Bendix® Wingman® Advanced™ FLR-20™ Radar Sensor

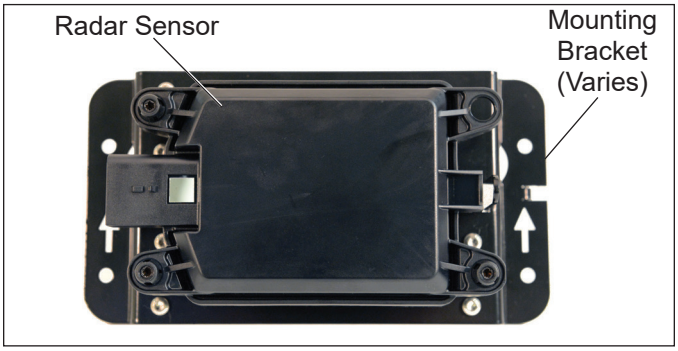
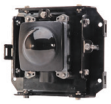


Figure 1 - Bendix® Wingman® FLR-20™ Radar Sensor and Cover

If the vehicle also has a Bendix™ AutoVue® FLC-21™ Camera, use the Bendix® Wingman® Fusion™ FLR-21™ Radar Sensor SD Sheet, SD-61-4963.

If your Bendix Wingman Advanced System has a black "eyeball" (Bendix™ FLR-10™) radar sensor, use SD Sheet, SD-61-4962.



DESCRIPTION

The Wingman Advanced System is an integrated combination of three features:

- Adaptive cruise control with braking;
- Alerts (several different types); and
- Collision mitigation technology.

⚠ WARNING

Improper use of the Wingman Advanced system can result in a collision causing property damage, serious injuries, or death.

The driver is always responsible for the control and safe operation of the vehicle at all times. The Wingman Advanced System does not replace the need for a skilled, alert professional driver, reacting appropriately and in a timely manner, and using safe driving practices.

PART ONE: ADAPTIVE CRUISE CONTROL WITH BRAKING

The adaptive cruise control with braking feature is an additional upgrade of ordinary cruise control. When using cruise control, the Wingman Advanced System will maintain the set speed, and also will intervene, as needed, to help maintain a set following distance behind a detected forward vehicle.

Using a radar sensor mounted to the front of the vehicle — with a range of approximately 500 feet (152 m) — the Bendix Wingman Advanced System reacts to detected forward vehicles in the same lane, traveling in the same direction. *See Figure 1.*

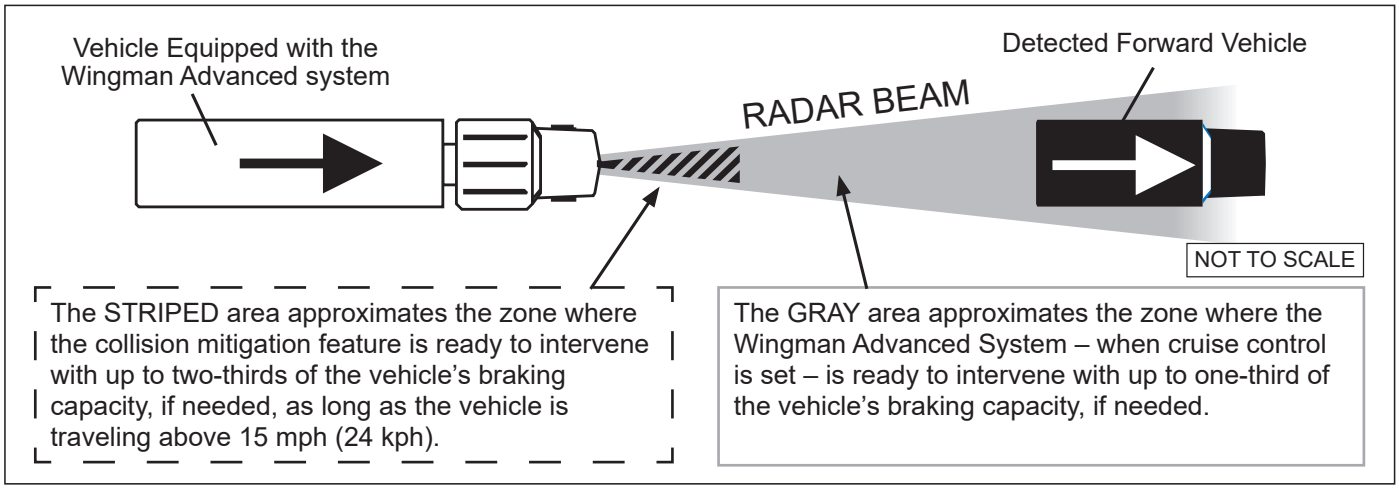


Figure 2 - Wingman Advanced System Radar Detection

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.
- 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.
- You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.

WARNING

The driver is always responsible for the control and safe operation of the vehicle at all times. The Bendix® Wingman® Advanced™ system does not replace the need for a skilled, alert professional driver, reacting appropriately and in a timely manner, and using safe driving practices.

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.

The adaptive cruise control with braking feature is designed to help the driver maintain a set following distance between his vehicle and a detected forward vehicle when cruise control is set. *See the gray "Radar Beam" area in Figure 2.*

Once cruise control is set and the system is maintaining a set following distance between you and the vehicle in front:

If the vehicle in front of you slows down below the cruise control's set speed, the Bendix® Wingman® Advanced™ system will intervene and, as necessary, in this order:

(a) reduce the engine throttle; then

(b) apply the engine retarder; then

(c) apply the foundation brakes,

in an attempt to maintain the set following distance behind the vehicle ahead. NOTE: If during the intervention, it is necessary to apply the foundation brakes, the vehicle will not automatically resume the cruise control set speed.

If the vehicle ahead slows below the cruise control's set speed, but then accelerates away, and the Wingman Advanced System did not need to use the foundation brakes, the system will automatically accelerate back to the original cruise control set speed, and again maintain a set following distance behind any detected forward vehicles.

Because the Wingman Advanced System operates along with normal cruise control, all the typical features built into cruise control work as usual. For example, limits imposed by factory-set road speed governors, etc. are fully supported by the Wingman Advanced System.

PART TWO: ALERTS

The Wingman Advanced system also assists by giving audible and visual alerts, whether or not cruise control is on. *See Pages 10-12 for more information on the three types of alerts the driver may hear and/or see displayed.*

PART THREE: COLLISION MITIGATION TECHNOLOGY

See the striped area in Figure 2. The Wingman Advanced System's collision mitigation technology is designed to be ready to react to the presence of moving vehicles in front of your vehicle (whether or not cruise control is set). Collision mitigation interventions can be up to two-thirds of the vehicle's braking capacity. The system provides the driver with an alert before an intervention occurs. The driver must immediately act to potentially avoid, or lessen the severity of, a collision.

KEY CONTENTS

(See the full index on pages 72-73)

1.0 OPERATION SECTION

Section Index

1.1 IMPORTANT SAFETY INFORMATION

⚠ WARNING

The driver is always responsible for the control and safe operation of the vehicle at all times. The Wingman Advanced System does not replace the need for a skilled, alert professional driver, reacting appropriately and in a timely manner, and using safe driving practices.

This vehicle's cruise control must be used only in the same conditions that are normally recommended for ordinary cruise control.

Vehicle manufacturers may use alerts, messages, and dash arrangements that vary from the examples shown here. Consult the vehicle operator's manual for applicable details regarding use and operation.

WHEN NOT TO USE THE BENDIX® WINGMAN® ADVANCED™ ADAPTIVE CRUISE CONTROL WITH BRAKING SYSTEM

The adaptive cruise control with braking feature in the Wingman Advanced System is automatically ready when normal cruise control is set.

⚠ CAUTION

This vehicle's cruise control must be used only in the same conditions that are normally recommended for ordinary cruise control. As noted below, there are certain situations when cruise control should *NOT* be used.

• **Inclement Weather/Low Visibility Situations** – Do not use cruise control in inclement weather or low visibility conditions such as rain, snow, smoke, fog, ice or other severe weather conditions that may affect the performance of the Bendix Wingman Fusion system.	
• **Dense Traffic** – Do not use cruise control in heavy traffic.	
• **Sharp Curves and Winding Roads** – Do not use cruise control when traveling sharply curved or winding roadways. CAUTION: Road curvature may impact the radar's ability to track vehicles ahead in the same lane.	
• **Entrance or Exit Ramps** – Do not use cruise control when entering or exiting roadways.	
• **Downhill Grades** – Do not use cruise control on downhill grades.	
• **Construction Zones** – Do not use cruise control in construction zones.	
• **Off-Road** – Do not use cruise control in off-road conditions.	
• **Smaller Forward Vehicles** – Smaller vehicles, such as motorcycles, may be difficult for the radar to identify. It is the driver's responsibility to be aware of these types of vehicles and to slow down if necessary.	

Visit the Wingman Fusion web page – under the products tab of bendix.com – for more information, along with any updates to these limitations and restrictions.

AUTOMATIC FOUNDATION BRAKE APPLICATIONS

The vehicle automatically manages foundation brake priorities among the various vehicle systems that use the foundation brakes, such as the Bendix® Wingman® Advanced™ system, Bendix® ESP® Electronic Stability Program, Bendix® ATC (Automatic Traction Control) and Bendix® ABS (Antilock Braking System).

NOTE: Cruise control will automatically cancel whenever the Wingman Advanced System applies the foundation brakes. You can verify that your cruise control is disengaged by observing that the cruise-enabled icon is no longer illuminated. You must resume or set cruise control in order to regain normal cruise control functionality and to reengage the adaptive cruise control with braking feature of the Wingman Advanced System.

Additional information, and complete troubleshooting procedures for the Bendix ESP stability system, can be found in the *Bendix Service Data Sheet SD-13-4869*.

1.2 SYSTEM COMPONENTS

The radar sensor (or radar) used in the Wingman Advanced System unit is located at the front of the vehicle – either on the bumper or just behind it on a cross-member. *See Figure 3*.

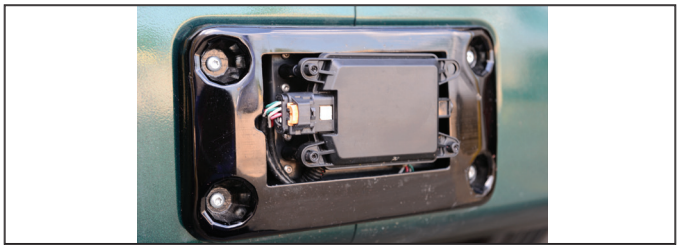


Figure 3 - Component: Radar Sensor

The radar sensor is pre-aligned at the factory and no adjustment should be needed. If the radar sensor becomes misaligned (or a Diagnostic Trouble Code is issued), either a message – or light on the dash, depending on the vehicle – lets the driver know that service is needed.

The Bendix Wingman Advanced System is either fully integrated into the vehicle dashboard, or uses the Bendix™ Driver Interface Unit (DIU™). *See Figure 4*.

Figure 4 - Bendix Driver Interface Unit (DIU)

Although the system functions the same, how the alerts are displayed to the driver can be different. Where a DIU is used, all visual, text, and audible indicators and alerts will be provided by the DIU. The DIU allows the volume to be adjusted. *See Appendix F*.

Also see the Indications and Alerts in Section 1.4 for more detailed information about the alerts.

NOTE: For some integrated systems, the volume level of the alerts is not adjustable, nor can they be switched off.

1.3 ACTIVATING THE WINGMAN ADVANCED SYSTEM

To have the Wingman Advanced System cruise control with braking features of the Wingman Advanced System (engine de-throttle/retard, foundation brake interventions) the vehicle's regular cruise control must be switched on. *See Figure 5 for examples of switches that may be used.*

When the vehicle reaches the desired cruise speed, the driver presses the cruise control set switch to activate the system. The Wingman Advanced System will then engage and help the driver maintain a set following distance behind the detected forward vehicle.

Once the cruise control speed is set, a cruise-enabled icon (or similar) will illuminate on the instrument panel. If the cruise-enabled or set (or similar) icon does not illuminate, the Wingman Advanced System is not functioning normally. Refer to the vehicle operator's manual to double-check the location of the icon, and for further troubleshooting information.

The driver can switch off the Wingman Advanced System manually by either stepping on the brake pedal or switching off the cruise control.

Figure 5 - Examples of Cruise Control Switches

IMPORTANT NOTE: Cruise control will automatically cancel whenever the Wingman Advanced System applies the foundation brakes.

1.4 WHAT TO EXPECT WHEN USING THE BENDIX® WINGMAN® ADVANCED™ SYSTEM

Table 1, parts 1-3, illustrate what to expect from the Bendix® Wingman® Advanced™ system in various driving situations. Typical system indications and actions to expect from the system are illustrated.

What to Expect (1.4)		
Part One: All driving scenarios (Cruise is either "on" or "off")		
Situation	**Typical System Indication/Alerts**	**Typical System Actions**
A broken-down vehicle is stationary in the lane in which the truck is traveling.	A Stationary Object Alert (SOA) may be issued up to (three) 3 seconds prior to impact.	None.
A pedestrian, deer, or dog runs in front of the truck.	None.	None.
Another vehicle crosses the road perpendicular to your path of travel – such as at an intersection.	None.	None.

Table 1 - Part 1 - Operational Scenarios with the Wingman Advanced System

What to Expect (1.4)		
Part Two: Cruise control "on" and speed "set"		
Situation	**Typical System Indication/Alerts**	**Typical System Actions**
With no detected forward vehicle.	None.	Vehicle maintains set speed.
With a detected forward vehicle.	The cruise control ON indicator is illuminated and the detected forward vehicle icon is illuminated.	The adaptive cruise control with braking feature will maintain the set speed and following distance.
The detected forward vehicle slows moderately.	The Following Distance Alert (FDA) will sound and a visual message/ icon typically appears on the dash screen or Bendix™ Driver Interface Unit (DIU™) display.	The vehicle will be slowed by (a) reducing throttle; (b) then engaging the engine retarder; and (c) then applying the foundation brakes. ***Note:*** *If the foundation brakes are applied, cruise control is cancelled.*
The detected forward vehicle slows rapidly.	The Impact Alert (IA) warning (continuous tone), will sound and a visual message/icon typically appears on the dash screen or DIU display. The Following Distance Alert may also be heard.	The vehicle throttle will be reduced; the engine retarder engaged; and the foundation brakes applied, in that order. The cruise control feature cancels after the event.
The detected forward vehicle cuts in front of the truck but then speeds away.	Following Distance Alerts may be given to the driver, depending on the exact system configuration that has been set for the vehicle, and how close the vehicle cuts in front.	Vehicle maintains set speed.
Going down a grade with a detected forward vehicle. Cruise control should ***NOT*** be used on downhill grades - *see page 3.*	DO NOT USE cruise control on downhill grades. *(See the CDL manual instructions on proper gear usage for downhill grades.)*	*DO NOT USE cruise control on downhill grades.*

Table 1 - Part 2 - Operational Scenarios with the Wingman Advanced System

NOTE: The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer, or earlier versions of the Wingman Advanced System.

What to Expect (1.4)		
Part Three: Cruise control NOT "SET", or "OFF"		
Situation	**Typical System Indication/Alerts**	**Typical System Actions**
Your vehicle comes up fast behind a slower-moving detected forward vehicle.	The Following Distance Alert (FDA) will sound and a visual message/icon typically appears on the dash screen or Bendix™ Driver Interface Unit (DIU™) display. Depending on how close your vehicle approaches, the system may initiate an Impact Alert (IA) warning.	If a collision is likely to occur, the collision mitigation feature will apply up to two-thirds of the vehicle's braking capacity. **⚠ WARNING** **The driver must immediately act to potentially avoid, or lessen the severity of, a collision.**
The detected forward vehicle slows rapidly.	The Following Distance Alert (FDA), or Impact Alert (IA) warning (continuous tone) will sound and a visual message/icon typically appears on the dash screen or DIU display.	If a collision is likely to occur, the collision mitigation feature will apply up to two-thirds of the vehicle's braking capacity. **⚠ WARNING** **The driver must immediately act to potentially avoid, or lessen the severity of, a collision.**

Table 1 - Part 3 - Operational Scenarios with the Bendix® Wingman® Advanced™ System

NOTE: These are typical situations and responses that may occur when using the Wingman Advanced System. All possible situations and responses are not covered in this table.

⚠ WARNING

Due to inherent limitations of radar technology, the collision mitigation technology — on rare occasions — may not detect moving vehicles or stationary objects in your vehicle's lane of travel. Alerts, warnings or brake interventions may not occur.

⚠ WARNING

Due to inherent limitations of radar technology, the collision mitigation technology — on rare occasions — may react to moving vehicles not in your vehicle's lane of travel. Alerts, warnings or brake interventions may occur.

1.5 HOW A DRIVER INTERACTS WITH THE BENDIX® WINGMAN® ADVANCED™ SYSTEM

Table 2 illustrates how the Bendix® Wingman® Advanced™ system will respond to various actions a driver may take when using the Bendix Wingman Advanced System on the road.

⚠ WARNING

The driver is always responsible for the control and safe operation of the vehicle at all times. The Wingman Advanced System does not replace the need for a skilled, alert professional driver, reacting appropriately and in a timely manner, and using safe driving practices.

How a Driver Interacts with the Wingman Advanced System (1.5)	
Action	**Reaction of Wingman Advanced System**
If the driver does this:	**Expect the Wingman Advanced System to do this:**
Steps on the brake. (During a collision mitigation event.)	The driver is always in control and is able to apply full braking power.
Steps aggressively on the accelerator. (During a collision mitigation event.)	The driver is always in control. His/her actions override any Wingman Advanced System actions. Note: If cruise control is engaged, it will be overridden until the accelerator is released; then cruise control will resume the original set speed automatically.
Steps on the brake. (When in cruise.)	Cruise control will be cancelled.
Steps on the accelerator. (When in cruise.)	Cruise control will be overridden until the accelerator is released; then cruise control will resume the original set speed automatically.
Switches on the cruise control.	Nothing. The adaptive cruise control with braking feature will not engage until the driver sets the cruise control speed.
Switches off the cruise control.	The adaptive cruise control with braking feature will turn off; the collision mitigation feature remains active and ready to intervene. The driver will continue to hear all alerts as needed.
Sets the cruise control speed.	The adaptive cruise control with braking feature is automatically activated. Your vehicle maintains a set speed and following distance behind the vehicle ahead.
Covers or blocks the radar.	The Bendix Wingman Advanced System performance will be diminished or even disabled and a Diagnostic Trouble Code (DTC) will be set. A blockage will also affect engine cruise control availability.
Uses normal cruise control “+/-” switch.	Vehicle speed increased (+) or reduced (-) to achieve the new set speed while actively maintaining following distance with the vehicle ahead, if one is present within 500 feet (152 m).

Table 2 - How a Driver Interacts with the Wingman Advanced System

NOTE: The system responses above are typical, but may vary from the descriptions shown here by vehicle manufacturer, or earlier versions of the Wingman Advanced System. These are examples of driver actions and typical Bendix Wingman Advanced System responses, however this chart does not attempt to cover all possible situations.

THE FORWARD VEHICLE DETECTED ICON

When cruise control is switched on and set and a vehicle ahead of you is detected by the radar, the detected forward vehicle icon — or similar — will illuminate on the vehicle dashboard.

This is an indication to the driver that the Bendix® Wingman® Advanced™ system is actively managing the distance between your vehicle and the vehicle ahead, and may intervene automatically, if needed.

See Figure 6 for examples.

Figure 6 - Forward Vehicle Detected Icons

ADJUSTING THE CRUISE CONTROL SPEED

Use the switch(es) provided by the vehicle manufacturer to set your cruise control speed. When adjusted, your set speed will typically be indicated on the vehicle dash, message center, or speedometer.

1.6 FOLLOWING DISTANCE

Following distance refers to the time gap, measured in seconds, between your vehicle and the vehicle ahead. The actual physical distance between the two will vary based on the speeds of both vehicles; however, the set gap will remain the same for all set cruise speeds.

FOLLOWING DISTANCE ADJUSTMENT SWITCH

The Wingman Advanced System feature has an option that allows the driver to adjust the following-distance or time-gap. The availability of this feature is determined by the vehicle manufacturer. The switch has an increase or decrease function. Pressing increase (+) will provide a larger following distance, measured in seconds. Pressing decrease (-) will provide a shorter following distance.

1.7 BENDIX WINGMAN ADVANCED SYSTEM COLLISION MITIGATION FEATURE OPERATION

Whenever your vehicle is traveling at speeds above 15 mph (24 kph), the Wingman Advanced System collision mitigation feature is ready to intervene, if needed. It does not require cruise control to be set. The collision mitigation feature of the Wingman Advanced System will alert you automatically and apply up to two-thirds of the vehicle's braking capacity, if a collision with the detected forward vehicle is likely to occur. You, the driver, must immediately act to potentially avoid, or lessen the severity of, a collision.

Collision mitigation is ready to intervene as long as no DTCs are active in either the brake system, the Bendix Wingman Advanced System, or any other contributing vehicle system.

AUTOMATIC FOUNDATION BRAKE APPLICATIONS

The vehicle automatically manages foundation braking priorities among the various vehicle systems that use the foundation brakes, such as the Bendix Wingman Advanced System, Bendix® ESP® (Electronic Stability Program), Bendix® ATC (Automatic Traction Control) and the Bendix® ABS (Antilock Braking System).

1.8 ALERTS AND WARNINGS

The Bendix® Wingman® Advanced™ system operates differently compared to other cruise control/forward collision warning systems. It is important for ***YOU*** to fully understand the system's features, especially the driver alerts and warnings.

Three important warnings provided by the Wingman Advanced System are the Following Distance Alert (FDA), Impact Alert (IA), and Stationary Object Alert (SOA). The driver will be alerted by any of the three warnings, whether or not the cruise control is activated.

See Appendix B, Sections 3.0-5.0, for more information about how the Bendix™ Driver Interface Unit (DIU™) communicates alerts.

⚠ WARNING

Any audible and/or visual alert by the system means that your vehicle is too close to the vehicle ahead and the driver must immediately act to potentially avoid, or lessen the severity of, a collision.

IMPACT ALERT (IA)

⚠ WARNING

The Impact Alert is the most severe warning issued by the Bendix® Wingman® Advanced™ system. This alert indicates that a collision with the detected forward vehicle is likely and the driver must immediately act to potentially mitigate, or lessen the severity of, a collision.

The Impact Alert is ready to alert the driver whenever the vehicle is moving above 15 mph (24 kph).

When activated, the IA will sound and a visual message/icon typically appears on the dash screen or DIU display. The actual sound/display method varies by vehicle manufacturer.

NOTE: The Impact Alert is typically accompanied by automatic brake interventions. The Wingman Advanced System will apply up to two-thirds of your vehicle's braking capacity. The driver must apply additional braking, when necessary, to maintain a safe distance from the vehicle ahead.

See Figure 7 for an example of an Impact Alert Icon.

Figure 7 - Example of Impact Alert Icon

Figure 8 - Impact Alert Text and Light Pattern as Seen on the Bendix DIU

FOLLOWING DISTANCE ALERT (FDA)

WARNING

The FDA is ready to alert the driver whenever the vehicle is moving above five (5) mph/ 8 kph. If the following distance continues to decrease, the driver will hear more rapid audible alerts. When the FDA reaches its highest level, typically a red LED also illuminates on the instrument cluster. The FDA may be accompanied by a visual alert.

Note: One-and-a-half (1.5) seconds is the system default and may vary by fleet/OEM.

Figure 9 - Bendix™ Driver Interface Unit (DIU™) Showing Examples of Following Distance Alerts with Progressively Faster Audible Alerts

Above: Examples of other vehicle manufacturer's displays.

Figure 10 - Following Distance Alert

STATIONARY OBJECT ALERT (SOA)

WARNING

Stationary Object Alert (SOA) – The Bendix® Wingman® Advanced™ system will give up to a three (3) second alert to the driver when approaching a detected, sizable, metallic (radar-reflective), stationary object in your lane of travel. This alert indicates that a collision with a stationary object is likely and the driver must immediately act to potentially avoid, or lessen the severity of, a collision.

CAUTION

The SOA is ready to alert the driver whenever the vehicle is moving above 10 mph / 16 kph. The driver should be especially careful when approaching certain types of vehicles or objects. The Bendix Wingman Advanced System radar may not be able to detect vehicles and objects with limited metal surfaces (such as recreational vehicles, horse-drawn buggies, motorcycles, logging trailers, etc.). *NOTE: Entering a curve may reduce the alert time to less than three (3) seconds.*

Figure 11 - Stationary Object Alert (SOA) Displayed

BRAKE OVERUSE ALERT

⚠ WARNING

The Bendix® Wingman® Advanced™ system provides a warning when the system is intervening and using the foundation brakes excessively. Overuse of the foundation brakes can lead to the brakes overheating and a potential loss of braking performance caused by brake fade. Using cruise control on downhill runs will cause this alert to be activated.

⚠ WARNING

Approach grades as you would normally, with the appropriate gear selected and at a safe speed. Cruise control should *NOT* be used on downhill grades.

When the system detects brake overuse, depending on the vehicle manufacturer, a text message will be displayed on the dashboard and an audible alert will be activated. The driver should intervene immediately.

Figure 12 - Brake Overuse Warning

- Once the brake overuse alert is activated, certain driver interventions that cancel cruise control – like stepping on the brake pedal or switching off cruise – will discontinue the alert. Following an overuse alert, the driver should not reset cruise control for at least 20 minutes. This gives the brakes time to cool down. If the driver chooses to reset cruise control during that 20 minute period, Bendix Wingman Advanced System interventions will be limited to de-throttling and engine retarder only. The system will automatically disable all Bendix Wingman Advanced System foundation brake applications for at least 20 minutes.
- If the system does not detect a driver intervention within 15 seconds after the brake overuse alert sounds, it will shut itself off and set a Diagnostic Trouble Code (DTC). The driver will continue to receive alerts, but ALL Bendix Wingman Advanced System interventions (de-throttling, engine retarder or brake applications) will be disabled until the next ignition cycle.

Note: In all cases, the driver still has the ability to apply the foundation brakes if necessary. The driver should take care since overheated brakes may reduce the vehicle's braking capability. *(See Appendix B7.0).*

1.9 BENDIX WINGMAN ADVANCED SYSTEM DIAGNOSTIC TROUBLE CODES

The Bendix Wingman Advanced System is monitored and if any malfunction is detected, a Diagnostic Trouble Code (DTC) will be set and the driver will be alerted. The exact alert given depends on the vehicle manufacturer: refer to your vehicle operator's manual and Sections 3 and 4.

1.10 RADAR SENSOR INTERCHANGEABILITY

Many variables must be considered when determining whether or not the radar sensor can be relocated from one vehicle to another vehicle. They include, but are not limited to, the version of the Bendix® ESP® stability system used on the vehicle, the instrument cluster, the vehicle Electronic Control Unit (ECU), the engine and the transmission. Contact the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2 to determine if this is a viable option.

⚠ WARNING

Do not interchange radar sensors without contacting Bendix first!

1.11 ALERT VOLUME

For Bendix Wingman Advanced Systems installed on vehicles with alerts that come directly through the instrument cluster, audible alert levels are pre-set at the factory and can not be turned off, nor can the volume be adjusted. However, where the Bendix™ Driver Interface Unit (DIU™) is used, volume adjustment is permitted.

1.12 POTENTIAL FALSE ALERTS

In certain unusual traffic or roadway conditions, Bendix Wingman Advanced System may issue a false alert. While eliminating all false alerts is not possible, if false alerts occur too frequently (more than twice a day), this may indicate sensor misalignment. Service the system at the earliest opportunity.

Drivers should take into account the road conditions, and any other factors they are encountering, as they choose how to react to any alerts they receive from the Bendix Wingman Advanced System.

2.0 MAINTENANCE SECTION

Section Index

2.1 GENERAL SAFETY GUIDELINES

See Page 2 of this Service Data Sheet for the General Safety Guidelines.

2.2 EQUIPMENT MAINTENANCE: BRAKE SYSTEM AND ABS FUNCTIONALITY

⚠ CAUTION

Importance of Antilock Braking System (ABS) Maintenance – Optimal Bendix® Wingman® Advanced™ system braking requires a properly maintained ABS system, without any active ABS Diagnostic Trouble Codes (DTCs). Have active DTCs repaired by a qualified technician. Any ABS DTCs will cause Bendix Wingman Advanced System to deactivate.

⚠ CAUTION

Importance of Brake Maintenance – Optimal Bendix Wingman Advanced System braking requires properly maintained foundation brakes (drum, wide-drum, or air disc) which meet appropriate safety standards and regulations. Brake performance also requires that the vehicle be equipped with properly sized and inflated tires, with a safe tread depth.

⚠ CAUTION

System Problems – If a problem with the Bendix Wingman Advanced System is detected, depending on the vehicle manufacturer, typically there will be a message on the dashboard display. Depending on the type of problem detected, the system will determine if the vehicle may continue normal cruise control functions (without the benefits of Bendix Wingman Advanced System), or whether all cruise control functions should be disabled until service is performed. The system should be serviced as soon as possible to restore full Bendix Wingman Advanced System functionality.

2.3 SYSTEM PREVENTIVE MAINTENANCE

The Bendix Wingman Advanced System is relatively maintenance free. The key items to keep the system functioning properly include:

1. Keep the radar lens clean and free of obstructions.
2. Inspect for any damage to the bumper or the Bendix Wingman Advanced System cover, bracket or radar to ensure that the alignment has not been compromised. **Never use the radar unit as a step.**
3. Periodically check the radar alignment.
4. Perform appropriate inspections of the braking system as required by the manufacturer to ensure brakes are in proper working order.
5. Ensure that the tires are properly inflated and that adequate tread is present.

⚠ CAUTION

Radar Inspection – The driver should inspect the radar and mounting bracket regularly and remove any mud, snow, ice build-up, or other obstructions. The installation of aftermarket deer guards, bumper guards, snow plows or similar potential obstructions is not recommended, and could impair the operation of the radar.

⚠ CAUTION

Radar Damage / Misalignment / Tampering - In cases where the bumper and/or radar have sustained any damage, are misaligned, or if you suspect that the radar has been tampered with, do not use the cruise control until the vehicle has been repaired and the radar re-aligned. In addition, an indicator on the dash typically will illuminate if the system detects any of these conditions. Consult your vehicle's operator's manual or contact Bendix for more information.

NOTE: Any vehicle trouble code that disables vehicle cruise control will also cause a DTC in Bendix Wingman Advanced System.

2.4 ADDITIONAL SUPPORT AT BENDIX.COM / 1-800-AIR-BRAKE (1-800-247-2725), OPTION 2

For the latest information, and for downloads of the Bendix® ACom® PRO™ Diagnostic Software, visit the Bendix website at bendix.com. You will also find a current list of compatible RP1210 data link adapters for ABS and the Wingman® ACB system.

For direct telephone technical support, the Bendix Tech Team is available at 1-800-AIR-BRAKE (1-800-247-2725), option 2, 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. The Bendix Tech Team can also be reached by email at techteam@bendix.com.

3.0 INTRODUCTION TO TROUBLESHOOTING SECTION

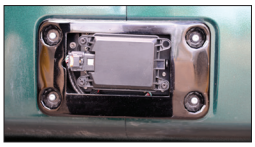
Section Index

This section introduces three initial steps to accurately troubleshoot the Bendix® Wingman® Advanced™ system.

We recommend reading this introductory section, as well as the *Troubleshooting/Diagnostics Section (4.0)*, before performing any troubleshooting.

When diagnosing the Bendix Wingman Advanced System, a current version of Bendix® ACom® PRO™ Diagnostic Software will be required. This software is available as a download from bendix.com.

3.1 TROUBLESHOOTING BASICS

Which radar sensor system is installed?	 The Wingman Advanced System (Bendix™ FLR-20™) sensor system covered in this SD sheet has a flat rectangular radar sensor.	If, in addition to the flat rectangular FLR-20 series radar sensor, the vehicle has a Bendix™ AutoVue® FLC-20™ Camera, +  the vehicle may be using the Bendix® Wingman® Fusion™ FLR-21™ Radar Sensor, SD-61-4963.	 If your Bendix Wingman Advanced System has a black “eyeball” (Bendix™ FLR-10™) radar sensor, use SD sheet SD-61-4962 instead.

Troubleshooting Basics (3.1)	
Questions	**Next Steps**
Have the driver run the Power-Up Self-Test.	**Power-Up Self-Test** This is a self-diagnostic check, to determine if the system operation is normal. 1. Park the vehicle. Power off. 2. Put the key into the ignition, and turn to the “ignition power” position. 3. Toggle the cruise control switch at least once, and leave it in the “on” position. 4. Start the vehicle, but do not drive away. 5. **Note that if the cruise control is in the “off” position, or if the vehicle is moving, this test will not run.** The self-test will start after 15 seconds, and takes approximately five (5) seconds to complete. (Note that other vehicle system self-tests, e.g. the ABS “chuff” test, may run during the initial 15 seconds after ignition “on.”) As the Wingman Advanced System self-test runs, the driver should hear a short set of beeps. The test checks the engine, transmission, and brake systems to make sure they are communicating. In addition, depending on the vehicle, the test may briefly display a distance alert message and/or cause the Forward Vehicle Detected icon in the instrument cluster to illuminate; this is normal.
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 trouble code be set. If the system has found an issue that will prevent it from functioning properly, **a long warning beep will sound** to alert the driver, and a Diagnostic Trouble Code (DTC) will be logged in the system (typically with a status indicator/dash icon illuminated). For descriptions of all DTCs, *see Section 4.3: Diagnostic Trouble Codes.*
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. *See Section 3.2: Narrowing Down the Problem.*

Table 3 - Troubleshooting Basics

3.2 NARROWING DOWN THE PROBLEM

Use the questions found in Table 4 below to help assess if the Bendix® Wingman® Advanced™ system is not performing correctly. Be sure to have a thorough understanding of the system's normal behavior; this will reduce the troubleshooting time. The 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.

If Bendix Tech Team assistance is needed, prior to calling 1-800-AIR-BRAKE (1-800-247-2725), option 2 complete the *Troubleshooting Checklist* (*See Appendix A*), to help reduce the time needed to troubleshoot the system.

Narrowing Down the Problem (3.2)	
Questions	**Next Steps**
Blocked Radar Sensor Issues	
Is mud, ice, or snow covering the radar sensor? Is anything blocking the view of the radar sensor?	Clean the radar sensor front surface immediately. Remove anything blocking the radar sensor then power cycle and read any remaining trouble codes. *Read Section 4.3: Diagnostic Trouble Codes.* *Read Appendix A3: Bendix™ FLR-20™ Radar Sensor Mounting Clearance.* If the vehicle's cruise control is set and the radar sensor is blocked by ice, snow, mud, tampering, etc. so that it cannot "see" a forward vehicle, Bendix® Wingman® Advanced™ system may log a Diagnostic Trouble Code (DTC). After the blockage is removed, the DTC will clear automatically when the vehicle's ignition is cycled. Add a visual check of the radar sensor for blockage to the driver's pre-trip inspection checklist.
Potential False Warnings	
Do false alerts seem to happen in construction zones or going under bridges?	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.
Mounting Problems	
Is the radar sensor mounting location (bumper or cross-member) damaged? • Does the system seem to not "see" as far as it "used to", or warn on many more overhead bridges/signs than previously?	Re-align the radar sensor vertically and laterally. Use the following procedures: • 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 first, then align the radar sensor. • Appendix B1 - Go to Appendix B1 and use the flowchart to find out the procedure(s) needed. Follow the actions directed in the procedure(s) and align the radar. • Appendix B4 - Check the vertical alignment and adjust if needed.
Does the mounting bracket look damaged or tampered with?	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. If no visible damage is found, realign the radar sensor vertically and laterally. • Check the Vertical Alignment (Appendix B4) and adjust if needed. • Check the Lateral Alignment (Appendix B2 & B3) and adjust if needed. The radar sensor needs a solid mounting surface in order to hold the alignment. If the radar sensor alignment can not 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. Where replacing either or both of these, align the radar sensor using the procedure shown in Appendix C.
Other Questions	
Has the system worked properly in the past and is not working correctly now?	This is a good indication that something has changed, such as misalignment of the radar sensor. Review questions listed above with the driver to further diagnose the problem.

Table 4 - Narrowing Down the Problem (Pages 15-16)

Narrowing Down the Problem (3.2)	
Questions	**Next Steps**
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. Read Section 4.3: *Diagnostic Trouble Codes.*
Did the radar sensor currently on the vehicle come from another vehicle?	The radar sensor may be incompatible with the new vehicle. Follow Section 1.10: *Radar Sensor Interchangeability* procedure and check system DTCs with ACom PRO Diagnostic Software. Read Section 4.3: *Diagnostic Trouble Codes.*
With cruise control set, does the system consistently apply the foundation brakes when a forward vehicle slows?	This is normal operation. Continue asking the driver questions to determine if the radar system interventions are not the expected Bendix® Wingman® Advanced™ system behavior. 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 first, then align the radar sensor. • Appendix B1 - Go to Appendix B1 and use the flowchart to find out the procedure needed. Follow the actions directed in the procedure and align the radar. • Appendix B4 - Check the vertical alignment and adjust if needed. The service technician will need to check trouble codes as well. Read Section 4.3: *Diagnostic Trouble Codes.*
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 adaptive cruise control with braking feature of the Bendix Wingman Advanced 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 Wingman Advanced System provides a visible warning to the driver. In addition, the vehicle will also drop out of cruise mode, providing an audible and/or visual warning to the driver as well. The driver must pull off the road, and cycle the ignition before the vehicle's cruise control can be used.
Does the system seem to disengage after an automatic braking event?	This is normal operation. The driver must set or "resume" the cruise control once again to regain the following distance function.
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 adaptive cruise control with braking feature of Bendix Wingman Advanced System may continue to function even after an automatic brake application. No driver input is needed.
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. Read Section 4.3: *Diagnostic Trouble Codes,* and Section 4.8: *Troubleshooting Wiring Harnesses*.
Does the system generate a DTC going down a grade when using ACB (Adaptive Cruise Control with Braking) to slow the vehicle, but the code goes away later?	This is normal operation. The adaptive cruise control with braking feature of Bendix Wingman Advanced System is not intended to be used on grades. Verify there are no DTCs. Proper downgrade driving techniques should be used. Read Section 4.3: *Diagnostic Trouble Codes*.
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 a current version of Bendix ACom PRO Diagnostic Software and replace the damaged radar sensor. Read Section 4.3: *Diagnostic Trouble Codes*, and Appendix A3: *Radar Sensor Mounting*.

Table 4 - Narrowing Down the Problem (Pages 15-16)

3.3 OVERVIEW OF POSSIBLE ISSUES

Some customer issues are actually misunderstandings of how the Bendix® Wingman® Advanced™ system performs normally. Use Table 5 below to learn the causes of potential issues if the Bendix Wingman Advanced 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: *See Section 4.3: Diagnostic Trouble Codes*.

Overview of Possible Issues (3.3)	
Issue	**Description**
Vehicle Diagnostic Trouble Codes (DTCs)	The Bendix Wingman Advanced 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® system, or transmission. These components must be repaired and cleared of DTCs before troubleshooting the Bendix Wingman Advanced System. (*NOTE: Clearing the vehicle DTCs may be the only step needed to reestablish full Bendix Wingman Advanced System functionality. See Section 4.4: Clearing Diagnostic Trouble Codes (DTCs).*
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. Use Section 3.0: *Introduction to Troubleshooting*, Section 4.3: *Diagnostic Trouble Codes* and Section 3.1: *Troubleshooting Basics* to verify if the system is functioning normally; then continue.
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. *See Section 3.1: Troubleshooting Basics*.
Radar sensor blocked	If the system doesn't seem to work at all, the radar sensor may possibly be blocked. A DTC will also be set. Visually inspect it, clear the blockage, turn the ignition on and run through a power cycle. *See Appendix A3 for more information about radar mounting and clearances.*
Damaged radar sensor or bracket	If the vehicle has been in an accident, it is likely the radar sensor will need to be re-aligned 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, check for DTCs outlined in the Section 4.3: *Diagnostic Trouble Codes (DTCs)* to determine if radar sensor replacement is necessary.
Damaged connector or wiring	Visually inspect the connector and wire harness for corrosion or chafing. Refer to Sections 4.5: *Troubleshooting Diagnostic Trouble Codes: Power Supply* and 4.6 *Serial Data (J1939) Communications Link* of this document for additional troubleshooting.
Radar sensor misalignment	Inspect the front of the vehicle. If (a) it has been damaged, or (b) if the vehicle does not track straight, either of these conditions must be repaired before troubleshooting the Bendix Wingman Advanced System. If there is a DTC set or if the system does not function, the radar sensor may be severely misaligned and the Bendix Wingman Advanced System will not operate until this is corrected. *See Appendix B - Bendix™ FLR-20™ Radar Alignment*.
J1939 network problems	If the entire system is non-functional, it may be a J1939 network problem. Follow the instructions in Section 4.6: *Serial Data (J1939) Communications Link*.
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. Follow the instructions in Section 4.5: *Troubleshooting Diagnostic Trouble Codes: Power Supply.*

Table 5 - Review of Possible Issues

4.0 TROUBLESHOOTING/ DIAGNOSTICS SECTION

Section Index

IMPORTANT NOTE: All vehicle 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® Wingman® Advanced™ system DTCs.

4.1 BENDIX® ACOM® PRO™ DIAGNOSTIC SOFTWARE

Bendix® ACom® PRO™ Diagnostic Software is a PC-based software program available to purchase at 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.

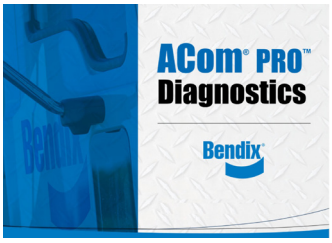


Figure 13 - Bendix ACom PRO Diagnostic Software

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).

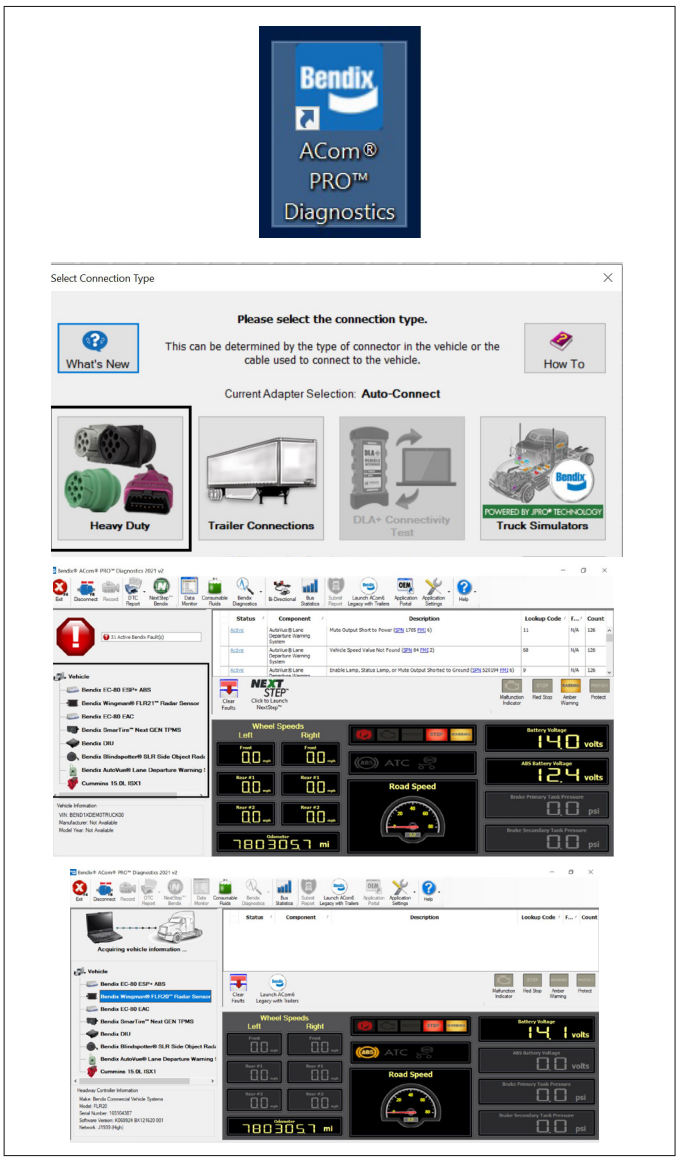


Figure 14 - Starting Bendix ACom PRO Diagnostic Software

4.2 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, then a current version of ACom® PRO™ Diagnostic Software is required. ***See Appendix G for screen shots.*** *See Section 4.3 for a complete table showing DTCs and troubleshooting information.*

4.21 READING THE SYSTEM SOFTWARE VERSION

If during troubleshooting, you are asked for the Bendix® Wingman® Advanced™ system software version, the number is found at the bottom left of the screen below the roll call. *See Figure 15. Also, see Section 5.1 for other system indicators.*

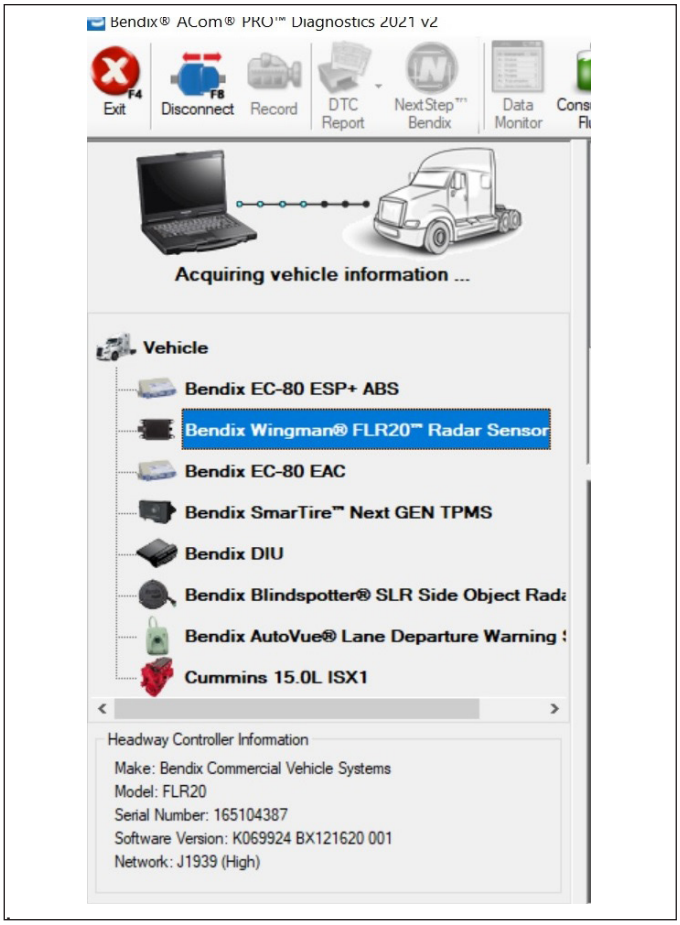


Figure 15 - Bendix® ACom® PRO™ Diagnostic Software - Roll Call Showing Software Version

4.3 TABLE OF BENDIX® WINGMAN® ADVANCED™ SYSTEM DIAGNOSTIC TROUBLE CODES (DTCs)

NOTE: Bendix™ FLR-10™ radar sensors use a different set of DTCs – see SD-61-4962.

For DTC(s), refer to Table 6A. [Alternately, for SPN (Suspect Parameter Number) and FMI (Failure Mode Identifier) code combinations, refer to Table 6B.]

In Table 6A, find the DTC(s) found in column one and determine the Service Action Code(s) to look up in Table 6C.

Table 6A: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes				Go to the Service Action Code List in Table 6C (Page 31)
DTC	**Description**	**SPN**	**FMI**	
1-1	Internal radar sensor error	886	12	A
3	Antenna is dirty or partially blocked	886	17	B
4	Battery voltage too low	886	4	C
5	Battery voltage too high	886	3	
6-10	Internal radar sensor error	630	12	A
11	Radar cannot detect any J1939 messages from vehicle components	639	19	Y
12	Radar detects intermittent loss of J1939 messages from vehicle components	639	9	
13-14	Not used	#N/A	#N/A	Not Used
15	Internal radar sensor error	886	12	A
16	Antenna is dirty or partially blocked	886	1	D
17-18	Internal radar sensor error	630	12	A
19	Not used	#N/A	#N/A	Not Used
20	Internal radar sensor error	630	12	A
21	Not used	#N/A	#N/A	Not Used
22	Internal radar sensor error	886	14	A
23-27	Internal radar sensor error	886	12	
28	Internal radar sensor error	1799	14	D
29	J1939 signal: Missing AEBS2 message	5681	14	
30	J1939 signal: Missing CCVS1 message	527	14	E
31	J1939 signal: Missing CVW message	1760	14	F
32	J1939 signal: Missing EBC1 message	1243	14	
33	J1939 signal: Missing EBC2 message	904	14	
34	J1939 signal: Missing EBC5 message	2919	14	
35	J1939 signal: Missing EEC1 message	190	14	
36	J1939 signal: Missing EEC2 message	91	14	
37	J1939 signal: Missing ERC1_DR message	520	9	
38	J1939 signal: Missing ERC1_XR message	520	14	
39	Not used	#N/A	#N/A	Not Used
40	J1939 signal: Missing OEL message	2876	14	F
41	Not used	#N/A	#N/A	Not Used
42	J1939 signal: Missing VDC2 message	1807	14	F
43	Internal radar sensor error	#N/A	#N/A	Not Used
44	J1939 signal: Missing EBC3 message	1091	14	F
45	Not used	#N/A	#N/A	Not Used
46	Radar sensor is misaligned	886	7	G
47	Internal radar sensor error	886	12	A
48	Internal radar sensor error	630	14	A
49-53	Not used	#N/A	#N/A	Not Used
54	Internal radar sensor error	630	12	A
55-58	Not used	#N/A	#N/A	Not Used
59	Internal radar sensor error	886	31	A
60	Internal radar sensor error	886	12	
61	Internal radar sensor error	886	14	

Table 6A - DTC Code to Service Action Code

Table 6A: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes				Go to the Service Action Code List in Table 6C (Page 31)
DTC	**Description**	**SPN**	**FMI**	
62	Not used	#N/A	#N/A	Not Used
63	Internal radar sensor error	886	12	A
64-65	Not used	#N/A	#N/A	Not Used
66	Internal radar sensor error	886	12	A
67	Internal radar sensor error	886	8	
68-77	Internal radar sensor error	886	12	
78	Bendix® ABS J1939 proprietary message signal missing or error state	2551	14	H
79-81	Internal radar sensor error	886	12	A
82	Adaptive cruise control braking overuse	3839	0	J
83	J1939 signal: ACC1 Engine not properly configured for Bendix® Wingman® System	5606	13	K
84-85	Internal radar sensor error	630	12	A
86	CMT configuration mismatch between brake controller and radar sensor	886	13	L
87	J1939 signal: Missing VDC1 message	1814	14	E
88	CMT braking overuse	2920	0	M
89-91	Not used	#N/A	#N/A	Not Used
92	J1939 signal: Invalid CCVS2 wheel speed	84	2	N
93	J1939 signal: Error in CCVS1 wheel speed	84	19	P
94	J1939 signal: Not available CCVS1 wheel speed	84	9	R
95	J1939 signal: Invalid CCVS1 CC speed	86	2	N
96	J1939 signal: Error in CCVS1 CC speed	86	19	P
97	J1939 signal: Not available CCVS1 CC speed	86	9	R
98	J1939 signal: Error CCVS1 CC active	595	19	P
99	J1939 signal: Not available CCVS1 CC active	595	9	R
100	J1939 signal: Error in CCVS1 CC enable	596	19	P
101	J1939 signal: Not available CCVS1 CC enable	596	9	R
102-103	Not used	#N/A	#N/A	Not Used
104	J1939 signal: Invalid CVW GCVW	1760	2	N
105	J1939 signal: Error in CVW gross combination vehicle weight	1760	19	P
106	J1939 signal: Not available CVW GCVW	1760	9	R
107	J1939 signal: Error in EBC1 brake switch	1121	19	P
108	J1939 signal: Not available EBC1 brake switch	1121	9	R
109	J1939 signal: Error in EBC1 ABS fully operational	1243	19	P
110	J1939 signal: Not available EBC1 ABS operate	1243	9	R
111	J1939 signal: Invalid EBC2 front axle	904	2	N
112	J1939 signal: Error in EBC2 front axle	904	19	P
113	J1939 signal: Not available EBC2 front axle	904	9	R
114	J1939 signal: Invalid EBC2 LF wheel	905	2	N
115	J1939 signal: Error in EBC2 LF wheel	905	19	P
116	J1939 signal: Not available EBC2 LF wheel	905	9	R
117	J1939 signal: Invalid EBC2 RF wheel	906	2	N
118	J1939 signal: Error in EBC2 RF wheel	906	19	P
119	J1939 signal: Not available EBC2 LF wheel	906	9	R

Table 6A - DTC Code to Service Action Code

Table 6A: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes				Go to the Service Action Code List in Table 6C (Page 31)
DTC	**Description**	**SPN**	**FMI**	
120	J1939 signal: Invalid EBC2 LR1 wheel	907	2	N
121	J1939 signal: Error in EBC2 LR1 wheel	907	19	P
122	J1939 signal: Not available EBC2 LR1 wheel	907	9	R
123	J1939 signal: Invalid EBC2 RR1 wheel	908	2	N
124	J1939 signal: Error in EBC2 RR1 wheel	908	19	P
125	J1939 signal: Not available EBC2 RR1 wheel	908	9	R
126	J1939 signal: Invalid EBC5 XBR state	2917	2	N
127	J1939 signal: Error in EBC5 XBR state	2917	19	P
128	J1939 signal: Not available EBC5 XBR state	2917	9	R
129	J1939 signal: Error in EBC5 brake use	2919	19	P
130	J1939 signal: Not available EBC5 brake use	2919	9	R
131	J1939 signal: Invalid EBC5 XBR limit	2921	2	N
132	J1939 signal: Error in EBC5 XBR limit	2921	19	P
133	J1939 signal: Not available EBC5 XBR limit	2921	9	R
134	J1939 signal: Error in EBC5 brake temp	3839	19	P
135	J1939 signal: Not available EBC5 brake temp	3839	9	R
136	J1939 signal: Invalid EC1 engine reference torque	544	2	N
137	J1939 signal: Error in EC1 engine reference torque	544	19	P
138	J1939 signal: Not available EC1 engine reference torque	544	9	R
139	J1939 signal: Invalid EEC1 engine speed	190	2	N
140	J1939 signal: Error in EEC1 engine speed	190	19	P
141	J1939 signal: Not available EEC1 engine speed	190	9	R
142	J1939 signal: Invalid EEC1 driver torque	512	2	N
143	J1939 signal: Error in EEC1 driver torque	512	19	P
144	J1939 signal: Not available EEC1 driver torque	512	9	R
145	J1939 signal: Invalid EEC1 actual torque	513	2	N
146	J1939 signal: Error in EEC1 actual torque	513	19	P
147	J1939 signal: Not available EEC1 Actual Torque	513	9	R
148	J1939 signal: Invalid EEC2 accelerator pedal position	91	2	N
149	J1939 signal: Error in EEC2 accelerator pedal position	91	19	P
150	J1939 signal: Not available EEC2 accelerator pedal position	91	9	R
151-154	Not used	#N/A	#N/A	Not Used
155	J1939 signal: Invalid OEL turn signal	2876	2	N
156	J1939 signal: Error in OEL turn signal	2876	19	P
157	J1939 signal: Not available OEL turn signal	2876	9	R
158	J1939 signal: Error in VDC1 ROP brake control	1818	19	P
159	J1939 signal: Not available VDC1 ROP brake control	1818	9	R
160	J1939 signal: Error in VDC1 ROP engine control	1816	19	P
161	J1939 signal: Not available VDC1 ROP engine control	1816	9	R
162	J1939 signal: Error in VDC1 YC brake control	1819	19	P
163	J1939 signal: Not available VDC1 YC brake control	1819	9	R
164	J1939 signal: Error in VDC1 YC engine control	1817	19	P
165	J1939 signal: Not available VDC1 YC engine control	1817	9	R

Table 6A - DTC Code to Service Action Code

Table 6A: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes				Go to the Service Action Code List in Table 6C (Page 31)
DTC	Description	SPN	FMI	
166	J1939 signal: Invalid VDC2 steer angle	1807	2	N
167	J1939 signal: Error in VDC2 steer angle sensor	1807	19	P
168	J1939 signal: Not available VDC2 steer angle	1807	9	R
169	J1939 signal: Invalid VDC2 yaw rate	1808	2	N
170	J1939 signal: Error in VDC2 yaw rate	1808	19	P
171	J1939 signal: Not available VDC2 yaw rate	1808	9	R
172-174	Not used	#N/A	#N/A	Not Used
175	J1939 signal: Invalid TSC1 requested torque limit	518	2	N
176	J1939 signal: Error in TSC1 requested torque limit	518	19	P
177	J1939 signal: Not available TSC1 requested torque limit	518	9	R
178	Antenna is dirty or partially blocked	886	17	D
179	Vehicle cruise control and ACC out of sync	886	14	S
180	Radar mounting offset is out of range	886	2	T
181	J1939 signal: EBC1 ABS not fully operational	1243	2	U
182	J1939 signal: VDC1 VDC not fully operational	1814	2	V
183	J1939 signal: Error in VDC1 VDC fully operational	1814	19	P
184	J1939 signal: Not available VDC1 VDC fully operational	1814	9	R
185	ABS tire size needs recalibration	1069	13	W
186	Internal radar sensor error	630	12	A
187	J1939 signal: Error in ACC1 ACC mode	5606	2	P
188	J1939 signal: Not available ACC1 ACC mode	5606	19	R
189	J1939 signal CCVS3: Engine not properly configured for Bendix® Wingman® System	5606	13	K
190	Internal radar sensor error	5676	14	A
191	Internal radar sensor error	2921	12	A
192-193	Internal radar sensor error	630	12	A
194	Proprietary CAN: Message counter error	625	19	X
195	Proprietary CAN: Message timeout	625	9	X
196	Proprietary CAN: Message inconsistent	625	2	X
197	Not used	#N/A	#N/A	Not Used
198	J1939 signal: Missing EC1 message	188	14	F
199	J1939 signal: Error in AEBS2 driver activation demand	5681	19	P
200	J1939 signal: Not available AEBS2 driver activation	5681	9	R
201	J1939 signal: Error in AEBS2 message checksum	5683	19	P
202-204	Not used	#N/A	#N/A	Not Used
205	J1939 signal: Invalid ACC2 requested ACC distance mode	1799	2	N
206	J1939 signal: Error in ACC2 requested ACC distance mode	1799	19	P
207	J1939 signal: Not available ACC2 distance mode	1799	9	R
208	J1939 signal: Error in ACC2 ACC usage demand	5023	19	P
209	J1939 signal: Not available ACC2 ACC usage	5023	9	R
210	J1939 signal: Error in AUXIO1 trailer ABS operational	707	19	P
211	J1939 signal: Not available AUXIO trailer ABS operational	707	9	R
212	J1939 signal: Error in AUXIO1 trailer ABS detected	706	19	P

Table 6A - DTC Code to Service Action Code

Table 6A: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes				Go to the Service Action Code List in Table 6C (Page 31)
DTC	Description	SPN	FMI	
213	J1939 signal: Not available AUXIO trailer ABS detected	706	9	R
214	J1939 signal: Error in AUXIO1 trailer connected	705	19	P
215	J1939 signal: Not available AUXIO trailer connected	705	9	R
216	J1939 signal: Error in CCVS1 parking brake switch	70	19	P
217	J1939 signal: Not available CCVS1 parking brake switch	70	9	R
218	J1939 signal: Error in CCVS1 cruise control set switch	599	19	P
219	J1939 signal: Not available CCVS1 Set switch	599	9	R
220	J1939 signal: Error in CCVS1 cruise control Coast switch	600	19	P
221	J1939 signal: Not available CCVS1 Coast switch	600	9	R
222	J1939 signal: Error in CCVS1 cruise control resume switch	601	19	P
223	J1939 signal: Not available CCVS1 resume switch	601	9	R
224	J1939 signal: Error in CCVS1 cruise control accelerate switch	602	19	P
225	J1939 signal: Not available CCVS1 accl. switch	602	9	R
226	J1939 signal: Error in CCVS1 cruise control pause switch	1633	19	P
227	J1939 signal: Not available CCVS1 pause switch	1633	9	R
228	J1939 signal: Invalid EBC1 brake pedal position	521	2	N
229	J1939 signal: Error in EBC1 brake pedal position	521	19	P
230	J1939 signal: Not available EBC1 brake pedal position	521	9	R
231	J1939 signal: Error in EBC1 Anti-Lock braking active	563	19	P
232	J1939 signal: Not available EBC1 ABS active	563	9	R
233	J1939 signal: Error in EBC1 ASR engine control active	561	19	P
234	J1939 signal: Not available EBC1 ASR engine control active	561	9	R
235	J1939 signal: Error in EBC1 ASR brake control active	562	2	P
236	J1939 signal: Not available EBC1 ASR brake control active	562	19	R
237	J1939 signal: Error in EBC1 source address of controlling device	1481	2	P
238	J1939 signal: Not available EBC1 source address of controlling device	1481	19	R
239	J1939 signal: Invalid EBC5 XBR active control mode	2918	2	N
240	J1939 signal: Error in EBC5 XBR active control mode	2918	19	P
241	J1939 signal: Not available EBC5 XBR active control mode	2918	9	R
242-245	Not used	#N/A	#N/A	Not Used
246	J1939 signal: Invalid EC1 engine speed at idle point 1	188	2	N
247	J1939 signal: Error in EC1 engine speed at idle point 1	188	19	P
248	J1939 signal: Not available EC1 engine speed at idle point 1	188	9	R
249	J1939 signal: Invalid EEC3 nominal friction percent torque	514	2	N
250	J1939 signal: Error in EEC3 nominal friction percent torque	514	19	P
251	J1939 signal: Not available EEC3 nominal friction percent torque	514	9	R
252	J1939 signal: Error in ETC1 transmission driveline engaged	560	19	P
253	J1939 signal: Not available ETC1 transmission driveline engaged	560	9	R
254	J1939 signal: Invalid ETC2 transmission selected gear	524	2	N
255	J1939 signal: Error in ETC2 transmission selected gear	524	19	P
256	J1939 signal: Not available ETC2 transmission selected gear	524	9	R
257	J1939 signal: Invalid ETC2 transmission actual gear ratio	526	2	N
258	J1939 signal: Error in ETC2 transmission actual gear ratio	526	19	P

Table 6A - DTC Code to Service Action Code

Table 6A: Diagnostic Trouble Codes (DTCs), Descriptions and Service Action Codes				Go to the Service Action Code List in Table 6C (Page 31)
DTC	**Description**	**SPN**	**FMI**	
259	J1939 signal: Not available ETC2 transmission actual gear ratio	526	9	R
260	J1939 signal: Invalid ETC2 transmission current gear	523	2	N
261	J1939 signal: Error in ETC2 transmission current gear	523	19	P
262	J1939 signal: Not available ETC2 transmission current gear	523	9	R
263	J1939 signal: Error in TC1 transmission requested gear	525	19	P
264	J1939 signal: Not available TC1 transmission requested gear	525	9	R
265	J1939 signal: Missing AUXIO message	701	14	F
266	J1939 signal: Missing DM1 message	1214	14	F
267	J1939 signal: Missing EEC3 message	514	14	F
268	J1939 signal: Missing ETC1 message	560	14	F
269	J1939 signal: Missing ETC2 message	524	14	F
270	J1939 signal: Missing TC1 message	525	14	F
271	J1939 signal: Missing FLC message. *See SD-64-20124.*	1705	14	F
272	J1939 signal: AUXIO trailer ABS not fully operational	707	2	V
273	Proprietary CAN: Message counter increment error	625	10	X
274	Fusion configuration mismatch between brake controller and radar sensor. *See SD-61-4963.*	630	19	L
275-277	Not used	#N/A	#N/A	Not Used
278	J1939 signal: Error in CCVS1 brake switch	597	19	P
279	J1939 signal: Not available CCVS1 brake switch	597	9	R

Table 6A - DTC Code to Service Action Code

For SPN (Suspect Parameter Number) and FMI (Failure Mode Identifier) code combinations, refer to Table 6B below. [Alternatively, for DTC(s) codes, refer to Table 6A.]

In Table 6B, find the SPN code in column one and determine the Service Action Code(s) to look up in Table 6C.

Table 6B: SPN and FMI Codes, Descriptions and Service Actions			Go to the Service Action Code List in Table 6C (Page 31)
SPN	**FMI**	**Description**	
70	9	J1939 signal: Not available CCVS1 parking brake switch	R
70	19	J1939 signal: Error in CCVS1 parking brake switch	P
84	2	J1939 signal: Invalid CCVS2 wheel speed	N
84	9	J1939 signal: Not available CCVS1 wheel speed	R
84	19	J1939 signal: Error in CCVS1 wheel speed	P
86	2	J1939 signal: Invalid CCVS1 CC speed	N
86	9	J1939 signal: Not available CCVS1 CC speed	R
86	19	J1939 signal: Error in CCVS1 CC speed	P
91	2	J1939 signal: Invalid EEC2 accelerator pedal position	N
91	9	J1939 signal: Not available EEC2 accelerator pedal position	R
91	14	J1939 signal: Missing EEC2 message	F
91	19	J1939 signal: Error in EEC2 accelerator pedal position	P
188	2	J1939 signal: Invalid EC1 engine speed at idle point 1	N
188	9	J1939 signal: Not available EC1 engine speed at idle point 1	R
188	14	J1939 signal: Missing EC1 message	F
188	19	J1939 signal: Error in EC1 engine speed at idle point 1	P
190	2	J1939 signal: Invalid EEC1 engine speed	N
190	9	J1939 signal: Not available EEC1 engine speed	R
190	14	J1939 signal: Missing EEC1 message	F
190	19	J1939 signal: Error in EEC1 engine speed	P
512	2	J1939 signal: Invalid EEC1 driver torque	N
512	9	J1939 signal: Not available EEC1 driver torque	R
512	19	J1939 signal: Error in EEC1 driver torque	P
513	2	J1939 signal: Invalid EEC1 actual torque	N
513	9	J1939 signal: Not available EEC1 actual torque	R
513	19	J1939 signal: Error in EEC1 actual torque	P
514	2	J1939 signal: Invalid EEC3 nominal friction percent torque	N
514	9	J1939 signal: Not available EEC3 nominal friction percent torque	R
514	14	J1939 signal: Missing EEC3 message	F
514	19	J1939 signal: Error in EEC3 nominal friction percent torque	P
518	2	J1939 signal: Invalid TSC1 requested torque limit	N
518	9	J1939 signal: Not available TSC1 requested torque limit	R
518	19	J1939 signal: Error in TSC1 requested torque limit	P
520	9	J1939 signal: Missing ERC1_dr message	F
520	14	J1939 signal: Missing ERC1_xr message	F
521	2	J1939 signal: Invalid EBC1 brake pedal position	N
521	9	J1939 signal: Not available EBC1 brake pedal position	R
521	19	J1939 signal: Error in EBC1 brake pedal position	P

Table 6B - SPN and FMI Codes and Their Service Action Code

Table 6B: SPN and FMI Codes, Descriptions and Service Actions			Go to the Service Action Code List in Table 6C (Page 31)
SPN	**FMI**	**Description**	
523	2	J1939 signal: Invalid ETC2 transmission current gear	N
523	9	J1939 signal: Not available ETC2 transmission current gear	R
523	19	J1939 signal: Error in ETC2 transmission current gear	P
524	2	J1939 signal: Invalid ETC2 transmission selected gear	N
524	9	J1939 signal: Not available ETC2 transmission selected gear	R
524	14	J1939 signal: Missing ETC2 message	F
524	19	J1939 signal: Error in ETC2 transmission selected gear	P
525	9	J1939 signal: Not available TC1 transmission requested gear	R
525	14	J1939 signal: Missing TC1 message	F
525	19	J1939 signal: Error in TC1 transmission requested gear	P
526	2	J1939 signal: Invalid ETC2 transmission actual gear ratio	N
526	9	J1939 signal: Not available ETC2 transmission actual gear ratio	R
526	19	J1939 signal: Error in ETC2 transmission actual gear ratio	P
527	14	J1939 signal: Missing CCVS1 message	E
544	2	J1939 signal: Invalid EC1 engine reference torque	N
544	9	J1939 signal: Not available EC1 engine reference torque	R
544	19	J1939 signal: Error in EC1 engine reference torque	P
560	9	J1939 signal: Not available ETC1 transmission driveline engaged	R
560	14	J1939 signal: Missing ETC1 message	F
560	19	J1939 signal: Error in ETC1 transmission driveline engaged	P
561	9	J1939 signal: Not available EBC1 ASR engine control active	R
561	19	J1939 signal: Error in EBC1 ASR engine control active	P
562	2	J1939 signal: Error in EBC1 ASR brake control active	P
562	19	J1939 signal: Not available EBC1 ASR brake control active	R
563	9	J1939 signal: Not available EBC1 ABS active	R
563	19	J1939 signal: Error in EBC1 anti-lock braking active	P
595	9	J1939 signal: Not available CCVS1 CC active	R
595	19	J1939 signal: Error CCVS1 CC active	P
596	9	J1939 signal: Not available CCVS1 CC enable	R
596	19	J1939 signal: Error in CCVS1 CC enable	P
597	9	J1939 signal: Not available CCVS1 brake sw	R
597	19	J1939 signal: Error in CCVS1 brake switch	P
599	9	J1939 signal: Not available CCVS1 set switch	R
599	19	J1939 signal: Error in CCVS1 cruise control set switch	P
600	9	J1939 signal: Not available CCVS1 coast switch	R
600	19	J1939 signal: Error in CCVS1 cruise control coast switch	P
601	9	J1939 signal: Not available CCVS1 resume switch	R
601	19	J1939 signal: Error in CCVS1 cruise control resume switch	P
602	9	J1939 signal: Not available CCVS1 accl. switch	R
602	19	J1939 signal: Error in CCVS1 cruise control accelerate switch	P
625	2	Proprietary can: Message inconsistent	X

Table 6B - SPN and FMI Codes and Their Service Action Code

Table 6B: SPN and FMI Codes, Descriptions and Service Actions			Go to the Service Action Code List in Table 6C (Page 31)
SPN	**FMI**	**Description**	
625	9	Proprietary can: Message timeout	X
625	10	Proprietary can: Message counter increment error	X
625	19	Proprietary can: Message counter error	X
630	12	Internal radar sensor error	A
630	14	Internal radar sensor error	A
630	19	Fusion configuration mismatch between brake controller and radar sensor. *See SD-61-4963.*	L
639	9	Radar detects intermittent loss of J1939 messages from vehicle components	Y
639	19	Radar cannot detect any J1939 messages from vehicle components	
701	14	J1939 signal: Missing AUXIO message	F
705	9	J1939 signal: Not available AUXIO trailer connected	R
705	19	J1939 signal: Error in AUXIO1 trailer connected	P
706	9	J1939 signal: Not available AUXIO trailer ABS detect	R
706	19	J1939 signal: Error in AUXIO1 trailer ABS detected	P
707	2	J1939 signal: AUXIO trailer ABS not fully operational	V
707	9	J1939 signal: Not available AUXIO trailer ABS operational	R
707	19	J1939 signal: Error in AUXIO1 trailer ABS operational	P
886	1	Antenna is dirty or partially blocked	D
886	2	Radar mounting offset is out of range	T
886	3	Battery voltage too high	C
886	4	Battery voltage too low	C
886	7	Radar sensor is misaligned	G
886	8	Internal radar sensor error	A
886	12	Internal radar sensor error	A
886	13	CMT configuration mismatch between brake controller and radar sensor	L
886	14	Internal radar sensor error	A
886	14	Vehicle cruise control and ACC out of sync	S
886	17	Antenna is dirty or partially blocked	B
886	31	Internal radar sensor error	A
904	2	J1939 signal: Invalid EBC2 front axle	N
904	9	J1939 signal: Not available EBC2 front axle	R
904	14	J1939 signal: Missing EBC2 message	F
904	19	J1939 signal: Error in EBC2 front axle	P
905	2	J1939 signal: Invalid EBC2 LF wheel	N
905	9	J1939 signal: Not available EBC2 LF wheel	R
905	19	J1939 signal: Error in EBC2 LF wheel	P
906	2	J1939 signal: Invalid EBC2 RF wheel	N
906	9	J1939 signal: Not available EBC2 LF wheel	R
906	19	J1939 signal: Error in EBC2 RF wheel	P
907	2	J1939 signal: Invalid EBC2 LF1 wheel	N
907	9	J1939 signal: Not available EBC2 LF1 wheel	R

Table 6B - SPN and FMI Codes and Their Service Action Code

Table 6B: SPN and FMI Codes, Descriptions and Service Actions			Go to the Service Action Code List in Table 6C (Page 31)
SPN	**FMI**	**Description**	
907	19	J1939 signal: Error in EBC2 LF1 wheel	P
908	2	J1939 signal: Invalid EBC2 RR1 wheel	N
908	9	J1939 signal: Not available EBC2 RR1 wheel	R
908	19	J1939 signal: Error in EBC2 RR1 wheel	P
1069	13	ABS tire size needs recalibration	W
1091	14	J1939 signal: Missing EBC3 message	F
1121	9	J1939 signal: Not available EBC1 brake sw	R
1121	19	J1939 signal: Error in EBC1 brake switch	P
1214	14	J1939 signal: Missing DM1 message	F
1243	2	J1939 signal: EBC1 ABS not fully operational	U
1243	9	J1939 signal: Not available EBC1 ABS operate	R
1243	14	J1939 signal: Missing EBC1 message	F
1243	19	J1939 signal: Error in EBC1 ABS fully operational	P
1481	2	J1939 signal: Error in EBC1 source address of controlling device	P
1481	19	J1939 signal: Not available EBC1 source address of controlling device	R
1633	9	J1939 signal: Not available CCVS1 pause switch	R
1633	19	J1939 signal: Error in CCVS1 cruise control pause switch	P
1705	14	J1939 signal: Missing FLC message. *See SD-64-20124.*	F
1760	2	J1939 signal: Invalid CVW GCVW	N
1760	9	J1939 signal: Not available CVW GCVW	R
1760	14	J1939 signal: Missing CVW message	F
1760	19	J1939 signal: Error in CVW gross combination vehicle weight	P
1799	2	J1939 signal: Invalid ACC2 requested ACC distance mode	N
1799	9	J1939 signal: Not available ACC2 distance mode	R
1799	14	Internal radar sensor error	D
1799	19	J1939 signal: Error in ACC2 requested ACC distance mode	P
1807	2	J1939 signal: Invalid VDC2 steer angle	N
1807	9	J1939 signal: Not available VDC2 steer angle	R
1807	14	J1939 signal: Missing VDC2 message	F
1807	19	J1939 signal: Error in VDC2 steer angle sensor	P
1808	2	J1939 signal: Invalid VDC2 yaw rate	N
1808	9	J1939 signal: Not available VDC2 yaw rate	R
1808	19	J1939 signal: Error in VDC2 yaw rate	P
1814	2	J1939 signal: VDC1 VDC not fully operational	V
1814	9	J1939 signal: Not available VDC1 VDC fully operational	R
1814	14	J1939 signal: Missing VDC1 message	E
1814	19	J1939 signal: Error in VDC1 VDC fully operational	P
1816	9	J1939 signal: Not available VDC1 ROP engine control	R
1816	19	J1939 signal: Error in VDC1 ROP engine control	P
1817	9	J1939 signal: Not available VDC1 YC engine control	R
1817	19	J1939 signal: Error in VDC1 YC engine control	P

Table 6B - SPN and FMI Codes and Their Service Action Code

Table 6B: SPN and FMI Codes, Descriptions and Service Actions			Go to the Service Action Code List in Table 6C (Page 31)
SPN	**FMI**	**Description**	
1818	9	J1939 signal: Not available VDC1 ROP brake control	R
1818	19	J1939 signal: Error in VDC1 ROP brake control	P
1819	9	J1939 signal: Not available VDC1 YC brake control	R
1819	19	J1939 signal: Error in VDC1 YC brake control	P
2551	14	Bendix ABS J1939 proprietary message signal missing or error state	H
2876	2	J1939 signal: Invalid OEL turn signal	N
2876	9	J1939 signal: Not available OEL turn signal	R
2876	14	J1939 signal: Missing OEL message	F
2876	19	J1939 signal: Error in OEL turn signal	P
2917	2	J1939 signal: Invalid EBC5 XBR state	N
2917	9	J1939 signal: Not available EBC5 XBR state	R
2917	19	J1939 signal: Error in EBC5 XBR state	P
2918	2	J1939 signal: Invalid EBC5 XBR active control mode	N
2918	9	J1939 signal: Not available EBC5 XBR active control mode	R
2918	19	J1939 signal: Error in EBC5 XBR active control mode	P
2919	9	J1939 signal: Not available EBC5 brake use	R
2919	14	J1939 signal: Missing EBC5 message	F
2919	19	J1939 signal: Error in EBC5 brake use	P
2920	0	CMT braking overuse	M
2921	2	J1939 signal: Invalid EBC5 XBR limit	N
2921	9	J1939 signal: Not available EBC5 XBR limit	R
2921	12	Internal radar sensor error	A
2921	19	J1939 signal: Error in EBC5 XBR limit	P
3839	0	Adaptive cruise control braking overuse	J
3839	9	J1939 signal: Not available EBC5 brake temp	R
3839	19	J1939 signal: Error in EBC5 brake temp	P
5023	9	J1939 signal: Not available ACC2 ACC usage	R
5023	19	J1939 signal: Error in ACC2 ACC usage demand	P
5606	2	J1939 signal: Error in ACC1 ACC mode	P
5606	13	J1939 signal: ACC1 or CCVS3: Engine not properly configured for the Bendix® Wingman® System	K
5606	19	J1939 signal: Not available ACC1 ACC mode	R
5676	14	Internal radar sensor error	A
5681	9	J1939 signal: Not available AEBS2 driver activation	R
5681	14	J1939 signal: Missing AEBS2 message	D
5681	19	J1939 signal: Error in AEBS2 message checksum or driver activation demand	P

Table 6B - SPN and FMI Codes and Their Service Action Code

Service Action Code (From Table 6A or 6B)	Table 6C: Service Action Codes and the Recommended Service to Perform
	Recommended Service *(FLR-20 Radar Sensors Only)*
A	**This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • Some error conditions may occur at extreme high or low temperatures. These trouble codes must be diagnosed with the ambient temperature above 32°F (0°C) and below 100°F (38°C). **Perform the following:** • Clear the Bendix® Wingman® Advanced™ system trouble codes using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • If the error returns, call the Bendix® Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
B	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • These trouble codes may arise from infrequent conditions that could occur normally. **Perform the following:** • Check for sensor obstruction. Clean dirt or packed snow or ice from the sensor if present. • Clear the Bendix Wingman Advanced System trouble codes using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • If the error returns, call the Bendix Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
C	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • These trouble codes result from incorrect ignition, battery supply voltage, or wiring harness issues as measured at the radar sensor. **Review the following sections:** • 4.5: *Ignition Voltage Too Low* • 4.5: *Ignition Voltage Too High* • 4.5: *Power Supply Tests* • 4.8: *Troubleshooting Wiring Harnesses* **Perform the following:** • Verify ignition supply voltage to the radar sensor is between 9 to 16 VDC. • Visually check for damaged or corroded connectors. • Visually check for damaged wiring. • Clear the Bendix Wingman Advanced System trouble codes using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. If the error returns, call the Bendix Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.

Table 6C - Service Action Codes (Pages 31-36)

Service Action Code (From Table 6A or 6B)	Table 6C: Service Action Codes and the Recommended Service to Perform **Recommended Service** ***(FLR-20 Radar Sensors Only)***
D	**This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Bendix® Wingman® System is indicating a required signal within a J1939 PGN message is not being sent from one or more sources. This could be accompanied by other active DTCs from the same source. **Review the following sections:** • 1.10: *Radar Sensor Interchangeability* • 4.7: *Engine Communications (J1939) Test Procedure* **Perform the following:** • Check the source of the signal to identify why the signal has invalid data in the J1939 message. • Check the engine, engine retarder, and ABS for trouble codes 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 signal must be investigated first, but the origin of the signal could be another component. Some examples are gross vehicle weight and various engine torque signals. • Clear the Bendix® Wingman® Advanced™ system DTCs using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs).* • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
E	**This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Bendix Wingman System is indicating a required signal within a J1939 PGN message is not being sent from one or more sources. This could be accompanied by other active DTCs from the same source. **Review the following sections:** • 1.10: *Radar Sensor Interchangeability* • 4.7: *Engine Communications (J1939) Test Procedure* **Perform the following:** • Check the source of the signal to identify why the signal has invalid data in the J1939 message. • Check the engine, engine retarder, and ABS for trouble codes 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 signal must be investigated first, but the origin of the signal could be another component. Some examples are gross vehicle weight and various engine torque signals. • Clear the Bendix Wingman Advanced System DTCs using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs).* • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
F	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Bendix Wingman System is indicating a required signal within a J1939 PGN message is not being sent from one or more sources. This could be accompanied by other active DTCs from the same source. **Review the following sections:** • 1.10: *Radar Sensor Interchangeability* • 4.7: *Engine Communications (J1939) Test Procedure* **Perform the following:** • Check the source of the signal to identify why the signal has invalid data in the J1939 message. • Check the engine, engine retarder, and ABS for trouble codes 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 signal must be investigated first, but the origin of the signal could be another component. Some examples are gross vehicle weight and various engine torque signals. • Clear the Bendix Wingman Advanced System DTCs using the procedure in Section 4.4: C*learing Diagnostic Trouble Codes (DTCs).* • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.

Table 6C - Service Action Codes (Pages 31-36)

Service Action Code (From Table 6A or 6B)	Table 6C: Service Action Codes and the Recommended Service to Perform **Recommended Service** ***(FLR-20 Radar Sensors Only)***
G	**This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • Radar sensor out of alignment. **Perform the following:** • Go to Appendix B1 and use the flowchart to find out the procedure needed. Follow the actions directed in the procedure and align the radar. • Clear the Bendix Wingman Advanced System trouble codes using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
H	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Bendix® Wingman® Advanced™ system is indicating a required signal from the ABS controller is missing or the ABS is sending message indicating an error. This DTC could be accompanied by other active DTCs. **Review the following sections:** • 1.10: *Radar Sensor Interchangeability* **Perform the following:** • Check the ABS for trouble codes using the Bendix's diagnostic procedures. Some examples are incorrect ABS ECU software version, incorrect parameter settings, or failure of a component in the ABS or ESP systems. • Clear the Bendix Wingman Advanced System trouble codes using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
J	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The system was used improperly, such as use of the system on downhill grades. **Perform the following:** • Check any engine, or engine retarder trouble codes. • Clear the Bendix Wingman Advanced System trouble codes using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • If the error returns, call the Bendix Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
K	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** • The engine has a calibration setting enabling it to perform the torque and retarder control for the Bendix® Wingman® Adaptive Cruise Control (ACC). **Possible causes:** • The "ACC-enable" setting in the engine software calibration is not set. • The engine is not equipped with an engine retarder, or does not support the engine ACC option. **Perform the following:** • Check the vehicle and engine manufacturers engine configuration for an engine ACC feature. • Check the engine for an engine retarder feature. • Check engine configuration for enabling the ACC function. • If the error returns, call the Bendix Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.

Table 6C - Service Action Codes (Pages 31-36)

Service Action Code (From Table 6A or 6B)	Table 6C: Service Action Codes and the Recommended Service to Perform **Recommended Service** ***(FLR-20 Radar Sensors Only)***
L	**This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The controller is recognizing that there are components installed that have part numbers incompatible with the current system configuration. [For example, when a technician attempts to install a more recent radar sensor onto a vehicle with an earlier Bendix® Wingman® Advanced™ system or ACB (Adaptive Cruise-control with Braking) system.] Contact the dealer or call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2 for the correct part number to use, or the re-programming steps to take for the newer part number to be accepted. **After addressing the possible causes, perform the following:** • Clear the Bendix Wingman Advanced System DTCs using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • If the error returns, call the Bendix Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
M	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Collision Mitigation System (CMS) applied the brakes more than three times in a power cycle and the system was used improperly: **After addressing the possible causes, perform the following:** • Clear the Bendix Wingman Advanced System DTCs using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • Review the operation of the Bendix Wingman Advanced System with the driver. • If the error returns, call the Bendix Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
N	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • J1939 source of the signal is indicating a signal is producing a value that is out-of-range. **Review the following sections:** • 1.10: *Radar Sensor Interchangeability* • 4.7: *Engine Communications (J1939) Test Procedure* **Perform the following:** • Check the source of the signal to identify why the signal has invalid data in the J1939 message. • Check the engine, engine retarder, and 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 signal must be investigated first, but the origin of the signal could be another component. Some examples are gross vehicle weight and various engine torque signals. • Clear the Bendix Wingman Advanced System DTCs using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*. • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
P	**This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • J1939 source of the signal is indicating an error in the signal. **Review the following sections:** • 1.10: *Radar Sensor Interchangeability* • 4.7: *Engine Communications (J1939) Test Procedure* **Perform the following:** • Check the source of the signal to identify why the signal has an error. • Check the engine, engine retarder, and ABS for trouble codes 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 signal must be investigated first, but the origin of the signal could be another component. Some examples are gross vehicle weight and various engine torque signals. • Clear the Bendix® Wingman® Advanced™ system DTCs using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs).* • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.

Service Action Code (From Table 6A or 6B)	Table 6C: Service Action Codes and the Recommended Service to Perform **Recommended Service** ***(FLR-20 Radar Sensors Only)***
R	**This Diagnostic Trouble Code (DTC) is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Bendix Wingman Advanced System is indicating the required data within a J1939 signal is not supported from one or more sources. **Review the following sections:** • 1.10: *Radar Sensor Interchangeability* • 4.7: *Engine Communications (J1939) Test Procedure* **Perform the following:** • Check the source of the signal to identify why the signal has invalid data in the J1939 message. • Check the engine, engine retarder, and ABS for trouble codes 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 signal must be investigated first, but the origin of the signal could be another component. Some examples are gross vehicle weight and various engine torque signals. • Clear the Bendix Wingman Advanced System DTCs using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs).* • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
S	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** • Some system, signal, or component caused the Bendix Wingman Advanced System to be disabled. Engine cruise control is unavailable and should not operate when the Bendix Wingman Advanced System is disabled. **Possible causes:** • Check engine, and engine retarder trouble codes. Inspect and troubleshoot the cruise control system wiring, switches, etc. for proper operation. **After addressing the possible causes, perform the following:** • Clear the Bendix Wingman Advanced System DTCs by cycling the power. Start the engine. • If the error returns, call the Bendix Tech Team for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
T	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • Mounting offset incorrect. **Perform the following:** • Check the mounting offset of the radar sensor in Bendix® ACom® PRO™ Diagnostic Software by selecting the Bi-directional Test, then the Wingman FLR Configuration Screen. The offset value should not exceed 500 mm. • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
U	**There is not a failure of the radar sensor. Do not replace the radar sensor.** **Possible causes:** • The Bendix® Wingman® Advanced™ system is indicating a required signal that indicates whether the Antilock Brake System is fully operational or whether its functionality is reduced by a permanent or temporary (e.g. low voltage) defect, or not configured or not yet fully initialized or loss of input sensors. • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.

Table 6C - Service Action Codes (Pages 31-36)

Service Action Code (From Table 6A or 6B)	Table 6C: Service Action Codes and the Recommended Service to Perform **Recommended Service** ***(FLR-20 Radar Sensors Only)***
V	**There is not a failure of the radar sensor. Do not replace the radar sensor.** **Possible causes:** The Bendix Wingman Advanced System is indicating that the Antilock Braking System (ABS) sizes are out of calibration. **Perform the following:** • To connect the Bendix® ACom® PRO™ Diagnostic Software, select the ABS Electronic Control Unit (ECU) in the Bi-directional menu. Select “ABS Configuration” from the available tests. Enter the correct tire sizes in the “Tire Size [rpm]” table for each axle of the vehicle. • Clear the Bendix Wingman Advanced System Diagnostic Trouble Codes (DTCs) *using the procedure in Section 4.4:* Clearing the DTCs. If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
W	**There is not a failure of the radar sensor. Do not replace the radar sensor.** **Possible causes:** The Bendix Wingman Advanced System is indicating that the ABS tire sizes are out of calibration. **Perform the following:** • To connect the Bendix® ACom® PRO™ Diagnostic Software, select the ABS Electronic Control Unit (ECU) in the Bi-directional menu. Select “ABS Configuration” from the available tests. Enter the correct tire sizes in the “Tire Size [rpm]” table for each axle of the vehicle. • • Clear the Bendix Wingman Advanced System Diagnostic Trouble Codes (DTCs) *using the procedure in Section 4.4:* Clearing the DTCs. If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
X	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Bendix Wingman Advanced System is indicating an error in the messages on the Proprietary CAN bus. **Perform the following:** • Check the Proprietary CAN connections at the Camera and Radar. • Check that the resistance between the Proprietary CAN+ and CAN- is between 50 and 70 ohms with the power off. • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.
Y	**This DTC is not an indicator of a malfunctioning sensor. Do not replace the sensor.** **Possible causes:** • The Bendix Wingman Advanced System is indicating an error in the messages on the public/vehicle CAN bus. **Perform the following:** • Check the public/vehicle CAN connections at the Camera and Radar. • Check that the resistance between the public/vehicle CAN+ and CAN- is between 50 and 70 ohms with the power off. • If the error returns, call Bendix for assistance at 1-800-AIR-BRAKE (1-800-247-2725), option 2.

Table 6C - Service Action Codes (Pages 31-36)

4.4 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 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).

4.5 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.

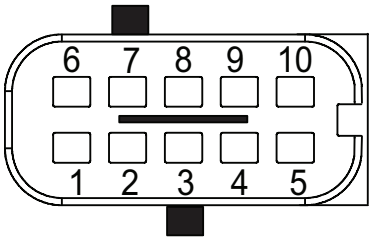
IGNITION VOLTAGE TOO HIGH

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 (e.g. 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 (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.

Power Supply Pin Codes (4.5)



(Looking into the Front of the Harness Connector)

Pin #	Description
1	J1939 High
2	Not Used
3	Not Used
4	Not Used
5	Radar Sensor Ground GND (-)
6	J1939 Low
7	Not Used
8	Supply Voltage IGN (+)
9	Not Used
10	Not Used

Table 7 - Harness Connector Pins

4.6 SERIAL DATA (J1939) COMMUNICATIONS LINK

Check for a loss of communications between the Bendix® Wingman® Advanced™ system radar sensor, the 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.

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

4.7 ENGINE COMMUNICATIONS (J1939) TEST PROCEDURE

The Bendix Wingman Advanced System requires several J1939 messages from the engine ECU to control the engine and retarder torque for distance control and braking. The Bendix Wingman Advanced 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 Bendix Wingman Advanced System from controlling the engine or retarder torque.

4.7.1 J1939 TROUBLESHOOTING PROCEDURE

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

   CAUTION: DO NOT INSERT PROBES INTO THE BACK SIDE OF THE CONNECTOR AS THIS WILL DAMAGE THE SEAL AROUND THE WIRE.

   CAUTION: DO NOT INSERT ANY PROBE INTO THE PIN ON THE MATING CONNECTOR OF THE RADAR SENSOR THAT IS GREATER THAN 0.62 MM DIAMETER OR SQUARE. THIS WILL DAMAGE THE CONNECTOR PIN AND REQUIRE 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. In that event, 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.

4.8 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 Advanced radar sensor, check that the wire harness connector is free of corrosion before plugging 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.

5.0 OTHER SYSTEM FEATURES SECTION

Section Index

5.1 READING BENDIX® WINGMAN® ADVANCED™ SYSTEM KEY INDICATORS

1. Connect a current version of Bendix® ACom® PRO™ 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).

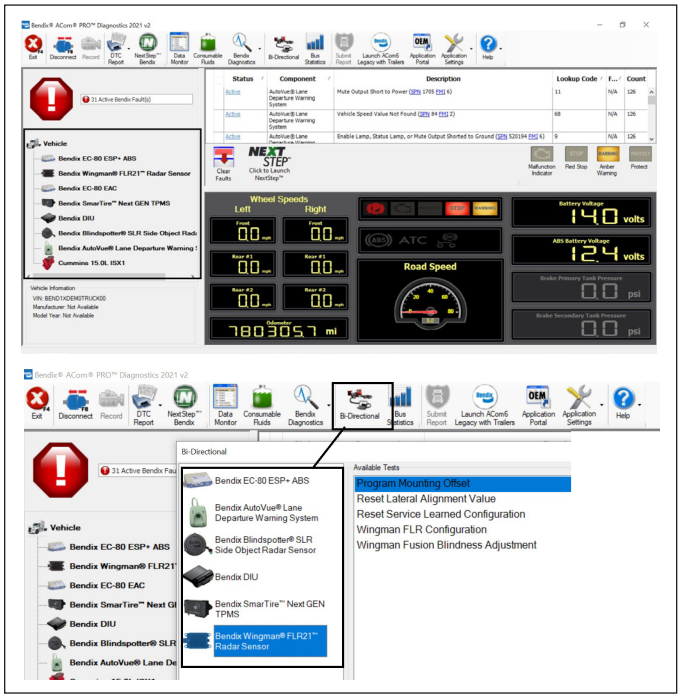


Figure 16 - Bendix® ACom® PRO™ Screen Showing Configuration Number

5.2 BENDIX WINGMAN ADVANCED 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 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).

5.3 FOLLOWING DISTANCE ADJUSTMENT SWITCH (OPTIONAL)

If the vehicle is equipped with the following distance adjustment switch and 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.

5.4 CONFIGURING BENDIX® WINGMAN® ADVANCED™ SYSTEM FOLLOWING DISTANCE ALERTS

Multiple alert and distance setting strategies, known as Following Distance Alert (FDA) configurations, can be chosen using the Bendix® ACom® PRO™ Diagnostic Software. In current versions of the ACom PRO Diagnostic Software, the service technician will find a selection box called “Following Distance Alert Table” which gives the service technician the choices *shown in Figure 18 and in Table 8*. *See Appendix B* for an example of FDAs for systems where a Bendix® Driver Interface Unit (DIU) is used. *See Appendix F* for information about how to change the FDA settings and enable momentary beeping.

Configuring Bendix® Wingman® Advanced™ System Following Distance Alerts (FDAs) (5.4)					
Configuration No.	Option	Farthest Following Distance	Medium Following Distance	Closest Following Distance	Default Advanced Following Distance (seconds)
		Slow Speed Audible Alert (seconds)	Medium Speed Audible Alert (seconds)	Fast Speed Audible Alert (seconds)	
1	City	—	—	0.5	2.8
	Highway (>37 mph [>60 kph])	1.5	1.0	0.5	
2	City	—	—	0.5	3.5
	Highway (>37 mph [>60 kph])	1.5	1.0	0.5	
3	City	—	1.5	1.0	2.8
	Highway (>37 mph [>60 kph])	2.0	1.5	1.0	
4	City	—	1.5	1.0	3.5
	Highway (>37 mph [>60 kph])	2.0	1.5	1.0	
5	City	—	1.5	1.0	3.5
	Highway (>37 mph [>60 kph])	3.0	2.0	1.0	
6	City	3.0	1.5	1.0	3.5
	Highway (>37 mph [>60 kph])	3.0	2.0	1.0	
7	City	—	—	0.2	2.8
	Highway (>37 mph [>60 kph])	—	—	0.2	
8 *See Note Below*	City	—	—	0.5	1.7
	Highway (>37 mph [>60 kph])	1.5	1.0	0.5	
9 *See Note Below*	City	—	—	0.5	2.3
	Highway (>37 mph [>60 kph])	1.5	1.0	0.5	

Table 8 - Configuring Following Distance Alerts (FDA)

Note: Configurations 8 and 9 are available on select applications only and may not be available on your system.

Changing configuration allows the fleet user to adjust both the following distance alerts and the following distance behind a detected forward vehicle. *See Figure 17.*

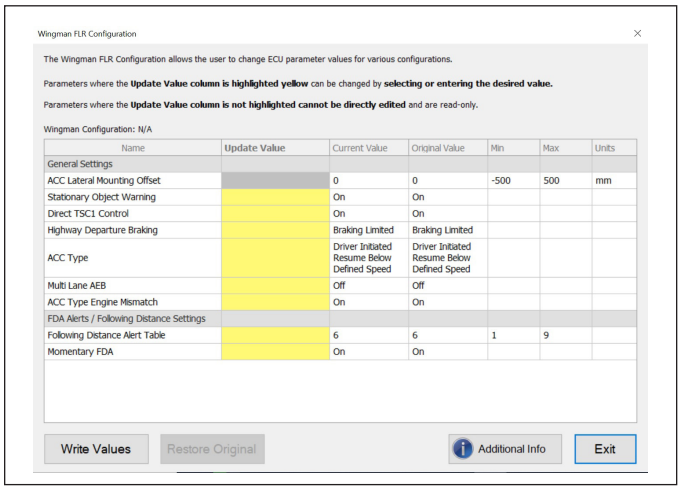


Figure 17 - Bendix® ACom® PRO™ Diagnostic Software – Following Distance Alert (FDA) and Following Distance See Also Table 8.

APPENDIX A - RADAR MOUNTING AND INSTALLATION

Appendix A

Mounting the Bendix™ FLR-20™ Radar

GENERAL

⚠ WARNING

Improper use of the Bendix® Wingman® Advanced™ system can result in a collision causing property damage, serious injuries, or death.

⚠ WARNING

Under no circumstances must the radar be removed or repositioned from the original production line installation. The assembly should always be mounted in the original OEM location. 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. *See Appendix A3.* 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.

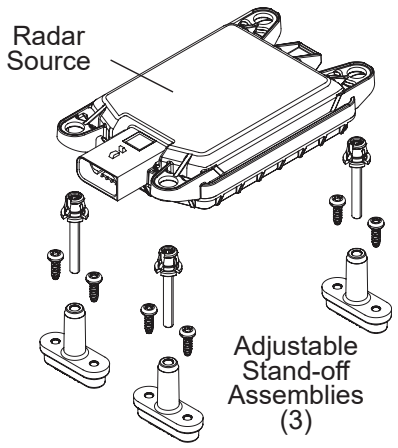
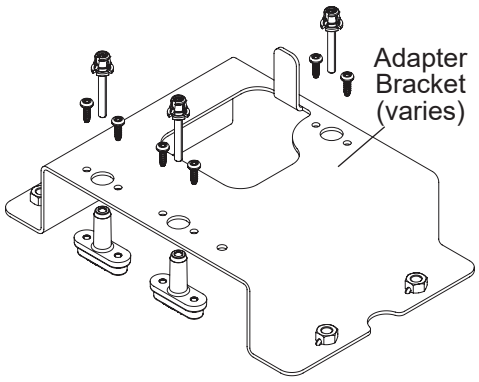
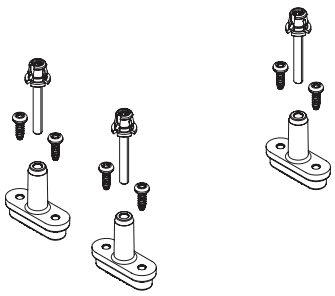
The radar sensor assembly is mounted to the front of the vehicle using an adjustable bracket. This adjustable bracket allows for the radar sensor to be properly aimed laterally and vertically to maximize Wingman Advanced System performance. When mounting a radar sensor, the wire harness connector should always point towards the passenger side of the vehicle.

A1 Vehicle Applications

The radar sensor can be mounted and installed only on vehicles that have a Bendix® Wingman® Advanced™ system already installed. Note that some vehicles can be retrofitted with the Wingman Advanced system by certified Bendix installers. To learn more about retrofit opportunities visit bendixcvsupgrade.com.

A2 Replacement Parts

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

		
Radar Sensor with Stand-off Assemblies	**Bracket (Varies) and Stand-off Assemblies**	**Stand-off Assemblies Only**
• Kit K071772 includes a specifically-programmed Bendix™ FLR-20™ radar sensor, three stand-off adjuster assemblies, and six mounting screws.	• Provide the bracket part number (see label) when ordering replacements. Kits will include three stand-off adjuster assemblies, and six mounting screws.	• Kit K073199 includes three stand-off adjuster assemblies, and six mounting screws.

Bendix™ FLR-20™ Radar Mounting Clearance

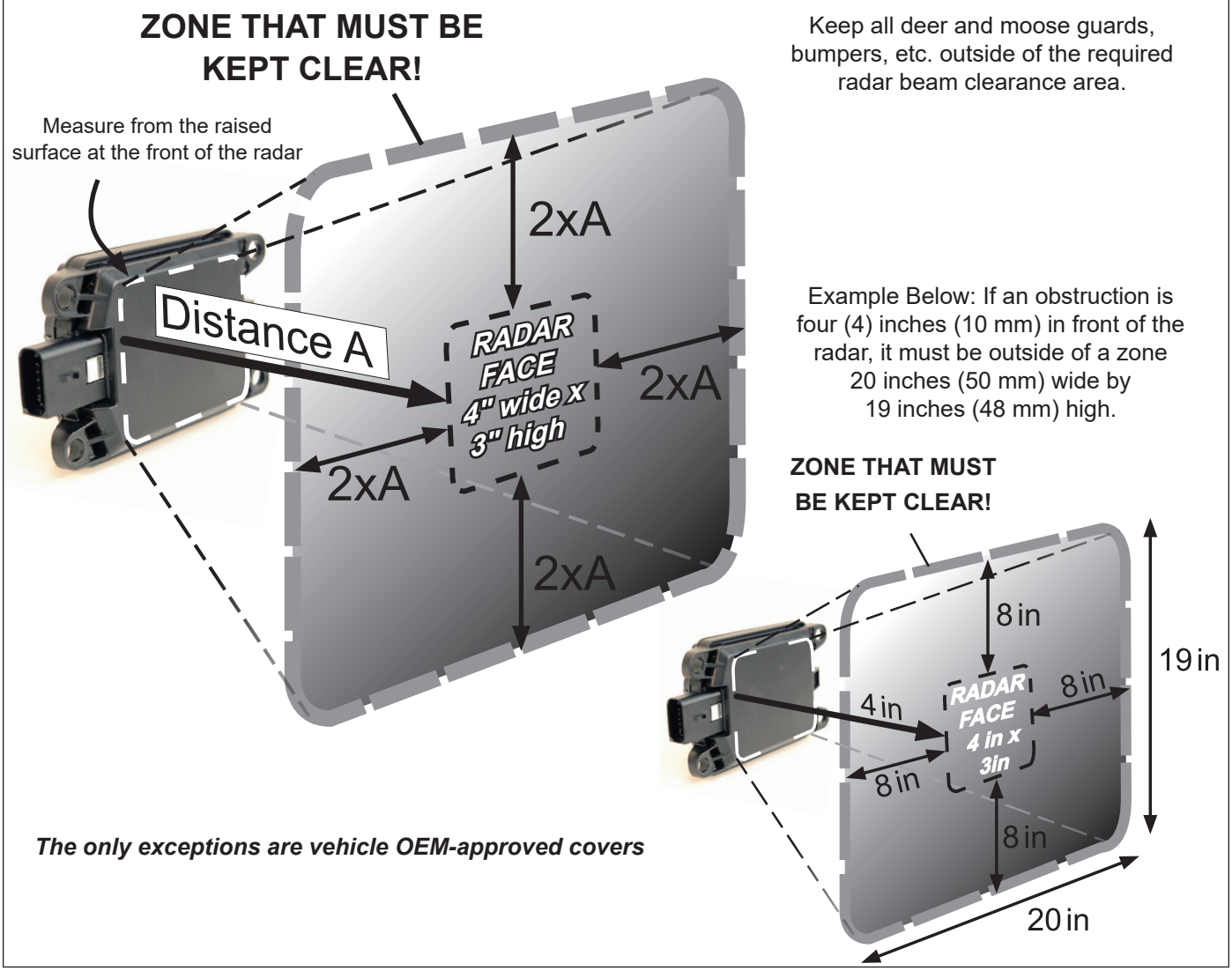
A3 Bendix™ FLR-20™ Radar Sensor Mounting Clearance

⚠ 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. 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 directly in front of the radar.

For proper operation of your Bendix® Wingman® Advanced™ system, 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. 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.

NOTE: Bendix does not certify nor offer warranty on Bendix® Wingman® Systems where system performance is affected by beam obstructions of any kind or unapproved post-production covers. This document gives general guidelines that will work for most vehicles; exceptions may exist.



The only exceptions are vehicle OEM-approved covers

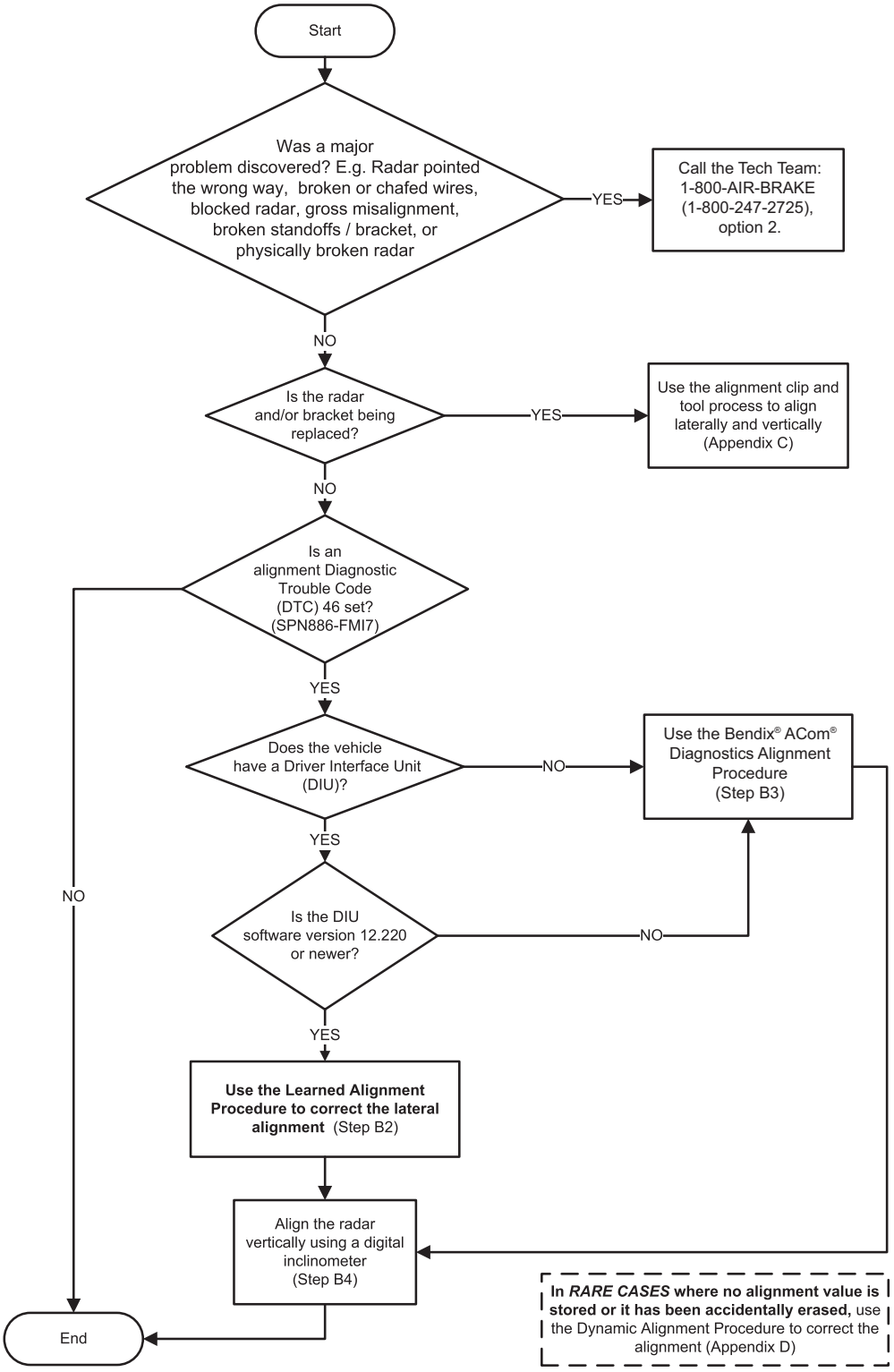
Appendix B

Bendix™ FLR-20™ Radar Sensor Alignment

B1.0 Radar Alignment Flowchart

For Bendix™ FLR-10™ radar sensors, see Bendix® Service Data Sheet (SD-61-4962).

Use this flowchart to find which section(s) of this Appendix to use.



Appendix B

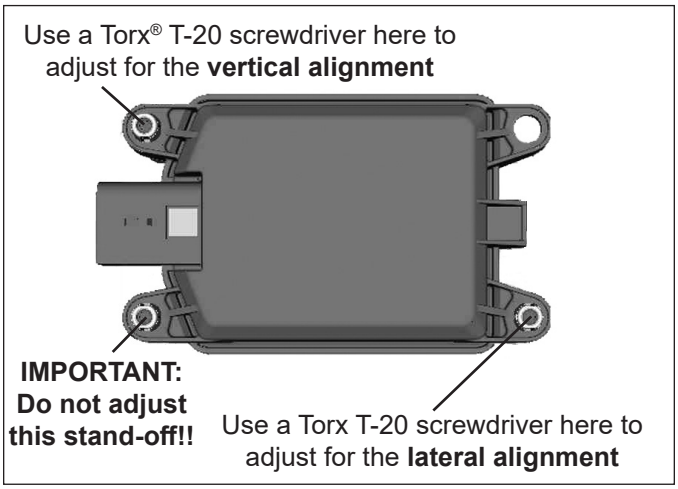
Bendix™ FLR-20™ Radar Alignment

B1.1 General Information About Adjusting The Alignment

Accurate vertical and lateral alignment of the radar sensor is critical for proper operation of Bendix® Wingman® Advanced™. If the alignment is outside a certain range it could cause false warnings, missed warnings, and a Diagnostic Trouble Code (DTC) in the system.

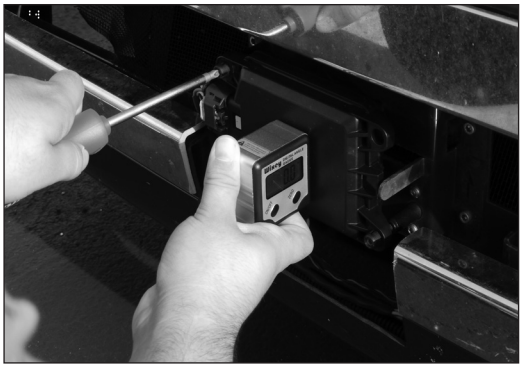
The radar sensor is mounted to the front of the vehicle using a bracket with three stand-offs, two of which are used when making adjustments, if necessary.

It is important to use the correct stand-off when making any alignment adjustments.



ABOVE: A TECHNICIAN MAKES AN ADJUSTMENT TO THE LATERAL ALIGNMENT STANDOFF.

BELOW: THE VERTICAL ALIGNMENT STANDOFF IS ADJUSTED.



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

Appendix B

Bendix™ FLR-20™ Radar Alignment

B2 Lateral Alignment Using The Learned Alignment Screen

This is the preferred and recommended method for lateral alignments

This method is for vehicles with Bendix™ Driver Interface Unit (DIU™) displays that use software whose version is 12.220 and above. To verify the DIU's software version, go to the Volume screen, where it is displayed in the top right-hand corner.

If the radar's lateral alignment is not correct, the system calculates over the course of many hours of driving, an alignment adjustment value. The DIU displays the learned alignment value, and also shows the technician the direction to turn, and number of turns to make to, the lateral alignment adjustment screw.

B2.1 Tools needed: DIU (with software version 12.220 or above), and a Torx® T-20 screwdriver.

B2.2 Enter the DIU menu item titled "Radar" and select "Alignment Check".

B2.3 Upon selecting the "Alignment Check" menu item the following screen will be displayed:

Bendix® DIU screen showing learned alignment value

For example, the Figure above shows a correction value of five (5) full turns counterclockwise is needed. The correction count and arrow direction displayed shows that in order to adjust the radar to be correctly aligned with the travel of the vehicle, the lateral adjustment screw (lower right screw when facing the front of the vehicle) should be turned.

B2.4 Make the adjustment shown on the Bendix DIU.

IMPORTANT: Make necessary adjustments to the alignment standoff prior to resetting the alignment value.

B2.5 Select "Reset" and then "Exit" on the Bendix DIU screen to return to the default screen.

B2.6 Cycle the ignition power.

B2.7 **IMPORTANT: Before returning the vehicle to service, go to *Appendix B4* and check the vertical alignment.**

NOTE: The alignment process is complete after the vertical alignment has been checked (and adjusted, if necessary.) You do not need to test-drive the vehicle.

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

Appendix B

Bendix™ FLR-20™ Radar Alignment

B3 Lateral Alignment Using Bendix® ACom® PRO™ Diagnostic Software

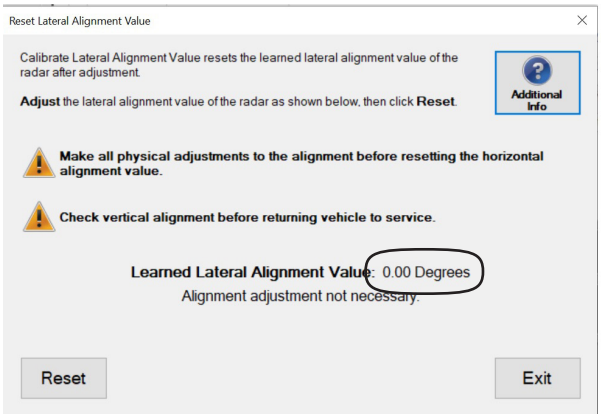
Use this method to align the Bendix FLR-20 radar laterally – when the vehicle does not have a Bendix™ DIU™, or has a DIU (but its software version is prior to 12.220)

B3.1 Tools needed: Bendix ACom PRO Diagnostic Software, and a Torx® T-20 screwdriver.

B3.2 Connect the vehicle to a laptop computer with the current release of the Bendix ACom PRO Diagnostic Software.

B3.3 *See the "Alignment Value" shown on the Reset Lateral Alignment Value test in available Bi-directional tests for FLR-20.*

If the alignment value shown by Bendix ACom PRO Diagnostic Software is between -1.1° and 1.1°, this is acceptable and the system should operate normally. A value outside that range means the radar sensor should be adjusted.



THE BENDIX® ACOM® PRO™ DIAGNOSTIC SOFTWARE SCREEN SHOWING THE ALIGNMENT VALUE

Alignment Value Range (Degrees)	Service Action	Number of Full Turns of the Lateral Alignment Adjustment Screw
-2.0 to -1.8	***Adjustment Required***	6 clockwise
-1.7 to -1.6		5 clockwise
-1.5 to -1.2		4 clockwise
-1.1 to -0.8	***No Adjustment Needed***	3 clockwise *(optional)*
-0.7 to -0.5		2 clockwise *(optional)*
-0.4 to -0.3		1 clockwise *(optional)*
-0.2 to 0.2		*No adjustment needed*
0.3 to 0.4		1 counterclockwise *(optional)*
0.5 to 0.7		2 counterclockwise *(optional)*
0.8 to 1.1		3 counterclockwise *(optional)*
1.2 to 1.5	***Adjustment Required***	4 counterclockwise
1.6 to 1.7		5 counterclockwise
1.8 to 2.0		6 counterclockwise

ADJUSTMENT SCREW ROTATION REQUIRED

Note: The maximum Alignment Value shown by the Bendix ACom PRO Diagnostic Software is two degrees (plus or minus).

Appendix B

Bendix™ FLR-20™ Radar Alignment

B3 Lateral Alignment Using Bendix® ACom® PRO™ Diagnostic software (Continued)

B3.4 *See the image below to see the lateral alignment adjustment screw location.*

Use Table in B3.3 on the prior page to find the number of full turns of the stand-off adjustment screw required to bring the radar sensor back into alignment. A Torx® T-20 screwdriver. with a mark or other indicator may help track the number of turns.

IMPORTANT: Do not adjust this stand-off!!

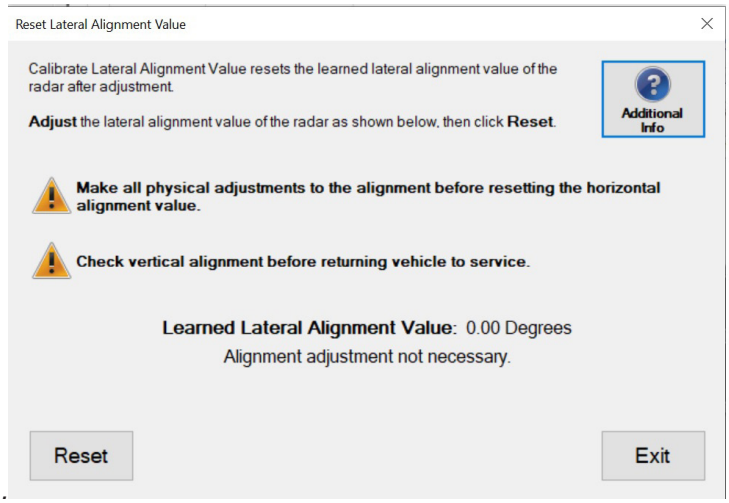
Use a Torx T-20 screwdriver here to adjust for the **lateral alignment**

B3.5 After making the adjustment, clear the Bendix® Wingman® Advanced™ system Diagnostic Trouble Code (DTC) using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)*.

B3.6 Then follow steps B3.7-11 to reset the alignment value stored in the system.

B3.7 **Procedure to Reset the Alignment Value.** From the available Bi-directional Tests for FLR-21 in ACom PRO, select the *Reset Lateral Alignment Value* test.

B3.8 Review the test instructions and select *Reset* in the *Reset Lateral Alignment Value* test. *(See Appendix H for more details.)*



B3.9 Close the Bendix ACom PRO Diagnostic Software program and any open windows.

B3.10 Cycle the vehicle ignition.

B3.11 After the vehicle has been driven at least 20 miles at above 35 mph (56 kph) in multi-lane urban traffic, re-check the alignment value using Bendix ACom PRO Diagnostic Software.

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

Appendix B

Bendix™ FLR-20™ Radar Alignment

B4 Vertical Alignment Using An Inclinometer

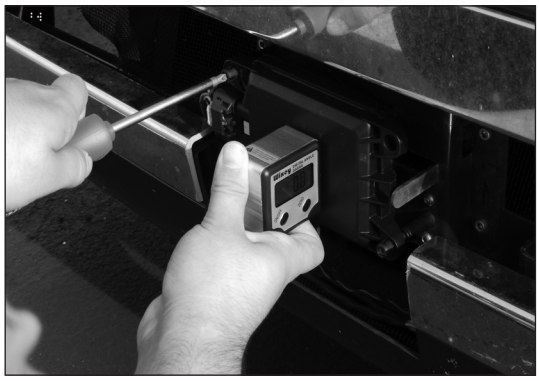
B4.1 Tools Needed: A digital inclinometer, Torx® T-20 screwdriver. (If a clip from the Bendix Alignment Tool kit is available, the clip may be placed over the front of the radar sensor during this process.)

B4.2 Park the vehicle on a level floor. Air suspensions must be charged and stable.

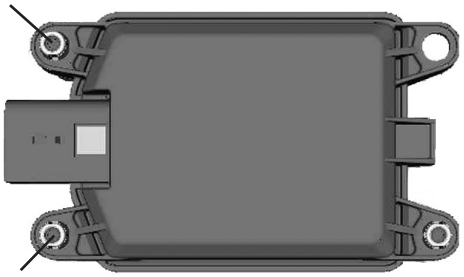
B4.3 Calibrate (or "zero") the inclinometer on a horizontal section of the frame rail. Follow the manufacturer's instructions (typically digital inclinometers have a "SET" button for this purpose).

Calibrate (or *"zero"*) the Digital Inclinometer on a Cab Frame Rail in the direction that the vehicle travels.

B4.4 Place the calibrated digital inclinometer against the front surface of the radar, ***so that the tool is held in the same direction as it was on the rail.*** **With the digital inclinometer resting as shown, verify that the display shows 0° (±1.1°) from vertical**, when measured by an inclinometer set to zero on the vehicle's frame.



Use a Torx T-20 screwdriver here to adjust for the **vertical alignment**



IMPORTANT: Do not adjust this stand-off!!

NOTE: Complete the steps below ***only*** *if a vertical adjustment is necessary.*

B4.5 Use the Torx T-20 screwdriver to turn by hand the top-left adjustment stand-off. During the adjustment, observe the digital display on the inclinometer and turn the vertical alignment screw clockwise or counterclockwise depending on the vertical direction (up or down) needed, until the reading is zero degrees.

B4.6 **The radar is aligned vertically when the display is between -1.5° and 1.5°, however to achieve a more precise alignment, adjust the vertical alignment screw until the digital alignment value is near zero (0°).**

Note: The alignment process shown here is for Bendix alignment brackets. For other brackets, similar alignment steps will be needed; consult the vehicle manual for full instructions.

B4.7 If used, be sure to remove the clip before returning the vehicle to service.

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

APPENDIX C - RADAR ALIGNMENT USING THE BENDIX® ALIGNMENT CLIP AND TOOL

Appendix C

Bendix™ FLR-20™ Radar Alignment

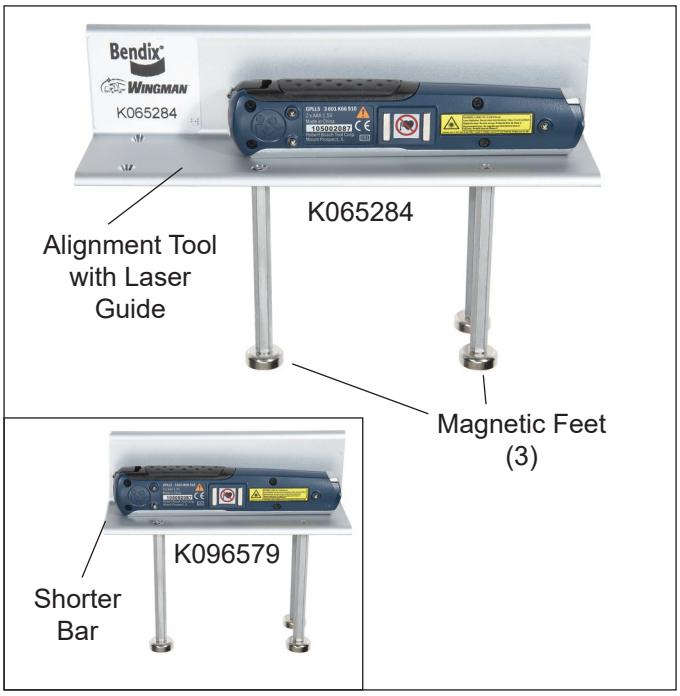
C Lateral Alignment Using The Bendix® Alignment Clip And Tool

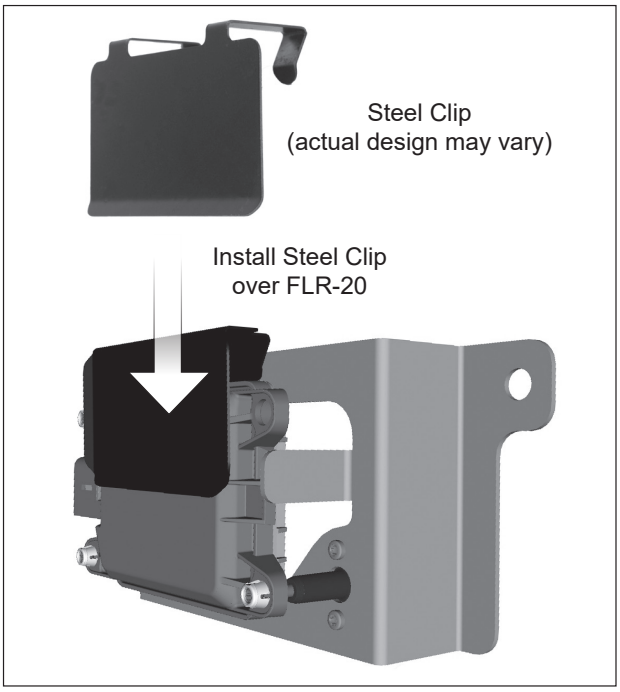
This is the method to use for lateral alignment when a radar and/or bracket is replaced.

Tools needed: Bendix® alignment kit, steel clip, Torx T-20 screwdriver and a tape measure.

- One of the Bendix® Alignment Tools part no: K065284 and K096579 — available from Bendix® parts outlets — are used.

The alignment procedure also requires a steel clip, part number K073087.

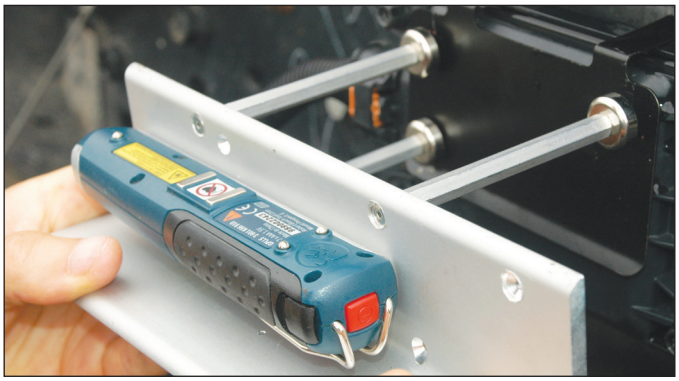




ALIGNMENT TOOLS AVAILABLE

C1.1 Park the vehicle on a level floor. Air suspensions must be charged and stable. Install the steel clip supplied over the radar sensor.

C1.2 Attach the alignment tool onto the clip using its magnetic feet. Inspect to make sure that the alignment tool is approximately horizontal width-wise.



C1.3 Activate the lateral alignment laser light “on” switch. Place the tool into position for the first measurement. (The tool will be reversed when the second measurement is made.)

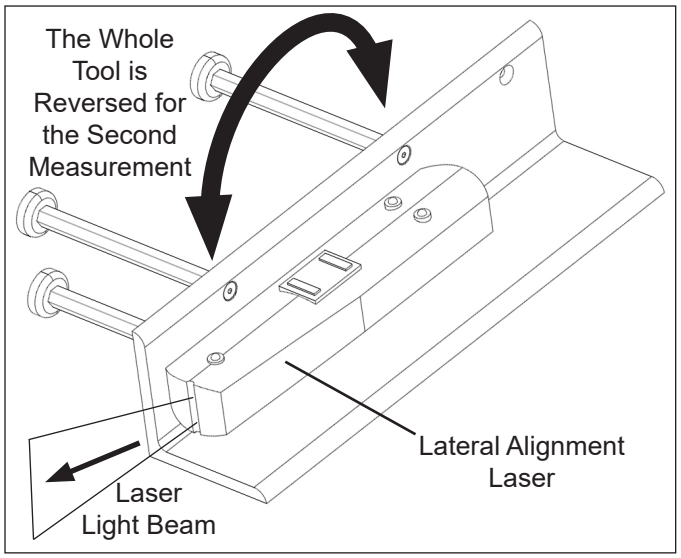
C Lateral Alignment Using The Bendix® Alignment Clip And Tool (Continued)

C1.4 Locate symmetrical points on the front of the vehicle that are at least 12 inches (30 mm) from the vehicle's center line (such as the tow hooks). Using a ruler or tape measure, record the distance from each side to the laser light line.

LATERAL ALIGNMENT LEFT MEASUREMENT

NOTE: *The technician must be careful during the laser positioning process to double-check the values measured on each side of the truck. Be sure to check back and forth for each side of the radar sensor several times to ensure accuracy.*

C1.5 Repeat the process for the opposite side, reversing the tool, so that the laser light points to the other side of the vehicle.



C1.6 Compare the left and right distance measurements. A properly aligned radar sensor will have the same measurement from each side. If these two dimensions are within 1/8" (3 mm), no alignment is necessary and the technician can go to Step C1.10 to check the vertical alignment. If an adjustment is needed, follow the instructions in C1.7-9 on page 53.

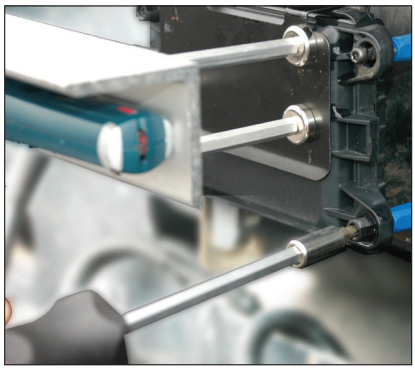
Appendix C

Bendix™ FLR-20™ Radar Alignment

C Lateral Alignment Using The Bendix® Alignment Clip And Tool (Continued)

NOTE: Complete these steps only if a lateral adjustment is necessary.

C1.7 With the Bendix alignment tool still in place, use the Torx® T-20 screwdriver to turn by hand the driver-side stand-off adjustment screw until the desired alignment is reached.



IMPORTANT: Do not adjust this stand-off!!

Use a Torx T-20 screwdriver here to adjust for the **lateral alignment**

C1.8 Re-measure the distances from symmetrical points located at least 12" from the center line of the vehicle. Reverse the tool for each measurement, until the values are the same [within 1/8" (3 mm)].

C1.9 After the lateral alignment procedure is complete, if there is an active misalignment DTC (codes 55, 56, or 57), clear the Bendix® Wingman® Advanced™ system Diagnostic Trouble Code (DTC) using the procedure in Section 4.4: *Clearing Diagnostic Trouble Codes (DTCs)* and reset the alignment value by connecting the vehicle to a PC with Bendix® ACom® PRO™ Diagnostic Software and follow steps B4.4-20 to reset the alignment value. (*Also, see Appendix H.)*

C1.10 **IMPORTANT: Before returning the vehicle to service, check the vertical alignment using the procedure outlined below.**

C1.11 [The steel clip and alignment tool should already be in place. *See C1.1-2.*]

C1.12 Calibrate (or "zero") the inclinometer on a horizontal section of the frame rail. Follow the manufacturer's instructions (typically digital inclinometers have a "SET" button for this purpose).

Calibrate (or *"zero"*) the Digital Inclinometer on a Cab Frame Rail in the direction that the vehicle travels.

Place the calibrated digital inclinometer onto the surface of the tool, ***so that the tool is in the same direction as it was on the rail.*** **Verify that the display shows 0° (±1.5°) from vertical**.

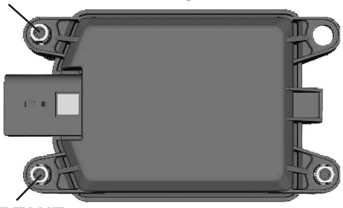
NOTE: Complete these steps only if a vertical adjustment is necessary.

C1.13 With the Bendix alignment tool still in place, use the screwdriver to turn by hand the top-left adjustment stand-off. *See the Figure on the right.* During the adjustment, observe the digital display on the inclinometer and turn the vertical alignment screw clockwise or counterclockwise depending on the vertical direction (up or down) needed, until the reading is near zero degrees.

C1.14 **The radar is aligned vertically when the display is near zero (0°).**

Note: The alignment process shown here is for Bendix alignment brackets. For other brackets, similar alignment steps will be needed; consult the vehicle manual for full instructions.

Use a Torx T-20 screwdriver here to adjust for the **vertical alignment**



IMPORTANT: Do not adjust this stand-off!!

NOTE: The alignment process is complete after the vertical alignment has been checked (and adjusted, if necessary.) You do not need to test-drive the vehicle.

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

APPENDIX D - DYNAMIC RADAR ALIGNMENT

Appendix D

Bendix™ FLR-20™ Radar Dynamic Alignment Method

This procedure may be used in rare cases where the stored alignment value is not available. The vehicle must have a Bendix™ Driver Interface Unit (DIU™) with a software version 12.220 or above.

D Lateral Alignment Using The Dynamic Alignment Method

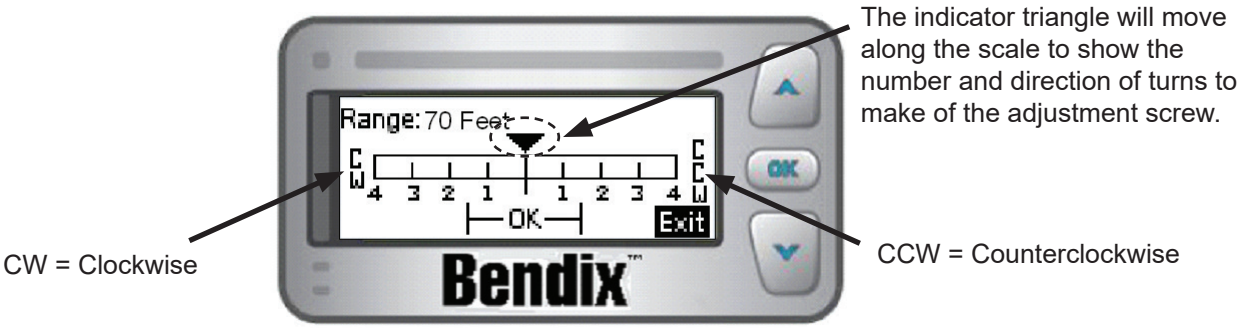
Use the flowchart B1 to be sure you are using the correct alignment procedure. This procedure is used in the rare cases where a learned alignment value is not available. For example, in cases where a technician erroneously resets the alignment value before recording the Learned Alignment correction value and direction.

D1.1 Tools needed: DIU (with software version 12.220 or above), and a Torx® T-20 screwdriver. The assistance of another vehicle will be necessary, and an assistant in the cab of the vehicle with the driver.

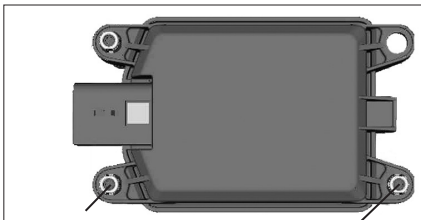
The DIU's software version can be seen in the top right-hand corner of the Volume screen. The Bendix DIU's Dynamic Alignment Screen is used to show a dynamic calculation of the alignment of the radar.

D1.2 To perform the inspection, the vehicle must be traveling behind a cooperative vehicle on a straight, level length of highway. Obeying all traffic laws, follow the vehicle in the same lane at a speed greater than 35 mph (56 kph). For the most accurate results, the distance between the vehicles must be between 50 and 300 feet (15 to 91 meters), so the observed distance figure, displayed in the top left-hand corner of the display helps the driver maintain the correct range. Verify that both vehicles remain in the middle of the lane during the test. The radar determines the distance and alignment to the vehicle ahead, and, if needed, calculates an alignment correction value, displayed on the screen.

D1.3 During the test, an assistant in the vehicle should observe where on the scale the triangle indicator shows the alignment correction value. Because this is a dynamic measurement, the arrow will typically move through a range of positions. Note the average position where the triangle points over a length of time. This value gives the number of turns of the lateral adjust screw clockwise (CW) or counterclockwise (CCW), in order to correct any misalignment present. *See Figure below.* The number of turns may require less than a full screw turn, e.g. half way between 2 and 3 is 2.5 turns. The scale to the left of center shows when a clockwise (CW) adjustment is needed, and numbers to the right are for counterclockwise (CCW) adjustments.



Dynamic Alignment Screen



D1.4 Lateral alignment values less than 1.1 degrees from the center are acceptable and do not necessarily require adjustment. (See the "OK" zone shown on the scale for this range).

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

APPENDIX E - TROUBLESHOOTING CHECKLIST

Appendix E	
Troubleshooting Checklist	
Detailed Scenarios and Tests	**Record Driver's Answers for Follow-up with Bendix**
Does the vehicle maintain its set speed when cruise control is switched on and set?	Yes ☐ No ☐ _____
Is the cruise control "set" icon displayed?	Yes ☐ No ☐ _____
While following a forward vehicle within radar range and the cruise control switched on and set, observe 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 ☐ No ☐ _____ Icon Color_____ Yes ☐ No ☐ _____
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 ☐ No ☐ _____
With cruise control switched on and set, when the forward vehicle slows moderately or cuts in front of the truck and slows, did you observe any of the following conditions? Does the vehicle slow and Advanced maintain the following distance? Is the engine throttle reduced? Is the engine retarder applied? Are foundation brakes applied? Are there Diagnostic Trouble Codes (DTCs) logged? Does the truck proceed toward the forward vehicle without a following distance alert or braking intervention?	Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____
With cruise control engaged, and while following a vehicle ahead in gentle curves (assuming a 3 to 3.5 second following distance): Does Advanced continue to follow the vehicle through the curves following at a constant distance? Does the truck proceed toward the forward vehicle without a following distance alert or braking intervention?	Yes ☐ No ☐ _____ Yes ☐ No ☐ _____
With cruise engaged, when your vehicle passes a slower vehicle on the left or right on a straight or slightly curvy road: Does Advanced ignore the vehicle you are overtaking? Does it give a following distance alert?	Yes ☐ No ☐ _____ Yes ☐ No ☐ _____

Appendix E	
Troubleshooting Checklist	
Detailed Scenarios and Tests	**Record Driver's Answers for Follow-up with Bendix**
With cruise engaged, and a faster vehicle passes your vehicle on the left or right on a straight or slightly curvy road: Does your vehicle throttle up and try to keep pace with the faster moving vehicle? Does it give a following distance alert?	 Yes ☐ No ☐ _____ Yes ☐ No ☐ _____
With cruise control engaged, if the vehicle ahead slows moderately or cuts in front of your truck and slows down: Does your vehicle slow and Advanced maintain the following distance? Is the engine throttle reduced? Is the engine retarder applied? Are the foundation brakes applied? Are there Diagnostic Trouble Codes (DTCs) logged? Does your truck proceed toward the forward vehicle without a following distance alert or braking intervention?	 Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____ Yes ☐ No ☐ _____
What version of Bendix® ABS and Bendix® Wingman® Advanced™ system is installed on the vehicle? *See Section 4.21: Reading the System Software Version.*	_____
What are the key system indicators? *See Section 5.1: System Key Indicators.*	_____ _____ _____ _____ _____
Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2 Monday through Thursday, 8:00 a.m. – 6:00 p.m., and Friday, 8:00 a.m. – 5:00 p.m. ET for troubleshooting assistance.	

APPENDIX F - DRIVER INTERFACE UNIT (DIU): DISPLAYS AND ALERTS

Appendix F

Bendix™ Driver Interface Unit (DIU™): Displays & Alerts

F1 Operator Interface

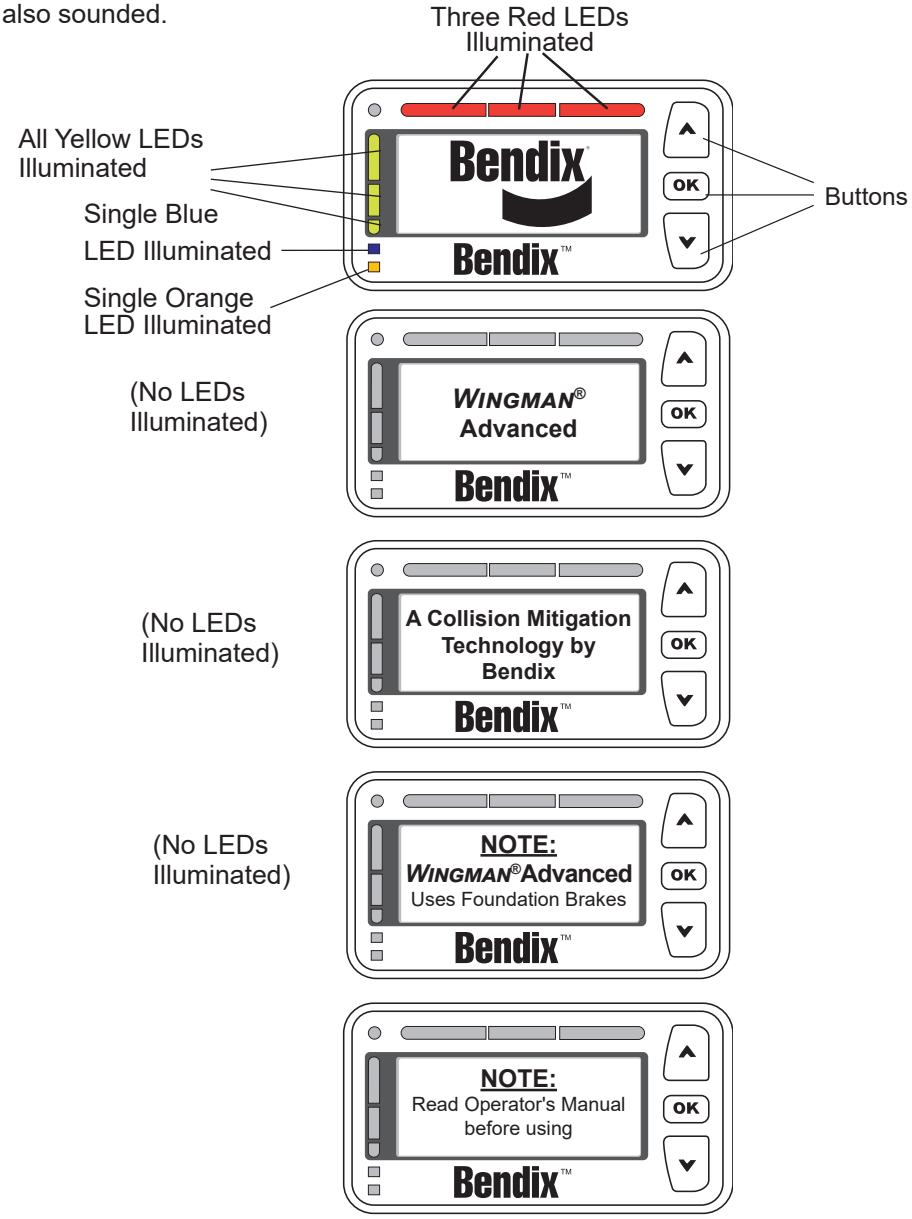
The Bendix® Wingman® Advanced™ system is either integrated into the vehicle's dash or console, or uses the Bendix™ Driver Interface Unit (DIU™) to communicate with the driver. *(For integrated systems, see the vehicle operator's manual for more information.)*

This Section describes the functions of the DIU. The DIU mounts in, or on, the vehicle dash and provides the interface between the driver and the Advanced system. The DIU provides visual and audio warnings to the driver and accepts input from the driver through the "Up", "Down" and "OK" buttons.

The DIU contains an internal speaker to provide audible warnings, 2 LED arrays (one each in yellow and red), a single orange and blue LED and an LCD screen for visual warnings, and a light radar sensor to distinguish between day and night conditions.

F1.1 Start-Up Mode

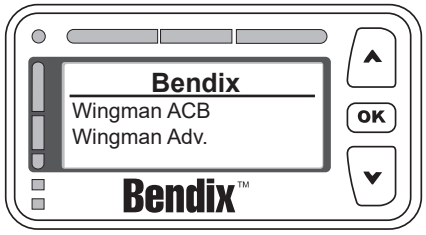
At initialization, the DIU executes self-test routines during which the following screens are displayed and all LEDs are activated (power-on bulb check) for approximately three (3) seconds. If configured, a power-up tone is also sounded.



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

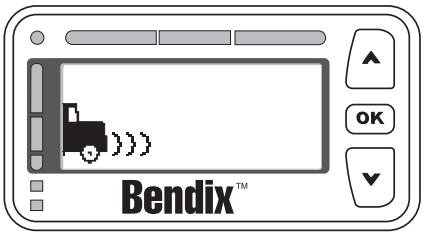
When the initialization sequence is complete, the following screen is displayed for approximately three (3) seconds to indicate the features available to the driver.

(No LEDs Illuminated)



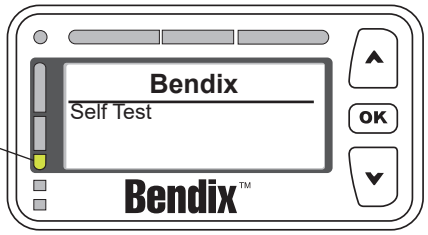
Next, the Bendix™ Driver Interface Unit (DIU™) will enter normal operation. Under normal operation, the screen is:

(No LEDs Illuminated)

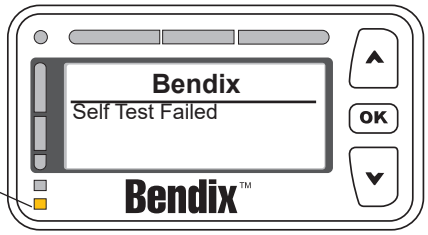


If the Bendix® Wingman® Advanced™ system goes into self-test mode, the DIU may briefly display the "Bendix Self-Test" screen. Also, the audible distance alerts will activate, followed by a screen indicating that the self-test has run. Below left is the screen that will be briefly displayed if the self-test runs and passes. Below right is the screen that will be briefly displayed if the self-test runs and fails. If the self-test fails, a Diagnostic Trouble Code (DTC) will be set. The driver should turn off the vehicle, wait 15 seconds and then turn it back on again. If the problem persists, a qualified technician will be necessary for troubleshooting. *See the "Power-Up Self-Test" in this service data sheet Section 3.1: Troubleshooting Basics for further information.*

Single Yellow LED Illuminated



(Followed by a Single Orange LED Illuminated)



F1.2 Menu Operation

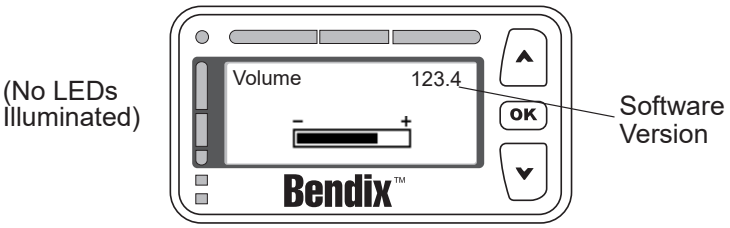
Pressing the "OK" button at any time will enter the "Menu Operation Mode". The following selections will appear in a scrollable window. Some items may not appear if the feature is not configured or not allowed as shown below.

- Volume
- Dist. Setting (Distance Setting)
- Dist. Units (Distance Units)
- US/Metric
- Brightness
- System Status
- Diag. Display (Diagnostic Display)
- Demo (Demonstration. Note: Demo is available only when vehicle is not moving)

The desired menu item is highlighted using the up (▲) or down (▼) arrow buttons and selected with the "OK" button. The following sections describe each menu item.

F1.3 Volume

Selecting “Volume” from the main menu displays the following screen:



Use the up (▲)/down (▼) arrow buttons to change the volume. Pressing the “OK” button exits this menu item.

The modified volume setting will be retained through ignition cycles unless configured not to do so. If not configured, the volume setting will default to 100% on each new ignition cycle.

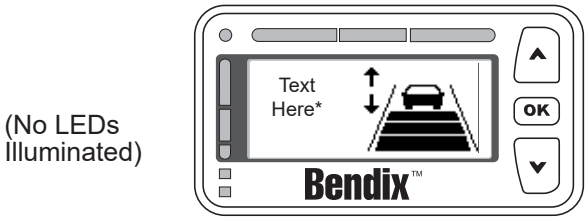
NOTE: The Bendix™ Driver Interface Unit (DIU™) can be configured to limit the minimum volume setting that the driver can select. The bar shown above always represents the adjustable range based on minimum and maximum values. For example, if the minimum value is set to 50% (midpoint between lowest (70 ± 3dB) and highest (89 ± 3dB) audio levels, the bar represents an adjustable range from 50% (approx. 80dB) to 100% (approx. 89dB). Once the minimum (or maximum) has been reached, a message will be shown indicating that further adjustment is not allowed (e.g. “Minimum volume reached”). The step change per button press is approximately 2dB.

F1.4 Dist. Setting (Distance Setting)

On systems where changes are permitted, the “Distance Setting” option from the main menu will adjust the following distance that the Bendix® Wingman® Advanced™ system will attempt to maintain while in the following distance mode. Distance Settings 1, 2, 3, and 4 will have different meanings based on the configuration chosen by the user in Bendix® ACom® PRO™ Diagnostic Software. Generally, 4 relates to the farthest distance setting available and 1 relates to the closest distance setting available. In many of the Advanced configurations available in ACom PRO, two or more distance settings may be made equivalent to one another.

For more information on user configurations available through the Bendix ACom PRO Diagnostic Software, *see Section 5.4: Configuring Bendix Wingman Advanced System Following Distance Alerts* in this Service Data sheet for further information.

Selecting “Dist. Setting” from the main menu displays the following screen:



F1.5 Dist. Units (Distance Units) *(See also F1.6 for metric units)*

From the “Dist. Units” menu item, the user may choose to have the following distance from the forward vehicle displayed in either seconds or feet. By default, this item is set to seconds. If the user selects feet, the DIU will display the approximate distance from the bumper to the selected forward vehicle in feet. If the user selects seconds, the DIU will display the approximate distance from the bumper to the selected forward vehicle in seconds.

NOTE: Following distance in seconds is calculated based on the current speed of the Bendix Wingman Advanced System-equipped truck, and the distance, in feet, away from the selected forward vehicle. For instance, if the selected forward vehicle is 88 feet (27 m) from the bumper of the Bendix Wingman Advanced System-equipped truck, and the Bendix Wingman Advanced System-equipped truck is traveling 60 mph (97 kph), then the following distance in seconds would be 1.0 seconds because a truck traveling 60 mph (97 kph) can travel 88 feet (27 m) in one (1) second.

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

F1.6 US/Metric

From this menu item, the user may select whether English or Metric units are displayed. For instance in "metric" mode, the following distance is shown in meters. In "US" mode, the following distance is shown in feet.

F1.7 Brightness

Selecting Brightness from the main menu displays the following screen:

(No LEDs Illuminated)

The driver uses the up ( ) and down ( ) arrow buttons to change the LCD backlighting, LED brightness and button backlighting. Pressing the OK button exits this menu item.

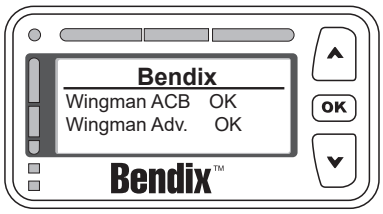
The light sensor reading determines whether the current cab lighting mode is bright (day) or dark (night). When the light mode is bright, any brightness adjustment made by the driver is applied to only the bright mode setting. Likewise, when the light radar sensor sets the light mode to dark, any brightness adjustment made by the driver is applied to only the dark mode setting. This functionality allows the driver to adjust the brightness setting for the two cab lighting conditions after which the Bendix™ Driver Interface Unit (DIU™) will automatically toggle between the two settings based on the light radar sensor's input. Both the bright mode setting and the dark mode setting are stored across power cycles.

NOTE: The DIU does not allow the brightness control to completely shut off the LEDs. DIU units without a light sensor will use signals from the vehicle's J1939 CAN bus to determine and configure the day and night setting

F1.8 System Status

This screen shows the configured features of the system and their current operational status (i.e., "Failed" or "OK"). The failed status means that some system malfunction is preventing the feature from properly operating and that the feature is not available for use by the driver at this time. Pressing "OK" exits this menu item.

(No LEDs Illuminated)



F1.9 Diagnostics

Selecting Diagnostics from the main menu displays any active Bendix® Wingman® Advanced™ system Diagnostic Trouble Code (DTC) conditions [including SAE standard diagnostic codes called J1939 SPNs (Suspect Parameter Numbers) and J1939 FMIs (Failure Mode Identifiers)] that may be present in the DIU and radar sensor. The following is a typical screen displayed in this mode when an active DTC is present:

(No LEDs Illuminated)

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

F2.0 Driver Demonstration Mode

Selecting Demo from the main menu starts a demonstration mode that shows the various lights, display screens, and sounds produced by the Bendix™ Driver Interface Unit (DIU™) – along with a brief explanation of their meaning – for the configured features. Pressing the down (▼) arrow button advances through the screens. The up (▲arrow button has no functionality in this mode. The mode may be exited at any time by pressing the OK button.

NOTE: This mode can only be entered while the vehicle is not moving. Also, while in the demonstration mode, if the vehicle begins to move, the demonstration mode terminates.

If a screen is associated only with a configurable feature, and that feature is not configured, then that screen will not be shown in the demonstration mode.

The screens presented to the driver in the demonstration mode are shown with the following text: “Error! Reference source not found.”

F3.0 Following Distance Alerts (FDAs)

One of the features of the Bendix® Wingman® Advanced™ system is the Following Distance Alert (FDA). A proprietary system combining vehicle speed, forward vehicle speed, distance, and driving scenario, FDAs are used to provide the driver with distance alerts which are intelligent, in that they will give appropriate distance alerts for the given situation. They alert the driver to objects far ahead in highway and country road driving situations, while not over-alerting in dense city traffic.

The radar sensor uses the DIU to communicate the FDA alerts to the driver. This system can be configured through a current version of Bendix® ACom® PRO™ Diagnostic Software, for use by a fleet as a driver training tool with or without coordinating the data made available by the Bendix Wingman Advanced System. In addition to being a reminder of when a driver may be dangerously close to the vehicle ahead, the following distance alerts may also be configured to reinforce safe following distance habits taught by the fleet.

The FDA is based on the following interval between the host vehicle and the object ahead. In other words, this is the time required by the host vehicle to travel forward and reach the object’s current location. With the exception of the volume, the FDA may not be adjusted by the driver through the DIU. A qualified technician must connect to the vehicle through the diagnostic port and run Bendix ACom PRO Diagnostic Software, in order to change the configuration. The volume can not be turned all the way down, but other adjustments may be made by the fleet. *See Section B1.3* for more details on volume adjustment.

The FDA system is intended only to alert the driver about following distance. For more information on alerts for forward objects with high relative velocities and sudden decelerations, *see Section B4.0: Impact Alert.*

Only objects detected in the vehicle's lane, traveling in the same direction, are considered valid objects for the FDA. For more information on stationary objects, *see Section B5.0: Stationary Object Alert.*

See Section 5.4: Configuring Bendix Wingman Advanced System Following Distance Alerts.

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

⚠ WARNING

The driver is always responsible for the control and safe operation of the vehicle at all times. The Bendix® Wingman® Advanced™ system does not replace the need for a skilled, alert professional driver, reacting appropriately and in a timely manner, and using safe driving practices.

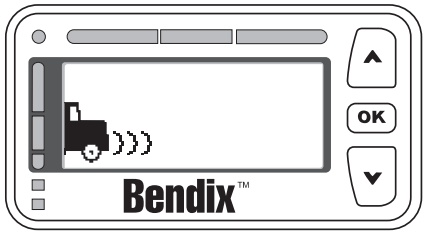
Appendix F

Bendix™ Driver Interface Unit (DIU™): Displays & Alerts

F3.1 Object Detected

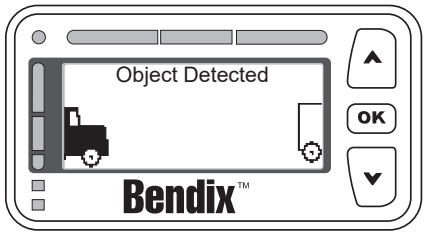
When there is no valid object detected and no other high priority alert is displayed, the Bendix™ Driver Interface Unit (DIU™) will stand by with the following screen:

(No LEDs Illuminated)



When a valid object is detected, and is outside the range of the first level of alert, and no other higher priority alert is displayed, the DIU will display the following and no audio tones will be issued. The distance to the object will be displayed in large characters in the white space at the center of the screen (not shown) in seconds, feet, or meters, depending on the menu-selected preferences. By default, seconds will be displayed.

(No LEDs Illuminated)

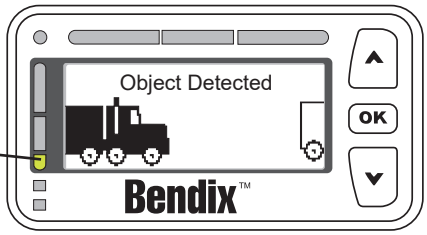


F3.2 Following Distance Alert (FDA) Level I *(Slow audible two-tone alert/single LED illuminated)*

When FDA Level I is issued, the following distance to the object/vehicle ahead has been reduced to the distance determined in the current configuration for FDA Level I. The DIU will begin to give the driver audio and visual alerts for as long as the forward vehicle is in this zone and traveling at the same speed or slower.

The DIU will not display following distance units while in an FDA Level. For FDA Level I, the audible alert will be a single repeating tone, and the visual alert is a single yellow LED and a screen with the vehicles slightly closer as shown below.

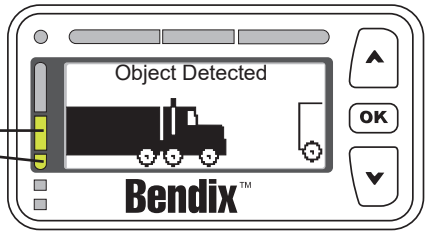
Single Yellow LED Illuminated



F3.3 Following Distance Alert (FDA) Level II *(Medium audible two-tone alert/two LED's illuminated)*

The DIU will give the driver audio and visual alerts for as long as the object/vehicle ahead is in this zone and traveling at the same speed or slower. The DIU will not display following distance while in an FDA Level. For FDA Level II, the audible alert will be a repeating double tone, and the visual alert is two yellow LEDs and a screen with the vehicles closer as shown below.

Two Yellow LEDs Illuminated

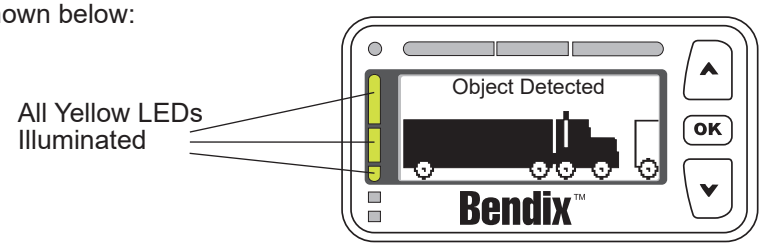


Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2 for troubleshooting assistance.

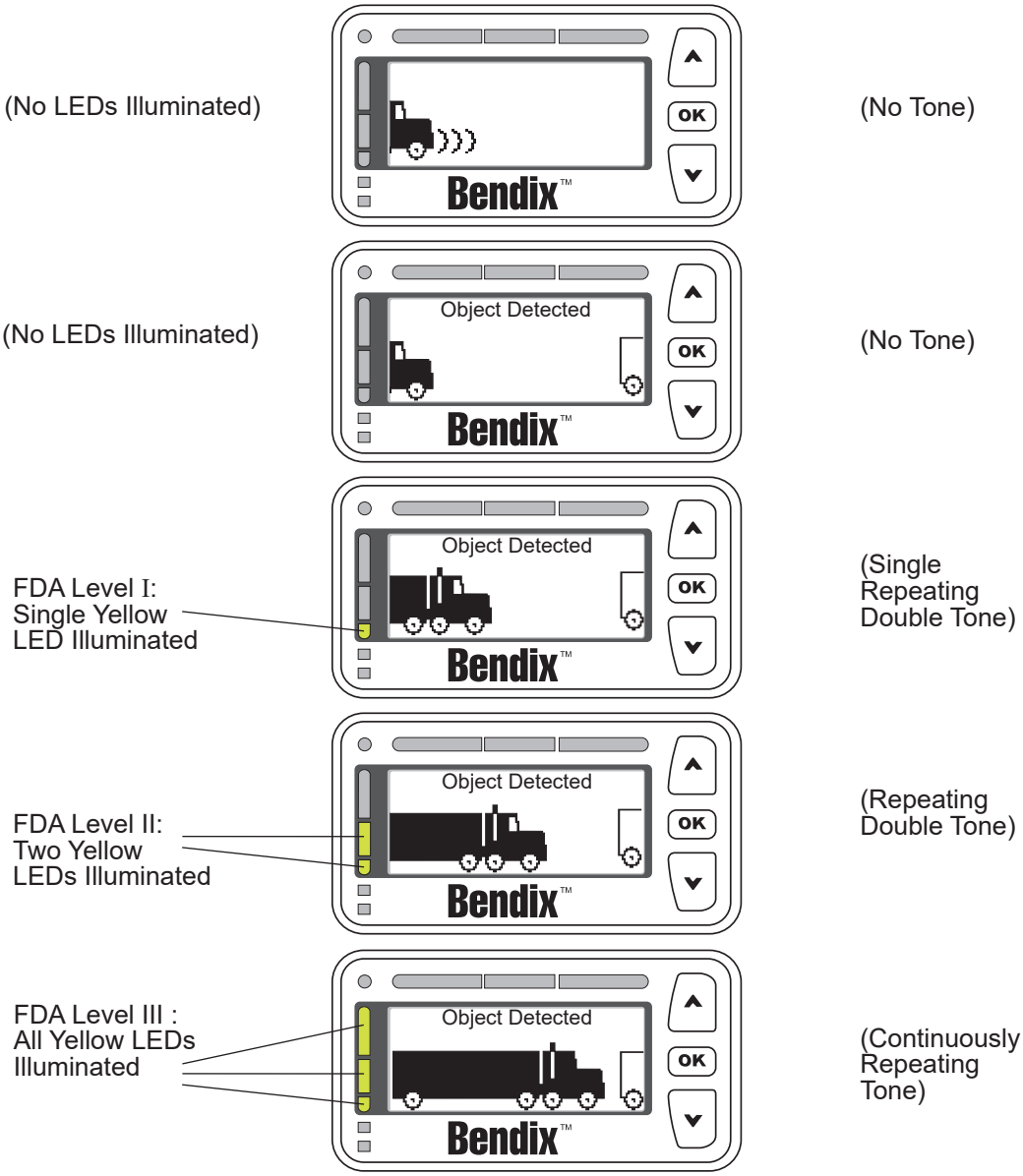
F3.4 Following Distance Alert (FDA) Level III *(Fast audible two-tone alert/three yellow LEDs illuminated)*

The Bendix™ Driver Interface Unit (DIU™) provides the driver with audio and visual alerts for as long as the vehicle ahead is in this zone and traveling at the same speed or slower. This is the closest and most urgent Following Distance Alert.

The DIU will not display following distance while in an FDA Level. For FDA Level III, the audible alert will be a continuously repeating tone, and the visual alert is three yellow LEDs and a screen with the vehicles close as shown below:



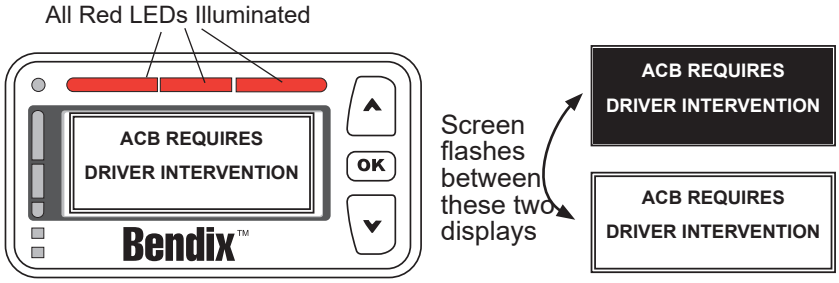
All five states of the FDA system can be seen together below.



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

F4.0 Impact Alert (IA)

The “Impact Alert”, uses a combination of distance to the vehicle ahead, plus high relative velocity, to decide when to issue a loud solid tone, as well as a visual indicator to the driver. The red LED bar across the top of the Bendix™ Driver Interface Unit (DIU™) will illuminate and “Wingman Adv. Requires DRIVER INTERVENTION” will flash using the two screens below:



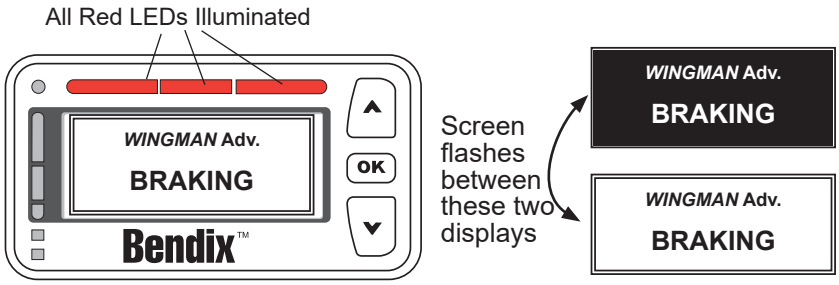
When the Impact Alert activates, the driver must immediately act to potentially avoid, or lessen the severity of, a collision.

The impact alert can not be configured or turned off.

NOTE: At most, the adaptive cruise control with braking feature of Bendix® Wingman® Advanced™ system will apply up to one-third of the vehicle’s braking capacity. The driver must apply additional braking, when necessary, in order to maintain a safe distance from the vehicle ahead.

F4.1 Collision Mitigation

If a collision is likely to occur, and the collision mitigation feature activates the foundation brakes, the tone of the alert will typically change and the display will be as shown below. The driver must immediately act to potentially avoid, or lessen the severity of, a collision.



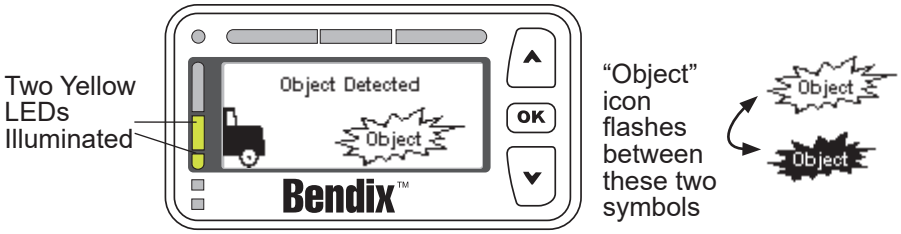
NOTE: At most, the collision mitigation feature of Bendix® Wingman® Advanced™ system will apply up to two-thirds of the vehicle’s braking capacity.

F5.0 Stationary Object Alert (SOA)

Stationary Object Alert (SOA) is an alert given to the driver when the radar detects a sizeable, nonmoving metallic object in the vehicle's path of travel. To reduce the number of false detections, such as bridges and overhead signs, an advanced set of filters are put in place so the SOA will not warn on every stationary object.

The SOA can be configured to be on or off through the display.

If a SOA is issued, the DIU will very briefly send out an alert identical to a very brief FDA Level II: continuous tone and two yellow LEDs, with the display image switching between the two shown below.



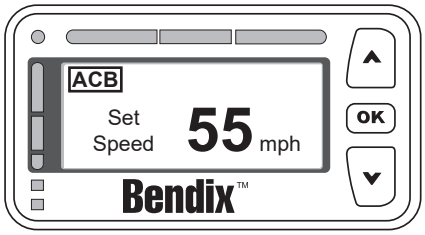
Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2 for troubleshooting assistance.

F6.0 ACB (Adaptive Cruise Control with Braking) Icon

The ACB icon appears in the upper left-hand corner of the Bendix™ Driver Interface Unit (DIU™) screen to indicate to the driver that the adaptive cruise control with braking feature of the Bendix® Wingman® Advanced™ system is ready and able to intervene.

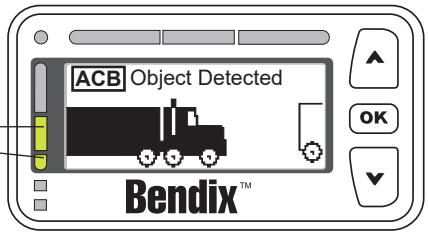
Once the driver sets cruise, the DIU will display the set speed and the ACB icon as shown below.

(No LEDs Illuminated)



When a forward vehicle is detected and either the distance to the vehicle or a following distance alert is shown, the ACB icon should remain on the screen if the adaptive cruise control feature of Bendix Wingman Advanced System is still engaged and ready to intervene.

Two Yellow LEDs Illuminated



NOTE: If the ACB icon is not displayed on the screen, the driver must assume that the adaptive cruise control with braking feature of the Bendix Wingman Advanced System is not ready, or able, to intervene!

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

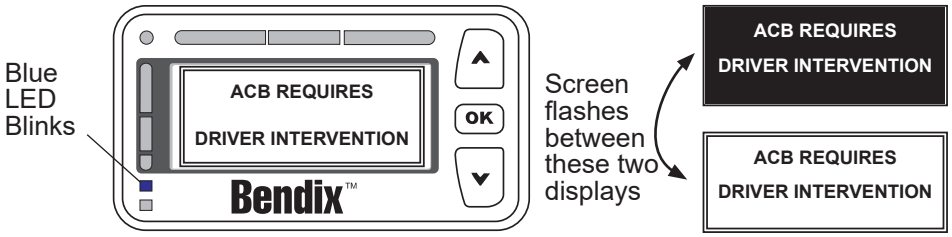
F7.0 Brake Overuse Alert

Using cruise control on downhill runs is the primary cause for this alert to be activated.

⚠ WARNING

Approach grades as you would normally, with the appropriate gear selected and at a safe speed. Cruise control should *NOT* be used on downhill grades.

To guard against foundation brake overuse by the adaptive cruise control with braking feature of the Bendix® Wingman® Advanced™ system, the frequency of foundation brake interventions is monitored. If the system detects a situation where the brakes are being applied too frequently by the system in a given time period, the brake overuse alert will activate. This is designed to help prevent overheating of the brakes, which may lead to brake fade and reduced vehicle braking capability. In this situation, the Brake Overuse Alert (BOA) will flash a message requesting driver intervention. Also, an audible alert will sound and a blue LED will blink on the Bendix Driver Interface Unit (DIU™), as illustrated below:



This alert will continue for 15 seconds, during which time the driver should step on the brake or turn off cruise control using the cruise control on/off switch.

If the system detects that the driver has intervened within 15 seconds after a brake overuse alert *(Typically by applying the brakes, or cancelling cruise control)*	• The intervention cancels cruise control. • After a Brake Overuse Alert, for a period of time (typically 20 minutes), the Bendix Wingman Advanced System ***will not use the foundation brakes*** when intervening. The system will be limited to de-throttling the engine and applying the engine retarder. **Note: In all cases, the driver still has the ability to apply the foundation brakes if necessary. The driver should take care since overheated brakes may reduce the vehicle's braking capability.** • The time period for this mode is measured from the time the Brake Overuse Alert was activated and lasts approximately 20 minutes. • Note: The driver will continue to receive all three alerts Following Distance Alert (FDA), Impact Alerts (IA), and Stationary Object Alerts (SOA). • Additionally, the DIU message will change to "ACB Braking Overuse" and the blue LED will remain lit, as shown below:
	Blue LED Stays On Bendix ACB BRAKING OVERUSE Press OK for Menu OK Bendix™ At the end of the "cooling-off" period, the "ACB Braking Overuse" message and the blue LED will turn off.
If the system does not detect an intervention by the driver within 15 seconds after a brake overuse alert	• **The system will shut itself off, and set a Diagnostic Trouble Code (DTC).** • **All intervention features of the Bendix Wingman Advanced System will be disabled until the next ignition cycle.** • Note: The driver will continue to receive all three alerts (FDA, Impact, and Stationary Object). • **Note: In all cases, the driver still has the ability to apply the foundation brakes if necessary. The driver should take care since overheated brakes may reduce the vehicle's braking capability.**

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

APPENDIX G - HOW TO GENERATE, READ, AND RESET THE BENDIX® WINGMAN® SYSTEM DIAGNOSTIC TROUBLE CODES (DTCs) USING BENDIX® ACOM® PRO™ DIAGNOSTIC SOFTWARE

Appendix G

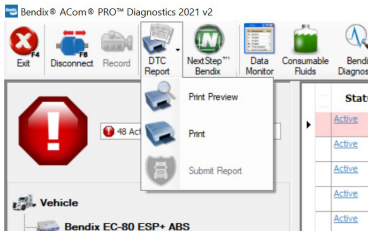
G1: How to Generate a DTC Report with Bendix ACom PRO Diagnostic Software

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

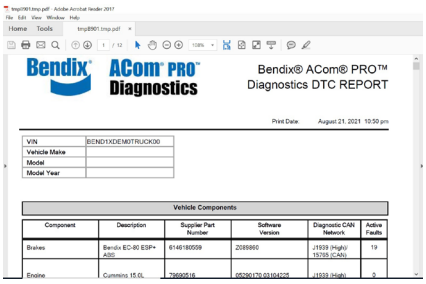
2. Once the roll call is complete, you can select the DTC Report icon on the top menu.

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.



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

Appendix G

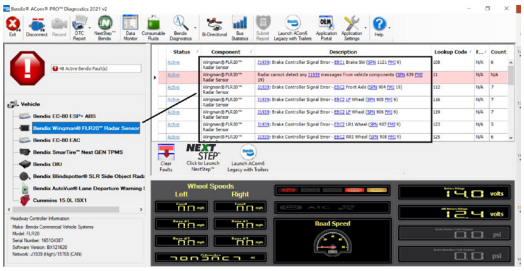
G2: How to Read the Bendix® Wingman® Advanced™ System Diagnostic Trouble Code (DTC) Reports with Bendix® ACom® PRO™ Diagnostic Software

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

2. Once the roll call is complete, you can view active and inactive DTCs and clear DTCs from all vehicle components or only 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 click “‘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 click “Clear Faults.”



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

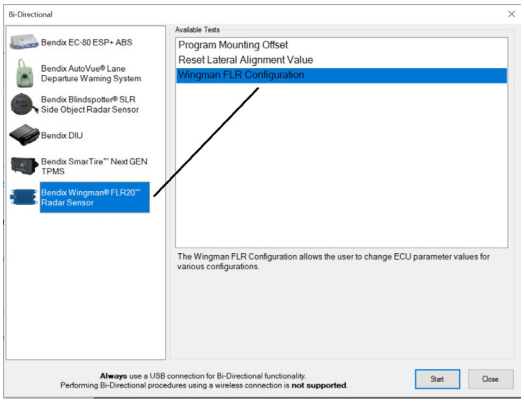
APPENDIX H - HOW TO READ KEY SYSTEM INDICATORS AND RESET ALIGNMENT VALUES

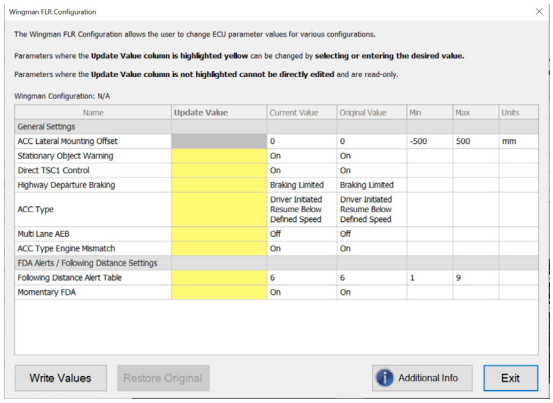
Appendix H

How to Read Key System Indicators and Reset Alignment Values

Read System Key Indicators (Configuration)

1. Connect to a current version of the Bendix® ACom® PRO™ Diagnostic Software and select “Bi-Directional” from the main menu.
2. Select the FLR20 controller from the menu.
3. Select the “Wingman FLR Configuration” from the available tests, which will display all the FLR20 configuration parameters.

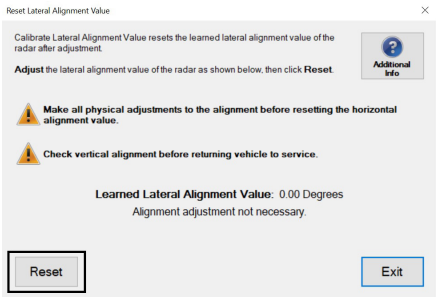




System Key Indicators		
Attribute	**Description**	**See Section:**
ACC Lateral Mounting Offset	This value should equal 0 if the radar sensor is mounted on the center line of the vehicle. If the service technician believes the radar sensor should be mounted offset from center, call 1-800-AIR-BRAKE (1-800-247-2725), option 2.	Appendix A
Stationary Object Warning Indicator	This is a status indicator for the function of stationary object warning. Available for use in Bendix® Wingman® Advanced™ system versions since 2010.	1.8
Following Distance Alert (FDA)Table	This indicates the distance setting and FDA that are configured for the vehicle. *Refer to Table 7* for setting information.	Appendix J

How To Reset The “Alignment Value”

1. In the “Bi-Directional” menu, select the FLR20 controller.
2. Select the “Reset Lateral Alignment Value” from the available tests.
3. Follow the instructions on the window and click “Reset.”
4. Cycle the vehicle ignition power to complete the process.



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

APPENDIX J - HOW TO CHANGE THE FOLLOWING DISTANCE ALERT (FDA) SETTINGS AND ENABLE MOMENTARY BEEPING

Appendix J
How to Change the Following Distance Alert (FDA) Settings and Enable Momentary Beeping
Read Key System Indicators (Configuration) 1. Connect a current version of Bendix® ACom® PRO™ Diagnostic Software and select “Bi-Directional” from the main menu. 2. Select the FLR20 controller from the menu. 3. Select the “Wingman FLR Configuration” from the available tests, which will display all the FLR20 configuration parameters. 4. To update the FDA settings, enter the desired value in “Update Value” and select “Write Values.” 5. Turn the “Momentary FDA” on or off as needed and select “Write Values.”
Call the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2 for troubleshooting assistance.

Bendix®

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