



# Service Data

SD-29-50022

## Bendix® Fusion™ FLR-25™ Radar Sensor

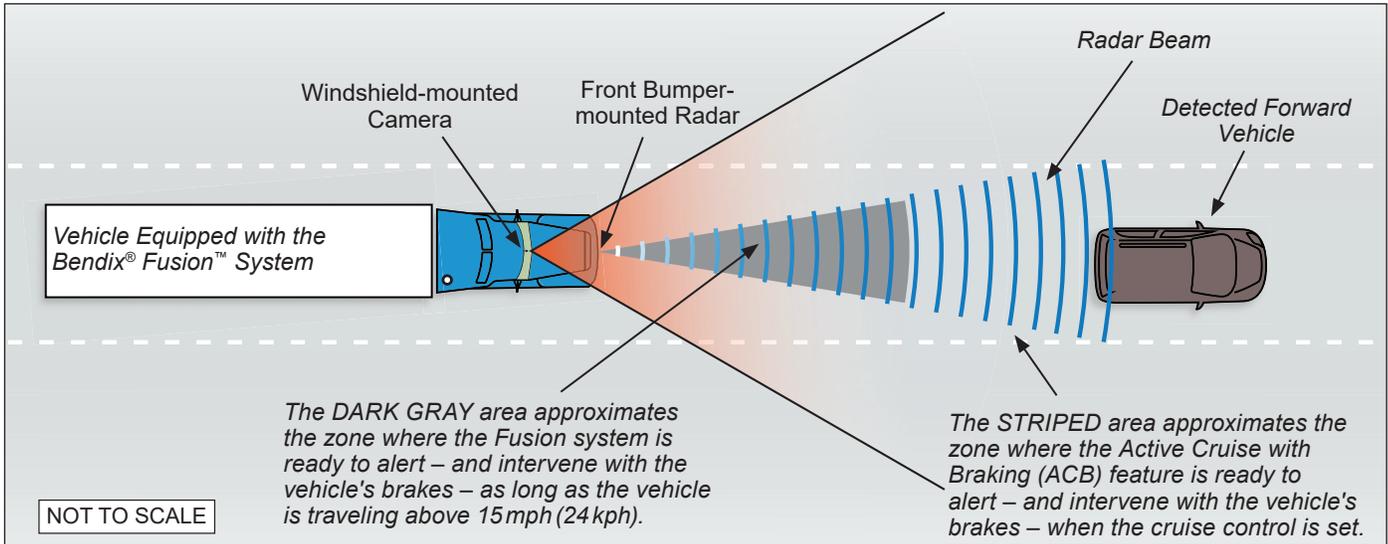


Figure 1 – Bendix® Fusion™ System

### ⚠ IMPORTANT

Bendix®-brand Electronic Control Units (ECUs) are not designed to store data for purposes of accident reconstruction, and Bendix® ACom® PRO™ Diagnostic Software is not intended to retrieve data for purposes of accident reconstruction. Bendix makes no representations as to the accuracy of data or video retrieved and interpreted from ECUs for purposes of accident reconstruction. Bendix does not offer accident reconstruction services or interpretation of stored data. Bendix ECUs are not protected from fire, loss of power, impact damage, or other conditions that may be sustained in a crash situation and may cause data to be unavailable or irretrievable.

### ⚠ IMPORTANT

Under no circumstance will the Bendix® Fusion™ Driver Assistance System apply the brakes during a faulted state. If a fault occurs, the particular feature disables and the brakes are not applied.

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## 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, a Bendix® AD-9sI®, AD-HF®, or AD-HFi™ 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® Fusion™ Driver Assistance System can result in a collision causing property damage, serious injuries, or death.



### 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.



### 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.



### IMPORTANT

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

The Bendix™ FLR-25™ radar sensor is an integral component of the Bendix® Fusion™ Driver Assistance System, which integrates a camera, radar, and brakes. The Fusion system provides the following alerts and actions:

- Autonomous Emergency Braking (AEB)
  - Stationary Vehicle Braking (SVB)
  - Multi-lane AEB
  - Close-range AEB
- Highway Departure Braking (HDB)
- Active Cruise with Braking (ACB)
  - ACB Pedestrian Abort
- Overspeed Alert and Action (OAA)
- Alert Prioritization

**NOTE:** Depending on configuration, the system may record data and video of certain events and, when integrated with a telematics provider, can transmit this information for viewing on the SafetyDirect® by Bendix CVS web portal.

The major components that are used in the Bendix Fusion Driver Assistance System are:

- Bendix FLR-25 Radar Sensor
- Bendix® Driver Interface Unit (DIU™)
- Bendix® ESP® EC-80™ Controller
- SafetyDirect® by Bendix CVS Processor
- Bendix® AutoVue® FLC-20™ Camera

For additional information, refer to the following related documents on b2bendix.com:

- *SD-13-4986, Bendix® ESP® EC-80™ Controller*
- *SD-65-21025, SafetyDirect® By Bendix CVS Processor*
- *SD-64-20124, Bendix™ AutoVue® FLC-20™ Camera*
- *BW8107, Bendix® Safety Systems Challenging Scenarios Overview*



**Figure 2 – Major Bendix® Fusion™ System Components**

## 1.0 INTRODUCTION TO TROUBLESHOOTING

This section introduces three (3) initial steps to accurately troubleshoot the Bendix® Fusion™ FLR-25™ Radar Sensor.

Read this introductory section – as well as the *Troubleshooting/Diagnostics Section (2.0)* – before performing any troubleshooting.

When diagnosing the Fusion system, a current version of Bendix® ACom® PRO™ Diagnostic Software is required. This software is available as a download at [b2bendix.com](http://b2bendix.com).

**NOTE:** Prior to troubleshooting, all aftermarket-installed components should be removed from the vehicle and the vehicle must be returned to factory specifications. Once the vehicle is returned to factory specifications, the fault should be recreated prior to performing troubleshooting steps.

## 1.1 TROUBLESHOOTING BASICS

Troubleshooting Basics (1.1)	
Questions/Instructions	Next Steps
1. Does the driver hear a long warning beep?	If no problem is found and the test is passed, no additional beeps/lamps will be displayed nor will a Diagnostic Trouble Code (DTC) be set.  If the system has found an issue that will prevent it from functioning properly, <b>a long warning beep will sound</b> to alert the driver, and a DTC will be logged in the system (typically with a status indicator/dash icon illuminated). For descriptions of all DTCs, refer to <i>Section 2.5: Diagnostic Trouble Codes</i> .
2. Have the driver describe the system behavior that they believe shows it is not working properly.	When diagnosing the system, especially in cases where there are no DTCs logged, find out which part of the system behavior appears to be operating improperly.  <b>NOTE:</b> False brake applications are often misdiagnosed and are, in fact, <i>not</i> brake applications, but rather loss of engine throttle caused by a J1939 communication failure on the vehicle. This is frequently caused by aftermarket components installed in the vehicle CAN line (i.e. electronic drivers logs [EDLs], GPS, or telematics systems).
3. Fill out the Troubleshooting Checklist and generate a DTC report.	<i>The Checklist and DTC report will clarify the problem and be necessary if a call to the Bendix Tech Team is needed.</i>  <i>Refer to Section 1.2: Narrowing Down the Problem.</i>
Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2, for troubleshooting assistance.	

**Table 1 – Troubleshooting Basics**

## Troubleshooting Checklist

**WARNING: The Troubleshooting Checklist should not be completed while the vehicle is in motion and while the driver is completing the scenarios and tests.**

*Reference Section 1.2, Narrowing Down the Problem.*

Detailed Scenarios and Tests	Record Driver's Answers for Follow-up with Bendix
Are there any active faults or lamps illuminated on the dash?	Yes <input type="checkbox"/> No <input type="checkbox"/> _____
Are there any aftermarket components installed on the vehicle?	Yes <input type="checkbox"/> No <input type="checkbox"/> _____
Does the vehicle maintain its set speed when the cruise control is switched on and set?	Yes <input type="checkbox"/> No <input type="checkbox"/> _____
Is the cruise control "set" icon displayed?	Yes <input type="checkbox"/> No <input type="checkbox"/> _____
While following a forward vehicle within radar range and the cruise control is switched on and set, record your response to the following:  Is the "forward vehicle detected" icon displayed?  What color is the icon?  When the forward vehicle slows down, does the truck also slow down to maintain the set distance?	Yes <input type="checkbox"/> No <input type="checkbox"/> _____  Icon Color _____  Yes <input type="checkbox"/> No <input type="checkbox"/> _____
With engine cruise "off" and a forward vehicle present, does the audible alert become faster as the truck moves closer to the forward vehicle?	Yes <input type="checkbox"/> No <input type="checkbox"/> _____
With cruise control switched on and set, when the forward vehicle slows moderately or cuts in front of the truck and slows, did the driver observe any of the following conditions?  Are there Diagnostic Trouble Codes (DTCs) logged?  Does the vehicle slow and the Bendix® Fusion™ system maintain the following distance?  Is the engine throttle reduced?  Is the engine retarder applied?  Are foundation brakes applied?  Does the truck proceed toward the forward vehicle without a following distance alert or braking intervention?	Yes <input type="checkbox"/> No <input type="checkbox"/> _____  Yes <input type="checkbox"/> No <input type="checkbox"/> _____

## Troubleshooting Checklist

**WARNING: The Troubleshooting Checklist should not be completed while the vehicle is in motion and while the driver is completing the scenarios and tests.**

*Reference Section 1.2, Narrowing Down the Problem.*

Detailed Scenarios and Tests	Record Driver's Answers for Follow-up with Bendix
<p>With cruise engaged, when your vehicle passes a slower vehicle on the left or right on a straight road:</p> <p style="padding-left: 40px;">Does the Bendix® Fusion™ system ignore the vehicle you are overtaking?</p> <p style="padding-left: 40px;">Does it give a following distance alert?</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/> _____</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/> _____</p>
<p>With cruise engaged, if a faster vehicle passes your vehicle on the left or right on a straight road:</p> <p style="padding-left: 40px;">Does it give a Following Distance Alert (FDA)?</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/> _____</p>
<p>With cruise control engaged, if the vehicle ahead slows moderately or cuts in front of your truck and slows down:</p> <p style="padding-left: 40px;">Does your vehicle slow and the Bendix® Fusion™ System maintain the following distance?</p> <p style="padding-left: 40px;">Is the engine throttle reduced?</p> <p style="padding-left: 40px;">Is the engine retarder applied?</p> <p style="padding-left: 40px;">Are the foundation brakes applied?</p> <p style="padding-left: 40px;">Does your truck proceed toward the forward vehicle without a Following Distance Alert (FDA) or braking intervention?</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/> _____</p>

## 1.2 NARROWING DOWN THE PROBLEM

Use this table to help assess if the Bendix® Fusion™ FLR-25™ Radar Sensor is not performing correctly. Be sure to have a thorough understanding of the system's normal behavior; this will reduce the troubleshooting time. This table provides a guide to basic troubleshooting questions and possible corrective actions. Items *in italics* cross-reference to the service procedures in this manual to repair the condition described.

<b>Narrowing Down the Problem (1.2)</b>	
<b>Questions</b>	<b>Next Steps</b>
<b>Blocked Radar Sensor Issues</b>	
<p>Is mud, ice, or snow covering the radar sensor?</p> <p>Is anything blocking the view of the radar sensor?</p>	<p>Clean the radar sensor front surface immediately. Remove anything blocking the radar sensor then power cycle and read any remaining Diagnostic Trouble Codes (DTCs).</p> <p><i>Refer to Section 2.5: Diagnostic Trouble Codes.</i></p> <p><i>Refer to Appendix A3: Bendix™ FLR-25™ Radar Sensor Mounting Clearance.</i></p> <p>If the radar sensor is blocked by ice, snow, mud, tampering, etc. so that it cannot "see" a forward vehicle, the Fusion system will notify the driver by an audible and/or visual alert. After the blockage is removed, the audible and/or visual alert will be removed. Drivers should visually check the radar sensor for blockage during the pre-trip inspection.</p>
<b>Potential False Warnings</b>	
<p>Do false warnings seem to happen in construction zones?</p>	<p>Several road scenarios have a tendency to cause false warnings, including construction zones and bridges. Unless these false warnings are frequent, the system is likely reacting normally. The driver should not set the cruise control in construction zones. If driver complaints persist, continue asking questions to more narrowly define the driving condition presenting the problems. Review proper operating conditions in the operator's manual.</p>
<b>Mounting Problems</b>	
<p>Is the radar sensor mounting location (bumper or cross-member) damaged?</p> <p>Does the system seem to not "see" as far as it "used to," or warn on many more overhead bridges/signs than previously?</p>	<p>Inspect the radar mounting. A solid mounting surface is necessary in order to hold the alignment. If the bumper or mounting cross-member is damaged, replace it.</p>
<p>Does the mounting bracket look damaged or tampered with?</p>	<p>Other than expected surface scratches or some discoloration over time, there should be no visible damage to the radar sensor bracket assembly or the bumper.</p> <p>The radar sensor needs a solid mounting surface in order to hold the alignment. If the radar sensor alignment cannot be held in place, the bracket assembly must be replaced, and/or if the bumper or mounting cross-member is damaged, replace it as needed.</p>

**Table 2 – Narrowing Down the Problem**

<b>Narrowing Down the Problem (1.2)</b>	
<b>Questions</b>	<b>Next Steps</b>
Has the system worked without problems in the past but is not working as expected now?	This is a good indication that something has changed. Review the following questions with the driver to further diagnose the problem.
Has the radar sensor been changed recently?	If so, the new radar sensor may be incompatible with the vehicle. In addition, check any system Diagnostic Trouble Codes (DTCs) with Bendix® ACom® PRO™ Diagnostic Software. <i>Refer to Section 2.5: Diagnostic Trouble Codes.</i>  Check the radar sensor baud rate. Confirm the part number (located on the front face of the radar sensor) is the correct part number per the vehicle's VIN. Confirm the radar sensor is not installed backwards (the connector tab on the radar sensor is a good reference).
Did the radar sensor currently on the vehicle come from another vehicle?	The radar sensor may be incompatible with the new vehicle. <i>Check system DTCs with Bendix ACom PRO Diagnostic Software. Refer to Section 2.5: Diagnostic Trouble Codes.</i>
With cruise control set, does the system consistently apply the foundation brakes when a forward vehicle slows?	This is normal operation. If the radar system interventions are not typical, the radar sensor may be misaligned.  Inspect the radar mounting. A solid mounting surface is necessary in order to hold the alignment. If the bumper or mounting cross-member is damaged, replace it.  The service technician will need to check trouble codes as well. <i>Read Section 2.5: Diagnostic Trouble Codes.</i>
Does a DTC seem to occur when driving through the desert or in barren areas (no road signs, trees, or vehicles)?	In normal operation, the active cruise control with braking feature of the Bendix Fusion system may indicate a DTC if it hasn't detected a metallic object after a pre-determined period. This is rare, but most likely to occur when driving in deserts or barren areas. If the system does set a DTC, the Bendix Fusion system provides a visible warning to the driver, but cruise control will still be active. Full and proper radar sensor functionality will be restored after a power cycle.
Does the system seem to disengage after an automatic braking event?	This is normal operation. Contact the vehicle OEM for details on cruise control operation.
Does cruise control disengage sometimes when the brakes come on and not at other times?	This is normal operation. When traveling with lightly loaded trailers, or "bobtail", the active cruise control with braking feature of the Bendix Fusion system may continue to function even after an automatic brake application. No driver input is needed. Contact the vehicle OEM for details on cruise control operation.
Does the connector or wiring appear damaged?	Wires can become corroded if the radar sensor is not plugged in properly. Clean the connectors on the wire harness, as well as the radar sensor, and reattach. If wires are chafed, replace the wire harness. Also, check for trouble codes.  <i>Refer to Section 2.5: Diagnostic Trouble Codes and Section 2.12: Troubleshooting Wiring Harnesses.</i>
Does the system generate a DTC going down a grade when using ACB (Active Cruise-control with Braking) to slow the vehicle, but the code goes away later?	This is normal operation. The active cruise control with braking feature of the Bendix Fusion system is not intended to be used on grades. Verify there are no DTCs. Proper downgrade driving techniques should be used.  <i>Refer to Section 2.5: Diagnostic Trouble Codes.</i>
Does the radar sensor have noticeable damage beyond normal discoloration or surface scratches?	The radar sensor and bracket are very durable. However, if the radar sensor housing or cover is cracked or broken, immediately look for trouble codes via Bendix ACom PRO diagnostic software and replace the damaged radar sensor. <i>Refer to Section 2.5: Diagnostic Trouble Codes and Appendix A3: Radar Sensor Mounting Clearance.</i>

**Table 2 – Narrowing Down the Problem**

### 1.3 OVERVIEW OF POSSIBLE ISSUES

Some customer issues are actually misunderstandings of how the Bendix® Fusion™ system performs normally. Use Table 3 below to learn the causes of potential issues if the Fusion system is not performing correctly. Some issues can be investigated by a visual inspection. Others may cause a Diagnostic Trouble Code (DTC) to be logged: *Refer to Section 2.5: Diagnostic Trouble Codes.*

Overview of Possible Issues (1.3)	
Issue	Description
Vehicle Diagnostic Trouble Codes (DTCs)	<b>The Bendix Fusion system will not operate and will set a DTC if any of the following vehicle systems also show a DTC: engine, engine cruise, instrument cluster, Bendix® ABS, Bendix® ATC, Bendix® ESP®, or transmission. These components must be repaired and cleared of DTCs before troubleshooting the Fusion system. (NOTE: Clearing the vehicle DTCs may be the only step needed to reestablish full Fusion system functionality. Refer to Section 2.6: Clearing Diagnostic Trouble Codes (DTCs).</b>
System familiarity	Verify the system functionality. Is it operating normally or not? Drivers who are unfamiliar with the system may report dissatisfaction over the way it beeps or how it activates the brakes. <i>Refer to Section 1.0: Introduction to Troubleshooting, Section 1.1: Troubleshooting Basics, and Section 2.5: Diagnostic Trouble Codes to verify if the system is functioning normally; then continue.</i>
DTCs caused by temporary operating conditions	Some DTCs indicate a temporary condition and will clear when that condition is no longer present. If these persist, further investigation is warranted. <i>Refer to Section 1.1: Troubleshooting Basics.</i>
Radar sensor blocked	If the system doesn't seem to work at all, the radar sensor may possibly be blocked. If the radar is blocked, an alert should be issued to the driver to indicate this condition. Visually inspect the area around the radar, clear the blockage, turn the ignition on and run through a power cycle. <i>Refer to Appendix A3 for more information about radar mounting and clearances.</i>
Damaged radar sensor or bracket	If the vehicle has been in an accident, it is likely the radar sensor will need to be re-inspected or replaced. Inspect the radar sensor and housing for damage. Radar sensor discoloration or small scratches may be acceptable. Significant damage (such as cracks or broken pieces) will require radar sensor replacement. Regardless of the exterior condition, <i>check for DTCs outlined in the Section 2.5: Diagnostic Trouble Codes (DTCs) to determine if radar sensor replacement is necessary.</i>
Damaged connector or wiring	Visually inspect the connector and wire harness for corrosion or chafing. <i>Refer to Sections 2.7: Troubleshooting Diagnostic Trouble Codes: Power Supply and 2.8 Serial Data (J1939) Communications Link of this document for additional troubleshooting.</i>
Radar sensor misalignment	Inspect the front of the vehicle. If a) it has been damaged; or b) the vehicle does not track straight, either of these conditions must be repaired before troubleshooting the Bendix Fusion system.  If there is a DTC set or if the system does not function, the radar sensor may be severely misaligned and the Fusion system will not operate until this is corrected.
J1939 network problems	<b>If the entire system is non-functional, it may be a J1939 network problem. Follow the instructions in Section 2.8: Serial Data (J1939) Communications Link.</b>
Power to radar sensor problems	If the entire system is non-functional, another likely cause may be a lack of power to the radar sensor. <i>Follow the instructions in Section 2.7: Troubleshooting Diagnostic Trouble Codes: Power Supply.</i>

**Table 3 – Overview of Possible Issues**

## 1.4 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 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.

## 2.0 TROUBLESHOOTING/ DIAGNOSTICS SECTION



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 trouble codes present during the vehicle operation while in cruise control—before attempting to diagnose Bendix® Fusion™ system DTCs.

Important examples are VDC2 and EBC DTCs which are typically related to the brake controller. The hierarchy of Electronic Control Units (ECUs) determines that any DTCs on the brake controller must be resolved before attempting to troubleshoot the Fusion system.

## 2.1 BENDIX® ACOM® PRO™ DIAGNOSTIC SOFTWARE

Bendix® ACom® PRO™ Diagnostic Software is a PC-based software program available to purchase from bendix.com. This software provides the technician with access to all the available Electronic Control Unit (ECU) diagnostic information and configuration capability. For controller-specific system diagnostics, use a current version of the ACom PRO Diagnostic Software.

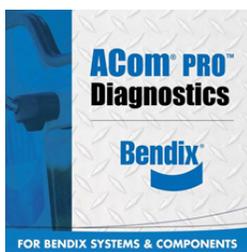


Figure 4 – Bendix ACom PRO Diagnostic Software

## STARTING BENDIX ACOM PRO DIAGNOSTIC SOFTWARE

The ACom PRO Diagnostic Software can be started from the desktop shortcut. To begin, the technician should select “Connect” from the main toolbar, then “Heavy Duty” connection type. The “Heavy Duty” button connects to the vehicle BUS using all vehicle protocols. This process could take approximately two (2) minutes. After the connection is complete, the roll call will show the ECU and its active and inactive DTCs. The connection depends on a compatible RP1210C adapter. For assistance with the ACom PRO Diagnostic Software, contact the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2, option 2).

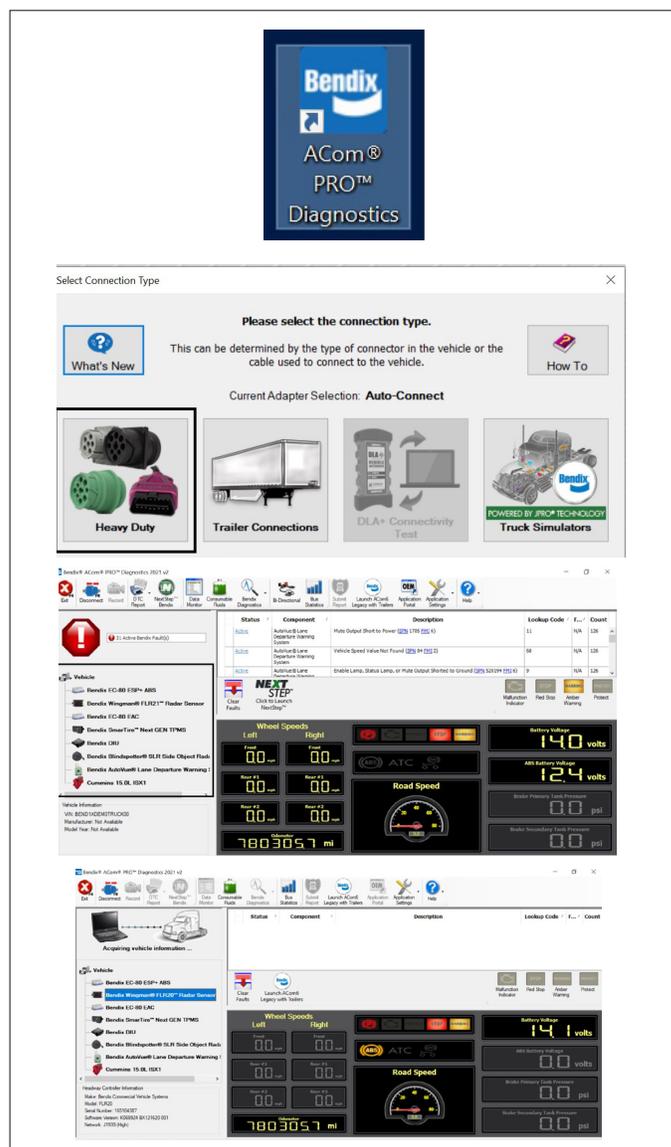


Figure 5 - Starting Bendix ACom PRO Diagnostic Software

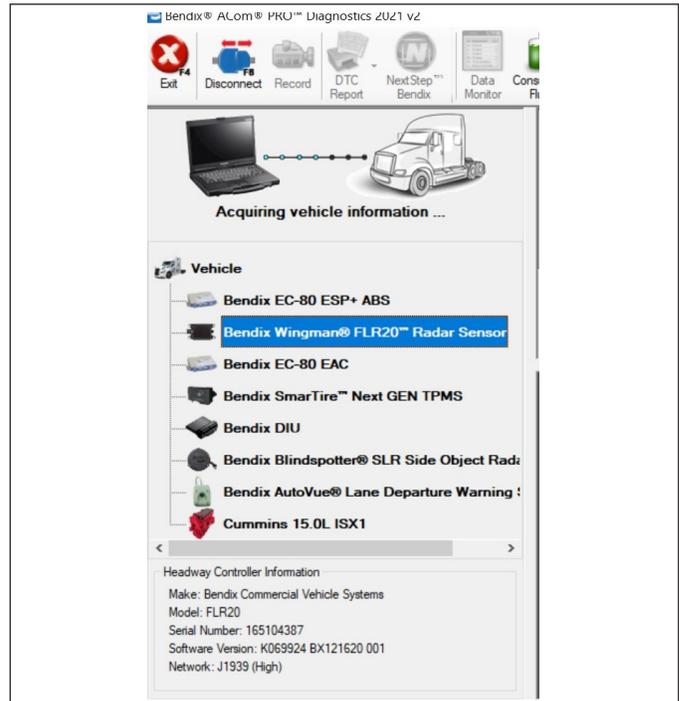
## 2.2 READING DIAGNOSTIC TROUBLE CODES (DTCS)

1. Connect a current version of the Bendix® ACom® PRO™ Diagnostic Software to the vehicle.
2. Once the roll call is complete, you can view active and inactive DTCS and clear DTCS from all vehicle components or solely from a selected Bendix controller.
3. To read and clear DTCS from all vehicle components at the same time, select the vehicle on the roll call and clear the DTCS by selecting “Clear Faults.”
4. To read and clear DTCS from a specific Bendix Electronic Control Unit (ECU), select the Bendix ECU on the roll call select “Clear Faults.”

For assistance with ACom PRO Diagnostic Software, contact the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2, option 2).

## 2.3 READING THE SYSTEM SOFTWARE VERSION

Connect a current version of Bendix® ACom® PRO™ Diagnostic Software to the vehicle. View the software version by selecting the appropriate vehicle.



**Figure 6 – Bendix® ACom® PRO™ Diagnostic Software Starter Screen Showing Software Version**

## 2.4 HOW TO GENERATE A BENDIX® FUSION™ FLR-25™ RADAR SENSOR DIAGNOSTIC TROUBLE CODE (DTC) REPORT

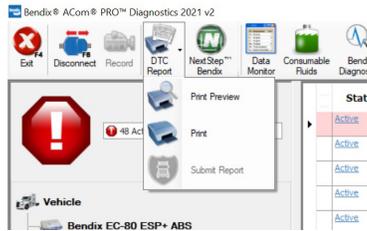
1. Connect a current version of the Bendix® ACom® PRO™ Diagnostic Software with the vehicle.



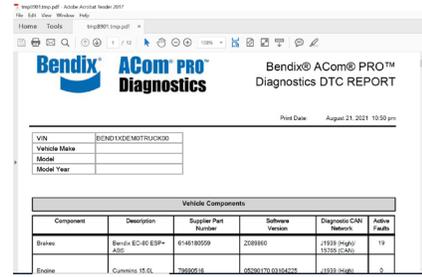
2. Once the roll call is complete, you can select the DTC Report icon on the top menu.

3. The DTC report drop-down gives you the following options:

- Print DTC Report
- Print Preview of the DTC Report
- Submit DTC Report



4. Select “Print Preview” to generate and save the report.



## 2.5 TABLE OF BENDIX® FUSION™ FLR-25™ RADAR SENSOR DIAGNOSTIC TROUBLE CODES (DTCs) AND SERVICE ACTION CODES



Review the preliminary steps prior to referencing the Table 4A (DTCs) and Table 4B (Service Action Codes).

1. Check Bendix® ACom® PRO™ Diagnostic Software for the Diagnostic Trouble Codes (DTCs) that indicate an inoperable radar. If one of these DTCs is active and displayed on ACom PRO **and the Bendix® Fusion™ System is still under warranty**, you can submit for a warranty evaluation.
2. Faults referencing *J1939 Signal Missing* are faults indicating that the Bendix® FLR-25™ Radar Sensor did not receive a required message from the component listed in the fault description (*refer to the acronym table below*). Refer to the associated Service Action Code list in Table 4B.

Acronym	Description
ABS	Antilock Braking System
ACC	Adaptive Cruise Control
AEBS	Autonomous Emergency Brake System
ASR	Anti-slip Reduction
CC	Cruise Control
CCVS	Cruise Control Vehicle Speed
CMT	Collision Mitigation Technology
CVW	Combined Vehicle Weight
DTC	Diagnostic Trouble Code
DM	Diagnostic Message
EBC	Electronic Brake Control
EC	Electronic Control
ECM	Electronic Control Module
EEC	Electronic Engine Control
ERC	Electronic Retarder Control
FLC	Forward-looking Camera
GCVW	Gross Combined Vehicle Weight
HDB	Highway Departure Braking
OEL	Operator's External Light
RC	Retarder Control
ROP	Rollover Prevention
TC	Torque Control
TSC	Torque/Speed Control
VDC	Vehicle Dynamic Controller
XBR	External Brake Request

DTC	SPN	FMI	Description	Go to the Service Action Code List in Table 4B
8192	57376	2	J1939 signal: inconsistent FLC signal	N
20736	57425	2	Powertrain signals not available	B
57358	57344	14	NVM Block Error: Automatic Emergency Braking System (AEBS)_CUSTOMER data Out of Range	A
61442	61440	2	Velocity implausible	D
66050	513	2	J1939 Signal Error: Invalid Electronic Engine Control (EEC)1 Actual Torque	N
66057	513	9	J1939 Signal Error: Not available Electronic Engine Control (EEC)1 Actual Torque	N
66067	513	19	J1939 Signal Error: Error in Electronic Engine Control (EEC)1 Actual Torque	N
122894	57345	14	NVM Block Error: AEBS_PRIVATE data Out of Range	A
126978	61441	2	Yaw Rate Error	E
131586	514	2	J1939 signal: Invalid Electronic Engine Control (EEC)3 nominal friction percent torque	N
131593	514	9	J1939 signal: Electronic Engine Control (EEC)3 nominal friction percent torque not available	N
131598	514	4	J1939 Signal Error: Missing Electronic Engine Control (EEC)3 Message	D
131603	514	19	J1939 signal: Error in Electronic Engine Controller (EEC)3 nominal friction percent torque	N
188430	57346	14	NVM Block Error: ALGO_PRIVATE data Out of Range	A
192514	61442	2	Yaw rate or wheel speed signal implausible	E
253966	57347	14	NVM Block Error: Adaptive Cruise Control (ACC)_CUSTOMER data Out of Range	A
258057	61443	2	Vehicle velocity not available	N
319502	57348	14	NVM Block Error: ACC_PRIVATE data Out of Range	A
323586	61444	2	Input signal error	N
385038	57349	14	NVM Block Error: IM_PRIVATE data Out of Range	A
389134	61445	14	Misalignment left	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
450574	57350	14	Dataset Error: The NVM layout version of AEBS_CUSTOMER block is not correct.	A
454670	61446	14	Misalignment right	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
460558	1799	14	J1939 signal: Missing Adaptive Cruise Control (ACC)2 message.	D
516110	57351	14	Dataset Error: The NVM layout version of AEBS_PRIVATE block is not correct.	A
520206	61447	14	Alignment path compensation	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
524814	520	14	J1939 signal: Missing Engine Retarder Control (ERC)1 message	D

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

<b>DTC</b>	<b>SPN</b>	<b>FMI</b>	<b>Description</b>	<b>Go to the Service Action Code List in Table 4B</b>
581646	57352	14	Dataset Error: The NVM layout version of AL-GO_CUSTOMER block is not correct.	A
585737	61448	9	Vehicle yaw rate not available	N
590338	521	2	J1939 Signal Error: Invalid Electronic Brake Controller (EBC) 1 Brake Pedal Position	N
590345	521	9	J1939 Signal Error: Not available Electronic Brake Controller (EBC)1 Brake Pedal Position	N
590355	521	19	J1939 Signal Error: Error in Electronic Brake Controller (EBC)1 Brake Pedal Position	N
647182	57353	14	Dataset Error: The NVM layout version of AL-GO_PRIVATE block is not correct	A
651278	61449	14	Misalignment high	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
716814	61450	14	Misalignment low	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
721410	523	2	J1939 Signal Error: Invalid Electronic Transmission Control (ETC)2 Transmission Current Gear	N
721417	523	9	J1939 Signal Error: Not available Electronic Transmission Control (ETC)2 Transmission Current Gear	N
721427	523	19	J1939 Signal Error: Error in Electronic Transmission Control (ETC)2 Transmission Current Gear	N
782350	61451	14	End of Line (EOL) alignment signal insufficient	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
786946	524	2	J1939 Signal Error: Invalid Electronic Transmission Control (ETC)2 Transmission Selected Gear	N
786953	524	9	J1939 Signal Error: Not available Electronic Transmission Control (ETC)2 Transmission Selected Gear	N
786958	524	14	J1939 Signal Error: Missing ETC2 Message	D
786963	524	19	J1939 Signal Error: Error in ETC2 Transmission Selected Gear	N
913422	61453	14	ECU Contamination error (blockage detection)	A
984834	1807	2	J1939 Signal Error: Invalid Vehicle Dynamic Controller (VDC)2 Steer Angle	N
984841	1807	9	J1939 Signal Error: Not available Vehicle Dynamic Controller (VDC)2 Steer Angle	N
984846	1807	14	J1939 Signal Error: Missing Vehicle Dynamic Controller (VDC)2 Message	D
984851	1807	19	J1939 Signal Error: Error in Vehicle Dynamic Controller (VDC)2 Steer Angle Sensor	N
1044483	61455	3	Supply voltage too high	A
1050370	1808	2	J1939 Signal Error: Invalid Vehicle Dynamic Controller (VDC)2 Yaw Rate	N
1050377	1808	9	J1939 Signal Error: Not available Vehicle Dynamic Controller (VDC)2 Yaw Rate	N

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

<b>DTC</b>	<b>SPN</b>	<b>FMI</b>	<b>Description</b>	<b>Go to the Service Action Code List in Table 4B</b>
1050387	1808	19	J1939 Signal Error: Error in Vehicle Dynamic Controller (VDC)2 Yaw Rate Signal	N
1105934	57360	14	Dataset Error: The NVM layout version of Adaptive Cruise Control (ACC)_CUSTOMER block is not correct	A
1110020	61456	4	Supply voltage too low	A
1171470	57361	14	Dataset Error: The NVM layout version of Adaptive Cruise Control (ACC)_PRIVATE block is not correct	A
1175566	61457	14	ECU HW malfunction	A
1237006	57362	14	Dataset Error: The NVM layout version of IM_PRIVATE block is not correct	A
1241102	61458	14	ECU Disturbance	A
1302542	57363	14	Dataset Error: The NVM layout version of IM_CUSTOMER block is not correct	A
1306638	61459	14	ECU Disturbance CAT2	A
1368078	57364	14	Dataset Error: The NVM layout version of LAYOUTVERSIONSENTINEL_CUSTOMER block is not correct	A
1372162	61460	2	Invalid environment signal	N
1433614	57365	14	Dataset Error: Invalid Variant Configured in NVM	A
1437710	61462	14	ECU not yet aligned	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
1443586	1814	2	J1939 Signal Error: Vehicle Dynamic Controller (VDC)1 VDC Not Fully Operational	N
1443593	1814	9	J1939 Signal Error: Not available Vehicle Dynamic Controller (VDC)1 VDC Fully Operational	N
1443598	1814	14	J1939 Signal Error: Missing VDC1 Message	D
1443603	1814	19	J1939 Signal Error: Error in VDC1 VDC Fully Operational	N
1499150	57366	14	Dataset Error: Calibration memory error	A
1564686	57367	14	Dataset Error: Calibration memory error	A
1568782	61463	14	ECU misaligned monitoring	A - Ensure the radar sensor bracketry is mounted correctly and that there is no damage
1574665	1816	9	J1939 Signal Error: Not available Vehicle Dynamic Controller (VDC)1 ROP Engine Control Signal	N
1574675	1816	19	J1939 Signal Error: Error in Vehicle Dynamic Controller (VDC)1 ROP Engine Control Signal	N
1630222	57368	14	Dataset Error: Calibration memory error	A
1640201	1817	9	J1939 Signal Error: Not available Vehicle Dynamics Controller (VDC)1 Yaw Control (YC) Engine Control Signal	N
1640211	1817	19	J1939 Signal Error: Error in Vehicle Dynamic Controller (VDC)1 Yaw Control (YC) Engine Control Signal	N
1695758	57369	14	Missing Video Message from Camera	N
1705737	1818	9	J1939 Signal Error: Not available Vehicle Dynamic Controller (VDC)1 ROP Brake Control Signal	N
1705747	1818	19	J1939 Signal Error: Error in Vehicle Dynamic Controller (VDC)1 ROP Brake Control Signal	N

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

<b>DTC</b>	<b>SPN</b>	<b>FMI</b>	<b>Description</b>	<b>Go to the Service Action Code List in Table 4B</b>
1771273	1819	9	J1939 Signal Error: Not available Vehicle Dynamic Controller (VDC)1 Yaw Control (YC) Brake Control Signal	N
1771283	1819	19	J1939 Signal Error: Error in Vehicle Dynamic Controller (VDC)1 Yaw Control (YC) Brake Control Signal	N
2097666	544	2	J1939 Signal Error: Invalid Electronic Engine Control (EEC)1 Engine Reference Torque	N
2097673	544	9	J1939 Signal Error: Not Available Electronic Engine Control (EEC)1 Engine Reference Torque	N
2097683	544	19	J1939 Signal Error: Error in Electronic Engine Control (EEC)1 Engine Reference Torque	N
2220046	57377	14	NVM Block Error: TSR_PRIVATE data out of range	A
2285582	57378	14	NVM Block Error: TSR_CUSTOMER data out of range	A
2351118	57379	14	NVM Block Error: The NVM layout version of TSR_CUSTOMER block is not correct	A
2416654	57380	14	NVM Block Error: The NVM layout version of TSR_PRIVATE block is not correct	A
2482190	57381	14	NVM Block Error: The NVM layout version of PAEBS_CUSTOMER block is not correct	A
2547726	57382	14	NVM Block Error: The NVM layout version of PAEBS_PRIVATE block is not correct	A
2613262	57383	14	NVM Block Error: HDB_PRIVATE data out of range	A
2678798	57384	14	NVM Block Error: HDB_CUSTOMER data out of range	A
2744334	57385	14	Dataset Error: The NVM layout version of HDB_CUSTOMER block is not correct	A
3146254	560	14	J1939 Signal Error: Missing Electronic Transmission Control (ETC)1 Message	D
3203086	57392	14	Dataset Error: The NVM layout version of HDB_PRIVATE block is not correct	A
3216905	5681	9	J1939 signal: Advanced Emergency Braking System (AEBS)2 driver activation not available	N
3216910	5681	14	J1939 signal: Missing AEBS2 message	D
3216915	5681	19	J1939 signal: Error in AEBS2 driver activation	D
3268622	57393	14	J1939 Signal Error: Missing Lane Message	N
3277314	562	2	J1939 Signal Error: Invalid in Electronic Brake Control (EBC)1 Anti Slip Reduction (ASR) Brake Control Active	N
3334158	57394	14	NVM Block Error: FDA_PRIVATE data out of range	A
3342857	563	9	J1939 Signal Error: Not available EBC1 ABS Active	N
3342867	563	19	J1939 Signal Error: Error in EBC1 ABS Active	N
3347987	5683	19	J1939 signal: Error in AEBS2 checksum	D
3399694	57395	14	NVM Block Error: FDA_CUSTOMER data out of range	A
3465230	57396	14	Dataset Error: The NVM layout version of FDA_CUSTOMER block is not correct	A
3530766	57397	14	Dataset Error: The NVM layout version of FDA_PRIVATE block is not correct	A
3549186	10294	2	J1939 Signal Error: Invalid Cruise Control Set Speed (CCSS) Adaptive Cruise Control (ACC) Powertrain	N

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

DTC	SPN	FMI	Description	Go to the Service Action Code List in Table 4B
3596302	57398	14	Dataset Error: The NVM layout version of CRB_CUSTOMER block is not correct	A
3661838	57399	14	Dataset Error: The NVM layout version of CRB_PRIVATE block is not correct	A
3727374	57400	14	Dataset Error: The NVM layout version of OM_PRIVATE block is not correct	A
3792910	57401	14	NVM Block Error: CRB_CUSTOMER data out of range	A
3934978	2876	2	J1939 Signal Error: Invalid OEL Turn Signal	N
3934985	2876	9	J1939 Signal Error: Not available OEL Turn Signal	N
3934990	2876	14	J1939 Signal Error: Missing OEL Message	D
3934995	2876	19	J1939 Signal Error: Error in OEL Turn Signal	N
4251662	57408	14	NVM Block Error: CRB_PRIVATE data out of range	A
4317198	57409	14	NVM Block Error: OM_PRIVATE data out of range	A
4382734	57410	14	NVM Block Error: IM_CUSTOMER data out of range	A
4448270	57411	14	NVM Block Error: OM_CUSTOMER data out of range	A
4513806	57412	14	Dataset Error: The NVM layout version of OM_CUSTOMER block is not correct	A
4579342	57413	14	J1939 Signal Error: Missing Camera Prop Warn Message	Y
4587529	70	9	J1939 Signal Error: Not available Cruise Control Vehicle Speed (CCVS)1 Park Brake Switch	N
4587539	70	19	J1939 Signal Error: Error in Cruise Control Vehicle Speed (CCVS)1 Park Brake Switch	N
4644878	57414	14	System Specific Fault: Brake overuse	M
4710414	57415	14	NVM Block Error: MLAEB_CUSTOMER data out of range	A
4775950	57416	14	Dataset Error: The NVM layout version of MLAEB_CUSTOMER block is not correct	A
4841486	57417	14	NVM Block Error: MLAEB_PRIVATE data out of range	A
5300238	57424	14	Dataset Error: The NVM layout version of MLAEB_PRIVATE block is not correct	A
5431310	57426	14	System specific: Internal monitoring function detected an unexpected system behavior	A
5440009	595	5	J1939 Signal Error: Not Available Cruise Control Vehicle Speed (CCVS)1 Cruise Control (CC) Active	N
5440019	595	19	J1939 Signal Error: Error Cruise Control Vehicle Speed (CCVS)1 Cruise Control (CC) Active	N
5496846	57427	14	Automatic Electronic Brake System (AEBS) braking overuse	M
5505026	84	2	J1939 Signal: Invalid Cruise Control Vehicle Speed (CCVS)1 Wheel Speed	N
5505033	84	9	J1939 Signal: Cruise Control Vehicle Speed (CCVS)1 Wheel Speed not available	N
5505043	84	19	J1939 Signal: Error in Cruise Control Vehicle Speed (CCVS)1 Wheel Speed	N
5505545	596	9	J1939 Signal Error: Not Available Cruise Control Vehicle Speed (CCVS)1 CC Enable	N
5505555	596	19	J1939 Signal Error: Error in Cruise Control Vehicle Speed (CCVS)1 Cruise Control (CC) Enable	N

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

<b>DTC</b>	<b>SPN</b>	<b>FMI</b>	<b>Description</b>	<b>Go to the Service Action Code List in Table 4B</b>
5562382	57428	14	Highway Departure Braking (HDB) braking overuse	M
5571081	597	9	J1939 Signal Error: Not available CCVS1 Brake Switch	N
5571091	597	19	J1939 Signal Error: Error in Cruise Control Vehicle Speed (CCVS)1 Brake Switch	N
5627918	57429	14	Traffic Sign Recognition (TSR) braking overuse	M
5636098	86	2	J1939 Signal Error: Invalid Cruise Control Vehicle Speed (CCVS)1 Cruise Control (CC) Speed	N
5636105	86	9	J1939 Signal Error: Not Available Cruise Control Vehicle Speed (CCVS)1 Cruise Control (CC) Speed	N
5636115	86	19	J1939 Signal Error: Error in Cruise Control Vehicle Speed (CCVS)1 Cruise Control (CC) Speed	N
5702153	599	9	J1939 Signal Error: Not available Cruise Control Vehicle Speed (CCVS)1 Cruise Control Set Switch	N
5702163	599	19	J1939 Signal Error: Error in Cruise Control Vehicle Speed (CCVS)1 Cruise Control Set Switch	N
5767689	600	9	J1939 Signal: Cruise Control Vehicle Speed (CCVS)1 coast switch not available	N
5767699	600	19	J1939 Signal: Error in Cruise Control Vehicle Speed (CCVS)1 coast switch	N
5833225	601	9	J1939 Signal Error: Not available Cruise Control Vehicle Speed (CCVS)1 Cruise Control Resume Switch	N
5833235	601	19	J1939 Signal Error: Error in Cruise Control Vehicle Speed (CCVS)1 Cruise Control Resume Switch	N
5890062	57433	20	NVM Block Error: CONFIG Out of Range	A
5898761	602	9	J1939 Signal: Cruise Control Vehicle Speed (CCVS)1 Cruise Control accelerate switch not available	N
5898771	602	19	J1939 Signal: Error in Cruise Control Vehicle Speed (CCVS)1 accel switch	N
5963778	91	2	J1939 Signal Error: Invalid Electronic Engine Control (EEC)2 Accelerator pedal position	N
5963785	91	9	J1939 Signal Error: Not available Electronic Engine Control (EEC)2 Accelerator pedal position	N
5963790	91	14	J1939 Signal Error: Missing Electronic Engine Control (EEC)2 message	D
5963795	91	19	J1939 Signal Error: Error in Electronic Engine Control (EEC)2 Accelerator pedal position	N
6358025	1121	9	J1939 Signal Error: Not available Electronic Brake Control (EBC)1 Brake SW	N
6358035	1121	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)1 Brake SW	N
6358537	1633	9	J1939 Signal: Cruise Control Vehicle Speed (CCVS)1 pause switch not available	N
6358547	1633	19	J1939 Signal Error: Error in Cruise Control Vehicle Speed (CCVS)1 Cruise Control Pause Switch	N
6621954	2917	2	J1939 Signal Error: Invalid Electronic Brake Control (EBC)5 External Brake Request (XBR) State	N
6621961	2917	9	J1939 Signal Error: Not available Electronic Brake Control (EBC)5 External Brake Request (XBR) State	N

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

DTC	SPN	FMI	Description	Go to the Service Action Code List in Table 4B
6621971	2917	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)5 External Brake Request (XBR) State	N
6687490	2918	2	J1939 Signal: Invalid Electronic Brake Control (EBC)5 External Brake Request (XBR) active control mode	N
6687497	2918	9	J1939 Signal: Electronic Brake Control (EBC)5 External Brake Request (XBR) control mode not available	N
6687507	2918	19	J1939 Signal: Error in Electronic Brake Control (EBC)5 External Brake Request (XBR) control mode	N
6753038	2919	14	J1939 Signal Error: Missing Electronic Brake Control (EBC)5 message	D
8913666	904	2	J1939 Signal Error: Invalid Electronic Brake Control (EBC)2 Front Axle	N
8913673	904	9	J1939 Signal Error: Not Available Electronic Brake Control (EBC)2 Front Axle	N
8913678	904	14	J1939 Signal Error: Missing Electronic Brake Control (EBC)2 message	D
8913683	904	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)2 Front Axle	N
8979202	905	2	J1939 Signal Error: Invalid Electronic Brake Control (EBC)2 Left Front (LF) Wheel	N
8979209	905	9	J1939 Signal Error: Not Available Electronic Brake Control (EBC)2 Left Front(LF) Wheel	N
8979219	905	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)2 Left Front (LF) Wheel	N
9044738	906	2	J1939 Signal Error: Invalid Electronic Brake Control (EBC)2 Right Front (RF) Wheel	N
9044745	906	9	J1939 Signal Error: Not Available Electronic Brake Control (EBC)2 Left Front (LF) Wheel	N
9044755	906	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)2 Right Front (RF) Wheel	N
9110274	907	2	J1939 Signal Error: Invalid Electronic Brake Control (EBC)2 Left Rear (LR)1 Wheel	N
9110281	907	9	J1939 Signal Error: Not available Electronic Brake Control (EBC)2 Left Rear (LR)1 Wheel	N
9110291	907	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)2 Left Rear (LR)1 Wheel	N
9175810	908	2	J1939 Signal Error: Invalid Electronic Brake Control (EBC)2 Right Rear (RR)1 Wheel	N
9175817	908	9	J1939 Signal Error: Not available Electronic Brake Control (EBC)2 Right Rear (RR)1 Wheel	N
9175827	908	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)2 Right Rear (RR)1 Wheel	N
12320782	188	14	J1939 Signal Error: Missing EC1 Message	D
12451842	190	2	J1939 Signal Error: Invalid Electronic Engine Control (EEC)1 Engine Speed	N
12451849	190	9	J1939 Signal Error: Not available Electronic Engine Control (EEC)1 Engine Speed	N

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

<b>DTC</b>	<b>SPN</b>	<b>FMI</b>	<b>Description</b>	<b>Go to the Service Action Code List in Table 4B</b>
12451854	190	14	J1939 Signal Error: Missing Electronic Engine Control (EEC)1 message	D
12451859	190	19	J1939 Signal Error: Error in Electronic Engine Control (EEC)1 Engine Speed	N
14353410	1243	2	J1939 Signal Error: Electronic Brake Controller (EBC)1 ABS Not Fully Operational	U
14353417	1243	9	J1939 Signal Error: Not available Electronic Brake Controller (EBC)1 ABS Operate	N
14353422	1243	14	J1939 Signal Error: Missing Electronic Brake Controller (EBC)1 message	D
14353427	1243	19	J1939 Signal Error: Error in Electronic Brake Controller (EBC)1 ABS Operate	N
16712201	767	9	J1939 Signal Error: Not available Electronic Transmission Control (ETC)5 Transmission Reverse Direction Switch	N
16712206	767	14	J1939 Signal Error: Missing Electronic Transmission Control (ETC)5 Message	D
16712211	767	19	J1939 Signal Error: Error in Electronic Transmission Control (ETC)5 Transmission Reverse Direction Switch	N
16715273	3839	9	J1939 Signal Error: Not available Electronic Brake Control (EBC)5 Brake Temperature Warning	N
16715283	3839	19	J1939 Signal Error: Error in Electronic Brake Control (EBC)5 Brake Temperature Warning	N

**Table 4A – Diagnostic Trouble Codes (DTCs), SPN, and FMI**

## Service Action Codes and the Recommended Service to Perform

Service Action Code (From Table 4A)	Table 4B: Service Action Codes and the Recommended Service to Perform
	Recommended Service (Bendix™ FLR-25™ Radar Sensors Only)
A	<p>This DTC <b><i>is</i></b> a failure of the FLR-25 radar sensor. <b><u>Replace the FLR-25 radar sensor.</u></b></p> <p><b>Prior to replacing the FLR-25 radar sensor, perform the following:</b></p> <ul style="list-style-type: none"> <li>• Clear the Bendix® Wingman® Fusion™ system DTCs using the procedure in Section 2.6: <i>Clearing Diagnostic Trouble Codes (DTCs)</i>.</li> <li>• Add the FLR-25 radar sensor to a compatible vehicle and test to determine if the error persists.</li> <li>• If the error returns, replace the FLR-25 radar sensor.</li> </ul>
B	<p>This DTC <b><i>is not</i></b> a failure of the FLR-25 radar sensor. <b><u>Do not</u></b> replace the FLR-25 radar sensor.</p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>• This error will be triggered by Active Cruise with Braking (ACB) if not enough power train-related input signals are available for the function to operate.</li> <li>• It is a de-centralized error handling approach by ACB.</li> <li>• Non-OE-specified components are installed in the CAN line (i.e. Electronic Driver's Log [EDL]).</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Check if one of the signals is not available: <ul style="list-style-type: none"> <li>• ETC1:TransmissionShiftInProgress (SPN 574)</li> <li>• ETC1:TransmissionOutputShaftSpeed (SPN 191)</li> <li>• ETC2: TransmissionActualGearRatio (SPN 526)</li> </ul> </li> </ul>
D	<p>This DTC <b><i>is not</i></b> a failure of the FLR-25 radar sensor. <b><u>Do not</u></b> replace the FLR-25 radar sensor.</p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>• The system receives an implausible signal (J1939 EBC2 Mean Front Axle) from an external ECU.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Clear the Fusion system DTCs using the procedure in Section 2.6: <i>Clearing Diagnostic Trouble Codes (DTCs)</i>. If the error persists, continue to the next step.</li> <li>• Check the source of the signal to identify why the signal has an error.</li> <li>• Check the source of the signal for trouble codes using the manufacturer's diagnostic procedures.</li> </ul>
E	<p>This DTC <b><i>is not</i></b> a failure of the FLR-25 radar sensor. <b><u>Do not</u></b> replace the FLR-25 radar sensor.</p> <p><b>Possible cause:</b></p> <ul style="list-style-type: none"> <li>• Vehicles without external yaw rate sensor: the system receives an implausible signal (J1939 EBC2 Mean Front Axle) from an external ECU.</li> <li>• Vehicles with external yaw rate sensor: the system receives an implausible signal (J1939 VDC2 Yaw rate) from an external ECU.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Clear the Fusion system DTCs using the procedure in Section 2.6: <i>Clearing Diagnostic Trouble Codes (DTCs)</i>. If the error persists, continue to the next step.</li> <li>• Check the source of the signal to identify why the signal has invalid data in the J1939 message.</li> <li>• Check the ABS for DTCs using the manufacturer's diagnostic procedures. The ABS is the source of the signal and must be investigated first.</li> <li>• If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2.</li> </ul>
<p><i>Note: The system will not report newly active J1939 Diagnostic Trouble Codes (DTCs) until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.</i></p>	

**Table 4B – Service Action Codes**

Service Action Code (From Table 4A)	Table 4B: Service Action Codes and the Recommended Service to Perform
	Recommended Service (Bendix™ FLR-25™ Radar Sensors Only)
M	<p>This DTC <b><i>is not</i></b> a failure of the FLR-25 radar sensor. <b><i>Do not</i></b> replace the FLR-25 radar sensor.</p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>The Collision Mitigation System (CMS) applied the brakes more than five (5) times in a power cycle.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Clear the Fusion system DTCs using the procedure in Section 2.6: <i>Clearing Diagnostic Trouble Codes (DTCs)</i>.</li> <li>Review the operation of the Bendix® Fusion™ system with the driver.</li> </ul>
N	<p>This DTC <b><i>is not</i></b> a failure of the FLR-25 radar sensor. <b><i>Do not</i></b> replace the FLR-25 radar sensor.</p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>The source of the J1939 message is producing a value that is out of range, in error, or not supported.</li> </ul> <p><b>Review the following sections:</b></p> <ul style="list-style-type: none"> <li>2.10: <i>J1939 Engine Communications Test Procedure</i>.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>Clear the Fusion system DTCs using the procedure in Section 2.6: <i>Clearing Diagnostic Trouble Codes (DTCs)</i>. If the error persists, continue to the next step.</li> <li>Check the source of the J1939 message to identify why it has invalid or missing data.</li> <li>Check the engine, engine retarder, and Antilock Braking System (ABS) for DTCs using the manufacturer's diagnostic procedures. Either the engine, engine retarder, or the ABS are the source of the signal. The controller that broadcasts the J1939 message must be investigated first. Some examples are gross vehicle weight and various engine torque signals.</li> <li>If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2.</li> </ul>
<p><i>Note: The system will not report newly active J1939 Diagnostic Trouble Codes (DTCs) until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.</i></p>	

Table 4B – Service Action Codes

Service Action Code (From Table 4A)	Table 4B: Service Action Codes and the Recommended Service to Perform
	Recommended Service (Bendix™ FLR-25™ Radar Sensors Only)
U	<p>This DTC <b><i>is not</i></b> a failure of the FLR-25 radar sensor. <b><i>Do not</i></b> replace the radar FLR-25 radar sensor.</p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>• A fault occurred in the ABS controller causing the radar to not receive a proper message from the ABS controller.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Clear the Fusion system DTCs using the procedure in Section 2.6: <i>Clearing Diagnostic Trouble Codes (DTCs)</i>. If the error persists, continue to the next step.</li> <li>• Repair the ABS fault(s).</li> <li>• Check the ABS fault history for reoccurring intermittent faults.</li> <li>• If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2.</li> </ul>
Y	<p>This DTC <b><i>is not</i></b> a failure of the FLR-25 radar sensor. <b><i>Do not</i></b> replace the FLR-25 radar sensor.</p> <p><b>Possible causes:</b></p> <ul style="list-style-type: none"> <li>• This is an indicator of an intermittent CAN failure. Refer to CAN line diagnostics for further troubleshooting steps.</li> <li>• The Fusion system is indicating an error in the messages on the CAN bus.</li> </ul> <p><b>Perform the following:</b></p> <ul style="list-style-type: none"> <li>• Clear the Fusion system DTCs using the procedure in Section 2.6: <i>Clearing Diagnostic Trouble Codes (DTCs)</i>. If the error persists, continue to the next step.</li> <li>• Check the public/vehicle CAN connections at the camera and the FLR-25 radar sensor.</li> <li>• Check that the resistance between the public/vehicle CAN+ and CAN- is between 50 and 70 ohms with the power off.</li> <li>• If the error returns, call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2.</li> </ul>
<p><i>Note: The system will not report newly active J1939 Diagnostic Trouble Codes (DTCs) until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs without the engine running.</i></p>	

**Table 4B – Service Action Codes**

## 2.6 CLEARING DIAGNOSTIC TROUBLE CODES (DTCs)

1. Connect a current version of the Bendix® ACom® PRO™ Diagnostic Software to the vehicle.
2. Once the roll call is complete, you can view active and inactive Diagnostic Trouble Codes (DTCs) and clear DTCs from all vehicle components or solely from a selected Bendix controller.
3. To read and clear DTCs from all vehicle components at the same time, select the vehicle on the roll call and clear the DTCs by selecting “Clear Faults.”
4. To read and clear DTCs from a specific Bendix Electronic Control Unit (ECU), select the Bendix ECU on the roll call and select “Clear Faults.”

For assistance with ACom PRO Diagnostic Software, contact the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725, option 2, option 2).

## 2.7 TROUBLESHOOTING DIAGNOSTIC TROUBLE CODES: POWER SUPPLY

### IGNITION VOLTAGE TOO LOW

Measure the ignition voltage under load. Ensure that the ignition voltage is greater than 10 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.

### POWER SUPPLY TESTS

1. Take all measurements at the radar sensor harness connector.
2. Place a load (i.e. 1157 stop lamp) across the supply voltage and ground connection. Measure the voltage with the load. The supply voltage on pin 8 to ground should measure between 10 to 16 VDC.
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.

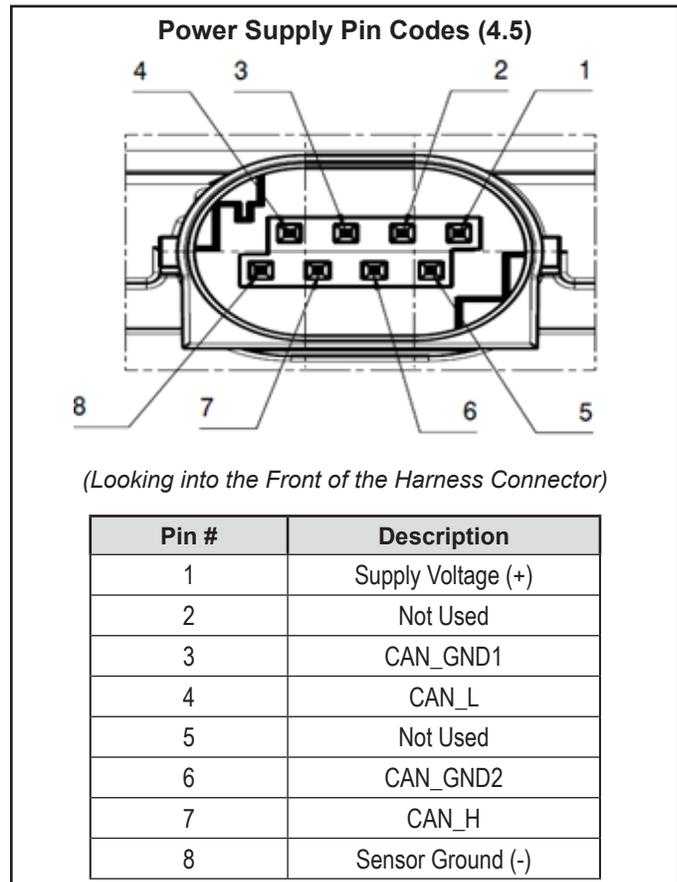


Table 5 – Harness Connector Pins

## 2.8 SERIAL DATA (J1939) COMMUNICATIONS LINK

Check for a loss of communications between the Bendix® Fusion™ FLR-25™ Radar Sensor, the Antilock Braking System (ABS) controller, the engine ECU, and other devices connected to the J1939 link. Check for damaged or reversed J1939 wiring. Check for corroded or damaged connectors and loose connections. Using procedures described by the vehicle manufacturer, verify the presence of the engine ECU and the ABS controller on the J1939 link. This can be done using the roll call function the ACom PRO Diagnostic Software.

Verify the engine ECU configuration. Check for other devices inhibiting J1939 communications.

**NOTE:** The FLR-25 Radar Sensor will not report newly active J1939 DTCs until the engine has been running for 15 seconds. Do not attempt to diagnose J1939 DTCs with the engine running.

## 2.9 ENGINE COMMUNICATIONS (J1939) TEST PROCEDURE

**NOTE:** Remove all non-factory-equipped components – such as Electronic Drivers' Logs (EDLs), GPS, and telematic systems – prior to testing communications.

The Bendix® Fusion™ FLR-25™ Radar Sensor requires several J1939 messages from the engine Electronic Control Unit (ECU) to control the engine and retarder torque for distance control and braking. The Fusion system will set a Diagnostic Trouble Code (DTC) if one of these messages is not present.

Use the engine manufacturer's diagnostic test procedures to verify that there are no errors present in the engine that may prevent the Fusion system from controlling the engine or retarder torque.

**NOTE:** The Fusion FLR-25 radar sensor 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.

### 2.10 J1939 TROUBLESHOOTING PROCEDURE

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



**Do not insert probes into the back of the connector as this will damage the seal around the wire.**



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

**NOTE:** The Fusion FLR-25 Radar Sensor 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.

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 sometimes operate normally. If this occurs, multiple DTCs will be logged in multiple engine and vehicle controllers.

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.

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 into the radar sensor. Replacement of the entire harness is recommended. If the terminals of the radar sensor are corroded, replacement of the radar sensor is recommended.
4. 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.
5. Unplug the radar sensor. With the ignition switch off, measure the resistance (ohms) using a multimeter between harness pins 1 and 6. The reading should be approximately 60 ohms. If it is not, the vehicle wiring should be investigated using procedures described by the manufacturer.

### 2.11 TROUBLESHOOTING WIRING HARNESSES

All wire harness connectors must be properly seated to maintain environmental seals. Push the mating connector until it seals with a click. When replacing an FLR-25 radar sensor, check that the wire harness connector is free of corrosion before plugging it into a new radar sensor. 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 radar sensor. Replacement of the entire harness is recommended. If the terminals of the radar sensor are corroded, replacement of the radar sensor is recommended.

### 3.0 OTHER SYSTEM FEATURES

#### 3.1 READING BENDIX® FUSION™ SYSTEM KEY INDICATORS

1. Connect a current version of Bendix® ACom® PRO™ Diagnostic Software key system indicators from the roll call. Key Electronic Control Unit (ECU) indicators will be shown at the bottom left of the screen below the roll call. Some information shown in this includes the make, model, serial number, software version, etc.
2. Additional ECU indicators can be found by selecting “Bi-Directional” from the main menu. Select the Bendix controller and the controller-specific configuration option in the populated menu.

For assistance with the ACom PRO Diagnostic Software, contact the Bendix Tech team at 1-800-AIR-BRAKE (1-800-247-2725, option 2, option 2).

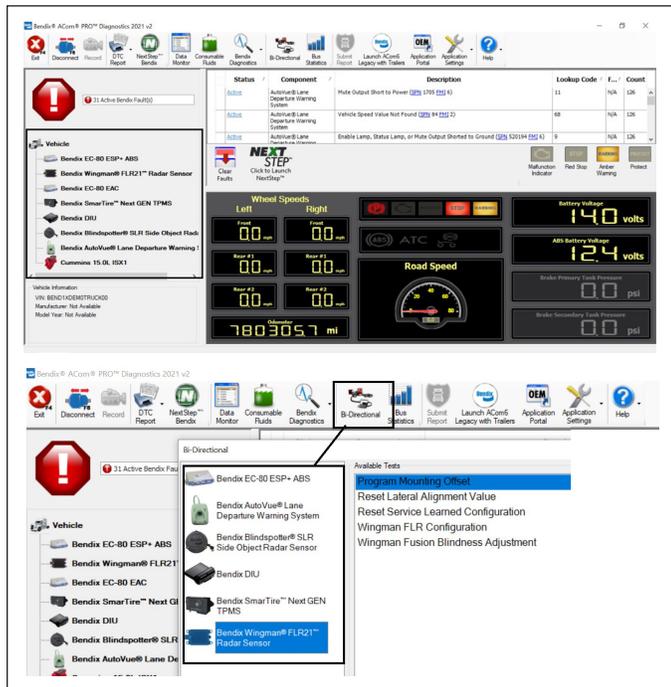


Figure 7 – Bendix® ACom® PRO Screen Showing the Configuration Number

### 3.2 BENDIX FUSION SYSTEM DIAGNOSTIC TROUBLE CODE (DTC) SELF-CLEARING

1. Connect a current version of the ACom PRO Diagnostic Software to the vehicle.
2. Once the roll call is complete, you can view active and inactive DTCs and clear DTCs from all vehicle components or solely from a selected Bendix controller.
3. To read and clear DTCs from all vehicle components at the same time, select the vehicle on the roll call and clear the DTCs by selecting “Clear Faults.”
4. To read and clear DTCs from a specific Bendix Electronic Control Unit (ECU), select the Bendix ECU on the roll call and select “Clear Faults.”

### 3.3 FOLLOWING DISTANCE ADJUSTMENT SWITCH (OPTIONAL)

If the vehicle is equipped with the following distance does not change after an adjustment is made, the switch, wiring, or a controller on the vehicle should be checked using the diagnostic procedures described by the vehicle manufacturer. The radar sensor receives the driver’s desired following distance on the J1939 data communication link from a controller on the vehicle. No DTC will be set if the vehicle is not equipped with a following distance adjustment switch. Refer to Table 6 for further information on configuration settings.

### 3.4 CONFIGURING BENDIX® FUSION™ SYSTEM FOLLOWING DISTANCE ALERTS (FDA)

FDA Config. No.	Vehicle Speed Range	Slow Audible Alert (sec.)	Medium Speed Audible Alert (sec.)	Fast Audible Alert (sec.)	Following Distance (Mode 0)	Following Distance (Mode 1)	Following Distance (Mode 2) Default	Following Distance (Mode 3)	Following Distance (Mode 4)
1	0 - 37 MPH	–	–	0.5	3.7	3.5	2.8	2.3	1.8
	38 - 52 MPH	1.125	0.875	0.5					
	> 52 MPH	1.5	1.0	0.5					
2	0 - 37 MPH	–	–	0.5	3.7	3.5	3.5	2.8	2.3
	38 - 52 MPH	1.125	0.875	0.5					
	> 52 MPH	1.5	1.0	0.5					
3	0 - 37 MPH	–	–	–	3.7	3.5	2.8	2.3	2.3
	38 - 52 MPH	2.0	1.5	1.0					
	> 52 MPH	2.0	1.5	1.0					
4	0 - 37 MPH	–	1.5	1.0	3.7	3.5	3.5	2.8	2.3
	38 - 52 MPH	2.0	1.5	1.0					
	> 52 MPH	2.0	1.5	1.0					
5	0 - 37 MPH	–	1.5	1.0	3.7	3.5	3.5	3.5	3.5
	38 - 52 MPH	3.0	2	1.0					
	> 52 MPH	3.0	2	1.0					
6	0 - 37 MPH	3.0	1.5	1.0	3.7	3.5	3.5	3.5	3.5
	38 - 52 MPH	3.0	2	1.0					
	> 52 MPH	3.0	2	1.0					
7	0 - 37 MPH	–	–	0.2	3.7	3.5	2.8	2.3	1.8
	38 - 52 MPH	–	–	0.2					
	> 52 MPH	–	–	0.2					
8	0 - 37 MPH	–	–	0.5	2.5	2.3	1.8	1.8	1.8
	38 - 52 MPH	1.125	0.875	0.5					
	> 52 MPH	1.5	1.0	0.5					
9	0 - 37 MPH	–	–	0.5	3	2.8	2.3	1.8	1.8
	38 - 52 MPH	1.125	0.875	0.5					
	> 52 MPH	1.5	1.0	0.5					

**Table 6 – Configuring Following Distance Alerts (FDAs)**

Changing configuration allows the fleet to adjust both the following distance alerts and the following distance behind a detected forward vehicle.

# APPENDIX A - RADAR MOUNTING AND INSTALLATION

## Appendix A

### Mounting the Bendix™ FLR-25™ Radar Sensor

#### GENERAL



**WARNING**

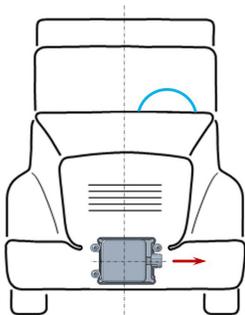
Improper use of the Bendix® Fusion™ system include repositioning from the original production line installation. Under no circumstances should the radar be removed or repositioned. The assembly shall always be mounted in the original OEM location. Failure to do so may result in a collision causing property damage, serious injuries, or death. If this location is not in the center of the vehicle, the mounting offset will need to be programmed through Bendix® ACom® PRO™ Diagnostic Software.



**CAUTION**

Vehicle equipment, including bumpers, deer guards, etc., must not infringe upon the zone used by the radar sensor to emit and receive radar waves. Refer to Appendix A.3. Failure to comply with this requirement will impair the function of the radar. Only vehicle OEM-approved covers and/or cover panels may be installed in front of the radar.

The radar sensor assembly is mounted to the front of the vehicle using a non-adjustable bracket. When mounting a radar sensor, the wire harness connector must always point towards the driver's side of the vehicle.



#### A.1 Vehicle Applications

The radar sensor can be mounted and installed only on vehicles that have the Bendix Fusion system already installed.

#### A.2 Replacement Parts

Replacement parts exist for the components shown below. Parts are available from any Bendix authorized parts supplier.



**Radar Sensor**



**Radar Bracket**

Provide the bracket part number (see label/stamp) when ordering replacements. Bracket will include three (3) mounting screws and the clinch nuts.

#### A.2.1 Radar Assembly



This image shows the proper assembly sequence for the radar bracket assembly. Once assembled, the radar assembly is to be mounted to a defined location at the front of the vehicle with the OEM-approved cover in place.

## Appendix A

### Bendix™ FLR-25™ Radar Sensor Mounting Clearance

#### A.3 Bendix™ FLR-25™ Radar Sensor Mounting Clearance

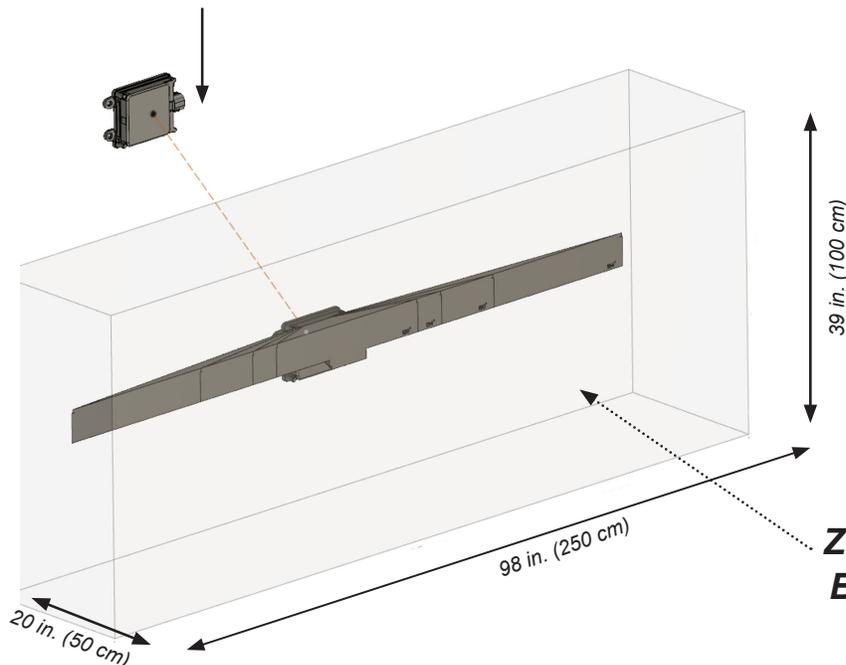
**⚠ CAUTION:** Vehicle equipment, including bumpers, deer guards, etc. should not infringe upon the zone used by the radar sensor *shown in Figure 1* to emit and receive radar waves. Failure to comply with this requirement may impair the function of the collision mitigation system. Bendix recommends to only use OEM-approved and supplied radar covers with our radar products. OEM-supplied radar covers have been tested and approved for radar operation with minimum degradation or attenuation of the radar signal. Non-approved radar covers may lead to degradation of the driver assistance system. To qualify a new radar cover design, please contact the vehicle OEM.

**NOTE:** Bendix does not certify nor offer warranty on Bendix® Wingman® systems where system performance is affected by obstructions of any kind. Furthermore, Bendix will not certify or approve of any third-party bumper guards mounted on the front of the vehicle. Bendix does NOT recommend the removal of an Advanced Driver Assistance System (ADAS) from a vehicle. This document gives general guidelines that will work for most vehicles; exceptions may exist.

For proper operation of the FLR-25 Radar Sensor, adhere to the following guidelines:

- The radar sensor assembly should be OEM-installed on the vehicle following all OEM specifications.
- The radar's field of view must NOT have interference from any other vehicle components such as bumpers, cow-catcher bumpers, engine blankets, seasonal decorations, or any other commonly mounted front-of-vehicle components. The radar signal is emitted from the front of the sensor with a spreading beam. The approved OEM-provided radar cover is the only item that is to be placed in front of the radar. In order to ensure that no adverse interference is experienced from bumpers or other nearby vehicle equipment, a suitable clearance must be maintained around the radar. This clearance must be maintained regardless if the vehicle is stationary or in motion. *See the diagram below for a general guide and an example of how to calculate the zone required.* The front of the radar may not be accessible to measure from; it may be behind the OEM radar cover. The shaded dark gray area below is the projected radar cone.

Measure from the raised surface at the front of the radar



**Keep all deer and moose guards, bumpers, etc. outside of the radar beam clearance area.**

**For proper sensor performance, the areas in front of and around the sensor antenna radiation cone need to be kept free of any materials or objects that may disturb the radar function.**

**The only exceptions are OEM-approved covers.**

**ZONE THAT MUST BE KEPT CLEAR!**

**NOTE:** Drawing is representative only and not to scale. Dimensions are accurate.

## ADDITIONAL SUPPORT

For the latest information, and for downloads of the Bendix® ACom® PRO™ Diagnostic Software, visit [b2bendix.com](http://b2bendix.com).

For technical support, contact the Bendix Tech Team at [techteam@bendix.com](mailto:techteam@bendix.com) or by phone at 1-800-AIR-BRAKE (1-800-247-2725), option 2. Representatives are available Monday through Thursday, 8:00 a.m. – 6:00 p.m., and Friday, 8:00 a.m. – 5:00 p.m. ET. For assistance, follow the instructions in the recorded message. Be sure to have a completed Troubleshooting Checklist and a Bendix ACom PRO Diagnostic Software DTC report.

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