
738DHA TRANSMISSION

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5.1 TRANSMISSION CONTROL SYSTEM

1 Warnings and Precautions

1.1 Warnings

■ In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

- (1) Vehicles equipped with 738DHA transmission must be towed with front wheels raised off the ground!
- (2) The required oil must be used, use of other oil may cause transmission damage, and our company rejects the warranty claim.

1.2 Precautions

■ In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

- (1) Bolts should be installed carefully so as to avoid falling into the transmission.
- (2) When assembling HCU, pay attention to adjust the position of transmission internal wire harness, so as not to knock and damage to the transmission internal wire harness.
- (3) After adjustment and repair or replacement of parts, please make sure to clear DTCs with diagnostic tester to avoid misdiagnosis next time. Because TCU will always memory the diagnostic trouble codes even if the battery is disconnected.
- (4) After replacing the dual clutch transmission or TCU, be sure to use a diagnostic tester to read the shifting and valve body characteristics data of the dual clutch transmission. As the data stored in the original TCU only matches the original dual clutch transmission, and it does not match the newly replaced dual clutch transmission.
- (5) TCU can store a maximum of 20 DTCs. If the storage space for DTCs is used up, the new DTCs will substitute the historical faults with the lowest priorities.
- (6) Clutch/transmission overheat failure (P2787/P1849) is overheat protection measures of transmission/clutch hardware. Usually, after overheat prompt appears, simply stop the vehicle for a rest, then it can work normally. Try to avoid repeated starting with accelerator pedal depressed firmly, which is easy to make oil temperature rise too fast.

2 General Description

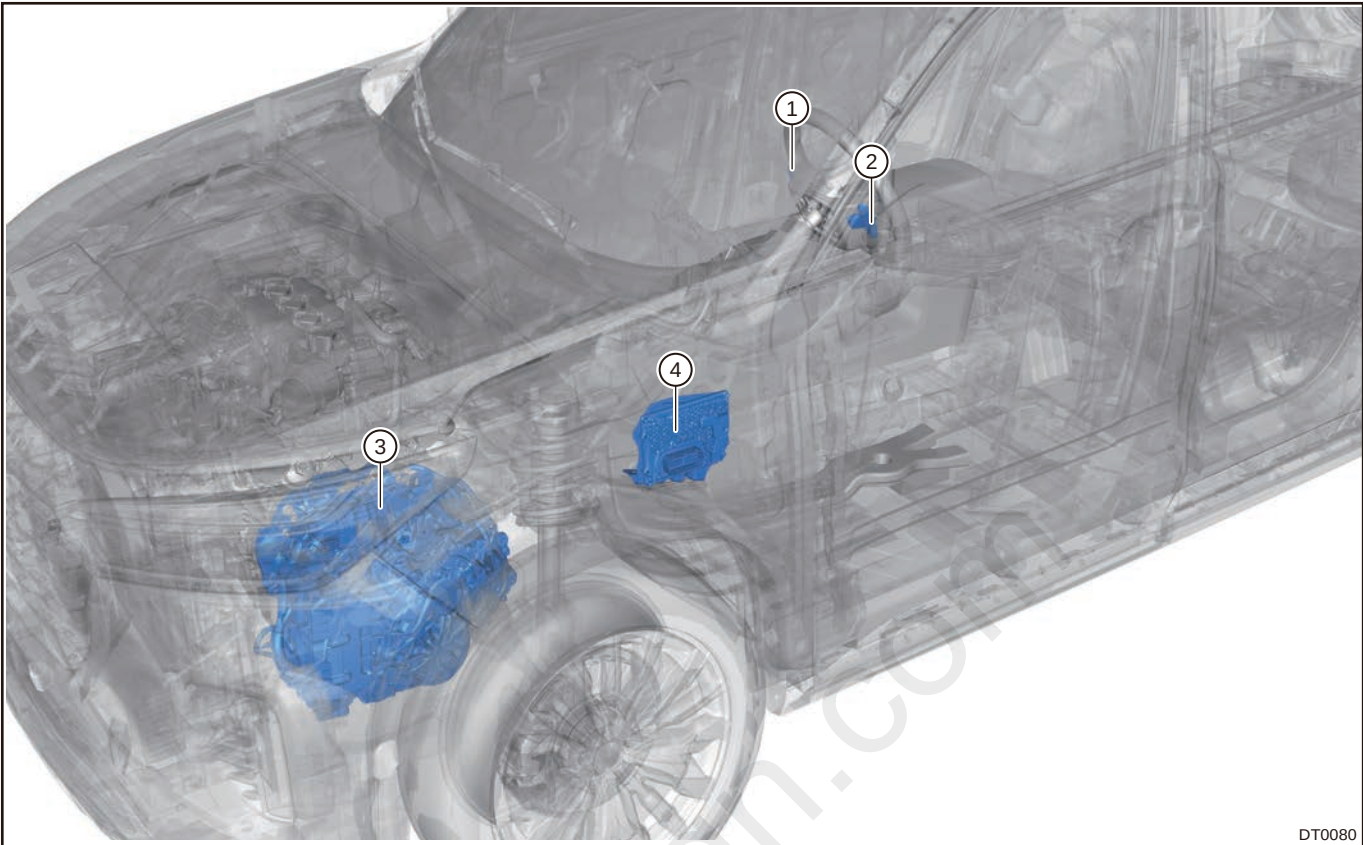
2.1 System Description

DCT (Dual Clutch Transmission) has two clutches, one is related to even gears and reverse gear, and the other is related to odd gears. It is a combination of manual transmission and automatic transmission. It integrates the advantages of manual transmission and automatic transmission.

Advantages:

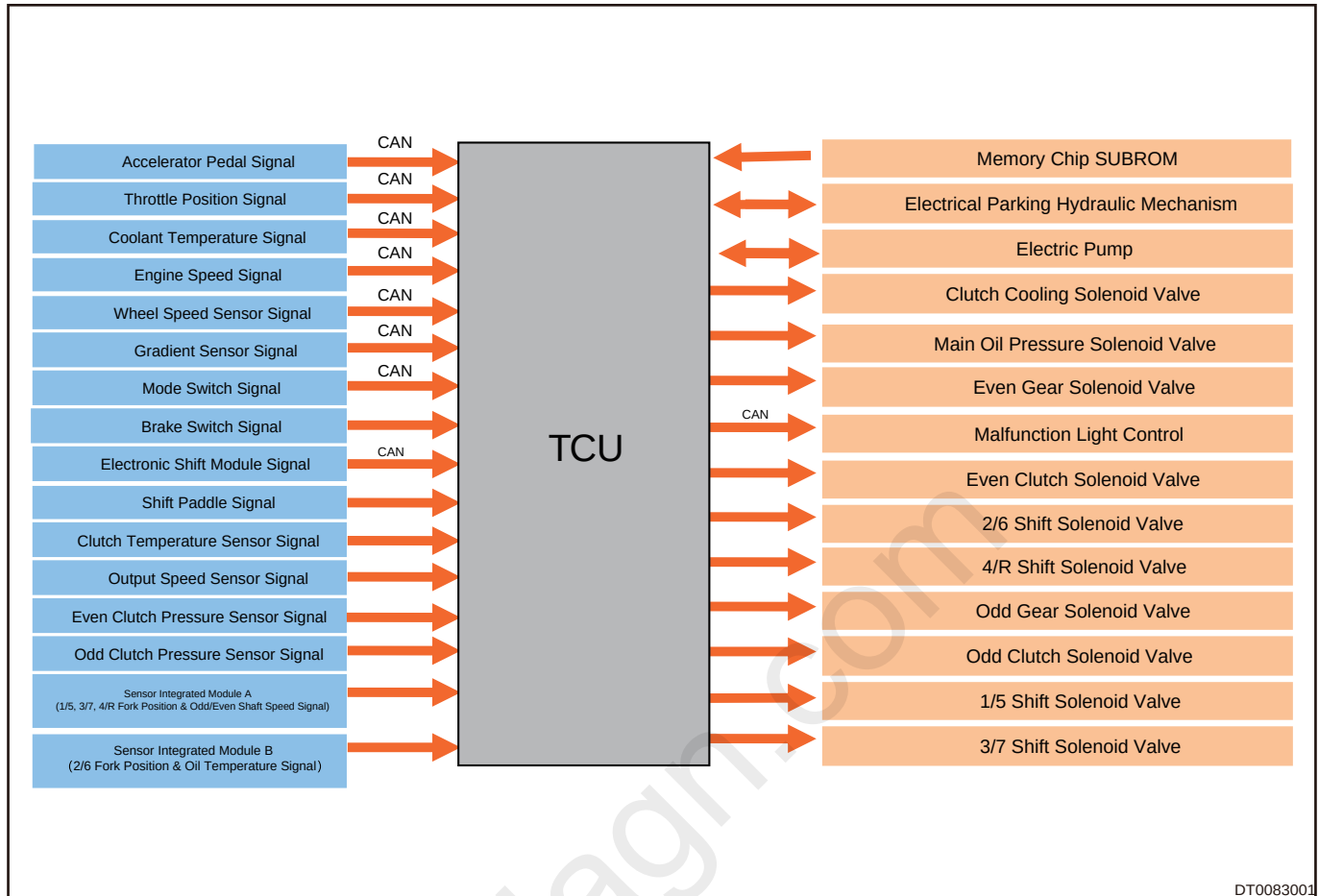
- The maximum input torque is 380 Nm.
- Net weight: 81 kg (excluding weight of dual mass flywheel).
- Wet dual clutch.
- It provides 7+R gears, and speed ratio range is greater than 6.89.
- Compact layout, improved efficiency, optimized shift sticking.
- Quick response, smooth shifting.
- Efficiency is improved.
- Support start and stop function and extended coasting function (additional hardware support is not required).
- Reverse shaft is canceled, making a more compact structure.
- A set of clutches are connected to gear 1/R respectively.
- Standard front column rear ball bearing arrangement, improving efficiency and contributing to platform collinearity.
- Common control for flow valve/pressure valve.
- Protect hydraulic parking, and vehicle can easily achieve gear control.

2.2 System Components Diagram



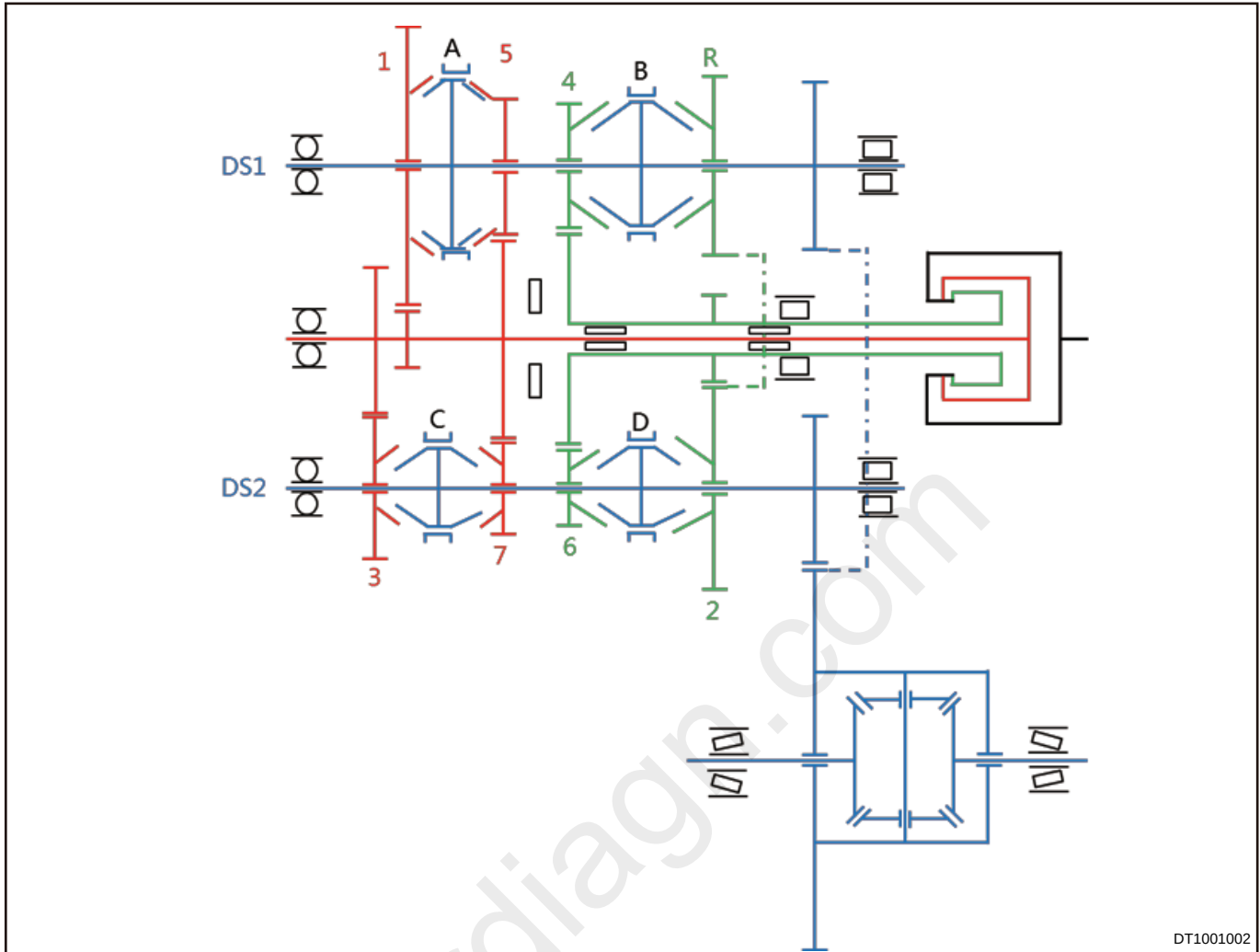
1	Right Shift Paddle	3	Transmission Assembly
2	Left Shift Paddle	4	Transmission Control Module

2.3 System Schematic Diagram



- According to the driver's driving command and each signal data sent by each sensor on transmission, 738DHA transmission control module (TCU) performs calculation to control engagement or separation of transmission and clutch, and switching of gears while combining signals received from other modules on vehicle via CAN line.
 - The upshift/downshift signal of shift paddle is transmitted through multi-function steering wheel connector to central gateway module via LIN network, and then the central gateway module transmits the signal to TCU module via CAN network.
 - Sensor integration module A collects 1\5, 3\7, 4\R fork position sensor signals, even shaft speed signals and odd shaft speed signals.
 - Sensor integration module B collects 2\6 fork position sensor signals and transmission oil temperature signal.
 - The application of memory chip SUBROM in transmission makes up for the difference of transmission characteristics caused by the difference of components and assembly, and provides guarantee for the normal and safe operation of hydraulic system. At the same time, drive efficiency of transmission and driving comfort are improved. In addition to store the hydraulic characteristic data of solenoid valve, SUBROM can also store some important calibration parameters of transmission, so as to optimize the transmission performance, and further improve product quality and market competitiveness.

Internal Principle



The dual clutch transmission uses two clutches (odd/even) that are controlled by electronic system and hydraulic system. For 738DHA, one clutch controls odd gears (1st, 3rd, 5th, and 7th), and the other clutch controls even gears (2nd, 4th, 6th, and reverse).

- Features: During the whole shifting operation, two sets of clutches operate in turn to ensure that at least one set of gear is outputting power, so as to avoid power interruption condition.

System Layout

- The 1st gear and R gear are controlled by two different clutches to avoid the risk of sticking caused by shifting operation in cold start.
- Reverse shaft is canceled to reduce weight and length of assembly.
- The whole platform adopts deep groove ball + short cylindrical bearing to reduce the towing torque.
- Basic speed ratio range of all platforms is more than 7.

2.4 System Function Description

Gear Position Introduction

During operation, automatic mode (P, R, N, D) and manual mode M (+, -) can be selected by driver. The corresponding selected gear information will be displayed in display area of instrument cluster.

- Automatic mode: When transmission is in D position, manual upshift/downshift operation is not required, and automatic upshift/downshift operation will be achieved by vehicle according to vehicle speed.
- Manual mode: When transmission is in D position, push it to right/left to enter manual mode, and push it forward to raise one gear, and push it backward to lower one gear.

■ Driving Mode

When engine starts, system is in NORMAL mode by default. Driving mode switches once every time the driving mode switch is pressed. You can select NORMAL/SPORT/ECO mode based on the different road conditions.

- NORMAL mode is the standard mode, and ECO mode is the economic mode, which can improve the fuel economy of vehicle.
- SPORT mode is the sport mode, which can improve the maneuverability, controllability and power performance of vehicle. You can select it according to different road conditions.

⚠ Caution

- When driving mode is switched, instrument cluster will switch the corresponding theme color.
- Adaptive Cruise Control System (ACC) makes acceleration become gentle in ECO mode, and Adaptive Cruise Control System (ACC) makes acceleration become quick in SPORT mode.

■ Fail-safe Mode

When transmission system fails, fail-safe mode is activated automatically, and the yellow indicator on instrument cluster remains on. The transmission will not operate properly and vehicle speed will gradually decrease and vehicle drives at low speed.

■ Automatically Shifting to P

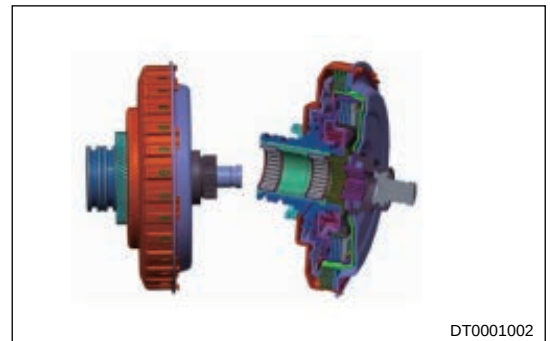
When vehicle speed changes from more than 15km/h to 0 (stop), if transmission is in R or D position and driver side door is opened and brake pedal is not depressed, system will shift to P position automatically. If driver side door cannot be closed due to damage, driver can shift the shift lever to R or D position after system shifts to P position automatically, and vehicle can be driven normally.

2.5 System Components Description

■ Technical Characteristics

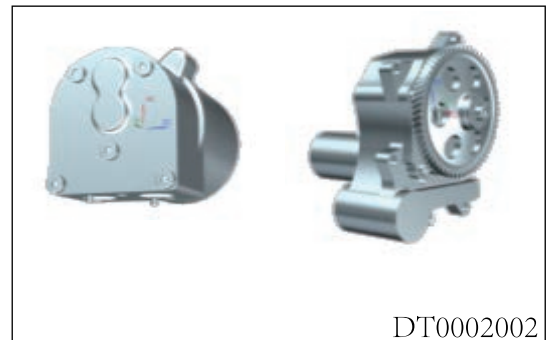
New generation of wet dual clutch.

- It is considered to adopt BW-CCF series dual clutch;
- Non-high pressure system is more reliable;
- Compact structure, contributing to platform collinearity;
- Special mold costs are not required.



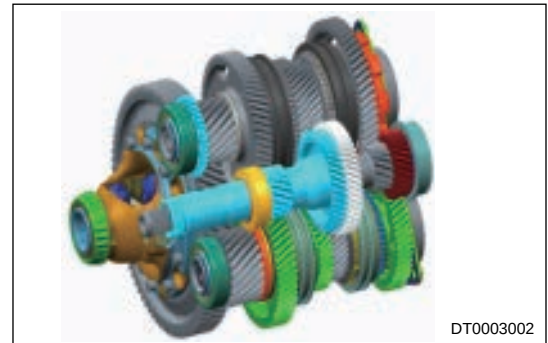
Mixing pump technology. Combination use of mechanical pump and electronic pump can reduce the displacement of mechanical pump and improve the efficiency of system.

- Amount of transmission oil is reduced;
- Start and stop during driving is supported;
- Efficiency is improved.



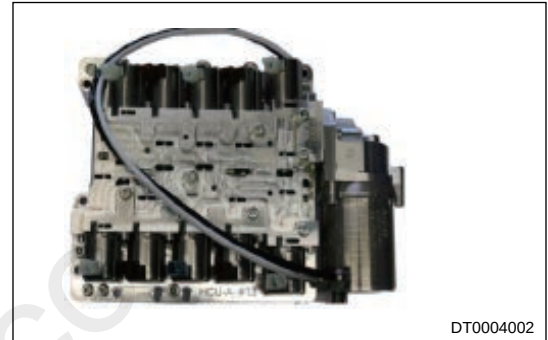
Optimized shaft train arrangement.

- Reverse shaft is canceled, making a more compact structure
- A set of clutches are connected to gear 1/R respectively
- Standard front column rear ball bearing arrangement, improving efficiency and contributing to platform collinearity.



New generation of HCU system.

- Quick response, smooth shifting;
- Protect hydraulic parking, and vehicle can easily achieve gear control;
- Low leaking hydraulic system, high precision solenoid valve, shift actuator separation, universal platform;
- Double control for shift control circuit by flow valve and pressure valve.



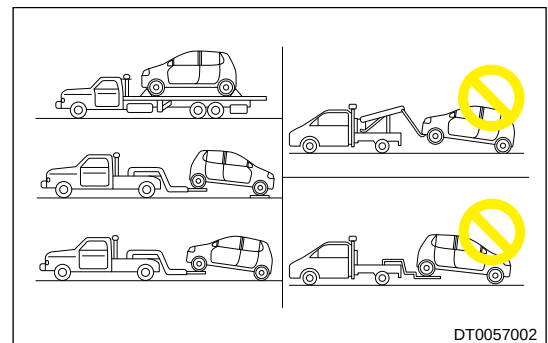
■ Parking Mechanism

- It is arranged on the output shaft to reduce the weight of parking mechanism and improve the robustness of system (In addition to parking gear, other parts are universal to all platforms).
- It also includes integrated hydraulic automatic parking.

2.6 Vehicle Towing

(1) Towing using the correct method can avoid unnecessary secondary damage to the vehicle.

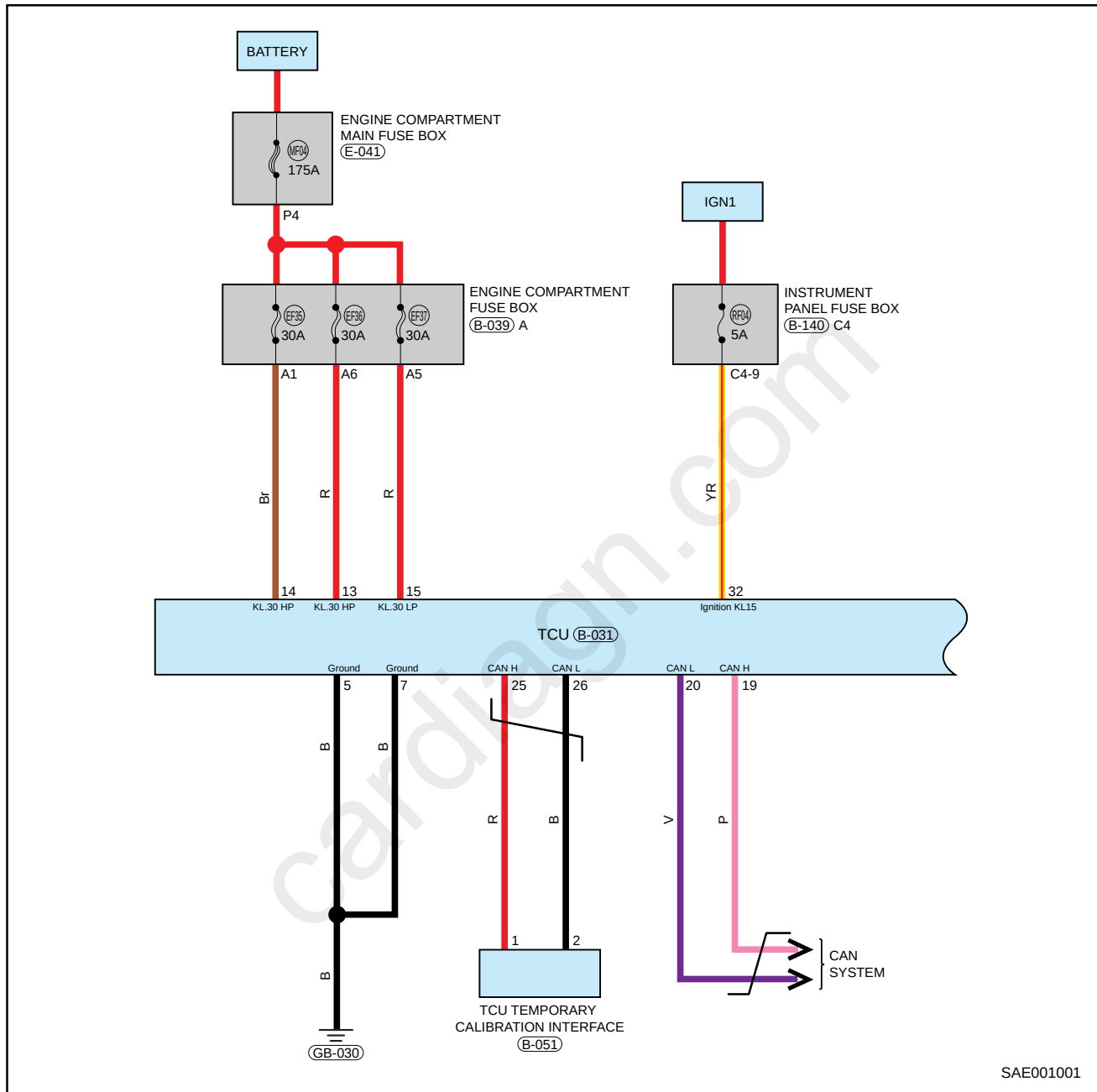
- 1) Use flatbed truck or large flatbed trolley to tow the vehicle after it is fully supported.
- 2) Use hard traction to lift the non-drive wheel while using a small flatbed (ground wheel) to lift the drive wheel and transport it
- 3) Use hard traction to lift the drive wheel and transport it.



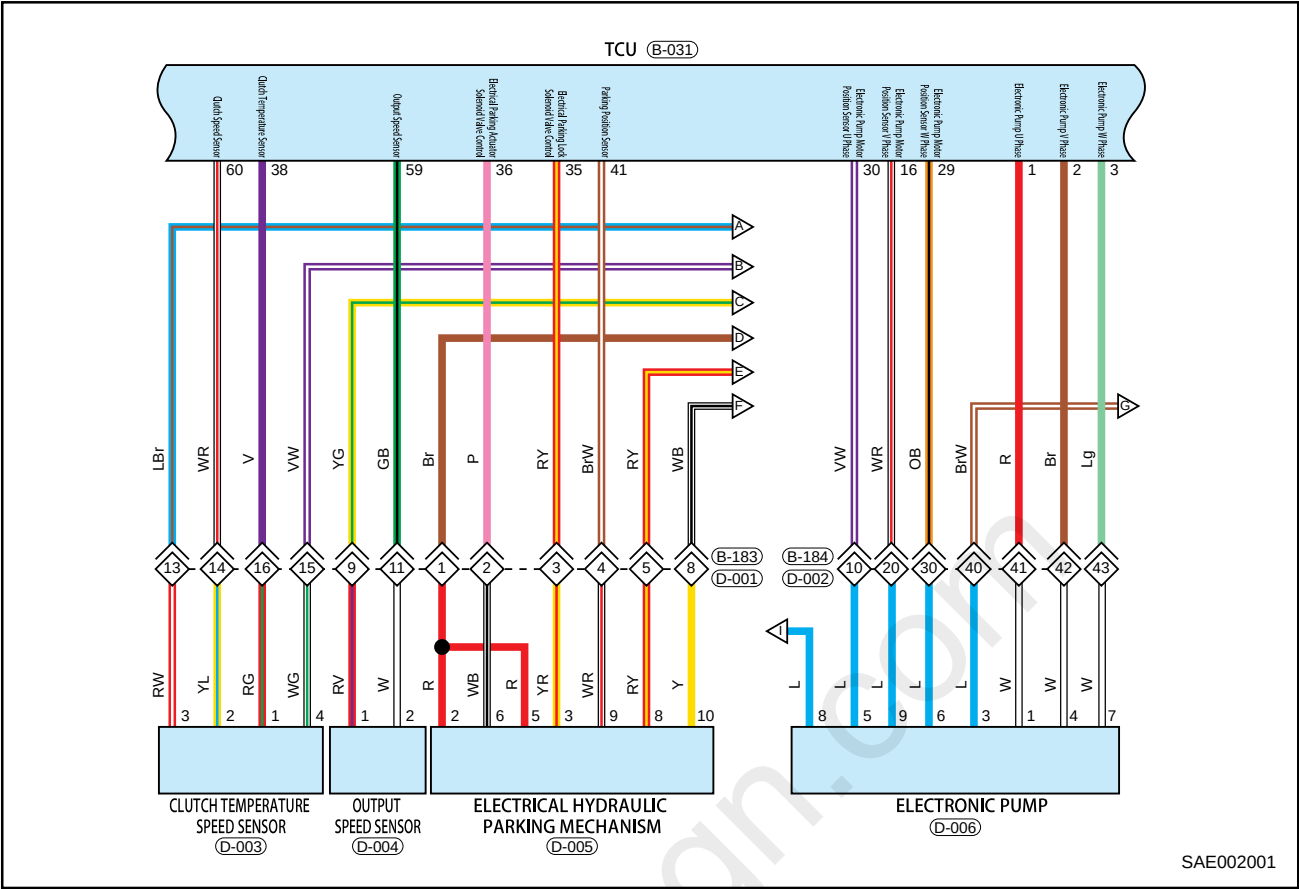
3 System Circuit Diagram

3.1 Circuit Diagram

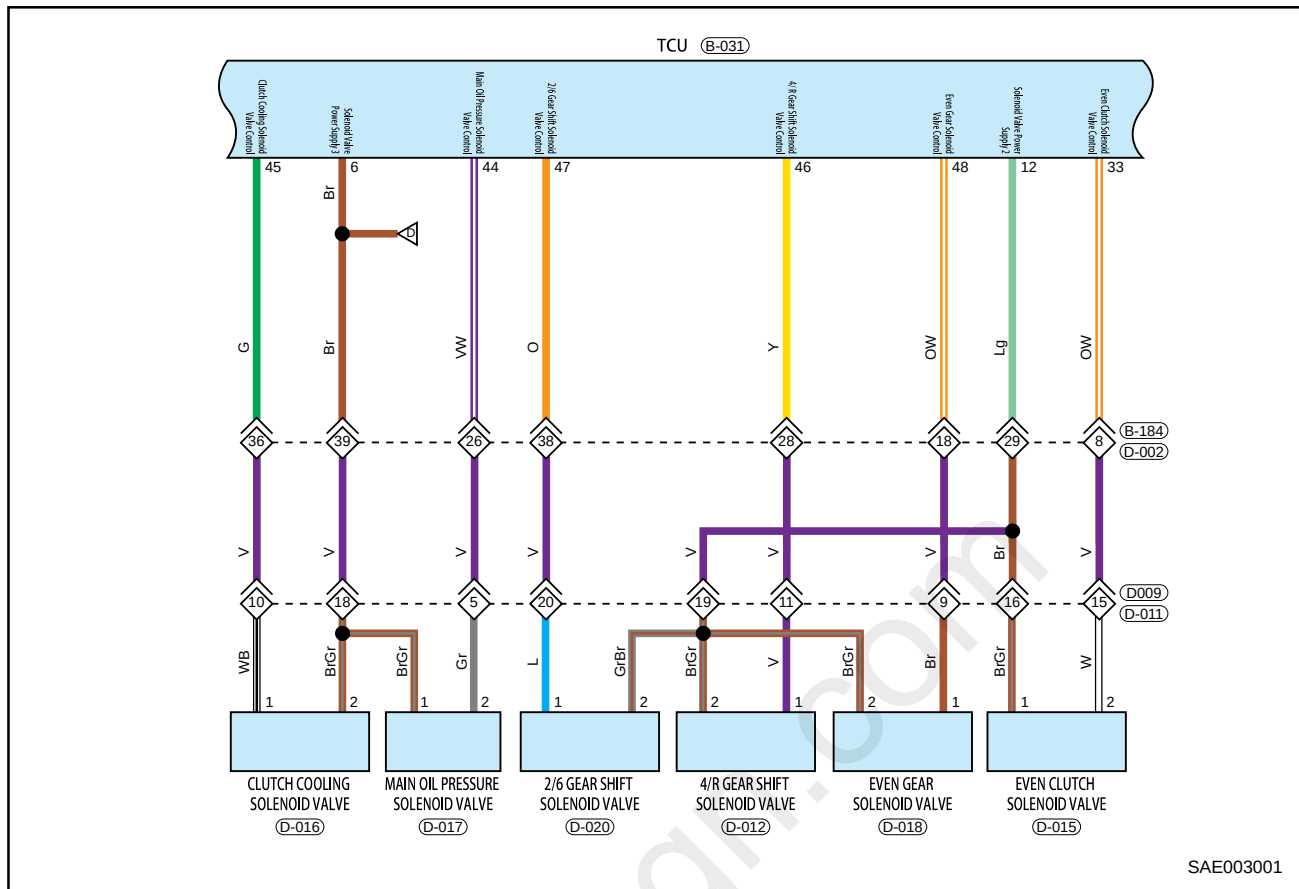
■ Transmission Control System Circuit Diagram 1



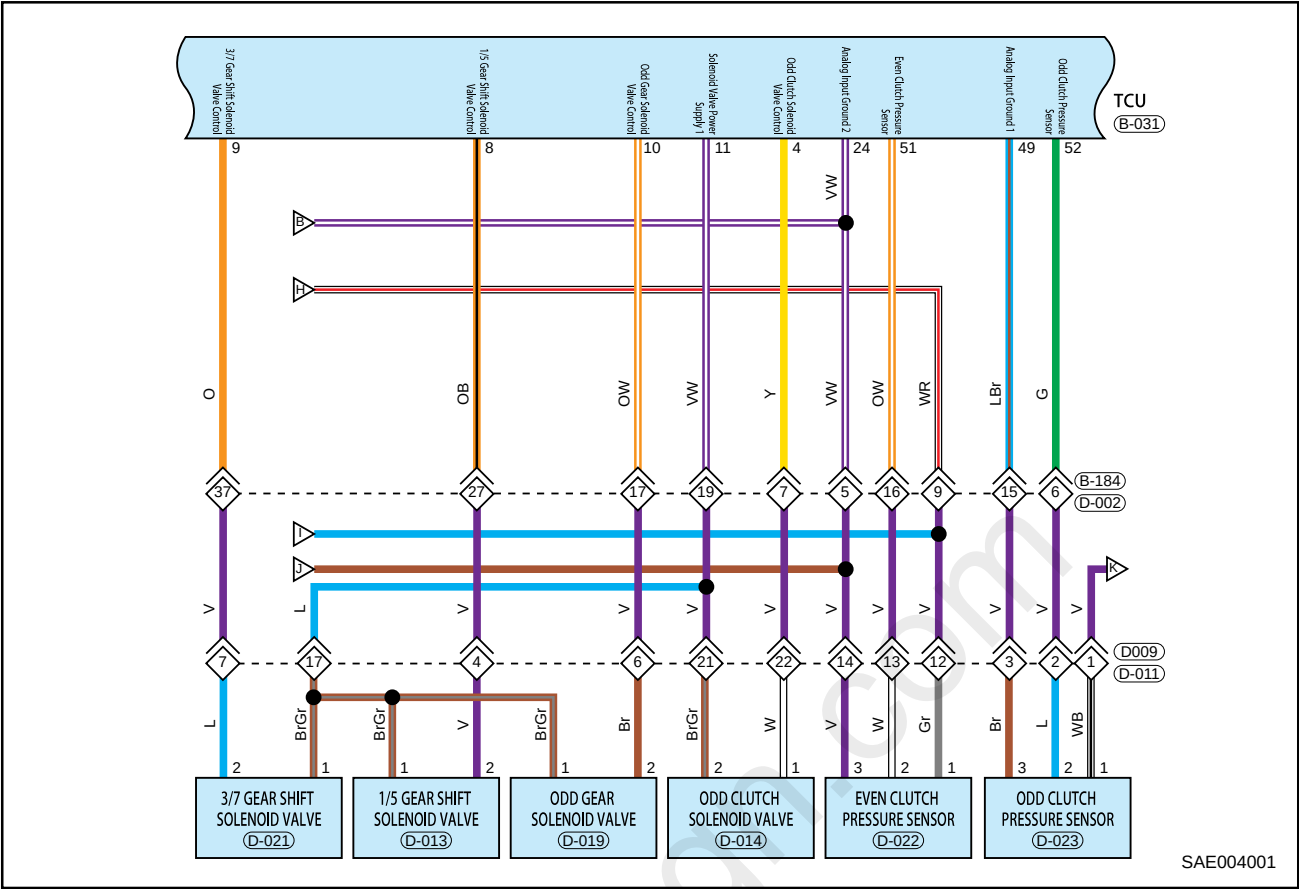
Transmission Control System Circuit Diagram 2



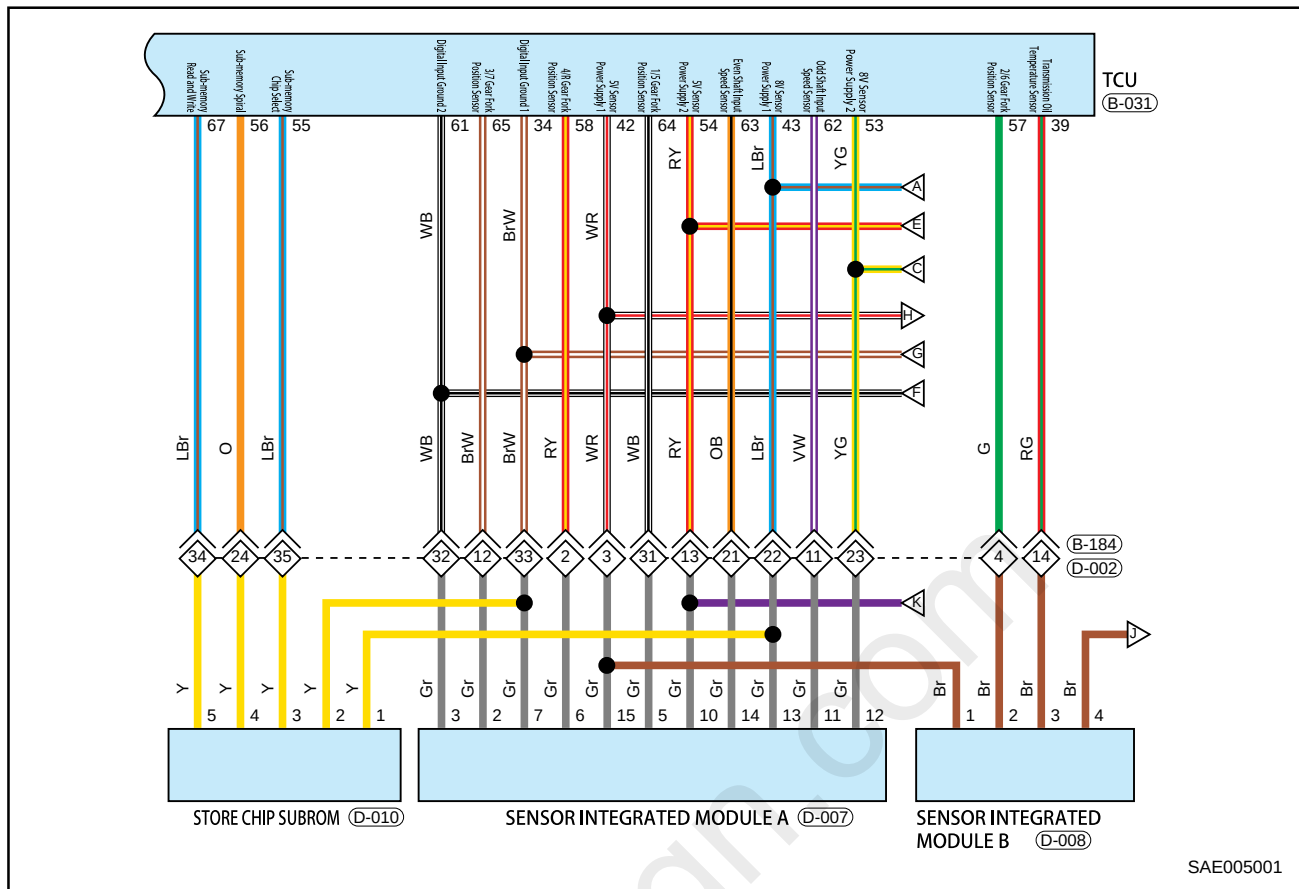
Transmission Control System Circuit Diagram 3



■ Transmission Control System Circuit Diagram 4



Transmission Control System Circuit Diagram 5



4 Diagnostic Information and Steps

4.1 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggle test.
- Check for broken, bent, protruded or corroded terminals.
- Check transmission control system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.

- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.4 Matching Learning

■ Matching Learning

Hint:

Before performing matching and learning of vehicle module, be sure to carefully read the related precautions and perform the operation strictly according to standard working procedures.

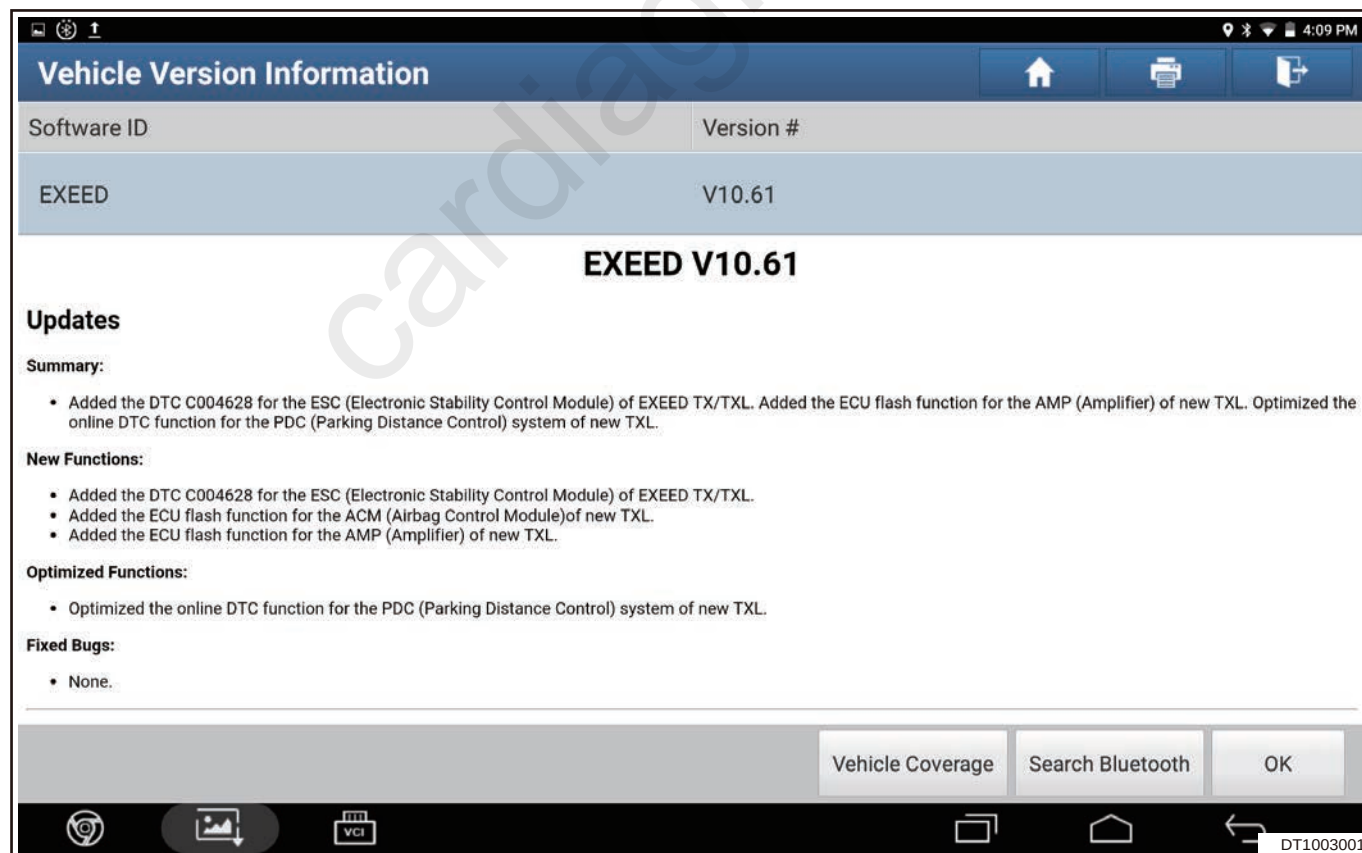
For matching learning required by transmission control system (dual clutch transmission) (DCT) module under different situations, see table below:

Items	Applicable Situations	Actions Required by Diagnostic Tester	Note
Module replacement	• Module damage • Module failure	Memory reset	If the provided spare parts are naked spare part (- without basic program data), perform software upgrading after VIN code is written
		Read transmission stored data	
		Write VIN code	
Software upgrading	• Low software version • Software error	Controller software refreshing	Refresh data can be requested from EXEED after-sales service department
Calibration	/	/	/
Write VIN code	Replace module	Write VIN code	/
Read transmission stored data	• Transmission case is replaced • Transmission controller is replaced • Transmission hydraulic system is replaced	Read transmission stored data	After the data is successfully read, the vehicle needs to be powered off for 55 seconds to ensure a complete data storage
Memory reset	• Transmission case is replaced • Transmission controller is replaced • Transmission hydraulic system is replaced	Memory reset	/

Items	Applicable Situations	Actions Required by Diagnostic Tester	Note
	Transmission clutch assembly is replaced		
Clutch solenoid valve wash	Solenoid valve stuck fault is reported	Clutch solenoid valve wash	After clutch solenoid valve is washed, if fault is still not eliminated, troubleshoot the hardware
Clutch TP point self-learning	- Transmission clutch assembly is replaced - Transmission clutch related components are replaced - Transmission hydraulic system is replaced - Fork related components are replaced	Clutch TP point self-learning	Transmission offline (EOL) related self-learning has been performed, it is unnecessary to perform self-learning if parts are not changed
Clutch TC curve self-learning		Clutch TC curve self-learning	
Fork position self-learning		Fork position self-learning	

■ Controller Software Refreshing

- (1) Use diagnostic tester to select Traditional Diagnosis.
- (2) Select EXEED on diagnostic tester.
- (3) Click “OK” on Vehicle Version Information screen.



- (4) Select “Generic Service” on diagnostic tester.



(5) Select “ECU Online Programming” on diagnostic tester.



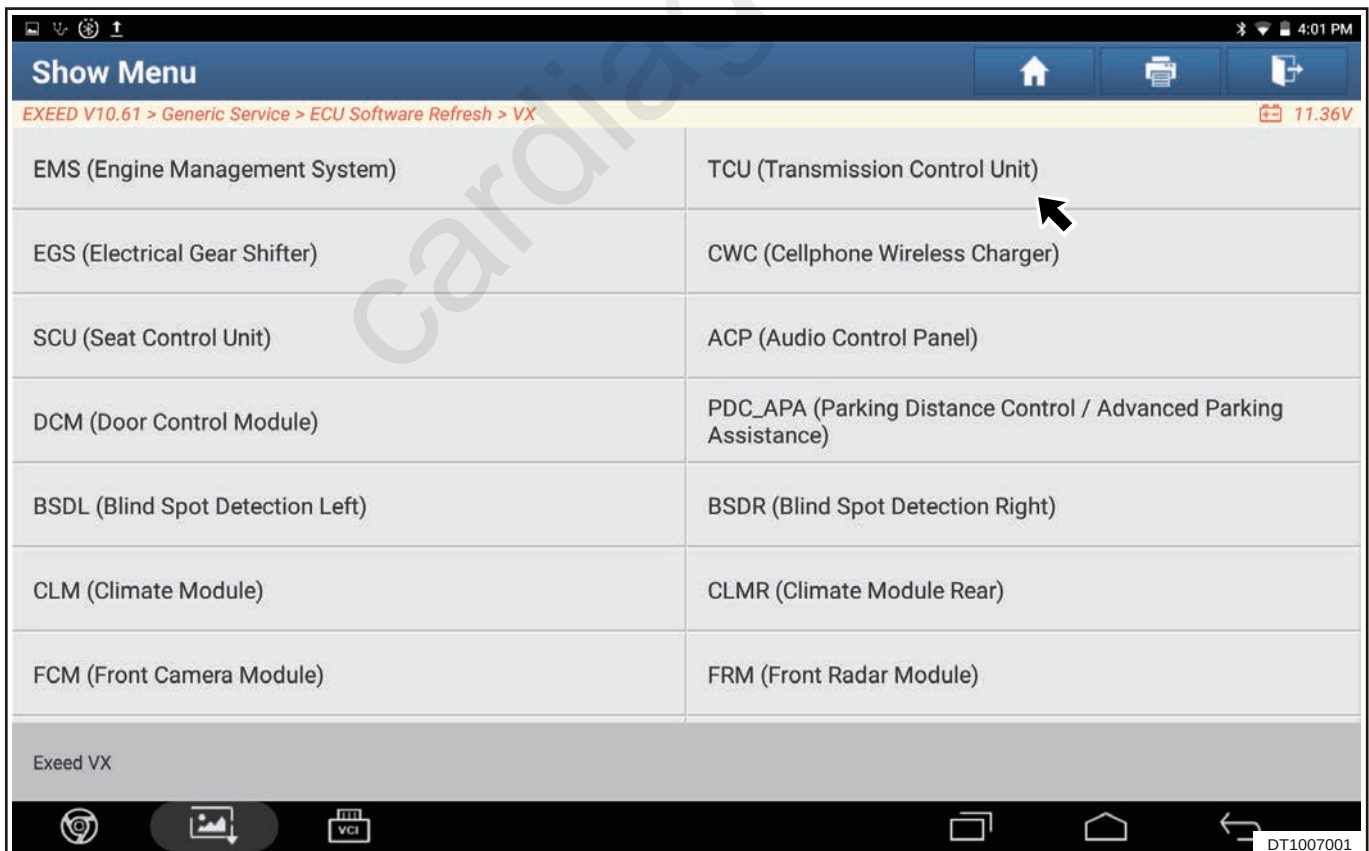
- (6) Select “ECU Software Refresh” on diagnostic tester.



- (7) Select “VX” on diagnostic tester.



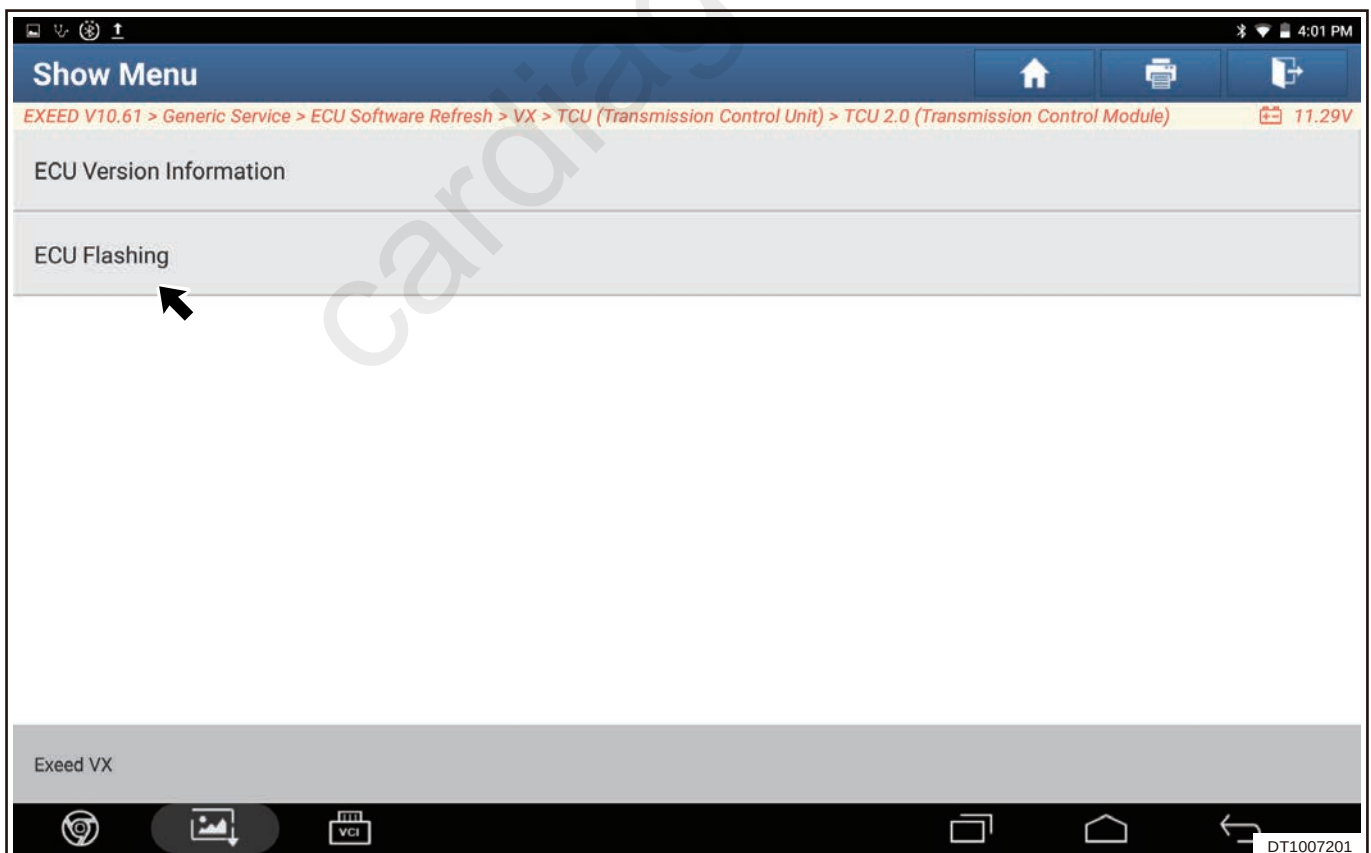
(8) Select "TCU (Transmission Control Unit)" on diagnostic tester.



(9) Select "TCU 2.0 (Transmission Control Module)" on diagnostic tester.



(10) Select “ECU Flashing” on diagnostic tester.



(11) Select “OK” on diagnostic tester.

(12) Select “Select Refresh File in Order” on diagnostic tester.

(13) Select “Start Refreshing” on diagnostic tester.

⚠ Caution

- **The picture is for reference only. The selection order of TCU writing package is subject to the latest writing package released by the manufacturer.**

(14) “Please wait” is displayed on diagnostic tester interface.

⚠ Warning

- **Power should not be cut during writing.**

(15) “Writing is successful” is displayed on diagnostic tester interface.

(16) The version information must be read for confirmation after writing.

⚠ Caution

- **The picture is for reference only. Actual version number is subject to the latest writing package released by the manufacturer.**

■ Writing VIN Code

(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

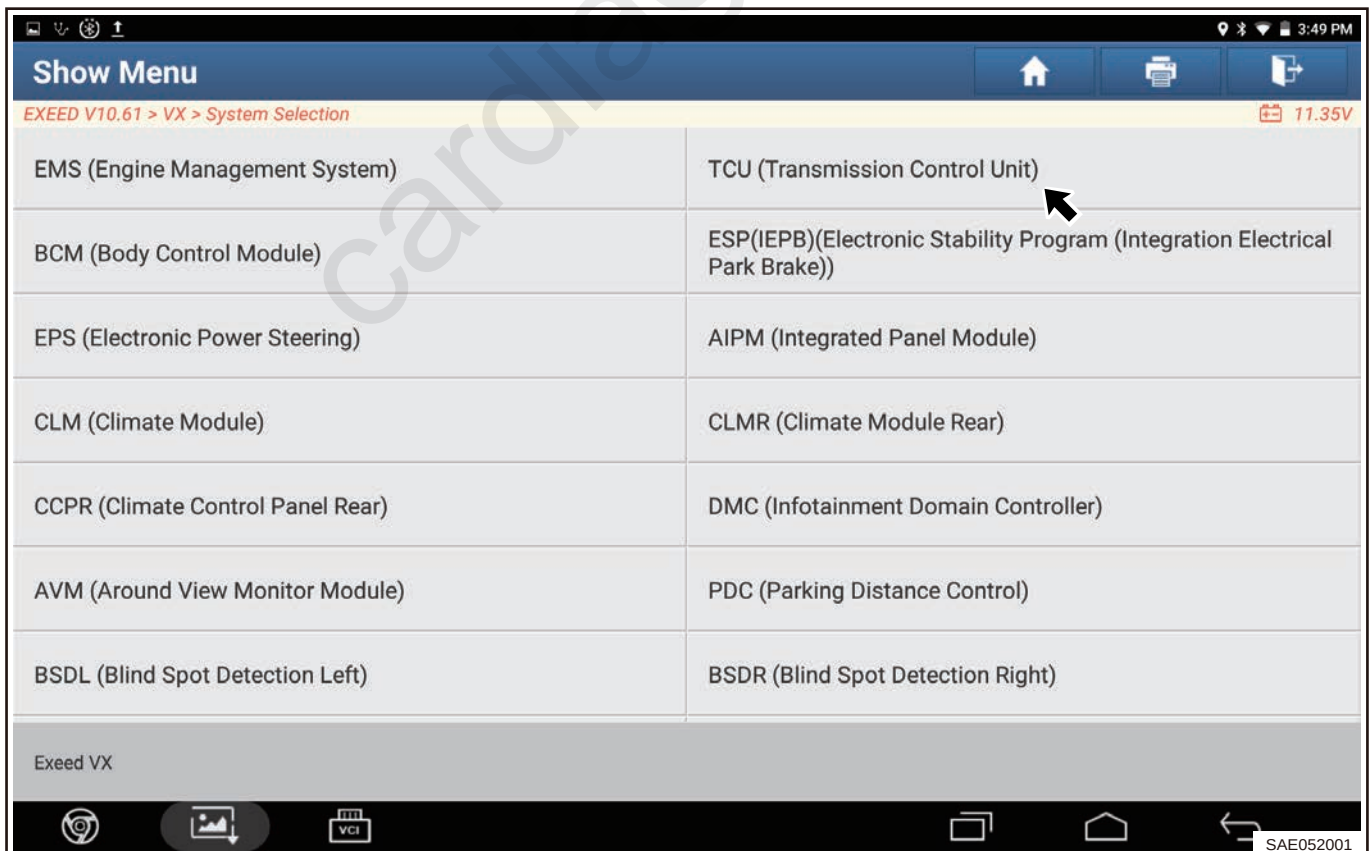
(2) Select “VX” model.



(3) Enter next screen and click “System Selection” .



(4) Enter next screen and click “TCU (Transmission Control Unit)” .



(5) Enter next screen and click “Special Function” .



(6) Enter next screen and click “VIN Data Write-in” .



(7) Input a 17-digit VIN code.

Write VIN

Please Enter The 17-Digit VIN, Which Can Be Obtained From The Front Windshield Or Name Plate Of The Vehicle Generally.

Input A 17-digit VIN.

Exeed VX Confirm

SAE054101

■ Fork Position Self-learning

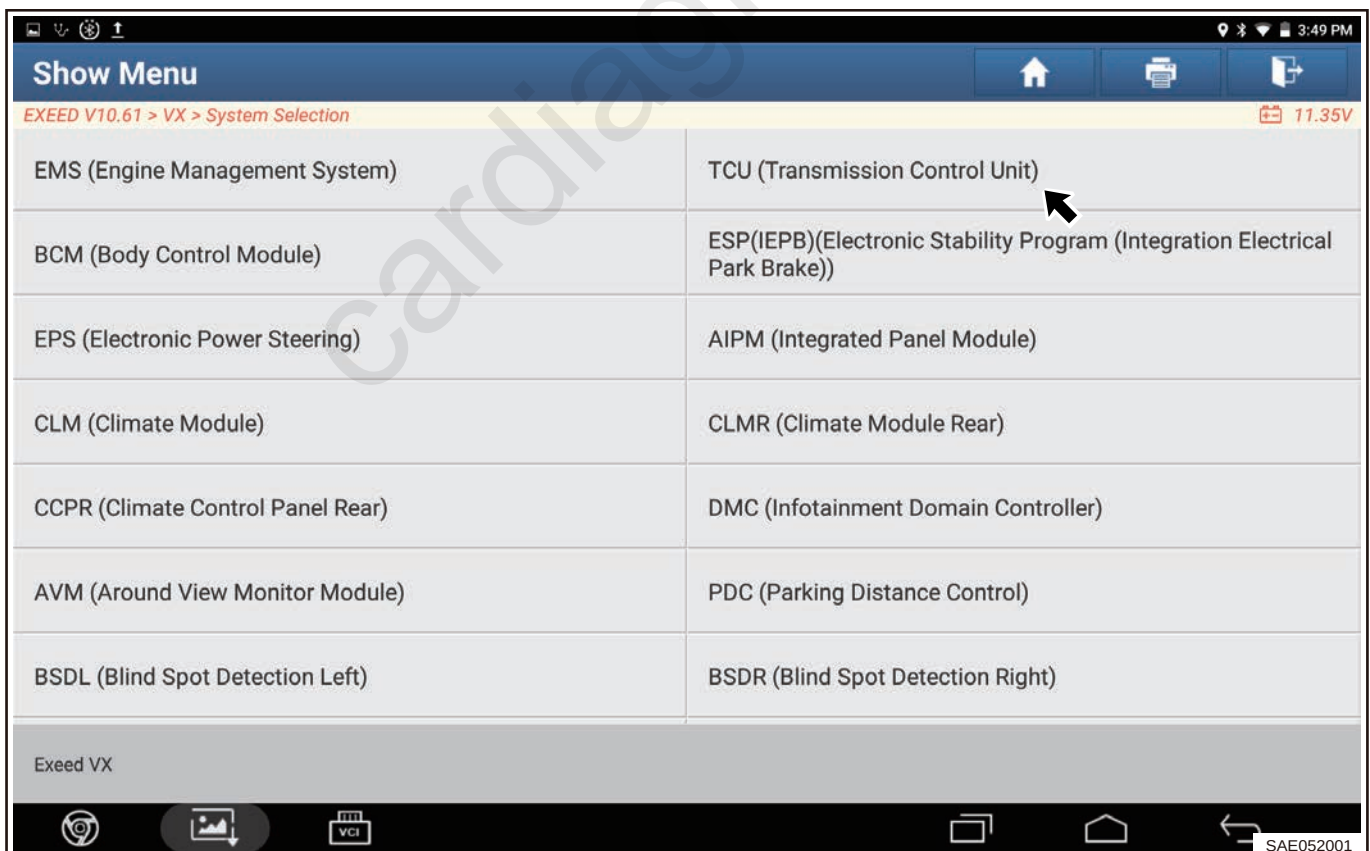
- (1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.
- (2) Select “VX” model.



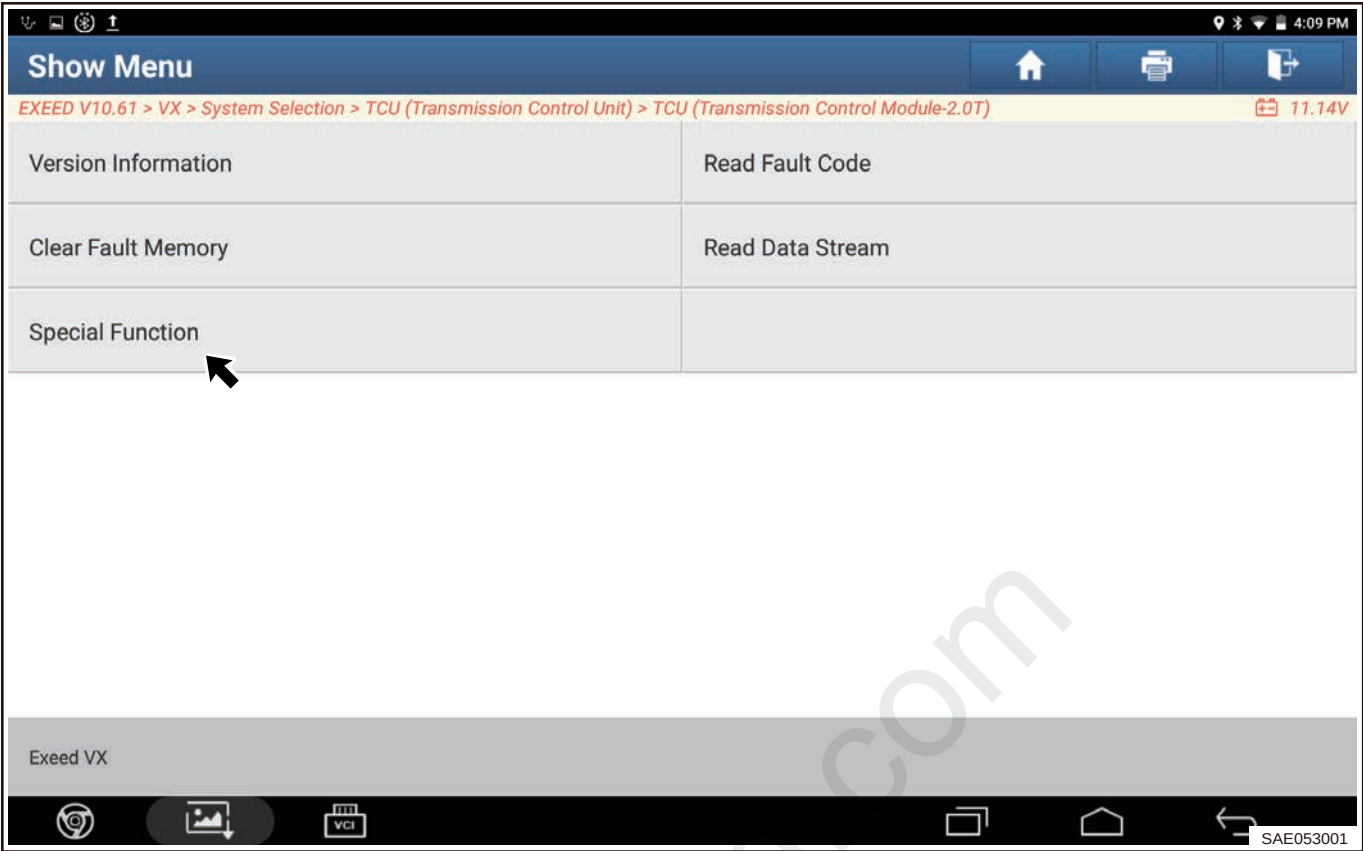
- (3) Enter next screen and click “System Selection” .



(4) Enter next screen and click “TCU (Transmission Control Unit)” .



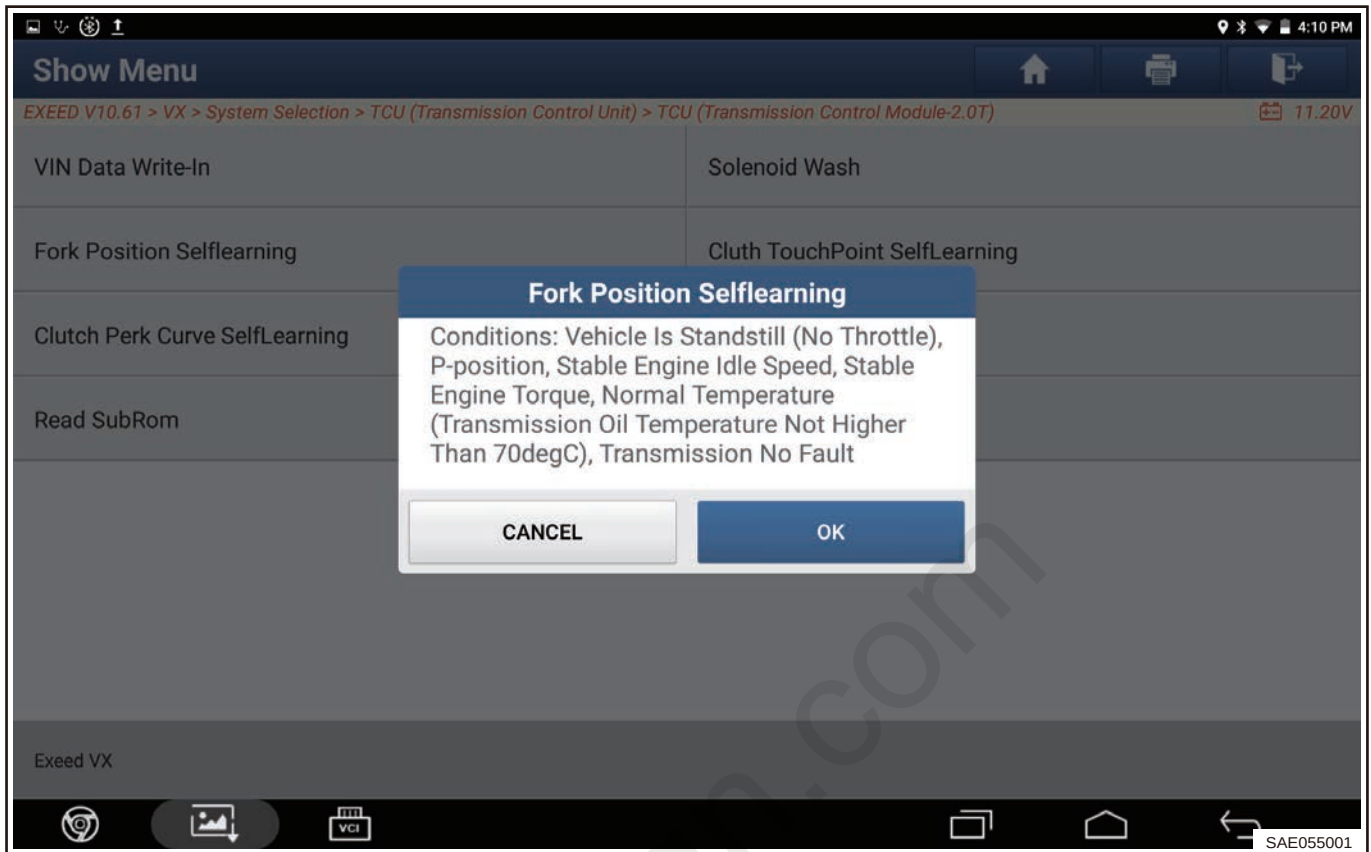
(5) Enter next screen and click “Special Function” .



(6) Enter next screen and click “Fork Position Selflearning” .



(7) Learn the conditions.



(8) Click “OK” to perform fork position self-learning.

■ Clutch PC Curve Self-learning

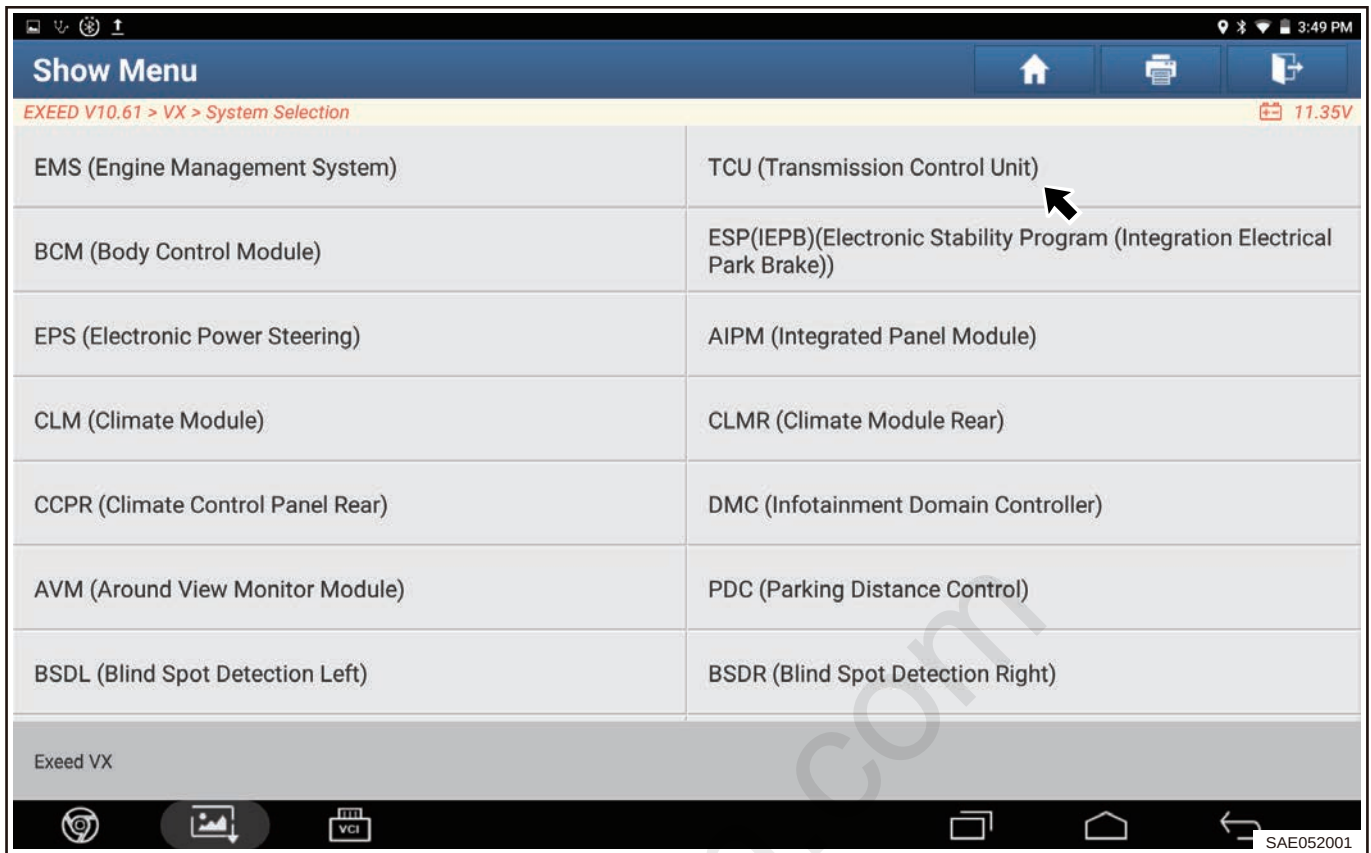
- (1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.
- (2) Select “VX” model.



(3) Enter next screen and click “System Selection” .



(4) Enter next screen and click “TCU (Transmission Control Unit)” .



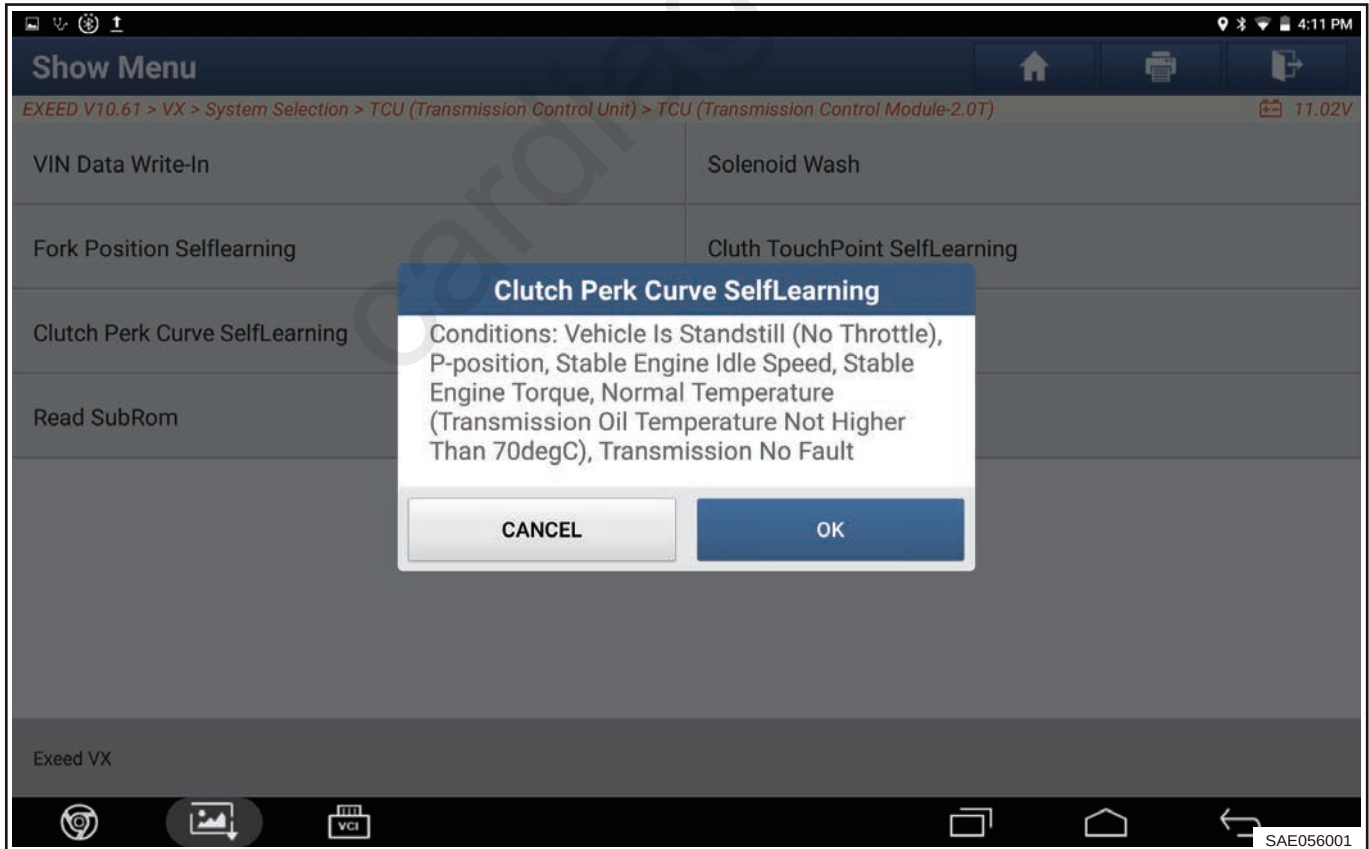
(5) Enter next screen and click “Special Function” .



(6) Enter next screen and click “Clutch Perk Curve SelfLearning” .



(7) Learn the conditions.



(8) Click "OK" to perform clutch PC curve self-learning.

■ Clutch TP Point Self-learning

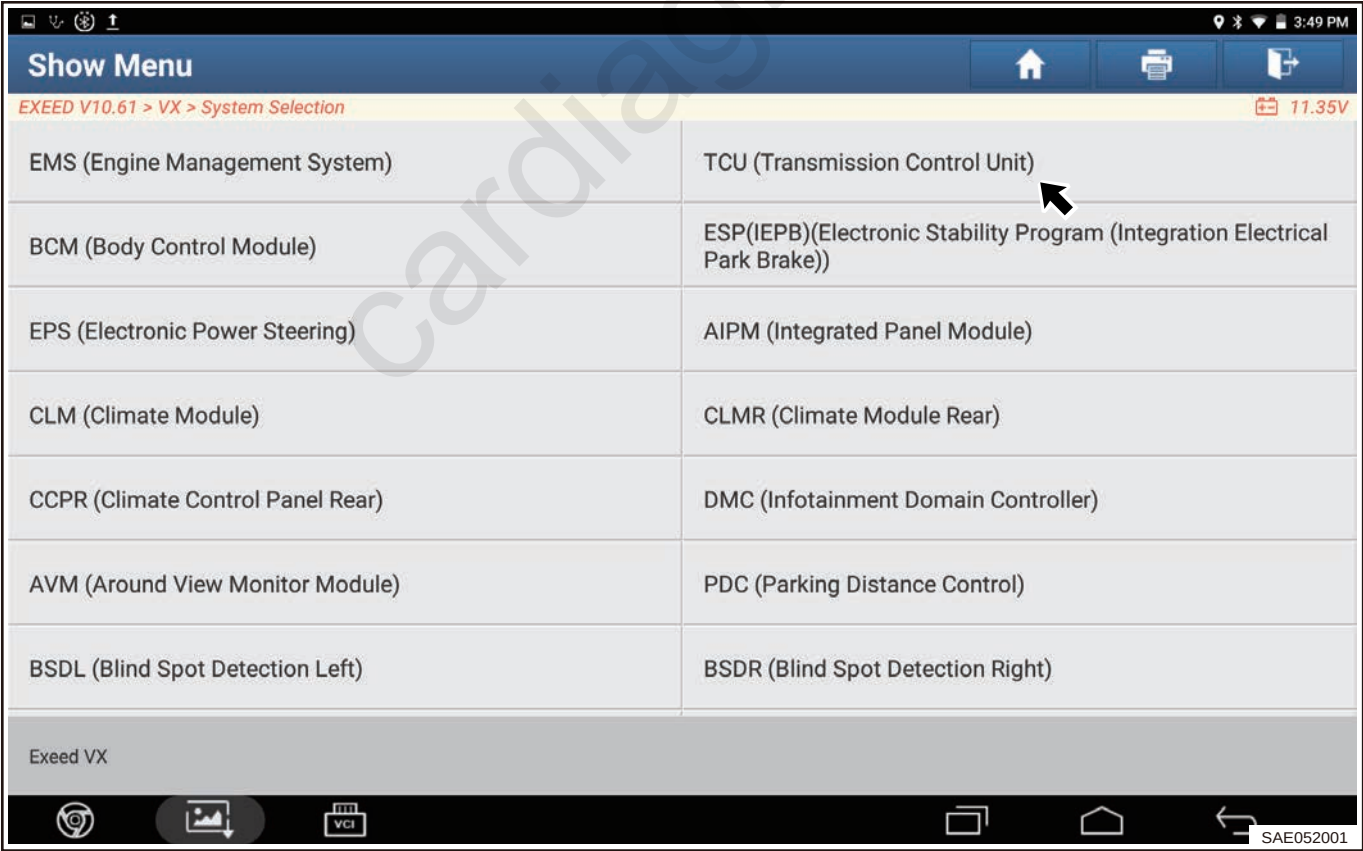
- (1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.
- (2) Select “VX” model.



- (3) Enter next screen and click “System Selection” .



(4) Enter next screen and click “TCU (Transmission Control Unit)” .



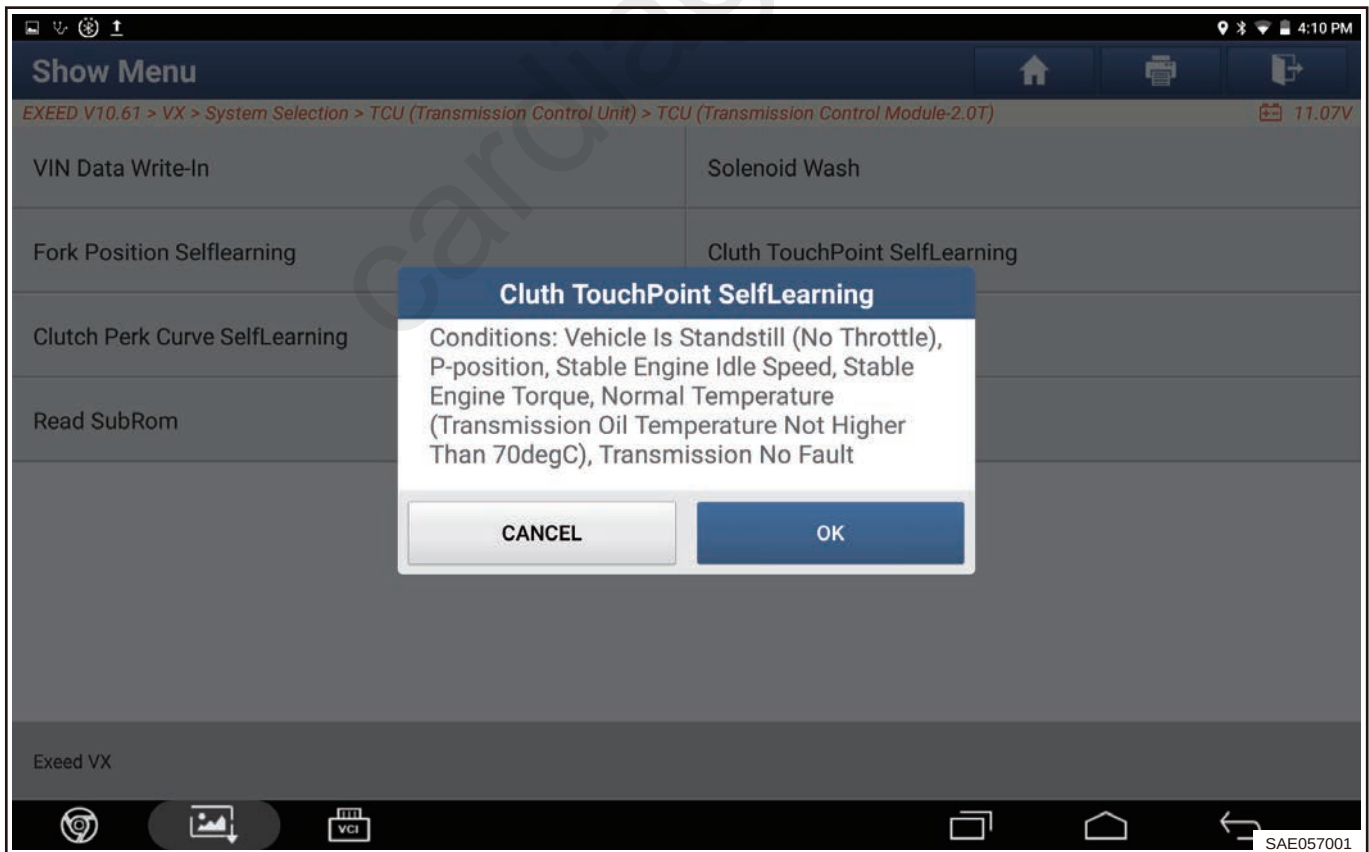
(5) Enter next screen and click “Special Function” .



(6) Enter next screen and click “Clutch TouchPoint SelfLearning” .



(7) Learn the conditions.



- (8) Click “OK” to perform clutch TP point self-learning.

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■ Clutch Solenoid Valve Wash

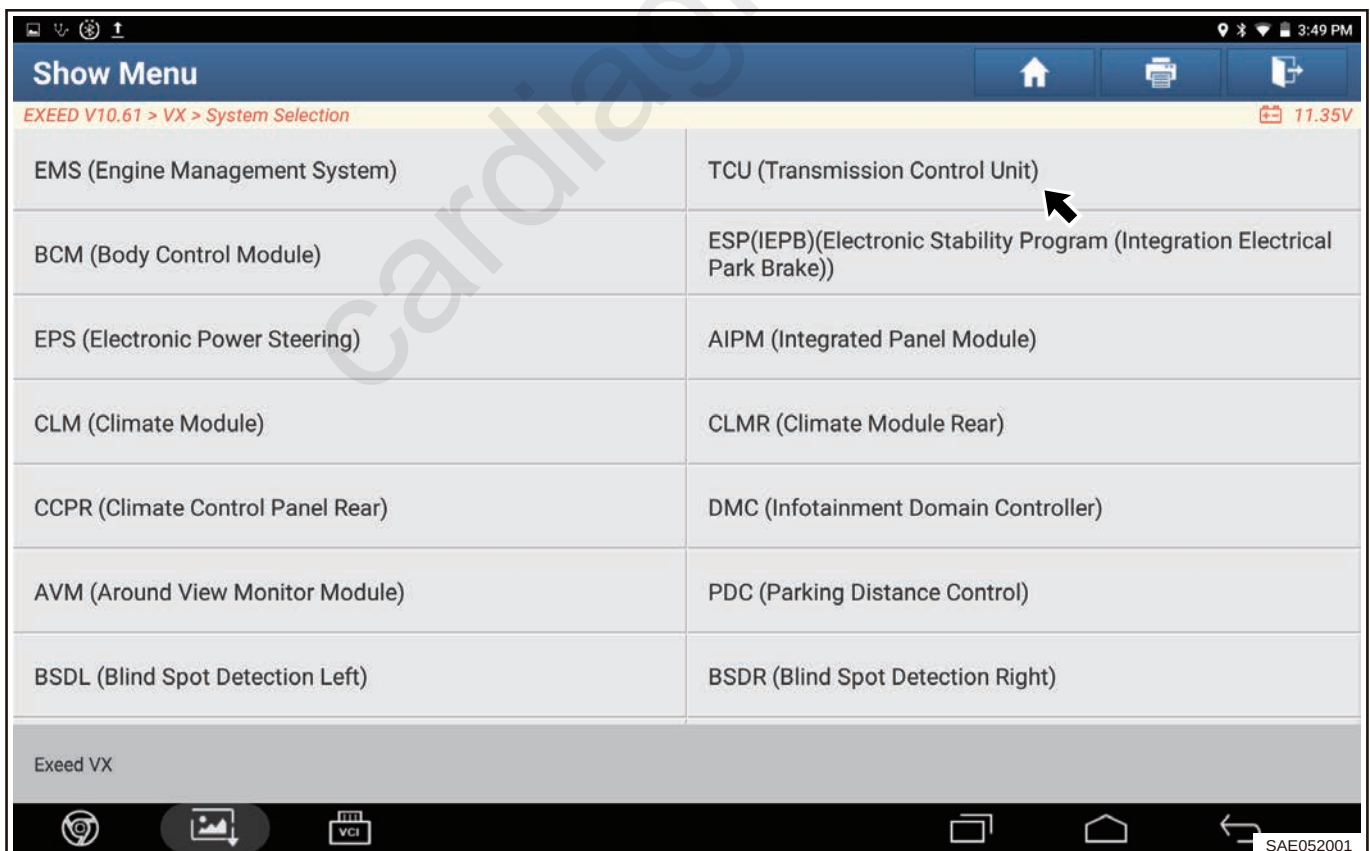
- (1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.
- (2) Select “VX” model.



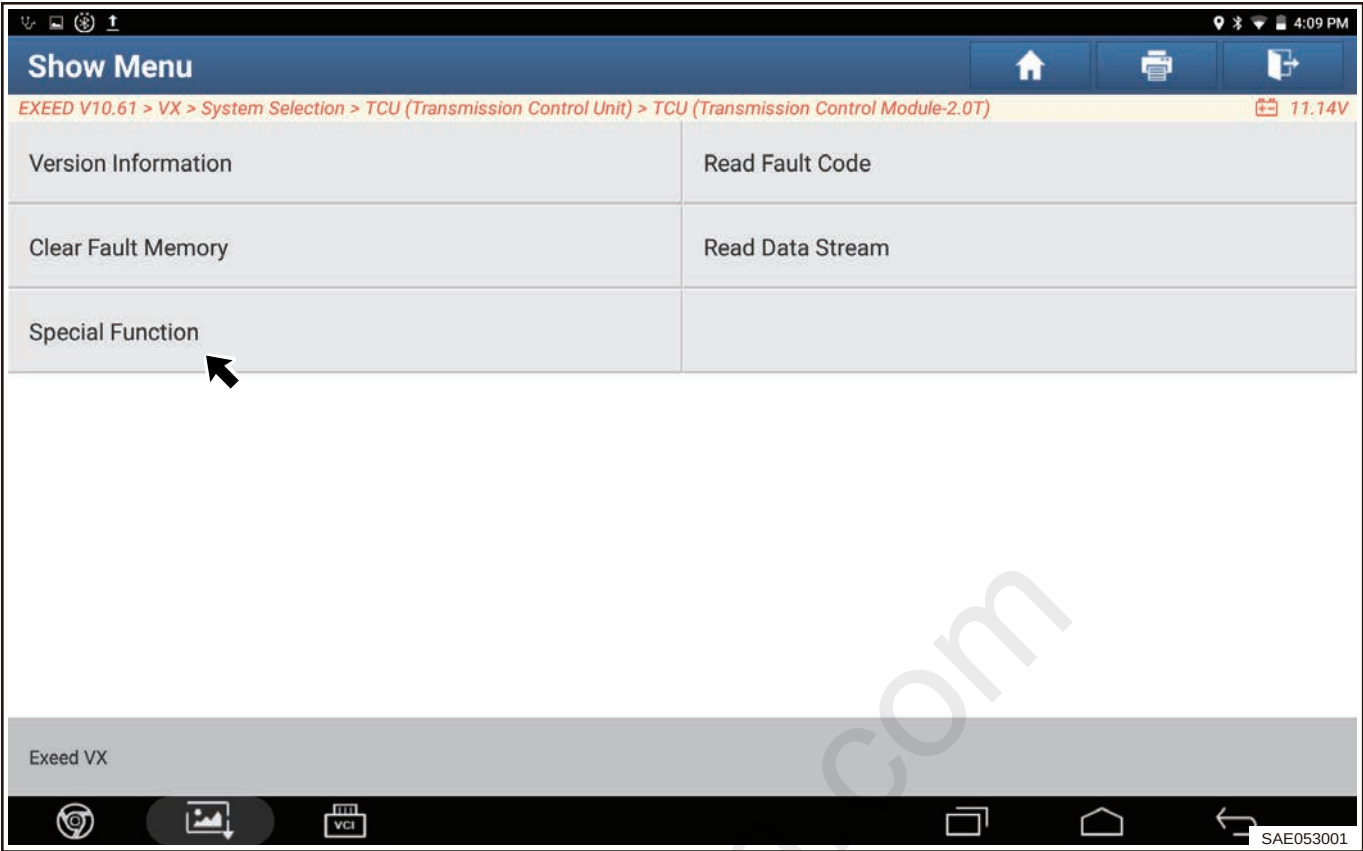
- (3) Enter next screen and click “System Selection” .



(4) Enter next screen and click “TCU (Transmission Control Unit)” .



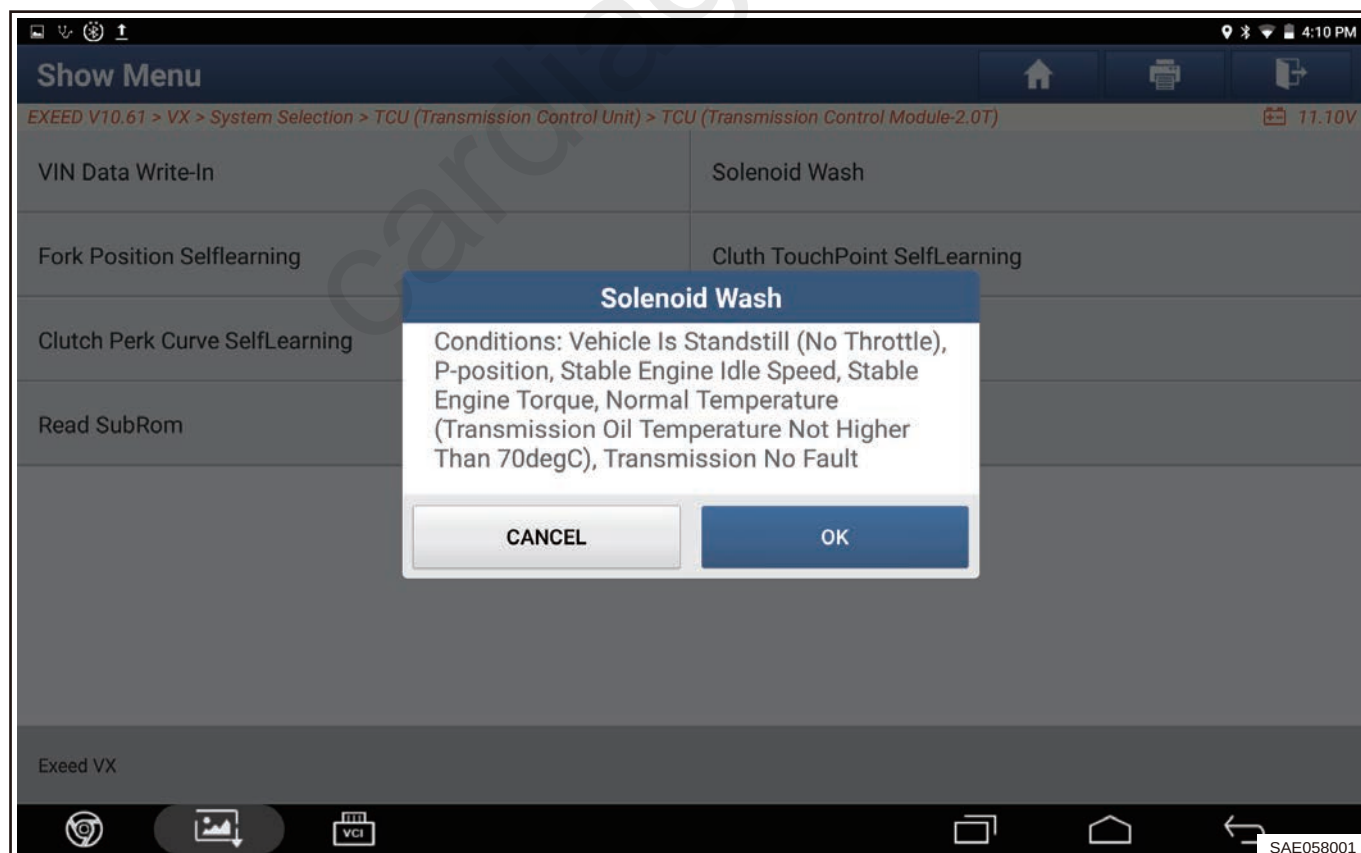
(5) Enter next screen and click “Special Function” .



(6) Enter next screen and click “Solenoid Wash” .



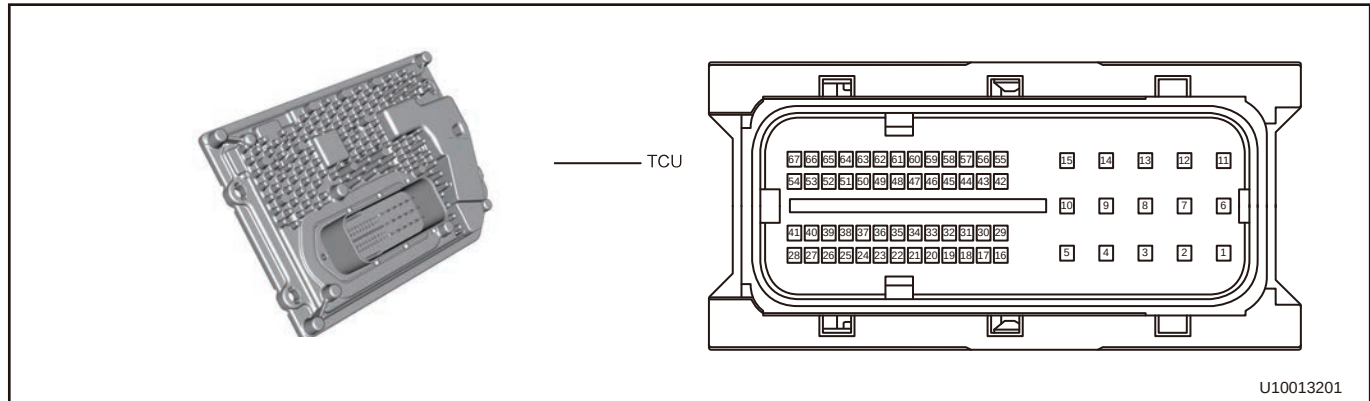
(7) Learn the conditions.



(8) Click “OK” and perform clutch solenoid valve wash.

4.5 Module Terminal Definition

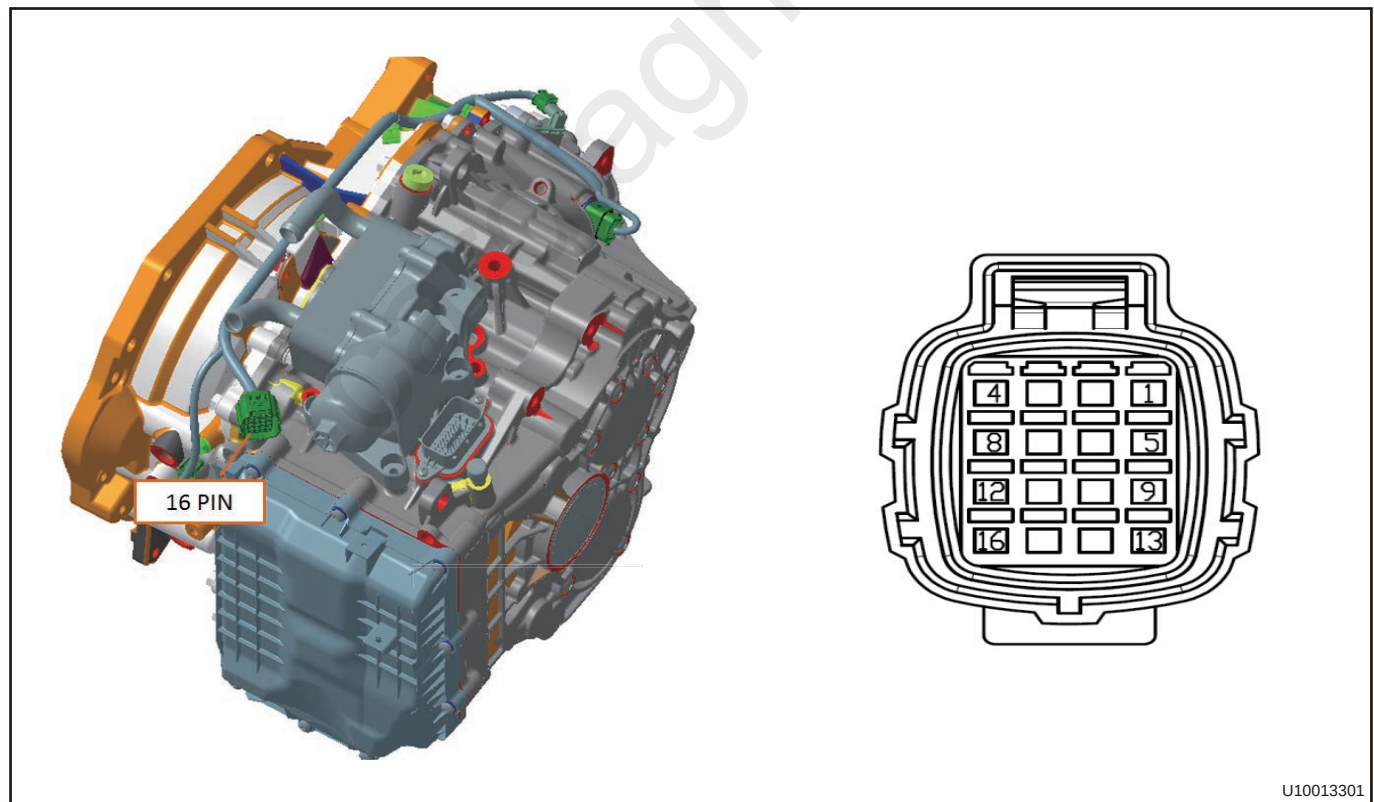
■ Transmission Control Module PIN



No.	Terminal Definition	No.	Terminal Definition
1	Electronic Pump U Phase	35	Electronic Parking Lock Electromagnet Control
2	Electronic Pump V Phase	36	Electronic Parking Actuator Solenoid Valve Control
3	Electronic Pump W Phase	37	Null
4	Odd Clutch Solenoid Valve Control	38	Clutch Temperature Sensor
5	TCU Ground KL31	39	Transmission Oil Temperature Sensor
6	Solenoid Valve Power Supply 3	40	Null
7	TCU Ground KL31	41	Parking Position Sensor
8	1st/5th Gear Shift Solenoid Valve Control	42	5V Sensor Power Supply 1
9	3rd/7th Gear Shift Solenoid Valve Control	43	8V Sensor Power Supply 1
10	Odd Gear Position Solenoid Valve Control	44	Main Oil Pressure Solenoid Valve Control
11	Solenoid Valve Power Supply 1	45	Clutch Cooling Solenoid Valve Control
12	Solenoid Valve Power Supply 2	46	4th/R Gear Shift Solenoid Valve Control
13	TCU Power Supply KL.30 HP	47	2nd/6th Gear Shift Solenoid Valve Control
14	TCU Power Supply KL.30 HP	48	Even Gear Position Solenoid Valve Control
15	TCU Power Supply KL.30 LP	49	Simulation Input Ground 1
16	Electronic Pump Motor Position Sensor V Phase	50	Null
17	Null	51	Even Clutch Pressure Sensor
18	Null	52	Odd Clutch Pressure Sensor
19	CAN1a High	53	8V Sensor Power Supply 2
20	CAN1a Low	54	5V Sensor Power Supply 2
21	Null	55	Sub Memory: Chip Selection

No.	Terminal Definition	No.	Terminal Definition
22	Null	56	Sub Memory: Clock
23	Null	57	2nd/6th Gear Fork Position Sensor
24	Simulation Input Ground 2	58	4th/R Gear Fork Position Sensor
25	CAN3 High (CAN Calibration)	59	Output Speed Sensor
26	CAN3 Low (CAN Calibration)	60	Clutch Speed Sensor
27	CAN2 High (CAN Calibration)	61	Digital Input Ground 2
28	CAN2 Low (CAN Calibration)	62	Odd Shaft Input Speed Sensor
29	Electronic Pump Motor Position Sensor W Phase	63	Even Shaft Input Speed Sensor
30	Electronic Pump Motor Position Sensor U Phase	64	1st/5th Gear Fork Position Sensor
31	Null	65	3rd/7th Gear Fork Position Sensor
32	IGN Power Supply	66	Null
33	Even Clutch Solenoid Valve Control	67	Sub Memory: Read and Write
34	Digital Input Ground 1		

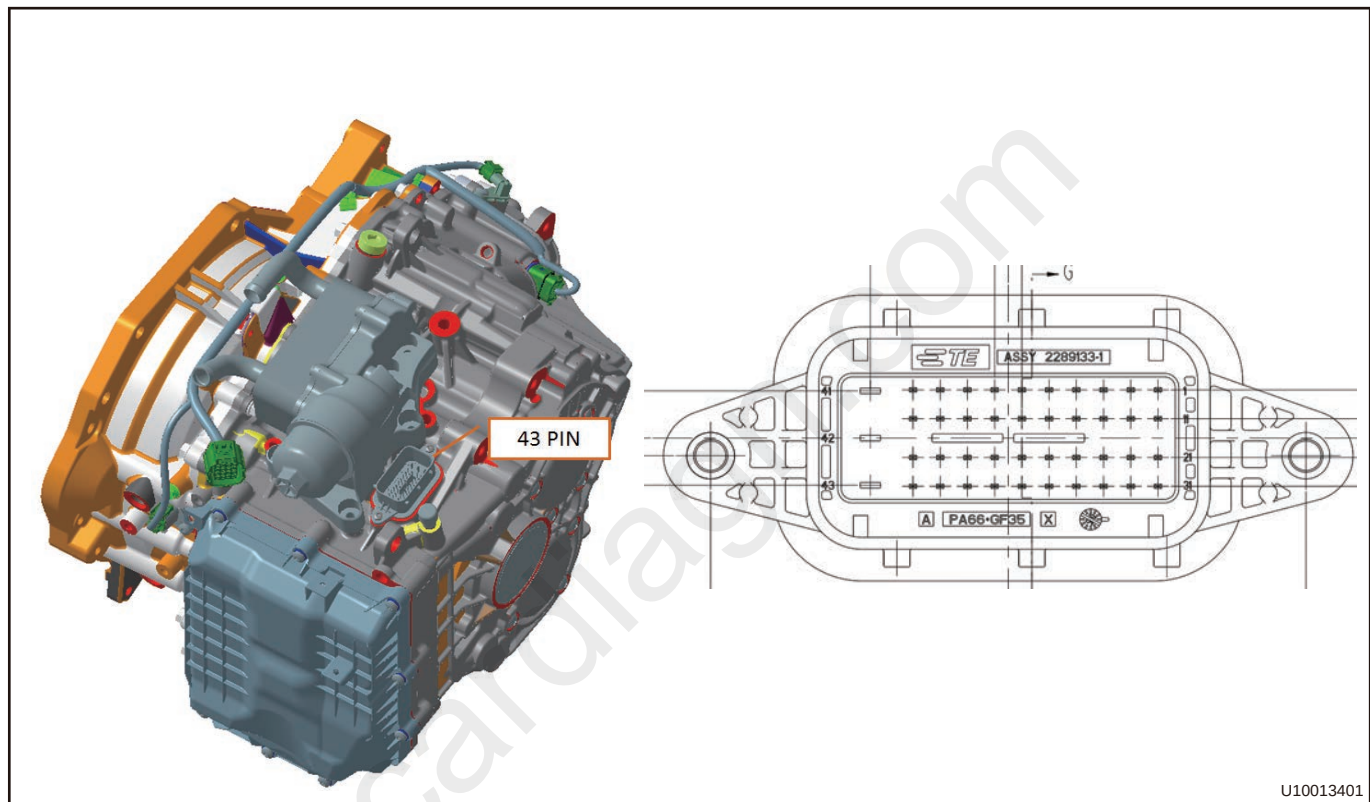
■ 16-PIN Terminal Definition



No.	Terminal Definition	No.	Terminal Definition
1	High Side Drive 3	9	8V Power Supply 2
2	Electronic Parking Hydraulic Valve	10	/

No.	Terminal Definition	No.	Terminal Definition
3	Electronic Parking Electromagnet	11	Transmission Output Speed
4	Electronic Parking Position Signal	12	/
5	5V Power Supply 2	13	8V Power Supply 1
6	/	14	Clutch Speed
7	/	15	Sensor Simulation Ground 2
8	Sensor Digital Ground 2	16	Clutch Oil Temperature

■ 43-Pin Terminal Definition



U10013401

No.	Terminal Definition	No.	Terminal Definition
1	NA	23	8V Sensor Power Supply 2
2	4th/R Gear Fork Position Sensor	24	Sub Memory: Clock
3	5V Sensor Power Supply 1	25	NA
4	2nd/6th Gear Fork Position Sensor	26	Main Oil Pressure Solenoid Valve Control
5	Simulation Input Ground 2	27	1st/5th Gear Shift Solenoid Valve Control
6	Odd Clutch Pressure Sensor	28	4th/R Gear Shift Solenoid Valve Control
7	Odd Clutch Solenoid Valve Control	29	Solenoid Valve Power Supply 2
8	Even Clutch Solenoid Valve Control	30	Electronic Pump Motor Position Sensor W Phase
9	5V Sensor Power Supply 1	31	1st/5th Gear Fork Position Sensor

No.	Terminal Definition	No.	Terminal Definition
10	Electronic Pump Motor Position Sensor U Phase	32	Digital Input Ground 2
11	Odd Shaft Input Speed Sensor	33	Digital Input Ground 1
12	3rd/7th Gear Fork Position Sensor	34	Sub Memory: Read and Write
13	5V Sensor Power Supply 2	35	Sub Memory: Chip Selection
14	Transmission Oil Temperature Sensor	36	Clutch Cooling Solenoid Valve Control
15	Simulation Input Ground 1	37	3rd/7th Gear Shift Solenoid Valve Control
16	Even Clutch Pressure Sensor	38	2nd/6th Gear Shift Solenoid Valve Control
17	Odd Gear Position Solenoid Valve Control	39	Solenoid Valve Power Supply 3
18	Even Gear Position Solenoid Valve Control	40	Digital Input Ground 1
19	Solenoid Valve Power Supply 1	41	Electronic Pump U Phase
20	Electronic Pump Motor Position Sensor V Phase	42	Electronic Pump V Phase
21	Even Shaft Input Speed Sensor	43	Electronic Pump W Phase
22	8V Sensor Power Supply 1		

4.6 System Diagnosis Procedure

Use following procedures to troubleshoot the transmission control system.

1	Vehicle brought to workshop
---	-----------------------------

NEXT

2	Check battery voltage
---	-----------------------

Check if battery voltage is normal.

- Standard voltage: Not less than 12 V.

NG

Replace battery

OK

3	Customer problem analysis
---	---------------------------

NEXT

4	Read fault code
---	-----------------

Result

No DTC

Repair according to Problem Symptoms Table

**DTC
OCCURS**

5 Read DTCs (current DTC and history DTC)

Result

No DTC

Troubleshoot according to intermittent DTC Fault Flow

**DTC
OCCURS**

6 Repair according to Diagnostic Trouble Code (DTC) chart**NEXT****7 Adjust, repair or replace****NEXT****8 Conduct test and confirm malfunction has been repaired****NEXT****End****4.7 Diagnostic Trouble Code (DTC) Chart****⚠ Caution**

- TCU can store a maximum of 20 DTCs. If the storage space for DTCs is used up, the new DTCs will substitute the historical faults with the lowest priorities.
- Clutch/transmission overheat failure (P2787/P1849) is overheat protection measures of transmission/clutch hardware. Usually, after overheat prompt appears, simply stop the vehicle for a rest, then it can work normally. Try to avoid repeated starting with accelerator pedal depressed firmly, which is easy to make the oil temperature rise too fast.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P186547	TCU Internal Malfunction	TCU cannot be reset	TCU internal malfunction	• Check TCU reset memory • Check if software is upgraded • Check or replace TCU
P186747	TCU Internal Malfunction	TCU cannot be reset	TCU internal malfunction	
P186947	TCU Internal Malfunction	TCU cannot be reset	TCU internal malfunction	
P186849	TCU Internal Malfunction	TCU chip fault	TCU chip fault	
P065912	HSD1 Power Supply Short to Power Supply	Voltage at high voltage side is more than 4 V	Voltage at high voltage side is less than 4 V	Check wire harness and connector
P267112	HSD2 Power Supply Short to Power Supply			Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P268612	HSD2 Power Supply Short to Power Supply			Check wire harness and connector
P267011	HSD1 Power Supply Short to Ground	Voltage difference between HSD1 and power supply voltage is more than 6 V, and HSD1 is less than 1.5 V	Voltage difference between HSD1 and power supply voltage is less than 6 V, and HSD1 is less than 1.5 V	Check wire harness and connector
P268511	HSD2 Power Supply Short to Ground	Voltage difference between HSD2 and power supply voltage is more than 6 V, and HSD2 is less than 1.5 V	Voltage difference between HSD2 and power supply voltage is less than 6 V, and HSD2 is less than 1.5 V	Check wire harness and connector
P065713	HSD1 Power Supply Open	It detects all lower end paths connected to this HSD1, and reports open circuit load failure.	If any of the lower end paths is connected to this HSD, there is no open circuit load failure.	Check wire harness and connector
P266913	HSD2 Power Supply Open	It detects all lower end paths connected to this HSD2, and reports open circuit load failure.	If any of the lower end paths is connected to this HSD, there is no open circuit load failure.	Check wire harness and connector
P268413	HSD3 Power Supply Open	It detects all lower end paths connected to this HSD3, and reports open circuit load failure.	If any of the lower end paths is connected to this HSD, there is no open circuit load failure.	Check wire harness and connector
P096013	Main Oil Path Solenoid Valve Open	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector
P096211	Main Oil Path Solenoid Valve Short to Ground	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P096312	Main Oil Path Solenoid Valve Short to Power Supply	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P188904	Main Oil Path Solenoid Valve Passage Closes Unexpectedly	Main oil path solenoid valve passage closes unexpectedly	Main oil path solenoid valve passage operates normally	Check wire harness and connector
P188A01	Main Oil Path Solenoid Valve Circuit Error	Main oil path solenoid valve circuit error	Main oil path solenoid valve circuit is normal	Check wire harness and connector
P074519	Main Oil Path Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P074818	Main Oil Path Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P096413	Lubricant Oil Path Solenoid Valve Open	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P096611	Lubricant Oil Path Solenoid Valve Short to Ground	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P096712	Lubricant Oil Path Solenoid Valve Short to Power Supply	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P188B04	Lubricant Oil Path Solenoid Valve Passage Closes Unexpectedly	Lubricant oil path solenoid valve passage closes unexpectedly	Lubricant oil path solenoid valve passage operates normally	Check wire harness and connector
P188C01	Lubricant Oil Path Solenoid Valve Circuit Error	Lubricant oil path solenoid valve circuit error occurs	Lubricant oil path solenoid valve circuit is normal	Check wire harness and connector
P077519	Lubricant Oil Path Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P077818	Lubricant Oil Path Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P097311	Odd Clutch Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P097412	Odd Clutch Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P182513	Odd Clutch Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector
P188D04	Odd Clutch Solenoid Valve Passage Closes Unexpectedly	Odd clutch solenoid valve passage closes unexpectedly	Odd clutch solenoid valve passage operates normally	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P188E01	Odd Clutch Solenoid Valve Circuit Error	Odd clutch solenoid valve circuit error occurs	Odd clutch solenoid valve circuit is normal	Check wire harness and connector
P075019	Odd Clutch Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P075318	Odd Clutch Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P097611	Even Clutch Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P097712	Even Clutch Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P182613	Even Clutch Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector
P188F04	Even Clutch Solenoid Valve Passage Closes Unexpectedly	Even clutch solenoid valve passage closes unexpectedly	Even clutch solenoid valve passage operates normally	Check wire harness and connector
P189001	Even Clutch Solenoid Valve Circuit Error	Even clutch solenoid valve circuit error	Even clutch solenoid valve circuit is normal	Check wire harness and connector
P075519	Even Clutch Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P075818	Even Clutch Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P097911	Odd Shaft Shift Pressure Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P098012	Odd Shaft Shift Pressure Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P182713	Odd Shaft Shift Pressure Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P189104	Odd Shaft Shift Pressure Solenoid Valve Passage Closes Unexpectedly	Odd shaft shift pressure solenoid valve passage closes unexpectedly	Odd shaft shift pressure solenoid valve passage operates normally	Check wire harness and connector
P189201	Odd Shaft Shift Pressure Solenoid Valve Circuit Error	Odd shaft shift pressure solenoid valve circuit error occurs	Odd shaft shift pressure solenoid valve circuit is normal	Check wire harness and connector
P076019	Odd Shaft Shift Pressure Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P076318	Odd Shaft Shift Pressure Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P098211	Even Shaft Shift Pressure Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P098312	Even Shaft Shift Pressure Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P182813	Even Shaft Shift Pressure Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector
P189304	Even Shaft Shift Pressure Solenoid Valve Passage Closes Unexpectedly	Even shaft shift pressure solenoid valve passage closes unexpectedly	Even shaft shift pressure solenoid valve passage operates normally	Check wire harness and connector
P189401	Even Shaft Shift Pressure Solenoid Valve Circuit Error	Even shaft shift pressure solenoid valve circuit error occurs	Even shaft shift pressure solenoid valve circuit is normal	Check wire harness and connector
P076519	Even Shaft Shift Pressure Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P076818	Even Shaft Shift Pressure Solenoid Valve	The difference between feedback current and target	The difference between feedback current and target	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Feedback Current Too Low	current is less than a certain threshold	current is more than a certain threshold	
P098511	4th/R Gear Flow Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P098612	4th/R Gear Flow Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P182913	4th/R Gear Flow Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector
P189504	4th/R Gear Flow Solenoid Valve Passage Closes Unexpectedly	4th/R gear flow solenoid valve passage closes unexpectedly	4th/R gear flow solenoid valve passage operates normally	Check wire harness and connector
P189601	4th/R Gear Flow Solenoid Valve Circuit Error	4th/R gear flow solenoid valve circuit error occurs	4th/R gear flow solenoid valve circuit is normal	Check wire harness and connector
P077019	4th/R Gear Flow Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P077318	4th/R Gear Flow Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P099411	2nd/6th Gear Flow Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P099512	2nd/6th Gear Flow Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P183013	2nd/6th Gear Flow Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector
P189704	2nd/6th Gear Flow Solenoid Valve Passage Closes Unexpectedly	2nd/6th gear flow solenoid valve passage closes unexpectedly	2nd/6th gear flow solenoid valve passage operates normally	Check wire harness and connector
P189801	2nd/6th Gear Flow Solenoid Valve Circuit Error	2nd/6th gear flow solenoid valve circuit error occurs	2nd/6th gear flow solenoid valve circuit is normal	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P270619	2nd/6th Gear Flow Solenoid Valve Feedback Current Too High	2nd/6th gear flow solenoid valve feedback current is too high	2nd/6th gear flow solenoid valve feedback current is normal	Check wire harness and connector
P270918	2nd/6th Gear Flow Solenoid Valve Feedback Current Too Low	2nd/6th gear flow solenoid valve feedback current is too low	2nd/6th gear flow solenoid valve feedback current is normal	Check wire harness and connector
P099B11	1st/5th Gear Flow Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
P099C12	1st/5th Gear Flow Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P186213	1st/5th Gear Flow Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector
P189904	1st/5th Gear Flow Solenoid Valve Passage Closes Unexpectedly	1st/5th gear flow solenoid valve passage closes unexpectedly	1st/5th gear flow solenoid valve passage operates normally	Check wire harness and connector
P189A01	1st/5th Gear Flow Solenoid Valve Circuit Error	1st/5th gear flow solenoid valve circuit error occurs	1st/5th gear flow solenoid valve circuit is normal	Check wire harness and connector
P075A19	1st/5th Gear Flow Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P075D18	1st/5th Gear Flow Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P099E11	3rd/7th Gear Flow Solenoid Valve Open	Voltage at low voltage side is less than 2 V	Voltage at low voltage side is more than 2 V	Check wire harness and connector
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P099F12	3rd/7th Gear Flow Solenoid Valve Short to Ground	Current at low voltage side is more than 4 A	Current at low voltage side is less than 4 A	Check wire harness and connector
P186313	3rd/7th Gear Flow Solenoid Valve Short to Power Supply	Voltage at low voltage side is between 2 and 4 V	Voltage at low voltage side is less than 2 V or more than 4 V	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P189B04	3rd/7th Gear Flow Solenoid Valve Passage Closes Unexpectedly	3rd/7th gear flow solenoid valve passage closes unexpectedly	3rd/7th gear flow solenoid valve passage operates normally	Check wire harness and connector
P189C01	3rd/7th Gear Flow Solenoid Valve Circuit Error	3rd/7th gear flow solenoid valve circuit error occurs	3rd/7th gear flow solenoid valve circuit is normal	Check wire harness and connector
P076A19	3rd/7th Gear Flow Solenoid Valve Feedback Current Too High	The difference between feedback current and target current is more than a certain threshold	The difference between feedback current and target current is less than a certain threshold	Check wire harness and connector
P076D18	3rd/7th Gear Flow Solenoid Valve Feedback Current Too Low	The difference between feedback current and target current is less than a certain threshold	The difference between feedback current and target current is more than a certain threshold	Check wire harness and connector
P282413	E-park Hydraulic Valve Open	Voltage LSS1 is more than 1.663 V and less than 6.153 V	Voltage LSS1 is less than 1.663 V or more than 6.153 V	Check wire harness and connector
P282712	E-park Hydraulic Valve Short to Power Supply	Voltage LSS1 is more than 4.157 V	Voltage LSS1 is less than 4.157 V	Check wire harness and connector
P282611	E-park Hydraulic Valve Short to Ground	Voltage LSS1 is less than 1.663 V	Voltage LSS1 is more than 1.663 V	Check wire harness and connector
P282F11	E-park Safety Valve Short to Ground	Voltage LSS3 is less than 1.663 V	Voltage LSS3 is more than 1.663 V	Check wire harness and connector
P283012	E-park Safety Valve Short to Power Supply	Voltage LSS3 is more than 4.157 V	Voltage LSS3 is less than 4.157 V	Check wire harness and connector
P282D13	E-park Safety Valve Open	Voltage LSS3 is more than 1.663 V and less than 6.153 V	Voltage LSS3 is less than 1.663 V or more than 6.153 V	Check wire harness and connector
P279912	Motor Short to Power Supply	Short circuit is detected at any lower end by predrive ASIC and predrive ASIC error indicator low	Short circuit is not detected at all lower ends by predrive ASIC or predrive ASIC error indicator high	Check wire harness and connector
P279814	Motor Short to Ground or Open	Short circuit is detected at any higher end by predrive ASIC and predrive ASIC error indicator low	Short circuit is not detected at all higher ends by predrive ASIC or predrive ASIC error indicator high	Check wire harness and connector
P0B0019	Motor Overcurrent	Calculated motor current load is more than 100%	Calculated motor current load is less than 100%	Check brushless DC motor
P279798	Motor Overtemperature	Motor temperature is too high	Motor temperature is normal	Check brushless DC motor

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P188817	Motor Overvoltage	Battery high voltage is more than 16.5 V	Battery high voltage is less than 16.5 V	Check power supply voltage
P0B0D49	Internal Motor Fault	Other faults in motor are detected by chip	Other faults in motor are not detected by chip	Check brushless DC motor
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U000188	CNA1 Busoff Fault	\	\	Check CAN transceiver wire harness
P183111	5V1 Power Supply Short to Ground	5v1 voltage is less than 2.8 V	5v1 voltage is more than 2.8 V	Check wire harness and connector
P183212	5V1 Power Supply Short to Power Supply	5v1 voltage is more than 6.8 V	5v1 voltage is less than 6.8 V	Check wire harness and connector
P183311	5V2 Power Supply Short to Ground	5V2 voltage is less than 2.8 V	5V2 voltage is more than 2.8 V	Check wire harness and connector
P183412	5V2 Power Supply Short to Power Supply	5V2 voltage is more than 6.8 V	5V2 voltage is less than 6.8 V	Check wire harness and connector
P183511	8V1 Power Supply Short to Ground	8V1 voltage is less than 1.04 V	8V1 voltage is more than 1.04 V	Check wire harness and connector
P183612	8V1 Power Supply Short to Power Supply	8V1 voltage is more than 8.78 V	8V1 voltage is less than 8.78 V	Check wire harness and connector
P183711	8V2 Power Supply Short to Ground	8V2 voltage is less than 1.04 V	8V2 voltage is more than 1.04 V	Check wire harness and connector
P183812	8V2 Power Supply Short to Power Supply	8V2 voltage is more than 8.78 V	8V2 voltage is less than 8.78 V	Check wire harness and connector
P0B0A16	Motor Hall Sensor Undervoltage	Measured Hall sensor power supply voltage is less than 4.8 V	Measured Hall sensor power supply voltage is more than 4.8 V	Check power supply voltage
P0B0B17	Motor Hall Sensor Overvoltage	Measured Hall sensor power supply voltage is more than 5.2 V	Measured Hall sensor power supply voltage is less than 5.2 V	Check power supply voltage
P189D25	Motor Hall Sensor Undefined Fault	One of three Halls has electrical malfunction or 5 V power supply of Hall is abnormal	There is no electrical malfunction in three Halls or no abnormality in 5 V power supply of Hall	Check brushless DC motor
P189E29	Motor Hall Sensor Signal Invalid	Hall mode values follow an irrational order	Hall mode values follow a reasonable order	Check hall signal
U300316	KL30 LP Overvoltage	Power supply voltage is less than 9 V	Power supply voltage is more than 9 V	Check power supply voltage

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U300317	KL30 LP Undervoltage	Power supply voltage is more than 16 V	Power supply voltage is less than 16 V	Check power supply voltage
P186616	KL30 HP Open or Short to Ground	Battery high voltage is less than 3.5 V	Battery high voltage is more than 3.5 V	Check wire harness and connector
P071714	Odd Input Shaft Speed Sensor Short to Ground or Open	Diagnostic voltage of odd input speed signal is less than 100 mV	Diagnostic voltage of odd input speed signal is more than 100 mV	Check wire harness and connector
P180112	Odd Input Shaft Speed Sensor Short to Power Supply	Diagnostic voltage of odd input speed signal is more than 3.5 V	Diagnostic voltage of odd input speed signal is less than 3.5 V	Check wire harness and connector
P276714	Even Input Shaft Speed Sensor Short to Ground or Open	Diagnostic voltage of even input speed signal is less than 100 mV	Diagnostic voltage of even input speed signal is more than 100 mV	Check wire harness and connector
P180212	Even Input Shaft Speed Sensor Short to Power Supply	Diagnostic voltage of even input speed signal is more than 3.5 V	Diagnostic voltage of even input speed signal is less than 3.5 V	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P072214	Output Shaft Speed Sensor Short to Ground or Open	Diagnostic voltage of even input speed signal is less than 100 mV	Diagnostic voltage of even input speed signal is more than 100 mV	Check wire harness and connector
P180312	Output Shaft Speed Sensor Short to Power Supply	Diagnostic voltage of even input speed signal is more than 3.5 V	Diagnostic voltage of even input speed signal is less than 3.5 V	Check wire harness and connector
P072714	Clutch Speed Sensor Short to Ground or Open	Diagnostic voltage of even input speed signal is less than 100 mV	Diagnostic voltage of even input speed signal is more than 100 mV	Check wire harness and connector
P180412	Clutch Speed Sensor Short to Power Supply	Diagnostic voltage of even input speed signal is more than 3.5 V	Diagnostic voltage of even input speed signal is less than 3.5 V	Check wire harness and connector
P084214	Odd Clutch Pressure Sensor Short to Ground or Open	Odd clutch pressure sensor voltage is less than 80 mV	Odd clutch pressure sensor voltage is more than 80 mV	Check wire harness and connector
P084312	Odd Clutch Pressure Sensor Short to Power Supply	Odd clutch pressure sensor voltage is more than 4.9 V	Odd clutch pressure sensor voltage is less than 4.9 V	Check wire harness and connector
P084714	Even Clutch Pressure Sensor Short to Ground or Open	Even clutch pressure sensor voltage is less than 80 mV	Even clutch pressure sensor voltage is more than 80 mV	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P084812	Even Clutch Pressure Sensor Short to Power Supply	Even clutch pressure sensor voltage is more than 4.9 V	Even clutch pressure sensor voltage is less than 4.9 V	Check wire harness and connector
P093911	Clutch Temperature Sensor Short to Ground	Valve temperature sensor voltage is less than 0.2 V	Valve temperature sensor voltage is more than 0.2 V	Check wire harness and connector
P094015	Clutch Temperature Sensor Short to Power Supply or Open	Clutch temperature sensor voltage is more than 4.75 V	Clutch temperature sensor voltage is less than 4.75 V	Check wire harness and connector
P071211	Valve Body Oil Temperature Sensor Short to Ground	Valve temperature sensor voltage is less than 0.2 V	Valve temperature sensor voltage is more than 0.2 V	Check wire harness and connector
P071315	Valve Body Oil Temperature Sensor Short to Power Supply or Open	Clutch temperature sensor voltage is more than 4.75 V	Clutch temperature sensor voltage is less than 4.75 V	Check wire harness and connector
P183914	1st/5th Gear Fork Position Sensor Short to Ground or Open	1st/5th gear fork pulse duty ratio is less than 5%	1st/5th gear fork pulse duty ratio is more than 5%	Check wire harness and connector
P187412	1st/5th Gear Fork Position Sensor Short to Power Supply	1st/5th gear fork pulse duty ratio is more than 95%	1st/5th gear fork pulse duty ratio is less than 95%	Check wire harness and connector
P184014	2nd/6th Gear Fork Position Sensor Short to Ground or Open	2nd/6th gear fork pulse duty ratio is less than 5%	2nd/6th gear fork pulse duty ratio is more than 5%	Check wire harness and connector
P187512	2nd/6th Gear Fork Position Sensor Short to Power Supply	2nd/6th gear fork pulse duty ratio is more than 95%	2nd/6th gear fork pulse duty ratio is less than 95%	Check wire harness and connector
P184114	3rd/7th Gear Fork Position Sensor Short to Ground or Open	3rd/7th gear fork pulse duty ratio is less than 5%	3rd/7th gear fork pulse duty ratio is more than 5%	Check wire harness and connector
P187612	3rd/7th Gear Fork Position Sensor Short to Power Supply	3rd/7th gear fork pulse duty ratio is more than 95%	3rd/7th gear fork pulse duty ratio is less than 95%	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P184214	4th/R Gear Fork Position Sensor Short to Ground or Open	4th/R gear fork pulse duty ratio is less than 5%	4th/R gear fork pulse duty ratio is more than 5%	Check wire harness and connector
P187712	4th/R Gear Fork Position Sensor Short to Power Supply	4th/R gear fork pulse duty ratio is more than 95%	4th/R gear fork pulse duty ratio is less than 95%	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P187115	E-park Position Sensor Short to Power Supply or Open	Position sensor duty ratio is more than 93%	Position sensor duty ratio is less than 93%	Check wire harness and connector
P187811	E-park Position Sensor Short to Ground	Position sensor duty ratio is less than 7%	Position sensor duty ratio is more than 7%	Check wire harness and connector
P071501	Odd Input Shaft Speed Sensor Overrange	Odd input shaft speed sensor value is more than 15000 rpm	Odd input shaft speed sensor value is less than 15000 rpm	Check wire harness and connector
P071664	Odd Input Shaft Speed Sensor Rationality Checksum Failure	Odd input shaft speed sensor rationality checksum fails	Odd input shaft speed sensor rationality checksum is successful	Check speed sensor
P276501	Even Input Shaft Speed Sensor Overrange	Odd input shaft speed sensor value is more than 15000 rpm	Odd input shaft speed sensor value is less than 15000 rpm	Check wire harness and connector
P276664	Even Input Shaft Speed Sensor Rationality Checksum Failure	Even input shaft speed sensor rationality checksum fails	Even input shaft speed sensor rationality checksum is successful	Check speed sensor
P072001	Output Shaft Speed Sensor Overrange	Transmission output speed is too high (more than 9100 rpm)	Transmission output speed is too high (less than 9100 rpm)	Check wire harness and connector
P072139	Output Shaft Speed Sensor Steering Error	Direction pulse is out of the acceptable standard range	Direction pulse is within the acceptable standard range	Check speed sensor
P072164	Output Shaft Speed Sensor Rationality Checksum Failure	Output shaft speed sensor rationality checksum fails	Output shaft speed sensor rationality checksum is successful	Check speed sensor
P072501	Clutch Speed Sensor Overrange	Clutch speed sensor value is more than 15000 rpm	Clutch speed sensor value is less than 15000 rpm	Check wire harness and connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P072664	Clutch Speed Sensor Rationality Checksum Failure	Clutch speed sensor rationality checksum fails	Clutch speed sensor rationality checksum is successful	Check speed sensor
P180564	Odd Shaft Gear Position Speed Ratio Matching Failure	Odd shaft gear position speed ratio matching fails	Odd shaft gear position speed ratio matching is successful	Check clutch pressure sensor
P180664	Even Shaft Gear Position Speed Ratio Matching Failure	Even shaft gear position speed ratio matching fails	Even shaft gear position speed ratio matching is successful	Check clutch pressure sensor
P084001	Odd Clutch Pressure Out of Limit	Odd clutch pressure is more than 16 bar	Odd clutch pressure is less than 16 bar	Check clutch pressure sensor
P084137	Difference Between Target and Actual Pressures of Odd Clutch Out of Range	Difference between target and actual pressures of odd clutch is more than 2 bar	Difference between target and actual pressures of odd clutch is less than 2 bar	Check clutch pressure sensor
P084136	Difference Between Target and Actual Pressures of Odd Clutch Out of Range	Difference between target and actual pressures of odd clutch is more than 2 bar	Difference between target and actual pressures of odd clutch is less than 2 bar	Check clutch pressure sensor
P084124	Odd Clutch Pressure Zero Shift	Zero shift occurs in odd clutch pressure	There is no zero shift in odd clutch pressure	Check clutch pressure sensor
P084501	Even Clutch Pressure Out of Limit	Even clutch pressure sensor signal out of range: Even clutch input pressure is less than 0 bar or more than 16 bar	Even clutch input pressure is more than 0 and less than 16 bar	Check clutch pressure sensor
P084637	Difference Between Actual and Target Pressures of Even Clutch Out of Range	Difference between target and actual pressures of even clutch is more than 2 bar	Difference between target and actual pressures of even clutch is less than 2 bar	Check clutch pressure sensor
P084636	Difference Between Target and Actual Pressures of Even Clutch Out of Range	Difference between target and actual pressures of even clutch is more than 2 bar	Difference between target and actual pressures of even clutch is less than 2 bar	Check clutch pressure sensor

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P084624	Even Clutch Pressure Zero Shift	Zero shift occurs in even clutch pressure	There is no zero shift in even clutch pressure	Check clutch pressure sensor
P071162	Difference Between Clutch Oil Temperature and Valve Body Oil Temperature Too Large	Difference between valve body oil temperature and clutch oil temperature is more than 60°C	Difference between valve body oil temperature and clutch oil temperature is less than 60°C	Check temperature sensor
P071685	Odd Input Shaft Speed Out of Upper Limit	Odd input shaft speed sensor value is more than 10000 rpm	Odd input shaft speed sensor value is less than 10000 rpm	Check speed sensor
P276685	Even Input Shaft Speed Out of Upper Limit	Even input shaft speed sensor value is more than 10000 rpm	Even input shaft speed sensor value is less than 10000 rpm	Check speed sensor
P072185	Excessive Clutch Slipping	Output speed sensor value is more than 3000 rpm	Output speed sensor value is less than 3000 rpm	Check speed sensor
P081107	Excessive Clutch Slipping	Clutch slipping is excessive	Clutch slipping is normal	Check clutch
P181077	Shifting to 1st Gear Failure	It fails to shift to 1st gear	It is successful to shift to 1st gear	Check shift lever, gear, position sensor and synchronizer
P181177	Shifting Out of 1st Gear Failure	It fails to shift out of 1st gear	It is successful to shift out of 1st gear	Check shift lever, gear, position sensor and synchronizer
P181277	Shifting to 2nd Gear Failure	It fails to shift to 2nd gear	It is successful to shift to 2nd gear	Check shift lever, gear, position sensor and synchronizer
P181377	Shifting Out of 2nd Gear Failure	It fails to shift out of 2nd gear	It is successful to shift out of 2nd gear	Check shift lever, gear, position sensor and synchronizer
P181477	Shifting to 3rd Gear Failure	It fails to shift to 3rd gear	It is successful to shift to 3rd gear	Check shift lever, gear, position sensor and synchronizer
P181577	Shifting Out of 3rd Gear Failure	It fails to shift out of 3rd gear	It is successful to shift out of 3rd gear	Check shift lever, gear, position sensor and synchronizer
P181677	Shifting to 4th Gear Failure	It fails to shift to 4th gear	It is successful to shift to 4th gear	Check shift lever, gear, position sensor and synchronizer
P181777	Shifting Out of 4th Gear Failure	It fails to shift out of 4th gear	It is successful to shift out of 4th gear	Check shift lever, gear, position sensor and synchronizer
P181877	Shifting to 5th Gear Failure	It fails to shift to 5th gear	It is successful to shift to 5th gear	Check shift lever, gear, position sensor and synchronizer

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181977	Shifting Out of 5th Gear Failure	It fails to shift out of 5th gear	It is successful to shift out of 5th gear	Check shift lever, gear, position sensor and synchronizer
P182077	Shifting to 6th Gear Failure	It fails to shift to 6th gear	It is successful to shift to 6th gear	Check shift lever, gear, position sensor and synchronizer
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182177	Shifting Out of 6th Gear Failure	It fails to shift out of 6th gear	It is successful to shift out of 6th gear	Check shift lever, gear, position sensor and synchronizer
P186077	Shifting to 7th Gear Failure	Engagement error occurs in gear failing to reach command position of 7th gear	Engagement error occurs in gear that can reach command position of 7th gear	Check shift lever, gear, position sensor and synchronizer
P186177	Shifting Out of 7th Gear Failure	Separation error occurs in gear failing to reach command position of 7th gear	Separation error occurs in gear that can reach command position of 7th gear	Check shift lever, gear, position sensor and synchronizer
P182277	Shifting to R Gear Failure	It fails to shift to R gear	It is successful to shift to R gear	Check shift lever, gear, position sensor and synchronizer
P181092	Shifting to 1st Gear Failure from Stationary State	It fails to shift to 1st gear from stationary state	It is successful to shift to 1st gear from stationary state	Check shift lever, gear, position sensor and synchronizer
P182292	Shifting to R Gear Failure from Stationary State	It fails to shift to R gear from stationary state	It is successful to shift to R gear from stationary state	Check shift lever, gear, position sensor and synchronizer
P182377	Shifting Out of R Gear Failure	It fails to shift out of R gear	It is successful to shift out of R gear	Check shift lever, gear, position sensor and synchronizer
P185007	Unexpected Shifting Out on Odd Shaft	Abnormal shifting out occurs on odd shaft	Upshift/downshift can be performed normally on odd shaft	Check shift lever, gear, position sensor and synchronizer
P185107	Unexpected Shifting Out on Even Shaft	Abnormal shifting out occurs on even shaft	Upshift/downshift can be performed normally on even shaft	Check shift lever, gear, position sensor and synchronizer
P185207	Engine Crankshaft Failure	Difference between engine speed and clutch speed sensor value is more than 750 rpm	Difference between engine speed and clutch speed sensor value is less than 750 rpm	Check crankshaft
P185307	Transmission Coupling Shaft or Differential Connection Failure	Difference between output shaft speed and propeller shaft speed is more than 250 rpm	Difference between output shaft speed and propeller shaft speed is less than 250 rpm	Check crankshaft
P089392	Odd Shaft Multi-gear	Odd shaft multi-gear engages	Gears engage normally on odd shaft	Check gear

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Engagement Failure			
P182492	Even Shaft Multi-gear Engagement Failure	Even shaft multi-gear engages	Gears engage normally on even shaft	Check gear
P278798	Clutch Surface Temperature Too High Failure	Clutch surface temperature is higher than 350°C	Clutch surface temperature is lower than 350°C	
P184998	Transmission Temperature Too High Failure	Valve oil temperature/(-clutch oil temperature - 20°C) is higher than 140°C	Valve/(clutch -25°C) temperature signal is lower than the maximum value (140°C)	
P184592	Dual Clutch Simultaneous Engagement Failure	Simultaneous engagement failure occurs in dual clutch	Dual clutch does not engage simultaneously	Check clutch

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P184809	SubRom Read Failure	It fails to read the sub procedure	Sub procedure is successfully read once	Check subrom
P185644	EEPROM Checksum Failure	The SubROM logical identifier compared to EE does not match properly	The SubROM logical identifier compared to EE matches properly	Read subrom
P187277	Shifting to P Gear Failure	Epark engages at wrong command position and cannot be reached after 3 times	Epark engages at wrong command position and can be reached within 3 times	Check Epark
P187377	Shifting Out of P Gear Failure	Epark separates at wrong command position and cannot be reached after 3 times	Epark separates at wrong command position and can be reached within 3 times	Check Epark
P279785	Motor Speed Out of Upper Limit	BLDC speed value is more than 3300 rpm	BLDC speed value is less than 3300 rpm	Check brush
P0A1B64	Motor Control Times Out	Motor target speed is more than 1000 rpm, and motor actual speed is less than 200 rpm	Motor target speed is less than 1000 rpm, and motor actual speed is more than 200 rpm	Check brush
P190344	TCU Memory Read Failure	TCU memory read error occurs	It is read successfully	
P190444	TCU Memory Writing Failure	TCU memory writing error occurs	It is written successfully	
P190198	CG135 Chip Overtemperature	CG135 and NTC have overtemperature	CG135 and NTC have low temperature	
P190201	CG135 Chip Temperature Error	CG135 and NTC have overtemperature	No CG135 and NTC temperature errors are detected	

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U010087	EMS Node Communication Missing	For message EMS\ U 1/ EMS\ U 2/EMS\ U 3/EMS\ U 4/EMS\ U 5/EMS\ U 7/ EMS\ U 9/EMS\ U C, TCU fails to receive message from EMS node 20 times	Once missing message is restored to normal reception	Check CAN communication
U010387	EMS Node Communication Missing	For message EGS\ U 1, TCU fails to receive message from EGS node 20 times	Once missing message is restored to normal reception	Check CAN communication
U012287	EMS Node Communication Missing	For message EPB\ U 1/ ESC\ U 2/ESC\ U 3/ESC\ U 4/ESC\ U 6/ESC\ U 7, TCU fails to receive message from ESC node 20 times	Once missing message is restored to normal reception	Check CAN communication
U014087	BCM Node Communication Missing	For message BCM\ U 1, TCU does not receive a message from BCM node 20 consecutive times	Once missing message is restored to normal reception	Check CAN communication
U015187	ACM Node Communication Missing	For message ACM\ U 1, TCU fails to receive message from ACM node for 4000 ms; For message ACM\ U 2, TCU fails to receive message from ACM node 20 times	Once missing message is restored to normal reception	Check CAN communication
U015587	IPC Node Communication Missing	For message IPC\ U 5/IPC\ U 7, TCU fails to receive message from IPC node for 4000 ms; For message IPC\ U C, TCU fails to receive message from IPC node 20 times	Once missing message is restored to normal reception	Check CAN communication
U016487	CLM Node Communication Missing	For message CLM\ U 3, TCU fails to receive message from CLM node 20 times	Once missing message is restored to normal reception	Check CAN communication
U021287	SCM Node Communication Missing	For message SCM\ U 1, TCU fails to receive message from SCM node 20 times	Once missing message is restored to normal reception	Check CAN communication
U024887	PEPS Node Communication Missing	For message PEPS\ U 4, TCU fails to receive message from PEPS node 20 times	Once missing message is restored to normal reception	Check CAN communication
U040181	EMS Node Data Invalid	Message with invalid signal content is received from EMS 10 times	Once the message with valid signal content is received from EMS node	Check CAN communication

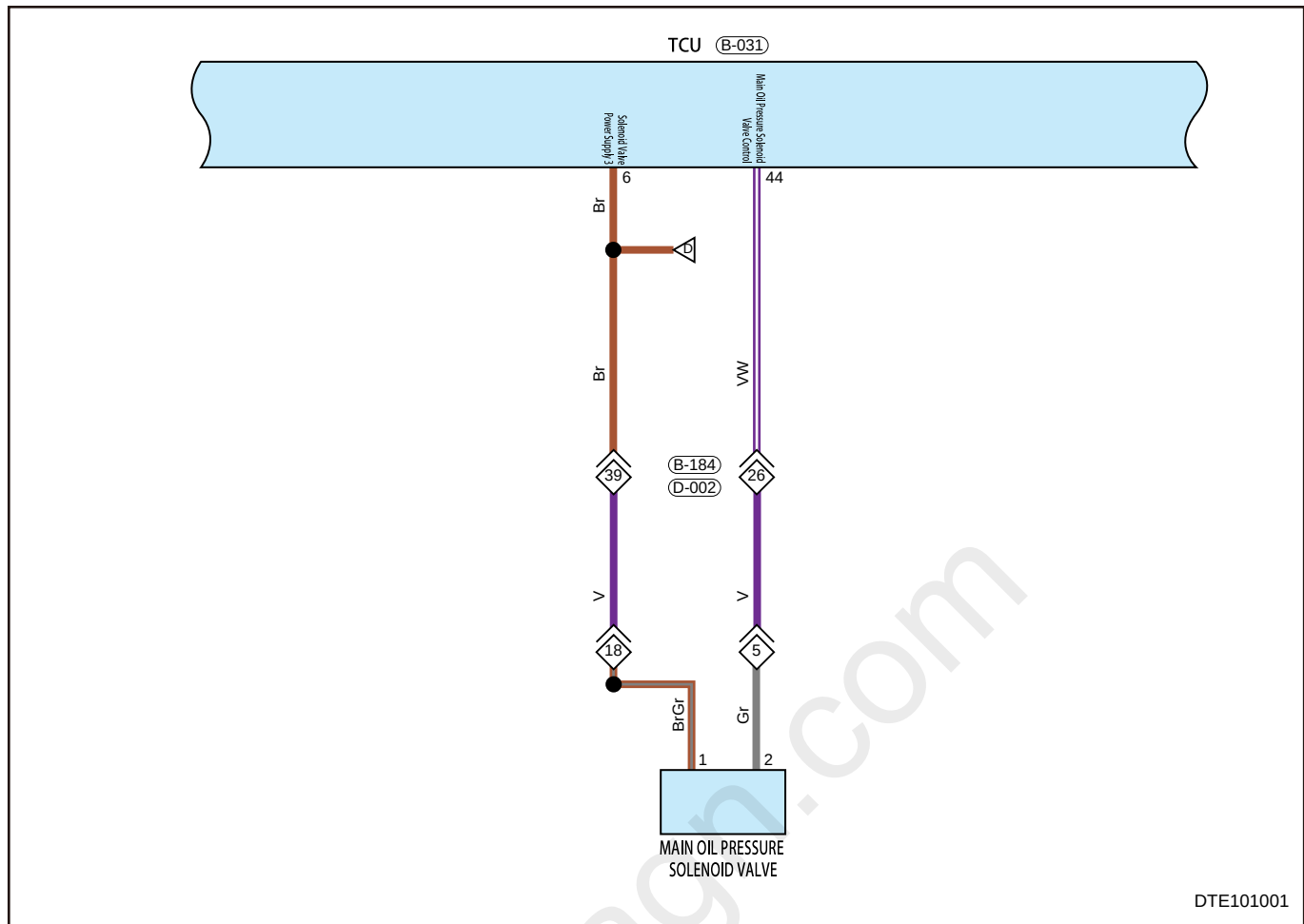
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U040481	EGS Node Data Invalid	Message with invalid signal content is received from EGS 10 times	Once the message with valid signal content is received from EGS node	Check CAN communication
U041681	ESC Node Data Invalid	Message with invalid signal content is received from ESC 10 times	Once the message with valid signal content is received from ESC node	Check CAN communication
U042281	BCM Node Data Invalid	Message with invalid signal content is received from BCM 10 times	Once the message with valid signal content is received from BCM node	Check CAN communication
U042381	IPC Node Data Invalid	Message with invalid signal content is received from IPC 10 times	Once the message with valid signal content is received from IPC node	Check CAN communication
U042481	CLM Node Data Invalid	Message with invalid signal content is received from CLM 10 times	Once the message with valid signal content is received from CLM node	Check CAN communication
U042681	PEPS Node Data Invalid	Message with invalid signal content is received from PEPS 10 times	Once the message with valid signal content is received from PEPS node	Check CAN communication
U042981	SCM Node Data Invalid	Message with invalid signal content is received from SCM 10 times	Once the message with valid signal content is received from SCM node	Check CAN communication
U045281	ACM Node Data Invalid	Message with invalid signal content is received from ACM 10 times	Once the message with valid signal content is received from ACM node	Check CAN communication

4.8 DTC Diagnosis Procedure

■ Main Oil Path Solenoid Valve DTCs

DTC	P096013	Main Oil Path Solenoid Valve Open
DTC	P096211	Main Oil Path Solenoid Valve Short to Ground
DTC	P096312	Main Oil Path Solenoid Valve Short to Power Supply
DTC	P188904	Main Oil Path Solenoid Valve Passage Closes Unexpectedly
DTC	P188A01	Main Oil Path Solenoid Valve Circuit Error
DTC	P074519	Main Oil Path Solenoid Valve Feedback Current Too High
DTC	P074818	Main Oil Path Solenoid Valve Feedback Current Too Low

Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

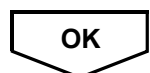
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery
----------	----------------------

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG	Replace battery
-----------	------------------------



2 Check alternator

(a) Check the alternator.

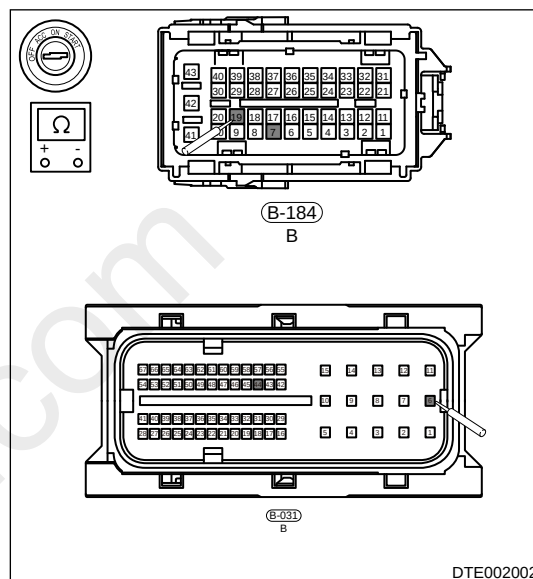
NG**Replace alternator****OK****3 Check main oil path solenoid valve wire harness**

(a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.

(b) Turn ENGINE START STOP switch to OFF.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (6) - B-184 (39)	Always	Less than 1 Ω
B-031 (44) - B-184 (26)	Always	Less than 1 Ω

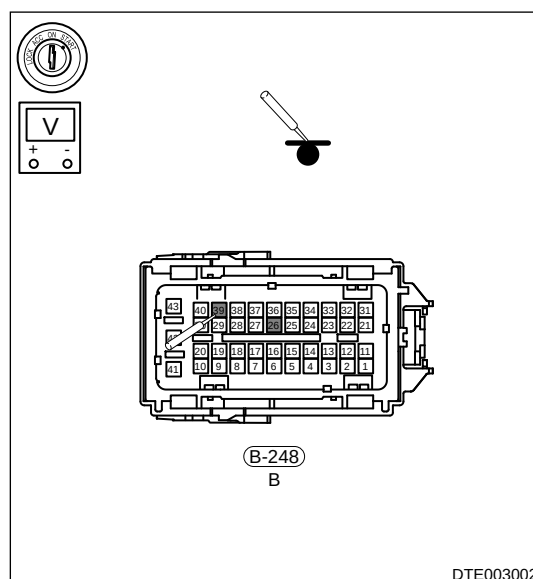
**NG****Check and repair main oil path solenoid valve wire harness****OK****4 Check voltage of main oil path solenoid valve wire harness connector**

(a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.

(b) Turn ENGINE START STOP switch to ON.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (39) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (26) - Body ground	ENGINE START STOP switch ON	0 V



NG

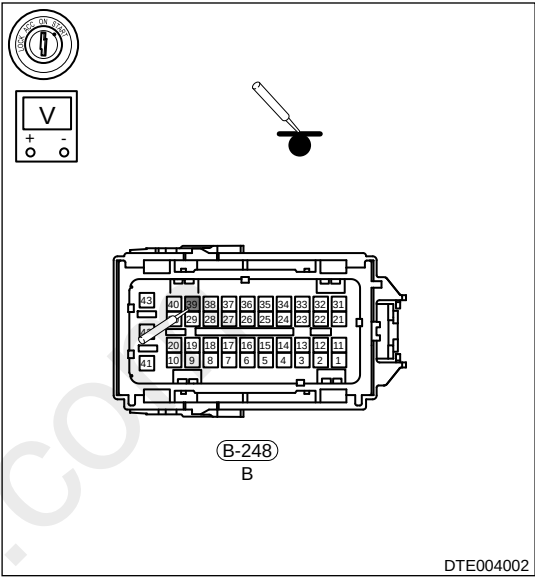
Repair short failure to power supply in main oil path solenoid valve

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 39 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (39) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Check wire harness between B-184 (39) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

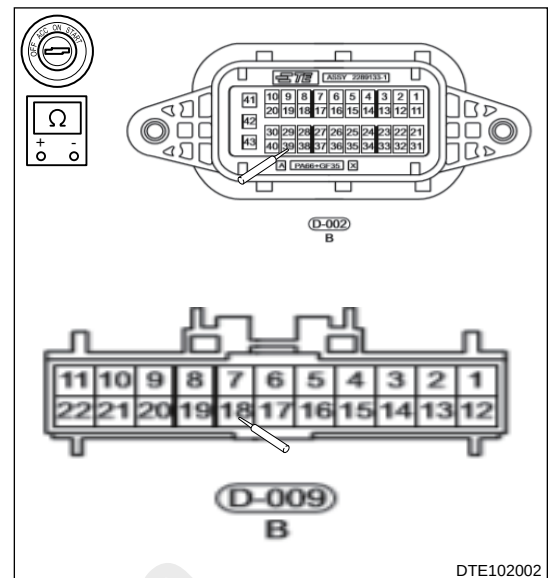
Repair or replace connector or wire harness

OK

7 Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, check for continuity between terminals 39 and 26 of connector D-002 and terminals 18 and 5 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (39) - D-009 (18)	Always	Less than 1 Ω
D-002 (26) - D-009 (5)	Always	Less than 1 Ω



DTE102002

NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
 (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
 (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

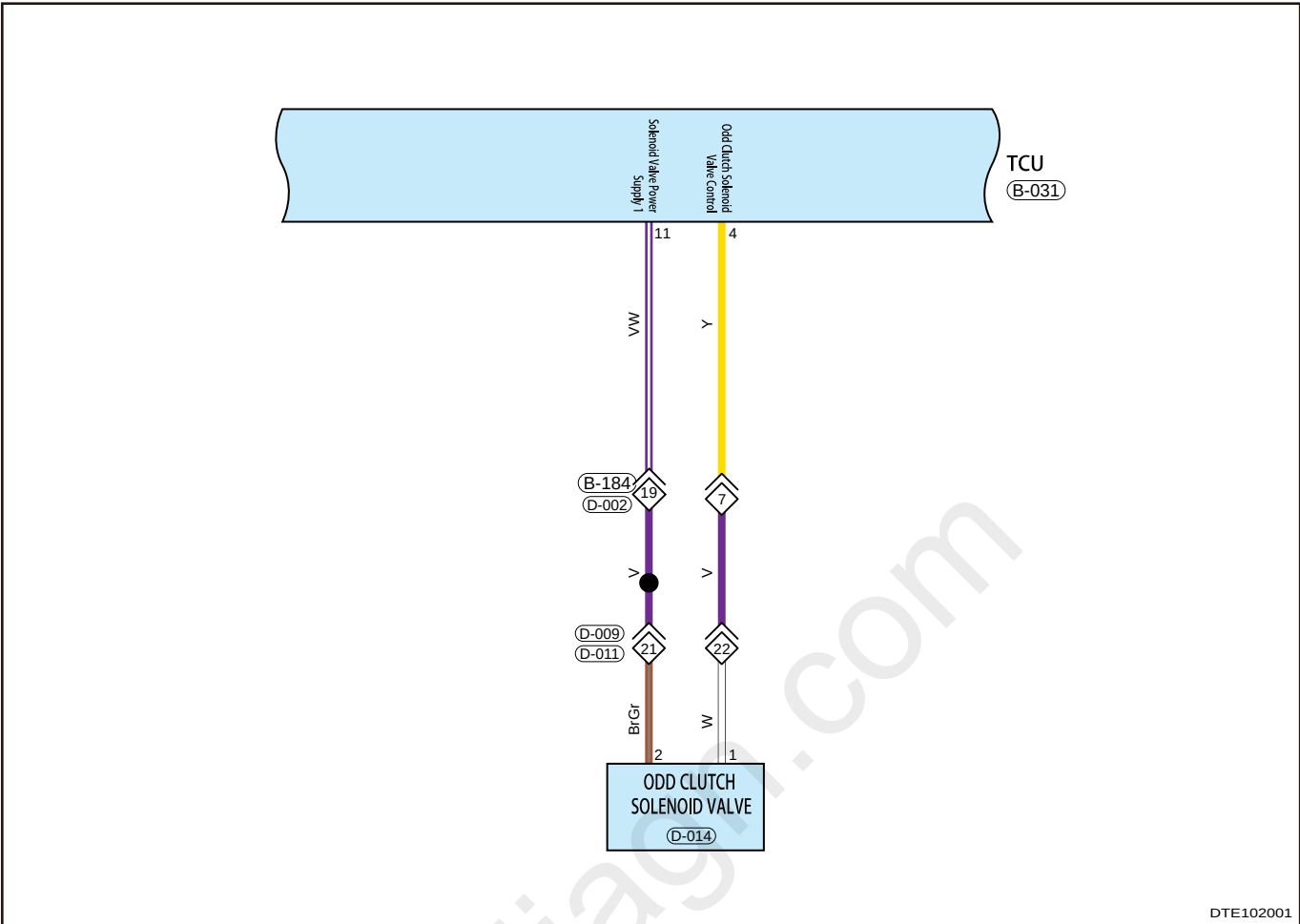
NG

Replace TCU module assembly

■ Odd Clutch Solenoid Valve DTCs

DTC	P182513	Odd Clutch Solenoid Valve Open
DTC	P097311	Odd Clutch Solenoid Valve Short to Ground
DTC	P097412	Odd Clutch Solenoid Valve Short to Power Supply
DTC	P188D04	Odd Clutch Solenoid Valve Passage Closes Unexpectedly
DTC	P188E01	Odd Clutch Solenoid Valve Circuit Error
DTC	P075019	Odd Clutch Solenoid Valve Feedback Current Too High
DTC	P075318	Odd Clutch Solenoid Valve Feedback Current Too Low

Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery
---	---------------

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG	Replace battery
----	-----------------

OK

2 Check alternator

(a) Check the alternator.

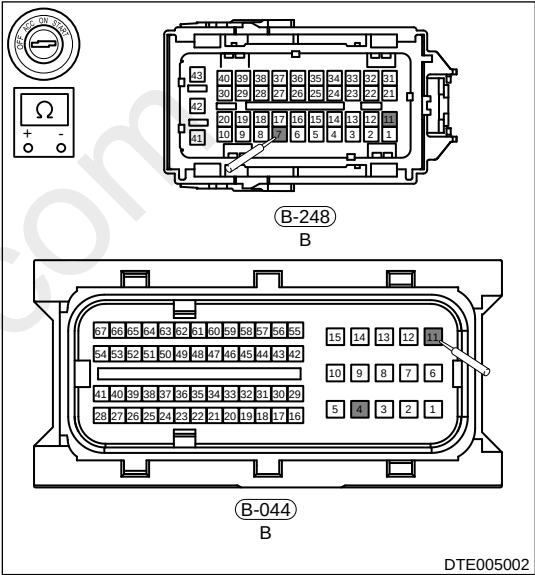
NG Replace alternator

OK

3 Check odd clutch solenoid valve wire harness

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to OFF.
- (c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (4) - B-184 (7)	Always	Less than 1 Ω
B-031 (11) - B-184 (19)	Always	Less than 1 Ω



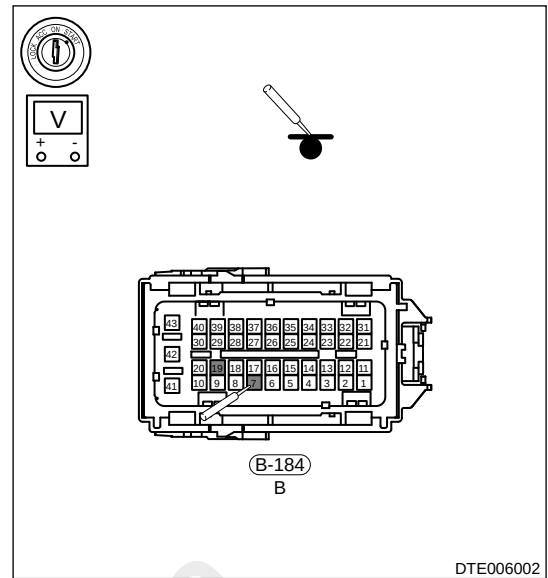
NG Check and repair odd clutch solenoid valve wire harness

OK

4 Check voltage of odd clutch solenoid valve wire harness connector

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (19) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (7) - Body ground	ENGINE START STOP switch ON	0 V



NG

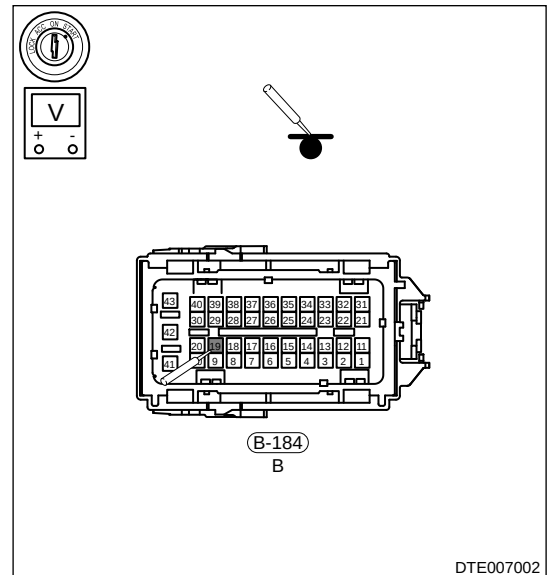
Repair short failure to power supply in odd clutch solenoid valve wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 19 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (19) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Check wire harness between B-184 (19) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

Repair or replace connector or wire harness

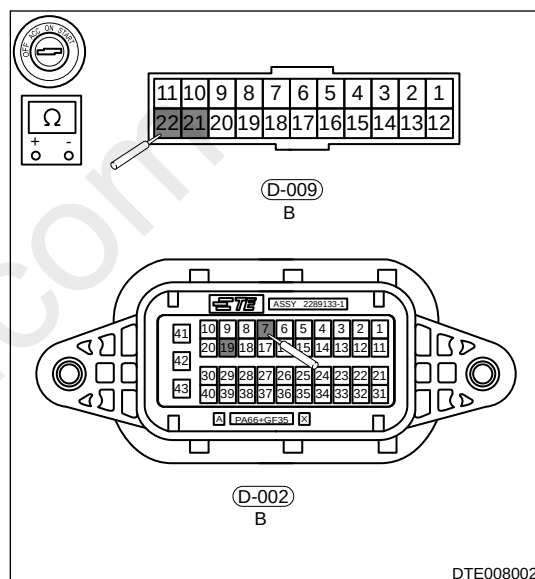
OK

7

Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 19 and 7 of connector D-002 and terminals 21 and 22 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (19) - D-009 (21)	Always	Less than 1 Ω
D-002 (7) - D-009 (22)	Always	Less than 1 Ω



NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

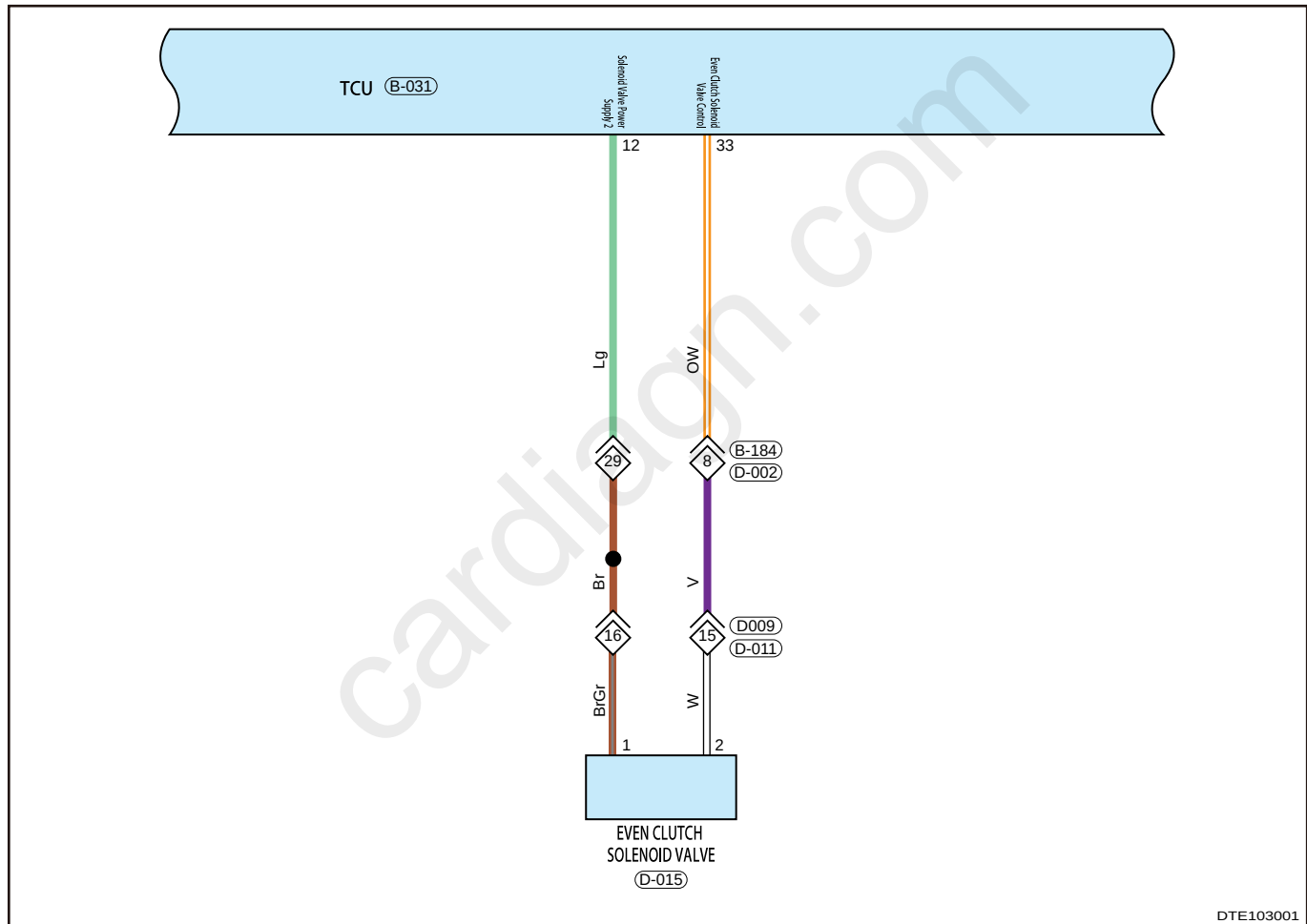
NG

Replace TCU module assembly

■ Even Clutch Solenoid Valve DTCs

DTC	P182613	Even Clutch Solenoid Valve Open
DTC	P097611	Even Clutch Solenoid Valve Short to Ground
DTC	P097712	Even Clutch Solenoid Valve Short to Power Supply
DTC	P188F04	Even Clutch Solenoid Valve Passage Closes Unexpectedly
DTC	P189001	Even Clutch Solenoid Valve Circuit Error
DTC	P075519	Even Clutch Solenoid Valve Feedback Current Too High
DTC	P075818	Even Clutch Solenoid Valve Feedback Current Too Low

Circuit Diagram



DTE103001

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.

- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check battery

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Using a multimeter, measure voltage between positive and negative battery terminals.

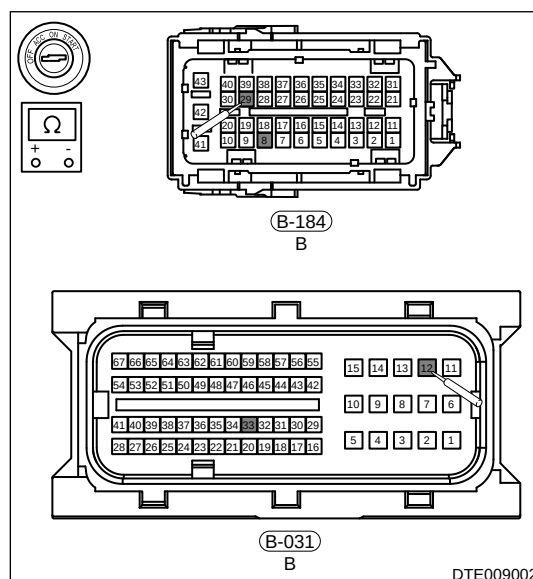
NG**Replace battery****OK****2 Check alternator**

- (a) Check generating capacity of alternator.

NG**Replace alternator****OK****3 Check even clutch solenoid valve wire harness**

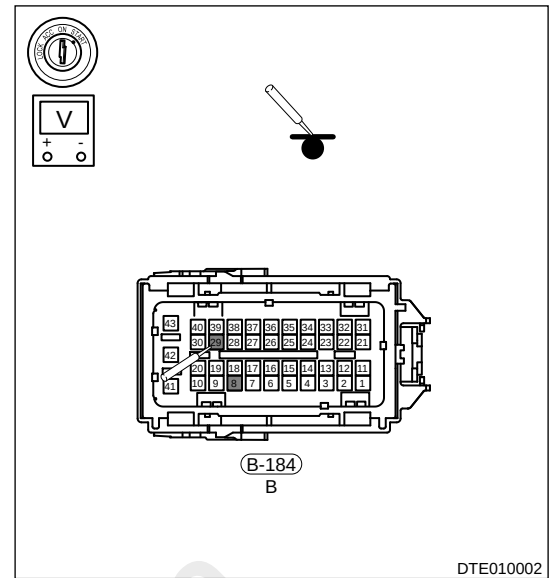
- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
 (b) Turn ENGINE START STOP switch to OFF.
 (c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (12) - B-184 (29)	Always	Less than 1 Ω
B-031 (33) - B-184 (8)	Always	Less than 1 Ω

**NG****Check and repair even clutch solenoid valve wire harness****OK****4 Check voltage of even clutch solenoid valve wire harness connector**

- Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- Turn ENGINE START STOP switch to ON.
- Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (29) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (8) - Body ground	ENGINE START STOP switch ON	0 V



NG

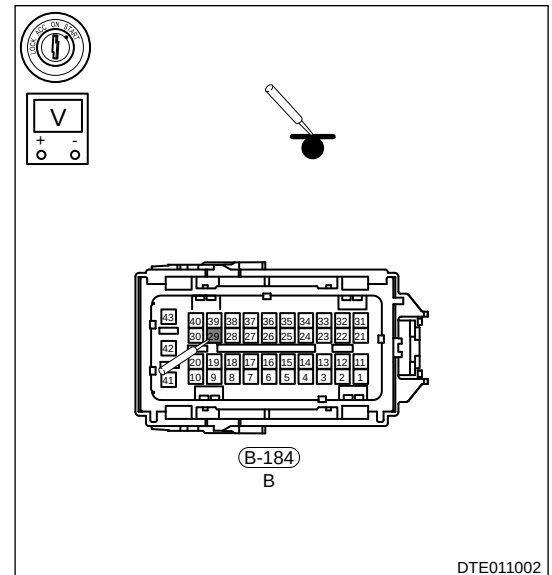
Repair short failure to power supply in even clutch solenoid valve wire harness

OK

5 Check TCU module output voltage

- Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- Turn ENGINE START STOP switch to ON.
- (Online detection) Measure voltage of terminal 29 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (29) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Check wire harness between B-184 (29) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

Repair or replace connector or wire harness

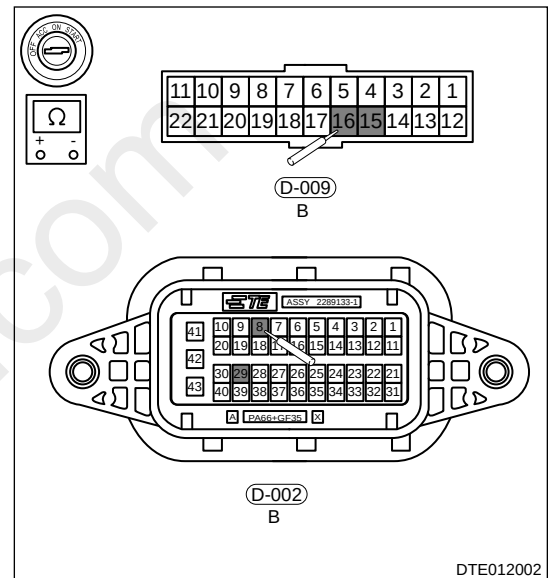
OK

7

Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 29 and 8 of connector D-002 and terminals 16 and 15 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (29) - D-009 (16)	Always	Less than 1 Ω
D-002 (8) - D-009 (15)	Always	Less than 1 Ω



NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

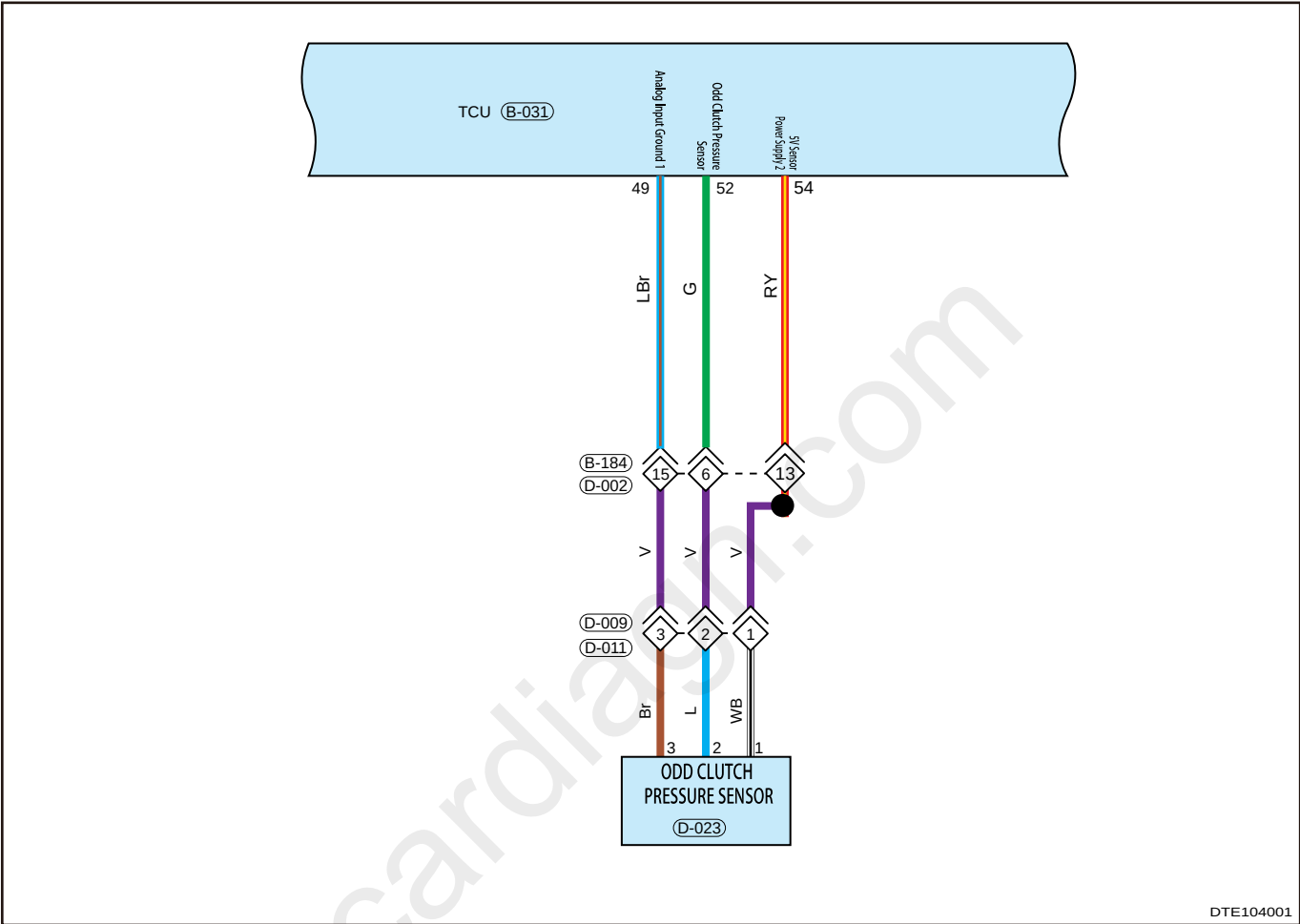
NG

Replace TCU module assembly

■ Odd Clutch Pressure Sensor DTCs

DTC	P084214	Odd Clutch Pressure Sensor Short to Ground or Open
DTC	P084312	Odd Clutch Pressure Sensor Short to Power Supply

Circuit Diagram



DTE104001

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check battery

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Using a multimeter, measure voltage between positive and negative battery terminals.

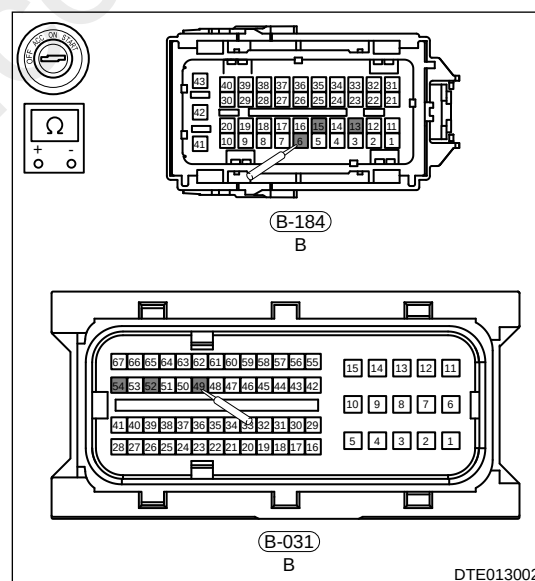
NG**Replace battery****OK****2 Check alternator**

- (a) Check the alternator.

NG**Replace alternator****OK****3 Check odd clutch pressure sensor wire harness**

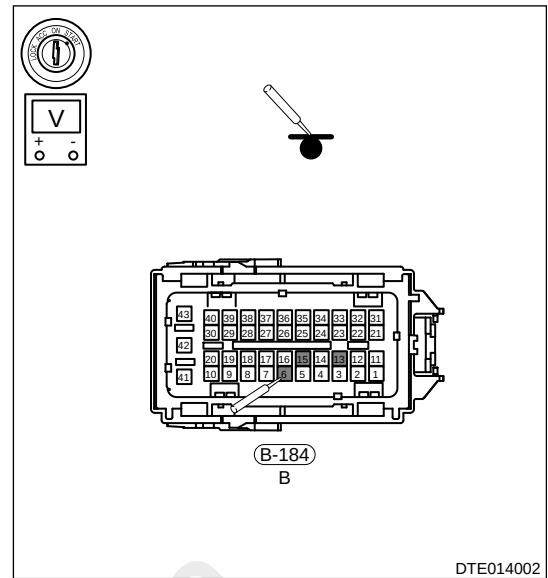
- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
 (b) Turn ENGINE START STOP switch to OFF.
 (c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (49) - B-184 (15)	Always	Less than 1 Ω
B-031 (52) - B-184 (6)	Always	Less than 1 Ω
B-031 (54) - B-184 (13)	Always	Less than 1 Ω

**NG****Check and repair odd clutch pressure sensor wire harness****OK****4 Check voltage of odd clutch pressure sensor wire harness connector**

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (15) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (13) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (6) - Body ground	ENGINE START STOP switch ON	0 V



NG

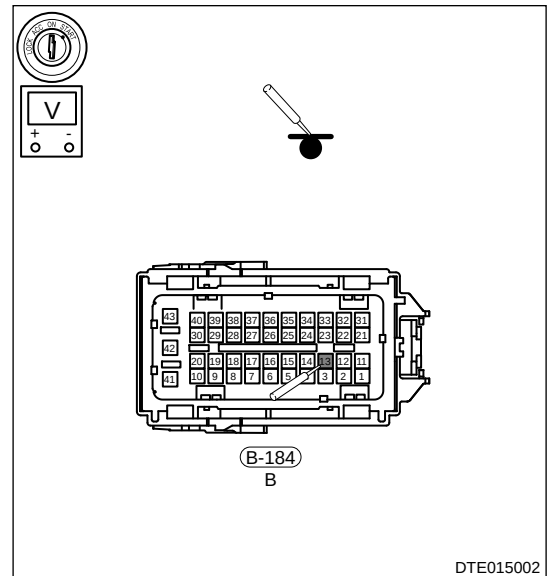
Repair short failure to power supply in odd clutch pressure sensor wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 13 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (13) - Body ground	ENGINE START STOP switch ON	Not less than 5V



NG

Check wire harness between B-184 (13) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

Repair or replace connector or wire harness

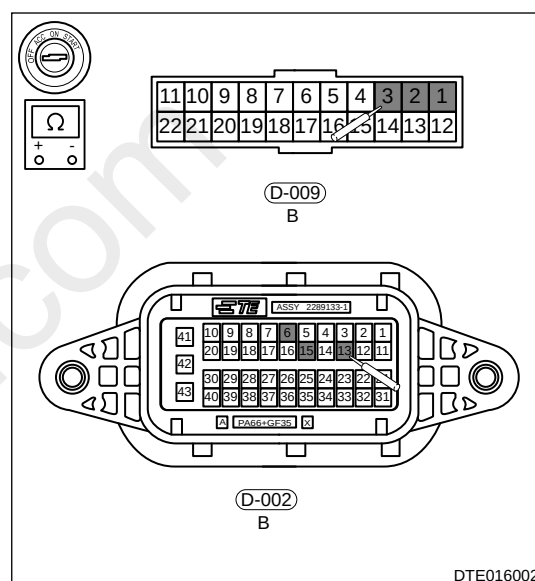
OK

7

Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 15, 13 and 6 of connector D-002 and terminals 3, 2 and 1 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (15) - D-009 (3)	Always	Less than 1 Ω
D-002 (6) - D-009 (2)	Always	Less than 1 Ω
D-002 (13) - D-009 (1)	Always	Less than 1 Ω



NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

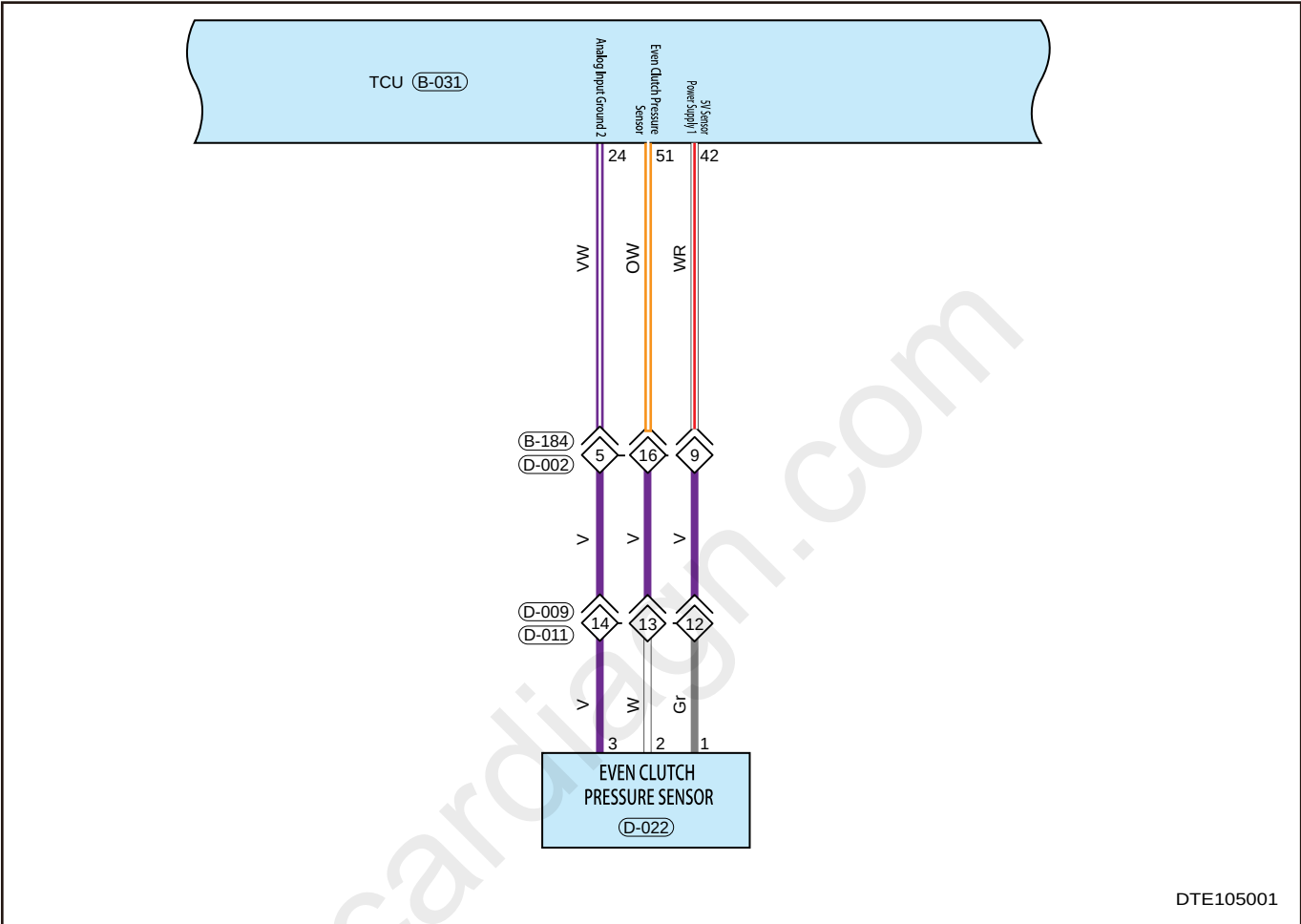
NG

Replace TCU module assembly

■ Even Clutch Pressure Sensor DTCs

DTC	P084714	Even Clutch Pressure Sensor Short to Ground or Open
DTC	P084812	Even Clutch Pressure Sensor Short to Power Supply

Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check battery

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Using a multimeter, measure voltage between positive and negative battery terminals.

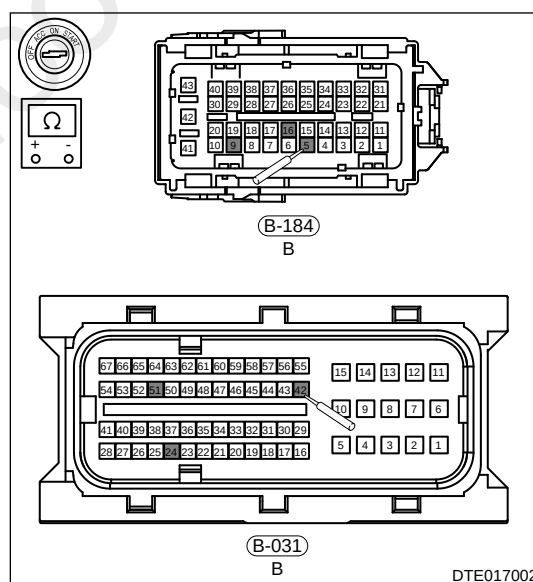
NG**Replace battery****OK****2 Check alternator**

- (a) Check the alternator.

NG**Replace alternator****OK****3 Check even clutch pressure sensor wire harness**

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
 (b) Turn ENGINE START STOP switch to OFF.
 (c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (24) - B-184 (5)	Always	Less than 1 Ω
B-031 (51) - B-184 (16)	Always	Less than 1 Ω
B-031 (42) - B-184 (9)	Always	Less than 1 Ω

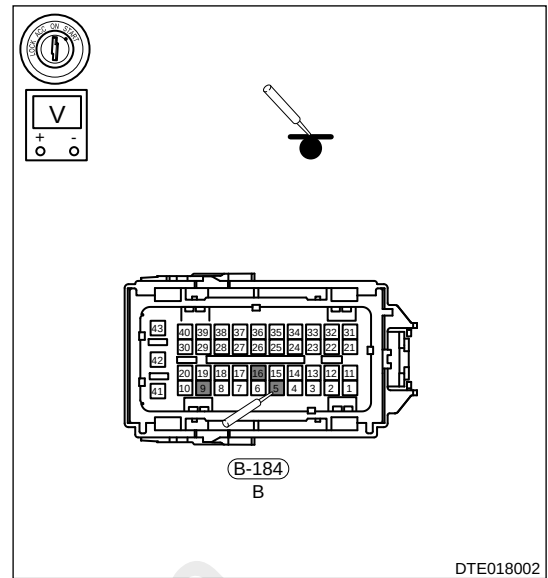


DTE017002

NG**Check and repair even clutch pressure sensor wire harness****OK****4 Check voltage of even clutch pressure sensor wire harness connector**

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (16) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (9) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (5) - Body ground	ENGINE START STOP switch ON	0 V



NG

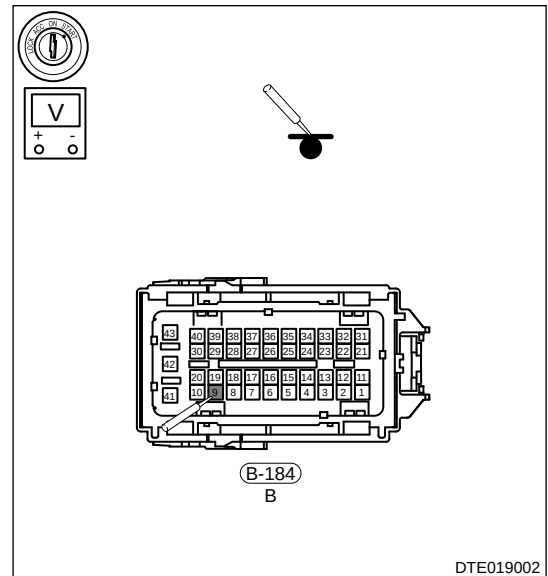
Repair short failure to power supply in even clutch pressure sensor wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 9 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (9) - Body ground	ENGINE START STOP switch ON	Not less than 5V



NG

Check wire harness between B-184 (9) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

Repair or replace connector or wire harness

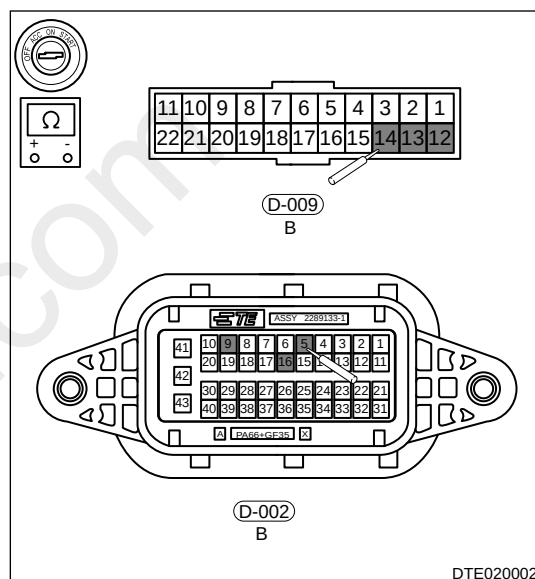
OK

7

Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 5, 16 and 9 of connector D-002 and terminals 14, 13 and 12 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (5) - D-009 (14)	Always	Less than 1 Ω
D-002 (16) - D-009 (13)	Always	Less than 1 Ω
D-002 (9) - D-009 (12)	Always	Less than 1 Ω



DTE020002

NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

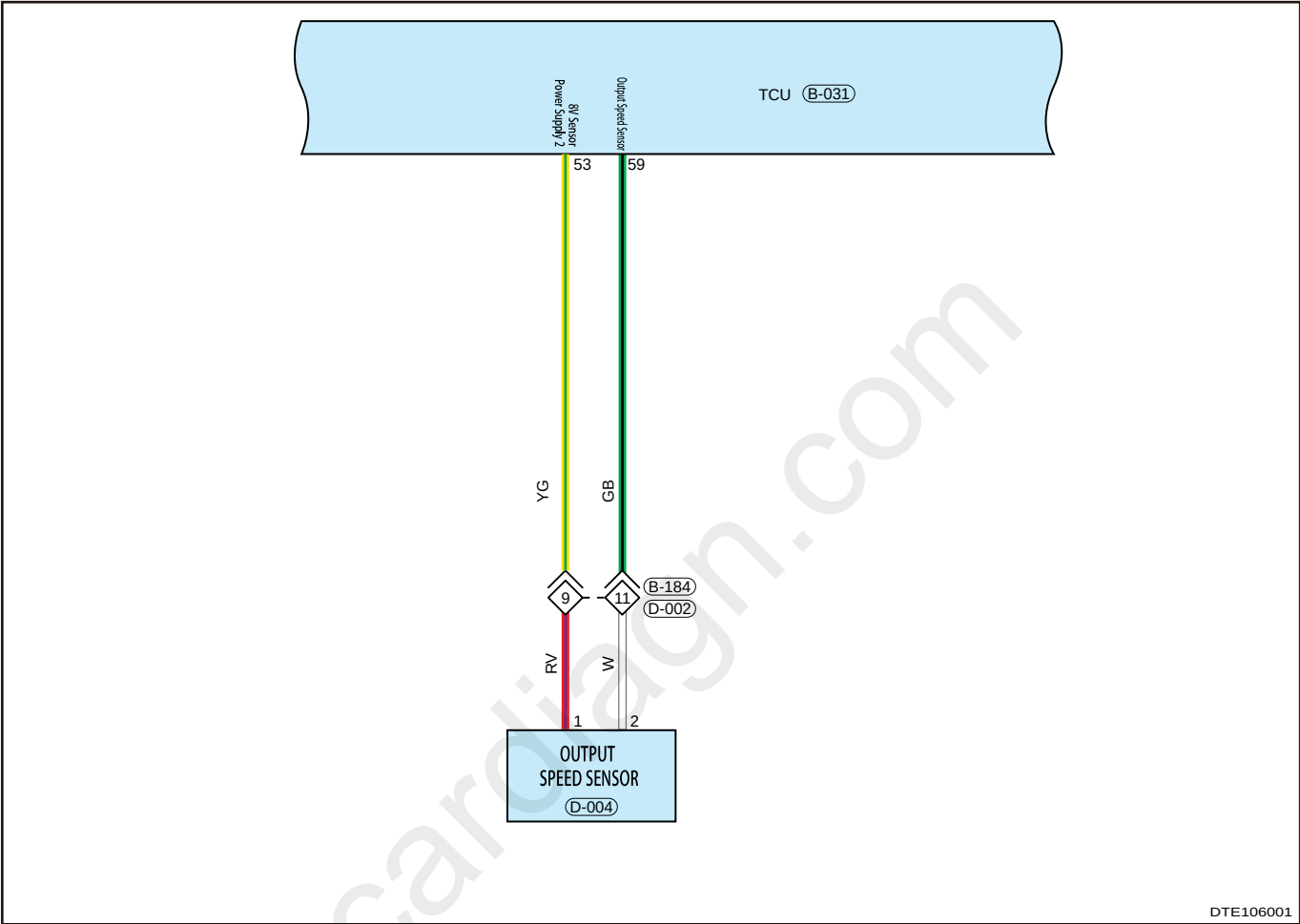
NG

Replace TCU module assembly

■ Output Shaft Speed Sensor DTCs

DTC	P072214	Output Shaft Speed Sensor Short to Ground or Open
DTC	P180312	Output Shaft Speed Sensor Short to Power Supply

Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check battery

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Using a multimeter, measure voltage between positive and negative battery terminals.

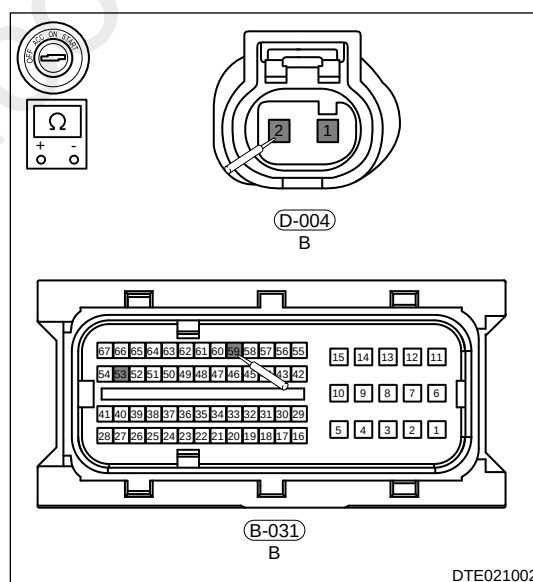
NG**Replace battery****OK****2 Check alternator**

- (a) Check the alternator.

NG**Replace alternator****OK****3 Check output shaft speed sensor wire harness**

- (a) Disconnect TCU connector, output shaft speed sensor connector and sensor integration module A.
 (b) Turn ENGINE START STOP switch to OFF.
 (c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031(59) - D-004 (2)	Always	Less than 1 Ω
B-031(53) - D-004 (1)	Always	Less than 1 Ω

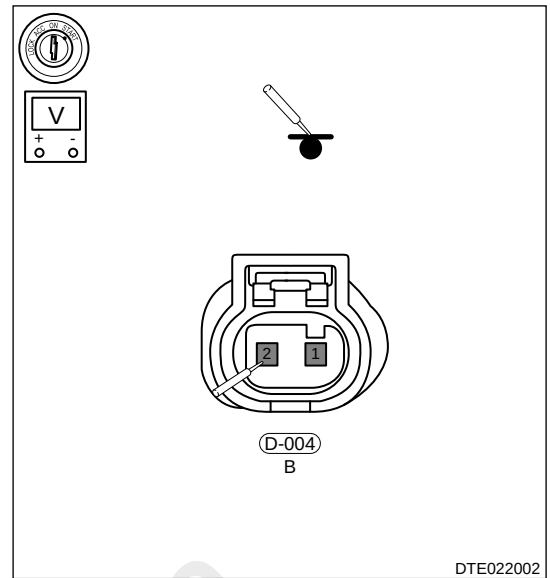


DTE021002

NG**Repair or replace wire harness****OK****4 Check voltage of output shaft speed sensor connector**

- (a) Disconnect TCU connector, output shaft speed sensor connector and sensor integration module A.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
D-004 (2) - Body ground	ENGINE START STOP switch ON	0 V
D-004 (1) - Body ground	ENGINE START STOP switch ON	0 V



NG

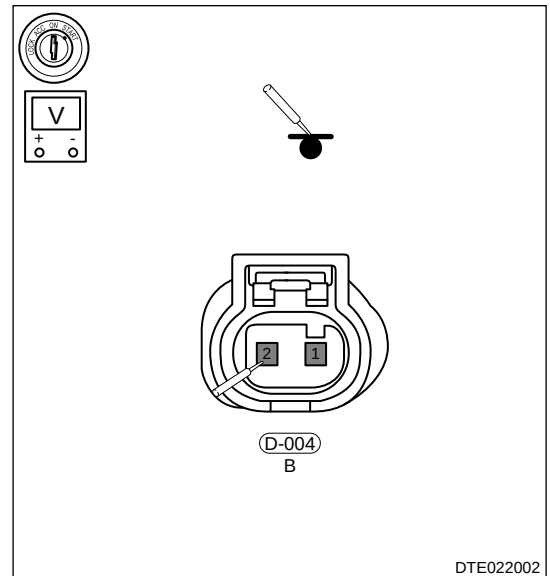
Repair short failure to power supply in output shaft speed sensor wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect output shaft speed sensor connector.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 1 of output shaft speed sensor connector D-004 (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
D-004 (1) - Body ground	ENGINE START STOP switch ON	Not less than 8V



NG

Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

OK

6 Check output shaft speed sensor

- (a) Disconnect the output shaft speed sensor connector.
 (b) Measure resistance of output shaft speed sensor with a multimeter.

NG

Replace output shaft speed sensor

OK

7

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
 (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
 (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

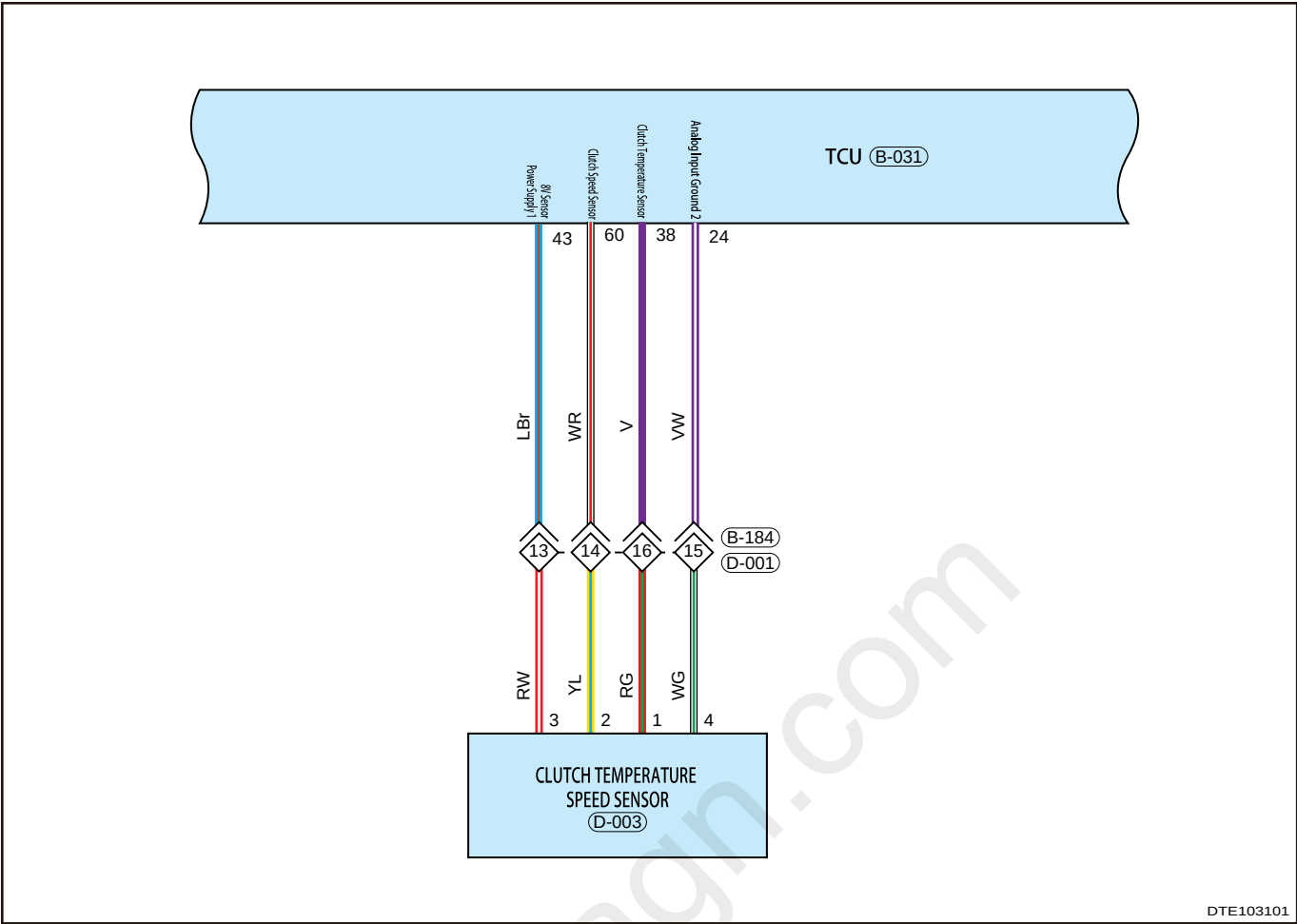
NG

Replace TCU module assembly

■ Clutch Temperature/Speed Sensor DTCs

DTC	P093911	Clutch Temperature Sensor Short to Ground
DTC	P094015	Clutch Temperature Sensor Short to Power Supply or Open
DTC	P072714	Clutch Speed Sensor Short to Ground or Open
DTC	P180412	Clutch Speed Sensor Short to Power Supply

Circuit Diagram



DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery
---	---------------

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG

Replace battery

OK

2 Check alternator

(a) Check the alternator.

NG

Replace alternator

OK

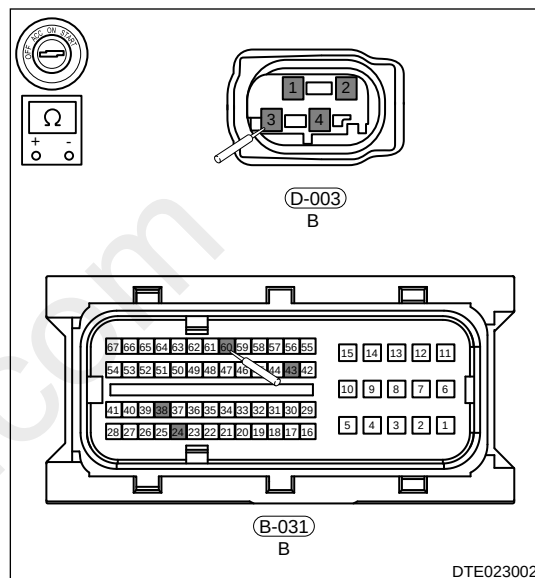
3 Check clutch temperature sensor wire harness

(a) Disconnect TCU connector, clutch temperature sensor connector and sensor integration module A.

(b) Turn ENGINE START STOP switch to OFF.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031(43) - D-003 (3)	Always	Less than 1 Ω
B-031(24) - D-003 (4)	Always	Less than 1 Ω
B-031(38) - D-003 (1)	Always	Less than 1 Ω
B-031(60) - D-003 (2)	Always	Less than 1 Ω



NG

Repair or replace wire harness

OK

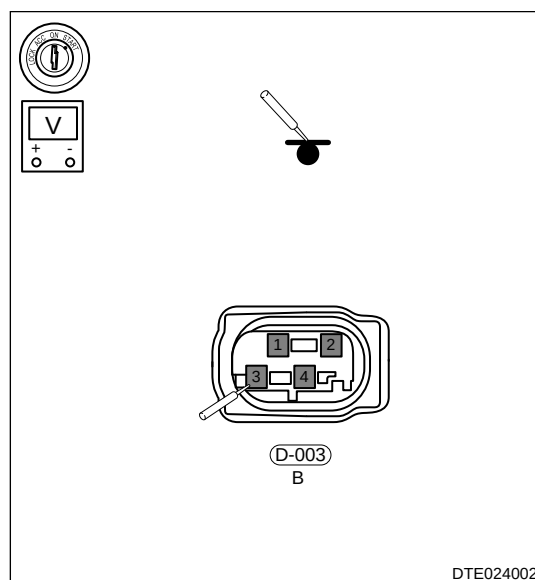
4 Check voltage of clutch temperature sensor connector

(a) Disconnect TCU connector, clutch temperature sensor connector and sensor integration module A.

(b) Turn ENGINE START STOP switch to ON.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
D-003 (3) - Body ground	ENGINE START STOP switch ON	0 V
D-003 (1) - Body ground	ENGINE START STOP switch ON	0 V
D-003 (4) - Body ground	ENGINE START STOP switch ON	0 V
D-003 (2) - Body ground	ENGINE START STOP switch ON	0 V



NG

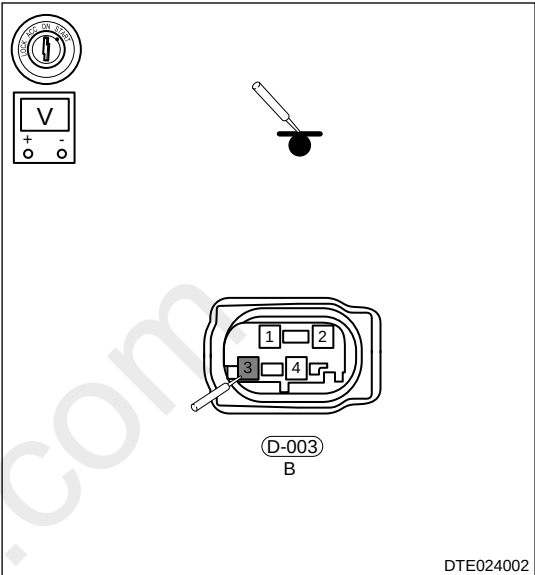
Repair short failure to power supply in clutch temperature sensor wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect clutch temperature sensor connector.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 1 of clutch temperature sensor connector D-003 (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
D-003 (3) - Body ground	ENGINE START STOP switch ON	Not less than 8V



NG

Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

OK

6 Check clutch temperature sensor

- (a) Disconnect the clutch temperature sensor connector.
- (b) Measure resistance of clutch temperature sensor with a multimeter.

NG

Replace clutch temperature sensor

OK

7 Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

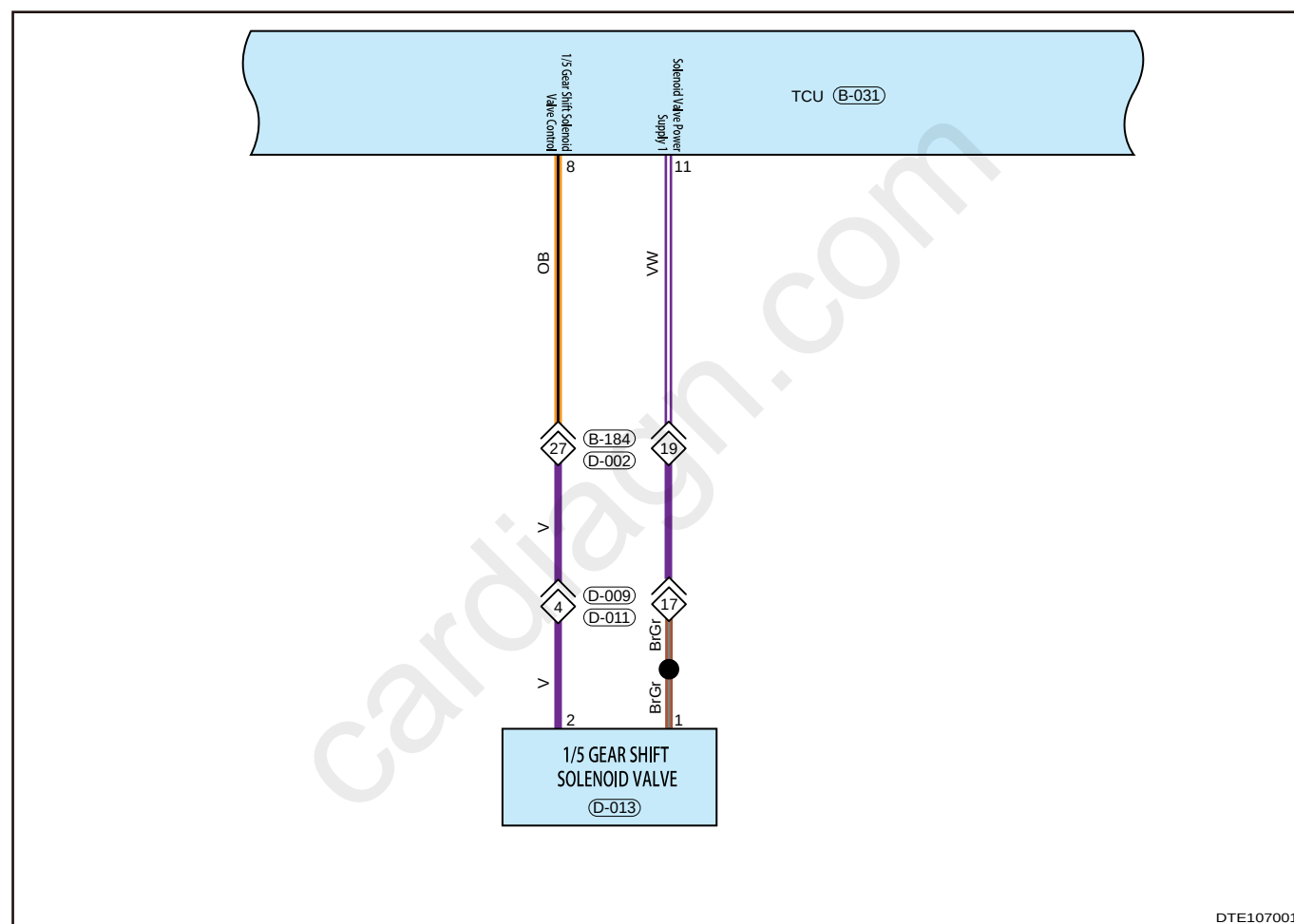
NG

Replace TCU module assembly

■ 1st/5th Gear Shift Solenoid Valve DTCs

DTC	P186213	1st/5th Gear Flow Solenoid Valve Open
DTC	P099B1	1st/5th Gear Flow Solenoid Valve Short to Ground
DTC	P099C12	1st/5th Gear Flow Solenoid Valve Short to Power Supply
DTC	P189904	1st/5th Gear Flow Solenoid Valve Passage Closes Unexpectedly
DTC	P189A01	1st/5th Gear Flow Solenoid Valve Circuit Error
DTC	P075A19	1st/5th Gear Flow Solenoid Valve Feedback Current Too High
DTC	P075D18	1st/5th Gear Flow Solenoid Valve Feedback Current Too Low

Circuit Diagram



DTE107001

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.

- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1

Check battery

- (a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG

Replace battery

OK

2

Check alternator

- (a) Check generating capacity of alternator.

NG

Replace alternator

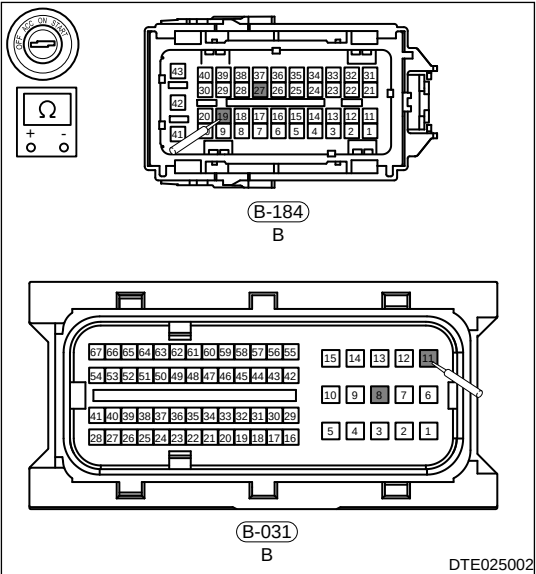
OK

3

Check 1st/5th gear shift solenoid valve wire harness

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
(b) Turn ENGINE START STOP switch to OFF.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (8) - B-184 (27)	Always	Less than 1 Ω
B-031 (11) - B-184 (19)	Always	Less than 1 Ω



NG

Check and repair 1st/5th gear shift solenoid valve wire harness

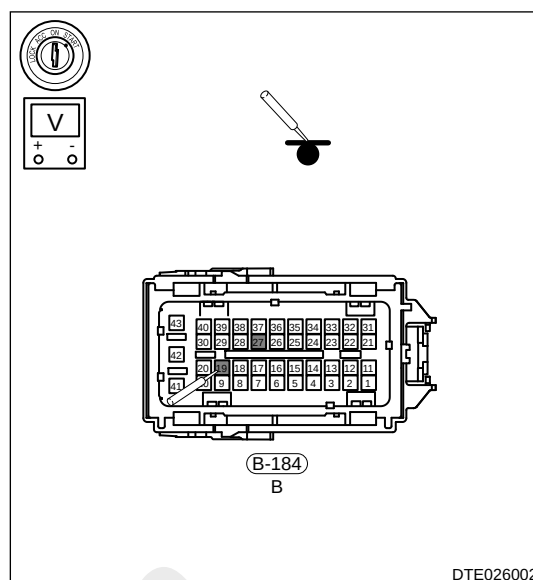
OK

4

Check voltage of 1st/5th gear shift solenoid valve wire harness connector

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (19) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (27) - Body ground	ENGINE START STOP switch ON	0 V



NG

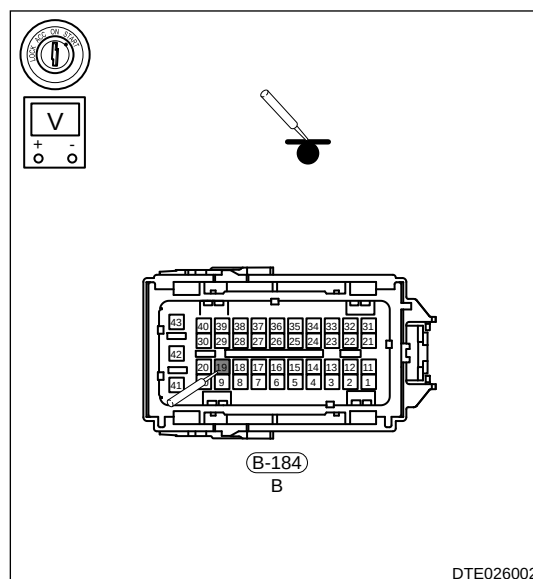
Repair short failure to power supply in 1st/5th gear shift solenoid valve wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 19 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (19) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Check wire harness between B-184 (19) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

Repair or replace connector or wire harness

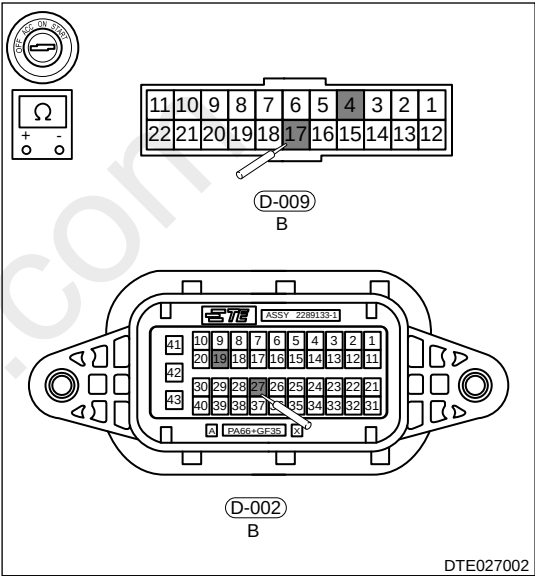
OK

7

Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 27 and 19 of connector D-002 and terminals 4 and 17 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (27) - D-009 (4)	Always	Less than 1 Ω
D-002 (19) - D-009 (17)	Always	Less than 1 Ω



NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

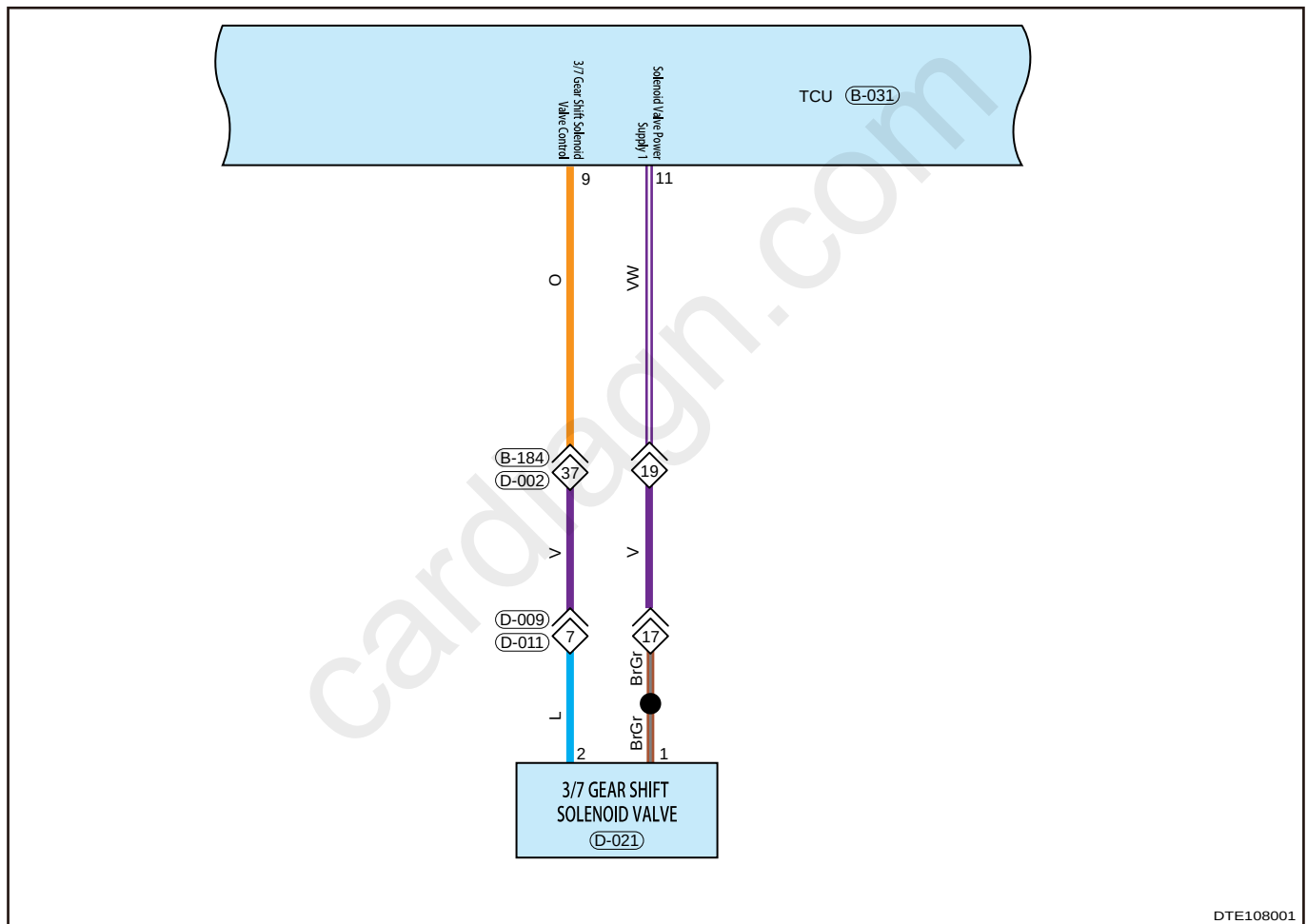
NG

Replace TCU module assembly

■ 3rd/7th Gear Shift Solenoid Valve DTCs

DTC	P186313	3rd/7th Gear Flow Solenoid Valve Open
DTC	P187612	3rd/7th Gear Fork Position Sensor Short to Ground
DTC	P099F12	3rd/7th Gear Flow Solenoid Valve Short to Power Supply
DTC	P189B04	3rd/7th Gear Flow Solenoid Valve Passage Closes Unexpectedly
DTC	P189C01	3rd/7th Gear Flow Solenoid Valve Circuit Error
DTC	P076A19	3rd/7th Gear Flow Solenoid Valve Feedback Current Too High
DTC	P076D18	3rd/7th Gear Flow Solenoid Valve Feedback Current Too Low

Circuit Diagram



DTE108001

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.

- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery
---	----------------------

- (a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG

Replace battery

OK

2	Check alternator
---	-------------------------

- (a) Check generating capacity of alternator.

NG

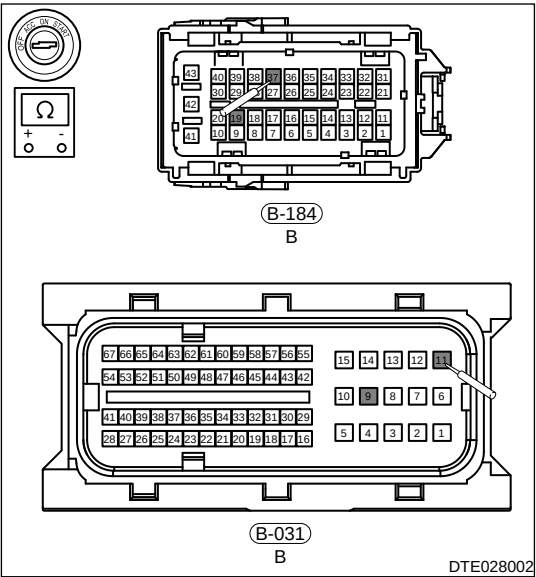
Replace alternator

OK

3	Check 3rd/7th gear shift solenoid valve wire harness
---	---

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
(b) Turn ENGINE START STOP switch to OFF.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (9) - B-184 (37)	Always	Less than 1 Ω
B-031 (11) - B-184 (19)	Always	Less than 1 Ω



NG

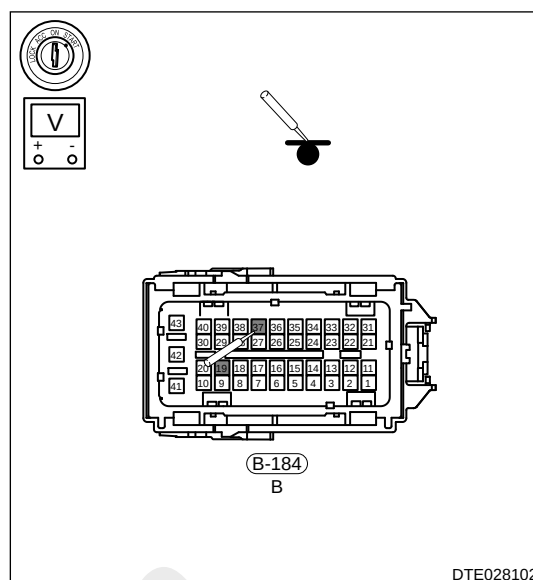
Check and repair 3rd/7th gear shift solenoid valve wire harness

OK

4	Check voltage of 3rd/7th gear shift solenoid valve wire harness connector
---	--

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (19) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (37) - Body ground	ENGINE START STOP switch ON	0 V



NG

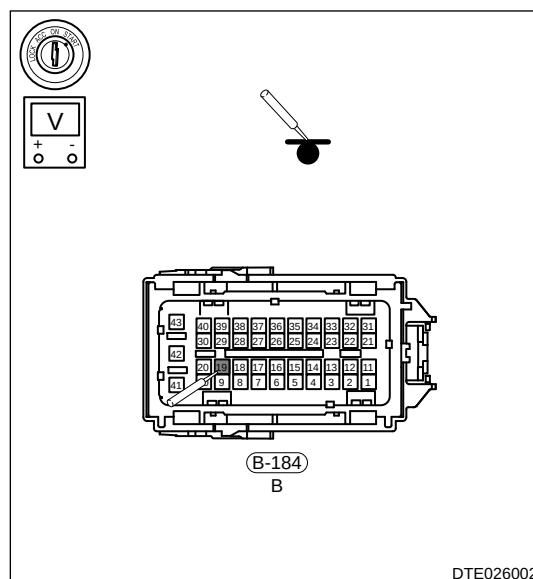
Repair short failure to power supply in 3rd/7th gear shift solenoid valve wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 19 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (19) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Check wire harness between B-184 (19) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

Repair or replace connector or wire harness

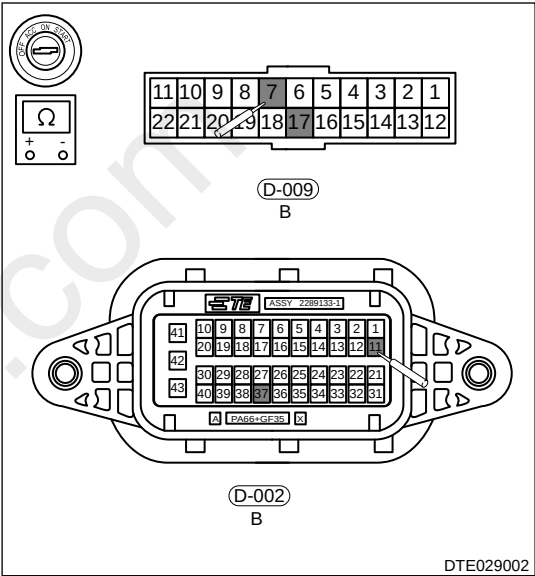
OK

7

Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 37 and 19 of connector D-002 and terminals 4 and 17 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (37) - D-009 (7)	Always	Less than 1 Ω
D-002 (11) - D-009 (17)	Always	Less than 1 Ω



NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

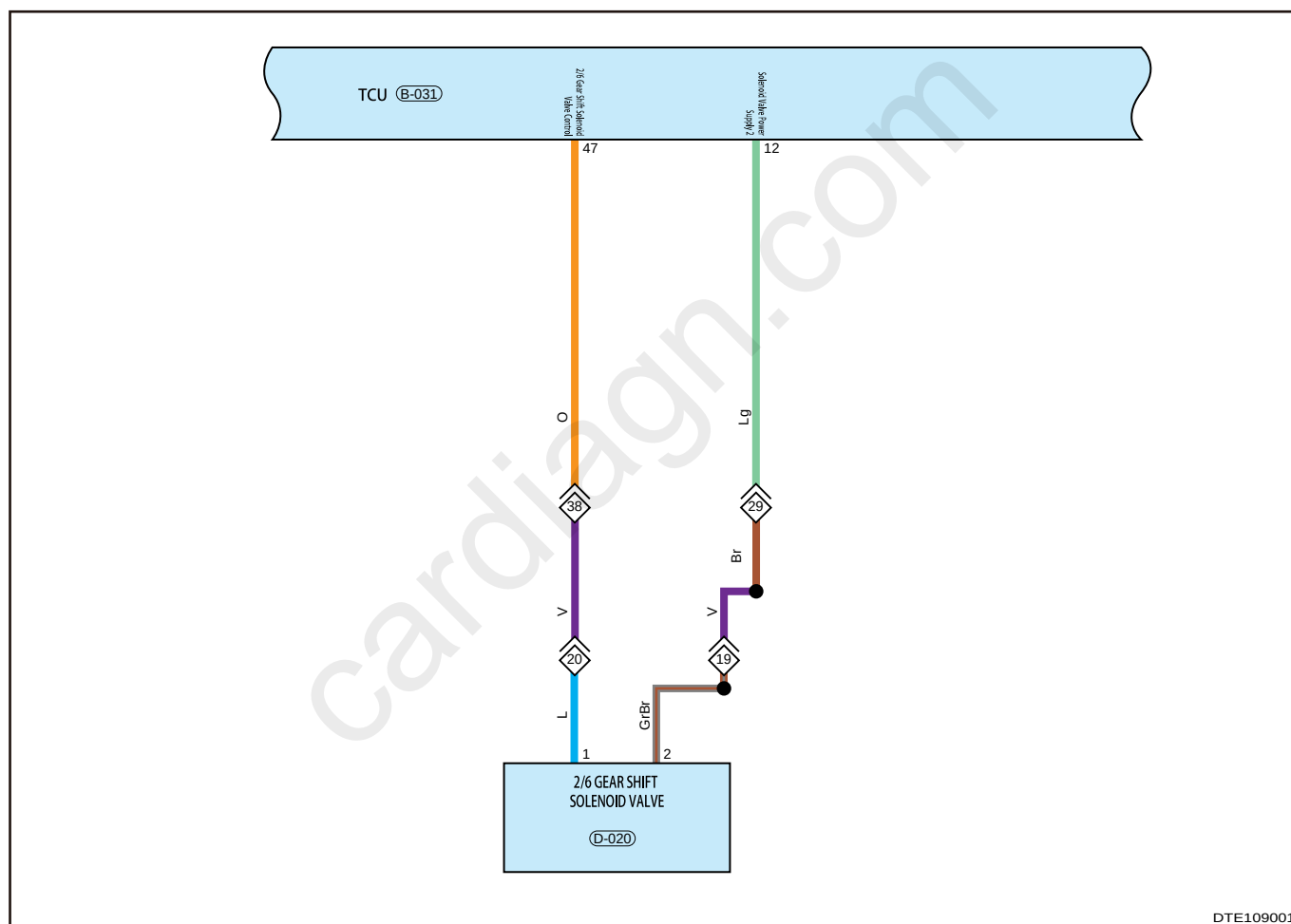
NG

Replace TCU module assembly

■ 2nd/6th Gear Shift Solenoid Valve DTCs

DTC	P183013	2nd/6th Gear Flow Solenoid Valve Open
DTC	P099411	2nd/6th Gear Flow Solenoid Valve Short to Ground
DTC	P099512	2nd/6th Gear Flow Solenoid Valve Short to Power Supply
DTC	P189704	2nd/6th Gear Flow Solenoid Valve Passage Closes Unexpectedly
DTC	P189801	2nd/6th Gear Flow Solenoid Valve Circuit Error
DTC	P270619	2nd/6th Gear Flow Solenoid Valve Feedback Current Too High
DTC	P270918	2nd/6th Gear Flow Solenoid Valve Feedback Current Too Low

Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.

- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1

Check battery

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG

Replace battery

OK

2

Check alternator

- (a) Check generating capacity of alternator.

NG

Replace alternator

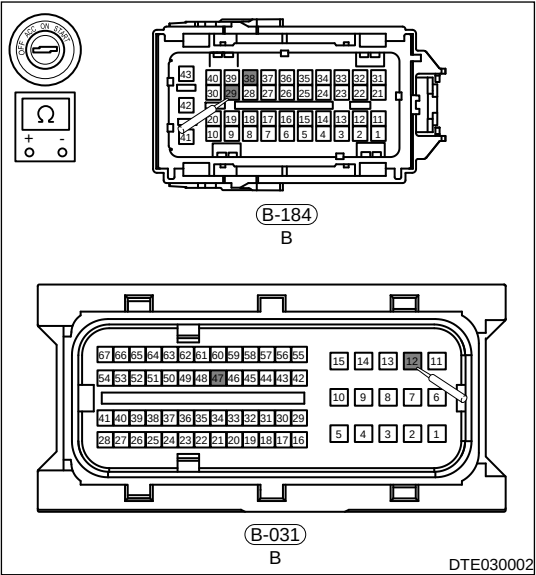
OK

3

Check 2nd/6th gear shift solenoid valve wire harness

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to OFF.
- (c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (47) - B-184 (38)	Always	Less than 1 Ω
B-031 (12) - B-184 (29)	Always	Less than 1 Ω



NG

Check and repair 2nd/6th gear shift solenoid valve wire harness

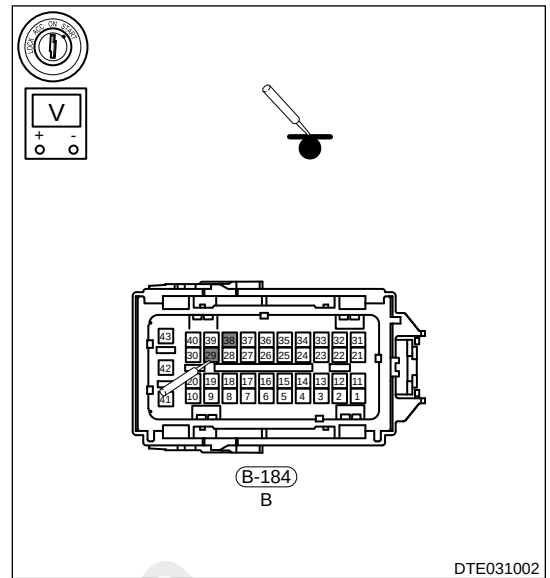
OK

4

Check voltage of 2nd/6th gear shift solenoid valve wire harness connector

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (29) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (38) - Body ground	ENGINE START STOP switch ON	0 V



NG

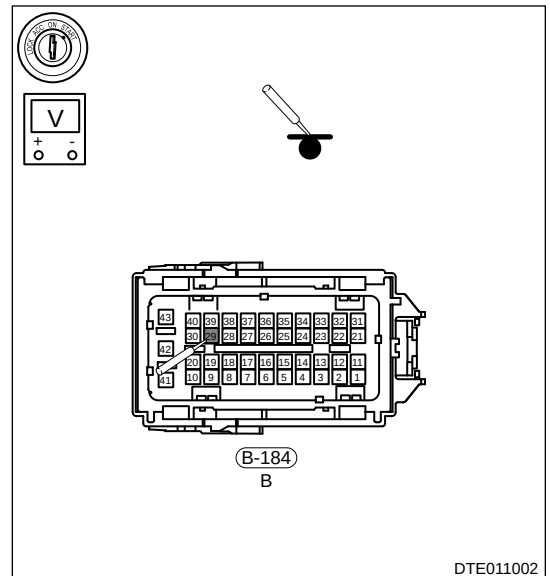
Repair short failure to power supply in 2nd/
6th gear shift solenoid valve wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 29 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-184 (29) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Check wire harness between B-184 (29) and
TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

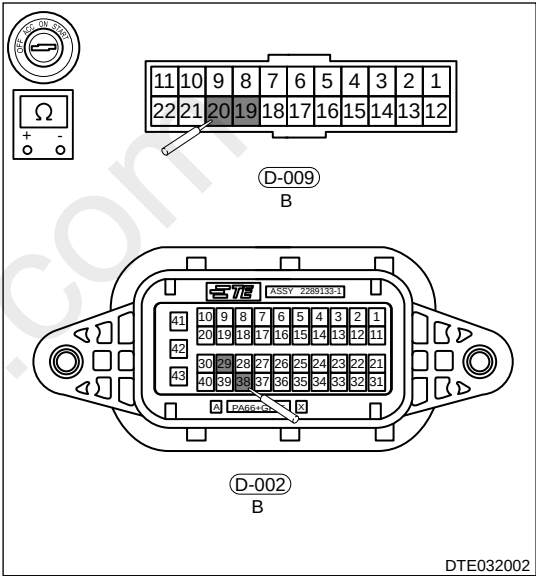
Repair or replace connector or wire harness

OK

7 Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 38 and 29 of connector D-002 and terminals 20 and 19 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (38) - D-009 (20)	Always	Less than 1 Ω
D-002 (29) - D-009 (19)	Always	Less than 1 Ω



NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8 Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9 Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

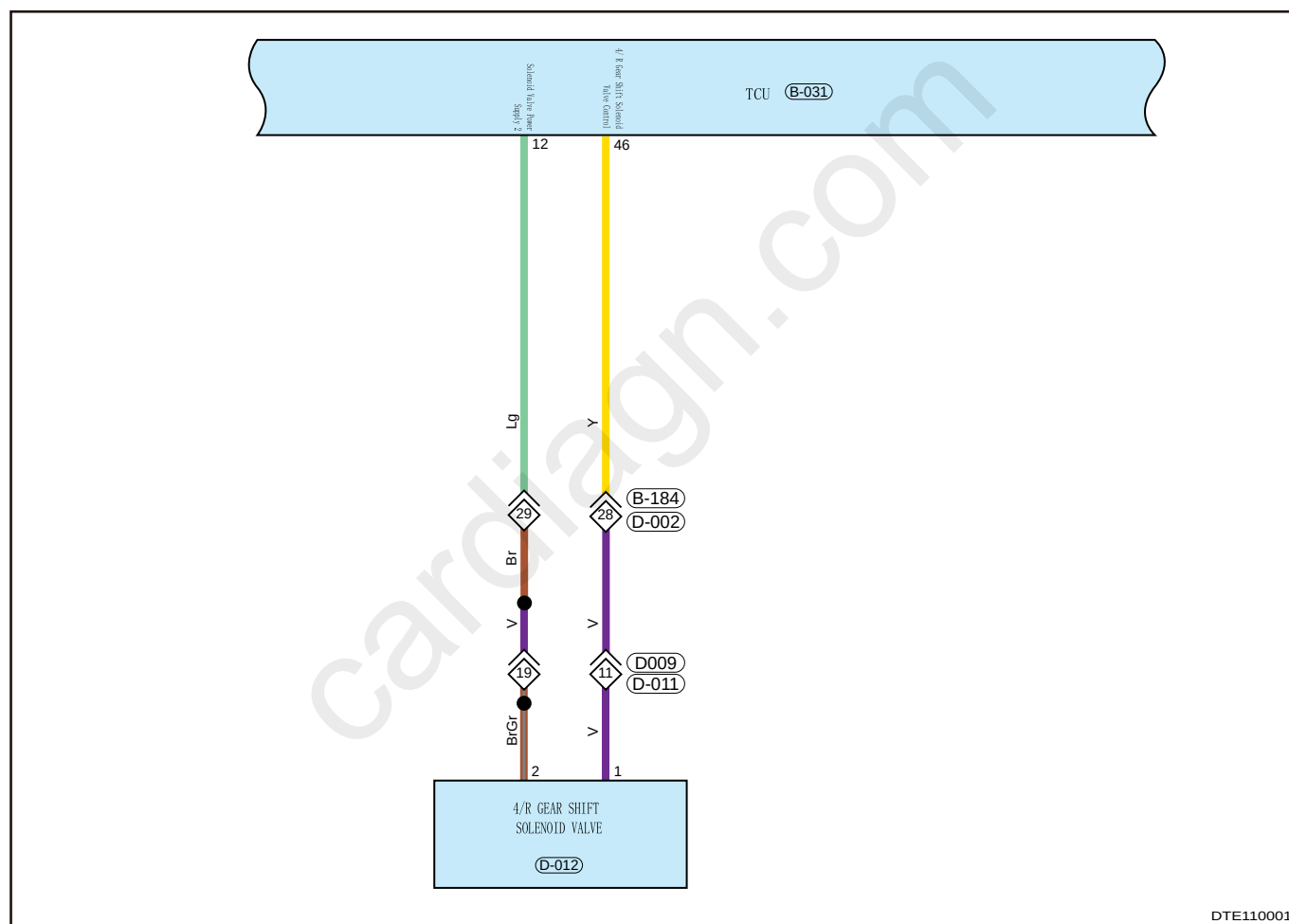
NG

Replace TCU module assembly

■ 4th/R Gear Shift Solenoid Valve DTCs

DTC	P182913	4th/R Gear Flow Solenoid Valve Open
DTC	P098511	4th/R Gear Flow Solenoid Valve Short to Ground
DTC	P098612	4th/R Gear Flow Solenoid Valve Short to Power Supply
DTC	P189504	4th/R Gear Flow Solenoid Valve Passage Closes Unexpectedly
DTC	P189601	4th/R Gear Flow Solenoid Valve Circuit Error
DTC	P077019	4th/R Gear Flow Solenoid Valve Feedback Current Too High
DTC	P077318	4th/R Gear Flow Solenoid Valve Feedback Current Too Low

Circuit Diagram



DTE110001

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.

- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1

Check battery

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG

Replace battery

OK

2

Check alternator

- (a) Check generating capacity of alternator.

NG

Replace alternator

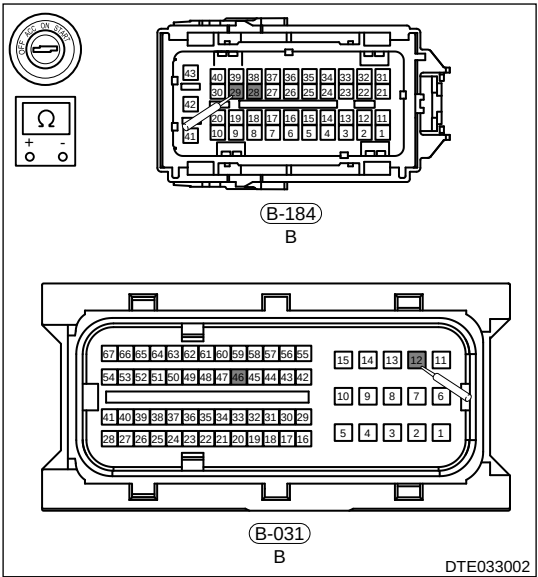
OK

3

Check 4th/R gear shift solenoid valve wire harness

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to OFF.
- (c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-031 (46) - B-184 (28)	Always	Less than 1 Ω
B-031 (12) - B-184 (29)	Always	Less than 1 Ω



NG

Check and repair 4th/R gear shift solenoid valve wire harness

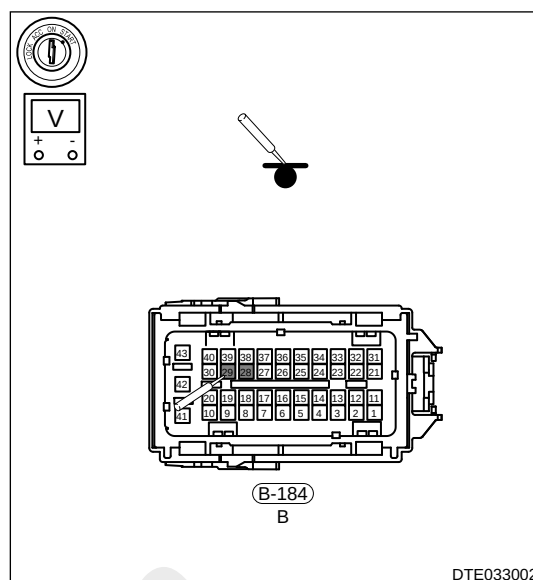
OK

4

Check voltage of 4th/R gear shift solenoid valve wire harness connector

- (a) Disconnect TCU connector, connector between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-184 (29) - Body ground	ENGINE START STOP switch ON	0 V
B-184 (28) - Body ground	ENGINE START STOP switch ON	0 V



NG

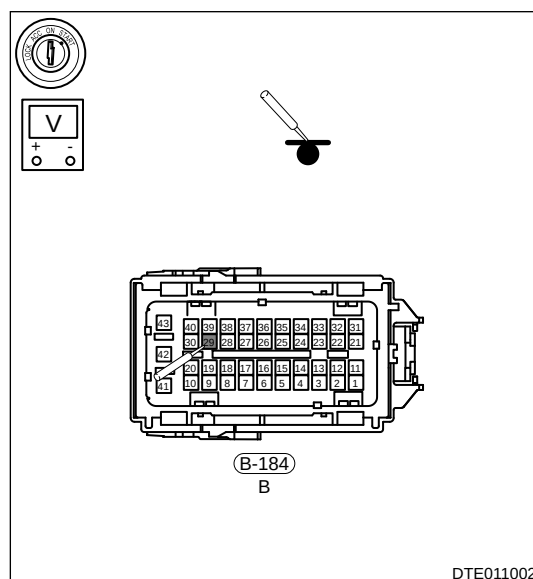
Repair short failure to power supply in 4th/R shift solenoid valve wire harness

OK

5 Check TCU module output voltage

- (a) Connect TCU connector, disconnect connector (B-184) between interior wire harness and transmission internal wire harness.
- (b) Turn ENGINE START STOP switch to ON.
- (c) (Online detection) Measure voltage of terminal 29 of connector B-184 between interior wire harness and transmission internal wire harness (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-248 (29) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Check wire harness between B-184 (29) and TCU

OK

6 Check sensor integration module B wire harness connectors D-002 and D-009.

- (a) Check connectors D-002 and B-184, confirm that they are installed in position and connected properly.
- (b) Drain the transmission oil.
- (c) Remove 11 valve body cap fixing bolts, and remove valve body cap assembly.
- (d) Disconnect sensor integration module B wire harness connectors D-002 and D-009. Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG

Repair or replace connector or wire harness

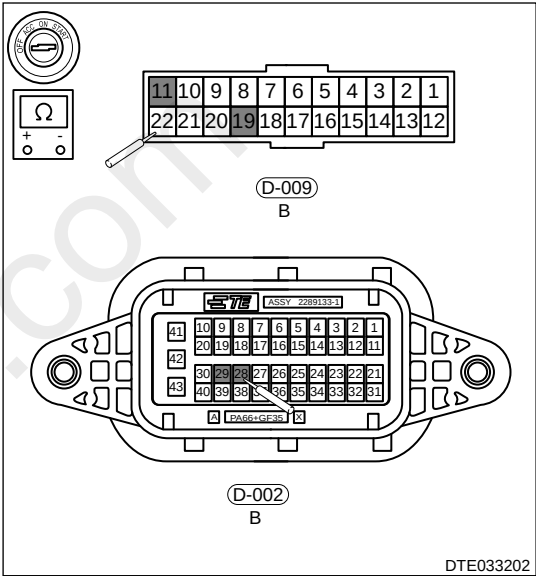
OK

7

Check resistance of wire harness between sensor integration module B connectors D-002 and D-009.

- (a) Using a multimeter, measure resistance between terminals 28 and 29 of connector D-002 and terminals 11 and 19 of connector D-009.

Multimeter Connection	Condition	Specified Condition
D-002 (28) - D-009 (11)	Always	Less than 1 Ω
D-002 (29) - D-009 (19)	Always	Less than 1 Ω



NG

Repair or replace wire harness between connectors D-002 and D-009

OK

8

Check sensor integration module B assembly

NG

Replace sensor integration module B assembly

OK

9

Reconfirm DTCs

- (a) Connect diagnostic tester and clear DTCs.
- (b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- (c) Read the fault information and confirm that the fault has been solved.

OK

System operates normally

NG

Replace TCU module assembly

■ Hydraulic Parking System DTCs

DTC	DTC Definition	Malfunction Reason
P2824, P2827, P2826, P282F, P2830, P282D, P1871, P1878	- Power supply J2-54 to signal J2-41: 11.56M, signal J2-41 to ground J2-61: ∞ - Power supply J2-6 to signal J2-36: 8.2, signal J2-36 to ground J2-5: ∞ - Power supply J2-54 to signal J2-41: 11.56M, signal J2-41 to ground J2-61: ∞	- TCU itself - Vehicle power supply system (battery) - Inside of transmission

1

Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

NEXT

Perform road test

DTCs
rec'd

2

Perform battery power supply inspection

(a) Check battery voltage and check if connecting wire is loose.

NG

Replace battery or secure connecting wire

OK

3

Check resistance between wire harness and ground wire

(a) Disconnect TCU connector, measure resistance between wire harness and ground wire through female terminal.

NG

Check for continuity between female terminal connectors J2 and T1, J2 and S1 of TCU

OK

4

Check resistance between transmission internal wire harness and ground wire

(a) Disconnect transmission terminal connector, measure resistance between wire harness terminals S1 and T1 and ground wire through male terminal.

OK

Connector intermittent contact fault exists

NG

5

Replace vehicle wire harness or connector

Fault is
solved

Rode test and delivery

Fault is
not solved

6

Check connection of TCU and C1

(a) Check for continuity between male terminal connector on TCU side and C1.

NG

Replace or repair connector

OK

7

Replace TCU

Fault is
solved

Confirm and replace TCU

Fault is
not solved

8

Replace transmission case (transmission internal wire harness fault)

■ Shift Fault DTCs

DTC	DTC Definition	Malfunction Reason
P1810, P1811, P1812, P1813, P1814, P1815, P1816, P1817, P1818, P1819, P1820, P1821, P1822, P1823, P1860, P1861, P1906, P1907, P1908, P1909	Shifting in/shifting out failure	- TCU itself - Inside of transmission

1

Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

NEXT

Perform rode test

DTCs
recur

2

Check transmission oil

(a) Check transmission oil level and whether there are impurities.

NG

Replace transmission oil

OK

3

Check TCU

(a) Perform road test after replacing TCU.

OK

Replace TCU

NG

4

Check each solenoid valve

(a) Disconnect transmission terminal connector, measure resistance between terminals S1 and T1 of wire harness and ground wire through male terminal.

NG

Replace hydraulic system

OK

5

Check fork position sensor

NG

Replace sensor integration modules A, B

OK

6

If transmission fork or synchronizer, or engagement teeth is damaged, replace transmission case.

■ Simultaneous Gears Engagement DTCs

DTC	DTC Definition	Malfunction Reason
P0893, P1824	Multiple gears are engaged simultaneously	- TCU itself - Inside of transmission

1

Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

OK

2

When multi-gear engagement fault occurs, front wheel of vehicle will be locked and cannot be pulled properly. The following operations can be repeated unless serious faults cause multi-gear engagement:

- (a) Shift to P and stall, then remove the key;
 (b) Turn engine switch on, switch from P to N gear and observe whether there is Gear light on the instrument panel;
 (c) If Gear light is still on, repeat steps 1 and 2 3 times

Gear
light
goes off

Connector intermittent contact fault exists,
and check connector pins

Gear light
does not
go off

3 Check TCU

(a) Perform road test after replacing TCU.

DTCs do
not
recur

Replace TCU

DTC
OCCURS

4 Check corresponding fork position sensor

(a) Disconnect transmission terminal connector, measure resistance between terminals S1 and T1 of wire harness and ground wire through male terminal.

NG

Replace sensor integration modules A, B

OK

5 Check fork position sensor

NG

Replace sensor integration modules A, B

OK

6 Check solenoid valve related to shifting

NG

Replace hydraulic system

■ Unexpected Shifting Out DTCs

DTC	DTC Definition	Malfunction Reason
P1850, P1851	- Unexpected Shifting Out on Odd Shaft - Unexpected Shifting Out on Even Shaft	- TCU itself failure - Transmission internal failure

1 Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

NEXT

2 Perform code test

No DTC

Connector intermittent contact fault exists,
and check connector pins

DTC
OCCURS

3 Check transmission oil

(a) Check transmission oil level and whether there are impurities.

NG

Replace transmission oil

OK

4 Check TCU

(a) Perform road test after replacing TCU.

No DTC

Replace TCU

DTC
OCCURS

5 Replace transmission case

■ Drive Ratio Not Matched DTCs

DTC	DTC Definition	Malfunction Reason
P1805, P1806	- Odd Shaft Drive Ratio Not Matched - Even Shaft Drive Ratio Not Matched	- TCU itself failure - Transmission internal failure

1 Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

NEXT

2 Perform road test

No DTC

Connector intermittent contact fault exists,
and check connector pins

DTC
OCCURS

3 Check TCU software version

(a) Check whether the TCU software version number matches the vehicle.

NG

Refresh software

OK

4 Check TCU

(a) Perform road test after replacing TCU.

No DTC

Replace TCU

DTC
OCCURS

5

Check odd/even input shaft speed sensor

NG

Replace sensor integration module A

OK

6

Check fork position sensor

NG

Replace sensor integration modules A, B

■ SubRom Fault DTCs

DTC	DTC Definition	Malfunction Reason
P1848, P1856	Subrom Data Cannot be Read	- TCU itself failure - Vehicle wire harness failure - Transmission internal failure

1

Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

NEXT

2

Perform code test

No DTC

Connector intermittent contact fault exists,
and check connector pinsDTC
OCCURS

3

Check TCU

(a) Read SubRom again after replacing TCU.

NG

Replace TCU

OK

4

Check vehicle wire harness

(a) Perform road test after replacing TCU.

NG

Replace vehicle wire harness

OK

5 Check connector**■ Clutch Fault DTCs**

DTC	DTC Definition	Malfunction Reason
P081107	Excessive Clutch Slipping	- TCU itself failure - Transmission internal failure

1 Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

NEXT

2 Perform road test

No DTC

Connector intermittent contact fault exists,
and check connector pins

DTC
OCCURS**3 Check transmission oil**

(a) Check transmission oil level and whether there are impurities.

NG

Replace transmission oil

OK

4 Check TCU

(a) Perform road test after replacing TCU.

OK

Replace TCU

NG

5 Check clutch speed sensor and input shaft speed sensor

NG

Replace clutch temperature speed sensor and
sensor integration module A

OK

6 Check clutch solenoid valve

NG

Replace hydraulic system

■ Clutch Fault DTCs

DTC	DTC Definition	Malfunction Reason
P184592	Dual Clutch Simultaneous Engagement	- TCU itself failure - Transmission internal failure

1

Confirm and clear DTCs

(a) Malfunction indicator comes on, connect diagnostic tester to vehicle; Confirm and record fault codes and related fault freeze frames; Clear the fault codes.

NEXT

2

Perform rode test

No DTC

Connector intermittent contact fault exists, and check connector pins

DTC
OCCURS

3

Check TCU

(a) Perform road test after replacing TCU.

No DTC

Replace TCU

DTC
OCCURS

4

Check dual clutch pressure sensor

NG

Replace hydraulic system

OK

5

Replace transmission case

4.9 Rode Test Operating Condition Table

After vehicle is repaired, perform relevant road test according to the table below and record the relevant results:

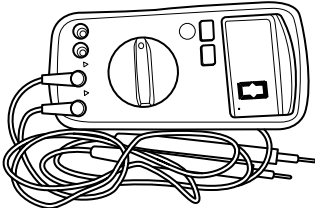
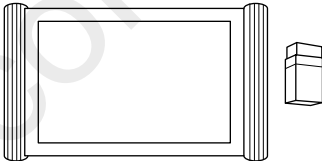
No.	Operating Condition	Test Item	Test Condition	Test Result
1	Stationary on a flat road	1.1	P->R->N->D->N->R->P (3 consecutive times, pause for 2 seconds at each gear)	OK
		1.2	P->R->N->D->S- 'M+' -> 'M-' -D->N->R->P (3 consecutive times, pause for 2 seconds at each gear)	OK

No.	Operating Condition	Test Item	Test Condition	Test Result
2	Crawl starting	2.1	With shift lever in R position, brake pedal released, accelerator pedal not depressed, crawl to 5 km/h, depress the accelerator pedal slightly until speed reaches more than 12km/h, then depress brake pedal slightly	OK
		2.2	With shift lever in D position, brake pedal released, accelerator pedal not depressed, crawl to 5 km/h, depress the accelerator pedal slightly until speed reaches more than 12km/h, then depress brake pedal slightly	OK
3	Upshift/downshift operation	3.1	With shift lever in D position, depress accelerator pedal in order of 1-2-3-4-5-6 to upshift, and then release the accelerator pedal in order of 6-5-4-3-2-1 to downshift	OK
		3.2	With shift lever in S position, depress accelerator pedal in order of 1-2-3 to upshift, and then release accelerator pedal quickly in order of 3-2 to downshift	OK
4	Simulate operating condition	4.1	Repeatedly simulate the operating condition for reported failure described by customer	OK
5	Self-adaption operating condition	5.1	Turn power switch on to start engine in P gear, shift the shift lever to carry out the following crawl operation: Crawl in D gear until vehicle speed is stable and then stop it, crawl in R gear until vehicle speed is stable and then stop it, repeat this cycle 3 to 5 times.	OK
		5.2	Use manual mode to switch to M3/M5 (M5 is recommended) for driving, make sure that small pedal opening (5% to 15%), medium opening (20% to 40%) and large opening (more than 50%) in M3/M5 all have a constant total driving time of more than 15 seconds, and repeat 3 to 5 times at each opening.	OK
		5.3	Use manual mode to switch to M4/M6 (M6 is recommended) for driving, make sure that small pedal opening (5% to 15%), medium opening (20% to 40%) and large opening (more than 50%) in M4/M6 all have a constant total driving time of more than 15 seconds, and repeat 3 to 5 times at each opening.	OK
		5.4	Use manual mode to drive and complete the following gear upshifting process: M1-M2-M3-M4-M5-M6-M7 (it is completed after accelerating vehicle to about 80 kph with acceleration pedal at medium lower opening), after upshifting to each gear, depress accelerator pedal at an opening of 10% to 20% for about 5 seconds, then switch to D mode for normal driving and stop vehicle, pay attention to the whole process and check if there is any fault reported. If a fault is reported, perform self-learning and clearing fault operations again, and then repeat above steps 1 to 4.	OK
		5.5	After above driving, turn power supply off and lock vehicle for 1 minute (ensure that the four doors and luggage compartment door are closed), then turn power supply on and start vehicle for normal driving (drive in D mode for about 5 km), deliver vehicle to customer if there is no obvious shock, shaking, abnormal engine speed, etc.	OK
		5.6	If there is any shock, shaking, abnormal speed, etc, repeat steps 1 to 5 until no obvious abnormal phenomenon occurs.	OK

5 ON-VEHICLE SERVICE

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Diagnostic Tester	 S00001

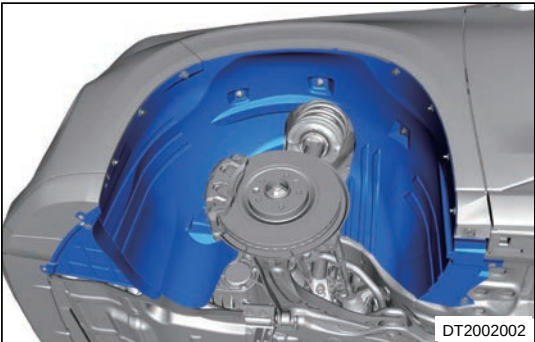
5.2 Replacement of TCU Module

■ Removal

 **Warning**

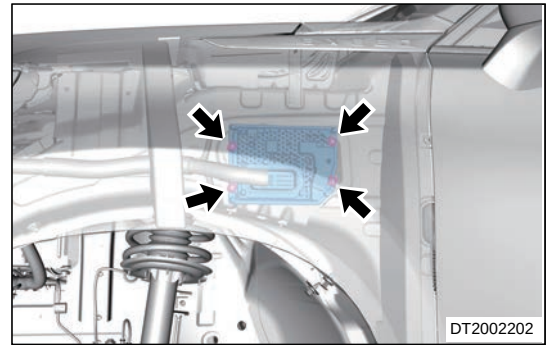
During removal and installation of TCU, antistatic equipment should be worn to avoid damage to electronic components in TCU.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front left tire.
- (4) Remove all fixing snap pins and nuts from front left fender liner, then remove liner.



- (5) Disconnect the transmission control unit connector.

- (6) Remove 4 fixing bolts (arrow) from transmission control unit.



■ Installation

⚠ Caution

- TCU bolts are pre-coated parts. Residual sealant should be cleaned from threaded hole of housing before assembly.
- TCU bolts are non-reusable parts, which must be replaced after each removal.
- If TCU is replaced with a new one, fresh correct TCU software with diagnostic tester.

- (1) Install 4 fixing bolts to transmission control unit.

Tightening torque: 8.5 - 9.5 N·m

- (2) Connect the transmission control unit connector.
(3) Install the front left fender liner.
(4) Install the front left tire.
(5) Connect the negative battery cable.
(6) Connect diagnostic tester, read and clear DTCs.

5.2 TRANSMISSION ASSEMBLY

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

- (1) Drain bolt and oil inspection bolt are both non-reusable parts, and replace them with new ones after removal.
- (2) Transmission oil (Kunlun DCTF-7S) has a service life of 60,000 km.
- (3) The vehicle must be kept level during refilling.
- (4) To avoid oil contamination, the container used to store transmission oil must be a special container for (- Kunlun DCTF-7S) oil (the container must not be used to store other liquids or items), and the container must be kept clean.
- (5) In case of oil spillage, the transmission oil needs to be added depends on the actual situation, but it must be ensured that the filled oil can make the position of oil in transmission higher than that of oil inspection bolt before adjusting oil level.
- (6) Transmission oil (Kunlun DCTF-7S) should be stored under $20^{\circ}\text{C} \pm 10^{\circ}\text{C}$.
- (7) The oil is a part of (738DHA) transmission system. It must be sent back to manufacturer together with transmission for further analysis if required.

2 System Overview

2.1 System Description

The automatic transmission system is composed of transmission control module, shift motor and button-type electronic shift module etc. The connection between button-type electronic shift module and transmission adopts a safer and faster electronic control mode, other than a traditional mechanical way, which eliminates the traditional mechanical shift mode and adopts electronic signals. Its advantage is that the driver's wrong shift operation will be judged by the computer to see if it will cause damage to the transmission, so as to better protect the transmission and correct the bad shift habits. However, if there is a fault or short circuit, the button-type electronic shift module is unable to release the current gear, we can only rely on the trailer and rescue.

2.2 Operation Principle of Clutch

■ Operation principle of clutch 1

- Hydraulic oil enters clutch 1 servo cylinder (clutch drum) from oil passage of clutch 1, and then hydraulic oil pushes piston of clutch 1 to compress clutch plate, connecting clutch drum with input shaft 1.
- Clutch 2 is disengaged when engaging clutch 1.

■ Operation principle of clutch 2

- Hydraulic oil enters clutch 2 servo cylinder (clutch drum) from oil passage of clutch 2, and then hydraulic oil pushes piston of clutch 2 to compress clutch plate, connecting clutch drum with input shaft 2.
- Clutch 1 is disengaged when engaging clutch 2.

2.3 Parameter Specifications

■ Transmission oil standard

- (1) Transmission oil selection standard:

Transmission Oil Type	Standard Capacity
Kunlun DCTF-7S	$6.5 \pm 0.2 \text{ L}$

- (2) Operating temperature range:

- The normal temperature does not exceed 120°C , the transient temperature does not exceed 140°C , the performance will be affected when the ambient temperature is below -30°C and will fail when it is below -40°C .

(3) Period of replacing oil:

- Replace the transmission oil every 60,000 km, and replace the element of filter cooling module at the same time.

(4) Maintenance requirements:

- The specified oil must be used. The other oils may cause damage to transmission. Such damage is not covered under warranty.

 Caution

- **The specified oil must be used. The other oils may cause damage to transmission. Such damage is not covered under warranty.**

■ Basic Parameters

Items	Parameter
Model	738DHA
Type	Wet Dual Clutch (DCT)
Layout	Transverse front-drive
Start Clutch Device	Wet dual clutch
Dimensions (L × W × H)	372mm × 562mm × 466mm
Weight (w/o Cooling Oil)	81kg
Central Distance	197.03mm
Maximum Input Speed	6500 rpm
Maximum Allowable Input Torque	380N•m
Gear Ratio Range	Higher than 6.89
Maximum Pressure of Hydraulic System	26.5 bar
Operating Pressure	Minimum: 3 bar; Maximum: 26.5 bar
Cooling Type	Water cooled

■ Gear Ratio Parameters

Gear Position	Gear Ratio	Overall Gear Ratio
1st	3.643	17.571
2nd	2.722	10.63
3rd	1.808	7.059
4th	1.047	5.048
5th	0.816	3.938
6th	0.791	3.087
7th	0.653	2.55
Rev	2.833	13.667
FD 1(154R)	4.824	/
FD 2 (3762)	3.905	/

■ Torque Specifications

Description	Specifications	Quantity	Preload (Nm)	Torque (Nm)
Hexagon Flange Bolt		12	$80 \pm 4 \text{ Nm} + 90 \pm 2^\circ$	120 - 150
Transmission Wire Harness Connector Fixing Bolt		6	2 - 3	2 - 3
Oil Level Pipe		1	3 ± 1	2 - 4
inner TORX Hexagon Bolt M6*12	M6*12	6	8 - 10	8 - 10
Pawl Rotary Shaft Fixing Bolt		1	23 ± 2	21 - 25
Output Shaft Locking Bolt		2	$60 \pm 3 \text{ Nm} + 90 \pm 2^\circ$	125 - 185
Guide Bolt		2	23 ± 2	21 - 25
Inner Hexagon Pan Head Bolt M6*20		8	9 ± 1	8 - 10
Inner Hexagon Pan Head Bolt M6*30	M6*30	13	9 ± 1	8 - 10
Inner TORX Hexagon Pan Head Bolt M6*25	M6*25	5	$5 (\pm 1) \text{ Nm} + 37.5 (\pm 2.5)^\circ$	10 - 18
Inner Hexagon Pan Head Bolt M6*58	M6*58	14	$4 \pm 0.5 \text{ Nm} + 90 \pm 2^\circ$	8 - 16
Inner Hexagon Oil Plug M18*1.5	M18*1.5	2	63 ± 3	60 - 66
Bearing Locating Plate Fixing Bolt		9	$12 \pm 1 \text{ Nm} + 90 \pm 5^\circ$	30 - 55
Hexagon Flange Bolt M8*35	M8*35	25	$8 \pm 0.5 \text{ Nm} + 90 \pm 2^\circ$	30 - 58

3 Component Operation Description

3.1 Output Speed Sensor

The sensor is a Hall sensor that can identify the actual speed of output shaft. The computer combines the engine speed sensor and other signals based on this value to accurately control the shift timing, lock clutch operating status, shift time, transmission oil pressure control, etc. This signal is a key signal for the normal shift of automatic transmission.

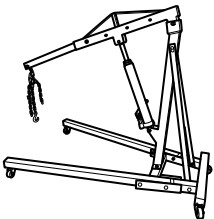
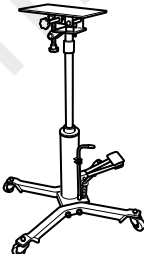
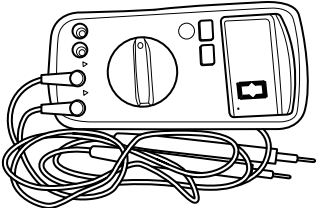
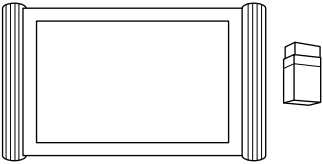
3.2 Clutch Temperature Speed Sensor

This sensor integrates clutch temperature sensor and clutch speed sensor. Detecting the temperature of clutch coolant. TCU detects the temperature of clutch coolant in real time to monitor the slipping state of clutch to avoid overheating and burning. This is a negative temperature coefficient resistor. The resistance becomes smaller as the temperature increases.

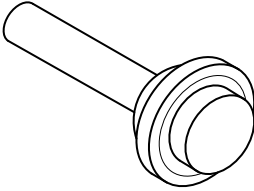
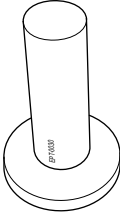
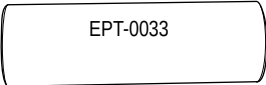
4 On-Vehicle Service

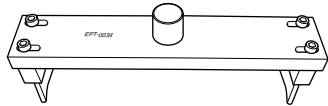
4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Engine Hoist	 S00032
Transmission Carrier	 S00004
Digital Multimeter	 S00002
Diagnostic Tester	 S00001

Special Tools

Tool Name	Tool Drawing
Differential Oil Seal Assembly Fixture	 S00096006
HCU Mould Assembling Pickup Lever	 RCH017006
Input Shaft Cover Plate Knock Fixture	 RCH018006
Clutch Snap Spring Mounting Guide Block	 RCH019006
Clutch Snap Spring Mounting Socket	 RCH020006

Tool Name	Tool Drawing
Clutch Shaft Sealing Cover Assembly Fixture	 RCH021006
Clutch Cover Assembly Oil Seal Protective Sleeve	 RCH022006

4.2 Transmission Fluid Inspection

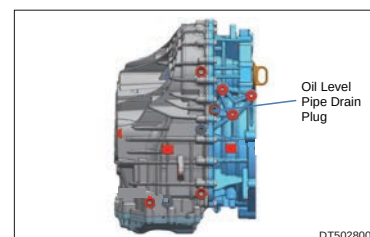
■ Maintenance period

- (1) In order to extend the service life of the transmission, it is required to replace the transmission oil once when the vehicle is traveling 60,000 km, and replace the element of filter cooling module at the same time. Inspect regularly. If necessary, replace transmission oil (for example, fault caused by oil shortage or deterioration).

■ Transmission oil level inspection

- (1) In order to extend the service life of the transmission, it is required to replace the transmission oil once when the vehicle is traveling 60,000 km.
- (2) Stop the vehicle on a level surface and pull up the parking brake handle.
- (3) When the engine is running at idle speed, depress and hold the brake pedal, shift the gears in the order of R, N and D for three cycles (A reciprocating motion for each cycle), each gear is kept for 5 s, and finally shift the shift lever to "P" or "N" position.
- (4) Raise the vehicle with a lift, keep it level, wipe off dust and oil stains around the plug, and remove oil level pipe drain plug.

Tightening torque: 6 - 9 N·m



- (5) If there is oil flowing out when the oil amount is normal, replace and tighten oil level pipe drain plug.

Caution

- Drain bolt and oil inspection bolt are both non-reusable parts, and replace them with new ones after removal.
- It is not allowed to increase the automatic transmission oil temperature by depressing on the accelerator rapidly at idling.
- Under the hot oil condition of transmission, the temperature of engine, radiator and its piping system is very high, fan may start with it, so care should be taken to avoid burns during operation.
- If the transmission oil level is too low, the transmission oil pump will suck in air while running, resulting in each clutch or brake working badly due to insufficient working pressure.
- If the transmission fluid is too high, the rotating parts of transmission will stir liquid to produce foam while rotating at high speed, which will produce same result as previous one.

■ Oil status inspection

- (1) The new transmission oil should be light yellow, but light yellow is not the quality indicator of the oil. As the vehicle is used, the color of the oil will gradually deepen and eventually become light brown.

Caution

- If the oil is dark brown with burnt smell, change it and check vehicle condition;
- If the oil is milky white or turbid, it indicates that the water enters the oil; change the oil, check the leakage point and confirm whether the transmission is damaged.
- If the oil is black and mixed with a large amount of powder, there is abnormal wear in wet clutch, and the clutch needs to be checked and repaired.

4.3 Transmission Oil Replacement**■ Draining/Refilling****⚠ Warning**

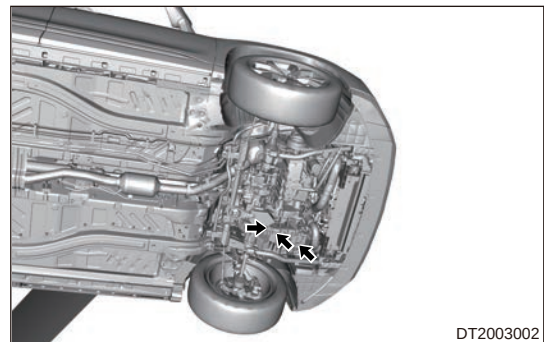
- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing or inspecting the lifted vehicle.

- (1) The oil draining will begin within 5 minutes after the engine is shut down.

⚠ Caution

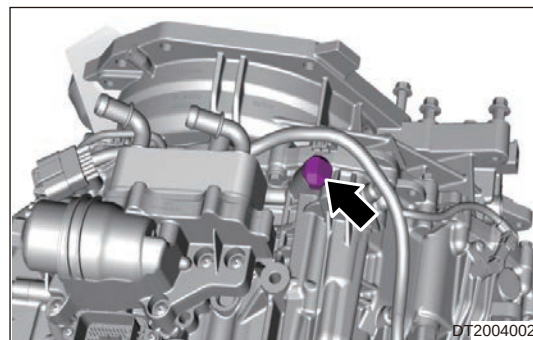
- **Prerequisites for replacing transmission oil: Transmission oil temperature must be: Between 35 and 45°C.**

- (2) Raise vehicle with a lift.
- (3) Remove the engine lower protector.
- (4) Remove 3 drain bolts (drain plug bolt in primary chamber/oil level pipe drain plug (overflow pipe)/drain plug in valve body chamber).

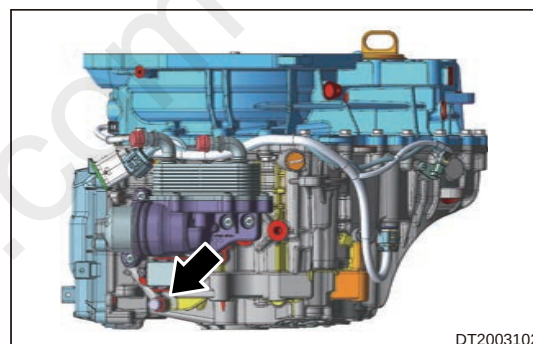


DT2003002

- (5) Drain the transmission oil.
- (6) Replace drain bolt and gasket with new ones and tighten the bolt again.
- (7) Remove the air filter assembly.
- (8) Removal the battery tray assembly.
- (9) Remove transmission filler port bolt and gasket.



- (10) Pull out the transmission breather cap.



- (11) Fill transmission oil (Kunlun DCTF-7S) from filler plug. After filling, follow the steps in "Oil Level Inspection" to check.

Caution

- Transmission oil (Kunlun DCTF-7S) has a service life of 60,000 km, and replace the element of filter cooling module at the same time.
- The vehicle must be kept level during refilling.
- To avoid oil contamination, the container used to store transmission oil must be a special container for (Kunlun DCTF-7S) oil (the container must not be used to store other liquids or items), and the container must be kept clean.
- In case of oil spillage, the transmission oil needs to be added depends on the actual situation, but it must be ensured that the filled oil can make the position of oil in transmission higher than that of oil inspection bolt before adjusting oil level.
- Transmission oil (Kunlun DCTF-7S) should be stored under $20^{\circ}\text{C} \pm 10^{\circ}\text{C}$.
- The oil, a part of 738DHA transmission system, must be sent back to manufacturer together with transmission for further analysis if required.

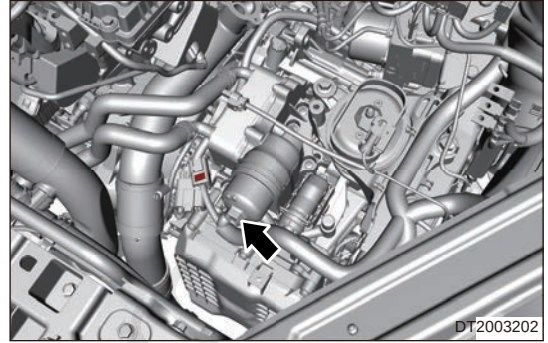
■ Transmission oil capacity and type are shown in the table below

Model	Oil Type	Total Capacity (After-sales Maintenance Oil Capacity)
738DHA	Kunlun DCTF-7S	$6.5 \pm 0.2 \text{ L}$

4.4 Transmission Oil Element Replacement

■ Removal

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the air filter assembly.
- (4) Remove the battery and battery tray.
- (5) Drain the transmission oil.
- (6) Remove transmission element cover (arrow) and take out element.



■ Installation

- (1) Install element and element cover, and tighten element cover.

Tightening torque: 20 + 5 N·m

- (2) Fill the transmission oil.
- (3) Install the battery tray.
- (4) Install the air filter assembly.
- (5) Install the battery.

⚠ Caution

- After installing, start the vehicle and check whether the filter is leaking.

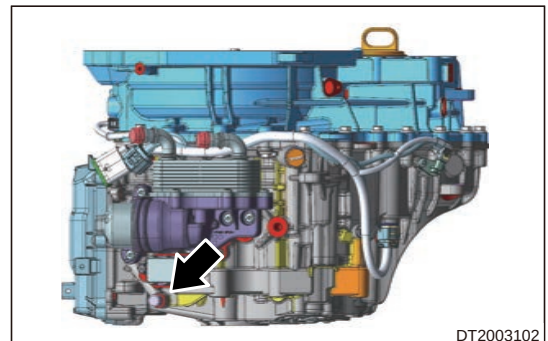
4.5 Transmission Breather Cap Replacement

■ Removal

⚠ Warning

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal.

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the air filter assembly.
- (4) Remove the transmission breather cap.



■ Installation

- (1) Install breather cap to a proper position on transmission.
- (2) Install the air filter assembly.
- (3) Connect the negative battery cable.

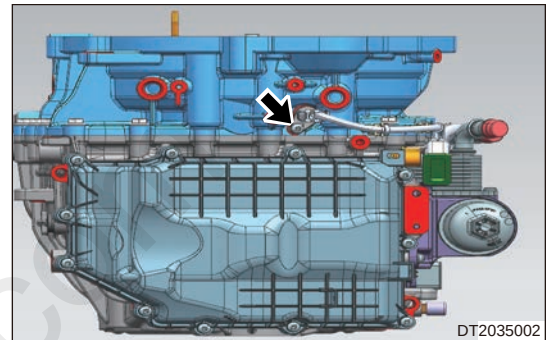
4.6 Clutch Temperature Sensor Replacement

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Drain the transmission oil.
- (4) Disconnect the temperature sensor connector.



- (5) Remove temperature sensor from housing with a torque wrench.

■ Installation

⚠ Caution

- **Sensor and its bolts are non-reusable parts, which must be replaced after each removal.**
- **Drain the transmission oil and remove wire harness before replacing the sensor (drain bolt and oil inspection bolt must be replaced).**

- (1) Install temperature sensor to a proper position on transmission.
- (2) Connect the temperature sensor connector.
- (3) Add the specified transmission oil.
- (4) Connect the negative battery cable.

4.7 Output Speed Sensor Replacement

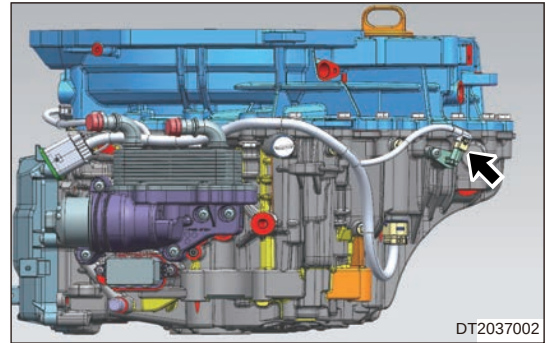
■ Removal

⚠ Warning

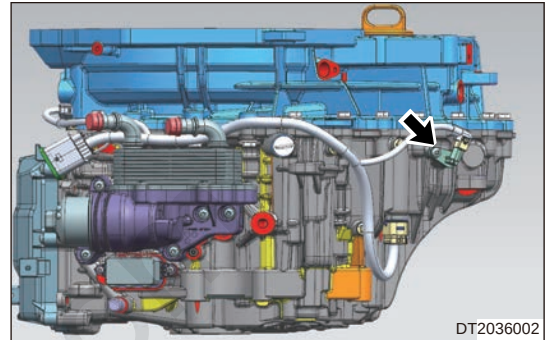
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the air filter assembly.
- (4) Remove the battery.
- (5) Remove the battery tray.
- (6) Drain the transmission oil.

- (7) Disconnect the output speed sensor connector.



- (8) Remove fixing bolt from output speed sensor.



- (9) Remove the output speed sensor.

■ Installation

⚠ Caution

- Sensor and its bolts are non-reusable parts, which must be replaced after each removal.
- Drain the transmission oil and remove wire harness before replacing the sensor (drain bolt and oil inspection bolt must be replaced).

- (1) Install output speed sensor to a proper position on transmission.
- (2) Install fixing bolt to output speed sensor.
- (3) Connect the output speed sensor connector.
- (4) Fill the transmission oil.
- (5) Install the battery tray.
- (6) Install the battery.
- (7) Install the air filter assembly.
- (8) Connect the negative battery cable.

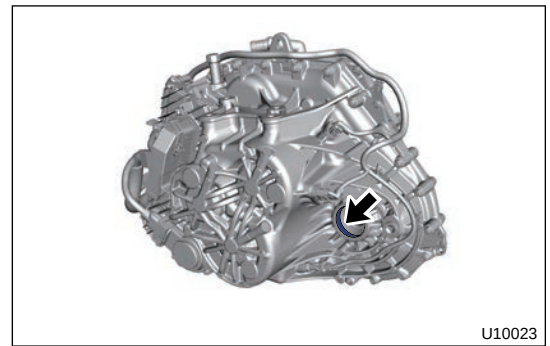
4.8 Drive Shaft Oil Seal Replacement

■ Removal

⚠ Warning

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal.
- Use same procedures for right and left sides, procedures listed below are for left side.

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the air filter assembly.
- (4) Remove the battery.
- (5) Remove the battery tray.
- (6) Drain the transmission oil.
- (7) Remove the front left wheel.
- (8) Remove the front left drive shaft assembly.
- (9) Remove left drive shaft oil seal from transmission assembly.

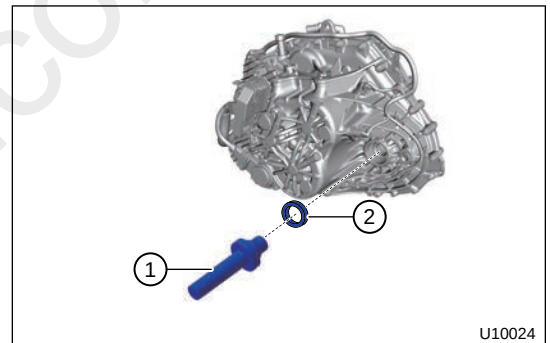


■ Installation

⚠ Caution

- Ensure that the transmission oil has been drained before removing oil seal.
- Be sure to avoid scratching the mating surface between transmission case and clutch housing during removal of drive shaft oil seal.
- Drive shaft oil seal is a non-reusable part, which must be replaced after each removal.

- (1) Using a special tool (1), install drive shaft oil seal (2) into place.



⚠ Caution

- Apply a proper amount of MP grease to new oil seal lip.
- Do not damage oil seal lip during installation.

- (2) Install the front left drive shaft assembly.
- (3) Install the front left wheel.
- (4) Fill the transmission oil.
- (5) Install the battery tray.
- (6) Install the battery.
- (7) Install the air filter assembly.
- (8) Connect the negative battery cable.

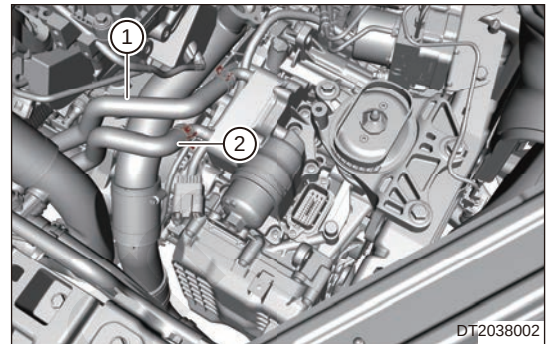
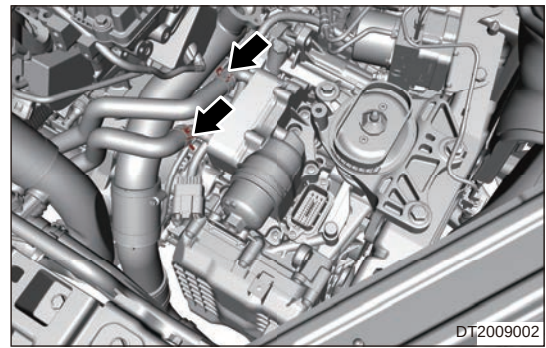
4.9 Coolant Connecting Pipe Assembly (Inlet and Outlet Pipes) Replacement

■ Removal

⚠ Warning

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- When removing coolant pipe from coolant connecting pipe assembly, be careful not to splash the coolant on electronic parts and the inside of transmission to contaminate transmission oil.

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the air filter assembly.
- (4) Remove the battery.
- (5) Remove the battery tray.
- (6) Remove the intercooler inlet pipe assembly II.
- (7) Drain the coolant.
- (8) Remove clamps from engine inlet pipe.
- (9) Disengage the engine inlet pipes ① and ②.



■ Installation

⚠ Caution

- **Bolts are non-reusable parts, which must be replaced after each removal.**

- (1) Install coolant connecting pipe into hole, align bolt holes of coolant connecting pipe, and tighten bolts.
- (2) Install the engine inlet pipes ① and ②.
- (3) Install clamps to engine inlet pipe.
- (4) Add the coolant.
- (5) Install the intercooler inlet pipe assembly II.
- (6) Install the battery tray.
- (7) Install the battery.
- (8) Install the air filter assembly.
- (9) Connect the negative battery cable.

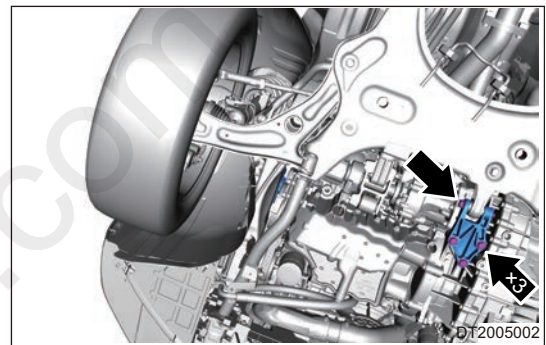
4.10 Transmission Assembly

■ Removal

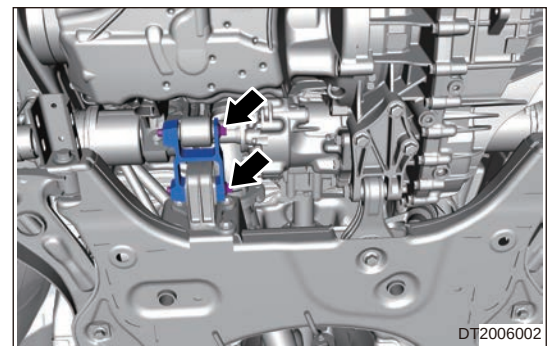
⚠ Caution

- **Before removal of power assembly, first drain transmission oil.**
- **During separation of engine and transmission, pay attention not to damage the peripheral accessories of transmission, such as rubber cooling pipe, pressure sensor, etc. If there is any damage, it is necessary to replace it according to requirements.**

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the battery.
- (4) Remove the battery tray.
- (5) Remove the air filter assembly.
- (6) Remove the front wheel tire.
- (7) Remove the engine lower protector.
- (8) Drain the transmission oil.
- (9) Drain the coolant.
- (10) Remove the lower coolant pipe.
- (11) Remove left and right drive shaft.
- (12) Disconnect the speed sensor connector and the oil pressure sensor connector, and move away the wire harness.
- (13) Remove fixing nut between shift cable and gear switch.
- (14) Raise vehicle to a proper height, remove 4 fixing bolts from rear left lower mounting.



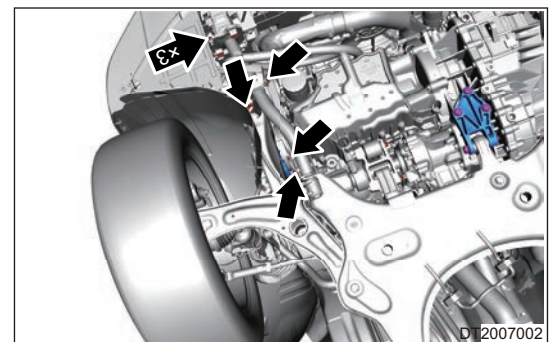
- (15) Raise vehicle to a proper height, remove 2 fixing bolts from rear right lower mounting.



- (16) Raise vehicle to a proper height, remove 7 fixing bolts from front left/right lower impact crossmember assembly.

Hint:

Use same removal procedures for left and right sides, here is front right lower impact crossmember.



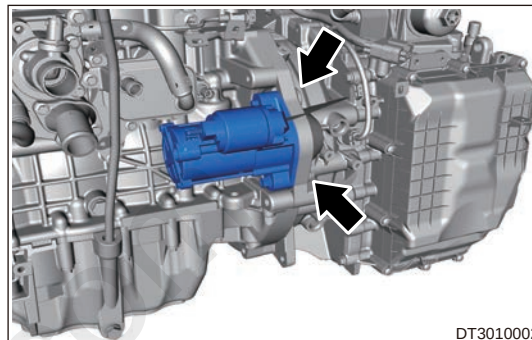
- (17) Raise vehicle to a proper height, remove 2 fixing bolts from left and right triangular arm, and remove triangular arm.

Hint:

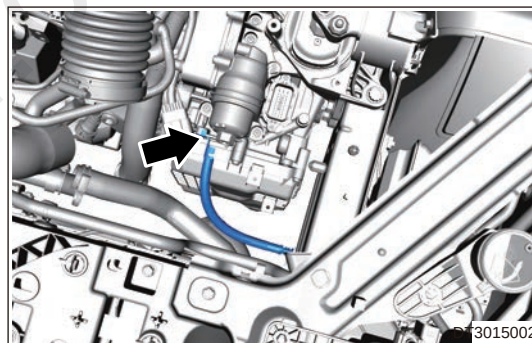
Use same removal procedures for left and right sides, here is front right triangular arm.

- (18) Raise vehicle to a proper height, remove 4 fixing bolts from sub frame. Use a transmission carrier to support sub frame, and then separate it from body and lower it to a proper position.
 (19) Remove 2 fixing bolts from steering gear, separate it from sub frame, remove sub frame assembly.
 (20) Raise vehicle to a proper height, remove rear propeller shaft.

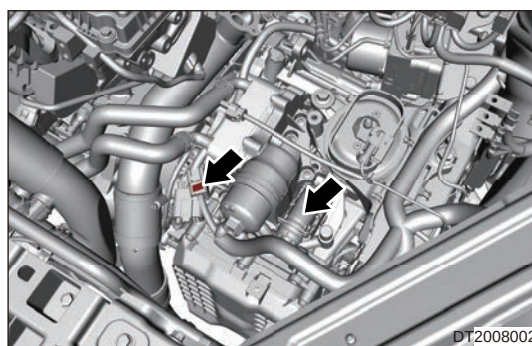
- (21) Remove 1 fixing bolt from starter.



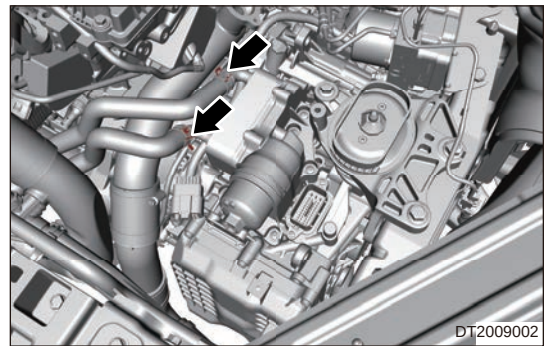
- (22) Remove the transmission ground wire fixing bolt.



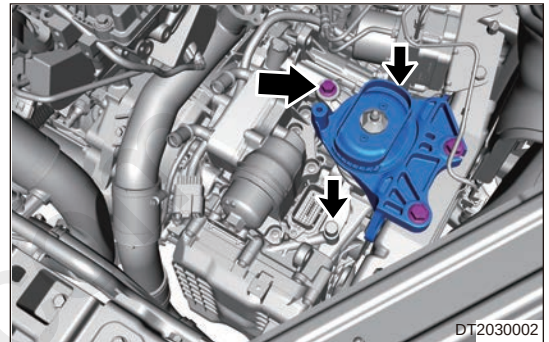
- (23) Remove the connectors (arrow) of transmission wire harness.



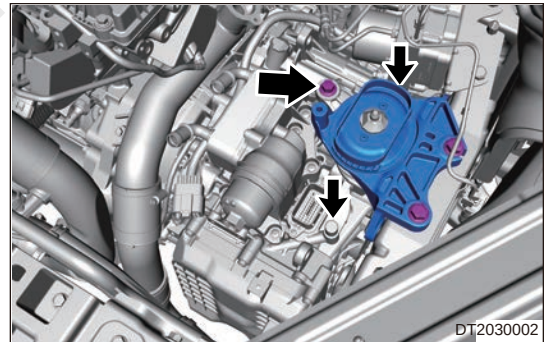
- (24) Remove cooler pipe clamps (arrow).
- (25) Remove the cooler pipe.



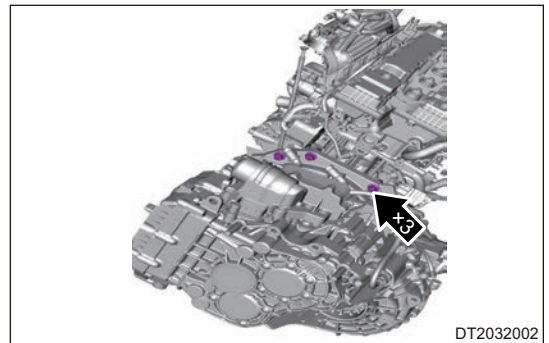
- (26) Install the engine hoist.
- (27) Install the transmission carrier.
- (28) Remove 4 fixing bolts and 1 nut from left mounting cushion and remove mounting cushion assembly.



- (29) Remove 3 fixing bolts from left mounting bracket and remove mounting bracket assembly.

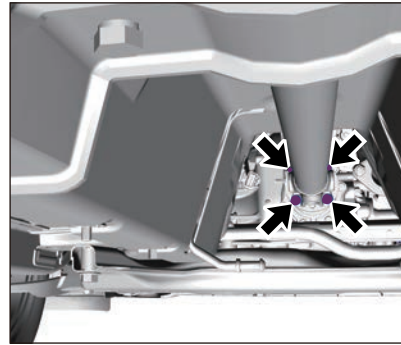


- (30) Remove 3 fixing bolts between upper part of transmission and engine.



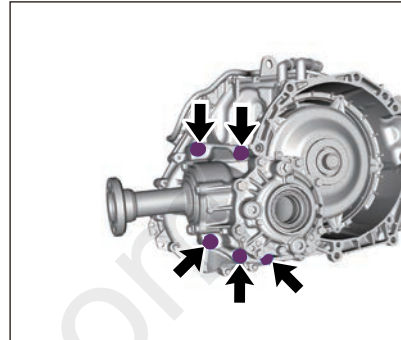
- (31) Remove the pre-catalytic converter assembly (4WD).
- (32) Remove the transfer assembly (4WD).

- 1) Remove 4 fixing bolts (arrow) between propeller shaft and PTU output flange surface.



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- 2) Remove 5 fixing bolts (arrow) between transfer and transmission.



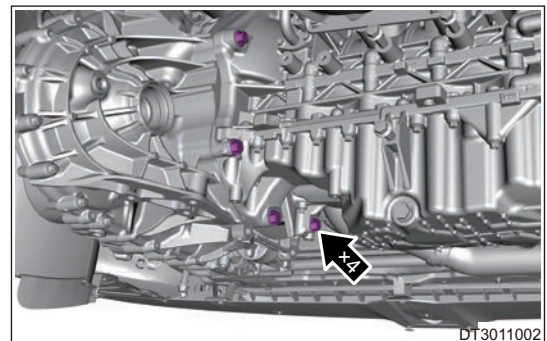
U10032002

- 3) Remove the transfer assembly.

⚠ Warning

- When handling the transfer, please pay attention to the flange surface connected with intermediate shaft and spline connected with transmission differential. Please pay attention to whether O-ring is intact and whether the oil seal is intact to avoid touching the lip of oil seal. Please handle the transfer case with care during whole operation, and do not move the transfer case upside down.

- (33) Remove 4 fixing bolts between lower part of transmission and engine.



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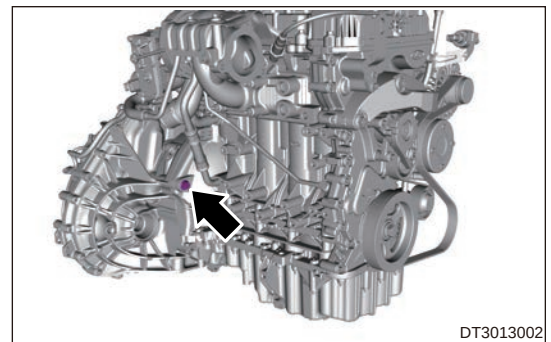
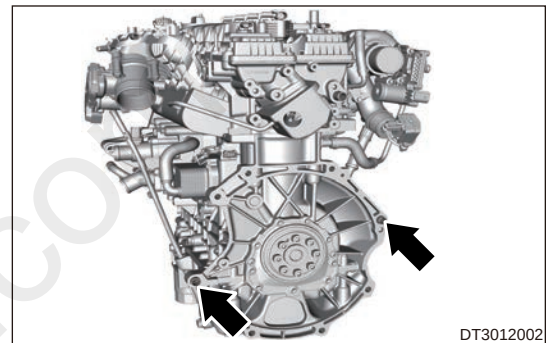
- (34) Use tool to separate transmission and engine assembly, and remove transmission assembly.

■ Installation

⚠ Caution

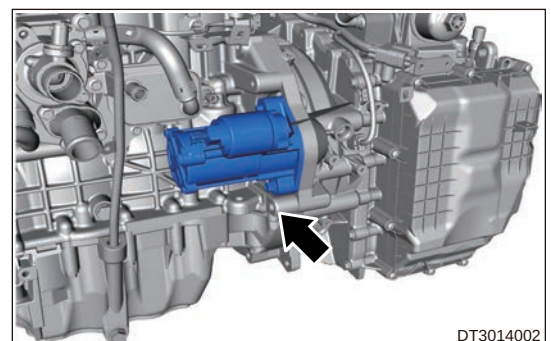
- Before assembly, the engine cannot be missed to install or sealing plate cannot be bent.
- When assembling transmission and engine, the joint surfaces between transmission and engine must be fully contacted before installing coupling bolts between transmission and engine, and then tighten them diagonally and alternately, otherwise it is easy to loose thread of bolt hole on the transmission clutch case.
- Teeth-to-teeth (dual clutch spline teeth and dual mass flywheel spline teeth) will occur when transmission and engine are assembled. It can not install assembling bolts or manually press to assemble forcibly. The transmission must be completely disengaged and re-assembled, otherwise it will easily cause the clutch adjusting spring position to deviate, clutch half-clutch point value does not match the joint point value stored in the transmission control unit, and also, vehicle is moved when shifting to driving position, vehicle does not move when depressing accelerator pedal, vehicle jitter will occur when reversing or engine stall will occur when releasing brake pedal in reverse gear.

- (1) As shown in the illustration below, install sealing plate to engine and ensure that dowel pin holes on engine are inserted into the corresponding holes of the sealing plate.



- (2) Align the dowel pin hole of transmission with the dowel pin hole of engine, push the transmission so that the joint surfaces between engine and transmission can be contacted well, and install 2 coupling bolts to engine side as shown in the illustration.

Tightening torque: $50 \pm 5 \text{ N}\cdot\text{m}$



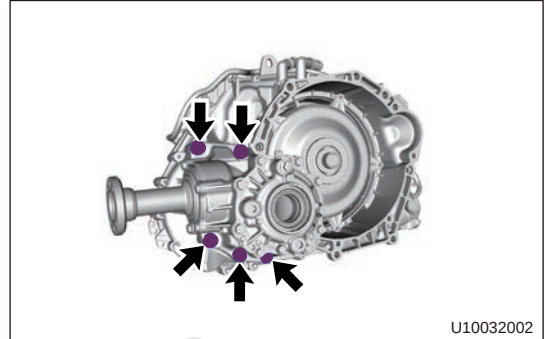
- (3) Install the transfer assembly (4WD).

⚠ Warning

- Install transfer spline to differential by turning it left and right, and align the transfer case dowel pin with positioning hole of differential case simultaneously.
- When installing 5 tightening bolts between transfer and transmission, follow the order of up, down, left and right and tighten diagonally.

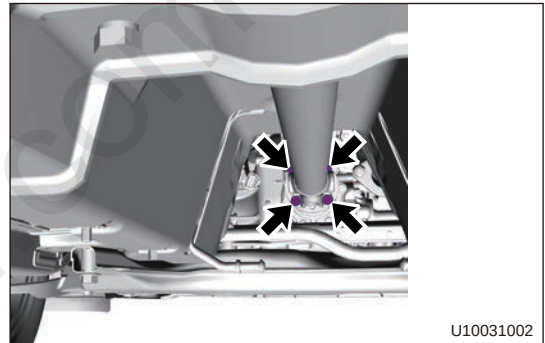
- 1) Install 5 fixing bolts between transfer and transmission.

Tightening torque: $120 \pm 10 \text{ N}\cdot\text{m}$



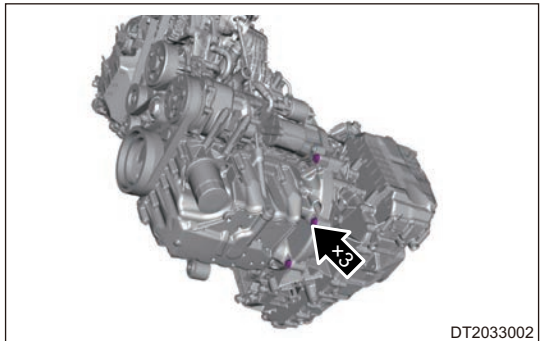
- 2) Install 4 fixing bolts between propeller shaft and PTU output flange.

Tightening torque: $33 \pm 3 \text{ N}\cdot\text{m}$

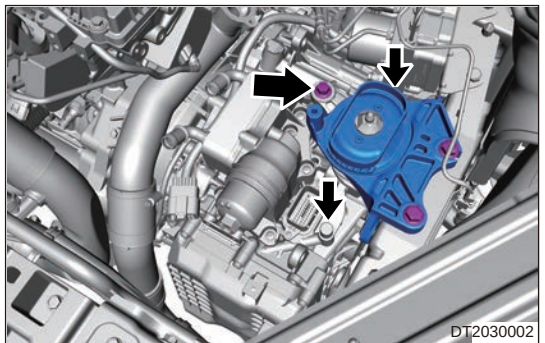


- (4) Install the precatalytic converter assembly (4WD).
(5) Install 4 coupling bolts to lower part of transmission.

Tightening torque: $50 \pm 5 \text{ N}\cdot\text{m}$

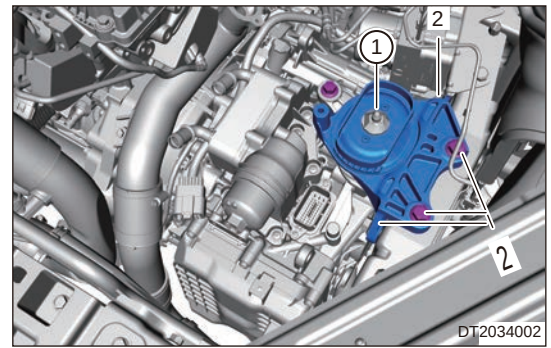


- (6) Install left mounting bracket and 3 fixing bolts.



- (7) Install 4 fixing bolts (2) and 1 nut (1) to left mounting cushion.

Tightening torque: $110 \pm 15 \text{ N}\cdot\text{m}$



- (8) Install 3 coupling bolts to transmission side.

Tightening torque: $90 \pm 9 \text{ N}\cdot\text{m}$



- (9) Connect connectors of transmission wire harness.
 (10) Install the engine inlet pipe.
 (11) Install clamps to engine inlet pipe.
 (12) Install the intercooler inlet pipe assembly II.
 (13) Install the transmission ground wire fixing bolt.
 (14) Install 1 fixing bolt to starter.
 (15) Install 1 fixing bolt to starter.
 (16) Install engine speed sensor and 1 fixing bolt.
 (17) Connect the engine speed sensor wire harness connector.
 (18) Install the rear propeller shaft assembly.
 (19) Use transmission carrier to support sub frame to a proper height, install steering gear assembly to sub frame.
 (20) Use transmission carrier to support sub frame to engage with axle and then install 4 fixing bolts.
 (21) Install left and right triangular arm assembly.
 (22) Install front left/right lower impact beam assembly.
 (23) Install 2 rear lower mounting.
 (24) Install the front right drive shaft with bearing bracket assembly.
 (25) Install the front left drive shaft assembly.
 (26) Install the front right wheel.
 (27) Install the front left wheel.
 (28) Fill the transmission oil.
 (29) Install the battery tray.
 (30) Install the battery.
 (31) Install the air filter assembly.
 (32) Add the coolant.
 (33) Install the engine trim cover assembly.
 (34) Connect the negative battery cable.

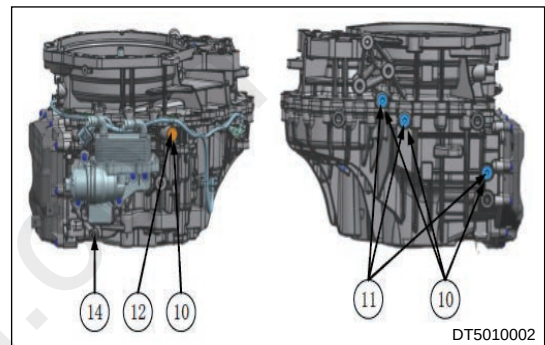
■ Follow the following process to perform diagnostic tester self-learning after replacing transmission body

- (1) The vehicle is powered on, shift lever is in P and the vehicle is stationary.
- (2) Use a diagnostic tester to activate "Reset Memory" function (Routine \$31 01 04 05) and get a positive response.
- (3) Use a diagnostic tester to activate "Read Transmission Storage Data" (Routine \$31 01 04 06 01) and get a positive response.
- (4) The vehicle is powered off and wait for 10 seconds.
- (5) Replacement is complete.

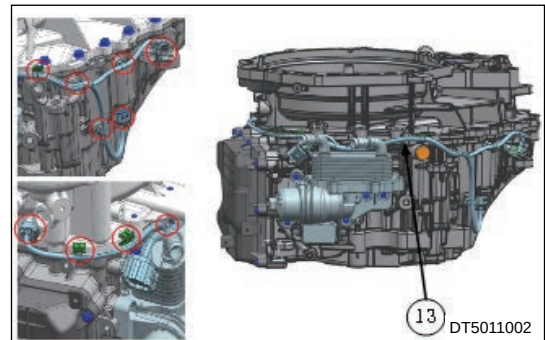
4.11 Transmission Assembly Disassembly

■ Disassembly

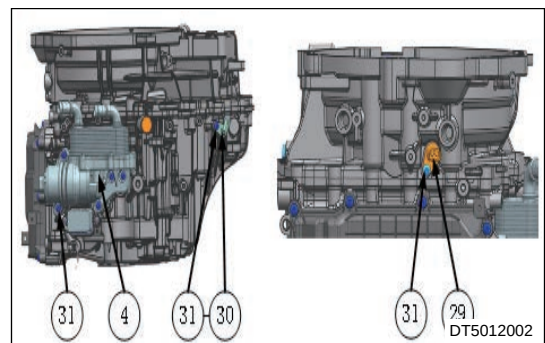
- (1) Place transmission assembly steadily. Remove breather plug (14) and filler plug (12), oil plug gasket (10), and then remove 3 inner hexagon oil plugs (11) and 3 oil plug gaskets (10). Drain transmission oil.



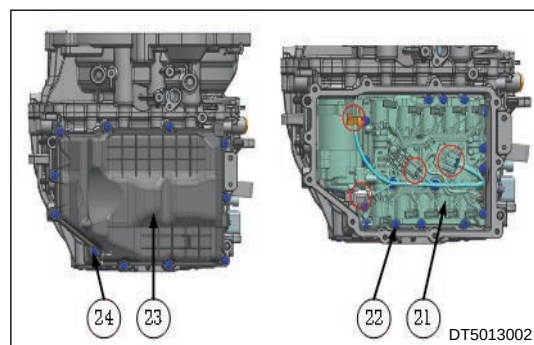
- (2) Remove connectors and clips as shown in illustration below, and then remove three-in-one wire harness (13).



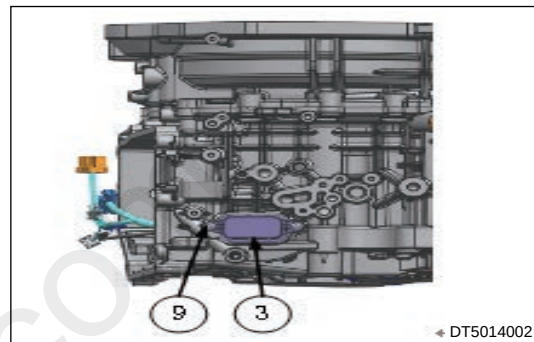
- (3) Remove 5 filter cooling module fixing bolts (31) and filter cooling module assembly (4); remove fixing bolts (31) and output speed sensor (30) & clutch temperature speed sensor (29).



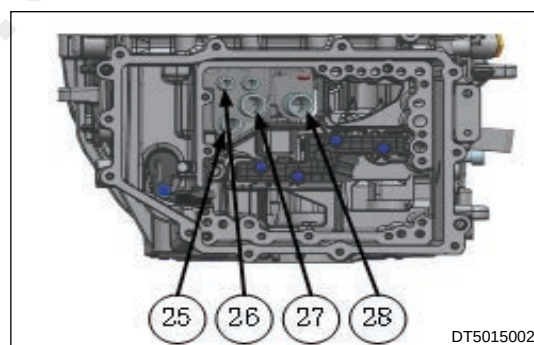
- (4) Remove 11 valve body cover fixing bolts (24) and valve body cover assembly (23); remove 4 connectors as shown in illustration below and 14 hydraulic system fixing bolts (22), and remove hydraulic system (21) by HCU mould assembling pickup lever, pay attention not to damage transmission wire harness.



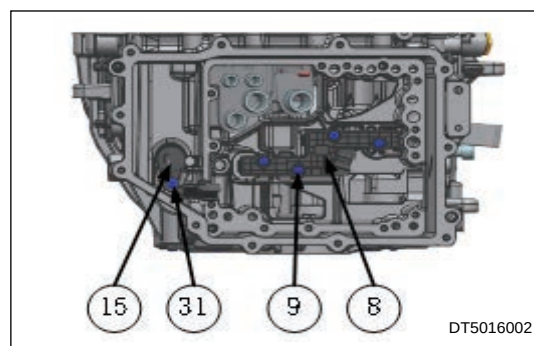
- (5) Remove 2 fixing bolts (9) from transmission wire harness assembly (3).



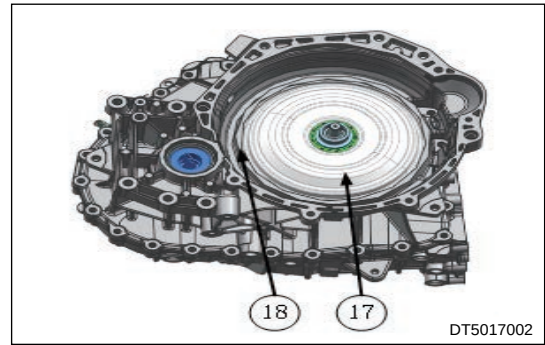
- (6) Remove oil pump valve body connecting pipe assembly 2 (25), oil pump valve body connecting pipe assembly 3 (26), oil pump valve body connecting pipe assembly 1 (27), oil pump valve body connecting pipe assembly 4 (28).



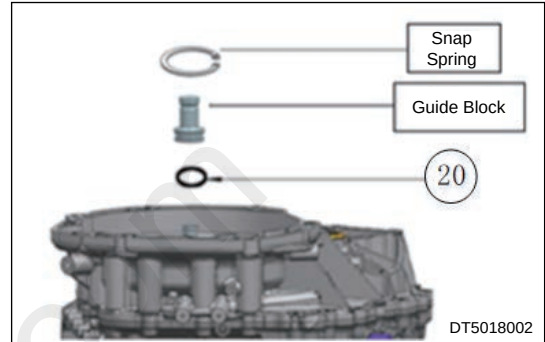
- (7) Remove fixing bolt (31) and, sensor integrated module B (15); remove 4 fixing bolts (9) and sensor integrated module A (8), pay attention not to drop the bolts into transmission.



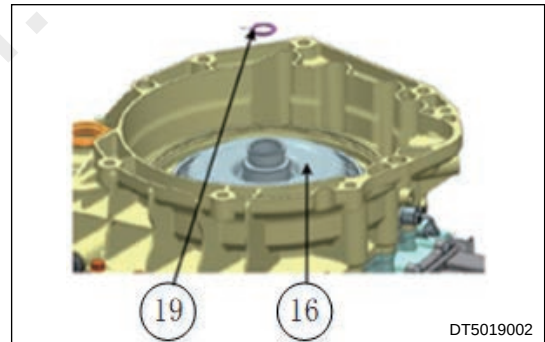
- (8) Remove fixing snap spring (18) and clutch sealing cover (17), pay attention not to scratch the joint surface between housing and sealing cover.



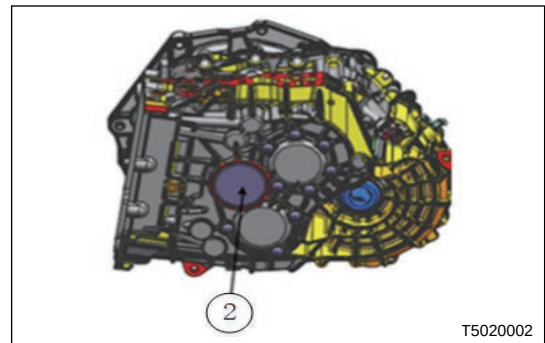
- (9) Remove snap spring from clutch guide block, take out guide block, and then remove clutch snap spring (20).



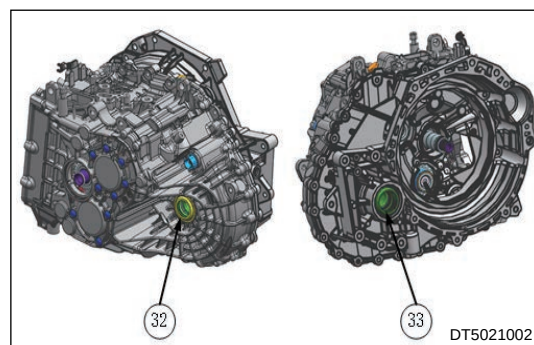
- (10) Take out clutch adjusting shim (19), remove dual clutch assembly (16) with clutch lifting fixture.



- (11) Remove input shaft cover plate (2), pay attention not to damage the joint surface between housing and input shaft cover plate.

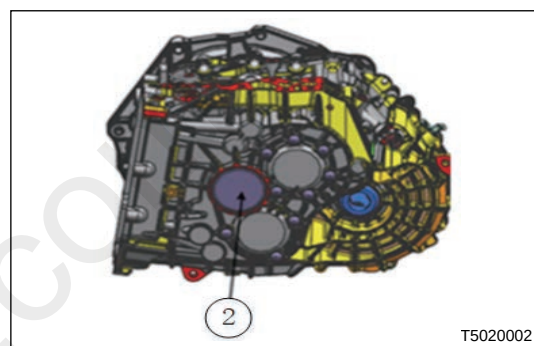


- (12) Remove half shaft oil seal (32) from main housing side and half shaft oil seal (33) from clutch housing side.

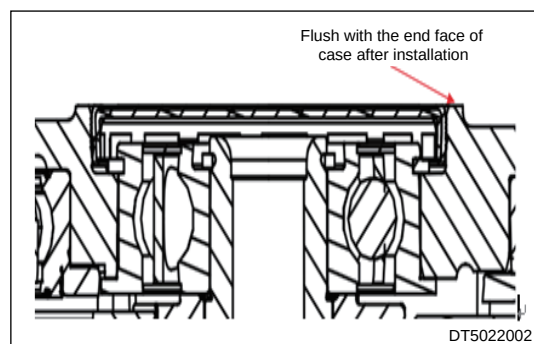


■ Assembly

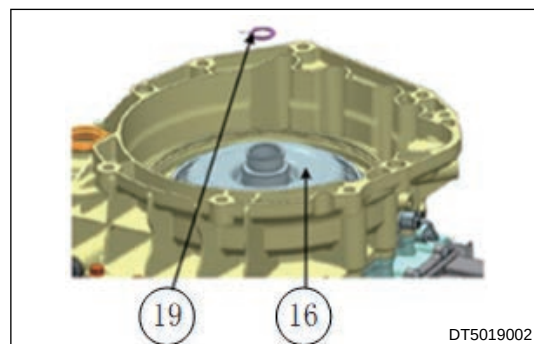
- (1) Install input shaft cover plate (2) with input shaft cover plate knock fixture.



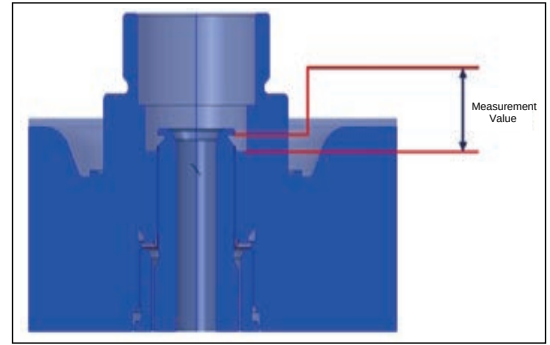
Note: Installation position of cover plate is shown in the following figure.



- (2) Place transmission assembly steadily. Install dual clutch assembly (16) with a clutch lifting fixture.



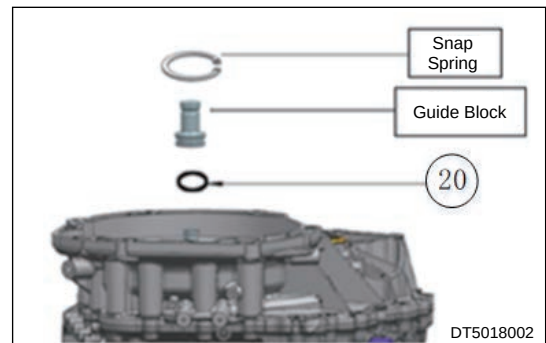
- 1) Using a clutch measuring fixture, measure the clearance H between end face of clutch and end face of input shaft snap spring groove.



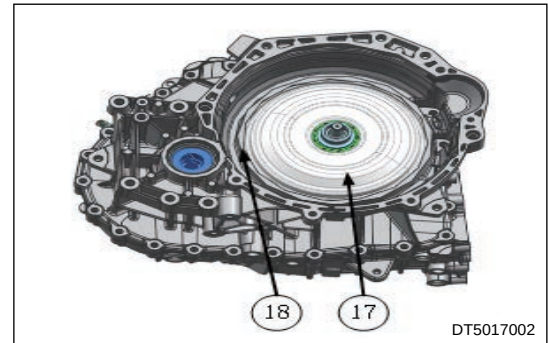
- 2) Select a appropriate clutch adjusting shim (19) to install to clutch assembly according to the following rules.

$X = H - 1.6 - 0.2$		Thickness of selected adjusting shim
>	<	
1.13	1.15	1.10 ± 0.01
1.15	1.25	1.20 ± 0.01
1.25	1.35	1.30 ± 0.01
1.35	1.45	1.40 ± 0.01
1.45	1.55	1.50 ± 0.01
1.55	1.65	1.60 ± 0.01
1.65	1.75	1.70 ± 0.01
1.75	1.85	1.80 ± 0.01
1.85	1.95	1.90 ± 0.01
1.95	2.05	2.00 ± 0.01
2.05	2.15	2.10 ± 0.01
2.15	2.25	2.20 ± 0.01
2.25	2.35	2.30 ± 0.01
2.35	2.42 (inclusive)	2.40 ± 0.01

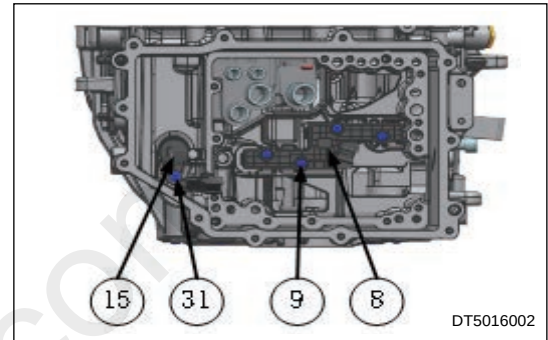
- (3) Using clutch snap spring mounting guide block and clutch snap spring mounting socket, install clutch snap spring (20), and then install guide block and guide block snap spring.



- (4) Using clutch sealing cover fixture and clutch sealing cover guide fixture, install clutch sealing cover (17) in place, and then clamp sealing cover to secure snap spring (18).



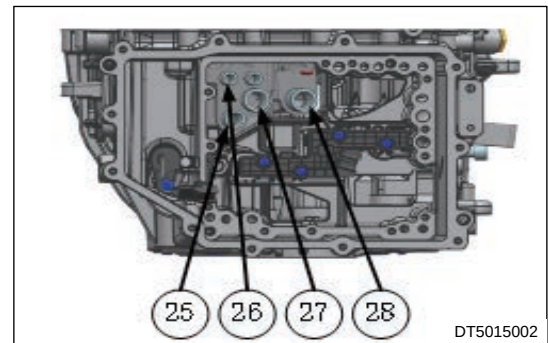
- (5) Install sensor integrated module A (8) and tighten 4 sensor integrated module A fixing bolts (9), install sensor integrated module B (15) and tighten 1 sensor integrated module B fixing bolt (31).



⚠ Caution

- Be careful not to drop the bolts into transmission when installing.

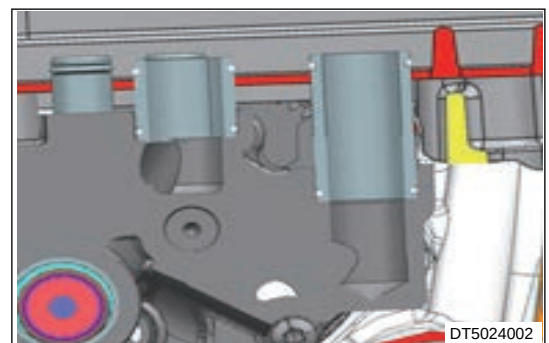
- (6) Install oil pump valve body connecting pipe assembly 2 (25), oil pump valve body connecting pipe assembly 3 (26), oil pump valve body connecting pipe assembly 1 (27), oil pump valve body connecting pipe assembly 4 (28), pay attention to apply transmission oil to O-ring of valve body connecting pipe.



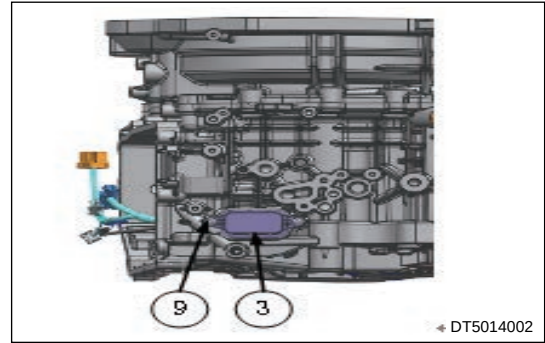
⚠ Caution

- Oil pump valve body connecting pipe assembly 1 and oil pump valve body connecting pipe assembly 4 have the same diameter, but the length is different, so do not install them incorrectly.

- 1) After installing correctly, the two connecting pipe assemblies are at the same height as shown in illustration.



- (7) Pass transmission wire harness connector assembly (3) through transmission case and install, and then tighten 2 fixing bolts (9) to transmission wire harness connector assembly. Tightening torque: 2 - 3 N·m.



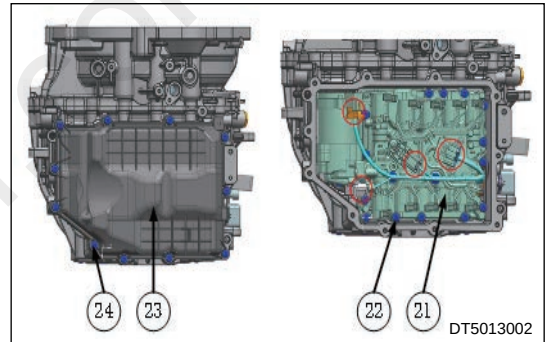
- (8) Install hydraulic system (21) in place with HCU mould assembling pickup lever and HCU mould assembling guide lever.

⚠ Caution

- **When HCU is assembled, pay attention to adjust the position of transmission wire harness connector assembly and do not damage it.**

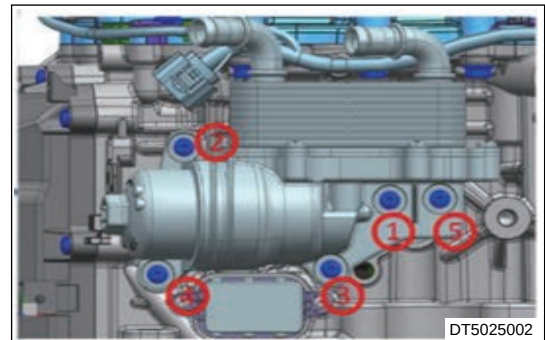
- (9) Tighten 14 fixing bolts (22) to hydraulic system diagonally, tightening torque: $4 \pm 0.5 \text{ Nm} + 90 \pm 2^\circ$, connect 4 connectors as shown in illustration, install valve body cover assembly (23) and tighten 11 fixing bolts (24) to valve body cover diagonally.

Tightening torque: 8 - 10 N·m

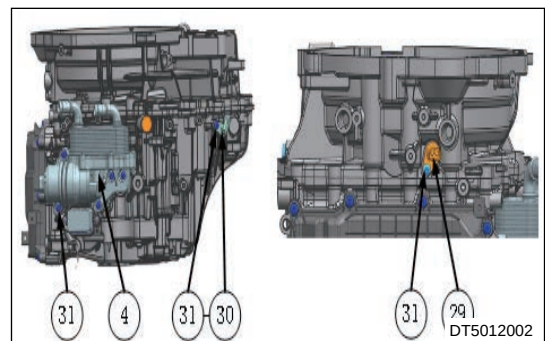


- (10) Install filter cooling module assembly (4) and tighten 5 fixing bolts (31) to filter cooling module assembly in the order of 1-2-3-4-5-1-2-3 as shown in the illustration below.

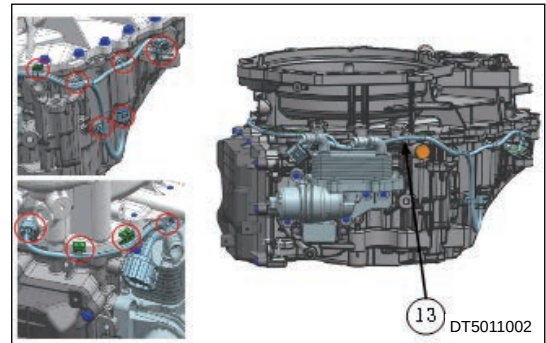
Tightening torque: 8 - 10 N·m



- (11) Install output speed sensor (30) and clutch temperature speed sensor (29), and tighten fixing bolts (31) to output speed sensor and clutch temperature speed sensor, tightening torque: 8 - 10 N·m.



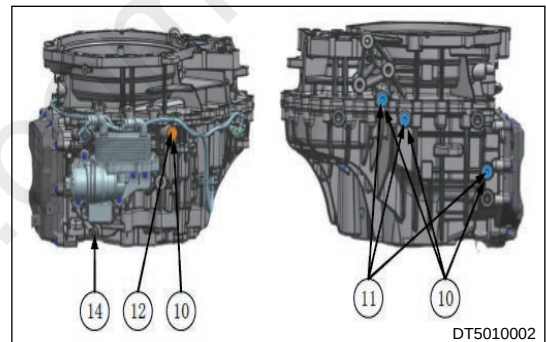
- (12) Install three-in-one wire harness assembly (13), and connect 7 connectors and clips as shown in illustration.



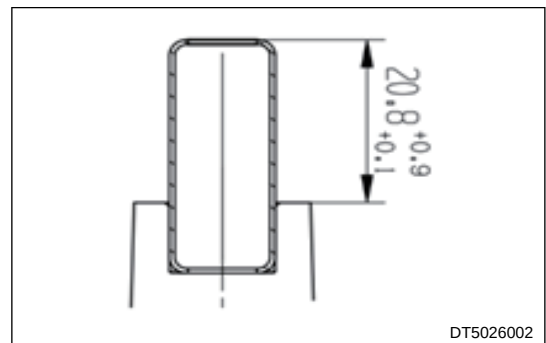
- (13) Install 3 inner hexagonal oil plugs (11) and oil plug gaskets (10), and tighten 3 inner hexagonal oil plugs, tightening torque: 60 - 66 N·m.

- (14) Fill transmission oil into transmission from filling port, install oil plug (12) and oil plug gasket (10), and tighten oil plug.

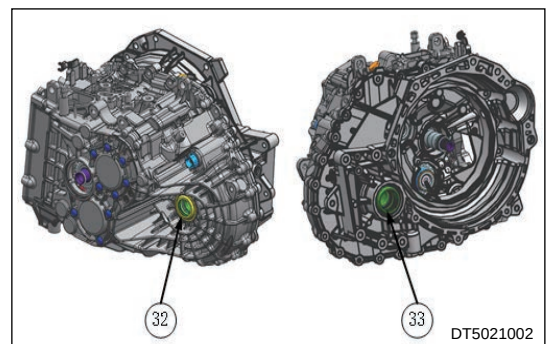
- (15) Install breather plug assembly (14) with breather plug knock fixture.



Note: After breather plug is installed in place, the distance above housing is shown in the following figure.



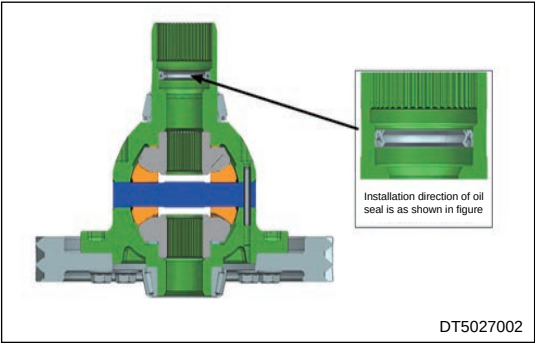
- (16) Install half shaft oil seal (32) to main housing side.



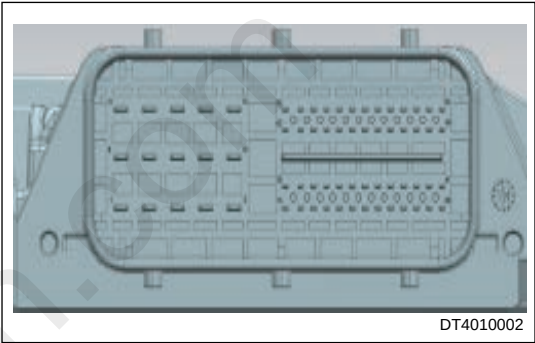
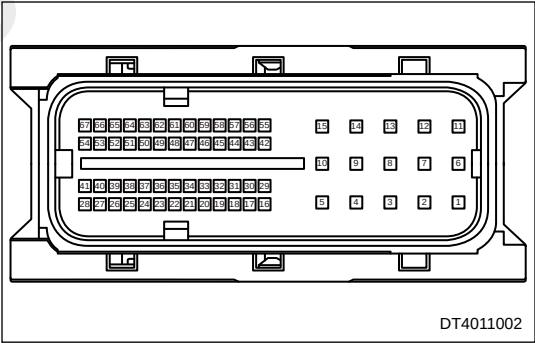
(17) Install half shaft oil seal (33) to clutch housing side.

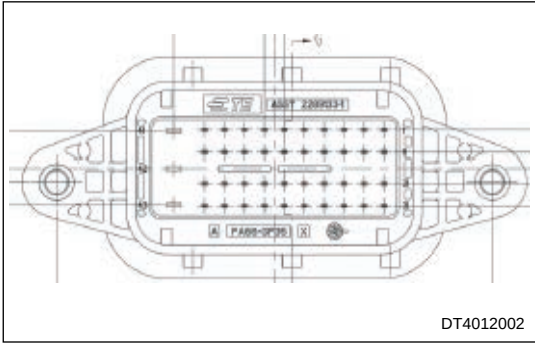
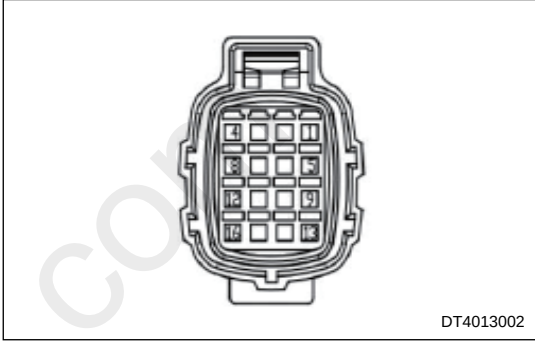
 **Caution**

- The installation direction of oil seal is shown on the right.



4.12 Sensor Inspection

Terminal Name	Terminal Image
TCU Terminal Male Connector J1	 DT4010002
TCU Terminal Wire Harness Female Connector J2	 DT4011002

Terminal Name	Terminal Image
Transmission End Large Connector Male Terminal T1	 DT4012002
Transmission End Small Connector Female Terminal S1	 DT4013002

■ Fork position sensor 1/5, fork position sensor 2/6, fork position sensor 3/7, fork position sensor 4/R

Detection 1: Detect wire harness terminal of fork position sensor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of fork position sensor 1/5 power supply to signal, connect positive terminal to J2-54, the negative terminal to J2-64, read the resistance value.
- (3) Measure the resistance value of fork position sensor 1/5 signal to ground, connect positive terminal to J2-64, the negative terminal to J2-61, read the resistance value.
- (4) Measure the resistance value of fork position sensor 2/6 power supply to signal, connect positive terminal to J2-42, the negative terminal to J2-57, read the resistance value.
- (5) Measure the resistance value of fork position sensor 2/6 signal to ground, connect positive terminal to J2-57, the negative terminal to J2-34, read the resistance value.
- (6) Measure the resistance value of fork position sensor 3/7 power supply to signal, connect positive terminal to J2-54, the negative terminal to J2-64, read the resistance value.
- (7) Measure the resistance value of fork position sensor 3/7 signal to ground, connect positive terminal to J2-64, the negative terminal to J2-61, read the resistance value.
- (8) Measure the resistance value of fork position sensor 4/R power supply to signal, connect positive terminal to J2-42, the negative terminal to J2-58, read the resistance value.
- (9) Measure the resistance value of fork position sensor 4/R signal to ground, connect positive terminal to J2-58, the negative terminal to J2-34, read the resistance value.
- (10)

Detection 2: Detect transmission terminal of fork position sensor

- (1) Disconnect negative battery, unplug corresponding transmission wire harness connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of transmission wire harness connector T1.
- (2) Measure the resistance value of fork position sensor 1/5 power supply to signal, connect positive terminal to T1-13, the negative terminal to T1-31, read the resistance value.

- (3) Measure the resistance value of fork position sensor 1/5 signal to ground, connect positive terminal to T1-31, the negative terminal to T1-32, read the resistance value.
- (4) Measure the resistance value of fork position sensor 2/6 power supply to signal, connect positive terminal to T1-3, the negative terminal to T1-4, read the resistance value.
- (5) Measure the resistance value of fork position sensor 2/6 signal to ground, connect positive terminal to T1-4, the negative terminal to T1-33, read the resistance value.
- (6) Measure the resistance value of fork position sensor 3/7 power supply to signal, connect positive terminal to T1-13, the negative terminal to T1-12, read the resistance value.
- (7) Measure the resistance value of fork position sensor 3/7 signal to ground, connect positive terminal to T1-12, the negative terminal to T1-32, read the resistance value.
- (8) Measure the resistance value of fork position sensor 4/R power supply to signal, connect positive terminal to T1-3, the negative terminal to T1-2, read the resistance value.
- (9) Measure the resistance value of fork position sensor 4/R signal to ground, connect positive terminal to T1-2, the negative terminal to T1-33, read the resistance value.

Detection 3: Detect TCU terminal of fork position sensor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of power supply to fork position sensor 1/5 power supply, connect positive terminal to J1-15, the negative terminal to J1-54, read the resistance value.
- (3) Measure the resistance value of fork position sensor 1/5 power supply to ground, connect positive terminal to J1-54, the negative terminal to J1-5, read the resistance value.
- (4) Measure the resistance value of power supply to fork position sensor 2/6, connect positive terminal to J1-15, the negative terminal to J1-42, read the resistance value.
- (5) Measure the resistance value of fork position sensor 2/6 power supply to ground, connect positive terminal to J1-42, the negative terminal to J1-5, read the resistance value.
- (6) Measure the resistance value of power supply to fork position sensor 3/7, connect positive terminal to J1-15, the negative terminal to J1-54, read the resistance value.
- (7) Measure the resistance value of fork position sensor 3/7 power supply to ground, connect positive terminal to J1-54, the negative terminal to J1-5, read the resistance value.
- (8) Measure the resistance value of power supply to fork position sensor 4/R power supply, connect positive terminal to J1-15, the negative terminal to J1-42, read the resistance value.
- (9) Measure the resistance value of fork position sensor 4/R power supply to ground, connect positive terminal to J1-42, the negative terminal to J1-5, read the resistance value.

■ **Odd input shaft speed sensor, even input shaft speed sensor, output shaft speed sensor, clutch speed sensor**

Detection 1: Detect wire harness terminal of speed sensor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of odd input shaft speed sensor power supply to signal, connect positive terminal to J2-53, the negative terminal to J2-62, read the resistance value.
- (3) Measure the resistance value of even input shaft speed sensor power supply to signal, connect positive terminal to J2-43, the negative terminal to J2-63, read the resistance value.
- (4) Measure the resistance value of output shaft speed sensor power supply to signal, connect positive terminal to J2-53, the negative terminal to J2-59, read the resistance value.
- (5) Measure the resistance value of clutch speed sensor power supply to signal, connect positive terminal to J2-43, the negative terminal to J2-60, read the resistance value.

Detection 2: Detect transmission terminal of speed sensor

- (1) Disconnect negative battery, unplug corresponding transmission wire harness connector and small connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of transmission wire harness connector T1 and small connector S1.
- (2) Measure the resistance value of odd input shaft speed sensor power supply to signal, connect positive terminal to T1-23, the negative terminal to T1-11, read the resistance value.
- (3) Measure the resistance value of even input shaft speed sensor power supply to signal, connect positive terminal to T1-22, the negative terminal to T1-21, read the resistance value.

- (4) Measure the resistance value of output shaft speed sensor power supply to signal, connect positive terminal to S1-9, the negative terminal to S1-11, read the resistance value.
- (5) Measure the resistance value of clutch speed sensor power supply to signal, connect positive terminal to S1-13, the negative terminal to S1-14, read the resistance value.

Detection 3: Detect TCU terminal of speed sensor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of power supply to odd input shaft speed sensor power supply, connect positive terminal to J1-15, the negative terminal to J1-53, read the resistance value.
- (3) Measure the resistance value of odd input shaft speed sensor power supply to ground, connect positive terminal to J1-53, the negative terminal to J1-5, read the resistance value.
- (4) Measure the resistance value of power supply to even input shaft speed sensor power supply, connect positive terminal to J1-15, the negative terminal to J1-43, read the resistance value.
- (5) Measure the resistance value of even input shaft speed sensor power supply to ground, connect positive terminal to J1-43, the negative terminal to J1-5, read the resistance value.
- (6) Measure the resistance value of power supply to output shaft speed sensor power supply, connect positive terminal to J1-15, the negative terminal to J1-53, read the resistance value.
- (7) Measure the resistance value of output shaft speed sensor power supply to ground, connect positive terminal to J1-53, the negative terminal to J1-5, read the resistance value.
- (8) Measure the resistance value of power supply to clutch speed sensor power supply, connect positive terminal to J1-15, the negative terminal to J1-43, read the resistance value.
- (9) Measure the resistance value of clutch speed sensor power supply to ground, connect positive terminal to J1-43, the negative terminal to J1-5, read the resistance value.

4.13 Solenoid Valve Inspection

■ Main oil passage, lubricant oil passage solenoid valve

Detection 1: Detect wire harness terminal of main oil passage, lubricating oil passage solenoid valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of power supply to main oil passage solenoid valve power supply, connect positive terminal to J2-15, the negative terminal to J2-6, read the resistance value.
- (3) Measure the resistance value of main oil passage solenoid valve power supply to signal, connect positive terminal to J2-6, the negative terminal to J2-44, read the resistance value.
- (4) Measure the resistance value of main oil passage solenoid valve signal to ground, connect positive terminal to J2-44, the negative terminal to J2-5, read the resistance value.
- (5) Measure the resistance value of power supply to lubricant oil passage solenoid valve power supply, connect positive terminal to J2-15, the negative terminal to J2-6, read the resistance value.
- (6) Measure the resistance value of lubricant oil passage solenoid valve power supply to signal, connect positive terminal to J2-6, the negative terminal to J2-45, read the resistance value.
- (7) Measure the resistance value of lubricant oil passage solenoid valve signal to ground, connect positive terminal to J2-45, the negative terminal to J2-5, read the resistance value.

Detect transmission terminal of main oil passage, lubricant oil passage solenoid valve

- (1) Disconnect negative battery, unplug corresponding transmission wire harness connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of transmission wire harness connector T1.
- (2) Measure the resistance value of main oil passage solenoid valve power supply to signal, connect positive terminal to T1-39, the negative terminal to T1-26, read the resistance value.
- (3) Measure the resistance value of lubricant oil passage solenoid valve power supply to signal, connect positive terminal to T1-39, the negative terminal to T1-36, read the resistance value.

Detection 3: Detect TCU terminal of main oil passage, lubricant oil passage solenoid valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.

- (2) Measure the resistance value of power supply to main oil passage solenoid valve power of supply, connect positive terminal to J1-15, the negative terminal to J1-6, read the resistance value.
- (3) Measure the resistance value of main oil passage solenoid valve signal to ground, connect positive terminal to J1-44, the negative terminal to J1-5, read the resistance value.
- (4) Measure the resistance value of power supply to lubricant oil passage solenoid valve power supply, connect positive terminal to J1-15, the negative terminal to J1-6, read the resistance value.
- (5) Measure the resistance value of lubricant oil passage solenoid valve signal to ground, connect positive terminal to J1-45, the negative terminal to J1-5, read the resistance value.

■ Odd clutch, even clutch solenoid valve

Detection 1: Detect wire harness terminal of clutch solenoid valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of power supply to odd clutch solenoid valve power supply, connect positive terminal to J2-15, the negative terminal to J2-11, read the resistance value.
- (3) Measure the resistance value of odd clutch solenoid valve power supply to signal, connect positive terminal to J2-11, the negative terminal to J2-4, read the resistance value.
- (4) Measure the resistance value of odd clutch solenoid valve signal to ground, connect positive terminal to J2-4, the negative terminal to J2-5, read the resistance value.
- (5) Measure the resistance value of power supply to even clutch solenoid valve power supply, connect positive terminal to J2-15, the negative terminal to J2-12, read the resistance value.
- (6) Measure the resistance value of even clutch solenoid valve power supply to signal, connect positive terminal to J2-12, the negative terminal to J2-33, read the resistance value.
- (7) Measure the resistance value of even clutch solenoid valve signal to ground, connect positive terminal to J2-33, the negative terminal to J2-5, read the resistance value.

Detection 2: Detect transmission terminal of clutch solenoid valve

- (1) Disconnect negative battery, unplug corresponding transmission wire harness connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of transmission wire harness connector T1.
- (2) Measure the resistance value of odd clutch solenoid valve power supply to signal, connect positive terminal to T1-19, the negative terminal to T1-7, read the resistance value.
- (3) Measure the resistance value of even clutch solenoid valve power supply to signal, connect positive terminal to T1-29, the negative terminal to T1-8, read the resistance value.

Detection 3: Detect TCU terminal of clutch solenoid valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of power supply to odd clutch solenoid valve power supply, connect positive terminal to J1-15, the negative terminal to J1-11, read the resistance value.
- (3) Measure the resistance value of odd clutch solenoid valve signal to ground, connect positive terminal to J1-4, the negative terminal to J1-5, read the resistance value.
- (4) Measure the resistance value of power supply to even clutch solenoid valve power supply, connect positive terminal to J1-15, the negative terminal to J1-12, read the resistance value.
- (5) Measure the resistance value of even clutch solenoid valve signal to ground, connect positive terminal to J1-33, the negative terminal to J1-5, read the resistance value.

■ Odd shift pressure, even shift pressure solenoid valve

Detection 1: Detect wire harness terminal of shift pressure solenoid valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of power supply to odd shift pressure solenoid valve power supply, connect positive terminal to J2-15, the negative terminal to J2-11, read the resistance value.
- (3) Measure the resistance value of odd shift pressure solenoid valve power supply to signal, connect positive terminal to J2-11, the negative terminal to J2-10, read the resistance value.

- (4) Measure the resistance value of odd shift pressure solenoid valve signal to ground, connect positive terminal to J2-10, the negative terminal to J2-5, read the resistance value.
- (5) Measure the resistance value of power supply to even shift pressure solenoid valve power supply, connect positive terminal to J2-15, the negative terminal to J2-12, read the resistance value.
- (6) Measure the resistance value of even shift pressure solenoid valve power supply to signal, connect positive terminal to J2-12, the negative terminal to J2-48, read the resistance value.
- (7) Measure the resistance value of even shift pressure solenoid valve signal to ground, connect positive terminal to J2-48, the negative terminal to J2-5, read the resistance value.

Detect transmission terminal of shift pressure solenoid valve

- (1) Disconnect negative battery, unplug corresponding transmission wire harness connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of transmission wire harness connector T1.
- (2) Measure the resistance value of odd shift pressure solenoid valve power supply to signal, connect positive terminal to T1-19, the negative terminal to T1-17, read the resistance value.
- (3) Measure the resistance value of even shift pressure solenoid valve power supply to signal, connect positive terminal to T1-29, the negative terminal to T1-18, read the resistance value.

Detection 3: Detect TCU terminal of clutch solenoid valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of power supply to odd shift pressure solenoid valve power supply, connect positive terminal to J1-15, the negative terminal to J1-11, read the resistance value.
- (3) Measure the resistance value of odd shift pressure solenoid valve signal to ground, connect positive terminal to J1-10, the negative terminal to J1-5, read the resistance value.
- (4) Measure the resistance value of power supply to even shift pressure solenoid valve power supply, connect positive terminal to J1-15, the negative terminal to J1-12, read the resistance value.
- (5) Measure the resistance value of even shift pressure solenoid valve signal to ground, connect positive terminal to J1-48, the negative terminal to J1-5, read the resistance value.

4.14 Motor Inspection

■ Driver motor

Detection 1: Detect wire harness terminal of driver motor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of motor power supply to U phase, connect positive terminal to J2-13, the negative terminal to J2-1, read the resistance value.
- (3) Measure the resistance value of motor power supply to V phase, connect positive terminal to J2-13, the negative terminal to J2-2, read the resistance value.
- (4) Measure the resistance value of motor power supply to W phase, connect positive terminal to J2-13, the negative terminal to J2-3, read the resistance value.
- (5) Measure the resistance value of motor U phase to ground, connect positive terminal to J2-1, the negative terminal to J2-5, read the resistance value.
- (6) Measure the resistance value of motor V phase to ground, connect positive terminal to J2-2, the negative terminal to J2-5, read the resistance value.
- (7) Measure the resistance value of motor W phase to ground, connect positive terminal to J2-3, the negative terminal to J2-5, read the resistance value.
- (8) Measure the resistance value of U phase to V phase, connect positive terminal to J2-1, the negative terminal to J2-2, read the resistance value.
- (9) Measure the resistance value of V phase to W phase, connect positive terminal to J2-2, the negative terminal to J2-3, read the resistance value.
- (10) Measure the resistance value of W phase to U phase, connect positive terminal to J2-3, the negative terminal to J2-1, read the resistance value.

Detection 2: Detect transmission terminal of driver motor

- (1) Disconnect negative battery, unplug corresponding transmission wire harness connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of transmission wire harness connector T1.
- (2) Measure the resistance value of U phase to V phase, connect positive terminal to T1-41, the negative terminal to T1-42, read the resistance value.
- (3) Measure the resistance value of V phase to W phase, connect positive terminal to T1-42, the negative terminal to T1-43, read the resistance value.
- (4) Measure the resistance value of W phase to U phase, connect positive terminal to T1-43, the negative terminal to T1-41, read the resistance value.

Detection 3: Detect TCU terminal of driver motor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of motor power supply to U phase, connect positive terminal to J1-13, the negative terminal to J1-1, read the resistance value.
- (3) Measure the resistance value of motor power supply to V phase, connect positive terminal to J1-13, the negative terminal to J1-2, read the resistance value.
- (4) Measure the resistance value of motor power supply to W phase, connect positive terminal to J1-13, the negative terminal to J1-3, read the resistance value.
- (5) Measure the resistance value of motor U phase to ground, connect positive terminal to J1-1, the negative terminal to J1-5, read the resistance value.
- (6) Measure the resistance value of motor V phase to ground, connect positive terminal to J1-2, the negative terminal to J1-5, read the resistance value.
- (7) Measure the resistance value of motor W phase to ground, connect positive terminal to J1-3, the negative terminal to J1-5, read the resistance value.

4.15 Hydraulic Parking Inspection

■ E-Park hydraulic valve

Detection 1: Detect wire harness terminal of E-Park hydraulic valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of power supply to E-Park hydraulic valve power supply, connect positive terminal to J2-15, the negative terminal to J2-6, read the resistance value.
- (3) Measure the resistance value of E-Park hydraulic valve signal to ground, connect positive terminal to J2-36, the negative terminal to J2-5, read the resistance value.
- (4) Measure the resistance value of E-Park hydraulic valve power supply to E-Park hydraulic valve signal, connect positive terminal to J2-6, the negative terminal to J2-36, read the resistance value.

Detection 2: Detect transmission terminal of E-Park hydraulic valve

- (1) Disconnect negative battery, unplug corresponding small connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of small connector S1.
- (2) Measure the resistance value of E-Park hydraulic valve power supply to E-Park hydraulic valve signal, connect positive terminal to S1-1, the negative terminal to S1-2, read the resistance value.

Detection 3: Detect TCU terminal of E-Park hydraulic valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of power supply to E-Park hydraulic valve power supply, connect positive terminal to J1-15, the negative terminal to J1-6, read the resistance value.
- (3) Measure the resistance value of E-Park hydraulic valve signal to ground, connect positive terminal to J1-36, the negative terminal to J1-5, read the resistance value.

■ E-Park safety valve

Detection 1: Detect wire harness terminal of E-Park safety valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.

- (2) Measure the resistance value of power supply to E-Park safety valve power supply, connect positive terminal to J2-15, the negative terminal to J2-6, read the resistance value.
- (3) Measure the resistance value of E-Park safety valve signal to ground, connect positive terminal to J2-35, the negative terminal to J2-5, read the resistance value.
- (4) Measure the resistance value of E-Park safety valve power supply to E-Park safety valve signal, connect positive terminal to J2-6, the negative terminal to J2-35, read the resistance value.

Detection 2: Detect transmission terminal of E-Park safety valve

- (1) Disconnect negative battery, unplug corresponding small connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of small connector S1.
- (2) Measure the resistance value of E-Park safety valve power supply to E-Park safety valve signal, connect positive terminal to S1-1, the negative terminal to S1-3, read the resistance value.

Detection 3: Detect TCU terminal of E-Park safety valve

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of power supply to E-Park safety valve power supply, connect positive terminal to J1-15, the negative terminal to J1-6, read the resistance value.
- (3) Measure the resistance value of E-Park safety valve signal to ground, connect positive terminal to J1-35, the negative terminal to J1-5, read the resistance value.

■ E-Park position sensor

Detection 1: Detect wire harness terminal of E-Park position sensor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of female connector J2 of wire harness side matched with TCU.
- (2) Measure the resistance value of E-Park position sensor power supply to signal, connect positive terminal to J2-54, the negative terminal to J2-41, read the resistance value.
- (3) Measure the resistance value of E-Park position sensor signal to ground, connect positive terminal to J2-41, the negative terminal to J2-61, read the resistance value.

Detection 2: Detect transmission terminal of E-Park position sensor

- (1) Disconnect negative battery, unplug corresponding small connector from transmission terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of small connector S1.
- (2) Measure the resistance value of E-Park position sensor power supply to signal, connect positive terminal to S1-5, the negative terminal to S1-4, read the resistance value.
- (3) Measure the resistance value of E-Park position sensor signal to ground, connect positive terminal to S1-4, the negative terminal to S1-8, read the resistance value.

Detection 3: Detect TCU terminal of E-Park position sensor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of E-Park position sensor power supply to signal, connect positive terminal to J1-54, the negative terminal to J1-41, read the resistance value.
- (3) Measure the resistance value of E-Park position sensor signal to ground, connect positive terminal to J1-41, the negative terminal to J1-61, read the resistance value. Measure the resistance value of sensor 4/R power supply, connect positive terminal to J1-15, the negative terminal to J1-42, read the resistance value.
- (4) Measure the resistance value of fork position sensor 4/R power supply to ground, connect positive terminal to J1-42, the negative terminal to J1-5, read the resistance value.

Detection 3: Detect TCU terminal of E-Park position sensor

- (1) Disconnect negative battery, unplug corresponding connector from TCU terminal, adjust digital multimeter to ohm band, measure the resistance between the pins of TCU male connector J1.
- (2) Measure the resistance value of E-Park position sensor power supply to signal, connect positive terminal to J1-54, the negative terminal to J1-41, read the resistance value.
- (3) Measure the resistance value of E-Park position sensor signal to ground, connect positive terminal to J1-41, the negative terminal to J1-61, read the resistance value. Measure the resistance value of sensor 4/R power supply, connect positive terminal to J1-15, the negative terminal to J1-42, read the resistance value.

- (4) Measure the resistance value of fork position sensor 4/R power supply to ground, connect positive terminal to J1-42, the negative terminal to J1-5, read the resistance value.

■ Resistance Inspection Result

There is no short circuit when detection resistance is greater than or equal to 1 megohm. It is a short circuit when detection resistance is low.

Caution

- When measuring resistance value, gently shake wire harness in vertical and horizontal directions.

4.16 Diagnostic Tester Operation Process after Replacing Parts

Depend to maintenance needs, the replacement process for transmission or transmission control unit TCU needs to be performed in the following steps:

Caution

- The transmission EOL off-line related self-learning has been completed, and there is no need to perform self-learning without replacing parts.

Hint:

In order to learn more accurate data, the following conditions need to be met when learning clutch engagement point:

- Clutch temperature: 40 - 100°C
- Engine coolant temperature: 80 - 100°C
- External ambient temperature: is 15 - 50°C
- Intake temperature: 0 - 55°C
- Net torque fluctuation at engine flywheel end is within ± 3.5 N m
- Engine speed is lower than 1,200 rpm, engine idle has no change
- Accelerator pedal is not depressed

■ Replacing transmission body

- (1) The vehicle is powered on, shift lever is in P and the vehicle is stationary.
- (2) Use a diagnostic tester to activate "Reset Memory" function (Routine \$31 01 04 05) and get a positive response.
- (3) Use a diagnostic tester to activate "Read Transmission Storage Data" (Routine \$31 01 04 06 01) and get a positive response.
- (4) The vehicle is powered off and wait for 10 seconds.
- (5) Replacement is complete.

Reset memory

- Self-learning conditions: The vehicle is stationary (accelerator pedal is not depressed), shift lever is in P, stable engine idle, stable engine torque, normal temperature (transmission oil temperature does not exceed 70°C), there is no fault in transmission.
- Reasons for learning failure: 1. BE function request times out; 2. F2 EEPROM Reset is failed.

Read transmission storage data

- Self-learning conditions: The vehicle is stationary (accelerator pedal is not depressed), shift lever is in P
- Reasons for learning failure: 1. BE function request times out; 2. F1 Subrom fails to communicate with TCU.

■ Replacing transmission control unit (TCU)

- (1) The vehicle is powered on, shift lever is in P and the vehicle is stationary.
- (2) Use a diagnostic tester to activate "Reset Memory" function (Routine \$31 01 04 05) and get a positive response.
- (3) Use a diagnostic tester to activate "Read Transmission Storage Data" (Routine \$31 01 04 06 01) and get a positive response.
- (4) Use a diagnostic tester to activate "VIN Code Writing" (2E F1 90 XX XX...).
- (5) The vehicle is powered off and wait for 10 seconds.

(6) Replacement is complete.

■ Replacing transmission clutch assembly

- (1) The vehicle is powered on, shift lever is in P, the vehicle is stationary, engine is in idling condition.
- (2) Use a diagnostic tester to activate "Reset Memory" function (Routine \$31 01 04 05) and get a positive response.
- (3) Use a diagnostic tester to activate "Clutch TP Point Self-learning" (Routine \$31 01 04 03) and get a positive response.
- (4) Use a diagnostic tester to activate "Clutch PC Curve Self-learning" (Routine \$31 01 04 04) and get a positive response.
- (5) The vehicle is powered off and wait for 10 seconds.
- (6) Replacement is complete.

Reset memory

- Self-learning conditions: The vehicle is stationary (accelerator pedal is not depressed), shift lever is in P, stable engine idle, stable engine torque, normal temperature (transmission oil temperature does not exceed 70°C), there is no fault in transmission.
- Reasons for learning failure: 1. BE function request times out; 2. F2 EEPROM Reset is failed.

Clutch TP point self-learning

- Self-learning conditions: The vehicle is stationary (accelerator pedal is not depressed), shift lever is in P, stable engine idle, stable engine torque, normal temperature (transmission oil temperature does not exceed 70°C), there is no fault in transmission.
- Reasons for learning failure: 1. BC does not find odd clutch contact points; 2. BD does not find even clutch contact point; 3. BE function request times out; 4. D1 temperature condition is not met; 5. D2 transmission is failed (report DFC failure); 6. D3 self-learning engine torque is unstable.

Clutch PC curve self-learning

- Self-learning conditions: The vehicle is stationary (accelerator pedal is not depressed), shift lever is in P, stable engine idle, stable engine torque, normal temperature (transmission oil temperature does not exceed 70°C), there is no fault in transmission.
- Reasons for learning failure: 1. A5 odd/even clutch pressure is out of range; 2. A6 odd clutch pressure is out of range; 3. A7 even clutch pressure is out of range; 4. A8 odd/even clutch pressure curve monotonicity inspection is failed; 5. A9 odd clutch pressure curve monotonicity inspection is failed; 6. AA even clutch pressure curve monotonicity inspection is failed; 7. BE function request times out; 8. D1 temperature condition is not met; 9. D2 transmission is failed (report DFC failure).

■ Replacing transmission hydraulic system

- (1) The vehicle is powered on, shift lever is in P, the vehicle is stationary, engine is in idling condition.
- (2) Use a diagnostic tester to activate "Reset Memory" function (Routine \$31 01 04 05) and get a positive response.
- (3) Use a diagnostic tester to activate "Read Transmission Storage Data" (Routine \$31 01 04 06 01) and get a positive response.
- (4) Use a diagnostic tester to activate "Fork Position Self-learning" (Routine \$31 01 04 02) and get a positive response.
- (5) Use a diagnostic tester to activate "Clutch TP Point Self-learning" (Routine \$31 01 04 03) and get a positive response.
- (6) Use a diagnostic tester to activate "Clutch PC Curve Self-learning" (Routine \$31 01 04 04) and get a positive response.
- (7) The vehicle is powered off and wait for 10 seconds.
- (8) Replacement is complete.

Fork Position Self-learning

- Self-learning conditions: The vehicle is stationary (accelerator pedal is not depressed), shift lever is in P, stable engine idle, stable engine torque, normal temperature (transmission oil temperature does not exceed 70°C), there is no fault in transmission.
- Reasons for learning failure: 1. The middle position of B0 1/5 gear is abnormal; 2. The middle position of B1 3/7 gear is abnormal; 3. The middle position of B2 2/6 gear is abnormal; 4. The middle position of B3 4/R gear is abnormal; 5. B4 1st gear position is abnormal; 6. B5 2nd gear position is abnormal; 7. B6 3rd gear position is abnormal; 8. B7 4th gear position is abnormal; 9. B8 5th gear position is abnormal 10. B9

6th gear position is abnormal; 11. BA 7th gear position is abnormal; 12. BB reverse gear position is abnormal; 13. BE function request times out; 14. D2 transmission is failed (report DFC failure).

■ Reporting solenoid valve stuck malfunction

If solenoid valve stuck malfunction is reported, clutch solenoid valve can be scoured. If the malfunction is not repaired, hardware needs to be checked.

- (1) The vehicle is powered on, shift lever is in P, the vehicle is stationary, engine is in idling condition.
- (2) Use a diagnostic tester to activate "Clutch Solenoid Valve Scour" and get a positive response.
- (3) The vehicle is powered off and wait for 10 seconds.
- (4) Scour is completed.

Clutch solenoid valve scour

- Self-learning conditions: The vehicle is stationary (accelerator pedal is not depressed), shift lever is in P, stable engine idle, stable engine torque, normal temperature (transmission oil temperature does not exceed 70°C), there is no fault in transmission.
- Reasons for learning failure: 1. C7 odd gear is not in neutral; 2. C8 even gear is not in neutral; 3. BE function request times out; 4. D1 temperature condition is not met; 5. D2 transmission is failed (report DFC failure).

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5.3 ELECTRONIC SHIFT

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

- (1) When removing electronic shift module assembly, be sure to wear safety equipment to prevent accidents.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

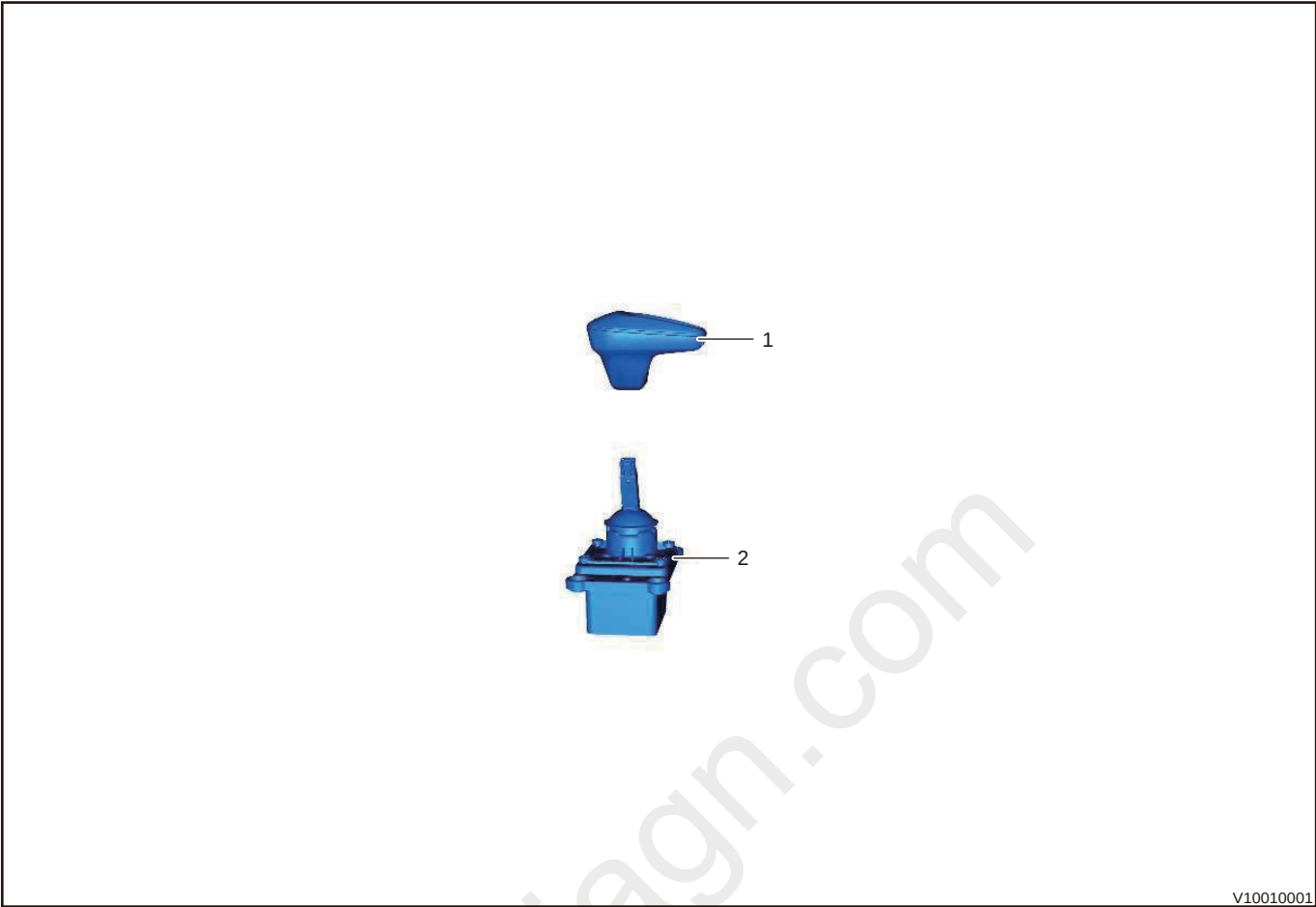
- (1) Appropriate force should be applied, when removing upper cover plate body. Be careful not to operate roughly.

2 System Overview

2.1 System description

Electronic shift is gear shift mechanism and transmission are not connected in a traditional mechanical way, but a safer and faster electronic control mode, eliminating the traditional mechanical shift mode, and all using electronic signals for substitution. Its advantage is that the driver's wrong shift operation will be judged by the computer to see if it will cause damage to the transmission, so as to better protect the transmission and correct the bad shift habits. As a luxurious, high-technology configuration, electronic shift lever eliminates the traditional mechanical shifting mechanism and provides us with a more convenient operation. However, if there is a fault or short circuit, the electronic shifting mechanism is unable to release the current gear, we can only rely on the trailer and rescue.

2.2 System component diagram

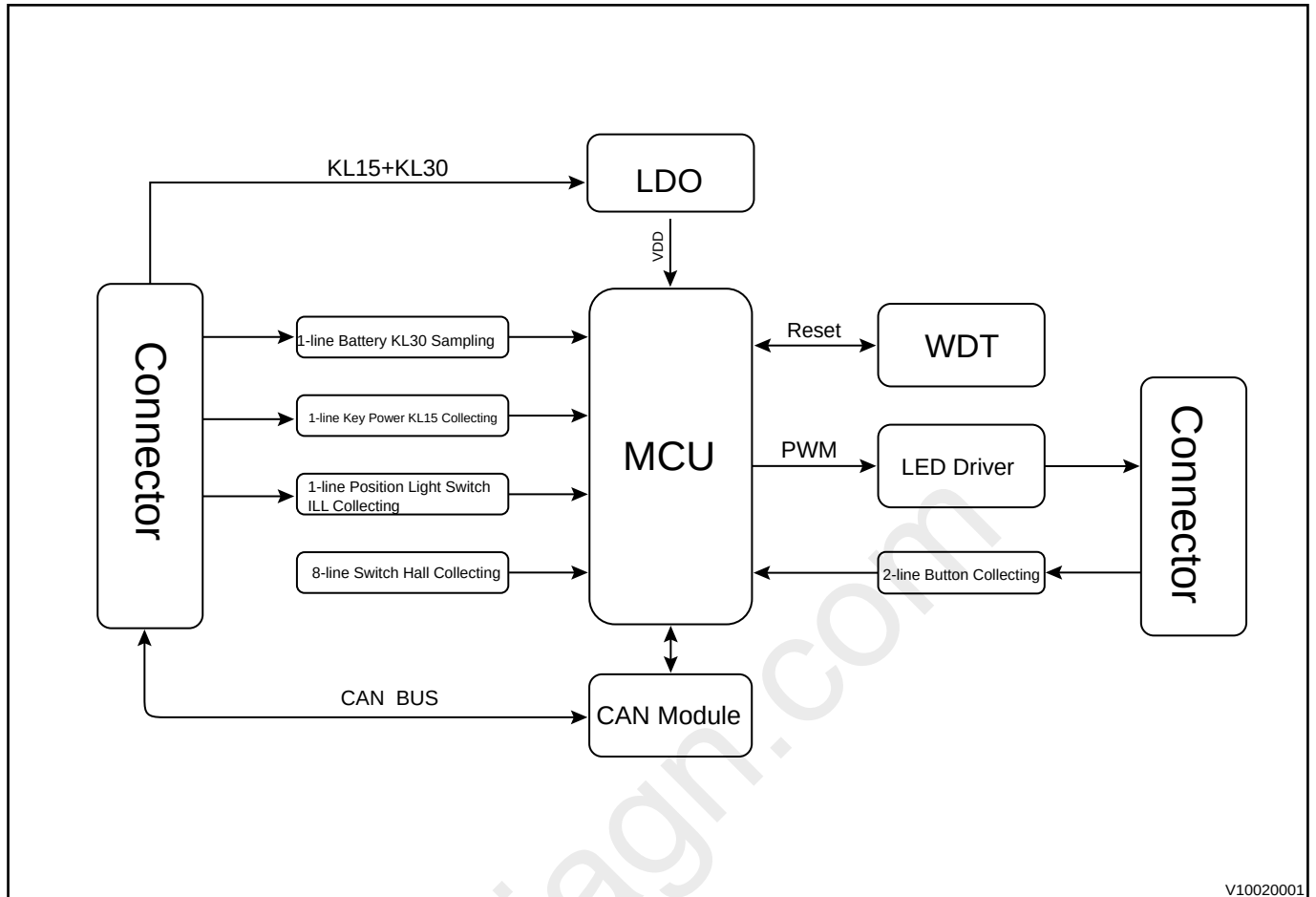


V10010001

1	Shift Lever Assembly	2	Electronic Shift Module
---	----------------------	---	-------------------------

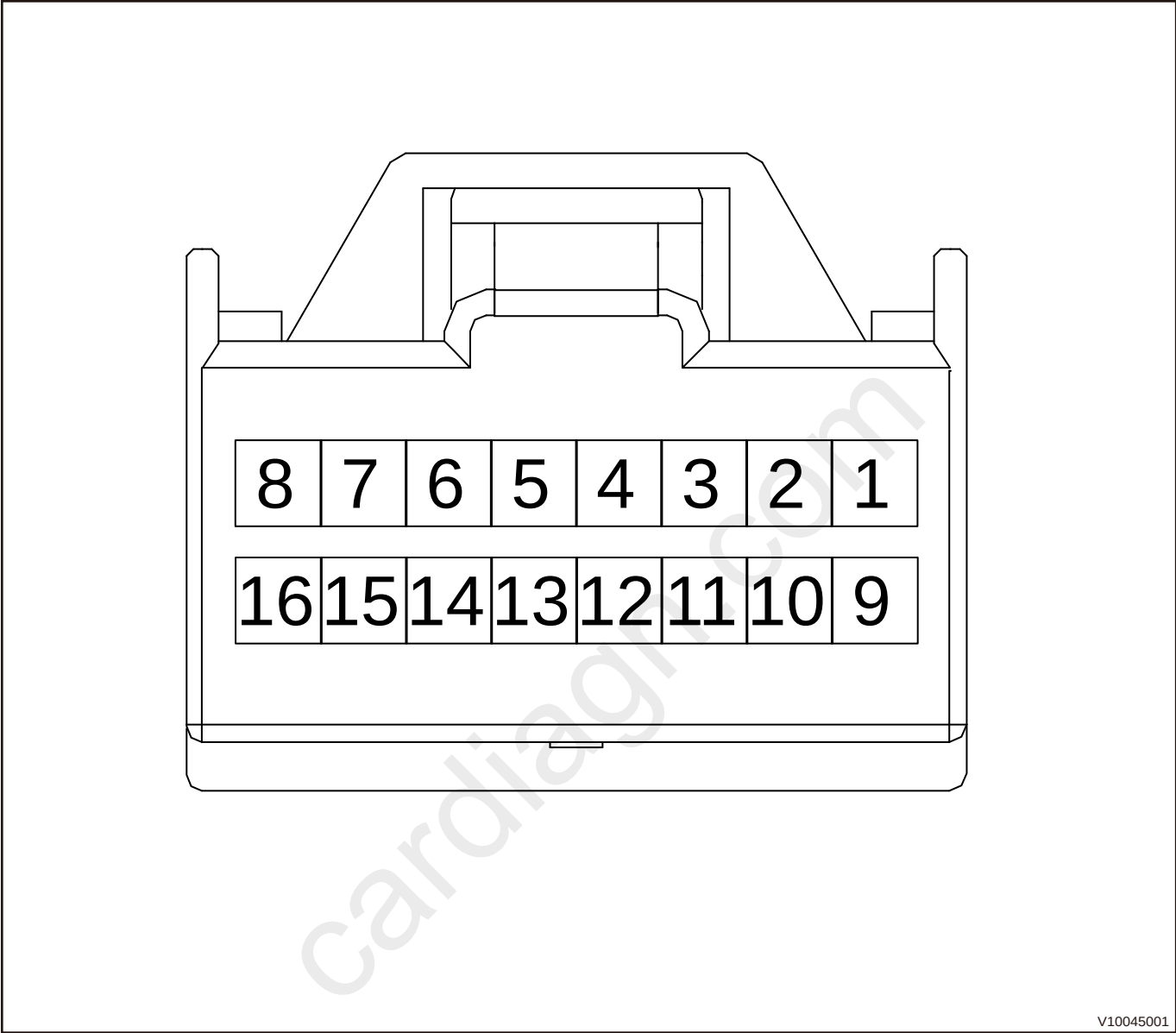
Electronic shift module collects vehicle speed and other signals through CAN network and transmits gear signal to TCU. TCU collects signals input from sensors and other devices to shift gear.

2.3 System schematic diagram



3 System Circuit Diagram

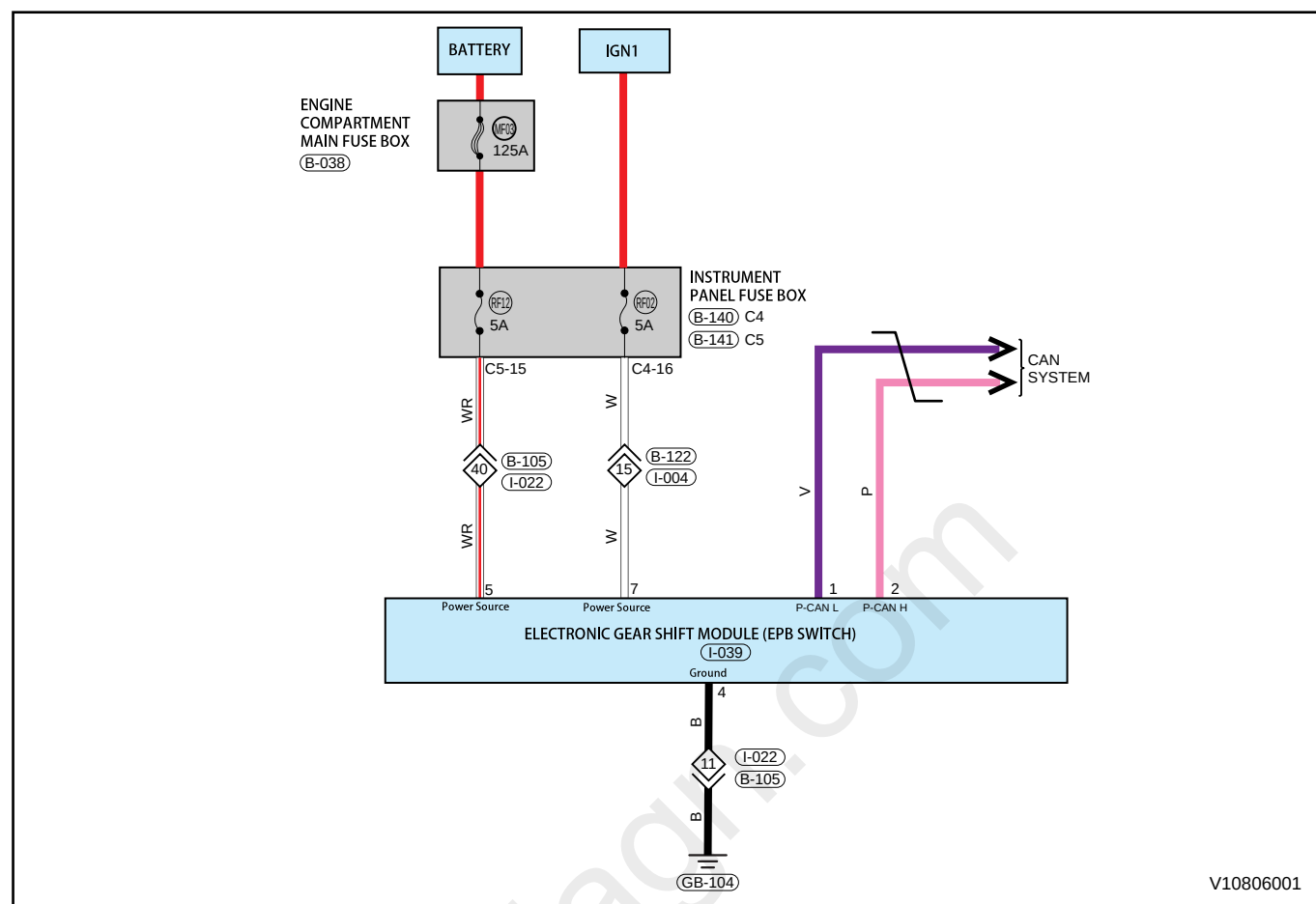
3.1 Electronic shift module (integrated EPB switch) connector terminal definition



V10045001

Pin	Terminal Definition	Pin	Terminal Definition
1	CAN-L	9	-
2	CAN-H	10	SW6
3	-	11	AUTOHOLD switch operation indicator drives
4	Ground	12	AUTOHOLD switch signal outputs
5	Power supply	13	SW4
6	-	14	SW3
7	Ignition signal	15	EPB switch operation indicator drives
8	-	16	SW1

3.2 Circuit diagram



4 DTC Diagnosis

4.1 Diagnosis procedure

Hint:

- Use following procedures to troubleshoot the transmission system.

1	Vehicle brought to workshop
---	-----------------------------

Next

2	Check battery voltage
---	-----------------------

Check if battery voltage is normal.

Standard condition

Standard voltage: Not less than 12V.

NG

Replace battery

OK

3	Customer problem analysis
---	---------------------------

Next

4 Read DTCs

NG

Perform repair according to problem symptoms table

OK

5 Read DTCs (current DTC and history DTC)

NG

Troubleshoot according to Intermittent DTC Fault Flow

OK

6 Repair according to Diagnostic Trouble Code (DTC) chart

Next

7 Adjust, repair or replace

Next

8 Conduct test and confirm malfunction has been repaired

Next

End

4.2 DTC confirmation procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.3 Intermittent DTC troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.

- Look for data that has changed or DTC to reset during wiggle test.
- Check for broken, bent, protruded or corroded terminals.
- Check electronic shift system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.4 Ground inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.5 Diagnostic trouble code (DTC) chart

Electronic Shift System

Hint:

- History trouble code cannot be reported, otherwise it will affect the use by customer.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C244016	Supply Voltage Too Low	The voltage is less than 9 V for 5 s, which is stored as current fault	• Battery • Wire harness or connector is damaged • Shift module failure	• Check for generating capacity of battery and alternator • Check if wire harness or connectors is damaged • Check shift module
C244017	Supply Voltage Too High	The voltage is less than 16V for 5 s, which is stored as current fault		
C244200	Push Forward Stuck	Shifter is pushed forward for more than 60 s	• Electronic shift module is damaged • Wire harness or connector is damaged • Switch stuck	• Check if electronic shift module is damaged • Check if circuit is connected normally • Check switch for stuck
C244300	Push Back Stuck	Shifter rear pushed back for more than 60 s		
C244400	M+ Stuck	Move M+ for more than 60 s		
C244500	M- Stuck	Move M- for more than 60 s		
C244649	Shift Lever Position Sensor Slight Failure	If one or more of the following conditions exist, the fault is		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		determined to be present: - Position sensor self-diagnostic failed - SPI received error message, CRC error		
C244749	Shift Lever Position Sensor Serious Failure	There is an error in the data of two position sensors		
C244892	P Button Stuck	Press P gear button for more than 60 s		
C244946	Calibration Parameters Damaged	- Position sensor has not been calibrated after repair or replacement - Standard parameters are damaged		
C244A92	Shifter Connection Failure	Defective or missing torque connector for 60 s		
U128F88	CAN Bus Off	1) After ignition on T diagstart (Tdiastart defined in network DTC strategy specification); 2) After system resets Tdiagstart; 3) After power supply voltage is normal from abnormal voltage Tdiagstart.	Network line connection is abnormal	Check the network connection
U012287	Lost Communication With ESP	1) After ignition on T diagstart (Tdiastart defined in network DTC strategy specification); 2) After system resets Tdiagstart; 3) After power supply voltage recovers from abnormal voltage Tdiagstart; 4) Tdiagstart after CAN bus off and fault disappears.	- Corresponding module node failure - CAN bus connection failure - Shift module failure	- Check if corresponding module node sends messages in correct cycle - Check CAN bus connection between shift module and each module for damage/problem - Check shift module
U010187	Lost Communication With TCU			
U024887	Lost Communication With PEPS			
U015587	Lost Communication With IPC			
U014087	Lost Communicate With BCM			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U042281	Invalid Data Received From BCM	1) Normal communication (- messages received from each module); 2) After ignition on T diagstart (Tdiagstart defined in network DTC strategy specification); 3) After system resets Tdiagstart; 4) After power supply voltage recovers from abnormal voltage Tdiagstart; 5) Tdiagstart after CAN bus off and fault disappears.	- Each module to shift module wire harness node failure - Shift module failure	- Check if each module node is sending a message with correct valid - Check shift module
U041681	Invalid Data Received From ESP			
U042381	Invalid Data Received From IPC			
U040281	Invalid Data Received From TCU			

4.6 DTC trouble diagnosis

Description

DTC	DTC Definition
C244016	Supply Voltage Too Low
C244017	Supply Voltage Too High

⚠ Caution

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery voltage
---	-----------------------

- (a) Check if battery voltage is normal.
 (b) Check battery voltage with voltage band of multimeter.

OK

Standard voltage: Not less than 12V.

NG

Check and repair battery

OK

2	Check fuse
---	------------

- (a) Check if fuses RF02 and RF12 are blown.

NG

Replace fuse

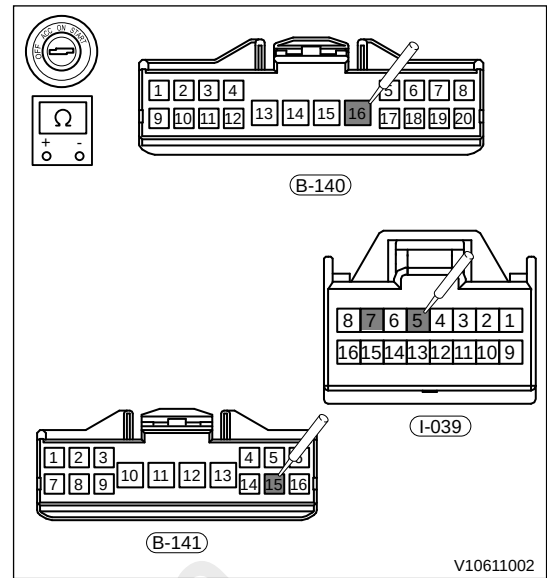
OK

3	Check supply circuit
---	----------------------

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Disconnect the electronic shift module connector I-039.
 (d) Using a digital multimeter, check for open circuit among connectors I-039, B-140 and B-141 according to table below.

OK

Multimeter Connection	Condition	Specified Condition
I-039 (5) - B-141 (15)	Always	$\leq 1 \Omega$
I-039 (7) - B-140 (16)		$\leq 1 \Omega$



NG

Repair or replace related wire harness

OK

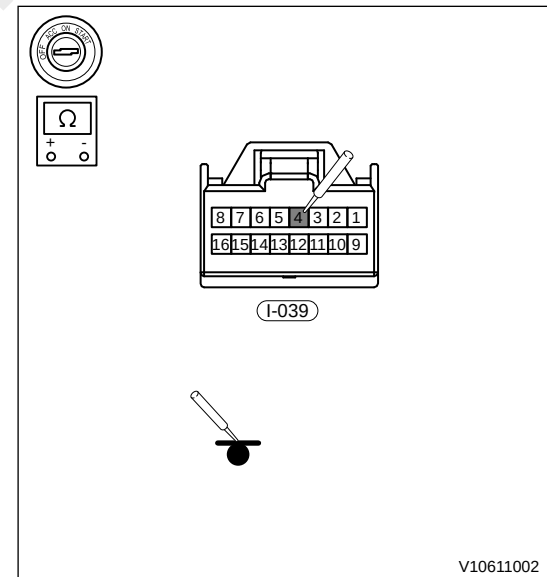
4

Check ground

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the electronic shift module connector I-039.
 (c) Check for continuity between I-039 (4) and body ground with ohm band of multimeter.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
I-039 (4) - Body ground	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$



NG

Repair ground point

OK

5

Reconfirm DTCs

- (a) Connect all connectors.
 (b) Connect the negative battery cable.
 (c) Turn ENGINE START STOP switch to ON.
 (d) Check if DTC exists.

OK

**Conduct test and confirm vehicle function
system operates normally**

NG

Replace shift module assembly

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C244200	Push Forward Stuck	ENGINE START STOP switch is in ON and engine is running	- Wire harness or connector damaged - Shift Lever Position Sensor Failure - Electronic shift module is damaged
C244300	Push Back Stuck		
C244400	M+ Stuck		
C244500	M- Stuck		
C244649	Shift Lever Position Sensor Slight Failure		
C244749	Shift Lever Position Sensor Serious Failure		
C244892	P Button Stuck		
C244946	Calibration Parameters Damaged		
C244A92	Shifter Connection Failure		

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

Diagnosis Procedure

1

Check shift module connector

- (a) Turn off all electrical equipment and ENGINE START STOP switch.
 (b) Disconnect the negative battery cable.
 (c) Disconnect the connector I-039.
 (d) Check if wire harnesses are worn, pierced, pinched or partially broken.
 (e) Check for broken, bent, protruded or corroded terminals.

NG

**Repair or replace related connector or wire
harness**

OK

2

Check ground circuit

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Check the electronic shifter ground point GB-104.

NG

Repair ground circuit

OK

3

Check shift module

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Replace electronic shift knob with a new one and confirm if the fault still exists.

NG

Replace shift module assembly

OK

4

Reconfirm DTCs

- (a) Connect all connectors.
- (b) Connect the negative battery cable.
- (c) Turn ENGINE START STOP switch to ON.
- (d) Check if same DTCs or same problem symptoms are output.

OK

**Conduct test and confirm vehicle function
system operates normally**

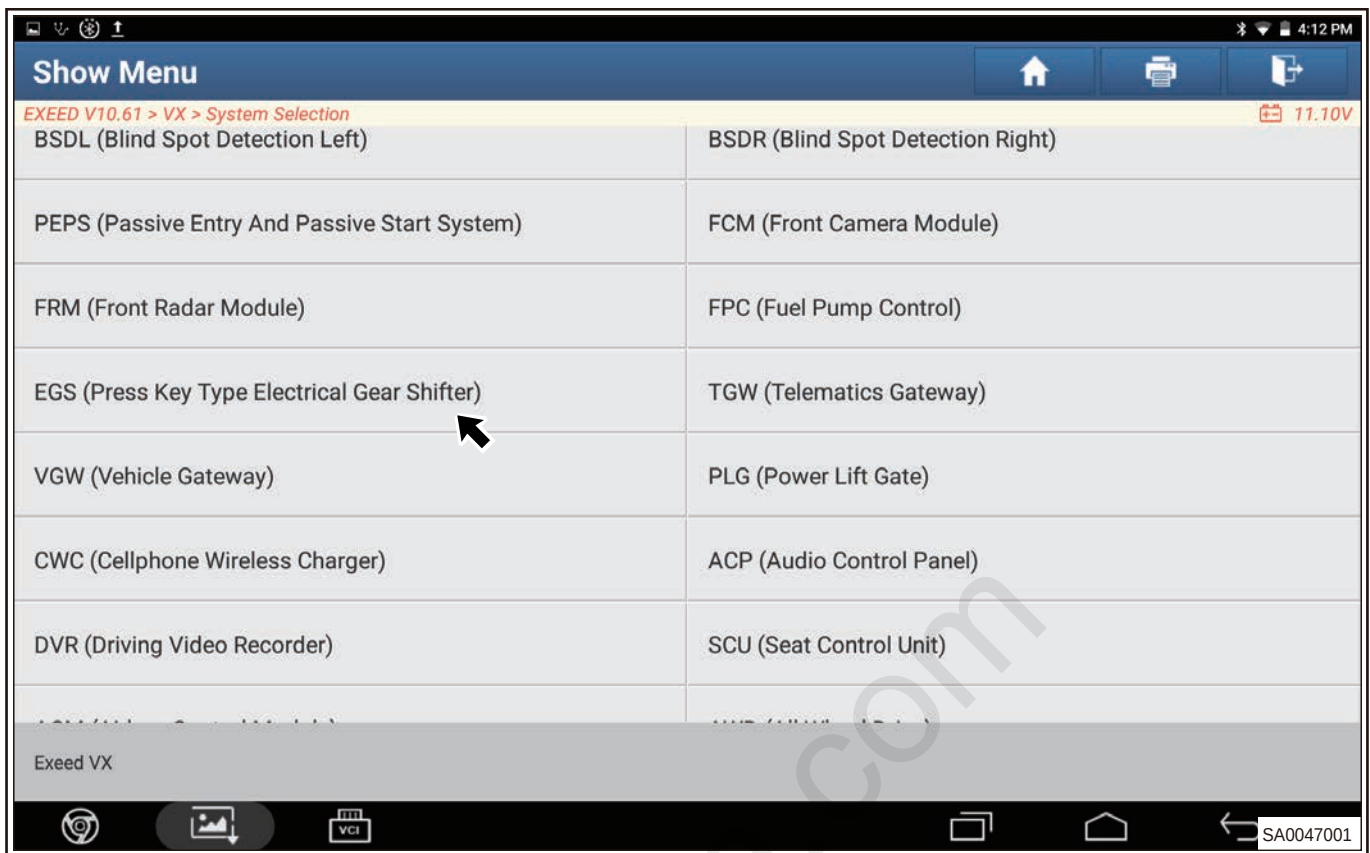
Description

DTC	DTC Definition	Possible Cause
U010187	Lost Communication With TCU	CAN network fault
U012287	Lost Communication With ESP	
U014087	Lost Communicate With BCM	
U015587	Lost Communication With IPC	
U024887	Lost Communication With PEPS	
U040281	Invalid Data Received From TCU	
U041681	Invalid Data Received From ESP	
U042281	Invalid Data Received From BCM	
U042381	Invalid Data Received From IPC	
U128F88	CAN Bus Off	

Refer to CAN Network Diagnosis

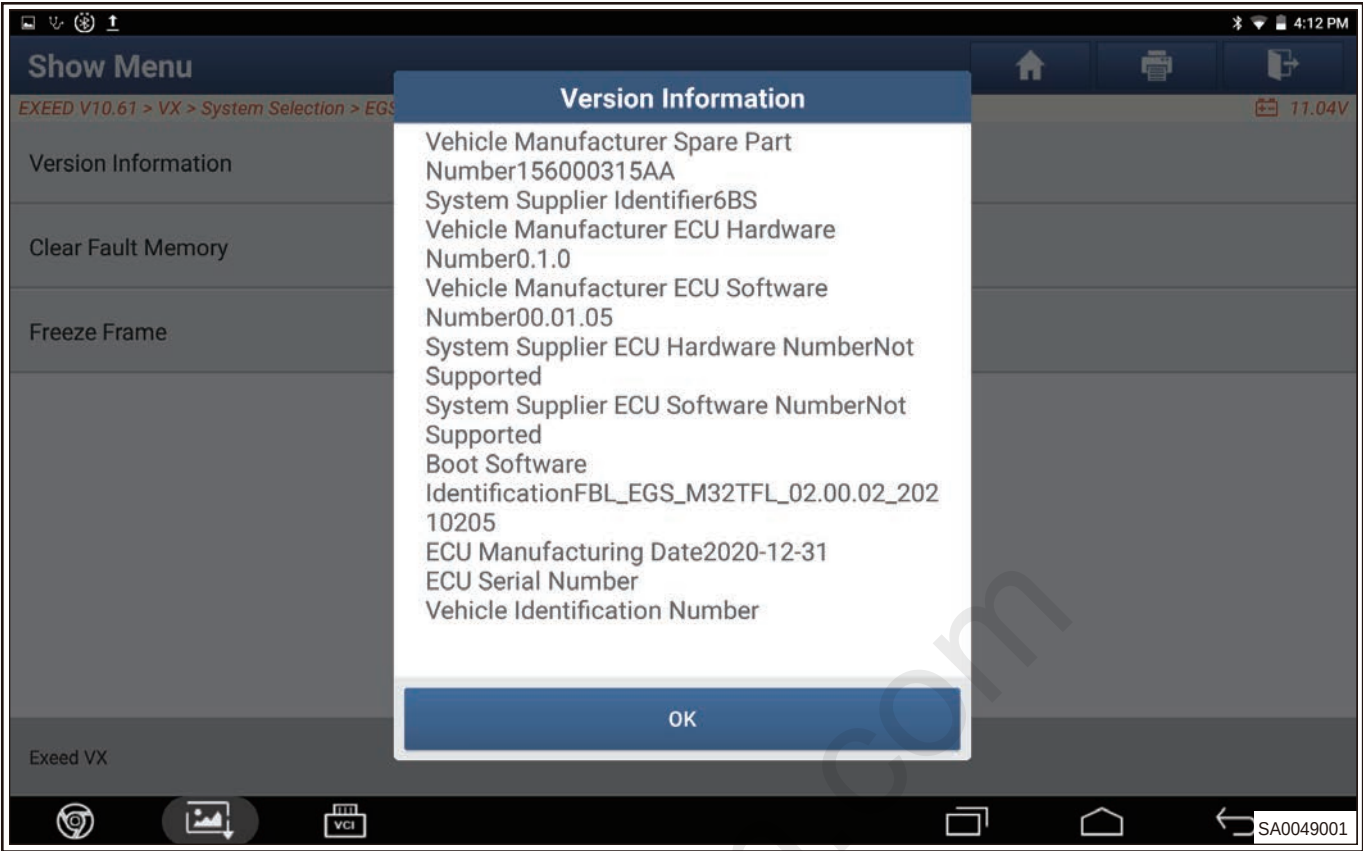
5 Diagnosis Procedure**5.1 Diagnostic tester menu**

- (1) Read data stream.
 - 1) Connect the diagnostic tester. Turn ENGINE START STOP switch to ON.
 - 2) Select the model "VX" .
- (2) Enter next screen, and click "EGS" .



(3) Enter next screen and click “Version Information” .





(4) Read DTC screen: Read the current and history DTCs.

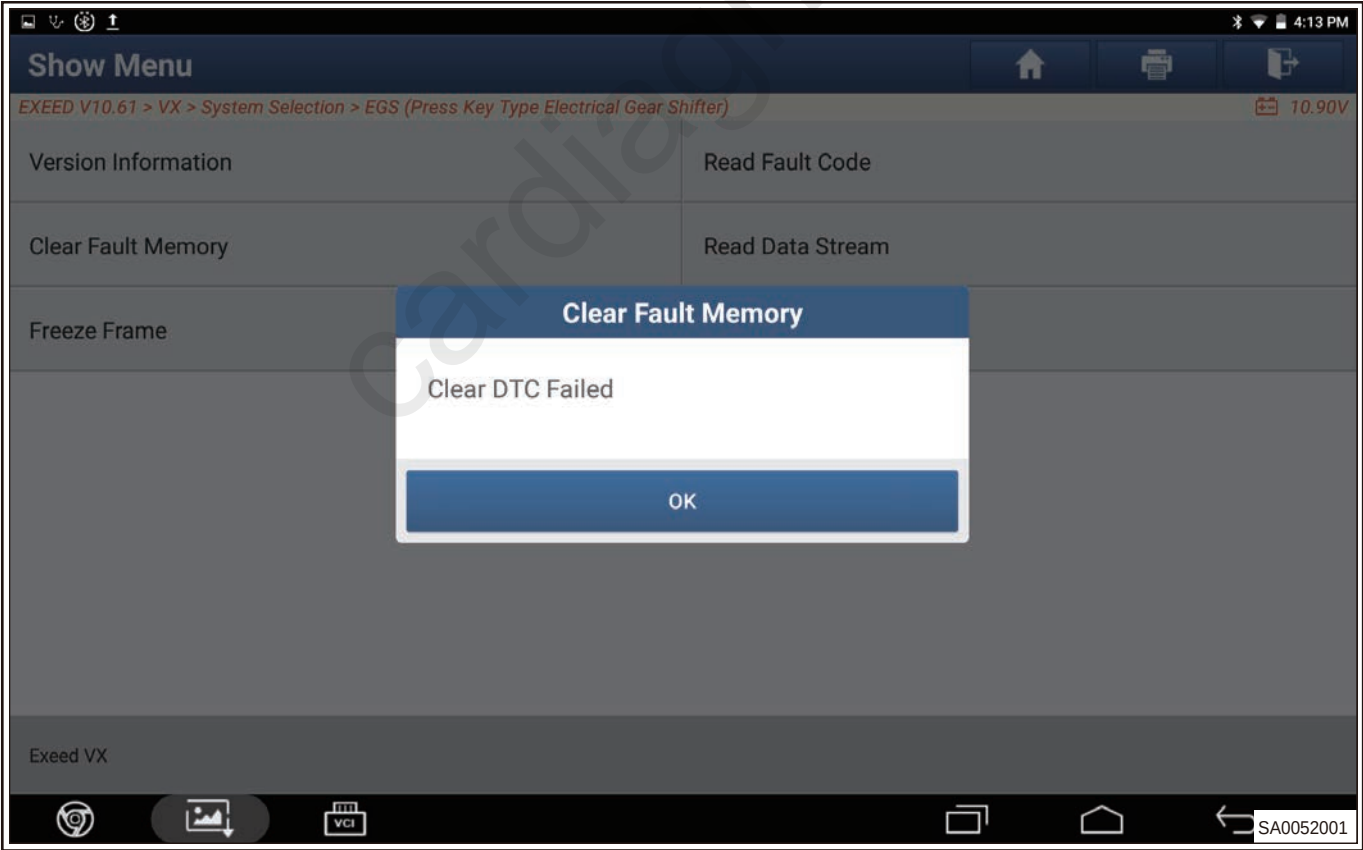
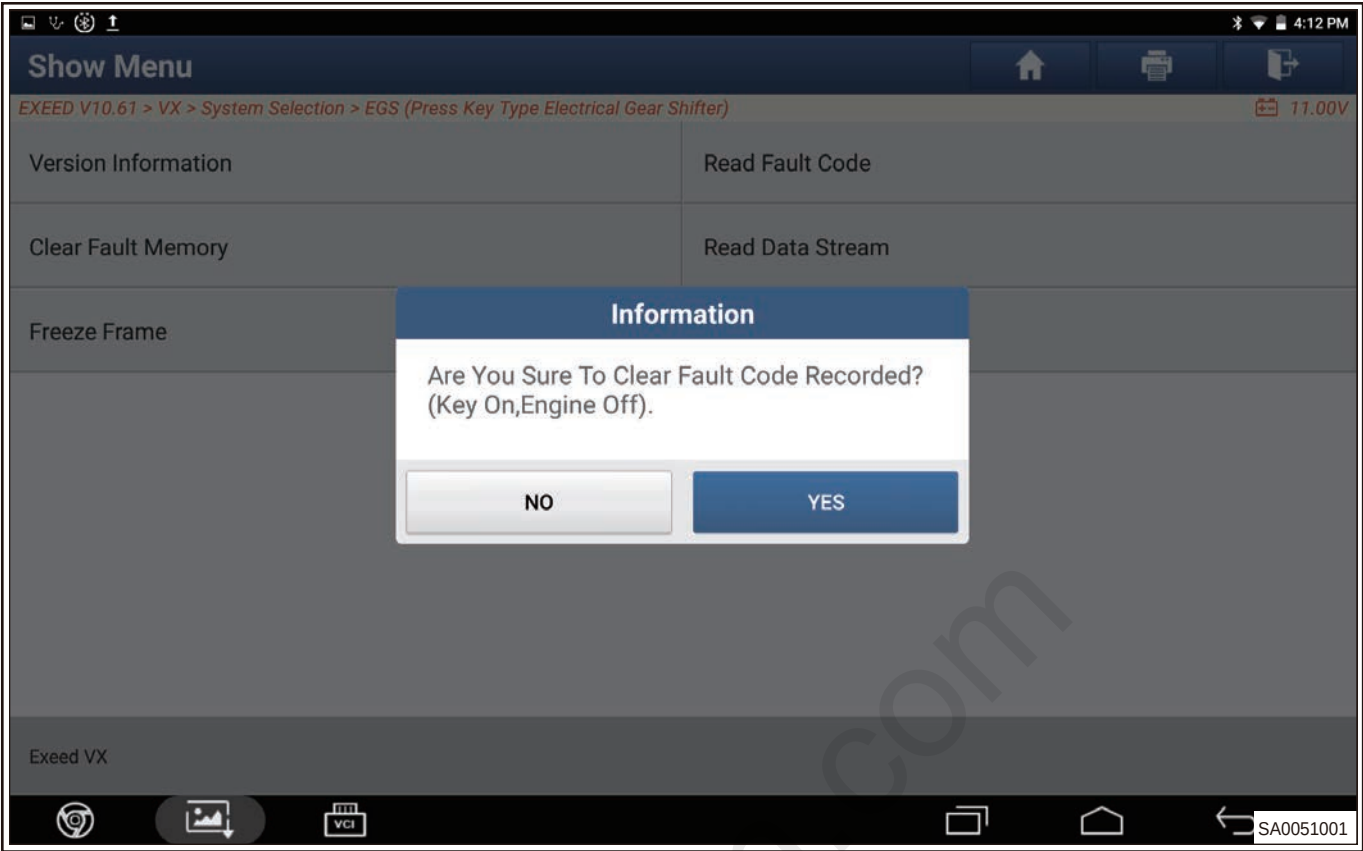




(5) Click Clear DTC screen.



(6) Click "Yes" to display the conditions for clearing DTC, and click "Yes" to clear DTC.



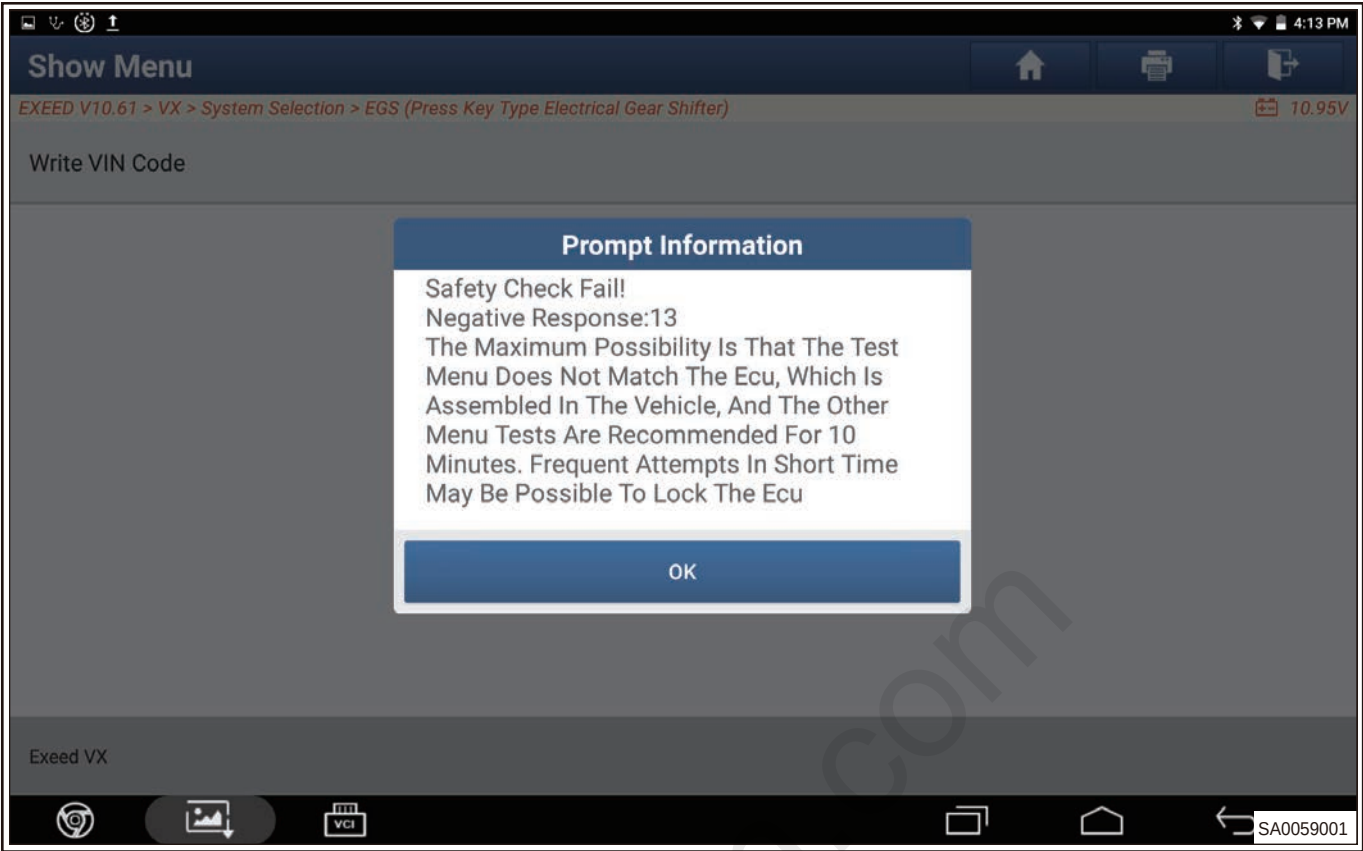
(7) As shown in illustration, click “Special Function” on diagnostic tester.



(8) Click Write VIN Code.



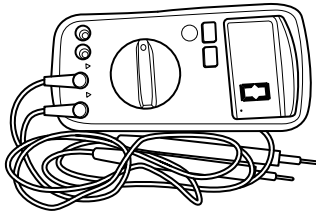
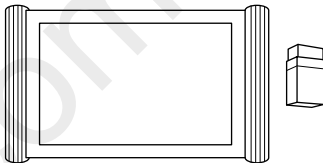
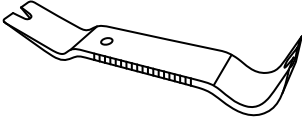
(9) Display prompt information, click "OK" .



(10) Input VIN code.

6 On-Vehicle Service

6.1 Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Diagnostic Tester	 S00001
Interior Crow Plate	 S00020

6.2 Electronic shift lever

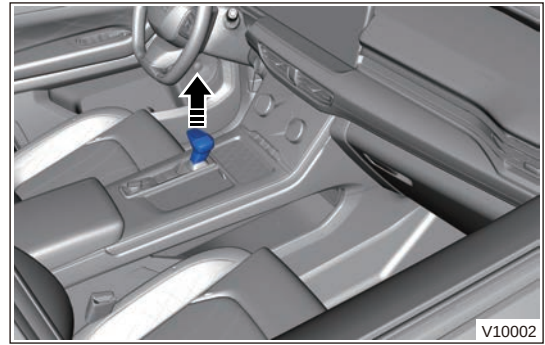
■ Removal

Warning

- When removing shift lever assembly, be sure to wear safety equipment to prevent accidents.
- Appropriate force should be applied, when removing shift lever assembly. Be careful not to operate roughly.

- (1) Disconnect the negative battery cable.
- (2) Remove the shift lever assembly.

- 1) Remove shift lever assembly in direction of arrow.



■ Installation

- (1) Insert shift lever assembly along the direction of shift lever of shift control mechanism, until shift lever reaches the lower limit (there will be a slight sound of a snap ring in place), and shift lever can not be pushed down.
- (2) Connect the negative battery cable.

⚠ Warning

- Slightly apply force to push the lever upward after assembly, confirm it is assembled in place.
- Do not hit the lever to avoid damaging connector.

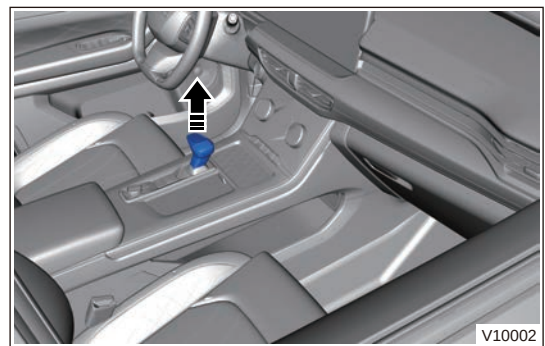
6.3 Electronic shift module assembly

■ Removal

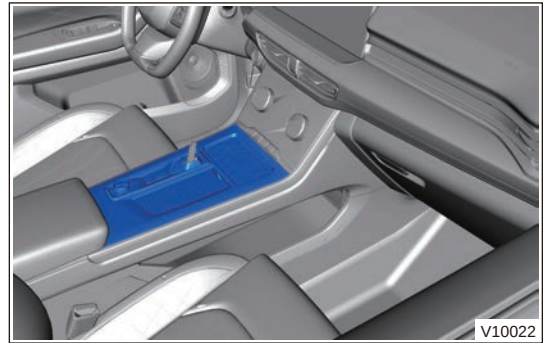
⚠ Warning

- When removing electronic shift module assembly, be sure to wear safety equipment to prevent accidents.
- Appropriate force should be applied when removing electronic shift module assembly. Be careful not to operate roughly.

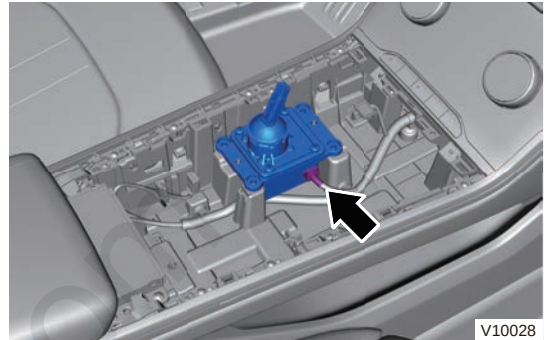
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the shift lever.
- (4) Hold shift lever assembly with both hands and directly pull out shift lever (arrow).



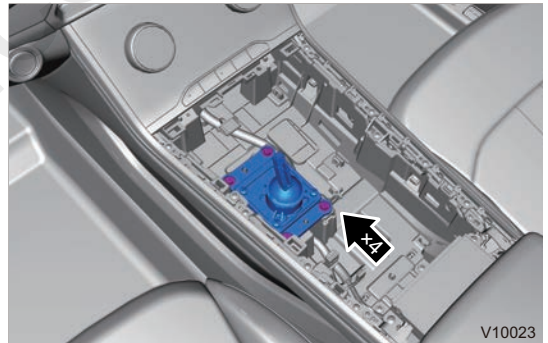
- (5) Open armrest box cover and gradually tilt out auxiliary fascia console control panel assembly from rear of auxiliary fascia console control panel assembly.



- (6) Disconnect the electronic shift module assembly wire harness connector (arrow).



- (7) Remove 4 fixing bolts (arrow) from electronic shift module assembly, and remove electronic shift module assembly.



■ Installation

- (1) Install electronic shift module assembly to a proper position.
- (2) Install 4 fixing screws to electronic shift module.

Tightening torque: 5 ± 1 N·m

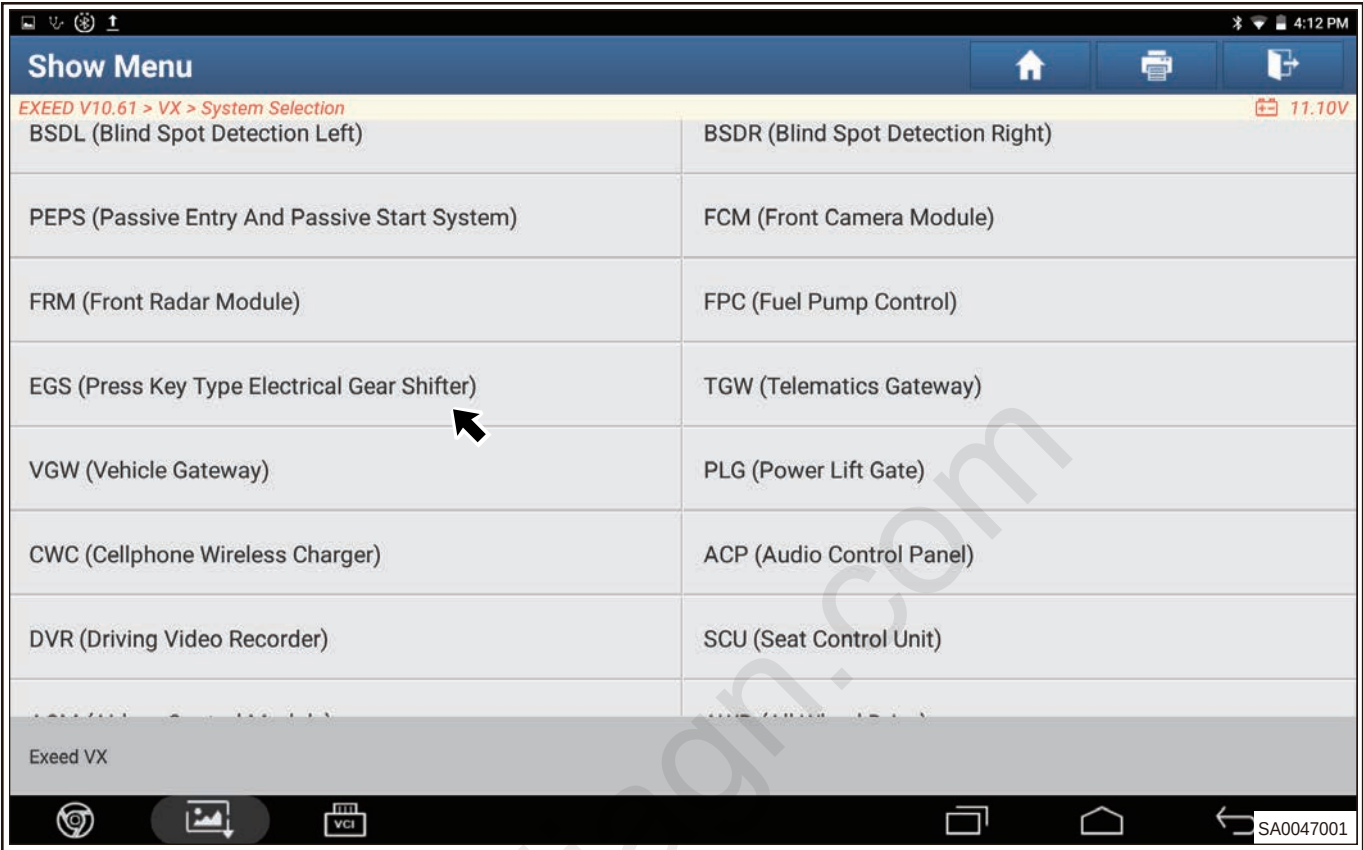
- (3) Connect the electronic shift module assembly wire harness connector.
- (4) Install the auxiliary fascia console control panel assembly.
- (5) Install the shift lever assembly.
- (6) Connect the negative battery cable.
- (7) Connect diagnostic tester, read and clear DTCs.

■ Matching learning

⚠ Caution

- It is necessary to write module VIN code with a diagnostic tester when replacing a new EGS module.

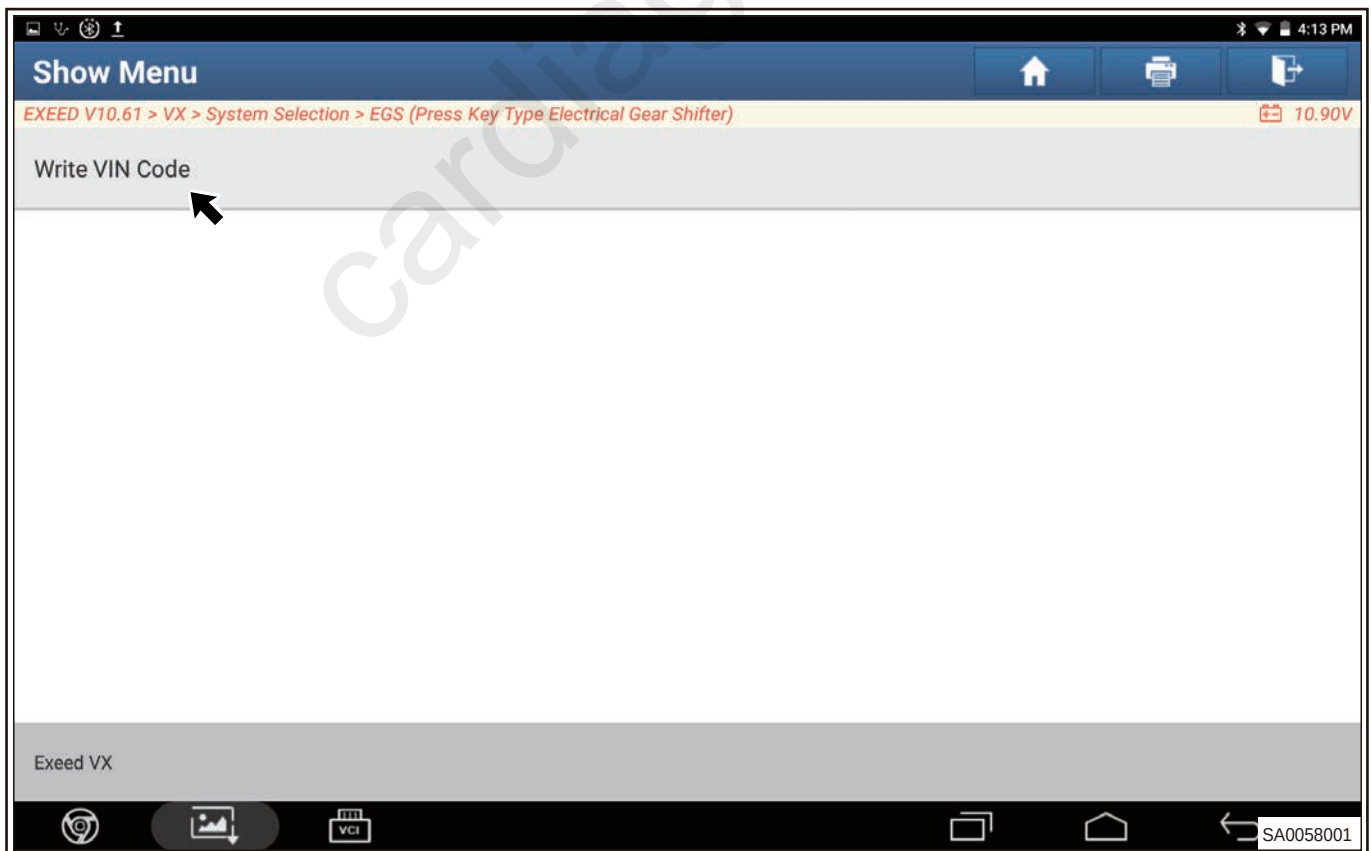
- (1) Connect the diagnostic tester. Turn ENGINE START STOP switch to ON.
- (2) Select the model "New TXL" .
- (3) Enter next screen and click "System Selection" .
- (4) Enter next screen, and click "EGS (Button-type Electronic Shift Module)" .



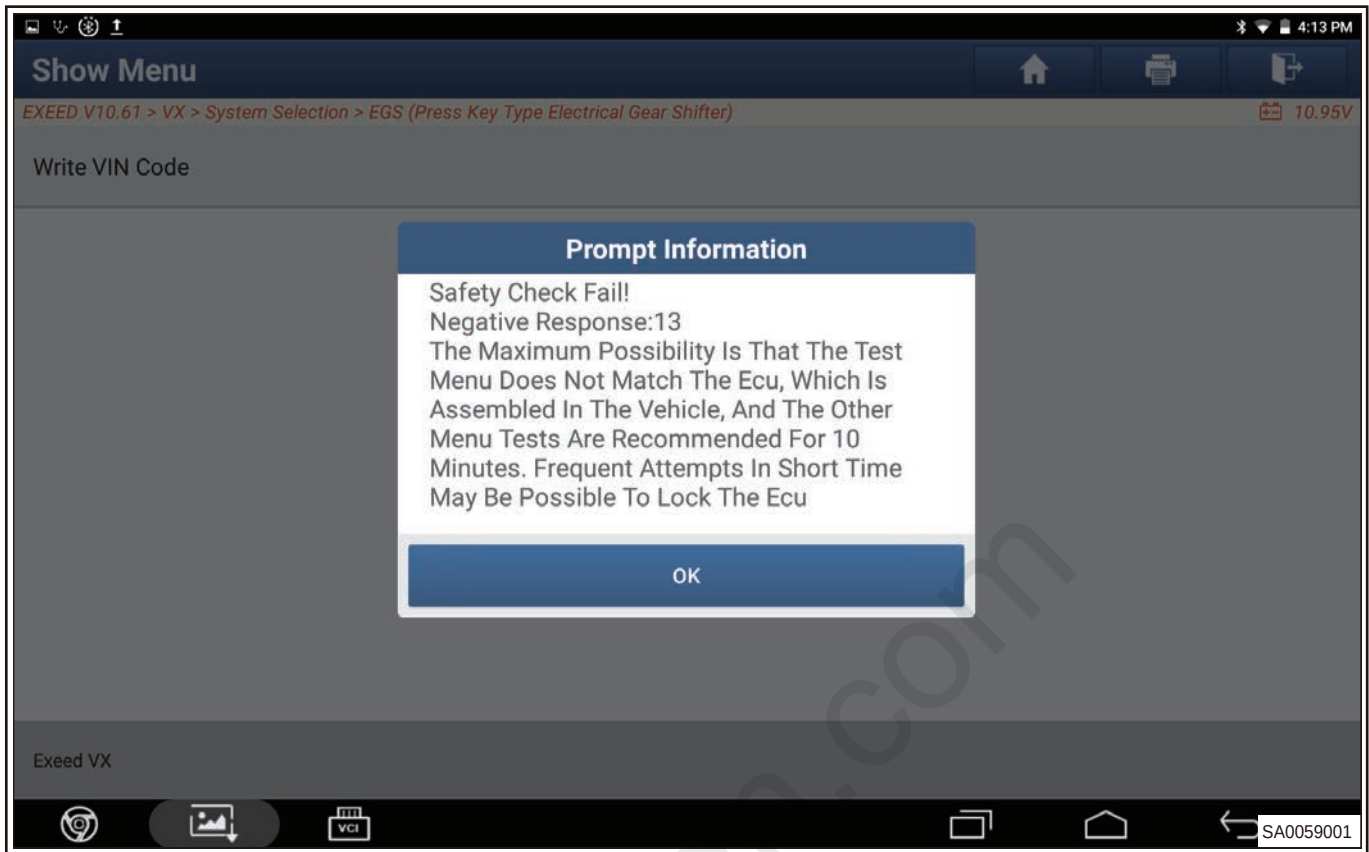
(5) Enter next screen and click “Special Function” .



(6) The screen displays “Write VIN Code” .



(7) The screen displays information and click "OK" .



(8) Input VIN code.

6.4 Shift paddle

■ Removal

Warning

- **Be sure to read precautions for SRS airbag before removing steering wheel.**

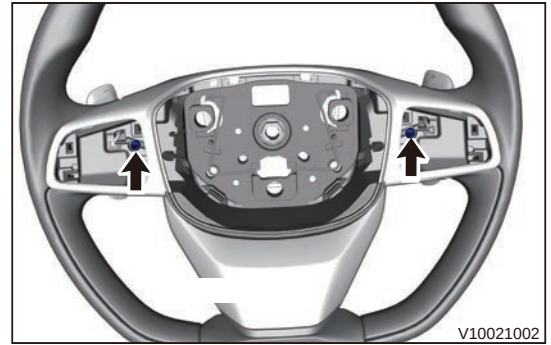
- (1) Set the steering wheel to straight-ahead position.
- (2) Turn off all electrical equipment and ENGINE START STOP switch.
- (3) Disconnect the negative battery cable.

Caution

- **Wait at least 90 seconds after disconnecting the negative battery cable to prevent airbag and belt pretensioner from being activated.**

- (4) Remove the driver airbag assembly.
- (5) Remove the steering wheel assembly.
- (6) Remove the multi-function switch assembly.
- (7) Remove the shift paddle.

- 1) Remove 2 fixing screws from shift paddle and steering wheel.



- 2) Remove the shift paddle assembly.

■ Inspection

- (1) Way to check shift paddle is as follow:

- 1) Using a multimeter, check value of resistance between connector PIN1 and PIN2. The value during pressing shift paddle is: $228\ \Omega \leq R \leq 252\ \Omega$. During releasing: $R \geq 10\ M\Omega$

■ Installation

- (1) Install the shift paddle assembly.
- (2) Install 2 fixing screws between shift paddle and steering wheel.

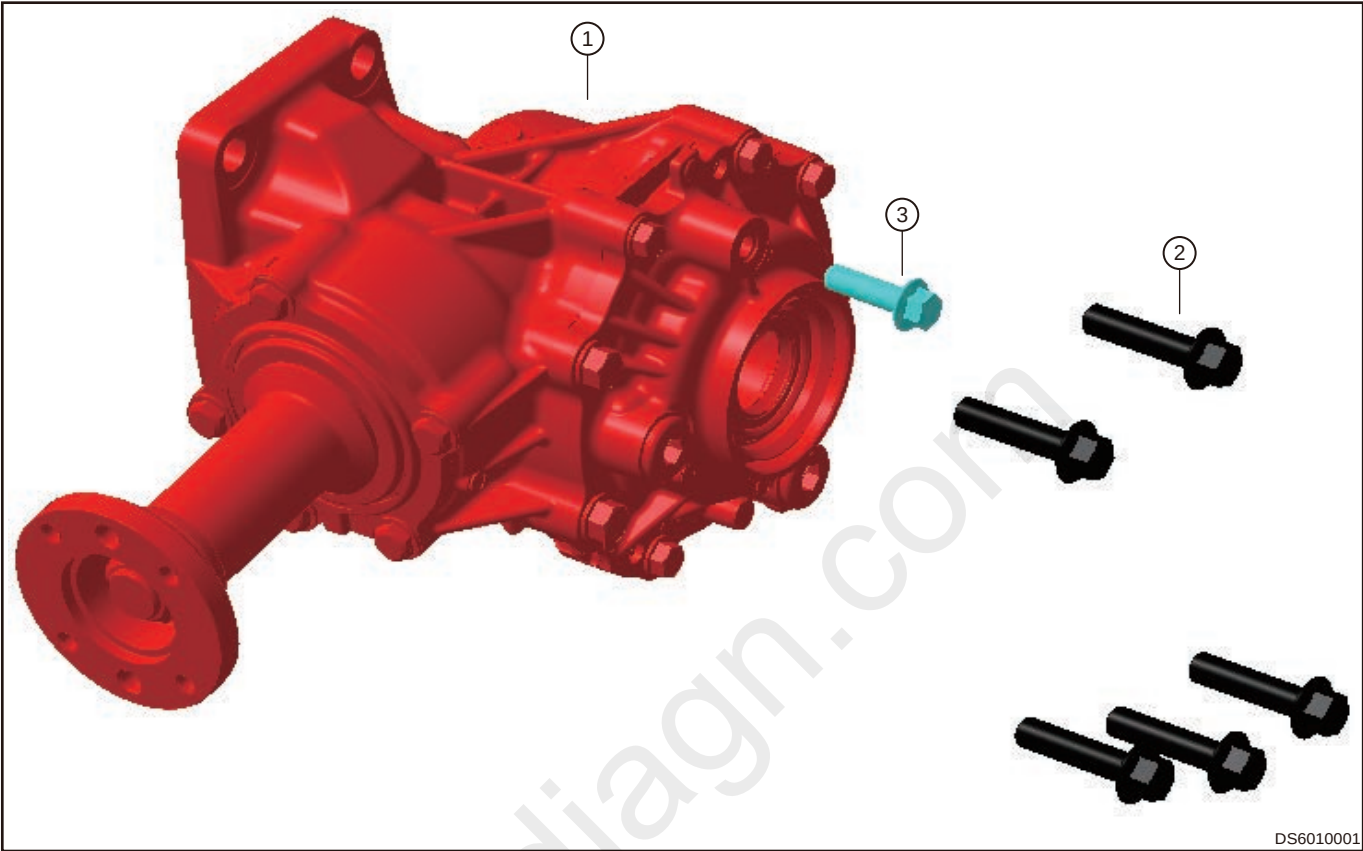
Tightening torque: $0.8 \pm 0.2\ N\cdot m$

- (3) Install the multi-function switch assembly.
- (4) Install the steering wheel assembly.
- (5) Install the driver airbag assembly.
- (6) Install the negative battery cable.

5.4 TRANSFER CASE

1 Overview

1.1 Description



DS6010001

1 - Transfer Case Assembly	2 - Hexagon Flange Bolt
3 - Hexagon Flange Bolt	

Transfer case is a device that distributes engine power, which can output power to rear axle.

2 Specifications

2.1 Torque specifications

Description	Torque (N·m)
Fixing Bolt Between Transfer Case and Transmission	120 ± 10
Baffle Plate Fixing Bolt	3.7 - 5

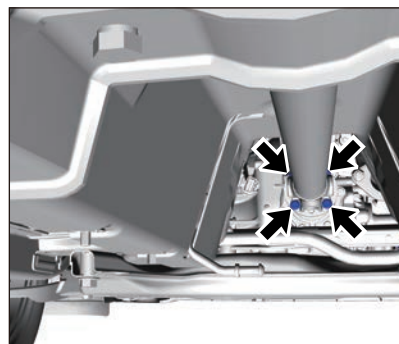
3 Transfer Case Assembly

3.1 Removal

- (1) Remove the front right wheel.
- (2) Remove the front right drive shaft assembly (4WD).
- (3) Remove the precatalytic converter assembly.

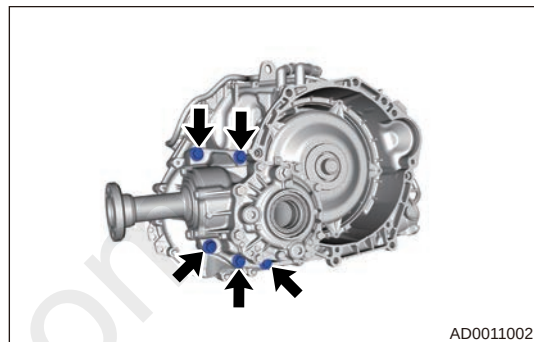
- (4) Remove the transfer case assembly. Remove 4 fixing bolts (arrow) between propeller shaft and PTU output flange.

Tightening torque: $79 \pm 8 \text{ N}\cdot\text{m}$



DS0115002

- (5) Remove fixing bolt between front left lower control arm and steering knuckle, and remove 5 fixing bolts (arrow) between transfer case and transmission. Tightening torque: $120 \pm 10 \text{ N}\cdot\text{m}$



AD0011002

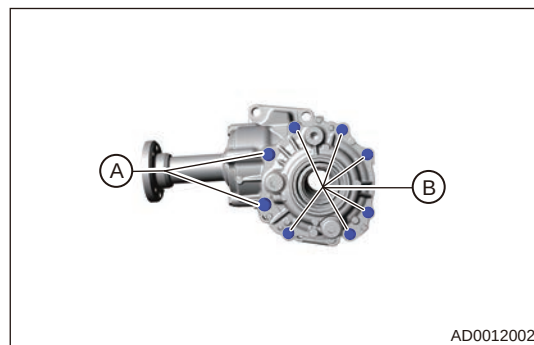
- (6) Remove the transfer assembly.

Warning

After any bumps, pay attention to whether O-ring is intact and whether the oil seal is intact to avoid touching the lip of oil seal. Please handle the transfer case with care during whole operation, and do not move the transfer case upside down.

3.2 Disassembly

- (1) Remove the output shaft oil seal. a. Remove 8 fixing bolts (A and B) from transfer case cover. Tightening torque: A: $45.5 - 50.5 \text{ N}\cdot\text{m}$
B: $28 - 31.5 \text{ N}\cdot\text{m}$



AD0012002

- (2) Slightly tap the edge of cover with a rubber hammer, and remove cover.
(3) Remove O-ring from cover.

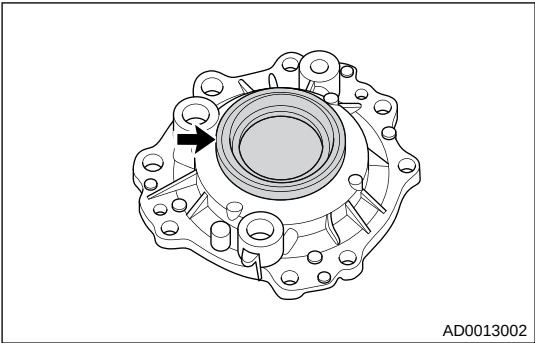
Warning

Do not use tools or damage cover.

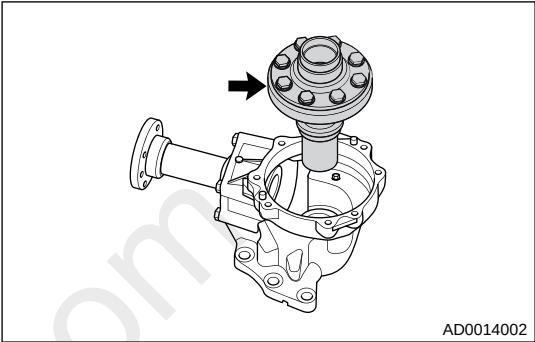
- (4) Slightly tap the metal part of oil seal from inside to remove oil seal.

 **Warning**

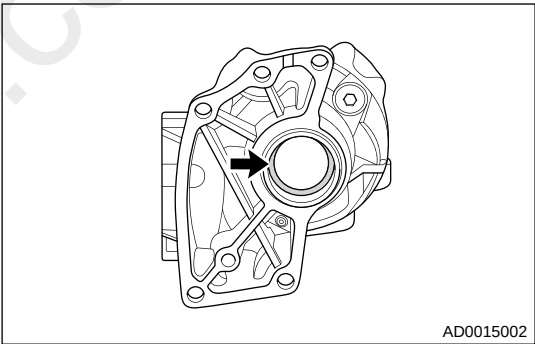
Do not take it out with a tool during removal.



- (5) Remove the main shaft.



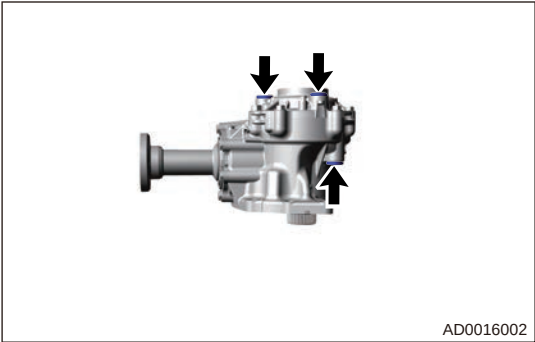
- (6) Slightly tap the oil seal, and then remove it.



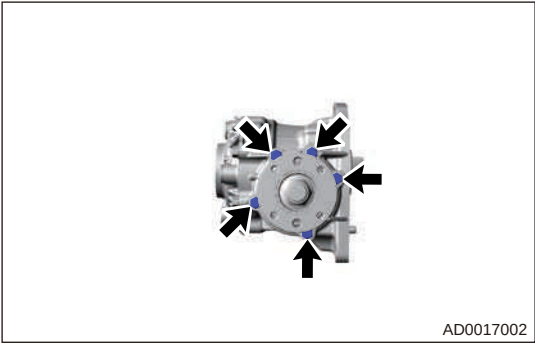
- (7) Remove the oil plugs (arrow).

 **Warning**

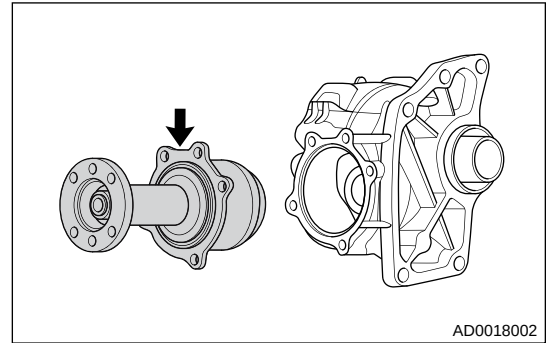
The used gasket cannot be reused.



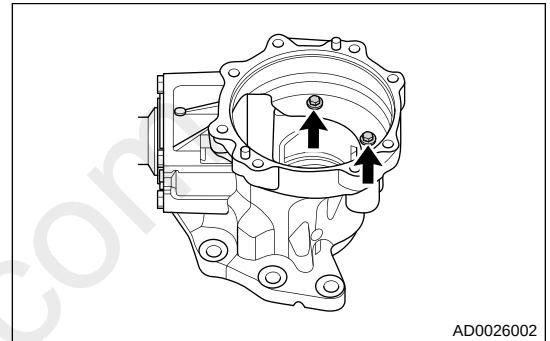
- (8) Remove the O-ring, and remove 5 fixing bolts (arrow) from main gear assembly.



- (9) Remove the main gear assembly (arrow).



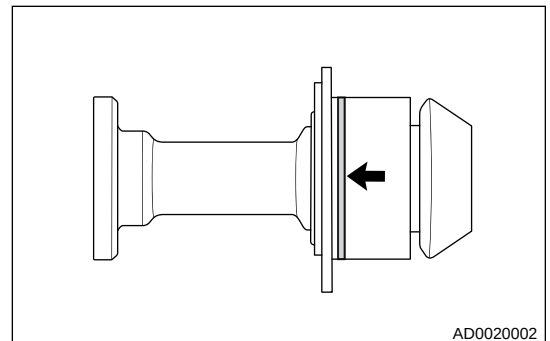
- (10) Remove the O-ring.
 (11) Remove the main shaft assembly.
 (12) Remove 2 fixing bolts (arrow) from baffle plate.
 Tightening torque: 3.7 - 5 N·m



- (13) Remove the baffle plate.

3.3 Reassembly

- (1) Install the baffle plate, the installation is in the reverse order of removal.
 (2) Replace O-ring, and apply vaseline oil to O-ring and outer diameter of bearing.

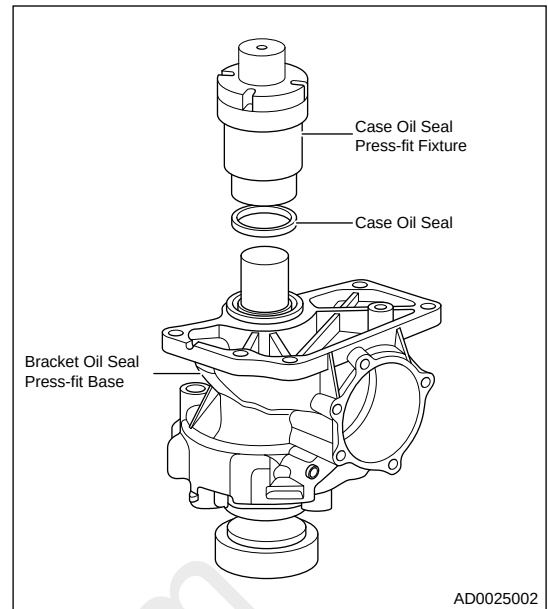


- (3) Install main gear, and tighten 5 fixing bolts (arrow) with specified torque.
 Tightening torque: 45 - 50 N·m
 (4) Install the oil plug, loosen 2 to 3 teeth of pre-locking oil hole, tighten oil plug to torque range of 30 - 39 N·m with a torque wrench and paint the oil plug, indicating that torque is within specified range.
 (5) Install the output shaft oil seal, put main shaft into case, turn the flange slightly, confirm that main shaft assembly is placed in place, replace O-ring with a new one and install O-ring.

Warning

After installing O-ring, apply vaseline oil.

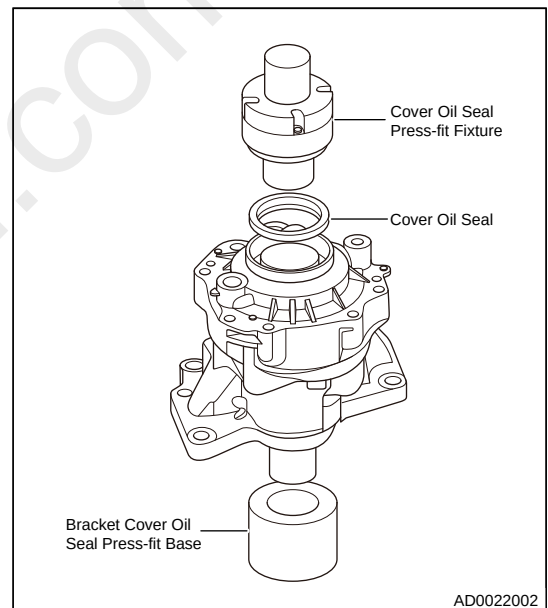
- (6) Install transfer case cover, and tighten 8 fixing bolts to specified torque.



- (7) Install oil seal with oil seal press-fit fixture.

Warning

Apply vaseline oil to cover before assembly, 100% visually check if oil seal lip is turned over after tapping. Otherwise, the oil seal must be removed and installed again.



3.4 Installation

Installation is in the reverse order of removal.

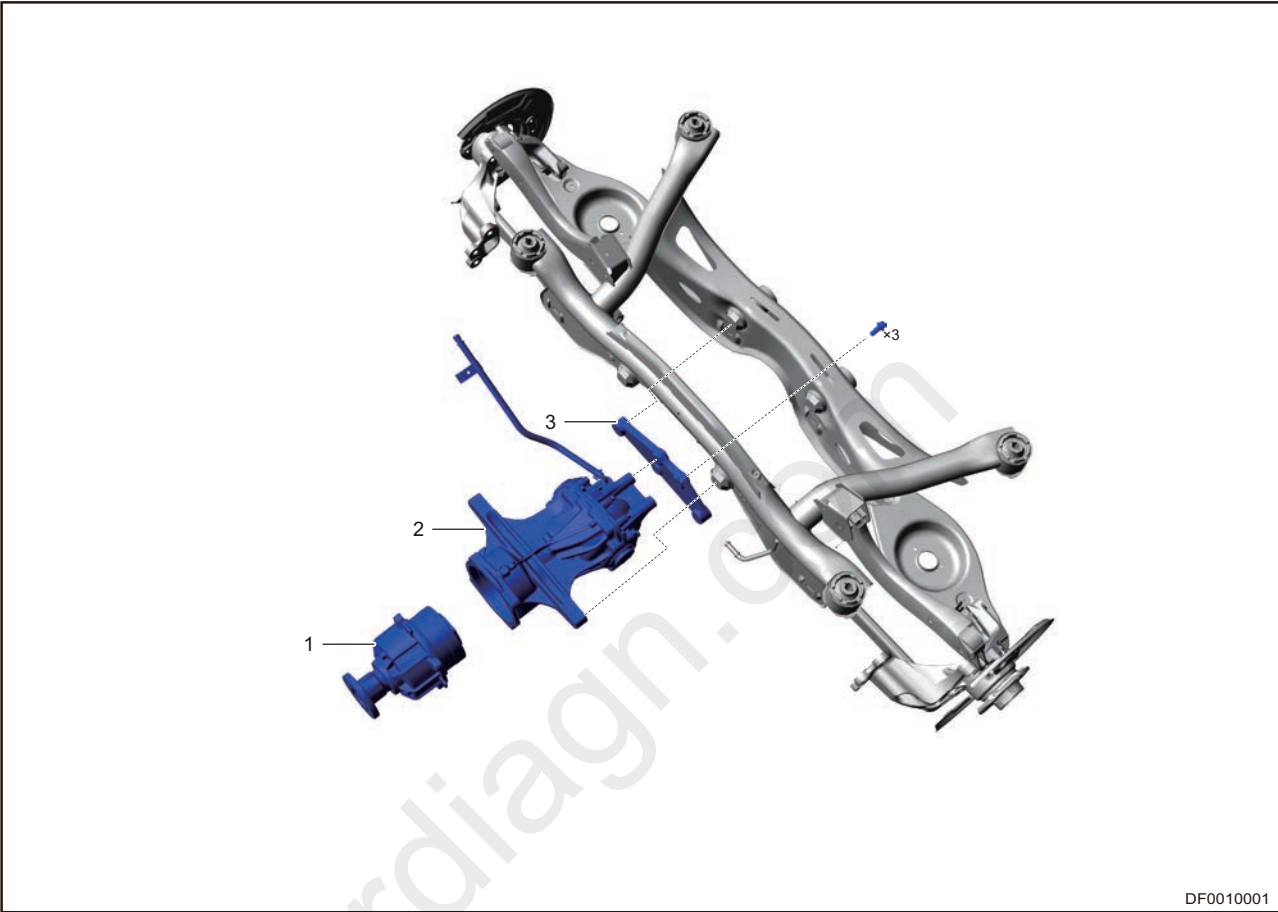
Warning

- Install transfer case spline to differential by turning it left and right, and align the transfer case dowel pin with positioning hole of differential case simultaneously.
- When installing 5 tightening bolts between transfer case and transmission, follow the order of up, down, left and right and tighten diagonally.

5.5 REAR FINAL DRIVE

1 Description

1.1 Rear final drive assembly



DF0010001

1	Torque Manager	2	Rear Final Drive
3	Rear Final Drive Bracket		

2 Rear drive operating principle

Dana Spicer M150 single speed rear axle is an integral rear final drive, which adopts a hypoid gear design. The center axis of drive gear is located below the center axis of driven gear. Drive gear and driven gear consist of a ring gear with a diameter of 150 mm and a driven gear matched with it. Drive gear is positioned between driven gear and internal drive gear conical bearing with selectable gaskets, and supported by two conical rolling shafts. Drive gear bearing is adjusted by drive gear nut and gasket during pre-installation. The whole rear axle housing is composed of bracket and rear cover. The connecting part of rear cover is sealed with RTV sealant. Differential case is an integral unit with two openings for the assembly of internal components and flow of lubricant. The differential shaft is fixed by fixing pin. Differential assembly is placed in the bracket housing. Differential adjusts the clearance through adjusting shim between outer rolling bearing cup and bracket, and is fixed by movable bearing cap and bracket. The rear axle drive gear obtains power from engine through transmission and propeller shaft. Drive gear rotates the differential by engaging with driven gear, which is fixed on outer edge of differential case with bolts. Differential side gear is connected to drive shaft of vehicle. Drive shaft is connected to tires. During steering, differential gear system applies torque separately to drive shafts, so that they rotate at different speeds. In differential case, two drive gears are placed on differential shaft fixed to case. These drive gears engage with differential side gear. When differential case rotates, drive shaft and wheels also rotate. When one wheel and axle shaft need to be rotated faster than the other one (such as when steering), the differential gear on the faster side will make

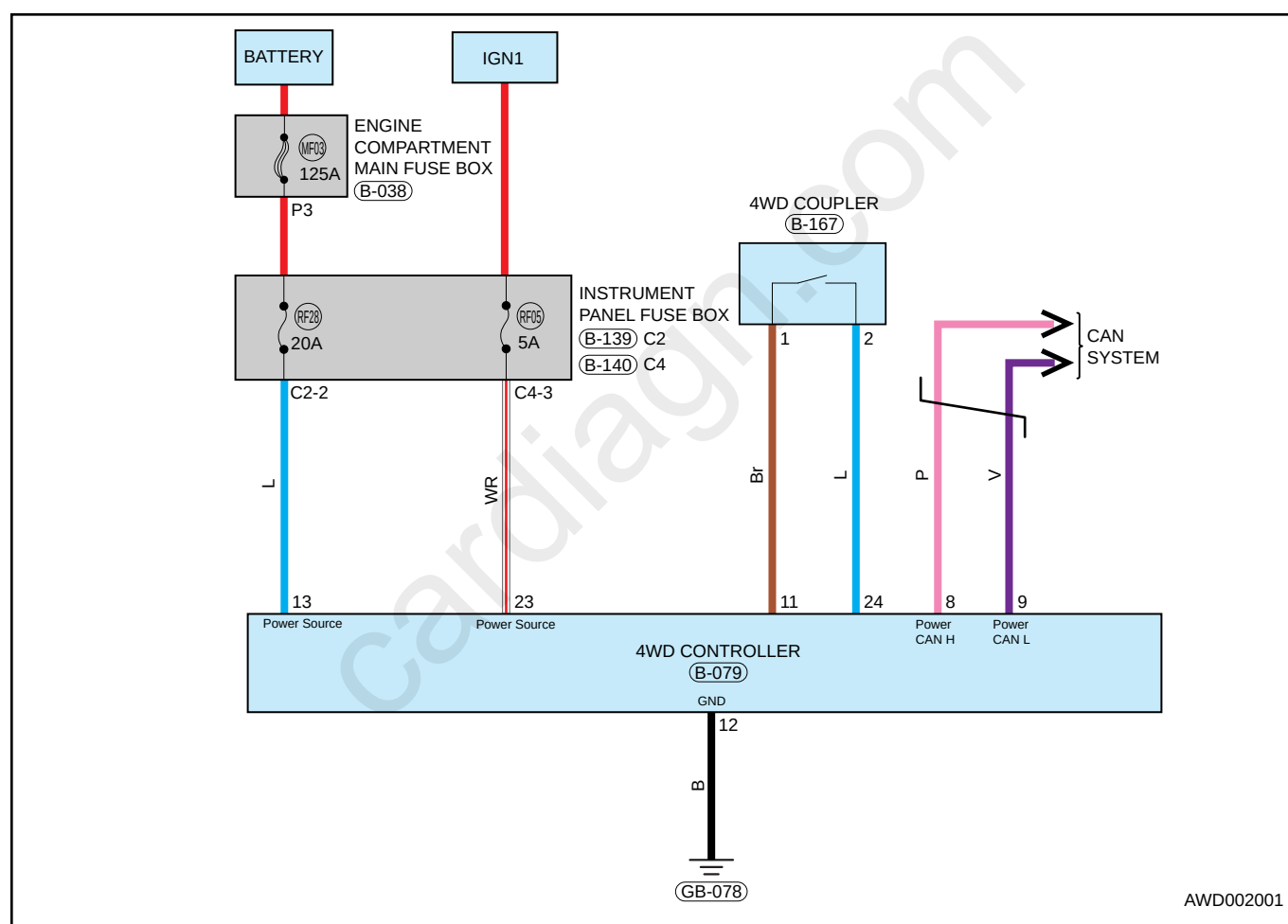
drive gear to rotate on differential side gear with low speed, so that the axle shafts on both sides to rotate at different speeds. When driving straight ahead, the differential drive gear will not rotate on the drive gear matching shaft. This is because the torque input by drive gear acts equally on both side gears, and drive gear rotates together with drive gear matching shaft, rather than rotating around it.

3 Specification

3.1 Torque specifications

Description	Torque (N•m)
Torque Manager Control Unit Fixing Bolt	8 ± 1
Rear Final Drive Bracket Fixing Bolt	110 - 130
Rear Final Drive Filler Plug/Drain Plug	24 - 34

4 AWD Control System Circuit Diagram



5 DTC Diagnosis

5.1 Diagnostic trouble code (DTC) chart

DTC	DTC Definition
P172813	Electromagnetic Coupling Coil Open Circuit
P172912	Electromagnetic Coupling Coil Circuit Short to Power Supply

DTC	DTC Definition	
P173011	Electromagnetic Coupling Coil Circuit Short to Ground	
P177198	Electromagnetic Coupler Overheating	
P177398	Electromagnetic Coupler Close to Overheating	
P30031C	System Voltage Out of Range	
U000188	Bus Off	
U010000	CAN Communication Error - Lost Communication with EMS	
U010100	CAN Communication Error - Lost Communication with TCU	
U012200	CAN Communication Error - Lost Communication with ESC	
U012800	CAN Communication Error - Lost Communication with EPB	
U015100	CAN Communication Error - Lost Communication with ACM	
U015500	CAN Communication Error - Lost Communication with IPC	
U021200	CAN Communication Error - Lost Communication with SCM	
U024800	CAN Communication Error - Lost Communication with PEPS	
U040181	CAN Communication Error - Invalid Data Length Received from EMS	
U040186	CAN Communication Error - Invalid Data Received from EMS	
U040281	CAN Communication Error - Invalid Data Length Received from TCU	
U040286	CAN Communication Error - Invalid Data Received from TCU	
U041681	CAN Communication Error - Invalid Data Length Received from ESC	
U041686	CAN Communication Error - Invalid Data Received from ESC	
U041781	CAN Communication Error - Invalid Data Length Received from EPB	
U041786	CAN Communication Error - Invalid Data Received from EPB	
U042381	CAN Communication Error - Invalid Data Length Received from IPC	
U042386	CAN Communication Error - Invalid Data Received from IPC	
U042681	CAN Communication Error - Invalid Data Length Received from PEPS	
U042686	CAN Communication Error - Invalid Data Received from PEPS	
U042981	CAN Communication Error - Invalid Data Length Received from SCM	
U042986	CAN Communication Error - Invalid Data Received from SCM	
U045281	CAN Communication Error - Invalid Data Length Received from ACM	
U045286	CAN Communication Error - Invalid Data Received from SACM	
DTC	P30031C	System Voltage Out of Range

5.2 DTC diagnosis procedure

DTC	P30031C	System Voltage Out of Range
-----	---------	-----------------------------

Description

DTC	DTC Definition	Possible Cause
P30031C	System Voltage Out of Range	- Wire harness or connector failure 4WD coupler module failure

 Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1	Check fuse
---	------------

(a) Check if the fuses RF28 20A, RF05 5A in instrument panel fuse box are blown.

NG	Replace fuse
-----------	---------------------

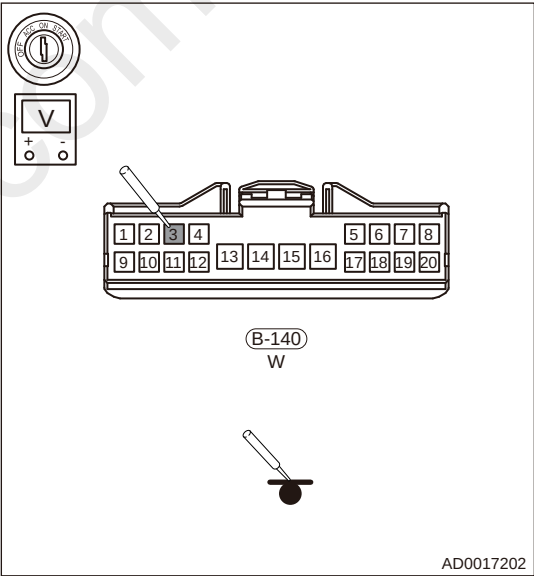
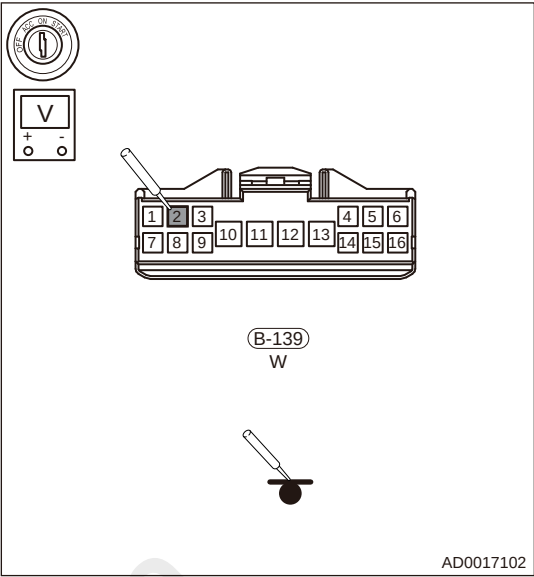
OK

2	Check instrument panel fuse box output voltage
---	--

(a) Turn ENGINE START STOP switch to ON.

(b) Measure voltage between terminal 2 of instrument panel fuse box B-139, terminal 3 of B-140 and ground. (When using digital multimeter)

Multimeter Connection	Condition	Specified Condition
B-139 (2) - Body ground	ON	12V
B-140 (3) - Body ground	ON	12V



NG Replace instrument panel fuse box assembly

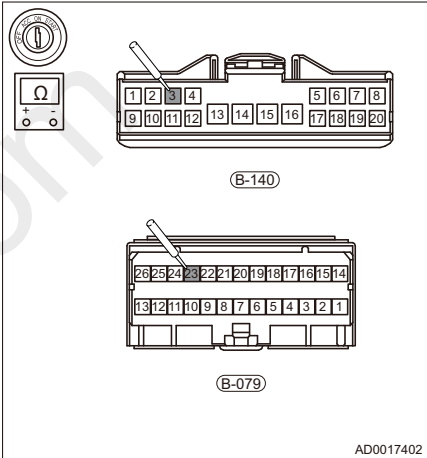
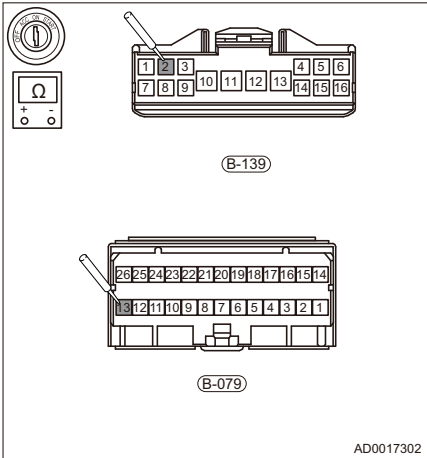
OK

3 Check wire harness for open

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect 4WD coupler module connector B-079, instrument panel fuse box connectors B-139 and B-140.

(d) Using ohm band of digital multimeter, measure resistance between connectors B-079 (13) and B-139 (2), connectors B-079 (23) and B-140 (3) to check wire harness for open.

Multimeter Connection	Condition	Specified Condition
B-139 (2) - B-079 (13)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$
B-140 (3) - B-079 (23)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$



NG	Repair or replace related wire harness or connector
OK	Replace 4WD coupler module assembly

DTC	P172813	Electromagnetic Coupling Coil Open Circuit
DTC	P172912	Electromagnetic Coupling Coil Circuit Short to Power Supply
DTC	P173011	Electromagnetic Coupling Coil Circuit Short to Ground

Description

DTC	DTC Definition
P172813	Electromagnetic Coupling Coil Open Circuit
P172912	Electromagnetic Coupling Coil Circuit Short to Power Supply
P173011	Electromagnetic Coupling Coil Circuit Short to Ground

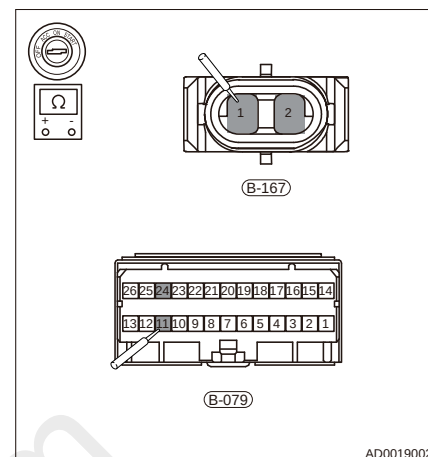
 Caution
• When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1	Check wire harness for open or short
---	--------------------------------------

- (a) Disconnect electromagnetic coupler connector B-022 and 4WD coupler module connector B-026.
- (b) Check if wire harnesses are worn, pierced, pinched or partially broken.
- (c) Check for broken, bent, protruded or corroded terminals.
- (d) Check if related connector pins are in good condition.
- (e) Using ohm band of digital multimeter, measure resistance of connecting wire harness between B-167 (1) - B-079 (11) and B-167 (2) - B-079 (24) to check wire harness for open.

Standard Resistance

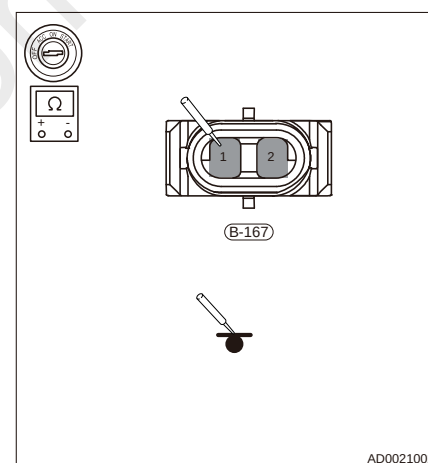
Multimeter Connection	Condition	Specified Condition
B-079 (11) - B-167 (1)	Always	$\leq 1 \Omega$
B-079 (24) - B-167 (2)	Always	$\leq 1 \Omega$



- (f) Using ohm band of digital multimeter, measure resistance between terminals 1 and 2 of connector B-167 and body ground respectively to check wire harness for short to body ground.

Standard Resistance

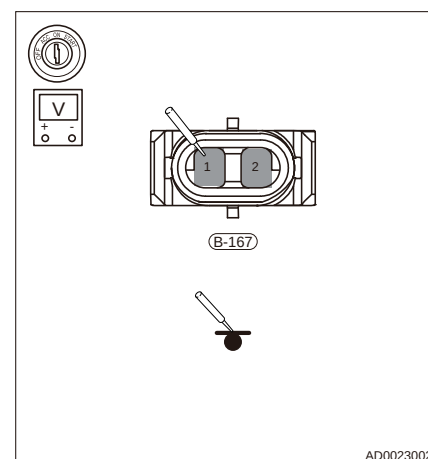
Multimeter Connection	Condition	Specified Condition
B-167 (1) - Body ground	Always	∞
B-167 (2) - Body ground	Always	∞



- (g) Connect the negative battery cable, and turn the ENGINE START STOP switch to ON (confirm that connectors B-079 and B-167 are disconnected). Using voltage band of digital multimeter, measure voltage between terminals 1, 2 of connector B-167 and body ground respectively to check wire harness for short to power supply.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
B-167 (1) - Body ground	Always	0V
B-167 (2) - Body ground	Always	0V



NG

Repair or replace wire harness or connector

OK

Replace electromagnetic coupler assembly

6 On-Vehicle Service

6.1 Rear final drive oil replacement

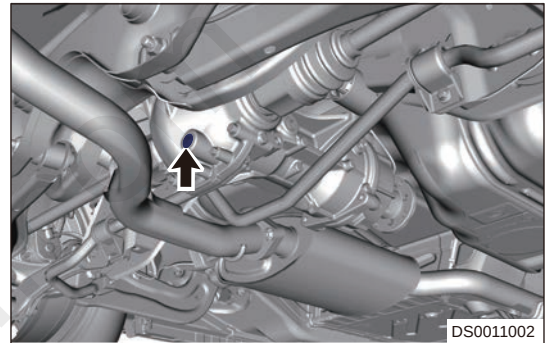
Caution

- Replace rear final drive oil only when engine stops and rear final drive cools down.
- Used filler plug and drain plug are non-reusable.

■ Rear final drive oil draining

- (1) Park vehicle on a level ground.
- (2) Turn off all electrical equipment and the ENGINE START STOP switch.
- (3) Raise the vehicle to a proper height.
- (4) Put a recovering container under transmission drain hole.
- (5) Remove drain plug (with magnet) (arrow) with a tool.

Tightening torque: 24 - 34 N·m

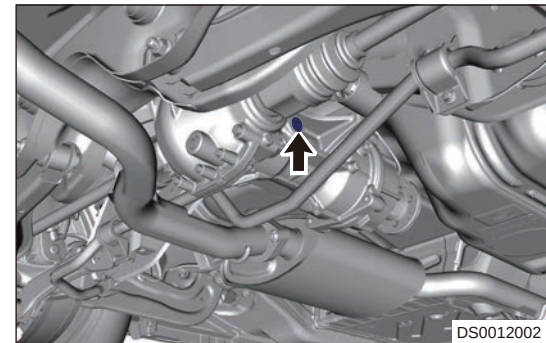


■ Rear final drive oil filling

Gear oil type: Sinolube 80W90, oil capacity: 445 ml ± 30 ml.

- (1) Make sure that rear final drive drain plug is tightened in place.
- (2) Remove filler plug (with magnet) (arrow) with a tool.

Tightening torque: 24 - 34 N·m



- (3) Fill rear final drive oil from fill plug.
- (4) Replace filler plug with a new one after filling, and tighten it in place according to torque.

6.2 Rear final drive assembly

■ Removal

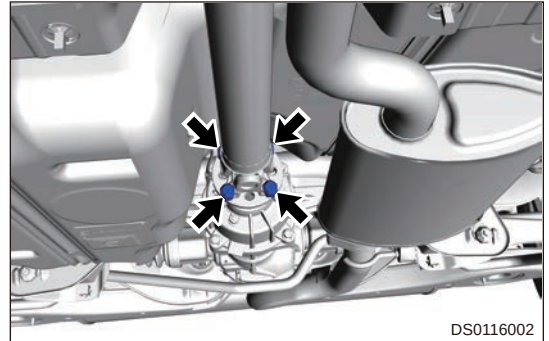
Caution

- If gear loaded housing is submerged in water, especially if it exceeds the breather valve, it is recommended to drain gear lubricant daily and check internal components for any damage and/or contamination caused by water.
- Clean, test and replace damaged parts before assembly and refilling of specified gear lubricant.

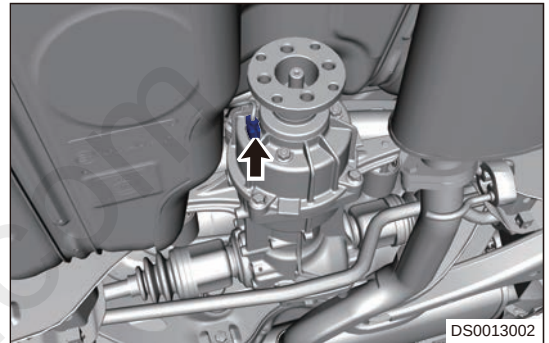
- (1) Disconnect the negative battery cable.
- (2) Drain the final drive oil.

- (3) Remove the rear left drive shaft assembly.
- (4) Remove the rear right drive shaft assembly.
- (5) Remove the rear final drive assembly.
 - 1) Remove 4 fixing bolts (arrow) between propeller shaft and torque manager flange.

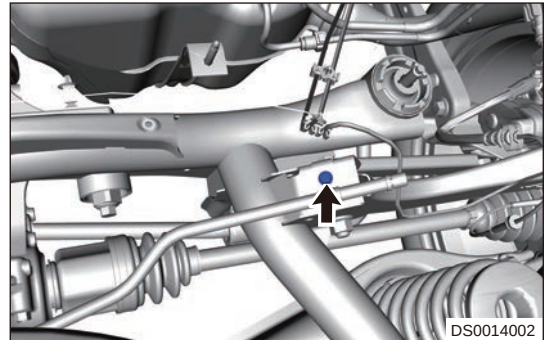
Tightening torque: $71.5 \pm 6.5 \text{ N}\cdot\text{m}$



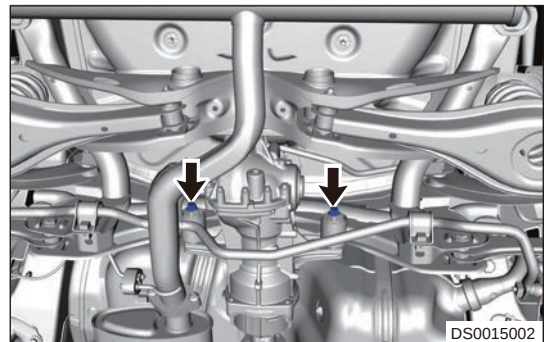
- 2) Disconnect the torque manager connector (arrow).



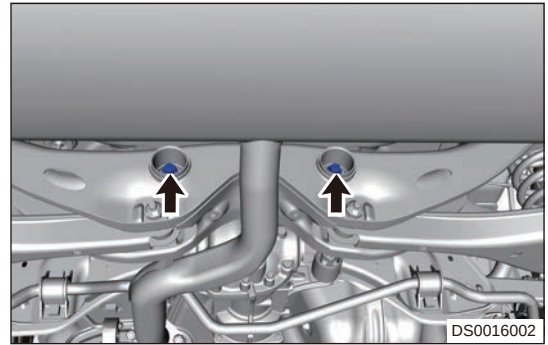
- 3) Remove fixing bolt (arrow) between rear final drive breather pipe and rear sub frame.



- 4) Place jack firmly in a proper position under rear final drive assembly.
 - 5) Remove 2 fixing bolts (arrow) between rear final drive and front part of rear sub frame.



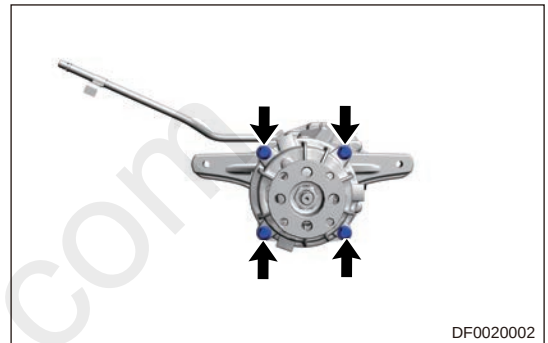
- 6) Remove 2 fixing bolts (arrow) between rear final drive and rear part of rear sub frame.



- 7) Remove the rear final drive assembly.

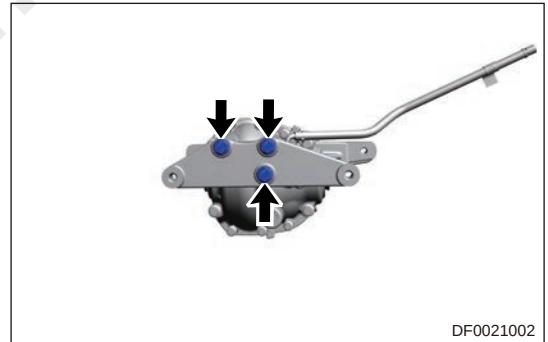
■ Disassembly

- (1) Remove 4 fixing bolts (arrow) between torque manager and rear final drive.

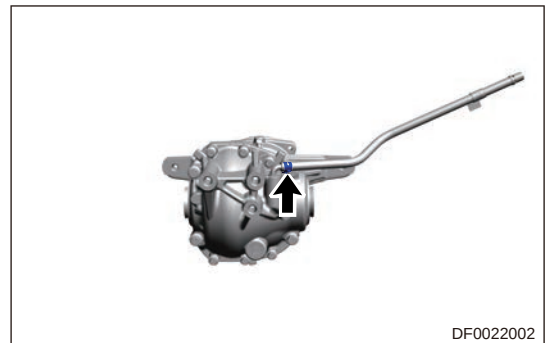


- (2) Remove the torque manager.
 (3) Remove 3 fixing bolts (arrow) between rear final drive bracket and rear final drive.

Tightening torque: 110 - 130 N·m



- (4) Remove the rear final drive bracket.
 (5) Remove clamp (arrow) and breather pipe.



■ Reassembly

- (1) Install breather pipe and clamp.
 (2) Install the rear final drive bracket.
 (3) Install 3 fixing bolts between rear final drive bracket and rear final drive.

Tightening torque: 110 - 130 N·m

- (4) Install the torque manager.

- (5) Install 4 fixing bolts between torque manager and rear final drive.

■ Installation

- (1) Install the rear final drive assembly.
 (2) Install 2 fixing bolts (arrow) between rear final drive and rear part of rear sub frame.

Tightening torque: $120 \pm 10 \text{ N}\cdot\text{m}$

- (3) Install 2 fixing bolts (arrow) between rear final drive and front part of rear sub frame.

Tightening torque: $120 \pm 10 \text{ N}\cdot\text{m}$

- (4) Install fixing bolt between rear final drive breather pipe and rear sub frame.
 (5) Install the torque manager connector.
 (6) Install 4 fixing bolts between propeller shaft and torque manager flange.

Tightening torque: $71.5 \pm 6.5 \text{ N}\cdot\text{m}$

6.3 Torque manager control unit

■ Removal

- (1) Disconnect the negative battery cable.
 (2) Remove the rear right interior trim panel.
 (3) Remove the torque manager control unit.
 1) Disconnect the torque manager control unit connector (arrow).



- 2) Remove 2 fixing nuts (arrow) from torque manager control unit.

Tightening torque: $8 \pm 1 \text{ N}\cdot\text{m}$



- 3) Remove the torque manager control unit.

■ Installation

- (1) Install the torque manager control unit.
 (2) Install 2 fixing nuts to torque manager control unit.

Tightening torque: $8 \pm 1 \text{ N}\cdot\text{m}$

- (3) Install the torque manager control unit connector.
 (4) Rear right interior trim panel.
 (5) Connect the negative battery cable.

6.4 Drive shaft oil seal (final drive side)**■ Replace oil seal**** Warning**

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**

Hint:

- Use same procedures for right and left sides.
 - Procedures listed below are for left side.
- (1) Remove the rear left wheel.
 - (2) Drain the final drive oil.
 - (3) Remove the rear left drive shaft.
 - (4) Remove the drive shaft oil seal.
 - 1) Using a screwdriver with the tip wrapped with protective tape, remove drive shaft oil seal.

** Caution**

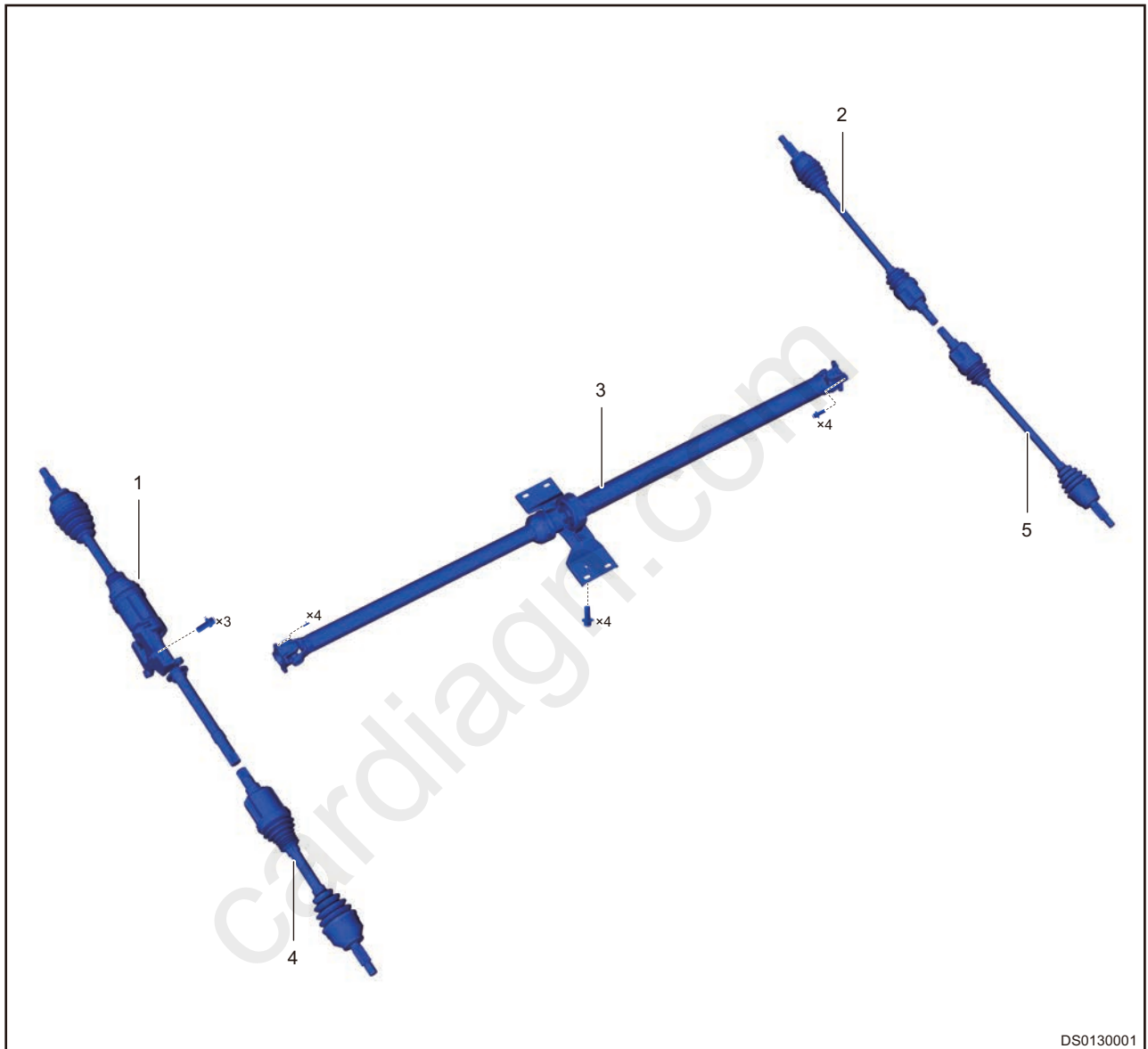
- **Ensure that the transmission oil has been drained before removal.**
- **Oil seal is a non-reusable part, which must be replaced after each removal.**

- (5) Install the drive shaft oil seal.
 - 1) Install new drive shaft oil seal in position with a tool.
- (6) Install the rear left drive shaft.
- (7) Fill the final drive oil.
- (8) Install the rear left wheel.

5.6 DRIVE SHAFT

1 Overview

1.1 Description



DS0130001

1	Front Right Drive Shaft Assembly	2	Rear Right Drive Shaft Assembly
3	Propeller Intermediate Shaft Assembly	4	Front Left Drive Shaft Assembly
5	Rear Left Drive Shaft Assembly		

Drive shaft, which is a solid shaft, transmits torque between differential and drive wheels. Generally, the inner end of drive shaft is connected with drive shaft gear by spline, and the outer end is connected with wheel hub. Drive shaft transmits torque from differential to wheels, thus rotating the wheels to run vehicle. Propeller intermediate shaft is the shaft which transmits rotation of transmission to main final drive.

2 Specifications

2.1 Torque Specifications

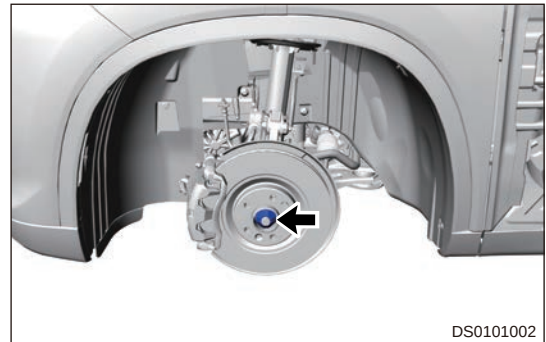
Description	Torque (N•m)
Tightening Bolt Between Propeller Intermediate Shaft Bracket and Body	71.5 ± 6.5
Tightening Bolt Between Propeller Intermediate Shaft and Torque Manager	71.5 ± 6.5
Tightening Bolt Between Propeller Intermediate Shaft and PTU	79 ± 8
Fixing Bolt Between Front Right Drive Shaft Bracket and Engine	70 ± 10
Drive Shaft Fixing Nut	Firstly tighten torque to 200 N•m, reverse it by 100 °, and then tighten to 286 ± 23 N•m

3 On-vehicle Service

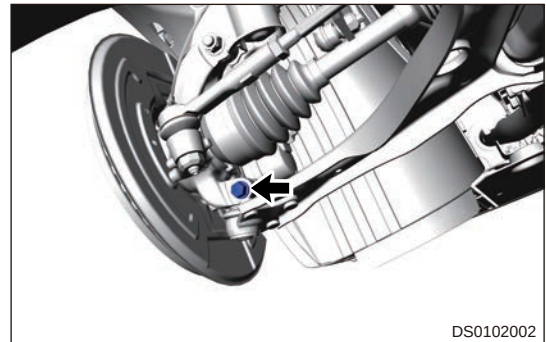
3.1 Front Drive Shaft Assembly

■ Removal

- (1) Remove the front left wheel.
- (2) Remove the right left wheel.
- (3) Drain the transmission oil.
- (4) Remove the front left drive shaft assembly.
 - 1) Remove fixing nut (arrow) from front left drive shaft.

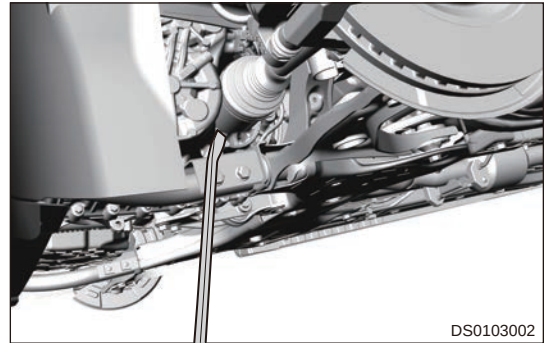


- 2) Remove fixing bolt (arrow) between front left lower control arm and steering knuckle.

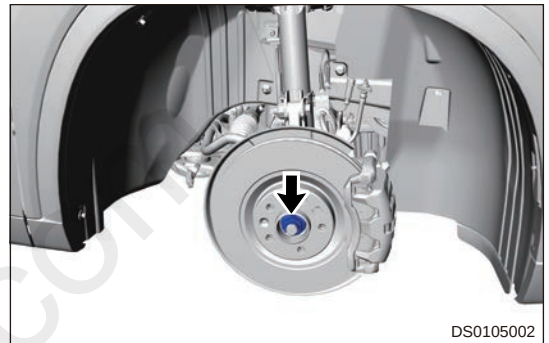


- 3) Disconnect the connection between front left lower control arm and steering knuckle.

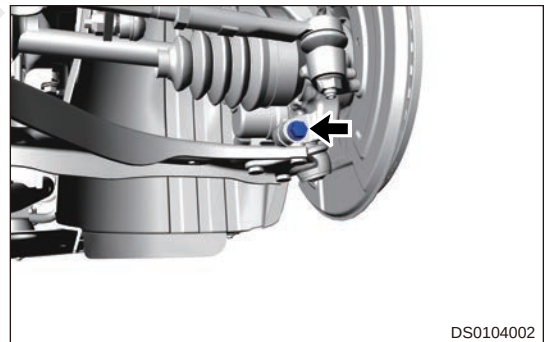
- 4) Use crowbar to pry out inner ball cage spline inserted into transmission end.



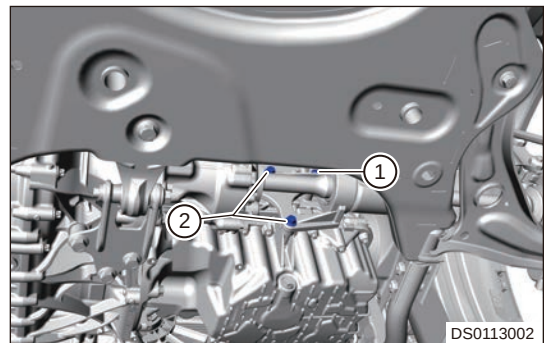
- 5) Remove the front left drive shaft.
- (5) Remove the front right drive shaft assembly.
- 1) Remove fixing nut (arrow) from front right drive shaft.



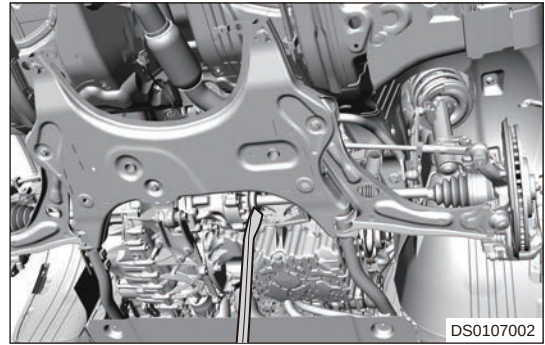
- 2) Remove fixing nut (arrow) from front right drive shaft.



- 3) Disconnect the connection between front right lower control arm and steering knuckle.
- 4) Remove 3 fixing bolts (1) and (2) from front right drive shaft bracket.



- 5) Use crowbar to pry out inner ball cage spline inserted into transfer case.



- 6) Remove the front right drive shaft assembly.

■ Installation

- (1) Install the front right drive shaft.

⚠ Caution

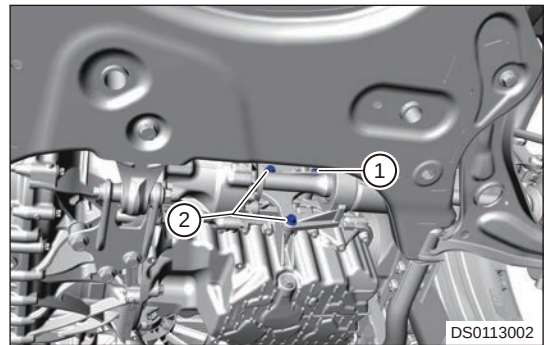
- It is necessary to use oil seal mounting fixture to ensure that transmission output shaft oil seal is not scratched during installation. Remove fixture after drive shaft spline is passed through fixture, and do not remove it forcibly.
- It is necessary to align drive shaft spline with spline hole when assembling drive shaft. Drive shaft can be pushed firmly and smoothly only drive shaft spline is aligned with spline hole.
- Install drive shaft bracket in the order above.

- 1) Raise the right shaft first until drive shaft spline end axis centering is flush with transmission differential hole center.
- 2) Insert oil seal protection fixture into transmission output shaft oil seal.
- 3) Push drive shaft into fixture, and remove fixture after drive shaft spline passes through fixture.
- 4) Finally, push the drive shaft to bottom.
- 5) Install 3 fixing bolts (arrow) from front right drive shaft bracket.

Tightening torque: 70 ± 10 N·m

⚠ Caution

- Put a bolt into bolt mounting hole at position (1) firstly and pre-tighten it. Put the other 2 bolts to mounting holes (2) respectively and pre-tighten them.
- Tighten them to specified torque.



- (2) Install the connection between front right lower control arm and steering knuckle.

Tightening torque: 95 ± 7.3 N·m

- (3) Install fixing nut to front right drive shaft.
- (4) Install the front right wheel.
- (5) Install the front left drive shaft.

⚠ Caution

- It is necessary to use oil seal mounting fixture to ensure that transmission output shaft oil seal is not scratched during installation. Remove fixture after drive shaft spline is passed through fixture, and do not remove it forcibly.
- It is necessary to align drive shaft spline with spline hole when assembling drive shaft. Drive shaft can be pushed firmly and smoothly only drive shaft spline is aligned with spline hole.
- Install drive shaft bracket in the order above.

- 1) Raise the left shaft first until drive shaft spline end axis centering is flush with transmission differential hole center.
- 2) Insert oil seal protection fixture into transmission output shaft oil seal.
- 3) Push drive shaft into fixture, and remove fixture after drive shaft spline passes through fixture.
- 4) Finally, push the drive shaft to bottom.
- (6) Install the connection between front left lower control arm and steering knuckle.

Tightening torque: $95 \pm 7.3 \text{ N}\cdot\text{m}$

- (7) Install fixing nut to front left drive shaft.
- (8) Install the front left wheel.
- (9) Fill the transmission oil.

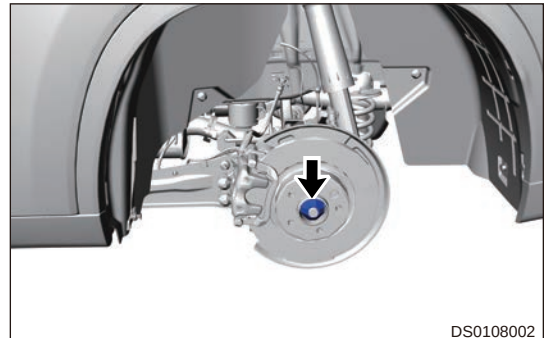
3.2 Rear Drive Shaft Assembly (4WD)

■ Removal

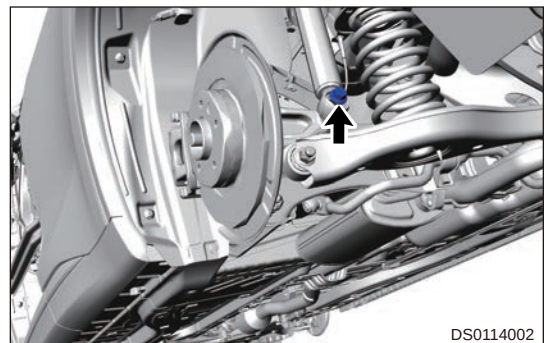
Caution

- Use same removal and installation procedures for left drive shaft and right drive shaft assembly.
- Removal procedures listed below are for left drive shaft.

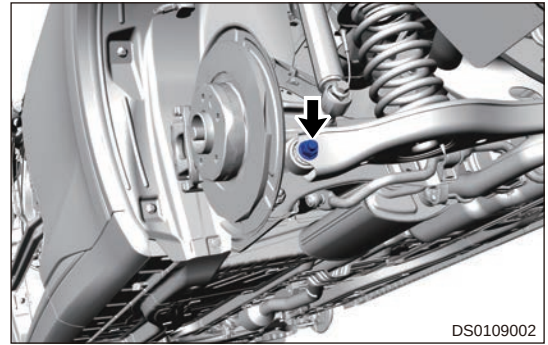
- (1) Remove the rear left wheel.
- (2) Drain the final drive oil.
- (3) Remove the rear left drive shaft assembly.
 - 1) Remove fixing nut (arrow) from rear left drive shaft.



- 2) Remove fixing bolt (arrow) between rear left shock absorber and steering knuckle.

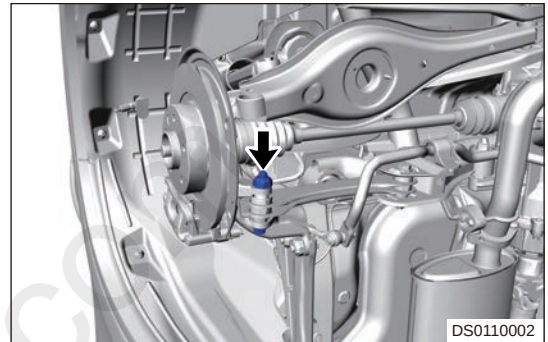


- 3) Remove fixing bolt (arrow) between rear left lower control arm and steering knuckle.

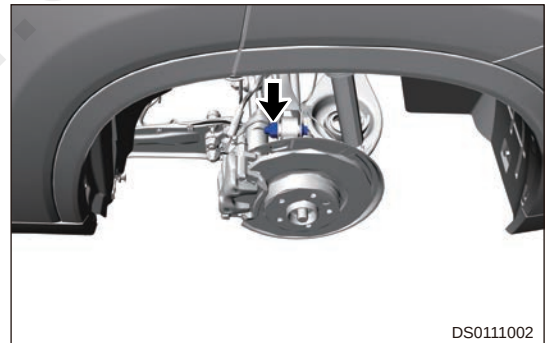


- 4) Disconnect the connection between rear left lower control arm and steering knuckle, and remove coil spring.

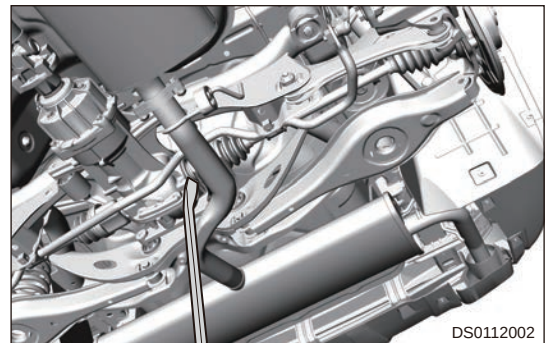
- 5) Remove fixing bolt (arrow) between left tie rod and steering knuckle.



- 6) Remove fixing bolt (arrow) between upper left control arm and steering knuckle.



- 7) Use crowbar to pry out the rear left drive shaft assembly.



- 8) Remove the rear left drive shaft assembly.

■ Installation

Caution

- Use same installation procedures for left drive shaft and right drive shaft assembly.
- Installation procedures listed below are for left drive shaft.

- (1) Install the rear left drive shaft assembly.

- (2) Install fixing bolt between upper left control arm and steering knuckle.
- (3) Install fixing bolt between left tie rod and steering knuckle.
- (4) Install fixing bolt between rear left shock absorber and steering knuckle.

Tightening torque: $160 \pm 12 \text{ N}\cdot\text{m}$

- (5) Install fixing nut to rear left drive shaft.
- (6) Install the rear left drive shaft assembly.
- (7) Install the rear left wheel.
- (8) Use same installation procedures for right drive shaft and left drive shaft assembly.
- (9) Fill the final drive oil.

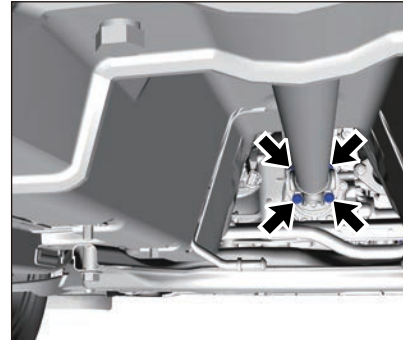
⚠ Caution

- Check wheel alignment after installation. Adjust wheel alignment to the standard range as necessary.

3.3 Propeller Intermediate Shaft Assembly (4WD)

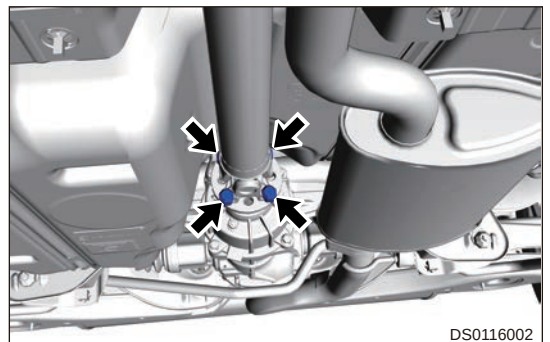
■ Removal

- (1) Turn off all electrical equipment and the ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front muffler assembly.
- (4) Remove the propeller intermediate shaft assembly.
 - 1) Remove 4 fixing bolts (arrow) between propeller shaft and PTU output flange.



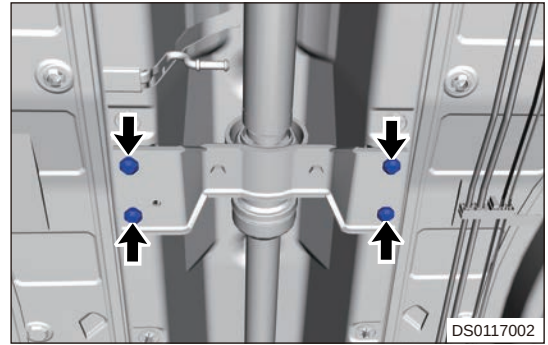
DS0115002

- 2) Remove 4 fixing bolts (arrow) between propeller shaft and torque manager flange.



DS0116002

- 3) Remove 4 fixing bolts (arrow) between intermediate bracket and lower body.



- 4) Remove the propeller intermediate shaft assembly.

■ Installation

- (1) Install the propeller intermediate shaft assembly.
(2) Install 4 fixing bolts between intermediate bracket and lower body.

Tightening torque: $71.5 \pm 6.5 \text{ N}\cdot\text{m}$

- (3) Install 4 fixing bolts between propeller shaft and torque manager flange.

Tightening torque: $71.5 \pm 6.5 \text{ N}\cdot\text{m}$

- (4) Install 4 fixing bolts between propeller shaft and PTU output flange.

Tightening torque: $33 \pm 3 \text{ N}\cdot\text{m}$

- (5) Install the front muffler assembly.
(6) Install the negative battery cable.

⚠ Caution

- Raise the propeller shaft to installation height with a lifter, fit front end cross fork flange with PTU output shaft flange, align 4 bolt holes separately and tighten them with bolts. Installation of bolt should follow the principle of diagonal tightening.
- Fit rear end cross fork flange with torque manager flange, align 4 bolt holes separately and tighten them with bolts. Installation of bolt should follow the principle of diagonal tightening.

3.4 Replacement of Outer Ball Cage

■ Removal

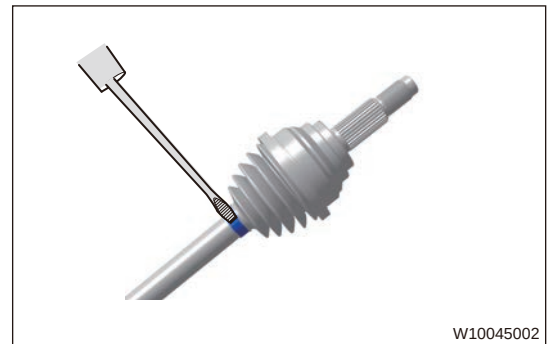
⚠ Warning

- Use same disassembly and assembly procedures for outer ball cage of left / right drive shaft assemblies.

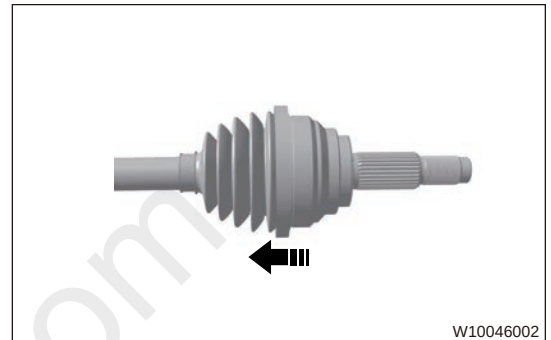
- (1) Remove the drive shaft assembly.
(2) Using a screwdriver, pry out striker of outer ball cage dust boot outer clamp and remove outer ball cage dust boot outer clamp.



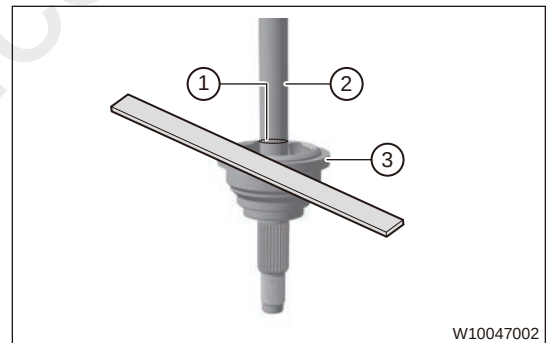
- (3) Using a screwdriver, pry out striker of outer ball cage dust boot inner clamp and remove outer ball cage dust boot inner clamp.



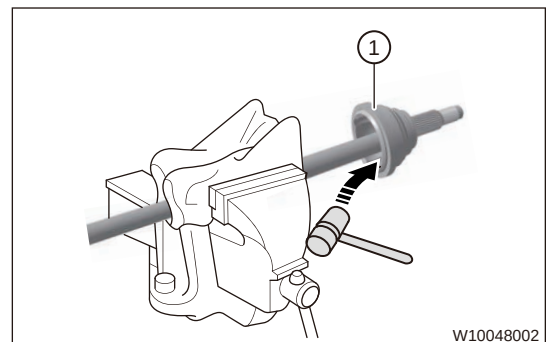
- (4) Slide the outer dust boot carefully into the inner ball cage side in direction of arrow.



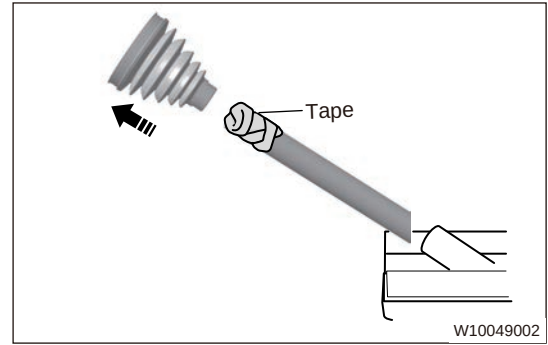
- (5) Put matchmarks (1) on area at same height as drive shaft assembly (2) and edge of outer ball cage (3) for correct installation.



- (6) Wrap the drive shaft assembly with a piece of cloth and put it onto a vise. Secure the vise to prevent drive shaft assembly from shaking. Expand the internal positioning snap spring of outer ball cage with snap spring calipers, then tap outer ball cage with a hammer and remove outer ball cage (1).



- (7) Remove the left drive shaft from vise.
- (8) Remove the internal positioning snap spring of outer ball cage.
- (9) Wrap tape on the spline of drive shaft, and remove dust boot.



- (10) Remove the tape.

■ Installation

⚠ Caution

- Check if spline of drive shaft is in good condition. If it is deformed or damaged, replace it.
- Check if dust boot is in good condition. If it is scratched or broken, replace it.
- Refill grease during installation, and install with a new clamp.

- (1) Wrap tape on the spline of drive shaft, and install dust boot.
- (2) Install outer ball cage and internal positioning snap spring.
- (3) Install the outer ball cage dust boot.
- (4) Install the outer ball cage dust boot inner clamp.
- (5) Install the outer ball cage dust boot outer clamp.