03 - 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

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

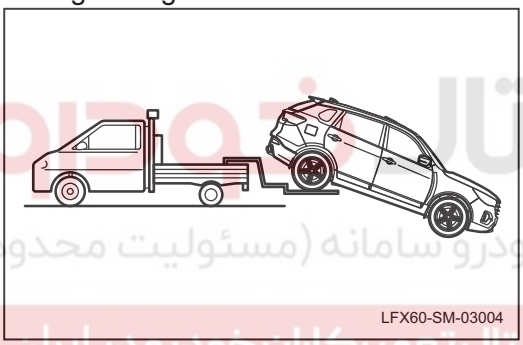
Towing the car properly can avoid unnecessary secondary damage.

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.

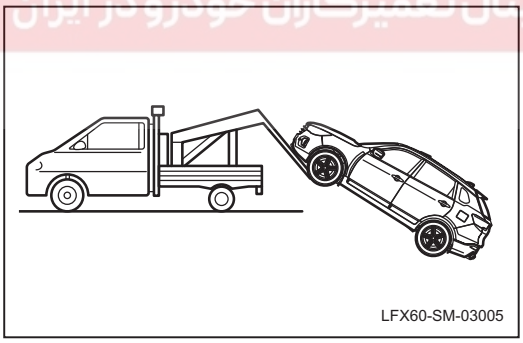
ℹ Note.

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

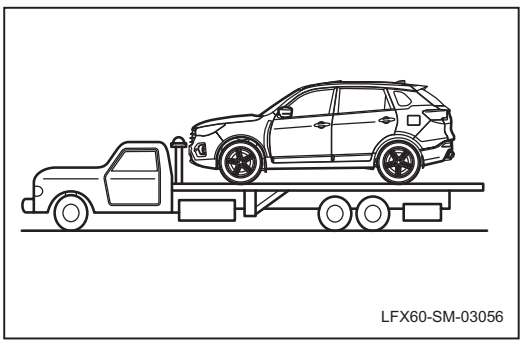
Wrong towing methods:



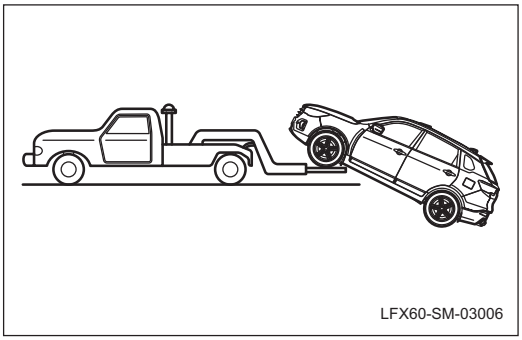
LFX60-SM-03004



LFX60-SM-03005



LFX60-SM-03056



LFX60-SM-03006

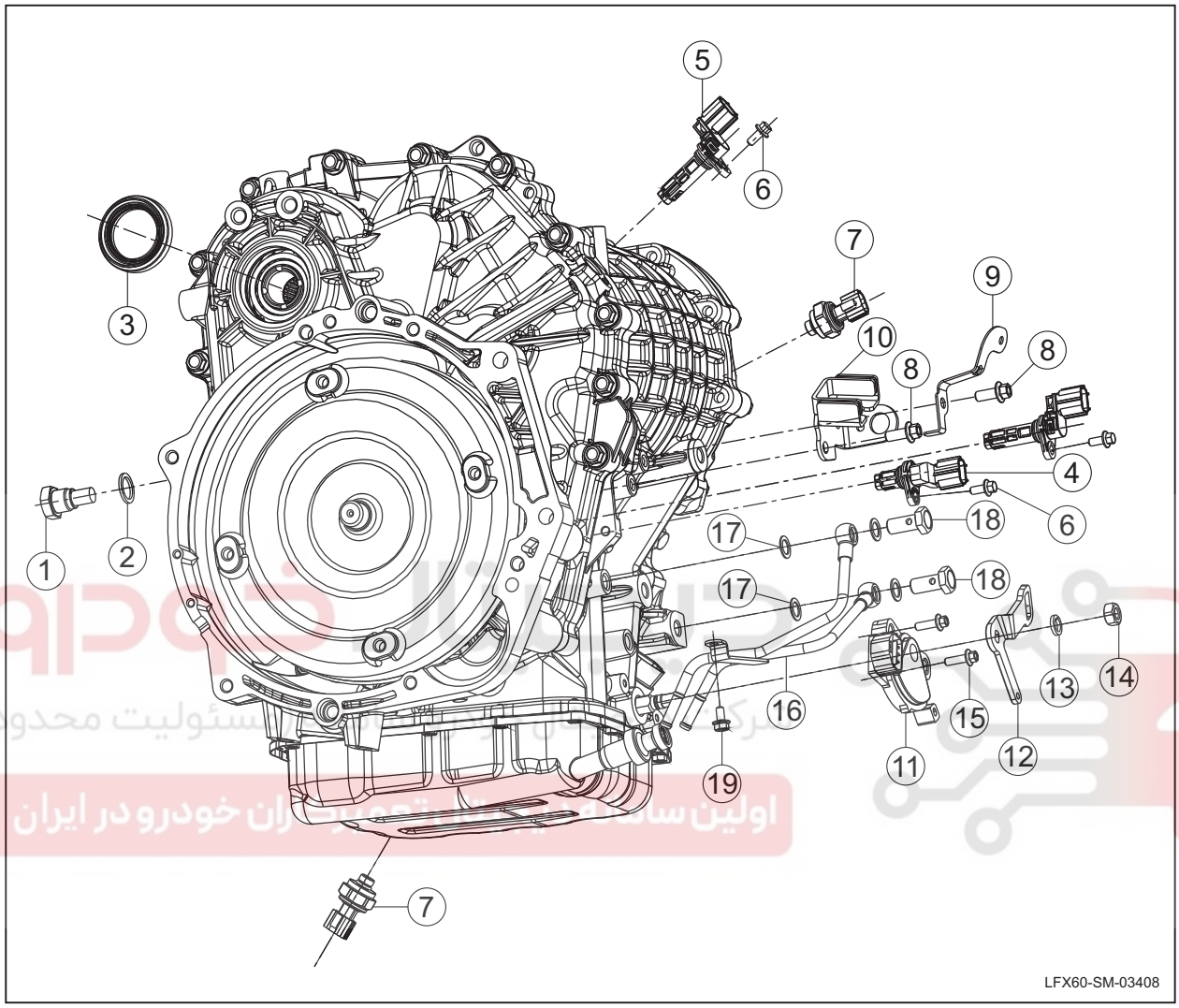
Preparation

Special maintenance tools

Structure and installation location

Part exploded view

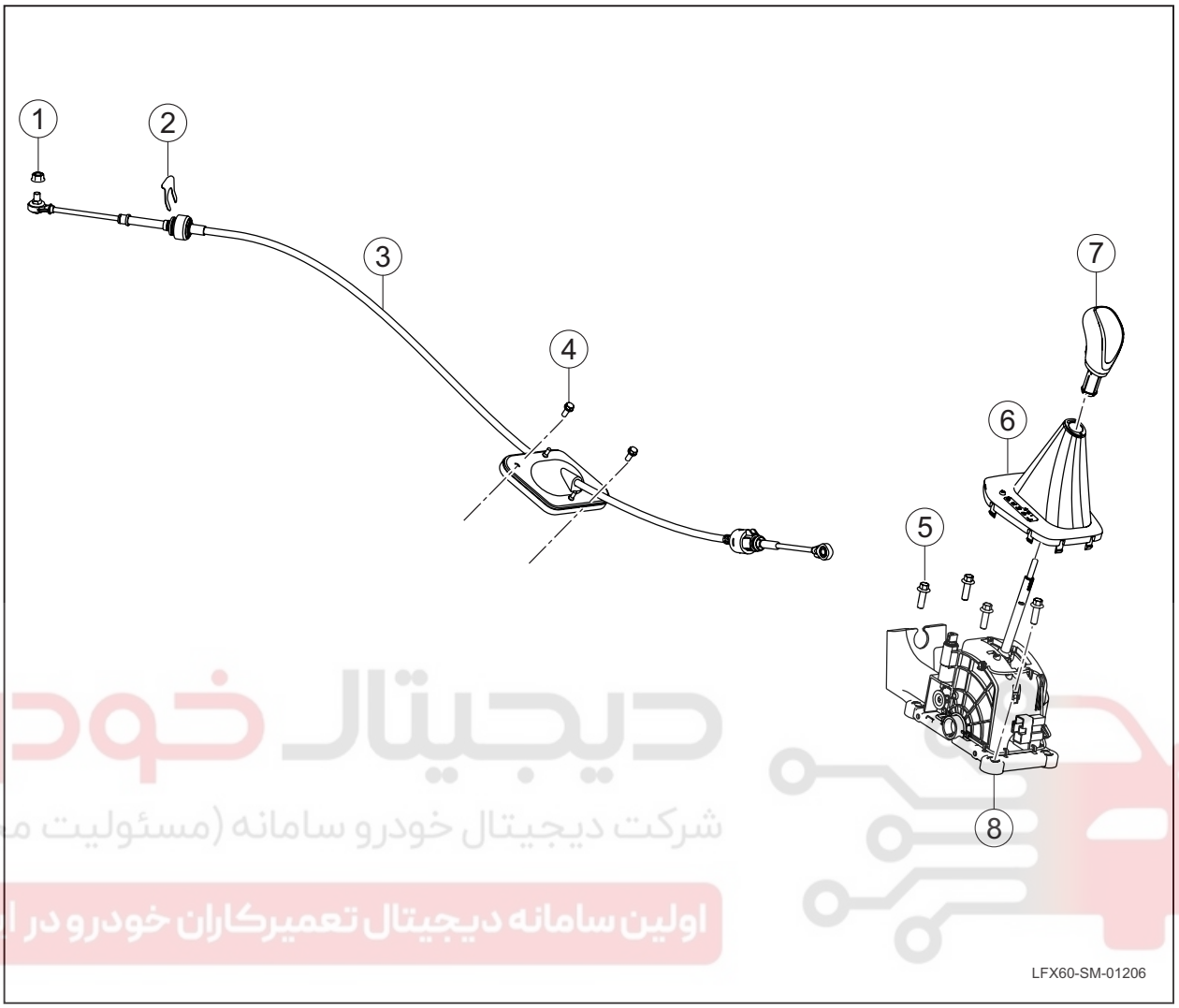
Transmission accessories



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

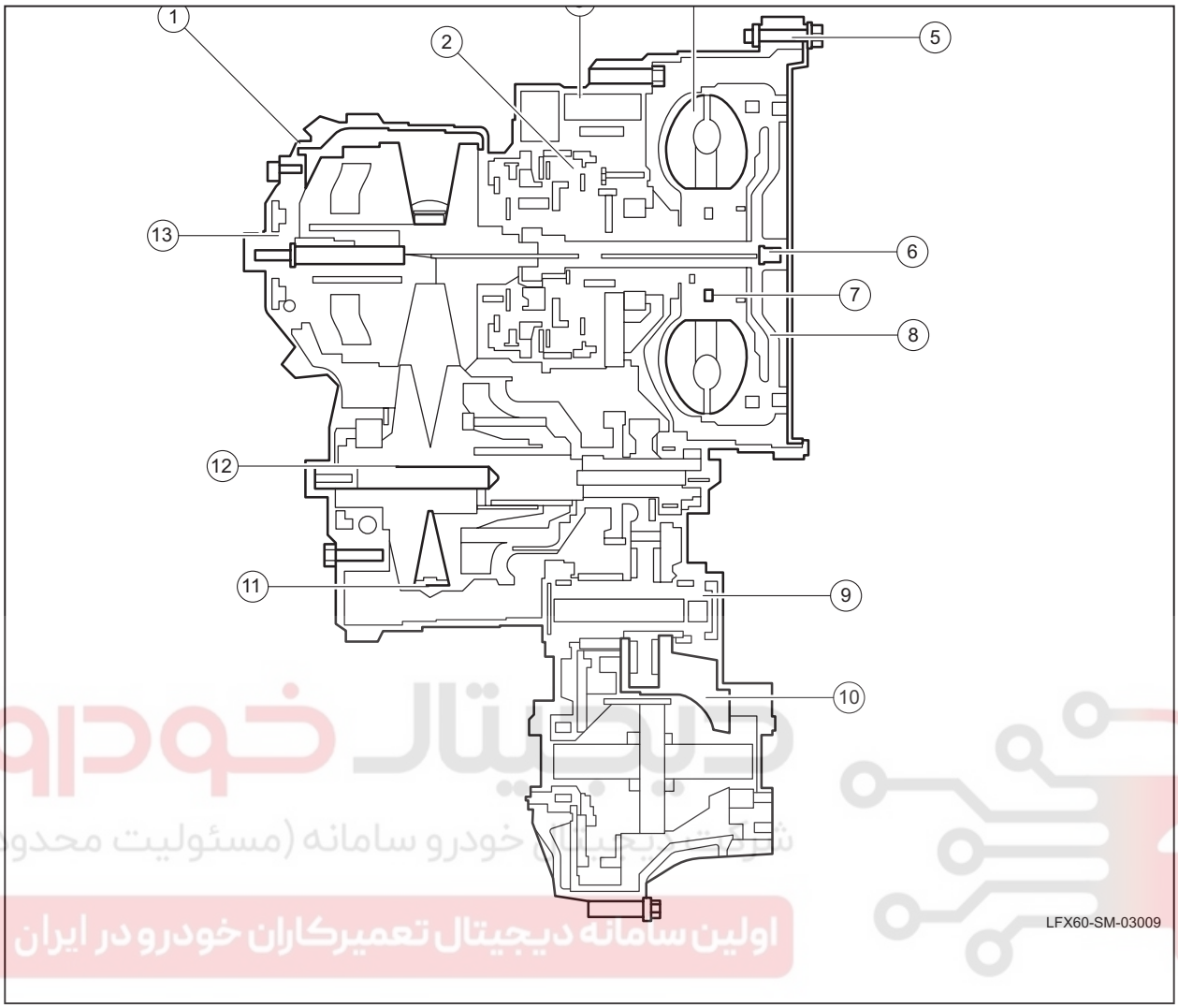
Gear shift control device



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

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±5 ℃ or 25±5 ℃ (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±5℃ , be accurate	Oil temperature: 25±5℃ , 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.

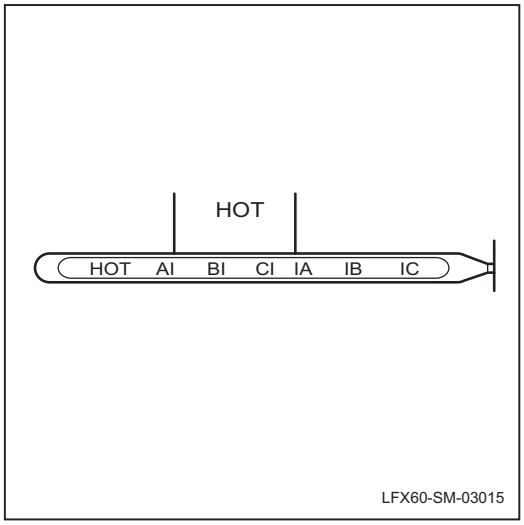
Note

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.



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

1. Lift the vehicle with a lifter.
2. Remove the transmission fluid drain bolts.
3. Discharge the ATF.
4. And then re-tighten the oil plug, and do not forget the gasket.
   Tools: 24# socket spanner, and torque wrench.
5. 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±0.1L of oil directly.

6. After that, check the oil level as per 4.1.

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.**

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.

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).
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

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.)

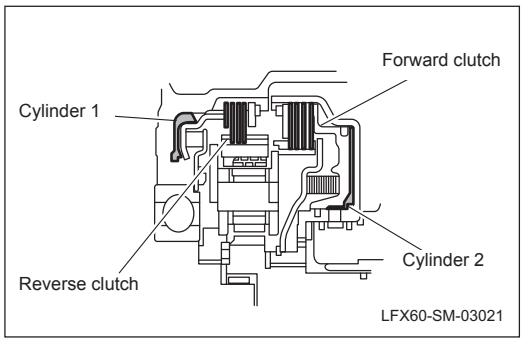
- Solenoid valves continuously adjust the working condition according to the instructions from TCU. These 4 solenoid valves work in different combinations of conditions, so that the flow and pressure of hydraulic oil change in a timely manner, thus the accurate manipulation of hydraulic actuators (e.g. 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



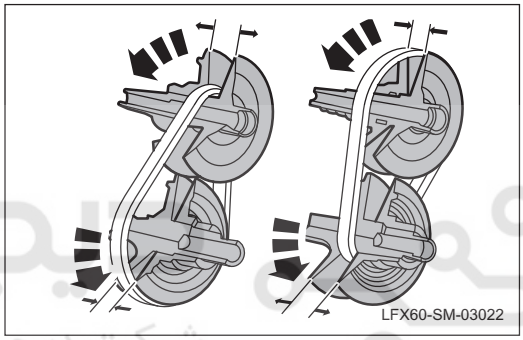
CVT uses wet multi-disk clutch with stable friction characteristics, excellent high temperature resistance and anti-stripping property, as well as good reliability; with advanced software control system, the transmission system has excellent static shift performance.

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



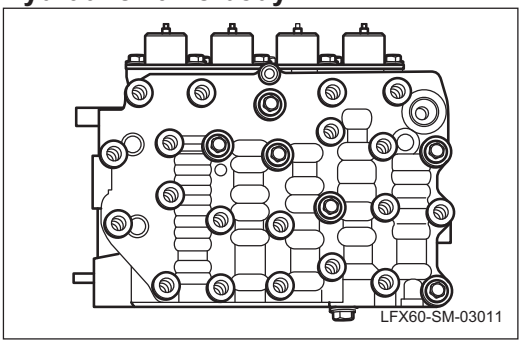
The CVT uses the latest generation of thrusting steel belt which with light weight, great speed ratio, large torque transmitting capacity, high transmission efficiency, and good durability.

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.

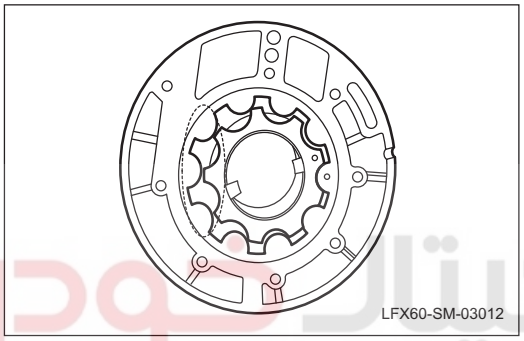
The metal rings on both sides are composed of multiple layers of thin belt rings to guide the sheet metals correctly. The small thickness of steel belts is important to reduce operating noise. Many components contact with the belt pulley to reduce the pressure on contact surface, which is conducive to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

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.

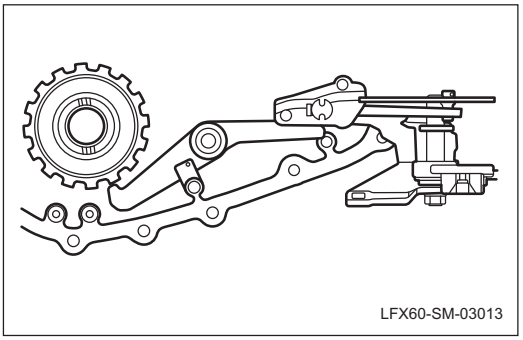
Oil pump



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

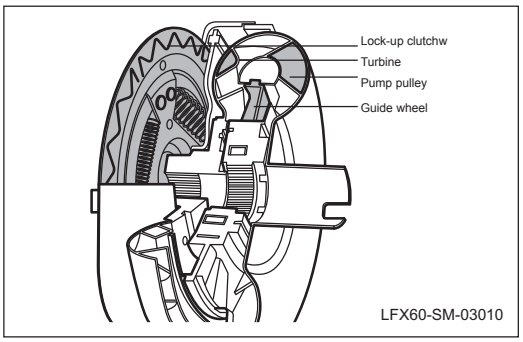
The engine directly drives the inner rotor to suck oil from the inside of the transmission, then the pressure oil is fed to the torque converter, pulley system, clutch system, cooling system, etc., meet the transmission requirements for hydraulic transmission, cooling and lubrication to ensure the normal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

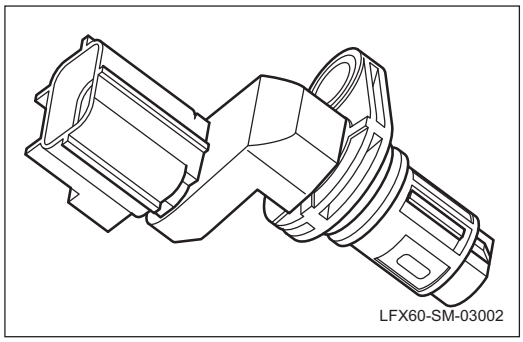
The role of the torque converter is to transmit the torque output from the engine to the transmission. It transfers energy through the liquid flow with good cushioning properties and also torque amplification function.

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

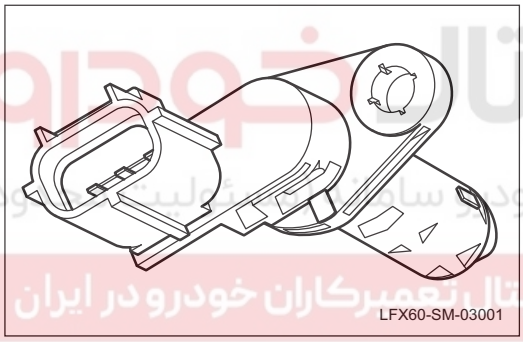
The control system includes sensors, transmission control unit (TCU), actuators and other components.

Input shaft speed sensor



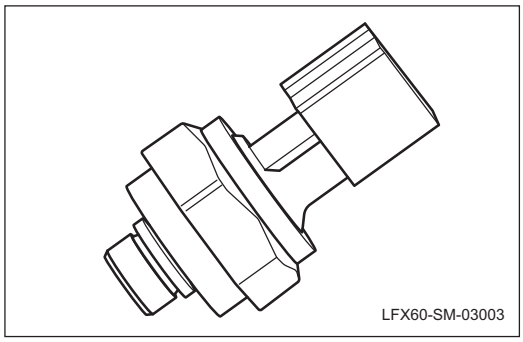
The input shaft speed sensor is a Hall sensor for detecting the rotational speed of the driving cone wheel. A crankshaft induction ring is mounted on the side of the driving cone wheel, and the corresponding sensor generates square wave signal.

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.

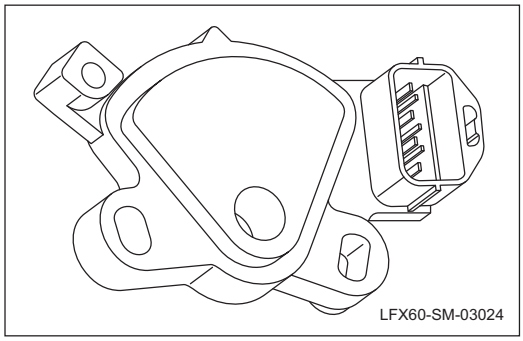
Brake switch

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℃ .
4. Move the shift lever to P (or N).
5. Start the engine
6. Standing for 2min.
7. Self-learning is completed.

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 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.

- 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.

ℹ 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.

ℹ Note:

Apply "SNOW" mode as needed.

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.

Visual Inspection

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

visual check table

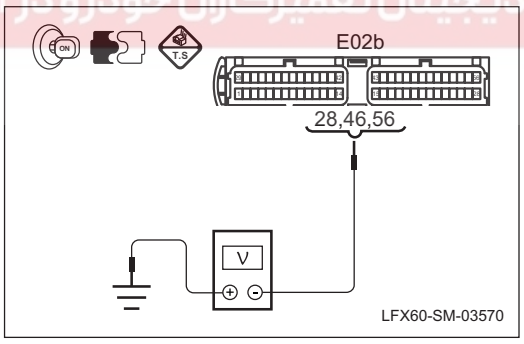
Mechanical	Electrical
• Leakage • Shift level • Shift cable • Brake switch	• Fuse • Line • Harness plug • TCM

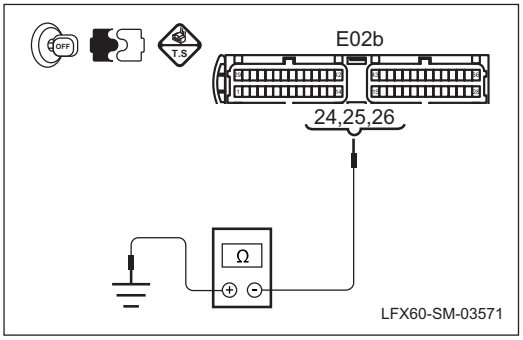
3. Solve the problem finding before the next step inspection.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If the visual check is OK, check for the problems against the fault list.

Fault symptom table

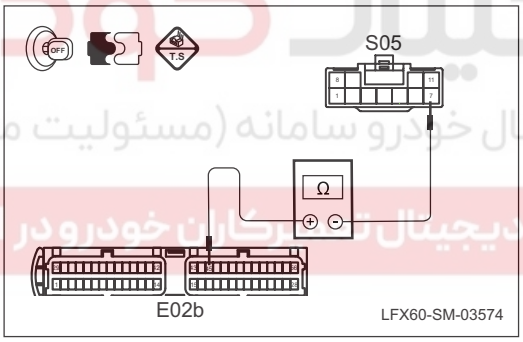
Symptom	Possible point of failure	Recommended measures
The fault indicator is not working properly	• Line fault	• Line fault maintenance
	• Instrument damage	• Replace the instrument **Refer to:replacement of instrument cluster assembly**
	• CAN bus fault	• Repair CAN bus
	• TCM	• Replace the TCM **Refer 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

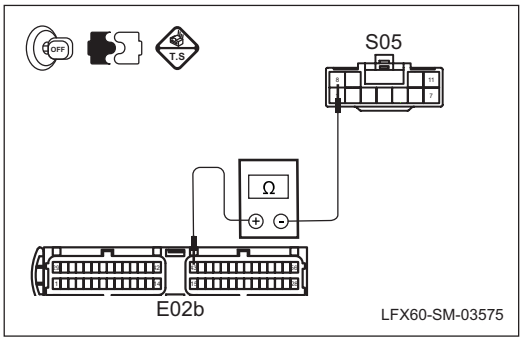
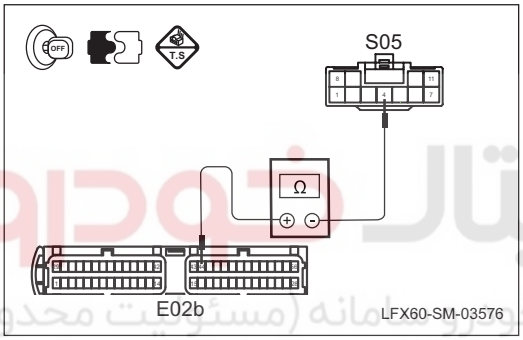
Diagnostic process for difficulty in starting the car

Test condition	Details / Results / Measures
1. Check the trouble code.	
	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
2. Check the adaptive learning.	
	A. Check adaptive learning Is the self-learning finished? →**Yes** Step 3 →**No** Carry out adaptive learning.
3. Check the transmission fluid level.	
	A. Check transmission oil level Is the level normal? → **Yes** Step 4 → **No** Adjust the fluid level to the normal mark.
4. Check the transmission control module power supply.	
	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.

Test condition	Details / Results / Measures
5. Check the TCM ground line.	
	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. **Standard value: less than 5Ω** Is the resistance normal? → **Yes** Step 6. → **No** Repair the TCM ground line fault and replace the harness if necessary.
6. Check the transmission control module.	
	A. Replace the TCM. **Refer to:replacement of TCM** B. Execute the adaptive learning. **Refer to:CVT self-learning** Is the vehicle normal? → **Yes** Replace the TCM. → **No** Step 7
7. Check CVT for mechanical fault.	
	A. Replace the transmission assembly. **Refer to:replacement of the transmission assembly.** Confirm the fault is eliminated.

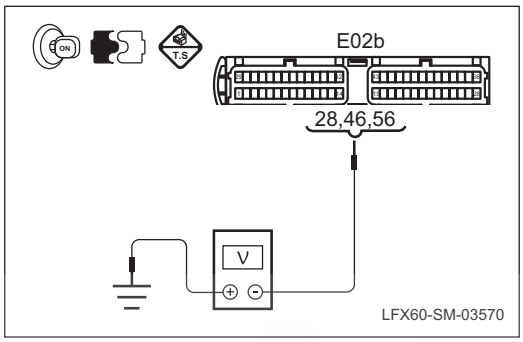
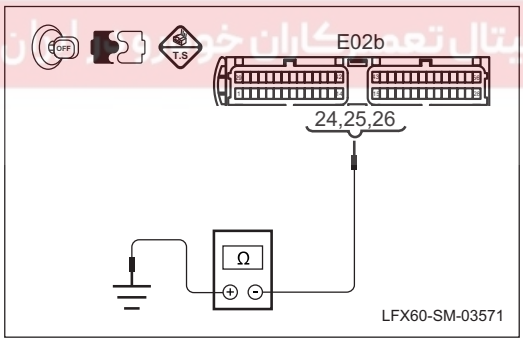
Diagnostic process for failure to start manual mode

Test condition	Details / Results / Measures
1. Check the trouble code.	
	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
2. Check the manual mode switch.	
	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)
3. Check the S/M signal line.	
	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.

Test condition	Details / Results / Measures
4. Check the manual upshift signal line.	
	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.
5. Check the manual downshift signal line.	
	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.
6. Check the shift lever assembly.	
	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
7. Replace the transmission control module.	
	A. Replace the TCM. **Refer to:Replacement of TCM** Confirm the fault is solved.

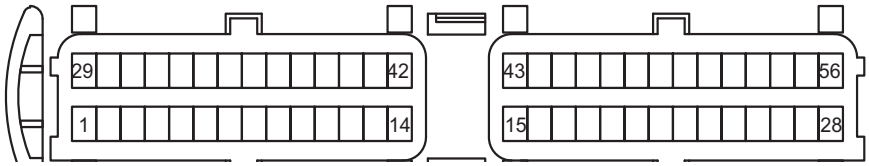
Diagnostic process for driving impact

Test condition	Details / Results / Measures
1. Check the trouble code.	
	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
2. Check if the transmission is in emergency mode.	
	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
3. Check the CVT harness plugs.	
	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.
4. Check CVT adaptive learning.	
	A. Check CVT adaptive learning. Is the self-learning finished? →**Yes** Step 5 →**No** Carry out adaptive learning. **Refer to:CVT**

Test condition	Details / Results / Measures
5. Check the transmission fluid.	
	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)**
6. Check the TCM power line.	
	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.
7. Check the TCM ground line.	
	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. **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.

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

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 Bl/G	Power supply for input shaft pressure sensor
9	-	-
10	0.50 Bl/Y	Input shaft pressure sensor grounded
11	0.50 Bl/W	Input shaft pressure sensor signal
12	0.50 Bl/R	Output shaft pressure sensor grounded
13	0.50 Bl	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 Bl/B	Grounding
21	0.50 Br/B	Turbine speed sensor grounded
22	0.50 V/W	Turbine speed sensor signal

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

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	**Refer to:P0900, , P0902 ,P0903**
P0902	Clutch solenoid valve control circuit is short to ground	
P0903	Clutch solenoid valve control circuit is short to power supply	
P0938	Transmission oil temperature too high	**Refer to:P0938, , P0939 ,P0940**
P0939	Transmission fluid temperature sensor circuit is short to ground	
P0940	Transmission fluid temperature sensor circuit is short to power supply or open	
P0960	Control circuit of pressure control solenoid valve "A" (input pulley shaft) is open	**Refer to:P0960, , P0962 ,P0963**
P0962	The control circuit of pressure control solenoid valve "A" (input pulley shaft) is short-circuited	
P0963	Pressure control solenoid valve “A” (input belt pulley shaft)control circuit short power supply	

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	

DTC P0703

DTC description

DTC	Description	Definition
P0703	• Brake signal is abnormal	• 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	• Checking the hardware or harness	• 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.	• Brake switch • Brake switch line

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the brake switch harness plugs, the engine control modules for damage, poor contact, aging, looseness and other problematic signs. Are the results normal? →**Yes** Step 2 →**No** Examine and repair the fault location.
2. Clear the trouble code.	
	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.

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

DTCP0705

DTC description

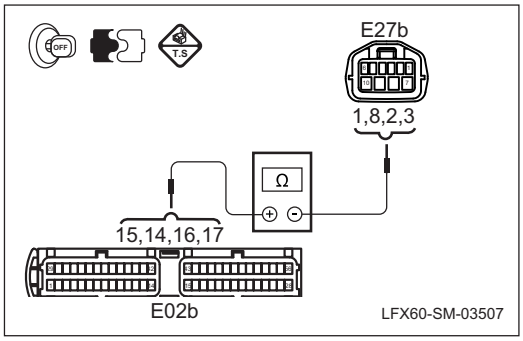
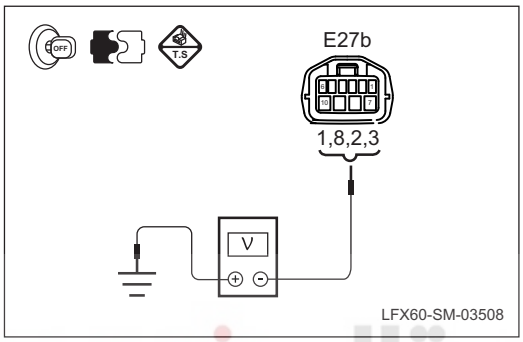
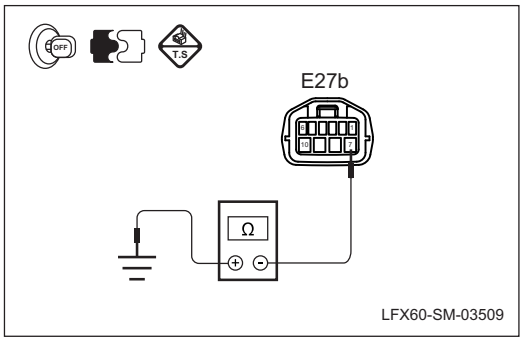
DTC	Description	Definition
P0705	• Transmission gear signal is abnormal	• Transmission gear (PRND) signal is processed by TCM circuit, and the low level signals are active. This is mainly used to determine the current driving mode to provide important information for the coupling and variable speed control of clutch.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0705	• Checking the hardware or harness	• 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.	• Gear switch harness • Gear switch

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the transmission gear switch harness plugs and TCM for damage, poor contact, aging, looseness and other problematic signs. Are the results normal? →**Yes** Step 2 →**No** Examine and repair the fault location.
2. Clear the trouble code.	
	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.→No Finish.

Test condition	Details / Results / Measures
3. Check the gear switch input line.	
 	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. **Standard value: less than 5Ω** 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. **Standard value:0V** Is the voltage normal? →**Yes** Step 4. →**No** Check the gear switch input line for fault; and replace the harness, if necessary.
4. Check the gear switch ground line.	
	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. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** Step 5 →**No** Check the gear switch ground line for fault; and replace the harness, if necessary.

Test condition	Details / Results / Measures
5. Check the gear switch.	
	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. Use a multimeter to measure the resistance between terminals 1 and 7 of the gear switch when the shift lever stays at P. E. Measure the resistance between the terminal 8 and 7 of the gear switch at R gear with a multimeter. F. Measure the resistance between the terminal 2 and 7 of the gear switch at N gear with a multimeter. G. Measure the resistance between the terminal 3 and 7 of the gear switch at D gear with a multimeter. **Standard value: less than 5Ω** 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. I. Measure the resistance between terminal 8 and other terminals of the gear switch at R gear with a multimeter. J. Measure the resistance between terminal 2 and other terminals of the gear switch at N gear with a multimeter. K. Measure the resistance between terminal 3 and other terminals of the gear switch at D gear with a multimeter. **Standard value: 10MΩ or higher** Is the resistance normal? →**Yes** Step 6 →**No** Replace the gear switch.
6. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTCP0716

DTC description

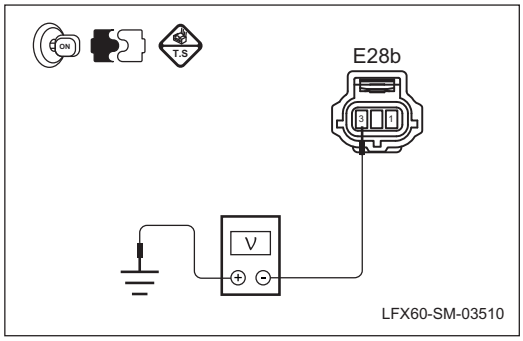
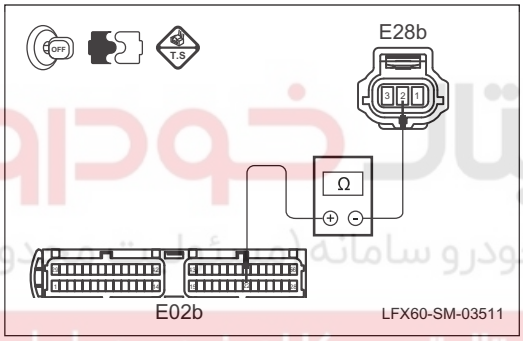
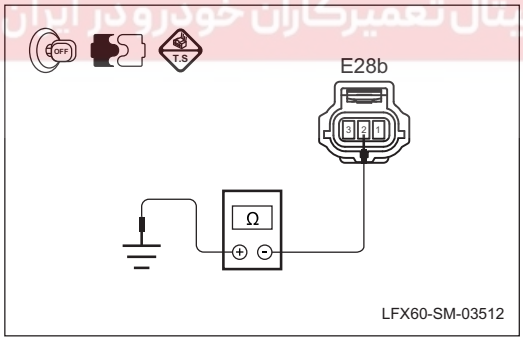
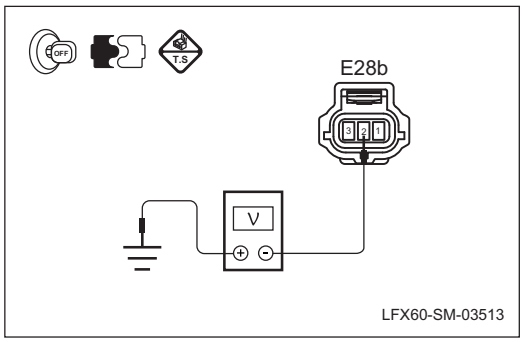
DTC	Description	Definition
P0716	• Turbine speed signal range is abnormal	• The turbine speed signal is processed by TCM circuit and it is a kind of high frequency pulse signal. TCM works out the turbine speed according to the pulse signal. This is mainly designed for the hydraulic torque converter locking, clutch engagement and the variable speed control functions.

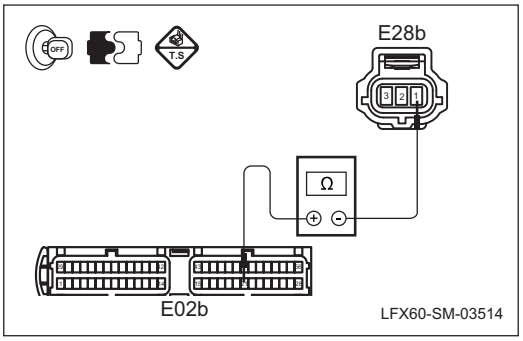
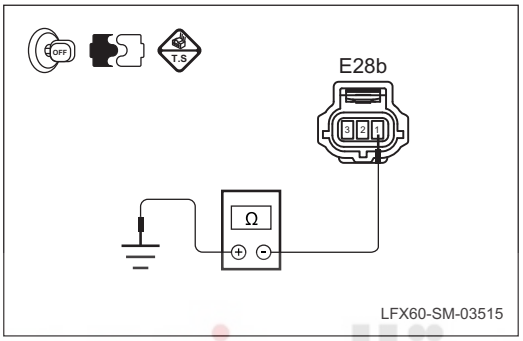
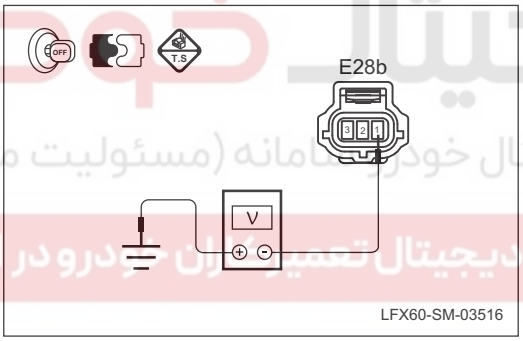
Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0716	• Checking the hardware or harness	• 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.	• Turbine speed sensor installed incorrectly • Turbine speed sensor line • Turbine speed sensor

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the turbine speed sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs. B. Check if the turbine speed sensor is installed incorrectly. Are the results normal? →**Yes** Step 2 →**No** Examine and repair the fault location.
2. Clear the DTC.	
	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.

Test condition	Details / Results / Measures
3. Check the turbine speed sensor power supply line.	
	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.
4. Check the turbine speed sensor signal line.	
  	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.

Test condition	Details / Results / Measures
5. Check the grounding line of turbine speed sensor.	
  	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.
6. Check the turbine speed sensor.	
	A. Replace the turbine speed sensor. Are the results normal? →**Yes** Step 7. →**No** Replace the turbine speed sensor
7. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTC P0730

DTC description

DTC	Description	Definition
P0730	• Speed ratio control is abnormal	• 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	• Checking the hardware or harness	• 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.	• 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	
	A. Check the input shaft pressure sensor and input shaft pressure solenoid valve for damage, poor contact, aging, looseness and other problematic signs. Are the results normal? →**Yes** Step 2. →**No** Examine and repair the fault location.

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

DTC P0792

DTC description

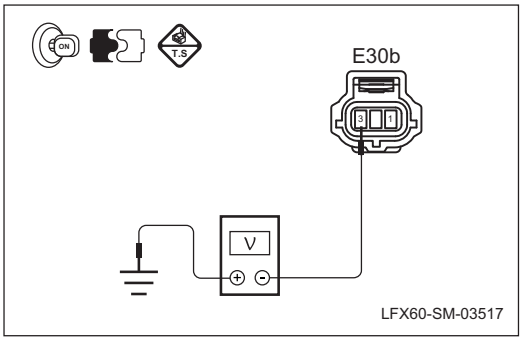
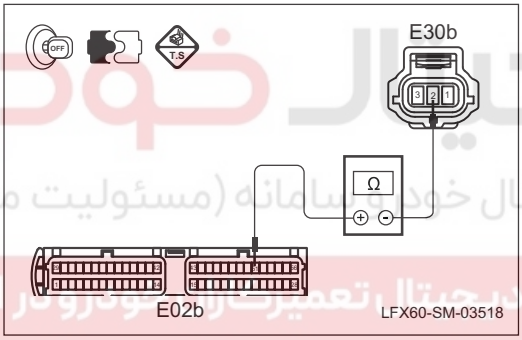
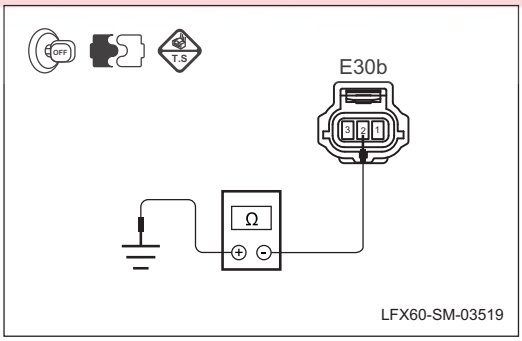
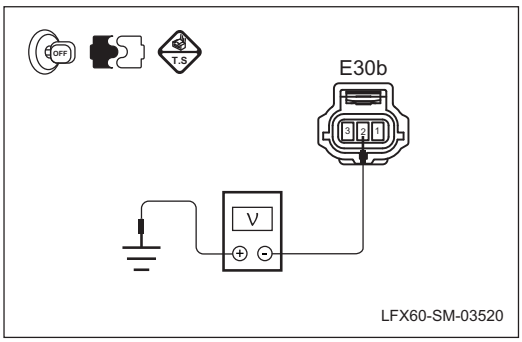
DTC	Description	Definition
P0792	• Speed signal range of input belt pulley shaft is abnormal	• The speed signal of input belt pulley shaft is processed by TCM circuit and it is a kind of high frequency pulse signal. TCM works out the turbine speed according to the pulse signal. Mainly used for torque converter locking, clutch coupling and variable speed control.

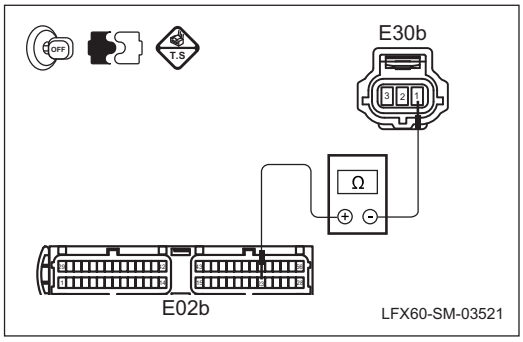
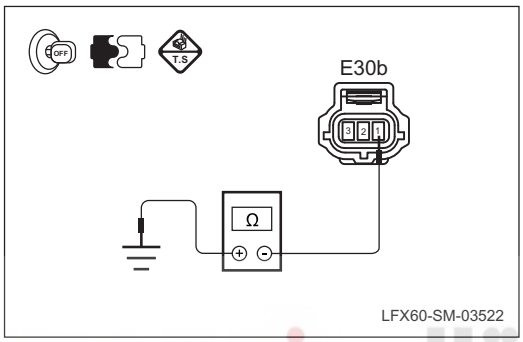
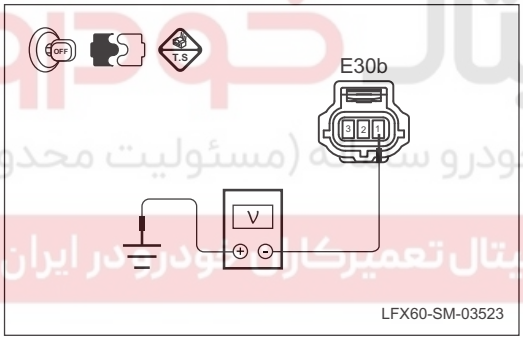
Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0792	• Checking the hardware or harness	• 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.	• Input shaft speed sensor line • Input shaft speed sensor

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the input shaft speed sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs. B. Check if the speed sensor is installed incorrectly. Are the results normal? →**Yes** Step 2. →**No** Examine and repair the fault location.
2. Clear the trouble code.	
	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.

Test condition	Details / Results / Measures
3. Check the input shaft speed sensor power supply line.	
	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.
4. Check the input shaft speed sensor signal line.	
  	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.

Test condition	Details / Results / Measures
5. Check the grounding line of input shaft speed sensor.	
  	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 1 and TCM harness plug E02b terminal 23 with the multimeter. **Standard value: less than 5Ω** F. Measure the resistance between the input shaft speed sensor harness plug E30b 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 input shaft speed sensor harness plug E30b terminal 1 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.
6. Check the input shaft speed sensor.	
	A. Replace the input shaft speed sensor. Are the results normal? →**Yes** Step 7. →**No** Replace the input shaft speed sensor.
7. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

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

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the turbine speed sensor, clutch control 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.
2. Clear the trouble code.	
	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.

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

DTC P081E

DTC description

DTC	Description	Definition
P081E	• Reverse clutch slips	• 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	• Checking the hardware or harness	• 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.	• Turbine speed sensor • Clutch solenoid valve • Hydraulic system • Reverse clutch friction plate

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the turbine speed sensor, clutch control 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.
2. Clear the trouble code.	
	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.

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

DTC P0842,P0843

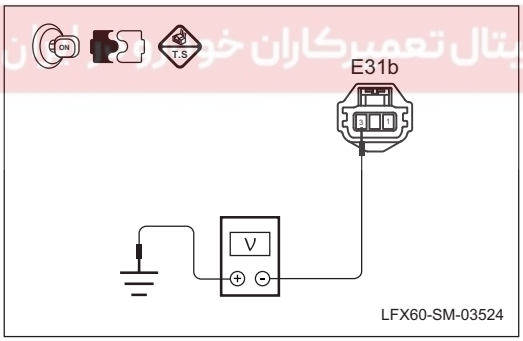
DTC description

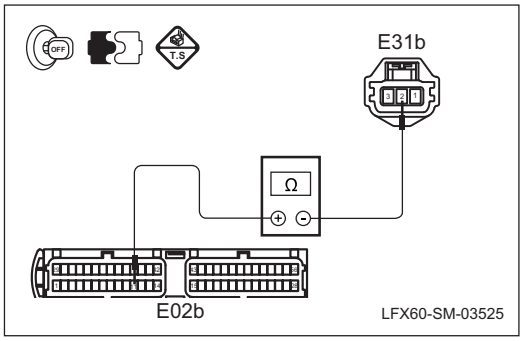
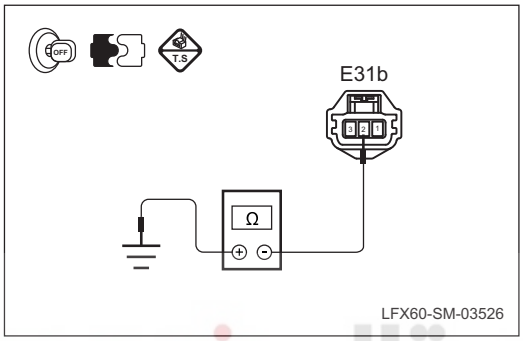
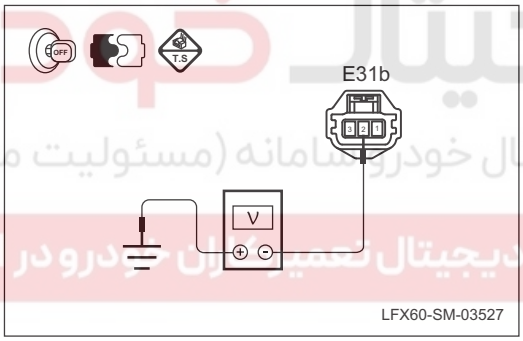
DTC	Description	Definition
P0842	• Pressure sensor circuit A (input pulley shaft) is short to ground or open	• The transmission hydraulic pressure sensor A (input belt pulley) detects the input shaft pressure from CVT and sends a signal to TCM.
P0843	• Pressure sensor circuit A (input pulley shaft) is short to power supply	

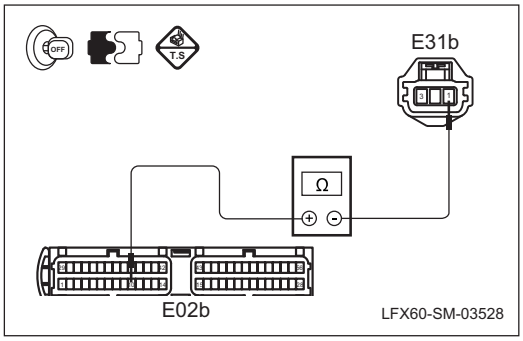
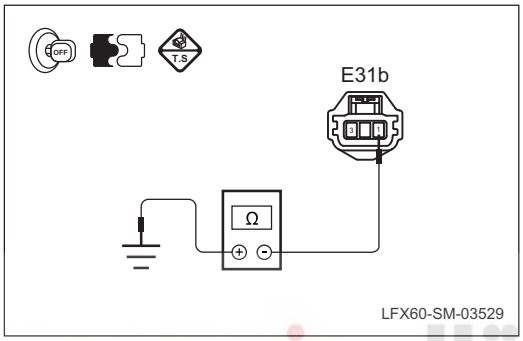
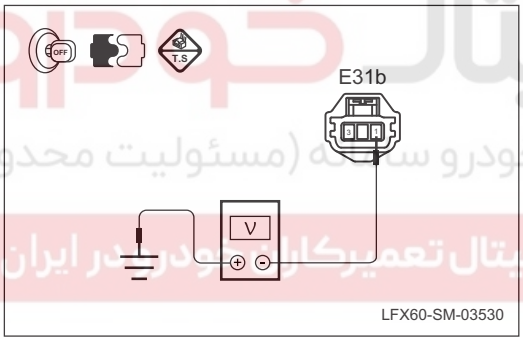
Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0842	• Checking the hardware or harness	• 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.	• Input shaft pressure sensor line • Input shaft pressure sensor
P0843		• 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.	

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	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. B. Check if the input belt pulley shaft pressure sensor is installed incorrectly. Are the results normal? →**Yes** Step 2. →**No** Examine and repair the fault location.
2. Clear the DTC.	
	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.
3. Check the power supply line of input shaft speed 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. 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 pressure sensor harness plug E31b 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 pressure sensor; replace the harness, if necessary.

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.

Test condition	Details / Results / Measures
5. Check the grounding 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 harness plug E31b from input belt pulley shaft pressure sensor. D. Disconnect the TCM harness plug E02b. 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. **Standard value: less than 5Ω** F. Measure the resistance between the input shaft pressure sensor harness plug E31b 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 input shaft pressure sensor E31b terminal 1 and the fixed ground point with the multimeter. **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.
6. Check the input shaft pressure sensor.	
	A. Disconnect the harness plug E31b from input shaft pressure sensor. F. Use a multimeter to measure the voltage between terminals 3 and 2 of input shaft pressure sensor. **Standard value:~10KΩ** Is the resistance normal? →**Yes** Step 7. →**No** Replace the input 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.

DTC P0847,P0848

DTC description

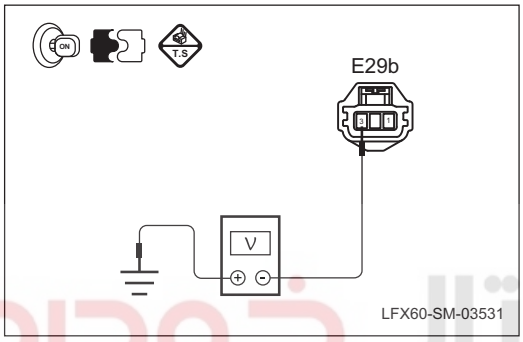
DTC	Description	Definition
P0847	• Pressure sensor circuit B (output pulley shaft) is short to ground or open	• The transmission hydraulic pressure sensor B (output belt pulley) detects the input shaft pressure from CVT and sends a signal to TCM.
P0848	• Pressure sensor circuit B (input pulley shaft) is short to power supply	

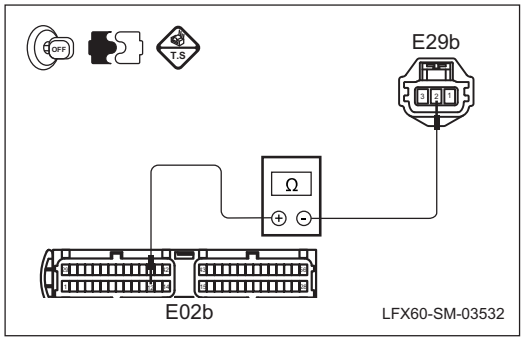
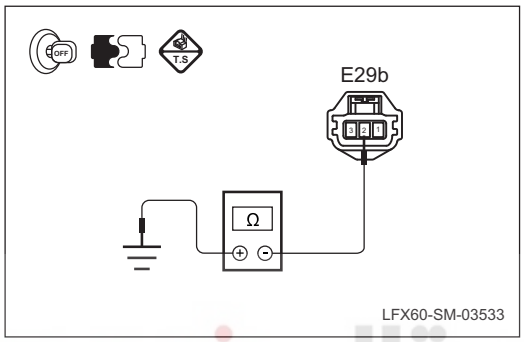
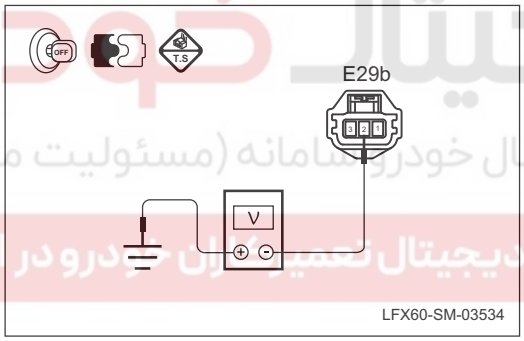
Possible causes

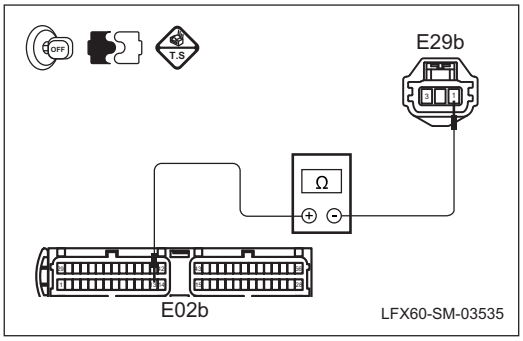
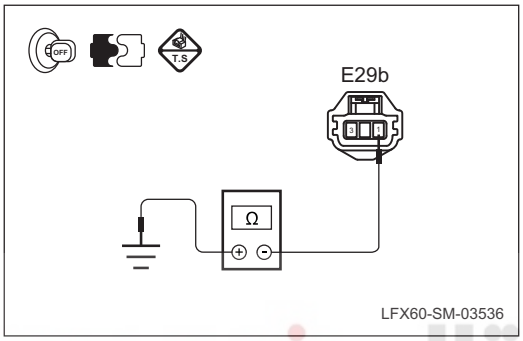
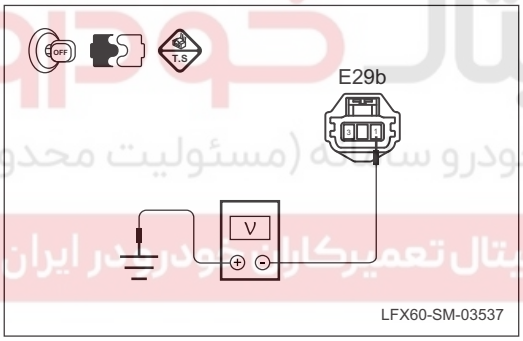
DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0847	• Checking the hardware or harness	• When the oil pressure of hydraulic pressure sensor B is less than the minimum allowable value, the diagnostic condition is established and the fault is being acknowledged. 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.	• Output shaft pressure sensor line • output shaft pressure sensor
P0848		• 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	
	A. Check the output shaft pressure sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs. B. Check if the output belt pulley shaft pressure sensor is installed incorrectly. Are the results normal? →**Yes** Step 2. →**No** Examine and repair the fault location.

Test condition	Details / Results / Measures
2. Clear the trouble code.	
	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.
3. Check the power supply line of output shaft speed sensor.	
	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. Connect the battery negative terminal. E. Operate the start switch to turn the power to ON state. F. Measure the voltage between the output shaft pressure sensor harness plug E29b terminal 3 and the fixed ground point with the multimeter. **Standard value:4.5 ~ 5.5V** Is the voltage normal? →**Yes** Step 4. →**No** Repair the power line of output shaft pressure sensor; replace the harness, if necessary.

Test condition	Details / Results / Measures
4. Check the power supply line of output shaft pressure sensor.	
  	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** 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** 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** Are the results normal? →**Yes** Step 5. →**No** Repair the output shaft pressure sensor signal line fault and replace the harness if necessary.

Test condition	Details / Results / Measures
5. Check the grounding line of output shaft pressure sensor.	
  	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? →**Yes** Step 5. →**No** Repair the output shaft pressure sensor signal line fault and replace the harness if necessary.
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.

DTC P0890

DTC description

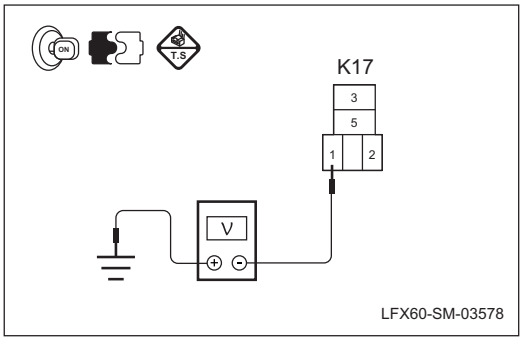
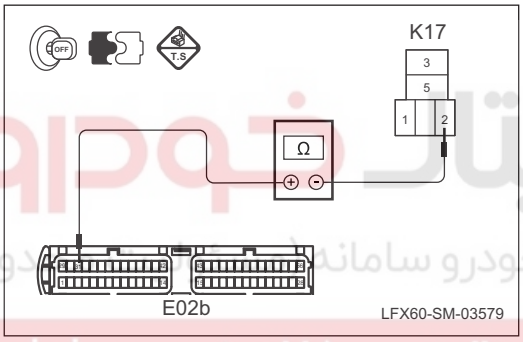
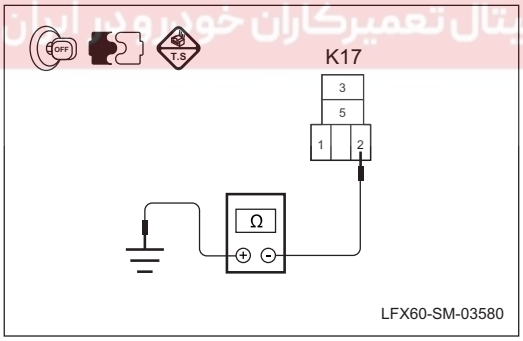
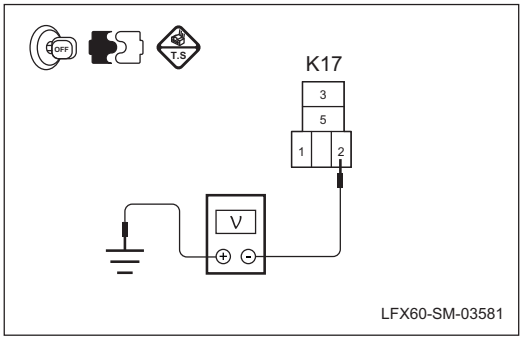
DTC	Description	Definition
P0890	• TCM main relay control circuit is short or open	• TCM power supply relay is a switch-controlled solenoid valve that supplies power to all solenoid valves. TCM software system controls the solenoid valve switch to achieve the control over various types of solenoid valves in transmission control system.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0890	• Checking the hardware or harness	• 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.	• Activation request relay line • start request relay

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	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.
2. Clear the trouble code.	
	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.

Test condition	Details / Results / Measures
3. Check the power supply line of activation request relay.	
	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. 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 1 of relay K17 harness plug and the reliable ground point. **Standard value:11 ~ 14V** Is the voltage normal? →**Yes** Step 4. →**No** Repair the power supply line of activation request relay; replace the harness, if necessary.
4. Check the activation request relay control line.	
  	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. Disconnect the TCM harness plug E02b. 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. **Standard value: less than 5Ω** F. Use a multimeter to measure the resistance between terminal 2 of relay K17 harness plug and the reliable ground point. **Standard value: 10MΩ or higher** G. Connect the battery negative terminal. H. Use a multimeter to measure the voltage between terminal 2 of relay K17 harness plug and the reliable ground point. **Standard value:0V** Are the results normal? →**Yes** Step 5. →**No** Repair the control line of activation request relay K17; replace the harness, if necessary.

Test condition	Details / Results / Measures
5. Check the activation request relay.	
	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.
6. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTC P0894

DTC description

DTC	Description	Definition
P0894	• Torque converter clutch slips	• 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	• Hardware or harness inspection	• 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.	• Hydraulic torque converter solenoid valve or line • Hydraulic control circuit • Hydraulic torque converter

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the hydraulic torque converter 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.
2. Clear the trouble code.	
	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.

Test condition	Details / Results / Measures
3. Check the hydraulic torque converter solenoid valve.	
	A. Check the hydraulic torque converter solenoid valve for fault. Refer to:“P0968, , P0970, , P0971” DTC Does DTC recur? →**Yes** Step 4. →**No** Finish.
4. Check the hydraulic control circuit.	
	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.
5. Check the hydraulic torque converter.	
	A. Contact the relevant technical personnel of transmission for inspection. Confirms that the troubleshooting is successful.

DTC P0900,P0902,P0903

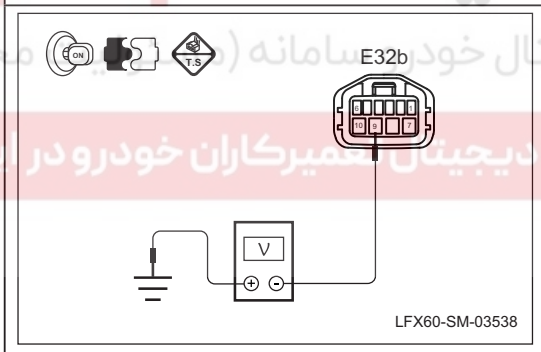
DTC description

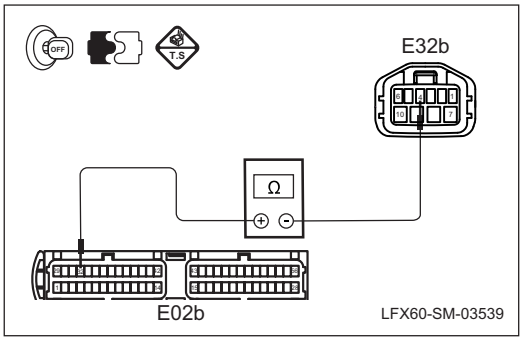
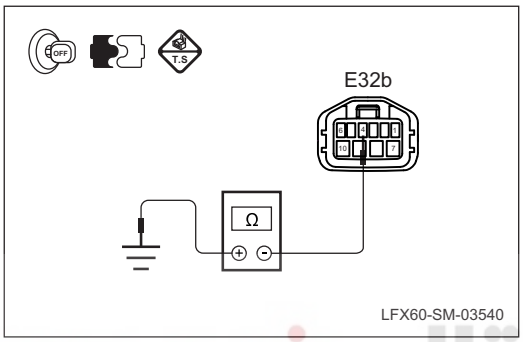
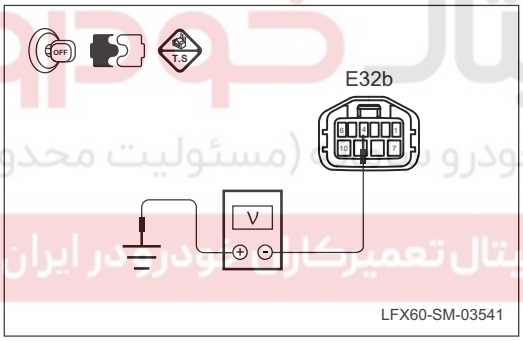
DTC	Description	Definition
P0900	• Clutch solenoid valve control circuit is open	• Description: After the gear signal is sent to TCM, TCM activates the clutch control solenoid valve to control the clutch operation.
P0902	• Clutch solenoid valve control circuit is short to ground	
P0903	• Clutch solenoid valve control circuit is short to power supply	

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0900	• Checking the hardware or harness	• 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.	• Clutch solenoid valve line • Clutch solenoid valve
P0902		• 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		• 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.	

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	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.
2. Clear the trouble code.	
	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.
3. Check the power supply line of clutch solenoid valve.	
	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.

Test condition	Details / Results / Measures
4. Check the control line of clutch solenoid valve.	
  	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 4 and TCM harness plug E02b terminal 32 with the multimeter. **Standard value: less than 5Ω** F. Measure the resistance between the solenoid valve harness plug E32b terminal 4 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 solenoid valve harness plug E32b terminal 4 and the fixed ground point with the multimeter. **Standard value:0V** Are the results normal? →**Yes** Step 5. →**No** Repair the control line of clutch solenoid valve; and replace the harness, if necessary.
5. Check the clutch solenoid valve.	
	A. Disconnect the solenoid valve harness plug E32b. B. Use a multimeter to measure the resistance between terminals 4 and 9 of clutch solenoid valve. **Standard value:10±0.6Ω** Is the resistance normal? →**Yes** Step 6. →**No** Replace the solenoid valve.
6. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTC P0938,P0939,P0940

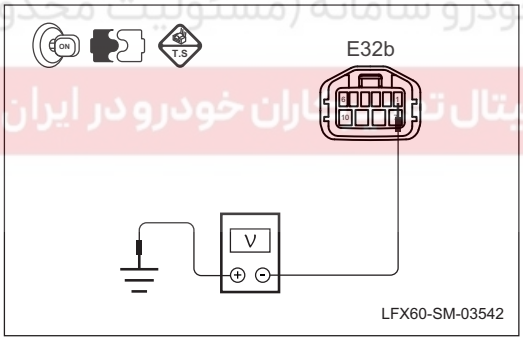
DTC description

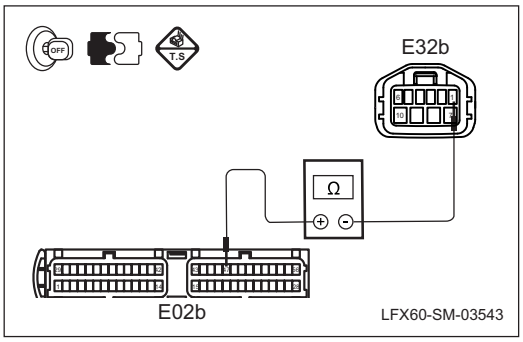
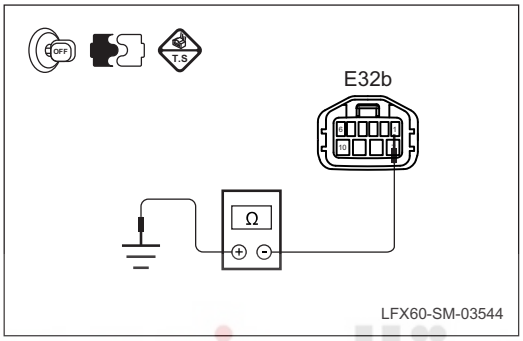
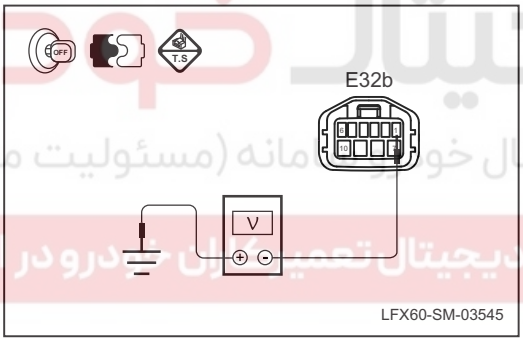
DTC	Description	Definition
P0938	• Transmission fluid temperature is too high	• CVT fluid temperature sensor detects CVT fluid temperature and sends signal to TCM.
P0939	• Transmission fluid temperature sensor circuit is short to ground	
P0940	• Transmission fluid temperature sensor circuit is short to power supply or open	

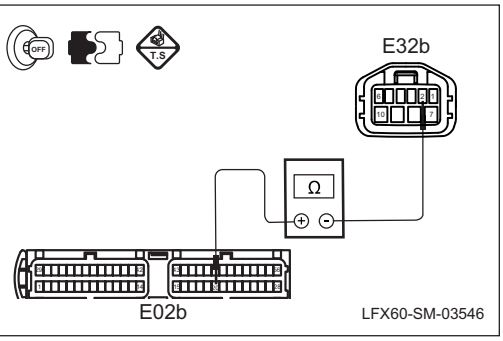
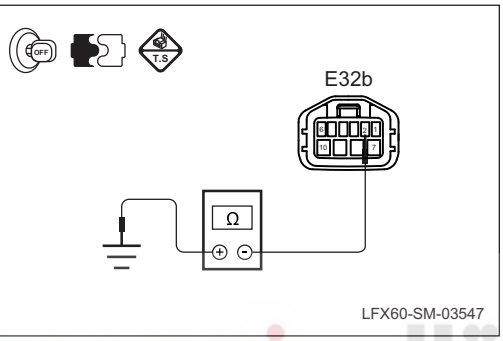
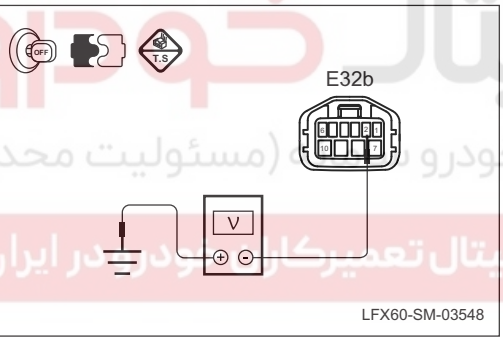
Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0938	• Checking the hardware or harness	• When the engine speed is greater than 500rpmand CVT fluid temperature is greater than 128℃ , 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.	• CVT fluid temperature sensor line • CVT oil temperature sensor
P0939		• 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.	
P0940		• 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	
	A. Check the fluid temperature sensor and transmission control module harness plugs for damage, poor contact, aging, looseness and other problematic signs. B. Check the transmission cooling system. Are the results normal? →**Yes** Step 2. →**No** Examine and repair the fault location.
2. Clear the DTC.	
	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.
3. Check the signal power supply line of fluid temperature sensor.	
	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 1 and the fixed ground point with the multimeter. **Standard value:4.5 ~ 5.5 V** Is the voltage normal? →**Yes** Step 4. →**No** Repair the signal power supply line of fluid temperature sensor; replace the harness, if necessary.

Test condition	Details / Results / Measures
4. Check the signal line of fluid temperature sensor.	
  	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. **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. **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. **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.

Test condition	Details / Results / Measures
5. Check the grounding line of fluid temperature sensor.	
 LFX60-SM-03546  LFX60-SM-03547  LFX60-SM-03548	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** 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** Are the results normal? →**Yes** Step 6. →**No** Repair the oil temperature sensor control line fault and replace the harness if necessary.

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

DTC P0960,P0962,P0963

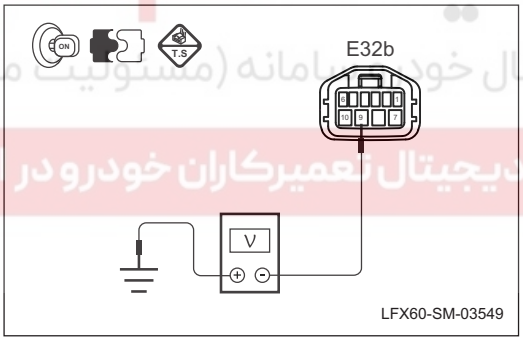
DTC description

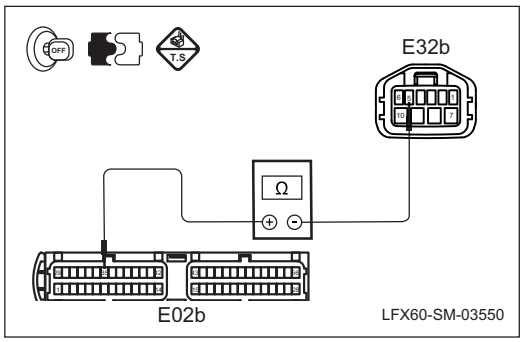
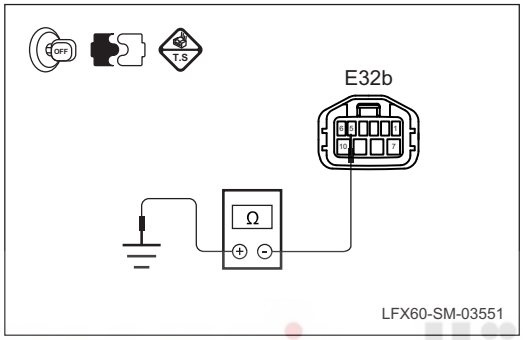
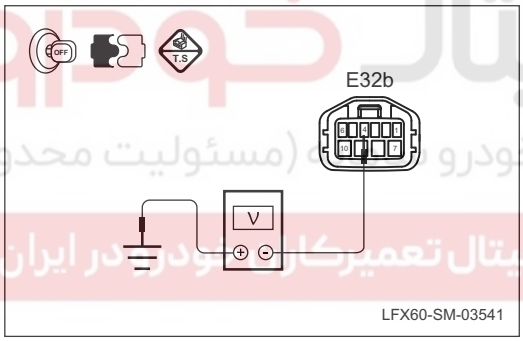
DTC	Description	Definition
P0960	• Control circuit of pressure control solenoid valve "A" (input pulley shaft) is open	• Accelerator pedal signal, gear signal, and vehicle speed signal are sent to TCM, and TCM starts the fluid pressure control solenoid valve "A" so as to control CVT to change the speed ratio.
P0962	• The control circuit of pressure control solenoid valve "A" (input pulley shaft) is short-circuited	
P0963	• 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	• Checking the hardware or harness	• 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.	• Pressure solenoid valve line of input shaft • Input shaft pressure solenoid valve
P0962		• 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		• 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.	

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	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.
2. Clear the DTC.	
	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.
3. Check the power supply line of pressure solenoid valve of input shaft.	
	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.

Test condition	Details / Results / Measures
4. Check the control line of pressure solenoid valve of input shaft.	
 LFX60-SM-03550  LFX60-SM-03551  LFX60-SM-03541	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** 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** Are the results normal? **→Yes** Step 5. **→No** Repair the input shaft pressure solenoid valve control circuit fault and replace the harness if necessary.
5. Check the input shaft pressure solenoid valve.	
	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±0.6Ω** Is the resistance normal? **→Yes** Step 6. **→No** Replace the solenoid valve.
6. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTC P0964,P0966,P0967

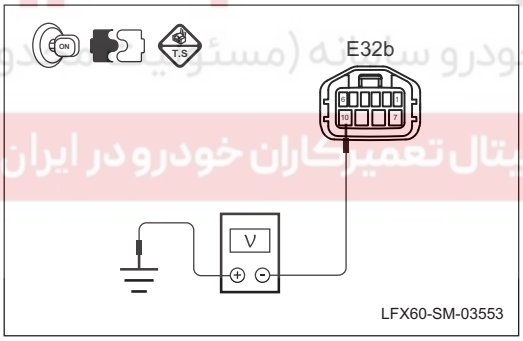
DTC description

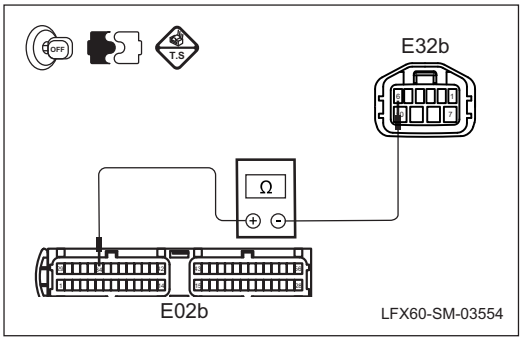
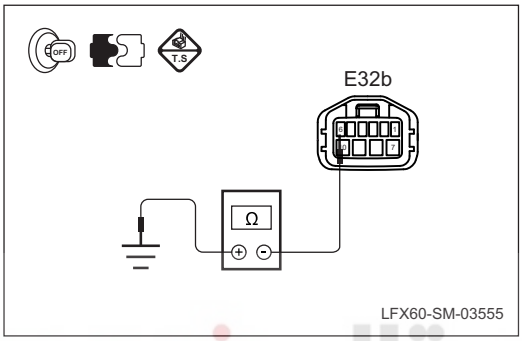
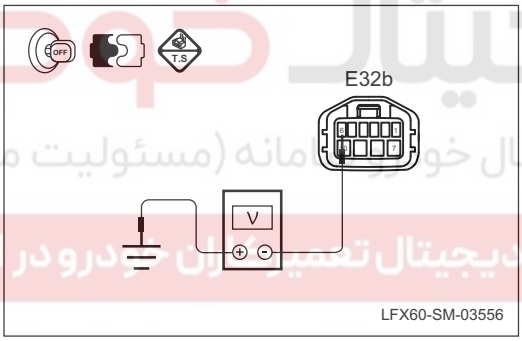
DTC	Description	Definition
P0964	• Pressure control solenoid valve “B” (output belt pulley shaft)control circuit open circuit	• Send the throttle pedal signal, gear signal and speed to TCM, TCM response signal starts oil pressurecontrol solenoid valve “B”, control CVT and change the speed ratio.
P0966	• 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	

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P0964	• Checking the hardware or harness	• 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.	• Output shaft pressure solenoid valve line • Output shaft pressure solenoid valve
P0966		• 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		• 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	
	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.
2. Clear the trouble code.	
	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.
3. Check the output shaft pressure solenoid valve power supply circuit.	
	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.

Test condition	Details / Results / Measures
4. Check the output shaft pressure solenoid valve control circuit.	
  	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 6 and TCM harness plug E02b terminal 34 with the multimeter. **Standard value: less than 5Ω** F. Measure the resistance between the solenoid valve harness plug E32b terminal 6 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 solenoid valve harness plug E32b terminal 6 and the fixed ground point with the multimeter. **Standard value:0V** Are the results normal? →**Yes** Step 5. →**No** Repair the pressure solenoid valve control line of output shaft; replace the harness, if necessary.
5. Check the output shaft pressure solenoid valve.	
	A. Disconnect the solenoid valve harness plug E32b. B. Measure the resistance between the output shaft pressure solenoid valve terminal 10 and 6 with the multimeter. **Standard value:10±0.6Ω** Are the results normal? →**Yes** Step 6. →**No** Replace the solenoid valve.
6. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTC P0968,P0970,P0971

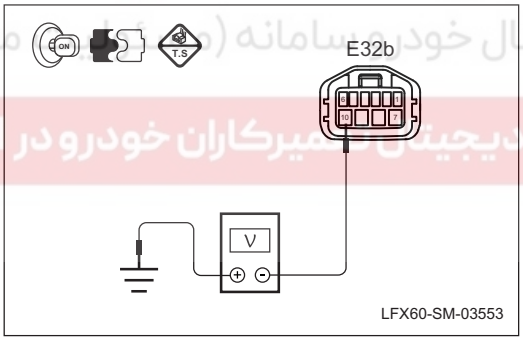
DTC description

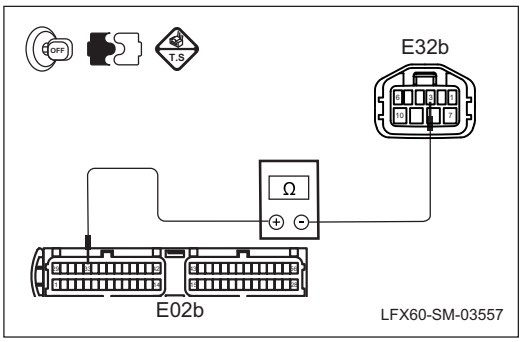
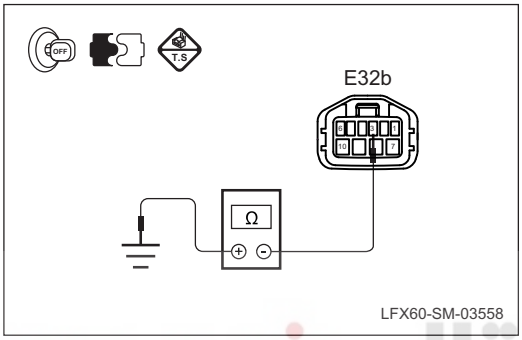
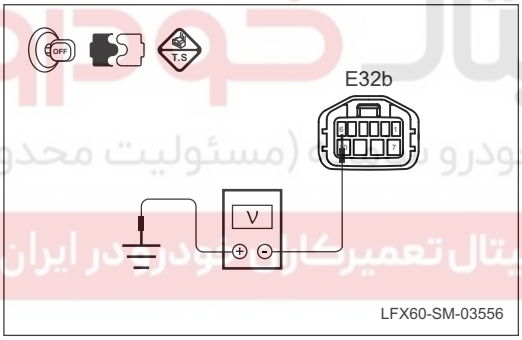
DTC	Description	Definition
P0968	• Pressure control solenoid valve “C” (hydraulic torque converter) control circuit open circuit	• Accelerator pedal signal, gear signal, and vehicle speed signal are sent to TCM, and TCM starts the fluid pressure control solenoid valve "C" so as to control the locking operation of torque converter.
P0970	• Pressure control solenoid valve “C” (hydraulic torque converter) control circuit short circuit	
P0971	• 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	• Checking the hardware or harness	• 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.	• Hydraulic torque converter solenoid valve line • Hydraulic torque converter solenoid valve
P0970		• 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.	
P0971		• 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.	

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	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.
2. Clear the trouble code.	
	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.
3. Check the power supply line of torque converter solenoid valve.	
	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.

Test condition	Details / Results / Measures
4. Check the control line of torque converter solenoid valve.	
  	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** 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** Are the results normal? →**Yes** Step 5. →**No** Repair the control line of torque converter solenoid valve; and replace the harness, if necessary.
5. Check the hydraulic torque converter solenoid valve.	
	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±0.6Ω** Are the results normal? →**Yes** Step 6. →**No** Replace the solenoid valve.
6. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTC P1706

DTC description

DTC	Description	Definition
P1706	• Steel belt slips	• 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.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P1706	• Checking the hardware or harness	• 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.	• Sensor, solenoid valve • Hydraulic system failure • Engine torque overshot • Transmission parts abnormally worn

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the solenoid valve, sensors, 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.
2. Clear the trouble code.	
	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.

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

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

DTC P1745

DTC description

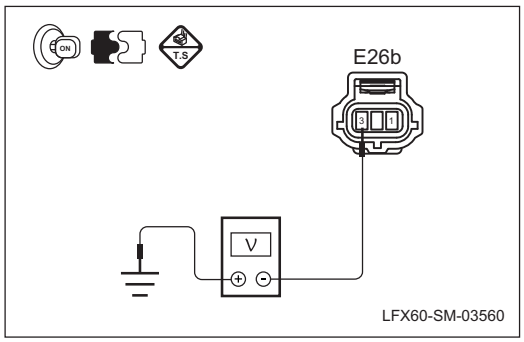
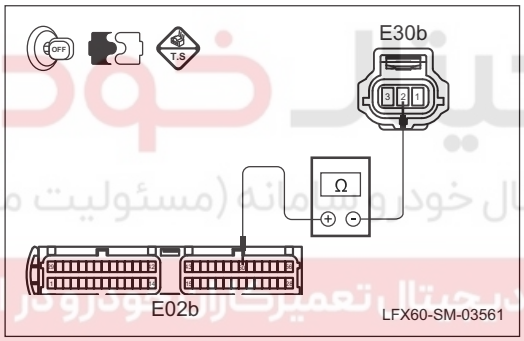
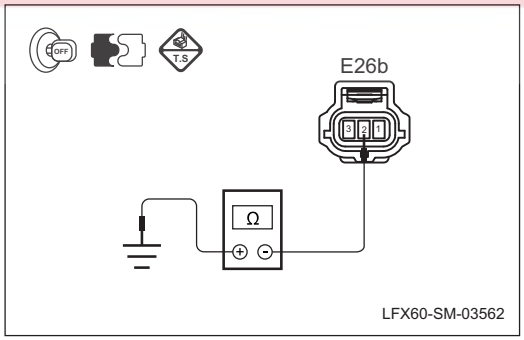
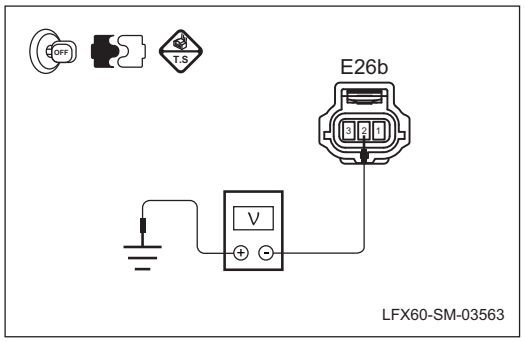
DTC	Description	Definition
P1745	• Speed signal range of output belt pulley shaft is abnormal	• The speed signal of output belt pulley shaft is processed by TCM circuit and it is a kind of high frequency pulse signal. TCM works out the turbine speed according to the pulse signal. This is mainly designed for the hydraulic torque converter locking, clutch engagement and the variable speed control functions.

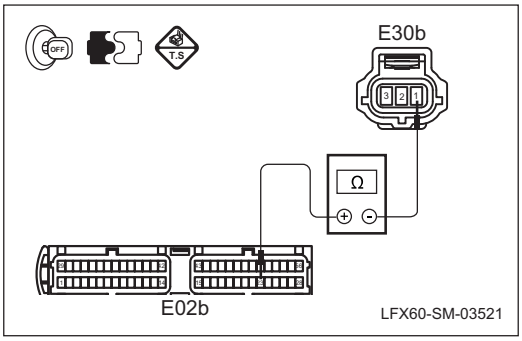
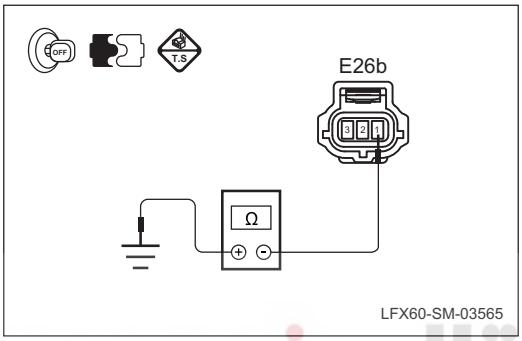
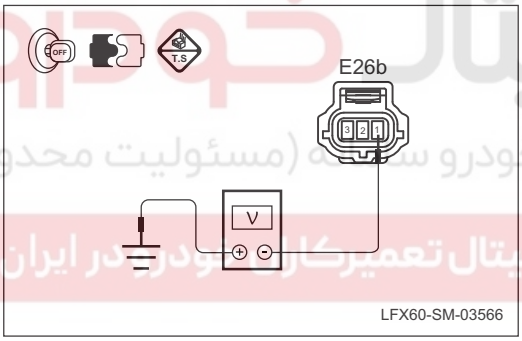
Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P1745	• Checking the hardware or harness	• 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.	• Output shaft speed sensor line • Output shaft speed sensor

Diagnostic process

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

Test condition	Details / Results / Measures
3. Check the output shaft speed sensor power supply line.	
	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.
4. Check the output shaft speed sensor signal line.	
  	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.

Test condition	Details / Results / Measures
5. Check the grounding line of output shaft speed sensor.	
  	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. 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? →**Yes** Step 5. →**No** Repair the output shaft speed sensor signal line fault and replace the harness if necessary.
6. Check the output shaft speed sensor.	
	A. Replace the output shaft speed sensor. Are the results normal? →**Yes** Step 7. →**No** Replace the output shaft speed sensor.
7. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Confirms that the troubleshooting is successful.

DTC P2797

DTC description

DTC	Description	Definition
P2797	• Input pulley shaft pressure control is abnormal	• 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

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P2797	• Checking the hardware or harness	• 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.	• Input shaft pressure sensor signal • Input shaft pressure solenoid valve • Hydraulic system

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the pressure solenoid valve, pressure sensor 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.
2. Clear the trouble code.	
	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.

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

DTC P2798

DTC description

DTC	Description	Definition
P2798	• Output pulley shaft pressure control is abnormal	• 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.

Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
P2798	• Checking the hardware or harness	• 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.	• Output shaft pressure sensor signal • Output shaft pressure control solenoid valve • Hydraulic system

Diagnostic process

Test condition	Details / Results / Measures
1. General check	
	A. Check the pressure solenoid valve, pressure sensor 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.
2. Clear the DTC.	
	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.

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

DTC U0100,U0121,U0401

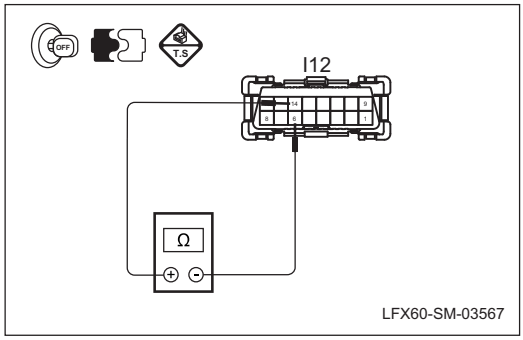
DTC description

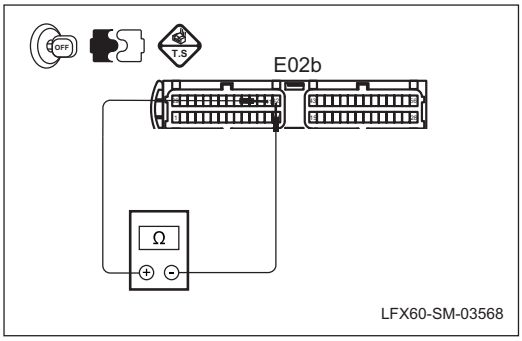
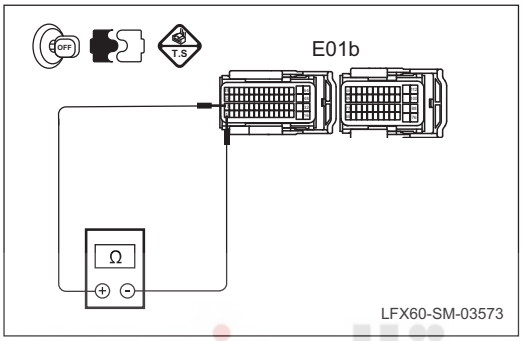
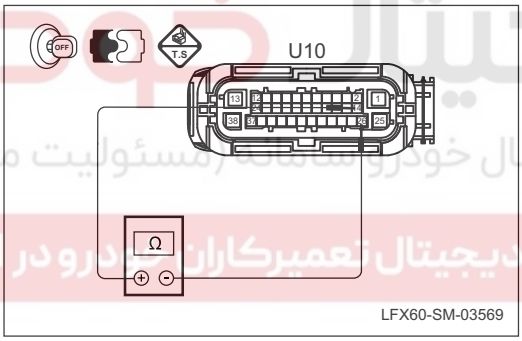
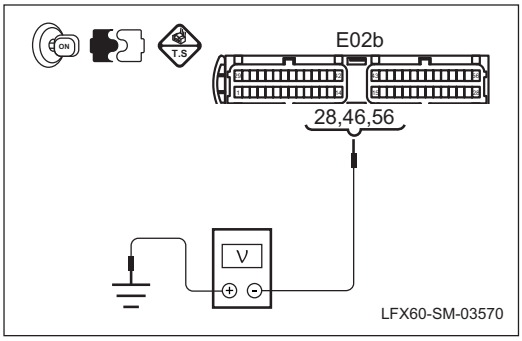
DTC	Description	Definition
U0100	• ECM communication fault	• Engine cooling water temperature, altitude coefficient, intake air temperature and brake signal are sent to TCM through CAN network for clutch control, variable speed control and torque converter control.
U0121	• ABS communication fault	• ABS speed, ABS working status and brake signals are sent to TCM through CAN network for variable speed control and torque converter control.
U0401	• ECM data reception is abnormal	• 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.

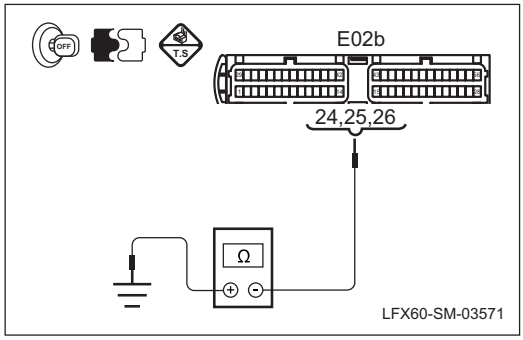
Possible causes

DTC	Detection strategy	Set the condition (control strategy)	Define the fault location
U0100	• Checking the hardware or harness	• 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.	• Engine sensor • CAN circuit fault • ABS sensor
U0121		• 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		• 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	
	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. Are the results normal? →**Yes** Step 2. →**No** Examine and repair the fault location.
2. Clear the trouble code.	
	A. Connect the equipment for diagnosing faults to the diagnostic interface. B. Operate the start switch to turn the power to ON state C. Read the trouble code by using diagnostic equipment. Is there any other DTC? →**Yes** Eliminate other DTCs first. **Refer to:corresponding DTC list** →**No** Step 3.
3. Clear the trouble code.	
	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 4. →**No** Finish.
4. Check CAN bus terminal resistance.	
	A. Operate the start switch to turn the power to OFF state. B. Use a multimeter to measure the resistance between terminals 6 and 14 of OBD diagnostic interface I12. **Standard value:60±5Ω** →**Yes** Step 5. →**No** Examine and repair the fault location.

Test condition	Details / Results / Measures
5. Check the CAN line of each control module.	
  	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±5Ω** 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±5Ω** 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±5Ω** Are the results normal? →**Yes** Step 6. →**No** Examine and repair the fault location.
6. Check the TCM power line.	
	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.

Test condition	Details / Results / Measures
7. Check the grounding circuit of transmission control module.	
	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. **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.
8. Check the TCM.	
	A. Replace the TCM. **Refer to:Replacement of transmission control module (TCM)** Is the system normal? **→Yes** Replace the TCM. **→No** Step 9.
9. Check ABS or engine control module.	
	A. Replace ABS or engine control module. **Refer to: Replace the engine or ABS control module** Confirm that the fault has been eliminated.

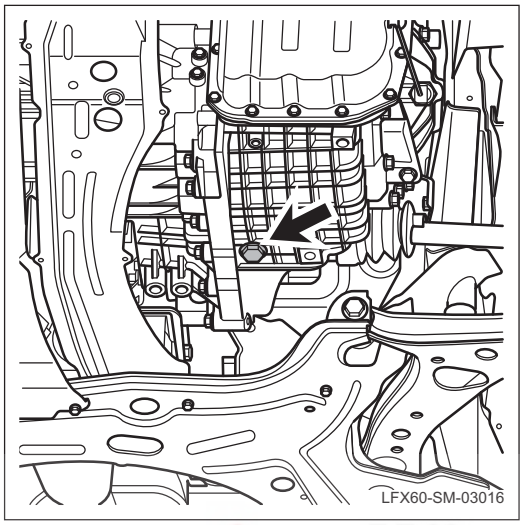
Removal and Installation

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.

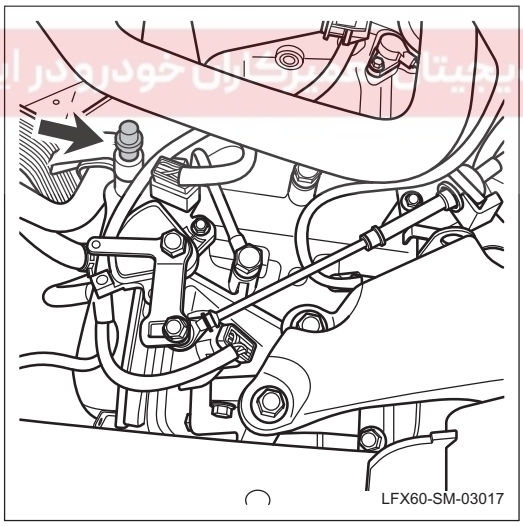
Torque: 46Nm

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.

Note:

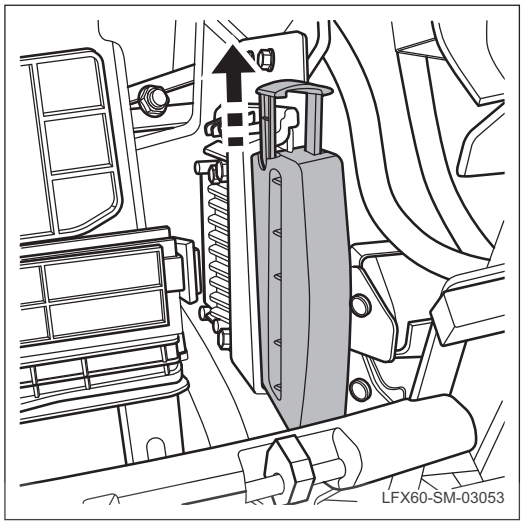
- **Wipe the oil dipstick with the lint-free paper to prevent the foreign matter entering the transmission inside.**
- **Wipe the oil dipstick with the lint-free paper to prevent the foreign matter entering the transmission inside.**
- **The engine compartment contains high-temperature parts. In order 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

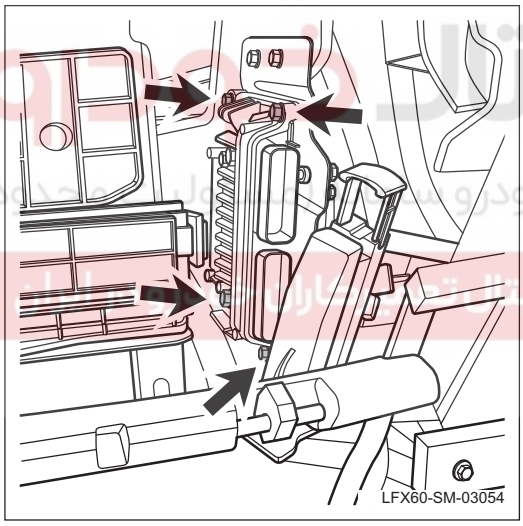
1. Remove the transmission control module.

(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.

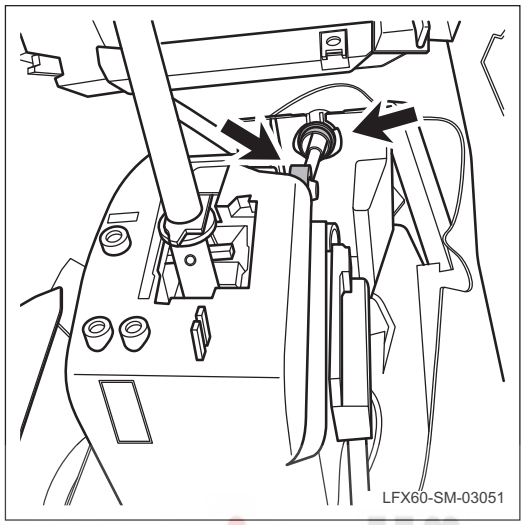
(b). Execute CVT self-learning. **Reference: CVT self-learning.**

Replacement of transmission operating mechanism
Removal

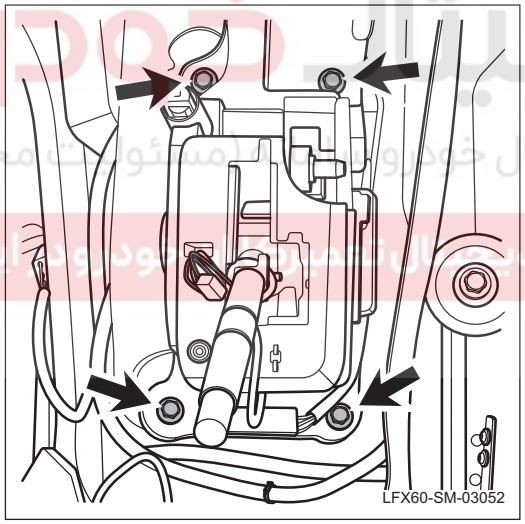
1. Remove the transmission operating mechanism.

(a). Disconnect the battery negative terminal.

(b). Remove the center console assembly. **Reference: Replacement of the center console assembly.**



(c). Remove the shift cable.



(d). Remove the fixing bolts from the transmission operating mechanism.

(e). Take out the transmission operating mechanism.

Installation

1. Install the transmission operating mechanism.

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

Replacement of transmission shift cable

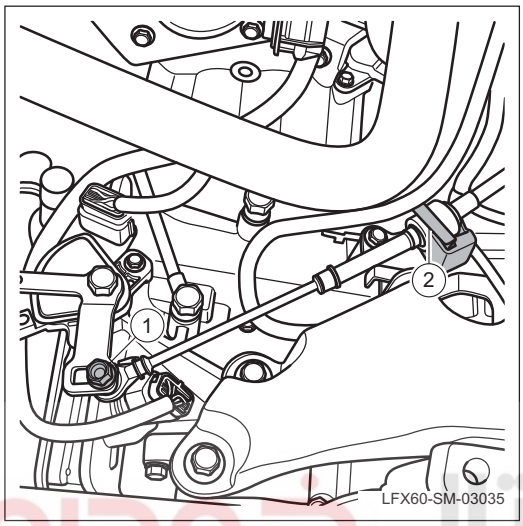
Removal

1. Remove the transmission shift cable.

(a). Disconnect the battery negative terminal.

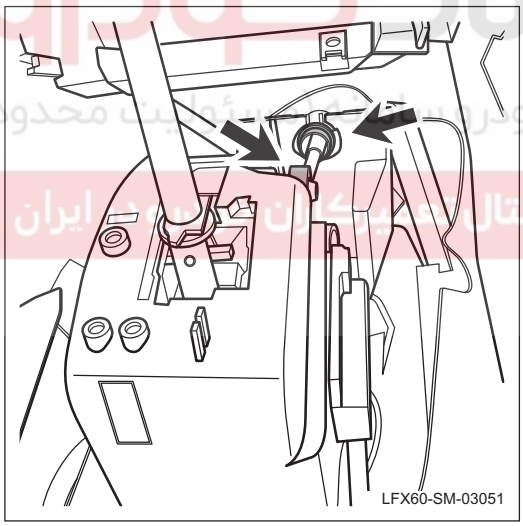
(b). Remove the air filter assembly. **Refer to the replacement of air filter assembly.**

(c). Remove the center console assembly. **Reference: Replacement of the center console assembly.**

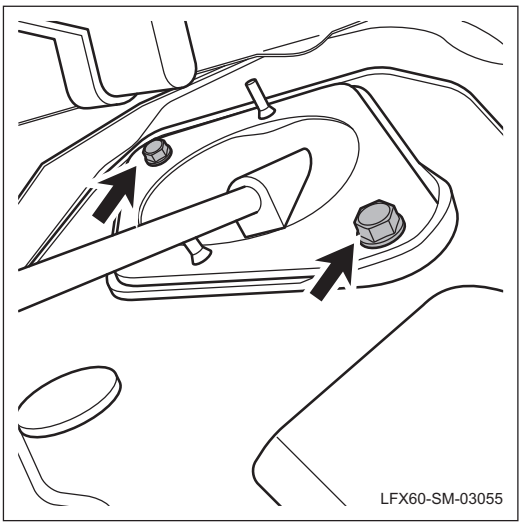


(d). Remove the fixing bolt 1 from the shift cable.

(e). Remove the fixing device 2 from the shift cable.



(f). Remove the shift cable.



(g). Remove the fixing bolts from the shift cable.

(h). Take out the shift cable assembly.

Installation

1. Install the transmission shift cable.

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

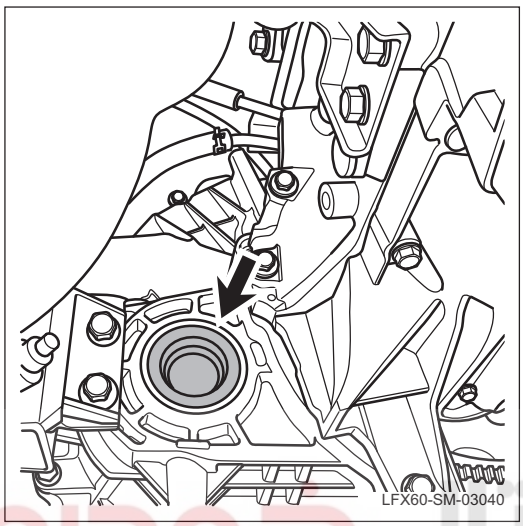
Replacement of differential oil seal
Removal

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.

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.**

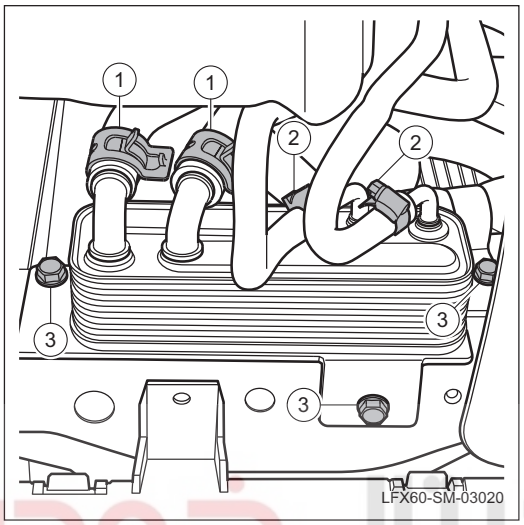
Replacement of oil cooler assembly
Removal

1. Remove the oil cooler assembly.

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

(b). Remove the left engine bottom panel.

(c). Discharge the antifreeze with a returnable container. **Reference: Replacement of antifreeze.**



(d). Remove the oil cooler water pipe clamp 1, and take out the water cooler pipe.

(e). Remove the oil cooler fuel line clamp 2, and take down the oil cooler water pipe.

(f). Remove the fixing bolt 3 from the oil cooler assembly.

(g). Remove the oil cooler assembly.

Installation

1. Install the oil cooler assembly.

(a). 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.**

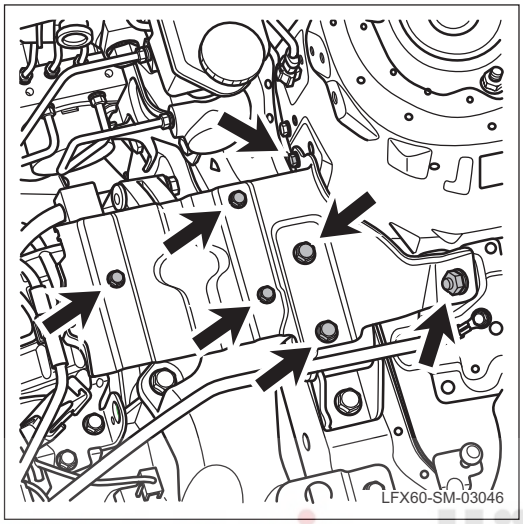
Replacement of CVT assembly
Removal

1. Remove the CVT assembly.

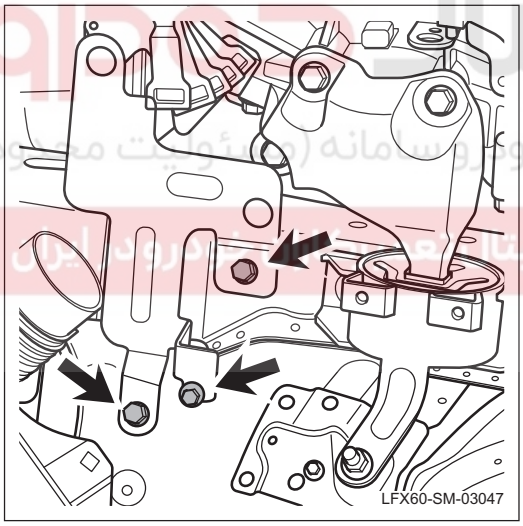
(a). Disconnect the battery negative terminal.

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

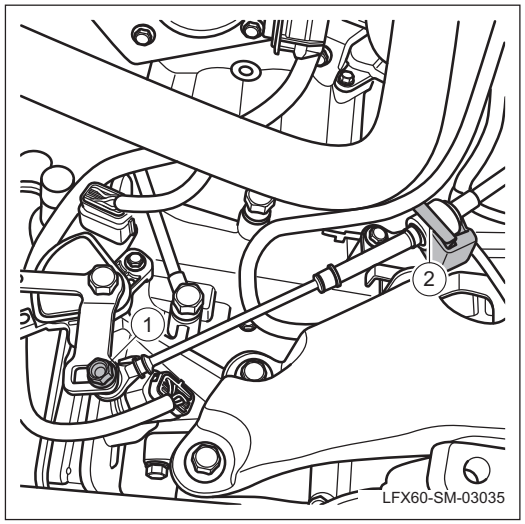
(c). Remove the fuse box.



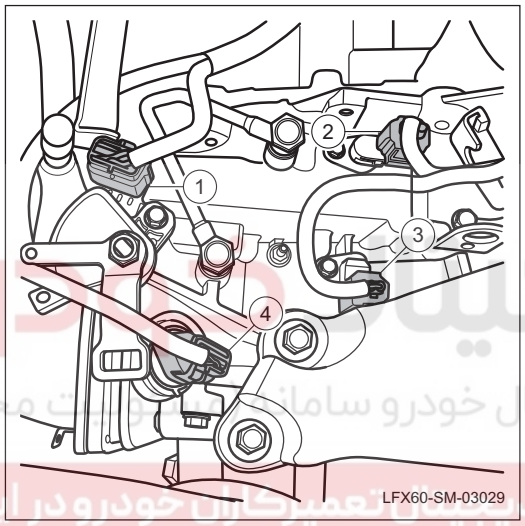
(d). Remove the fixing bolts from the fuse box holder.



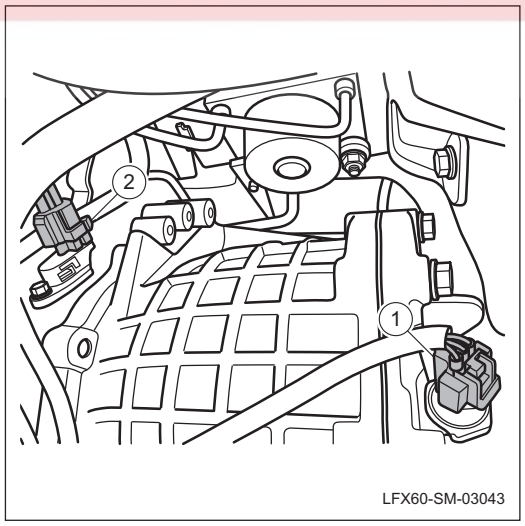
(e). Remove the fixing bolts from the air filter holder.



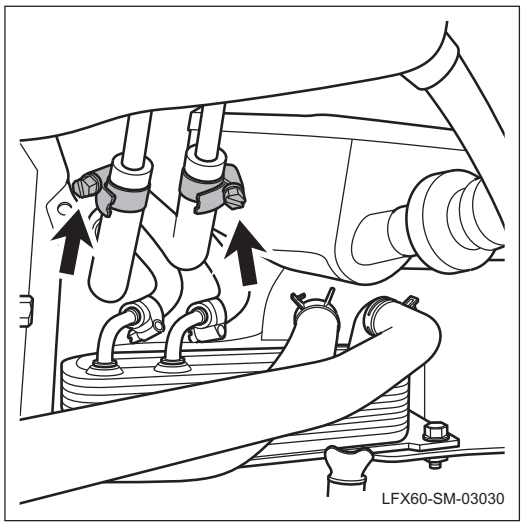
(f). Remove the nut 1 from the shift cable.
(g). Remove the clamp 2 from the shift cable.
(h). Remove the shift cable.



(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.



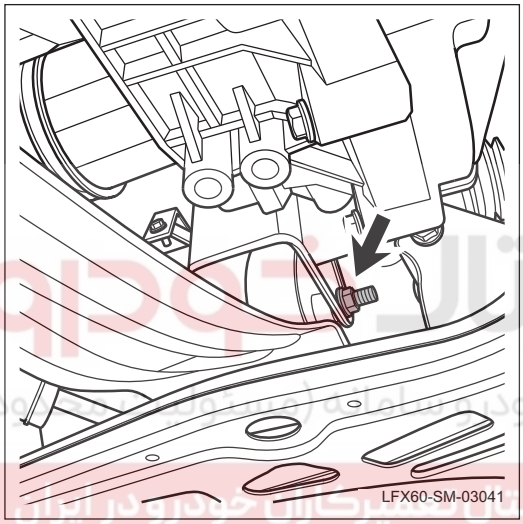
(m). Disconnect the harness plug 1 from the output shaft fluid pressure sensor.
(n). Disconnect the harness plug 2 from the output shaft speed sensor.



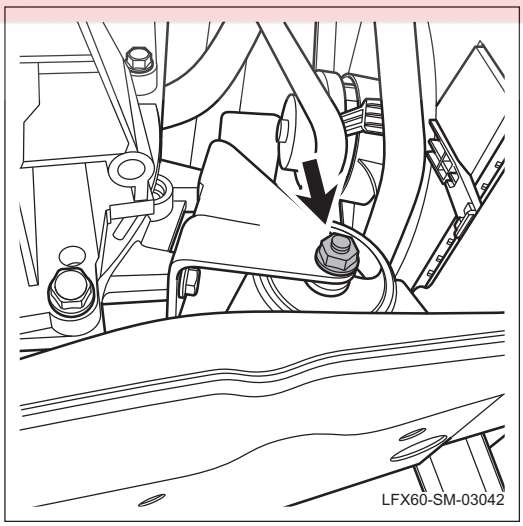
(o). Remove the oil cooler hose.

(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.

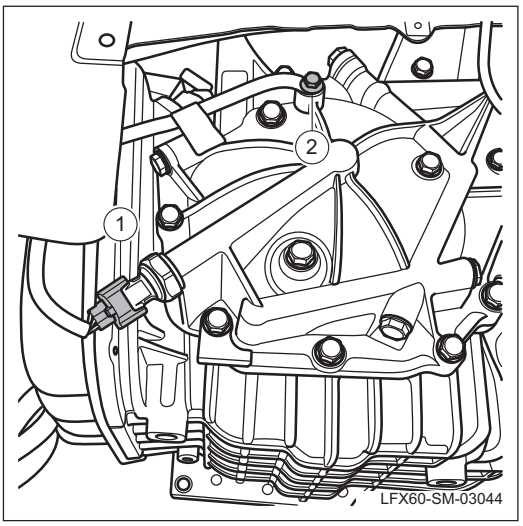


(s). Remove the front mounting connecting bracket bolt.

(t). Remove the front subframe. **Reference: Replacement of front subframe.**

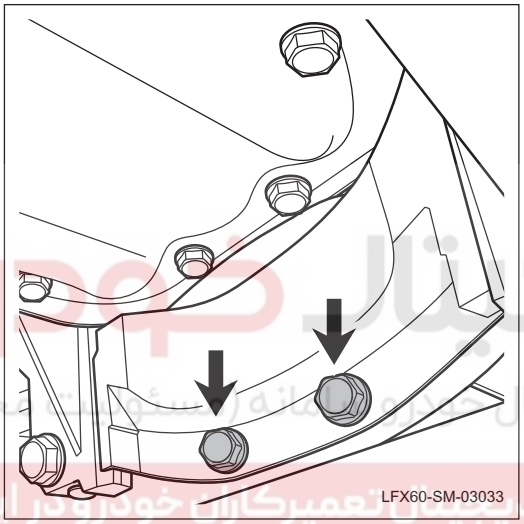
(u). Remove the drive shaft. **Reference: Replacement of drive shaft.**

(v). Discharge the transmission fluid. **Reference: Steps to replace transmission fluid.**

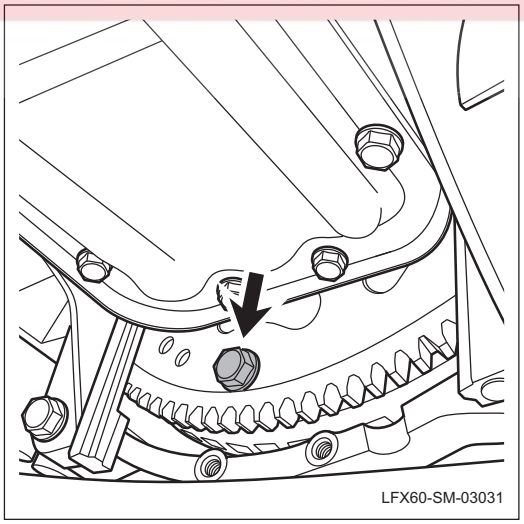


(w). Disconnect the harness plug 1 from the input shaft fluid pressure sensor.

(x). Remove the bond strap 2.



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



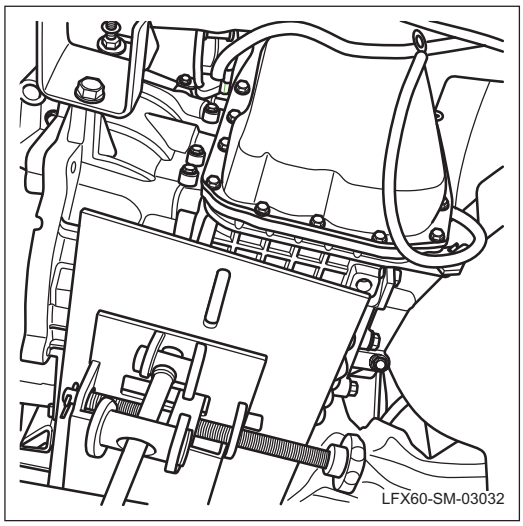
(z). Remove the connecting bolts from the first torque converter.

(aa). Turn the crankshaft by 90°, remove the second bolt and continue in the same direction.

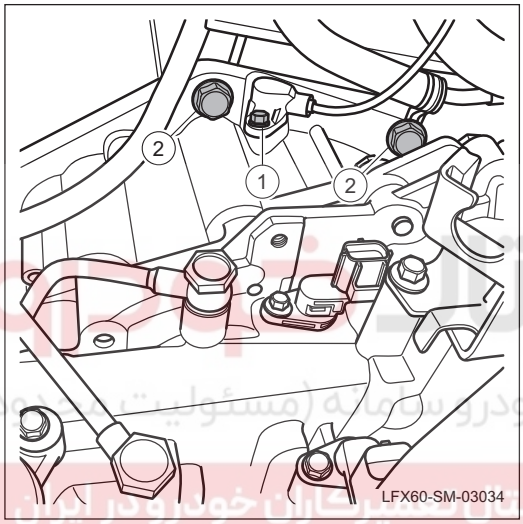
(ab). Turn the crankshaft by 90°, remove the third bolt and continue in the same direction.

(ac). Turn the crankshaft by 90°, and remove the last bolt.

Tightening torque: as a torque of 55Nm

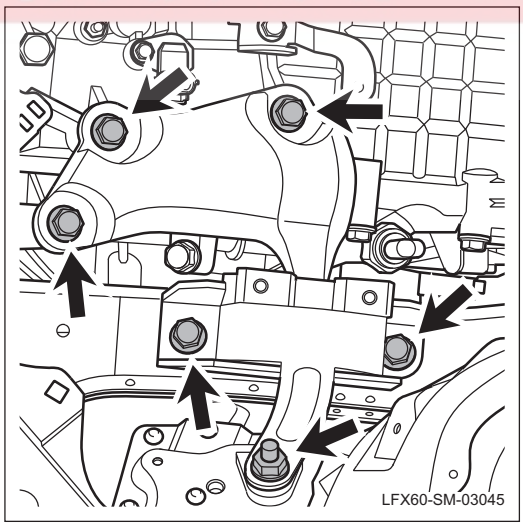


(ad). Use the jack to support the transmission.

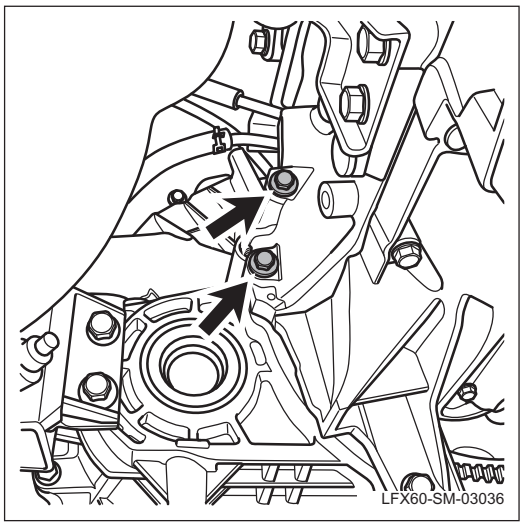


(ae). Remove the speed sensor bolt 1 and remove the speed sensor.

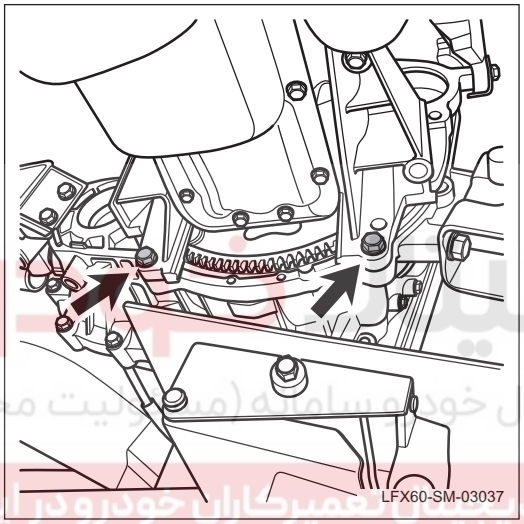
(af). Remove the connecting bolt 2 between the transmission and the upper part of the engine.



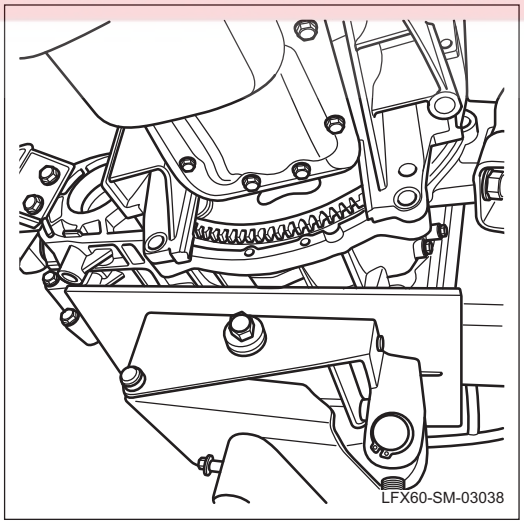
(ag). Remove the fixing bolts from the left suspension of the transmission.



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



(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.

△ **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.**