

DIAGNOSTIC AND FAULT CODES

GENERAL

MONITORING SYSTEM

The Engine Management System (EMS) features a monitoring system that self-diagnoses various electrical and electronic components. This mode becomes active when the ignition key is turned ON.

NOTE: Some components require the engine to be running to be monitored (fuel injectors for example).

The monitoring system continuously validates that the components (control modules, sensors and actuators) are not faulty or defective. When a malfunction is detected, the related electronic module(s):

- Sets an active fault code.
- Adapts the proper protection strategy according to the failure.
- Sends out signals to the multifunction gauge to inform the rider of a particular condition.

A fault code is an indication that a glitch or malfunction is detected by the monitoring system of the vehicle.

If a minor fault occurs, the engine and vehicle will continue to operate without noticeable loss of performance.

If a more important fault occurs, engine RPM may be limited. The engine/vehicle will continue to operate with reduced performance.

If a major component of the EMS fails, engine RPM will be limited as well as vehicle speed.

These strategies are used to protect engine/electrical system from damage and to maintain safe operation of the vehicle. In extreme cases, the engine may also be completely shut down.

Pilot Lamps for Problematic Conditions

When a problem is detected, a pilot lamp will turn on or blink in the multifunction gauge. If the fault that caused the pilot lamp to come on is momentary, the pilot lamp may turn off automatically, or may need to be reset by powering down the vehicle and then restarting it.

A message may also be displayed to provide additional information related to the fault that turned on the pilot lamp. Refer to the following chart.

NOTE: In some cases, the CHECK ENGINE message can be displayed along with other messages.

PILOT LAMP	MULTI-FUNCTION GAUGE MESSAGE	CAUSE
	DESS KEY NOT RECOGNIZED	Module unable to read the key
	BAD KEY	Key not programmed for the vehicle
	LO BATT VOLT	Low system voltage
	HIGH BATT VOLT	High system voltage
	LOW OIL PRESSURE STOP ENGINE	Low engine oil pressure
	LIMP HOME MODE	An important engine management component is not working properly. Vehicle performance is purposely limited
	CHECK ENGINE	An engine management component is not functioning properly
	MAINTENANCE REQUIRED	Periodic maintenance required
	ECM NOT RECOGNIZED	Communication error between gauge and ECM
	CHECK DPS	DPS malfunction
	TRANSMISSION SIGNAL FAULT	Gauge receives an invalid gear position data
	BRAKE	Displayed when brake is applied for more than 15 seconds (while riding)
	HI TEMP	High engine temperature

Limp Home Mode

When a major component of the EMS is not operating properly, limp home mode will be set.

Engine RPM will be limited and/or engine behavior and control may be modified depending on the cause of the failure.

This mode allows the rider to return home, which would otherwise not be possible without this advanced system.

LIMP HOME will be displayed in the multifunction gauge and the CHECK ENGINE light symbol will be on in the gauge.

FAULT CODES

Fault Code Categories

A fault code consists of an alphanumeric designator followed by a hexadecimal number of 3 digits. The alphanumeric designator defines the category of the fault code while the hexadecimal number refers to a unique fault.

FAULT CODE CATEGORIES		
ALPHANUMERIC DESIGNATOR	MODULE/ SYSTEM	EXAMPLE OF FAULT CODE
From P0 to P3	Power train, TCM and DPS	P0116
From U0 to U3	Communication between module and sensors	U0073

RELATED MODULE AND FAULTS	
MODULE	FAULT CODE CATEGORY
ECM	P and U
DPS	P and U
Cluster	P and U

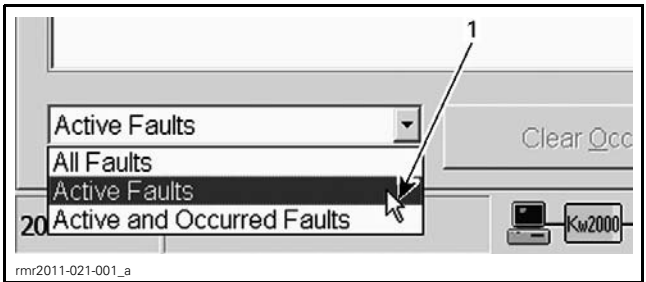
Fault Code States

Fault codes have 3 possible states:

- Active
- Occurred
- Inactive.

Click the **Fault** tab then click on the drop-down list on the LH lower corner.

Choose the fault code state you want to display.



TYPICAL
1. Drop down list

Active Fault Codes

An active fault code is an indication of a fault that is currently triggered.

The active fault may or may not compromise normal operation of the system(s). Service action should be taken to correct the problem that caused the fault code.

Once the fault condition(s) of the active fault is no longer present, its state will change to "occurred".

Occurred Fault Codes

An occurred fault code indicates a fault that was active, but **no longer** is.

The occurred fault does not presently affect system or component operation but is retained as a history of the faults that were detected.

The fault may have been generated due to a system or component that was momentarily operating outside normal parameters. Repeated occurred faults of this type should be considered when troubleshooting a problem, and may require that maintenance action be taken.

An occurred fault may also be generated when disconnecting and reconnecting a component, replacing a burnt fuse, when the software update of an electronic module has been carried out, or may be due to a momentary high or low voltage.

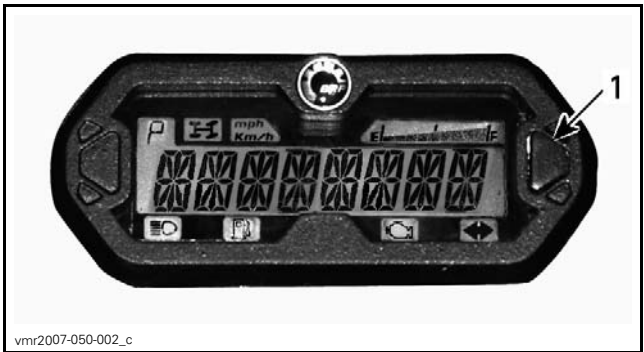
Inactive Fault Codes

An inactive fault code represents a fault code that is neither active, nor occurred. It is simply part of a list of all possible faults that can be monitored by the ECM and multifunction gauge, which may become active or occurred if the monitoring system detects an applicable fault. These codes can be viewed in B.U.D.S.

How to Display Fault Codes in the Multifunction Gauge

NOTE: A fault code must be in an "Active" state to be displayed in the multifunction gauge. B.U.D.S. must be used to read all fault codes states.

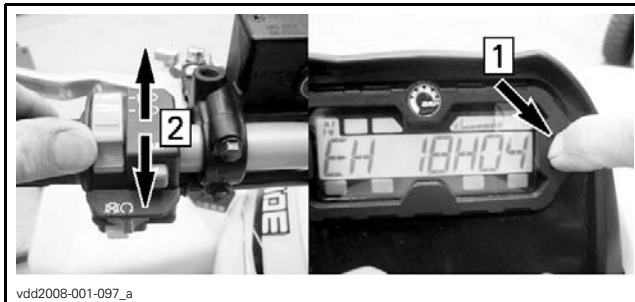
1. Use the selector button or mode button and scroll to Engine Hour (EH) on the gauge.



1. Selector button

2. Press and HOLD mode button while QUICKLY toggling HI - LO beam.

NOTE: A minimum of 3 HI - LO toggles must be completed within 2 seconds.



TYPICAL

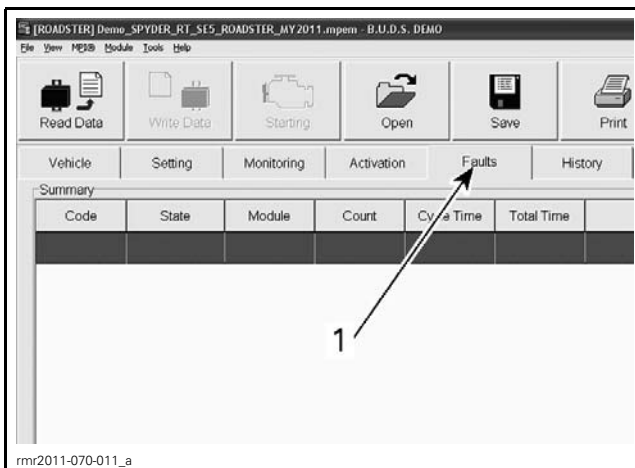
Step 1: Press and hold

Step 2: Quickly toggle HI - LO beam

How to Read Fault Codes Using B.U.D.S.

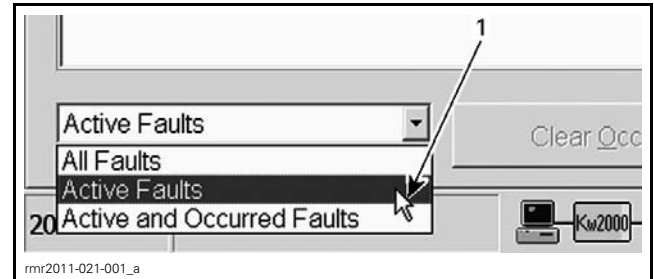
NOTE: All fault code (regardless of their state) can be read with B.U.D.S.

1. Connect vehicle to the latest applicable B.U.D.S. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Click on the **Read Data** button.
3. Click on the **Faults** tab.



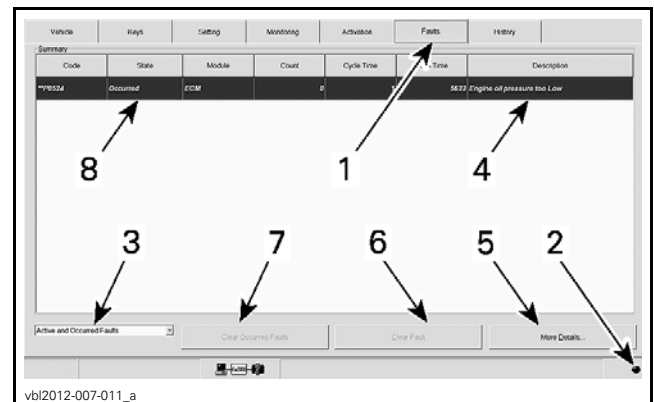
1. Fault tab

4. Click on the drop-down list on the LH lower corner.
5. Choose the fault state to display.



1. Drop down list

FAULT STATE	INFORMATION
All faults	Display all possible faults regardless of state
Active faults	Display only faults matching this state Empty area if there is no active fault
Active and occurred faults	Display only faults that have either state Empty area if there is neither active nor occurred fault



FAULT PAGE

1. Fault tab
2. Fault indicator light
3. Fault code state drop box
4. Fault description
5. More Details button
6. Clear Fault button
7. Clear Occurred Faults button
8. Selected fault

FAULT PAGE DESCRIPTION	
ITEM	INFORMATION
Fault tab	Click tab to display the fault page
Fault indicator light	When flashing, it indicates there is active fault(s)
Fault code state drop box	Click drop box to select the type of faults to display
Fault nomenclature	Display specific information and statistics related to the fault (see fault nomenclature table)

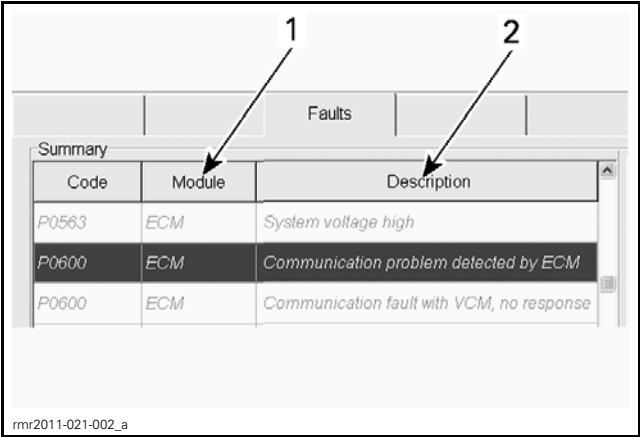
Subsection 01 (DIAGNOSTIC AND FAULT CODES)

FAULT PAGE DESCRIPTION	
ITEM	INFORMATION
More Details button	To display possible causes and service actions related to the selected fault
Clear Fault button	To clear occurred faults one at a time
Clear Occurred Faults button	To clear all occurred faults in related ECU(s)
Selected fault	When a fault is selected, additional information pertaining to that fault will be displayed when clicking the "More details" button. To select a fault, click on the fault with the mouse or use the cursor up or down to scroll to the desired fault

FAULT NOMENCLATURE	
COLUMN	INFORMATION
Code	Fault code number. When 2 stars (**) precedes the code, detailed conditions when the fault occurred, can be displayed by clicking the "More details" button
State	Display the fault state (active, occurred, inactive)
Module	Displays the module that reports the fault code. This is the module that detects or has received a message of an anomaly and reports it. List of modules: - Cluster (multifunction gauge) - DPS (dynamic power steering) - ECM (engine control module)
Count	Number of times this fault occurred within the driving cycle. Value: From 0 to 255
Cycle time	Not to be used. Value: From 0 to 255 minutes
Total time	Not to be used. Value: From 0 to 64 255 minutes
Description	Provides a short description of the fault

When reading a fault code in B.U.D.S., pay particular attention to which module reports a fault. It is indicated in the **Module** column.

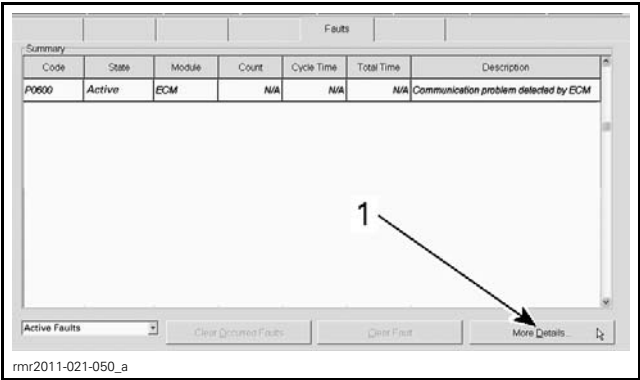
The **Description** column gives a short description of the fault.



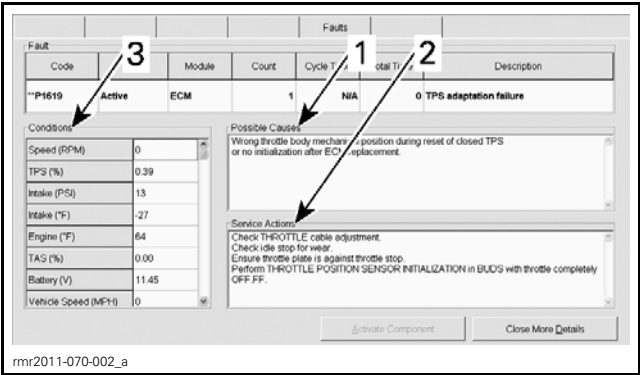
SOME COLUMNS REMOVED FOR CLARITY PURPOSE

- 1. Module that reports a fault
- 2. Fault description

Click on the **More Details** button, on the RH lower corner, to display the "Possible Causes" and the "Service Actions" to step further in the diagnosis.



- 1. Click here



MORE DETAILS PAGE

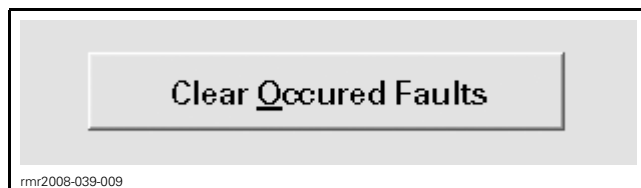
- 1. Possible causes related to the selected fault
- 2. Service actions
- 3. Operating conditions when fault occurred

MORE DETAILS PAGE DESCRIPTION	
ITEM	INFORMATION
Possible causes	List the possible causes that triggered the fault
Service actions	List the possible actions to perform to solve the fault
Conditions when fault occurred	List the operating conditions of the engine and/or vehicle when the fault was triggered

How to Clear Fault Codes Using B.U.D.S.

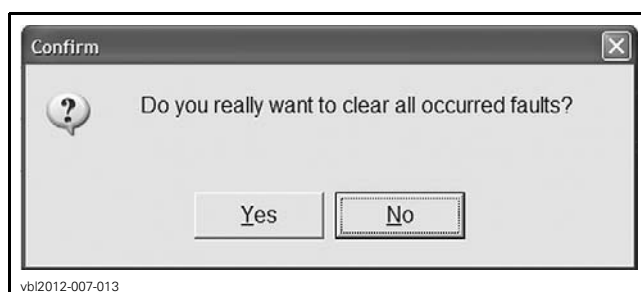
1. Connect vehicle to the latest applicable B.U.D.S. software. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Click on the **Read Data** button.
3. Click on the **Faults** tab.

The fault(s) (occurred state only) can be cleared by pressing the **Clear Occurred Faults** or **Clear Fault** buttons in B.U.D.S.

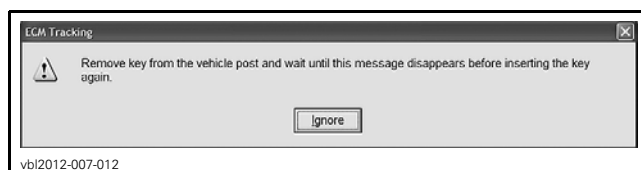


FAULTS PAGE TAB, CLEAR OCCURRED FAULTS

4. Click YES on the following message box.



The following message will appear.



5. Turn ignition OFF and wait until the message disappears.

This will reset the appropriate counter(s) and will also record that the problem has been fixed in the related ECU memory.

NOTE: An active fault code cannot be cleared. In other words, the problem relevant to the fault code must be repaired before the fault can be cleared.

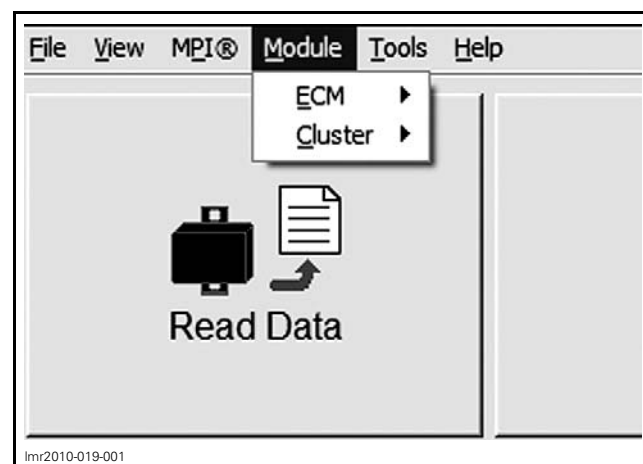
FAULT CODE DIAGNOSTIC

Missing Module

If a module is missing, several fault codes will appear.

To quickly find which module is missing, perform the following:

1. Connect vehicle to the latest applicable B.U.D.S. software. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Click on the **Read Data** button.
3. Click **Module** in the menu bar.
4. Look at the list of modules.
5. If a module is not visible, then it is not communicating through the CAN bus (controller area network).



TYPICAL - MODULE SUBMENU LIST

6. Refer to the following table to find the appropriate subsection in this manual to diagnose the missing module.

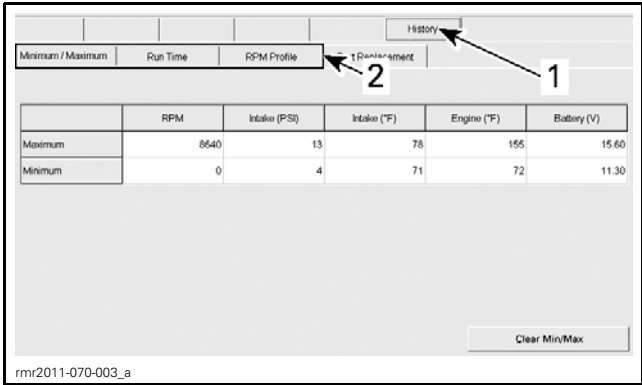
MISSING MODULE	SECTION TO REFER TO
ECM	<i>ELECTRONIC FUEL INJECTION (EFI)</i>
Cluster	<i>LIGHTS, GAUGE AND ACCESSORIES</i>
DPS	<i>DYNAMIC POWER STEERING (DPS)</i>

Diagnostic Tips

To see the last minute of operating conditions, click on the **History** tab in B.U.D.S.

Subsection 01 (DIAGNOSTIC AND FAULT CODES)

NOTE: The page displays data whatever there is fault code(s) or not.



- 1. History tab
- 2. Additional history pages

HISTORY PAGE DESCRIPTION	
ITEM	INFORMATION
Minimum/Maximum	Display the minimum and maximum values encountered. Click "Clear Min/Max" to reset the values
Run time	Display the time proportion in what mode the engine was running in
RPM profile	Display the RPM range proportion in which the engine was running in

When a minor fault occurs:

- Turn ignition key OFF.
- Wait 30 seconds.
- Turn ignition key ON.

This should change the fault state from "Active" to "Occurred".

The vehicle should then operate normally.

If a sensor-related fault persists, you may try disconnecting/reconnecting the sensor.

Read the following for a general approach to troubleshoot fault codes (active or occurred).

GENERAL GUIDELINES TO SOLVE FAULT CODES	
CONDITION	ACTION
Troubleshooting vehicle	Use B.U.D.S. to: Read fault codes. Display "Active" faults to see components currently not operating normally. Display "Occurred" faults to troubleshoot intermittent problems. Monitor system(s), sensor(s), switches and actual conditions. Activate component(s) for troubleshooting. Set components (resets etc). Know the last minute of operating conditions by using the "History" page. Know the operating conditions, if available, when a fault code occurred by using the "More details" button in the fault page.
New fault(s) appear after a vehicle maintenance or repair	Check sensor connections or mixed up connections. Before vehicle maintenance: Read the electronic modules with B.U.D.S. After vehicle maintenance: Read the electronic modules with B.U.D.S. Compare the fault code(s) before and after the maintenance using the printed copy and the current B.U.D.S. reading. Investigate only the newly fault codes. Clear all occurred faults in B.U.D.S.
Communication faults displayed as "Occurred" after module flashing	Normal behavior when flashing a module. Clear all occurred faults and check again.
Sensor "Active" fault	Read the fault description in B.U.D.S. Click on the "More Details" button. Look at the "Conditions" when available. Read the "Possible Causes". Apply the "Service Actions".

GENERAL GUIDELINES TO SOLVE FAULT CODES	
CONDITION	ACTION
Low system voltage on one module. Power problem on sensor(s)	Check related fuse(s) and relay. Check related power and ground wires. Check for common power supply to several sensors/modules (refer to <i>POWER DISTRIBUTION AND GROUNDS</i>). NOTE: Some sensors are supplied by the battery while others are supplied by a module.
Low system voltage on several modules (several communication faults will also appear)	Check battery condition and connections. Check related fuse(s) and relay. Check voltage regulator/rectifier.
High system voltage on several modules	A battery charger has likely been used to substitute the vehicle battery. Clear all occurred faults and check again. Check voltage regulator/rectifier.
When all modules report that a module is missing	Check the module that is reported as missing. Check related fuse(s) and relay. Check related power and ground wires.
When several modules are in fault	Search for a common problem such as a faulty sensor.
CAN bus OFF	When several modules and sensors report that a module is missing. The missing module may report CAN bus off. Check related CAN wires (continuity, short to ground, short between CAN low and high). Check module pins and wiring terminals. Then, the other modules should stop reporting that module is missing.
Occurred fault(s)	May have been generated due to a system or component that was momentarily operating outside normal parameters.
	May be generated when disconnecting and reconnecting a component, replacing a burnt fuse, or may be due to a momentary high or low voltage.
	Before being "Occurred", a fault has always been "Active" for a certain time, indicating that an unexpected condition or problem has been present during the driving cycle. A frequent momentarily fault or an intermittent fault may never be seen as "Active" in B.U.D.S. while there is still a pending problem. This type of malfunctions can be discovered by looking at the "Occurred" faults and then by evaluating the fault count. As long as a fault is present, it is displayed as "Active".
Fault count (0 - 255)	Low value: Suggests handling problems (connections, terminal contact/shape etc.). High value: Suggests a frequent and unsolved problem. The problem should be investigated.
Fault conditions (more details button)	Look for abnormal, excessive values.
Hard to find problems	When the basic troubleshooting has been done and the fault code(s) persists, often the problem is related to the wiring harness, connections or electromechanical components. Short to ground, to battery or between wires. Wire splices, chafing, terminal problems (pulled out, bent, out of shape, corroded etc.). Bad contacts in switch or relay.

ECUs share information and their systems may interact with each other. Certain faults may cause more than one ECU to set a fault code or indication (pilot lamp or message) as the failure of some components may affect the operation of several systems.

FAULT CODE TABLE

ACRONYMS USED IN THE FAULT CODE TABLE	
USED IN FAULT CODE TABLE	MEANING
ECM	Engine Control Module
DPS	Dynamic Power Steering
CAN	Controller Area Network
TPS	Throttle Position Sensor
GBPS	Gearbox Position Sensor
SCM	Suspension Control Module

HOW TO FIND FAULT CODE
DESCRIPTIONS

For the latest fault code table, use the **Info Center** submenu in BOSSWeb and enter the following search criteria:

- Enclose the search within quotes " "
- Enter: "ATV DTC (All engines) 2016".