



**An ISO 9001:2008 Registered Company**

### Merlin – Symptom Flow Chart

**Begin diagnosis by obtaining the Merlin Multiplex System file from the bus builder. The OEM Bus VIN # or Bus Builder Bus # is needed to acquire the MMS information.**

The MMS file # will be displayed on the ISP screen during the system initialization when the key is cycled on. The system will display the first five characters of the MMS file name followed by an arrow then the last character for the name. (11168 FORD.MMS will be displayed as 11168→D.)

If a Gateway Interlock system is installed, observe the operation of the LED display panel. The LEDs must prove out and the Gateway Interlock system must function properly before continuing with diagnostics.

Choose the condition from the chart below that best fits with the symptom identified.

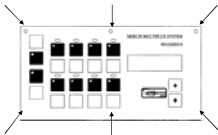
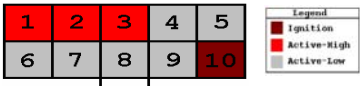
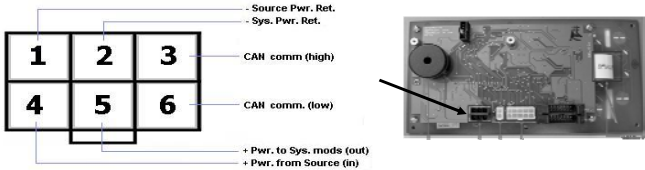

Condition	Possible Causes	Action
<ul style="list-style-type: none"> <li>No system initialization when the key is cycled On.</li> </ul>	<ul style="list-style-type: none"> <li>Connections</li> <li>Power</li> <li>Ground</li> <li>Harness(es)</li> <li>ISP</li> </ul>	<ul style="list-style-type: none"> <li>Go to Pinpoint Test A.</li> </ul>
<ul style="list-style-type: none"> <li>“Comm Error” warning displayed on ISP. Fault Alarm Sounding.</li> </ul>	<ul style="list-style-type: none"> <li>Connections</li> <li>Harness(es)</li> <li>Modules (DPC4, DPC8)</li> </ul>	<ul style="list-style-type: none"> <li>Go to Pinpoint Test B.</li> </ul>
<ul style="list-style-type: none"> <li>Rear A/C , interior lighting, and/or door operators shut down after a few minutes of operation.</li> </ul>	<ul style="list-style-type: none"> <li>Connections</li> <li>Power</li> <li>Ground</li> <li>Harness(es)</li> <li>Module Programming.</li> </ul>	<ul style="list-style-type: none"> <li>Go to Pinpoint Test C.</li> </ul>
<ul style="list-style-type: none"> <li>Button sticks in the depressed position. (Does not pop back up.)</li> </ul>	<ul style="list-style-type: none"> <li>ISP</li> <li>ISP snap dome</li> </ul>	<ul style="list-style-type: none"> <li>Go to Pinpoint Test D.</li> </ul>
<ul style="list-style-type: none"> <li>A system controlled by an ISP button will not function.</li> </ul>	<ul style="list-style-type: none"> <li>Connections</li> <li>Harness(es)</li> <li>ISP</li> <li>ISP Snap Dome</li> <li>Module (DPC4, DPC8)</li> </ul>	<ul style="list-style-type: none"> <li>Go to Pinpoint Test E.</li> </ul>

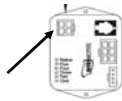
**PINPOINT TEST A: No System Initialization when key is cycled On.**

**No System Initialization when key is cycled On indicates that:**

- the Merlin ISP does not have power, or its 'hot in run' p10 input is not connected.
- the ISP display is inoperative

**Estimated Time To Complete: 18 Minutes**

Test Step	Result/Action to Take
<p><b>A1</b> Ensure that all connectors are installed correctly</p> <ul style="list-style-type: none"> <li>Remove the 4 ISP mounting screws and tilt the ISP forward to expose Harnesses and connectors.</li> <li>Carefully inspect module and harness(es)</li> <li>Refer to Merlin Installation documentation.</li> </ul>  <ul style="list-style-type: none"> <li>Are all harness connectors properly installed into module?</li> </ul>	<p>Results _____</p> <p>Yes Go to A2</p> <p>No Review Merlin Installation instructions, reinstall all connectors in their proper position. Test system for normal operation.</p>
<p><b>A2</b> Check the voltage at the ISP 10 Pin Connector Pin #10.</p> <ul style="list-style-type: none"> <li>Turn the ignition on. Using a digital multimeter, measure voltage between the ISP 10 Pin connector Pin #10 and a ground source.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 Volts?</li> </ul>	<p>Results _____</p> <p>Yes Go to A3.</p> <p>No Repair the Ignition wire which connects to the ISP 10 Pin Connector Pin #10.</p>
<p><b>A3</b> Check voltage at the Merlin Connector at the ISP.</p> <ul style="list-style-type: none"> <li>Locate the the Black 6-Pin Merlin connector at the back of the ISP.</li> <li>Using a digital multimeter measure voltage between the Black wire Pin #1 and the Red wire Pin #4 of the Black 6-Pin Merlin connector.</li> </ul>  <ul style="list-style-type: none"> <li>Is the voltage greater than 10 Volts?</li> </ul>	<p>Results _____</p> <p>Yes Go to A4</p> <p>No With a Gateway 401 installed - Go to A5 With a MIM 401 installed - Go to A6 Without a Gateway lift interlock module installed - Repair Power and ground inputs to the Data Harness Flying Leads. Check the fuse. Refer to the owner's guide or service publications for the location of this fuse.</p>
<p><b>A4</b> Ensure that all wires are in their correct connector cavity</p> <ul style="list-style-type: none"> <li>Carefully inspect all harness connectors.</li> <li>Verify that each connector has the correct wires in the correct connector pin cavity.</li> <li>Refer to the Bus Builder documentation for wire colors and pin locations.</li> </ul> <ul style="list-style-type: none"> <li>Are all wires in their correct connector pin cavity?</li> </ul>	<p>Results _____</p> <p>Yes Contact InterMotive for assistance with the ISP</p> <p>No Contact InterMotive for assistance with harness and connectors</p>
<p><b>A5</b> Check the connections to the Gateway Module.</p> <ul style="list-style-type: none"> <li>Check the Merlin Data Harness connection to the Gateway Module. (Driver's Underdash)</li> </ul>  <ul style="list-style-type: none"> <li>Is the Merlin Data Harness connected to the Gateway Module Merlin Connector?</li> </ul>	<p>Results _____</p> <p>Yes Contact InterMotive for assistance with the Gateway System and/or Data Harness.</p> <p>No Reconnect the Merlin Data Harness Gateway Module Merlin Connector port.</p>

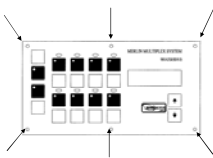
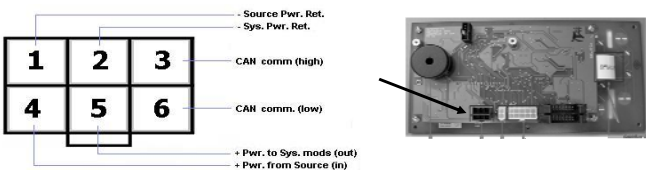
Test Step	Result/Action to Take
<p>A6 Check the voltage at Merlin Single Piece Harness Flying Leads.</p> <ul style="list-style-type: none"> <li>• Locate the 4 Pin Data Harness Connector on the MIM Module. (Driver's Underdash).</li> <li>• Locate the Red and Black flying Leads coming off of the Data Harness.</li> <li>• Measure the voltage at the Data Harness Red Flying Lead using the Data Harness Black Flying Lead as a ground source.</li> </ul>  <p>• Is the voltage greater than 10 Volts?</p>	<p>Results_____</p> <p>Yes Contact InterMotive for assistance with the InterMotive Data Link harness</p> <p>No Repair Power and ground inputs to the Data Harness Flying Leads. Check the OEM fuses. Refer to the owner's guide or service publications for the location of these fuses.</p>

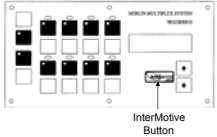
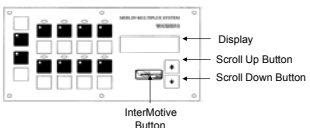
**PINPOINT TEST B: "Comm Error" warning displayed on the ISP. Fault Alarm Sounding.**

If a "Comm Error" warning is displayed on the ISP and/or the Fault Alarm is sounding:

- there is a problem with Data Harness and/or connections / terminations.
- there is a problem with the ISP and/or DPC4/8.

**Estimated Time To Complete: 18 Minutes**

Test Step	Result/Action to Take
<p>B1 Ensure that all connectors are installed correctly</p> <ul style="list-style-type: none"> <li>• Remove the ISP mounting screws and tilt the ISP forward to expose Harnesses and connectors.</li> <li>• Carefully inspect module and harness(es)</li> <li>• Pay special attention to colored tape on connectors indicating proper connections.</li> <li>• Refer to Merlin Installation documentation.</li> </ul>  <p>• Are all harness connectors properly installed into module?</p>	<p>Results_____</p> <p>Yes Go to B2</p> <p>No Review install instructions reinstall all connectors in their proper position. Test system for normal operation.</p>
<p>B2 Ensure that all wires are in their correct connector cavity</p> <ul style="list-style-type: none"> <li>• Carefully inspect all harness connectors</li> <li>• Verify that each connector has the correct wires in the correct connector pin cavity</li> <li>• Refer to the Bus Builder documentation for wire colors and pin locations.</li> </ul> <p>• Are all wires in their correct connector pin cavity?</p>	<p>Results_____</p> <p>Yes Go to B3</p> <p>No Contact InterMotive for assistance with harness and connectors</p>
<p>B3 Checking resistance value of the Data Harness.</p> <ul style="list-style-type: none"> <li>• Locate the Black 6 Pin Data Harness connector at back of the ISP.</li> <li>• Leave the connector plugged in.</li> <li>• Back probe the connector to make connections.</li> <li>• Set the Digital Volt/Ohm Meter (DVOM) to read resistance.</li> <li>• Connect the meter between Pin #3 Green wire and Pin #6 Yellow wire.</li> </ul>  <p>• Is the resistance approximately 60 ohms?</p>	<p>Results_____</p> <p>Yes GO to B4</p> <p>No Contact InterMotive for assistance with Merlin Data Harness.</p>

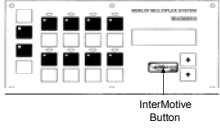
Test Step	Result/Action to Take
<p>B4 Checking Termination resistor positioning.</p> <ul style="list-style-type: none"> <li>• Locate the both ends of the Merlin Data Harness.</li> <li>• Segmented Merlin harnesses (vs. single piece harness) must have a resistor terminator plug on the T-Harness on the far DPC end. Must also have a resistor integrated into the harness on the Gateway end. There should be NO terminator plugs in the ISP "W" harness.</li> </ul> <p>• Are the Terminating Resistors in the correct location?</p>	<p>Results _____</p> <p>Yes Contact InterMotive for assistance with ISP Panel.</p> <p>No Remove and reinstall the Termination Resistors correctly. Contact InterMotive for assistance with one piece harness.</p>
<p><b>PINPOINT TEST C: Entering Merlin Diagnostics. Checking the Merlin system for fault codes.</b></p> <p><b>If a warning is displayed on the ISP and/or the Fault Alarm is sounding:</b></p> <ul style="list-style-type: none"> <li>- there is a problem with Data Harness and/or connections.</li> <li>- there is a problem with the ISP and/or DPC4/8.</li> </ul> <p><b>Estimated Time To Complete: 18 Minutes</b></p>	
Test Step	Result/Action to Take
<p>C1 Entering Merlin Diagnostics.</p> <ul style="list-style-type: none"> <li>• With the key in the ON position and Merlin initialized, press the InterMotive switch on the front of the ISP panel for more than 3 seconds.</li> </ul>  <p>• Did the Merlin system enter diagnostics?</p>	<p>Results _____</p> <p>Yes Go to C2.</p> <p>No Contact InterMotive for assistance with ISP Panel.</p>
Test Step	Result/Action to Take
<p>C2 Using the ISP controls when in diagnostics.</p> <ul style="list-style-type: none"> <li>• Move the selection arrow up and down the menu by pushing the up and down arrows on the ISP Panel.</li> <li>• Select the desired menu item by pushing the InterMotive button on the ISP.</li> <li>• To return to the previous menu, Select "PREVIOUS MENU" at the bottom of the menu.</li> <li>• To exit diagnostics mode, Select "EXIT" from the first menu.</li> </ul>  <p>• Do the arrow up, arrow down and InterMotive buttons function?</p>	<p>Results _____</p> <p>Yes Go to C3.</p> <p>No Contact InterMotive for assistance with ISP Panel.</p>
Test Step	Result/Action to Take
<p>C3 Displaying the Merlin Diagnostic Faults</p> <ul style="list-style-type: none"> <li>• Enter Merlin Diagnostics. (See C1)</li> <li>• Select "DIAG CODES"</li> <li>• Select "FAULT CODES"</li> <li>• The codes will be displayed as a DTC. (Diagnostic Trouble Code)</li> <li>• If there are no faults present the DTC1 will read "DTC1 No DTC"</li> <li>• The module "type" being used will be determined by function: PM1, PM2 - are "types" of DPC8 Modules PM3, PM4, DM1, DM2, DDM1, DDM2 - are "types" of DPC4 Modules.</li> </ul> <p>Are there any DTC faults recorded?</p>	<p>Results _____</p> <p>Yes Contact InterMotive for interpretation of any DTC recorded.</p> <p>No Contact InterMotive for assistance with the Merlin system.</p>

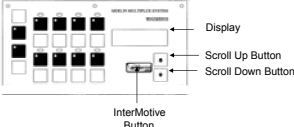
**PINPOINT TEST D: Rear A/C, Interior Lighting, and/or Door Operators shut down sporadically without user input.**

**If a system functions, but shuts down during operation:**

- there is a problem with the ISP programming.
- there is a problem with the DPC4/8 that controls the operation.

**Estimated Time To Complete: 18 Minutes**

Test Step	Result/Action to Take
<p>D1 Checking ISP firmware version.</p> <ul style="list-style-type: none"> <li>• Enter Merlin Diagnostics. (See C1)</li> <li>• Select "DIAG CODES".</li> <li>• Select "FAULT CODES".</li> <li>• Check the DTC codes for "Low Voltage" or "Brown Out".</li> <li>• Select "PREVIOUS MENU" two times.</li> <li>• Select "DETECT VERSION".</li> <li>• Select "ISP version".</li> <li>• If the ISP is a first generation the Version number will start with a "1".</li> <li>• If the ISP is a second generation the Version number will start with a "2".</li> </ul>  <ul style="list-style-type: none"> <li>• Is the ISP Version greater than: Version 1.42 on a first generation ISP? Version 2.02 on a second generation ISP?</li> </ul>	<p>Results _____</p> <p>Yes Go to D2.</p> <p>No Contact InterMotive for assistance with reprogramming the ISP.</p>

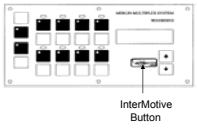
Test Step	Result/Action to Take
<p>D2 Displaying the Merlin Diagnostic Faults.</p> <ul style="list-style-type: none"> <li>• Enter Merlin Diagnostics. (See C1)</li> <li>• Select "DIAG CODES"</li> <li>• Select "FAULT CODES"</li> <li>• The codes will be displayed as a DTC. (Diagnostic Trouble Code)</li> <li>• If there are no faults present the DTC1 will read "DTC1 No DTC"</li> </ul>  <p>Are there any DTC faults recorded?</p>	<p>Results _____</p> <p>Yes Contact InterMotive for interpretation of any DTC recorded.</p> <p>No Contact InterMotive for assistance with ISP Panel.</p>

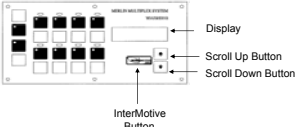
**PINPOINT TEST E: One or more of the Merlin systems function without the switch depressed.**

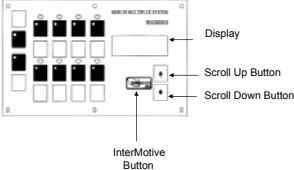
**• If a system initializes, but one or more of the Merlin systems function without the switch depressed.**

- there is a problem with the ISP control panel.
- there is a problem with the ISP switch.

**Estimated Time To Complete: 18 Minutes**

Test Step	Result/Action to Take
<p>E1 Entering Merlin Diagnostics.</p> <ul style="list-style-type: none"> <li>• Enter Merlin Diagnostics. (See C1)</li> </ul>  <ul style="list-style-type: none"> <li>• Did the Merlin system enter diagnostics?</li> </ul>	<p>Results _____</p> <p>Yes Go to E2.</p> <p>No Contact InterMotive for assistance with ISP Panel.</p>

Test Step	Result/Action to Take
<p>E2 Displaying the Merlin Diagnostic Faults.</p> <ul style="list-style-type: none"> <li>• Select "DIAG CODES".</li> <li>• Select "FAULT CODES".</li> <li>• The codes will be displayed as a DTC. (Diagnostic Trouble Code)</li> <li>• If the there are no fault codes present the DTC1 will read "DTC1 NO DTC"</li> </ul>  <ul style="list-style-type: none"> <li>• Are there any DTC Faults recorded?</li> </ul>	<p>Results _____</p> <p>Yes Contact InterMotive for interpretation of any DTC recorded.</p> <p>No GO to E3</p>

Test Step	Result/Action to Take
<p>E3 Check ISP switch operation.</p> <ul style="list-style-type: none"> <li>• Select "BUTTON STATUS" from the main menu.</li> <li>• Check each ISP panel button state by pushing the down button to display the state of each button.</li> </ul>  <ul style="list-style-type: none"> <li>• Are any of the ISP panel buttons ON without the button being depressed?</li> </ul>	<p>Results _____</p> <p>Yes Contact InterMotive for assistance with replacing the switch snap dome.</p> <p>No Contact InterMotive for assistance with the ISP panel.</p>

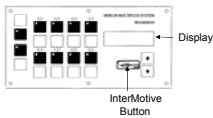
**PINPOINT TEST F: A system controlled by an ISP switch will not function.**

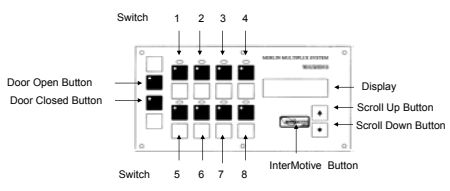
**If a system initializes, but one or more of the Merlin systems do not function:**

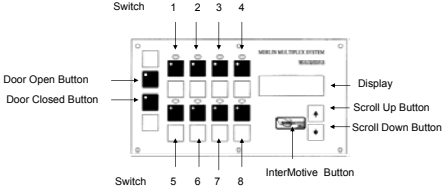
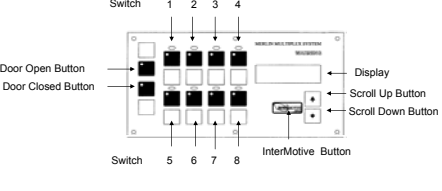
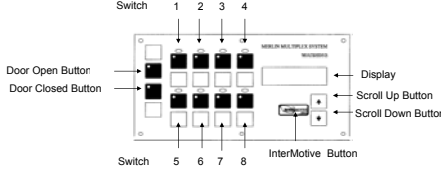
- there is a problem with the ISP panel.
- there is a problem with the DPC module.
- there is a problem with the wiring to the bus system being controlled.

**To continue with this test you must have a copy of the MMS file for this vehicle. The MMS file can be obtained from your files or the bus manufacturer.**

**Estimated Time To Complete: 18 Minutes**

Test Step	Result/Action to Take
<p>F1 Displaying the Merlin Diagnostic Faults.</p> <ul style="list-style-type: none"> <li>• Enter Merlin Diagnostics. (See C1)</li> <li>• Select "DIAG CODES"</li> <li>• Select "FAULT CODES"</li> <li>• The codes will be displayed as a DTC. (Diagnostic Trouble Code)</li> <li>• If there are no faults present the DTC1 will read "DTC1 No DTC"</li> </ul>  <p>Are there any DTC faults recorded?</p>	<p>Results _____</p> <p>Yes Contact InterMotive for interpretation of any DTC recorded.</p> <p>No GO to F2</p>

Test Step	Result/Action to Take
<p>F2 Checking Desired Output status for a controlled system..</p> <ul style="list-style-type: none"> <li>• Locate the non-functioning load in the MMS file print out. Note the Module type and HCO/LCO number.</li> <li>• Select "OUTPUT STATUS" from the main menu.</li> <li>• Select "DESIRED OUTPUT".</li> <li>• Scroll down until the selection arrow moves to the module type controlling the system to be tested. (PM1, PM2, PM3, PM4, DM1, DM2, DDM1, DDM2.)</li> <li>• Select the module by pushing the InterMotive button on the ISP.</li> <li>• Push the down button until the selection arrow moves to the output to be tested. (HCO1-HCO4, LCO1-LCO4)</li> <li>• Select the output to be tested.</li> <li>• Check the non-functioning system by activating the ISP panel switch for the system to be tested.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the HCO/LCO Module state "ON" with the switch being depressed?</li> </ul>	<p>Results _____</p> <p>Yes Go to F3.</p> <p>No Contact InterMotive for assistance with the ISP panel.</p>

Test Step	Result/Action to Take
<p>F3 Checking Actual Output status for a controlled system.</p> <ul style="list-style-type: none"> <li>• Select "ACTUAL OUTPUT" from the main menu.</li> <li>• Push the down button until the selection arrow moves to the module type controlling the system to be tested.(PM1, PM2, PM3, PM4, DM1, DM2, DDM1, DDM2.)</li> <li>• Select the module by pushing the InterMotive button on the ISP.</li> <li>• Push the down button until the selection arrow moves to the output to be tested. (HCO1-HCO4, LCO1-LCO4)</li> <li>• Select the output to be tested by pushing the InterMotive button on the ISP.</li> <li>• Check the non-functioning system by activating the ISP panel switch for the system to be tested.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the HCO/LCO Module state "ON" with the switch being depressed?</li> </ul>	<p>Yes Go to F4</p> <p>Results_____</p> <p>No Contact InterMotive for assistance with the DPC Module.</p>
<p>F4 Checking output current for a controlled system.</p> <ul style="list-style-type: none"> <li>• Select "OUTPUT CURRENT" from main menu.</li> <li>• Push the down button until the selection arrow moves to the module type controlling the system to be tested. (PM1, PM2, PM3, PM4, DM1, DM2, DDM1, DDM2.)</li> <li>• Select the module by pushing the InterMotive button on the ISP.</li> <li>• Push the down button until the selection arrow moves to the output to be tested. (HCO1-HCO4, LCO1-LCO4)</li> <li>• Select the output to be tested by pushing the InterMotive button on the ISP.</li> <li>• Check the non-functioning system by activating the ISP panel switch for the system to be tested.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the HCO/LCO Module current shows amperage reading with the switch being depressed?</li> </ul>	<p>Yes Go to F5</p> <p>Results_____</p> <p>No Contact InterMotive for assistance with the DPC Module.</p>
<p>F5 Checking Button actual output status for a controlled system.</p> <ul style="list-style-type: none"> <li>• Select "BUTTON STATUS" from the main menu.</li> <li>• Locate the non-functioning system on the MMS file.</li> <li>• Note the ISP switch number for the system.</li> <li>• Check the non-functioning system ISP panel switch state by pushing the down the button.</li> </ul>  <ul style="list-style-type: none"> <li>• Is the ISP panel button state "ON" with the switch being depressed?</li> </ul>	<p>Results_____</p> <p>Yes Contact InterMotive for assistance with the DPC Module</p> <p>No Contact InterMotive for assistance with the ISP Panel.</p>