The Electronic Monitoring System (EMS) will display an error code in the event of a fault developing in the transmission system.

The code will be displayed on the top line of the EMS display panel in the format: **ZFCB ERROR ??**

Fault Code	Fault Detected	Possible Causes	Action
12	Logical error at direction select signal	• Cable from shift lever to TCU is broken. • Cable is defective and is contacted to battery voltage or earth. • Shift lever is defective.	• Check cables from TCU to shift lever. • Check signal combinations of shift lever F-N-R.
25	Short circuit to battery voltage or open circuit to transmission sump temperature sensor input.	• Cable is defective and is contacted to battery voltage or earth. • Cable has no connection to TCU. • Temperature sensor has an internal defect. • Connector pin is contacted to battery voltage or is broken.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.
26	Short circuit to earth at transmission sump temperature sensor input.	• Cable is defective and is contacted to vehicle earth. • Temperature sensor has an internal defect. • Connector pin is contacted to vehicle earth.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.
27	Short circuit to battery voltage or open circuit at converter output temperature sensor input.	• Cable is defective and is contacted to battery voltage. • Cable has no connection to TCU. • Temperature sensor has an internal defect. • Connector pin is contacted to battery voltage or is broken.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.
28	Short circuit to earth at converter output temperature sensor input.	• Cable is defective and is contacted to vehicle earth. • Temperature sensor has an internal defect. • Connector pin is contacted to vehicle earth.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.
31	Short circuit battery voltage or open circuit at engine speed input.	• Cable is defective and is contacted to battery voltage. • Cable has no connection to TCU. • Speed sensor has an internal defect. • Connector pin is contacted to battery voltage or is broken.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.
32	Short circuit to earth at engine speed input.	• Cable is defective and is contacted to vehicle earth. • Speed sensor has an internal defect.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.

Fault Code	Fault Detected	Possible Causes	Action
33	Logical error at engine speed input.	• Cable/connector is defective and is contacted to vehicle earth. • Speed sensor has an internal defect. • Sensor gap is the wrong size.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor. • Check the sensor gap.
34	Short circuit to battery voltage or open circuit at turbine speed input.	• Cable is defective and is contacted to battery voltage. • Cable has no connection to TCU. • Speed sensor has an internal defect. • Connector pin is contacted to battery voltage or has no contact.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.
35	Short circuit to earth at turbine speed input.	• Cable/connector is defective and is contacted to vehicle earth. • Speed sensor has an internal defect.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.
36	Logical error at turbine speed input.	• Cable/connector is defective and is contacted to vehicle earth. • Speed sensor has an internal defect. • Sensor gap is the wrong size.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor. • Check the sensor gap.
37	Short circuit to battery voltage or open circuit at internal speed input.	• Cable is defective and is contacted to battery voltage. • Cable has no connection to TCU. • Speed sensor has an internal defect. • Connector pin is contacted to battery voltage or has no contact.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.
38	Short circuit to earth at internal speed input.	• Cable/connector is defective and is contacted to vehicle earth. • Speed sensor has an internal defect.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.
39	Logical error at internal speed input.	• Cable/connector is defective and is contacted to vehicle earth. • Speed sensor has an internal defect. • Sensor gap is the wrong size.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor. • Check the sensor gap.
3A	Short circuit to battery voltage or open circuit at output speed input.	• Cable is defective and is contacted to battery voltage. • Cable has no connection to TCU. • Speed sensor has an internal defect. • Connector pin is contacted to battery voltage or has no contact.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.

Fault Code	Fault Detected	Possible Causes	Action
3B	Short circuit to earth at output speed input.	• Cable/connector is defective and is contacted to vehicle earth. • Speed sensor has an internal defect.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor.
3C	Logical error at output speed input.	• Cable/connector is defective and is contacted to vehicle earth. • Speed sensor has an internal defect. • Sensor gap is the wrong size.	• Check the cable from TCU to the sensor. • Check the connectors. • Check the speed sensor. • Check the sensor gap.
3E	Output speed zero does not fit to other speed signals.	• Speed sensor has an internal defect. • Sensor gap is the wrong size.	• Check the cable from TCU to the sensor. • Check the sensor signal of the output speed sensor.. • Check the sensor gap of the output speed sensor.
54	EMS & ZF computer not communicating via the CAN-Bus.	• Interference on CAN-Bus. • CAN wire/connector is broken. • CAN wire/connector is defective and has contact with vehicle earth or battery voltage.	• Check cluster controller. • Check wire of CAN-Bus. • Check cable to cluster controller.
71	Short circuit to battery voltage at clutch K1.	• Cable/connector is defective and is contacted to battery voltage. • Cable/connector is defective and has contact to another regulator output of the TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
72	Short circuit to earth at clutch K1.	• Cable/connector is defective and is contacted to vehicle earth. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
73	Open circuit at clutch K1.	• Cable/connector is defective and has no contact to TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
74	Short circuit to battery voltage at clutch K2.	• Cable/connector is defective and has contact to battery voltage. • Cable/connector is defective and has contact to another regulator output of the TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.

Fault Code	Fault Detected	Possible Causes	Action
75	Short circuit to earth at clutch K2.	• Cable/connector is defective and has contact to vehicle earth. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
76	Open circuit at clutch K2.	• Cable/connector is defective and has no contact to TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
77	Short circuit to battery voltage at clutch K3.	• Cable/connector is defective and has contact to battery voltage. • Cable/connector is defective and has contact to another regulator output of the TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
78	Short circuit to earth at clutch K3.	• Cable/connector is defective and is contacted to vehicle earth. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
79	Open circuit at clutch K3.	• Cable/connector is defective and has no contact to TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
81	Short circuit to battery voltage at clutch K4.	• Cable/connector is defective and has contact to battery voltage. • Cable/connector is defective and has contact to another regulator output of the TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
82	Short circuit to earth at clutch K4.	• Cable/connector is defective and is contacted to vehicle earth. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
83	Open circuit at clutch K4.	• Cable/connector is defective and has no contact to TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.

Fault Code	Fault Detected	Possible Causes	Action
84	Short circuit to battery voltage at clutch KV.	• Cable/connector is defective and has contact to battery voltage. • Cable/connector is defective and has contact to another regulator output of the TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
85	Short circuit to earth at clutch KV.	• Cable/connector is defective and is contacted to vehicle earth. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
86	Open circuit at clutch KV.	• Cable/connector is defective and has no contact to TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
87	Short circuit to battery voltage at clutch KR.	• Cable/connector is defective and has contact to battery voltage. • Cable/connector is defective and has contact to another regulator output of the TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
88	Short circuit to earth at clutch KR.	• Cable/connector is defective and is contacted to vehicle earth. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
89	Open circuit at clutch KR.	• Cable/connector is defective and has no contact to TCU. • Regulator has an internal defect.	• Check the cable from TCU to the gearbox. • Check the connectors from TCU to the gearbox. • Check the regulator resistance. • Check the internal wire harness of the gearbox.
91	Short circuit to earth at the reverse warning alarm relay.	• Cable is defective and is contacted to vehicle earth. • Backup alarm device has an internal defect. • Connector pin is connected to vehicle earth.	• Check the cable from TCU to the backup alarm device. • Check the connectors from backup alarm device to the TCU. • Check the resistance of the backup alarm device.
92	Short circuit to battery voltage at the alarm warning relay.	• Cable is defective and is contacted to battery voltage. • Backup alarm device has an internal defect. • Connector pin is connected to battery voltage.	• Check the cable from TCU to the backup alarm device. • Check the connectors from backup alarm device to the TCU. • Check the resistance of the backup alarm device.

Fault Code	Fault Detected	Possible Causes	Action
93	Open circuit at the reverse warning alarm relay.	• Cable is defective and has no connection to the TCU. • Backup alarm device has an internal defect. • Connector has no connection to the TCU.	• Check the cable from TCU to the backup alarm device. • Check the connectors from backup alarm device to the TCU. • Check the resistance of the backup alarm device.
97	Short circuit to earth at park brake solenoid.	• Cable is defective and is contacted to vehicle earth. • Park brake solenoid has an internal defect. • Connector pin is connected to vehicle earth.	• Check the cable from TCU to the park brake solenoid. • Check the connectors from the park brake solenoid to the TCU. • Check the resistance of the park brake solenoid.
98	Short circuit to battery voltage at park brake solenoid.	• Cable is defective and is contacted to battery voltage. • Park brake solenoid has an internal defect. • Connector pin is connected to battery voltage.	• Check the cable from TCU to the park brake solenoid. • Check the connectors from the park brake solenoid to the TCU. • Check the resistance of the park brake solenoid.
99	Open circuit at park brake solenoid.	• Cable is defective and has no connection to the TCU. • Park brake solenoid has an internal defect. • Connector has no connection to the TCU.	• Check the cable from TCU to the park brake solenoid. • Check the connectors from the park brake solenoid to the TCU. • Check the resistance of the park brake solenoid.
B1	Slippage at clutch K1.	• Low pressure at clutch K1. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at output speed sensor. • Wrong size of the sensor gap. • Clutch is defective.	• Check pressure at clutch K1. • Check main pressure in the system. • Check sensor gap at internal speed sensor. • Check sensor gap at output speed sensor. • Check signal at internal speed sensor. • Check signal at output speed sensor. • Replace clutch.
B2	Slippage at clutch K2.	• Low pressure at clutch K2. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at output speed sensor. • Wrong size of the sensor gap. • Clutch is defective.	• Check pressure at clutch K2. • Check main pressure in the system. • Check sensor gap at internal speed sensor. • Check sensor gap at output speed sensor. • Check signal at internal speed sensor. • Check signal at output speed sensor. • Replace clutch.

Fault Code	Fault Detected	Possible Causes	Action
B3	Slippage at clutch K3.	• Low pressure at clutch K3. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at output speed sensor. • Wrong size of the sensor gap. • Clutch is defective.	• Check pressure at clutch K3. • Check main pressure in the system. • Check sensor gap at internal speed sensor. • Check sensor gap at output speed sensor. • Check signal at internal speed sensor. • Check signal at output speed sensor. • Replace clutch.
B4	Slippage at clutch K4.	• Low pressure at clutch K4. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at output speed sensor. • Wrong size of the sensor gap. • Clutch is defective.	• Check pressure at clutch K4. • Check main pressure in the system. • Check sensor gap at internal speed sensor. • Check sensor gap at output speed sensor. • Check signal at internal speed sensor. • Check signal at output speed sensor. • Replace clutch.
B5	Slippage at clutch KV.	• Low pressure at clutch KV. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at turbine speed sensor. • Wrong size of the sensor gap. • Clutch is defective.	• Check pressure at clutch KV. • Check main pressure in the system. • Check sensor gap at internal speed sensor. • Check sensor gap at turbine speed sensor. • Check signal at internal speed sensor. • Check signal at turbine speed sensor. • Replace clutch.
B6	Slippage at clutch KR.	• Low pressure at clutch KR. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at turbine speed sensor. • Wrong size of the sensor gap. • Clutch is defective.	• Check pressure at clutch KR. • Check main pressure in the system. • Check sensor gap at internal speed sensor. • Check sensor gap at turbine speed sensor. • Check signal at internal speed sensor. • Check signal at turbine speed sensor. • Replace clutch.
B7	Excessively hot sump.	• Measure temperature of oil in the sump is above allowed maximum.	• Cool down machine. • Check oil level. • Check temperature sensor.
B8	Excessively hot converter output.	• Measure temperature of the oil at the converter output is above allowed maximum.	• Cool down machine. • Check oil level. • Check temperature sensor.

Fault Code	Fault Detected	Possible Causes	Action
D1	Short circuit to battery voltage at power supply for sensors.	• The TCU measures more than 6V at the pin AU1 (5V sensor supply).	• Check cables and connectors to sensors, which are supplied from AU1. • Check the power supply at the pin AU1 (should be approx.. 5V).
D2	Short circuit to earth at power supply for sensors.	• The TCU measures less than 4V at the pin AU1 (5V sensor supply).	• Check cables and connectors to sensors, which are supplied from AU1. • Check the power supply at the pin AU1 (should be approx.. 5V).
D3	Low power at battery.	• Measured voltage at power supply is less than 24V.	• Check power supply battery. • Check cables from batteries to TCU. • Check connectors from batteries to TCU.
D4	High power at battery.	• Measured voltage at power supply is more than 24V.	• Check power supply battery. • Check cables from batteries to TCU. • Check connectors from batteries to TCU.
D5	Error at switch 1 for valve power supply VPS1.	• Cable or connectors are defective and are contacted to battery voltage. • Cable or connectors are defective and are contacted to vehicle earth. • Permanent power supply KL30 missing.	• Check fuse. • Check cables from gearbox to TCU. • Check connectors from gearbox to TCU. • Replace TCU.
D6	Error at switch 2 for valve power supply VPS2.	• Cable or connectors are defective and are contacted to battery voltage. • Cable or connectors are defective and are contacted to vehicle earth. • Permanent power supply KL30 missing.	• Check fuse. • Check cables from gearbox to TCU. • Check connectors from gearbox to TCU. • Replace TCU.
E3	Short circuit to battery voltage at display output.	• Cable or connectors are defective and are contacted to battery voltage. • display has an internal defect.	• Check cables from TCU to the display. • Check the connectors at the display. • Change display.
E4	Short circuit to earth at display output.	• Cable or connectors are defective and are contacted to vehicle earth. • display has an internal defect.	• Check cables from TCU to the display. • Check the connectors at the display. • Change display.
F1	General EEPROM fault.	• TCU is defective.	• Replace TCU.
F2	Configuration lost.	• interference during saving data on non volatile memory. • TCU is brand new or from another vehicle.	• Reprogramme the correct configuration for the vehicle (eg. with cluster controller).

Fault Code	Fault Detected	Possible Causes	Action
F3	Application error.	• Something in the application is wrong.	• Replace TCU.
F5	Clutch failure.	• One of the AEB values is out of limit.	• Check clutch.
F6	Clutch adjustment data lost.	• interference during saving data on non volatile memory. • TCU is brand new or from another vehicle.	• Execute AEB.