

## Bendix™ AutoVue® FLC20™ Camera

(See SD-61-4963 for the Bendix® Wingman® Fusion™ Driver Assistance System)

### 1.0 DESCRIPTION

The Bendix™ AutoVue® FLC20™ camera is a component used in many Bendix safety systems, including:

- The AutoVue Lane Departure Warning (LDW) System; and
- the Bendix Wingman Fusion Driver Assistance System.

For more information about the Bendix® Wingman® Fusion™ System, See *Service Data Sheet*, SD-61-4963. For free downloads of Service Data Sheets, visit the Bendix website at: [www.bendix.com](http://www.bendix.com).

This document covers installation, troubleshooting, and replacement for this camera.

### **WARNING**

**Bendix safety technologies complement safe driving practices. No commercial vehicle safety technology replaces a skilled, alert driver exercising safe driving techniques and proactive, comprehensive driver training. Responsibility for the safe operation of the vehicle remains with the driver at all times.**

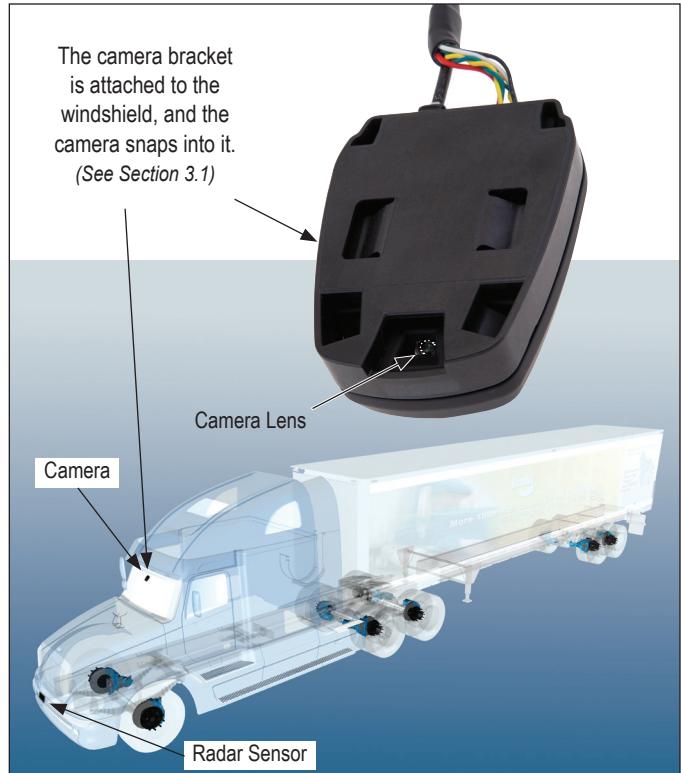


FIGURE 1 - BENDIX™ AUTOVUE® FLC20™ CAMERA

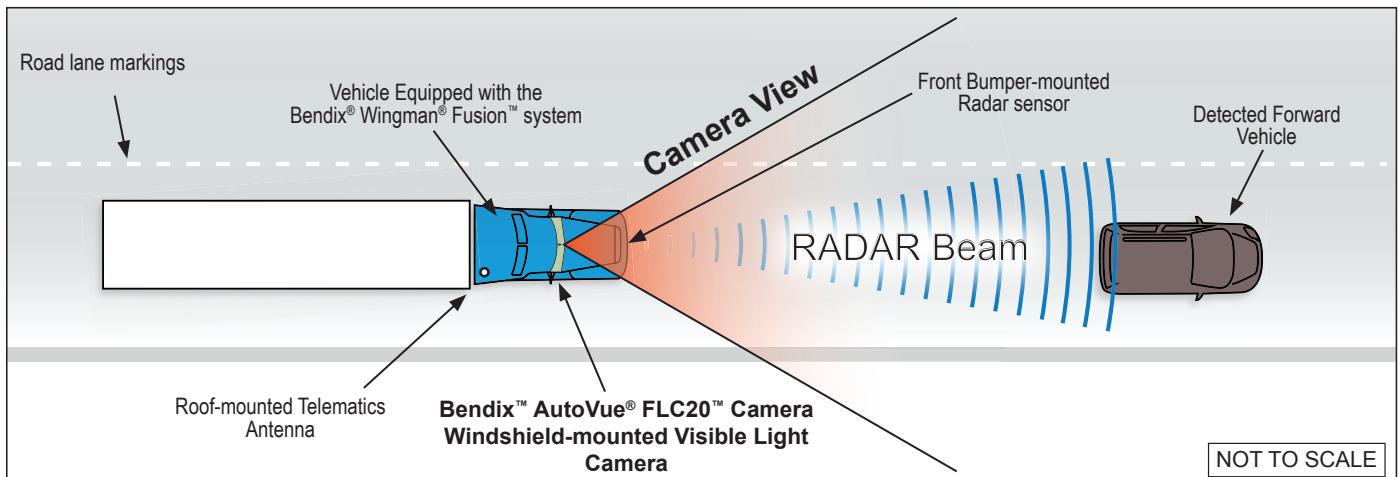


FIGURE 2 - OPERATIONAL VIEW

## 1.1 GENERAL SAFETY GUIDELINES



**WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS**



### **TO AVOID PERSONAL INJURY OR DEATH:**

**When working on or around a vehicle, the following guidelines should be observed AT ALL TIMES:**

- ▲ Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲ Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, EXTREME CAUTION should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲ Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲ If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, or a Bendix® AD-9si® air dryer, be sure to drain the purge reservoir.
- ▲ Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲ Never exceed manufacturer's recommended pressures.
- ▲ You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.
- ▲ Never connect or disconnect a hose or line containing pressure; it may whip and/or cause hazardous airborne dust and dirt particles. Wear eye protection. Slowly open connections with care, and verify that no pressure is present. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲ Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, wiring, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲ Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲ Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲ For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲ The power MUST be temporarily disconnected from the radar sensor whenever any tests USING A DYNAMOMETER are conducted on a vehicle equipped with a Bendix® Wingman® system.



### **WARNING**

**Improper use of the Bendix® Wingman® Fusion™ Driver Assistance System can result in a collision causing property damage, serious injuries, or death. Be sure to read, understand, and carefully follow the instructions in the Operator's Manual, BW2681.**



### **WARNING**

**Bendix safety technologies complement safe driving practices. No commercial vehicle safety technology replaces a skilled, alert driver exercising safe driving techniques and proactive, comprehensive driver training. Responsibility for the safe operation of the vehicle remains with the driver at all times.**



### **WARNING**

**Due to the inherent limitations of image recognition technology, camera-based safety technology — on rare occasions — may not be able to detect or may misinterpret lane markings. At these times, alerts may not occur, or erroneous alerts may occur.**

**IMPORTANT:** It is the responsibility of the driver to remain vigilant and change driving practices depending on traffic and road conditions.

## How to identify if the vehicle has the Bendix® Wingman® Fusion™ Driver Assistance System:



Look for the Bendix® brand logo on the camera label. (See Section 3.1 for how to remove the camera from the bracket to view the label.)

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## 2.0 TROUBLESHOOTING

### 2.1 SAFETY GUIDELINES

Read and follow the General Safety Guidelines shown on page two of this document.

#### **IMPORTANT**

**All vehicle Diagnostic Trouble Codes (DTCs) related to the engine, transmission, instrument cluster, engine cruise control and Bendix® ABS, ATC or ESP® systems must first be resolved, with no DTCs present during the vehicle operation while in cruise control, before trying to resolve camera DTCs.**

#### **IMPORTANT**

**System Problems.** If a problem with the Bendix™ AutoVue® FLC20™ camera is detected, it should be serviced as soon as possible to restore full functionality.

### 2.2 BENDIX® DRIVER INTERFACE UNIT (DIU™) LANE DEPARTURE WARNING SYSTEM ICONS

See Figure 3. In the case of vehicles that use a Bendix® Driver Interface Unit (DIU™), the top right corner of the display is used to show an icon. For other OEM displays, see the vehicle manual to find the method used to show the system status.

During Start-Up – System Busy	
	The first symbol shows when the LDW system is initializing.
Camera Impaired	
	If the system experiences problems detecting objects (for example, due to sun-glare, a dirty windshield, obstructions, etc.), a full DIU screen message will briefly be displayed.
Normal Operation	
	The screen will revert to displaying the icon shown, until the problem is resolved.
	The LDW system is actively seeking lane-markings.
	The LDW system is actively tracking lane-markings on both sides of the current lane.
	The system is actively tracking only lane-markings on the left.
	The system is actively tracking only lane-markings on the right.

**FIGURE 3 - NORMAL BENDIX DIU SCREENS SHOWING LDW SYSTEM STATUS**

Diagnostic Trouble Code (DTC) Set	
	If no LDW status symbol is shown – and the driver has not applied the LDW disable switch – if there is no icon present, this indicates that the system has detected a DTC.

**FIGURE 4 - BENDIX DIU SCREEN SHOWING LDW SYSTEM STATUS**

In these cases, the OE vehicle dash display will also alert the operator that there is a DTC present.

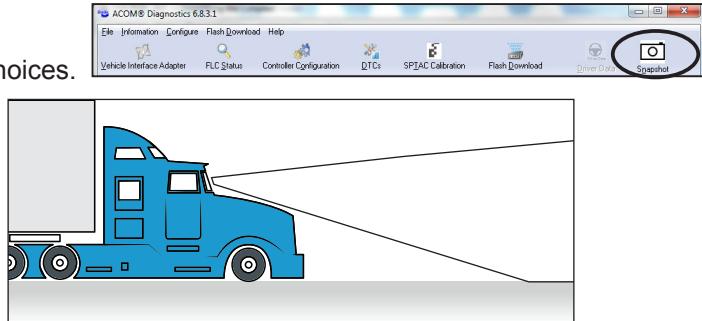
## 2.3 CAMERA TEST IMAGE

### Take a Test Image using Bendix® ACom® Diagnostic Software

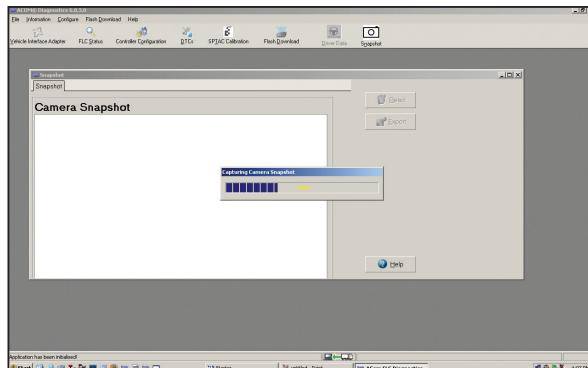
Troubleshooting a camera may be assisted by viewing a test image from the camera to ensure it is not blocked, or has another problem.

- Open Bendix® ACom® Diagnostic Software and select “FLC20” from the opening page list, and the “Start with ECU” button.

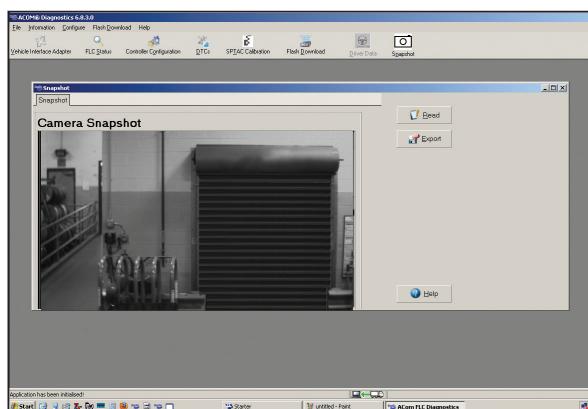
- Select “Snapshot” from the choices.



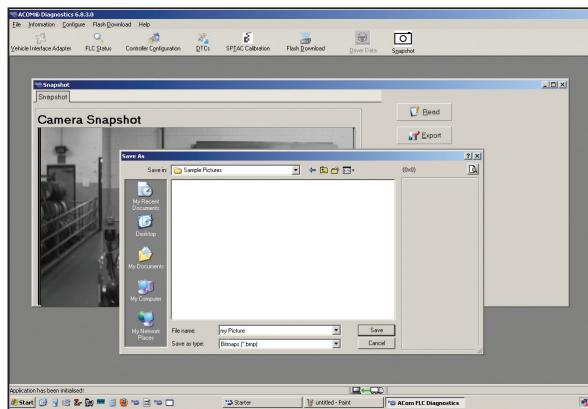
1. Click “Read”. A camera snapshot is taken. (5 minutes approximately.)



2. Inspect the image.



3. Save, if needed, using “Export”.



## 2.4 TEMPORARILY DISABLE THE LANE DEPARTURE WARNING (LDW)

To avoid erroneous LDW warnings in areas such as construction zones – where the non-standard or overlapping road markings present might cause false alerts – the Bendix® Wingman® Fusion™ Driver Assistance System (Fusion) has an enable/disable switch. The Bendix switch design shown in Figure 5 – or a similar OEM switch – may be used.



**FIGURE 5 - EXAMPLE OF AN LDW ENABLE/DISABLE SWITCH.**

*For vehicles that have the LDW switch hard-wired to the SafetyDirect® by Bendix CVS Web Portal Processor, and a functioning On Board Computer (OBC)/Telematics system: The enable/disable switch used by the Lane Departure Warning (LDW) system also functions – when depressed for six (6) seconds – to activate a manual request to transmit the last five seconds and next five seconds of buffered video data.*

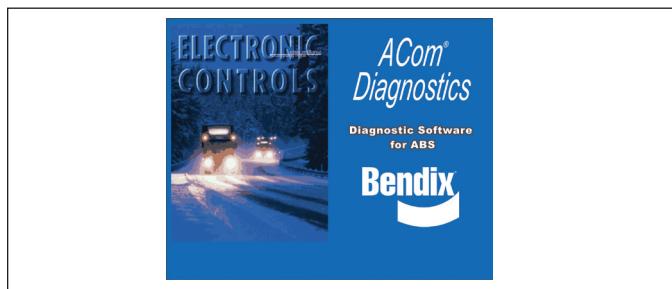
## 2.5 SETTING DIAGNOSTIC TROUBLE CODES

If, during operation, the Bendix Wingman Fusion system detects a problem with the Bendix™ AutoVue® FLC20™ camera, a DTC will be set and – depending on the OEM – the driver will be alerted on the dash display with an icon or similar method. In these cases, some features of the Fusion system will not be available.

If, for an extended period of time, the system detects that the camera is blocked by dirt, snow, ice, etc., a DTC will typically be set.

## 2.6 BENDIX® ACOM® DIAGNOSTIC SOFTWARE

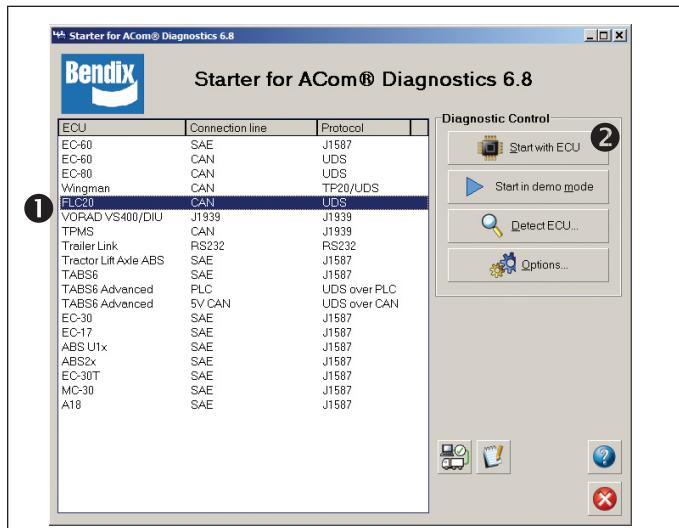
Bendix® ACom® Diagnostic Software is a PC-based software program available as a free download from the Bendix web site ([www.bendix.com](http://www.bendix.com)) or on a CD from the online Bendix Literature Center (order BW2329). This software provides the technician with access to all the available Electronic Control Unit (ECU) diagnostic information and configuration capability. For Fusion system diagnostics, use the current version of Bendix ACom Diagnostic Software.



**FIGURE 6 - BENDIX® ACOM® DIAGNOSTIC SOFTWARE**

## 2.7 STARTING BENDIX® ACOM® DIAGNOSTIC SOFTWARE

The Bendix® ACom® Diagnostic Software can be started from the desktop shortcut, or from the main Windows® screen with “Start...Programs...Bendix...ACom Diagnostic Software.” See *Figure 7*. To begin, the technician selects “FLC20” from the Starter screen, then “Start with ECU” from the Diagnostic Control panel.



**FIGURE 7 - STARTING BENDIX® ACOM® DIAGNOSTIC SOFTWARE**

**NOTE:** When using ACom Diagnostic Software for the first time, the service technician will be asked to select the communication adapter for both the Bendix® AutoVue® FLC20™ camera and Bendix® ABS and Stability Controllers. While both controllers will use the same physical adapter, the technician will need to indicate which communication protocol to use for each. Once a successful connection has been made, these steps will no longer be necessary.

The Bendix ACom Diagnostic Software for ABS User Guide is available for download at [www.bendix.com](http://www.bendix.com) and should be used as a reference to all functions of the ACom service tool.



**FIGURE 8 - BENDIX ACOM DIAGNOSTIC SOFTWARE - HARDWARE INTERFACE SCREEN**

## 2.8 READING DIAGNOSTIC TROUBLE CODES (DTCs)

If the system generates a Diagnostic Trouble Code (DTC), where a lamp or icon is illuminated on the instrument cluster, use a current version of ACom Diagnostic Software to troubleshoot. Select “FLC20” from the starter screen, then “Start with ECU”. Click “DTC” to show the DTCs. See Section 2.9 for a complete table showing DTCs and troubleshooting information.

## 2.9 DIAGNOSTIC TROUBLE CODES (DTCs)

Use a J1939 detection software to find the DTC code(s) and use the Table in Section 2.10 to find the service action code to use. The service actions to take may then be found in the Table shown in Section 2.11.

If the troubleshooting devices available to the technician provide SPN (Suspect Parameter Number) and FMI (Failure Mode Identifier) code combinations, refer to Appendix A.

## 2.10 TABLE OF DIAGNOSTIC TROUBLE CODES (DTCs) AND SERVICE ACTION CODES

Look in the left column below for the DTC and find the Service Action Code to follow in Table 2 (Section 2.11).

Table 1: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes		Go to the Service Action Code List in Table 2 (Pages 11-14)
DTC	Description	
1	High Battery Voltage	B
2	Low Battery Voltage	
3-10	Internal Error	A
11	Internal Error	
12	Internal Error	
13	Internal Error	Q
14-16	Internal Error	A
17	Internal Error	Q
18	J1939 bus fault	M
19	Calibration not complete	Q
20	Internal Error	
21-35	Internal Error	A
36	Image Processor software version error	I
37-42	Internal Error	A
43	Calibration data corrupt	Q
44-46	Internal Error	A
47	SPC Calibration not complete	Q
48-49	Internal Error	A
50	Dynamic Calibration out of range	Q
51	Dynamic Calibration not complete	
52-57	Internal Error	A
58	Internal Error	Q
59	Vehicle Calibration not complete	
60	Image Processor Calibration error	
61	Internal Error	A
62	J1939: LD Message missing	M
63	J1939: VDC2 Message missing	
64	J1939: CCVS1 Message missing	
65	J1939: OEL Message missing	
66	J1939: OEL Turn Signal error value	N
67	J1939: LD Right Turn error value	
68	J1939: LD Left Turn error value	
69	J1939: VDC2 Steering Wheel error value	
70	J1939: VDC2 Yaw Rate error value	
71	J1939: VDC2 Lateral Accl error value	V
72	Private CAN: Bus Off	
<p><i>Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.</i></p> <p>Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.</p>		

TABLE 1 - DTC CODE TO SERVICE ACTION CODE. (Pages 8 - 10)

Table 1: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes		Go to the Service Action Code List in Table 2 (Pages 11-14)
DTC	Description	
73	J1939: EBC2 Wheel speed error value	N
74	J1939: EBC1 Brake Switch error value	
75	J1939: LCMD Right Turn error value	
76	J1939: LCMD Left Turn error value	
77	Internal Error	A
78	J1939: VDHR missing message	M
79	J1939: LCMD missing message	
80	J1939: OEL Hazard Switch error value	N
81-86, 128-129	Internal Error	A
130	J1939: TCO1 message missing	M
131	J1939: EBC2 message missing	
132	J1939: EBC1 message missing	
133	Camera Lens Angle error	Q
134	J1939: Missing FLIC J1939 message	M
139	J1939: Missing ABS FLC Status message	E
140	Image Processor software version error	I
141	Internal Error	A
142	Internal Error	I
143-145	Internal Error	A
146	Camera lens blocked	C
147	Camera temperature too high	A
148	J1939: LDW Enable Switch error value	N
149	J1939: CCVS1 Parking Brake Switch error value	
150	J1939: EBC1 EBS Brake Switch error value	
151	J1939: EBC2 Vehicle Speed error value	
152	J1939: EEC1 Engine Speed error value	
153	J1939: FLIC Warning Command error value	
154	J1939: FLIC Buzzer error value	
155	J1939: LCMD Low Beam Headlamp error value	
156	J1939: LCMD High Beam Headlamp error value	
157	J1939: LD Low Beam Headlamp error value	
158	J1939: LD High Beam Headlamp error value	
159	J1939: OEL Turn Signal Switch error value	
160	J1939: OEL High-Low Beam Switch error value	
161	J1939: OEL High Beam Status error value	
162	J1939: OEL Wiper error value	
163	J1939: TCO1 Vehicle Speed error value	
164	J1939: VP37 Left Turn Signal error value	
165	J1939: VP37 Right Turn Signal error value	
166	J1939: VP37 High Headlamp error value	
167	J1939: VP37 Hazard Lamp error value	
168	J1939: VP37 Wiper Status error value	
172	J1939: EEC1 Engine Speed signal missing	M
173	J1939: FLIC Warning Command signal missing	
174	J1939: LDW Buzzer signal missing	
176	J1939: VDC2 Steering Wheel Angle Sensor signal missing	

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

Table 1: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes		Go to the Service Action Code List in Table 2 (Pages 11-14)
DTC	Description	
178	J1939: EBC2 Front Axle Speed signal invalid	P
179	J1939: EEC1 Engine Speed signal invalid	
180	J1939: OEL Turn Signal Switch signal invalid	
181	J1939: TCO1 Tachograph Vehicle Speed signal invalid	
182	J1939: VDC2 Steering Wheel Angle signal invalid	
183	J1939: OEL High Beam Headlamp signal missing	M
184	J1939: Left Turn signal missing	
185	J1939: Right Turn signal missing	
186	J1939: Windshield Wiper Signal signal missing	N
187	J1939: OWW Wiper Signal error value	
188	J1939: OEL High Beam Status error value	N
189	J1939: VDC2 Yaw Rate signal invalid	P
190	J1939: VDC2 Yaw Rate signal missing	M
191	J1939: VDC2 Lateral Accl signal invalid	P
192	J1939: VDC2 Lateral Accl signal missing	M
193	J1939: FLIC Buzzer signal invalid	P
194	J1939: OEL Hazard Switch signal missing	M
195	J1939: OEL Turn Signal Switch signal missing	
196	J1939: EBC1 EBS Brake Switch signal missing	
197	J1939: TCO1 Vehicle Speed signal missing	
198	Fusion mis-match between ABS and camera	Q
199	J1939: Missing OWW J1939 message	M
200	J1939: CCVS1 Vehicle Speed signal invalid	P
201	J1939: CCVS1 Vehicle Speed signal missing	M

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running. Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.*

TABLE 1 - DTC CODE TO SERVICE ACTION CODE. (Pages 8 - 10)

## 2.11 TABLE OF SERVICE ACTION CODES

Recommended service actions for the Diagnostic Trouble Code(s) [DTCs] found. For SPN (Suspect Parameter Number) and FMI (Failure Mode Identifier) code combinations, see Appendix B.

Service Action Code	Recommended Service
A	<p><b>This DTC is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible Causes:</b></p> <ul style="list-style-type: none"> <li>Some error conditions may occur at extreme high or low temperatures. These DTCs must be diagnosed with the ambient temperature above 32°F (0°C) and below 100°F (38°C).</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>. If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</li> </ul>
B	<p><b>This DTC is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible Causes:</b></p> <p>These Diagnostic Trouble Codes (DTCs) result from incorrect ignition, battery supply voltage, or wiring harness issues as measured at the camera.</p> <p>Review the following Sections:</p> <ul style="list-style-type: none"> <li>2.12 <i>Troubleshooting Diagnostic Trouble Codes: Power Supply; Ignition Voltage Too Low; Ignition Voltage Too High; Power Supply Tests</i>.</li> <li>2.16 <i>Troubleshooting Wiring Harnesses</i>.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Verify ignition supply voltage to the camera is between 9 to 32 Volts DC (VDC);</li> <li>Visually check for damaged or poorly crimped connectors;</li> <li>Visually check for damage wiring; and</li> <li>Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>. If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</li> </ul>
C	<p><b>This DTC is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible Causes:</b></p> <ul style="list-style-type: none"> <li>These DTCs may arise from infrequent conditions that could occur normally.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Check for lens obstruction. Clean dirt, packed snow or ice from the lens, if present. See Appendix A to take a test image with the camera to help check that the view is clear.</li> <li>Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes (DTCs)</i>. If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</li> </ul>

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds.*

*Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

TABLE 2 - SERVICE ACTION CODES TO RECOMMENDED SERVICE (PAGES 11-14)

Service Action Code	Recommended Service
E	<p><b>This DTC is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>• Camera mounting is improper.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Go to Section 3.0, measure and see if the camera was mounted properly on the windshield. If an improper mounting arrangement is discovered, follow the instructions included in this document to remove the camera. The adhesive cannot be re-used, but order the approved bracket with adhesive (Bendix part number K109285) to install and re-mount the camera onto the windshield.</li> <li>• Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>.</li> </ul> <p>If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</p>
I	<p><b>This DTC is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible Causes:</b></p> <ul style="list-style-type: none"> <li>• The system using the camera has either the incorrect/updated software version, or wasn't updated properly during a firmware upgrade.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Attempt an update of the software using a PC with Bendix® ACom® Diagnostic Software installed to facilitate the update. Make sure that the update program reports a successful download.</li> <li>• Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>.</li> </ul> <p>If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</p>
M	<p><b>This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible Causes:</b></p> <ul style="list-style-type: none"> <li>• The system using the camera has not found the J1939 signal(s) it is expecting from one or more sources. This could be accompanied by other active DTCs from the same source.</li> </ul> <p>Review the following Section:</p> <ul style="list-style-type: none"> <li>• 2.13 <i>Serial Data (J1939) Troubleshooting Procedure</i>.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Check the expected source(s) of the signal to identify why the signals have invalid data. A communication link may be disconnected, the power fuse disconnected or blown, or a change was made to the controller that was incorrect.</li> <li>• Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>.</li> </ul> <p>If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</p>

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds.*

*Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

**TABLE 2 - SERVICE ACTION CODES TO RECOMMENDED SERVICE (PAGES 11-14)**

Service Action Code	Recommended Service
N	<p><b>This DTC is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>The system using the camera has found J1939 signal(s) it is expecting, however the values indicated that there is a malfunctioning component and/or wiring error.</li> <li>Some examples of components, cameras or switches that produce J1939 signals are: brake pressure switches; steering angle sensors; lighting indicators (high/low beam lights, turn signals); windshield wiper status; various engine torque signals; Bendix® Wingman® Fusion™ Driver Assistance System components; and wheel speed sensors.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Check the engine, cab/body controller, Bendix Wingman Fusion components, or ABS for DTCs using the manufacturer's diagnostic procedures. The controller that broadcasts the error signal must be investigated first; however the origin of the signal could potentially be another source.</li> </ul> <p>After addressing the possible causes, perform the following:</p> <ul style="list-style-type: none"> <li>Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>. If the error returns, see the Bendix Wingman Fusion System (SD-61-4963) Service Data Sheet for more troubleshooting information, or call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</li> </ul>
P	<p><b>This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>The Bendix™ AutoVue™ FLC20™ camera finds an expected J1939 source, but the signal's value is out of the normal operating range.</li> </ul> <p>Review the following Sections:</p> <ul style="list-style-type: none"> <li>3.6 <i>Camera Interchangeability</i>.</li> <li>2.13 <i>Serial Data (J1939) Troubleshooting Procedure</i>.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Check engine, cab/body controller or ABS for DTCs using the manufacturer's diagnostic procedures. The controller that broadcasts the signal indicates that a camera or switch input is producing a value that is out of the normal operating range.</li> <li>After addressing the possible causes, perform the following:</li> <li>Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>. If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</li> </ul>

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds.*

*Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

**TABLE 2 - SERVICE ACTION CODES TO RECOMMENDED SERVICE (PAGES 11-14)**

Service Action Code	Recommended Service
Q	<p><b>This DTC is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible Causes:</b></p> <ul style="list-style-type: none"> <li>The camera is indicating that it is either not calibrated or an error has occurred.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>The ABS controller may be disconnected or configuration from the ABS controller may be sending invalid information.</li> <li>Go to Section 3.0, measure and see if the camera was mounted properly on the windshield. If an improper mounting arrangement is discovered, follow the instructions included in this document to remove the camera. The adhesive cannot be re-used, but order the approved bracket with adhesive (Bendix part number K109285) to install and re-mount the camera onto the windshield.</li> </ul> <p>After addressing the possible causes, perform the following:</p> <ul style="list-style-type: none"> <li>Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>. If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</li> </ul>
V	<p><b>This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning camera. Do not replace the camera.</b></p> <p><b>Possible Causes:</b></p> <ul style="list-style-type: none"> <li>The system using the camera has not found the signal(s) it is expecting from the private communications link. This could be accompanied by other active DTCs from the same source.</li> </ul> <p>Review the following Section:</p> <ul style="list-style-type: none"> <li>2.15 <i>Private Communications Network Test Procedure</i>.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Check the expected source(s) of the signal to identify why the signals have invalid data. The private communications link may be disconnected, have improper terminations, power fuse disconnected or blown, or a change was made to the controller that was incorrect.</li> <li>Clear the camera's DTCs using the procedure in Section 2.17 <i>Clearing Diagnostic Trouble Codes</i>. If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Representatives are available 8:00 a.m.-6:00 p.m. ET, Monday - Friday to assist you.</li> </ul>

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds.*

*Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

**TABLE 2 - SERVICE ACTION CODES TO RECOMMENDED SERVICE (PAGES 11-14)**

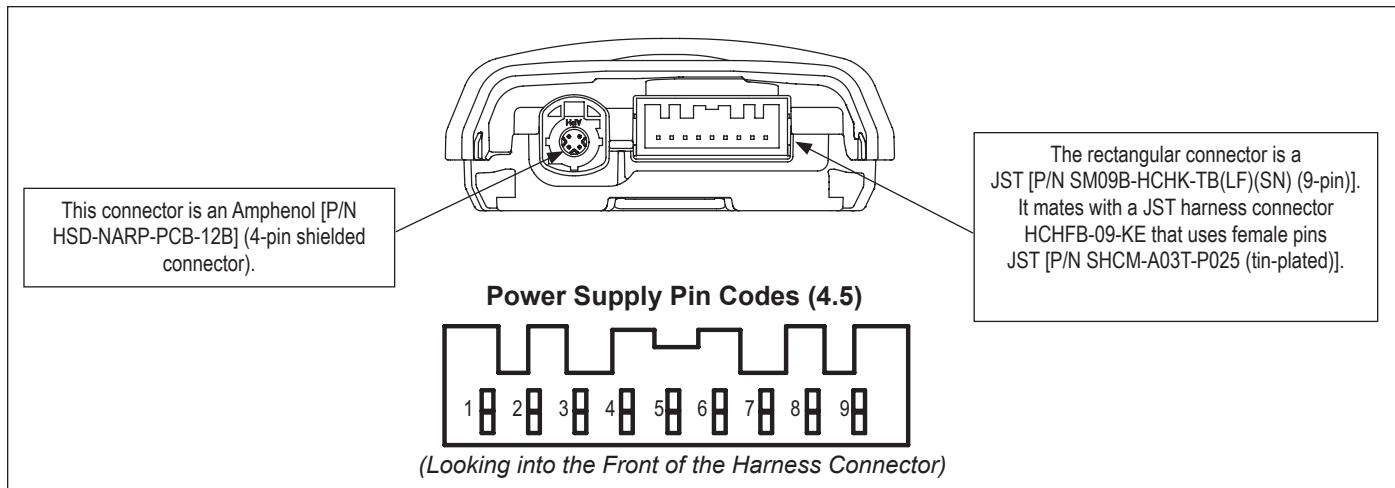


FIGURE 9 - CAMERA AND HARNESS CONNECTOR VIEWS

Pin #	Description	Nominal Voltage	Nominal Current
1	Module Power	14V/28V (9~32V)	200mA/100mA
2	Not Used	—	—
3	J1939 Low	5V	85mA
4	J1939 High	5V	85mA
5	Not Used	—	—
6	Private Communications Low	5V	85mA
7	Private Communications High	5V	85mA
8	Ground GND (-)	0.000V	200mA/100mA
9	Ignition Wake-Up	14V/28V (7~32V)	20mA/10mA

TABLE 3 - HARNESS CONNECTOR PINS

## 2.12 TROUBLESHOOTING DIAGNOSTIC TROUBLE CODES: POWER SUPPLY

### IGNITION VOLTAGE TOO LOW

Measure the ignition voltage under load. Ensure that the ignition voltage is greater than 9 VDC (Volts DC). Check the vehicle battery and associated components. Inspect for damaged wiring, damaged or corroded connectors and loose connections. Check the condition of the fuse.

### IGNITION VOLTAGE TOO HIGH

Measure the ignition voltage. Ensure that ignition voltage is not greater than 16 VDC. Check the vehicle battery and associated components. Inspect for damaged wiring, damaged or corroded connectors and loose connections.

### CONNECTOR PIN-OUT & POWER REQUIREMENTS

The camera has two connectors. See Figure 3.

### POWER SUPPLY TESTS

1. Take all measurements at the camera's harness connector.
2. Place a load (e.g. 1157 stop lamp) across the supply voltage and ground connection. Measure the voltage with the load. The supply voltage on pin 1 to ground should measure between 10 to 16 VDC (Volts DC).
3. Check for damaged wiring, damaged or corroded connectors and loose connections.
4. Check the condition of the vehicle battery and associated components. Ensure the connection to ground is secure and tight.
5. Using the procedures described by the vehicle manufacturer, check the alternator output for excessive noise.

## 2.13 SERIAL DATA (PRIVATE COMMUNICATIONS) TROUBLESHOOTING PROCEDURE

1. Take all measurements at the harness connector unless otherwise indicated.



**Do not insert any probe into the pin on the mating connector of the sensor that is greater than the width of a terminal. Damaged connector pins will require the replacement of the harness.**

2. Check for damaged or reversed Private Communications wiring.

If the Private Communications HIGH, **or** Private Communications LOW, wiring circuits are damaged, such as shorting together, the entire Private Communications link will be lost. The problem may be intermittent, enabling the Private Communications link to operate normally sometimes. In this event, multiple diagnostic trouble codes may be logged in the camera and radar.

If the Private Communications HIGH, **and** Private Communications LOW, wiring circuits are reversed, communication over the entire Private Communications link will be lost. Only those devices that are outside of the problem point from other devices will not receive, or be able to, transmit data messages.

3. Check for corroded or damaged wiring connector problems such as opens or shorts to voltage or ground.

If the connector terminals are corroded, this may be an indication of water intrusion into the wiring system and possibly the camera sensor. Replacement of the entire harness is recommended. If the terminals of the camera sensor are corroded, replacement of the sensor is recommended.

4. Check for other Private Communications devices which may be inhibiting communication. The service technician should consult the procedures for Private Communications troubleshooting. The device's power should be removed and measurements made at the Electronic Control Unit (ECU) pins for shorts to ground and power pins and resistance between the Private Communications HIGH or Private Communications LOW input circuits.

5. Unplug the camera harness. With the ignition switch off, measure the resistance (ohms) using a multimeter between harness pins 6 and 7. The reading should be approximately 120 ohms. If it is not, the vehicle wiring should be investigated.

## 2.14 POWER TROUBLESHOOTING PROCEDURES

1. Unplug the camera. With the ignition switch ON, using a multimeter, measure the voltage, between harness pin 9 and ground. The measurement should indicate 10 to 16 VDC (Volts DC). If this is not the case, the vehicle wiring should be investigated using procedures described by the manufacturer.
2. Unplug the camera. With the ignition switch OFF, using a multimeter, measure the voltage, between harness pin 9 and ground. The measurement should indicate zero VDC. If this is not the case, the vehicle wiring should be investigated using procedures described by the manufacturer.
3. Unplug the camera. With the ignition switch OFF, using a multimeter, measure the voltage, between harness pin 1 and ground. The measurement should indicate 10 to 16 VDC. If this is not the case, the vehicle wiring should be investigated using procedures described by the manufacturer.

## 2.15 COMMUNICATIONS (J1939) TEST AND TROUBLESHOOTING PROCEDURES

The Bendix™ AutoVue® FLC20™ camera requires several J1939 messages from various ECUs. The camera will set a Diagnostic Trouble Code (DTC) if one of the messages from one of the expected ECUs is not present. Go to the Service Data Sheet for the particular ECU for full troubleshooting information.

### Reference Documents:

- The Bendix® Wingman® Fusion™ Driver Assistance System (SD-61-4963)
- The Bendix® ESP® EC-80™ Controller (SD-13-4986)
- The SafetyDirect® By Bendix CVS Web Portal Processor (SD-65-21025)

1. Take all measurements at the harness connector unless otherwise indicated.



**Do not insert any probe into the pin on the mating connector of the sensor that is greater than the dimension of the mating connector. Damaged connector pins will require the replacement of the harness.**

2. Check for damaged or reversed J1939 wiring.

If the J1939 HIGH, **or** J1939 LOW, wiring circuits are damaged, such as shorting together, the entire J1939 link will be lost. The problem may be intermittent, enabling the J1939 link to operate normally sometimes. If this occurs, multiple diagnostic trouble codes will be logged in multiple engine and vehicle controllers.

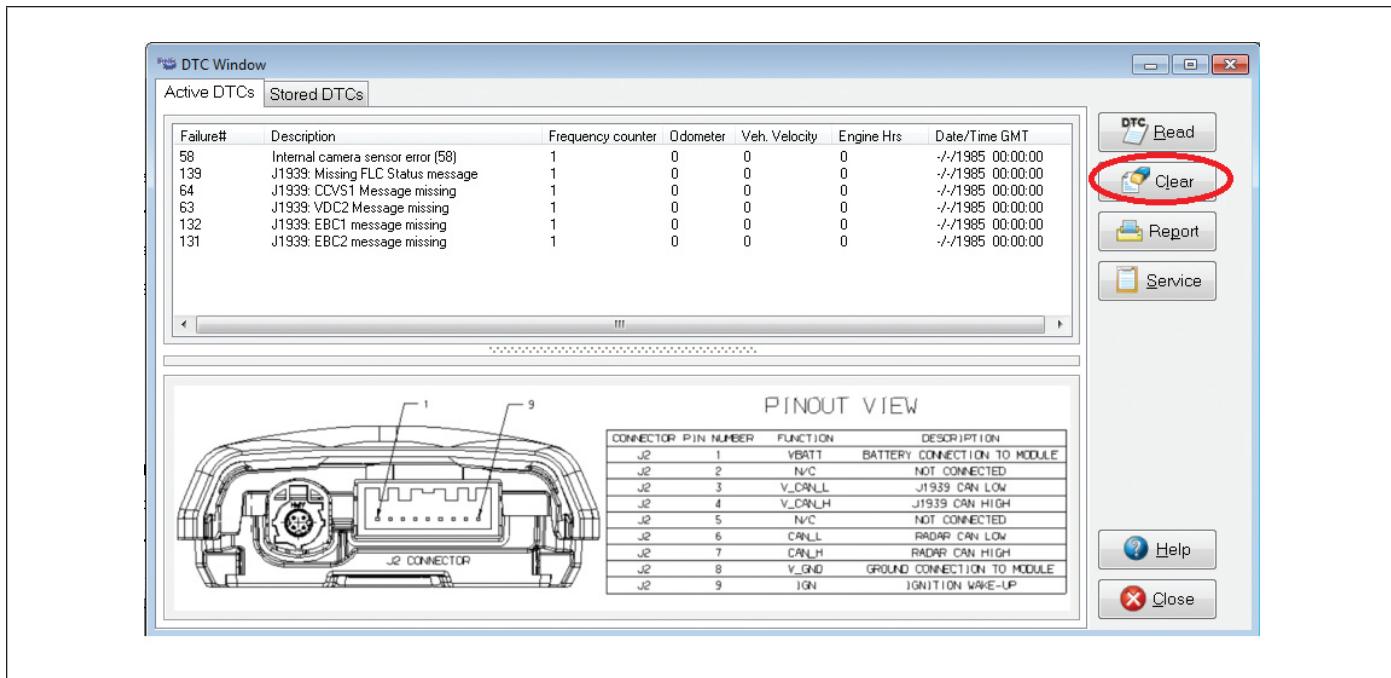


FIGURE 10 - CLEAR DIAGNOSTIC TROUBLE CODES (DTCs) BUTTON

If the J1939 HIGH, **and** J1939 LOW, wiring circuits are reversed, communication over the entire J1939 link will not be lost. Only those devices that are outside of the problem point from other devices will not receive, or be able to transmit, data messages.

- Check for poorly-crimped, corroded, contaminated or damaged wiring connector problems such as opens or shorts to voltage or ground.

If the connector terminals are corroded or damaged, this may be an indication of water intrusion into the wiring system and possibly into the sensor. Replacement of the entire harness is recommended. If the terminals of the sensor are corroded, replacement of the sensor is recommended.

- Check for other J1939 devices which may be inhibiting J1939 communication. The service technician should consult the vehicle manufacturer's procedures for other J1939 troubleshooting procedures. The device's power should be removed and measurements made at the ECU pins for shorts to ground and power pins and resistance between the J1939 HIGH or J1939 LOW input circuits.
- Unplug the camera harness. With the ignition OFF, measure the resistance (Ohms) using a multimeter between harness pins 3 and 4. The reading should be approximately 60 Ohms. If this is not the case, the vehicle wiring should be investigated.

## 2.16 PRIVATE COMMUNICATIONS NETWORK TEST PROCEDURE

The Bendix™ AutoVue® FLC20™ camera requires private network messages to and from the Bendix® Wingman® Fusion™ system. The camera will set a Diagnostic Trouble Code (DTC) if these messages are not present, or if there is a problem with the private communications system. Go to the *Bendix Wingman Fusion System Service Data Sheet (SD-61-4963)* for full troubleshooting information.

## 2.17 TROUBLESHOOTING WIRING HARNESSSES

All wire harness connectors must be properly seated to maintain electrical connectivity. Push the mating connectors until they click. When replacing a Bendix Fusion FLC20 camera, check that the wire harness connectors are free of damage, including corrosion, before plugging into a new camera. Check for corroded or damaged wiring connector problems such as opens or shorts to voltage or ground.

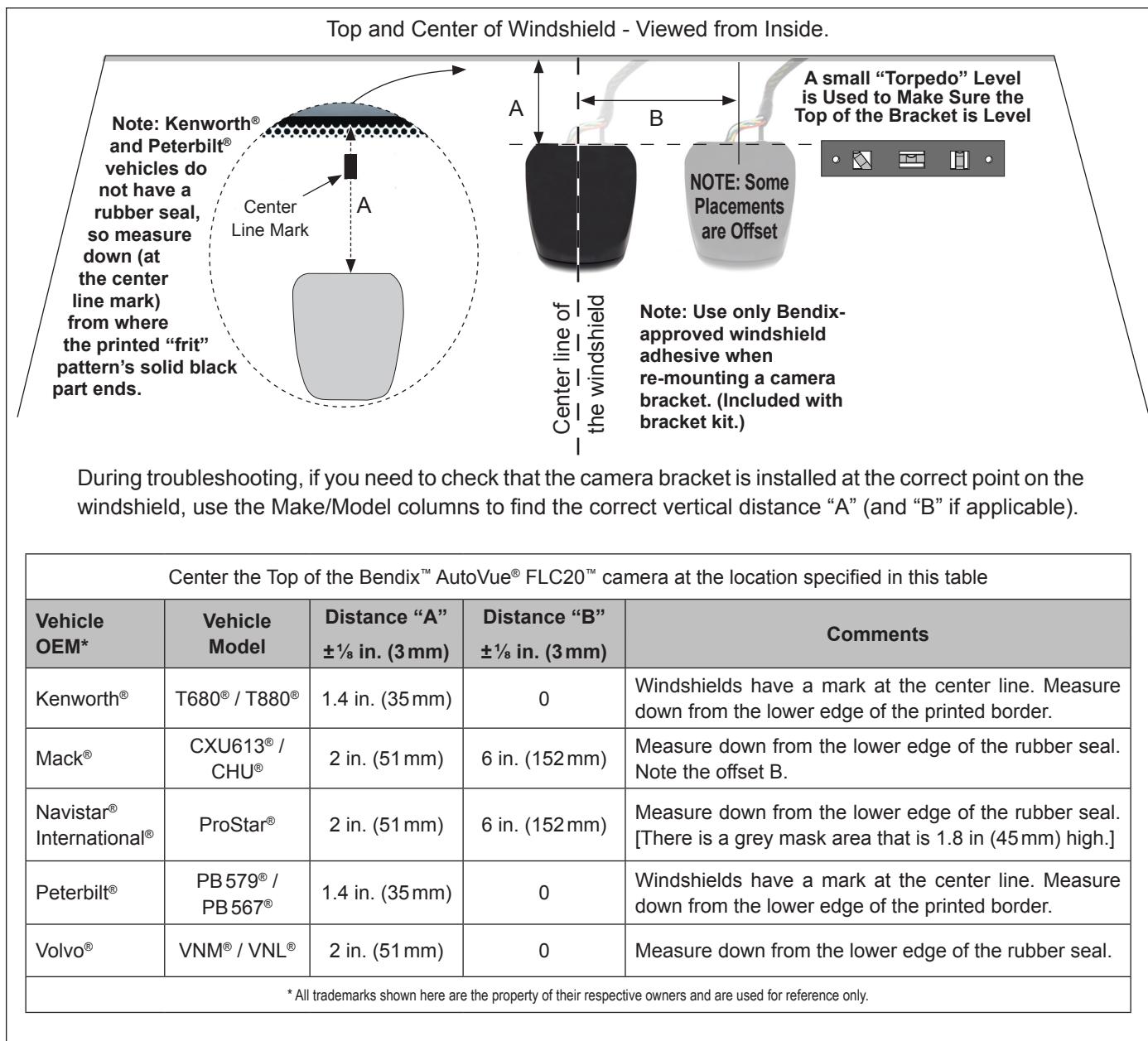
If the connector terminals are corroded, this may be an indication of water intrusion into the wiring system and possibly into the camera (presumably from a cracked windshield). Replacement of the entire harness is recommended. If the terminals of the camera are corroded, replacement of the camera is recommended.

## 2.18 CLEARING DIAGNOSTIC TROUBLE CODES (DTCs)

Cycle the ignition power, or use the Bendix® ACom® Diagnostic Software (version 6.8.3.2 or higher) to clear DTCs after troubleshooting – and correcting – any problem with the system. See *Figure 10*.

### 3.0 TYPICAL INSTALLATION

The Bendix™ AutoVue® FLC20™ camera is installed on the windshield at a position determined by Bendix engineering and the OEM. See *Figure 11*. (When replacing a camera bracket, temporarily mark the location of the top of the original bracket to help position the replacement.)



**FIGURE 11 - BRACKET INSTALLATION COORDINATES**



**Whenever re-installing or replacing a camera – for example, after a windshield is replaced – the recommended position for the vehicle must be used. Failure to install the camera in the correct position can result in system Diagnostic Trouble Codes being set, and system performance degradation.**

The ambient temperature must be in the range of 50-100° F. Thoroughly clean the area of the windshield where the camera will be installed with a lint-free cloth and a 50-50

water/isopropyl alcohol solution. Make certain that there is no grease or contamination present and that the windshield is completely dry before installing the bracket.

Use removable tape or a non-permanent marker pen to indicate where the top of the bracket will be installed. Remove the protective film from the tape covering the adhesive on the bracket and, using a small "torpedo" level to be sure that it is level, install the bracket on the glass, holding firmly [a minimum of 62lb. (28.1kg.) pressure] in place for ten (10) seconds. Wait at least twenty minutes before installing the camera, at which point a 50% bond strength is created. The full bond between the bracket and windshield is achieved after 72 hours.



**FIGURE 12 - CAMERA INSTALLATION**

To install the camera into the bracket, See *Figure 12*.

1. Engage the top of the camera into the bracket. There are two channels in the camera that need to line up with the bracket housing, so check to be sure that both sides engage into the bracket.
2. While maintaining the engagement at the top of the camera, rotate the rest of the camera body about that hinge point, towards the bracket.
3. When the camera and bracket meet, there are retaining clips built into the bracket that will snap into place, holding the camera in position.

**IMPORTANT**

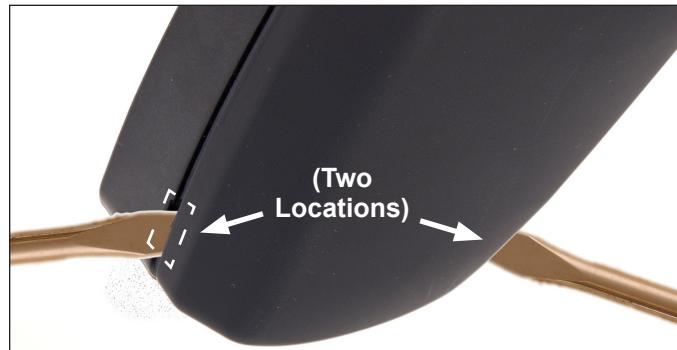
4. Double-check that the camera is fully engaged into the bracket, by verifying that the channel between them has the same gap all the way around. Pull gently on the camera to check that the tabs at the top and bottom are engaged and that there is no play. See *Figure 12*.
5. Remove any tape, or temporary marks made, during the installation.

### 3.1 CAMERA REMOVAL

**CAUTION**

Do not use a twisting action when releasing the tabs. Insert the screwdrivers and pry by moving the handles towards each other a small amount. Never twist the screwdrivers as the tabs may break! Replace the bracket if the tab is broken.

Verify that the channel between them has the same gap all the way around, and pull gently on the camera to check that the tabs at the top and bottom are engaged and that there is no play.



**FIGURE 13 - CAMERA RELEASE**

See *Figure 13*. If a camera needs to be removed, locate the two locations at the lower corners where the camera and bracket meet.

1. Insert two medium-sized flat-blade screwdrivers into the slots, fully seating them.
2. *Then – gently prying by moving the screwdriver handles away from the windshield a small amount – push against the retaining clips to release the camera.*

## 3.2 BRACKET REMOVAL

The camera must be removed prior to this procedure. The preferred method for removing a bracket ideally requires two technicians. Using a heat-gun, one of the technicians gradually applies heat to the outside of the windshield at the location of the adhesive, while the other gently applies a prying force to the bracket while being careful not to damage the windshield. As soon as the ideal temperature is reached, the bracket will release. Allow the windshield to completely cool down before cleaning the glass and installing a replacement bracket.

## 3.3 DASH SWITCHES AND LAMPS

Each OEM has their own method for displaying the system status to the driver, and typically there will be a switch on the dash board to allow the driver to temporarily disable the system. Refer to the OEM Operator's Manual for system indicator lamp(s) used for the Bendix™ AutoVue® FLC20™ camera, and whether there is a bulb-check illumination at vehicle power-up. See *Figure 15* for some examples of OEM icons used at the time this document was published.

Dash/Switch Icon.	International®	Kenworth®
(The design will vary by vehicle OEM. In some cases, the switch and lamps may be separate.)		
Mack®	Peterbilt®	Volvo®

\* All trademarks shown here are the property of their respective owners and are used for reference only.

**FIGURE 15 - DASH SWITCH ICONS**

Additionally, the system self-monitors and will set a Diagnostic Trouble Code (DTC) that will typically alert the driver using a similar icon on the dash display or by a status lamp. See Section 2.0 "Troubleshooting" (page 4), for more information.

## 3.4 MAINTENANCE

In normal use, the Bendix AutoVue FLC20 camera needs only a clean, properly maintained windshield to ensure a clear view of the road ahead. Protect the camera lens whenever the inside of the windshield is cleaned. You may check that the camera's view is clear by taking a test image (See *Appendix A*).

## 3.5 CAMERA INTERCHANGEABILITY

When replacing cameras only use replacements with the same part number (or a direct superceding replacement number supplied by Bendix).



### WARNING

**Cameras of different vehicle models and model years must not be interchanged. The use of an incorrect camera can lead to Diagnostic Trouble Codes (DTCs) being set, and performance degradation – including unnecessary system interventions and the potential for situations where interventions do not occur when they would normally.**

Cameras are designed specifically for particular vehicle and model. DTCs caused by relocating cameras to an incorrect vehicle may result in the vehicle system using the camera to be partially or fully unavailable.

If you have questions, contact the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2).

Bendix AutoVue FLC20 cameras are powered by the Mobileye System-on-Chip EyeQ processor with state-of-the-art-vision algorithms.

## 3.6 IMPORTANT NOTE ON TELEMATICS WIRING

Where a vehicle does not have an On Board Computer/Telematics (OBC/T) system – in order to prevent interference to the SafetyDirect by Bendix CVS Web Portal Processor – disconnect from the OBC/T harness (any wiring harness provisionally installed in the vehicle for potential use for Telematics) from the main vehicle harness. Re-connect the harness only when an OBC/T system is installed. (See *Appendix C*).

## APPENDIX A - SPN (SUSPECT PARAMETER NUMBER) AND FMI (FAILURE MODE IDENTIFIER) CODES TO SERVICE ACTION CODES

Look up the SPN/FMI code found and see the Service Action Code to use. The Table in Section 2.11 (pages 11-14) explains the service actions to take.

For an equivalent table sorted by Diagnostic Trouble Codes (DTCs) to service action codes, see Section 2.10 (pages 8-10).

Appendix A				
SPN/FMI Codes to Service Action Codes				
SPN	FMI	DTC	Diagnostic Trouble Codes (DTC) Description	Service Action Code (See 2.11)
70	9	64	J1939: CCVS1 Message missing	M
	19	149	J1939: CCVS1 Parking Brake Switch error value	N
84	2	200	J1939: CCVS1 Vehicle Speed signal invalid	P
	9	64, 201	J1939: CCVS1 Vehicle Speed signal missing	M
	19	63, 73	J1939: EBC2 Wheel speed error value	N
190	2	179	J1939: EEC1 Engine Speed signal invalid	P
	9	172	J1939: EEC1 Engine Speed signal missing	M
	19	152	J1939: EEC1 Engine Speed error value	N
234	12	142	Internal Error	I
597	2	74	J1939: EBC1 Brake Switch error value	N
	19			
625	9	72	Private CAN: Bus Off	V
628	2	11	Internal Error	A
	11	36	Image Processor software version error	I
630	2	19	Calibration not complete	Q
		47	SPC Calibration not complete	
		50	Dynamic Calibration out of range	
		51	Dynamic Calibration not complete	
		59	Vehicle Calibration not complete	
	19	198	Fusion mismatch between ABS and camera	
639	9	18	J1939 bus fault	M
	31			
879	9	184	J1939: Left Turn signal missing	
881	9	185	J1939: Right Turn signal missing	
904	2	178	J1939: EBC2 Front Axle Speed signal invalid	P
	9	131	J1939: EBC2 message missing	M
	19	151	J1939: EBC2 Vehicle Speed error value	N
917	9	78	J1939: VDHR missing message	
1121	9	132	J1939: EBC1 message missing	M
		196	J1939: EBC1 EBS Brake Switch signal missing	
	19	150	J1939: EBC1 EBS Brake Switch error value	N
<p><i>Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.</i></p> <p>Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.</p>				

## Appendix A

### SPN/FMI Codes to Service Action Codes

SPN	FMI	DTC	Diagnostic Trouble Codes (DTC) Description	Service Action Code (See 2.11)	
1624	2	181	J1939: TCO1 Tachograph Vehicle Speed signal invalid	P	
	9	130	J1939: TCO1 message missing	M	
		197	J1939: TCO1 Vehicle Speed signal missing		
1705	19	163	J1939: TCO1 Vehicle Speed error value	N	
	3	1	High Battery Voltage	B	
	4	2	Low Battery Voltage		
1705	7	146	Camera lens blocked	C	
	11	133	Camera Lens Angle error	Q	
	12	3, 4, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 37, 38, 39, 40, 41, 42	Internal Error	A	
1705		43	Calibration data corrupt	Q	
		44, 45, 46, 48, 49, 52, 53, 54, 55, 56, 57	Internal Error	A	
		60	Image Processor Calibration error	Q	
		61, 77, 81, 82, 83, 84, 85, 86, 128, 129, 138	Internal Error	A	
		140	Image Processor software version error	I	
		141, 143, 144, 145	Internal Error	A	
13	13	19	Calibration not complete	Q	
		47	SPC Calibration not complete		
		50	Dynamic Calibration out of range		
		51	Dynamic Calibration not complete		
		58	Internal Error		
		59	Vehicle Calibration not complete		
14	14	11	Internal Error	A	
		36	Image Processor software version error	I	
		147	Camera temperature too high	A	

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

## Appendix A

### SPN/FMI Codes to Service Action Codes

SPN	FMI	DTC	Diagnostic Trouble Codes (DTC) Description	Service Action Code (See 2.11)
1705	31	3, 4, 7-10, 12-17, 20-42	Internal Error	A
		43	Calibration data corrupt	Q
		44-46, 48-49, 52-58	Internal Error	A
		60	Image Processor Calibration error	Q
		61, 77, 81-86, 128-129, 138	Internal Error	A
		140	Image Processor software version error	I
		141, 143-145	Internal Error	A
		147	Camera temperature too high	
1807	2	182	J1939: VDC2 Steering Wheel Angle signal invalid	P
	9	176	J1939: VDC2 Steering Wheel Angle Sensor signal missing	M
	19	69	J1939: VDC2 Steering Wheel error value	N
1808	2	189	J1939: VDC2 Yaw Rate signal invalid	P
	9	63	J1939: VDC2 Message missing	
		190	J1939: VDC2 Yaw Rate signal missing	M
	19	70	J1939: VDC2 Yaw Rate error value	N
1809	2	191	J1939: VDC2 Lateral Accl signal invalid	P
	9	192	J1939: VDC2 Lateral Accl signal missing	M
	19	71	J1939: VDC2 Lateral Accl error value	
2347	19	156	J1939: LCMD High Beam Headlamp error value	
2348	19	158	J1939: LD High Beam Headlamp error value	
2349	19	155	J1939: LCMD Low Beam Headlamp error value	
2350	19	157	J1939: LD Low Beam Headlamp error value	
2367	19	76	J1939: LCMD Left Turn error value	
2368	2	164	J1939: VP37 Left Turn Signal error value	
	19	68	J1939: LD Left Turn error value	
2369	9	79	J1939: LCMD missing message	M
	19	75	J1939: LCMD Right Turn error value	N
2370	2	165	J1939: VP37 Right Turn Signal error value	
	9	62	J1939: LD Message missing	M
	19	67	J1939: LD Right Turn error value	N
2550	9	139	J1939: Missing ABS FLC Status message	E
2863	14	199	J1939: Missing OWW J1939 message	M
	19	187	J1939: OWW Wiper Signal error value	N
2874	19	160	J1939: OEL High-Low Beam Switch error value	N
2875	9	194	J1939: OEL Hazard Switch signal missing	M
	19	80	J1939: OEL Hazard Switch error value	N

*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

## Appendix A

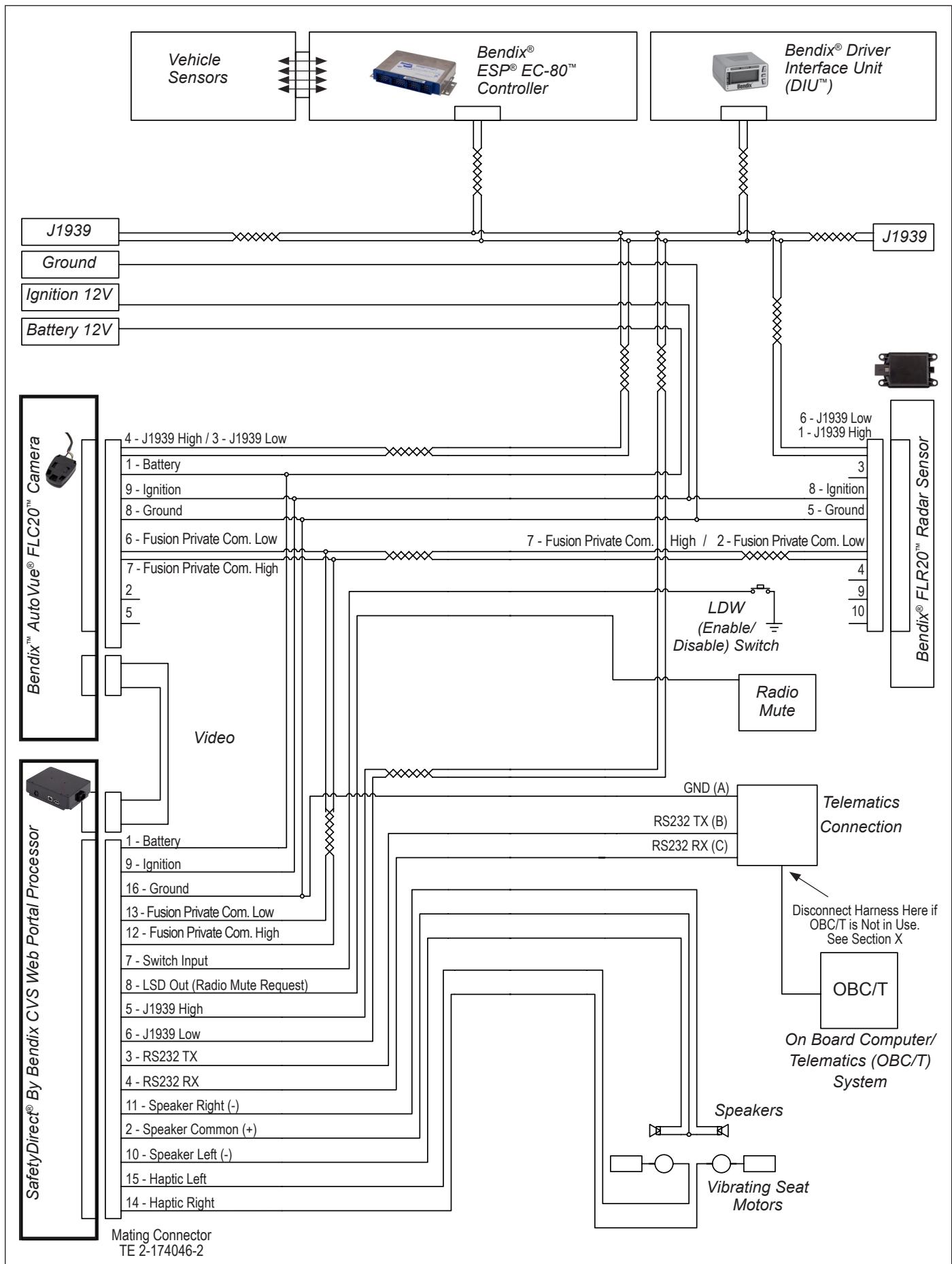
### SPN/FMI Codes to Service Action Codes

SPN	FMI	DTC	Diagnostic Trouble Codes (DTC) Description	Service Action Code (See 2.11)
2876	2	180	J1939: OEL Turn Signal Switch signal invalid	P
	9	65	J1939: OEL Message missing	M
		195	J1939: OEL Turn Signal Switch signal missing	
	19	66	J1939: OEL Turn Signal error value	N
3564	4	153	J1939: FLIC Warning Command error value	M
	9	173	J1939: FLIC Warning Command signal missing	
	14	134	J1939: Missing FLIC J1939 message	
	19	153	J1939: FLIC Warning Command error value	N
4011	9	183	J1939: OEL High Beam Headlamp signal missing	M
516096	19	148	J1939: LDW Enable Switch error value	N
516097	2	193	J1939: FLIC Buzzer signal invalid	P
	9	174	J1939: LDW Buzzer signal missing	M
	18	193	J1939: FLIC Buzzer signal invalid	P
	19	154	J1939: FLIC Buzzer error value	N
516098	2	188	J1939: OEL High Beam Status error value	
	19	161	J1939: OEL High Beam Status error value	
516099	9	186	J1939: Windshield Wiper signal missing	M
	19	162	J1939: OEL Wiper error value	N
516100	19	164	J1939: VP37 Left Turn Signal error value	
516101	19	165	J1939: VP37 Right Turn Signal error value	
516102	19	166	J1939: VP37 High Headlamp error value	
516103	19	167	J1939: VP37 Hazard Lamp error value	
516104	19	168	J1939: VP37 Wiper Status error value	

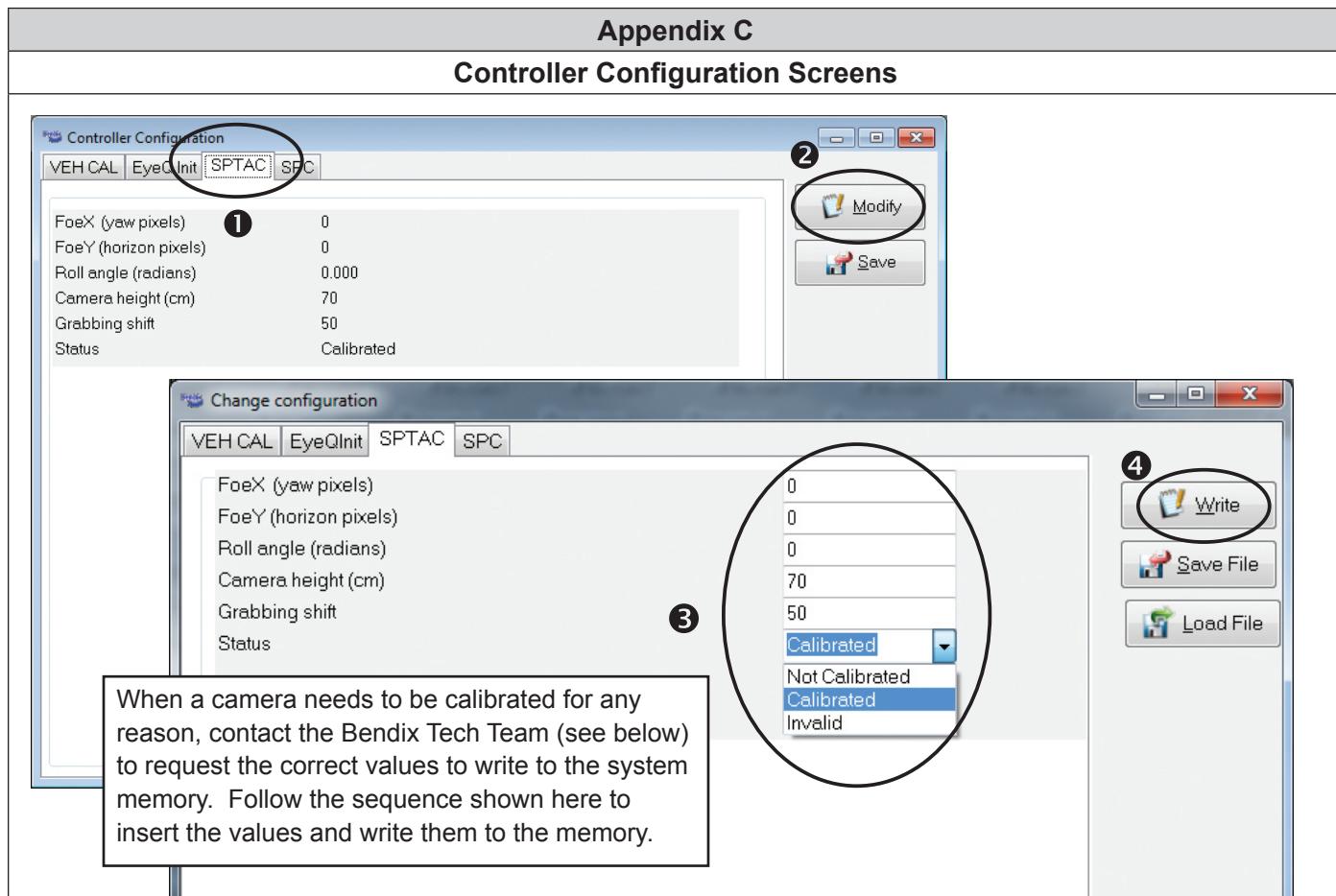
*Note: The system will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.*

Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2) for troubleshooting assistance.

## APPENDIX B - BENDIX® WINGMAN® FUSION™ SYSTEM COMPONENT SCHEMATIC



## APPENDIX C - CONTROLLER CONFIGURATION CHANGES



Appendix C

### ADDITIONAL SUPPORT AT [WWW.BENDIX.COM](http://WWW.BENDIX.COM) / 1-800-AIR-BRAKE (1-800-247-2725, OPTION 2)

For the latest information, and for free downloads of the Bendix® ACom® Diagnostics software, and its User Guide, visit the Bendix website at: [www.bendix.com](http://www.bendix.com).

For direct telephone technical support, the Bendix Tech Team is available at 1-800-AIR-BRAKE (1-800-247-2725, option 2). Follow the instructions in the recorded message.

The Bendix Tech Team can also be reached by e-mail at: [techteam@bendix.com](mailto:techteam@bendix.com).

## NOTES

**Reference Documents:**

- The Bendix® Wingman® Fusion™ Driver Assistance System (SD-61-4963)
- The Bendix® ESP® EC-80™ Controller (SD-13-4986)
- The SafetyDirect® By Bendix CVS Web Portal Processor (SD-65-21025)

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