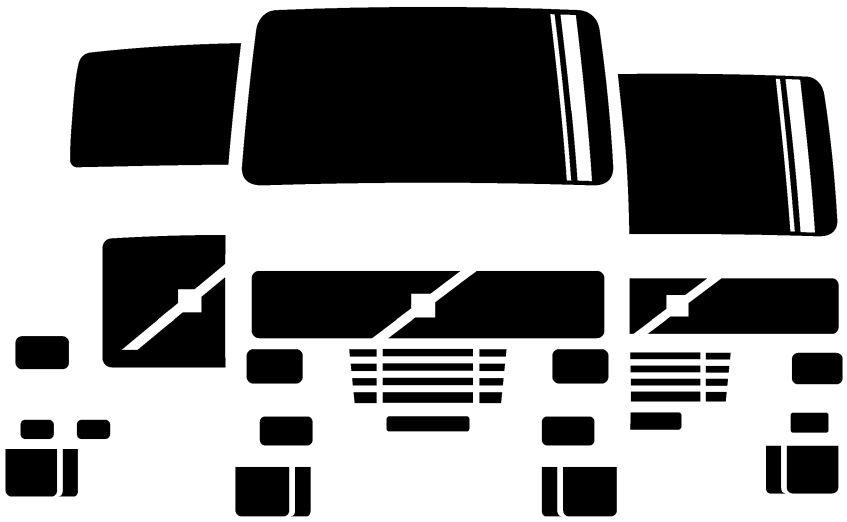
Service Manual
Trucks

Group **43**

MID 130/223 DTC Guide



PV776-88946390

VOLVO

Foreword

The descriptions and service procedures contained in this manual are based on designs and methods studies carried out up to October 2009.

The products are under continuous development. Vehicles and components produced after the above date may therefore have different specifications and repair methods. When this is believed to have a significant bearing on this manual, supplementary service bulletins will be issued to cover the changes.

The new edition of this manual will update the changes.

In service procedures where the title incorporates an operation number, this is a reference to an V.S.T. (Volvo Standard Times).

Service procedures which do not include an operation number in the title are for general information and no reference is made to an V.S.T.

Each section of this manual contains specific safety information and warnings which must be reviewed before performing any procedure. If a printed copy of a procedure is made, be sure to also make a printed copy of the safety information and warnings that relate to that procedure. The following levels of observations, cautions and warnings are used in this Service Documentation:

Note: Indicates a procedure, practice, or condition that must be followed in order to have the vehicle or component function in the manner intended.

Caution: Indicates an unsafe practice where damage to the product could occur.

Warning: Indicates an unsafe practice where personal injury or severe damage to the product could occur.

Danger: Indicates an unsafe practice where serious personal injury or death could occur.

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Contents

Design and Function

MID 130 Transmission Control Unit

The manufacturer diagnostic tool is the preferred tool for performing diagnostic work. Contact your local dealer for more information or visit “www.premiumtechtool.com”.

System Overview

The I-Shift transmission is a technologically advanced automated mechanical transmission, designed specifically to work in conjunction with Volvo’s new family of heavy-duty diesel engines. In order to work as a total package, the I-Shift is programmed with each engines’ efficiency map and is offered with different software options to fulfill each operators needs.

All variants of the Volvo I-Shift have 12 forward speeds and up to 4 reverse speeds depending on programming. It is a single countershaft transmission built up with a splitter section, a main section with three forward and one reverse gear, and a range gear section. It is an automated mechanical transmission and uses synchronizers in its splitter and range gears but not in the main section. The main section utilizes a countershaft brake to mesh gears and equalize shaft speeds as needed. A single disc automated clutch system is utilized. The I-Shift is a "two pedal" transmission and does not require a clutch pedal.

The I-Shift uses compressed air and electrical solenoids to perform shift functions, clutch control and countershaft brake functions. All of these functions are timed and controlled by the Transmission Control Module (TCM). A dedicated air tank is needed on the vehicle to supply air for these components. The air is plumbed to the transmission via a supply line and is distributed to the other components internally. The air control solenoids are housed in the Transmission Control Housing and in the Clutch Control Valve Assembly.

All Volvo Truck models will be available with this transmission including the VT, VN Series & VHD vocational trucks. Four I-Shift models will be offered to support the power ranges of the engines as well as offering different gear arrangements:

Transmission Model	**AT2512C**	**ATO2512C**	**AT2612D**	**ATO2612D**	**AT2812C**	**ATO3112C ATO3112D**
Operation	Two Pedal	Two Pedal	Two Pedal	Two Pedal	Two Pedal	Two Pedal
Forward Speeds	12	12	12	12	12	12
Engines Available	D11/D13	D11/D13	D11/D13	D11/D13	D16	D16
Overall Ratio	14.94:1	15.04:1	14.94:1	15.04:1	14.94:1	15.04:1
Top Ratio	Direct 1.00:1	Overdrive 0.78:1	Direct 1.00:1	Overdrive 0.78:1	Direct 1.00:1	Overdrive 0.78:1
Weight lbs (kg)	597 (275)	597 (275)	597 (275)	597 (275)	610 (281)	610 (281)

Transmission Identification

Each transmission has two identification tags. One is found on the top of the clutch housing and the other is found on the back of the range housing. The transmission version can be readily identified by the following nomenclature table.

Make	Volvo
Transmission Model	AT2512C, ATO2512C, AT2612D, ATO2612D, AT2812C, ATO3112C and ATO3112D
Description	A – Automatic T – Transmission O – Overdrive 25 – Torque Capacity 2500 Nm (1850 lb-ft) 26 – Torque Capacity 2600 Nm (2312 lb-ft) 28 – Torque Capacity 2800 Nm (2050 lb-ft) 31 – Torque Capacity 3100 Nm (2300 lb-ft) 12 – Number of forward gears C or D – Design Level

Sensors

Clutch Position Sensor

The Clutch Position Sensor is located on the side of the clutch cylinder assembly (inside bell housing).

Main Shaft Speed Sensor(s)

The speed sensors are located on the control housing and measure the speed of the main shaft and the speed of the countershaft.

The main shaft speed sensor is a electronic sensor with a hall element. Using a hall element makes it possible to measure the rotation speed and rotation direction of the shaft.

The countershaft speed sensor is an inductive sensor. Knowing the speed of the countershaft makes it possible to calculate the precise speed of every gear in the transmission.

The speed sensor(s) are located in the transmission on the lower portion of the control housing.

Output Shaft Speed Sensor

The Output Shaft Speed Sensor is located on the side of the rear transmission housing.

Range Cylinder Position Sensor

There are four position sensors in the transmission control housing. These sensors measure the position of the specific air cylinder within the control housing. The sensors are inductive and the inductive characteristics change depending on the position of the metal pin that follows the movements of the air cylinders.

The Range Cylinder Position Sensor is located in the transmission on the lower portion of the control housing.

Split Cylinder Position Sensor

The Split Cylinder Position Sensor is located in the transmission on the lower portion of the control housing.

1st/Reverse Cylinder Position Sensor

The 1st/Reverse Cylinder Position Sensor is located in the transmission on the lower portion of the control housing.

2nd/3rd Gear Cylinder Position Sensor

The 2nd/3rd Gear Cylinder Position Sensor is located in the transmission on the lower portion of the control housing.

Transmission Control Module (TCM)

The TCM communicates with the Gear Selector Control Module (GSCM) and other ECMs in the vehicle through the SAE J1939 and SAE J1587 data links. The functionality of the TCM can be different depending on the type of software packages that are installed. The TCM contains the following components:

- SAE J1587 data link
- SAE J1939 data link
- CAN 2 data link
- 11 Powerdrivers
- Inclination Sensor
- Temperature Sensor
- 9 Controlling Solenoid Valves

The Transmission Control Module located on the upper portion of the control housing.

Lubrication System

The transmission is lubricated through a combination of pressure from an oil pump and splashing. The oil is led into the main shaft to lubricate and cool the range gears, the input shaft and main shaft bearings. The countershaft brake and output shaft bearings, are also lubricated. The lubrication system has two overflow valves. One valve ensures that the transmission is lubricated if the filter gets blocked while the other prevents excessive pressure in the system, e.g. during cold start. The valves are made up of a compression spring and a valve peg.

MID 223 Gear Selector Control Unit

The manufacturer diagnostic tool is the preferred tool for performing diagnostic work. Contact your local dealer for more information or visit “www.premiumtechtool.com”.

System Overview

The gear selector is attached to the drivers seat and can be folded away to aid in entering the cabin. There are two available selector configurations, a basic and a premium. The selector in the vehicle is dependant on which program package level the vehicle is built with. Both selectors have gear positions of R (Reverse), N (Neutral), D (Drive), and M (Manual). With the selector in the drive position the transmission will shift as an automatic, performing gear selections and shifting without driver input. When in the manual position, the driver either selects the gears using the gear selector button (premium selector) or will lock the gear that the transmission is presently operating in and hold that gear until the selector is placed in the drive position again (basic selector). With the basic selector, if the manual position is engaged at a stop the vehicle will start in first and hold that gear. The basic selector isn’t equipped with a gear selector button or a economy/performance dive mode button. In situations where the I-Shift is unintentionally left in gear with the parking brake applied, the transmission control module (TCM) will automatically go to neutral when the key switch is turned off. This is done to avoid the transmission getting stuck in gear due to drive line “torque up”. There is a gear selector control module (GSCM) that is located in the center of the dash. The GSCM receives signals from the selector and interprets these signals into communication information that is transmitted to the TCM.

Selector Folding

The gear selector is capable of folding forward to aid in cab entry and is also used to identify which software level that is programmed in the TCM. With the selector in the neutral position (N) press in the fold button and the lever can be folded forward. The display will then show the program package level in place of the driving mode. This is found just to the right of the present gear within the display.

Limp Home Mode

Note: Limp Home Mode should only be used to get a vehicle to a safe or secure location. It is not meant for driving any distance.

At times when a sensor failure or certain internal transmission damage has occurred, “Limp Home Mode” can be activated. Press the “L” button on the gear selector and move the gear lever to the D position to active “Limp Home Mode”. When activated, L is displayed as the driving mode in the DID. In "Limp Home Mode", only forward gears 1, 3 and 5 are available for vehicles with the premium selector and only first gear for vehicles with the basic selector. No matter which selector the vehicle has, reverse gear 1 is available also. The vehicle must be stationary to shift gears. The “Limp Home Mode”, will be deactivated when the ignition is turned off. This mode is only meant to get a vehicle to a safe or secure location.

Sensors

Gear Selector Control Module (GSCM)

The gear selector communicates with the GSCM using 8 wires. These wires are used to decode a switch matrix inside the GSCM.

Inside the gear selector lever there are a number of switches. Some of the switches are normal and some are hall-effect switches.

The GSCM is located in the center of the dash just rear of the Vehicle ECU.

Troubleshooting

MID 130 Transmission Control Unit, Fault Codes

The manufacturer diagnostic tool is the preferred tool for performing diagnostic work. Contact your local dealer for more information or visit “www.premiumtechtool.com”.

The control modules on the information link communicate according to the SAE J1587 standard. The standard has been extended with Volvo’s own supplement (PPID, PSID). The fault codes set by the control modules contain information that is described by the following abbreviations.

MID	Message Identification Description: Identification of a control module.	SID	Subsystem Identification Description: Identification of a component.
PID	Parameter Identification Description: Identification of a parameter (value).	PSID	Proprietary Subsystem Identification Description Volvo: Unique identification of a component.
PPID	Proprietary Parameter Identification Description Volvo: Unique identification of a parameter (value).	FMI	Failure Mode Identifier: Identification of fault types.

FMI Table

FMI	Display Text	SAE Text
0	Too high value	Data valid, but above the normal work range
1	Too low value	Data valid, but below the normal work range
2	Incorrect data	Data erratic, Intermittent or incorrect
3	Electrical fault	Voltage above normal or shorted high
4	Electrical fault	Voltage below normal or shorted low
5	Electrical fault	Current below normal or open circuit
6	Electrical fault	Current above normal or grounded circuit
7	Mechanical fault	Mechanical system not responding properly
8	Mechanical or electrical fault	Abnormal frequency, pulse width or period
9	Communication fault	Abnormal update rate
10	Mechanical or electrical fault	Abnormal rate of change
11	Unknown fault	Failure mode not identifiable
12	Component fault	Bad intelligent device or component
13	Incorrect calibration	Out of calibration
14	Unknown fault	Special instructions
15	Unknown fault	Reserved for future assignment by SAE Data Formal Subcommittee

MID 130 Control module, Fault Tracing

PID

PPID

PSID

SID

MID 130 PID 31 Range Cylinder, Position

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal, or shorted to high source	• Status from ASIC is short circuit to U-BATT	• Slow gear changes • Yellow lamp is sent	• N/A
FMI 5	• Current below normal or open circuit	• Status from ASIC is open circuit	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• Status from ASIC is short circuit to ground	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 13	• Calibration value out of range	• The checksum in NVRAM is not correct or, the sensor has not been calibrated.	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start	• N/A

MID 130 PID 32 Split Cylinder, Position

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal, or shorted to high source	• Status from ASIC is short circuit to U-BATT	• Slow gear changes • Yellow lamp is sent	• N/A
FMI 5	• Current below normal or open circuit	• Status from ASIC is open circuit	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• Status from ASIC is short circuit to ground	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 13	• Calibration value out of range	• The checksum in NVRAM is not correct or, the sensor has not been calibrated.	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start	• N/A

MID 130 PID 33 Clutch Cylinder, Position

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• The difference between clutch positions indicated by the sensor signal (SEPoC) and the inverted sensor signal (SEPoCINV) is to large and both signals are within normal range	• Yellow lamp is sent • Slow clutch performance • Rough shifting at start and at slow speed • Slow gear changes	• N/A
FMI 3	• Voltage above normal, or shorted to high source	• Sensor signal is short circuit to UBATT or sensor supply when: at least one of the sensor signals is above normal range	• Yellow lamp is sent • Slow clutch performance • Rough shifting at start and at slow speed • Slow gear changes	• N/A
FMI 5	• Current below normal or open circuit	• Open circuit on any of the sensor signals is detected when: one of the sensor signals is within normal range and the other sensor signal is below normal range • Open circuit on ground is detected when both the sensor signals are within the normal range and the sum of the sensor signals is above a specific value	• Yellow lamp is sent • Slow clutch performance • Rough shifting at start and at slow speed • Slow gear changes	• N/A

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 12	• Faulty device or component	Both sensor signals are below normal when: • Status of the sensor ASIC is internal fault on the sensor or • Short circuit to ground on any of the sensor signals or • Open circuit on supply or • Short circuit between the two sensor signals	• Yellow lamp is sent • Slow clutch performance • Rough shifting at start and at slow speed • Slow gear changes	• N/A
FMI 13	• Calibration value out of range	• The checksum in NVRAM is not correct or, the sensor has not been calibrated.	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start	• N/A

MID 130 PID 36 Clutch Wear, Status

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Data valid but above normal operational range	• The clutch wear is more than or equal to "SERVICE DUE POSITION"	• Yellow lamp is sent • If active for a long period of time the clutch may completely wear out and fail	• N/A

MID 130 PID 37 Air Pressure, Transmission

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Data valid but above normal operational range	• Sensor signal is in normal range • Pressure is above 145 PSI (10.0 bar)	• Yellow lamp is sent • Slow clutch performance	• N/A
FMI 1	• Data valid but below operational range	• Sensor signal is in normal range • Pressure is below 72.5 PSI (5.0 bar)	• Yellow lamp is sent • The symbol for compressed air, transmission is sent • Gear changes may be absent • Slow clutch performance	• N/A
FMI 3	• Voltage above normal or shorted high	• The sensor signal is above normal range	• Yellow lamp is sent	• N/A
FMI 5	• Current below normal or open circuit	• The sensor signal is below normal range	• Yellow lamp is sent	• N/A

MID 130 PID 65 Brake Switch

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 14	• Special Instructions	• The gear lever is moved from neutral or “FOLD” position without prior application of the service brake	• White lamp is sent together with pop up message • The transmission will not engage the selected gear (stays in neutral)	• N/A

MID 130 PID 158 Control module, Battery Voltage

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Data valid but above normal operational range	• 12 Volt System: Voltage is above 19V	• Yellow lamp is sent	• N/A
FMI 1	• Data valid but below operational range	• 12 Volt System: Voltage is below 9 V and the engine has been running for 5 s	• Yellow lamp is sent • Reduced transmission performance	• N/A

MID 130 PID 160 Main Shaft, Rotation Speed

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	• Data valid but below operational range	• The sensor signal is within normal range and, • The main shaft speed differs from both the value of the countershaft speed and the vehicle speed received from the Vehicle ECU The following conditions must be fulfilled for a time of 2.0 s in order to activate: • A gear (not neutral) is engaged in the transmission • The value of the input shaft speed calculated from the main shaft speed sensor (SESM) is more than 300 rpm • The value of the input shaft speed calculated from the counter shaft speed sensor (SESC) is more than 300 rpm	• Yellow lamp is sent • Slow gear changes • Rough gear changes	• N/A

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	(Continued)	• The values of the input shaft speed calculated from the main shaft speed sensor (SESM) and the counter shaft speed sensor (SESC) differ more than 50 rpm • The values of the input shaft speed calculated from the main shaft speed sensor (SESM) and the vehicle speed received from the Vehicle ECU differ more than 30 rpm • The values of the input shaft speed calculated from the counter shaft speed sensor (SESC) and the vehicle speed received from the Vehicle ECU differ less than 30 rpm		

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• The sensor indicates wrong direction The following conditions must be fulfilled for a time of 2,0 s in order to activate: • The input shaft speed calculated from the countershaft speed sensor (SECS) is above 300 rpm and the clutch is engaged or • The input shaft speed calculated from the countershaft speed sensor (SECS) is above 600 rpm and the clutch position is more engaged than the slip point and the engine speed is received from the engine ECM and above 600 rpm • A forward gear is engaged in the transmission and the mainshaft speed sensor (SESM) indicates reverse movement or • A reverse gear is engaged and the mainshaft speed sensor (SESM) indicates forward movement • There is no other active fault on the sensor for the main shaft speed (SEMS)	• Yellow lamp is sent • Slow gear changes	• N/A

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• Signal or supply voltage is above normal range	• Yellow lamp is sent • Slow gear changes • Rough gear changes	• N/A
FMI 4	• Voltage below normal or shorted low	• Signal and supply voltage is below normal range	• Yellow lamp is sent • Slow gear changes • Rough gear changes	• N/A
FMI 5	• Current below normal or open circuit	• Signal voltage is below normal range • Supply voltage is in the normal range	• Yellow lamp is sent • Slow gear changes • Rough gear changes	• N/A

MID 130 PID 161 Input Shaft, Rotation Speed

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	• Data valid but below operational range	• The sensor signal is within normal range and, • The counter shaft speed differs from both the main shaft speed (SESM) and the vehicle speed received from the Vehicle ECU when the counter shaft is rotating The following conditions must be fulfilled for a time of 2.0 s in order to activate: • A gear (not neutral) is engaged in the transmission • The value of the input shaft speed calculated from the main shaft speed sensor (SESM) is more than 300 rpm • The value of the input shaft speed calculated from the counter shaft speed sensor (SESC) is more than 300 rpm	• Yellow lamp is sent • Slow gear changes • Transmission brake up-shifts cannot be used • Engagement point not functioning properly • Starting gear can only be engaged when the vehicle is stationary or when the vehicle speed is high enough to synchronize the transmission with the engine	• N/A

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 1	(Continued)	• The values of the input shaft speed calculated from the counter shaft speed sensor (SESC) and the main shaft speed sensor (SESM) differ more than 50 rpm • The values of the input shaft speed calculated from the counter shaft speed sensor (SESC) and the vehicle speed received from the Vehicle ECU differ more than 30 rpm • The values of the input shaft speed calculated from the main shaft speed sensor (SESM) and the vehicle speed received from the Vehicle ECU differ less than 30 rpm		

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 4	• Voltage below normal or shorted low	• The sensor signal is below normal range	• Yellow lamp is sent • Slow gear changes • Transmission brake up-shifts cannot be used • Engagement point not functioning properly • Starting gear can only be engaged when the vehicle is stationary or when the vehicle speed is high enough to synchronize the transmission with the engine	• N/A
FMI 5	• Current below normal or open circuit	• The sensor signal is above normal range	• Yellow lamp is sent • Slow gear changes • Transmission brake up-shifts cannot be used • Engagement point not functioning properly • Starting gear can only be engaged when the vehicle is stationary or when the vehicle speed is high enough to synchronize the transmission with the engine	• N/A

MID 130 PID 177 Oil Temperature, Transmission

Note: FMI 0 has three levels of severity, low, medium and high. All times are reset when the key is switched off.

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0 (Low)	• Data valid but above normal operational range	• The sensor signal is in normal range • Temperature is above 100°C (212°F) during 18000 s	• Yellow lamp is sent • Symbol for high transmission oil temperature is lit	• N/A
FMI 0 (Medium)	• Data valid but above normal operational range	• The sensor signal is in normal range • Temperature is above 120°C (248°F) during 600 s	• Yellow lamp is sent • Symbol for high transmission oil temperature is lit	• N/A
FMI 0 (High)	• Data valid but above normal operational range	• The sensor signal is in normal range • Temperature is above 140 °C (284°F) during 30 s	• Red stop lamp is illuminated • Symbol for high transmission oil temperature is lit	• N/A
FMI 4	• Voltage below normal or shorted low	• The sensor signal is below normal range	• Yellow lamp is sent	• N/A
FMI 5	• Current below normal or open circuit	• The sensor signal is above normal range	• Yellow lamp is sent	• N/A

MID 130 PPID 10 Gear Selector Cylinder 1, Position

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• Status from ASIC is short circuit to U-BATT	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 5	• Current below normal or open circuit	• Status from ASIC is open circuit	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• Status from ASIC is short circuit to ground	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 13	• Calibration value out of range	• The checksum in NVRAM is not correct or • The sensor has not been calibrated	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start	• N/A

MID 130 PPID 11 Gear Selector Cylinder 2, Position

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• Status from ASIC is short circuit to U-BATT	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 5	• Current below normal or open circuit	• Status from ASIC is open circuit	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• Status from ASIC is short circuit to ground	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 13	• Calibration value out of range	• The checksum in NVRAM is not correct or • The sensor has not been calibrated	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start	• N/A

MID 130 PPID 50 Clutch, Pre-load

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Data valid but above normal operational range	• The calculated stored energy is above 200 kJ • The energy calculation is time based for VTNA and physical for others	• Yellow lamp is sent • The clutch is overheated • The clutch is slowly engaged	• N/A
FMI 11	• Clutch protection active (unidentifiable error)	• Clutch slip more than 8.0 s with vehicle movement less than 0.8 m (e.g. hill holding event)	• Yellow lamp is sent • There has been unnecessary clutch slip • The clutch is slowly engaged	• N/A
FMI 14	• Special instructions	• Attempt to start in high range in manual position	• White lamp is sent • Not possible to start	• N/A

MID 130 PPID 51 Clutch Disc, Pull Position

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 13	• Calibration value out of range	• The checksum in NVRAM is not correct • The slip point has not been calibrated	• Yellow lamp is sent • It is not possible to drive the vehicle	• N/A

MID 130 PPID 54 ECM +5V Output

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Data valid but above normal operational range	• Voltage is above normal range	• Yellow lamp is sent • Slow clutch performance • Uneven shifting at start and at slow speed • Slow gear changes	• N/A
FMI 1	• Data valid but below operational range	• Voltage is below normal range	• Yellow lamp is sent • Slow clutch performance • Uneven shifting at start and at slow speed • Slow gear changes	• N/A

MID 130 PPID 55 ECM, Temperature

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Data valid but above normal operational range	• Temperature is above 125°C (257°F)	• Yellow lamp is sent	• N/A

MID 130 PPID 140 Inclination Angle

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• The sensor signal is above or below normal range • The vehicle has been standing still for a specific time	• Yellow lamp is sent • The start gear may be wrong • Gear selection performance might be reduced • Downhill and uphill gear change performance may be reduced	• N/A

MID 130 PSID 1 PWM Valve, Quick Engagement

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT and • There is no active fault code for short circuit to U-BATT on VAF-	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A

MID 130 PSID 2 PWM Valve, Slow Engagement

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT and • There is no active fault code for short circuit to U-BATT on VAS-	• Yellow lamp is sent • Erratic clutch performance • Uneven shifting at start and at slow speed	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • Erratic clutch performance • Uneven shifting at start and at slow speed	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • Erratic clutch performance • Uneven shifting at start and at slow speed	• N/A

MID 130 PSID 3 PWM Valve, Quick Disconnection

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT and • There is no active fault code for short circuit to U-BATT on VAF-	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A

MID 130 PSID 4 PWM Valve, Slow Disconnection

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT and • There is no active fault code for short circuit to U-BATT on VAS-	• Yellow lamp is sent • Erratic clutch performance • Uneven shifting at start and at slow speed	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance	• N/A

MID 130 PSID 5 Ground, Quick PWM Valves

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The low-side drive is short circuit to U-BATT	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• The low-side drive is short circuit to ground and • There is no active fault code for short circuit to ground on VAFE or VAFD	• Yellow lamp is sent • Erratic clutch performance • Slow clutch performance • Slow gear changes	• N/A

MID 130 PSID 6 Ground, Slow PWM Valves

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The low-side drive is short circuit to U-BATT	• Yellow lamp is sent • Erratic clutch performance • Uneven shifting at start and at slow speed	• N/A
FMI 6	• Current above normal or grounded circuit	• The low-side drive is short circuit to ground and • There is no active fault code for short circuit to ground on VASE or VASD	• Yellow lamp is sent • Erratic clutch performance • Uneven shifting at start and at slow speed	• N/A

MID 130 PSID 12 Solenoid Valve, Gear Selector Cylinder 1, Inner

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A

MID 130 PSID 13 Solenoid Valve, Gear Selector Cylinder 1, Outer

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A

MID 130 PSID 14 Solenoid Valve, Gear Selector Cylinder 2, Inner

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A

MID 130 PSID 15 Solenoid Valve, Gear Selector Cylinder 2, Outer

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Incorrect gear selection	• N/A

MID 130 PSID 20 Solenoid Valve, Power Take-off 1

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • The PTO cannot be deactivated • Rough gear changes	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • The PTO does not work	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • The PTO does not work	• N/A

MID 130 PSID 21 Solenoid Valve, Power Take-off 2

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • The PTO cannot be deactivated • Rough gear changes	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • The PTO does not work	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • The PTO does not work	• N/A

MID 130 PSID 22 Solenoid Valve, Brake, Counter Shaft

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Red stop lamp is illuminated • The valve and the brake are activated • The transmission will be damaged if the vehicle drives • The drive shaft has to be removed to move the vehicle	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Slow gear changes	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Slow gear changes	• N/A

MID 130 PSID 23 Split Engagement System

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Unintentional disengagement of indirect split	• Low split jumps out • The split cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• N/A
FMI 1	• Unintentional disengagement of direct split	• High split jumps out • The split cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• N/A
FMI 2	• Unintentional disengagement of neutral split	• The split cylinder position leaves the neutral position • The split cylinder valves are inactive	• Yellow lamp is sent	• N/A
FMI 7	• Blocked engagement of neutral split	• The neutral split gear cannot engage	• Yellow lamp is sent • Eco roll not available	• N/A
FMI 11	• Blocked engagement of indirect split	• The indirect split gear can not engage	• Yellow lamp is sent • Loss of torque • Incorrect gear selection • Slow gear changes	• N/A
FMI 12	• Blocked engagement of direct split	• The direct split gear can not engage	• Yellow lamp is sent • Loss of torque • Incorrect gear selection • Slow gear changes	• N/A

MID 130 PSID 24 Range Engagement System

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Unintentional disengagement of low range	• The range cylinder leaves the low range position • The range cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• N/A
FMI 1	• Unintentional disengagement of high range	• The range cylinder leaves the high range position • The range cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• N/A
FMI 11	• Blocked engagement of low range	• The low range gear can not engage	• Yellow lamp is sent • Loss of torque • Incorrect gear selection	• N/A
FMI 12	• Blocked engagement of high range	• The high range gear can not engage	• Yellow lamp is sent • Loss of torque • Incorrect gear selection	• N/A

MID 130 PSID 25 Gears 1/R Engagement System

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Unintentional disengagement of first gear	• The 1/R cylinder leaves the 1:st position • The 1:st cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Cylinder stroke • Clutch teeth, engaging sleeve • Piston rod • Main shaft hub • Gear wheel
FMI 1	• Unintentional disengagement of reverse gear	• The 1/R gear leaves the reverse position • The 1/R cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Cylinder stroke • Clutch teeth, engaging sleeve • Piston rod • Main shaft hub • Gear wheel
FMI 2	• Unintentional disengagement of neutral	• The 1/R cylinder leaves the neutral position • The 1/R cylinder valves are inactive	• Yellow lamp is sent • Loss of torque • Slow gear changes	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Cylinder stroke • Piston rod
FMI 7	• Blocked engagement of neutral	• The 1/R cylinder cannot reach neutral position when requested	• Yellow lamp is sent • Slow gear changes	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Seals, solenoid valve • Piston rod • Engaging sleeve

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 11	• Blocked engagement of first gear	• The 1:st gear can not engage and, • There is no active fault code on the SEPo1R and, • There is no active fault code for low air pressure and, • There is no active fault code on any of the 1:st and reverse gear cylinder valves	• Yellow lamp is sent • Loss of torque • Incorrect gear selection • The 1:st gears will not be selected by the system for a short while after five successful gearshifts a new attempt to use 1:st gear may be made	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Seals, solenoid valve • Gear and engagement Clutch teeth • Piston rod • Gear wheel
FMI 12	• Blocked engagement of reverse gear	• The reverse gear cannot engage	• Yellow lamp is sent • The R gear can not engage, but the system will try to engage it as log as the gear lever is in the reverse position	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Seals, solenoid valve • Gear and engagement Clutch teeth • Piston rod • Gear wheel

MID 130 PSID 26 Gears 2/3 Engagement System

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Unintentional disengagement of second gear	• The 2/3 cylinder position indicates that the 2/3 gear leaves the 2:nd position • The cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Cylinder stroke • Clutch teeth engaging sleeve • Piston rod • Main shaft hub • Gear wheel
FMI 1	• Unintentional disengagement of third gear	• The 2/3 cylinder leaves the 3:rd position • The 3:rd cylinder valves are inactive	• Yellow lamp is sent • Loss of torque	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Cylinder stroke • Clutch teeth engaging sleeve • Piston rod • Main shaft hub • Gear wheel
FMI 2	• Unintentional gear engagement	• The split cylinder position leaves the neutral position • The split cylinder valves are inactive	• Yellow lamp is sent	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Cylinder stroke • Piston rod
FMI 7	• Blocked engagement of neutral	• The 2/3 gear cylinder cannot reach neutral position when requested	• Yellow lamp is sent • Slow gear changes	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Seals, solenoid valve • Piston rod • Engaging sleeve

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 11	• Blocked engagement of second gear	• The 2:nd gear can not engage	• Yellow lamp is sent • Loss of torque • Incorrect gear selection • The 2:nd gear will not be selected by the system for a short while after five successful gearshifts a new attempt to use 2:nd gear may be made	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Seals, solenoid valve • Gear and engagement Clutch teeth • Piston rod • Gear wheel
FMI 12	• Blocked engagement of third gear	• The 3:rd gear cannot engage	• Yellow lamp is sent • Loss of torque • Incorrect gear selection • The 3:rd gear will not be selected by the system for a short while after five successful gearshifts a new attempt to use 3:rd gear may be made	• Control housing detent assembly • Brass lugs • Transmission Control Module (TCM) • Seals, solenoid valve • Gear and engagement Clutch teeth • Piston rod • Gear wheel

MID 130 PSID 27 Clutch System

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 0	• Unintentional disengagement of the clutch	• The clutch disengages when not commanded and, • There is no active fault code on the SEPoC and, • There is no active fault code for low air pressure and, • There is no active fault code on any of the clutch cylinder valves and, • The PCB temperature is above a specific limit	• Yellow lamp is sent • Slow gear changes • Slow clutch performance	• Clutch valve assembly
FMI 1	• Unintentional engagement of the clutch	• The clutch engages when not commanded and, • There is no active fault code on the SEPoC and • There is no active fault code for low air pressure and • There is no active fault code on any of the clutch cylinder valves and, • The PCB temperature is above a specific limit	• Yellow lamp is sent • Slow gear changes • Erratic clutch performance	• Clutch cylinder • Clutch valve assembly • Clutch cylinder air hose • Clutch cylinder air connection

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	• Mechanical system not responding or out of adjustment	• The clutch does not disengage/engage properly when commanded and, • There is no active fault code on the SEPoC and, • The mechanical system of the clutch does not work correctly • There is no active fault code for low air pressure and, • There is no active fault code on any of the clutch cylinder valves and, • The PCB temperature is above 10°C (50°F)	• Yellow lamp is sent • Slow gear changes • Erratic clutch performance	• Clutch • Clutch cylinder • Clutch cylinder air hose • Clutch valve assembly • Clutch valve assembly air supply
FMI 8	• Clutch system	• Low system air pressure • Set point for clutch position can not be reached using normal actuator control Limit for using actuator valves exceeded Clutch position is outside tolerance at disengaged position	• Yellow lamp is sent • Harsh start • Harsh shifting • Slow shifting • Slow clutch engagement at start	• Air leakage from the following component(s): Clutch cylinder Clutch valve assembly Clutch cylinder air hose Clutch cylinder air connection
FMI 11	• Clutch drag	• The clutch transfers too much torque in the disengaged position	• Yellow lamp is sent • The vehicle tends to creep on flat ground at idle • The clutch wear is high	• Clutch • Warped flywheel • Transmission input shaft
FMI 12	• Unintentional clutch slip	• The clutch cannot transfer a specific torque without slipping	• Yellow lamp is sent • The engine torque is reduced so that the clutch does not continue to slip	• Clutch

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 14	• Clutch system	• Not possible to disengage the clutch	• Red stop lamp is illuminated • Not possible to disengage the clutch • Engine shut down • Not possible to shift gears • Not possible to engage neutral gear position	• N/A

MID 130 PSID 28 Transmission Brake

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	• Mechanical system not responding or out of adjustment	• The transmission brake does not brake when the valve is activated	• Yellow lamp is sent • Slow gear changes at standstill	• N/A

MID 130 PSID 200 Communication Interference, Data Link, Engine Control Module (ECM)

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• Message missing on SAE J1939 data link from the following control module: Engine Control Module (ECM)	• Yellow lamp is sent • If there is no CAN 2 data link, automatic gear selection enters backup mode with gear changes only at certain vehicle speeds • If there is no CAN 2 data link and if the engine does not receive messages from the TCM, the gear changes will be slow	• N/A

MID 130 PSID 201 Communication Interference, Data Link, Vehicle ECU

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 8	• Abnormal frequency, pulse width, or period	• Signal from Vehicle ECU indicates fault in the accelerator pedal position or the brake pedal switch	• Yellow lamp is sent • If pedal position undefined, automatic gear selection enters backup mode with gear changes only at certain vehicle speeds • Uneven shifting at start and at slow speed • If service brake undefined, automatic gear selection enters backup mode with gear changes only at certain vehicle speeds	• N/A
FMI 9	• Abnormal update rate	• Message missing on SAE J1939 data link from the following control module: Engine Control Module (ECM)	• Yellow lamp is sent • Automatic gear selection enters backup mode with gear changes only at certain vehicle speeds • Rough shifting at start and at slow speed	• N/A

MID 130 PSID 204 Communication Interference, Data Link, Brake Control Module

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 8	• Abnormal frequency, pulse width, or period	• This FMI shall be set if the wheel speeds from the Brake ECM (MID 136) are not correct.	• Yellow lamp is sent • Slow gear changes	• N/A
FMI 9	• Abnormal update rate	• This FMI shall be set if the message from the Brake ECM (MID 136) is not received	• Yellow lamp is sent • Slow gear changes	• N/A

MID 130 PSID 207 Communication Interference, Data Link, Gear Selector Control Module

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• This FMI shall be set if the message from the GSCM (MID 223) is not received	• Yellow lamp is sent • Slow response on manual gear changes and slow response when buttons on the gearlever are pressed.	• N/A

MID 130 PSID 210 J1939 Data Link Interruption, Lighting ECM

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• This FMI shall be set if the message from the LCM (MID 216) is not received	• Yellow lamp is sent • The start gear might be wrong • Automatic gear selection performance might be reduced a certain time after start • Automatic gear selection performance might be reduced a certain time after a trailer has been connected/disconnected	• N/A

MID 130 PSID 211 J1939 Data Link Interruption, Adaptive Cruise Control ECM

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• This FMI shall be set if the message from the ACC (MID 219) is not received and, • ACC is installed	• Yellow lamp is sent • The retarder ACC function does not work	• N/A

MID 130 PSID 232 Powertrain CAN

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
Note: This fault code is valid for vehicles where a CAN 2 data link exists between the TCM and the engine				
FMI 2	• Data erratic, intermittent, or incorrect	• CAN 2 data link communication does not work	• Yellow lamp is sent • Slow gear shifts	• N/A
FMI 9	• Abnormal update rate	• Message missing on SAE J1939 data link from the following control module: Engine Control Module (ECM)	• Yellow lamp is sent • Slow gear shifts	• N/A

MID 130 PSID 254 DIEE Signal

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The voltage level for the DIEE pin is high	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start • All communication with the control module is disabled except for programming of MSW	• N/A

MID 130 SID 35 Solenoid Valve, High Range

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • Low range gears are missing • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • High range gears are missing • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Range gears are missing • Incorrect gear selection	• N/A

MID 130 SID 36 Solenoid Valve, Low Range

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • High range gears are missing • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Low range gears are missing • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Range gears are missing • Incorrect gear selection	• N/A

MID 130 SID 37 Solenoid Valve, High Split

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • Indirect and neutral split gears are missing • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Splitter gears are missing • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Splitter gears are missing • Incorrect gear selection	• N/A

MID 130 SID 38 Solenoid Valve, Low Split

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 3	• Voltage above normal or shorted high	• The high-side drive is short circuit to U-BATT	• Yellow lamp is sent • The valve is activated • Direct and neutral split gears are missing • Incorrect gear selection	• N/A
FMI 5	• Current below normal or open circuit	• The high-side drive is open circuit	• Yellow lamp is sent • The valve cannot be activated • Splitter gears are missing • Incorrect gear selection	• N/A
FMI 6	• Current above normal or grounded circuit	• The high-side drive is short circuit to ground	• Yellow lamp is sent • The valve cannot be activated • Splitter gears are missing • Incorrect gear selection	• N/A

MID 130 SID 231 SAE J1939 Data Link

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• CAN 2 data link communication does not work	• Yellow lamp is sent • Slow gear shifts	• N/A

MID 130 SID 240 Program Memory

Note: The boot program only sets this fault code during power-up. The boot program does not save any fault codes.

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• Faulty data in program memory	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start	• N/A

MID 130 SID 250 SAE J1587 Data Link

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• Signal from MID 128 PID 190, PID 85, PPID 212 is not received within 30s	• Yellow lamp is sent • Slow gear shifts • Fault codes cannot be read • On-vehicle tests cannot be performed	• N/A

MID 130 SID 253 Calibration Memory EEPROM

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 13	• Calibration value out of range	• Flash checksum dataset error • Program code missing	• Yellow lamp is sent • Cranking is inhibited • Engine cannot start	• N/A

MID 223 Gear Selector Control Unit, Fault Codes

The manufacturer diagnostic tool is the preferred tool for performing diagnostic work. Contact your local dealer for more information or visit “www.premiumtechtool.com”.

The control modules on the information link communicate according to the SAE J1587 standard. The standard has been extended with Volvo’s own supplement (PPID, PSID). The fault codes set by the control modules contain information that is described by the following abbreviations.

MID	Message Identification Description: Identification of a control module.	SID	Subsystem Identification Description: Identification of a component.
PID	Parameter Identification Description: Identification of a parameter (value).	PSID	Proprietary Subsystem Identification Description Volvo: Unique identification of a component.
PPID	Proprietary Parameter Identification Description Volvo: Unique identification of a parameter (value).	FMI	Failure Mode Identifier: Identification of fault types.

FMI Table

FMI	Display Text	SAE Text
0	Too high value	Data valid, but above the normal work range
1	Too low value	Data valid, but below the normal work range
2	Incorrect data	Data erratic, Intermittent or incorrect
3	Electrical fault	Voltage above normal or shorted high
4	Electrical fault	Voltage below normal or shorted low
5	Electrical fault	Current below normal or open circuit
6	Electrical fault	Current above normal or grounded circuit
7	Mechanical fault	Mechanical system not responding properly
8	Mechanical or electrical fault	Abnormal frequency, pulse width or period
9	Communication fault	Abnormal update rate
10	Mechanical or electrical fault	Abnormal rate of change
11	Unknown fault	Failure mode not identifiable
12	Component fault	Bad intelligent device or component
13	Incorrect calibration	Out of calibration
14	Unknown fault	Special instructions
15	Unknown fault	Reserved for future assignment by SAE Data Formal Subcommittee

MID 223 Control Module, Fault Tracing

PSID

SID

MID 223 PSID 9 Gear Selector, Position

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 12	• Faulty device or component	• The sensor signals do not correspond with valid value	• Yellow lamp is sent • Some or all stalk actions are not working • It is not possible to select gear	• N/A

MID 223 PSID 36 Relay Power Supply

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 7	• Mechanical system not responding properly	• The relay does not release	• Yellow lamp is sent • Fault displayed after ignition OFF • Risk of battery discharge if main circuit breaker is not opened when vehicle is not used	• N/A
FMI 12	• Faulty device or component	• 0 voltage at Pin 1	• It is not possible to drive the vehicle	• N/A

MID 223 PSID 42 Signals, Key

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• Inconsistency between hard-wired ignition signal and ignition signal read on network	• Yellow lamp is sent • Transmission supplied and Optidriver fully functional until main circuit breaker is opened • Risk of battery discharge if main circuit breaker not opened when vehicle not used • Transmission not supplied and vehicle immobilized after main circuit breaker has been cycled	• N/A

MID 223 PSID 200 Communication Interference, Data Link, Engine Control Module (ECM)

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• Message missing on SAE J1939 data link from the following control module: Engine Control Module (ECM)	• Yellow lamp is sent • Downhill help disabled	• N/A

MID 223 PSID 201 Communication Interference, Data Link, Vehicle ECU

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• Message missing on SAE J1939 data link from the following control module: Vehicle ECU	• Yellow lamp is sent • Temporary manual mode disabled • Downhill help disabled • Return to drive disabled	• N/A

MID 223 PSID 205 Communication Interference, Data Link, Transmission Control Module

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• Message missing on SAE J1939 data link from the following control module: Transmission Control module (TCM)	• Yellow lamp is sent • No memorization during 1.5 sec of direction change requests when vehicle is moving • Temporary manual mode disabled	• N/A

MID 223 PSID 214 No Data From BBM

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• Message missing on SAE J1939 data link from the following control module: Bodybuilder	• Yellow lamp is sent	• N/A

MID 130 SID 231 SAE J1939 Data Link

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• CAN 2 data link communication does not work	• Yellow lamp is sent • Gear lever commands slower (J1587) • No memorization during 1.5 sec of direction change requests when vehicle is moving • Temporary manual mode disabled • Downhill help disabled • Return to drive disabled	• N/A

MID 223 SID 240 Program Memory

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• Fault data in program memory • The control module is not programmed	• Yellow lamp is sent • GSCM: No function except supply the relay • Unable to shift out of neutral position	• N/A

MID 223 SID 250 SAE J1587 Data Link

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 9	• Abnormal update rate	• The information link SAE J1587 data link is not working	• Yellow lamp is sent	• A control module is being programmed

MID 223 SID 253 Calibration Memory EEPROM

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 2	• Data erratic, intermittent, or incorrect	• Fault in main software	• Yellow lamp is sent • Use of default values of parameters	• The control module is not programmed

MID 223 SID 254 Hardware Fault

Type of fault:	FMI Description:	Fault Condition:	Possible Symptoms:	Possible Cause:
FMI 12	• Faulty device or component	• Internal fault in control module	• Yellow lamp is sent • It is not possible to drive the vehicle	• Gear selector control module (GSCM)

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