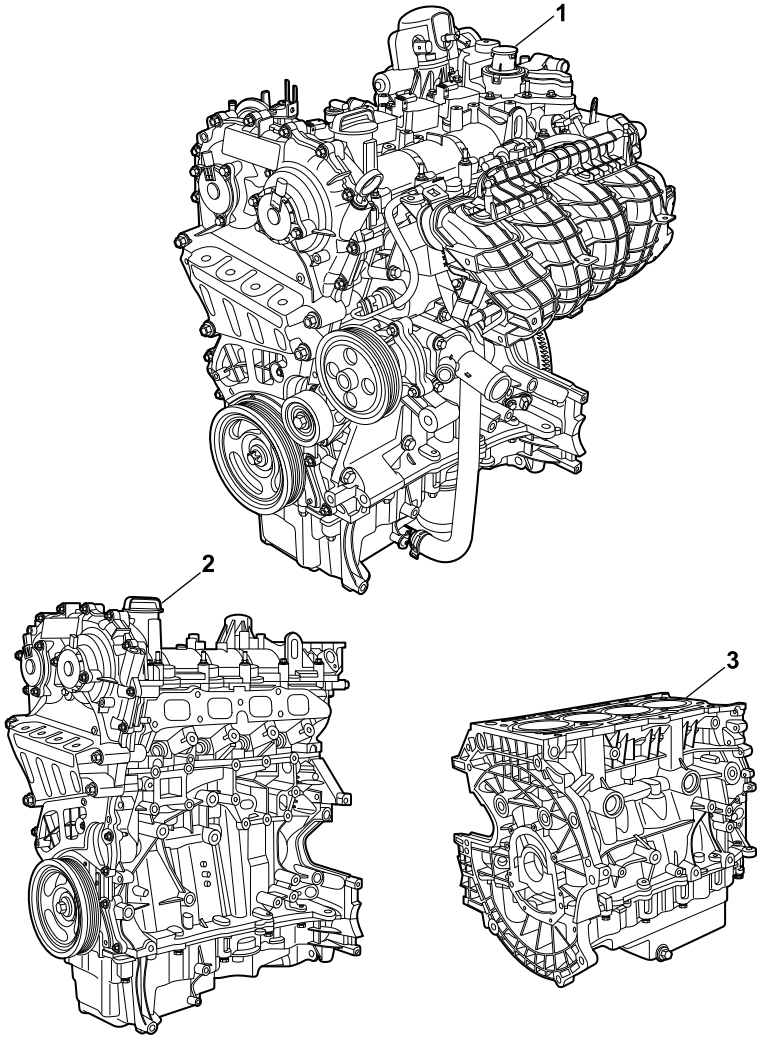
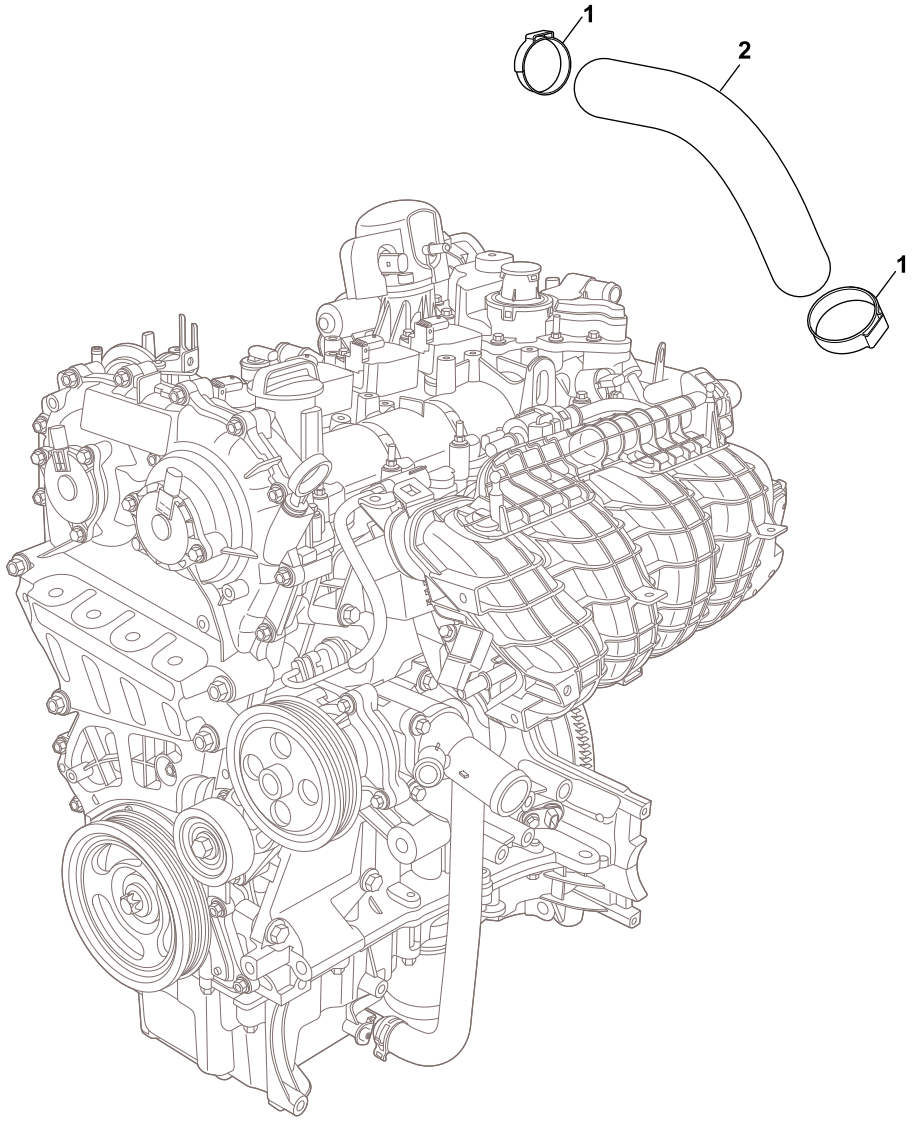
Description and Operation

System Layout



S1110246

1. ENGINE
2. Short engine assembly
3. Engine main moving parts assembly



S1110238

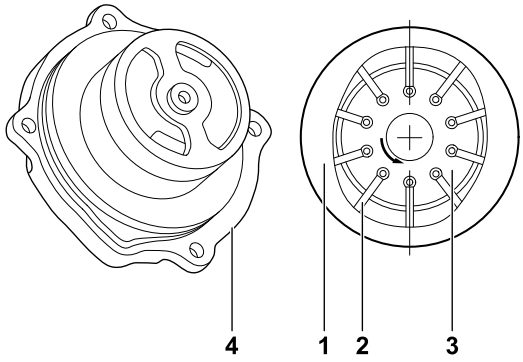
1. Pipe clamp - crankcase full load breathing tube
2. Full load breathing hose assembly for crankcase

8. Suction Filter

The internal hydraulic system is mainly used to realize the function of oil pumping, filtering, oil circuit distribution and oil pressure control. The relevant parts of each function are as follows:

1. Oil pumping: driving sprocket, driven sprocket, chain, oil pump;
2. Filtering: suction filter, press filter;
3. Oil circuit distribution: oil distribution plate;
4. Oil pressure control: valve body assembly.

Oil Pump



S1213781

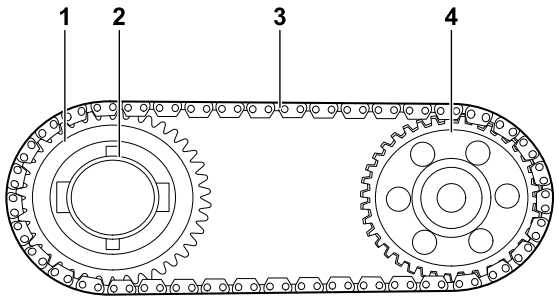
1. Stator
2. Blade
3. Rotor
4. Oil Pump Assembly

The oil pump is the power source of the transmission hydraulic system, which is a single/double mode vane pump. It mainly consists of a stator, a rotor and blades. The blades are located on the rotor. Two chambers are formed between the stator and the rotor. Both chambers can cooperate with the blades to extrude oil and establish pressure. Because the two chambers can build pressure at the same time, the same speed can provide greater pressure, but also release the pressure of one chamber by controlling, so that the pressure can be halved, and the same speed can provide less pressure.

Oil pump performance parameters are as follows:

1. Operating temperature range: -40 - 140°C;
2. Main oil circuit pressure range: 4 - 60bar;
3. Speed range: 750 - 6,359 rpm;
4. Rotation direction: clockwise (from the direction of sprocket);
5. Drive oil pump transmission ratio: 1.0526 (40/38)

Sprocket Chain



S1213779

1. Driving Sprocket
2. Sliding Bushing
3. Chains
4. Driven Sprocket

The main function of sprocket chain is to transfer power to drive oil pump, which is mainly composed of driving sprocket, sliding bushing, chain and driven sprocket. The sliding bushing and driving sprocket are rigidly connected. They are fitted together on the shaft of the oil distribution plate. They can rotate around the shaft of the oil distribution plate. The driving sprocket has two large rectangular grooves which can be connected with the claw of the hydraulic torque converter. The driven sprocket and the rotor of the oil pump are rigidly connected.

The power transmission routine is: engine ® hydraulic torque converter housing ® driving sprocket ® chain ® driven sprocket ® oil pump rotor.

Parking Mechanism

The shift shaft connects the shift cables and drives the parking pawl to be stuck in the parking gear groove, which makes the driven pulley axle unable to rotate and realizes parking through shifting to P gear. At the same time, the rocker arm drives the manual shift valve to change the oil circuit of the Brake B1 or Clutch C1 to realize the switching of D and R gears.

Operation

Connect the EPB

When the vehicle is static or the START/STOP Switch is off, the electronic parking brake can be applied at any time. When leaving the vehicle or parking, the parking brake must be applied.

- Pull the **EPB** switch (button) up until the indicator lamp on the **EPB** switch comes on.
- If the indicator lamp on the **EPB** switch and the IPK Ⓟ illuminates, the EPB is activated.
- If the indicator lamp Ⓟ in the instrument pack illuminates, the EPB fails, please contact a local Authorised Repairer for service as soon as possible.

Disable the EPB Manually

- Switch the vehicle On
- Depress the brake pedal, press the **EPB** switch or slightly depress the accelerator pedal when the engine is working.
- If the indicator lamp on the switch/IPK Ⓟ goes out, the EPB is disabled.

Aux Start

The EPB automatically judges the intention of the driver, and release the parking brake automatically. For hill start, the EPB can judge engine torque output and prevent slip.

When you fasten the seat belt, place the START/STOP Switch in "RUNNING" position, engage D or R gear and slightly depress the accelerator pedal to start the vehicle, the EPB will close automatically.

ECD

During driving, when in any emergency, such as the vehicle can not be stopped by stepping on the pedal, decelerate by pulling up and holding the **EPB** switch.

- Pull the **EPB** switch up and hold to realize emergency brake. Continuous acoustic alarm can be heard during emergency brake.
- Release the **EPB** switch or depress the accelerator pedal to cancel the brake process.
- During dynamic deceleration of the EPB, the EPB can prevent the rear wheel from being locked by the clamp force of the EPB actuator, namely anti-lock function.

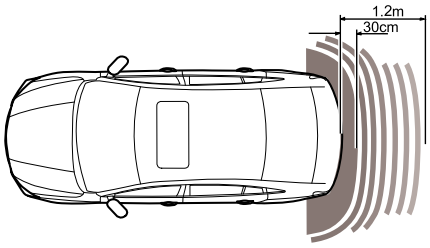
Operation

Overview

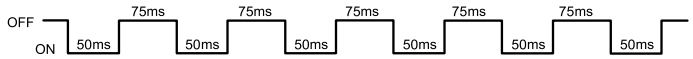
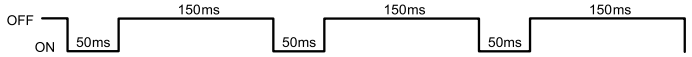
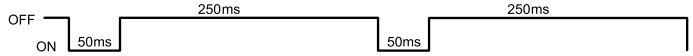
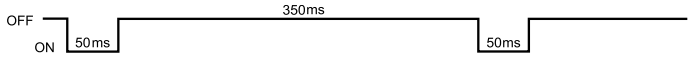
After the ultrasonic sensor receives the reverse gear signal, it outputs signals to the acoustic warning device to make it generate a single audible alarm ("beep"), which shows that the system is activated. Then, it receives the distance information from the ultrasonic sensor and determines whether there is any object in the detection range. If no object is detected within the detection range, it will not issue any audible alarm; if there are objects detected, it outputs signals to the acoustic warning device to produce a repetitive audible alarm.

From the detection range margin, about 1200mm away from the vehicle rear, the frequency of the alarm increases with the decrease of the distance between the detected object and the vehicle, when the distance to the vehicle reaches about 300mm and the audible alarm becomes consecutive alarm.

Detection Zone



The table below shows the relationship between the alarm level/obstacle distance and the acoustic alarm:

SN.	Alarm Level	Distance (mm)	Alarm Cycle (msec)
1	00 = No Obstacle	>1200	
2	01 = Zone 1	0-300	
3	02 = Zone 2	300-450	
4	03 = Zone 3	450-600	
5	04 = Zone 4	600-750	
6	05 = Zone 5	750-900	
7	06 = Zone 6	900-1050	
8	07 = Zone 7	1050-1200	

Caution: Blind spots, areas where the sensor cannot detect obstructions, may occur if obstructions are present at distances of around 200 mm from the sensors.

Excessive Brake Pedal Travel

Test Condition	Detail/Result/Action
1. Check brake disc/drum	Check if the brake disc/drum is abnormally worn: • Whether the thickness of front brake disc is less than the service limit value. • Whether the thickness of rear brake disc is less than the service limit value. • Whether the brake disc runout is greater than maximum runout. Repair/replace it when necessary. After the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step 2.
2. Check brake pads/shoes	Check if the thickness of brake pads/shoes is less than 2mm. Repair/replace it when necessary. After the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step 3.
3. Check the brake system for air existence	Check if air exists in the brake system. • Yes → Bleed the brake system. • No → Check for other possible causes.

P0522, P0523 and P0524

DTC Description

,

DTC	FTB	Failure Description
P0522	00	Engine Oil Pressure Sensor Circuit Low (Voltage/DutyRatio)
P0523	00	Engine Oil pressure Sensor Circuit High (Voltage/DutyRatio)
P0524	23	Engine Oil Pressure Too Low

Subsystem Principle

The oil pressure sensor is used to monitor the engine oil pressure and sends the electrical signal to the ECM.

Conditions for Running DTCs

P0522, P0523 :The engine is running.

P0524 :

- The time required to meet the following conditions is greater than 10 seconds
- key on
- Engine has been cranked
- Engine Speed is greater than 1000rpm
- Following DTCs not present: P0522, P0523

Conditions for Setting DTCs

P0522: The oil pressure sensor voltage is less than 0.0977V.

P0523: The oil pressure sensor signal is greater than 4.9023V.

P0524 :The deviation between engine oil pressure and ambient pressure shall not exceed 500kpa

Operations of ECU after Failure

DTCs P0522 , P0523 and P0524 are Category 5 DTCs.

Conditions for Clearing DTCs

DTCs P0522 , P0523 and P0524 are Category 5 DTCs.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Engine oil pressure sensor failure.
- Engine control module failure.

Reference Information

Reference Circuit Information

Engine Management System

Reference Connector End View Information

EN021 and EN017

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Read relevant parameters or perform the forced output with a scan tool, then determine the failure state:
   a. Connect the scan tool, and place the start/stop switch in "ON" position.
   b. Read "Engine Oil Pressure (GDI)" to check whether it is within the rational value range (refer to the Appendix for rational value range).
      - Yes → Test/replace the ECM;
      - No → Go to Step 2.
2. Check the connectivity of connectors:
   a. Check harness connector EN017 of the ECM and harness connector EN021 of the oil pressure sensor for looseness, poor contact, distortion, corrosion, contamination, deformation, etc. Clean, lubricate, repair or replace the faulty parts found in visual check.
   b. After the test/repair of relevant failures, turn off the start/stop switch and turn it on again, read DTCs again and confirm if the DTC still exists.
      - Yes → Go to Step 3;
      - No → Diagnosis is completed.
3. Test related circuits:
   a. Place the start/stop switch in "OFF" position, disconnect the negative battery cable, and disconnect harness connector EN017 of the ECM and harness connector EN021 of the oil pressure sensor.

      Test if the resistance between the following terminals of oil pressure sensor harness connector and terminals of ECM harness connector is less than 5Ω.
      - Terminal EN021-1 and Terminal EN017-23
      - Terminal EN021-2 and Terminal EN017-8
      - Terminal EN021-3 and Terminal EN017-1

      If it is not within the specified range, test the circuit for open circuit/high resistance.
   b. Test if the resistance between the following terminals of oil pressure sensor harness connector or terminals of ECM harness connector and the ground is infinite.
      - Terminal EN021-1 or Terminal EN017-23
      - Terminal EN021-2 or Terminal EN017-8
      - Terminal EN021-3 or Terminal EN017-1

P0846,P0847 and P0848

DTC Description

DTC	FTB	Failure Description
P0846	1C	Secondary Cylinder Pressure Sensor Signal Out of Value
P0846	64	Secondary Cylinder Pressure Sensor Signal Stuck
P0847	14	Secondary Cylinder Pressure Sensor Circuit Short to Ground or Open
P0848	12	Secondary Cylinder Pressure Sensor Circuit Short to Battery

Subsystem Principle

The Slave cylinder pressure sensor is installed on the transmission housing to monitor the pressure of the slave cylinder and send the pressure signal to the electronic control unit through a hard wire. When a significant deviation between the actual pressure and the expected value is detected, this fault is set.

Circuit related to this fault:

Transmission Control Unit (TCM) connector:

- terminal 27 Sensor 5V power supply
- terminal 16 Line pressure Sensor Signal
- terminal 76 Sensor grounding

[Slave cylinder pressure sensor] connector:

- terminal 3 Sensor 5V power supply
- terminal 2 Slave cylinder pressure Sensor Signal
- terminal 1 Sensor grounding

Conditions for Running DTCs

- The battery voltage is within the normal range and remains stable.
- The electronic control unit is in a wake-up state (KL15=ON).

Conditions for Setting DTCs

P0846 1C : Detected pressure sensor signal value less than -3.3 bar or greater than 65 bar.

P0846 64 : Detected no change in the signal value of the pressure sensor.

P0847 14 : The pressure sensor signal value detected is less than 0.14 volts.

P0848 12 : Detected pressure sensor signal value greater than 4.8 volts.

Operations of ECU after Failure

Adjust target pressure.

Conditions for Clearing DTCs

Normal value for pressure recovery.

Possible Causes

[Transmission Control Unit (TCM)]:

- Internal software failure.
- Internal hardware failure.

[Slave cylinder pressure传感器]：

- Signal circuit malfunction.
- Internal hardware failure.

Control circuit malfunction.

- The suction filter, pressure filter, and valve body assembly are leaking and blocked.
- Insufficient oil or impurities.

Reference Information

Repair circuit diagram:

- Automatic transmission - CVT

Diagnostic Test Steps

1. System detection:Shift to P gear, press the brake pedal, and let the engine idle from not running,Use a diagnostic tool to observe the parameters and determine if they comply with the following pattern.

   - The voltage value of Slave cylinder pressure varies between 0.5-4.5 volts. And the deviation between the actual pressure of the slave cylinder and the target pressure of the slave cylinder remains within 2.0 bar.

     → Yes, confirm the next item;

     → No, execute "Detect Pressure Sensor Signal Circuit Fault" and "Detect Hydraulic Pipeline System Fault".

   - The oil is sufficient and free of impurities.

     → Yes, confirm the next item;

     → No, replace the oil.

   - The software version of the electronic control unit is not the latest.

     → Yes, execute the electronic control unit refresh;

     → No, use a diagnostic tool to clear this fault code.

2. Detection of pressure sensor signal circuit malfunction:Confirm the following phenomena.

   - The wiring harness connector of the Transmission Control Unit (TCM) has faults such as damaged terminals, loose pins, looseness, and water immersion.

     → Yes, repair the connector failure;

     → Yes, confirm the next item.

B1084

DTC Description

DTC	FTB	Failure Description
B1084	11	Power Mode Run and Crank Indicator Circuit Short to Ground
	13	Power Mode Run and Crank Indicator Circuit Open Circuit

Subsystem Principle

The ACC indicator on the Start/Stop button is controlled by the BCM which commands the ACC indicator (Orange) to illuminate after receiving the signal that the Start/Stop button is pressed, so that the vehicle is in ACC state. Long press the Start/Stop button for 3s (with the brake pedal released), the BCM receives the signal and commands the Start indicator (Green) to illuminate, so that the vehicle is in ON state.

Conditions for Running DTCs

B1084 11

- Power mode "Crank/Run" indicator lamp control circuit is on.
- The duty ratio is 100%.

B1084 13

- Power mode "Crank/Run" indicator lamp control circuit is off.
- The duty ratio is 100%.

Conditions for Setting DTCs

B1084 11: HSD detects "Crank/Run" indicator lamp circuit short to ground failure for 20 consecutive times.

B1084 13: HSD detects "Crank/Run" indicator lamp circuit open circuit for 20 consecutive times.

Operations of ECU after Failure

B1084 11: Close the output signal until the next ignition cycle.

B1084 13: None.

Conditions for Clearing DTCs

- HSD working normally is detected for 36 consecutive times.
- History DTCs will be cleared after 40 failure-free ignition cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Body control module failure.
- Start/Stop button failure.

Reference Information

Reference Circuit Information

Starting & Charging (2)

Reference Connector End View Information

FA002, FA042

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Check the connectivity of connectors:
   a. Check harness connector FA002 of the BCM or harness connector FA042 of the Start/Stop button for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.

      Clean, lubricate, repair or replace the faulty parts found in visual check.

   b. After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.

      • Yes → Go to Step 2;

      • No → Diagnosis is completed.

2. Test related circuits:
   a. Place the Start/Stop switch in "OFF" position, disconnect the negative battery cable, and disconnect harness connector FA002 of the BCM and harness connector FA042 of the Start/Stop button.

      Test if the resistance between harness connector terminal FA042-4 of the Start/Stop button and the ground is less than 5Ω.

      If it is not within the specified range, test/repair the circuit for open circuit or high resistance.

   b. Test if the resistance between harness connector terminal FA002-35 of the BCM and harness connector terminal FA042-5 of the Start/Stop button is less than 5Ω.

      If it is not within the specified range, test/repair the circuit for open circuit or high resistance.

   c. Test if the resistance between harness connector terminal FA002-35 of the BCM or harness connector terminal FA042-5 of the Start/Stop button and the ground is infinite.

      If it is not within the specified range, test/repair the circuit for short to ground.

   d. Test if the resistance between harness connector terminal FA002-35 of the BCM or harness connector

P1910

DTC Description

DTC	FTB	Failure Description
P1910	IC	Remote PRND Display Module (RPD) Power Supply Abnormal

Subsystem Principle

The PRND gear display module communicates with the BCM via the LIN. Where, the BCM is the master node and LIN is the slave node. The BCM transmits gear information to PRND, and PRND displays the gear in accordance with display policy. For the LIN slave node, the DTC is recorded by the master node. When the BCM makes LIN communication with PRND, PRND slave node shall check the signal sent by the master node. The check mode is that PRND calculates the checksum of received signals, then compare it with checksum sent by the BCM. If they are not consistent, the check goes wrong. PRND sends signal to master node to check the error signal. The BCM records the DTC of PRND though this signal.

Conditions for Running DTCs

- The vehicle is waken-up.
- The vehicle voltage is normal.
- DTC U1008 is not set.
- The power mode is not in CRANK position.

Conditions for Setting DTCs

The supply voltage is detected between 7-8.5V or 16.5-18.5V for 1,000ms.

Operations of ECU after Failure

Turn off the PRND display.

Conditions for Clearing DTCs

- The supply voltage is detected between 9-16V for 1,000ms.
- History DTCs will be cleared after 40 failure-free ignition cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Body control module failure.
- Gear display failure.

Reference Information

Reference Circuit Information

Automatic Transmission - CVT

Reference Connector End View Information

FA178, BY009, FA014

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Read relevant parameters or perform the forced output with a scan tool, then determine the failure state:

   Connect the scan tool, and place the Start/Stop switch in "ON" position.

   Read the "Gear Display Module Timeout Occurs When Receiving LIN Information" to check whether it is within the rational value range (refer to the Appendix for rational value range).

   - Yes → Test/replace the BCM;
   - No → Go to Step 2.

2. Check the connectivity of connectors:

   a. Check harness connector FA178 of the passenger compartment fuse box, harness connector BY009 of the BCM, harness connector FA014 of the gear display or the battery terminal for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.

      Clean, repair or replace the faulty parts found in visual check.

   b. After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.

      - Yes → Go to Step 3;
      - No → Diagnosis is completed.

3. Test related circuits:

   a. Place the Start/Stop switch in “OFF” position, disconnect the negative battery cable, and disconnect harness connector FA178 of the passenger compartment fuse box, harness connector BY009 of the BCM and harness connector FA014 of the gear display.

      Test if the voltage between harness connector terminal FA014-1 of the gear display and the ground is the battery voltage.

      If it is not within the specified range, test the circuit for open circuit/high resistance.

   b. Test if the resistance between harness connector terminal BY009-1 of the BCM and harness connector terminal FA014-2 of the gear display is less than 5Ω.

      If it exceeds the specified range, test the circuit for open circuit/high resistance.

   c. Test if the resistance between harness connector terminal BY009-1 of the BCM or harness connector

B0053, B0054 and B0055

DTC Description

DTC	FTB	Failure Description
B0053	12	Second Row Left Seat Belt Buckle Switch Short to Battery
B0054	12	Second Row Middle Seat Belt Buckle Switch Short to Battery
B0055	12	Second Row Right Seat Belt Buckle Switch Short to Battery

Subsystem Principle

When the vehicle starts, the driver and passengers will be notified to fasten their seat belts through beeps and indicator light. When a collision occurs, the supplemental restraint system sensing and diagnostic module (SDM) sends a control signal to the airbags and the seat belt pre-tensioners. After receiving the control signal, the airbags deploy, and the seat belt pre-tensioners tighten to ensure that the driver and passengers are securely kept in their seats and to protect the safety of the drivers and passengers.

Conditions for Running DTCs

The Start/Stop switch is in "ON" position.

Conditions for Setting DTCs

B0053 12: The 2nd row left seat belt buckle is short to battery.

B0054 12: The 2nd row middle seat belt buckle is short to battery.

B0055 12: The 2nd row right seat belt buckle is short to battery.

Operations of ECU after Failure

The module still has the deployment function, and the airbag warning lamp illuminates.

Conditions for Clearing DTCs

- The signal returns to normal again.
- History DTCs will be cleared and the airbag warning lamp will go out after 40 failure-free ignition cycles.

Possible Causes

Supplemental restraint system sensing and diagnostic module failure.

Reference Information

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Connect the diagnostic tool and place the Start/Stop switch in the ON position.
2. Confirm that no other DTC except for B0053, B0054 and B0055 have been read.
3. After clearing the DTC using the diagnostic tool, confirm that the following DTC have not been read: B0053, B0054 and B0055.
4. If the DTC is read again, check/replace the SDM.

Service Guide

Please refer to the relevant sections of service manual (Remove & Refit) and self learning programming manual.

U1264

DTC Description

DTC	FTB	Failure Description
U1264	87	Lost Communication with Front View Camera Module (FVCM)

Subsystem Principle

The supplemental restraint system sensing and diagnostic module (SDM) communicates with the front view camera module (FVCM) via the CAN bus.

Conditions for Running DTCs

- The SDM wakes up.
- The system voltage is normal.
- DTC U0073 is not set.
- The start switch is in "ON" position.

Conditions for Setting DTCs

The DTC will be set if the specified data frame sent from the FVCM cannot be received within 2s.

Operations of ECU after Failure

The module still has the deployment function.

Conditions for Clearing DTCs

- The corresponding data frame is received for 100 consecutive times.
- History DTCs will be cleared after 40 failure-free ignition cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Supplemental restraint system sensing and diagnostic module failure.
- Front view camera module failure.

Reference Information

Reference Circuit Information

CAN BUS System System-High Controller Area Network

Reference Connector End View Information

FA111, FA129

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Check the connectivity of connectors:
   a. Check harness connector FA111 of the SDM and harness connector FA129 of the FVCM for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.

      Clean, repair or replace the faulty parts found in visual check.
   b. After the test/repair of relevant failures, turn off the start switch and turn it on again, read DTCs again and confirm if the DTC still exists.
      - Yes → Go to Step 2;
      - No → Diagnosis is completed.
2. Test related circuits:
   a. Refer to "Integrity Inspection of Chassis HS CAN Network". If other module tests are normal, continue the following inspection procedures.
   b. Place the start switch in "OFF" position, disconnect the negative battery cable, and disconnect harness connector FA111 of the SDM and harness connector FA129 of the FVCM.

Warning: It is imperative that before any work is undertaken on the SRS system the appropriate information is read thoroughly.

   c. Test if the resistance between terminals of SDM harness connector and terminals of FVCM harness connector is less than 5Ω.
      - Terminal FA111-3 and Terminal FA129-11
      - Terminal FA111-4 and Terminal FA129-9

      If it is not within the specified range, test/repair the circuit for open circuit or high resistance.
   d. Test if the resistance between terminals of SDM harness connector or terminals of FVCM harness connector and the ground is infinite.
      - Terminal FA111-3 or Terminal FA129-11
      - Terminal FA111-4 or Terminal FA129-9

      If it is not within the specified range, test/repair the circuit for short to ground.
   e. Connect the negative battery cable, and test if the voltage between terminals of SDM harness connector or terminals of FVCM harness connector and the ground is 2-3V.
      - Terminal FA111-3 or Terminal FA129-11
      - Terminal FA111-4 or Terminal FA129-9

      If it is not within the specified range, test/repair the circuit for short to battery.
   f. After the test/repair of relevant failures, turn off the start switch and turn it on again, read DTCs again and confirm if the DTC still exists.

C0061, C0062 and C0063

DTC Description

DTC	FTB	Failure Description
C0061	01	Lateral Acceleration Sensor Electrical Error
C0061	28	Lateral Acceleration Sensor Offset Error
C0061	54	Lateral Acceleration Sensor Not Calibrated
C0061	64	Lateral Acceleration Sensor Signal Implausible
C0061	2F	Lateral Acceleration Sensor Signal Erratic
C0062	01	Longitudinal Acceleration Sensor Electrical Error
C0062	28	Longitudinal Acceleration Sensor Offset Error
C0062	54	Longitudinal Acceleration Sensor Not Calibrated
C0062	64	Longitudinal Acceleration Sensor Signal Implausible
C0062	76	Longitudinal Acceleration Sensor Wrong Mounting Position
C0063	01	Yaw Rate Sensor Electrical Error
C0063	28	Yaw Rate Sensor Offset Error
C0063	64	Yaw Rate Sensor Signal Implausible
C0063	2F	Yaw Rate Sensor Signal Erratic

Subsystem Principle

The lateral acceleration sensor, longitudinal acceleration sensor and yaw rate sensor are integrated in the SCS. It measures the vehicle rotary motion around its vertical axis and the slippage of vehicle and sends corresponding data to SCS ECU which compares the signals received from the lateral acceleration sensor, longitudinal acceleration sensor, yaw rate sensor and steering angle sensor to judge the forthcoming situation and then takes corresponding control.

Conditions for Running DTCs

C0061, C0062 01: The Start/Stop switch is in “ON” position.

C0061 28: Vehicle stops running, sensor signal is valid.

C0061, C0062 54: Reset and power on and place the Start/Stop switch in "ON" position.

C0061 C0063 64, 2F: The forward speed is greater than 10.8km/h, and the sensor is normal, without slippage.

C0062 28: No stored phase difference checksum failure is detected or no initialisation is performed at intervals of 10s.

C0062 64: Undervoltage is detected by the internal sensor.

C0062 76: The vehicle is between 14km/h and 70km/h, the sensor signal is normal, and the diagnosis mode is exited.

C0063 01: Place the Start/Stop switch in “ON” position once per cycle.

C0063 28: Every 10ms.

Conditions for Setting DTCs

C0061 01: If the self-check passes, the CTRL memory inside the sensor will be set as 0 digit, and the sensor does not work under normal mode.

C0061 28: When the vehicle is stationary, the uncalibrated but filtered lateral acceleration is detected to be greater than $7m/s^2$.

C0061 54: Lateral acceleration sensor is not calibrated.

C0061 64, 2F: The difference between the reference signal and the sensor signal is over the threshold value.

C0062 01: Undervoltage is detected by the internal sensor.

C0062 28: The absolute value of calculated longitudinal acceleration signal offset is over $2.5m/s^2$.

C0062 54: Longitudinal acceleration sensor is not calibrated.

C0062 64: Undervoltage is detected by the internal sensor.

C0062 76:

- Within the specific minimum failure duration, the calculated acceleration of the vehicle is greater than 0.35g or less than -0.35g while the measured acceleration is about 0.0g.
- Within the specific minimum failure duration, the measured and calculated acceleration values show reverse symbol, and both of the two values are higher than 0.2g.

C0063 01: Odd-even check is performed per 16 transmitted bytes. In each control cycle, when more than one odd-even check error is monitored, a incorrect communication mark in the system will be set, failure record will be caused and the count will exceed the threshold value.

C0063 28: The absolute value of calculated yaw rate sensor offset value is over 6.5/s.

C0063 64, 2F: The difference between the reference signal and the measured sensor signal and gradient of measured sensor signal is over the threshold value.

Operations of ECU after Failure

C0061:

- EDC, ETC, ESC and HSA functions are invalid.
- ESC malfunction indicator lamp is on.

C0062:

C0039, C003A, C0515, C0514, C0512, C003B, C0516, C0517, C003A, and C051B

DTC Description

DTC	FTB	Failure Description
C0039	14	Right Rear Wheel Speed Sensor Return Line Has Parasitic Resistance to Ground
C003A	07	Right Rear Wheel Speed Sensor Mechanical Error
	29	Right Rear Wheel Speed Sensor Signal Invalid
	49	Right Rear Wheel Speed Sensor Hardware Failures
	2F	Right Rear Wheel Speed Sensor Signal Erratic
	64	Right Rear Wheel Speed Sensor Signal Implausible
C0515	12	RHR Wheel Speed Sensor Circuit Short to Ubatt
C0514	11	RHR Wheel Speed Sensor Circuit Short to Ground
C0512	15	Right Rear Wheel Speed Sensor Signal Line Has Parasitic Resistance to Supply
C003B	14	Right Rear Wheel Speed Sensor Signal Line Has Parasitic Resistance to Ground
C0516	12	Right Rear Wheel Speed Sensor Return Line Short to Battery
C0517	15	Right Rear Wheel Speed Sensor Return Line Has Parasitic Resistance to Supply
C003A	13	RHR Wheel Speed Sensor Circuit Open
C051B	1D	Rear Rear Wheel Speed Sensor Supply Circuit Current Out of Range

Subsystem Principle

The wheel speed is detected by the active wheel speed sensor and the encoder ring. The encoder ring is composed of permanent magnets. Each wheel speed sensor receives a 12V reference voltage from the electronic brake control module, and transmits the AC square-wave signal to the electronic brake control module. When the wheels are rotating, the electronic brake control module calculates the wheel speed based on the frequency of the square-wave signal.

Conditions for Running DTCs

C0039, C003A 07: KL.30 is not lower than the second low voltage threshold value.

C003A 29: The vehicle is started after keeping the Start/Stop switch in "ON" position for 1.8s while not in diagnosis mode.

C003A 49: The Start/Stop switch is in "ON" position.

C003A 2F: ABS is activated.

C003A 64: The vehicle is started after keeping the Start/Stop switch in "ON" position for 1.8s.

C0515, C0514, C0512, C003B, C0516, C0517, C003A, C051B: Set the start switch to the ON position.

Conditions for Setting DTCs

C0039: Self check result: The sensor circuit confirmed the presence of parasitic resistance to ground after 140 milliseconds.

C003A 07: It is recognized that an unfiltered wheel acceleration exceeds 20g; wheel acceleration signal has changed in the last cycle; disharmonious fluctuation is monitored in wheel acceleration signal; unfiltered wheel acceleration derivative of every cycle is over 40g; the above failure conditions occur for 40 times.

C003A 29:

- If the fastest wheel speed VMAX exceeds 10km/h, and the slowest wheel speed VMIN is less than 2km/h, then, after 180s, the failures of all the wheel speed sensors with a speed less than 2km/h will be detected.
- If the speed detected by all the road test sensors is less than 6km/h under the following conditions, then report the failures: the non-drive wheel speed reaches 14km/h; the fastest wheel speed VMAX reaches 14km/h, but no slip is detected.

C003A 49: The monitor reads PCU status information of each wheel speed sensor, and the information in the failure status register is used to detect internal PCU hardware errors.

C003A 2F: The constant pressure keeps dropping or the pressure does not reach the specified minimum value during the pressure holding stage.

C003A 64:

- The displayed deviation between the fastest and the second fastest wheel speed ratios is greater than the actual threshold value, which is less than 150%.
- The displayed deviation between the slowest and the second slowest wheel speed ratio is less than the actual threshold value.

C0515: After 140 milliseconds, it was confirmed that the sensor power line was short circuited to the battery.

C0514: After 140 milliseconds, it was confirmed that the sensor power line was short circuited to ground.

C0512:140 milliseconds after self check result, sensor signal line has a positive correlation with power supply Generating resistance.

EPS

Real-time Display Parameter List

Unless otherwise specified, the specific condition for the following parameters is defaulted to: the vehicle is stationary and powered on.

Parameter Name	Definition	Parameter Value Range	Specific Condition Value	Unit
Driving Torque	The parameter displays the driving torque.	-8 ~ 8	0.02	Nm
System Mode	This parameter indicates the system mode.	- Normal Mode - Reduction Mode - Failure Mode - Power Off Mode		
Motor Drive Current	The parameter indicates the motor drive current.	-128 - 128	-0.13	A
Battery Voltage	This parameter indicates the battery voltage.	0 - 21.5	14.30	V
Engine Running	This parameter indicates the engine is running.	- Incorrect - Correct		
Torque Sensor Signal 1 Cycle	This parameter indicates the torque sensor signal 1 cycle	0 ~ 750	470	μs
Torque Sensor Signal 2 Cycle	This parameter indicates the torque sensor signal 2 cycle	0 ~ 750	488	μs
Torque Sensor Signal 1 Duty Ratio	This parameter indicates the torque sensor signal 1 duty ratio	0 ~ 100	50	%
Torque Sensor Signal 2 Duty Ratio	This parameter indicates the torque sensor signal 2 duty ratio	0 ~ 100	50	%
Angle Sensor Signal 1 Cycle	This parameter indicates the angle sensor signal 1 cycle	0 ~ 1,500	940	μs
Angle Sensor Signal 2 Cycle	This parameter indicates the angle sensor signal 2 cycle	0 ~ 6,553	5019	μs
Angle Sensor Signal 1 Duty Ratio	This parameter indicates the angle sensor signal 1 duty ratio	0 ~ 100	76	%
Angle Sensor Signal 2 Duty Ratio	This parameter indicates the angle sensor signal 2 duty ratio	0 ~ 100	51	%
ECU Temperature	This parameter indicates the ECU temperature	-256 ~ 256	27	℃
Steering Gear Left End Protection Learning Value	This parameter displays the learning value of steering gear left end protection.	-2,048 ~ 2,048	-490	°
Steering Gear Right End Protection Learning Value	This parameter displays the learning value of steering gear right end protection.	-2,048 ~ 2,048	484	°