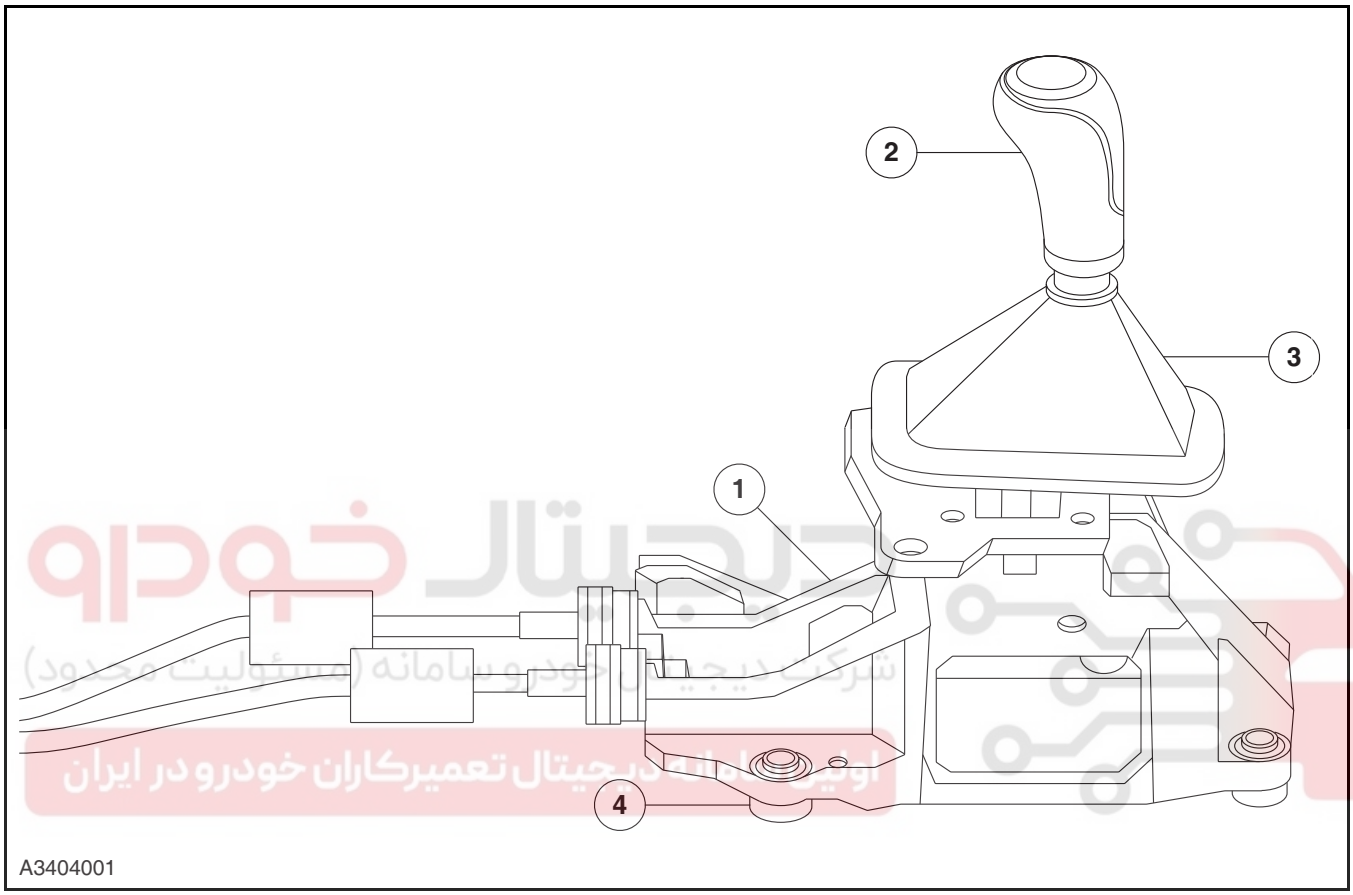
Torque Specifications

Item	Nm	lb-ft	lb-in
Gearshift control assembly retaining bolt	23	17	-
Cable and front wall plate connection nut	23	17	-

Description and Operation

System Overview

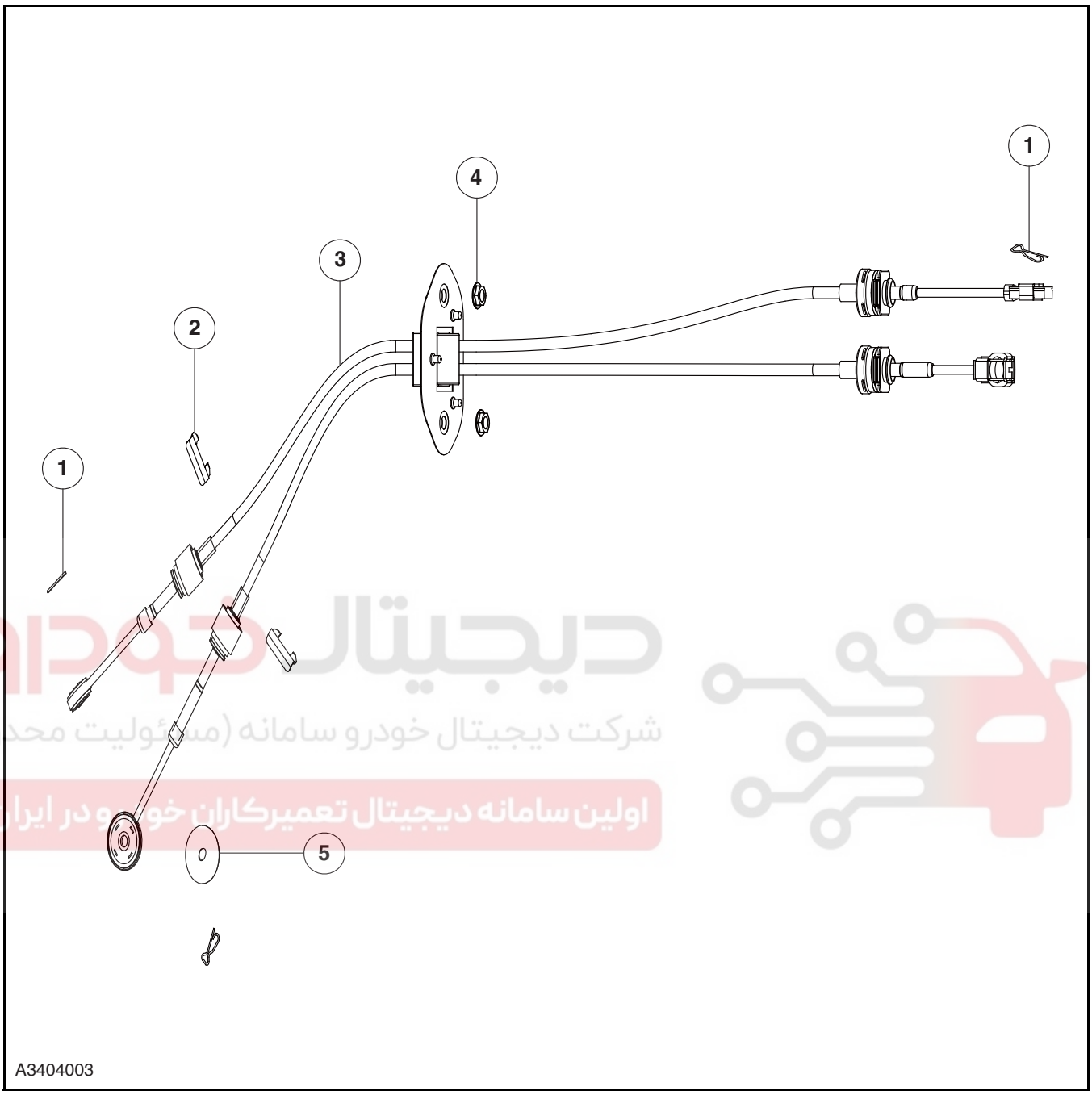
The manual transmission gearshift mechanism includes the gearshift retainer assembly and the gearshift cables. The gearshift retainer is connected to the transmission via the gearshift cables to separate the external gearshift mechanism from the vehicle body to reduce the vibration. 4 damping rubber pads are installed on the base.



A3404001

Item	Description	Item	Description
1	Gearshift supporting seat assembly	3	Gearshift dust cover
2	Gearshift handle	4	Base installing ring

Gearshift Control Cables Assembly



A3404003

Item	Description	Qty.	Item	Description	Qty.
1	Flexible clip	3	4	Hex flange nut	2
2	E-type clip	2	5	Washer	2
3	Gearshift control cables assembly	1			

Symptom Diagnosis and Testing

Inspection and Verification

1. Verify the customer concern and reset the fault as necessary.
2. if the customer's concern can't be found, carry on a road test or a visual inspection according to the table:

Visual Inspection Chart

Mechanical Component
• Obviously damaged or worn components
• loosed or lost nuts or bolts

3. If the fault can be identified obviously, repair it.
4. If the fault can not be identified obviously, carry out a precise inspection according to the symptom chart.

Symptom Chart

If there is a symptom but no diagnosis trouble code (DTC) is stored in control module and can not confirm the symptom reasons in basic inspect, it is necessary to diagnosis and eliminate the symptoms in the following chart.

Symptom	Possible Sources	Action
• Difficult operation of the gearshift mechanism	• Distorted connection of the external gearshift mechanism	• Adjust the external gearshift mechanism
	• Damaged gearshift lever	• Difficult operation of the gearshift mechanism diagnosis
	• Gearshift cable connection	

Difficult Operation of Gearshift Mechanism Diagnosis

Test conditions	Details/Results/Actions
1. Inspect the tire	
	A.Separate the gearshift lever from the transmission. Does the external gearshift mechanism operate difficultly? **Y** Remove the gearshift lever to locate the default components. **Refer to: Gearshift Mechanism (3.3.4 Manual Transmission - External Control, Removal and Installation).** **N** Go to step 2.
2. Inspect the gearshift cables	
	A.Remove the gearshift cable from the transmission. Are the cables damaged? **Y** Locate the fault, replace the damaged cable. **Refer to: Gearshift Mechanism (3.3.4 Manual Transmission - External Control, Removal and Installation).** **N** Transmission fault.

Removal and Installation

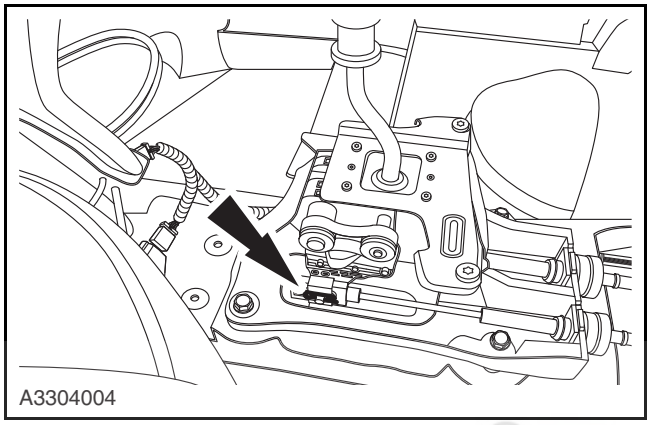
Gearshift Mechanism

Removal

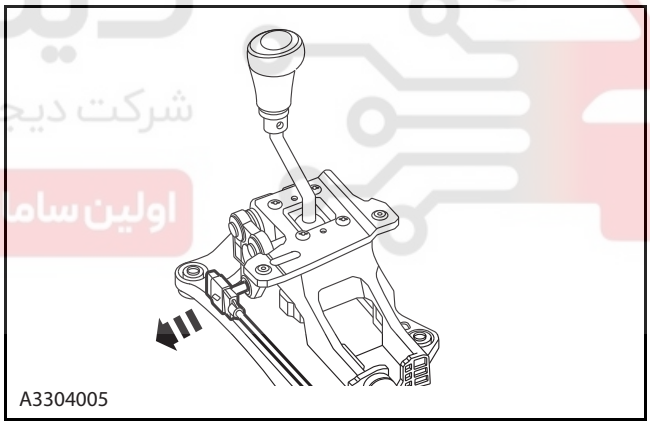
1. Remove the center console assembly.

   Refer to: Console (5.1.6 Instrument Cluster and Console, Removal and Installation).

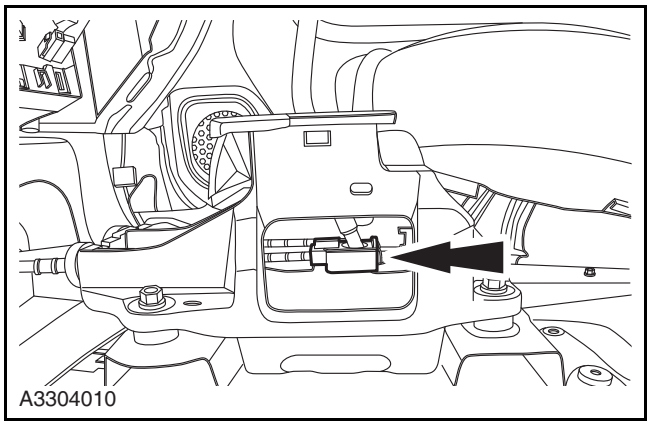
2. Remove the gear selector cable circlip.


A3304004

3. Separate the gear selector cable from the gearshift lever.

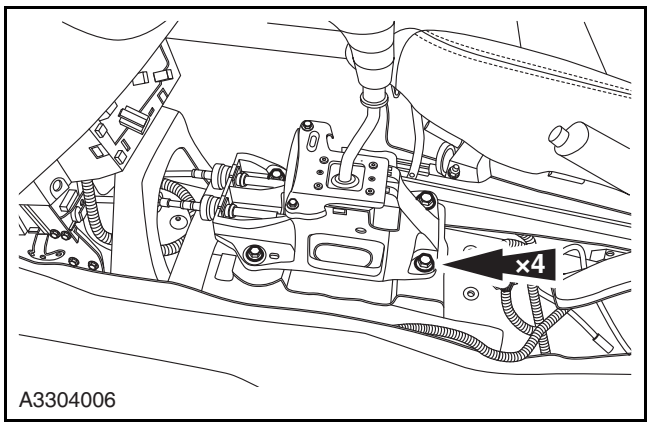

A3304005

4. Remove the gearshift cable circlip, and separate the gearshift cable from the gearshift lever.


A3304010

5. Remove 4 retaining bolts of gearshift mechanism.

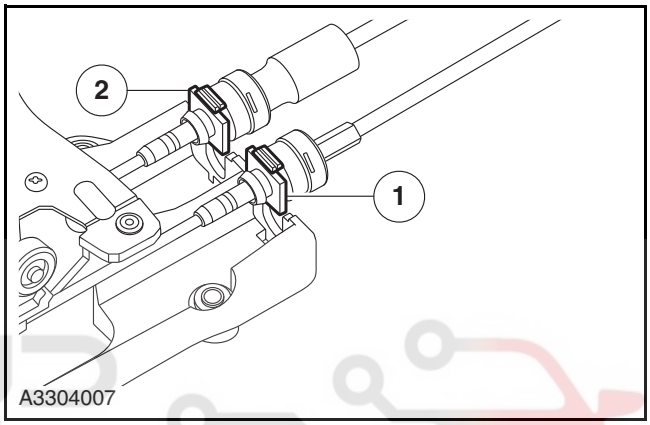
   Torque: 23 Nm



6. Remove the gearshift mechanism.

   1. Pull up the gearshift cable sleeve cap and separate the gearshift cable.

   2. Pull up the gearshift cable sleeve cap and separate the gearshift cable.



Installation

1. To install, reverse the removal procedure.

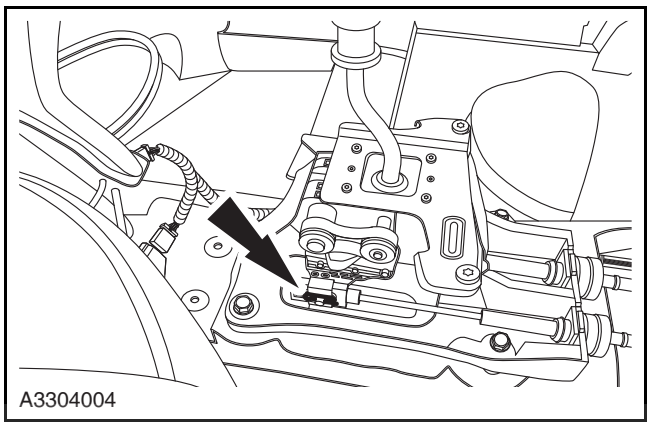
Gearshift Control Cables

Removal

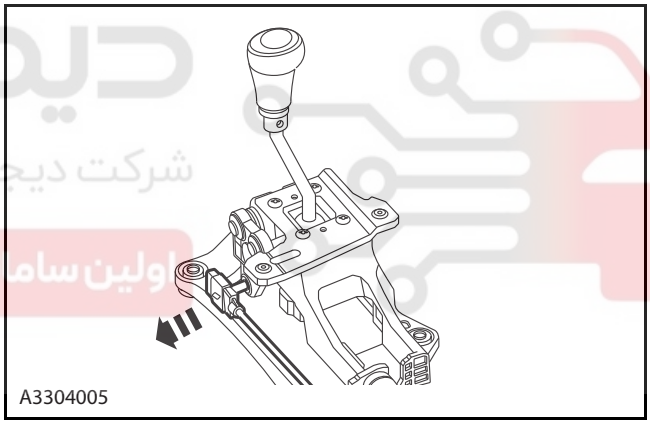
1. Remove the center console assembly.

   Refer to: Console (5.1.6 Instrument Cluster and Console, Removal and Installation).

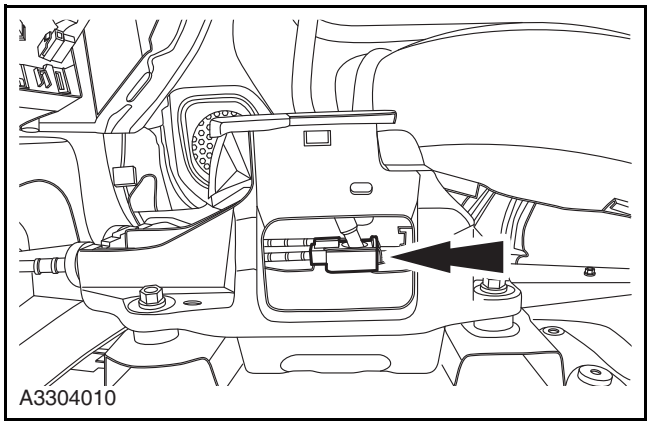
2. Remove the gear selector cable circlip.



3. Separate the gear selector cable from the gearshift lever.



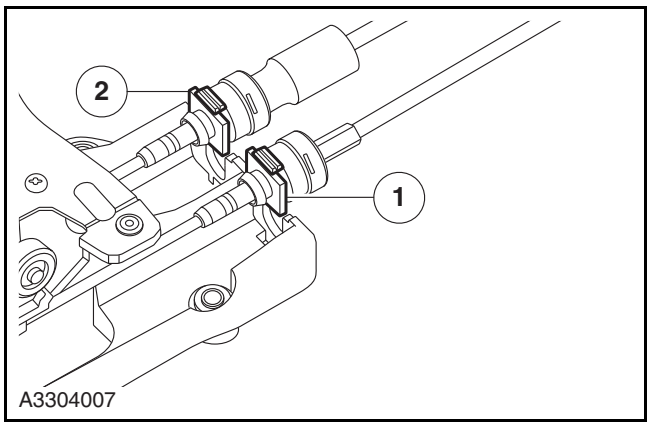
4. Remove the gearshift cable circlip, and separate the gearshift cable from the gearshift lever.



5. Remove the gearshift mechanism.

1. Pull up the gearshift cable sleeve cap and separate the gearshift cable.

2. Pull up the gearshift cable sleeve cap and separate the gearshift cable.



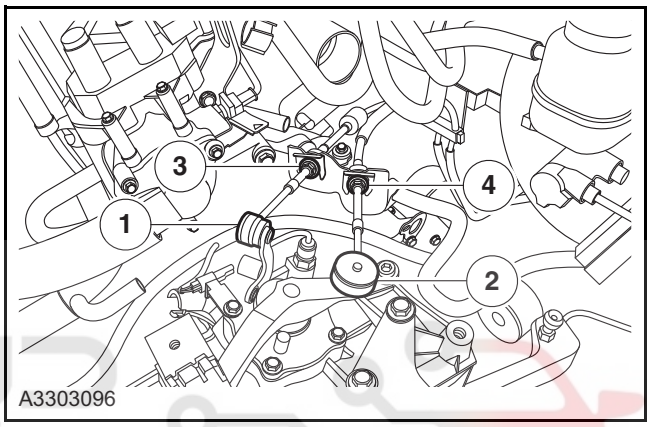
6. Separate the gearshift cable from the transmission.

1. Remove gearselect cables circlip.

2. Remove gearshift cables circlip.

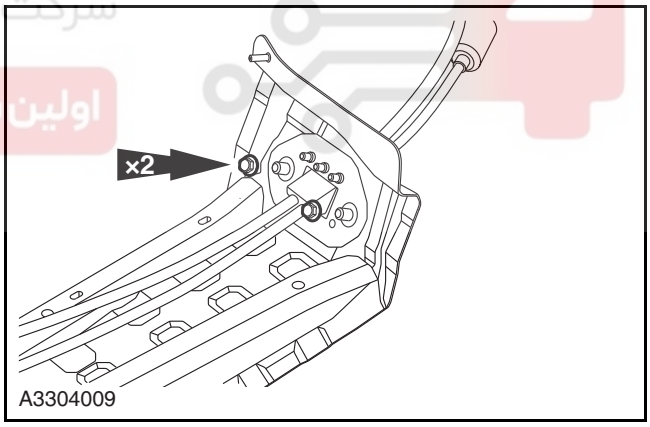
3. Remove the gearselect cable E clip and take out the gearselect cable.

4. Remove the gearshift cable E clip and take out the gearshift cable.



7. Remove gearshift control cable and front wall connecting nut.

Torque: 23 Nm



Installation

1. To install, reverse the removal procedure.