

## Engine Monitor System EMS501

2009-2011 Ford E Series 5.4L, 6.0L, 6.8L

2009-2010 Ford F Series 5.4L, 6.4L, 6.8L

Contact InterMotive for additional vehicle applications

### Introduction

The EMS system continuously monitors several engine and transmission parameters. If any one of these parameters falls outside of its safe operating range, EMS initiates a Shutdown warning. After sounding a warning and flashing the display, the system will shut off the engine when the vehicle comes to a stop. It does this by cutting ignition power to prevent engine/transmission damage and it also disables the fuel pump. The EMS systems also provides Engine Disable Request inputs and an Engine Disabled Confirmation output for use by auxiliary systems that require engine shut down (i.e. a fire suppression system).

Parameters that trigger a Warning and Shutdown:

- Transmission Fluid Temperature > 300° F
- Engine Temperature > 250° F
- Low Engine Coolant (Diesel engines only)
- Low Oil Pressure
- Auxillary Engine Disable Request

### Installation Instructions

Remove the lower dash panel below the steering column and find a suitable location to mount the EMS module. Do not mount the module until all wire harnesses are routed and secure. (The last step of the installation is to mount the module).

**Be sure the vehicle's battery is disconnected before proceeding with the installation.**



**WARNING**  
Disconnect the battery to  
prevent setting a check engine  
light.

It is the installer's responsibility to route and secure all wiring harnesses where they cannot be damaged by sharp objects, mechanical moving parts and high heat sources. Failure to do so could result in damage to the system or vehicle and create possible safety concerns for the operator and passengers.

### Data Link Harness (6-pin connector)

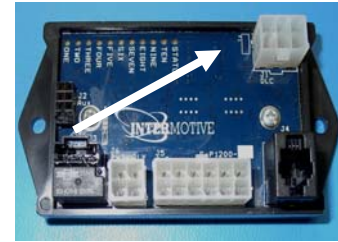
- Locate the vehicle OBDII Data Link Connector. It will be mounted below the lower left dash panel.
- Remove the mounting screws for the OBDII connector. Plug the red connector from the EMS Data Link Harness into the vehicle's OBDII connector. Ensure the connection is fully seated and secured with the supplied wire tie.



## Data Link Harness (6-pin connector)

### Continued

- Mount the black connector from the Data Link Harness in the former location of the vehicle's OBDII connector.
- Secure the Data Link Harness so that it does not hang below the lower dash panel.
- Plug the 6-pin "Data Link" connector into the 6-pin connector on the module.



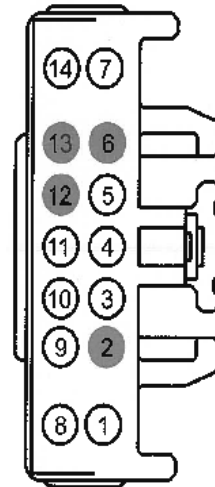
## Engine Shutdown Harness (4-pin connector)

- Locate OEM Connector C2280A on the Smart Junction Box.
- Locate Pin #14 Blue/Red wire.
- Cut the Blue/Red wire 2" from the connector.
- Attach the Blue/Red wire from the harness side to the EMS Engine Shutdown Harness Red wire.
- Attach the Blue/Red wire from the connector side to the EMS Engine Shutdown Harness Blue wire.

**These connections must be made by using solder and the supplied heat shrink tubing.**

**The heat shrink tubing should be cut to 1" lengths for this purpose.**

- Attach the 4-pin EMS harness connector to the 4-pin connector on the EMS module.

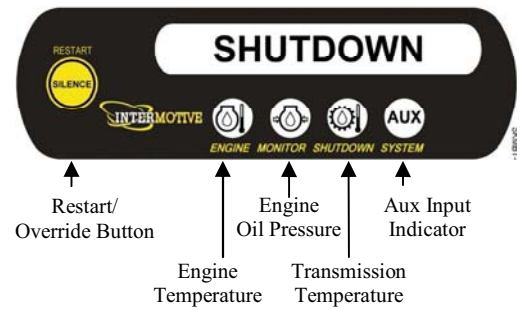


Front of the C2280A Connector



## LED Display Panel

- Locate a suitable position on the dashboard within view of the driver for mounting the EMS LED Display Panel. The length of the display harness is 40". This is the maximum distance the display can be mounted from the EMS module.
- Drill a 5/8" hole in the dashboard where you wish the center of the display to be, being careful not to damage anything behind the dashboard.
- Run the free end of the display harness under the dash and out through the 5/8" hole.
- Attach the end of the display harness to the EMS LED Display Panel.
- Ensure panel is level, and secure using the supplied screws.
- Attach the 4 Pin EMS LED display harness to the EMS Module's 4-pin connector.

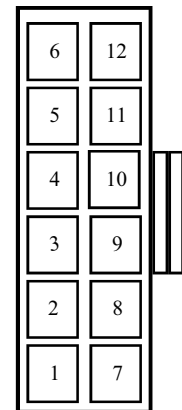
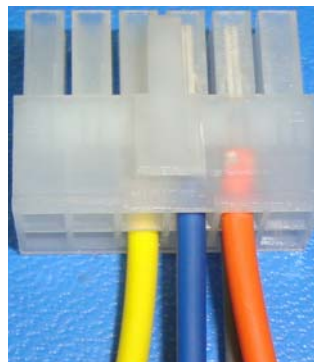


## Control Outputs and Input Connections - 12-pin I/O connector

A harness with a 12-pin connector is provided with the following wires. Note that most of these signals are optional and not all of these wires will be used in any given application. Unused wires should be left as "no connects" and taped up to prevent contact. EMS kits with the "Diesel" option also have green wires in pins 1 & 3. Connect the appropriate wires that your application requires. Solder and tape/heat shrink all connections.

### 12-pin connector pin out definition

- Pin #1 - Green - EC Sensor - Engine Coolant Level Detection Input (Diesel kit Only)
- Pin #2 - Gray - Optional EDR Input - Engine Disable Request Input (0 V)
- Pin #3 - Green - connects to pin 1 in the harness (Diesel kit only)
- Pin #4 - Yellow - Optional EDR Input - Engine Disable Request Input (12 V)
- Pin #5, #6, #7 - Not Used
- Pin #8 - Orange - Warning Indicator Output. Connected to beeper
- Pin #9 - Blue - Optional EDC Output - Engine Disabled Confirmation (12 V)
- Pin #10, #11, #12 - Not Used



Back of the  
12 Pin Connector

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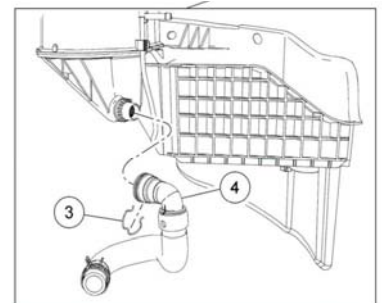
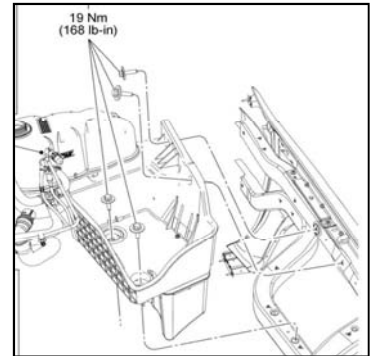
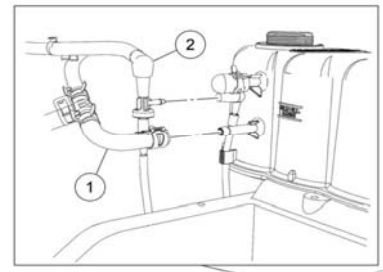
## Engine Coolant Level Detection Input (E-Series 6.0L Diesel Only)

- Make sure coolant is cool and not under pressure.
- Remove the Coolant reservoir mounting bolts.
- Lift the reservoir higher than radiator inlet hose.
- Remove the small over flow hose from the reservoir.
- Tilt the reservoir to locate coolant away from the large reservoir hose.
- Remove the large reservoir hose and drain reservoir.
- Remove the reservoir cap. Completely drain the reservoir.
- Drill a 3/8 inch hole in the location shown for the coolant level sensor.
- Clean all plastic shavings, from drilling the hole, out of the reservoir.
- If the coolant level sensor is too long, cut to desired length.
- Install the coolant level sensor using the rubber seal and nut provided.
- Reconnect the large and small reservoir hoses.
- Reinstall the coolant reservoir mounting bolts.
- Refill the reservoir with coolant. Additional coolant may be needed.
- Reinstall the reservoir cap.
- The optional EMS501 Diesel kit provides green wires inserted into the 12 pin connector at pin locations 1 & 3, with a 36" length to allow connection through the bulkhead for attaching to the coolant level sensor.
- Attach the eyelet connector of the coolant level sensor green wire to the coolant level sensor stud. Secure as needed with wire ties.



## Engine Coolant Level Detection Input (F-Series 6.4L Diesel Only)

- Make sure coolant is cool and not under pressure.
- Drain the engine cooling system.
- Remove the passenger side battery.
- Disconnect the EGR cooler-to-degas bottle hose from the degas bottle. (1)
- If equipped, disconnect the vacuum hose connector. (2)
- Remove the 4 bolts and lift up the degas bottle in order to access the engine-to-degas bottle hose.
- Remove the spring clip and disconnect the engine-to-degas bottle hose from the degas bottle. (3) and (4).
- Remove the degas bottle from the vehicle.
- Remove the reservoir cap. Completely drain the reservoir.
- Drill a 3/8 inch hole in the location shown for the coolant level sensor. Clean all plastic shavings, from drilling the hole, out of the reservoir.
- If the coolant level sensor is too long, cut to desired length.
- Install the coolant level sensor using the rubber seal and nut provided.
- Reconnect the large and small reservoir hoses.
- Reinstall the coolant reservoir mounting bolts.
- Refill the reservoir with coolant. Additional coolant may be needed. Reinstall the reservoir cap.
- The optional EMS501 Diesel kit provides green wires inserted into the 12 pin connector at pin locations 1 & 3, with a 36" length to allow connection through the bulkhead for attaching to the coolant level sensor. Route this wire through the bulkhead.
- Attach the eyelet connector of the coolant level sensor green wire to the coolant level sensor stud. Secure as needed with wire ties.



## Engine Disable Request Input (Optional)

- The EMS501 12 pin connector Pin #2 Gray wire can be connected to a grounding Engine Disable Request input which will activate the Engine Shutdown System and shut off the engine.

**Warning: If the 12 pin connector Pin #2 Gray wire is shorted to ground the engine will turn off when the vehicle speed equals 0 MPH.**

- The EMS501 12 pin connector Pin #4 Yellow wire input can be connected to a 12V Engine Disable Request which will activate the Engine Shutdown System and shut off the engine.  
(For use with auxiliary systems, such as fire suppression, that require an engine/fuel pump to be disabled before activating.)

## Engine Disable Confirmation Signal Output (Optional)

- The EMS501 12 pin connector Pin #9 Blue wire will provide a 12V confirmation output when the Engine Shutdown System disables the engine.  
(Indicates to an auxiliary system that the vehicle has been disabled.)

## Warning Indicator Beeper

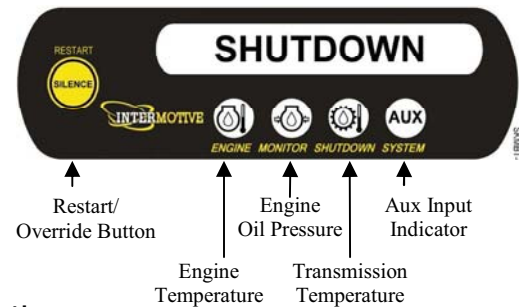
- Locate an accessible location to mount the warning indicator beeper.
- Drill a 1 1/8 inch hole to mount the beeper.
- Connect the EMS501 12 pin connector Pin #8 Orange wire to the indicator beeper positive (+) terminal.
- Connect the Black wire to the indicator beeper negative (-) terminal.
- Attach the indicator beeper Black wire eyelet to a ground source.
- Secure the indicator beeper into the hole with the supplied nut and rubber washer.



## Post Installation Testing

### **THE FOLLOWING PROCEDURE MUST BE PERFORMED TO VERIFY PROPER INSTALLATION:**

- Set Park Brake, place transmission in Park. Start the engine.
- Verify the four lower LEDs prove-out on LED Status Panel. All four (4) lower LEDs should illuminate for approximately two seconds upon initial power on. The Shutdown LED does not prove out.
- Push yellow Restart/Silence button for 10 seconds to enter test mode. Release the button once the warning initiates.
- Shutdown will flash and Beeper will sound for three seconds.
- Shutdown will illuminate solid and the engine will shut down.
- Push and release the Restart/Silence button to restore ignition function.
- Restart the vehicle. Test drive vehicle. Maintain a speed above 5 MPH.
- Push Restart/Silence button for 10 seconds to enter test mode.
- Briefly push Restart/Silence button to silence the beeper.
- Slow the vehicle speed to 0 MPH, the Shutdown LED will illuminate solid and the engine will shut down.
- Push the Restart/Silence button to regain ignition control. Remember to place vehicle in Park to restart engine.
- In vehicles with auxiliary systems which connect to EMS to request engine shut down, you can simulate a shutdown request by either grounding the pin #2 gray wire, or applying 12V to pin #4 yellow wire. Verify the system shuts down the engine when requested.



**The EMS501 is properly installed only if it passes all of the above steps.**

**If any irregular operational issues persist,**

**contact InterMotive at 530-823-1048 for technical assistance.**

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2009-2011 Ford E Series 5.4L, 6.0L, 6.8L

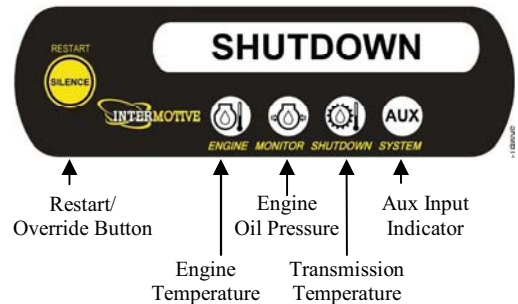
2009-2010 Ford F Series 5.4L, 6.4L, 6.8L

## System Operating Instructions

### Engine Monitor System EMS501 Operation:

The Engine Monitor and Shutdown System gathers specific engine and transmission information and initiates a warning and engine shutdown sequence if any problems are observed. Note that it will NOT shut the engine off if the vehicle is in motion. The system consists of the control module, a remote buzzer for audible notification, an LED panel with several indicators, and a "silence" button for the buzzer.

When the ignition is turned on, the EMS501 module powers up and the four LEDs along the bottom row illuminate for several seconds. With prove out completed, the module begins monitoring the vehicle's internal data network. It uses this information to determine whether operating conditions are safe or potentially damaging to the vehicle. If any parameters are outside of the normal operating range, the EMS501 module will issue a shutdown warning which consists of beeping and flashing the LED panel. Once the vehicle comes to a stop, EMS removes ignition power, thereby shutting off the engine and preventing further damage to the vehicle.



Additionally, there are several inputs to the EMS system which can allow auxiliary equipment to shut the engine down (i.e. fire suppression systems).

When the vehicle's Ignition Switch is shut off in normal operation, the EMS501 module will enter a low power sleep mode within several seconds.

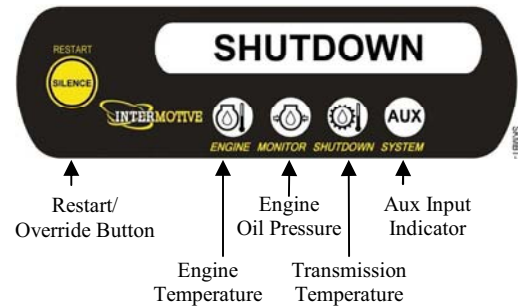


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## System Operating Instructions (Continued)

**Engine Shutdown initiation will be triggered due to any one of the following conditions:**

- Engine Temperature is greater than 250° F.  
Engine temperature LED illuminates.
- Engine Coolant level is below sensor level. (Diesel only)  
Engine temperature LED flashes.
- Engine Oil Pressure Switch indicates low pressure.  
Oil Pressure LED illuminates.
- Transmission Fluid Temperature is greater 300° F.  
Transmission Temperature LED illuminates.
- Auxiliary Engine Disable Request input applied.  
Auxiliary LED illuminates.



**The Engine Shutdown Sequence proceeds as follows:**

- One or more of the filtered threshold value(s) are exceeded and confirmed.
- The audible and visual warning notifies the driver that a shutdown sequence has been initiated and notifies the driver which trigger has been activated.
- The EMS continues to monitor vehicle speed. Once the filtered vehicle speed is zero, the engine is shut off. Therefore, it is highly important that the operator get the vehicle out of harms way before bringing the vehicle to a complete stop.
- The EMS will then record the shutdown event and the activation trigger. The ten most recent events are stored in the module's memory. This information can be extracted and viewed as explained below.

### Viewing EMS501 Shutdown Record:

Follow these steps to view the record of the 10 most recent engine shutdown events:

- Ensure that the proper laptop drivers are installed for the USB to Serial Communication cable provided by InterMotive. All driver files are located online at: <http://www.ftdichip.com/Drivers/VCP.htm>
- Find the correct drivers for your system and follow the steps to download the latest version (located under the "Driver Version" heading). If unsure about the installation process, please contact InterMotive for further assistance.
- Once the installation process is complete, plug the Communication cable into one of your computer's USB ports.

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EMS501-03-OP



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## Viewing EMS501 Shutdown Record: (Continued)

- Ensure the vehicle's key is off and plug the other end of the download cable into the EMS501 port labeled 'COMM'.
- Open the Windows communication application HyperTerminal. This program can be found under: Start > All Programs > Accessories > Communications > HyperTerminal
- You will be prompted to give this connection setup a name. We suggest something meaningful such as EMS Viewer.
- The next window will prompt you to select the COM port for this connection. Typically, the highest numbered COM port will be the InterMotive Communication cable.
- **Note:** This can be double-checked on Windows XP by right-clicking on 'My Computer' and selecting 'Properties.' From this window select the 'Hardware' tab and click on 'Device Manager.' In the Device Manager window, expand the 'Ports' menu and the download cable will display as 'USB Serial Port.'
- In the next window, you will need to change several of the default parameter for the Port Settings.
- Change the Bits per second to: **57600**, Data bits: **8**, Parity: **None**, Stop bits: **1**, and Flow control: **None**.
- HyperTerminal setup is now complete.
- Turn the vehicle key to the ON position. The EMS module should wakeup and text should display on the open HyperTerminal window.
- If nothing appears, unplug the 6 pin connector going into the EMS module, wait several seconds and plug the connector back in.
- If still nothing appears, go to File > New Connection and try re-configuring the HyperTerminal as described above. If unsuccessful, contact InterMotive for further assistance.
- With communication established, type in the words "get data" (followed by the enter key) and the record of the 10 most recent engine shutdown events will display.
- The screen data can be captured to the Windows clipboard for later printing by using the Edit copy command.
- When finished, key off and disconnect the Communication cable.

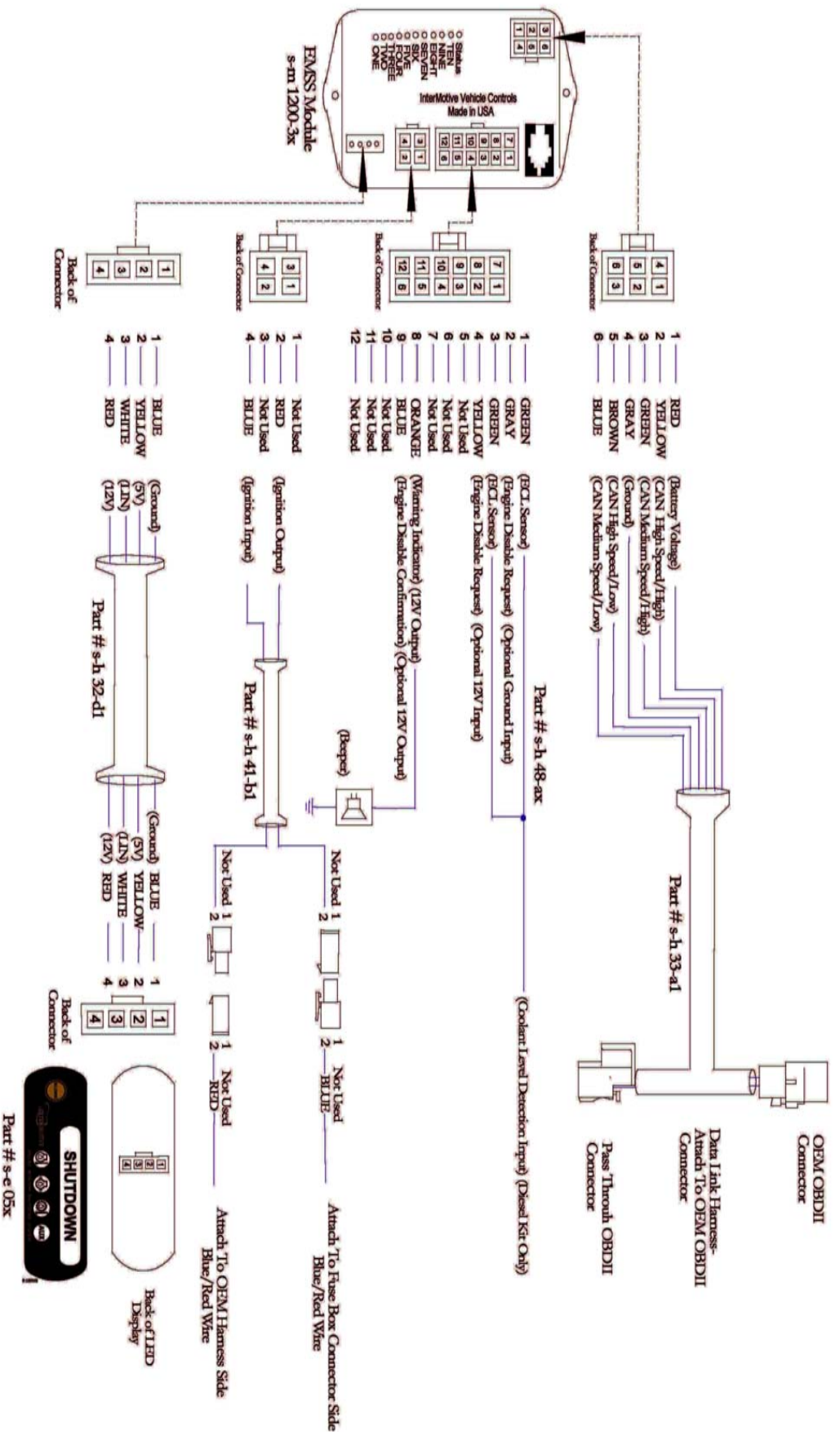
```
InterMotive Engine Monitor Shutdown System
EMS EVENT  EVENT 000(miles)  OFF 000(miles)  TIME(sec)  SILENCE BUTTON
Trans Temp  152851.3        152862.2        525        0
Engine Temp  65556.4           65559.2        205        3
EMS Test     18.0                18.0          0          0
No Event
No Event
No Event
No Event
No Event

NOTE: The most recent event is always in the top slot.
EMS EVENT is the vehicle parameter that initiated the shutdown warning.
EVENT 000 is the odometer mileage at which the EMS event was detected.
OFF 000 is the odometer mileage at which the engine was shut off.
TIME is the time between the start of the EMS event and engine shutoff.
SILENCE BUTTON is a count of the number of times the warning was ignored.
```

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## Submit product registration at [www.intermotive.net](http://www.intermotive.net)

If the EMS501 fails any step in the System Operation Test, review the installation instructions and check all connections.  
If necessary, call

**InterMotive technical support @ (530) 823-1048.**