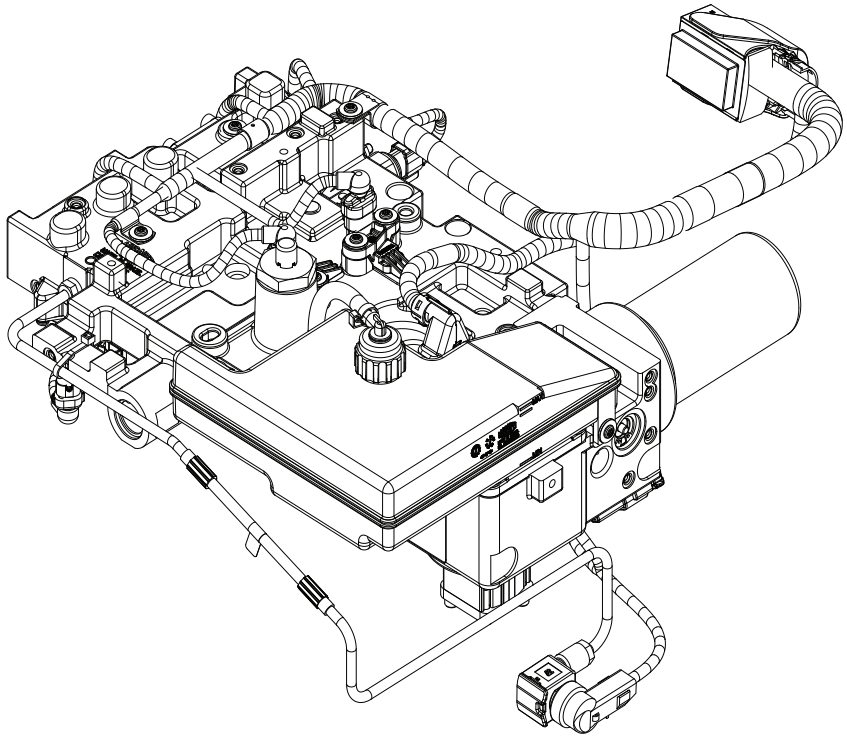
Troubleshooting Manual
Electro Hydraulic Control Unity

EA06X06 EN - OEM I

2019 December

Model EA06X06



PREPARED BY:

MAGNETI MARELLI

TABLE OF CONTENTS

Introduction - Use of This Manual

Overview

This Troubleshooting Guide provides troubleshooting instructions that are presented in codes when they occur.

How to consult the Manual

For query by code (DTC) see "**DTC INDEX**" on page IV.
For query by component see "**TABLE OF CONTENTS**" on page I.

Wiring inspection and procedure for troubleshooting

Recommendations

This topic represents a set of recommendations on how to troubleshoot potential vehicle wiring issues. These issues may be residing on the transmission harness, vehicle harness, power harness, or other accessory wiring, depending on the fault code or existing condition. When troubleshooting wiring, consider that wiring faults may be continuous, intermittent, or may not exist.

This procedure describes a visual inspection of wiring and connectors, and how to use a multimeter in open circuit inspection, short circuits in other wiring, and short circuit to GND.

Possible Causes

- Short of wiring to ground, short to power or open circuit.
- Terminals bent or broken apart or opened, oxidized or damaged.
- Missing or damaged connector protection.
- Wiring damaged, compressed or worn.

Visual Inspection

1. Make sure all connectors are clean and properly locked.
2. Inspect the wiring length between the connections and look for faulty wiring signals.
3. Before reading with the Meter, make sure there are no loose, rusted or damaged terminals other than bent or broken pins.

Note: If any damage is found on the transmission harness it is recommended that it be replaced. Check that the connector is damaged and replace it, if applicable. If damage to the vehicle wiring is found, refer to wiring replacement recommendations and vehicle connectors.

Care and Warnings

Warning: Failure to follow the indicated procedures creates a high risk or injury to service technicians.

Caution: failure to follow the indicated procedures can lead to damage or malfunction of the components.

Important: TO CARRY OUT THE SERVICES CORRECTLY AND SAFELY IT IS MANDATORY TO FOLLOW THE INDICATED PROCEDURES.

Important: Whenever the TCU is replaced or removed from its location for any reason, replace it in its position with all screws and connections properly.

Important: The TCU takes about 20 seconds to turn off after being switched off the key, so it's important to wait this time whenever you need to perform a key cycle (turn off and on the vehicle key).

Tool

Digital Multimeter

Resources:

- Voltage Measurement (Volts DC)
- Measurement of continuity

Acronyms

TCU - Transmission Control Unit – Name given to central (module), responsible for the electronic control of the transmission.

GND - Ground – Name given to battery negative (Mass). Ground in English means 'Earth'.

PWM - Pulse Width Modulation – Pulse Width Modulation, it is a Digital technique of varying the activation time of the signal at a given frequency. In this system Pulse Width Modulation is used as the signal generated by a digital circuit present in some sensors, and is interpreted by the TCU.

MMP - Main Microprocessor – Main Microprocessor, TCU device that performs the logic and calculation part for the correct operation of the automation system.

SMP - Safety Microprocessor – Security Microprocessor, device present in the TCU responsible for performing security tasks when necessary.

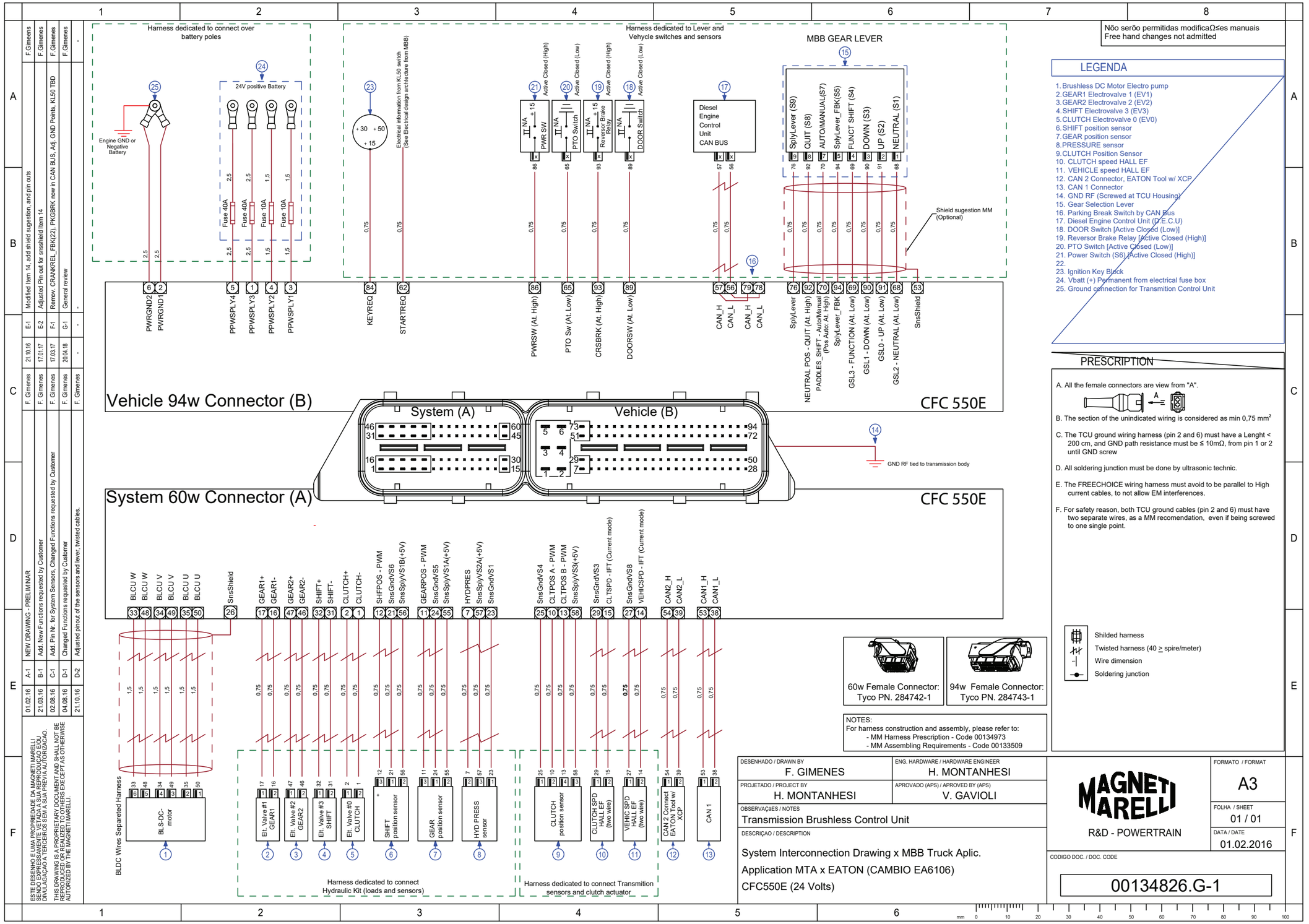
Terms

Kiss Point – Designation given when the clutch disc touches the engine flywheel. Moment that starts the engine torque transmission to the gear box.

Lever – Name given to the Gear Selector lever and steering mode.

Kick Down - Denomination given the function that understands that the driver requires maximum power during the drive ability of the vehicle (accelerator pedal fully engaged)

ELECTRICAL SYSTEM



Não serão permitidas modificaΩ≤es manuais
Free hand changes not admitted

LEGENDA

1. Brushless DC Motor Electro pump
2. GEAR1 Electrovalve 1 (EV1)
3. GEAR2 Electrovalve 2 (EV2)
4. SHIFT Electrovalve 3 (EV3)
5. CLUTCH Electrovalve 0 (EV0)
6. SHIFT position sensor
7. GEAR position sensor
8. PRESSURE sensor
9. CLUTCH Position Sensor
10. CLUTCH speed HALL EF
11. VEHICLE speed HALL EF
12. CAN 2 Connector, EATON Tool w/ XCP
13. CAN 1 Connector
14. GND RF (Screwed at TCU Housing)
15. Gear Selection Lever
16. Parking Break Switch by CAN Bus
17. Diesel Engine Control Unit (D.E.C.U)
18. DOOR Switch [Active Closed (Low)]
19. Reversor Brake Relay [Active Closed (High)]
20. PTO Switch [Active Closed (Low)]
21. Power Switch (S6) [Active Closed (High)]
22.
23. Ignition Key Block
24. Vbatt (+) Permanent from electrical fuse box
25. Ground connection for Transmition Control Unit

PRESCRIPTION

A. All the female connectors are view from "A".

B. The section of the unindicated wiring is considered as min 0,75 mm²

C. The TCU ground wiring harness (pin 2 and 6) must have a Lenght < 200 cm, and GND path resistance must be ≤ 10mΩ, from pin 1 or 2 until GND screw

D. All soldering junction must be done by ultrasonic technic.

E. The FREECHOICE wiring harness must avoid to be parallel to High current cables, to not allow EM interferences.

F. For safety reason, both TCU ground cables (pin 2 and 6) must have two separate wires, as a MM recomendation, even if being screwed to one single point.

Shilded harness
Twisted harness (40 ≥ spire/meter)
Wire dimension
Soldering junction

60w Female Connector: Tyco PN. 284742-1

94w Female Connector: Tyco PN. 284743-1

NOTES:
For harness construction and assembly, please refer to:
- MM Harness Prescription - Code 00134973
- MM Assembling Requirements - Code 00133509

DESENHADO / DRAWN BY: F. GIMENES	ENG. HARDWARE / HARDWARE ENGINEER: H. MONTANHESI
PROJETADO / PROJECT BY: H. MONTANHESI	APROVADO (APS) / APROVED BY (APS): V. GAVIOLI
OBSERVAÇAES / NOTES: Transmission Brushless Control Unit	
DESCRIÇAO / DESCRIPTION: System Interconnection Drawing x MBB Truck Aplic. Application MTA x EATON (CAMBIO EA6106) CFC550E (24 Volts)	

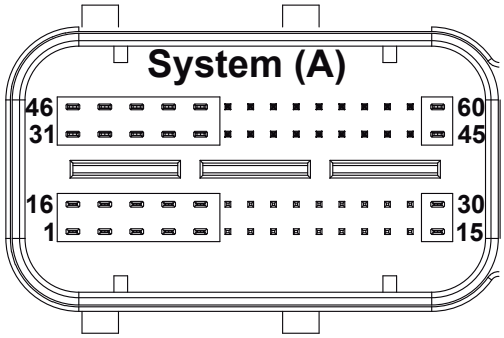
MAGNETI MARELLI
R&D - POWERTRAIN

FORMATO / FORMAT: A3
FOLHA / SHEET: 01 / 01
DATA / DATE: 01.02.2016
CODIGO DOC. / DOC. CODE: 00134826.G-1

A-1	01.02.16	NEW DRAWING - PRELIMINAR
B-1	21.03.16	Add. New Functions requested by Customer
C-1	02.08.16	Add. Pin Nr. for System Sensors, Changed Functions requested by Customer
D-1	04.08.16	Changed Functions requested by Customer
D-2	21.10.16	Adjusted pinout of the sensors and lever, twisted cables.
E-1	21.10.16	Modified Item 14, add shield sugestion, and pin outs
E-2	17.01.17	Adjusted Pin out for snsshield Item 14
F-1	17.03.17	Remov. CRANKREL_FBK(22), PKGBRK now in CAN BUS, Adj. GND Points, KL50 TBD
G-1	20.04.18	General review

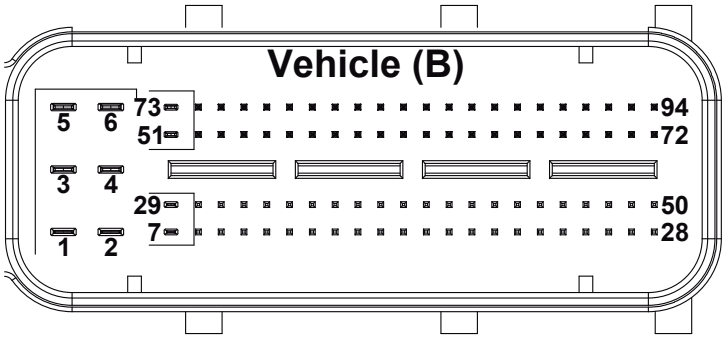
Connectors Pins Description

System Connector A - 60-way



Pin	Description	Pin	Description
1	CLUTCH- - Clutch Electrovalve Solenoid Grounding	31	SHIFT- Solenoid Electrovalve Selection
2	CLUTCH+ - Clutch Electrovalve Solenoid Control	32	SHIFT+ - Solenoid Valve Control Selection
3	Free	33	BLCU W
4	Free	34	BLCU V
5	Free	35	BLCU U
6	Free	36	Free
7	Analog Signal Hydraulic Pressure Sensor	37	Free
8	Free	38	Free
9	Free	39	CAN_L - Secondary CAN bus CAN signal
10	CLTPOS A - Clutch Position Sensor A PWM Signal	40	Free
11	GEARPOS - PWM signal of the coupling position sensor	41	Free
12	SHFPOS - Selection position sensor PWM signal	42	Free
13	CLTPOS B - Clutch Position Sensor B Signal PWM	43	Free
14	TOSS - Transmission Output Rotation Sensor	44	Free
15	TISS - Clutch Rotation Sensor	45	Free
16	GEAR1 - Solenoid of the first Engaged Check Valve grounding	46	GEAR2 - Solenoid Grounding of the Second Engagement Electrovalve
17	GEAR+ - Solenoid control of the first coupling electrovalve	47	GEAR2+ - Solenoid control of the second coupling Electrovalve
18	Free	48	BLCU W
19	Free	49	BLCU V
20	Free	50	BLCU U
21	SnsGNDVS6 - GND (Ground), of the selection position sensor.	51	Free
22	Free	52	Free
23	SnsGNDVS1 - GND, Hydraulic pressure sensor	53	Free
24	SnsGNDVS5 - GND, of the coupling position sensor.	54	CAN2_H - Secondary CAN Bus High CAN Signal
25	SnsGNDVS4 - GND, of the clutch position sensors	55	SnsSplyVS1A (+5V) - Coupling position sensor supply
26	SnsShield - Shielding of hydraulic pump coil controls	56	SnsSplyVS1B (+5V) - Selection position sensor supply
27	SnsGNDVS8 - GND (Ground), TOSS sensor	57	SnsSplyVS2A (+5V) - Hydraulic pressure sensor supply
28	Free	58	SnsSplyVS3(+5V) - Clutch Position Sensor Power
29	SnsGNDVS3 - GND (Ground), TISS sensor	59	Free
30	Free	60	Free

System Connector B - 94 way



Pin	Description
1	PPWSPLY3 - Power to drive hydraulic pump motor and the Electrovalves
2	PWRGND1 - GND (grounding), from TCU
3	PPWSPLY1 - Main Microprocessor Power (MMP)
4	PPWSPLY2 - Power Microprocessor Power Supply (SMP)
5	PPWSPLY4 - Power to drive hydraulic pump motor and the Electrovalves
6	PWRGND2 - GND (grounding), from TCU
7	Free
8	Free
9	Free
10	Free
11	Free
12	Free
13	Free
14	Free
15	Free
16	Free
17	Free
18	Free
19	Free
20	Free
21	Free
22	Free
23	Free
24	Free
25	Free
26	Free
27	Free
28	Free
29	Free
30	Free
31	Free
32	Free
33	Free
34	Free
35	Free
36	Free
37	Free
38	Free
39	Free
40	Free
41	Free
42	Free
43	Free
44	Free
45	Free
46	Free
47	Free

Pin	Description
48	Free
49	Free
50	Free
51	Free
52	Free
53	SnsShield - Shielding of the Selector Lever
54	Free
55	Free
56	CAN_L - CAN Bus Signal Low
57	CAN_H - CAN bus high signal CAN
58	Free
59	Free
60	Free
61	Free
62	STARTREQ -
63	Free
64	Free
65	PTO Sw (At. Low) - PTO Function Button
66	Free
67	Free
68	GSL2 - NEUTRAL (At. Low) - Check lever Neutral request button signal
69	GSL2 - FUNCTION (At. Low) - Selector lever function button
70	PADDLES_SHIFT - Auto/Manual (Pos. Auto: At. High) – Steering mode selection
71	Free
72	Free
73	Free
74	Free
75	Free
76	SplyLever- Supply Lever Feed
77	Free
78	CAN_L - CAN Bus Signal Low
79	CAN_H - CAN bus high signal CAN
80	Free
81	Free
82	Free
83	Free
84	KEYREQ
85	Free
86	PWRSW (At.High) - Power mode selection button
87	Free
88	Free
89	DOORSW (At. Low) - Driver's door sensor signal
90	GLS1 - DOWN (At. Low) - Gear lever reduction signal
91	GLS0 -UP (At. Low) - Gear lever raise signal
92	NEUTRAL POS - QUIT (At. High)
93	CRSBRK
94	SplyLever_FBK - Return Lever Signal

Generic Test

If no DTC regarding the system is validated, but the system is malfunctioning, perform a general test according to the following steps.

A

Purpose: *Check Batteries and Fuses*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts). If it is not, recharge the battery or replace it.
2. Also check that the system fuses are not broken and that they are connected correctly.
3. Make sure the load is appropriate by checking it again and, at the appropriate level, go to the next step.
    - If there is a fault, perform the indicated procedure and go to **Step V.**
    - If the problem is not identified or the error persists, go to the next step.

B

Purpose: *Check connectors and harness*

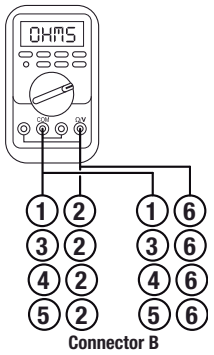
Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. check the harness for any broken or damaged wire.
    - If there is a fault, perform the indicated procedure and go to **Step V.**
    - If the problem is not identified or the error persists, go to the next step.

C

Purpose: *Check power to the TCU connector*

⚠ **Caution:** using a multimeter, check that the correct voltage (between 18 and 32 Volts) is present between:



Connector B

1. pins 1 and 2 of connector B (positive and GND).
2. pins 3 and 2 of connector B (positive and GND).
3. pins 4 and 2 of connector B (positive and GND).
4. pins 1 and 6 of connector B (positive and GND).
5. pins 3 and 6 of connector B (positive and GND).
6. pins 4 and 6 of connector B (positive and GND).
7. pins 5 and 6 of connector B (positive and GND).
    - If it is found that the correct voltage is not present, but the battery voltage checked in 'A' step is correct, investigate the connections to the battery are properly positioned without the presence of ill-contact.
    - If necessary, proceed with maintenance and go to **Step V.**
    - Otherwise go to the next step.

D

Purpose: *Update the TCU*

1. With the help of the tool, update the TCU.
   - After performing the upgrade go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Coupling Position Sensor

DTC: 1/37/23 - 1/37/25 - 1/37/26 - 1/37/27 - 1/37/28

Overview

The Coupling Position Sensor detects the longitudinal position of the engaging piston, and informs it by sending a PWM signal to the TCU. The sensor is connected to the TCU 60-way A connector via three cables (power, GND and signal).

The TCU continuously diagnoses the circuits and, upon detecting an inappropriate signal voltage level or a wrong PWM cycle, the corresponding fault code will be activated.

Detection

1/37/23 - Wrong PWM period: the signal received by the TCU is out of tolerance of the expected value.

1/37/25 - Fixed signal at HIGH level.

1/37/26 - Fixed signal at LOW level.

1/37/27 - PWM work cycle above the upper limit.

1/37/28 - PWM work cycle below the lower limit.

Possible Causes

1/37/23

- System harness compromised.
- Sensor connector with bad contact
- Sensor problem

1/37/25

- Loss of reference to GND
- Open circuit on sensor signal

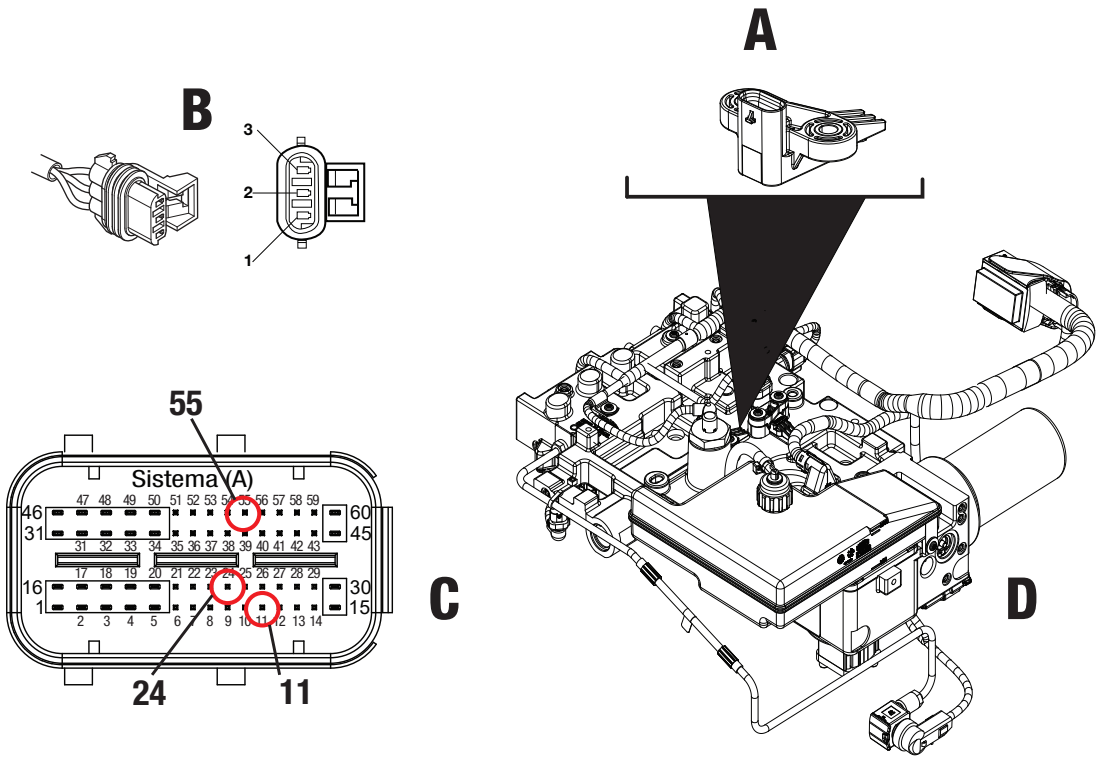
1/37/26

- Loss of reference to GND
- Open circuit on sensor signal

1/37/27 e 1/3728

- Reference loss of magnetism (magnet loose or out of place)

Component Identification



A. Coupling Position Sensor
B. Coupling Position Sensor Connector
C. TCU 60- way A Connector
D. Hydraulic Kit

Procedure

A

Purpose: *Check fault codes present*

1. Use the diagnostic tool to check for fault codes.
   - If 1/37/23 or 1/37/25 or 1/37/26 go to **Step B.**
   - If 1/37/27 or 1/37/28 go to **Step E.**

B

Purpose: *Check connectors and harness*

Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected to have suffered an over current or short circuit.
4. check the harness for any broken or damaged wire.
   - If an irregularity is verified, change the harness and go to **Step V.**
   - Otherwise go to the next step.

C

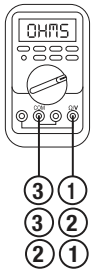
Purpose: *Check that there is no short circuit*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter, check that there is no continuity:

1 between pin 3 and pin 1 of the sensor connector

2. between pin 3 and pin 2 of the sensor connector
3. between pin 2 and pin 1 of the sensor connector

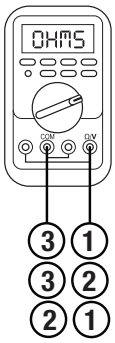


- Perform this procedure on the sensor and the harness connector.
- If there is continuity, replace the harness.
- Otherwise go to the next step.

D

Purpose: *Check that there are no problems of continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.



With the aid of a multimeter, check that there is no continuity:

1. between pin 3 of the sensor with pin 1
2. between pin 3 of the sensor with pin 2

3. between pin 3 and 2 of the sensor
    - If continuity problems are verified perform the harness change and go to **Step V.**
    - Otherwise go to the next step.

E

Purpose: *Replace the coupling shaft*

1. Replace the system coupling shaft according to the Service Manual due to a problem in the system.
    - After the replacement go to **Step V.**

F

Purpose: *Check whether the problem is in the sensor*

1. Replace the coupling position sensor with another of the same model.
    - After the replacement go to **Step V.**

G

Purpose: *Check if the problem is in the TCU*

1. If with previous checks and sensor replacement the fault is not found, perform a test with the TCU of another vehicle of the same model.
    - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
    - If the fault is active during the test, go to **Step A.**
    - If another fault code appears, see "**DTC INDEX**" on page IV.
    - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

    Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Coupling and Selection Position Sensors Power Supply

DTC: 1/38/21 - 1/38/22

Overview

The Selection and Coupling Position Sensors respectively detect the position of the selection piston and the position of the coupling piston, and inform them by sending a signal to the TCU. The TCU uses the same supply circuit for both sensors.

The TCU continuously diagnoses the supply circuits of the Selection and Coupling Position Sensors and upon detecting an out-of-range supply voltage, the corresponding fault code is activated.

Detection

1/38/21 - Supply voltage of the sensors below the lower limit.

1/38/22 - Supply voltage of the sensors above the upper limit.

Possible Causes

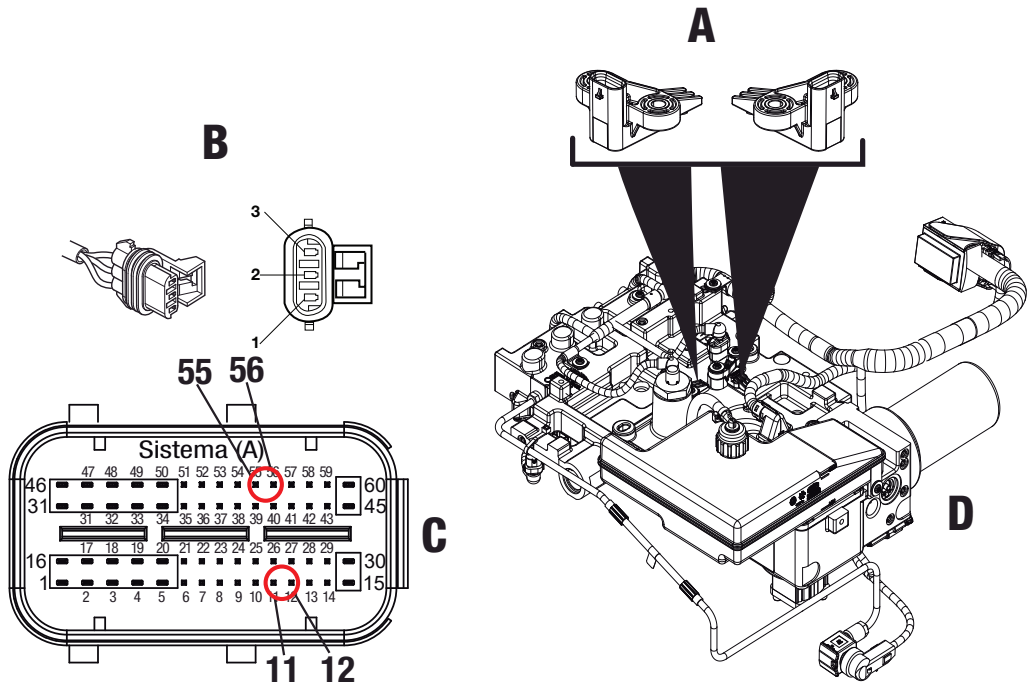
1/38/21

- System harness compromised
- Sensor power connector with bad contact
- Short circuit to GND
- Sensor problem

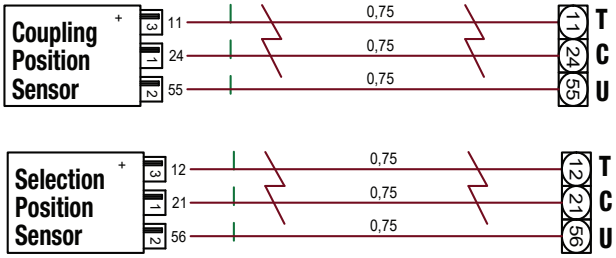
1/38/22

- System connector compromised
- Sensor power connector with bad contact
- Short circuit to Supply
- TCU problems

Component Identification



A.Coupling and Selection Position Sensors
B.Coupling and Selection Sensors Connectors
C.TCU 60- way A Connector
D.Hydraulic Kit



Procedure

A

Purpose: *Check connectors and harness*

Check:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If an irregularity is verified carry out the change of the harness and go to **Step V.**
   - Otherwise go to the next step.

B

Purpose: *Check fault codes present*

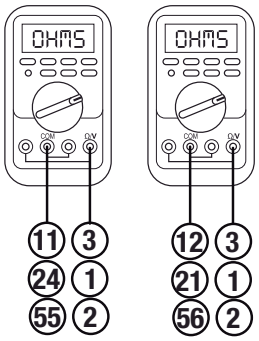
1. Use the diagnostic tool to check for fault codes.
   - If 1/38/21 go to **Step C.**
   - If 1/38/22 go to **Step D.**

C

Purpose: *Check the continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter, check that there is no continuity:



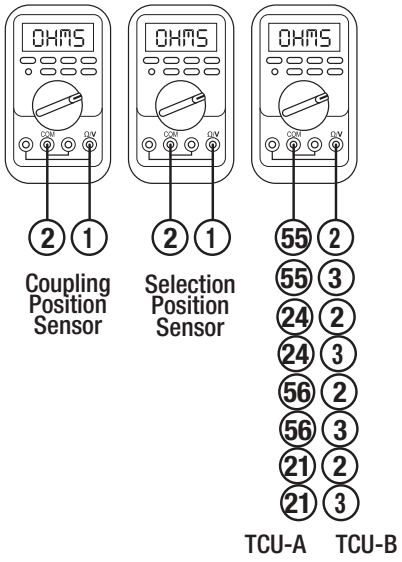
Coupling Selection

1. between terminal 11 of the TCU connector and terminal 3 of the Coupling Position Sensor connector.
2. between terminal 24 of the TCU connector and terminal 1 of the Coupling Position Sensor connector.
3. between terminal 11 of the TCU connector and terminal 3 of the Coupling Position Sensor connector.
4. between terminal 12 of the TCU connector and terminal 3 of the Selection Position Sensor connector.
5. between terminal 21 of the TCU connector and terminal 1 of the Selection Position Sensor connector.
6. between terminal 56 of the TCU connector and terminal 2 of the Selection Position Sensor connector.
   - If it is verified that there is no continuity in the above test, perform the harness change and go to **Step V.**
   - Otherwise go to the next step

D

Purpose: *Check that there are no problems of continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.



Using a multimeter, check for continuity.

1. between terminals 2 and 1 of the Coupling Position Sensor connector
2. between terminals 2 and 1 of the Selection Position Sensor connector
3. between terminal 55 of connector A and terminal 2 of connector B of the TCU
4. between terminal 55 of connector A and terminal 3 of connector B of the TCU
5. between terminal 24 of connector A and terminal 2 of connector B of the TCU
6. between terminal 24 of connector A and terminal 3 of connector B of the TCU
7. between terminal 56 of connector A and terminal 3 of connector B of the TCU
8. between terminal 56 of connector A and terminal 2 of connector B of the TCU
9. between terminal 21 of connector A and terminal 2 of connector B of the TCU
10. between terminal 21 of connector A and terminal 3 of connector B of the TCU
    - If it is verified that there is no continuity in the above test, perform the whip change and go to **Step V.**
    - Otherwise go to the next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
    - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Selection Position Sensor

DTC: 1/39/23 - 1/39/25 - 1/39/26 - 1/39/27 - 1/39/28

Overview

The selection position sensor detects the position of the selection piston and informs it by sending a signal to the TCU. The sensor is connected to the TCU 60-way A connector via three cables (power, GND and signal).

The TCU continuously diagnoses the circuits and, upon detecting an inadequate signal voltage level, or a wrong PWM cycle, the corresponding fault code will be activated.

Detection

1/39/23 - Wrong PWM period: the signal received by the TCU is out of tolerance of the expected value.

1/39/25 - Fixed signal at HIGH level.

1/39/26 - Fixed signal at LOW level.

1/39/27 - PWM work cycle above the upper limit.

1/39/28 - PWM work cycle below the lower limit.

Possible Causes

1/39/23

- System harness compromised
- Sensor connector with bad contact
- Sensor problem

1/39/25

- Loss of reference to GND
- Open circuit on sensor signal

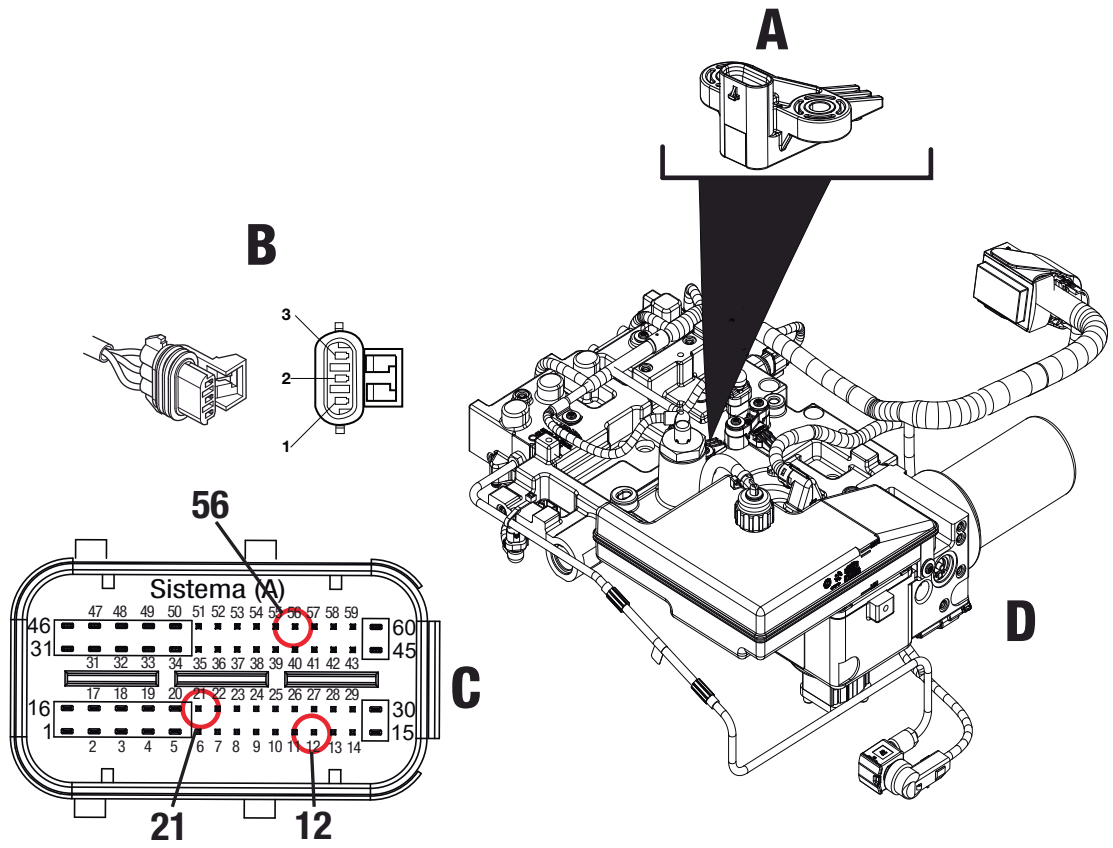
1/39/26

- Short circuit to GND
- Loss of supply to sensor

1/39/27 e 1/39/28

- Reference loss of magnetism (magnet loose or out of place)

Component Identification



A.Selection position sensor
B.Selection position sensor connector
C.TCU 60-way A connector
D.Hydraulic Kit

Procedure

A ***Purpose:*** *Check fault codes present*

1. Use the diagnostic tool to check for fault codes.
   - If 1/39/23 or 1/39/25 or 1/39/26 go to **Step B.**
   - If 1/39/27 or 1/39/28 go to **Step E.**

B ***Purpose:*** *Check connector and harness*

Check:

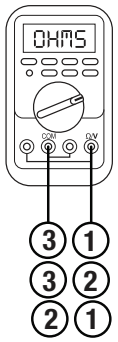
1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected to have suffered an over current or short circuit.
4. check the harness for any broken or damaged wire.
   - If an irregularity is verified, perform the harness change and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check that there is no short circuit*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter, check that there is no continuity:

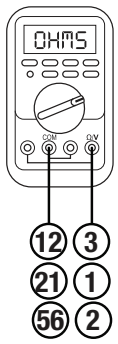
1. between pin 3 and pin 1 of the sensor connector
2. between pin 3 and pin 2 of the sensor connector
3. between pin 2 and pin 1 of the sensor connector



- Perform this procedure on the harness connector.
- If there is continuity, replace the harness.
- Otherwise go to the next step.

D ***Purpose:*** *Check that there are no problems of continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.



1. between the terminal 12 of the TCU and the terminal 3 of the sensor
2. between the terminal 21 of the TCU and the terminal 1 of the sensor

3. between the terminal 56 of the TCU and the terminal 2 of the sensor
   - If continuity problems are verified perform the harness change and go to **Step V.**
   - Otherwise go to the next step.

E

Purpose: *Replace the coupling shaft*

1. Replace the system coupling shaft according to the Service Manual due to a problem in the system.
   - After the replacement go to **Step V.**

F

Purpose: *Check whether the problem is in the sensor*

1. Replace the coupling position sensor with another of the same model.
   - After the replacement go to **Step V.**

G

Purpose: *Check if the problem is in the TCU*

1. If with previous checks and sensor replacement the fault is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch Position Sensor - A Signal

DTC: 2/34/23 - 2/34/25 - 2/34/26 - 2/34/27 - 2/34/28

Overview

The clutch position sensor detects the position of the clutch, and informs it by sending PWM signals to the TCU. The sensor is connected to the TCU's 60-way A connector via four cables (power, GND and two position signals: A and B).

The TCU continuously diagnoses the circuits and, upon detecting an inappropriate signal voltage level or a wrong PWM cycle, the corresponding fault code will be activated.

Detection

2/34/23 - Wrong PWM period in signal A: the signal received by the TCU is out of tolerance of the expected value.

2/34/25 - A signal set to HIGH.

2/34/26 - A signal set to LOW.

2/34/27 - PWM duty cycle in signal A above the upper limit.

2/34/28 - PWM duty cycle in signal A below the lower limit.

Possible Causes

2/34/23

- System harness compromised
- Sensor connector with bad contact

2/34/25

- Open circuit in power supply, signal A or GND of the sensor
- Short circuit in signal supply A

2/34/26

- Short circuit to the GND in the power supply or signal A
- Short circuit between signal A and signal B

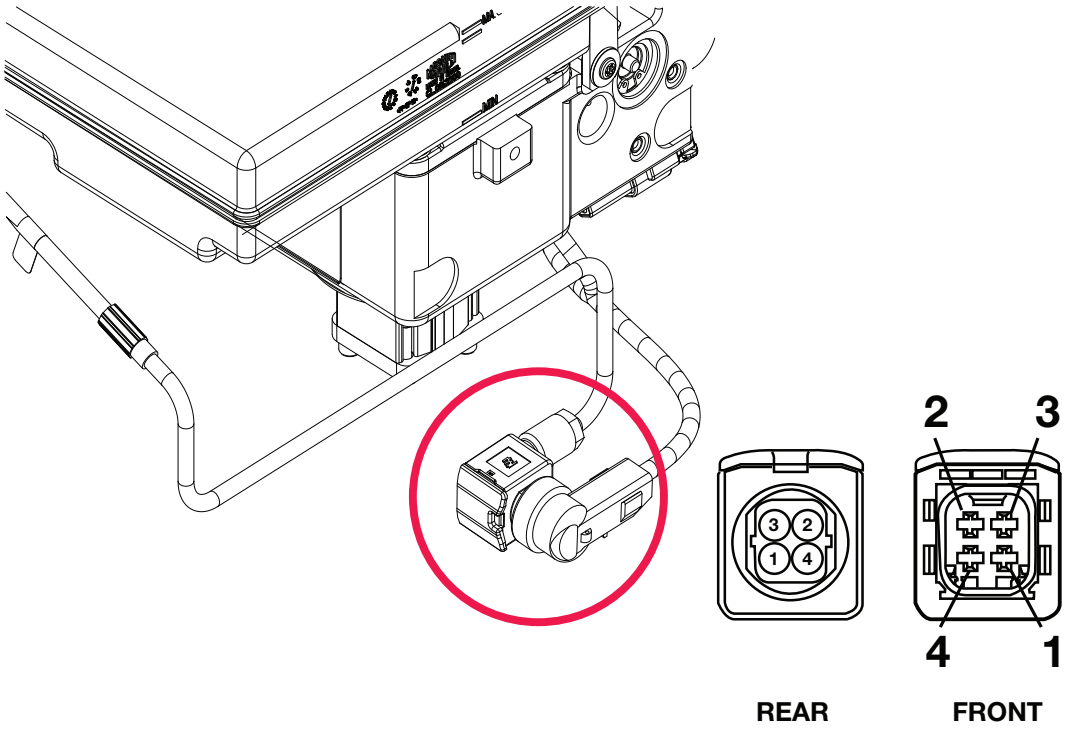
2/34/27

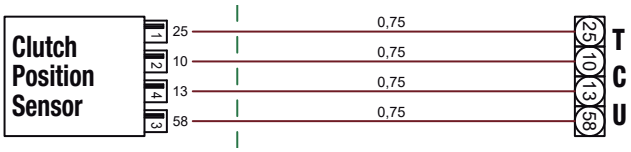
- Loss of magnetism

2/34/28

- Loss of magnetism
- Sensor problem

Component Identification





Procedure

A ***Purpose:*** *Check fault codes present*

1. Use the diagnostic tool to check the fault codes.
   - If 2/34/27 or 2/34/28 go to **Step E.**
   - IF 2/34/23 or 2/34/25 or 2/34/26 go to **Step B.**

B ***Purpose:*** *Check connectors and harness*

Check:

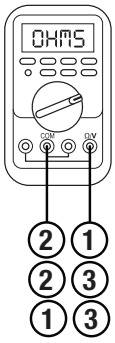
1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, has no moisture or is suspected of over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If an irregularity is verified, change the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check that there is no short circuit.*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter, check that there is no continuity:

1. between pin 2 and pin 1 of the sensor connector
2. between pin 2 and pin 3 of the sensor connector
3. between pin 1 and pin 3 of the sensor connector



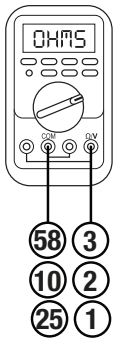
- If continuity is found, replace the lash and go to **Step V.**
- Otherwise go to the next step.

D ***Purpose:*** *Check that there are no problems of continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, perform a continuity test.

1. between terminal 58 of the TCU connector and terminal 3 of the sensor connector.
2. between terminal 10 of the TCU connector and terminal 2 of the sensor connector.
3. between terminal 25 of the TCU connector and terminal 1 of the sensor connector.



- If continuity problems are verified perform the harness change and go to **Step V.**
- Otherwise go to the next step.

E

Purpose: *Replace the clutch actuator plunger*

1. Replace the clutch actuator plunger in accordance with the service manual, due to a problem with the clutch actuator.
   - After the replacement go to **Step V.**

F

Purpose: *Check whether the problem is in the sensor*

1. If possible, replace the clutch position sensor with another of the same model.
   - After the replacement go to **Step V.**

G

Purpose: *Verify that the problem is not in the TCU*

1. If with previous checks and sensor replacement the fault is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch Position Sensor - B Signal

DTC: 2/35/23 - 2/35/25 - 2/35/26 - 2/35/27 - 2/35/28

Overview

The clutch position sensor detects the position of the clutch, and informs it by sending PWM signals to the TCU. The sensor is connected to the TCU's 60-way A connector via four cables (power, GND and two position signals: A and B).

The TCU continuously diagnoses the circuits and, upon detecting an inappropriate signal voltage level or a wrong PWM cycle, the corresponding fault code will be activated.

Detection

2/35/23 - Wrong PWM period in signal B: the signal received by the TCU is out of tolerance of the expected value.

2/34/25 - B signal set to HIGH.

2/35/26 - B signal set to HIGH.

2/35/27 - PWM duty cycle in signal B above the upper limit.

2/35/28 - PWM duty cycle in signal B below the lower limit.

Possible Causes

2/35/23

- System harness compromised
- Sensor connector with bad contact

2/35/25

- Open circuit in power supply, signal B or sensor GND
- Short circuit in the signal supply B

2/35/26

- Short circuit to GND in power supply or in signal B
- Short circuit between signal A and signal B

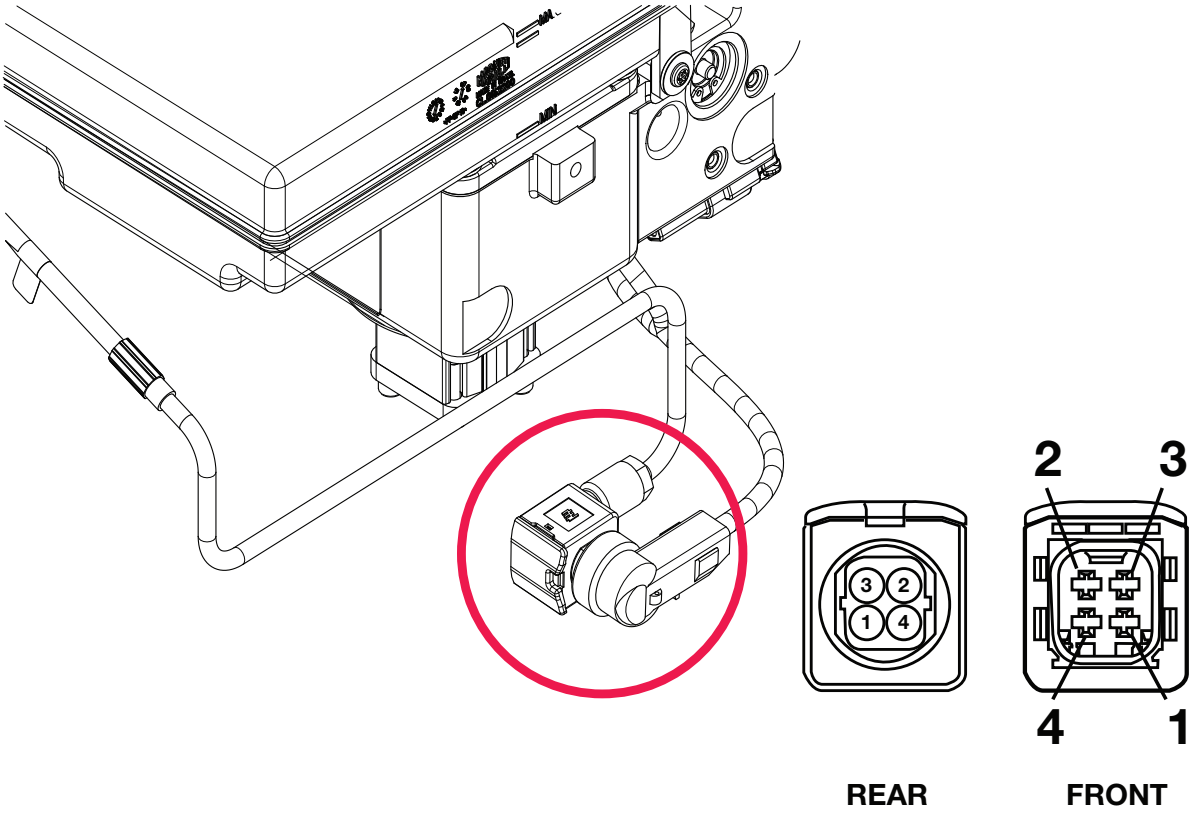
2/35/27

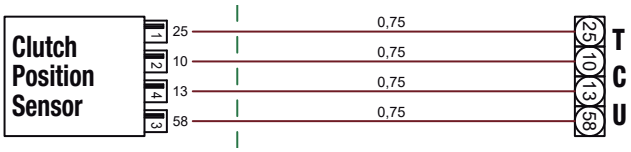
- Loss of magnetism

2/35/28

- Loss of magnetism
- Sensor problem

Component Identification





Procedure

A ***Purpose:*** *Check fault codes present*

1. Use the diagnostic tool to check the fault codes.
   - If 2/35/27 or 2/35/28 go to **Step E.**
   - IF 2/35/23 or 2/35/25 or 2/35/26 go to **Step B.**

B ***Purpose:*** *Check connectors and harness*

Check:

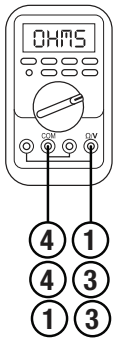
1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, has no moisture or is suspected of over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If an irregularity is verified, change the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check that there is no short circuit.*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter, check that there is no continuity:

1. between pin 4 and pin 1 of the sensor connector
2. between pin 4 and pin 3 of the sensor connector
3. between pin 1 and pin 3 of the sensor connector



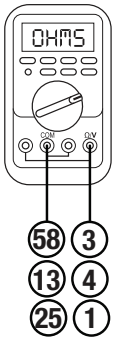
- If continuity is found, replace the lash and go to **Step V.**
- Otherwise go to the next step.

D ***Purpose:*** *Check that there are no problems of continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, perform a continuity test.

1. between terminal 58 of the TCU connector and terminal 3 of the sensor connector.
2. between terminal 13 of the TCU connector and terminal 4 of the sensor connector.
3. between terminal 25 of the TCU connector and terminal 1 of the sensor connector.



- If continuity problems are verified perform the harness change and go to **Step V.**
- Otherwise go to the next step.

E

Purpose: *Replace the clutch actuator plunger*

1. Replace the clutch actuator plunger in accordance with the service manual, due to a problem with the clutch actuator.
   - After the replacement go to **Step V.**

F

Purpose: *Check whether the problem is in the sensor*

1. If possible, replace the clutch position sensor with another of the same model.
   - After the replacement go to **Step V.**

G

Purpose: *Verify that the problem is not in the TCU*

1. If with previous checks and sensor replacement the fault is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch Position Sensor Power Supply

DTC: 2/36/21 - 2/36/22

Overview

The clutch position sensor detects the position of the clutch, and informs it by sending PWM signals to the TCU.

The TCU continuously diagnoses the circuits and, if it detects a power failure, the fault will be activated.

Detection

2/36/21 - Supply voltage below the lower limit.

2/36/22 - Supply voltage above the upper limit.

Possible Causes

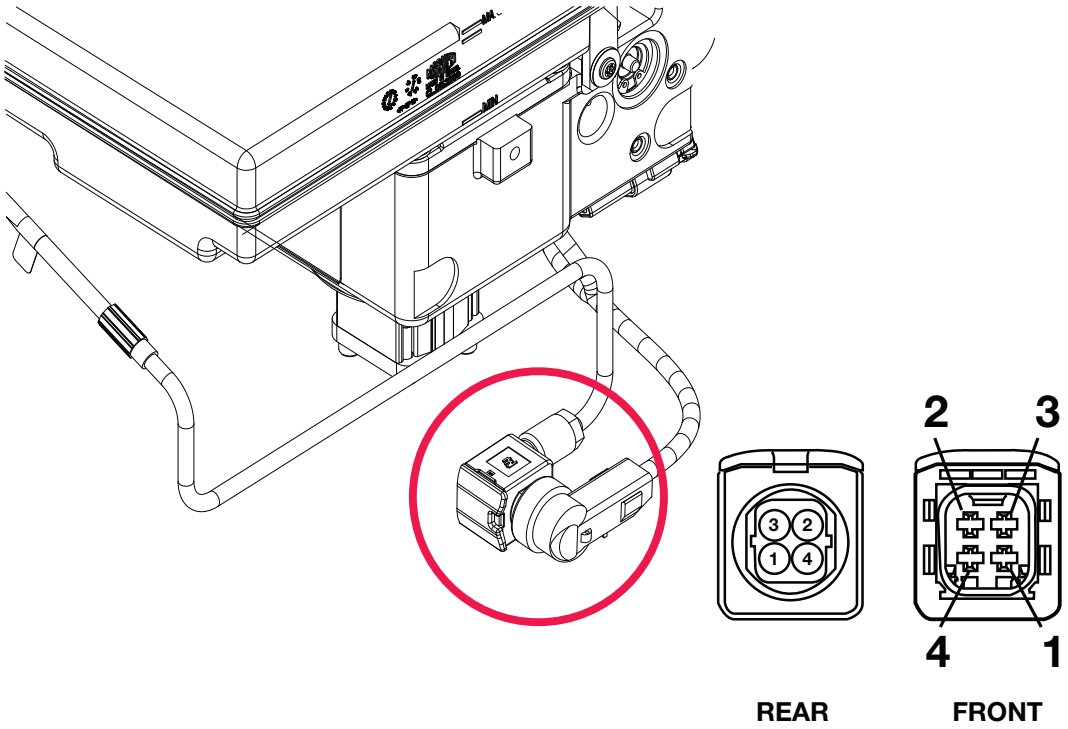
2/36/21

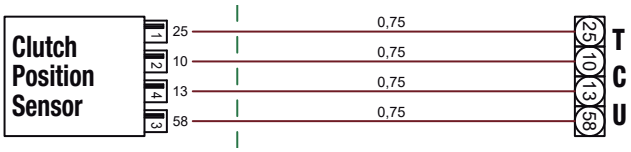
- System harness compromised
- Sensor power connector with bad contact
- Short circuit to GND.
- TCU problems.

2/36/22

- System harness compromised
- Sensor power connector with bad contact
- Short circuit to power supply
- TCU problem.

Component Identification





Procedure

A *Purpose: Check connectors and harness*

Check:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, has no moisture or is suspected of over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If an irregularity is verified, change the harness and go to **Step V.**
   - Otherwise go to the next step.

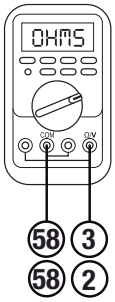
B *Purpose: Check fault codes present*

1. Use the diagnostic tool to check the fault codes.
   - If 2/36/21 go to **Step C.**
   - If 2/36/22 go to **Step D.**

C *Purpose: Check that there is no short circuit.*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter, check that there is no continuity:



1. between terminal 58 of connector A of the TCU and terminal 3 of connector B of the TCU.
2. between terminal 58 of connector A of the TCU and terminal 2 of connector B of the TCU.
   - If continuity is verified in the above test, perform maintenance on the damaged component and go to **Step V.**
   - Otherwise go to the next step.

D *Purpose: Verify that the problem is not in the TCU*

1. If with previous checks and sensor replacement the fault is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Hydraulic Pressure Sensor

DTC: 1/30/21 - 1/30/22 - 1/30/23 - 1/30/24

Overview

The hydraulic pressure sensor detects the oil pressure present in the system, stored in the pressure accumulator and generated by the hydraulic pump. This pressure operates the electrovalves that position the coupling and selection piston and the coupling of the clutch. The sensor is connected to the TCU 60-way A connector via three wires (power, GND and signal).

The TCU makes a continuous diagnosis in the circuits and in case it detects an inadequate signal voltage level the fault will be activated.

Detection

1/30/21 - Signal below the lower limit.

1/30/22 - Sign above the upper limit.

1/30/23 - Wrong sensor signal value: The fault is detected when the TCU encounters an error in the signal value.

1/30/24 - Peak sensor signal value: failure is detected if the TCU detects electrical peaks in the sensor signal circuit.

Possible Causes

1/30/21

- Open circuit on sensor signal.
- Short circuit between sensor signal and GND.

1/30/22

- Short circuit between the sensor signal and the supply voltage of the sensor.

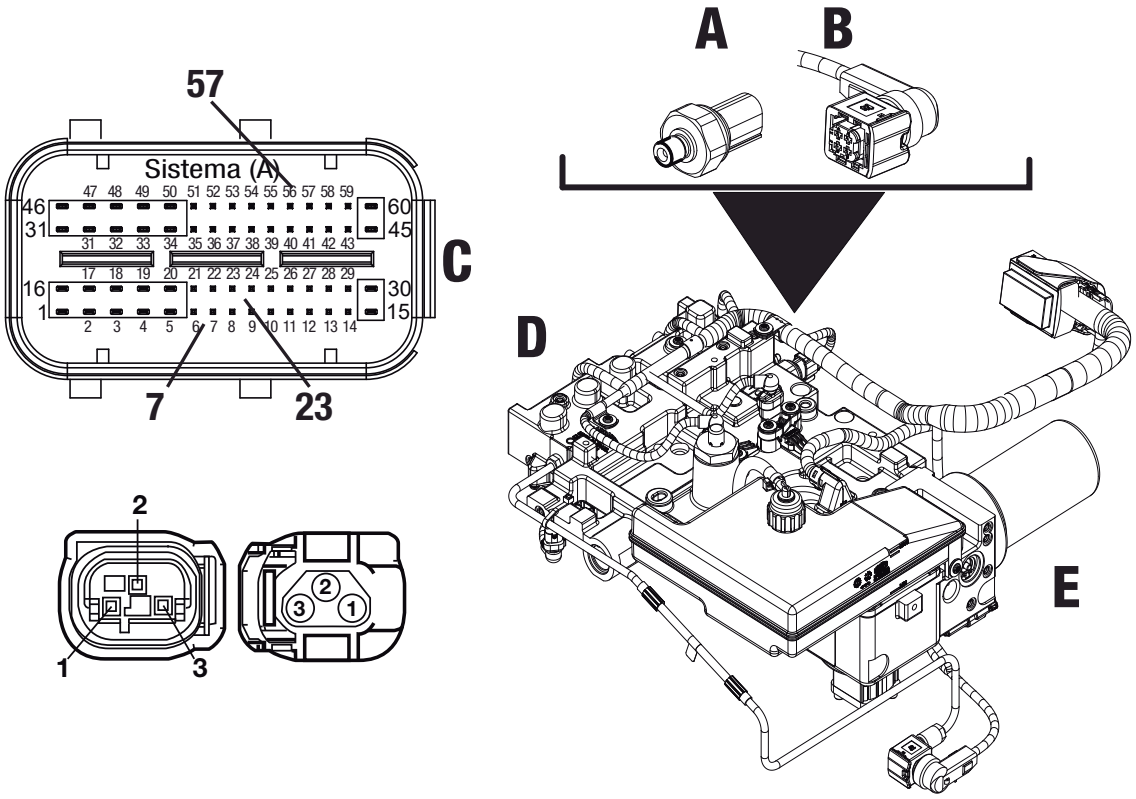
1/30/23

- Hydraulic pressure sensor damaged.

1/30/24

- Connector and / or sensor whip problems.

Component Identification



A.Hydraulic pressure sensor
B.Pressure sensor connector
C.TCU 60-way A connector
D.Hydraulic Kit
E.Pressure accumulator

Procedure

A

Purpose: *Check fault codes present*

1. Use the diagnostic tool to check the fault codes.
   - If 1/36/21 or 1/30/22 go to **Step C.**
   - If 1/36/23 or 1/30/24 go to **Step D.**

B

Purpose: *Check connectors and harness*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Check:

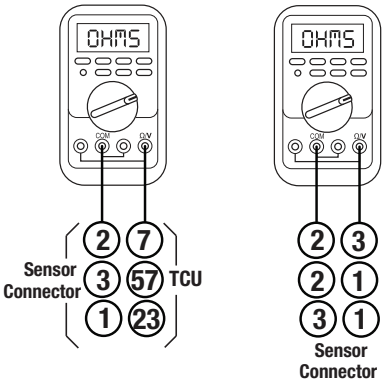
1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, has no moisture or is suspected of over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If an irregularity is verified, change the harness and go to **Step V.**
   - Otherwise go to the next step.

C

Purpose: *Check for continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, check:



1. that there is continuity between terminal 2 of the sensor connector and 7 of the TCU connector.
2. that there is continuity between terminal 3 of the sensor connector and 57 of the TCU connector.
3. that there is continuity between terminal 1 of the sensor connector and 23 of the TCU connector.
4. that there is no continuity between terminals 2 and 3 on the connector and also on the sensor.
5. that there is no continuity between terminals 2 and 1 on the connector and also on the sensor.
6. that there is no continuity between terminals 3 and 1 on the connector and also on the sensor.
   - If there are any problems with the sensor, go to the next step.
   - If the problem is on the connector, replace the harness and go to **Step V.**
   - If no problem is identified go to the next step.

D

Purpose: *Hydraulic pressure sensor replacement*

1. If the fault code is 1/30/23, or if the previous procedures indicated a defect in the sensor or did not indicate a defect, proceed with the replacement of the hydraulic pressure sensor due to a probable internal fault in the sensor.
   - After the replacement is made, go to **Step V.**
   - If the sensor has already been replaced, go to the next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Hydraulic Pressure Sensor Power Supply

DTC: 1/31/21 - 1/31/22

Overview

The hydraulic pressure sensor detects the oil pressure present in the system, stored in the pressure accumulator and generated by the hydraulic pump. This pressure operates the electrovalves that position the coupling and selection piston and the coupling of the clutch. The sensor is connected to the TCU 60-way A connector via three wires (power, GND and signal).

The TCU makes a continuous diagnosis in the circuits and in case it detects an incorrect power supply to the pressure sensor the fault will be activated.

Detection

1/31/21 - Hydraulic pressure sensor supply circuit short to GND.

1/31/22 - Hydraulic pressure sensor short supply circuit with battery.

Possible Causes

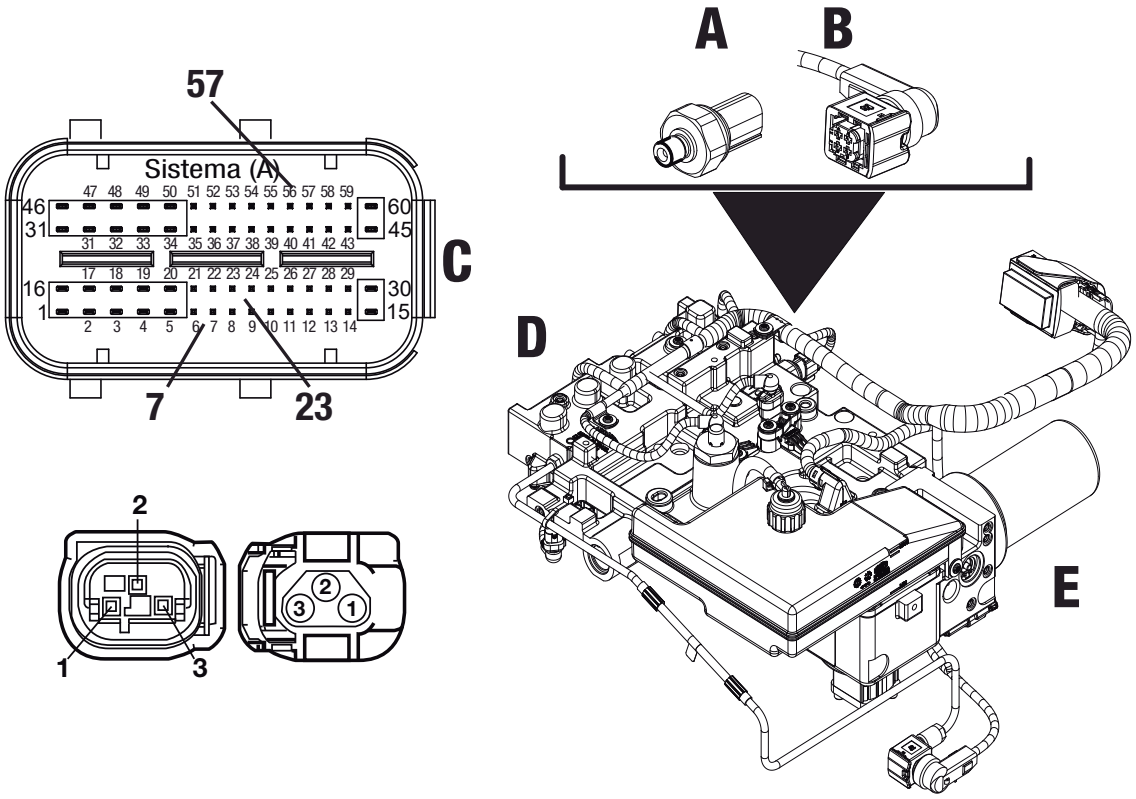
1/31/21

- TCU or short circuit to GND in the sensor supply circuit.

1/31/22

- TCU or short circuit to the battery in the sensor power circuit.

Component Identification



A.Hydraulic pressure sensor
B.Pressure sensor connector
C.TCU 60-way A connector
D.Hydraulic Kit
E.Pressure accumulator

Procedure

A ***Purpose:*** *Check*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

1. if there is no continuity between pin 57 of connector A with pin 1 of connector B.
2. if there is no continuity between pin 57 of connector A with pin 2 of connector B.
   - If there are continuity between these pins, proceed with the replacement of the harness and go to **Step V.**
   - Otherwise go to the next step.

B ***Purpose:*** *Perform a TCU test*

1. If with the previous checks the fault is not found, perform a test with the TCU of another vehicle.
   - After the replacement go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Shift Lever Sensors - UP

DTC: 1/26/16 - 1/26/17

Overview

The shift lever sensors detect the command performed by the driver and sends signals to the TCU of the following functions: **UP, DOWN, Neutral, Function** (lever activation signal on the lever) and **Quit** (lever moved to other positions).

Detection

1/26/16 - Sign above the upper limit.

1/26/17 - Signal below the lower limit.

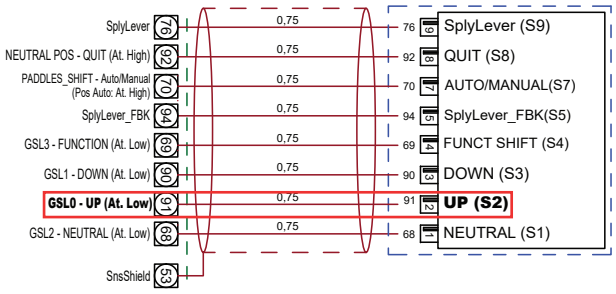
Possible Causes

1/26/16

- Short circuit to supply voltage or open circuit in connection with pin 91.

1/26/17

- Short circuit to GND in connection with pin 91.



Procedure

A *Purpose: Check connectors and harness*

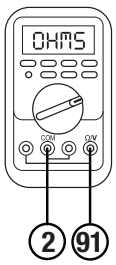
Check the lever and TCU connector:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

B *Purpose: Check the continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Using a multimeter, check for continuity between Pin 2 of the Lever connector and pin 91 of the TCU connector.

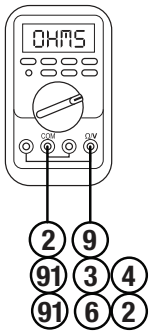


   - If there is no continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

C *Purpose: Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Make sure there is no continuity between pin 2 and pin 9 of the lever connector.



2. Check that there is no continuity between pin 91 with pin 3 or 4 of the TCU connector.
3. Check that there is no continuity between pin 91 with pin 6 or pin 2 of the TCU connector.
   - If there is continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

D

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

E

Purpose: *Check if the problem is in the lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Shift Lever Sensors- DOWN

DTC: 1/27/16 - 1/27/17

Overview

The shift lever sensors detect the command performed by the driver and sends signals to the TCU of the following functions: **UP, DOWN, Neutral, Function** (lever activation signal on the lever) and **Quit** (lever moved to other positions).

Detection

1/27/16 - Sign above the upper limit.

1/27/17 - Signal below the lower limit.

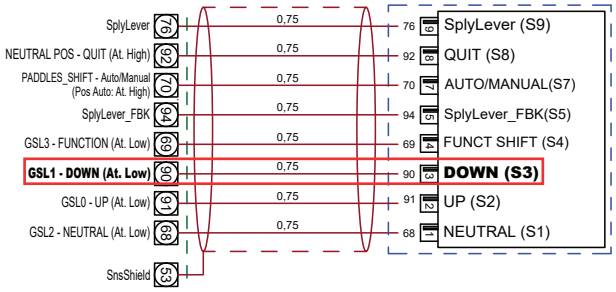
Possible Causes

1/27/16

- Short circuit to supply voltage or open circuit in connection with pin 90.

1/27/17

- Short circuit to GND in connection with pin 90.



Procedure

A *Purpose: Check connectors and harness*

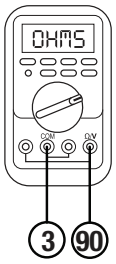
Check the lever and TCU connector:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

B *Purpose: Check the continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Using a multimeter, check for continuity between Pin 3 of the Lever connector and pin 90 of the TCU connector.

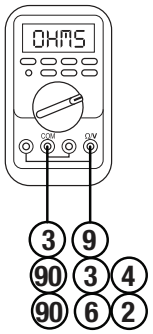


   - If there is no continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

C *Purpose: Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Make sure there is no continuity between pin 2 and pin 9 of the lever connector.



2. Check that there is no continuity between pin 90 with pin 3 or 4 of the TCU connector.
3. Check that there is no continuity between pin 90 with pin 6 or pin 2 of the TCU connector.
   - If there is continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

D

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

E

Purpose: *Check if the problem is in the lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Shift Lever Sensors - NEUTRAL

DTC: 1/24/16 - 1/24/17

Overview

The shift lever sensors detect the command performed by the driver and sends signals to the TCU of the following functions: **UP, DOWN, Neutral, Function** (lever activation signal on the lever) and **Quit** (lever moved to other positions).

Detection

1/24/16 - Sign above the upper limit.

1/24/17 - Signal below the lower limit.

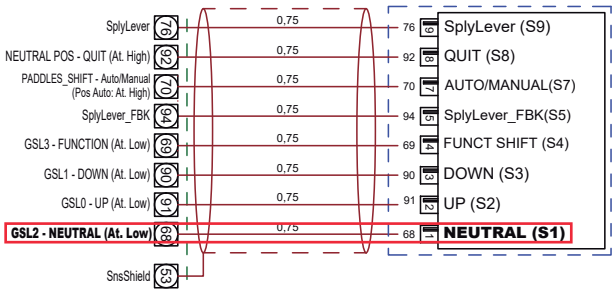
Possible Causes

1/24/16

- Short circuit to supply voltage or open circuit in connection with pin 68.

1/24/17

- Short circuit to GND in connection with pin 68.



Procedure

A *Purpose: Check connectors and harness*

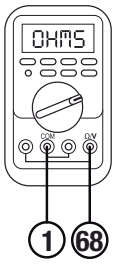
Check the lever and TCU connector:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

B *Purpose: Check the continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Using a multimeter, check for continuity between Pin 1 of the Lever connector and pin 68 of the TCU connector.

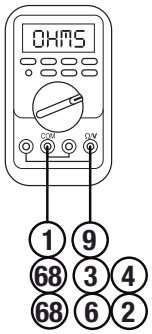


   - If there is no continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

C *Purpose: Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Make sure there is no continuity between pin 1 and pin 9 of the lever connector.



2. Check that there is no continuity between pin68 with pin 3 or 4 of the TCU connector.
3. Check that there is no continuity between pin 68 with pin 6 or pin 2 of the TCU connector.
   - If there is continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

D

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

E

Purpose: *Check if the problem is in the lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Shift Lever Sensors - FUNCTION

DTC: 1/25/16 - 1/25/17

Overview

The shift lever sensors detect the command performed by the driver and sends signals to the TCU of the following functions: **UP, DOWN, Neutral, Function** (lever activation signal on the lever) and **Quit** (lever moved to other positions).

Detection

1/25/16 - Sign above the upper limit.

1/25/17 - Signal below the lower limit.

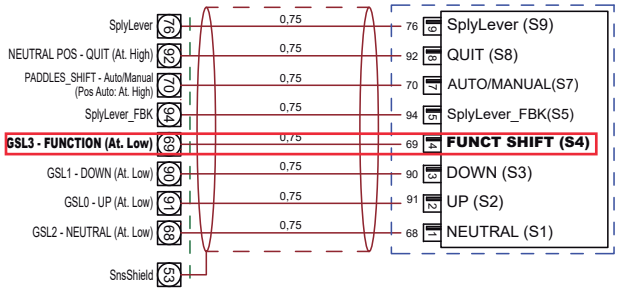
Possible Causes

1/25/16

- Short circuit to supply voltage or open circuit in connection with pin 69.

1/25/17

- Short circuit to GND in connection with pin 69.



Procedure

A *Purpose: Check connectors and harness*

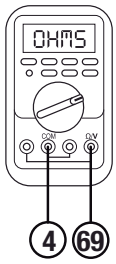
Check the lever and TCU connector:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
    - If there is a fault, replace the harness and go to **Step V.**
    - If the problem is not identified, proceed to the next step.

B *Purpose: Check the continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Using a multimeter, check for continuity between Pin 1 of the Lever connector and pin 68 of the TCU connector.

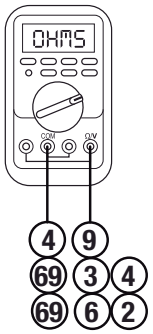


- If there is no continuity, replace the harness and go to **Step V.**
- If the problem is not identified, proceed to the next step.

C *Purpose: Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Make sure there is no continuity between pin 4 and pin 9 of the lever connector.



2. Check that there is no continuity between pin69 with pin 3 or 4 of the TCU connector.
3. Check that there is no continuity between pin 69 with pin 6 or pin 2 of the TCU connector.
    - If there is continuity, replace the harness and go to **Step V.**
    - If the problem is not identified, proceed to the next step.

D

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

E

Purpose: *Check if the problem is in the lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Shift Lever Sensors - QUIT

DTC: 1/28/16 - 1/28/17

Overview

The shift lever sensors detect the command performed by the driver and sends signals to the TCU of the following functions: **UP, DOWN, Neutral, Function** (lever activation signal on the lever) and **Quit** (lever moved to other positions).

Detection

1/28/16 - Sign above the upper limit.

1/28/17 - Signal below the lower limit.

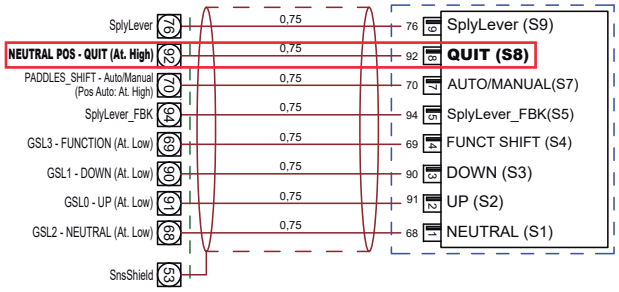
Possible Causes

1/28/16

- Short circuit to supply voltage or open circuit in connection with pin 92.

1/28/17

- Short circuit to GND in connection with pin 92.



Procedure

A *Purpose: Check connectors and harness*

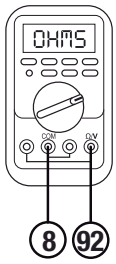
Check the lever and TCU connector:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

B *Purpose: Check the continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Using a multimeter, check for continuity between Pin 8 of the Lever connector and pin 92 of the TCU connector.

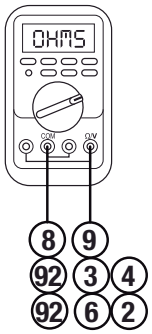


   - If there is no continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

C *Purpose: Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Make sure there is no continuity between pin 8 and pin 9 of the lever connector.



2. Check that there is no continuity between pin92 with pin 3 or 4 of the TCU connector.
3. Check that there is no continuity between pin 92 with pin 6 or pin 2 of the TCU connector.
   - If there is continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

D

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

E

Purpose: *Check if the problem is in the lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Shift Lever Plausibility

DTC: 1/20/12 - 1/20/13

Overview

The shift lever sensors detect the command used by the driver and send signals to the TCU.

In case of failure of these signals or if there is misuse of the Lever a fault is activated.

Detection

1/20/12 - Misuse of the shift lever.

1/20/13 - Invalid shift lever.

Possible Causes

1/20/12

- Misuse of the shift lever.
- Shift lever locked in uneven position.

1/20/13

- Fault on one or more sensors.
- Misuse of the shift lever.

Procedure

A

Purpose: *Inspect lever*

1. Make sure there is nothing hanging or holding the Lever in a way that holds it locked in a position other than the rest position.
   - If there is something locking the lever pull in order to leave it in the rest position and go to **Step V.**
   - If no irregularities are identified, proceed to the next step.

B

Purpose: *Check connectors and harness*

Check the lever and TCU connector:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. check the harness for any broken or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If no irregularities are identified, proceed to the next step.

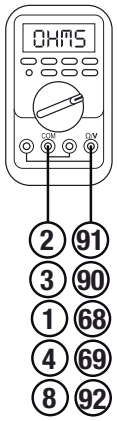
C

Purpose: *Check continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check for continuity between:

1. the pin 2 of the lever connector with the pin 91 of the TCU connector.
2. the pin 3 of the lever connector with the pin 90 of the TCU connector.
3. the pin 1 of the lever connector with the pin 68 of the TCU connector.
4. the pin 4 of the lever connector with the pin 69 of the TCU connector.
5. the pin 8 of the lever connector with the pin 92 of the TCU connector.



- If there is continuity, replace the harness and go to **Step V.**
- If no irregularities are identified, proceed to the next step.

D

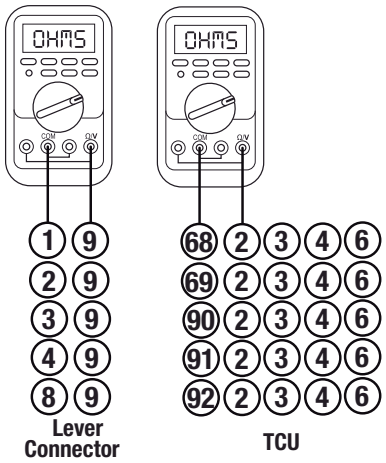
Purpose: *Check short circuits*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Check that there is no continuity between:

1. pin 1 with pin 9 of the lever connector.
2. pin 2 with pin 9 of the lever connector.
3. pin 3 with pin 9 of the lever connector.

4. pin 4 with pin 9 of the lever connector.
5. pin 8 with pin 9 of the lever connector.
6. pin 68 with pin 2, 3, 4, or 6 of the TCU connector.
7. pin 69 with pin 2, 3, 4, or 6 of the TCU connector.
8. pin 90 with pin 2, 3, 4, or 6 of the TCU connector.
9. pin 91 with pin 2, 3, 4, or 6 of the TCU connector.
10. pin 92 with pin 2, 3, 4, or 6 of the TCU connector.



- If there is continuity, replace the harness and go to **Step V.**
- If no irregularities are identified, proceed to the next step

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to V.

F

Purpose: *Check if the problem is in the Lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Shift Lever Power Supply

DTC: 1/32/17

Overview

The power supply of the Shift Lever provides the reference voltage for the Lever sensors, and in case of problems or absence of this power their positions are no longer recognized by the TCU.

Detection

1/32/17 - Battery voltage or sensor signal.

Possible Causes

1/32/17

- Short to GND or to battery voltage or open circuit in sensor signal.

Procedure

A *Purpose: Check connectors and harness*

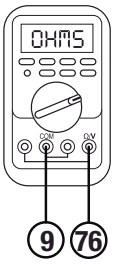
Check the lever and TCU connector:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

B *Purpose: Check the continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

1. Using a multimeter, check for continuity between Pin 8 of the Lever connector and pin 92 of the TCU connector.

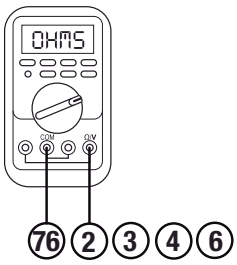


   - If there is no continuity, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

C *Purpose: Verificar curtos circuitos*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Check that there is no continuity between pin 76 with pin 2, 3, 4, or 6 of the TCU connector.



- If there is continuity, replace the harness and go to **Step V.**
- Otherwise go to the next step.

D *Purpose: Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

E

Purpose: *Check if the problem is in the lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Manual/Auto Mode Command

DTC: 1/23/12

Overview

The Auto / Manual mode switch is used to select the gear shift mode from Auto or Manual. In the event of electrical or mechanical defects, a fault may be activated.

Detection

1/23/12 - Electrical or mechanical problems in the selection mode control button.

Possible Causes

1/23/12

- Short circuit to battery
- Short circuit to GND or open circuit
- Closed locked switch, manual / auto command harness damaged, or internal defect in TCU.

Procedure

A *Purpose: Check connectors and harness*

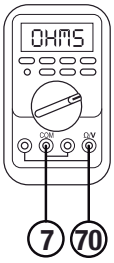
The Mode Control Knob is part of the Lever assembly, so if possible check the lever and TCU connectors:

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

B *Purpose: Check continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Using a multimeter, check for continuity between pin 7 of the lever connector with pin 70 of the TCU connector.

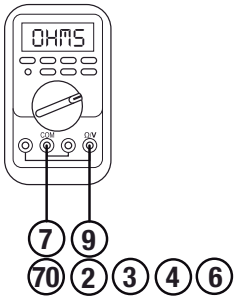


   - If there is continuity, replace the harness and go to **Step V.**
   - If no irregularities are identified, proceed to the next step.

C *Purpose: Check short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

1. Make sure there is no continuity between pin 7 and pin 9 of the lever connector.
2. Check that there is no continuity between pin 70 with pin 2, 3, 4, or 6 of the TCU connector.



   - If there is continuity, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

D

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

E

Purpose: *Check if the problem is in the lever*

1. If with the previous checks the fault is not found, perform a test with the lever of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch Rotation Sensor

DTC: 1/41/21 - 1/41/22 - 1/41/23 - 1/41/24 - 1/41/29

Overview

The clutch rotation speed is detected by means of a Hall effect sensor and a phonic wheel, and the information is sent to the TCU. The clutch rotation sensor is connected to the TCU via the 60-way A connector via two wires (GND and signal feedback).

The TCU continuously diagnoses the signal received from the Hall sensor and, upon detecting a failure to read the clutch rotation, the corresponding fault code will be activated.

Detection

1/41/21 - Signal below the lower limit.

1/41/22 - Sign above the upper limit.

1/41/23 - Incorrect signal: due to discrepancy between crankshaft rotation and clutch rotation.

1/41/24 - Sensor signal with noises: the fault occurs when the TCU detects high peaks in the rotation signal.

1/41/29 - Missing signal: The fault is detected when the TCU reads the clutch rotation equal to zero, always with motor on and clutch engaged.

Possible Causes

1/41/21

- Short circuit to GND.

1/41/22

- Short circuit to power supply.
- Open circuit.

1/41/23

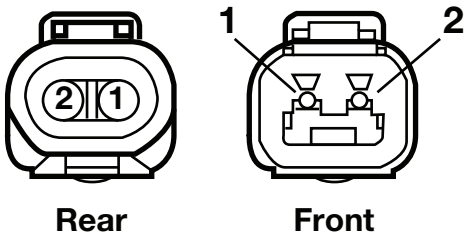
- Electrical fault on the harness or internal sensor defect.

1/41/24

- Sensor with bad contact or problems with the harness.

1/41/29

- Lagged sensor with respect to the teeth.
- Sensor sending incorrect rotation.
- Sensor not sending rotation.



Procedure

A ***Purpose:*** *Check connectors and harness*

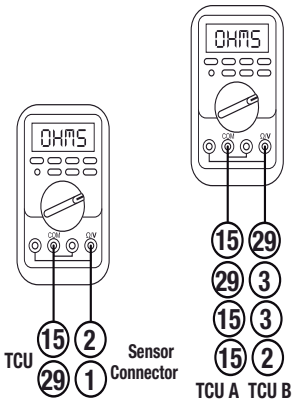
1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

B ***Purpose:*** *Check that there are no problems of continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check **that there is continuity:**

1. between pin 15 of TCU connector A and pin 2 of sensor connector.
2. between pin 29 of TCU connector A and pin 1 of sensor connector.



That **there is no continuity:**

1. between pins 15 and 29 of connector A of the TCU.
2. between pin 29 of connector A of the TCU and pin 3 of connector B of the TCU.
3. between pin15 of connector A of the TCU and pin 3 of connector B of the TCU.
4. between pin 15 of connector A of the TCU and pin 2 of connector B of the TCU.
   - If there is a fault, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check the clutch rotation sensor*

1. Verify that the clutch rotation sensor is correctly installed and is not dislodged or damaged.
   - If a problem is verified, proceed with the correction and go to **Step V.**
   - Otherwise go to the next step.

D ***Purpose:*** *Check the sprocket*

1. Check that it is not damaged, has traces of filings or that the distance between the sensor and the sprocket is not excessive.
   - If a problem is verified, proceed with the correction and go to **Step V.**
   - Otherwise go to the next step.

E

Purpose: *Replacing the Clutch Rotation Sensor*

1. If there is no fault in the sensor installation or in the harness, replace the Clutch Rotation Sensor.
   - After the replacement go to **Step V.**

F

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Vehicle Speed Sensor

DTC: 1/42/21 - 1/42/22

Overview

The vehicle speed is detected by means of a Hall effect sensor and a phonic wheel, which sends the signal to the TCU defining the speed of the vehicle. The vehicle speed sensor is connected to the TCU via the 60-way A connector through two wires (GND and signal feedback).

The TCU continuously diagnoses the signal received from the Hall sensor and, upon detecting a failure to read the vehicle speed, the corresponding fault code will be activated.

Detection

1/42/21 - Signal below the lower limit.

1/42/22 - Sign above the upper limit.

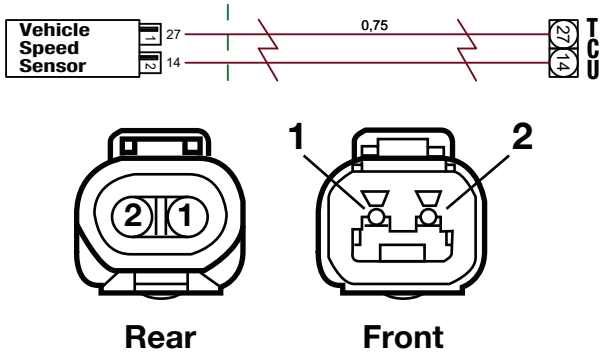
Possible Causes

1/42/21

- Short circuit to GND.

1/42/22

- Short circuit to power supply.
- Open circuit.



Procedure

A

Purpose: *Check connectors and harness*

1. Let there be no bent or broken pins.
2. That there are no open or loose terminals.
3. That no terminal is oxidized or damaged, or with traces of moisture or suspected to have suffered an over current or short circuit.
4. Check the harness for any cracked or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - If the problem is not identified, proceed to the next step.

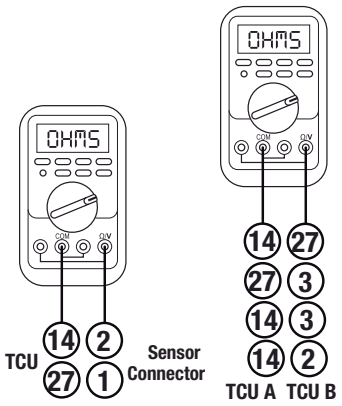
B

Purpose: *Check that there are no problems of continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

That **there is no continuity**:

1. between pin 14 of connector A of the TCU and pin 2 of sensor connector.
2. between pin 27 of connector A of the TCU and pin 1 of sensor connector.



With the aid of a multimeter check that **there is continuity**:

1. between pins 14 and 27 of connector A of the TCU.
2. between pin 27 of connector A of the TCU and pin 3 of connector B of the TCU.
3. between pin 14 of connector A of the TCU and pin 3 of connector B of the TCU.
4. between pin 14 of connector A of the TCU and pin 2 of connector B of the TCU.
   - If there is a fault, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C

Purpose: *Check speed sensor installation*

1. Check that the speed sensor of the vehicle is properly installed and not displaced.
   - If a problem is found, proceed with the correction and go to **Step V.**
   - Otherwise to the next step.

D

Purpose: *Replacing the vehicle speed sensor*

1. If there is no defect in sensor installation or harness, replace the Vehicle Speed Sensor.
   - If a problem is found, proceed with the correction and go to **Step V.**
   - Otherwise go to the next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Speed and Rotation Sensors Plausibility Monitoring

DTC: 1/43/23

Overview

The vehicle speed and the Clutch Rotation are detected by means of Hall sensors and phonic wheel, which send the signal to the TCU defining the speed of the vehicle and the rotation of the clutch. The sensors are connected to the TCU via the 60-way A connector through two wires (GND and signal return).

The TCU continuously diagnoses the coherence of speed monitoring and, upon detecting a fault, the corresponding fault code will be activated.

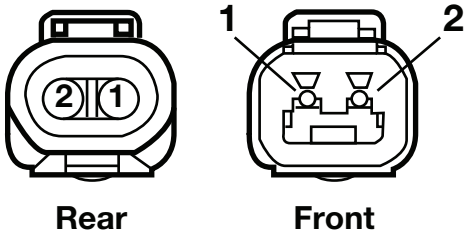
Detection

1/43/23 - Signal monitoring of the clutch speed sensor and vehicle speed sensor.

Possible Causes

1/43/23

- Failure of the clutch rotation sensor or the vehicle speed sensor, and problems with the plausibility between these signals and values of engine speed or rotation of the drive shaft.



Procedure

A *Purpose: Check other fault codes*

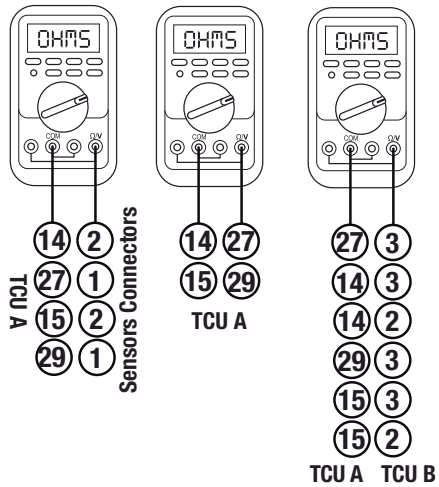
1. With the vehicle diagnostics check for other fault codes, and if there are others, treat them first according to specific procedure.
   - If there is a fault, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

B *Purpose: Check for continuity between circuits*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check that **there is continuity**:

1. between pin 14 of connector A of the TCU and pin 2 of sensor connector.
2. between pin 27 of connector A of the TCU and pin 1 of sensor connector.
3. between pin 15 of connector A of the TCU and pin 2 of sensor connector.
4. between pin 29 of connector A of the TCU and pin 1 of sensor connector.



That **there is no continuity**:

1. between pins 14 and 27 of connector A of the TCU.
2. between pins 15 and 29 of connector A of the TCU.
3. between the pin 27 of the A connector of the TCU and the pin 3 of the connector B of the TCU.
4. between the pin 14 of the A connector of the TCU and the pin 3 of the connector B of the TCU.
5. between the pin 14 of the A connector of the TCU and the pin 2 of the connector B of the TCU.
6. between the pin 29 of the A connector of the TCU and the pin 3 of the connector B of the TCU.
7. between the pin 15 of the A connector of the TCU and the pin 3 of the connector B of the TCU.
8. between the pin 15 of the A connector of the TCU and the pin 2 of the connector B of the TCU.
   - If a malfunction occurs, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C *Purpose: Replace the TCU*

1. If the above checks do not define the defect, replace the TCU (internal defect).
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch Rotation and Vehicle Speed Sensor Power Supply

DTC: 1/40/21 - 1/40/22

Overview

The vehicle speed and the Clutch Rotation are detected by means of Hall sensors, which send the signal to the TCU, defining the speed of the vehicle and the rotation of the clutch.

The TCU continuously diagnoses the supply voltage of the sensors and, upon detecting a fault, the corresponding fault code will be activated.

Detection

1/40/21 - Supply voltage below the lower limit.

1/40/22 - Supply voltage above the upper limit.

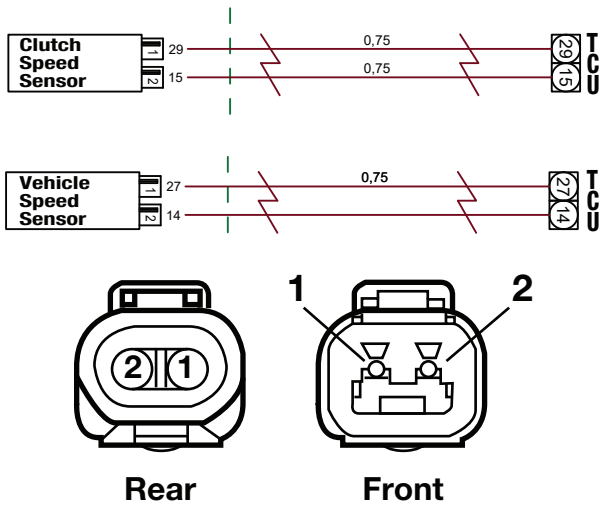
Possible Causes

1/40/21

- System harness compromised
- Sensor power connector with bad contact.
- Short circuit to GND.
- TCU Problems.

1/40/22

- System harness compromised.
- Sensor power connector with bad contact.
- Short circuit to power supply.
- TCU Problems.



Procedure

A ***Purpose:*** *Check connectors and harness*

Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. check the harness for any broken or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

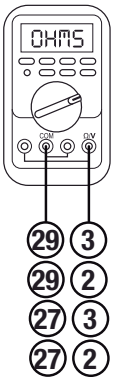
B ***Purpose:*** *Check pending fault codes*

1. Use the diagnostic tool to check for fault codes.
   - If 1/40/21 or 1/40/22 go to **Step C.**

C ***Purpose:*** *Perform a continuity test*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check that there is no continuity:



1. between pin 29 of connector A of the TCU and pin 3 of connector B of the TCU.
2. between pin 29 of connector A of the TCU and pin 2 of connector B of the TCU.
3. between pin 27 of connector A of the TCU and pin 3 of connector B of the TCU.
4. between pin 29 of connector A of the TCU and pin 2 of connector B of the TCU.
   - If continuity is verified in the above test, perform maintenance on the damaged component and go to **Step V.**
   - Otherwise go to the next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Power Mode Switch

DTC: 1/22/12

Overview

The TCU module monitors the Power Mode switch to detect its status and activates a DTC if it has an electrical defect or in the circuit that connecting it to the control unit.

Detection

1/22/12 - Switch jammed.

Possible Causes

1/22/12

- Sign locked as closed due to harness or switch itself.

Procedure

A

Purpose: *Inspect the button*

1. Make sure that the button is working normally, is not jammed, or is operating irregularly.
   - If there are problems with the button replace it with a new one according to the procedures indicated by MBB and go to **Step V.**
   - Otherwise go to the next step.

B

Purpose: *Check connectors and harness*

Check:

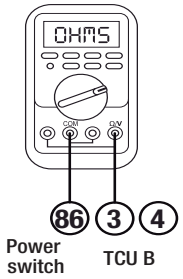
1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. check the harness for any broken or damaged wire.
   - If there is a fault, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C

Purpose: *Check other circuits*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

1. If in the previous checks the problem is not identified, with the button at rest check that there is no continuity between pin 86 and battery positive (pins 4 and 3), connector B of the TCU.



   - If there is continuity, replace the harness and go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Engine Rotation

DTC: 1/07/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect engine rotation message, the fault is activated.

Detection

1/07/08 - Invalid engine rotation signal.

Possible Causes

1/07/08

- The TCU receives an incorrect message or is absent.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Idle Engine Rotation

DTC: 1/14/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a message of the engine idle rotation absent or incorrect, the fault is activated.

Detection

1/14/08 - Invalid CAN Signal.

Possible Causes

1/14/08

- The TCU receives an incorrect message or is absent.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Gas Pedal Position

DTC: 1/05/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect gas pedal position message, fault is activated.

Detection

1/05/08 - Invalid accelerator pedal position signal.

Possible Causes

1/05/08

- The TCU receives an incorrect or an absent message.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Current Engine Torque

DTC: 1/06/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect engine current torque message, the fault is activated.

Detection

1/06/08 - Invalid engine current torque signal.

Possible Causes

1/06/08

- The TCU receives an incorrect or an absent message.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Engine Torque (Requested)

DTC: 1/16/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect (requested) motor torque message, the fault is activated.

Detection

1/16/08 - engine torque signal (requested) invalid.

Possible Causes

1/16/08

- The TCU receives an incorrect message or value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Maximum Engine Torque

DTC: 1/17/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a message of maximum engine torque missing or incorrect, the fault is activated.

Detection

1/17/08 - Invalid motor maximum torque signal.

Possible Causes

1/17/08

- The TCU receives an incorrect message or value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Coolant Temperature

DTC: 1/08/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a message of the coolant temperature missing or incorrect, the fault is activated.

Detection

1/08/08 - Invalid coolant temperature signal.

Possible Causes

1/08/08

- The TCU receives an incorrect message or value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

External Temperature

DTC: 1/09/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect external temperature message, the fault is activated.

Detection

1/09/08 - Invalid external temperature signal.

Possible Causes

1/09/08

- The TCU receives an incorrect message or value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Rear Axle Average Speed

DTC: 1/13/01 - 1/13/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect rear axle average speed message, the fault is activated.

Detection

1/13/01 - Average rear axle speed signal missing or wrong.

1/13/08 - Invalid rear axle average speed CAN signal.

Possible Causes

1/13/01

- Problems with the harness or sensor.

1/13/08

- Signal is invalid or out of its valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Front Axle Average Speed

DTC: 1/11/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect front axle average speed message, the fault is activated.

Detection

1/11/08 - Invalid front axle average speed signal.

Possible Causes

1/11/08

- The TCU receives an incorrect message or the value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then ***go to*** **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, ***go to*** **Step A.**
   - If another fault code appears, ***see ?*****DTC INDEX*? on page IV*.**
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Brake Switch

DTC: 1/03/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect brake switch message, fault is activated.

Detection

1/03/08 - Invalid brake switch signal.

Possible Causes

1/03/08

- The TCU receives an incorrect message or the value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

ASR Active Brake Control

DTC: 1/18/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is missing or incorrect ASR active brake control message, fault is activated.

Detection

1/18/08 - Signal of active brake control ASR is invalid.

Possible Causes

1/18/08

- The TCU receives an incorrect message or the value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

ABS Active Anti Lock Brake System

DTC: 1/19/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is message of active ABS anti-lock brake system missing or incorrect, fault is activated.

Detection

1/19/08 - Signal of anti-lock brake system ABS active invalid.

Possible Causes

1/19/08

- The TCU receives an incorrect message or the value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Kick Down Request

DTC: 1/12/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a missing or incorrect kick down request message, the fault is activated.

Detection

1/12/08 - Invalid kick down request sign.

Possible Causes

1/12/08

- The TCU receives an incorrect message or the value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Atmospheric Pressure

DTC: 1/10/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is a message of atmospheric pressure absent or incorrect, the fault is activated.

Detection

1/10/08 - Invalid atmospheric pressure signal.

Possible Causes

1/10/08

- The TCU receives an incorrect message or the value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Park Brake

DTC: 1/02/08

Overview

The TCU monitors the communication in the CAN bus and evaluates the values of the different messages that travel through the bus. In case there is missing or incorrect parking brake message, fault is activated.

Detection

1/02/08 - Invalid parking brake signal.

Possible Causes

1/02/08

- The TCU receives an incorrect message or the value outside the valid range.

Procedure

A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

CAN Line

DTC: 1/01/06 - 1/01/07

Overview

The TCU monitors the lines on the CAN bus and each of the nodes present in the system to detect internal wiring problems to the modules, and the integrity of the messages on the CAN bus. In case there is a value outside the defined parameters or some fault line CAN it is activated.

Detection

1/01/06 - Loss of CAN bus.

1/01/07 - Internal verification of CAN communication.

Possible Causes

1/01/06

- CAN bus problems.

1/01/07

- Internal TCU failure.

Procedure

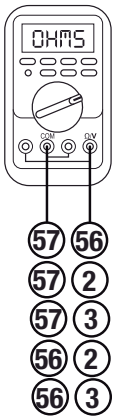
A ***Purpose:*** *Check fault codes present*

1. Use the diagnostic tool to check for fault codes.
   - If 1/01/06 go to **Step B.**
   - If 1/01/07 go to **Step C.**

B ***Purpose:*** *Check other circuits*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between pins 57 and 56 of connector B of the TCU.
2. between pins 57 and 2 of connector B of the TCU.
3. between pins 57 and 3 of connector B of the TCU.
4. between pins 56 and 2 of connector B of the TCU.
5. between pins 56 and 3 of connector B of the TCU.
   - If problem is identified, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

FR CAN Node - CPC Powertrain Control

DTC: 1/01/03

Overview

The TCU monitors the CAN bus and checks the CAN messages on the system from the powertrain node or control module. In case there is a missing message ID, or an inconsistent message length, the system shows this defect.

Detection

1/01/03 - Missing message ID or inconsistent message length.

Possible Causes

1/01/03

- Module inactive on the CAN network
- Sending message with wrong data length codes

Procedure

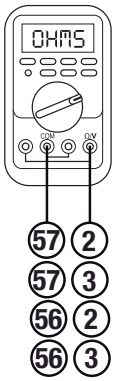
A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between pins 57 and 2 of connector B of the TCU.
2. between pins 57 and 3 of connector B of the TCU.
3. between pins 56 and 2 of connector B of the TCU.
4. between pins 56 and 3 of connector B of the TCU.
   - If problem is identified, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

BS CAN Node - ABS Brake System

DTC: 1/01/01

Overview

The TCU monitors the CAN bus and checks the CAN messages on the system from the ABS control node or module. In case there is a missing message ID, or an inconsistent message length, the system has this defect.

Detection

1/01/01 - Missing message ID or inconsistent message length.

Possible Causes

1/01/01

- Module inactive on the CAN network
- Sending message with wrong data length codes

Procedure

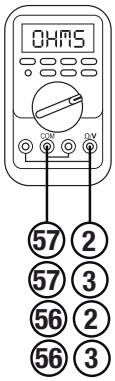
A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between pins 57 and 2 of connector B of the TCU.
2. between pins 57 and 3 of connector B of the TCU.
3. between pins 56 and 2 of connector B of the TCU.
4. between pins 56 and 3 of connector B of the TCU.
   - If problem is identified, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

MR CAN Node - ECM (engine) Control

DTC: 1/01/02

Overview

The TCU monitors the CAN bus and checks the CAN messages in the system from the node or engine control module. In case there is a missing message ID, or an inconsistent message length, the system has this defect.

Detection

1/01/02 - Missing message ID or ECM message length less than expected.

Possible Causes

1/01/02

- Module inactive on the CAN network
- Module is sending message with wrong length codes

Procedure

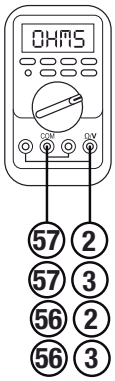
A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between pins 57 and 2 of connector B of the TCU.
2. between pins 57 and 3 of connector B of the TCU.
3. between pins 56 and 2 of connector B of the TCU.
4. between pins 56 and 3 of connector B of the TCU.
   - If problem is identified, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

PSM CAN Node - Programmable Special Module (for Power Take Offs)

DTC: 1/01/04

Overview

The TCU monitors the CAN bus and checks the CAN messages on the system from the PSM node or control module. In case there is a missing message ID, or an inconsistent message length, the system has this defect.

Detection

1/01/04 - Missing message ID or inconsistent message length.

Possible Causes

1/01/04

- Module inactive on the CAN network
- Module is sending message with wrong length codes

Procedure

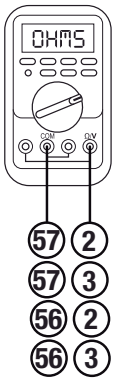
A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between pins 57 and 2 of connector B of the TCU.
2. between pins 57 and 3 of connector B of the TCU.
3. between pins 56 and 2 of connector B of the TCU.
4. between pins 56 and 3 of connector B of the TCU.
   - If problem is identified, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Message 450 - (ABS System)

DTC: 1/05/03

Overview

The TCU monitors the CAN bus and checks the CAN messages on the system. In case there is a missing message ID, the system has this defect.

Detection

1/05/03 - Missing message ID.

Possible Causes

1/05/03

- Missing message on CAN network

Procedure

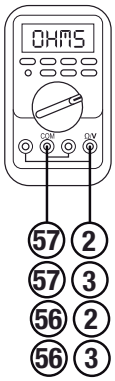
A ***Purpose:*** *Check other modules*

1. With the help of the Diagnostics tool, check if there are no faults present in other modules that communicate with the TCU.
   - If fault occurs, perform maintenance according to the procedure in the specific manual for the module that has the fault.
   - If the problem is not identified or if the problem persists, go to the next step.

B ***Purpose:*** *Check for short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between pins 57 and 2 of connector B of the TCU.
2. between pins 57 and 3 of connector B of the TCU.
3. between pins 56 and 2 of connector B of the TCU.
4. between pins 56 and 3 of connector B of the TCU.
   - If problem is identified, replace the harness and go to **Step V.**
   - Otherwise go to the next step.

C ***Purpose:*** *Check if the problem is not in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch Electrovalve EVØ

DTC: 2/50/20 - 2/50/30 - 2/50/31 - 2/50/32 - 2/50/33 - 2/50/34 - 2/50/35

Overview

The TCU monitors the output circuits of the different actuators to check if there is any electrical problem in the system. In this case the monitored circuits correspond to the command of the EV0 clutch flow proportional electrovalve used to operate the hydraulic circuit, which in turn couples or disengages the clutch, and upon detecting something inappropriate the corresponding fault code will be activated.

Detection

2/50/20 - Open circuit fault.

2/50/30 - Short circuit fault to the GND on the high side.

2/50/31 - Short circuit fault to power supply on the high side.

2/50/32 - Short circuit fault to the GND on the low side.

2/50/33 - Short circuit fault to power supply on the low side.

2/50/34 - Short circuit fault between low and high sides.

2/50/35 - Generic error, failure not recognized.

Possible Causes

2/50/20

- Open circuit on the low side of the solenoid valve
- Open circuit on the high side of the solenoid valve

2/50/30

- Short circuit to GND on the high side.

2/50/31

- Short circuit to power supply on the high side.

2/50/32

- Short circuit to GND on the low side.

2/50/33

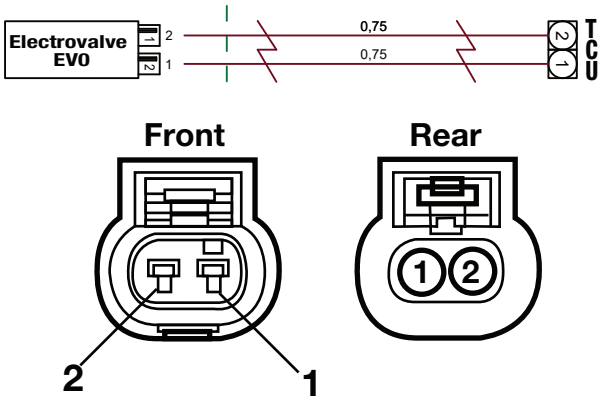
- Short circuit to power supply on the low side.

2/50/34

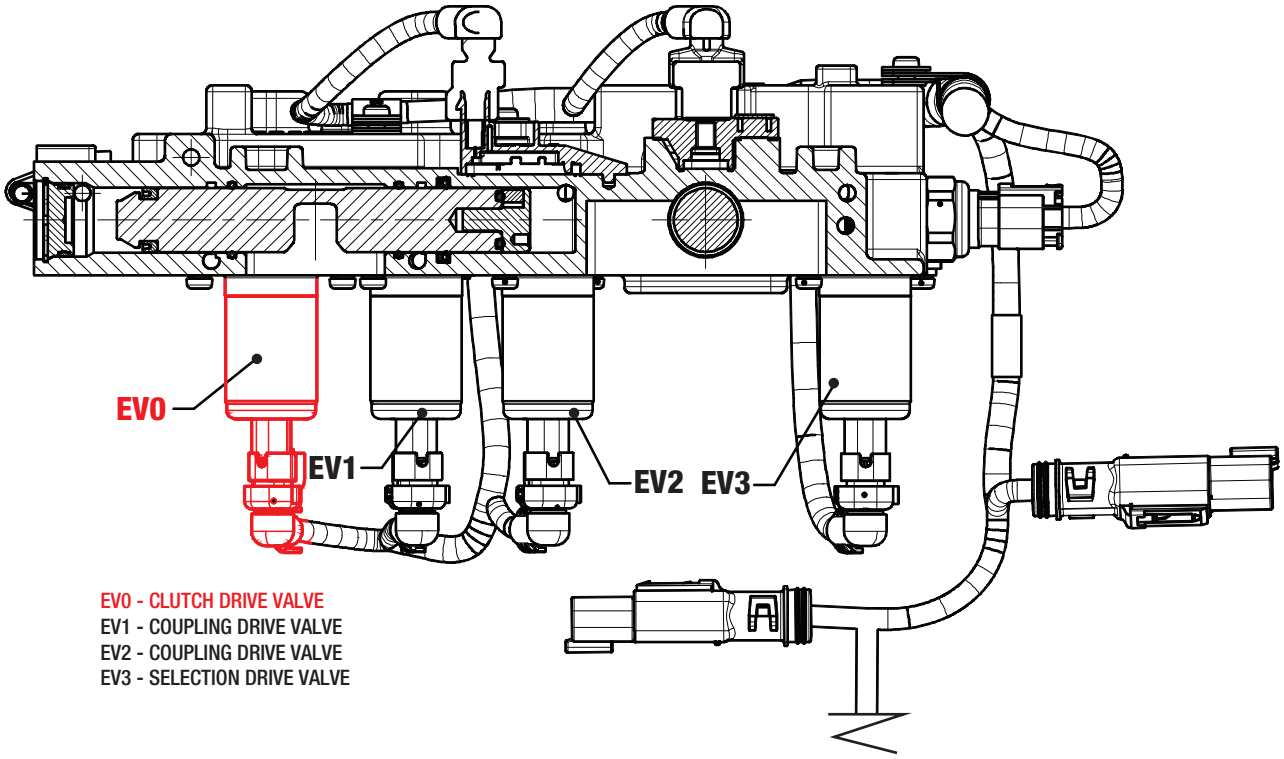
- Short circuit between the low and high sides of the solenoid valve.

2/50/35

- The TCU module detects that the solenoid valve is not working properly, but the reason has not yet been determined.



Component Identification



EV0 - CLUTCH DRIVE VALVE
EV1 - COUPLING DRIVE VALVE
EV2 - COUPLING DRIVE VALVE
EV3 - SELECTION DRIVE VALVE

Procedure

A ***Purpose:*** *Check connectors and harness*

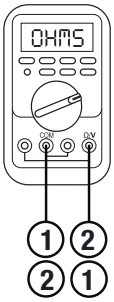
Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. that there is no broken or damaged wire in the harness.
   - If an irregularity is verified carry out the change of the harness and go to **Step V.**
   - Otherwise go to the next step.

B ***Purpose:*** *Check that there are no problems of continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With a multimeter check for continuity.

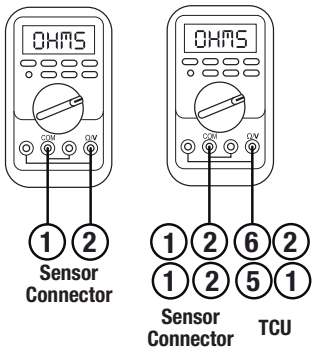


1. between pin 1 of the TCU connector and pin 2 of the solenoid valve connector.
2. between pin 2 of the TCU connector and pin 1 of the solenoid valve connector.
   - If continuity problems are verified, perform the harness change and go to **Step V.**
   - Otherwise go to the next step

C ***Purpose:*** *Check that there is not short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check that there is no continuity



1. between pins 1 and 2 of the sensor connector.
2. between pins 1 or 2 of the sensor connector with pins 6 or 2 of the TCU (GND) connector.
3. between pins 1 or 2 of the sensor connector with pins 5 or 1 of the TCU connector (Vbat).
   - If it is verified that continuity exists in the above test, perform the harness change and go to **Step V.**
   - Otherwise go to the next step.

D

Purpose: *Check the electrovalve solenoid*

With the aid of a multimeter check that the solenoid

1. is not with the circuit open (infinite resistance between terminals 1 and 2).
2. not in short circuit (close to zero resistance between terminals 1 and 2).
3. not in short circuit to the positive of the battery (voltage around 24V between terminals 1 and 2 and GND).
4. is not in short circuit with GND (resistance close to zero between any of terminals 1 or 2 and GND).
   - If there is any problem, replace the solenoid valve and go to **Step V.**
   - Otherwise go to the next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Coupling Electrovalve EV1

DTC: 1/51/20 - 1/51/30 - 1/51/31 - 1/51/32 - 1/51/33 - 1/51/34 - 1/51/35

Overview

The TCU monitors the output circuits of the different actuators to check if there is any electrical problem in the system. In this case the monitored circuits correspond to the command of the proportional coupling electrovalve EV1, used to operate the hydraulic circuit, which provides pressure for engaging the gears 1, 3 and 5 and when detecting an inappropriate signal voltage level the corresponding fault code will be activated.

Detection

1/51/20 - Open circuit fault

1/51/30 - Short circuit fault to the GND on the high side.

1/51/31 - Short circuit fault to power supply on the high side.

1/51/32 - Short circuit fault to the GND on the low side.

1/51/33 - Short circuit fault to power supply on the low side.

1/51/34 - Short circuit fault between low and high sides.

1/51/35 - Generic error, failure not recognized.

Possible Causes

1/51/20

- Open circuit on the low side of the solenoid valve
- Open circuit on the high side of the solenoid valve

1/51/30

- Short circuit to GND on the high side.

1/51/31

- Short circuit to power supply on the high side.

1/51/32

- Short circuit to GND on the low side.

1/51/33

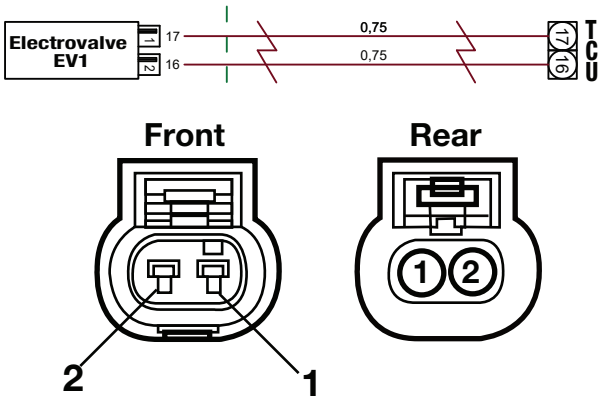
- Short circuit to power supply on the low side.

1/51/34

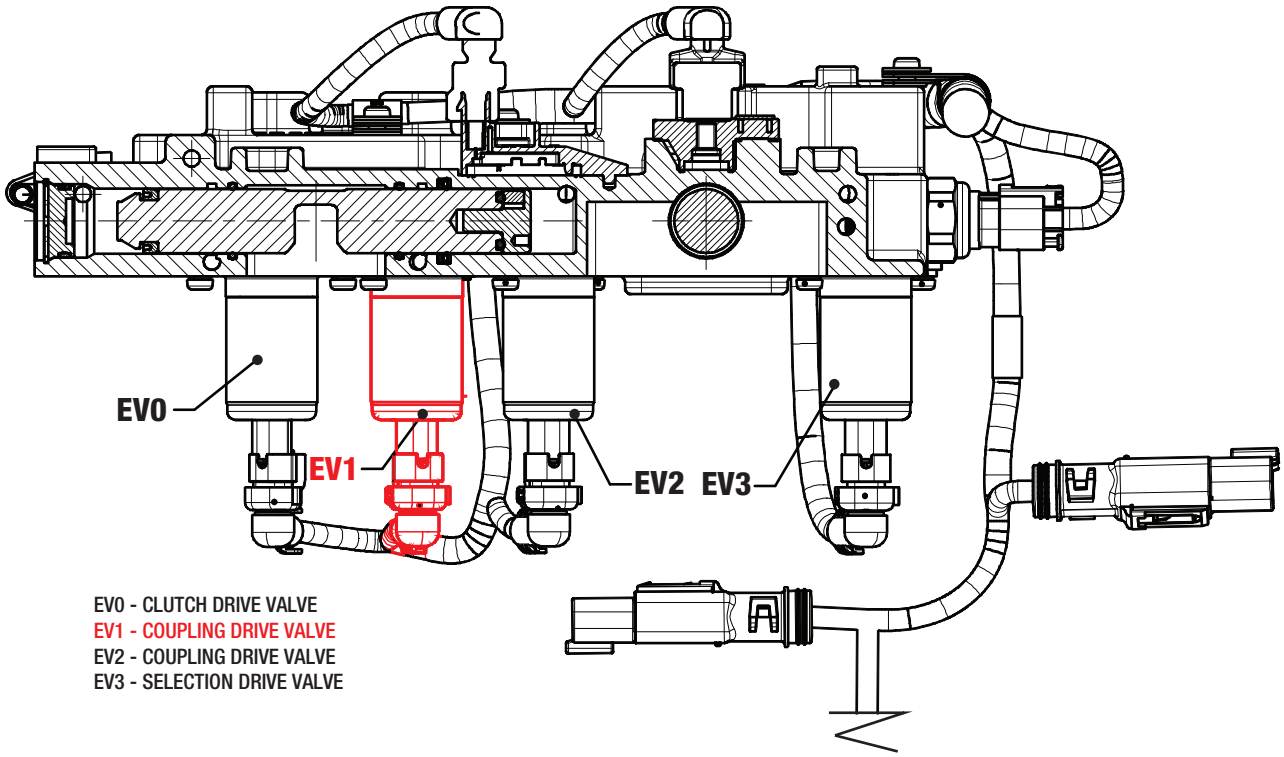
- Short circuit between the low and high sides of the solenoid valve.

1/51/35

- The TCU module detects that the solenoid valve is not working properly, but the reason has not yet been determined.



Component Identification



EV0 - CLUTCH DRIVE VALVE
EV1 - COUPLING DRIVE VALVE
EV2 - COUPLING DRIVE VALVE
EV3 - SELECTION DRIVE VALVE

Procedure

A ***Purpose:*** *Check connectors and harness*

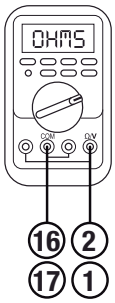
Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. that there is no broken or damaged wire in the harness.
   - If an irregularity is verified carry out the change of the harness and go to **Step V.**
   - Otherwise go to the next step.

B ***Purpose:*** *Check that there are no problems of continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With a multimeter check for continuity.

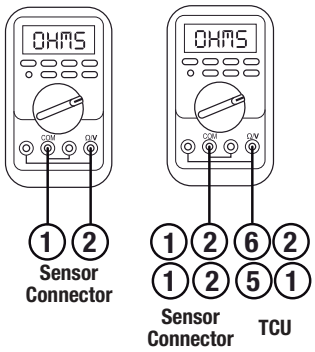


1. between pin 16 of the TCU connector and pin 2 of the solenoid valve connector.
2. between pin 17 of the TCU connector and pin 1 of the solenoid valve connector.
   - If continuity problems are verified, perform the harness change and go to **Step V.**
   - Otherwise go to the next step

C ***Purpose:*** *Check that there is not short circuits*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check that there is no continuity



1. between pins 1 and 2 of the sensor connector.
2. between pins 1 or 2 of the sensor connector with pins 6 or 2 of the TCU (GND) connector.
3. between pins 1 or 2 of the sensor connector with pins 5 or 1 of the TCU connector (Vbat).
   - If it is verified that continuity exists in the above test, perform the harness change and go to **Step V.**
   - Otherwise go to the next step.

D

Purpose: *Check the electrovalve solenoid*

With the aid of a multimeter check that the solenoid

1. is not with the circuit open (infinite resistance between terminals 1 and 2).
2. not in short circuit (close to zero resistance between terminals 1 and 2).
3. not in short circuit to the positive of the battery (voltage around 24V between terminals 1 and 2 and GND).
4. is not in short circuit with GND (resistance close to zero between any of terminals 1 or 2 and GND).
   - If there is any problem, replace the solenoid valve and go to **Step V.**
   - Otherwise go to the next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Coupling Electrovalve EV2

DTC: 1/52/20 - 1/52/30 - 1/52/31 - 1/52/32 - 1/52/33 - 1/52/34 - 1/52/35

Overview

The TCU monitors the output circuits of the different actuators to check if there is any electrical problem in the system. In this case, the monitored circuits correspond to the control of the proportional electrovalve of the coupling EV2, used to operate the hydraulic circuit, which provides pressure to engage the R, 2, 4 and 6 gears and to detect an inappropriate signal voltage level the code corresponding fault will be activated.

Detection

1/52/20 - Open circuit fault

1/52/30 - Short circuit fault to the GND on the high side.

1/52/31 - Short circuit fault to power supply on the high side.

1/52/32 - Short circuit fault to the GND on the low side.

1/52/33 - Short circuit fault to power supply on the low side.

1/52/34 - Short circuit fault between low and high sides.

1/52/35 - Generic error, failure not recognized.

Possible Causes

1/52/20

- Open circuit on the low side of the solenoid valve
- Open circuit on the high side of the solenoid valve

1/52/30

- Short circuit to GND on the high side.

1/52/31

- Short circuit to power supply on the high side.

1/52/32

- Short circuit to GND on the low side.

1/52/33

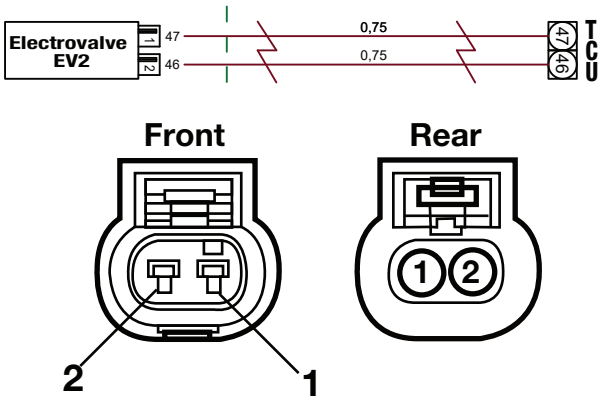
- Short circuit to power supply on the low side.

1/52/34

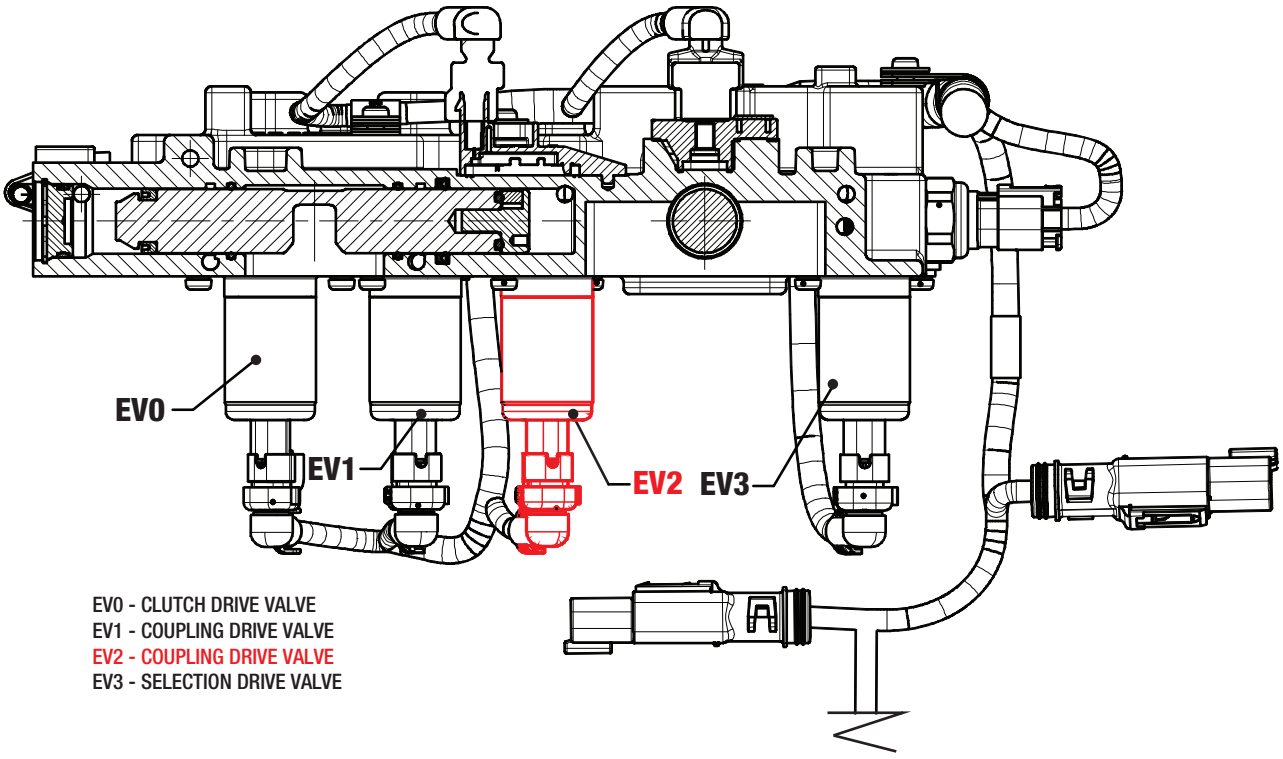
- Short circuit between the low and high sides of the solenoid valve.

1/52/35

- The TCU module detects that the solenoid valve is not working properly, but the reason has not yet been determined.



Component Identification



EV0 - CLUTCH DRIVE VALVE
EV1 - COUPLING DRIVE VALVE
EV2 - COUPLING DRIVE VALVE
EV3 - SELECTION DRIVE VALVE

Procedure

A ***Purpose:*** *Check connectors and harness*

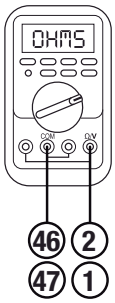
Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. that there is no broken or damaged wire in the harness.
   - If an irregularity is verified carry out the change of the harness and go to **Step V.**
   - Otherwise go to the next step.

B ***Purpose:*** *Check that there are no problems of continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With a multimeter check for continuity.

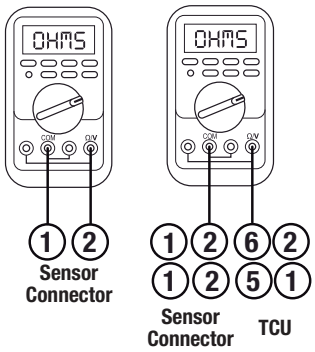


1. between pin 46 of the TCU connector and pin 2 of the solenoid valve connector.
2. between pin 47 of the TCU connector and pin 1 of the solenoid valve connector.
   - If continuity problems are verified, perform the harness change and go to **Step V.**
   - Otherwise go to the next step

C ***Purpose:*** *Check that there is not short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check that there is no continuity



1. between pins 1 and 2 of the sensor connector.
2. between pins 1 or 2 of the sensor connector with pins 6 or 2 of the TCU (GND) connector.
3. between pins 1 or 2 of the sensor connector with pins 5 or 1 of the TCU connector (Vbat).
   - If it is verified that continuity exists in the above test, perform the harness change and go to **Step V.**.
   - Otherwise go to the next step.

D

Purpose: *Check the electrovalve solenoid*

With the aid of a multimeter check that the solenoid

1. is not with the circuit open (infinite resistance between terminals 1 and 2).
2. not in short circuit (close to zero resistance between terminals 1 and 2).
3. not in short circuit to the positive of the battery (voltage around 24V between terminals 1 and 2 and GND).
4. is not in short circuit with GND (resistance close to zero between any of terminals 1 or 2 and GND).
   - If there is any problem, replace the solenoid valve and go to **Step V.**
   - Otherwise go to the next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Selection Electrovalve EV3

DTC: 1/53/20 - 1/53/30 - 1/53/31 - 1/53/32 - 1/53/33 - 1/53/34 - 1/53/35

Overview

The TCU monitors the output circuits of the different actuators to check if there is any electrical problem in the system. In this case, the monitored circuits correspond to the control of the proportional electrovalve EV3, used to operate the hydraulic circuit, which provides pressure for engaging the Reverse, 1/2, 3/4 and 5/6 gears and detecting a level of the corresponding fault code will be activated.

Detection

1/53/20 - Open circuit fault

1/53/30 - Short circuit fault to the GND on the high side.

1/53/31 - Short circuit fault to power supply on the high side.

1/53/32 - Short circuit fault to the GND on the low side.

1/53/33 - Short circuit fault to power supply on the low side.

1/53/34 - Short circuit fault between low and high sides.

1/53/35 - Generic error, failure not recognized.

Possible Causes

1/53/20

- Open circuit on the low side of the solenoid valve
- Open circuit on the high side of the solenoid valve

1/53/30

- Short circuit to GND on the high side.

1/53/31

- Short circuit to power supply on the high side.

1/53/32

- Short circuit to GND on the low side.

1/53/33

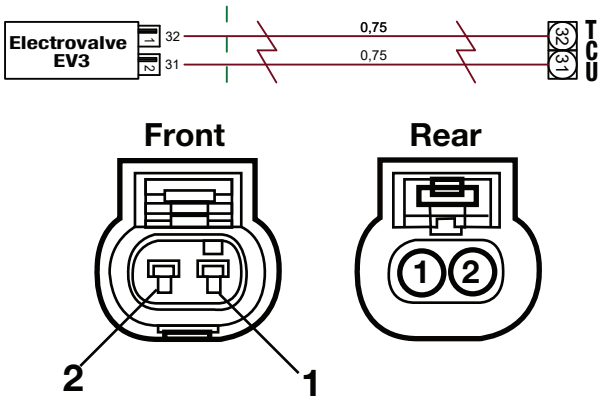
- Short circuit to power supply on the low side.

1/53/34

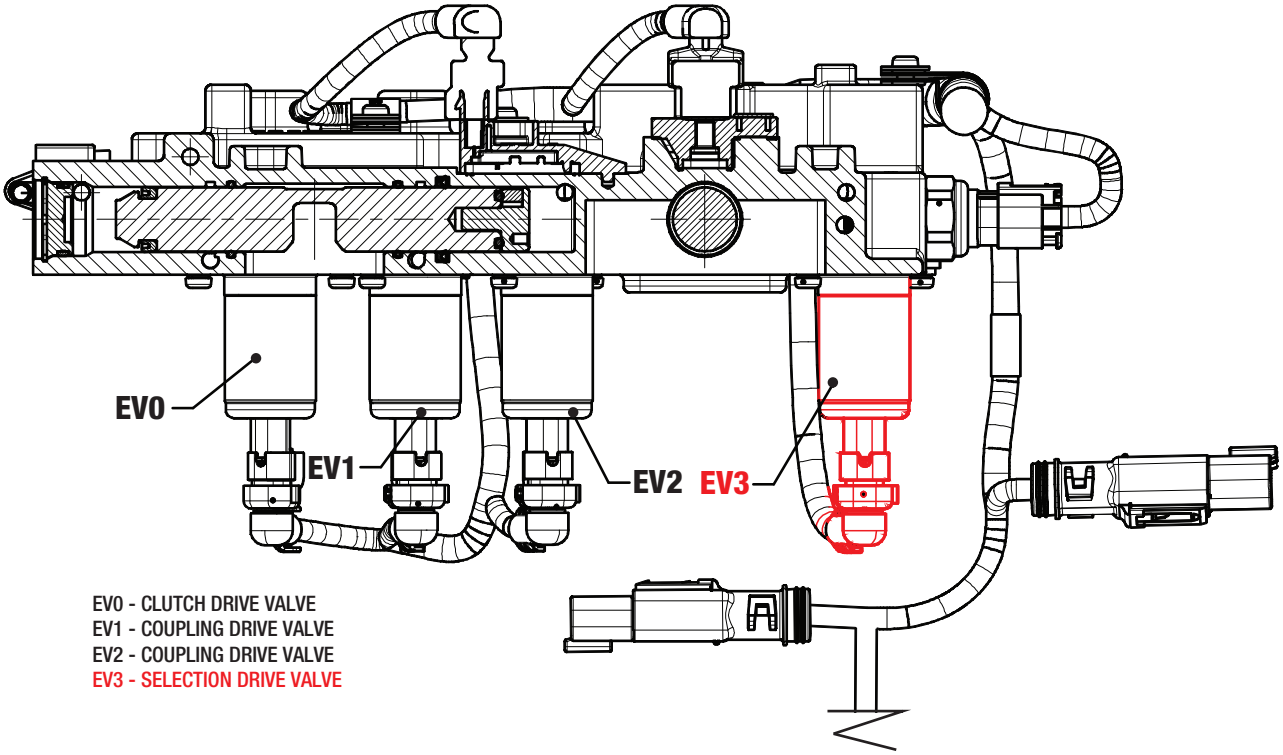
- Short circuit between the low and high sides of the solenoid valve.

1/53/35

- The TCU module detects that the solenoid valve is not working properly, but the reason has not yet been determined.



Component Identification



EV0 - CLUTCH DRIVE VALVE
EV1 - COUPLING DRIVE VALVE
EV2 - COUPLING DRIVE VALVE
EV3 - SELECTION DRIVE VALVE

Procedure

A ***Purpose:*** *Check connectors and harness*

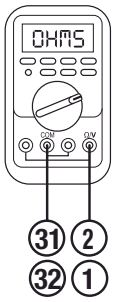
Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. that there is no broken or damaged wire in the harness.
   - If an irregularity is verified carry out the change of the harness and go to **Step V.**
   - Otherwise go to the next step.

B ***Purpose:*** *Check that there are no problems of continuity*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With a multimeter check for continuity.

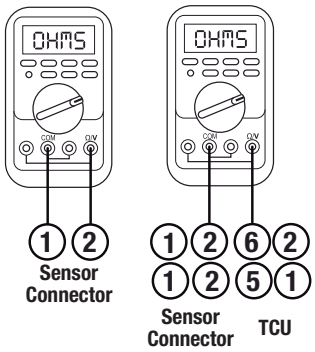


1. between pin 31 of the TCU connector and pin 2 of the solenoid valve connector.
2. between pin 432 of the TCU connector and pin 1 of the solenoid valve connector.
   - If continuity problems are verified, perform the harness change and go to **Step V.**
   - Otherwise go to the next step

C ***Purpose:*** *Check that there is not short circuits*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check that there is no continuity



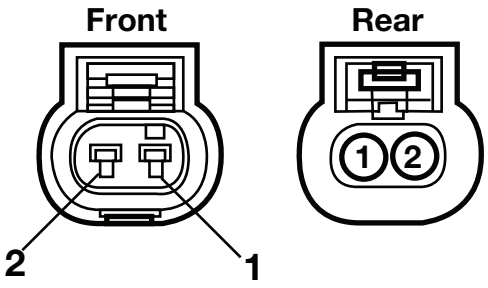
1. between pins 1 and 2 of the sensor connector.
2. between pins 1 or 2 of the sensor connector with pins 6 or 2 of the TCU (GND) connector.
3. between pins 1 or 2 of the sensor connector with pins 5 or 1 of the TCU connector (Vbat).
   - If it is verified that continuity exists in the above test, perform the harness change and go to **Step V.**
   - Otherwise go to the next step.

D

Purpose: *Check the electrovalve solenoid*

With the aid of a multimeter check that the solenoid

1. is not with the circuit open (infinite resistance between terminals 1 and 2).
2. not in short circuit (close to zero resistance between terminals 1 and 2).
3. not in short circuit to the positive of the battery (voltage around 24V between terminals 1 and 2 and GND).
4. is not in short circuit with GND (resistance close to zero between any of terminals 1 or 2 and GND).



- If there is any problem, replace the solenoid valve and go to **Step V.**
- Otherwise go to the next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Hydraulic Pump Motor

DTC: 1/54/36 - 1/54/37 - 1/54/38 - 1/54/39 - 1/54/40 - 1/54/41 - 1/54/42 - 1/54/43 - 1/54/44 - 1/54/45 - 1/66/20 - 1/67/20 - 1/68/20

Overview

The TCU monitors the output circuits of each of the different actuators to check for any electrical problems in the system. In this case the monitored circuits correspond to the three phases of the brushless DC motor that acts on the system pressure pump.

The TCU performs continuous circuit diagnostics and, upon detecting an inadequate signal voltage level, the corresponding fault code will be activated.

Detection

1/54/36 - U-phase error in the high-side circuit.

1/54/37 - V-phase error in the high-side circuit.

1/54/38 - W-phase error in the high-side circuit.

1/54/39 - Error in phase W in the high-side circuit.

1/54/40 - Error in phase V in the high-side circuit.

1/54/41 - Error in W phase in the low-side circuit.

1/54/42 - U phase signal overload.

1/54/43 - V phase signal overload.

1/54/44 - W phase signal overload

1/54/45 - Hydraulic pump locked.

1/66/20 - Open circuit in phase U.

1/67/20 - Open circuit in phase V.

1/68/20 - Open circuit in phase W.

Possible Causes

1/54/36

- Electric circuit defect (high side) of the phase U.

1/54/37

- Electric circuit defect (high side) of the phase V.

1/54/38

- Electric circuit defect (high side) of the phase W.

1/54/39

- Electric circuit defect (low side) of the phase U.

1/54/40

- Electric circuit defect (low side) of the phase V.

1/54/41

- Electric circuit defect (low side) of the phase W.

1/54/42

- U phase signal overload, caused by a low resistance in phase or one of the circuits up to phase.

1/54/43

- V phase signal overload, caused by a low resistance in phase or one of the circuits up to phase.

1/54/44

- W phase signal overload, caused by a low resistance in phase or one of the circuits up to phase.

1/54/45

- Mechanical blocking of the pump, caused by the electric motor shaft locking, resulting in a strong increase of the current in all phases.

1/66/20

- Open circuit on the low or high side of the U-phase or U-phase of the motor or the connector (motor side or TCU side).

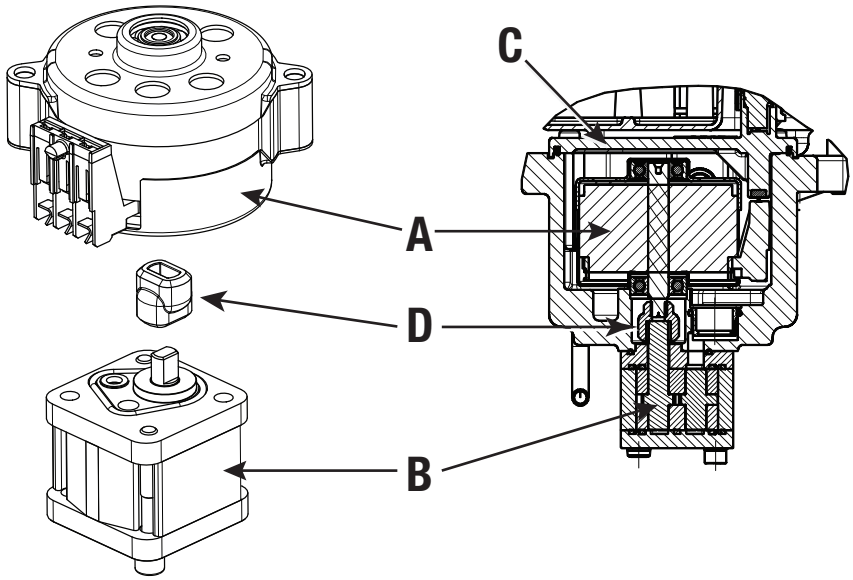
1/67/20

- Open circuit on the low or high side of the V-phase or V-phase of the motor or the connector (motor side or TCU side).

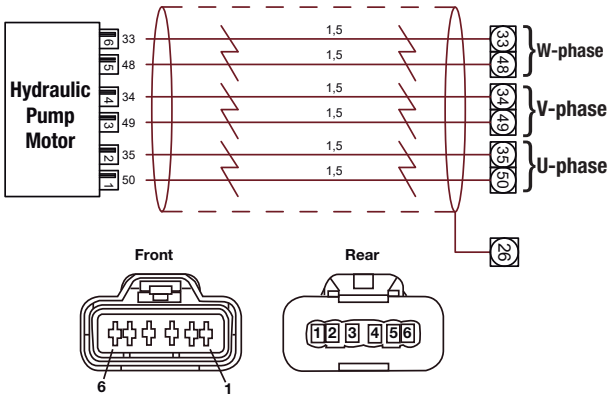
1/68/20

- Open circuit on the low or high side of the W-phase or W-phase of the motor or the connector (motor side or TCU side).

Component Identification



A.Electric Motor
B.Hydraulic Pump
C.Oil Reservoir Cap
D.Plastic Coupling Bushing



Procedure

A ***Purpose:*** *Check connectors and harness*

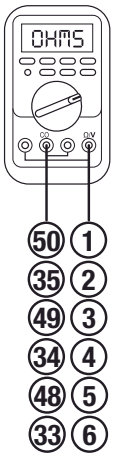
Check:

5. that there are no bent or broken pins.
6. that there are no open or loose terminals.
7. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
8. that there is no broken or damaged wire in the harness.
    - If an irregularity is verified carry out the change of the harness and go to **Step V.**
    - Otherwise go to the next step.

B ***Purpose:*** *Check that there are no problems of continuity*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With a multimeter check for continuity.

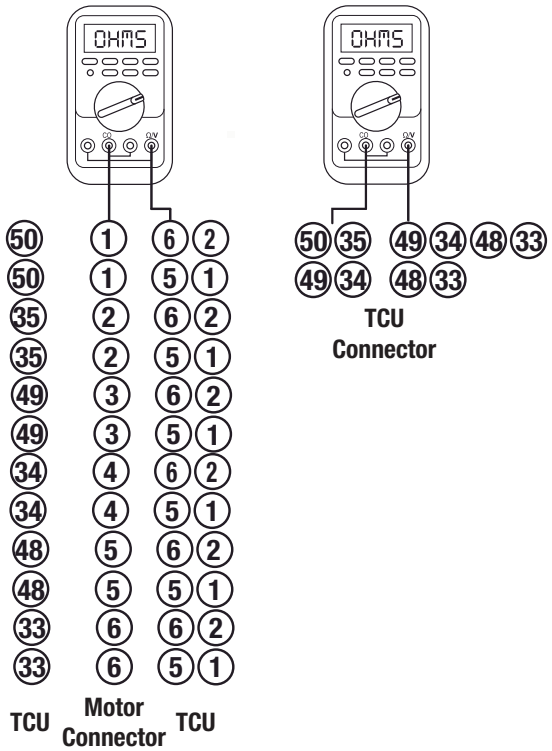


1. between pin 50 of the TCU connector and terminal 1 of the motor connector.
2. between pin 35 of the TCU connector and terminal 2 of the motor connector.
3. between pin 49 of the TCU connector and terminal 3 of the motor connector.
4. between pin 34 of the TCU connector and terminal 4 of the motor connector.
5. between pin 48 of the TCU connector and terminal 5 of the motor connector.
6. between pin 33 of the TCU connector and terminal 3 of the motor connector.
    - If continuity problems are verified, perform the harness change and go to **Step V.**
    - Otherwise go to next step

C ***Purpose:*** *Check that there is not short circuits*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check that there is no continuity



1. between terminal 50 of the TCU connector or terminal 1 of the motor connector (U-phase) and terminal 6 or 2 of the TCU connector.
2. between terminal 50 of the TCU connector or terminal 1 of the motor connector (U-phase) and terminal 5 or 1 of the TCU connector.
3. between terminal 35 of the TCU connector or terminal 2 of the motor connector (U-phase) and terminal 6 or 2 of the TCU connector.
4. between terminal 35 of the TCU connector or terminal 2 of the motor connector (U-phase) and terminal 5 or 1 of the TCU connector.
5. between terminal 49 of the TCU connector or terminal 3 of the motor connector (phase V) and terminal 6 or 2 of the TCU connector.
6. between terminal 49 of the TCU connector or terminal 3 of the motor connector (phase V) and terminal 5 or 1 of the TCU connector.
7. between terminal 34 of the TCU connector or terminal 4 of the motor connector (phase V) and terminal 6 or 2 of the TCU connector.
8. between terminal 34 of the TCU connector or terminal 4 of the motor connector (phase V) and terminal 5 or 1 of the TCU connector.
9. between terminal 48 of the TCU connector or terminal 5 of the motor connector (phase W) and terminal 6 or 2 of the TCU connector.
10. between terminal 48 of the TCU connector or terminal 5 of the motor connector (phase W) and terminal 5 or 1 of the TCU connector.
11. between terminal 33 of the TCU connector or terminal 6 of the motor connector (phase W) and terminal 6 or 2 of the TCU connector.
12. between terminal 33 of the TCU connector or terminal 6of the motor connector (phase W) and terminal 5 or 1 of the TCU connector.
13. between the terminal 50 or 35 and the terminal 49, 34, 48 or 33 of the TCU connector.
14. between the terminal 49 or 34 and the terminal 48 or 33 of the TCU connector.

- If continuity problems are verified, perform the harness change and go to **Step V.**
- Otherwise go to next step

D ***Purpose:*** *Check that the motor coils are not totally or partially in short circuit*

1. It does not have a low resistance between terminals 1 and 2 of the motor connector (U-phase totally or partially in short circuit).
2. It does not have a low resistance between terminals 3 and 4 of the motor connector V-phase totally or partially in short circuit).
3. Do not have a low resistance between terminals 5 and 6 of the motor connector (W-phase totally or partially in short circuit).

- If there is any problem, replace the solenoid valve and go to **Step V.**
- Otherwise go to next step.

E

Purpose: *Check for mechanical problems*

1. Check that there are no mechanical blockages or friction in the rotation of the electric pump.
   - If any, replace the faulty element.

F

Purpose: *Check if the problem is in the TCU*

1. If with the previous procedures the problem is not identified and solved, perform a test if possible, changing the TCU to another one of a vehicle of the same model and configuration.
   - After the replacement go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch

DTC: 1/60/51 - 1/60/52 - 1/60/53 - 1/60/54 - 2/60/50 - 2/60/55

Overview

The TCU monitors the variables and values of the system through the data received from the sensors, to detect mechanical or hydraulic failures of the components that form the exchange system. This defect occurs if there is a problem with the clutch.

Detection

1/60/51 - Coupling clutch during gear shift.

1/60/52 - Overheating of the clutch.

1/60/53 - Clutch locked open.

1/60/54 - Clutch slipping

2/60/50 - Clutch does not disengage prior to shifting.

2/60/55 - Clutch control.

Possible Causes

1/60/51

Damage to clutch / actuator / valve:

- Clutch valve jammed
- Clutch actuator jammed
- Oil leak in clutch actuator
- Clutch diaphragm stuck
- Clutch Position Sensor Magnet Off

1/60/52

- Slipping clutch over a long period

1/60/53

Clutch disengaged locked due to hydraulic or mechanical damage:

- Contamination of the clutch valve
- Inside clutch movement locked
- Clutch Actuator Locked
- Clutch sensor failure (signal locked within range)

1/60/54

Clutch or sensor problem

2/60/50

Damage to clutch / actuator / valve:

- Clutch Valve Locked
- Clutch Actuator Locked
- Clutch Diaphragm Locked

2/60/55

Clutch engagement due to command failure (hydraulic or mechanical damage):

- Clutch Valve Locked
- Clutch Actuator Locked
- Oil leak in clutch actuator
- Clutch diaphragm stuck
- Clutch Position Sensor Magnet Off

Procedure

A *Purpose: Check other faults*

1. With the help of diagnostic equipment make sure that there are other DTCs present in the system.
   - If there perform the diagnosis of these first.
   - Otherwise go to next step

B *Purpose: Check the clutch position sensor*

1. Make sure that the sensor is not damaged and that it is properly installed, free and aligned.
   - If an irregularity is identified, proceed with the repositioning of the component correctly or with the replacement of the same and go to **Step V.**
   - Otherwise go to next step.

C *Purpose: Check the clutch electrovalve*

1. Check that the valve operates properly, frictionless, that it is not stuck, and there are no oil contaminations or foreign bodies in the clutch valve.
   - If an irregularity is identified, proceed with the replacement of the component and go to **Step V.**
   - Otherwise go to next step.

D *Purpose: Check the clutch actuator*

1. Verify that the actuator operates properly, frictionless, is not stuck, and there is no oil leakage or foreign matter in the clutch actuator.
   - If any irregularities are identified, proceed with the maintenance according to the Service Manual and go to **Step V.**
   - Otherwise go to next step.

E *Purpose: Inspect the clutch assembly*

Check:

1. that the clutch diaphragm operates correctly, without friction, and that none of the vanes are broken, damaged or deformed.
2. that the clutch disc has no damage to the friction surface, that it is not spinned or glazed.
3. that there are no rotating moving internal components in the clutch assembly that are stuck or frayed, or damaged, and that the clutch assembly rotates properly.
   - If any irregularities are identified, proceed with the maintenance according to the Service Manual and go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Gearbox

DTC: 1/61/61 - 1/61/62 - 1/61/63 - 1/61/64 - 1/61/66 - 1/61/68 - 1/61/69- 2/61/65 - 2/61/67

Overview

The TCU monitors the variables and values of the system through the data received from the sensors, to detect mechanical or hydraulic failures of the components that form the gearbox system. This defect occurs if there is a problem with the exchange.

Detection

1/61/61 - Failure to disengage.

1/61/62 - Failure to engage

1/61/63 - Selection failure

1/61/64 - Unintentional disengage

1/61/66 - Selector blocked

1/61/68 - Pattern test failed.

1/61/69 - Neutral Failure: When the gearbox has one or more gears engaged.

2/61/65 - Unintentional engage

2/61/67 - Excessive rotation of the clutch during gear engagement.

Possible Causes

1/61/61

- Engage valve stuck
- engage actuator stuck
- Gear shaft or selector fork blocked
- Irregular clutch drag torque

1/61/62

- Engage actuator stuck
- Gear shaft or selector fork blocked
- Clutch drag torque
- Wear of the engage fork
- Synchronized ring damaged

1/61/63

- Selection Valve Blocked by Contamination
- Selection shaft moving parts locked
- Selection actuator stuck
- Selection sensor failure (unsteady signal)

1/61/64

- Gear retention fault
- Synchronized ring damaged

1/61/66

- Selection Valve jammed by Contamination
- Selection shaft moving parts locked
- Selection actuator stuck
- Selection sensor failure (unsteady signal)

1/61/68

- Hydraulic or mechanical problem

1/61/69

- Hydraulic or mechanical problem

2/61/65

- Selection Valve jammed by Contamination
- Reservoir pressure above or below nominal (breather clogged)
- Gearbox interior damaged
- Failure of the coupling sensor

2/61/67

- Fault in the actuator of selection by blocking
- Coupling valve blocked opened

Procedure

A

Purpose: *Check other faults*

1. With the help of diagnostic equipment make sure that there are other DTCs present in the system.
   - If there perform the diagnosis of these first.
   - Otherwise go to next step

B

Purpose: *Check sensors*

1. Check that the coupling sensor is not damaged and that it is correctly installed, free of gaps and aligned.
2. Check that the selection sensor is not damaged and that it is correctly installed, free of gaps and aligned.
   - If an irregularity is identified, proceed with the repositioning of the component correctly or with the replacement of the same and go to **Step V.**
   - Otherwise go to next step.

C

Purpose: *Check electrovalves*

1. Check that the check valve operates properly, frictionless, that is not stuck, and does not leak.
2. Check that the coupling valve operates properly, frictionless, that is not stuck, and does not leak.
   - If an irregularity is identified, proceed with the replacement of the component and go to **Step V.**
   - Otherwise go to next step.

D

Purpose: *Check actuators*

1. Verify that the actuator engages properly, frictionless, that is not stuck.
2. Check that the selection actuator operates correctly, frictionless, and is not stuck.
   - If any irregularities are identified, proceed with the maintenance according to the Service Manual and go to **Step V.**
   - Otherwise go to next step.

E

Purpose: *Inspect gearbox assembly*

Check:

1. that the shaft and the fork work properly, frictionlessly, and are not jammed or damaged.
2. that the fork has no wear, friction, damage and is not stuck.
3. that the selection axis operates correctly, without friction, and that it is not jammed or damaged.
4. that the synchronizer rings are not damaged.
5. that there is no internal damage to the gearbox.
   - If any irregularities are identified, proceed with the maintenance according to the Service Manual and go to **Step V.**

F

Purpose: *Check the system pressure*

1. Check, with the aid of a pressure gauge, that the operating pressure is within tolerance.
   - If not checking that the tank breather is not damaged or clogged.
   - If any irregularities are identified, proceed with the maintenance according to the Service Manual and go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Hydraulic Circuit

DTC: 1/62/72 - 1/62/73 - 1/62/74 - 1/62/75 - 1/62/76 - 2/62/71

Overview

The TCU monitors the variables and values of the system through the data received from the sensors, to detect mechanical or hydraulic failures of the components that form the exchange system. This defect occurs if there is a problem with the hydraulic system operating the gear unit.

Detection

1/62/72 - Very large leakage

1/62/73 - Pump overheating

1/62/74 - Discharged accumulator

1/62/75 - Bad use of the system.

1/62/76 - Running time of the pump wrong.

2/62/71 - Low pressure.

Possible Causes

1/62/72

- Hydraulic failure in the circuit (leakage from the high pressure side to reservoir)
- Solenoid Valve damaged or worn

1/62/73

- Hydraulic failure in the circuit (leakage from the high pressure side to reservoir)
- Bad driver use

1/62/74

- Problems in the pressure accumulator

1/62/75

- High number of manual gear shifting requests
- Or in automatic mode when the throttle is pressed and released continuously

1/62/76

- Low oil level
- Misuse of the system
- Damage to the pump

2/62/71

- Very low oil level
- Check valve stuck open
- Breather valve stuck open
- Hydraulic failure in the circuit (leakage from the high pressure side to the reservoir)

Procedure

A *Purpose: Check the oil level*

1. Check that the oil level is within specification.
   - If necessary complete or drain the oil, and go to **Step V.**
   - Otherwise go to next step.

B ***Purpose:*** *Check driver's use*

1. Check and ask if the driver is not using the system aggressively, operating with the lever in the manual mode when the system is in automatic mode, or if it makes constant changes in the pedal (fully depressed and released) for a long period .
   - If an irregularity is identified, walk a little with the truck in automatic mode and correctly (avoiding operations mentioned above). After walking with the truck go to **Step V.**
   - Otherwise go to next step.

C ***Purpose:*** *Check valves*

1. Verify that the check valve is stuck, operates properly, frictionless, and is not damaged.
2. Check that the breather valve is stuck, operates properly, without friction, and is not damaged.
3. Check that the valve solenoid is not damaged.
   - If an irregularity is identified, proceed with the replacement of the component and go to **Step V.**
   - Otherwise go to next step.

D ***Purpose:*** *Check for leakages*

1. Check for leaks in the circuit or if the system accumulator is leaking or damaged.
2. Check if the pump is leaking, stuck, spinning or damaged.
3. Check with a pressure gauge for pressure leaks in the system and, if any, locate if there is a leak or sealing failure between the high pressure and low pressure side.
   - If any irregularities are identified, proceed with the maintenance according to the Service Manual and go to **Step V.**
   - Otherwise go to next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Power Supply (2) 24 V

DTC: 1/70/17

Overview

The TCU monitors the supply voltage at terminal 4 of the 94-way vehicle side B connector, and if it is above the upper limit or below the lower limit with respect to the reference voltage (battery positive) the corresponding fault code is activated.

Detection

1/70/17 - Inadequate supply voltage

Possible Causes

1/70/17

- System harness compromised
- Bad contact in the power supply connector
- Fuse with bad contact or damage

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Check connectors, harness and fuses*

Check:

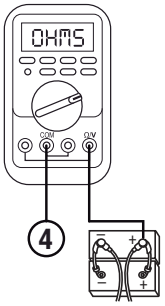
1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. on the harness that there is no broken or damaged wire.
5. that there is no damaged fuse in system.
   - If an irregularity is verified, replace the harness or the fuse and go to **Step V.**
   - Otherwise go to next step.

C

Purpose: *Check continuity problems*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between terminal 4 of the TCU connector and the battery positive.
   - If there is no continuity replace the harness and go to **Step V.**
   - Otherwise go to next step.

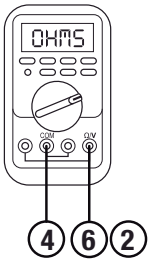
D

Purpose: *Check for short circuit problems*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, check that there is no continuity (short circuit).

1. between terminal 4 and terminal 6 or 2 of the TCU connector.



- If there is continuity replace the whip and go to **Step V.**
- Otherwise go to next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to the next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Battery Voltage

DTC: 1/69/14 - 1/69/15 - 1/69/18

Overview

The TCU monitors the battery supply voltage, and if it is unsuitable the corresponding fault code is activated.

Detection

1/69/14 - Battery voltage above the upper limit.

1/69/15 - Battery voltage below the lower limit, making it impossible to change gears.

1/69/18 - Low battery voltage.

Possible Causes

1/69/14, 1/69/15, 1/69/18

- Battery discharged
- Alternator with malfunction
- Damaged accessory belt or pulley

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Check the charging system*

With the help of the correct tools, check:

1. the condition of the belt and pulley, and whether the alternator turns freely and without noise.
2. which, with the engine on, charge is generated by the alternator.
3. if the circuits from the alternator to the battery have continuity, they do not have high or short resistance to GND.
   - If the charging system is operating normally proceed to the next step.

C

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to the next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Power Supply (3) 24 V

DTC: 1/71/17

Overview

The TCU monitors the supply voltage at terminal 1 of the 94-way vehicle side B connector, and if it is above the upper limit or below the lower limit with respect to the reference voltage (battery positive) the corresponding fault code is activated .

Detection

1/71/17 - Inadequate supply voltage

Possible Causes

1/71/17

- System harness compromised
- Power supply connector with bad contact
- Fuse with bad contact or damaged

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Check connectors, harness and fuses*

Check:

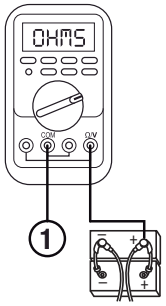
1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. on the harness that there is no broken or damaged wire.
5. that there is no damaged fuse in system.
   - If an irregularity is verified, replace the harness or the fuse and go to **Step V.**
   - Otherwise go to next step.

C

Purpose: *Check continuity problems*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between terminal 1 of the TCU connector and the battery positive.
   - If there is no continuity replace the harness and go to **Step V.**
   - Otherwise go to next step.

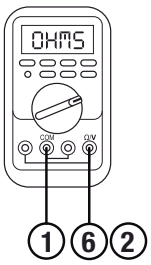
D

Purpose: *Check for short circuit problems*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, check that there is no continuity (short circuit).

1. between terminal 1 and terminal 6 or 2 of the TCU connector.



- If there is continuity replace the whip and go to **Step V.**
- Otherwise go to next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to the next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Power Supply (4) 24 V

DTC: 1/72/17

Overview

The TCU monitors the supply voltage at terminal 5 of the 94-way vehicle side B connector, and if it is above the upper limit or below the lower limit with respect to the reference voltage (battery positive) the corresponding fault code is activated .

Detection

1/72/17 - Inadequate power supply voltage

Possible Causes

1/72/17

- System harness compromised
- Power supply connector with bad contact
- Fuse with bad contact or damaged

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Check connectors, harness and fuses*

Check:

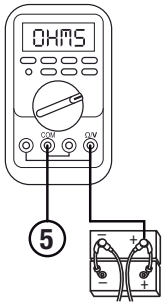
1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. on the harness that there is no broken or damaged wire.
5. that there is no damaged fuse in system.
   - If an irregularity is verified, replace the harness or the fuse and go to **Step V.**
   - Otherwise go to next step.

C

Purpose: *Check continuity problems*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between terminal 5 of the TCU connector and the battery positive.
   - If there is no continuity replace the harness and go to **Step V.**
   - Otherwise go to next step.

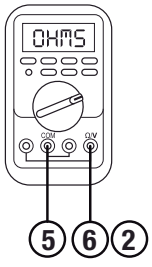
D

Purpose: *Check for short circuit problems*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, check that there is no continuity (short circuit).

1. between terminal 5 and terminal 6 or 2 of the TCU connector.



- If there is continuity replace the whip and go to **Step V.**
- Otherwise go to next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to the next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Power Supply to GND (1)

DTC: 1/73/16 - 1/73/17

Overview

The TCU monitors the supply voltage at terminal 2 of the 94-way vehicle side B connector, and if it is above the upper limit or below the lower limit with respect to the reference voltage the corresponding fault code is activated.

Detection

1/73/16 - Short to power supply

1/73/17 - Open circuit

Possible Causes

1/73/16

- Wrong connection to battery
- System harness compromised

1/73/17

- Power supply connector with bad contact
- Fuse damaged
- System harness compromised

Procedure

A *Purpose: Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B *Purpose: Check connectors, harness and fuses*

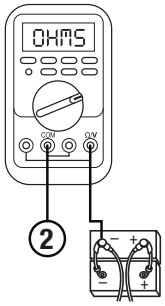
Check:

1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. on the harness that there is no broken or damaged wire.
5. that there is no damaged fuse in system.
   - If an irregularity is verified, replace the harness or the fuse and go to **Step V.**
   - Otherwise go to next step.

C *Purpose: Check continuity problems*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



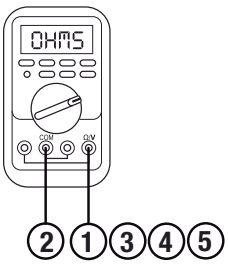
1. between terminal 2 of the TCU connector and the battery positive.
   - If there is no continuity replace the harness and go to **Step V.**
   - Otherwise go to next step.

D *Purpose: Check for short circuit problems*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, check that there is no continuity (short circuit).

1. between terminal 2 and terminal 1 or 3 or 4 or 5 of the TCU connector.



- If there is continuity replace the whip and go to **Step V.**
- Otherwise go to next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to the next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Power Supply to GND (2)

DTC: 1/74/16 - 1/74/17

Overview

The TCU monitors the supply voltage at terminal 6 of the 94-way vehicle side B connector, and if it is above the upper limit or below the lower limit with respect to the reference voltage the corresponding fault code is activated.

Detection

1/74/16 - Short circuit to power supply

1/74/17 - Open circuit

Possible Causes

1/74/16

- Wrong connection to battery
- System harness compromised

1/74/17

- Power supply connector with bad contact
- Fuse damaged
- System harness compromised

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Check connectors, harness and fuses*

Check:

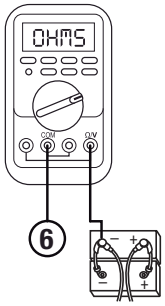
1. that there are no bent or broken pins.
2. that there are no open or loose terminals.
3. that no terminal is oxidized or damaged, has no moisture or is suspected of being over current or short circuit.
4. on the harness that there is no broken or damaged wire.
5. that there is no damaged fuse in system.
   - If an irregularity is verified, replace the harness or the fuse and go to **Step V.**
   - Otherwise go to next step.

C

Purpose: *Check continuity problems*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Use a multimeter to check for continuity.



1. between terminal 6 of the TCU connector and the battery positive.
   - If there is no continuity replace the harness and go to **Step V.**
   - Otherwise go to next step.

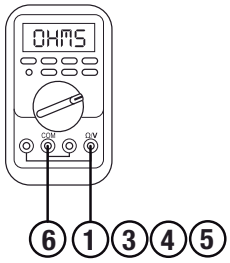
D

Purpose: *Check for short circuit problems*

⚠ **Caution:** before checking make sure that the sensor and TCU connectors are disconnected.

Using a multimeter, check that there is no continuity (short circuit).

1. between terminal 6 and terminal 1 or 3 or 4 or 5 of the TCU connector.



- If there is continuity replace the whip and go to **Step V.**
- Otherwise go to next step.

E

Purpose: *Check if the problem is in the TCU*

1. If with the previous checks the defect is not found, perform a test with the TCU of another vehicle of the same model.
   - After the replacement go to the next step.

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

ROM Memory

DTC: 1/64/83

Overview

The TCU monitors the verification data to see if the module's ROM is damaged or corrupted.

Detection

1/64/83 - Change of data.

Possible Causes

1/64/83

- Power supply failure during software update download
- Module damaged

Procedure

A *Purpose: Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B *Purpose: Update the TCU*

1. After making sure the battery is properly charged, try upgrading the module again with the help of the tool.
   - If you can upgrade, go to **Step V.**
   - Otherwise go to next step

C *Purpose: Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V *Purpose: Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

RAM Memory

DTC: 1/64/84

Overview

The TCU monitors the integrity of the module's RAM cell to see if it is damaged or corrupted.

Detection

1/64/84 - Change of data

Possible Causes

1/64/84

- Module internally damaged

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

C

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

EEPROM Memory

DTC: 1/64/81 - 1/64/82

Overview

The TCU monitors the data to see if the module's EEPROM memory is corrupted or corrupted.

Detection

1/64/81 - Grid data values changed.

1/64/82 - Changing of system auto-adjust values.

Possible Causes

1/64/81/16482

- Power supply failure during data storage
- Module internally damaged

Procedure

A *Purpose: Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B *Purpose: Update the TCU*

1. After making sure the battery is properly charged, try upgrading the module again with the help of the tool.
   - If you can upgrade, go to **Step V.**
   - Otherwise go to next step

C *Purpose: Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V *Purpose: Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Electrovalves Controller

DTC: 1/64/87 - 1/64/88 - 1/64/96 - 1/64/97

Overview

The TCU monitors the internal controller of the system's solenoid valves for damage or corruption.

Detection

1/64/87 - Lost communication

1/64/88 - Module defect

1/64/96 - Voltage below the lower limit.

1/64/97 - Module defect

Possible Causes

1/64/87

- SPI communication failed

1/64/88

- Driver software update unsuccessful

1/64/96

- Low Voltage Controller Problems

1/64/97

- Problems in the external controller oscillator (internal fault)

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Update the TCU*

1. After making sure the battery is properly charged, try upgrading the module again with the help of the tool.
   - If you can upgrade, go to **Step V.**
   - Otherwise go to next step

C

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Hydraulic Pump Motor Controller

DTC: 1/54/46 - 1/64/47 - 1/64/48 - 1/64/92 - 1/64/93 - 1/64/94 - 1/64/98 - 1/64/99

Overview

The TCU monitors the data to see if the Hydraulic Pump Motor Controller is damaged or corrupted.

Detection

1/54/46 - Over current.

1/64/47 - Temperature warning

1/64/48 - Controller shutdown because of temperature.

1/64/92 - Cross-driving.

1/64/93 - Controller communication error.

1/64/94 - Conductive port.

1/64/98 - Error or failure in controller.

1/64/99 - Power supply failure.

Possible Causes

1/54/46

- Over current identification in the electric motor drive

1/64/47

- Thermal controller warning

1/64/48

- Error in thermal shutdown of controller

1/64/92

- Cross-drive system failure

1/64/93

- Problems in the external controller oscillator (internal fault)

1/64/94

- Controller failure (power supply problems)

1/64/98

- Internal controller error

1/64/99

- Diagnosis of coherence in voltage supply

Procedure

A *Purpose: Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B *Purpose: Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

C *Purpose: Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V *Purpose: Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Accelerometer

DTC: 1/64/89

Overview

The TCU monitors the normal, lateral, and longitudinal acceleration data to verify that the accelerometer operation is correct.

Detection

1/64/89 - Accelerometer fail

Possible Causes

1/64/89

- Internally Damaged Module (Accelerometer Damaged)

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

C

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Protected Battery Voltage

DTC: 1/64/91

Overview

The protected battery voltage system, is a branching filtered and internal to the Hardware of the supply voltage.

It serves as a voltage source for digital and analog system input circuits.

The TCU monitors the state of the voltage of this system in order to verify that it is operative, and in the event of a problem with the system, the fault is activated.

Detection

1/64/91 - Lack of voltage or incorrect voltage in the system.

Possible Causes

1/64/91

- Short circuit to GND or open circuit

Procedure

A *Purpose: Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B *Purpose: Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

C *Purpose: Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V *Purpose: Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

TCU Switch Off Function

DTC: 1/65/95

Overview

The TCU monitors the period from the time the ignition key is set to "OFF" until it switches off. If the TCU continues to operate in normal power mode after the time set for "Power Latch Off" (electrical systems off), the fault is displayed.

Detection

1/65/95 - TCU shutdown.

Possible Causes

1/65/95

- Internally damaged module

Procedure

A ***Purpose:*** *Check other fault codes*

1. With the diagnostic tool check for other DTCs, and if there are others, treat them first according to specific procedure.
   - If there is a fault, replace the harness and go to **Step V.** Otherwise go to the next step.

B ***Purpose:*** *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

C ***Purpose:*** *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

D ***Purpose:*** *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Grid Self-Tuning Procedure

DTC: 0/61/70

Overview

The TCU monitors several system auto-tuning variables, and if there is any variable with the value out of specification, this defect is activated.

Detection

0/61/70 - Fail in the self-tuning system grid

Possible Causes

0/61/70

- Auto adjustment procedure not performed or not completed successfully

Procedure

A

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

B

Purpose: *Check Hydraulic Kit*

1. Perform an inspection on the Hydraulic Kit according to the Service Manual. After performing the inspection if the kit is not working properly proceed as indicated in the manual.
   - If the kit is working properly or the procedure has already been performed, proceed to the next step.

C

Purpose: *Redo the auto adjustment*

1. With the aid of the diagnostic tool, repeat the grid learning procedure.
   - After the procedure go to the next step.

D

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Kiss Point Auto-Learning Procedure

DTC: 0/60/60

Overview

The TCU monitors several variables present in the Kiss Point auto-learning function, and if there is any variable with the value out of specification, this defect is activated.

Detection

0/60/60 - Kiss Point's self-learning procedure failed.

Possible Causes

0/60/60

- Kiss Point self-learning procedure not performed or not completed successfully

Procedure

A ***Purpose:*** *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

B ***Purpose:*** *Check the clutch assembly*

1. Perform an inspection on the clutch assembly according to the Service Manual. After performing the inspection if the assembly is not working correctly proceed as indicated in the manual.
   - If the assembly is working properly or the procedure has already been performed, proceed to the next step.

C ***Purpose:*** *Redo the auto adjustment*

1. With the aid of the diagnostic device, redo the Kiss Point auto-learning procedure.
   - After the procedure go to next step

D ***Purpose:*** *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**.
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Clutch Coupling Position Auto Learning Procedure

DTC: 0/60/56 - 0/60/57 - 0/60/58 - 0/60/59

Overview
The module performs a self-learning procedure of the clutch position when the clutch is engaged. If it does not complete correctly, the fault is displayed.

Detection
0/60/56 - Coupling position of the clutch above the limit.

0/60/57 - Coupling position of the clutch below the limit.

0/60/58 - Coupling position of the clutch below the limit.

0/60/59 - Clutch position signal below the lower limit.

Possible Causes
0/60/56, 0/60/57, 0/60/58, 0/60/59

- Clutch mechanical problem

Procedure

A

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

B

Purpose: *Check the clutch assembly*

1. Perform an inspection on the clutch assembly according to the Service Manual. After performing the inspection if the assembly is not working correctly proceed as indicated in the manual.
   - If the assembly is working properly or the procedure has already been performed, proceed to the next step.

C

Purpose: *Redo the auto adjustment*

1. With the aid of the diagnostic device, repeat the procedure for learning the clutch coupling position.
   - After the procedure go to next step

D

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Accelerometer Auto-Learning

DTC: 0/63/89

Overview
The module performs an auto learn procedure of the Accelerometer. If it is not completed correctly, the fault is displayed.

Detection
0/63/89 - Accelerometer auto learning not completed.

Possible Causes
0/63/89

- Self-learning service procedure displaced
- Component internal failure

Procedure

A ***Purpose:*** *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

B ***Purpose:*** *Check the clutch assembly*

1. Perform an inspection on the clutch assembly according to the Service Manual. After performing the inspection if the assembly is not working correctly proceed as indicated in the manual.
   - If the assembly is working properly or the procedure has already been performed, proceed to the next step.

C ***Purpose:*** *Redo the auto adjustment*

1. With the aid of the diagnostic device, repeat the procedure for learning the accelerometer.
   - After the procedure go to next step

D ***Purpose:*** *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V ***Purpose:*** *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

   Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Safety - Level 2 Intervention

DTC: 1/65/96 - 1/65/97 - 1/65/98

Overview
The TCU monitors several self-diagnosis variables of the module itself, and if it has any out of specification, it activates this defect.

Detection
1/65/96 - Processing of incoming information failure.

1/65/97 - Integrity of the compromised module.

1/65/98 - Intervention of the prevention function of dangerous violations.

Possible Causes
1/65/96

- Problems with system inputs

1/65/97

- Hardware integrity failure (internal problem)

1/65/98

- Change of direction not requested by driver or change of direction not performed after driver's request when vehicle is stopped, engine on and pedal pressed
- Clutch lock above position limit with vehicle stopped, engine turned on and pedal released
- Failure to disengage the Clutch when vehicle is stopping and the driver is stepping on the brake to stop the vehicle

Procedure

A

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

B

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Safety - Level 3 Intervention (MMP Failure)

DTC: 1/65/99

Overview
The TCU monitors several self-diagnostic variables of the main Microprocessor (MMP), and if it has any out of specification, it activates this defect.

Detection
1/65/99 - Main microprocessor integrity failure.

Possible Causes
1/65/99

- Module internally damaged.

Procedure

A

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

B

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Safety Microprocessor

DTC: 1/64/85

Overview
The TCU monitors several self-diagnostic variables of the Safety Microprocessor (SMP), and if it is out of specification, it activates this defect.

Detection
1/64/85 - Security microprocessor integrity failure.

Possible Causes
1/65/85

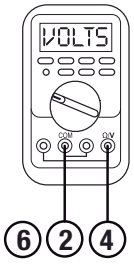
- Main microprocessor damaged or with power supply problem

Procedure

A *Purpose: Check voltage level on SMP power supply*

Caution: before checking make sure that the sensor and TCU connectors are disconnected.

With the aid of a multimeter check:



1. that the voltage level on pin 4 of the TCU is correct. To do this, place the multimeter on the voltage scale and place the negative probe on pin 6 or 2, and the positive probe on pin 4 of connector B on the TCU, and check that the voltage level is between 18 and 32 Volts.
2. if it is not within range check the integrity of the harness, the connection to the battery and even replace it if necessary.
   - If the problem is solved, go to **Step V.**
   - Otherwise go to next step.

B *Purpose: Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

C *Purpose: Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V *Purpose: Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Safety Microprocessor Charge Test

DTC: 1/64/86

Overview
The TCU monitors the internal microprocessor security (SMP) status of the module to check for a integrity problem or if it is unable to operate properly.

Detection
1/64/86 - SMP integrity failure or integrity failure of SMP inputs and outputs.

Possible Causes
1/64/86

- Failure to disable the coupling valve.
- Return or clutch control failure
- Failure to return or power command

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

C

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, See "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

Main Microprocessor Charge Test

DTC: 1/64/00

Overview
The TCU monitors the module's internal microprocessor (MMP) status to see if there is a integrity problem or if it can not operate properly.

Detection
1/64/00- Integrity failure at MMP inputs and / or outputs.

Possible Causes
1/64/00

- Disengagement of the coupling valve failure.
- Security mode activation signal failed
- Return or clutch control failure
- Failure to return or power command

Procedure

A

Purpose: *Check battery charge*

1. Make sure the vehicle's battery charge is at the proper level (between 18 and 32 Volts).
   - If it is not, recharge the battery or replace it, make sure the charge is appropriate and go to **Step V.**
   - If the charge is already at the appropriate level, go to the next step.

B

Purpose: *Erase the fault*

1. After making sure that the battery is properly charged, try to clear the defect with the aid of the diagnostic tool.
   - If you can erase, go to **Step V.**
   - Otherwise go to next step

C

Purpose: *Replace the TCU*

1. If it is not possible to complete the procedure and it is impossible to recover the module, proceed with its replacement due to an internal defect.
   - Then go to **Step V.**

V

Purpose: *Final check*

1. Key off.
2. Reconnect all connectors and make sure all components are fully installed.
3. Switch on and engine stopped.
4. Clean all fault codes using the "Diagnosis device".
5. If you have performed the TCU update, redo the grid, accelerometer, and Kiss Point learning procedure using the Diagnosis device.
6. Run with the vehicle if possible to verify that the system is functioning properly.
7. Check with the device for the same or other fault codes.
   - If the fault is active during the test, go to **Step A.**
   - If another fault code appears, see "**DTC INDEX**" on page IV.
   - If no faults appear and the vehicle works perfectly, THE TEST IS COMPLETE.

     Note: If the test was performed with the TCU of another vehicle replace it with a new one and repeat this procedure (V).

DTC INDEX

