

**BENDIX® FUSION™ ACTIVE  
SAFETY SYSTEM WITH  
ACB (ACTIVE CRUISE WITH  
BRAKING) STOP AND AUTO-GO™  
OPERATOR'S MANUAL**



AVAILABLE AT



This booklet contains important operational and safety information that benefits you and subsequent drivers.

F2.10

## THE BENDIX® ESP® STABILITY SYSTEM

All vehicles equipped with the Bendix® Fusion™ Active Safety system are also equipped with the Bendix® ESP® full stability system. When necessary, Bendix ESP may automatically intervene and de-throttle the engine and/or apply the service brakes to help you maintain stability during potential loss-of-control or rollover events.

The Fusion system uses the ESP system to help maintain vehicle stability during service brake applications.

The ESP stability system and the Fusion system do not replace the need for you to remain alert, react appropriately and in a timely manner, and use safe driving practices. Bendix safety technologies complement safe driving practices. Responsibility for the safe operation of the vehicle remains with you, the driver, at all times.



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



**Failure to understand and properly operate the Bendix ESP and Bendix Fusion systems can result in a collision causing property damage, serious injuries, or death. Be sure to read, understand, and follow all these instructions carefully.**



**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 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 collision situation and may cause data to be unavailable or irretrievable.**

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## IMPORTANT FEATURE INFORMATION

**Feature Removal:** This version of the Bendix® Fusion™ system **DOES NOT** contain the Stationary Object Alert feature as previous versions did. If the system cannot identify an object as a detected forward vehicle, it **WILL NOT** alert you.

**New Functionality:** This version of Bendix Fusion includes new functionality referred to as “Service Brake Hold,” which may occur, as described in this Operator’s Manual, after an automatic braking event.

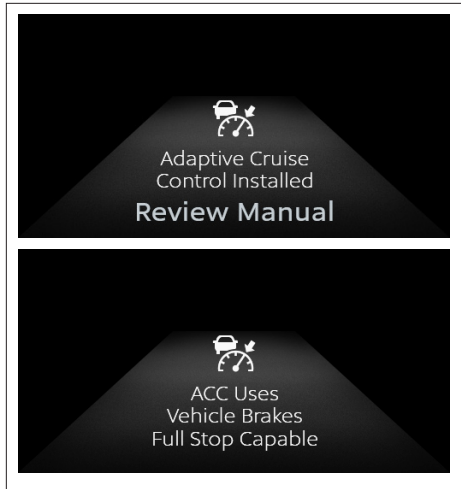
Since this version of the Bendix Fusion system uses a new radar sensor, differences in traditional features like Autonomous Emergency Braking (AEB), multi-lane AEB, and Stationary Vehicle Braking (SVB) exist and may or may not be noticed by the driver.

## INTRODUCTION

This Operator's Manual provides an overview of the Bendix® Fusion™ Active Safety System with Active Cruise with Braking (ACB) Auto-Resume™ and ACB Stop and Auto-Go™. This manual explains the components, features, functions, and possible system limitations. There are also example descriptions and explanations of the audio and visual alerts and system interventions that can be expected during operation.

Read this manual thoroughly before operating the system. Be familiar with the possible system actions, alerts, and its limitations.

Keep this manual in the vehicle as a reference at all times. See *Figure 1* for an example of the messages you may see on the integrated display when the Fusion system is initializing.



**Figure 1 – System Initializing**





### **Additional Information about Bendix® Systems**

Visit [bendix.com](http://bendix.com), [b2bendix.com](http://b2bendix.com), or call 1-800-AIR-BRAKE (1-800-247-2725), option 2, for additional information. Representatives are available to assist you Monday through Thursday, 8:00 a.m. to 6:00 p.m. and Friday, 8:00 a.m. to 5:00 p.m. ET.

**NOTE:** All of these alerts and actions are part of the Fusion system's feature set released by Bendix. To ensure full understanding of the Fusion system and its proper operation, this Operator's Manual should not be removed from the vehicle. Always verify the features that are included on your vehicle with your dealer or OEM.

Information about features, operation, and other aspects discussed in this manual is subject to change and updating and are posted on the document library located at [b2bendix.com](http://b2bendix.com).

## IMPORTANT SAFETY INFORMATION

-  **As a driver, you are always responsible for the control and safe operation of the vehicle at all times.** The Bendix® Fusion™ system *does not* replace the need for a skilled, alert professional driver, reacting appropriately and in a timely manner, and using safe driving practices.
-  **If you determine that a hazard or unsafe condition exists, you should take all necessary actions immediately. NEVER WAIT** for the Fusion system to intervene.
-  **Due to the inherent limitations of image recognition technology, camera-based safety technology may not be able to detect or may misinterpret lane markings, vehicles, or other objects and may have limited visibility at night. At these times, alerts may not occur, or erroneous alerts may occur.**
-  **The Fusion system DOES NOT respond to side-to-side moving traffic, or oncoming traffic. The system will not slow your vehicle or provide an alert as you approach vehicles in these circumstances. See Figure 2.**

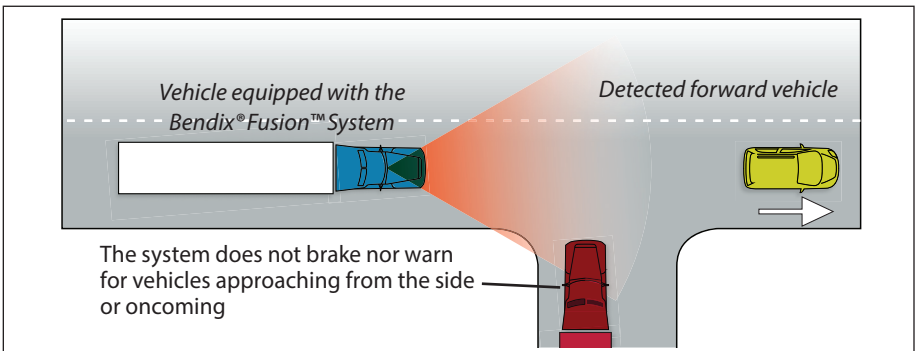















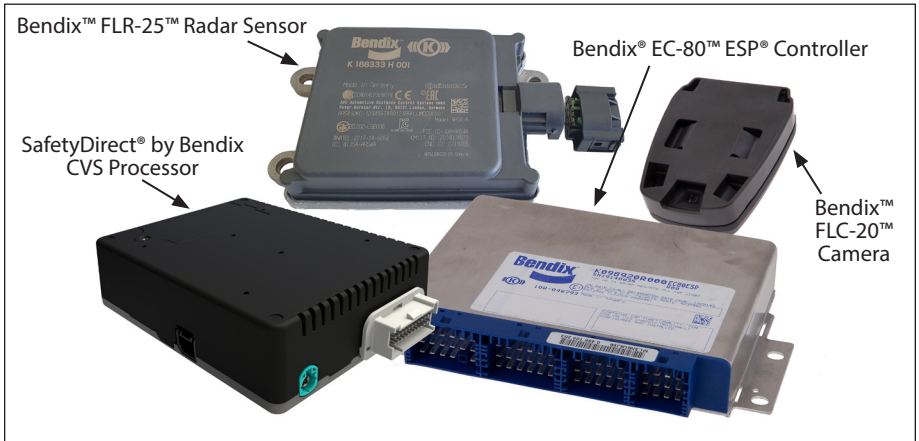
Figure 2 – System Responses

-  **When the Fusion system needs to intervene, it works in conjunction with the Bendix® ESP® full stability system to activate the service brakes. The system should never be relied upon to stop your vehicle or to avoid a potential collision. You can, and should, still apply full service braking force, if needed.**
-  **Potential False Alerts – The Fusion system may generate a false alert or false braking. Radar sensor and camera technology has limitations and false alerts or false braking sometimes occur.**

-  **The Bendix® Fusion™ system DOES NOT respond to stationary objects – it may only respond to stationary vehicles. The system will not slow your vehicle or provide an alert as you approach stationary objects.**
-  **Animals, Non-Metallic, or Limited-Metallic Objects – The Fusion system will not warn or react to animals or non-metallic objects. The system may not warn or react to limited-metallic objects (such as recreational vehicles, horse-drawn buggies, motorcycles, logging trailers, etc.).**
-  **The Fusion system may react to pedestrians in the vehicle path during Active Cruise with Braking (ACB) Stop and Auto-Go™.**
-  **The system should never be relied upon to stop your vehicle or to avoid a collision. You can, and should, still apply full braking force, if needed.**
-  **Metallic objects may impair the radar sensor – Objects that are radar-reflective – such as crash barriers, guard rails, construction zone barricades, and tunnel entrances – may impair the function of the radar sensor.**
-  **Approach grades as you would normally, with the appropriate gear selected and at a safe speed. Cruise control SHOULD NOT be used on steep downhill grades. Follow all safe driving practices.**
-  **Inspect the radar sensor and mounting bracket regularly and remove any mud, snow, ice build-up, debris, or other obstructions that may be blocking the radar sensor. Installing aftermarket deer or bumper guards is not recommended and could impair the operation of the radar sensor.**
-  **If the bumper and/or radar sensor are damaged or misaligned – or if the radar sensor was tampered with – do not use the cruise control until the vehicle is repaired.**
-  **If a problem is detected with the Fusion system, there is an audible alert and/or icon on the display. Depending on the type of problem, the system may disable cruise control functions or other safety functionality until service is performed.**
-  **Smaller forward vehicles, such as motorcycles and certain types of trailers, may be difficult for the system to identify. As the driver, it is your responsibility to be aware of these types of vehicles, to be cautious, and to slow down if necessary.**
-  **Service brake hold is not a parking brake. After any Bendix safety system braking that brings the vehicle to a complete stop, you, the driver, must intervene and secure the vehicle. As the driver, you should use caution and manually apply the parking brake as needed.**

## SYSTEM COMPONENTS

See Figure 3. The main Bendix® components used in the Bendix® Fusion™ Active Safety system are the Bendix® ESP® controller; the Bendix® radar sensor; and the Bendix™ camera (powered by the Mobileye® System-on-Chip EyeQ® processor with state-of-the-art-vision algorithms).



**Figure 3 – System Components**

The Fusion system may detect and monitor moving and stationary vehicles within its field of view. The radar sensor is located at the front of the vehicle. The camera is located on the windshield, inside the wiper path. The camera placement meets federal requirements for device placement on the windshield.

The Fusion system radar sensor is pre-aligned at the factory. If the radar sensor becomes misaligned – or any other system problem is detected – a message (or light) on the display lets you know that service is needed.

## SYSTEM DISPLAY

Driver information about the Fusion system is fully integrated into the vehicle display. See the *System Features* section of this manual for more detailed information about the alerts.

## SYSTEM FEATURES

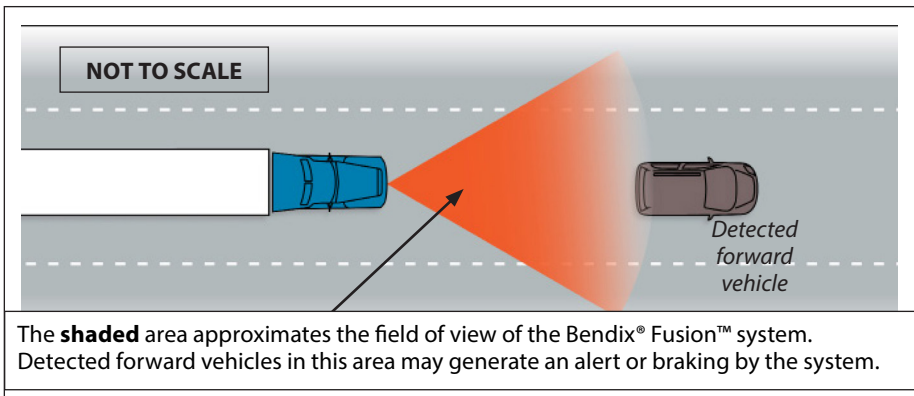
**NOTE: You must verify with the vehicle OEM or OEM Dealer to determine which features are included on your vehicle.**

### Active Cruise with Braking (ACB)

**NOTE:** The term Adaptive Cruise Control (ACC) may be used instead of Active Cruise with Braking (ACB).

When vehicle cruise control is on and set, the ACB feature also becomes available. The system may not only intervene to maintain the cruise control set speed, but also may potentially intervene – if needed – to maintain a set default following distance behind the moving vehicle in front of you.

When you encounter a detected forward vehicle that slows down below the cruise control set speed, the system has the ability to automatically de-throttle the engine, activate the engine retarder, and apply the service brakes – if needed – in order to maintain the distance between you and the forward vehicle. The following distance is adjustable by the driver on some vehicles. See *Figure 4*.



**Figure 4 – ACB Example**

**NOTE:** When the ACB feature requests engine torque reduction or vehicle deceleration, the cruise control of the vehicle may be paused. *Figure 5* shows a message you may see on the integrated display identifying this condition.



**Figure 5 – Paused Cruise Control**

**NOTE:** When cruise control is paused, the set speed is displayed in gray numbers. When cruise control is active, the set speed is displayed in white numbers.



## Auto-Resume™ after Active Cruise with Braking (ACB)

If the Bendix® Fusion™ system automatically applies the service brakes during an Active Cruise with Braking (ACB) event in order to maintain the distance between your vehicle and the detected forward vehicle – and the vehicle remains above a minimum speed defined by the OEM – the vehicle will a) automatically accelerate back to the cruise control set speed, while b) still attempting to maintain the set following distance with the forward vehicle. If the vehicle is below the minimum defined speed, cruise control will automatically cancel and *will not* attempt to adjust the speed to the previously set speed.

### Canceling Cruise Control and ACB

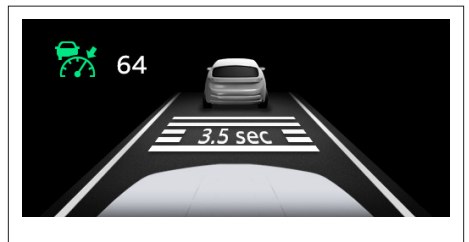
At any time, you can step on the brake pedal, press “cancel,” or turn cruise control off via the switch to cancel cruise control and the ACB feature.

*Figure 6a* shows an integrated display message you may see when ACB is actively engaged and maintaining a set following distance behind the detected forward vehicle. Additionally, *Figure 6b* shows a message you may see on the integrated display when the ACB feature cancels, and the Autonomous Emergency Braking (AEB) feature has detected the forward vehicle.

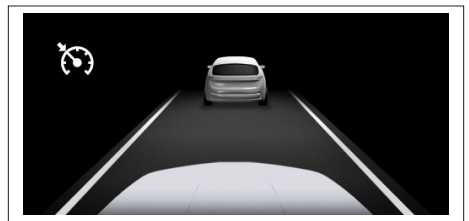
**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

**NOTE:** At all times, you, the driver, are responsible for the control and safe operation of the vehicle and you should be alert and ready to potentially intervene.

**NOTE:** The term CMS (Collision Mitigation System) may be used instead of AEB.



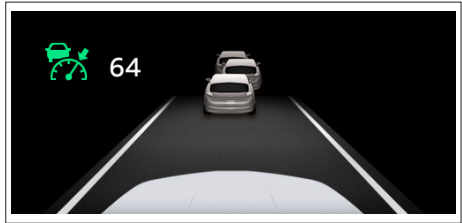
**Figure 6a – ACB Actively Engaged and Maintaining Set Following Distance**



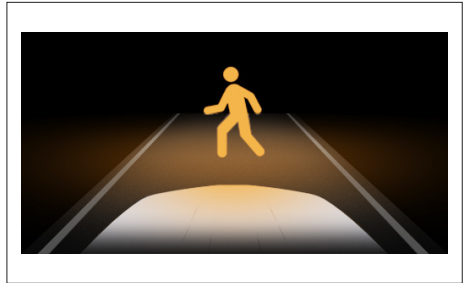
**Figure 6b – ACB Canceled, AEB Detecting the Forward Vehicle**

## Active Cruise with Braking (ACB) Stop and Auto-Go™

When cruise control is on and set, if the detected forward vehicle slows down to a stop, the system may automatically de-throttle the engine, activate the engine retarder, and apply the service brakes to bring your vehicle to a full stop. If the detected vehicle in front moves forward within a few seconds and a pedestrian is not detected between the front of your vehicle and the detected forward vehicle, your vehicle will accelerate back up to the previously set cruise control speed while maintaining the distance between your vehicle and the detected forward vehicle. *Figure 7* shows a message you may see on the integrated display when the Active Cruise with Braking (ACB) feature is actively engaged.



**Figure 7 – ACB Stop and Auto-Go**



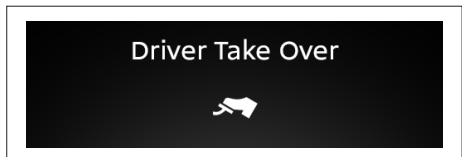
**Figure 8 – Pedestrian Detection**

**NOTE:** The Bendix® Fusion™ system may react to pedestrians in the vehicle path during ACB (Active Cruise with Braking) Stop and Auto-Go™. *Figure 8* shows a message you may see on the integrated display indicating a pedestrian has been detected.

If the detected vehicle in front does not move forward within a few seconds, the service brakes will hold the vehicle at a stop until you, the driver, intervene. You can manually accelerate the vehicle by pressing down on the accelerator pedal or by pressing the cruise control resume switch. The ACB feature will automatically re-engage upon reaching the vehicle's minimum cruise control set speed defined by the OEM, and will accelerate back up to the cruise control set speed. *It should be noted that stepping on the brake will cancel cruise control and the cruise control resume function.*

### If the System Detects a Pedestrian

If the system detects a pedestrian between your vehicle and the detected forward vehicle, the ACB feature will cancel and the foundation brakes will hold the vehicle at a stop until you, the driver, intervene. *Figure 9* shows a message you may see on the integrated display when the ACB Stop and Auto-Go feature cancels after a pedestrian is detected, and you, the driver, must intervene. Alerts and messages will come from the OEM display.



**Figure 9 – Service Brake Hold**

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

**This feature can only detect pedestrians within the radar sensor’s field of view and it is important to note that pedestrians are not instantly detectable.** You, the driver, should always be responsible for the safe operation of the vehicle and be aware of potential threats that may enter the vehicle’s lane of travel. Bendix® Fusion’s™ Active Cruise with Braking (ACB) and the ACB Stop and Auto-Go™ feature should not be used in city environments with a high occurrence of pedestrians crossing in front of the vehicle. The ACB Stop & Auto-Go feature will also cancel under any of the following circumstances:

- If the forward vehicle is no longer detected
- If the turn signal is activated
- If the hazard lights are activated
- If the steering system input indicates the vehicle is planning to turn.

### **Passing a Vehicle / Changing Lanes**

The accelerator pedal can be applied to pass a vehicle at any time while the ACB feature is active.

### **When No Forward Vehicle is Present**

When cruise control is switched on and set – and no forward vehicle is within range of the Bendix Fusion system – the vehicle will use standard cruise control to help maintain the set speed.

### **The Detected Forward Vehicle Icon**

When cruise control is switched on and set – and a vehicle ahead of you is detected by the system – the detected forward vehicle icon on the vehicle display will illuminate. *See Figure 10.*



**Figure 10 – Detected Forward Vehicle Icon**

This is an indication to you that the Bendix Fusion system detected the forward vehicle, and the system may automatically intervene to help maintain the distance.

### **What is Following Distance?**


Following distance refers to the time gap – measured in seconds – between the vehicle equipped with the Fusion system and the detected vehicle ahead. The following distance between the two will vary based on the speeds of both vehicles. This physical distance is sometimes referred to as “headway.”








## Automatic Service Brake Applications

Service brake application priorities among the various Bendix® vehicle systems, such as the Bendix® Electronic Stability Program ESP®, Bendix® Automatic Traction Control (ATC), Bendix® Antilock Braking System (ABS), and the Bendix® Fusion™ system, are automatically managed by the Bendix® EC-80™ Electronic Controller.

**NOTE:** Vehicle stability has priority over all other braking requests.

### When Not to Use Cruise Control

 This vehicle's Active Cruise with Braking (ACB) system must only be used in the same conditions that are normally recommended for cruise control systems that do not have active, adaptive, or predictive systems. **DO NOT USE CRUISE CONTROL IN THE FOLLOWING SITUATIONS:**

Inclement Weather/Low Visibility Situations – <u>Do not use</u> cruise control in inclement weather or low visibility conditions – such as rain, snow, smoke, fog, ice, or other severe weather conditions.	
Dense Traffic – Follow all safe driving practices.	
Sharp Curves and Winding Roads – <u>Do not use</u> cruise control when traveling sharply curved or winding roadways. CAUTION: Road curvature may impact the radar sensor's ability to detect forward vehicles in the same lane.	
Entrance or Exit Ramps – Follow all safe driving practices.	
Downhill Grades – Follow all safe driving practices.	
Construction Zones – <u>Do not use</u> cruise control in construction zones.	
Off-Road – <u>Do not use</u> cruise control in off-road conditions.	

## Impact Alert (IA) and Autonomous Emergency Braking (AEB)

Impact Alert (IA) is the most severe warning the Bendix® Fusion™ system can make. It can become active at low vehicle speeds (i.e. < 10 mph [16 kph]), but can also change with different versions of Fusion. Contact your dealer for more information. The alert indicates that a collision with the detected forward vehicle is likely, and **you should take immediate action** to potentially avoid – or lessen the severity of – the potential collision. If you do not address the potential forward collision, the Autonomous Emergency Braking (AEB) feature may reduce throttle and automatically apply up to full service brakes on the tractor while pulsing air to the trailer brakes – if needed – to help mitigate, or lessen the severity of, the potential collision.



**Figure 11a – AEB System Alert**



**Figure 11b – Possible Autonomous Braking Applied**

When activated, you may be notified by an audible and visual indication from the OEM-integrated display. If, as a result of the Fusion system intervention, the vehicle comes to a full stop, the service brakes will hold the vehicle at a stop until you, the driver, intervene. Service brake hold is only available on vehicles equipped with Active Cruise with Braking (ACB) Stop and Auto-Go™. *Figures 11a and 11b* shows examples of messages you may see on the integrated display when the IA or AEB feature is activated.

If you are following very close to the detected forward vehicle while your distance with the detected forward vehicle is also decreasing, the system may anticipate a potential collision and may activate the Impact Alert and possibly the AEB feature. **You should intervene to slow down, increase your following distance with the forward vehicle, or take other action as needed to address the potential collision.**

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

**NOTE:** At all times, you, the driver, are responsible for the control and safe operation of the vehicle and you should be alert and ready to potentially intervene.

**NOTE:** The Bendix Fusion system **does not** react (alert and/or brake) to all potential collision situations. As the driver, you are responsible for the safe operation of the vehicle at all times. For more information on system limitations, refer to *BW8107, Challenging Scenarios, on b2bendix.com or the section "Potentially Challenging Situations for the Bendix Fusion System" in this Operator's Manual.*

**NOTE:** The Fusion system **DOES NOT** respond to stationary objects. The Fusion system will not alert or slow the vehicle as it approaches stationary objects.

## Service Brake Hold

**NOTE:** The Service Brake Hold functionality of Bendix® Fusion™ is only available on vehicles equipped with Active Cruise with Braking (ACB) Stop and Auto-Go™.

If, as a result of the Bendix Fusion system brake intervention, the vehicle comes to a full stop, the service brakes will hold the vehicle at a stop until you, the driver, intervene via throttle, service brake application, or by setting the parking brakes. Service brake hold is not a parking brake and you must intervene and secure the vehicle.

If you choose to exit the vehicle, you are responsible for setting the parking brakes.

**NOTE:** The service brake hold can be canceled if you, the driver, press the accelerator pedal or the brake pedal, or apply the parking brake.

## Slower Moving Vehicles Ahead

The Bendix Fusion system is ready to potentially intervene with service braking, as needed, if the system determines that a potential collision with a detected slower moving vehicle ahead is imminent. However, you, the driver, must apply additional braking or possible steering when necessary to maintain a safe distance with the vehicle ahead. When approaching a slower moving vehicle ahead, you should anticipate this and take necessary action.



**Figure 12 – Slower Moving Vehicle Ahead**

## **DO NOT WAIT FOR THE SYSTEM TO INTERVENE!**

Figure 12 shows examples of the messages you may see on the integrated display when the Following Distance Alert (FDA) and Impact Alert (IA), or Autonomous Emergency Braking (AEB) feature, is activated.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

## Stationary Vehicle Braking (SVB)

When a potential collision with a stationary vehicle in your lane of travel is detected, the system may sound an alert before braking. If you, the driver, don't take action to address the potential collision, the Bendix® Fusion™ system may reduce throttle and apply service brakes to assist you in potentially avoiding and/or lessening the severity of the potential collision with the detected stationary vehicle. If, as a result of the Bendix Fusion system intervention, the vehicle comes to a full stop, the service brakes will hold the vehicle at a stop until you, the driver, intervene. Service Brake Hold is only available on vehicles equipped with Active Cruise with Braking (ACB) Stop and Auto-Go™.

Service Brake Hold is not a parking brake and you must intervene and secure the vehicle. As the driver, you should use caution and manually apply the parking brakes when exiting the vehicle.

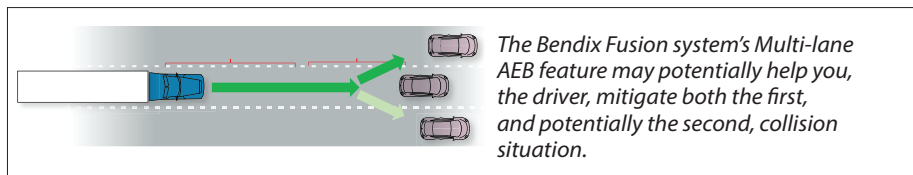
**NOTE: At all times, you, the driver, are responsible for the control and safe operation of the vehicle and you should be alert and ready to potentially intervene.**

**NOTE:** The service brake hold can be canceled if you, the driver, press the accelerator pedal or the brake pedal, or apply the parking brake.

**NOTE:** The Fusion system DOES NOT respond to stationary objects. Fusion will not slow the vehicle or provide an alert as it approaches stationary objects.

## Multi-lane Autonomous Emergency Braking (AEB)

See Figure 13. Once a collision mitigation braking event begins and you, as the driver, steer into an adjacent lane to avoid the forward vehicle, the Bendix Fusion system's Multi-lane AEB feature may a) continue to apply the brakes, and b) sound an alert when it detects a potential collision threat in the new lane of travel. If there is no potential threat in the lane you swerve into, system intervention will stop.



**Figure 13 – Multi-lane AEB**

If, as a result of the Bendix® Fusion™ system intervention, the vehicle comes to a full stop, the service brakes may hold the vehicle at a stop until you, the driver, intervene with a service brake application, throttle, or by setting the parking brake. Service brake hold is only available on vehicles equipped with Active Cruise with Braking (ACB) Stop and Auto-Go™. Service brake hold is not a parking brake and you must intervene and secure the vehicle. As the driver, you should use caution and manually apply the parking brakes when exiting the vehicle.

**NOTE: At all times, you, the driver, are responsible for the control and safe operation of the vehicle and you should be alert and ready to potentially intervene.**

**NOTE:** The service brake hold can be canceled if you, the driver, press the accelerator pedal or the brake pedal, or apply the parking brake.

### Driver Override

**NOTE: At all times, you, the driver, are responsible for the control and safe operation of the vehicle and you should be alert and ready to intervene.**

Some driver actions can override Fusion system activations. Once an Autonomous Emergency Braking (AEB) event has started, you, the driver, can override its activation by applying a significant change in accelerator position during the initial stage of braking or by making a full throttle application. The system will respond with a warning and some braking before AEB is suppressed.

### Following Distance Alerts (FDAs)

Following Distance Alerts (FDAs) are enabled above the minimum speed threshold and are independent of Active Cruise with Braking (ACB). FDAs are both audible and visual indications to you, the driver, whenever your vehicle is within the alert range of the detected forward vehicle.

Once the audible alert is given, you should increase the distance between your vehicle and the forward vehicle until the audible alert stops.

The FDA is ready to alert you even when the vehicle is moving at low speeds. If the distance continues to decrease, the system will generate more rapid alerts. *Figure 14* shows messages you may receive on the integrated display when the FDA is activated.



**Figure 14 – FDA**



When the FDA reaches its highest level, the beeping will be rapid. *Figure 15* shows messages you may see on the integrated display when the highest level FDA and Impact Alert (IA) has been activated.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

**NOTE:** The Bendix® Fusion™ system DOES NOT respond to stationary objects. Fusion will not alert or slow the vehicle as it approaches stationary objects. As the driver, you are responsible for the safe operation of the vehicle at all times. For more information, refer to *BW8107 Challenging Scenarios* on [b2bendix.com](http://b2bendix.com).



**Figure 15 – Highest Level FDA and IA Alerts**

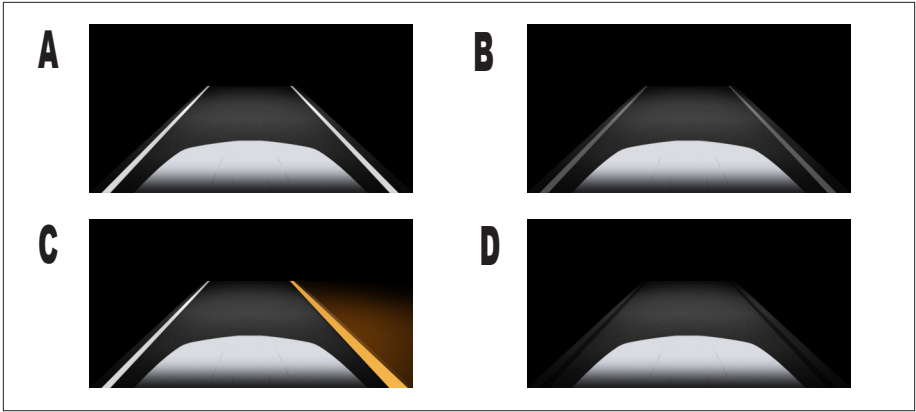
### **Lane Departure Warning (LDW)**

The Bendix Fusion system has the ability to warn you if your vehicle unintentionally departs its lane, or you change lanes without using the turn signal, by emitting an audible rumble strip sound and a visual alert on the dash to get your attention. In most applications, the Lane Departure Warning (LDW) feature is enabled above 37 mph (60 kph). If the turn signal is used to change lanes, the LDW is suppressed and no audible or visual alerts are activated. You should always be aware of your vehicle's lane position and be ready to immediately correct as needed.

*Figure 16* shows integrated display messages you may see from the LDW feature. This includes:

- A. The LDW feature is detecting the lane lines.
- B. The vehicle speed is below 37 mph (60 kph) or the lane lines are not detected.
- C. The LDW indicates vehicle is departing the lane.
- D. The LDW feature is disabled.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.



**Figure 16 – LDW Messages**

**NOTE:** When making lane changes, the proper use of the turn signals and/or hazard lights ensures the Bendix® Fusion™ system Lane Departure Warning (LDW), Highway Departure Warning (HDW), and Highway Departure Braking (HDB) technologies are aware of your intention to depart a lane and will suppress alerts and braking. The vehicle is equipped with a 15-minute LDW, HDW, and HDB disable switch (Figure 17) that you can activate when driving on roads with inconsistent lane markings (that can cause excessive false warnings). Examples of these circumstances include construction zones, poorly marked lanes, or missing lane markings. The system alerts will automatically become available again after 15 minutes or if the disable switch is pressed a second time.



**Figure 17 – LDW, HDW, and HDB Disable Switch**

### Highway Departure Warning (HDW)

The Highway Departure Warning (HDW) feature may potentially provide an audible alert if the system determines your vehicle has unintentionally left the roadway.

In most applications, the HDW alert is enabled above 37 mph (60 kph). If this alert is sounded, you should immediately correct the vehicle path into the correct lane position.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

## Highway Departure Braking (HDB)

If the highway departure situation that caused the Highway Departure Warning (HDW) is not addressed, the Bendix® Fusion™ system may potentially apply the brakes to assist in reducing your vehicle speed. In some circumstances, the system may be capable of reducing the vehicle speed to a full stop.



**Figure 18 – HDB**

Figure 18 shows the message you may see on the integrated display when Highway Departure Warning (HDB) is activated. **NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

If, as a result of the HDB feature, the vehicle comes to a full stop, the service brakes will hold the vehicle at a stop until you, the driver, intervene. Service brake hold is only available on vehicles equipped with Active Cruise with Braking (ACB) Stop and Auto-Go™. Service brake hold is not a parking brake and you must intervene and secure the vehicle. You, the driver, should manually set the parking brakes when exiting the vehicle.

**NOTE: At all times, you, the driver, are responsible for the control and safe operation of the vehicle and you should be alert and ready to intervene.**

**NOTE:** An active HDB event can be overridden by the driver by steering, applying full throttle, or applying the service brake. Additionally, the HDB feature can be suppressed by activating the turn signal or hazard lights when making a lane change.

**NOTE:** HDW and HDB can only be activated if the lane markings are identifiable by the system.

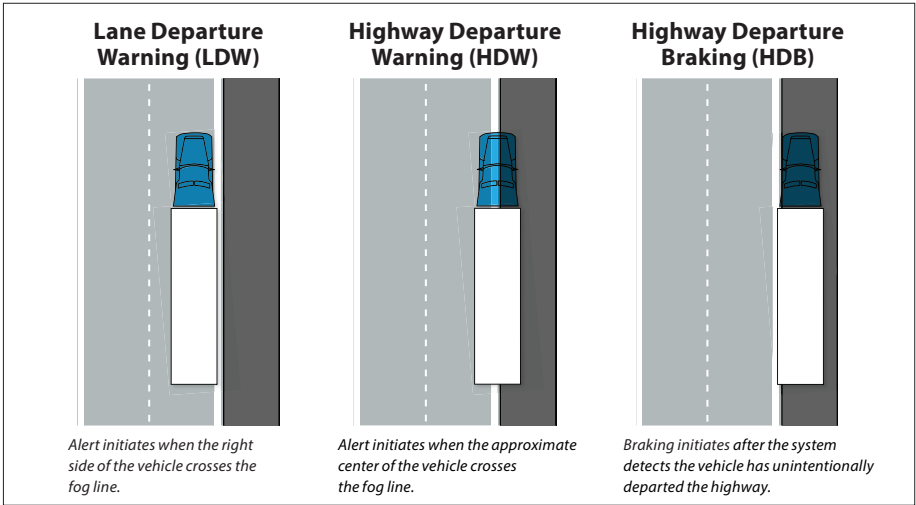
**NOTE:** When making lane changes, the proper use of the turn signals and/or hazard lights ensures the Bendix Fusion system Lane Departure Warning (LDW), HDW, and HDB technologies are aware of your intention to depart a lane and will suppress alerts and braking. The vehicle is equipped with a 15-minute LDW, HDW, and HDB disable switch (Figure 19) that you can activate when driving on roads with inconsistent lane markings that can cause excessive LDW, false warnings. Examples of these circumstances include construction zones, HDW, and HDB poorly marked lanes, or missing lane markings. The LDW, HDW, and HDB alerts will automatically become available again after 15 minutes or if the disable switch is pressed a second time.



**Figure 19 – LDW, HDW, and HDB Disable Switch**

When HDW and HDB are activated excessively, the Bendix Fusion system provides a warning and will disable these features until you restart the vehicle. Other Fusion system features, including LDW, will remain available.

**NOTE:** The service brake hold can be canceled if you press the accelerator pedal or the brake pedal, or apply the parking brake.



**Figure 20 – LDW, HDW, and HDB**

### **Overspeed Alert and Action (OAA)**

The Bendix® Fusion™ system can read most roadside speed limit signs in the United States and Canada and may potentially warn you if your vehicle speed exceeds the posted speed limit.

The Overspeed Alert and Action (OAA) may potentially sound an audible and visual alert when your vehicle is traveling at +5 mph (8 kph) over the posted speed limit.

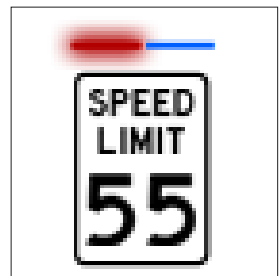
If your vehicle is traveling at +10 mph (16 kph) over the posted speed limit, in addition to the alert, you may potentially experience a haptic warning through a brief engine torque reduction of about one (1) second.

Both the +5 (8 kph) and +10 mph (16 kph) thresholds are customizable by your fleet and may vary. Also, the system does not sound an OAA when the posted speed limit is 20 mph (32 kph) or less.

Figure 21 shows a message you may see on the integrated display when the OAA is activated.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

**NOTE:** The OAA feature does not apply vehicle brakes.



**Figure 21 – OAA**

## SPECIAL ALERTS

### Brake Overuse Alert

The Bendix® Fusion™ system may potentially provide a warning when it is intervening and using the service brakes excessively. Overuse of the service brakes can lead to the brakes overheating which may result in a reduction or loss of braking performance. This scenario is typically referred to as brake fade. Using cruise control on downhill stretches of road may cause this alert to activate. When the system detects brake overuse, a message may be shown on the display along with an audible alert. As the driver, you should intervene immediately.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

Once the brake overuse alert is activated, certain driver interventions that cancel cruise control – such as stepping on the brake pedal or switching off cruise control – will discontinue the alert. Following a brake overuse alert, you should not reset cruise control for at least 20 minutes. This will give the brakes time to cool down.

If you choose to reset cruise control during that 20-minute period, the Bendix Fusion system interventions will be limited to de-throttling and engine retarder only. The system will automatically disable all the Fusion system service 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). You will continue to receive alerts, but all Bendix Fusion system interventions (de-throttling, engine retarder, or brake applications) will be disabled until the next ignition cycle.

**NOTE:** In all cases, you have the ability to apply the service brakes if necessary. You should take care since overheated brakes may reduce the vehicle's braking capability. Overheated brakes could be an indicator of a malfunctioning system or service brake and should be checked by a certified technician immediately.

**NOTE:** In all cases, as the driver, it is your responsibility to maintain safe operation of your vehicle. This includes proper gear and speed selection, and engine retarder activation, especially when driving routes with extended downhill sections of roadway.

## Power-on Self-test (POST)

During every power-on cycle, the Bendix® Fusion™ system executes a Power-on Self-test (POST) during which the driver assistance features described in this document are not available. Vehicle cruise control is still available to the driver during the POST. The POST requires the vehicle speed to be above 5 mph (8 kph) and for the radar sensor to see objects to validate proper radar sensor operation. Under normal operating conditions, the POST completes within a few seconds and all driver assistance features become available to you.

In the special case where the radar sensor is blocked, the POST will not be able to verify normal system operation and, after two (2) minutes driving under this condition, will set an active Diagnostic Trouble Code (DTC) rendering the functionality of the Fusion system reduced or inoperable. Two (2) minutes under this condition will lead to a DTC, but regular vehicle cruise control will remain available to you.

## SYSTEM RESPONSES

This chart illustrates how the system may react to specific driver actions.


If you, the driver, do this:	The Bendix Fusion system may do this:
Step on the brake (during a collision mitigation event).	As the driver, you are always in control and are able to apply full braking power. The Bendix Fusion system will honor the greater braking power demand from either the driver or the system.
Step aggressively on the accelerator (during a collision mitigation event).	As the driver, you are always in control. Your actions can override any Bendix Fusion system actions.  Once an Autonomous Emergency Braking (AEB) event has started, you, the driver, can override its activation by applying a significant change in accelerator position during the initial stage of braking or by making a full throttle application. The system may respond with a warning and some braking before AEB is suppressed.
Step on the brake (when cruise control is on and set).	Cruise control will be canceled.
Step on the brake or accelerator pedal, or activate the parking brake (when in service brake hold).	Service brake hold will be canceled. You, the driver, must intervene and secure the vehicle by pressing the accelerator pedal, brake pedal, or parking brake as appropriate.
Step on the accelerator (when cruise control is on and set).	Cruise control will be overridden until the accelerator is released; then cruise control will resume the original set speed automatically.

<b>Your Action:</b>	<b>Potential Reaction of the Bendix® Fusion™ System:</b>
If you, the driver, do this:	The Bendix Fusion system may do this:
Switch on the cruise control.	Nothing. The Active Cruise with Braking (ACB) feature will not engage until you set the cruise control speed.
Switch off the cruise control.	The ACB feature will turn off; the collision mitigation feature remains active and ready to intervene, if needed. You, the driver, will continue to hear all alerts as needed.
Set the cruise control speed.	The ACB feature is automatically activated, and your vehicle maintains set speed and following distance behind the vehicle ahead.
Block the radar sensor.	<p>The Bendix Fusion system performance will be diminished, or disabled, when the radar sensor becomes physically blocked. When the radar sensor can detect this condition, an alert may be issued to warn you.</p> <p>You should visually inspect the radar sensor and mounting bracket regularly and remove any mud, snow, ice build-up, or other obstructions. After clearing any obstructions, you will need to turn the vehicle off and then on to clear applicable Diagnostic Trouble Code (DTC).</p>
Block the camera.	<p>The Bendix Fusion system performance will be diminished, or disabled, whenever the camera becomes blocked. An alert may be issued to alert you of this condition.</p> <p>When a camera blockage is detected, it will be indicated through an alert and will disable all camera-based features (i.e. Lane Departure Warning, Highway Departure Braking/Warning, OverSpeed Alert and Action, and Stationary Vehicle Braking).</p>
Use normal cruise control "+/-" switch.	Vehicle speed will be increased (+) or decreased (-) to achieve the new set speed, while actively maintaining the following distance with the vehicle ahead, if one is present within 328 ft (100 m).

**NOTE:** The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer.

## WHAT TO EXPECT

The following charts illustrate what to expect from the Bendix® Fusion™ system in various driving situations you may encounter. Both the system indication, as well as action(s) to expect from the system, are illustrated on the pages that follow.

<b>What to Expect</b>		
<b>Situation</b>	<b>Typical System Indications and Alerts</b>	<b>Typical System and/or Driver Actions</b>
<b>Stationary detected forward vehicles in your lane of travel</b>		
<p>A stationary forward vehicle is detected ahead in your lane.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>A stationary vehicle alert may potentially be issued if the Bendix Fusion system determines a stationary detected forward vehicle is a potential collision threat.</p>	<div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">  <b>WARNING</b> </div> <p style="color: red; margin-top: 10px;"><b>You must immediately act to potentially avoid – or lessen the severity of – a potential collision.</b></p> <p>If a potential collision is likely to occur, the Bendix Fusion system may potentially provide a warning and/or apply the vehicle brakes.</p>

**NOTE:** The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer.



What to Expect		
Situation	Typical System Indications and Alerts	Typical System and/or Driver Actions
<b>Moving detected forward vehicles in your lane of travel</b>		
<p>Your vehicle comes up fast behind a slower-moving detected forward vehicle.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>The Following Distance Alert (FDA) may potentially sound, and a visual message/icon may potentially appear on the display.</p> <p>Depending on how close your vehicle approaches, the system may initiate an Impact Alert (IA) warning.</p>	<p>You must respond as needed. If a potential collision is likely to occur, the collision mitigation feature may apply your vehicle's service brakes.</p>
<p>The detected forward vehicle slows rapidly.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>The FDA and IA warning (continuous tone) may potentially sound, and a visual message/icon typically appears on the display.</p>	<p>You must respond as needed.</p> <p>If a potential collision is likely to occur, the collision mitigation feature may apply your vehicle's brakes.</p>
<p>Another vehicle crosses the road perpendicular to your path of travel – such as at an intersection.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>None.</p>	<p>None.</p> <p>You must respond as needed.</p>
<p>A collision mitigation braking event has begun and you, as the driver, steer into an adjacent lane to avoid the forward vehicle.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>If the system detects the adjacent lane is blocked by a potential collision threat, the IA warning may potentially sound and a visual message/icon typically appears on the display.</p>	<p>The Bendix® Fusion™ system may potentially continue to apply the brakes and/or alerts if it detects another situation ahead in the new traffic lane posing a potential collision.</p>

**NOTE:** The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer.

What to Expect		
Situation	Typical System Indications and Alerts	Typical System and/or Driver Actions
<b>Lane Departure System Active (Lane detection icons being displayed)</b>		
<p>You activate the right or left turn signal, then merge into the corresponding lane.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>No Lane Departure Warning (LDW), Highway Departure Warning (HDW), or Highway Departure Braking (HDB) alerts or braking would occur. However, other Autonomous Emergency Braking-related (AEB) features would operate as intended.</p>	<p>None.</p>
<p>Traveling below approximately 37 mph / 60 kph, your vehicle crosses a lane marker (without the corresponding turn signal activated).</p> <p>Cruise is either "ON" or "OFF."</p>	<p>No Lane Departure Warning (LDW), Highway Departure Warning (HDW), or Highway Departure Braking (HDB) alerts or braking would occur. However, other Autonomous Emergency Braking-related (AEB) functions would operate as intended.</p>	<p>None.</p> <p><b>You must respond as needed.</b></p>
<p>Traveling above approximately 37 mph / 60 kph, your vehicle departs your lane of travel without the corresponding turn signal activated.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>A "rumble strip" audible/vibration/visual alert may potentially activate.</p>	<p><b>You must respond as needed. If you do not respond, the Bendix® Fusion™ system may potentially apply the brakes if the fog line is crossed to reduce the vehicle speed to alert you.</b></p> <p>(Use the turn signal when changing lanes and/or keep your vehicle within the lane markings.)</p>

**NOTE:** The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer.

<b>What to Expect</b>		
<b>Situation</b>	<b>Typical System Indications and Alerts</b>	<b>Typical System and/or Driver Actions</b>
<b>Overspeed Alert and Action (OAA)</b>		
<p>Your vehicle passes a U.S. or Canadian speed limit sign and you are not speeding.</p> <p>Cruise is either "ON" or "OFF."</p>	<p>The OEM-integrated display may potentially show the posted speed limit.</p>	<p>None.</p>
<p>In some cases, the Overspeed Alert and Action (OAA) feature may detect speed signs on parallel roads, warning you, the driver, and reducing the accelerator pedal input.</p>	<p>A possible alert will sound.</p>	<p>The system may respond with a possible de-throttle.</p>
<p>Your vehicle passes a speed limit sign and your vehicle is exceeding the speed limit by 5 to 9 mph (8 to 14 kph).</p>	<p>An Overspeed Alert and Action (OAA) may potentially be issued and the posted speed limit will be visually presented to you, the driver.</p>	<p>None.</p>
<p>Your vehicle passes a speed limit sign and is traveling &gt;10mph (16 kph) over the posted speed limit.</p>	<p>An OAA may potentially be issued and the posted speed limit will be visually presented to inform you that your vehicle should slow down.</p>	<p>A one-second accelerator pedal decrease of the engine may potentially occur.</p>

**NOTE:** The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer.

What to Expect		
Situation	Typical System Indications and Alerts	Typical System and/or Driver Actions
Interactions with detected forward vehicles in your lane of travel		
With no detected forward vehicle.	None.	None.
With a detected forward vehicle.  Cruise is "ON" and speed is "SET."	The cruise control ON indicator is illuminated and the detected forward vehicle icon is illuminated.	The Active Cruise with Braking (ACB) feature will maintain the set speed and following distance.
The detected forward vehicle slows moderately.  Cruise is "ON" and speed is "SET."	The Following Distance Alert (FDA) may potentially sound, and a visual message or icon typically appears on the display.	<b>You must respond as needed.</b>  If the system intervenes, it may derate the engine, the engine retarder may be engaged, and the service brakes may be applied, in that order. If your vehicle speed falls below the minimum defined speed, the vehicle will cancel cruise control and <u>will not</u> attempt to increase the vehicle speed to the previously set cruise control speed.
The detected forward vehicle slows moderately to a full stop.  Cruise is "ON" and speed is "SET."	The FDA may sound, and a visual message or icon typically appears on the display.	The system may intervene to bring the vehicle to a full stop. You, the driver, can resume cruise control by pressing down on the throttle or by pressing the resume button within a few seconds and the vehicle will accelerate back to the cruise control set speed.

**NOTE:** The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer.

What to Expect		
Situation	Typical System Indications and Alerts	Typical System and/or Driver Actions
<b>Interactions with detected forward vehicles in your lane of travel</b>		
<p>The detected forward vehicle slows rapidly.</p> <p>Cruise is "ON" and speed is "SET."</p>	<p>The Impact Alert (IA) warning (continuous tone), may potentially sound and a visual message/icon typically appears on the display. The Following Distance Alert (FDA) may also be heard.</p>	<p><b>You must respond as needed.</b></p> <p>If the system intervenes, the vehicle accelerator pedal input may be reduced; the engine retarder may be engaged; and the service brakes may be applied, in that order.</p>
<p>A detected forward vehicle traveling at a higher rate of speed cuts in front of your vehicle and speeds away.</p> <p>Cruise is "ON" and speed is "SET."</p>	<p>FDAs may be given, depending on the exact system configuration that has been set for the vehicle, and how close the vehicle cuts in front.</p>	<p>Vehicle maintains set speed and distance.</p>
<b>Downhill Grades</b>		
<p>Going down a grade with a detected forward vehicle.</p> <p>Cruise is "ON" and speed is "SET."</p>	<p>DO NOT USE cruise control on downhill grades.</p>	<p>DO NOT USE cruise control on downhill grades. Brake overuse may occur.</p>
<p>Cruise control should NOT be used on downhill grades. <i>See the CDL manual instructions on proper gear usage for downhill grades.</i></p>		

**NOTE:** The system indicators/alerts above are typical, but may vary from the descriptions shown here by vehicle manufacturer.

**NOTE:** The preceding sections show examples of situations and typical Bendix® Fusion™ system responses. However, the charts do not attempt to cover all possible situations.



**Due to the inherent limitations of radar sensor and camera technology as well as the vast number of traffic scenarios possible, the enhanced collision mitigation technology may not:**

- **react to moving vehicles in your vehicle's lane of travel.**
- **sound alerts, warnings, or brake interventions when expected.**

**Additionally, alerts, warnings, or brake interventions may occur when not expected.**

## **POTENTIALLY CHALLENGING SITUATIONS FOR THE BENDIX® FUSION™ SYSTEM**

The following examples illustrate situations in which the Bendix® Fusion™ system may potentially issue an alert or braking in a manner not consistent with your expectations. The Fusion system may unexpectedly issue warnings, apply braking, or not respond. For further information on challenging scenarios, refer to *BW8107, Challenging Scenarios*, on *b2bendix.com*.

Driver Assistance Systems (DAS), such as the family of Bendix Fusion active safety solutions, help to continuously monitor a variety of vehicle parameters and sensors to determine if the vehicle is near a potential collision or a following distance threshold. As a reminder, all Driver Assistance Systems have limitations and may misinterpret a scenario leading to a reaction when one is not anticipated or when one may not be required. This section describes driving scenarios that may be challenging for any Bendix safety system.

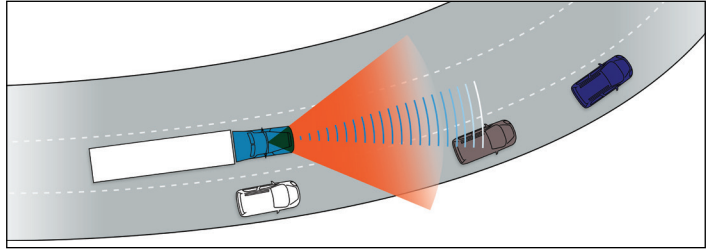
### **KEY SYSTEM FUNCTIONALITY CLARIFICATIONS**

- High differences in speed will limit system performance due to the time needed to recognize the scenario.
- Radar sensors work based on reflections from metallic objects which can overlap, cancel, or interfere, causing the radar sensor to miss targets or see false targets.
- Low light or low roadway-background contrast conditions can impact the camera's ability to recognize the forward vehicle and limit system braking performance.

### Driving Through Curves:

When driving through curves, adaptive cruise control and collision mitigation systems may detect vehicles in adjacent lanes. The system also may not recognize forward vehicles as in-lane depending on the curvature and may react late to in-lane objects within a curve.

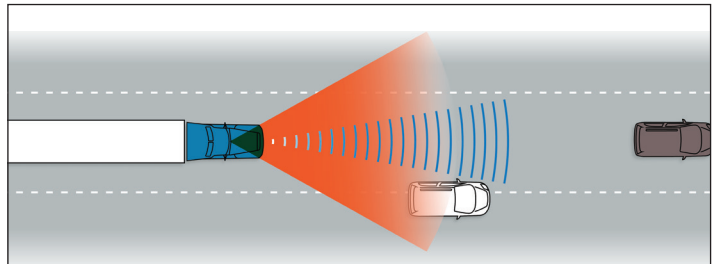
Driving Through a Curve or an Exit Ramp



### Offset Forward Vehicles:

Vehicles that are offset, or not completely in your vehicle's lane of travel, may not be detected or trigger a reaction by the vehicle's collision mitigation system.

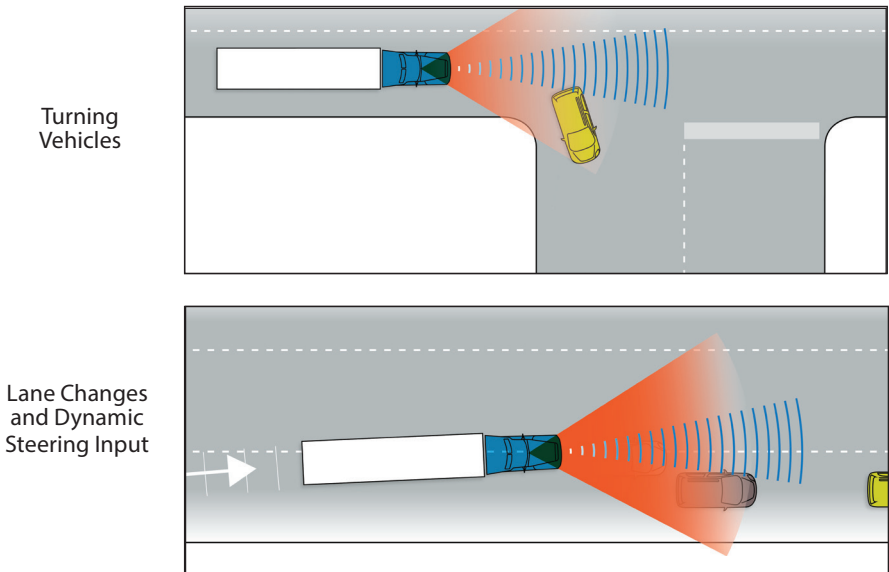
Other Vehicles Partially Inside Your Lane of Travel



### In-lane Slow Vehicles:

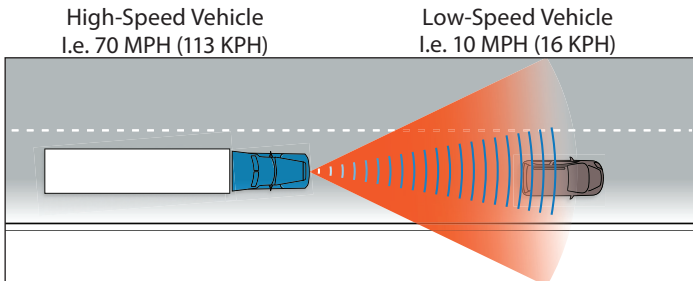
When the detected forward vehicle makes a sharp turn – or your vehicle changes lanes behind a slow, in-lane vehicle – the Bendix® Fusion™ system may perceive this as an in-lane slow or stopped vehicle. The system may continue to track the vehicle as the forward vehicle continues through the turn or your vehicle completes a lane change, causing the Fusion system to possibly warn or brake.

The system may continue reacting as the forward vehicles turns off the original road and onto the new road or as your vehicle has transitioned into the other lane. The system will release when the forward vehicle is sufficiently out of the initial lane and no longer considered a detected forward vehicle by the system.



### High Differences in Speed:

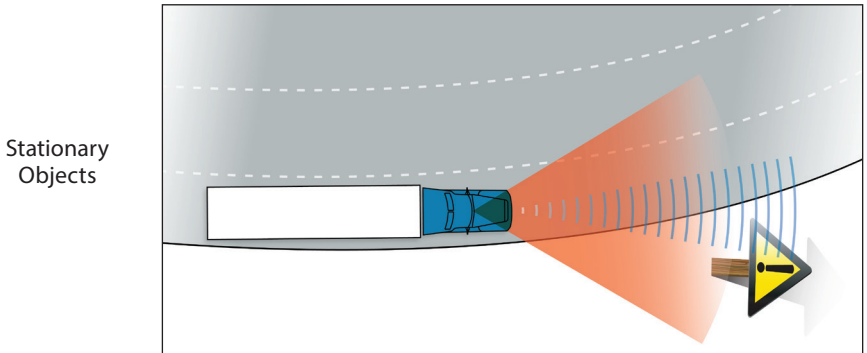
The higher the difference in speed between your vehicle and the detected forward vehicle, the less time the system has to react. High speed differences may potentially cause little to no system alert or activation.



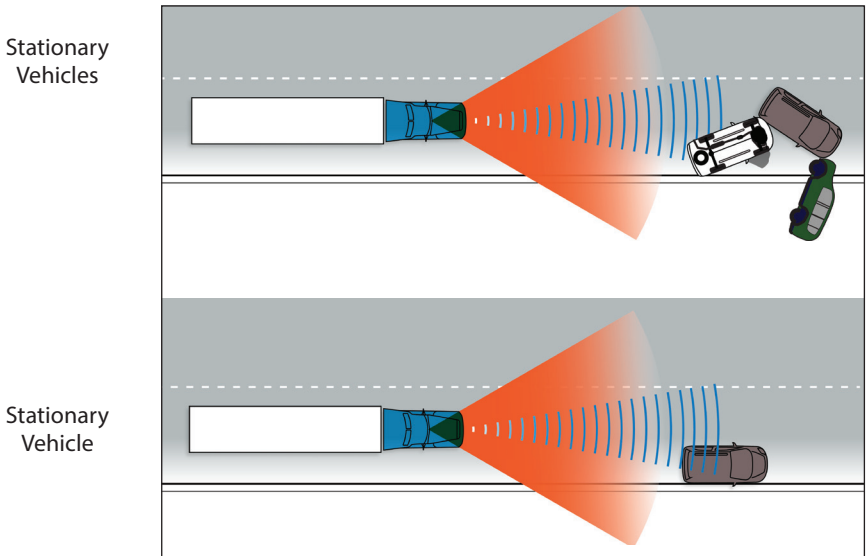


## Stationary Vehicles and Objects:

- Signs, bridges, or other sizeable, stationary metallic objects may be falsely detected by collision mitigation systems. Although not very common and usually not very long in duration, the system may, on occasion, activate a false alert or possibly a momentary false braking event on these objects.
- Objects that are not recognized as a forward vehicle may not trigger a reaction by the system.
- Objects that are offset in your vehicle's lane of travel may not trigger a reaction by the system.



False detection possible: a stationary object in the forward detection path of the system around a bend may inadvertently generate a system response.

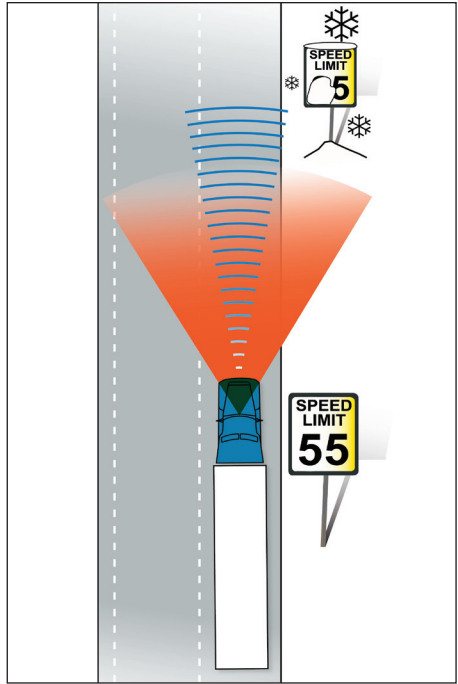


May not be detected: irregular stationary objects or offset vehicles may not be detected by the system and may, or may not, generate a system response.

### Speed Limit Sign Detection:

The Bendix® Fusion™ system detects roadway speed signs in order to alert the driver and sometimes de-throttle the vehicle when traveling over the posted speed limit (Overspeed Alert and Action). In some scenarios, the system may detect the speed limit sign from a parallel roadway and inadvertently alert you.

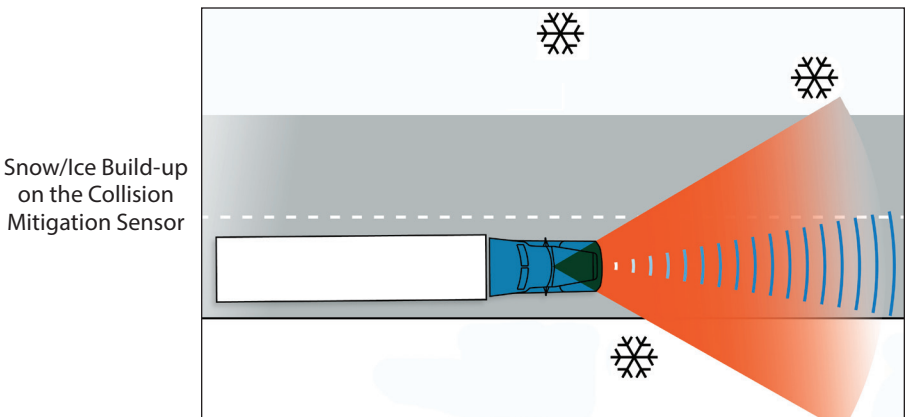
In some other situations, the system may not detect roadway speed signs. In about the first five (5) minutes of driving, the Fusion system will conduct a calibration procedure in which the system will not provide any overspeed alert or de-throttling.



### Weather Conditions:

Heavy precipitation – in particular, snow and ice build-up in front of a collision mitigation radar sensor – may contribute to false detection of objects. This may, in turn, lead to false alerts or nuisance braking events.

If the forward radar sensor becomes blocked and the Fusion system cannot reliably detect forward objects, a radar sensor Diagnostic Trouble Code (DTC) may be set.



## Potential Causes of False Object Detection, Warning, and Braking

Potential Cause	Solution
Obstruction of radar sensor – deer and moose guards, bumpers, etc.	Refer to Appendix A of the Bendix® Fusion™ Active Safety System Service Data sheet (SD-61-4963) for radar sensor mounting clearance. Ensure the guard/bumper does not interfere with the radar sensor beam clearance area.
Obstruction of radar sensor or camera – debris	Inspect the radar sensor or camera and remove any road debris blocking the front of the radar sensor.
Obstruction of radar sensor – mud/ice/snow accumulation in front of the radar sensor or on a radar sensor cover	Inspect the radar sensor and remove any mud, snow, or ice build-up in front of the radar sensor or the cover.
Radar sensor misalignment	Refer to Appendix B of the Bendix Fusion Active Safety System Service Data sheet (SD-61-4963) for radar sensor alignment.

If after becoming familiar with the contents of this document you still believe the Bendix Fusion system is not performing properly, Bendix recommends the following:

- Run the most current version of the Bendix® ACom® PRO™ Diagnostic Software to determine if an active Diagnostic Trouble Code (DTC) exists with the system. Correct the DTC(s) prior to placing the vehicle back in service.
- Verify the radar sensor is operating the latest software version. This can be determined by using the ACom PRO Diagnostic Software or by contacting your Bendix account manager. This radar sensor software helps reduce sensitivity to road conditions that may cause a radar sensor blind condition.
- Fully understand when the braking occurred. It may be a challenging condition for the system that may not be called out in this document. Driver education may be required to fully understand how the system(s) operates.

**NOTE:** All radar-based systems are sensitive to conditions such as those described within this document, and all radar sensor systems have limitations. It is unlikely that full elimination of unwanted false-positive activations will be possible with this generation of technology. There is no substitute for a skilled, alert driver exercising safe driving techniques and proactive, comprehensive driver training. Responsibility for the safe operation of the vehicle remains with the driver at all times.

**NOTE:** The preceding section shows examples of situations and typical Bendix Fusion system responses. However, the scenarios do not attempt to cover all possible situations.

## Detected Forward Vehicles in a Curve

With cruise control set, when following a detected forward vehicle around a curve, the Bendix® Fusion™ system's Active Cruise with Braking (ACB) feature may delay acceleration back to the set speed until one of the following events occur:

- The system detects the forward vehicle;
- The system determines that there is no longer a detected forward vehicle; or
- A time gap has occurred (based on the last following distance recorded).

For example: Assume cruise control is set at 50 mph (80 kph) and you are following three (3) seconds behind a vehicle traveling at 45 mph (72 kph) that just entered a sharp curve. If the forward vehicle is no longer detected as you travel around the curve, the Bendix Fusion system will delay the vehicle acceleration back to 50 mph (80 kph).

It is also possible for the Fusion system to detect vehicles in other lanes when traveling around curves. In cases where the Fusion system detects an adjacent-lane vehicle as the forward vehicle, the system may intervene and begin making brake applications.

## Curve Speed Control

In sharp curves, ACB may limit acceleration to prevent reducing following distance with detected forward vehicles.

## WHEN THE BENDIX® FUSION™ SYSTEM IS NOT WORKING

The performance of the Bendix® Fusion™ system may be diminished or disabled when the radar sensor or camera becomes blocked or has not detected a forward vehicle for an extended period of time.

Figure 22 shows examples of alerts that will be issued on the integrated display to warn you of this condition.

When the radar sensor is blocked, Active Cruise with Braking (ACB), Autonomous Emergency Braking (AEB), and Following Distance Alert (FDA) features will not function.

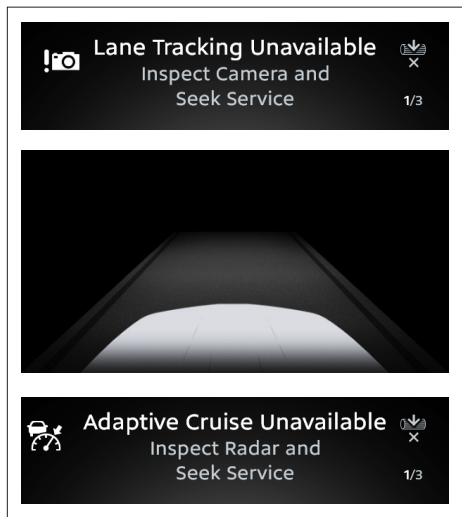


Figure 22 – Blocked Sensors

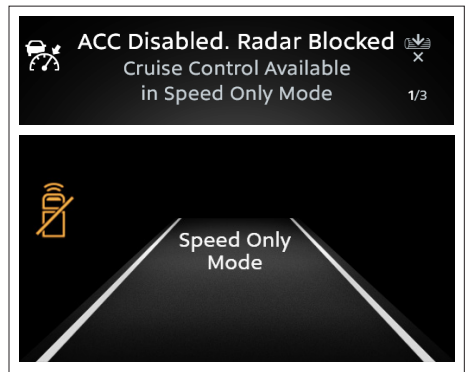
When the camera is blocked, Lane Departure Warning (LDW), Highway Departure Braking (HDB), Highway Departure Warning (HDW), Overspeed Alert and Action (OAA), and Stationary Vehicle Braking (SVB) will not function.

If the Fusion system has detected a problem, depending on the vehicle manufacturer, there will typically be a warning message on the display, a Diagnostic Trouble Code (DTC) will be set, and you will be alerted.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.

### Speed Only Mode

In the case of blocked radar sensor or detection of an issue with the radar sensor, the system will determine – depending on the type of issue detected – if the vehicle may continue to have normal cruise control functions (without the benefits of the Bendix® Fusion™ system), or if all cruise control functions need to be disabled until the vehicle is serviced. The system should be serviced as soon as possible to restore full Fusion system functionality.



**Figure 23 – Speed Only Mode**

Conventional engine cruise control may be re-engaged by the driver when the radar sensor is disabled. Camera-based features, such as Lane Departure Warning (LDW) will remain.

**NOTE:** Dash display images are representative only and may not reflect the actual vehicle display.


# SYSTEM MAINTENANCE AND TROUBLESHOOTING


## Preventive Maintenance


The Bendix® Fusion™ system is relatively maintenance-free. The key items to keep the system functioning properly include:


- Keep the area in front of the radar sensor and camera lens clean and free of obstructions.
- Visually inspect for any damage to the bumper or the Fusion cover, bracket, or radar sensor to ensure the alignment has not been compromised. Never use the radar sensor unit as a step.
- Verify there are no active system Diagnostic Trouble Codes (DTCs).


## Equipment Maintenance

 **Importance of Antilock Braking System (ABS) Maintenance – Optimal Bendix Fusion system braking requires a properly maintained ABS system, without any active ABS DTCs. Have active DTCs repaired by a qualified technician. Any ABS DTCs will cause the Fusion system to deactivate.**

 **Importance of Brake Maintenance – Optimal Fusion system braking requires properly maintained truck service brakes (drum, wide-drum, or air disc), which meet appropriate safety standards and regulations. Brake performance also requires the vehicle be equipped with properly sized and inflated tires with a safe tread depth.**

 **Radar Sensor Inspection – You should visually inspect the radar sensor and mounting bracket regularly and remove any mud, snow, ice build-up, or other obstructions. An alert may be issued when the radar sensor detects it is blocked. After clearing any obstructions, you will need to turn the vehicle off and then on to clear the DTC. 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 sensor.**

 **Radar Sensor Damage / Tampering – In cases where the bumper and/or radar sensor have sustained any damage, or if you suspect the radar sensor has been tampered with, do not use the cruise control until the vehicle has been repaired. In addition, an indicator on the display typically will illuminate if the system detects any of these conditions. Consult your vehicle's Operator's Manual or contact Bendix for more information.**

 **Camera Inspection – The Bendix Fusion system camera is mounted to the windshield of the vehicle. The camera will be mounted inside the wiper pattern and should be clear of any obstructions. An alert may be issued to the driver when the camera is blocked. After clearing any obstructions, you will need to turn the vehicle off and then on to clear the DTC.**

## ADDITIONAL OPERATIONAL NOTES

### Adjusting the Alert Volume

The Bendix® Fusion™ system audible alerts are pre-set at the factory for fully integrated systems and cannot be turned off by you, the driver.

### Event Capture

For vehicles configured to do so, you can manually activate data and video capture by pushing and holding the Lane Departure Warning (LDW) disable switch for six (6) seconds. This will indicate to the SafetyDirect® processor to capture and possibly transmit 10 seconds of video and data (5 before and 5 after button press). In some cases, more video data may be available using the optional SafetyDirect web portal (subscription fee applies).



**Figure 24 – LDW, HDW, and HDB Disable Switch**

### Other Information

Federal Communications Commission (FCC) Part 15: These devices comply with Part 15 of the FCC rules with the limits for a Class B digital device and with RSS-210 of Industry Canada. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference; and (2) these devices must accept any interference received, including interference that may cause undesired operation.

### Additional Information Sources for Bendix® Systems on Your Vehicle

Visit [b2bendix.com](http://b2bendix.com) for free downloads of the Service Data sheets listed below, or to order paper copies of these publications from the Literature Center/Document Library. Consult the vehicle manufacturer's documentation.

#### Service Data Sheets

- SD-29-50022 *Bendix® Fusion™ FLR-25™ Radar Sensor*
- SD-64-20124 *Bendix™ AutoVue® FLC-20™ Camera*
- SD-13-4986 *Bendix® EC-80™ ESP® Controllers*

For additional support, visit [bendix.com](http://bendix.com) or contact the Bendix Tech team for direct telephone technical support at 1-800-AIR-BRAKE (1-800-247-2725), option 2, Monday through Thursday, 8:00 a.m. to 6:00 p.m., and Friday, 8:00 a.m. to 5:00 p.m. ET.

## Acronyms and Definitions

<b>ABS</b>	Antilock Braking System
<b>ACB</b>	Active Cruise with Braking
<b>ACC</b>	Adaptive Cruise Control
<b>Bendix® ACom® PRO™</b>	Bendix diagnostic software
<b>AEB</b>	Autonomous Emergency Braking
<b>ATC</b>	Automatic Traction Control
<b>CMS</b>	Collision Mitigation System
<b>Detected Forward Vehicle</b>	The forward vehicle identified by the safety system that can cause a system reaction (alert or automatic braking).
<b>DTC</b>	Diagnostic Trouble Code
<b>ESP</b>	Electronic Stability Program
<b>FDA</b>	Following Distance Alert
<b>Forward Vehicle</b>	A car/truck/other vehicle in front of the host vehicle.
<b>HDB</b>	Highway Departure Braking
<b>HDW</b>	Highway Departure Warning
<b>IA</b>	Impact Alert
<b>LDW</b>	Lane Departure Warning
<b>LED</b>	Light Emitting Diode
<b>OAA</b>	Overspeed Alert and Action
<b>OBC</b>	On-board Computer
<b>SafetyDirect®</b>	Web portal
<b>SVB</b>	Stationary Vehicle Braking
<b>Your Vehicle/Host Vehicle</b>	The truck/tractor/specialty vehicle equipped with the Bendix safety system.



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