



03- Transmission

Manual transmission assembly	3-725
Technical specifications	3-725
Precautions	3-727
Preparation	3-728
Structure and installation location..	3-730
General Inspection.....	3-738
Operating Principle	3-740
Diagnostic Information and Procedures	3-743
Removal and Installation	3-752
Disassembly and installation	3-768

03

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Manual transmission assembly



03

Manual transmission assembly

Technical specifications

Technical specifications

Transmission model	L5MF25E1 (LD525MFA20)	
Transmission type	5MT	
Reduction ratio	1 gear	3.889
	2 gear	2.118
	3 gear	1.458
	4 gear	1.091
	5 gear	0.814
	R gear	3.6
	Final drive	4.0625
Gear oil capacity	2±0.1L	

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Torque Specifications

Name	Torque range	
	Metric (Nm)	British (lb-ft)
Transmission drain plug	25	18
Transmission filler plug	25	18
Reverse-gear rocker bracket bolts	23	17
Connecting bolts between the transmission housing and clutch housing	23	17
Cable bracket fixing bolt	23	17
Output pressure plate nuts	26	19
Reverse-gear stop block locking bolts M8x32M8x32	20	15
Reverse-gear stop block locking bolts M8x38	20	15
Transmission housing end face bolts	20	15
Fork support bolt	20	15
Shift box bolt	20	15
Balancing weight tape reel nuts	26	19
Output shaft locking bolt	105	77
Fifth-gear shifting fork locating pin bolts	23	17
Fifth input gear reserve and shift guide block bolts	20	15
End cap bolt	10	7

Precautions

Maintenance precautions

1. For maintenance work, it is necessary to use sealant or the equivalent. Apply the sealant to corresponding position on the surface of the transmission housing. If the housing is made of aluminum, the fastening bolts on the housing must be fastened to a specific torque with a torque wrench. In addition, it is very important to clean all the parts with the detergent or cleaning solution and dry air before reinstallation.
2. Compressed air tools can cause dust and other particles to fly out, resulting in damage to the eyes; so you should wear goggles in the use of compressed air.
3. Check and make sure that all parts are cleaned before assembling the transmission (except rubber parts and gaskets).
4. Replace all disposable parts (all kinds of oil seals, spring pins, O seals, etc.).
5. When sealing elements are installed, it is necessary to clean the residual sealant on the bonding surface.
6. To ensure that the sealing elements are oil-tight, the assembly should be completed within 3 minutes after the sealant is applied.
7. The removed rings, bearings, oil covers, etc. cannot be reused.
8. All bolts and nuts must be tightened in accordance with the specified tightening torque.
9. When installing the moving parts, apply some gear oil to these moving places, and then use some lubricating grease to the seal lips.
10. When the bearings are installed, do not use any rolling body to transfer the pressure. The oil seal can not be tilted during the installation process.
11. When the transmission is working normally, there shall be no leakage of lubricating oil.
12. Old clamping rings must be replaced with new ones, and the new clamping rings installed in place shall not be excessively open so as to avoid deformation.
13. The bolts and nuts used to fix the end caps, housings or brackets shall be loosened or tightened diagonally.

Third-level maintenance of transmission

First-level maintenance

1. In first-level maintenance, we should check the lubricant level which should be aligned to the lower edge of the filler port; add lubricant when the level is low, because too low level may cause poor lubrication and burn the bearings and gears, while too high oil level may cause overheating and oil spills.
2. In first -level maintenance, we should remove the ventilation valve for inspection and cleaning, because ventilation valve blockage will result in too high internal pressure and thus transmission fluid leakage.

Level II Maintenance

1. In the first second-level maintenance for a new car, replace the transmission lubricant and clean the transmission with kerosene.
2. After the first second-level maintenance, regularly check the quality of the lubricant.
3. In case the lubricant becomes diluted, thick, dirty and so on, it should be replaced.

Level III Maintenance

1. For third-level maintenance, we should conduct disassembling inspection, cleaning and replacement of oil.



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Manual transmission assembly

Preparation

Special maintenance tools

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Manual transmission assembly



03

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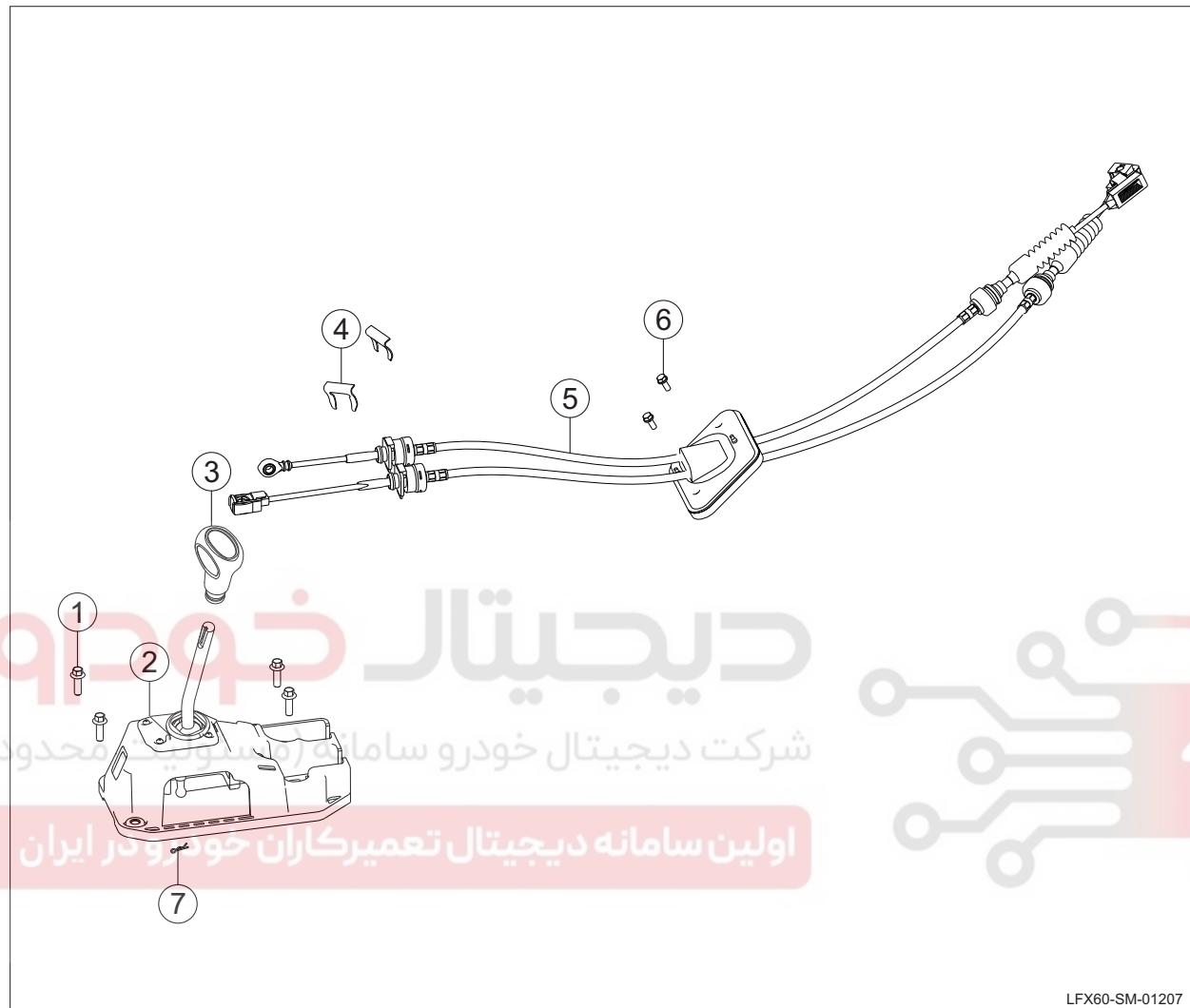


3-729

Structure and installation location

Part exploded view

Gear shift control device



No.	Part name
1	Gear shift device fixing bolt
2	Gear shift device
3	Handle ball assembly
4	U-shaped clip

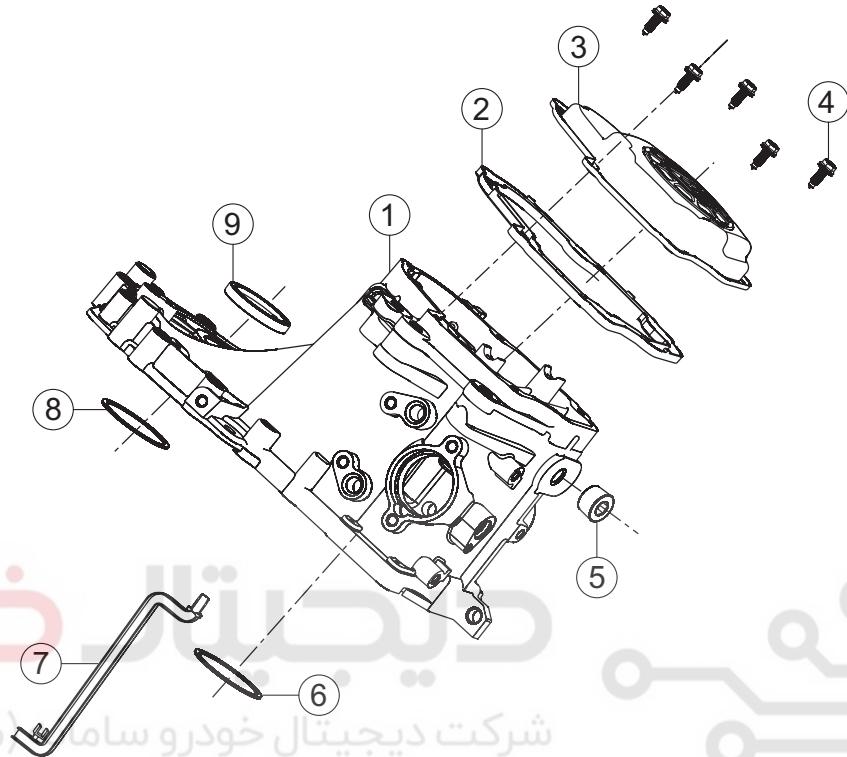
No.	Part name
5	Gear shift cable assembly
6	Gear shift cable fixing bolt
7	Lock pin

Manual transmission assembly

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Transmission housing

03



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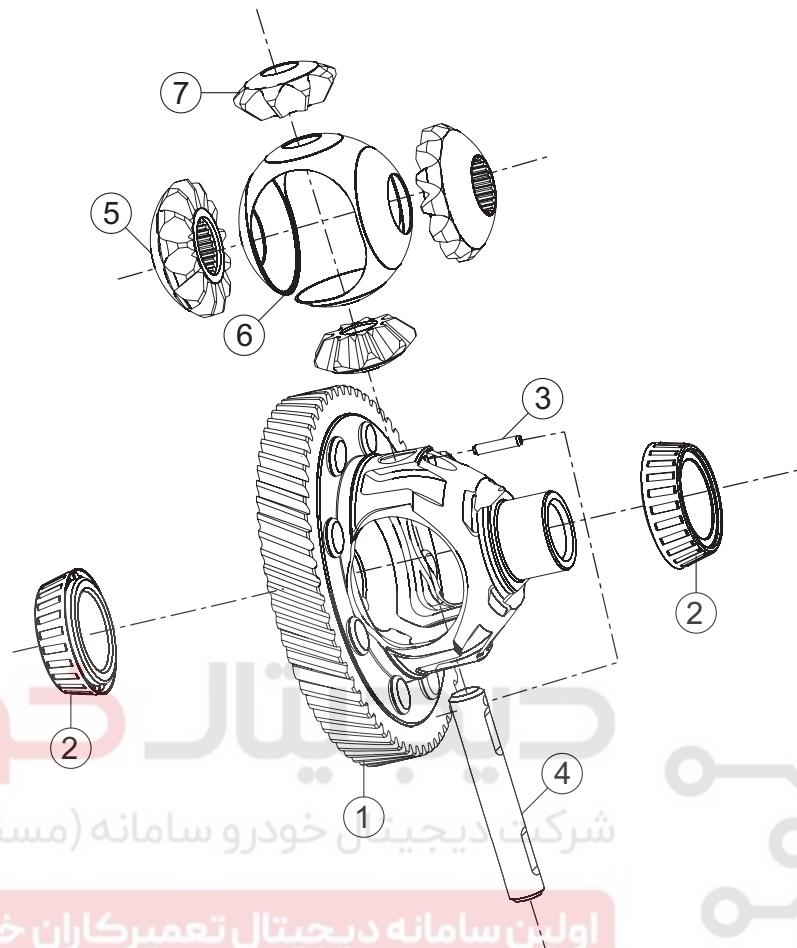
LFX60-SM-03400

No.	Part name
1	Transmission housing
2	End cap sealing gasket
3	End cap
4	End cap bolt
5	Drain bolt

No.	Part name
6	Input shaft rear bearing adjusting gasket
7	Oil guide groove
8	Differential bearing adjusting gasket
9	Differential left oil seal

3-731

Differential housing assembly



LFX60-SM-03401

No.	Part name
1	Differential housing assembly
2	Differential bearing
3	Elastic cylindrical pin $\Phi 5$
4	Planetary gear shaft

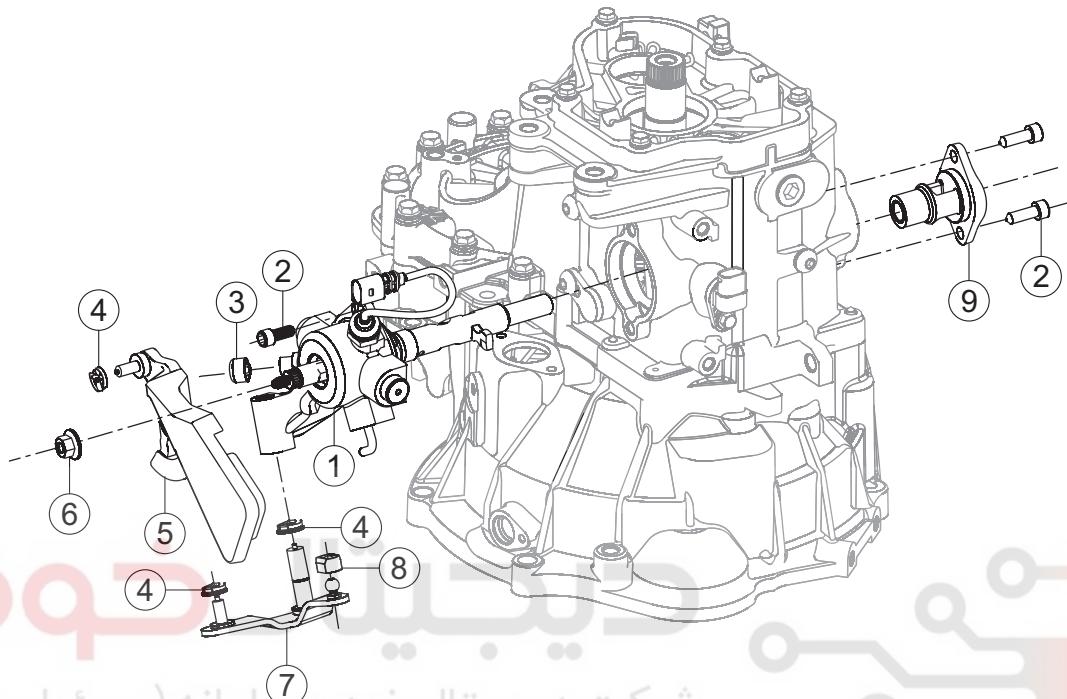
No.	Part name
5	Half axle gear $\Phi 5$
6	Planetary half axle gear gasket
7	Planet gear

Manual transmission assembly



Gear shift box

03



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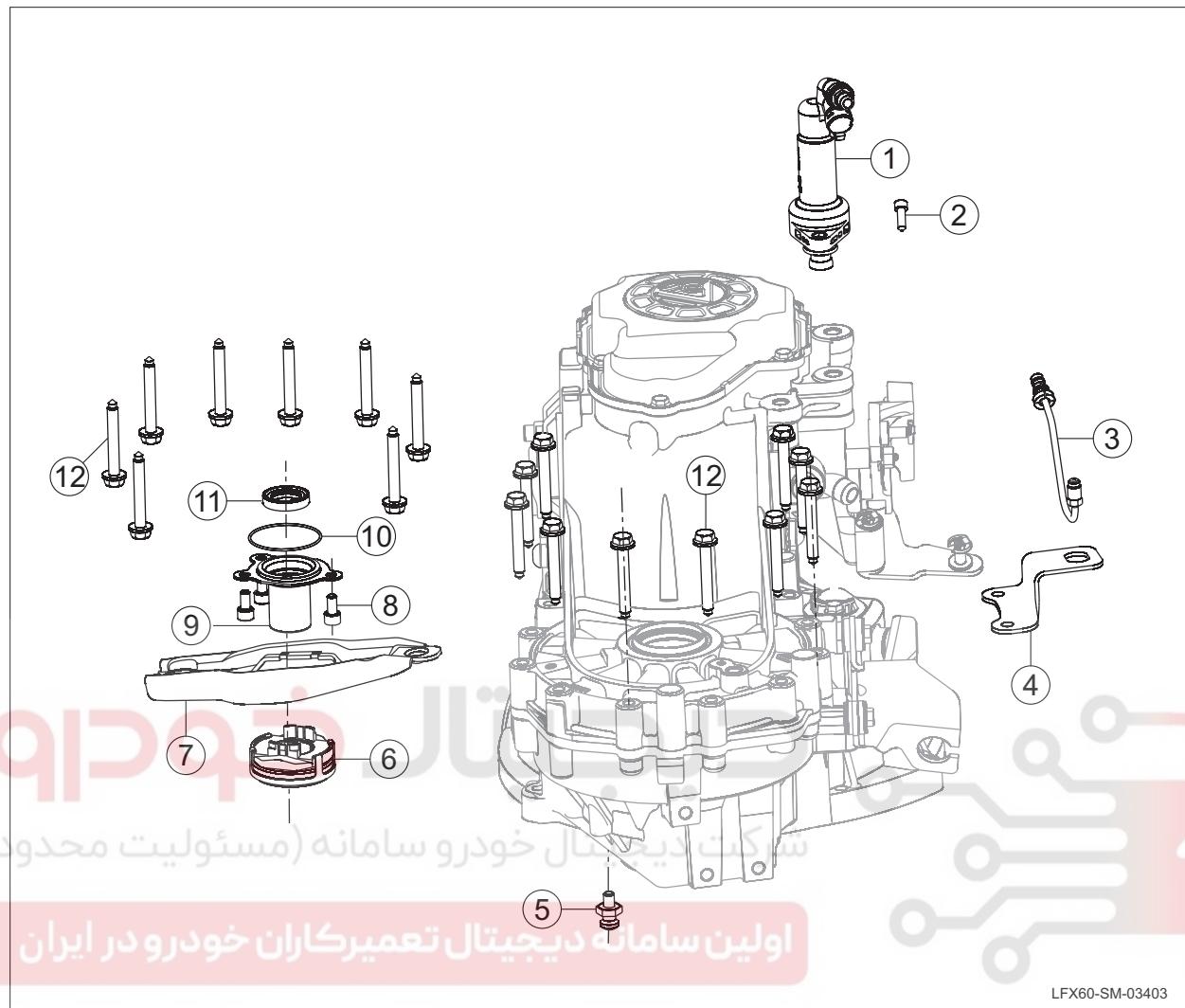
No.	Part name
1	Gear shift box assembly
2	Gear shift box bolts
3	Vent hole blocked
4	Transposition rocker clip
5	Gear shift rockers

No.	Part name
6	Gear shift rocker tape reel nuts
7	Gear shift rocker components
8	Gear shift rocker pin bush
9	Gear shift box rear base

3-733



Appearance accessories



No.	Part name
1	Clutch slave cylinder
2	Clutch slave cylinder bolts
3	Slave cylinder pipe
4	Slave cylinder pipe bracket
5	Release fork support beam
6	Release bearing

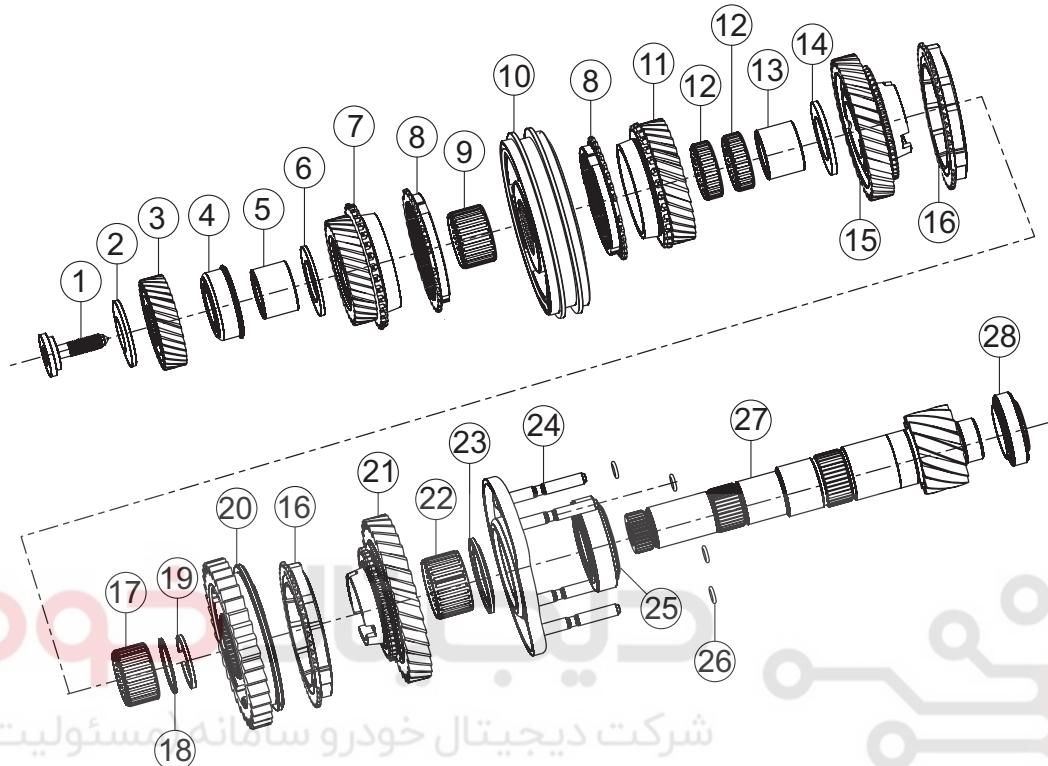
No.	Part name
7	Flywheel
8	Input front bolts
9	Front end cap of input shaft
10	Input shaft cap oil seal
11	O-ring on front end cap of input shaft
12	Connecting bolt

Manual transmission assembly

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Output shaft

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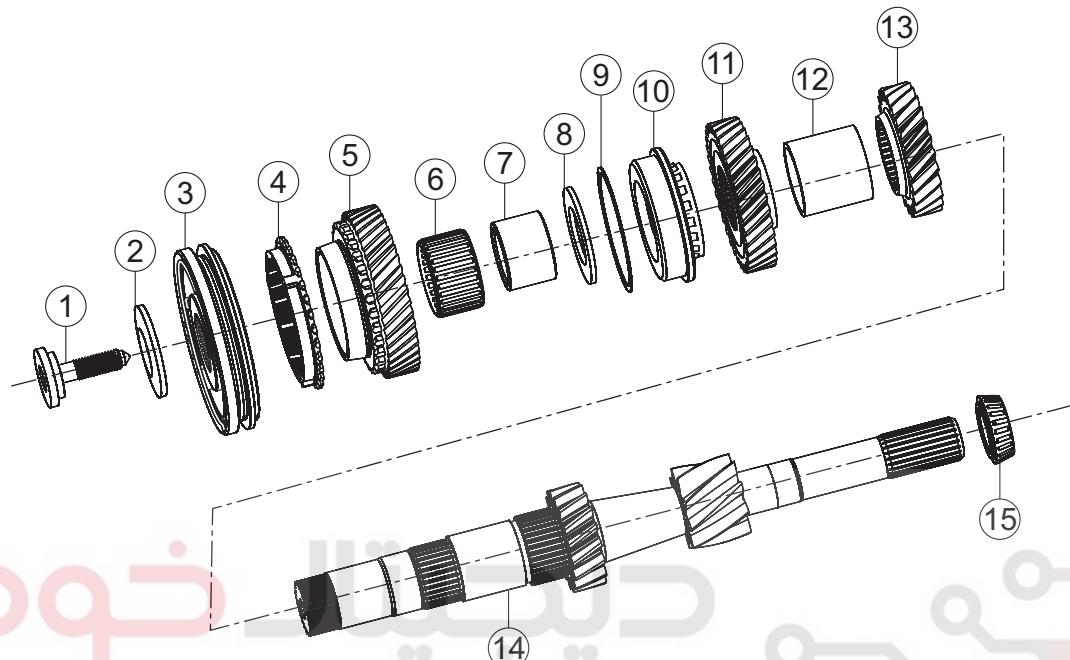
LFX60-SM-03404

No.	Part name
1	Output shaft locking bolt
2	Locking bolt washer
3	Output shaft 5 th gear
4	Output shaft rear bearing
5	Fourth-gear sleeve of output shaft
6	Fourth-gear gasket of output shaft
7	Fourth-gear assembly of output shaft
8	Third- and fourth-gear rings of output shaft
9	Needle bearing of the fourth output gear
10	Third and fourth output gear synchronizer assembly
11	Third -gear assembly of output shaft
12	Needle bearing of the third gear
13	Output shaft 3 rd sleeve
14	Output shaft 2 nd washer

No.	Part name
15	Output shaft 2 nd gear assembly
16	Gear ring assembly of the first and second gears
17	Needle bearing of the second gear
18	Second gear gasket of output shaft
19	1 st – 2 nd gear synchronizer retainer
20	1 st – 2 nd gear synchronizer assembly
21	Output shaft 1 st gear assembly
22	Output shaft 1 st gear needle roller bearing
23	Output shaft 1 st gear washer
24	Intermediate shaft pressure plate of output shaft
25	Output shaft intermediate bearing
26	O-ring of output shaft pressure plate
27	Output shaft
28	Front bearing of output shaft

3-735

Input shaft



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LFX60-SM-03405

No.	Part name
1	Output shaft locking bolt
2	Locking bolt washer
3	Fifth gear synchronizer assembly
4	Fifth gear ring
5	Fifth gear assembly of input shaft
6	Needle bearing of the fourth gear
7	Input shaft 4th gear sleeve
8	Input shaft 4th gear washer

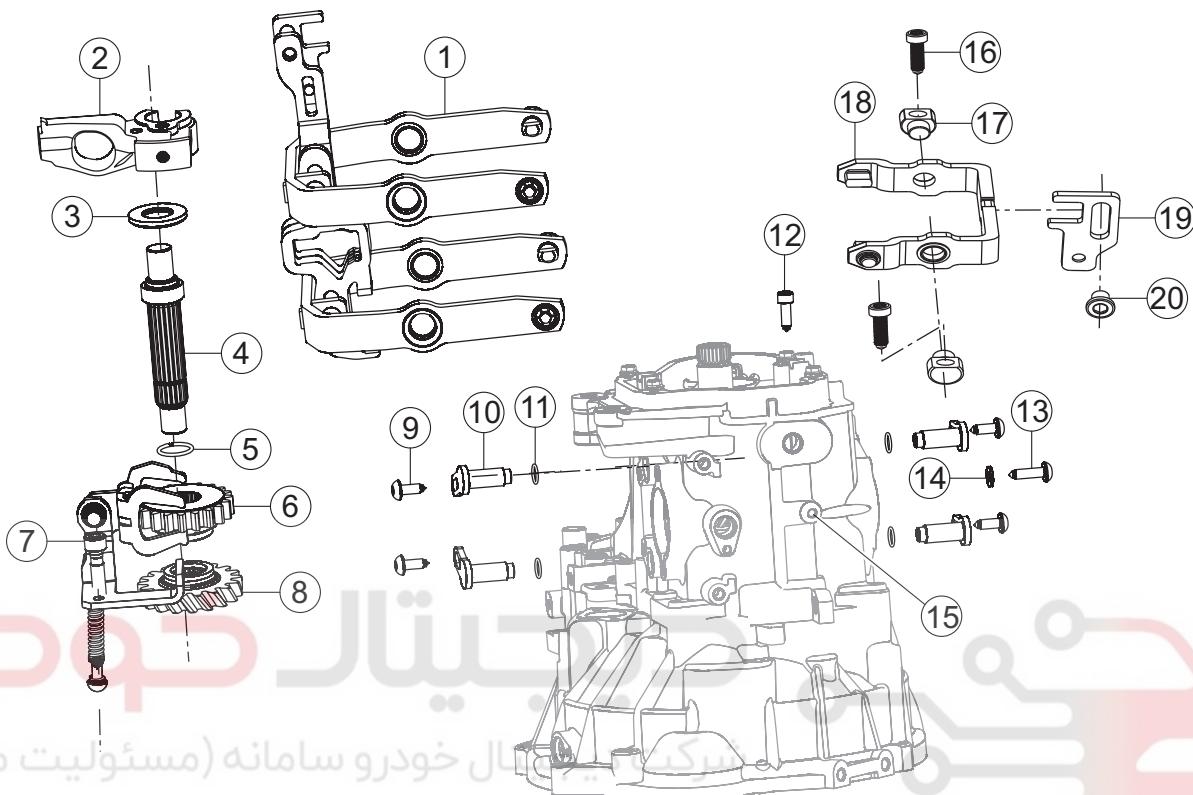
No.	Part name
9	Fourth gear adjusting gasket of input shaft
10	Rear bearing of input shaft
11	Fourth gear of input shaft
12	Third- and fourth- gear spacer bush of input shaft
13	Third gear of input shaft
14	Input shaft
15	Front bearing of input shaft

Manual transmission assembly

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Gear shift mechanism

03



LFX60-SM-03406

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No.	Part name
1	Shifting fork assembly
2	Reverse gear stop block assembly
3	Reverse gear thrust bearing
4	Reverse gear shaft
5	Reverse gear shaft clamp spring
6	Reverse gear pinion
7	Reverse gear rocker bracket assembly
8	Constant mesh gear of reverse gear
9	Fork support bolt
10	Release fork support beam components

No.	Part name
11	R-ring of release fork support beam
12	Transmission housing endface bolt
13	Reverse-gear stop block locking bolt I
14	Bolt gasket of reverse gear shaft
15	Reverse-gear stop block locking bolt II
16	Shifting fork assembly bolts of the fifth gear
17	Shifting fork locating pin of the fifth gear
18	5 th gear shift fork
19	Reverse and shift guide block of the fifth input gear
20	Reverse and shift guide block bolts of the fifth input gear

3-737



General Inspection

General Inspection

Visually check all parts for damage or excessive/uneven wear, and replace the damaged or worn parts that affect the normal performance.

Inspection Items:

- Burr: Locally raised edges on materials.
- Debris: Broken or fractured pieces or particles.
- Crack: Partially or completely separated surface crack from materials.
- Excessive wear: Exceptional wear or obvious wear beyond the normal degree.
- Distortion: Material slip caused by heavy pressure.
- Bonding: Soft metal particles are torn and adhered to hard metal surfaces.
- Grooves: Local crack or recess, usually the transfer of material rather than loss.
- Pitting: Metal surface stretch under contact pressure, where the heat generated by the metal friction causes color change.
- Stepped wear: Can see or feel the steps due to excessive wear between the adjacent contact surface and the non-contact surface.
- Uneven wear: Local unevenly distributed wear, including holes, bright spots, uneven polishing, and other visible signs.

Transmission inspection

1. Inspect the transmission housing for damage, cracks or other defects; if any, repair or replace the damaged parts.
2. Check the transmission for oil leakage; if there is oil leakage, repair leakage place.
3. Start the engine, step on the clutch, check the transmission the gears for smoothness, accuracy and abnormal sound; if problematic, solve the problem.

Transmission fluid inspection

1. Make sure the car is level and lift the car to check the oil level.
2. Check the transmission for leakage. If there is oil leakage, repair the problem in a timely manner.

3. Remove the transmission filler plug, and roughly check the oil level via the filler port. Remove the filler plug, if the transmission fluid spills from the port or you can see the transmission fluid has reached the port, then the oil level is normal. Otherwise, add transmission fluid up to the filler port.
4. Filling capacity: 2.0L.
5. Observe the quality of the transmission fluid, and replace it if it has deteriorated.

Shifting gears properly

1. The driver must drive the car properly, and start the car using the first gear. The engine should keep a relatively high speed in order to maintain sufficient power to avoid the shift impact due to lack of engine power. Use the appropriate gearshift timing and corresponding gear suitable for the current road conditions to avoid shift impact and sudden quick acceleration. It is strictly forbidden to downshift in non-emergency situations because forced downshift will exacerbate the early damage to the synchronizer and shift mechanism.
2. Choose the appropriate gearshift timing and do it in a normal manner. When shifting the gear, the clutch should be completely separated; do it softly instead of suddenly so as to synchronizer failure.
3. Don't start at a high speed so as to avoid gears collision.
4. While the car is traveling, do not always put the hand on the shift lever so as not to form premature wear on the shifting fork.
5. Reverse gear belongs to straight tooth slide type without reverse gear synchronizer, so you should first stop the car before using the reverse gear, or the reverse gear pair will collide with each other. Second, you must step on the clutch pedal for 1 ~ 2s before gently shifting the lever to avoid shift impact. Sometimes it's hard to move the lever to the reverse gear, and you can step on the clutch before doing it again.

Manual transmission assembly



Full lubricating

1. Use the specified lubricants instead of low-quality lubricants, and different grades of lubricants can not be mixed.
2. Transmission gets lubricated by splash lubrication method. Add lubricant as required. That is: After the car is parked on the road, add lubricant to the filler port.

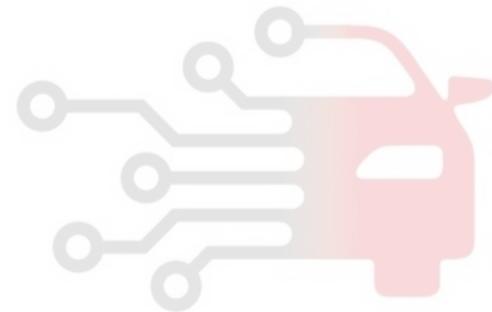
Internal cleaning

● Note

Check the magnet for metal chipping before cleaning. The large and granular or irregular particles indicate there is cracking or similar damage; the small and dusty chipping indicates there is uneven or excessive wear. In case the metal chipping is found, ensure to carefully check the revolving parts and the matching parts for damage and wear.

1. Wash the parts in cleaning agent to remove the residual lubricants and deposits. Remove the deposits from holes with a brush. The parts that cannot be cleaned with a brush should be cleaned carefully, and don't scratch their metal bonding surfaces.
2. Dry the parts with low-pressure (max. 20psi) of compressed air. Don't wipe with a cloth because fiber may be left.

03



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3-739



Operating Principle

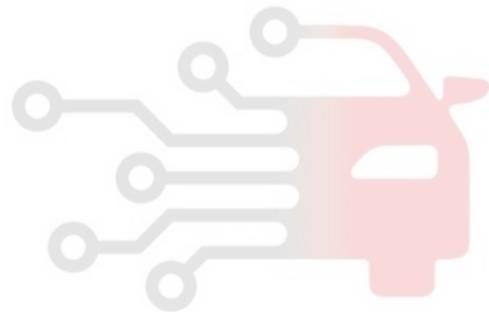
System Overview

The transmission provides five forward gears and one reverse gear through 3 synchronizers and an axis-input shaft, an intermediate shaft and a reverse gear shaft. All gears are constant mesh gears, yet the reverse gear is a combination of a constant mesh and a sliding gear. The first and second gears' synchronizer is mounted on the output shaft and interlocked with the first or second gear of the output shaft; the third and fourth gears' synchronizer is also mounted on the output shaft and interlocked with the third or fourth gear of the output shaft. The fifth gear synchronizer on the input shaft is meshed with the fifth gear mounted on the input shaft. The output shaft drives the main reduction gear and the differential device to force the front wheel driving shaft. For maintenance work, it is necessary to use sealant or the equivalent. Apply the sealant to corresponding position on the surface of the transmission housing. If the housing is made of aluminum, the fastening bolts on the housing must be fastened to a specific torque with a torque wrench. In addition, it is very important to clean all the parts with the detergent or cleaning solution and dry air before reinstallation.

Gear shift mechanism

- The movement of gear shift lever drives the transmission shaft and the shift shaft via the transmission control shaft, then driving the transmission, shift lever, and fork via the transmission arm and yoke. The shift mechanism contains shift box assembly, rear end cover of shift box, shift shaft, shift positioning seat, reverse gear switch, shift rocker assembly, transposition rocker assembly, transposition rocker clip, transposition pin bushes 1 and 2, and balancing weight tape reel nuts; the internal shift mechanism contains reverse-gear rocker bracket assembly, shifting fork assembly, fifth-gear shifting fork, fifth reverse gear shifting fork guide block and bolts.

- In the shift mechanism, when shift rocker assembly and transposition rocker assembly change their positions, the shift pendulum in shift shaft assembly drives the shifting fork to realize the conversion between "R", "N" and "gears 1~5".
- Except the third and fourth gears that can be shifted directly, you have to push the lever to "N" first for the other gears.
- If we need to push the lever to "R", we've to release the lock of the entire lever retainer; if not, we cannot shift to "R".



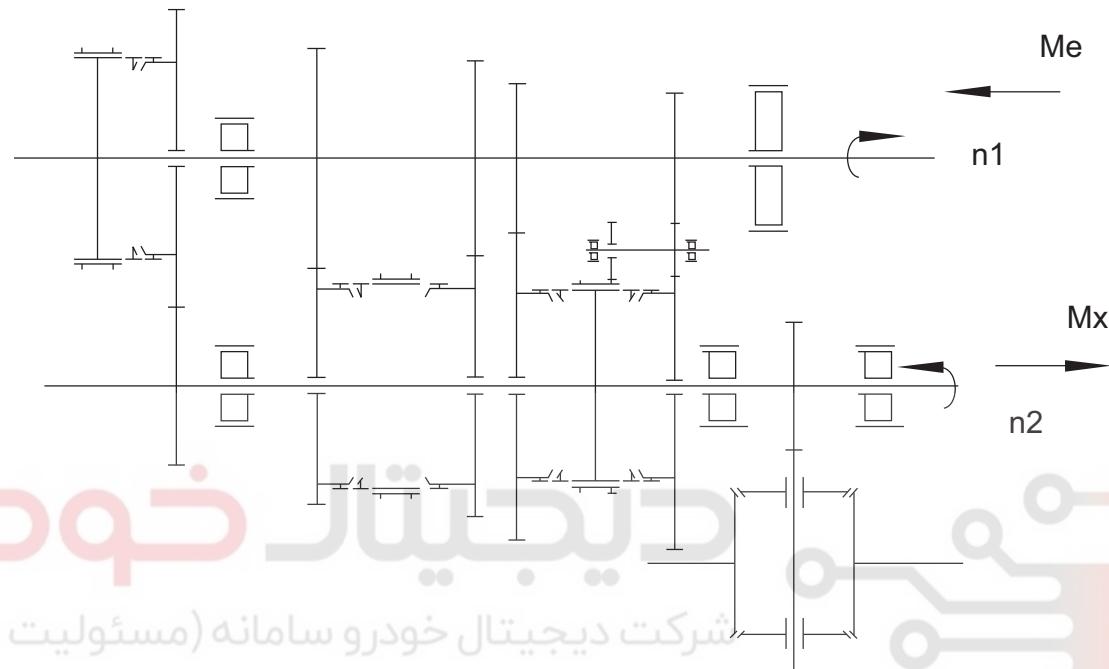
Manual transmission assembly



Variable-speed power transmission line

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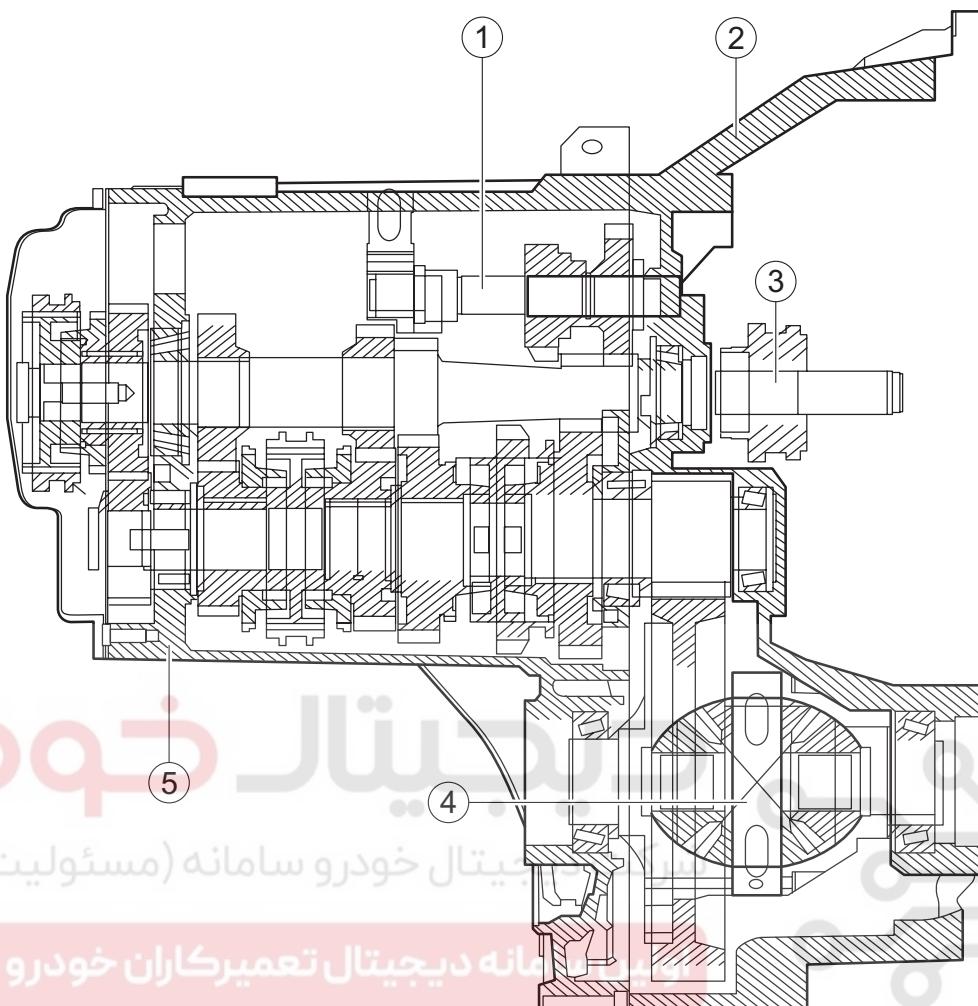
V IV III II R I



LFX60-SM-01075

3-741

Structure diagram of transmission



LFX60-SM-01074

No.	Part name
1	Reverse gear shaft
2	Clutch housing
3	Input shaft

No.	Part name
4	Differential
5	Transmission housing

Diagnostic Information and Procedures

Diagnosis Instructions

Before starting to diagnose a fault in the manual transmission, familiarize yourself with the operating principle of the transmission, and then start the transmission diagnostics, which helps to determine the correct troubleshooting steps in the event of a failure. More importantly, this also helps to determine whether the customer's situation belongs to normal operation.

Any troubleshooting of the manual transmission should begin with the transmission check, so as to instruct the service personnel to take the next logical step to troubleshoot. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

General equipment

Spacer gauge

Circlip pliers

Visual Inspection

1. Confirm the problem of the customer.
2. Visually check whether there is any obvious mechanical or electrical damage sign.

Visual inspection table

Mechanical	Electrical
<ul style="list-style-type: none"> • Transmission fluid seal • Transmission housing • Transmission fasteners • Transmission shift lever • Transmission shift mechanism 	<ul style="list-style-type: none"> • Gear switch • Reverse lamp switch • Fuse • Wiring harness • Electrical connector

3. If the observed or proposed problem is obvious and its cause is identified, rectify the cause before proceeding with next step.
4. If for the problem, there are no obvious findings, then confirm the fault and refer to the symptom table.



List of fault symptoms

Symptom	Possible point of failure	Recommended Measures
Transmission leakage	• The transmission oil is excessive, and the oil level is too high	• Check and restore the oil level
	• Drain plug is loose	• Tighten the drain plug
	• Transmission fluid seal damaged	• Check and replace the transmission fluid
	• Transmission housing damaged	• Replace the transmission housing Refer to: Disassembly and assembly of transmission
	• Sealing gasket damaged	• Check and replace the transmission sealing gasket
	• Air vent blocked	• Clean and dredge the air vent
Transmission noise or abnormal sound	• Transmission fasteners get loose	• Tighten the transmission fasteners
	• Transmission suspension parts are abnormal	• Check and replace the abnormal transmission suspension parts
	• Transmission fluid shortage	• Add transmission fluid to the specific level
	• Transmission fluid gets dirty	• Replace the transmission oil Refer to: Steps to drain and add transmission fluid
	• Transmission bearing wear	• Check and replace the transmission bearing Refer to: Disassembly and assembly of transmission
	• Gears are severely worn or broken	• Check and replace the damaged gear Refer to: Disassembly and assembly of transmission
	• Gear surface bump or pitting	• Check and replace the damaged gear Refer to: Disassembly and assembly of transmission
	• Internal damage of clutch	• Check the clutch plate and pressure plate; replace the damaged parts Refer to: Diagnostic process for transmission noise or abnormal sound

Symptom	Possible point of failure	Recommended Measures
Difficulty in gear shift	• Clutch brake fluid is want	• Check and add brake fluid
	• Clutch system air influx	• Clutch system air discharge Refer to: Clutch bleed procedures
	• Clutch master cylinder fault	• Check and replace the clutch master cylinder Refer to: Replacement of clutch master cylinder
	• Clutch slave cylinder fault	• Check and replace the clutch slave cylinder Refer to: Replacement of clutch wheel cylinder
	• The clutch is not properly adjusted and the separation is not complete	• Check and adjust the clutch
	• Synchronizer gear ring damaged	• Check and replace the damaged components Refer to: Disassembly and assembly of transmission
Shift mechanism is difficult to act	• Shift mechanism improperly adjusted	• Adjust the shift mechanism Refer to: Diagnosis process for gear shift problem
	• External shift mechanism deformed	• Check and replace the damaged components
Transmission out of gear	• Shift level damaged	• Check and replace the shift lever Refer to: Replacement of shift lever
	• Fork shaft severely worn or deformed	• Check and replace the fork shaft
Transmission out of gear	• Shifting fork severely worn or deformed	• Check and replace the shifting fork Refer to: Disassembly and assembly of transmission
	• Gear axial clearance excessive, and gear gasket severely worn	• Check and adjust the gear axial clearance
	• Fork support beam or bearing worn or deformed	• Check and replace the worn or damaged parts
	• Synchronizer hub, gear sleeve or ring worn	• Check and replace the synchronizer Refer to: Disassembly and assembly of transmission
	• Shift mechanism worn or damaged	• Check and replace the shift mechanism
	• Fork shaft positioning ball and spring worn or damaged	• Check and replace the damaged components Refer to: Diagnostic process for transmission out of gear



Diagnostic process for transmission noise or abnormal sound

● Note

In order to avoid personal injury caused by control errors, the road test should be carried out by two people for driving safety.

Test condition	Details/results/measures
1. General inspection.	<p>A. Check if the engine and transmission support are broken, missing or damaged. B. Check if the transmission is interfering with the exhaust pipe and body. Is it OK after checking? →Yes To step 2. →No Repair the fault position.</p>
2. Check the transmission fluid.	<p>A. Check if the transmission fluid level is normal. B. Check if the transmission is dirty. Is it OK after checking? →Yes To step 3. →No Restore or replace the transmission fluid. Refer to: Steps to drain and add transmission fluid</p>
3. Check the noise at the beginning of the clutch separation.	<p>A. Start the engine, and gently step on but don't floor the accelerator pedal. Is there any noise? →Yes Clutch release bearing noise; replace the clutch release bearing. Refer to: Replacement of clutch release bearing →No To step 4.</p>
4. Check the noise when the clutch is engaged.	<p>A. Remove the transmission. Refer to: Replacement of transmission assembly B. Check the clutch plate and clutch pressure plate. Is it OK after checking? →Yes To step 5. →No Replace the clutch assembly. Refer to: Replacement of clutch assembly</p>

Manual transmission assembly



Test condition	Details/results/measures
5. Check the noise when the lever is geared and stays at "N".	<p>A. Start the engine for road test, and check the noise when the lever is geared and stays at "N". Make sure if the transmission is noisy.</p> <p>→Yes Repair the transmission. Refer to:Disassembly and assembly of transmission</p> <p>→No To step 6.</p>
6. Check the noise of other systems.	<p>A. Check the noise of other systems. Confirm that the fault has been ruled out.</p>

03

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3-747



Diagnosis process for gear shift problem

Test condition	Details/results/measures
1. General inspection.	<p>A. Check the engine and transmission suspension for loosening, damage and other abnormalities. Is it OK after checking?</p>
	<p>→Yes To step 2. →No Fasten or replace the suspension device.</p>
2. Check the clutch system.	<p>A. Check if the clutch is completely separated and reliably combined. Refer to: Clutch drag diagnosis</p>
	<p>Is it OK after checking? →Yes To step 3. →No Repair or replace the damaged components.</p>
3. Check the gear lever.	<p>A. Check if the shift lever is worn, deformed, and the fasteners are loose. Is it OK after checking?</p>
	<p>→Yes اولین سال تعمیرکاران خودرو در ایران To step 4. →No Repair or replace the damaged components.</p>
4. Check the shift mechanism.	<p>A. Check if the shift mechanism is worn, deformed, and the fasteners are loose. Is it OK after checking?</p>
	<p>→Yes To step 5. →No Repair or replace the damaged components.</p>

Manual transmission assembly



Test condition	Details/results/measures
5. Check the shift fork, fork shaft, synchronizer and gears self-lock/inter-locking devices the transmission.	<p>A. Remove the transmission. Refer to: Replacement of transmission assembly</p> <p>B. Disassemble the transmission. Refer to:Disassembly and assembly of transmission</p> <p>C. Check if the transmission shift fork / fork shaft is damaged or deformed.</p> <p>D. Check if the transmission shift synchronizer is damaged.</p> <p>E. Check if the transmission self-lock / inter-locking devices are damaged.</p> <p>Is it OK after checking?</p> <p>→Yes Confirm that the fault has been ruled out.</p> <p>→No Repair or replace the damaged components.</p>

03

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اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



3-749



Diagnostic process for transmission out of gear

Test condition	Details/results/measures
1. Check the gear lever.	<p>A. Check that the shift lever is installed properly. B. Check if the shift lever and shift cable positioning components are normal. Is it OK after checking? →Yes To step 2. →No Repair the fault position.</p>
2. Check the transmission shift mechanism.	<p>A. Check that the shift transmission is installed properly. Is it OK after checking? →Yes To step 3. →No Repair the fault position.</p>
3. Check the transmission's gear self-lock and interlocking devices.	<p>A. Remove the transmission. Refer to: Replacement of transmission assembly B. Disassemble the transmission. Refer to: Disassembly and assembly of transmission C. Check if the transmission's self-lock and interlocking devices are well located. Is it OK after checking? →Yes To step 4. →No Repair the fault position.</p>
4. Check the transmission synchronizer.	<p>A. Check if the synchronizer gear sleeve or the bonding surface is seriously worn. Is it OK after checking? →Yes To step 5. →No Repair or replace the damaged components.</p>

Manual transmission assembly



Test condition	Details/results/measures
5. Check the transmission fork and fork shaft.	<p>A. Check if the transmission fork / fork shaft is deformed. Is it OK after checking? →Yes To step 6. →No Repair or replace the damaged components.</p>
6. Check the gear's axial clearance and shaft runout.	<p>A. Check if the gear's axial clearance and shaft runout are too obvious. Is it OK after checking? →Yes Reassemble. →No Repair or replace the damaged components.</p>

03

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



3-751

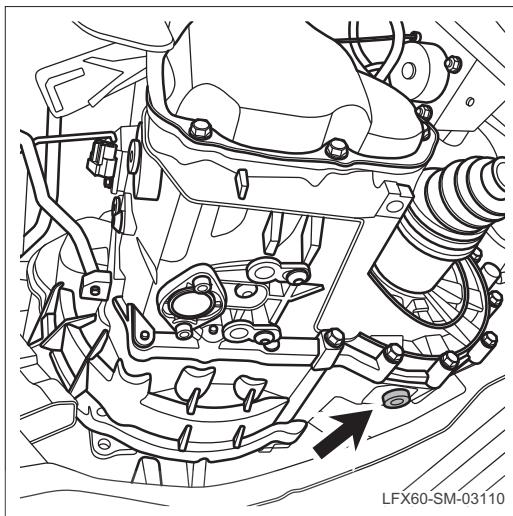
Removal and Installation

Transmission oil draining and filling procedures

Drain

1. Drain the transmission oil.

(a). Lift the vehicle. Refer to the vehicle lift and support

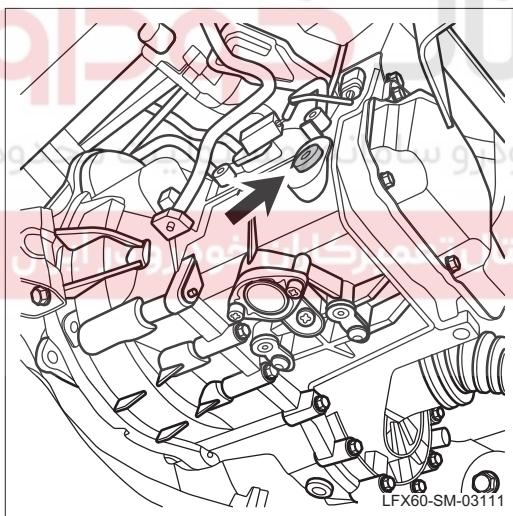


(b). Place the recovery container and remove the transmission oil drain screw plug.

① Note:

During the installation, replace the new sealing gasket.

2. Add transmission fluid



(a). Remove the filing bolts.

(b). Insert the injector's filler pipe into the transmission port, add transmission fluid, and restore the plug.

① Note

During the installation, replace the new sealing gasket.

Manual transmission assembly



Replacement of shift mechanism

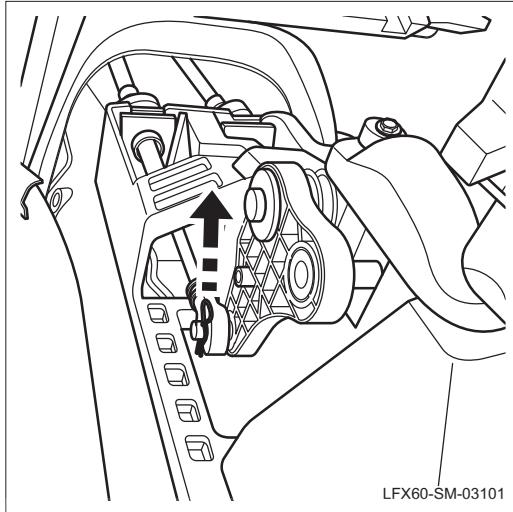
Removal

1. Remove the shift mechanism.

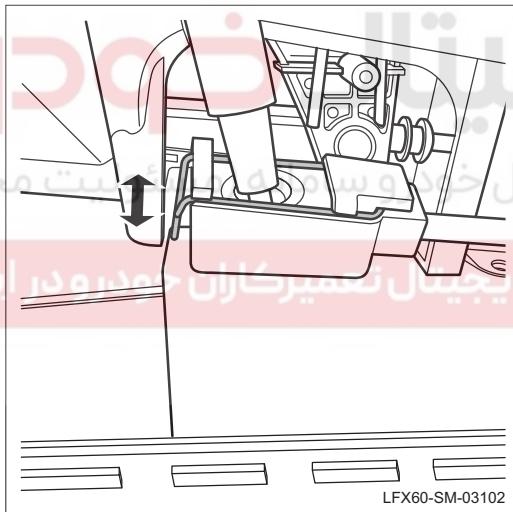
(a). Disconnect the battery negative connector.

(b). Remove the central desk. Refer to the replacement of central desk assembly.

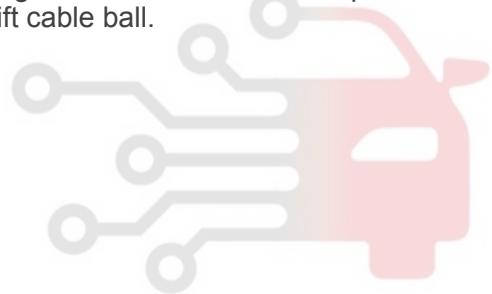
(c). Remove the left shift cable ball clamp, and remove the shift cable ball.



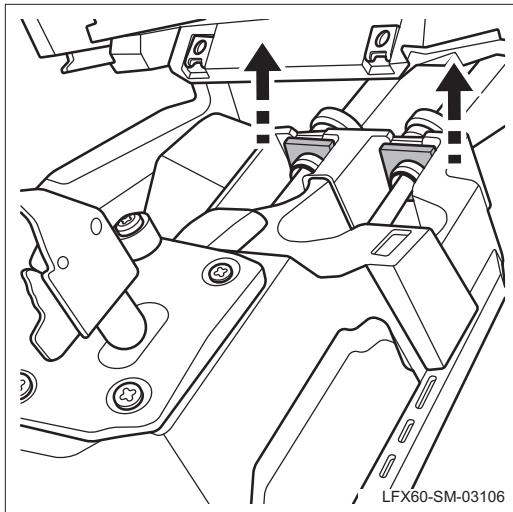
03



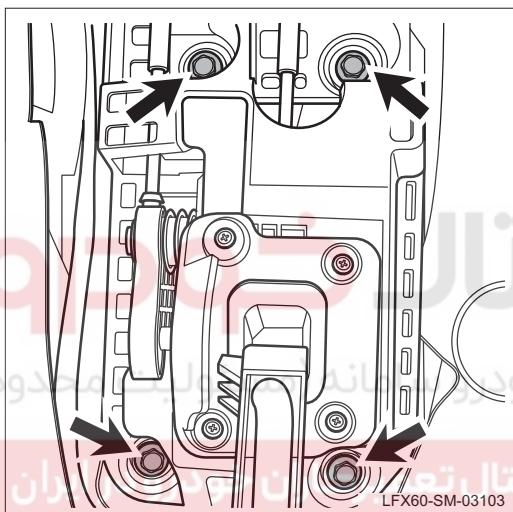
(d). Remove the right shift cable ball clamp, and remove the shift cable ball.



3-753



(e). Remove the gear cable fixing device.



(f). Remove the fixing bolts from the shift mechanism.
 (g). Remove the shift mechanism.

Installation

1. Install the shift mechanism.

(a) . The installation sequence is the reverse of the disassembly order.



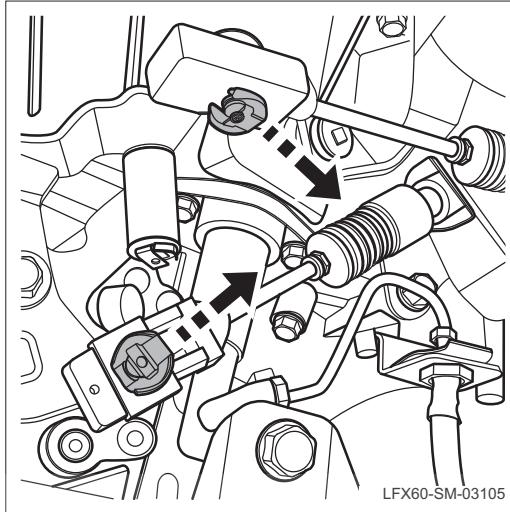
Replacement of shift and selector cable assembly

Removal

1. Remove the shift and selector cable assembly.

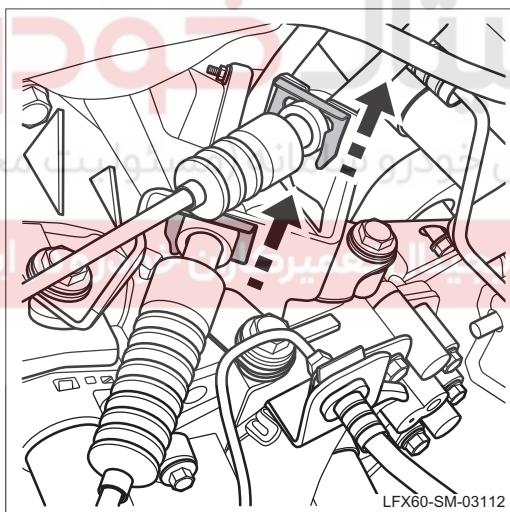
- Disconnect the battery negative connector.
- Remove the air filter assembly. Refer to the replacement of air filter assembly.
- Remove the central desk. Refer to the replacement of central desk assembly.

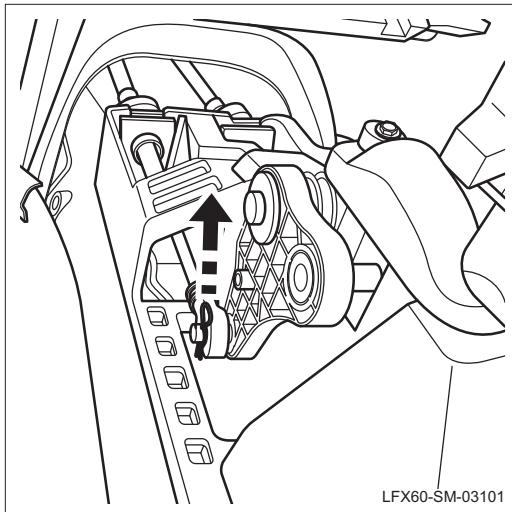
- Remove the clamps from the shift and selector cable.



03

- Remove the fixing device from the shift and selector cable.

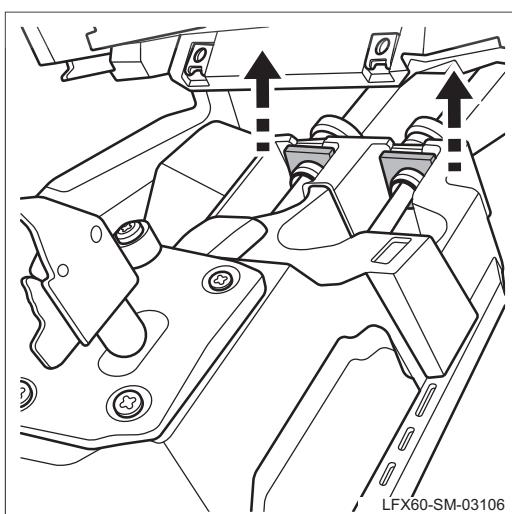




(f). Remove the left shift cable ball clamp, and remove the shift cable ball.

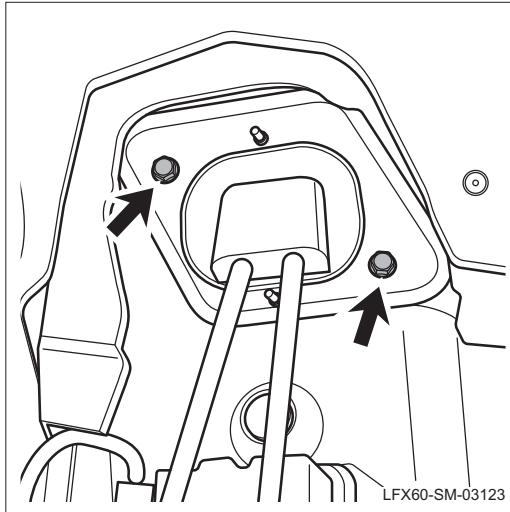


(g). Remove the left selector cable ball clamp, and remove the selector cable ball.



(h). Remove the gear cable fixing device.





- (i). Remove the fixing bolts from the shift and selector cable.
- (j). Remove the shift and selector the cable assembly.

03

Installation

1. Install the shift and selector cable assembly.

- (a). The installation sequence is the reverse of the disassembly order.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

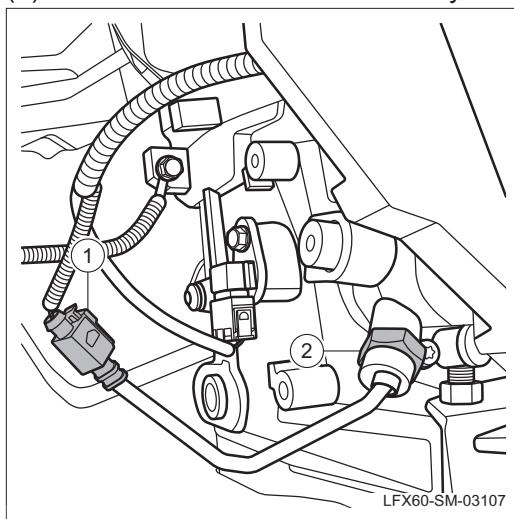
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Replacement of reversing light switch assembly

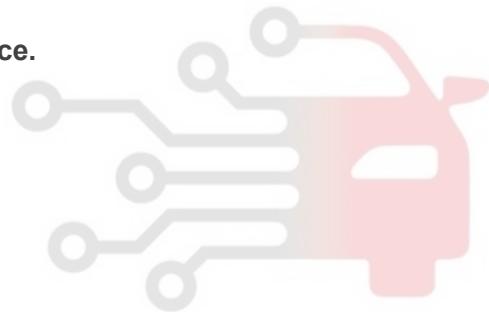
Removal

1. Remove the reversing light switch assembly.
 - (a). Disconnect the battery negative connector.
 - (b). Remove the air filter assembly. **Refer to the replacement of air filter assembly.**
 - (c). Disconnect the harness plug 1 from the reversing light switch assembly.
 - (d). Remove the fixing bolt 2 from the reversing switch.
 - (e). Remove the reversing switch assembly.



Installation

1. The installation sequence is reverse to the removal sequence.



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Replacement of neutral position switch

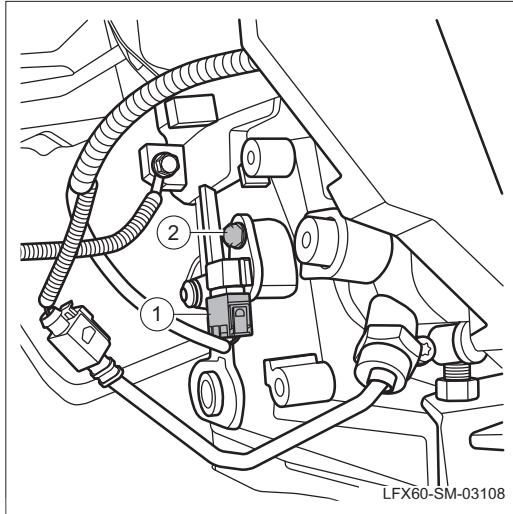
Removal

1. Remove the neutral position switch.

(a). Disconnect the battery negative connector.

(b). Remove the air filter assembly. **Refer to the replacement of air filter assembly.**

- (c). Disconnect the harness plug 1 from the neutral position switch.
- (d). Remove the fixing bolt 2 from the neutral position switch.
- (e). Remove the neutral position switch assembly.



03

Installation

1. Install the neutral position switch.

(a). The installation sequence is the reverse of the disassembly order.

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



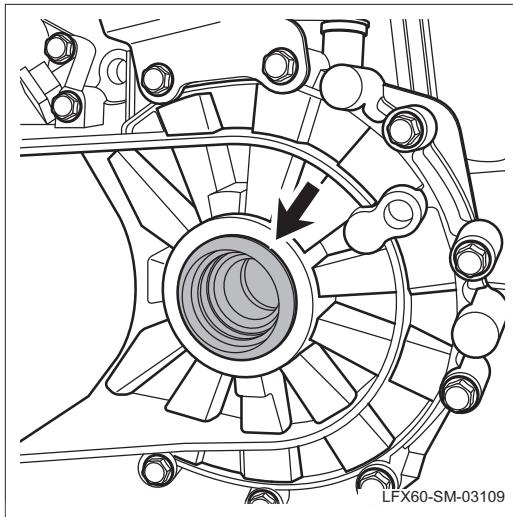
Replacement of drive shaft seal

Removal

1. Remove the drive shaft seal.

- (a). Discharge the transmission fluid. **Reference: Steps to drain and add transmission fluid.**
- (b). Remove the drive shaft. **Reference: Replacement of drive shaft.**

- (c). Use appropriate tools to remove the drive shaft from the transmission.



Installation

1. Remove the drive shaft seal.

- (a). The installation sequence is the reverse of the disassembly order.

● Note

When installing the oil seal, apply an appropriate amount to the oil seal.

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Replacement of drive shaft seal

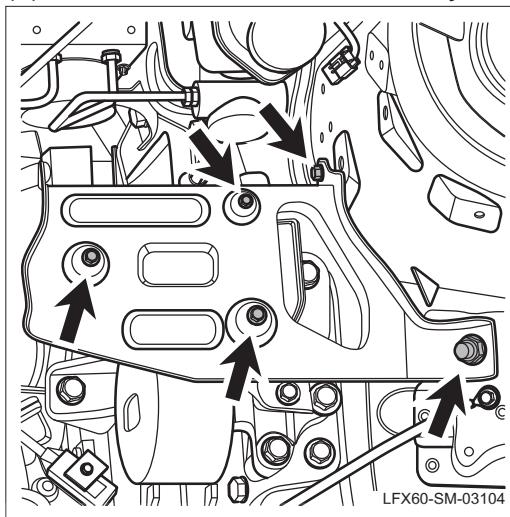
Removal

1. Remove the transmission assembly.

(a). Disconnect the battery negative connector.

(b). Remove the air filter assembly. Reference: Replacement of air filter assembly.

(c). Remove the bolts and nuts from the fuse box holder.



03

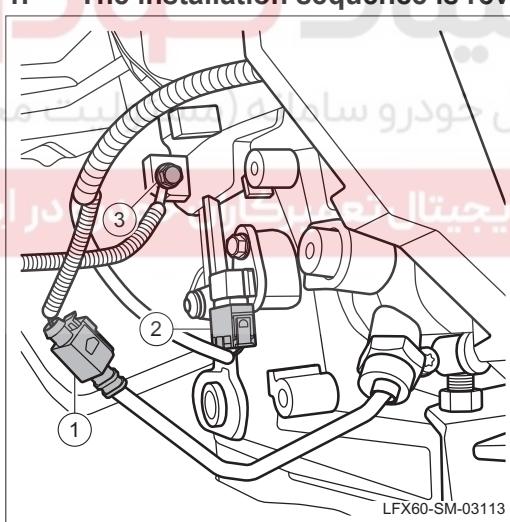
Installation

1. The installation sequence is reverse to the removal sequence.

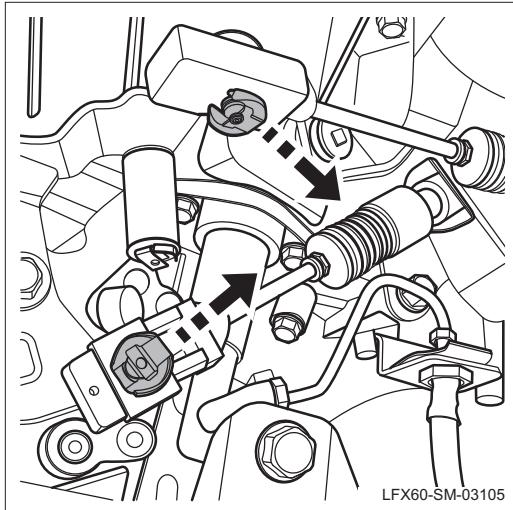
(d). Disconnect the harness plug 1 from the reversing light switch assembly.

(e). Disconnect the harness plug 2 from the neutral position switch.

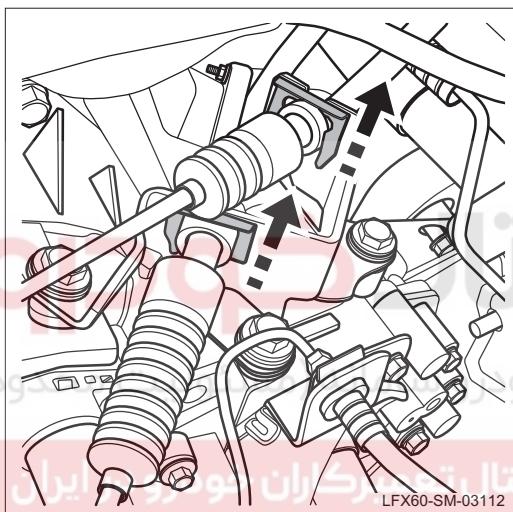
(f). Remove the fixing bolt 3 from the transmission grounding cable.



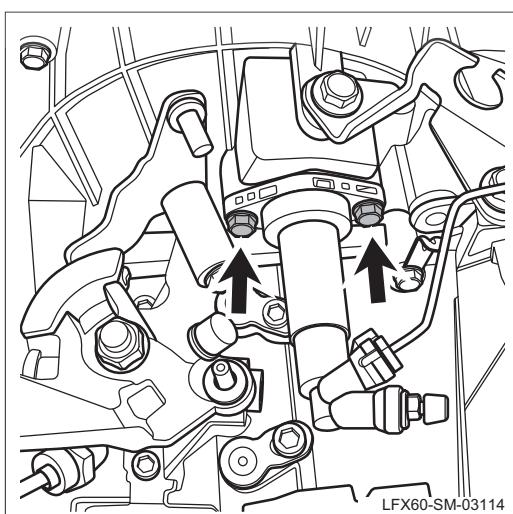
3-761



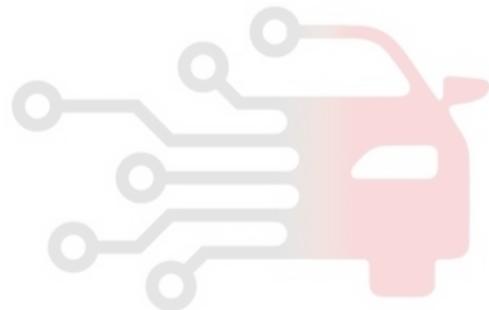
(g). Remove the clamps from the shift and selector cable.



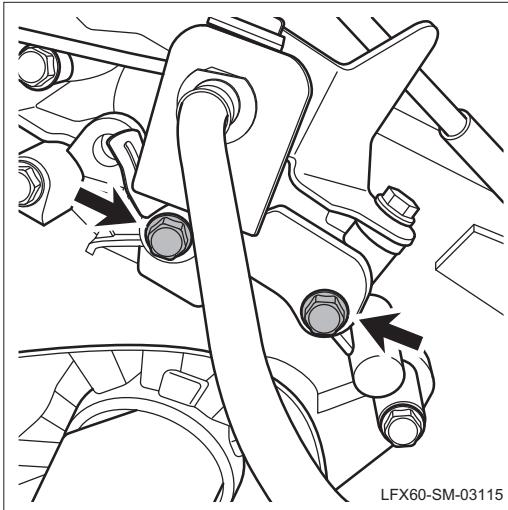
(h). Remove the clamps from the shift cable.



(i). Remove the fixing bolts from the clutch slave cylinder.

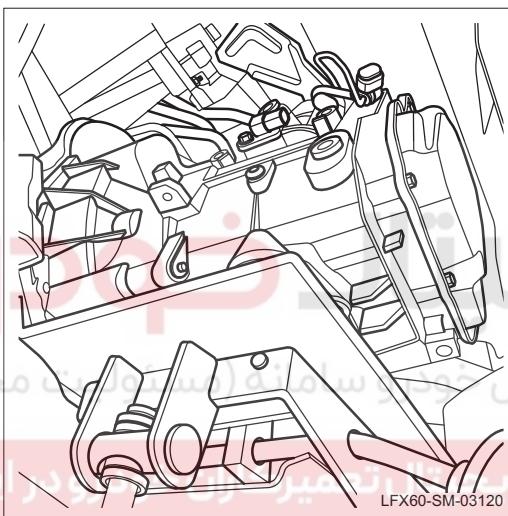


Manual transmission assembly

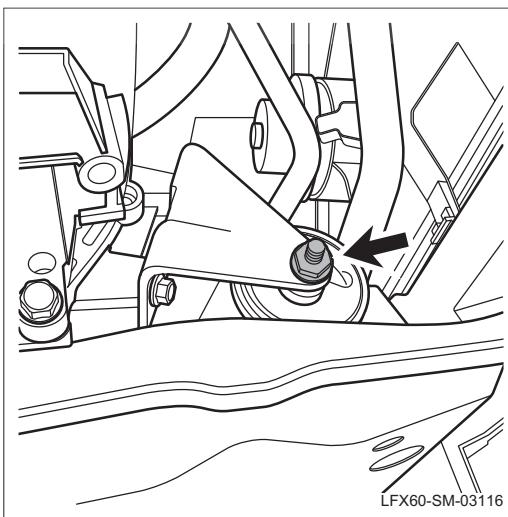


- (j). Remove the bracket bolts from the pipes of clutch slave cylinder.
- (k). Remove the starter assembly. **Reference: Replacement of the starter assembly.**
- (l). Lift the vehicle. **Reference: Lifting and supporting of vehicle.**
- (m). Discharge the transmission fluid. **Reference: Steps to drain and add transmission fluid.**

03

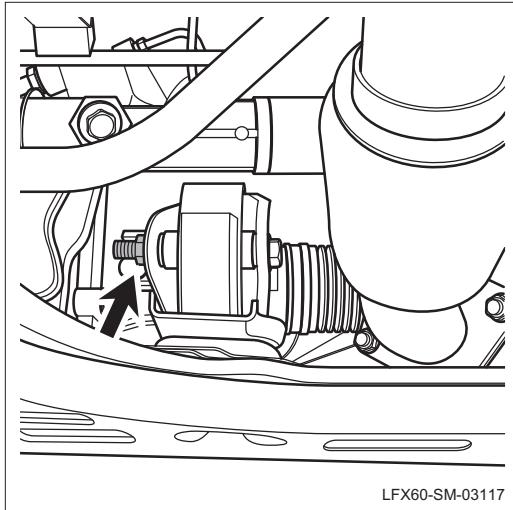


- (n). Use the jack to support the transmission.



- (o). Remove the connecting bracket bolts from the front suspension.

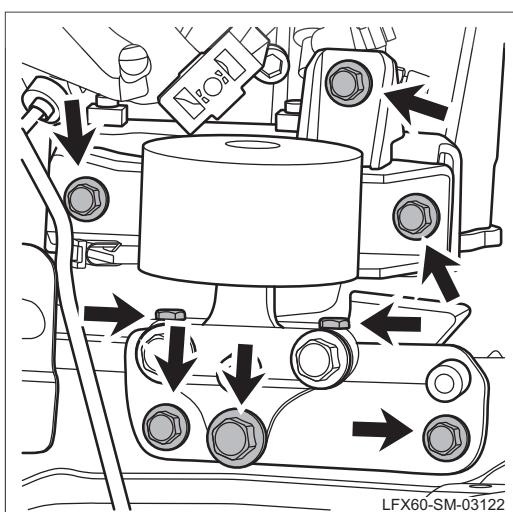
3-763



- (p). Remove the connecting bracket bolts from the rear suspension.
- (q). Remove the front subframe assembly.
Reference: Replacement of front subframe assembly.

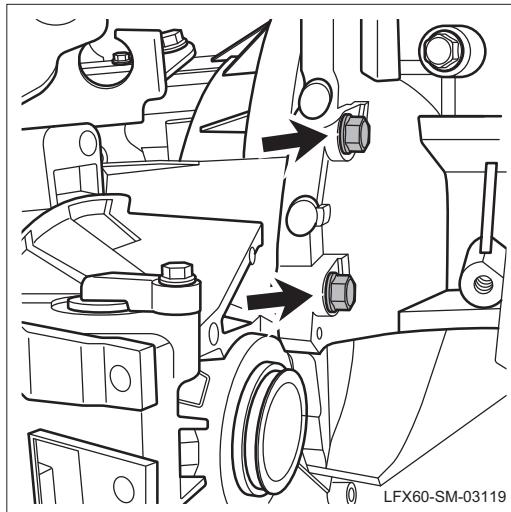


- (r). Remove the bolt 1 from the crankshaft position sensor, and remove the crankshaft position sensor.
- (s). Remove the bolt 2 connecting the transmission with the upper part of the engine.



- (t). Remove the fixing bolts from the left suspension.

Manual transmission assembly



(u). Remove the bolt connecting the transmission with the rear part of the engine.

03



(v). Remove the fixing bolt 1 from the flywheel cover.
 (w). Remove the bolt 2 connecting the transmission with the lower part of the engine.
 (x). Slowly lower the jack, and disconnect the transmission from the engine.
 (y). Remove the transmission assembly.

① Note:

This step requires someone else to assist.

اولین سامانه در حرف تالی تعمیرکاران خودرو در ایران

Installation

1. Installation of transmission assembly.

(a). The installation sequence is the reverse of the disassembly order.
 (b). Add transmission fluid. Reference: Steps to drain and add transmission fluid.

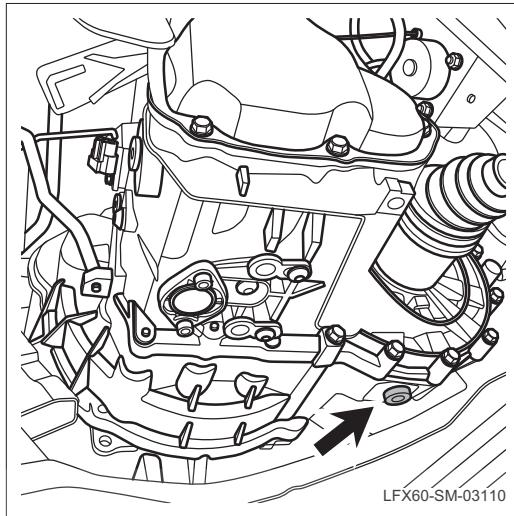


3-765

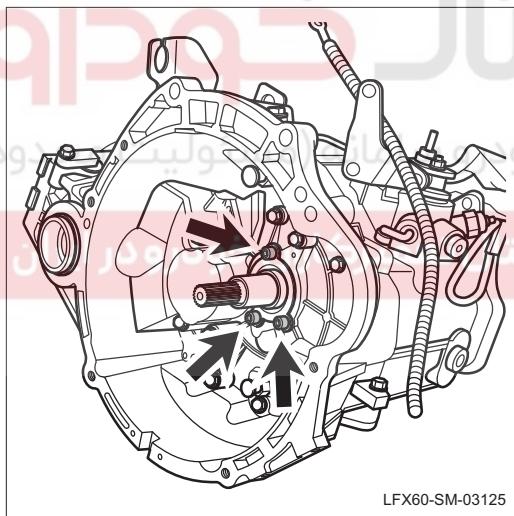
Replacement of main shaft oil seal

Removal

1. Remove the front oil seal from the transmission.
 - (a). Disconnect the battery negative connector.
 - (b). Remove the transmission assembly. **Reference: Replacement of the transmission assembly.**



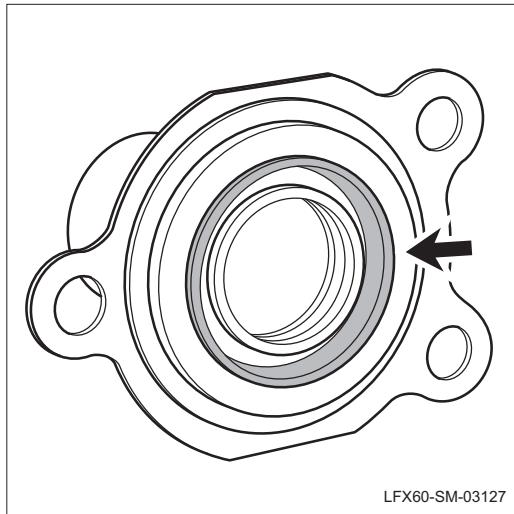
- (c). Remove the clutch release bearing.
- (d). Remove the clutch release fork.



- (e). Remove the fixing bolts from the release bearing base.



Manual transmission assembly



(f). Use appropriate tools to remove the front oil seal from the transmission.

03

Installation

1. Remove the front oil seal to the transmission.

(a). The installation sequence is the reverse of the disassembly order.

Note.

When installing the oil seal, apply an appropriate amount to the oil seal.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



3-767

Disassembly and installation

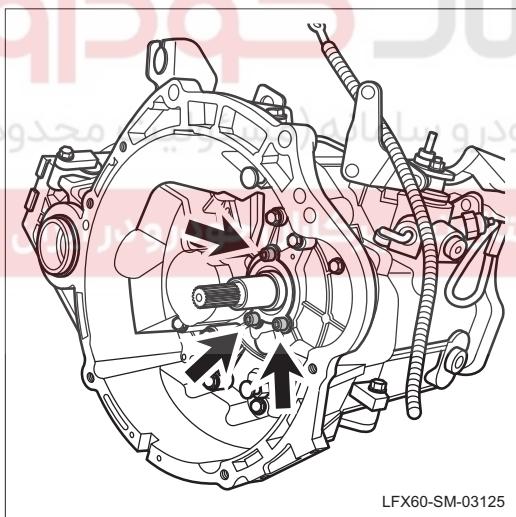
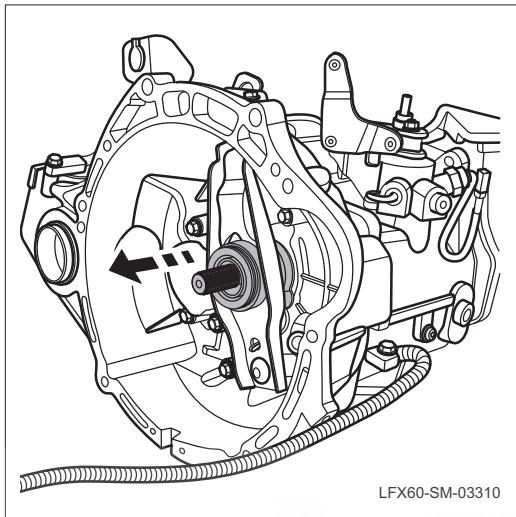
Disassembly and installation of transmission assembly

Disassembly

1. Disassemble the transmission assembly.

(a). Remove the transmission assembly. Refer to: **Replacement of the transmission assembly**

(b). Remove the clutch release bearing.
(c). Remove the clutch release fork.



(d). Remove the fixing bolts from the release bearing base.

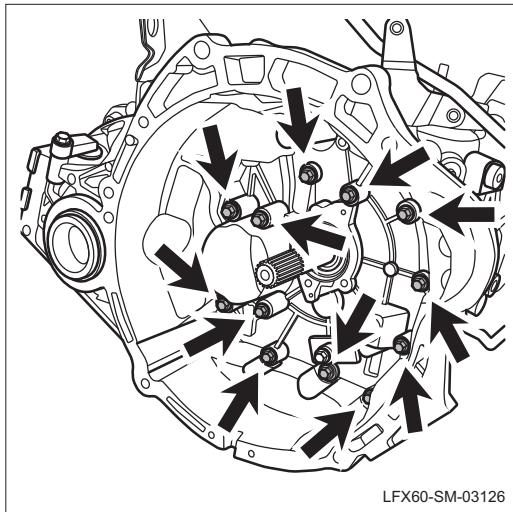


Manual transmission assembly



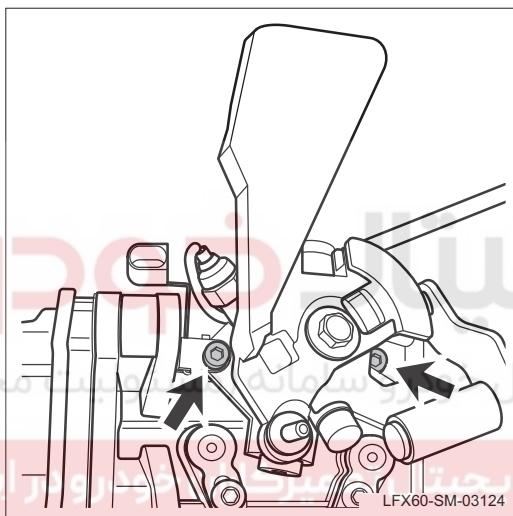
力帆汽车

LIFAN AUTO

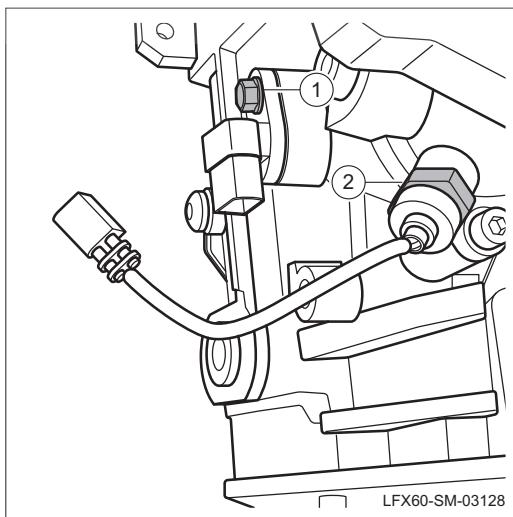
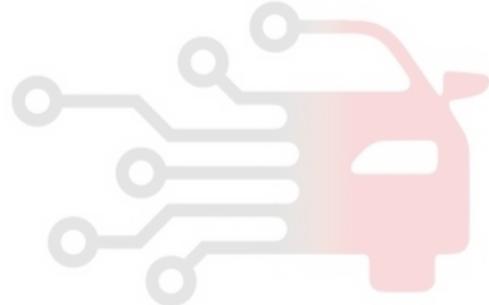


(e). Remove the connecting bolts and nuts from the transmission housing.

03

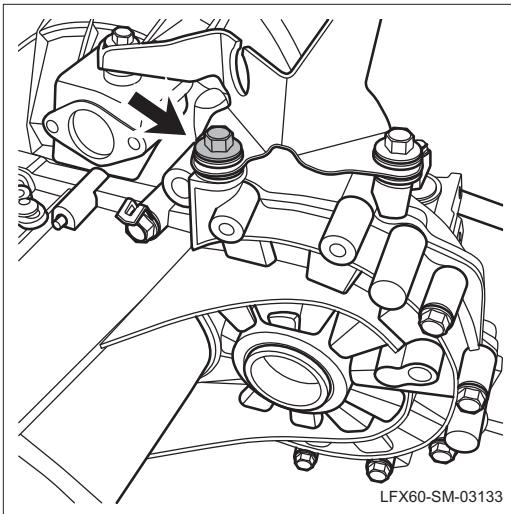


(f). Adjust the shift shaft to the neutral position, and remove the selector mechanism bolts and take out the selector mechanism from the transmission housing.

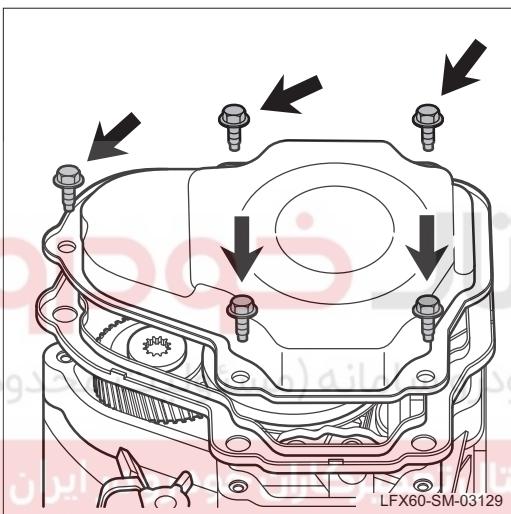


(g). Remove the fixing bolt 1 from the neutral position switch, and remove the neutral position switch.
 (h). Remove the lock nut 2 from the reverse switch, and remove the reverse switch.

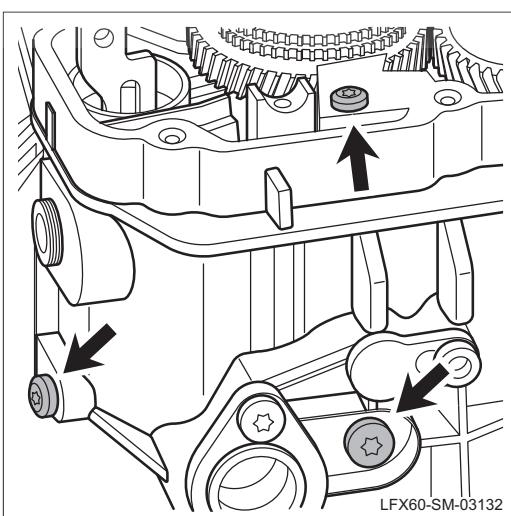
3-769



(i). Remove the fixing bolts from the shift cable bracket.



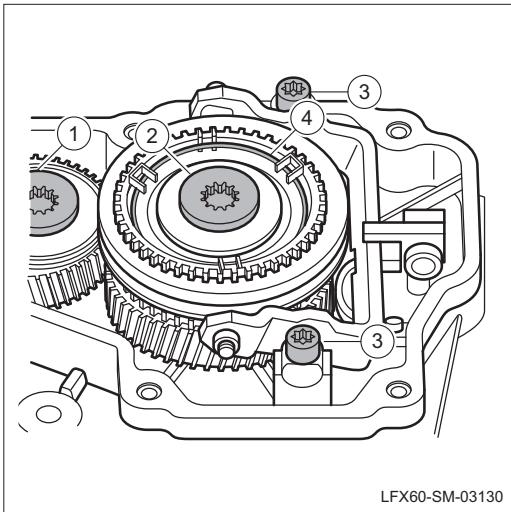
(j). Remove the fixing bolts from the transmission end cover.
 (k). Remove the sealing gasket from the transmission end cover.



(l). Remove the three locking bolts from the reverse-gear stop block.

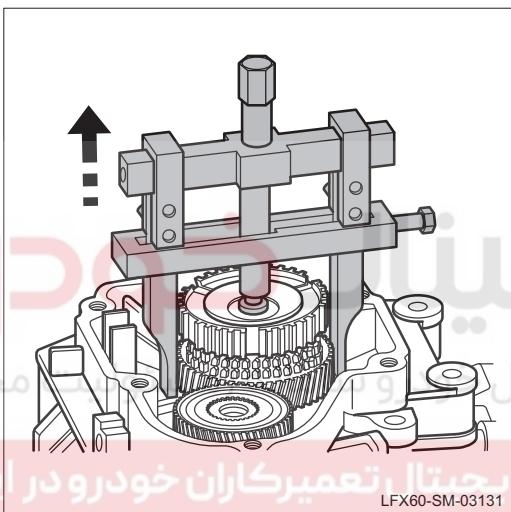


Manual transmission assembly

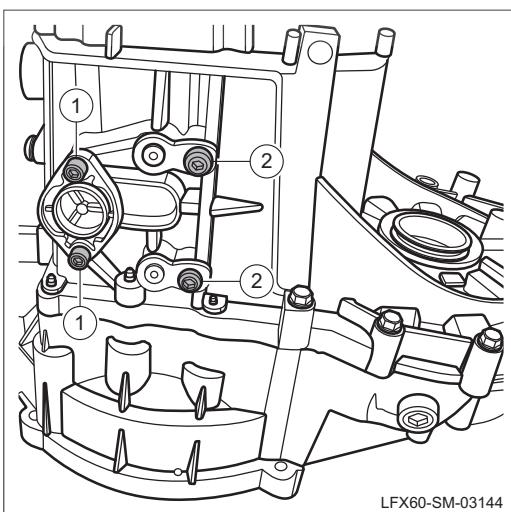


- (m). Remove the locking bolt 1 from input shaft.
- (n). Remove the locking bolt 2 from input shaft.
- (o). Remove the fixing bolt 3 from the fifth-gear fork, and take out the fork.
- (p). Remove the spring 4 from the fifth-gear synchronizer, and take out the fifth-gear sleeve.

03

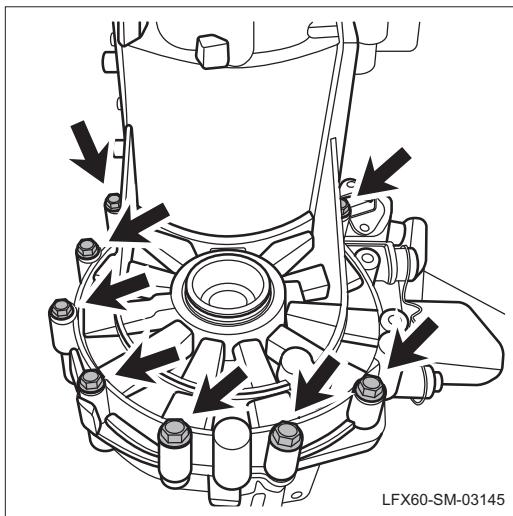


- (q). Use special tools to remove the fifth-gear synchronizer hub and the fifth output shaft gear, respectively.



- (r). Remove the bolts from the gear shift box.
- (s). Remove the fixing bolt 2 from the fork support beam.

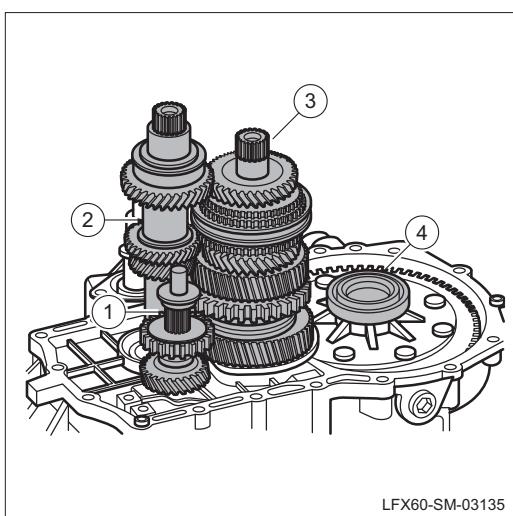
3-771



(t). Remove the connecting bolts from the differential mechanism, and take out the transmission housing.



(u). Remove the bolt 1 from the reverse gear rocker bracket.
 (v). Take out the shift fork assembly 2.



(w). Remove the reverse shaft assembly 1.
 (x). Remove the input shaft assembly 2.
 (y). Remove the output shaft assembly 3.
 (z). Remove the differential assembly 4.



Manual transmission assembly



Assembly

1. Installation of transmission assembly.

(a). Contrary to the order of disassembly.

● Note:

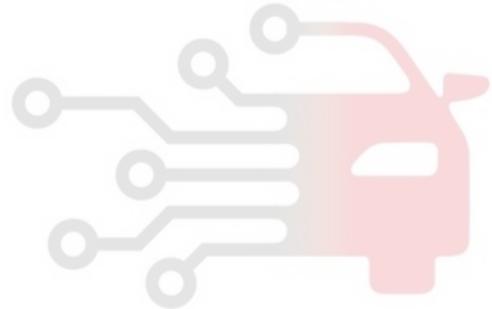
Apply proper amount of sealant to the contact surface of transmission assembly housing.

03

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

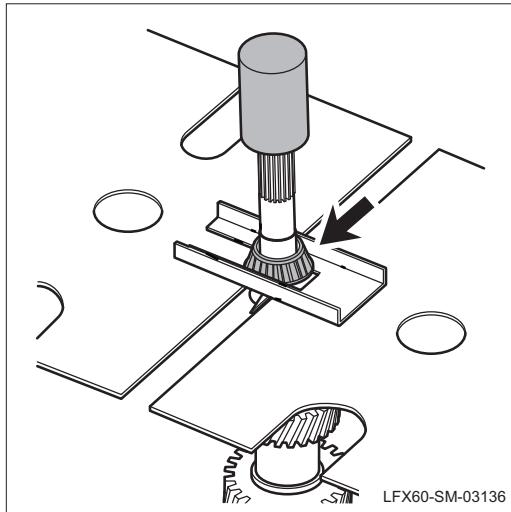


3-773

Disassembly and installation of input shaft assembly

Disassembly

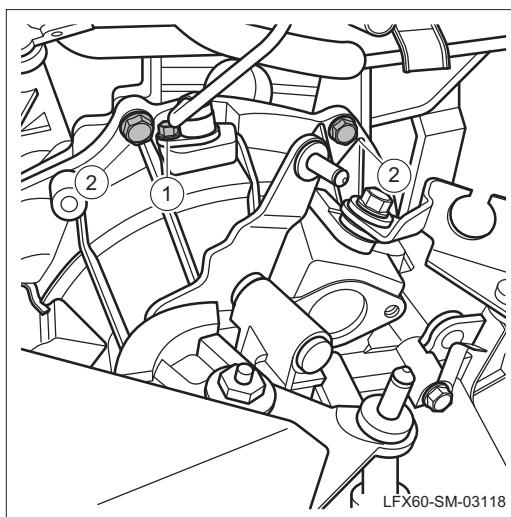
1. Disassemble the input shaft assembly.



- (a). Use a special tool to press the front bearing inner ring into the input shaft.
- (b). Remove the front bearing from the input shaft.



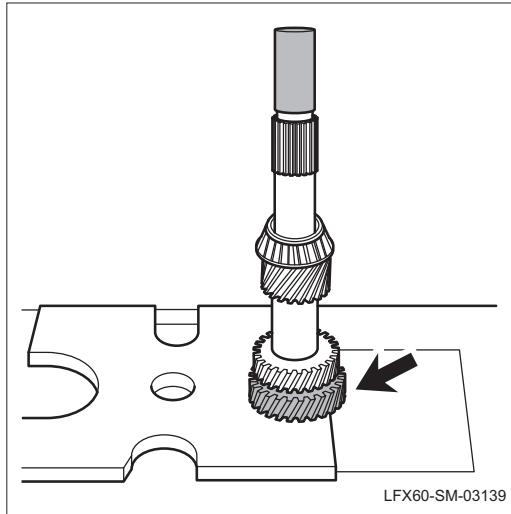
- (c). Use a special tool to take out the inner ring from the rear bearing of the fourth input gear and input shaft, and take out the fourth output gear gasket.



- (d). Use special tools and hydraulic press to take out the third input gear, and get out the third and fourth input gear spacers.

Assembly

1. Install the input shaft assembly.

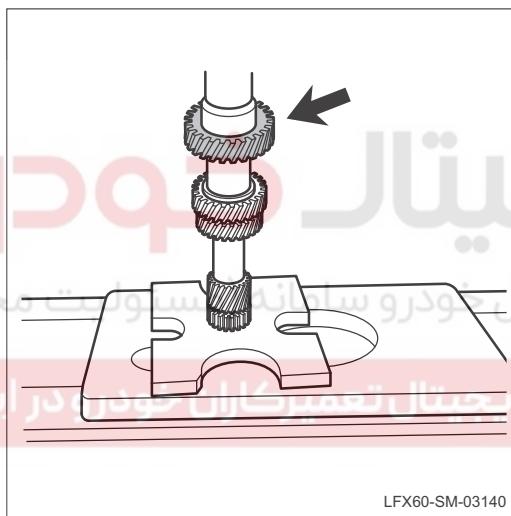


- (a). Use special tools to press third input gear.
- (b). Restore the third and fourth input gear spacers.

● Note:

The end face with lug boss on the inner ring of the gear shall face the fourth gear during the installation.

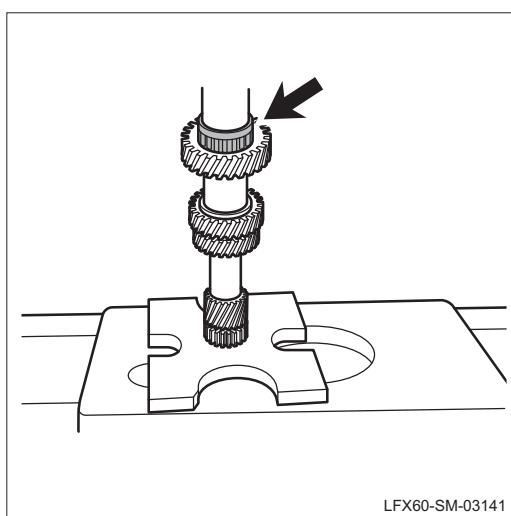
03



- (c). Use special tools to press fourth input gear.

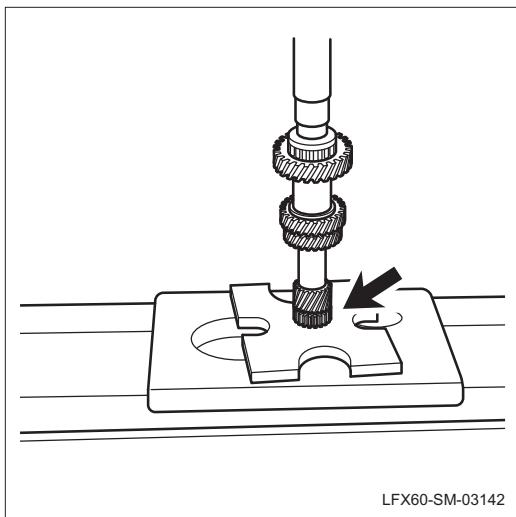
● Note:

The end face with lug boss on the inner ring of the gear shall face the third gear during the installation.



- (d). Use special tools to press the rear bearing inner ring into the input shaft.
- (e). Install gasket for the fourth output gear.





(f). Use special tools to press the fourth output gear shaft sleeve.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

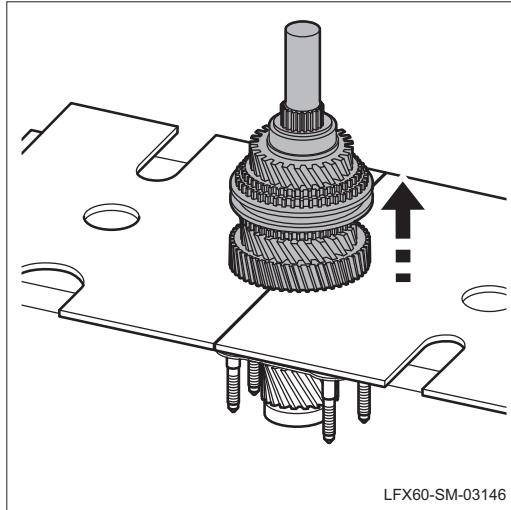
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Disassembly and installation of output shaft assembly

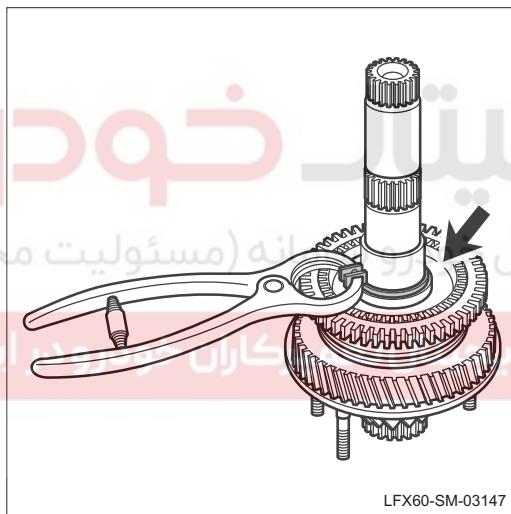
Disassembly

1. Disassemble the output shaft assembly 3.

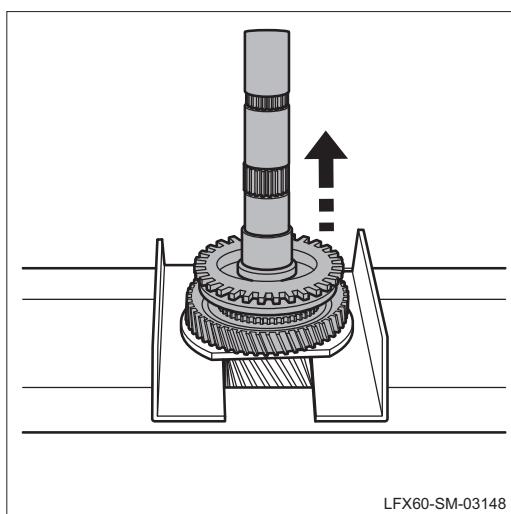


(a). Use appropriate tools to remove the second output gear, third gear and fourth gear synchronizer assembly, as well as the fourth output gear, fourth output gear gasket, and the rear shaft inner ring of the output shaft.

03



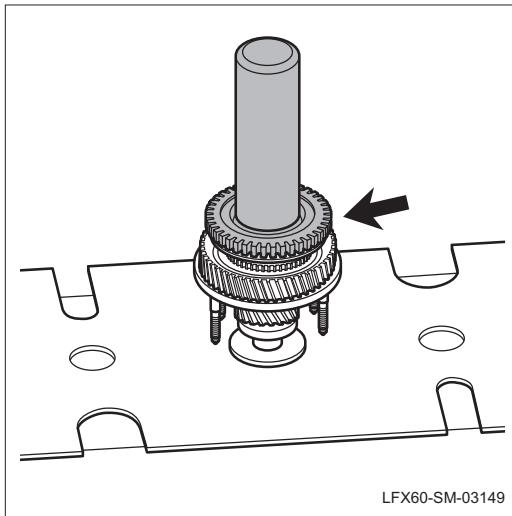
(b). Use appropriate tools to remove the clamps from the first and second output gear synchronizers.



(c). Use appropriate tools to remove the first and second gear synchronizer hubs and corresponding gear sleeves, the gear output shaft of the first output gear, intermediate bearing, and bearing pressure plate

Assembly

1. Install the input shaft assembly.



- Use special tools to press third input gear.
- Restore the third and fourth input gear spacers.

● Note:

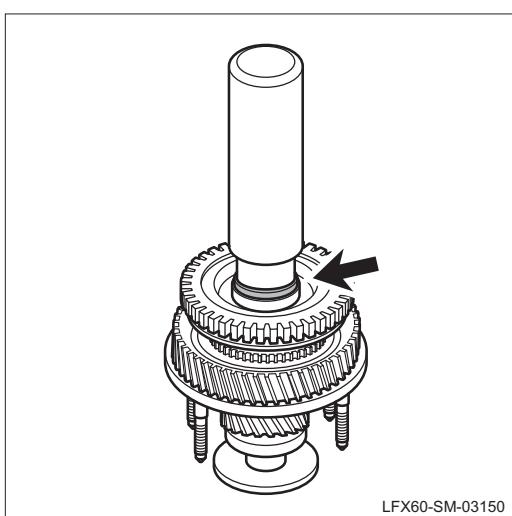
The end face with lug boss on the inner ring of the gear shall face the fourth gear during the installation.



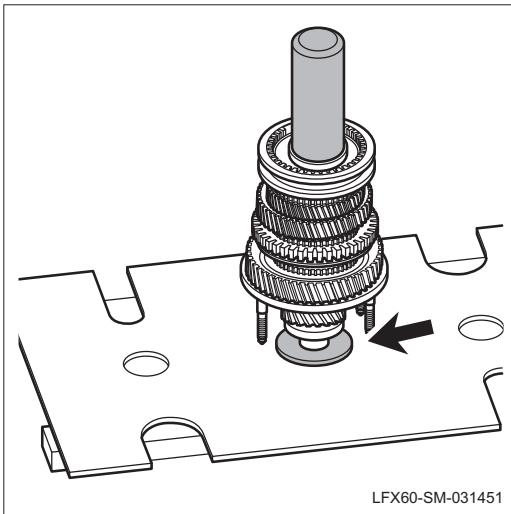
- Use special tools to press fourth input gear.

● Note:

The end face with lug boss on the inner ring of the gear shall face the third gear during the installation.



- Use special tools to press the rear bearing inner ring into the input shaft.
- Install gasket for the fourth output gear.

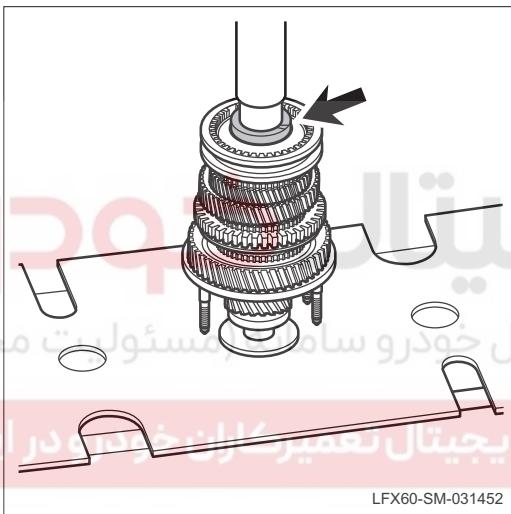


(h). Use special tools to press the third and fourth gear synchronizer assembly.

① Note:

Align the synchronizer gear ring notch with the boss position.

03

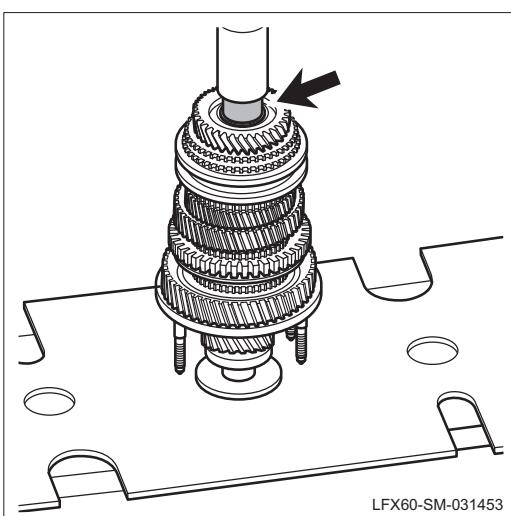


(i). Use a locating sleeve to press the fourth output gear shaft sleeve.

(j). Install the fourth gear synchronizer gear ring, fourth gear needle bearing, and the fourth output gear assembly.

① Note:

Align the synchronizer gear ring notch with the boss position.



(k). Install the fourth output gear gasket (flat gasket) to the gear end face of fourth gear output, and use a locating sleeve to press the rear shaft inner ring of the output shaft into the output shaft.



- Memo -

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



03 - transmission

Continuously variable transmission 3-783

Technical specifications.....	3-783
Precautions	3-784
Preparation.....	3-785
Structure and installation location ..	3-786
General Inspection	3-789
Operating Principle.....	3-792
Diagnostic Information and Procedures	3-797
DTC diagnosis and testing	3-808
Removal and Installation.....	3-871

03



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Continuously variable transmission



Continuously variable transmission

Technical specifications

Torque Specifications

Name	Torque range	
	Metric(Nm)	British (Lb·ft)
Oil drain plug assembly	46	34
Oil pressure sensor assembly	18	13
Oil pipe hollow bolt	30	22
Fixing bolts for shift cable bracket	23	17
Fixing bolts for shift rocker	11	8
Locking nuts for shift rocker	22	16
Fixing bolts for pipe bracket	11	8

03

General specifications

Name	Specification
Transmission model	019CHD
Transmission type	Continuously variable transmission (CVT)
Layout	Transversal front drive
Starting clutch device	Hydraulic torque converter
Control modes	Electronic hydraulic control
Dimension (L × W × H)	385mm×55mm×05mm
Weight (no cooling lubricating oil contained)	78Kg
Central distance	204mm
Maximum permissible input torque	190 Nm
Main reduction ratio	5.141
Pulley speed ratio range	0.427-2.465
Oil type	Idemitsu SP3
Transmission oil level in total	8±2L

Precautions

Provisions for vehicle towing

Introduction to towing methods

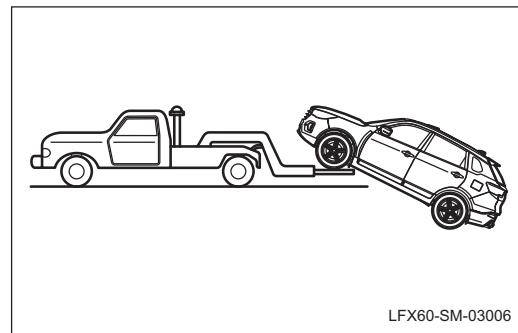
Towing the car properly can avoid unnecessary secondary damage.

1. Use a (large) flat truck to erect the car completely for towing;
2. Erect the non-driving wheels by hard towing means, and then erect the driving wheels carrier for towing with a tablet truck (jockey wheel);
3. Erect the driving wheels carrier for towing by hard towing means.

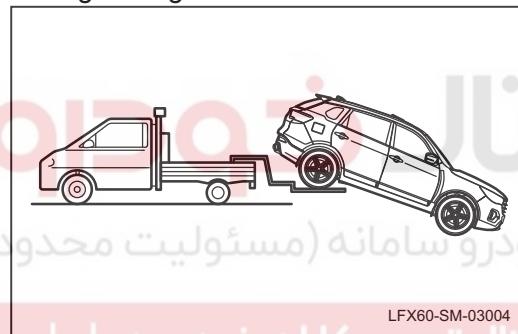
① Note.

- **Do not use soft towing means to tow the driving wheels.**
- **Do not use soft towing means to tow the non-driving wheels.**

Wrong towing methods:



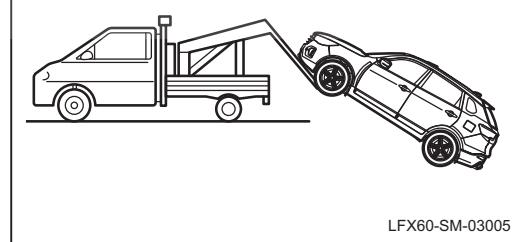
LFX60-SM-03006



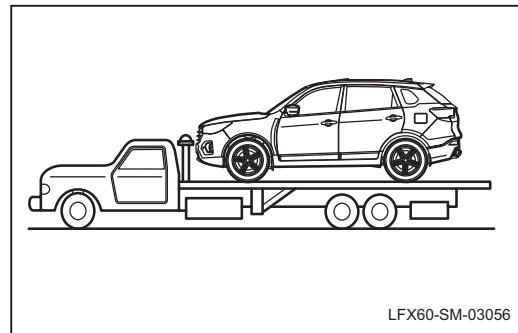
LFX60-SM-03004

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال خودرو سامانه (مسئولیت محدود)



LFX60-SM-03005



LFX60-SM-03056

Continuously variable transmission



Preparation

Special maintenance tools

03

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

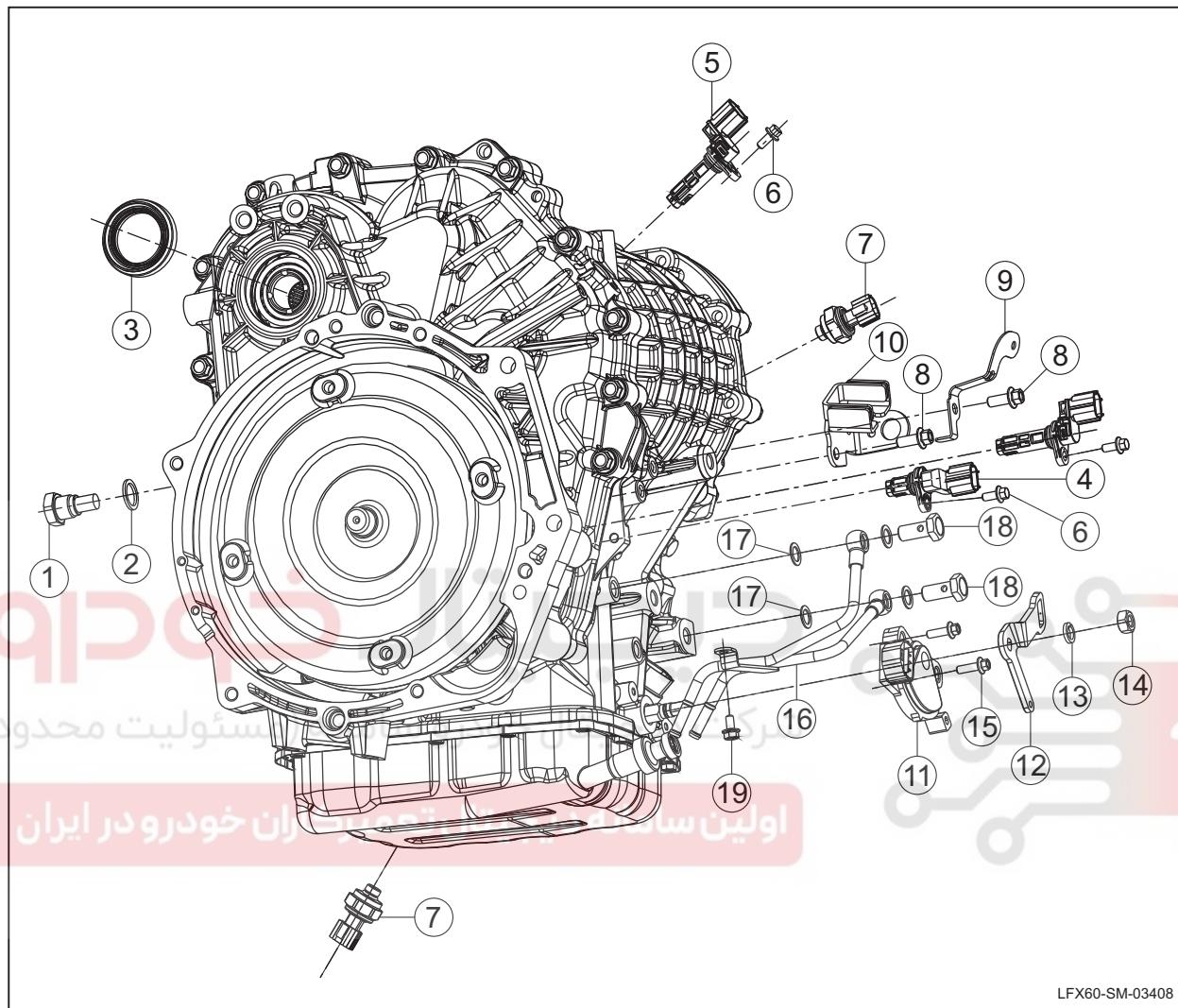


3-785

Structure and installation location

Part exploded view

Transmission accessories



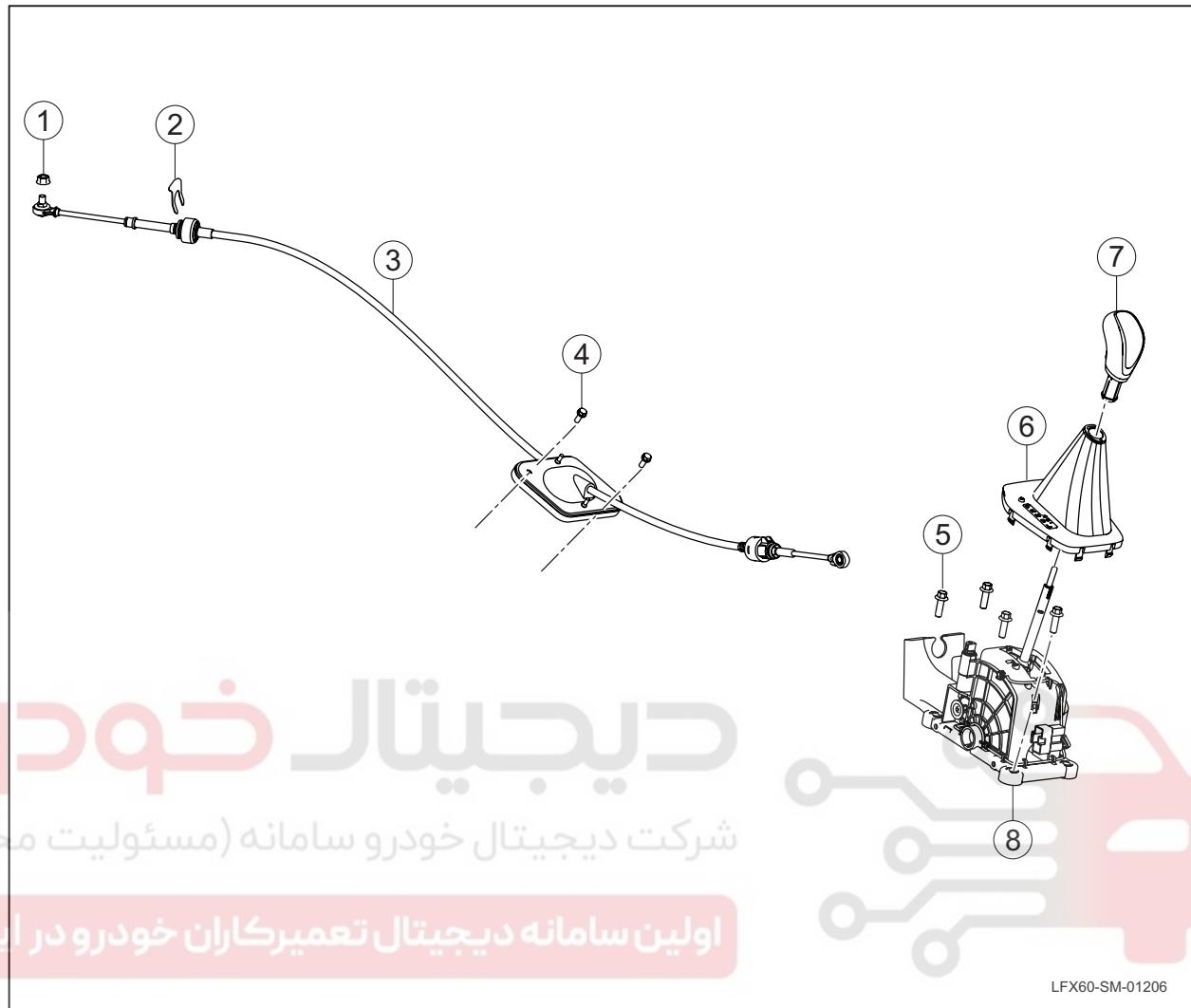
No.	Part name
1	Oil drain plug assembly
2	Sealing gasket
3	Differential oil seal
4	Speed sensor assembly
5	Speed sensor assembly
6	Hexagon flange bolt
7	Oil pressure sensor assembly
8	Hexagon flange bolt
9	harness bracket
10	Shift cable bracket assembly

No.	Part name
11	Gear switch assembly
12	Shift rocker
13	Spring washer
14	Hexagon nut
15	Hexagon flange bolt
16	Tubing assembly
17	Sealing gasket
18	Hollow bolt
19	Hexagon flange bolt

Continuously variable transmission

 力帆汽车
LIFAN AUTO

Gear shift control device

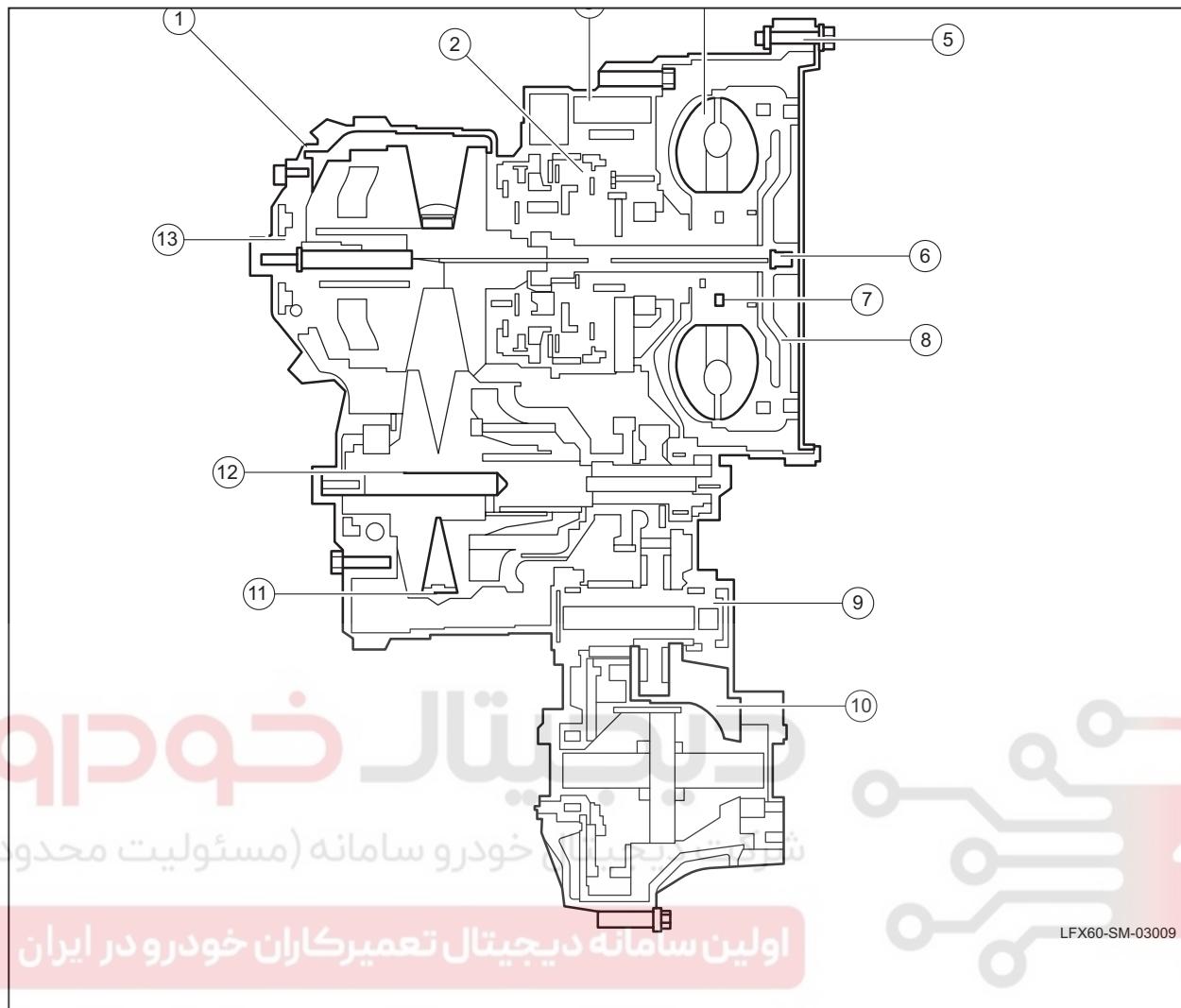


No.	Part name
1	Shift cable locking nut
2	U-shaped clip
3	Gear shift cable assembly
4	Gear shift cable fixing bolt

No.	Part name
5	Gear shift device fixing bolt
6	Shift panel
7	Handle ball assembly
8	Gear shift device



Internal structure diagram



No.	Part name
1	Rear housing assembly
2	Forward clutch assembly
3	Transmission housing assembly
4	Hydraulic torque converter assembly
5	Torque converter housing assembly
6	Input shaft assembly
7	Thrust washer

No.	Part name
8	Oil pump assembly
9	Output shaft assembly
10	Differential assembly
11	Steel strip
12	Output belt pulley shaft assembly
13	Input belt pulley shaft assembly

Continuously variable transmission



General Inspection

Provisions for use of oils and fluids

Oil specification

019CH series CVT can only use the ATFSP III transmission fluid specified by Zhejiang Wanliyang Transmission Co., Ltd.

Oil grade: ATFSP-III

Volume: 8L

Maintenance period

In order to extend the life of the transmission, replace the transmission fluid after the first 40,000km, and then you needn't do it again in the future.

Oil state inspection

The new transmission fluid should be red, but red color is not the indicator of quality; with the use of vehicle, the oil color will gradually deepen, and ultimately it may become light brown:

- If the oil is dark brown accompanied by the smell of burnt something, you need to replace the transmission fluid and check the vehicle condition;
- If the oil is milky white or turbid, the oil has been mixed with water, and you need to replace the transmission fluid; check the water leaking points and make sure if the transmission is damaged;

If the oil is black and mixed with a large number of powder, the CVT is abnormally worn, and you need to check and repair the transmission.

● Note.

Do not use other oil instead, the damaged caused by the use of other oil is not covered by the warranty.

Inspection of transmission fluid level

Please check the oil level in the order as below:

1. After a period of time of driving on the dynamic road, the oil temperature of the transmission reaches $80\pm5^{\circ}\text{C}$ or $25\pm5^{\circ}\text{C}$ (measured with a diagnostic instrument).
2. Stop the car on the ground, and pull the parking brake handle.
3. While the engine is idling, step on the brake pedal, switch between R, N, and D for 3 cycles staying at each position for 5s; finally, stop the selector lever in position "P" or "N".
4. Clear the dust and oil around the oil scale.
5. Pull the vent plug from the conduit of the valve housing, and wipe the oil scale with a lint-free paper and insert it into the conduit to prevent foreign matter from falling into the transmission.
6. Pull out the oil scale, record the scale position, and determine if the oil level is acceptable against the table.

Oil level	HOT area	COLD area
	Oil temperature: $80\pm5^{\circ}\text{C}$, be accurate	Oil temperature: $25\pm5^{\circ}\text{C}$, for reference
019CHD	A-A	a-a

- If the oil level is within the corresponding range, the oil level is qualified.
- If not within the corresponding range, fill or discharge oil until the oil level rises to or falls into the middle position of the corresponding range to achieve the best performance.
- 7. Finally, restore the vent plug into the conduit, and ensure the installation in place.

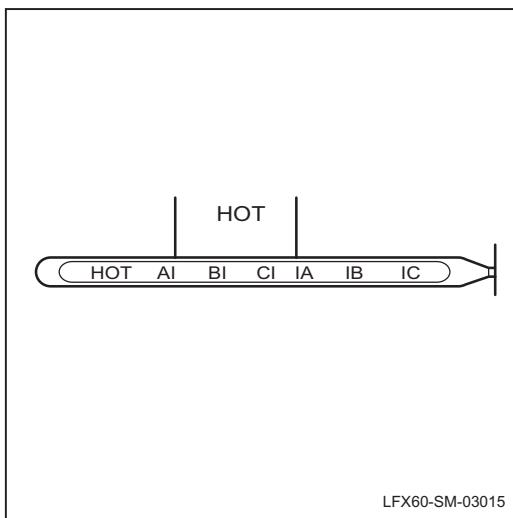
● Note

Transmission fluid is relatively hot, so protective equipment is necessary when removing the oil level bolts.

Example:

Example:

HOT oil level in the A-A range, and COLD oil level in the a-a range.



① Note:

- It's not allowed to in the idle state to warm the ATF by slamming on the accelerator.
- Use the "HOT" mark on the transmission fluid scale as the standard for detecting the amount of transmission fluid. The "COLD" (or "C") mark is for reference only.
- When the transmission fluid is hot, the engine, the radiator and its piping system are very hot too, and the fan may be started, so you must be very careful in the course of operation to avoid burns
- After the transmission has been repaired or the oil has been replaced, the oil level must be controlled at the middle position of the corresponding range.
- Every 100ml of oil means 3mm change in the scale for your reference.
- One side of the oil scale is used to measure the HOT oil level and the other side the COLD oil level.

- If the transmission fluid level is too low, the transmission fluid pump will suck air during normal operation, and then the air is compressed into bubbles into the electromagnetic valve oil pipes to lower the pressure, then the clutches or brakes will work weakly due to lack of pressure.
- If the transmission fluid is too much, the revolving parts in the transmission will stir the liquid to produce foam during the high-speed rotation, thus the same result as above.
- If there are too many bubbles, they are easy to get the transmission fluid oxidized at high temperatures and this affect the normal operation of the solenoid valves, clutches and brakes; and this can also cause the transmission fluid to spill out from the transmission vent holes, which may be easily mistook for transmission fluid spill.
- ATF replacement
 - Lift the vehicle with a lifter.
 - Remove the transmission fluid drain bolts.
 - Discharge the ATF.
 - And then re-tighten the oil plug, and do not forget the gasket.

Tools: 24# socket spanner, and torque wrench.
- Pull out the vent plug and add new ATF from the plug.
- Add same amount of ATF as the amounted discharged.
- If the transmission is new, you do not need to discharge the oil, and add 4.8 ± 0.1 L of oil directly.
- After that, check the oil level as per 4.1.

① Note:

- Gaskets are disposable and must be replaced with new ones for each maintenance.
- Wipe the oil dipstick with the lint-free paper to prevent the foreign matter entering the transmission inside.
- The engine compartment contains high-temperature parts. In order to avoid accidents, remember not to spill the ATF onto these hot parts.
- After filling ATF, wipe off the spilled fluid.
- When replacing the ATF, the residual oil in the transmission needn't to be completely discharged.
- When replacing the ATF, clean the oil cooler.

Continuously variable transmission



Oil leak check

General method

1. Make sure that the leaking oil is transmission fluid.
2. Thoroughly clean the suspicious leaking points.
3. Run the vehicle by 24km or until it reaches the normal working temperature.
4. Stop the car on a clean paper or cardboard.
5. Turn off the engine.
6. Find oil droplets on paper.
7. Carry out the required maintenance.

10. Improper sealing elements.
11. Cracks on parts.
12. Oil cooling pipe fittings improperly installed or damaged.
13. Sealing elements overly worn since bearings get loose or worn

03

Powder method

1. Thoroughly clean the suspicious leaking points with solvent.
2. Apply atomized powder (like foot powder) onto the suspicious places.
3. Run the vehicle by 24km or until it reaches the normal working temperature.
4. Turn off the engine.
5. Check these suspicious leaking points.
6. Find the leaking source along the powder's trajectory.
7. Carry out the required maintenance.

Dye and invisible light method

Liquid dyes and invisible light test components are available from different tool manufacturers.

1. Determine the amount of dye to be used according to the manufacturer's instructions.
2. Check the leaking points with invisible light.
3. Carry out the required maintenance.

Leakage reason

Identify the leaking points and trace the source along the leaking trajectory. The leakage reason must be identified in order to properly repair the problem. Before repairing the leakage problem, check for the following faults and make necessary repairs.

1. Oil level / oil pressure too high.
2. Vent holes blocked.
3. Fasteners tightened improperly.
4. Threads dirty or damaged.
5. Sealing surface twisted.
6. Sealing surface scratched, gigged or damaged in other ways.
7. Oil seal damaged or worn.
8. Cracks or pore on parts.
9. Improper sealants used (if any).





Operating Principle

System Overview

CVT realizes stepless variation of its speed by continuously changing the contact diameter between the driving, driven conical platens and steel belt, respectively. Working principle:

Transmission Control Unit (TCU) sends command signals to the four hydraulic valves in the hydraulic system at the right moment as needed by the driving conditions (vehicle speed, load, engine speed, etc.).

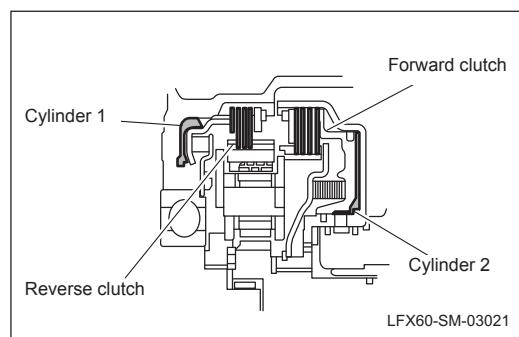
- Solenoid valves continuously adjust the working condition according to the instructions from TCU. These 4 solenoid valves work in different combinations of conditions, so that the flow and pressure of hydraulic oil change in a timely manner, thus the accurate manipulation of hydraulic actuators (e.g. cylinders, pistons, guiding valves, etc.).
- When the piston chamber pressure of the hydraulic driving and driven conical platens is continuously changed, the conical platens have corresponding axial movement with the changes in pressure, thus changing the radius of rotation of the steel belt to achieve a continuous change in transmission ratio for the purpose of stepless speed variation.

Description of mechanical parts

Mechanical composition of CVT

CVT consists of planetary gear components, multi-disc clutch, steel belt pulley and steel belt, intermediate shaft, differential, housing and oil pan.

Forward / reverse clutch



CVT uses wet multi-disk clutch with stable friction characteristics, excellent high temperature resistance and anti-stripping property, as well as good reliability; with advanced software control system, the transmission system has excellent static shift performance.

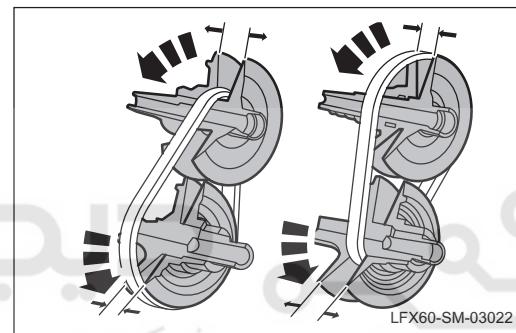
CVT realizes the action of forward and reverse gears through a planetary gear train, where the forward gear shares a roughly same speed

ratio with the reverse gear so the pressure does not change obviously during the shift, which is conducive to precise control over the pressure to improve the driving comfort during gear shift.

The piston chamber 1 in the reverse brake is connected with the solenoid valve body through the transmission housing, and the pressure oil directly enters the piston chamber 1 of reverse brake through the solenoid valve body.

The spring baffle in the forward clutch is provided with a sealing structure which, in addition to acting as a spring baffle, cooperates with the piston to form a balancing chamber for balancing the pressure in the piston chamber 2, and cushioning the impact from the forward clutch, which improves the driving comfort during gear shift.

Steel strip



The CVT uses the latest generation of thrusting steel belt which with light weight, great speed ratio, large torque transmitting capacity, high transmission efficiency, and good durability.

The steel belt is tightened with two sets of conical platens to transfer energy using the friction between them. The friction radius of steel belt and conical platens is changed by adjusting the pressure so as to change the speed ratio of the transmission, thus the stepless speed variation.

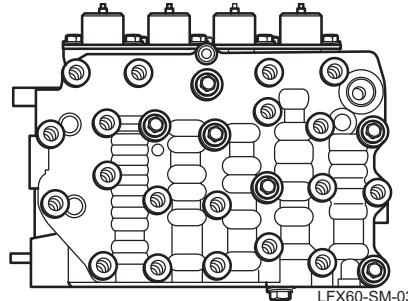
The steel belt, a highly flexible metal belt composed of a large number of V-sheet metals and two groups of metal rings, transfers energy in the presence of the conical platens on both sides.

The metal rings on both sides are composed of multiple layers of thin belt rings to guide the sheet metals correctly. The small thickness of steel belts is important to reduce operating noise. Many components contact with the belt pulley to reduce the pressure on contact surface, which is conducive to improving durability.

Continuously variable transmission

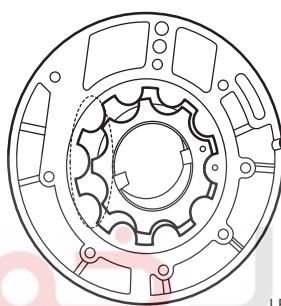


Hydraulic valve body



The hydraulic valve body of our CVT adopts independent split structure with a compact structure, good reliability, low loss, fast response and other advantages.

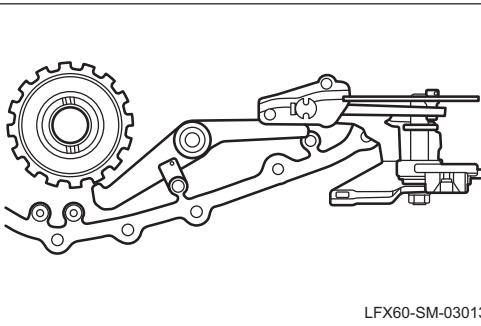
Oil pump



The CVT uses advanced rotor pump featuring simple overall structure, compact size, smooth operation, high efficiency, good durability, low noise and so on.

The engine directly drives the inner rotor to suck oil from the inside of the transmission, then the pressure oil is fed to the torque converter, pulley system, clutch system, cooling system, etc., meet the transmission requirements for hydraulic transmission, cooling and lubrication to ensure the normal operation of the transmission.

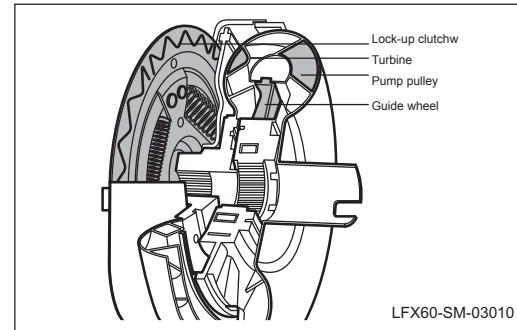
Parking mechanism



The CVT adopts the parking form as shown in the figure. When the driver pushes the gear lever to P gear, the transmission gear shift arm will move as well. The drive rod moves to the left as shown in the figure and drives the parking ratchet tail to move upward and consequently force the parking ratchet head to move towards the parking wheel center, mesh the parking gear

teeth and limit the parking wheel rotating. Since the parking wheel and transmission output shaft adopt the rigid connection, the parking action is realized. When the driver pushes the gear lever to exit P gear, the drive rod will move rightward as shown in the figure and does not apply force to the parking ratchet. Meanwhile, the retracting spring will pull the parking ratchet out of the parking gear teeth groove and thus disable the parking function.

Hydraulic Torque Converter



The CVT adopts the parking form as shown in the figure. When the driver pushes the gear lever to P gear, the transmission gear shift arm will move as well. The drive rod moves to the left as shown in the figure and drives the parking ratchet tail to move upward and consequently force the parking ratchet head to move towards the parking wheel center, mesh the parking gear teeth and limit the parking wheel rotating. Since the parking wheel and transmission output shaft adopt the rigid connection, the parking action is realized. When the driver pushes the gear lever to exit P gear, the drive rod will move rightward as shown in the figure and does not apply force to the parking ratchet. Meanwhile, the retracting spring will pull the parking ratchet out of the parking gear teeth groove and thus disable the parking function.

The role of the torque converter is to transmit the torque output from the engine to the transmission. It transfers energy through the liquid flow with good cushioning properties and also torque amplification function.

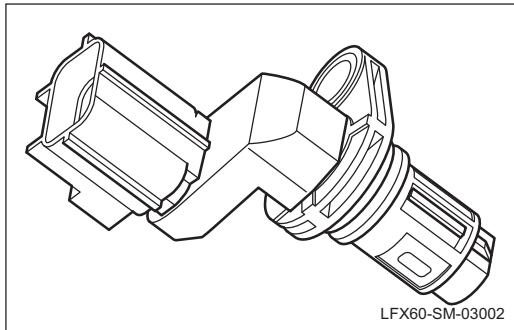
The torque converter contains three components (turbine, pump pulley, and guide wheel) and absorbs shock secondary in two stages. It is locked by a lock-up clutch. With advanced software control system, the torque converter can be locked at low speeds, so the vehicle has excellent starting comfort, acceleration performance, climbing property, and also splendid fuel economy.



Description of electronic control parts

The control system includes sensors, transmission control unit (TCU), actuators and other components.

Input shaft speed sensor



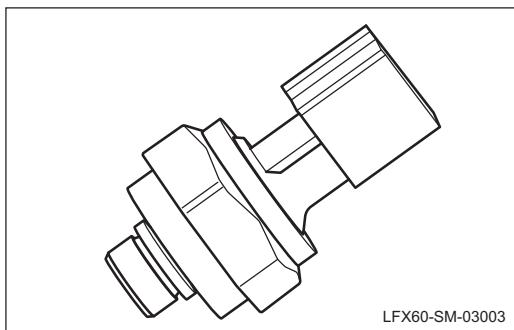
The input shaft speed sensor is a Hall sensor for detecting the rotational speed of the driving cone wheel. A crankshaft induction ring is mounted on the side of the driving cone wheel, and the corresponding sensor generates square wave signal.

Output shaft speed sensor



Output shaft speed sensor is a Hall sensor to directly detect the speed of the differential and indirectly detect the speed of the driven cone pulley.

Oil pressure sensor



CVT has two hydraulic sensors (for input and output shafts)

Wheel speed sensor

The transmission receives the wheel speed signal from the ABS system to determine if there is wheel slip.

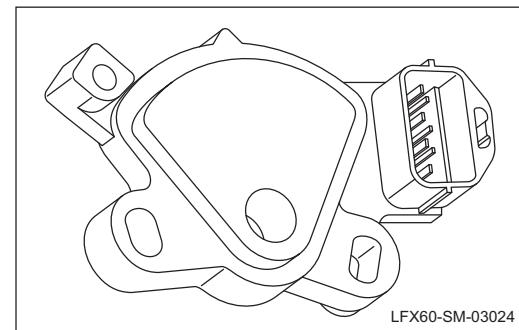
Brake switch

The brake switch signal provides the driver's deceleration signal. The transmission uses this signal to control the slip rate of the clutch.

Transmission Control Unit (TCU)

The transmission control unit (TCU) is used to receive the sensor signals for control over speed ratio, clutch, and clamping force

Gear switch



CVT self-learning

Self-learning condition

In the event of the following circumstances, the transmission needs to learn by itself, or you may feel not so smooth when you shift gears or start the car.

1. Driven for the first time as a new car.
2. TCU was replaced.
3. Transmission assembly was overhauled.

Self-learning process

1. Step on and hold the brake to keep the car still.
2. The engine is idling stably (do not turn on or off the air conditioner and other electrical equipment, because these behaviors may cause idling fluctuation).
3. When the transmission fluid is greater than 60°C .
4. Move the shift lever to P (or N).
5. Start the engine
6. Standing for 2min.
7. Self-learning is completed.

Continuously variable transmission



● Note:

In order to achieve a good driving effect in a variety of conditions, the transmission needs to perform a self-learning operation at high temperature, low temperature, room temperature and other conditions.

Gear description

P (parking)

Get the output shaft of the transmission locked to prevent the driving wheels from moving, and use the handbrake when the vehicle is stopped for a long time.

- When the transmission stops at P (or N), the engine can be ignited yet the other gears can not be ignited.
- The shift mechanism has parking lock. To quit P, step on the brake pedal and switch the car to "KEY ON".
- If the lever cannot quit P, you can get it unlocked by mechanical means.
- It is forbidden to move the lever to P before the car is completely stopped. Otherwise, the car will be prone to being out of control.
- Do not replace position P with the hand brake, and, after the vehicle is completely stopped, pull the hand brake first before moving the lever to P.
- Do not park the car on a long ramp, and a safe parking slope should not be greater than 30%.

R (Reverse)

R (Reverse) for reversing motion.

- Before the shift lever is pushed to or pulled away from R, it is necessary to confirm that the car is completely stopped, or the transmission may be easily damaged.
- Before stopping the vehicle in D gear, check the environment and ensure the safety.

N (neutral)

When the lever stays at N, the driving wheels and transmission are both freely idling, which is suitable for a short-time stop.

- When the transmission stops at N (or P), the engine can be ignited yet the other gears can not be ignited.
- When the lever stays at N, if you do not pull the hand brake or step on the foot brake, the car will be rolling on the ramp, which may cause an accident.
- It is forbidden to put the shift lever at N when the car is moving at a high speed, or the transmission may be easily damaged.
- Neutral taxiing is prohibited after the stalling of engine, or the transmission can be easily

damaged.

D (drive)

Normal forward mode for stepless speed variation: when the shift lever stays at D, the transmission will automatically select the appropriate speed ratio according to the driver's intention.

- Make sure the car is completely stopped before moving the lever to D.
- Before stopping the vehicle in D gear, check the environment and ensure the safety.

Moving mode

This mode is activated when the shift lever is pushed to S/M from D; quit the mode by moving the lever back to D or shifting up or down.

● Note:

Apply S/M as needed.

S/M (manual mode)

You can see a "+" and a "-" at S/M, also known as "M+" and "M-".

- M+: Move the shift lever forward to speed up.
- M-: Move the shift lever backward to slow down.

CVT has seven forward gears. No matter the car is still or running, just push the shift lever to switch between M and D; unlike manual transmissions, it is allowed to shift the gears when the accelerator pedal is pressed. A driver can manually shift up or down to experience a shifting effect similar to manual transmission for more driving pleasure.

● Note:

- Apply M as needed.
- You can move the shift lever from speed 1 to speed 7 or vice versa.
- In manual mode, the driver must shift the gear in a suitable operating condition to keep the engine away from the red line -- running with high loads for a long time.
- In manual mode: When the car slows down, the car will shift down automatically; when the engine runs too fast, you have to shift the gears at certain accelerator and speed conditions in manual mode. If these conditions are not met, the transmission does not perform any shift action even if the shift lever is pushed.

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- When driving on ice or low-attachment roads, you can switch to manual mode and put the shift lever at position 2 before starting the car, so that the car grips the ground well, or you can realize this function through snow mode.

L (low speed)

When driving downhill or along long-distance ramps, you can brake with the engine at this gear.

➊ Note:

Apply L as needed.

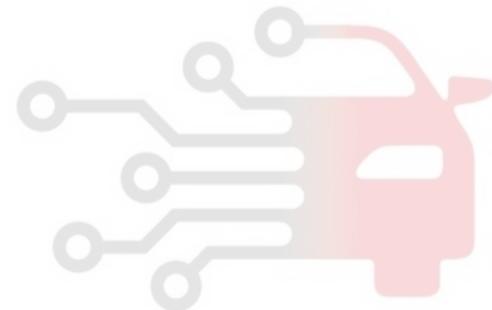
Snow mode

Press the "SNOW"button, and TCU will enter the snow mode program. Snow mode is suitable for driving on low-grip roads. Press the button again to quit the snow mode.

- In snow mode, TCU controls the transmission to start the car at the second gear to avoid slip.
- When the car gets matched up with ESP, please do not turn on the snow mode of transmission and TCS function in ESP at the same time, because they will conflict with each other and weaken each other.

➊ Note:

Apply "SNOW" mode as needed.



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Diagnostic Information and Procedures

Diagnosis Instructions

Before starting to diagnose a fault in the CVT control system, familiarize yourself with the operating principle of the CVT control system, and then start the system diagnostics, which helps to determine the correct troubleshooting steps in the event of a failure. More importantly, this also helps to determine whether the customer's situation belongs to normal operation.

Any troubleshooting of the CVT control system should begin with the CVT control system check, so as to instruct the service personnel to take the next logical step to troubleshoot. Understanding and using the CVT diagnostic flowchart correctly can reduce the diagnosis time and avoid misjudgment of components.

03

Visual Inspection

1. Confirm the problem raised by the customer.
2. Check the evident mechanical faults.

visual check table

Mechanical	Electrical
<ul style="list-style-type: none"> • Leakage • Shift level • Shift cable • Brake switch 	<ul style="list-style-type: none"> • Fuse • Line • Harness plug • TCM

3. Solve the problem finding before the next step inspection.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If the visual check is OK, check for the problems against the fault list.

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





Fault symptom table

Symptom	Possible point of failure	Recommended measures
The fault indicator is not working properly	• Line fault	• Line fault maintenance
	• Instrument damage	• Replace the instrument Refer to:replacement of instrument cluster assembly
	• CAN bus fault	• Repair CAN bus
	• TCM	• Replace the TCM Refer to:replacement of transmission control module (TCM)
Difficulty in starting the car	• Self-learning not fully finished • Brake switch signal • Valve body fault • Transmission internal fault • TCM	Refer to: Diagnostic process for difficulty in starting the car
Shifting rush when car is running	• Self-learning not fully finished	• Repair the high oil temperature fault
	• Oil deterioration	• Replace the transmission oil Refer to:transmission oil draining and filling procedures (CVT)
	• Speed sensor of input belt pulley shaft	• Replace the speed sensor of input belt pulley shaft Refer to: Replacement of the speed sensor of input shaft
	• Output belt pulley shaft speed sensor	• Replace the speed sensor of output belt pulley shaft Refer to: Replacement of the speed sensor of output shaft
	• TCM damage	• Replace the TCM Refer to:replacement of transmission control module (TCM)
Manual mode can not be enabled	• Harness plug • The switch inside the shift lever assembly is damaged • TCM damage	Refer to: Diagnostic process for the problem that the manual mode can not be enabled
Transmission fluid temperature is too high	• Transmission fluid leakage/shortage	• Repair the leakage problem and add transmission fluid
	• Transmission fluid is polluted and the fluid quality gets poor	• Replace the transmission fluid
	• Filter blocked	• Replace the filter
	• Transmission cooler hose blocked or shrunken	• Repair or replace the transmission hose
	• Transmission fluid cooler performs abnormal	• Repair or replace the transmission fluid cooler
	• Vehicle overload	• No overloading
	• Drawn using wrong gears	• Get the car drawn using appropriate gears
	• Transmission internal fault	• Replace CVT assembly

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Diagnostic process for difficulty in starting the car

Test condition	Details / Results / Measures
1. Check the trouble code.	<p>A. Connect the diagnostic meter. B. Test CVT system with the vehicle diagnostic meter. Is there a fault code in the transmission system? →Yes Check the DTC. →No Step 2</p>
2. Check the adaptive learning.	<p>A. Check adaptive learning Is the self-learning finished? →Yes Step 3 →No Carry out adaptive learning.</p>
3. Check the transmission fluid level.	<p>A. Check transmission oil level Is the level normal? →Yes Step 4 →No Adjust the fluid level to the normal mark.</p>
4. Check the transmission control module power supply.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Measure the voltage between the TCM harness plug E02b terminal 28, 46, 56 and the fixed ground point with the multimeter. Standard value: 11 ~ 14V Is the voltage normal? →Yes Step 5. →No Repair the TCM power line fault and replace the harness if necessary.</p>

03



Test condition	Details / Results / Measures
5. Check the TCM ground line.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Measure the resistance between the TCM harness plug E02b terminal 24, 25, 56 and the fixed ground point with the multimeter.</p> <p>Standard value: less than 5Ω</p> <p>Is the resistance normal?</p> <p>→ Yes Step 6.</p> <p>→ No Repair the TCM ground line fault and replace the harness if necessary.</p>
6. Check the transmission control module.	<p>A. Replace the TCM. Refer to:replacement of TCM</p> <p>B. Execute the adaptive learning. Refer to:CVT self-learning</p> <p>Is the vehicle normal?</p> <p>→ Yes Replace the TCM.</p> <p>→ No Step 7</p>
7. Check CVT for mechanical fault.	<p>A. Replace the transmission assembly. Refer to:replacement of the transmission assembly.</p> <p>Confirm the fault is eliminated.</p>

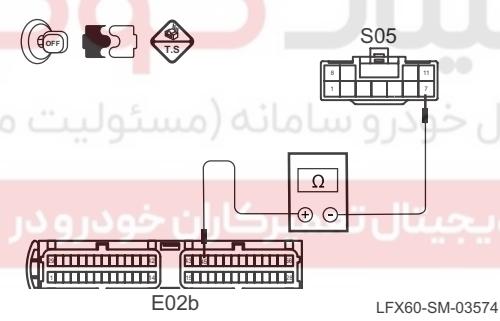
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Diagnostic process for failure to start manual mode

Test condition	Details / Results / Measures
1. Check the trouble code.	<p>A. Connect the diagnostic meter. B. Test CVT system with the vehicle diagnostic meter. Is there CVT system DTC? → Yes Check the DTC. → No Step 2</p>
2. Check the manual mode switch.	<p>A. Check the manual mode switch. Is the switch normal? → Yes Step 3 → No Replace the shift lever assembly. Refer to: Replacement of gear lever assembly (CVT)</p>
3. Check the S/M signal line.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Disconnect the gear lever harness plug S05. E. Connect the battery negative terminal. F. Use a multimeter to measure the resistance between terminal 45 of transmission control module harness plug E02b and terminal 7 of shift lever harness plug S05. Standard value: less than 5Ω Is the resistance normal? → Yes Step 4 → No Check S/M signal line for fault; and replace the harness, if necessary.</p>

03





Test condition	Details / Results / Measures
4. Check the manual upshift signal line.	<p></p> <p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Disconnect the gear lever harness plug S05. E. Measure the resistance between the TCM harness plug E02b terminal 43 and gear lever harness plug S05 terminal 8 with the multimeter. Standard value: less than 5Ω Is the resistance normal? → Yes Step 5 → No Check the manual upshift signal line for fault; and replace the harness, if necessary.</p>
5. Check the manual downshift signal line.	<p></p> <p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Disconnect the gear lever harness plug S05. E. Measure the resistance between the TCM harness plug E02b terminal 44 and gear lever harness plug S05 terminal 4 with the multimeter. Standard value: less than 5Ω Is the resistance normal? → Yes Step 5 → No Repair the open circuit fault of manual downshift signal line; and replace the harness, if necessary.</p>
6. Check the shift lever assembly.	<p>A. Replace the shift lever assembly. Refer to: Replacement of gear lever assembly (CVT) Is the troubleshooting successful? → Yes Replace the shift lever. → No Step 7</p>
7. Replace the transmission control module.	<p>A. Replace the TCM. Refer to: Replacement of TCM Confirm the fault is solved.</p>

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Diagnostic process for driving impact

Test condition	Details / Results / Measures
1. Check the trouble code.	<p>A. Connect the diagnostic meter. B. Test CVT system with the vehicle diagnostic meter. Is there CVT system DTC? → Yes Check the DTC. → No Step 2</p>
2. Check if the transmission is in emergency mode.	<p>A. oad test. B. Check if CVT can shift up and down in manual mode, and check if the vehicle speed increases as the engine speed increases. Is CVT in emergency mode? → Yes Repair the emergency mode problem. → No Step 3</p>
3. Check the CVT harness plugs.	<p>A. Check that CVT harness plug E02b is reliably connected without stripping or fouling. Is the result normal? → Yes Step 4 → No Repair the harness plug or replace the harness.</p>
4. Check CVT adaptive learning.	<p>A. Check CVT adaptive learning. Is the self-learning finished? → Yes Step 5 → No Carry out adaptive learning. Refer to:CVT</p>

03



Test condition	Details / Results / Measures
5. Check the transmission fluid.	<p>A. Check the transmission fluid level and quality. Are the results normal? →Yes Step 6 →No Replace CVT fluid. Refer to:Transmission oil draining and filling procedures (CVT)</p>
6. Check the TCM power line.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Measure the voltage between the TCM harness plug E02b terminal 28, 46, 56 and the fixed ground point with the multimeter. Standard value: 11 ~ 14V Is the voltage normal? →Yes Step 7. →No Repair the TCM power line fault and replace the harness if necessary.</p>
7. Check the TCM ground line.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Measure the resistance between the TCM harness plug E02b terminal 24, 25, 26 and the fixed ground point with the multimeter. Standard value: less than 5Ω Is the resistance normal? →Yes Step 8. →No Repair the TCM ground line fault and replace the harness if necessary.</p>

Continuously variable transmission



Test condition	Details / Results / Measures
8. Check the TCM.	<p>A. Replace TCM Refer to: Replacement of transmission control module (TCM)</p> <p>B. Execute the adaptive learning. Refer to: CVT self-learning</p> <p>Is the vehicle normal?</p> <p>→Yes Replace TCM</p> <p>→No Step 9</p>
9. Repair the transmission's mechanical fault.	<p>A. Repair the transmission's mechanical fault. Confirm the fault is solved.</p>

03

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

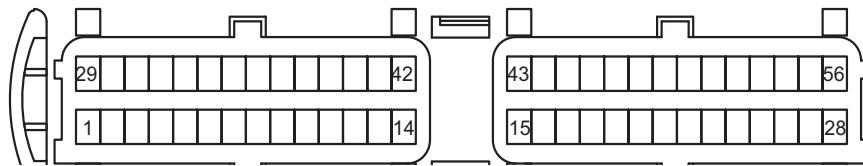


3-805



Continuously variable transmission

Control module terminal list



E02b

LFX60-SM-03577

Pin number	Wire diameter / Color	Function
1	-	-
2	-	-
3	1.25 R/G	Solenoid valve supply feedback
4	-	-
5	0.50 Y/G	Snow mode switch
6	0.50 Gr/R	Normally closed signal of the brake switch
7	0.50 Gr/W	Normally open signal of the brake switch
8	0.50 BI/G	Power supply for input shaft pressure sensor
9	-	-
10	0.50 BI/Y	Input shaft pressure sensor grounded
11	0.50 BI/W	Input shaft pressure sensor signal
12	0.50 BI/R	Output shaft pressure sensor grounded
13	0.50 BI	Output shaft pressure sensor signal
14	0.50 W/G	Reverse gear signal
15	0.50 O	Position P signal
16	0.50 Br/G	N gear signal
17	0.50 Y	D gear signal
18	0.50 R/W	S gear signal
19	0.50 R/Y	Output shaft speed sensor grounded
20	0.50 BI/B	Grounding
21	0.50 Br/B	Turbine speed sensor grounded
22	0.50 V/W	Turbine speed sensor signal

Continuously variable transmission



03

Pin number	Wire diameter / Color	Function
23	0.50 P	Input shaft speed sensor grounded
24	2.00 B	Grounding
25	0.50 B	Grounding
26	2.00 B	Grounding
27	0.50 Gr/O	Power supply for input shaft speed sensor
28	0.75 B/W	IG power supply
29	-	-
30	0.50 Y/Bl	Solenoid valve lock for position P
31	0.50 Y/R	Start control signal
32	0.50 Br/V	Clutch solenoid valve control
33	0.50 W/R	Hydraulic torque converter solenoid valve control
34	0.50 Br/W	Hydraulic torque converter solenoid valve control
35	0.50 Br	Solenoid valve control for input shaft pressure
36	0.50 G/Bl	Output shaft pressure sensor power supply
37	-	-
38	-	-
39	-	-
40	-	-
41	0.50 R/W	PCAN-H
42	0.50 B/W	PCAN-L
43	0.50 Y/B	Upshift switch
44	0.50 R/Bl	Downshift switch
45	0.50 Gr/V	M/S mode switch
46	0.50 B/W	IG power supply
47	0.50W	Oil temperature sensor signal
48	-	-
49	0.50 B	Gear switch power feedback
50	0.50 V	Output shaft speed sensor signal
51	0.50 Br/Y	Input shaft speed sensor signal
52	-	-
53	-	-
54	0.50 G/W	Power supply for output shaft speed sensor
55	0.50 V/Gr	Power supply for turbine speed sensor
56	1.25 R	Power source

3-807



DTC diagnosis and testing

DTC diagnostic instructions

Once the TCM has fault code, the fault light on the dashboard will light up.

When using the diagnostic tool to read DTC and find the fault code, first check if the fault code is a historical fault and make sure it did not appear in the last driving period (the detector shall show the "historical fault"). If it is a historical fault, delete the fault code and check if the fault code appear again. If it is a current fault rather than a historical fault (the detector shows "current fault"), it should be solved step by step following the fault codes listed below.

DTC troubleshooting table

DTC	Trouble code information	Diagnostic process
P0703	Brake signal is abnormal	Refer to:P0703
P0705	Transmission gear signal is abnormal	Refer to:P0705
P0716	Turbine speed signal range is abnormal	Refer to:P0716
P0730	Speed ratio control is abnormal	Refer to:P0730
P0792	Speed signal range of input belt pulley shaft is abnormal	Refer to:P0792
P0811	Forward clutch slips	Refer to:P0811
P081E	Reverse clutch slips	Refer to:P081E
P0842	Pressure sensor circuit A (input pulley shaft) is short to ground or open	Refer to:P0842, , P0843
P0843	pressure sensor A circuit (input belt pulley shaft)short power supply circuit	
P0847	pressure sensor B circuit (output belt pulley shaft) short to groundor open circuit	Refer to:P0847, , P0848
P0848	Pressure sensor circuit B (input pulley shaft) is short to power supply	
P0890	TCM main relay control circuit is short or open	Refer to:P0890
P0894	Torque converter clutch slips	Refer to:P0894
P0900	Clutch solenoid valve control circuit is open	
P0902	Clutch solenoid valve control circuit is short to ground	Refer to:P0900, , P0902
P0903	Clutch solenoid valve control circuit is short to power supply	P0903
P0938	Transmission oil temperature too high	
P0939	Transmission fluid temperature sensor circuit is short to ground	Refer to:P0938, , P0939
P0940	Transmission fluid temperature sensor circuit is short to power supply or open	P0940
P0960	Control circuit of pressure control solenoid valve "A" (input pulley shaft) is open	
P0962	The control circuit of pressure control solenoid valve "A" (input pulley shaft) is short-circuited	Refer to:P0960, , P0962
P0963	Pressure control solenoid valve "A" (input belt pulley shaft)control circuit short power supply	P0963

Continuously variable transmission



DTC	Trouble code information	Diagnostic process
P0964	Pressure control solenoid valve "B" (output belt pulley shaft)control circuit open circuit	Refer to:P0964, , P0966 ,P0967
P0966	Pressure control solenoid valve "B" (output belt pulley shaft)control circuit short circuit	
P0967	The control circuit of pressure control solenoid valve "B" (output pulley shaft) is short to power supply	
P0968	The control circuit of pressure control solenoid valve "C" (torque converter) is open	Refer to:P0968, , P0970 ,P0971
P0970	The control circuit of pressure control solenoid valve "C" (torque converter) is short-circuited	
P0971	The control circuit of pressure control solenoid valve "C" (torque converter) is short to power supply	
P1706	Steel belt slips	Refer to:P1706
P1745	Speed signal range of output belt pulley shaft is abnormal	Refer to:P1745
P2797	Input pulley shaft pressure control is abnormal	Refer to:P2797
P2798	output belt pulley shaft pressure control is abnormal	Refer to:P2798
U0100	ECM communication failure	Refer to:U0100 ,U0121 ,U0401
U0121	ABS communication fault	
U0401	ECM data reception is abnormal	

03

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DTC P0703

DTC description

DTC	Description	Definition
P0703	<ul style="list-style-type: none"> Brake signal is abnormal 	<ul style="list-style-type: none"> Brake signal, received by TCM via CAN bus, is mainly used to determine the current acceleration / deceleration state, providing important information for the transmission fluid pressure, hydraulic torque converter, and intelligent shift control.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0703	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the valid bit of the brake signal received from the CAN bus is 1, the diagnostic condition is satisfied and the fault is being acknowledged. 	<ul style="list-style-type: none"> Brake switch Brake switch line

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the brake switch harness plugs, the engine control modules for damage, poor contact, aging, looseness and other problematic signs.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3</p> <p>→No</p> <p>Finish.</p>

Continuously variable transmission



Test condition	Details / Results / Measures
3. Check the brake switch for related faults.	<p>A. Identify the brake switch faults. Refer to: "P0703" fault diagnosis →Yes Fault diagnosis →Yes Step 4. →No Repair the brake switch faults.</p>
4. Check the CAN communication between TCM and ECM.	<p>A. Check the CAN communication between TCM and ECM. Refer to: "U0100" fault diagnosis Confirms that the troubleshooting is successful.</p>

03

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





DTCP0705

DTC description

DTC	Description	Definition
P0705	<ul style="list-style-type: none"> Transmission gear signal is abnormal 	<ul style="list-style-type: none"> Transmission gear (PRND) signal is processed by TCM circuit, and the low level signals are active. This is mainly used to determine the current driving mode to provide important information for the coupling and variable speed control of clutch.

Possible causes

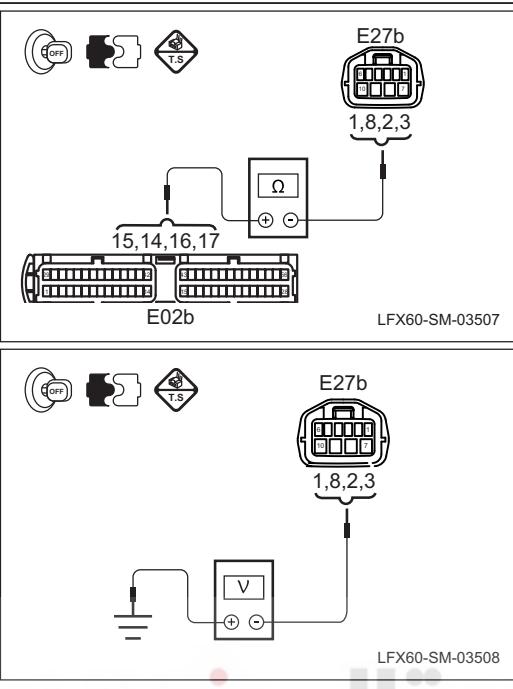
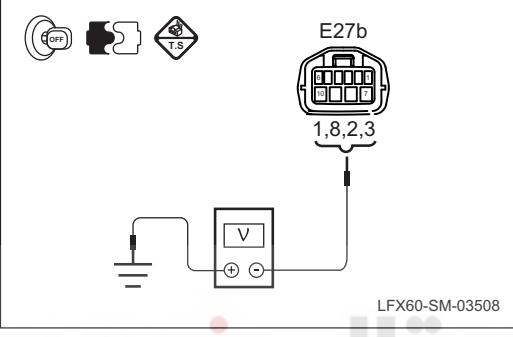
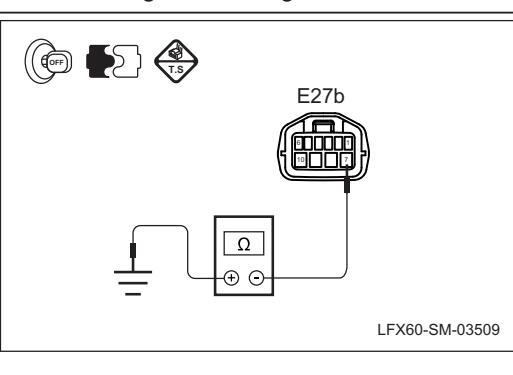
DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0705	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When there are multiple or no read-in signals, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Gear switch harness Gear switch

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>اولین چک کاران خودرو در ایران</p> <p>A. Check the transmission gear switch harness plugs and TCM for damage, poor contact, aging, looseness and other problematic signs.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3</p> <p>→No</p> <p>Finish.→No</p> <p>Finish.</p>

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Test condition	Details / Results / Measures
<p>3. Check the gear switch input line.</p>  <p>LFX60-SM-03507</p>  <p>LFX60-SM-03508</p>	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the gear switch harness plug E27b. D. Disconnect the TCM harness plug E02b. E. Use a multimeter to measure the resistance between terminal 1 of gear switch harness plug E27b and terminal 15 of transmission control module harness plug E02b. F. Measure the resistance between the gear switch harness plug E27b terminal 8 and transmission control module harness plug E02b terminal 14 with the multimeter. G. Measure the resistance between the gear switch harness plug E27b terminal 2 and transmission control module harness plug E02b terminal 16 with the multimeter. H. Measure the resistance between the gear switch harness plug E27b terminal 3 and transmission control module harness plug E02b terminal 17 with the multimeter.</p> <p>Standard value: less than 5Ω</p> <p>I. Connect the negative terminal 1 of the battery. J. Use a multimeter to measure the voltage between terminal 1 of gear switch harness plug E27b and the reliable ground point. K. Measure the voltage between the gear switch harness plug E27b terminal 8 and the fixed ground point with the multimeter. L. Measure the voltage between the gear switch harness plug E27b terminal 2 and the fixed ground point with the multimeter. M. Measure the voltage between the gear switch harness plug E27b terminal 3 and the fixed ground point with the multimeter.</p> <p>Standard value: 0V</p> <p>Is the voltage normal? →Yes Step 4. →No Check the gear switch input line for fault; and replace the harness, if necessary.</p>
<p>4. Check the gear switch ground line.</p>  <p>LFX60-SM-03509</p>	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the gear switch harness plug E27b. D. Connect the battery negative terminal. E. Disconnect the harness plug E02b from the transmission control module. F. Use a multimeter to measure the resistance between terminal 7 of gear switch harness plug E27b and the reliable ground point.</p> <p>Standard value: less than 5Ω</p> <p>Is the resistance normal? →Yes Step 5 →No Check the gear switch ground line for fault; and replace the harness, if necessary.</p>



Test condition	Details / Results / Measures
5. Check the gear switch.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the gear switch harness plug E27b.</p> <p>D. Use a multimeter to measure the resistance between terminals 1 and 7 of the gear switch when the shift lever stays at P.</p> <p>E. Measure the resistance between the terminal 8 and 7 of the gear switch at R gear with a multimeter.</p> <p>F. Measure the resistance between the terminal 2 and 7 of the gear switch at N gear with a multimeter.</p> <p>G. Measure the resistance between the terminal 3 and 7 of the gear switch at D gear with a multimeter.</p> <p>Standard value: less than 5Ω</p> <p>H. Use a multimeter to measure the resistance between terminals 1 and other terminals of the gear switch when the shift lever stays at P.</p> <p>I. Measure the resistance between terminal 8 and other terminals of the gear switch at R gear with a multimeter.</p> <p>J. Measure the resistance between terminal 2 and other terminals of the gear switch at N gear with a multimeter.</p> <p>K. Measure the resistance between terminal 3 and other terminals of the gear switch at D gear with a multimeter.</p> <p>Standard value: $10M\Omega$ or higher</p> <p>Is the resistance normal?</p> <p>→Yes</p> <p>Step 6</p> <p>→No</p> <p>Replace the gear switch.</p>
6. Check the TCM.	<p>A. Replace the TCM.</p> <p>Refer to: Replacement of transmission control module (TCM)</p> <p>Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTCP0716****DTC description**

DTC	Description	Definition
P0716	<ul style="list-style-type: none"> Turbine speed signal range is abnormal 	<ul style="list-style-type: none"> The turbine speed signal is processed by TCM circuit and it is a kind of high frequency pulse signal. TCM works out the turbine speed according to the pulse signal. This is mainly designed for the hydraulic torque converter locking, clutch engagement and the variable speed control functions.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0716	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the turbine speed is equal to 0 when the car is running, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Turbine speed sensor installed incorrectly Turbine speed sensor line Turbine speed sensor

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the turbine speed sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>B. Check if the turbine speed sensor is installed incorrectly. Are the results normal?</p> <p>→Yes Step 2</p> <p>→No Examine and repair the fault location.</p>
2. Clear the DTC.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes Step 3.</p> <p>→No Finish.</p>



Test condition	Details / Results / Measures
3. Check the turbine speed sensor power supply line.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the turbine speed sensor harness plug E28b. D. Connect the battery negative terminal. E. operate the start switch to turn the power to ON state. F. Use a multimeter to measure the voltage between terminal 3 of turbine speed sensor harness plug E28b and the reliable ground point. Standard value: 4.5 ~ 5.5V Is the voltage normal? →Yes Step 4. →No Repair the power line of turbine speed sensor; replace the harness, if necessary.</p>
4. Check the turbine speed sensor signal line.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the turbine speed sensor harness plug E28b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the turbine speed sensor harness plug E28b terminal 2 and TCM harness plug E02b terminal 22 with the multimeter. Standard value: less than 5Ω F. Measure the resistance between the turbine speed sensor harness plug E28b terminal 2 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher G. Connect the battery negative terminal. H. Measure the voltage between the turbine speed sensor harness plug E28b terminal 2 and the fixed ground point with the multimeter. Standard value: 0V Are the check results normal? →Yes Step 5. →No Repair the turbine speed sensor signal line fault and replace the harness if necessary.</p>

Continuously variable transmission

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Test condition	Details / Results / Measures
5. Check the grounding line of turbine speed sensor.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the turbine speed sensor harness plug E28b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the turbine speed sensor harness plug E28b terminal 1 and TCM harness plug E02b terminal 21 with the multimeter. Standard value: less than 5Ω F. Measure the resistance between the turbine speed sensor harness plug E28b terminal 1 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher G. Connect the battery negative terminal. H. Measure the voltage between the turbine speed sensor harness plug E28b terminal 1 and the fixed ground point with the multimeter. Standard value: 0V Are the results normal? →Yes Step 5. →No Repair the turbine speed sensor signal line fault and replace the harness if necessary.</p>
6. Check the turbine speed sensor.	
	<p>A. Replace the turbine speed sensor. Are the results normal? →Yes Step 7. →No Replace the turbine speed sensor</p>
7. Check the TCM.	
	<p>A. Replace the TCM. Refer to: Replacement of transmission control module (TCM) Confirms that the troubleshooting is successful.</p>



DTC P0730

DTC description

DTC	Description	Definition
P0730	<ul style="list-style-type: none"> Speed ratio control is abnormal 	<ul style="list-style-type: none"> TCM obtains the target speed ratio according to the current driving mode, vehicle speed and accelerator pedal signal. The actual speed ratio is obtained by input belt pulley shaft speed and output belt pulley shaft speed. The variable speed control module realizes the speed ratio control through the comprehensive feedback control according to the above information.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0730	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the absolute value of the difference between the target speed ratio and the actual speed ratio is greater than a given value, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Self-learning not completed Input shaft pressure sensor Input shaft pressure solenoid valve Hydraulic system

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	<p>A. Check the input shaft pressure sensor and input shaft pressure solenoid valve for damage, poor contact, aging, looseness and other problematic signs.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>

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Test condition	Details / Results / Measures
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. TCM self-learning.</p> <p>D. Use diagnostic tool to clear fault code.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>
3. Check the input shaft oil pressure sensor.	<p>A. Check the input shaft pressure sensor fault.</p> <p>Refer to: "P0842, P0843" DTC</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 4.</p> <p>→No</p> <p>Finish.</p>
4. Check the input shaft pressure solenoid valve.	<p>A. Check the input shaft pressure solenoid valve fault.</p> <p>Refer to: "P0960, P0962, P0963" DTC</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 5.</p> <p>→No</p> <p>Finish.</p>
5. Check the transmission hydraulic system.	<p>A. Contact the related transmission technician for the data acquisition and analysis.</p> <p>Confirms that the troubleshooting is successful.</p>

03



DTC P0792

DTC description

DTC	Description	Definition
P0792	<ul style="list-style-type: none"> Speed signal range of input belt pulley shaft is abnormal 	<ul style="list-style-type: none"> The speed signal of input belt pulley shaft is processed by TCM circuit and it is a kind of high frequency pulse signal. TCM works out the turbine speed according to the pulse signal. Mainly used for torque converter locking, clutch coupling and variable speed control.

Possible causes

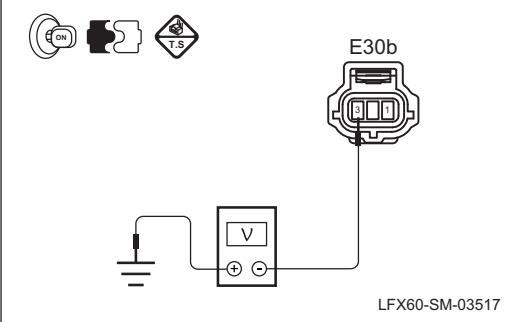
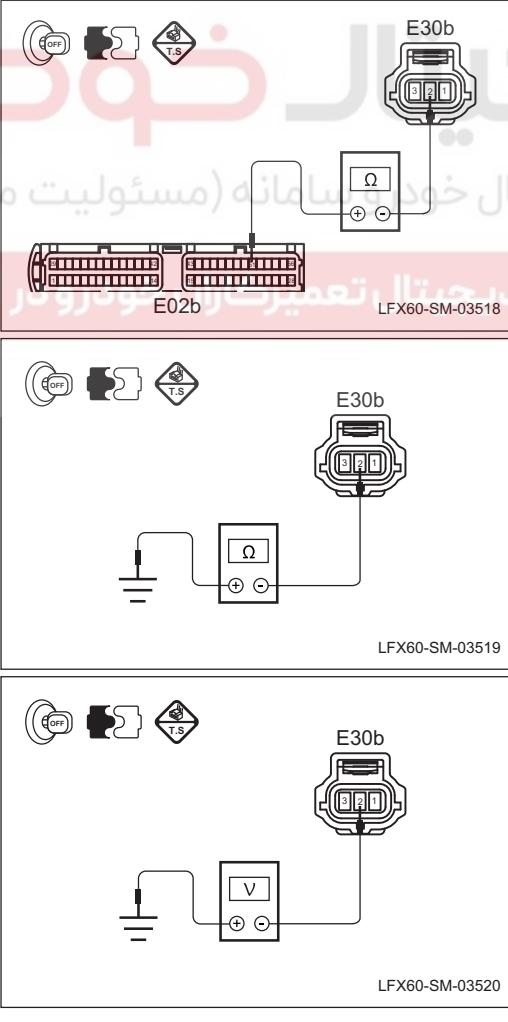
DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0792	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the input speed is equal to 0 while the car is running, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Input shaft speed sensor line Input shaft speed sensor

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the input shaft speed sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>B. Check if the speed sensor is installed incorrectly.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>

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Test condition	Details / Results / Measures
<p>3. Check the input shaft speed sensor power supply line.</p> 	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the input shaft speed sensor harness plug E30b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Use a multimeter to measure the voltage between terminal 3 of input shaft speed sensor harness plug E30b and the reliable ground point. Standard value: 4.5 ~ 5.5V Is the voltage normal? →Yes Step 4. →No Repair the power line of input shaft speed sensor; replace the harness, if necessary.</p>
<p>4. Check the input shaft speed sensor signal line.</p> 	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the input shaft speed sensor harness plug E30b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the input shaft speed sensor harness plug E30b terminal 2 and TCM harness plug E02b terminal 51 with the multimeter. Standard value: less than 5Ω F. Measure the resistance between the input shaft speed sensor harness plug E30b terminal 2 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher G. Connect the battery negative terminal. H. Measure the voltage between the input shaft speed sensor harness plug E30b terminal 2 and the fixed ground point with the multimeter. Standard value: 0V Are the results normal? →Yes Step 5. →No Repair the signal line of input shaft speed sensor; replace the harness, if necessary.</p>



Test condition	Details / Results / Measures
5. Check the grounding line of input shaft speed sensor.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the input shaft speed sensor harness plug E30b.</p> <p>D. Disconnect the TCM harness plug E02b.</p> <p>E. Measure the resistance between the input shaft speed sensor harness plug E30b terminal 1 and TCM harness plug E02b terminal 23 with the multimeter.</p> <p>Standard value: less than 5Ω</p> <p>F. Measure the resistance between the input shaft speed sensor harness plug E30b terminal 1 and the fixed ground point with the multimeter.</p> <p>Standard value: 10MΩ or higher</p> <p>G. Connect the battery negative terminal.</p> <p>H. Measure the voltage between the input shaft speed sensor harness plug E30b terminal 1 and the fixed ground point with the multimeter.</p> <p>Standard value: 0V</p> <p>Are the results normal?</p> <p>→Yes Step 5.</p> <p>→No Repair the signal line of input shaft speed sensor; replace the harness, if necessary.</p>
6. Check the input shaft speed sensor.	<p>A. Replace the input shaft speed sensor.</p> <p>Are the results normal?</p> <p>→Yes Step 7.</p> <p>→No Replace the input shaft speed sensor.</p>
7. Check the TCM.	<p>A. Replace the TCM.</p> <p>Refer to: Replacement of transmission control module (TCM)</p> <p>Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTCP0811****DTC description**

DTC	Description	Definition
P0811	• Forward clutch slips	• Clutch control is used to realize fast and smooth coupling of gear D.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0811	• Checking the hardware or harness	• When the slip difference between the forward clutch input speed and output speed is relatively obvious after the coupling or locking, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work.	• Turbine speed sensor • Clutch control solenoid valve • Hydraulic system • Forward clutch friction plate

03

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the turbine speed sensor, clutch control solenoid valve and TCM harness plug for breakage, loose contact, aging or looseness.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>



Test condition	Details / Results / Measures
3. Check the turbine speed sensor.	<p>A. Check the turbine speed sensor fault. Refer to: "P0716" DTC Does DTC recur? → Yes Step 4. → No Finish.</p>
4. Check the clutch solenoid valve.	<p>A. Check the clutch solenoid valve fault. Refer to: "P0900,,P0902,,P0903" DTC Does DTC recur? → Yes Step 5. → No Finish.</p>
5. Check the transmission hydraulic system.	<p>A. Contact the related transmission technician for the data acquisition and analysis. Are the results normal? → Yes Step 6. → No Examine and repair the fault location.</p>
6. Check the forward clutch friction plate.	<p>A. Contact the related transmission technician for the check and analysis. Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTC P081E****DTC description**

DTC	Description	Definition
P081E	<ul style="list-style-type: none"> Reverse clutch slips 	<ul style="list-style-type: none"> Clutch control is used to realize fast and smooth coupling of gear R.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P081E	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the slip difference between the reverse clutch input speed and output speed is relatively obvious after the coupling or locking, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Turbine speed sensor Clutch solenoid valve Hydraulic system Reverse clutch friction plate

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the turbine speed sensor, clutch control solenoid valve and TCM harness plug for breakage, loose contact, aging or looseness.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>

03



Test condition	Details / Results / Measures
3. Check the turbine speed sensor.	<p>A. Check the turbine speed sensor fault. Refer to: "P0716" DTC Does DTC recur? → Yes Step 4. → No Finish.</p>
4. Check the clutch control solenoid valve.	<p>A. Check the clutch solenoid valve fault. Refer to: "P0900,,P0902,,P0903" DTC Does DTC recur? → Yes Step 5. → No Finish.</p>
5. Check the transmission hydraulic system.	<p>A. Contact the related transmission technician for the data acquisition and analysis. Are the results normal? → Yes Step 6. → No Examine and repair the fault location.</p>
6. Check the reverse clutch friction plate.	<p>A. Contact the related transmission technician for the check and analysis. Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTC P0842,P0843****DTC description**

DTC	Description	Definition
P0842	<ul style="list-style-type: none"> Pressure sensor circuit A (input pulley shaft) is short to ground or open 	<ul style="list-style-type: none"> The transmission hydraulic pressure sensor A (input belt pulley) detects the input shaft pressure from CVT and sends a signal to TCM.
P0843	<ul style="list-style-type: none"> Pressure sensor circuit A (input pulley shaft) is short to power supply 	

Possible causes

03

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0842	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the oil pressure of hydraulic pressure sensor A is less than the minimum allowable value, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	
P0843		<ul style="list-style-type: none"> When the oil pressure of hydraulic pressure sensor A is greater than the maximum allowable value, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Input shaft pressure sensor line Input shaft pressure sensor

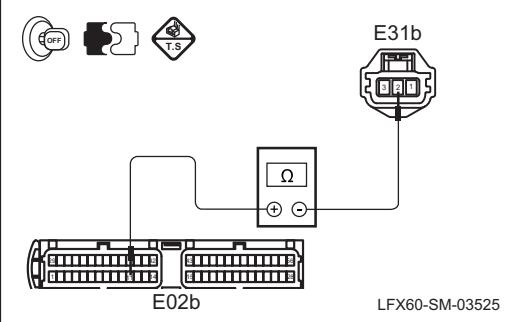
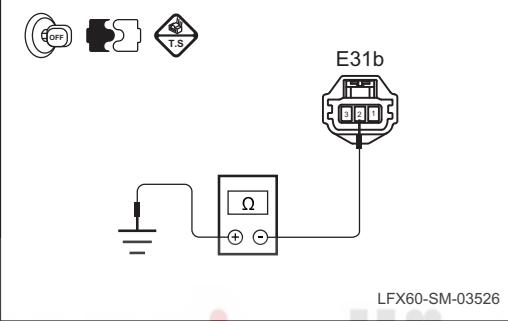
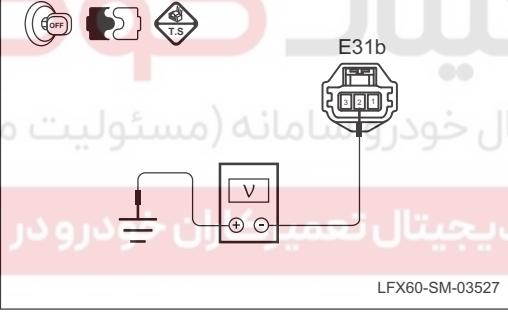


Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the input belt pulley shaft pressure sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>B. Check if the input belt pulley shaft pressure sensor is installed incorrectly.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the DTC.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>
3. Check the power supply line of input shaft speed sensor.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the input shaft pressure sensor harness plug E31b.</p> <p>D. Connect the battery negative terminal.</p> <p>E. operate the start switch to turn the power to ON state.</p> <p>F. Use a multimeter to measure the voltage between terminal 3 of input shaft pressure sensor harness plug E31b and the reliable ground point.</p> <p>Standard value:4.5 ~ 5.5V</p> <p>Is the voltage normal?</p> <p>→Yes</p> <p>Step 4.</p> <p>→No</p> <p>Repair the power line of input shaft pressure sensor; replace the harness, if necessary.</p>

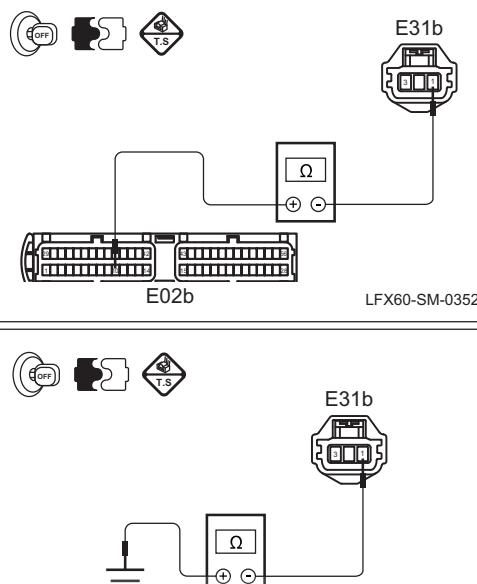
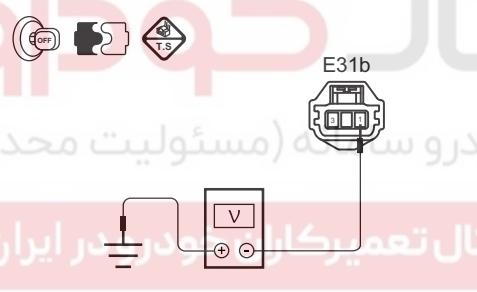
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Test condition	Details / Results / Measures
4. Check the power supply line of input shaft pressure sensor.	
	A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the input shaft pressure sensor harness plug E31b. D. Disconnect the TCM harness plug E02b. E. Use a multimeter to measure the resistance between terminal 2 of input shaft pressure sensor harness plug E31b and terminal 11 of transmission control module harness plug E02b. Standard value: less than 5Ω
	F. Measure the resistance between the input shaft pressure sensor harness plug E31b terminal 2 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher G. Connect the battery negative terminal. H. Use a multimeter to measure the voltage between terminal 2 of input shaft pressure sensor harness plug E31b and the reliable ground point. Standard value: 0V
	Are the results normal? →Yes Step 5. →No Repair the input shaft pressure sensor signal line fault and replace the harness if necessary.

03



Test condition	Details / Results / Measures
5. Check the grounding line of input shaft pressure sensor.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the harness plug E31b from input belt pulley shaft pressure sensor.</p> <p>D. Disconnect the TCM harness plug E02b.</p> <p>E. Measure the resistance between the input shaft pressure sensor harness plug E31b terminal 1 and TCM harness plug E02b terminal 10 with the multimeter.</p> <p>Standard value: less than 5Ω</p> <p>F. Measure the resistance between the input shaft pressure sensor harness plug E31b terminal 1 and the fixed ground point with the multimeter.</p> <p>Standard value: 10MΩ or higher</p> <p>G. Connect the battery negative terminal.</p>
	<p>H. Measure the voltage between the input shaft pressure sensor E31b terminal 1 and the fixed ground point with the multimeter.</p> <p>Standard value: 0V</p> <p>Are the results normal?</p>
	<p>→Yes Step 5.</p> <p>→No Repair the input shaft pressure sensor signal line fault and replace the harness if necessary.</p>
6. Check the input shaft pressure sensor.	<p>A. Disconnect the harness plug E31b from input shaft pressure sensor.</p> <p>F. Use a multimeter to measure the voltage between terminals 3 and 2 of input shaft pressure sensor.</p> <p>Standard value:~10KΩ</p> <p>Is the resistance normal?</p> <p>→Yes Step 7.</p> <p>→No Replace the input shaft pressure sensor.</p>
7. Check the TCM.	<p>A. Replace the TCM.</p> <p>Refer to: Replacement of transmission control module (TCM)</p> <p>Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTC P0847,P0848****DTC description**

DTC	Description	Definition
P0847	<ul style="list-style-type: none"> Pressure sensor circuit B (output pulley shaft) is short to ground or open 	<ul style="list-style-type: none"> The transmission hydraulic pressure sensor B (output belt pulley) detects the input shaft pressure from CVT and sends a signal to TCM.
P0848	<ul style="list-style-type: none"> Pressure sensor circuit B (input pulley shaft) is short to power supply 	

03

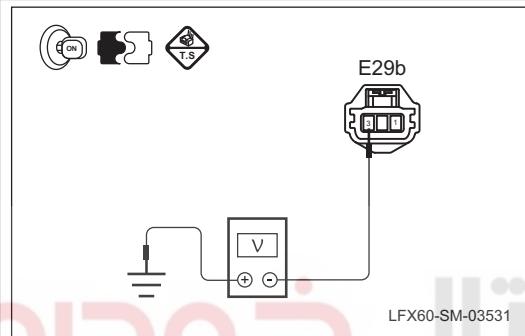
Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0847	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the oil pressure of hydraulic pressure sensor B is less than the minimum allowable value, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Output shaft pressure sensor line output shaft pressure sensor
P0848		<ul style="list-style-type: none"> When the oil pressure of hydraulic pressure sensor B is greater than the maximum allowable value, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	

Diagnostic process

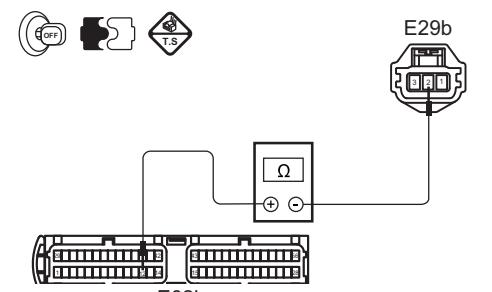
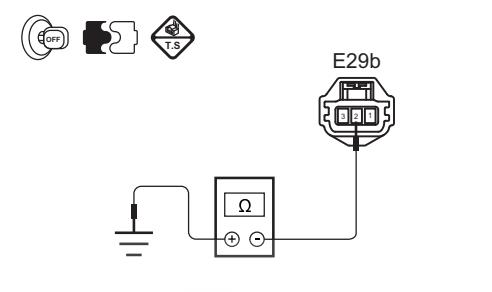
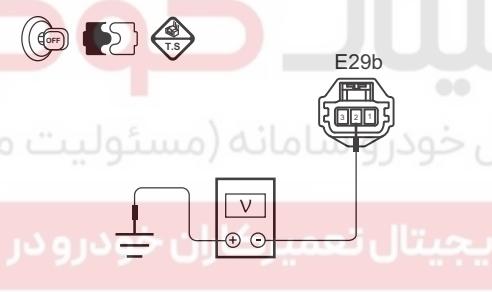
Test condition	Details / Results / Measures
1. General check	
	<p>A. Check the output shaft pressure sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>B. Check if the output belt pulley shaft pressure sensor is installed incorrectly.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>



Test condition	Details / Results / Measures
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes Step 3.</p> <p>→No Finish.</p>
3. Check the power supply line of output shaft speed sensor.	 <p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the output shaft pressure sensor harness plug E29b.</p> <p>D. Connect the battery negative terminal.</p> <p>E. Operate the start switch to turn the power to ON state.</p> <p>F. Measure the voltage between the output shaft pressure sensor harness plug E29b terminal 3 and the fixed ground point with the multimeter.</p> <p>Standard value: 4.5 ~ 5.5V</p> <p>Is the voltage normal?</p> <p>→Yes Step 4.</p> <p>→No Repair the power line of output shaft pressure sensor; replace the harness, if necessary.</p>

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Test condition	Details / Results / Measures
4. Check the power supply line of output shaft pressure sensor.	
 <p>LFX60-SM-03532</p>	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the output shaft pressure sensor harness plug E29b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the output shaft pressure sensor harness plug E29b terminal 2 and TCM harness plug E02b terminal 12 with the multimeter. Standard value: less than 5Ω</p>
 <p>LFX60-SM-03533</p>	<p>F. Measure the resistance between the output shaft pressure sensor harness plug E29b terminal 2 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher</p>
 <p>LFX60-SM-03534</p>	<p>G. Connect the battery negative terminal. H. Measure the voltage between the output shaft pressure sensor harness plug E29b terminal 2 and the fixed ground point with the multimeter. Standard value: 0V</p> <p>Are the results normal? →Yes Step 5. →No Repair the output shaft pressure sensor signal line fault and replace the harness if necessary.</p>

03



Test condition	Details / Results / Measures
5. Check the grounding line of output shaft pressure sensor. LFX60-SM-03535	A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the output shaft pressure sensor harness plug E29b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the output shaft pressure sensor harness plug E29b terminal 1 and TCM harness plug E02b terminal 13 with the multimeter. Standard value: less than 5Ω F. Measure the resistance between the output shaft pressure sensor harness plug E29b terminal 1 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher G. Connect the battery negative terminal. H. Measure the voltage between the output shaft pressure sensor harness plug E29b terminal 1 and the fixed ground point with the multimeter. Standard value: 0V Are the results normal?
 LFX60-SM-03536	→Yes Step 5. →No Repair the output shaft pressure sensor signal line fault and replace the harness if necessary.
 LFX60-SM-03537	
6. Check the output shaft pressure sensor.	A. Disconnect the output shaft pressure sensor harness plug E31b. B. Use a multimeter to measure the voltage between terminals 3 and 2 of output shaft pressure sensor. Standard value: ~10KΩ Is the resistance normal? →Yes Step 7. →No Replace the output shaft pressure sensor.
7. Check the TCM.	A. Replace the TCM. Refer to: Replacement of transmission control module (TCM) Confirms that the troubleshooting is successful.

Continuously variable transmission

**DTC P0890****DTC description**

DTC	Description	Definition
P0890	<ul style="list-style-type: none"> TCM main relay control circuit is short or open 	<ul style="list-style-type: none"> TCM power supply relay is a switch-controlled solenoid valve that supplies power to all solenoid valves. TCM software system controls the solenoid valve switch to achieve the control over various types of solenoid valves in transmission control system.

03

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0890	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When TCM power supply gives instruction and the output feedback voltage of solenoid valve is less than a certain value, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Activation request relay line start request relay

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the activation request relay and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs. Are the results normal? →Yes Step 2. →No Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface. B. operate the start switch to turn the power to ON state. C. Clear the trouble code by using diagnostic equipment. Does the trouble code reappear? →Yes Step 3. →No Finish.</p>



Test condition	Details / Results / Measures
3. Check the power supply line of activation request relay.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Remove the start request relay K17.</p> <p>D. Connect the battery negative terminal.</p> <p>E. Operate the start switch to turn the power to ON state.</p> <p>F. Use a multimeter to measure the voltage between terminal 1 of relay K17 harness plug and the reliable ground point.</p> <p>Standard value: 11 ~ 14V</p> <p>Is the voltage normal?</p> <p>→Yes</p> <p>Step 4.</p> <p>→No</p> <p>Repair the power supply line of activation request relay; replace the harness, if necessary.</p>
4. Check the activation request relay control line.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Remove the start request relay K17.</p> <p>D. Disconnect the TCM harness plug E02b.</p> <p>E. Use a multimeter to measure the resistance between terminal 2 of activation request relay harness plug and terminal 31 of transmission control module harness plug E02b.</p> <p>Standard value: less than 5Ω</p> <p>F. Use a multimeter to measure the resistance between terminal 2 of relay K17 harness plug and the reliable ground point.</p> <p>Standard value: 10MΩ or higher</p> <p>G. Connect the battery negative terminal.</p> <p>H. Use a multimeter to measure the voltage between terminal 2 of relay K17 harness plug and the reliable ground point.</p> <p>Standard value: 0V</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 5.</p> <p>→No</p> <p>Repair the control line of activation request relay K17; replace the harness, if necessary.</p>

Continuously variable transmission

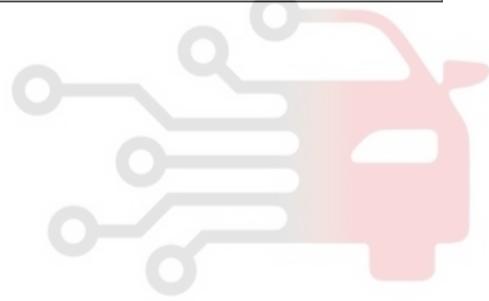


Test condition	Details / Results / Measures
5. Check the activation request relay.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Remove the start request relay K17. D. Apply a battery voltage between terminals 1 and 2 of the activation request relay. E. Use a multimeter to measure the resistance between terminals 3 and 5 of activation request relay. Standard value: less than 1Ω Is the resistance normal? →Yes Step 6. →No Replace the activation request relay.</p>
6. Check the TCM.	<p>A. Replace the TCM. Refer to: Replacement of transmission control module (TCM) Confirms that the troubleshooting is successful.</p>

03

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





DTC P0894

DTC description

DTC	Description	Definition
P0894	<ul style="list-style-type: none"> • Torque converter clutch slips 	<ul style="list-style-type: none"> • TCM obtains the locking control target according to the current driving mode, vehicle speed and accelerator pedal signal, achieving the closed control of lock-up clutch.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0894	<ul style="list-style-type: none"> • Hardware or harness inspection 	<ul style="list-style-type: none"> • When the slip difference between is relatively obvious after the hydraulic torque converter and lock-up clutch are coupled, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> • Hydraulic torque converter solenoid valve or line • Hydraulic control circuit • Hydraulic torque converter

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the hydraulic torque converter solenoid valve and transmission control module harness plug for damage, poor contact, aging, looseness and other problematic signs.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>

Continuously variable transmission



Test condition	Details / Results / Measures
3. Check the hydraulic torque converter solenoid valve.	<p>A. Check the hydraulic torque converter solenoid valve for fault. Refer to: "P0968, , P0970, , P0971" DTC Does DTC recur? →Yes Step 4. →No Finish.</p>
4. Check the hydraulic control circuit.	<p>A. Contact the relevant technical personnel of transmission for data acquisition and inspection. Are the results normal? →Yes Step 5. →No Examine and repair the fault location.</p>
5. Check the hydraulic torque converter.	<p>A. Contact the relevant technical personnel of transmission for inspection. Confirms that the troubleshooting is successful.</p>

03





DTC P0900,P0902,P0903

DTC description

DTC	Description	Definition
P0900	<ul style="list-style-type: none"> • Clutch solenoid valve control circuit is open 	<ul style="list-style-type: none"> • Description: After the gear signal is sent to TCM, TCM activates the clutch control solenoid valve to control the clutch operation.
P0902	<ul style="list-style-type: none"> • Clutch solenoid valve control circuit is short to ground 	
P0903	<ul style="list-style-type: none"> • Clutch solenoid valve control circuit is short to power supply 	

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0900	<ul style="list-style-type: none"> • Checking the hardware or harness 	<ul style="list-style-type: none"> • Once the solenoid valve output feedback voltage is normal, the clutch solenoid valve feedback current is less than a certain value, while TCM power supply command is released, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	 <ul style="list-style-type: none"> • Clutch solenoid valve line • Clutch solenoid valve
P0902		<ul style="list-style-type: none"> • When the solenoid valve output feedback voltage is normal, the clutch solenoid valve feedback current is greater than a certain value, and TCM power supply gives the instruction, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	
P0903		<ul style="list-style-type: none"> • Once the solenoid valve output feedback voltage is normal, the clutch solenoid valve feedback current is less than a certain value, while TCM power supply command is released, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	

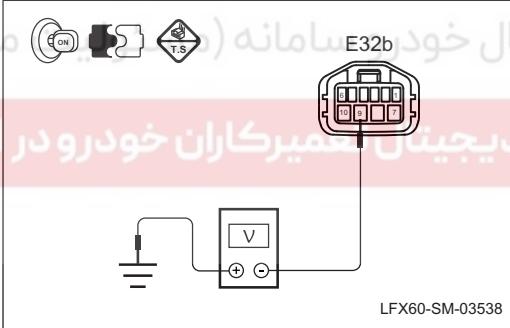
Continuously variable transmission



Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the clutch solenoid valve and transmission control module harness plug for damage, poor contact, aging, looseness and other problematic signs. Are the results normal? →Yes Step 2. →No Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface. B. Operate the start switch to turn the power to ON state C. Clear the trouble code by using diagnostic equipment. Does the trouble code reappear? →Yes Step 3. →No Finish.</p>
3. Check the power supply line of clutch solenoid valve.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Use a multimeter to measure the voltage between terminal 9 of clutch solenoid valve harness plug E32b and the reliable ground point. Standard value:11 ~ 14V Is the voltage normal? →Yes Step 4. →No Repair the power supply line of clutch solenoid valve; and replace the harness, if necessary.</p>

03





Test condition	Details / Results / Measures
4. Check the control line of clutch solenoid valve.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the solenoid valve harness plug E32b.</p> <p>D. Disconnect the TCM harness plug E02b.</p> <p>E. Measure the resistance between the solenoid valve harness plug E32b terminal 4 and TCM harness plug E02b terminal 32 with the multimeter.</p> <p>Standard value: less than 5Ω</p>
	<p>F. Measure the resistance between the solenoid valve harness plug E32b terminal 4 and the fixed ground point with the multimeter.</p> <p>Standard value: 10MΩ or higher</p> <p>G. Connect the battery negative terminal.</p> <p>H. Measure the voltage between the solenoid valve harness plug E32b terminal 4 and the fixed ground point with the multimeter.</p> <p>Standard value: 0V</p> <p>Are the results normal?</p>
	<p>→Yes</p> <p>Step 5.</p> <p>→No</p> <p>Repair the control line of clutch solenoid valve; and replace the harness, if necessary.</p>
5. Check the clutch solenoid valve.	<p>A. Disconnect the solenoid valve harness plug E32b.</p> <p>B. Use a multimeter to measure the resistance between terminals 4 and 9 of clutch solenoid valve.</p>
	<p>Standard value: $10 \pm 0.6\Omega$</p>
	<p>Is the resistance normal?</p>
	<p>→Yes</p>
	<p>Step 6.</p>
	<p>→No</p>
	<p>Replace the solenoid valve.</p>
6. Check the TCM.	<p>A. Replace the TCM.</p>
	<p>Refer to: Replacement of transmission control module (TCM)</p>
	<p>Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTC P0938,P0939,P0940****DTC description**

DTC	Description	Definition
P0938	<ul style="list-style-type: none"> Transmission fluid temperature is too high 	<ul style="list-style-type: none"> CVT fluid temperature sensor detects CVT fluid temperature and sends signal to TCM.
P0939	<ul style="list-style-type: none"> Transmission fluid temperature sensor circuit is short to ground 	
P0940	<ul style="list-style-type: none"> Transmission fluid temperature sensor circuit is short to power supply or open 	

03

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0938		<ul style="list-style-type: none"> When the engine speed is greater than 500rpmand CVT fluid temperature is greater than 128°C , the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	
P0939	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> Once the CVT oil temperature sensor voltage is less than a given minimum value, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> CVT fluid temperature sensor line CVT oil temperature sensor
P0940		<ul style="list-style-type: none"> When the CVT fluid temperature sensor voltage is greater than a given maximum value, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	



Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the fluid temperature sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>B. Check the transmission cooling system.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the DTC.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>
3. Check the signal power supply line of fluid temperature sensor.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the solenoid valve harness plug E32b.</p> <p>D. Connect the battery negative terminal.</p> <p>E. Operate the start switch to turn the power to ON state.</p> <p>F. Measure the voltage between the solenoid valve harness plug E32b terminal 1 and the fixed ground point with the multimeter.</p> <p>Standard value: 4.5 ~ 5.5 V</p> <p>Is the voltage normal?</p> <p>→Yes</p> <p>Step 4.</p> <p>→No</p> <p>Repair the signal power supply line of fluid temperature sensor; replace the harness, if necessary.</p>

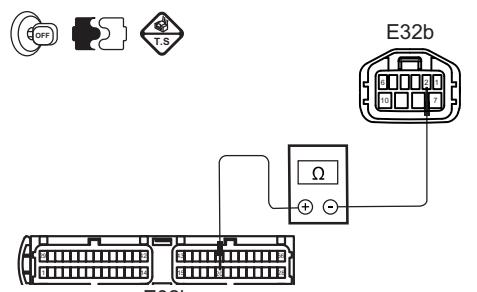
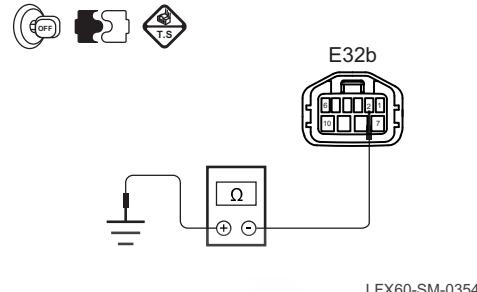
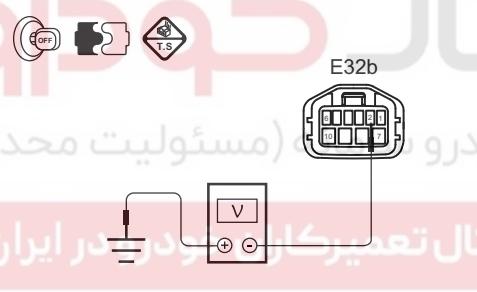
Continuously variable transmission

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Test condition	Details / Results / Measures
4. Check the signal line of fluid temperature sensor.	
<p>LFX60-SM-03543</p>	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the solenoid valve harness plug E32b terminal 1 and TCM harness plug E02b terminal 47 with the multimeter.</p>
<p>LFX60-SM-03544</p>	<p>Standard value: less than 5Ω F. Measure the resistance between the solenoid valve harness plug E32b terminal 1 and the fixed ground point with the multimeter.</p>
<p>LFX60-SM-03545</p>	<p>Standard value: 10MΩ or higher G. Connect the battery negative terminal. H. Measure the voltage between the solenoid valve harness plug E32b terminal 1 and the fixed ground point with the multimeter.</p>
<p>Standard value: 0V Are the results normal? →Yes Step 5. →No Repair the oil temperature sensor control line fault and replace the harness if necessary.</p>	

03



Test condition	Details / Results / Measures
5. Check the grounding line of fluid temperature sensor.	
	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the solenoid valve harness plug E32b terminal 2 and TCM harness plug E02b terminal 20 with the multimeter. Standard value: less than 5Ω F. Measure the resistance between the solenoid valve harness plug E32b terminal 2 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher</p>
	<p>G. Connect the battery negative terminal. H. Measure the voltage between the solenoid valve harness plug E32b terminal 2 and the fixed ground point with the multimeter. Standard value: 0V</p>
	<p>Are the results normal? →Yes Step 6. →No Repair the oil temperature sensor control line fault and replace the harness if necessary.</p>

Continuously variable transmission



Test condition	Details / Results / Measures
6. Check the fluid temperature sensor.	<p>A. Disconnect the solenoid valve harness plug E32b.</p> <p>B. Use a multimeter to measure the resistance between terminals 1 and 2 of fluid temperature sensor.</p> <p>Standard value:~47.7 kΩ at -20 °C</p> <p>Standard value:~29.5 kΩ at -10 °C</p> <p>Standard value:~18.6 kΩ at 0 °C</p> <p>Standard value:~12.08 kΩ at 10 °C</p> <p>Standard value:~6.63 kΩ at 25 °C</p> <p>Standard value:~1.53 kΩ at 70 °C</p> <p>Standard value:~0.79 kΩ at 90 °C</p> <p>Standard value:~0.38 kΩ at 120 °C</p> <p>Is the resistance normal?</p> <p>→Yes Step 7.</p> <p>→No Replace the solenoid valve.</p>
7. check TCM	<p>A. Replace the TCM.</p> <p>Refer to: Replacement of transmission control module (TCM)</p> <p>Confirms that the troubleshooting is successful.</p>

03



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC P0960,P0962,P0963

DTC description

DTC	Description	Definition
P0960	<ul style="list-style-type: none"> Control circuit of pressure control solenoid valve "A" (input pulley shaft) is open 	<ul style="list-style-type: none"> Accelerator pedal signal, gear signal, and vehicle speed signal are sent to TCM, and TCM starts the fluid pressure control solenoid valve "A" so as to control CVT to change the speed ratio.
P0962	<ul style="list-style-type: none"> The control circuit of pressure control solenoid valve "A" (input pulley shaft) is short-circuited 	
P0963	<ul style="list-style-type: none"> Pressure control solenoid valve "A" (input belt pulley shaft) control circuit short power supply 	

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0960	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the solenoid valve output feedback voltage is normal, the feedback current of fluid pressure control solenoid valve "A" is less than a certain value, and TCM power supply gives the instruction, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	 <ul style="list-style-type: none"> Pressure solenoid valve line of input shaft Input shaft pressure solenoid valve
P0962		<ul style="list-style-type: none"> When the solenoid valve output feedback voltage is normal, the fluid pressure control solenoid valve feedback current is greater than a certain value, and TCM power supply gives the instruction, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	
P0963		<ul style="list-style-type: none"> When the solenoid valve output feedback voltage is normal, the feedback current of fluid pressure control solenoid valve "A" is less than a certain value, and TCM power supply gives the instruction, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	

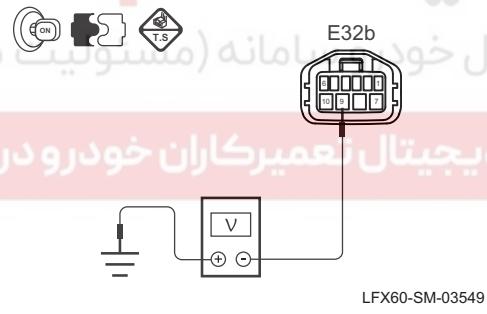
Continuously variable transmission

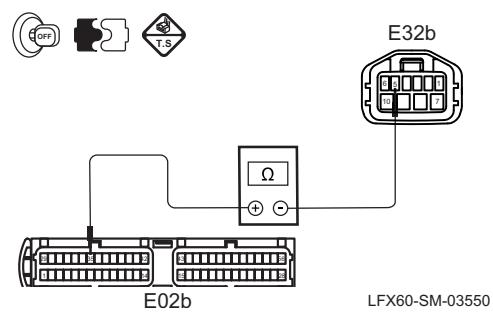
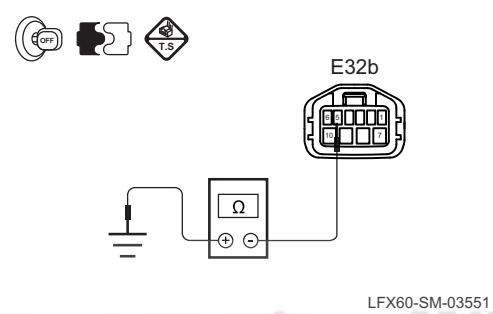
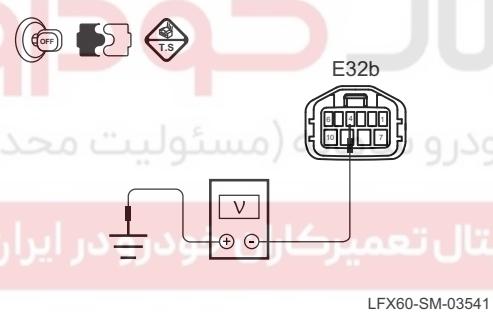


Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the solenoid valve and TCM harness plug for breakage, loose contact, aging or looseness. Are the results normal? →Yes Step 2. →No Examine and repair the fault location.</p>
2. Clear the DTC.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface. B. Operate the start switch to turn the power to ON state C. Clear the trouble code by using diagnostic equipment. Does the trouble code reappear? →Yes Step 3. →No Finish.</p>
3. Check the power supply line of pressure solenoid valve of input shaft.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Measure the voltage between the solenoid valve harness plug E32b terminal 9 and the fixed ground point with the multimeter. Standard value:11 ~ 14V Is the voltage normal? →Yes Step 4. →No Repair the pressure solenoid valve line of input shaft; replace the harness, if necessary.</p>

03



Test condition	Details / Results / Measures
<p>4. Check the control line of pressure solenoid valve of input shaft.</p> 	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the solenoid valve harness plug E32b terminal 5 and TCM harness plug E02b terminal 35 with the multimeter. Standard value: less than 5Ω F. Measure the resistance between the solenoid valve harness plug E32b terminal 5 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher</p>
	<p>G. Connect the battery negative terminal. H. Measure the voltage between the solenoid valve harness plug E32b terminal 5 and the fixed ground point with the multimeter. Standard value: 0V</p>
	<p>Are the results normal? →Yes Step 5. →No Repair the input shaft pressure solenoid valve control circuit fault and replace the harness if necessary.</p>
<p>5. Check the input shaft pressure solenoid valve.</p>	<p>A. Disconnect the solenoid valve harness plug E32b. B. Use a multimeter to measure the voltage between terminals 9 and 4 of pressure solenoid valve of input shaft. Standard value: $10 \pm 0.6\Omega$</p> <p>Is the resistance normal? →Yes Step 6. →No Replace the solenoid valve.</p>
<p>6. Check the TCM.</p>	<p>A. Replace the TCM.</p> <p>Refer to: Replacement of transmission control module (TCM)</p> <p>Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTC P0964,P0966,P0967****DTC description**

DTC	Description	Definition
P0964	<ul style="list-style-type: none"> Pressure control solenoid valve "B" (output belt pulley shaft)control circuit open circuit 	<ul style="list-style-type: none"> Send the throttle pedal signal, gear signal and speed to TCM, TCM response signal starts oil pressurecontrol solenoid valve "B", control CVT and change the speed ratio.
P0966	<ul style="list-style-type: none"> Pressure control solenoid valve "B" (output belt pulley shaft)control circuit short circuit 	
P0967	<ul style="list-style-type: none"> The control circuit of pressure control solenoid valve "B" (output pulley shaft) is short to power supply 	

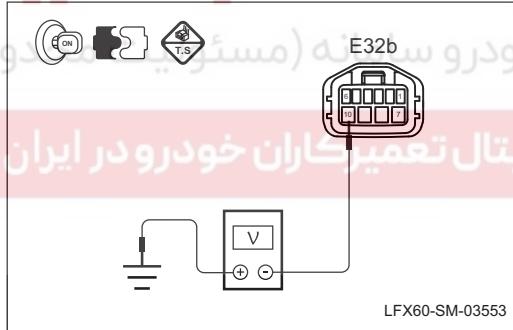
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Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0964	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> Once the solenoid valve output feedback voltage is normal, the oil pressure control solenoid valve "B" feedback voltage is less than a certain value, while TCM power supply command is released, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Output shaft pressure solenoid valve line Output shaft pressure solenoid valve
P0966		<ul style="list-style-type: none"> Once the solenoid valve output feedback voltage is normal, the oil pressure control solenoid valve "B" feedback voltage is more than a certain value, while TCM power supply command is released, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	
P0967		<ul style="list-style-type: none"> Once the solenoid valve output feedback voltage is normal, the oil pressure control solenoid valve "B" feedback voltage is less than a certain value, while TCM power supply command is released, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	



Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the solenoid valve and TCM harness plug for breakage, loose contact, aging or looseness. Are the results normal? →Yes Step 2. →No Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface. B. Operate the start switch to turn the power to ON state C. Clear the trouble code by using diagnostic equipment. Does the trouble code reappear? →Yes Step 3. →No Finish.</p>
3. Check the output shaft pressure solenoid valve power supply circuit.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Measure the voltage between the solenoid valve harness plug E32b terminal 10 and the fixed ground point with the multimeter. Standard value: 11 ~ 14V Is the voltage normal? →Yes Step 4. →No Repair the pressure solenoid valve line of output shaft; replace the harness, if necessary.</p> 

Continuously variable transmission

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Test condition	Details / Results / Measures
4. Check the output shaft pressure solenoid valve control circuit.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the solenoid valve harness plug E32b.</p> <p>D. Disconnect the TCM harness plug E02b.</p> <p>E. Measure the resistance between the solenoid valve harness plug E32b terminal 6 and TCM harness plug E02b terminal 34 with the multimeter.</p> <p>Standard value: less than 5Ω</p> <p>F. Measure the resistance between the solenoid valve harness plug E32b terminal 6 and the fixed ground point with the multimeter.</p> <p>Standard value: 10MΩ or higher</p> <p>G. Connect the battery negative terminal.</p> <p>H. Measure the voltage between the solenoid valve harness plug E32b terminal 6 and the fixed ground point with the multimeter.</p> <p>Standard value: 0V</p> <p>Are the results normal?</p> <p>→Yes Step 5.</p> <p>→No Repair the pressure solenoid valve control line of output shaft; replace the harness, if necessary.</p>
5. Check the output shaft pressure solenoid valve.	<p>A. Disconnect the solenoid valve harness plug E32b.</p> <p>B. Measure the resistance between the output shaft pressure solenoid valve terminal 10 and 6 with the multimeter.</p> <p>Standard value: $10 \pm 0.6\Omega$</p> <p>Are the results normal?</p> <p>→Yes Step 6.</p> <p>→No Replace the solenoid valve.</p>
6. Check the TCM.	<p>A. Replace the TCM.</p> <p>Refer to: Replacement of transmission control module (TCM)</p> <p>Confirms that the troubleshooting is successful.</p>



DTC P0968,P0970,P0971

DTC description

DTC	Description	Definition
P0968	<ul style="list-style-type: none"> Pressure control solenoid valve "C" (hydraulic torque converter) control circuit open circuit 	<ul style="list-style-type: none"> Accelerator pedal signal, gear signal, and vehicle speed signal are sent to TCM, and TCM starts the fluid pressure control solenoid valve "C" so as to control the locking operation of torque converter.
P0970	<ul style="list-style-type: none"> Pressure control solenoid valve "C" (hydraulic torque converter) control circuit short circuit 	
P0971	<ul style="list-style-type: none"> Pressure control solenoid valve "C" (hydraulic torque converter) control circuit short power supply circuit 	

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0968		<ul style="list-style-type: none"> When the solenoid valve output feedback voltage is normal, the feedback current of fluid pressure control solenoid valve "C" is less or greater than a certain value, and TCM power supply gives the instruction, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	
P0970	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> Once the solenoid valve output feedback voltage is normal, oil pressure control solenoid valve "C" feedback current is more than a certain value, while TCM power supply command is released, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Hydraulic torque converter solenoid valve line Hydraulic torque converter solenoid valve
P0971		<ul style="list-style-type: none"> Once the solenoid valve output feedback voltage is normal, oil pressure control solenoid valve "C" feedback current is less than a certain value, while TCM power supply command is released, the diagnosis conditions will be established and the fault will be confirmed. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	

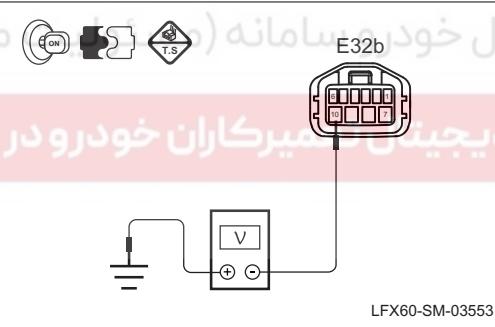
Continuously variable transmission

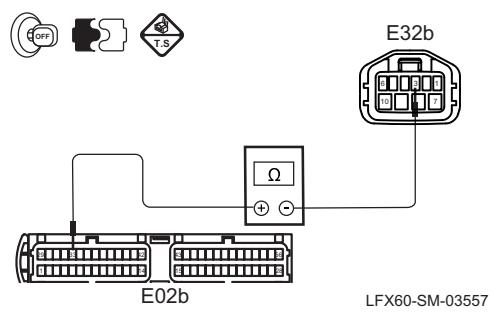
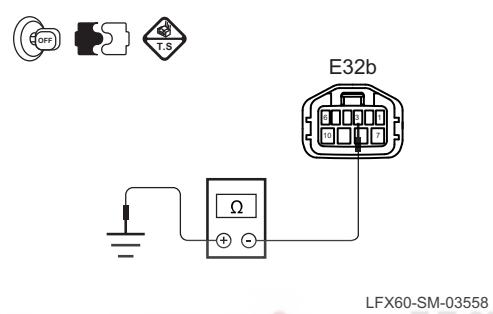
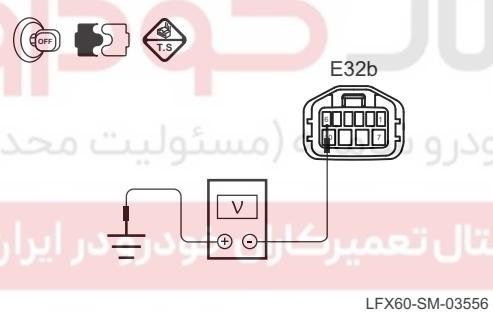


Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the solenoid valve and transmission control module harness plug for damage, poor contact, aging, looseness and other problematic signs. Are the results normal? →Yes Step 2. →No Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface. B. Operate the start switch to turn the power to ON state C. Clear the trouble code by using diagnostic equipment. Does the trouble code reappear? →Yes Step 3. →No Finish.</p>
3. Check the power supply line of torque converter solenoid valve.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Measure the voltage between the solenoid valve harness plug E32b terminal 10 and the fixed ground point with the multimeter. Standard value: 11 ~ 14V Is the voltage normal? →Yes Step 4. →No Repair the power supply line of torque converter solenoid valve; and replace the harness, if necessary.</p>

03



Test condition	Details / Results / Measures
<p>4. Check the control line of torque converter solenoid valve.</p>  <p>LFX60-SM-03557</p>	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the solenoid valve harness plug E32b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the solenoid valve harness plug E32b terminal 3 and TCM harness plug E02b terminal 33 with the multimeter. Standard value: less than 5Ω F. Measure the resistance between the solenoid valve harness plug E32b terminal 3 and the fixed ground point with the multimeter. Standard value: 10MΩ or higher</p>
 <p>LFX60-SM-03558</p>	<p>G. Connect the battery negative terminal. H. Measure the voltage between the solenoid valve harness plug E32b terminal 3 and the fixed ground point with the multimeter. Standard value: 0V</p>
 <p>LFX60-SM-03556</p>	<p>Are the results normal? →Yes Step 5. →No Repair the control line of torque converter solenoid valve; and replace the harness, if necessary.</p>
<p>5. Check the hydraulic torque converter solenoid valve.</p>	<p>A. Disconnect the solenoid valve harness plug E32b. B. Use a multimeter to measure the resistance between terminals 10 and 6 of torque converter solenoid valve. Standard value: $10 \pm 0.6\Omega$ Are the results normal? →Yes Step 6. →No Replace the solenoid valve.</p>
<p>6. Check the TCM.</p>	<p>A. Replace the TCM. Refer to: Replacement of transmission control module (TCM) Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTC P1706****DTC description**

DTC	Description	Definition
P1706	<ul style="list-style-type: none"> Steel belt slips 	<ul style="list-style-type: none"> After I/O speed, gear signal, accelerator pedal signal are sent to TCM, and TCM speed ratio control module controls the speed ratio and monitors the steel belt to ensure reliable and stable CVT speed ratio.

03

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P1706	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the actual speed ratio exceeds the normal range, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Sensor, solenoid valve Hydraulic system failure Engine torque overshot Transmission parts abnormally worn

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the solenoid valve, sensors, and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>



Test condition	Details / Results / Measures
3. Check the transmission speed sensor.	<p>A. Check the input shaft speed sensor for fault. Refer to: "P0792" DTC</p> <p>B. Check the transmission output shaft speed sensor fault. Refer to: "P1745" DTC</p> <p>Does DTC recur?</p> <p>→Yes Step 4. →No Finish.</p>
4. Check the pressure sensor.	<p>A. Check the input shaft pressure sensor fault. Refer to: "P0842, P0843" DTC</p> <p>B. Check the output shaft pressure sensor fault. Refer to: "P0847, P0848" DTC</p> <p>Does DTC recur?</p> <p>→Yes Step 5. →No Finish.</p>
5. Check the pressure control valve.	<p>A. Check the input shaft pressure solenoid valve fault. Refer to: "P0960, P0962, P0963" DTC</p> <p>B. Check the output shaft pressure solenoid valve for fault. Refer to: "P0964, P0966, P0967" DTC</p> <p>Refer to:</p> <p>Does DTC recur?</p> <p>→Yes Step 6. →No Finish.</p>
6. Check the hydraulic control system.	<p>A. Contact the related transmission technician for the data acquisition and analysis. Are the results normal?</p> <p>→Yes Step 7. →No Examine and repair the fault location.</p>

Continuously variable transmission



Test condition	Details / Results / Measures
7. Check the engine torque for overshooting.	<p>A. Contact the relevant technical personnel to detect and repair the engine torque. Check if the system is normal.</p> <p>→Yes Step 8.</p> <p>→No Examine and repair the fault location.</p>
8. Check the transmission parts for abnormal wear.	<p>A. Contact the related transmission technician for the check and analysis. Confirms that the troubleshooting is successful.</p>

03

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اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





DTC P1745

DTC description

DTC	Description	Definition
P1745	<ul style="list-style-type: none"> Speed signal range of output belt pulley shaft is abnormal 	<ul style="list-style-type: none"> The speed signal of output belt pulley shaft is processed by TCM circuit and it is a kind of high frequency pulse signal. TCM works out the turbine speed according to the pulse signal. This is mainly designed for the hydraulic torque converter locking, clutch engagement and the variable speed control functions.

Possible causes

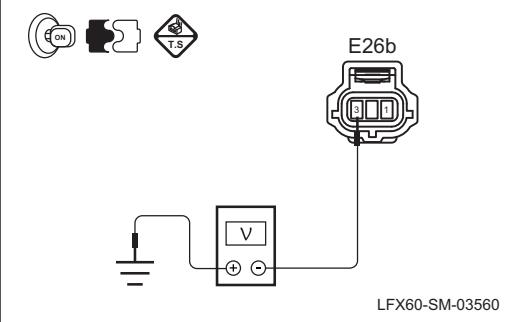
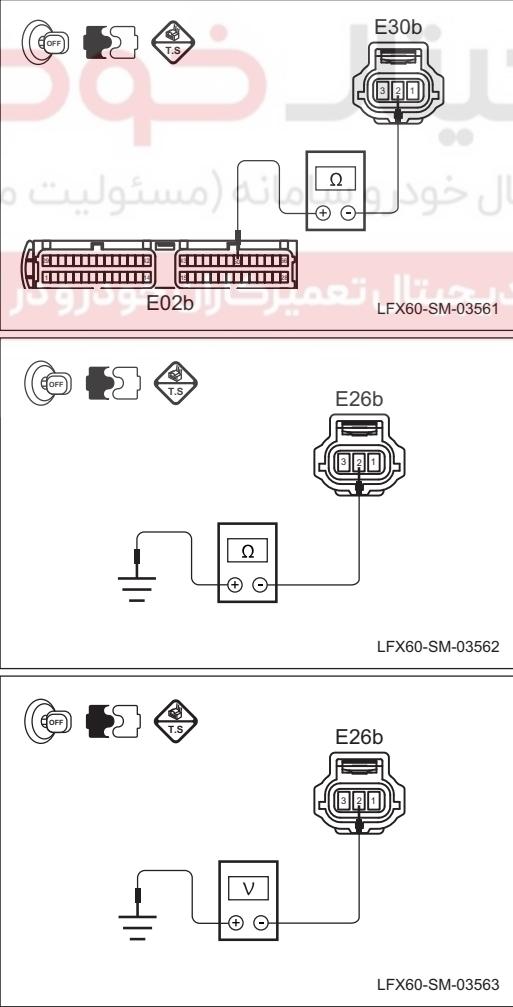
DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P1745	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the output speed is equal to 0 while the car is running, the diagnostic condition is established and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active, the alternative procedure will be executed and the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Output shaft speed sensor line Output shaft speed sensor

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the output shaft speed sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>B. Check if the output speed sensor is installed incorrectly.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state.</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>

Continuously variable transmission

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Test condition	Details / Results / Measures
<p>3. Check the output shaft speed sensor power supply line.</p> 	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the harness plug E30b from the output shaft speed sensor. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Use a multimeter to measure the voltage between terminal 3 of output shaft speed sensor harness plug E30b and the reliable ground point. Standard value: 4.5 ~ 5.5 V Is the voltage normal? →Yes Step 4. →No Repair the power line of output shaft speed sensor; replace the harness, if necessary.</p>
<p>4. Check the output shaft speed sensor signal line.</p> 	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the output shaft speed sensor harness plug E26b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the output shaft speed sensor harness plug E26b terminal 2 and TCM harness plug E02b terminal 50 with the multimeter. Standard value: less than 5Ω F. Use a multimeter to measure the resistance between terminal 2 of output shaft speed sensor harness plug E26b and the reliable ground point. Standard value: 10MΩ or higher G. Connect the battery negative terminal. H. Measure the voltage between the output shaft speed sensor harness plug E26b terminal 2 and fixed ground point with the multimeter. Standard value: 0V Are the results normal? →Yes Step 5. →No Repair the output shaft speed sensor signal line fault and replace the harness if necessary.</p>



Test condition	Details / Results / Measures
<p>5. Check the grounding line of output shaft speed sensor.</p> <p>LFX60-SM-03521</p>	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the output shaft speed sensor harness plug E26b. D. Disconnect the TCM harness plug E02b. E. Measure the resistance between the output shaft speed sensor harness plug E26b terminal 1 and TCM harness plug E02b terminal 19 with the multimeter. Standard value: less than 5Ω F. Use a multimeter to measure the resistance between terminal 1 of output shaft speed sensor harness plug E26b and the reliable ground point. Standard value: 10MΩ or higher G. Connect the battery negative terminal.</p>
<p>LFX60-SM-03565</p>	<p>H. Use a multimeter to measure the voltage between terminal 1 of output shaft speed sensor harness plug E26b and the reliable ground point. Standard value: 0V Are the results normal?</p>
<p>LFX60-SM-03566</p>	<p>→Yes Step 5. →No Repair the output shaft speed sensor signal line fault and replace the harness if necessary.</p>
<p>6. Check the output shaft speed sensor.</p>	<p>A. Replace the output shaft speed sensor. Are the results normal? →Yes Step 7. →No Replace the output shaft speed sensor.</p>
<p>7. Check the TCM.</p>	<p>A. Replace the TCM. Refer to: Replacement of transmission control module (TCM) Confirms that the troubleshooting is successful.</p>

Continuously variable transmission

**DTC P2797****DTC description**

DTC	Description	Definition
P2797	<ul style="list-style-type: none"> Input pulley shaft pressure control is abnormal 	<ul style="list-style-type: none"> CVT fluid pressure control module controls the main pressure according to the current fluid pressure and target fluid pressure, achieving the stable control over speed ratio.

Possible causes

03

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P2797	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the difference between the target fluid pressure and the actual fluid pressure is greater than a given value, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active or the alternative procedure will be executed or the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Input shaft pressure sensor signal Input shaft pressure solenoid valve Hydraulic system

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the pressure solenoid valve, pressure sensor and TCM harness plug for breakage, loose contact, aging or looseness.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>



Test condition	Details / Results / Measures
3. Check the input shaft pressure sensor.	<p>A. Check the input shaft pressure sensor for fault. Refer to: "P0842, P0843" DTC Does DTC recur? →Yes Step 4. →No Finish.</p>
4. Check the input shaft pressure control valve.	<p>A. Check the input shaft pressure control valve for fault. Refer to: "P0960, P0962, P0963" DTC Does DTC recur? →Yes Step 5. →No Finish.</p>
5. Check the hydraulic control system.	<p>A. Contact the related transmission technician for the data acquisition and analysis. Confirms that the troubleshooting is successful.</p>

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Continuously variable transmission

**DTC P2798****DTC description**

DTC	Description	Definition
P2798	<ul style="list-style-type: none"> Output pulley shaft pressure control is abnormal 	<ul style="list-style-type: none"> CVT fluid pressure control module controls the auxiliary pressure according to the current fluid pressure and target fluid pressure, achieving the reliable transfer of CVT system power.

03

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P2798	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the difference between the target fluid pressure and the actual fluid pressure is greater than a given value, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active or the alternative procedure will be executed or the instrument panel indicator lamp will work. 	<ul style="list-style-type: none"> Output shaft pressure sensor signal Output shaft pressure control solenoid valve Hydraulic system

Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the pressure solenoid valve, pressure sensor and TCM harness plug for breakage, loose contact, aging or looseness.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the DTC.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 3.</p> <p>→No</p> <p>Finish.</p>

3-865



Test condition	Details / Results / Measures
3. Check the output shaft pressure sensor.	<p>A. Check the output shaft pressure sensor for fault. Refer to: "P0847, P0848" DTC Does DTC recur? →Yes Step 4. →No Finish.</p>
4. Check the input shaft pressure control valve.	<p>A. Check the output shaft pressure control valve for fault. Refer to: "P0964, P0966, P0967" DTC Does DTC recur? →Yes Step 5. →No Finish.</p>
5. Check the hydraulic control system.	<p>A. Contact the related transmission technician for the data acquisition and analysis. Confirms that the troubleshooting is successful.</p>

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

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Continuously variable transmission

**DTC U0100,U0121,U0401****DTC description**

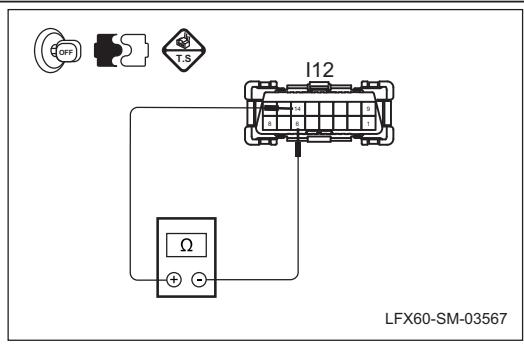
DTC	Description	Definition
U0100	<ul style="list-style-type: none"> ECM communication fault 	<ul style="list-style-type: none"> Engine cooling water temperature, altitude coefficient, intake air temperature and brake signal are sent to TCM through CAN network for clutch control, variable speed control and torque converter control.
U0121	<ul style="list-style-type: none"> ABS communication fault 	<ul style="list-style-type: none"> ABS speed, ABS working status and brake signals are sent to TCM through CAN network for variable speed control and torque converter control.
U0401	<ul style="list-style-type: none"> ECM data reception is abnormal 	<ul style="list-style-type: none"> Engine speed, engine output torque and accelerator pedal signals are sent through the vehicle's CAN network to TCM for clutch control, variable speed control and torque converter control.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
U0100	<ul style="list-style-type: none"> Checking the hardware or harness 	<ul style="list-style-type: none"> When the engine cooling water temperature, altitude coefficient, intake air temperature and brake signal TCM received are equal to the default failure value, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the frozen frame will be saved. 	
U0121		<ul style="list-style-type: none"> When ABS speed, ABS working status and brake signals TCM received are equal to the default failure value, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the frozen frame will be saved. 	
U0401		<ul style="list-style-type: none"> When engine speed, engine output torque and accelerator pedal signals TCM received are equal to the default failure value, the diagnostic condition is satisfied and the fault is being acknowledged. Once the error is confirmed, the fail safe mode will be active and the instrument panel indicator lamp will work. 	

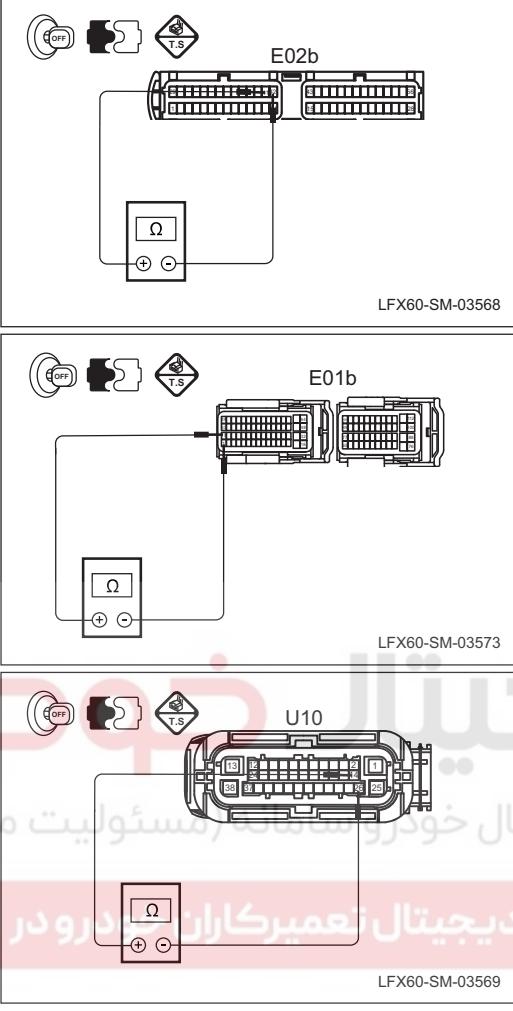
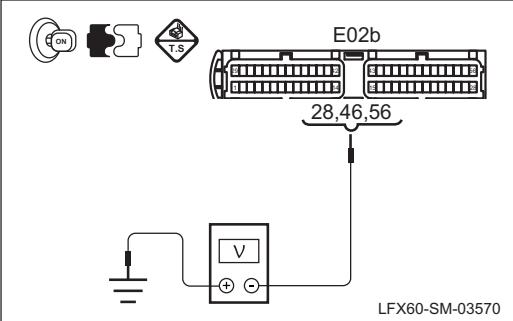


Diagnostic process

Test condition	Details / Results / Measures
1. General check	<p>A. Check the engine control module, transmission control module, and ABS control module harness plugs for damage, poor contact, aging, looseness and other problematic signs.</p> <p>Are the results normal?</p> <p>→Yes</p> <p>Step 2.</p> <p>→No</p> <p>Examine and repair the fault location.</p>
2. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state</p> <p>C. Read the trouble code by using diagnostic equipment.</p> <p>Is there any other DTC?</p> <p>→Yes</p> <p>Eliminate other DTCs first.</p> <p>Refer to:corresponding DTC list</p> <p>→No</p> <p>Step 3.</p>
3. Clear the trouble code.	<p>A. Connect the equipment for diagnosing faults to the diagnostic interface.</p> <p>B. Operate the start switch to turn the power to ON state</p> <p>C. Clear the trouble code by using diagnostic equipment.</p> <p>Does the trouble code reappear?</p> <p>→Yes</p> <p>Step 4.</p> <p>→No</p> <p>Finish.</p>
4. Check CAN bus terminal resistance.	<p>A. Operate the start switch to turn the power to OFF state.</p> <p>B. Use a multimeter to measure the resistance between terminals 6 and 14 of OBD diagnostic interface I12.</p> <p>Standard value:60±5Ω</p> <p>→Yes</p> <p>Step 5.</p> <p>→No</p> <p>Examine and repair the fault location.</p> 

Continuously variable transmission

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Test condition	Details / Results / Measures
<p>5. Check the CAN line of each control module.</p> 	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative cable. C. Disconnect the harness plug E02b from the transmission. D. Use a multimeter to measure the resistance between terminals 41 and 42 of transmission control module harness plug E02b. Standard value: $60\pm 5\Omega$ E. Connect the harness plug E02b to the transmission control module. F. Disconnect the harness plug E01b from the engine control module. G. Use a multimeter to measure the resistance between terminals 1 and 17 of engine control module harness plug E01b. Standard value: $120\pm 5\Omega$ H. Connect the harness plug E01b to the engine control module. I. Disconnect the harness plug U10 from ABS control module. J. Measure the resistance between the ABS control module harness plug U10 terminal 14 and terminal 26 with the multimeter. Standard value: $60\pm 5\Omega$ Are the results normal? → Yes Step 6. → No Examine and repair the fault location. </p>
<p>6. Check the TCM power line.</p> 	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Measure the voltage between the TCM harness plug E02b terminal 28, 46, 56 and the fixed ground point with the multimeter. Standard value: 11 ~ 14V Is the voltage normal? → Yes Step 7. → No Repair the TCM power line fault and replace the harness if necessary. </p>



Test condition	Details / Results / Measures
7. Check the grounding circuit of transmission control module.	<p>A. Operate the start switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the TCM harness plug E02b. D. Measure the resistance between the TCM harness plug E02b terminal 24, 25, 56 and the fixed ground point with the multimeter.</p> <p>Standard value: less than 5Ω</p> <p>Is the resistance normal?</p> <p>→Yes Step 8.</p> <p>→No Repair the TCM ground line fault and replace the harness if necessary.</p>
8. Check the TCM.	<p>A. Replace the TCM.</p> <p>Refer to: Replacement of transmission control module (TCM)</p> <p>Is the system normal?</p> <p>→Yes Replace the TCM.</p> <p>→No Step 9.</p>
9. Check ABS or engine control module.	<p>A. Replace ABS or engine control module.</p> <p>Refer to: Replace the engine or ABS control module</p> <p>Confirm that the fault has been eliminated.</p>

Continuously variable transmission

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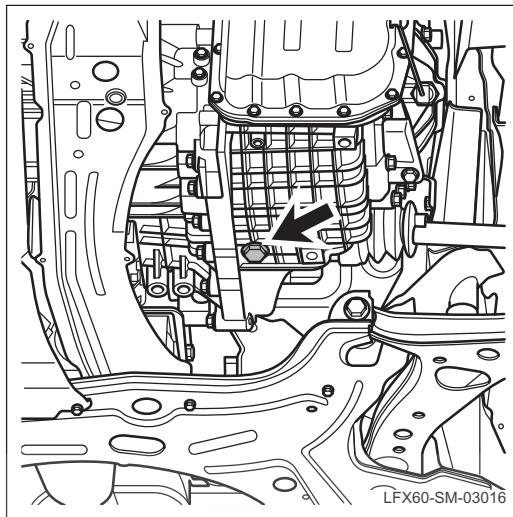
Removal and Installation

Transmission oil draining and filling procedures

Emission

1. Drain the transmission oil.

(a). Lift the vehicle. Refer to the vehicle lift and support.



(b). Place the recovery container and remove the transmission oil drain screw plug.
(c). After the transmission fluid is discharged, tighten the drain plug, do not forget the sealing gasket, and change the drain plug gasket.

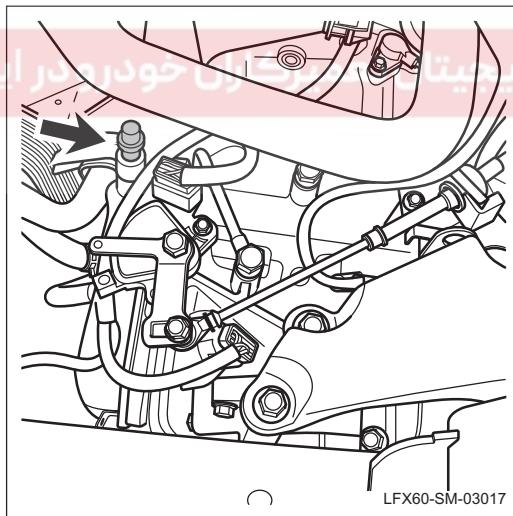
Torque: 46Nm

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Filling

1. Add transmission fluid.

(a). Lower the vehicle. Reference: Lifting and supporting of vehicle.
(b). Remove the air filter assembly. Refer to the replacement of air filter assembly.



(c). Pull out the vent plug and add new ATF from the plug.
(d). Add the same amount of ATF as the amount discharged.
(e). Use the appropriate tool to add 8L of ATF as required.

① Note:

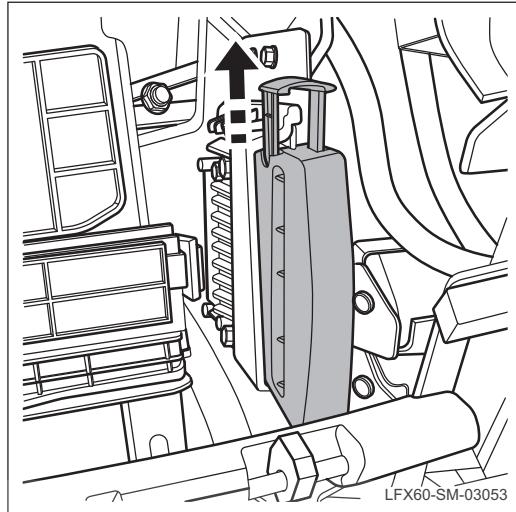
- Wipe the oil dipstick with the lint-free paper to prevent the foreign matter entering the transmission inside.
- Wipe the oil dipstick with the lint-free paper to prevent the foreign matter entering the transmission inside.
- The engine compartment contains high-temperature parts. In order to avoid accidents, remember not to spill the ATF onto these hot parts.
- After filling ATF, wipe off the spilled fluid.
- When replacing the ATF, clean the oil cooler.

Replacement of transmission control module

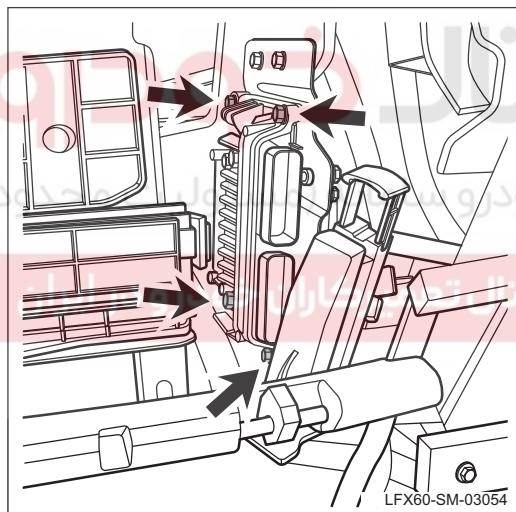
Removal

1. Remove the transmission control module.

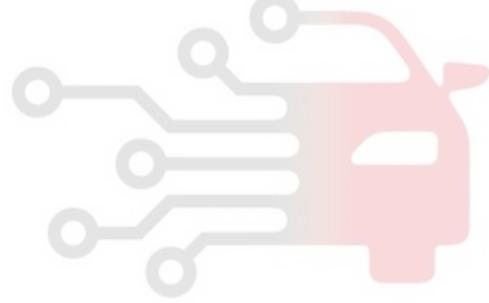
- (a). Disconnect the battery negative terminal.
- (b). Remove the left glovebox. **Reference: Replacement of the dashboard assembly.**



- (c). Disconnect the harness plug from the transmission control module.



- (d). Remove the fixing bolts from the transmission control module.



Installation

1. Install the transmission control module.

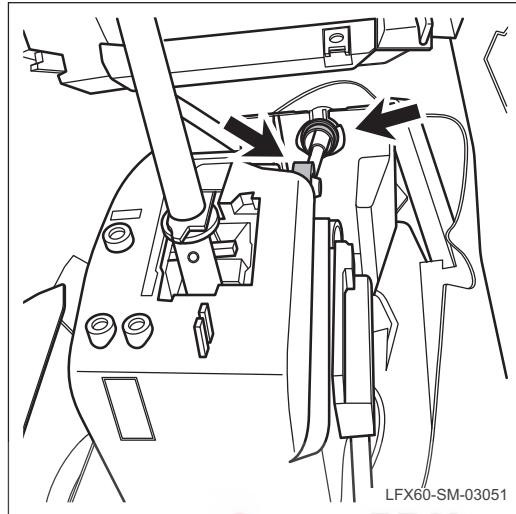
- (a). The installation sequence is the reverse of the disassembly order.
- (b). Execute CVT self-learning. **Reference: CVT self-learning.**

Replacement of transmission operating mechanism

Removal

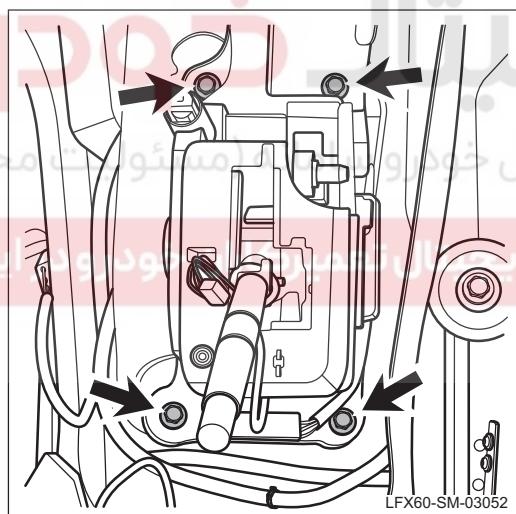
1. Remove the transmission operating mechanism.

- Disconnect the battery negative terminal.
- Remove the center console assembly. Reference: **Replacement of the center console assembly.**



- Remove the shift cable.

03

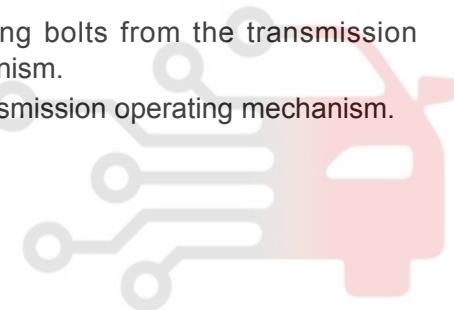


- Remove the fixing bolts from the transmission operating mechanism.
- Take out the transmission operating mechanism.

Installation

1. Install the transmission operating mechanism.

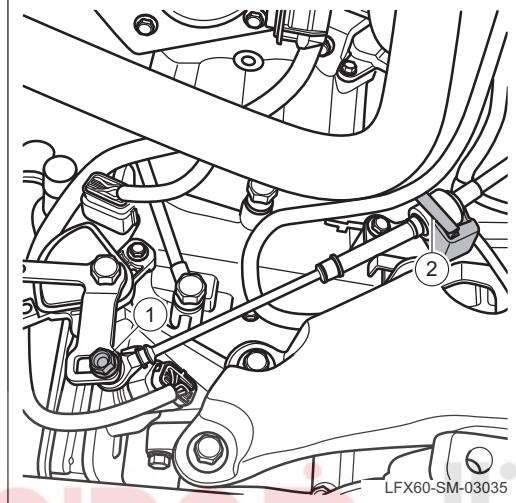
- The installation sequence is the reverse of the disassembly order.



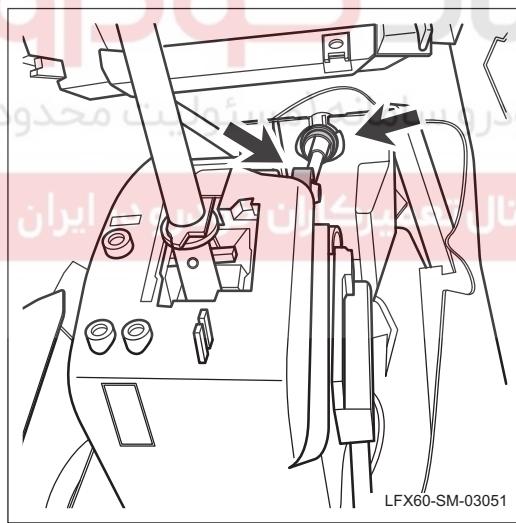
Replacement of transmission shift cable

Removal

1. Remove the transmission shift cable.
 - (a). Disconnect the battery negative terminal.
 - (b). Remove the air filter assembly. **Refer to the replacement of air filter assembly.**
 - (c). Remove the center console assembly. **Reference: Replacement of the center console assembly.**



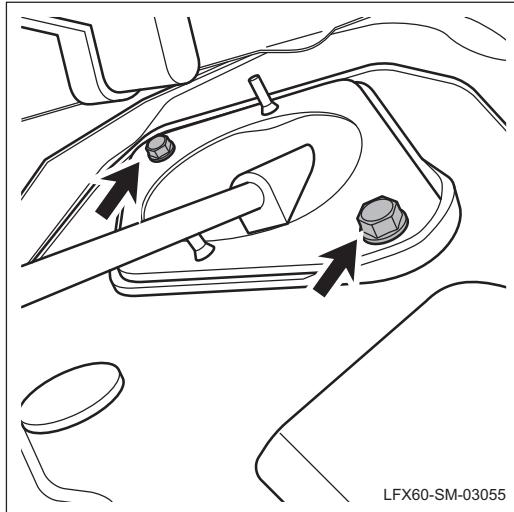
- (d). Remove the fixing bolt 1 from the shift cable.
- (e). Remove the fixing device 2 from the shift cable.



- (f). Remove the shift cable.



Continuously variable transmission



- (g). Remove the fixing bolts from the shift cable.
- (h). Take out the shift cable assembly.

03

Installation

1. Install the transmission shift cable.

- (a). The installation sequence is the reverse of the disassembly order.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

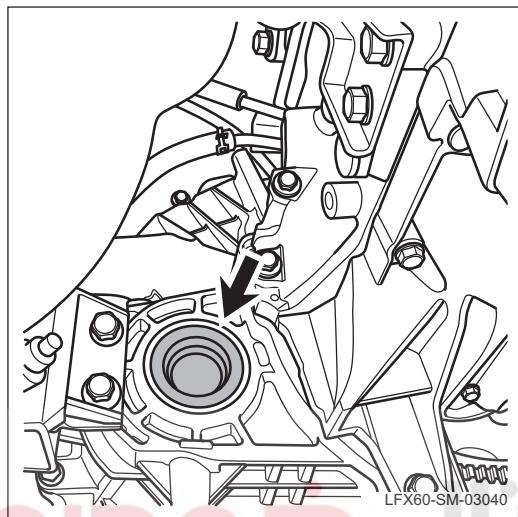


3-875

Replacement of differential oil seal

Removal

1. Remove the differential oil seal.
 - (a). Lift the vehicle. **Refer to the vehicle lift and support.**
 - (b). Discharge the transmission fluid with a returnable container. **Reference: Steps to drain and add transmission fluid.**
 - (c). Remove the drive shaft. **Refer to: Drive shaft replacement.**



- (d). Use appropriate tools to remove the oil seal from the transmission.

Installation

1. Installation of differential oil seal.

- (a). The installation sequence is the reverse of the disassembly order.

① Note:

- Because of the interference fit between the oil seal and transmission, deformation is inevitable in the removal process, and the damaged parts cannot continue to be used.
- Oil seals should be installed with even force so as not to damage the oil seals.
- The components of the transmission require high accuracy, so you should be careful in the disassembling and assembling process so as not to scratch or damage them (i.e. finished surface of housings).
- Install the oil seals vertically.

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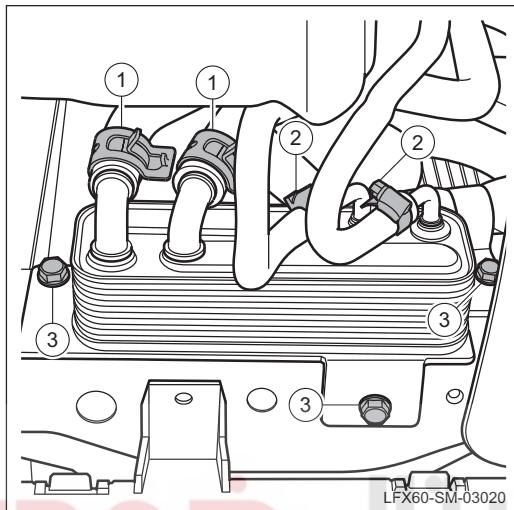


Replacement of oil cooler assembly

Removal

1. Remove the oil cooler assembly.

- Lift the vehicle. Refer to the vehicle lift and support.
- Remove the left engine bottom panel.
- Discharge the antifreeze with a returnable container. Reference: Replacement of antifreeze.



03

- Remove the oil cooler water pipe clamp 1, and take out the water cooler pipe.
- Remove the oil cooler fuel line clamp 2, and take down the oil cooler water pipe.
- Remove the fixing bolt 3 from the oil cooler assembly.
- Remove the oil cooler assembly.

Installation

1. Install the oil cooler assembly.

- The installation process is reverse to the removal process.

△ Note:

- Do not remove violently so as not to damage the transmission tubing assembly.
- Avoid foreign matter from entering the transmission from the inlet of tubing assembly.
- Transmission cooling hose is connected to the internal oil passage of transmission, so ensure that the hose is clean.

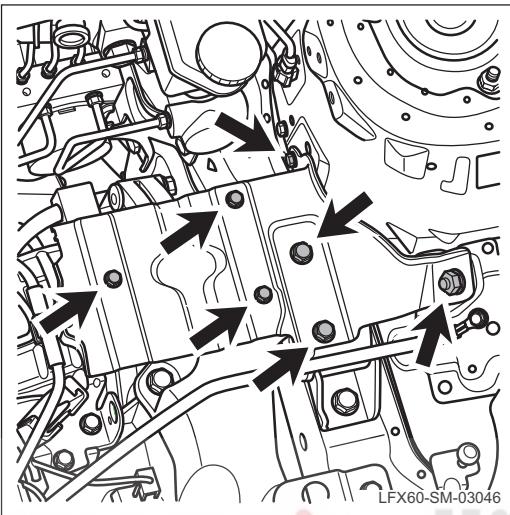
Replacement of CVT assembly

Removal

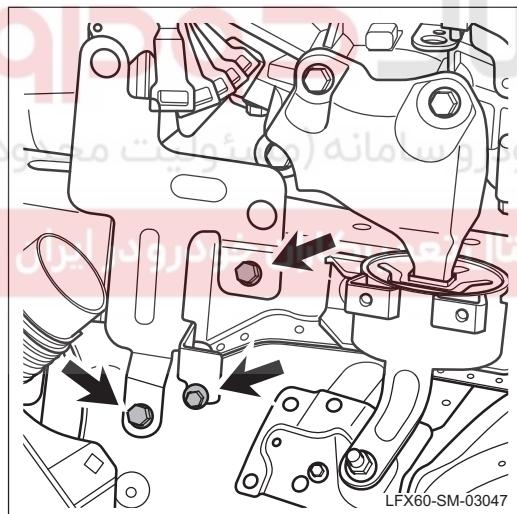
1. Remove the CVT assembly.

- Disconnect the battery negative terminal.
- Remove the air filter assembly. **Reference: Replacement of air filter assembly.**
- Remove the fuse box.

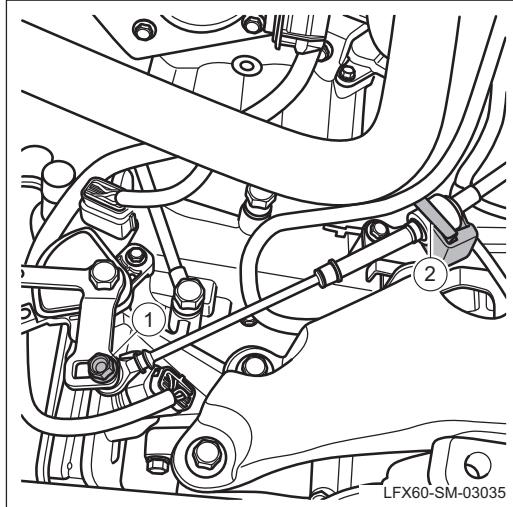
- Remove the fixing bolts from the fuse box holder.



- Remove the fixing bolts from the air filter holder.



Continuously variable transmission

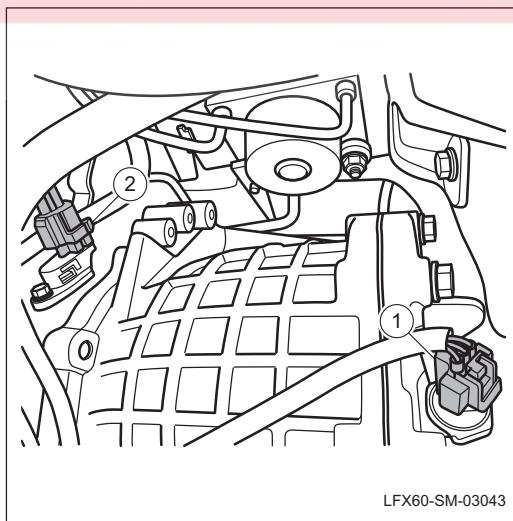


- (f). Remove the nut 1 from the shift cable.
- (g). Remove the clamp 2 from the shift cable.
- (h). Remove the shift cable.

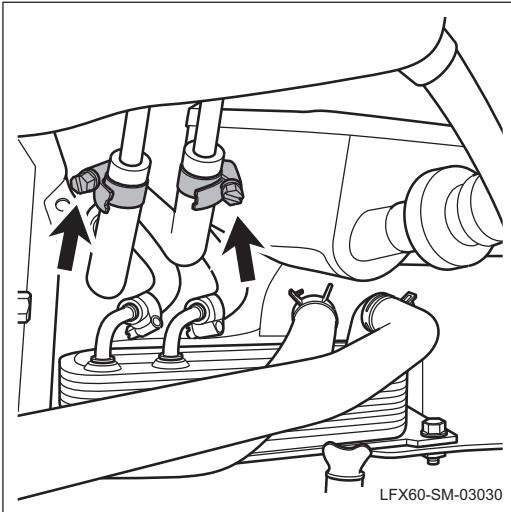
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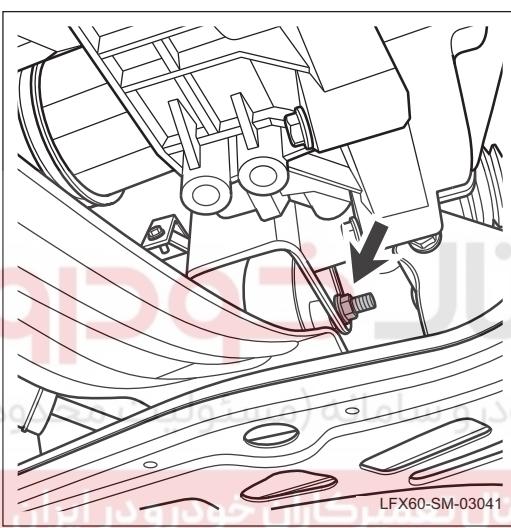
- (i). Disconnect the harness plug 1 from the gear switch.
- (j). Disconnect the harness plug 2 from the turbine speed sensor.
- (k). Disconnect the harness plug 3 from the input shaft speed sensor.
- (l). Disconnect the harness plug 4 from the transmission.



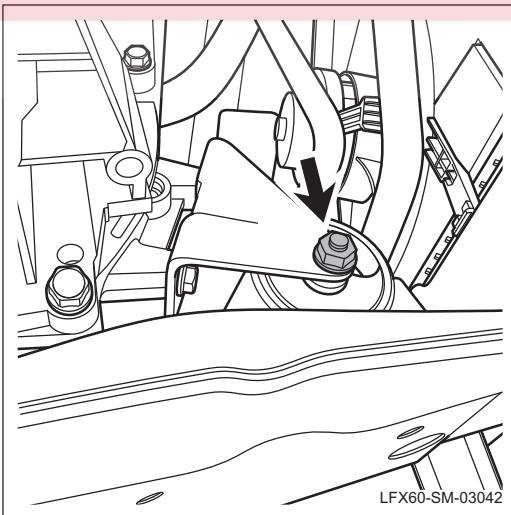
- (m). Disconnect the harness plug 1 from the output shaft fluid pressure sensor.
- (n). Disconnect the harness plug 2 from the output shaft speed sensor.



- (o). Remove the oil cooler hose.
- (p). Remove the starter. Reference: Replacement of the starter.
- (q). Lift the vehicle. Reference: Lifting and supporting of vehicle.

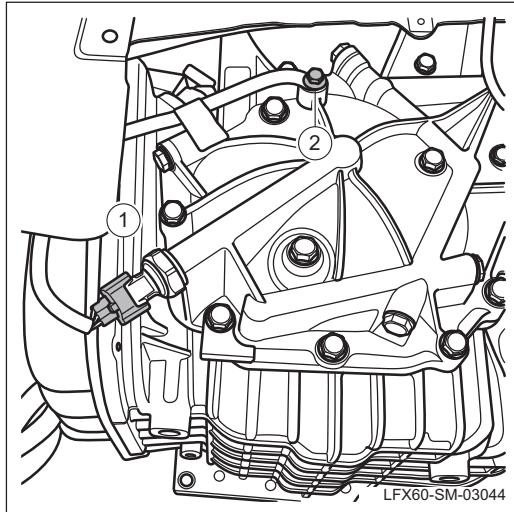


- (r). Remove the connecting bracket bolts from the rear suspension.



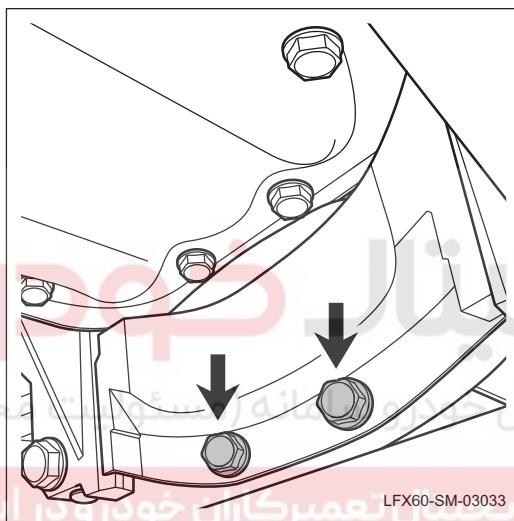
- (s). Remove the front mounting connecting bracket bolt.
- (t). Remove the front subframe. **Reference: Replacement of front subframe.**
- (u). Remove the drive shaft. **Reference: Replacement of drive shaft.**
- (v). Discharge the transmission fluid. **Reference: Steps to replace transmission fluid.**



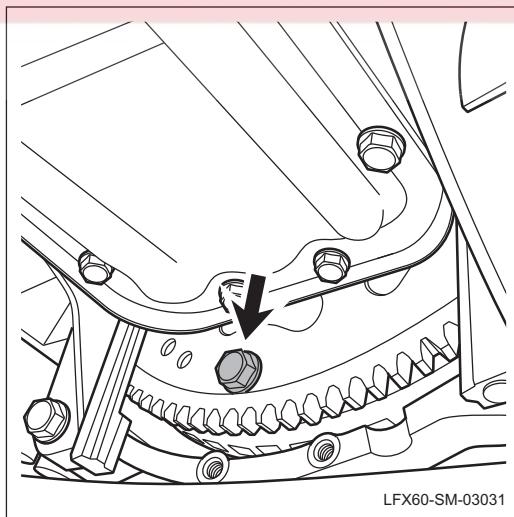


- (w). Disconnect the harness plug 1 from the input shaft fluid pressure sensor.
- (x). Remove the bond strap 2.

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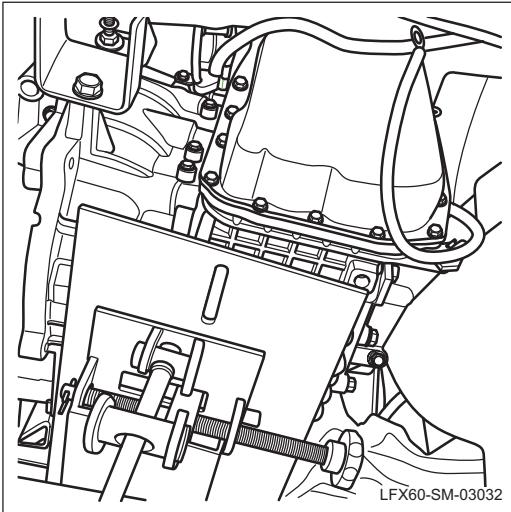
- (y). Remove the fixing bolts from the flywheel baffle.



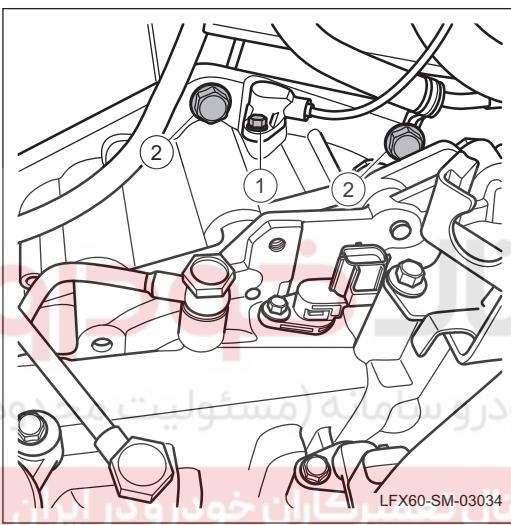
- (z). Remove the connecting bolts from the first torque converter.
- (aa). Turn the crankshaft by 90°, remove the second bolt and continue in the same direction.
- (ab). Turn the crankshaft by 90°, remove the third bolt and continue in the same direction.
- (ac). Turn the crankshaft by 90°, and remove the last bolt.

Tightening torque: as a torque of 55Nm

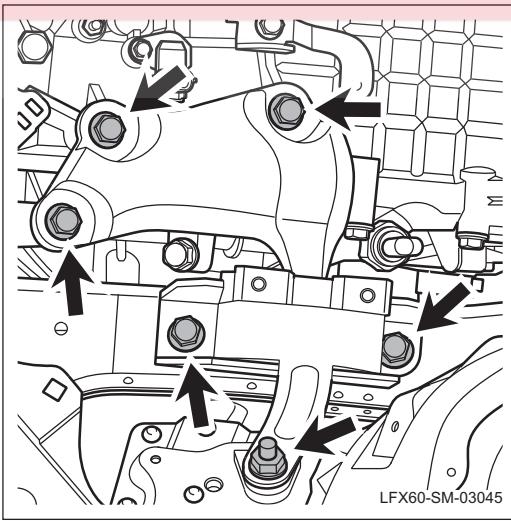




(ad). Use the jack to support the transmission.

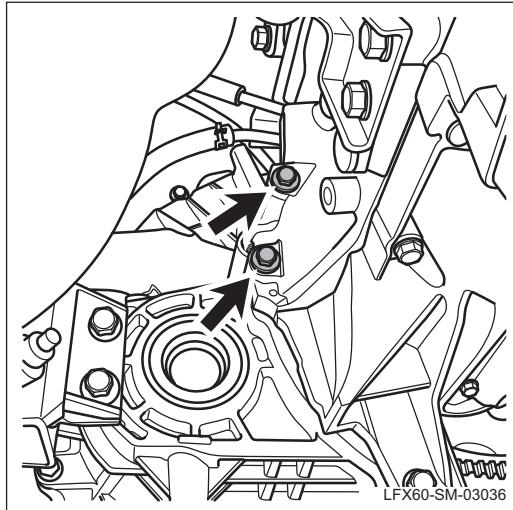


- (ae). Remove the speed sensor bolt 1 and remove the speed sensor.
- (af). Remove the connecting bolt 2 between the transmission and the upper part of the engine.



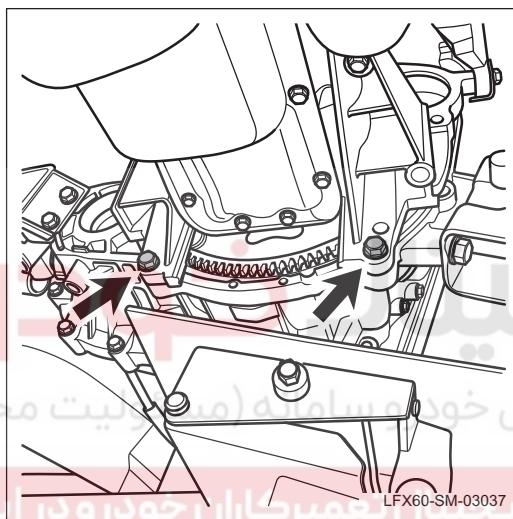
- (ag). Remove the fixing bolts from the left suspension of the transmission.

Continuously variable transmission

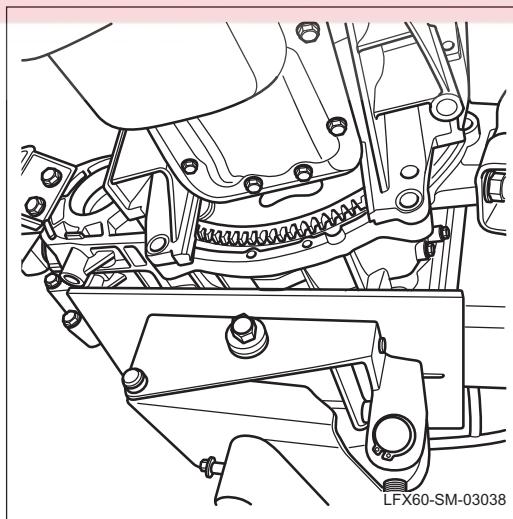
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(ah). Remove the connecting bolt between the transmission and the rear part of the engine.

03



(ai). Remove the connecting bolt between the transmission and the lower part of the engine.



(aj). Slowly lower the jack, and disconnect the transmission from the engine.

Installation

1. Install the CVT assembly.

(a). The installation process is reverse to the removal process.

3-883

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Continuously variable transmission

△ Note:

- After the assembly is removed from the car, disconnect the transmission from the engine.
- Before removing the powertrain, discharge the transmission fluid.
- When disassembling the transmission, make sure that the bolts connecting the torque converter with the flexible disc should be removed first, and the torque converter should be removed together with the transmission so as to prevent the torque converter from falling off.
- If the torque converter accidentally fell off, you need to re-install it but don't do it forcibly so as not to damage the transmission parts.
- Hydraulic torque converter is a high-precision component which has higher requirements for rotational inertia. In case of accidental bump and deformation, you need to replace with a new torque converter.
- During the disconnection of the engine from the transmission, be careful not to damage the peripheral parts of the transmission such as cooling tubing, pressure sensor, etc. The damaged parts need to be replaced as required, if necessary.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

