# Operator's Manual Bendix® Fusion™ Active Safety System with ACB Auto-Resume

Bendix

Fusion™

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

## The Bendix® ESP® Stability System

All vehicles equipped with the Bendix® Fusion™ system are also equipped with the Bendix® ESP® stability system. The Bendix ESP stability system is an always ready, full-stability system which monitors vehicle stability. When necessary, Bendix ESP automatically intervenes to reduce the throttle and/or apply the foundation 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 automatic brake applications.

The Bendix ESP stability system and Bendix Fusion do not replace the need for you to remain alert, react appropriately and in a timely manner, and use safe driving practices.

**⚠ WARNING**

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

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**⚠ WARNING**

**Improper use of the Bendix® Fusion™ system can result in a collision causing property damage, serious injuries, or death. Be sure to read, understand, and follow all these instructions carefully.**

# Introduction

This Operator's Manual provides an overview of the Bendix® Fusion™ system with Active Cruise with Braking (ACB) Auto-Resume. The manual explains the components, features, and functions, along with 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 controls, system alerts, and what to expect when the system is on. Keep this manual in the vehicle as a reference for the system, its operation, and its performance characteristics.

### Additional Information about Bendix® Systems

For additional information about Bendix® systems, call 1-800-AIR-BRAKE (1-800-247-2725) or visit bendix.com.

**NOTE: All of these alerts and actions are part of the Fusion system enhanced feature set system released by Bendix. It is possible for this operator's manual to be moved from vehicle to vehicle. You must verify with the vehicle OEM to determine which features are included on your own vehicle.**

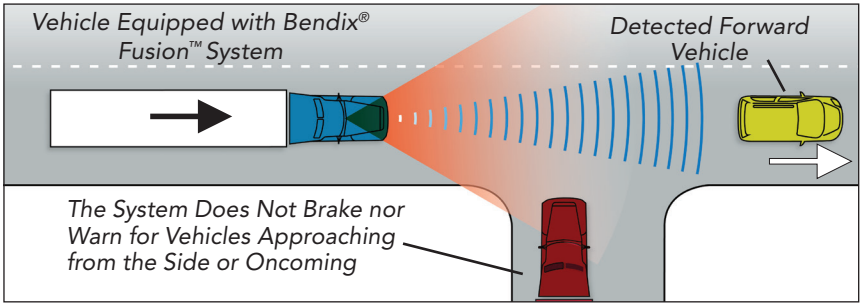
### Important Safety Information

⚠ As a driver, you are always responsible for the control and safe operation of the vehicle at all times. The 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 – on rare occasions – may not be able to detect or may misinterpret lane markings. At these times, alerts may not occur, or erroneous alerts may occur.

The Bendix® Fusion™ system reacts ONLY to vehicles that are stationary or moving in the same direction as your vehicle. 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.




When the Fusion system needs to intervene, it works in conjunction with the Bendix® ESP® full stability system to engage the brakes. 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.

Due to the inherent limitations of radar technology, the Stationary Object Alert feature may alert in response to stationary objects not in the vehicle's lane of travel. These objects may include bridges, signs, parked vehicles, and traffic lights. Braking or throttle intervention will not occur in response to stationary objects.

Potential False Alerts - The Fusion system may generate a false alert or false braking. Radar and camera technology is not perfect, and false alerts sometimes occur. Radar misalignment will likely lead to increases in stationary object false alerts. You should take into account the road conditions and any other factors they are encountering as they choose how to react to any alerts received from the Fusion system.

Pedestrians, Animals, Non-Metallic, or Limited-Metallic Objects - The Fusion system will not warn or react to pedestrians, 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 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 – Objects that are radar-reflective – such as crash barriers, guard rails, construction zone barricades, and tunnel entrances – may impair the function of the radar.

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.

Inspect the radar and mounting bracket regularly and remove and mud, snow, ice build-up, or other obstructions. Installing aftermarket deer guards is not recommended and could impair the operation of the radar.

If the bumper and/or radar are damaged or misaligned – or if the radar was tampered with – do not use the cruise control until the vehicle is repaired and the radar is re-aligned.

If a problem is detected with the Bendix® Fusion™ system, there is an audible alert and/or icon on the Bendix® Driver Interface Unit (DIU™) or the dash display. Depending on the type of problem, the system may disable cruise control functions until service is performed.

Smaller forward vehicles, such as motorcycles, may be difficult for the radar to identify. As the driver, it is your responsibility to be aware of this type of vehicle and to be cautious.

## System Components

The main components used in the Bendix® Fusion™ system are the Bendix® ESP® Controller; the Bendix® radar; the Bendix™ camera (powered by the Mobileye® System-on-Chip EyeQ® processor with state-of-the-art-vision algorithms); the Bendix® Driver Interface Unit (DIU™), or OEM dash display; the SafetyDirect® by Bendix CVS Processor; and the vehicle's telematics system.


The Bendix Fusion system locates and tracks moving and stationary vehicles. The radar is located at the front of your vehicle – either on the bumper or just behind it on a cross-member. When located behind the bumper, in some cases the unit may also be behind a protective covering that allows the radar signal to pass through. The camera is located on the windshield inside the wiper pattern.

The Bendix Fusion system radar is pre-aligned at the factory and no adjustment should be needed. If the radar becomes misaligned – or any other system problem is detected – a message (or light) on the dash lets you know that service is needed.

With a range of approximately 328 ft (100 m), the system reacts ONLY to vehicles moving in the same direction as you. (The system DOES NOT respond to side-to-side moving traffic or oncoming traffic.)

## System Display

Driver information about the Fusion system is either fully integrated into the vehicle dashboard, or uses the Bendix DIU. Although the system functions the same, how the alerts are displayed to you can be different. *See the System Features section of this manual for more detailed information about the alerts.*

## Active Cruise with Braking

When normal cruise control is on and set as confirmed by the cruise control icon on the dash, the Active Cruise with Braking (ACB) feature also becomes available. The system will not only intervene to maintain the cruise control set speed, but also can intervene to maintain a set following distance (about three seconds) behind the moving vehicle in front of you.

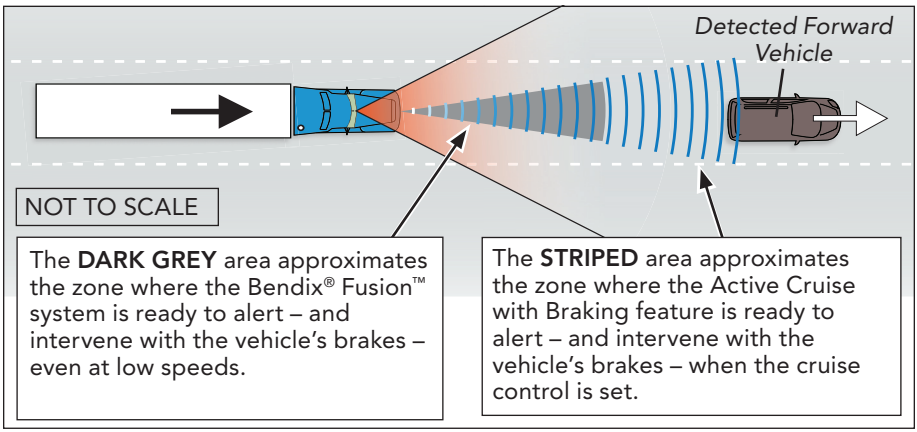
When you encounter a detected forward vehicle that slows down below the cruise control set speed, the system has the ability to de-throttle the engine, apply the retarder, or activate the foundation brakes – if needed – in order to maintain the gap with the forward vehicle.

### Auto-Resume after ACB Braking Event

If the system automatically applies the foundation brakes in order to maintain the gap with the forward vehicle, and the vehicle is above a minimum speed defined by the OEM, the vehicle will "auto-resume" back to the cruise control set speed and maintain the cruise control set speed setting.

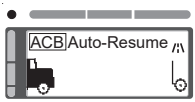
If the vehicle is below the minimum defined speed, the vehicle will automatically cancel cruise control and will not attempt to throttle up to a previously set cruise control set speed.

*See the striped area in the figure below.*



## Canceling Cruise Control and Active Cruise with Braking

At any time, you can step on the brake pedal, press "cancel," or turn cruise control off (normal methods) to cancel cruise control and the ACB Auto-Resume feature.




Shown here is an example of a message you may get when ACB Auto-Resume is active. Alerts and messages to the you will either come from the dash or the Bendix® Driver Interface Unit (DIU™) display. Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may display. **NOTE: As the driver, you should always be alert and ready to take over.**

## Passing a Vehicle / Changing Lanes

If you choose to pass a vehicle, you can apply throttle at any time to increase speed. As you pass the forward vehicle, it will go out of sight of the Bendix® Fusion™ system.

## When No Other Vehicles are Present

When no forward vehicle is within range of the Fusion system, your vehicle will maintain its set speed just like ordinary cruise control.

## The Forward Detected Vehicle Icon

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

This is an indication to you that the Fusion system is actively managing the distance between your vehicle and the vehicle ahead, and that the system may automatically intervene.

## What is Following Distance?

Following distance refers to the time gap – measured in seconds – between the vehicle equipped with the Fusion system and the vehicle ahead. The actual physical distance between the two will vary based on the speeds of both vehicles.

## Automatic Foundation Brake Applications

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

## When Not to Use Cruise Control

⚠ This vehicle's cruise control must only be used in the same conditions that are normally recommended for ordinary cruise control. THERE ARE CERTAIN SITUATIONS WHEN CRUISE CONTROL SHOULD NOT BE USED:

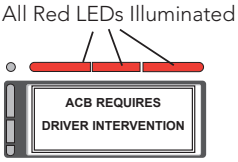
| | |
|---|---|
| Inclement Weather/Low Visibility Situations – Do not use cruise control in inclement weather or low visibility conditions – such as rain, snow, smoke, fog, ice, or other severe weather conditions – that may affect the performance of the Fusion system. |  |
| Dense Traffic – Do not use cruise control in heavy traffic or on roads where you cannot drive safely at a steady speed. |  |
| 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 forward vehicles, such as motorcycles, or certain types of trailers, may be difficult for the radar and camera to identify. It is your responsibility to be aware of these types of vehicles and to slow down if necessary. |  |

## Impact Alert and Autonomous Emergency Braking

This is the most severe warning and action the Bendix® Fusion™ system can make. Available at low vehicle speeds, 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 Fusion system may automatically apply up to full foundation brakes to help mitigate or lessen its severity. This newest version of the Bendix Fusion system can decelerate the vehicle by up to 50 mph (80 kph) when encountering a potential crash situation on a moving or stationary forward vehicle.

When activated, you will be notified by an audible and visual indication from the dash or the Bendix® Driver Interface Unit (DIU™).




Shown here is an example of a message you may get when the Impact Alert or Autonomous Emergency Braking is activated. Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may display. **NOTE: As the driver, you should always be alert and ready to take over.**

### Slower Moving Vehicles Ahead

The Fusion system is ready to intervene with braking as needed. You, the driver, must apply additional braking 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. Do not wait for the system to intervene!

### Stationary Vehicle Braking (SVB)

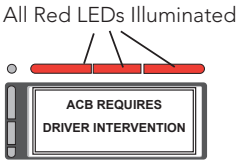
When a potential collision with a large, stationary, metallic object in your lane of travel (definitively identified as a vehicle) is detected, the system can sound an alert up to 3.5 seconds before impact.

If you don't take action to address the potential impact, the Bendix Fusion system may automatically engage the foundation brakes to assist you in reducing the severity or potentially avoiding the collision with that stationary vehicle.

If the system cannot definitively identify the stationary object as a vehicle, you will get up to 3.0 seconds of alert to address the situation but no automatic braking will activate.

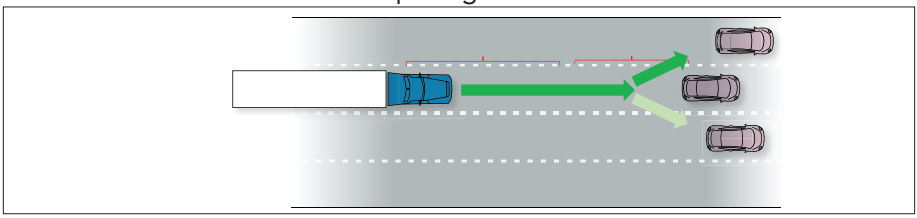
The stationary vehicle braking feature of the Bendix® Fusion™ system's Autonomous Emergency Braking is most useful when approaching a line of stopped traffic or a stalled vehicle that is not immediately recognized by a distracted driver, such as while driving in limited-sight conditions, at night, or in fog. Without the automatic alert and braking, it may be too late to avoid impact.

Shown here is an example of a message you may get when the Impact Alert, or Autonomous Emergency Braking, is activated. Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may display. **NOTE: As the driver, you should always be alert and ready to take over.**




## Multi-Lane Autonomous Emergency Braking (AEB)

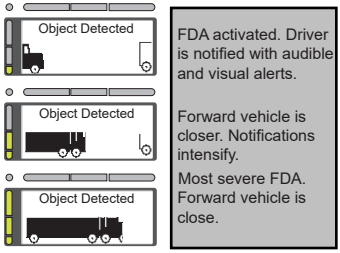
Not only can the Bendix Fusion system potentially mitigate a forward collision with an in-lane vehicle, it can also help you mitigate one when more than one highway lane is blocked. Once a collision mitigation braking event begins and you, as the driver, steer into an adjacent lane to avoid the forward vehicle, the Fusion system's new multi-lane AEB feature continues to apply the brakes – if needed – when it detects another forward vehicle ahead posing a threat in the new lane of travel.



## Following Distance Alerts (FDA)

FDAs are both audible and visual indications to you whenever the distance between your vehicle and the detected forward vehicle is less than 1.5 seconds (Bendix default distance) and getting closer. **NOTE: Confirm the FDA with your OEM.** 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, you will hear and see more rapid alerts.



When the Following Distance Alert (FDA) reaches its highest level, the beeping will be rapid and the dash may show an additional visual alert. Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may display.

## Stationary Object Alert (SOA)

The Bendix® Fusion™ system will provide up to 3.0 seconds alert when approaching a detected, sizeable, stationary object with metallic (radar-reflective) surfaces in your lane of travel. This alert is ready at low vehicle speeds and it indicates a collision with a stationary object is likely and you must take immediate action to potentially avoid, or lessen the severity of, a collision.

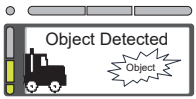
### Challenging Situations

Due to the inherent limitations of radar technology, the SOA may alert in response to stationary objects not in the vehicle lane of travel, such as a road sign on a bend ahead. Other examples include bridges, parked vehicles, and traffic lights.

The Fusion system does not automatically apply foundation brakes on stationary objects – only stationary vehicles as previously described.

Also, the Fusion system may not be able to detect objects with limited radar-reflecting surfaces or materials such as recreational vehicles, horse-drawn buggies, motorcycles, logging trailers, etc. As the driver, you are responsible for the safe operation of the vehicle at all times.

Shown here is an example of a message you may get when the SOA is activated. Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may display. **NOTE: As the driver, you should always be alert and ready to take over.**

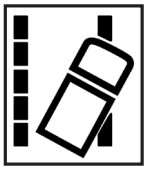



## Lane Departure Warning (LDW)

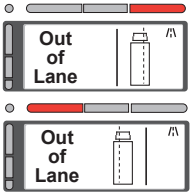
The Bendix Fusion system has the ability to warn you if your vehicle unintentionally departs its lane by emitting a rumble strip sound to get your attention.

In most vehicle applications, the LDW system 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 ready to immediately correct the vehicle lane position, especially when the LDW is activated.

The vehicle is equipped with a 15-minute Lane Departure Warning (LDW) disable switch that you can activate when driving on roads with inconsistent lane markings that can cause a lot of false warnings. Examples would include construction zones, poorly marked lanes, or missing lane markings. After activation, the system alerts will automatically become available again after 15 minutes.



Shown here is an example of a message you may get when the LDW is activated. Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may display. **NOTE: As the driver, you should always be alert and ready to take over.**




## Highway Departure Warning (HDW) and Highway Departure Braking (HDB)

### Highway Departure Warning (HDW)

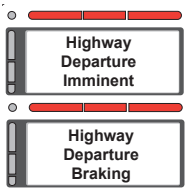
Built on the LDW functionality, Highway Departure Warning (HDW) provides an audible alert to you if the system determines your vehicle has unintentionally left the roadway.

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

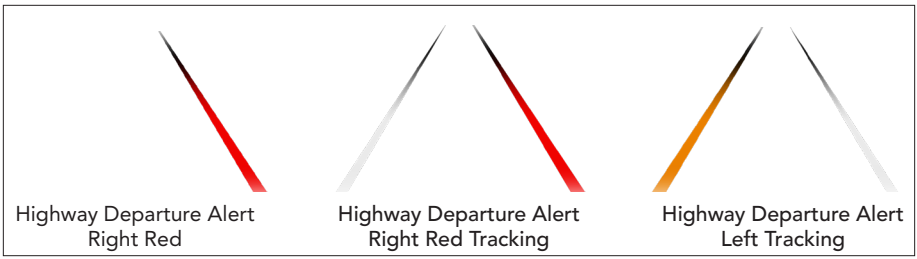
### Highway Departure Braking (HDB)

If the potential hazard that caused the HDW is not addressed, the Bendix® Fusion™ system may alert you by automatically applying the brakes to assist in reducing your vehicle speed moderately.

As the driver, you remain responsible for the safe operation of the vehicle at all times. HDB can be especially helpful in situations where you may have become drowsy behind the wheel.




Shown here is an example of a message you may get when the Highway Departure Warning, then braking is activated.



Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may display. **NOTE: Highway Departure Warning (HDW) and Highway Departure Braking (HDB) will only be effective if the lane markings are identifiable by the system.**

## Over-Speed Alert and Action (OAA)

The Bendix® Fusion™ system can read most roadside speed limit signs in North America and can warn you if your vehicle speed exceeds the posted speed limit.

The OAA is enabled at low vehicle speeds and will sound an audible and visual alert to you 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 will experience 1 second at 0% torque and a 3-second ramp-out. A message will then be transmitted to fleet management via the Bendix™ SafetyDirect® web portal.

Both the +5 and +10 mph 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. When driving between regions which post speeds in miles, and those which post in kilometers, the speed sign recognition feature will not function until the correct U.S./Metric selection is made.

Shown here is an example of a message you may get when the OAA is activated. Please verify with the vehicle operator's manual for audible and visual indications your vehicle may display.


## Special Alerts

### Brake Overuse Alert

The Fusion 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 may cause this alert to activate. When the system detects brake overuse, a text message will be displayed on the dashboard along with an audible alert. You should intervene immediately. Please verify with the vehicle operator's manual for the actual audible and visual indications your vehicle may 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 an overuse alert, you should not reset cruise control for at least 20 minutes. This gives 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 Fusion 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). You will continue to receive alerts, but all Fusion system interventions (de-throttling, engine retarder, or brake applications) will be disabled until the next ignition cycle.

**NOTE: In all cases, you still have the ability to apply the foundation brakes if necessary. You should take care since overheated brakes may reduce the vehicle's braking capability.**

## System Responses

This chart illustrates how the Bendix Fusion system reacts to specific driver actions.

| **Your Action:** | **Reaction of the Bendix® Fusion™ System:** |
|---|---|
| **If you, the driver, do this:** | **Expect the Fusion system to 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. |
| Step aggressively on the accelerator. *(During a collision mitigation event.)* | As the driver, you are always in control. Your actions can override any Fusion 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.** |
| Step on the brake. *(When in cruise.)* | Cruise control will be cancelled. |
| Step 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. |
| Switch on the cruise control. | Nothing. The Active Cruise with Braking (ACB) feature will not engage until you set the cruise control speed. |

| Your Action: | Reaction of the Bendix® Fusion™ System: |
|---|---|
| Switch off the cruise control. | The Active Cruise with Braking (ACB) feature will turn off; the collision mitigation feature remains active and ready to intervene. You, the driver, will continue to hear all alerts as needed. |
| Set the cruise control speed. | The Active Cruise with Braking feature is automatically activated, and your vehicle maintains set speed and following distance behind the vehicle ahead. |
| Cover or block the radar or camera. | The Bendix Fusion system performance will be diminished, or disabled, when either the radar or the camera become blocked. An alert will be issued to alert you of this condition.<br>Radar: A blocked radar will be indicated through an alert and will disable all Fusion functions. Camera-based functions such as Lane Departure Warning (LDW) will remain.<br>Camera: A blocked camera will be indicated through an alert and will disable all camera-based functions. The radar will maintain its function as a Bendix® Wingman® Advanced™ system. |
| Use normal cruise control "+/-" switch. | Vehicle speed will be increased (+) or reduced (-) 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 responses described above are typical but may vary with different versions of the Fusion system. These represent examples of driver actions and typical Fusion system responses; however, this chart does not attempt to cover all possible situations.**

# 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.

| What to Expect | | |
|---|---|---|
| **Situation** | **Typical System Indication/Alerts** | **Typical System Actions/Cautions** |
| **Stationary objects/vehicles ahead in your lane of travel** | | |
| A stationary – non-vehicle – metallic object is detected ahead in your lane.<br><br>*Cruise is either "ON" or "OFF."* | A Stationary Object Alert (SOA) may be issued up to three (3) seconds prior to impact. | None.<br>**⚠ WARNING**<br>You must immediately act to potentially avoid – or lessen the severity of – a collision. |
| A stationary motor vehicle is detected ahead in your lane.<br><br>*Factors that can potentially affect the system's ability to identify a vehicle include: if the vehicle is not a licensed motorized vehicle; or certain types of trailers.*<br><br>*Cruise is either "ON" or "OFF."* | A Stationary Vehicle Alert (SVA) may be issued up to three-and-a-half (3.5) seconds prior to impact. | **⚠ WARNING**<br>You must immediately act to potentially avoid – or lessen the severity of – a collision.<br>If a collision is likely to occur, the Fusion system can provide a warning and/or apply the vehicle brakes. |

**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 Indication/Alerts** | **Typical System Actions/Cautions** |
| **Moving objects/vehicles ahead in your lane of travel** | | |
| Your vehicle comes up fast behind a slower-moving detected forward vehicle.<br><br>*Cruise is either "ON" or "OFF."* | 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.<br><br>Depending on how close your vehicle approaches, the system may initiate an Impact Alert (IA) warning. | None.<br><br>You must respond as needed. If a collision is likely to occur, the collision mitigation feature will apply your vehicle's brakes. |
| The detected forward vehicle slows rapidly.<br><br>*Cruise is either "ON" or "OFF."* | 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. | None.<br><br>You must respond as needed.<br><br>If a collision is likely to occur, the collision mitigation feature will apply your vehicle's brakes. |
| A pedestrian, deer, or dog runs in front of your vehicle, or any organic or non-metallic object is in front of your vehicle.<br><br>*Cruise is either "ON" or "OFF."* | None. | None.<br><br>You must respond as needed. |

**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 Indication/Alerts** | **Typical System Actions/Cautions** |
| **Moving objects/vehicles ahead in your lane of travel** | | |
| Another vehicle crosses the road perpendicular to your path of travel – such as at an intersection.<br><br>*Cruise is either "ON" or "OFF."* | None. | None.<br>You must respond as needed. |
| A collision mitigation braking event has begun and you, as the driver, steer into an adjacent lane to avoid the forward vehicle.<br><br>*Cruise is either "ON" or "OFF."* | None. | Fusion will continue to apply the brakes if it detects another vehicle ahead in the new traffic lane posing a threat. |
| **Lane Departure System Active (Lane detection icons being displayed)** | | |
| Your vehicle signals a lane-change and crosses a lane-marking.<br><br>*Cruise is either "ON" or "OFF."* | None. | None. |

**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 Indication/Alerts** | **Typical System Actions/Cautions** |
| Traveling below 37 mph / 60 kph, your vehicle crosses a lane marker (without the corresponding turn signal activated).<br><br>*Cruise is either "ON" or "OFF."* | None. | None.<br>You must respond as needed. |
| **Lane Departure System Active (Lane detection icons being displayed)** | | |
| Traveling above 37 mph / 60 kph, your vehicle departs your lane of travel without the corresponding turn signal activated.<br><br>*Cruise is either "ON" or "OFF."* | A "rumble strip" audible/ vibration/visual alert is initiated. | None.<br>You must respond as needed. If you do not respond, the Fusion system may apply the brakes to reduce the vehicle speed moderately to alert you.<br>(Use the turn signal when changing lanes and/or keep your vehicle within the lane markings.) |

**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 Indication/Alerts** | **Typical System Actions/Cautions** |
| **Over-Speed Alert & Action**<br>***International travel:*** *When changing between regions which post speeds in miles and those which post in kilometers, the speed limit sign recognition feature will not function until the correct U.S./Metric selection has been made.* | | |
| Your vehicle passes a U.S. or Canadian speed limit sign. In some cases, this feature may detect speed signs on parallel roads, warning the driver and reducing the throttle.<br><br>*Cruise is either "ON" or "OFF."* | The Bendix® Driver Interface Unit (DIU™) will display the posted speed limit. | None. |
| Your vehicle exceeds the posted speed limit by 5 to 9 mph (8 to 14 kph). | An Over-Speed Alert (OAA) is issued and the posted speed limit will be visually presented to you, the driver. | None. |
| The vehicle exceeds the posted speed limit by more than 10 mph / 16 kph. | An audible Over-Speed Alert (OAA) is sounded and the posted speed limit will be visually presented to inform you that your vehicle should slow down. | If cruise control is NOT ON:<br>A one-second de-throttle of the engine will occur. |

**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 Indication/Alerts** | **Typical System Actions/Cautions** |
| **Interactions with vehicles ahead in your lane of travel** | | |
| With no detected forward vehicle. | None. | Your vehicle maintains the set speed. |
| With a detected forward vehicle.<br><br>*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.<br><br>*Cruise is "ON" and speed is "SET."* | 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. | You must respond as needed.<br><br>If the system intervenes, the vehicle throttle will be reduced; the engine retarder engaged; and the foundation brakes applied, in that order. |
| The detected forward vehicle slows rapidly.<br><br>*Cruise is "ON" and speed is "SET."* | 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. | You must respond as needed.<br><br>If the system intervenes, the vehicle throttle will be reduced; the engine retarder engaged; and the foundation brakes applied, in that order. |
| A detected forward vehicle cuts in front of your vehicle and speeds away.<br><br>*Cruise is "ON" and speed is "SET."* | Following Distance Alerts (FDAs) may be given to you, 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. |

| What to Expect | | |
|---|---|---|
| **Situation** | **Typical System Indication/Alerts** | **Typical System Actions/Cautions** |
| **Downhill Grades** | | |
| Going down a grade with a detected forward vehicle.<br><br>*Cruise is "ON" and speed is "SET."* | DO NOT USE cruise control on downhill grades. | DO NOT USE cruise control on downhill grades. Brake overuse may occur. |
| Cruise control should NOT be used on downhill grades. *See the CDL manual instructions on proper gear usage for downhill grades.* | | |

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

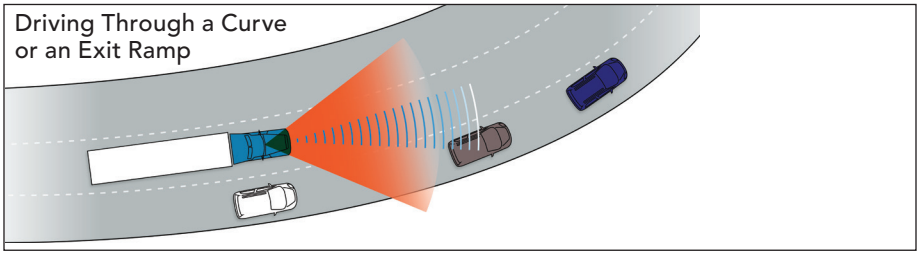
⚠ Due to the inherent limitations of radar and camera technology, the enhanced collision mitigation technology–on rare occasions–may not detect moving vehicles or stationary vehicles in your vehicle's lane of travel. Alerts, warnings, or brake interventions may not occur.

⚠ Due to the inherent limitations of radar and camera technology, the enhanced 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.

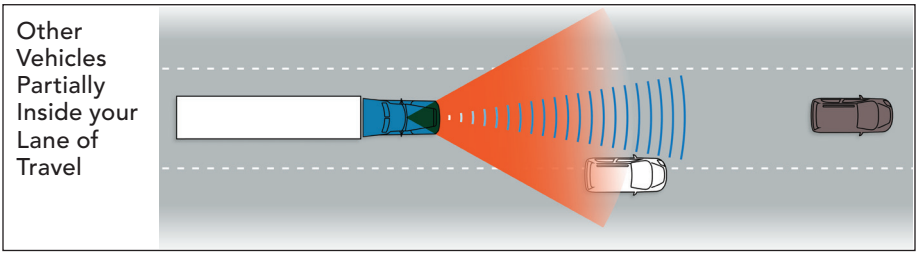
# Potentially Challenging Situations for the Bendix® Fusion™ System

The following examples illustrate situations in which the Bendix® Fusion™ system may issue an alert or braking in a manner not consistent with your expectations. The Bendix Fusion system may unexpectedly issue warnings, apply braking, or not respond.

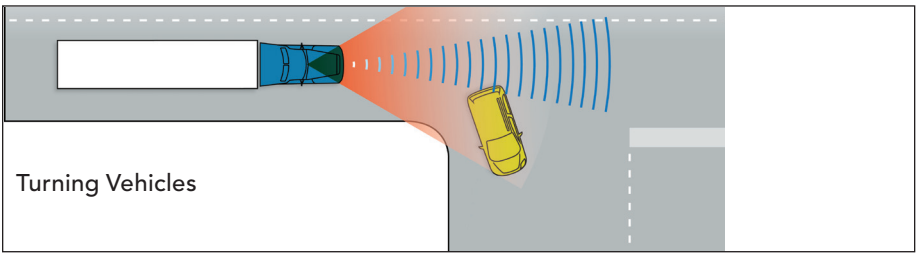
| Challenging Situation Examples |
| --- |




*Example 1 - Driving through a curve*

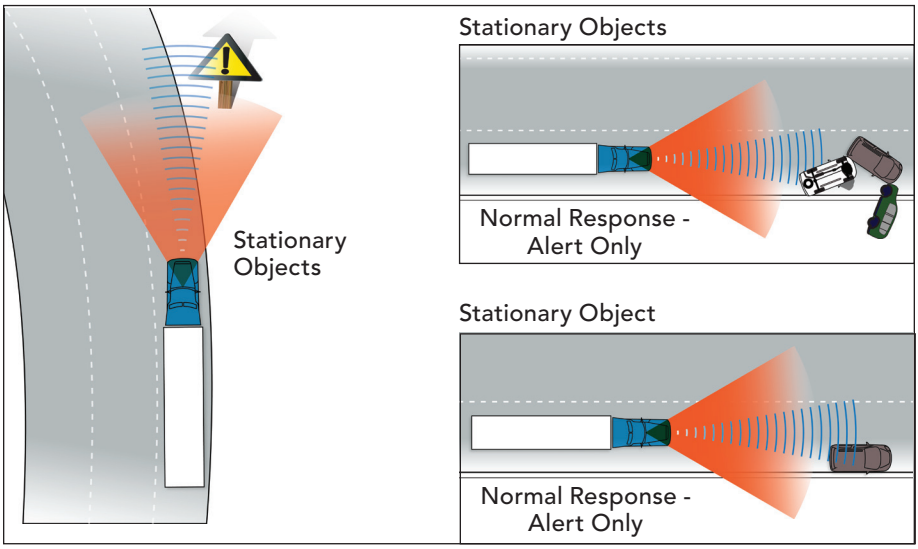



*Example 2 - Other vehicles ahead in your lane of travel*

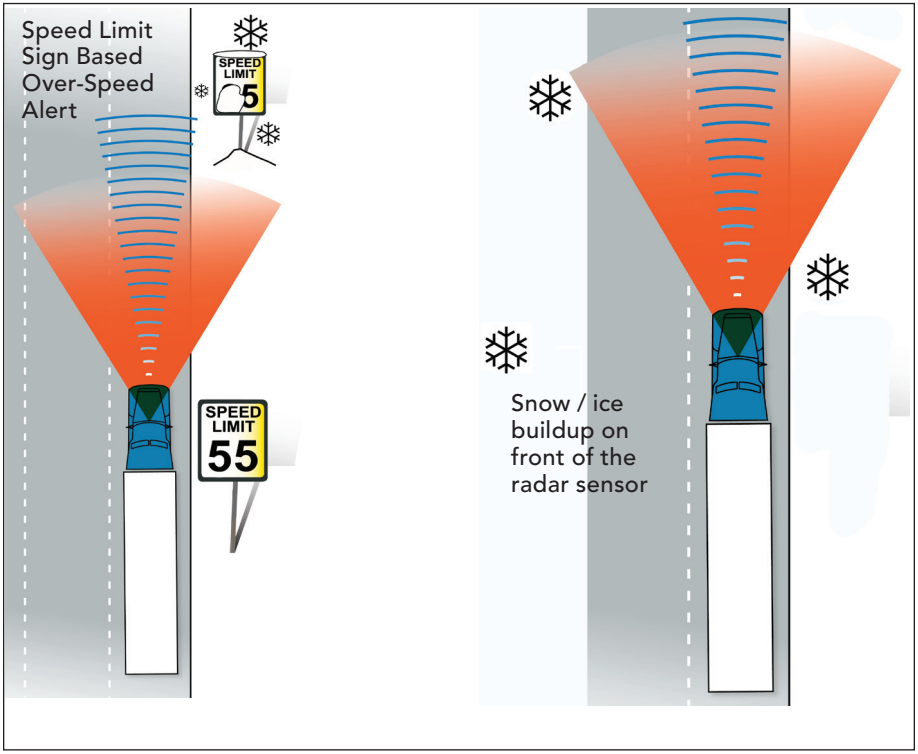



*Example 3 - Turning vehicles*

## Challenging Situation Examples (continued)




*Example 4 - Stationary objects*




*Example 5 - Speed limit sign unreadable* *Example 6 - Weather conditions*

## Tracking Vehicles in a Curve

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

- The system regains contact with the vehicle ahead;
- The system detects that there is no longer a vehicle ahead; 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 3 seconds behind a vehicle traveling at 45 mph / 72 kph that just entered a sharp curve. If the vehicle ahead is no longer detected as you travel around the curve, the Fusion system will delay the vehicle acceleration back to 50 mph (80 kph).*

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

## 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 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 to ensure the alignment has not been compromised. Never use the radar unit as a step.
- Ensure the tires are properly inflated and that adequate tread is present.

## When the Bendix® Fusion™ System Isn't Working

If the Bendix® Fusion™ system has detected a problem, depending on the vehicle manufacturer, there will typically be a warning message on the dashboard display, a Diagnostic Trouble Code (DTC) will be set, and you will be alerted. The system will determine – depending on the type of problem detected – if the vehicle may continue to have normal cruise control functions (without the benefits of the 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 functionality.

## Equipment Maintenance

**Importance of Antilock Braking System (ABS) Maintenance -** Optimal Bendix Fusion 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 Fusion to deactivate.

**Importance of Brake Maintenance -** Optimal Fusion system braking requires properly maintained truck foundation 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 Inspection -** You should visually 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.

**Radar Damage / Misalignment / Tampering -** In cases where the bumper and/or radar have sustained any damage, are misaligned – or if you suspect 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.*

**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.

# 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 the driver. Depending on the OE, the volume may be adjustable. *For systems using a Bendix® Driver Interface Unit (DIU™) display, see Bendix Fusion Advanced FLR10™ Sensor Service Data Sheet SD-61-4962 for information about volume adjustment.*

### Event Capture

In the case of vehicles configured to do so, the enable/disable switch used by the system also functions – when depressed for six seconds – to activate a request from the SafetyDirect® by Bendix CVS Processor on the On-Board Computer (OBC)/telematics system to transmit ten seconds of video data – the five seconds before and the five seconds after the button was pressed. In some cases, more video data may be available using the SafetyDirect web portal (subscription fee applies).

SafetyDirect by Bendix CVS delivers actionable information that can help improve fleet and driver safety. Data from the Fusion system's brake sensors, camera, and radar provides real-time knowledge and insight about your vehicle and surroundings while on the road. Together with the SafetyDirect Processor (SDP), they collect complex safety data and video that the SDP transfers to the SafetyDirect web portal (safetydirectportal.com) for review.

The user-friendly SafetyDirect web portal captures that data then, using your fleet's telematics system, automatically transmits driver performance and event-based information – including video – to your back office for analysis.

# 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.

## Acronyms and Definitions

| | |
|---|---|
| ABS | Antilock Braking System |
| ACB | Active Cruise with Braking |
| Bendix® ACom® PRO™ | Diagnostic Software |
| AEB | Autonomous Emergency Braking |
| CMB | Collision Mitigation Braking |
| Bendix® DIU™ | Driver Interface Unit |
| DTC | Diagnostic Trouble Code |
| ESP | Electronic Stability Program |
| FDA | Following Distance Alert |
| HDB | Highway Departure Braking |
| HDW | Highway Departure Warning |
| IA | Impact Alert |
| LDW | Lane Departure Warning |
| LED | Light Emitting Diode |
| OAA | Over-Speed Alert and Action |
| SOA | Stationary Object Alert |
| SVB | Stationary Vehicle Braking |

## Additional Information Sources About Bendix® Systems On Your Vehicle

Consult the vehicle manufacturer's documentation.

Visit bendix.com for free downloads of the Service Data sheets listed below, or order paper copies of these publications from the Literature Center at bendix.com.

### Service Data Sheets

- SD-61-4963 Bendix® Fusion™ System
- SD-64-20124 Bendix™ AutoVue® FLC-20™ Camera
- SD-13-4986 Bendix® EC-80™ ESP® Controllers
- SD-65-21025 SafetyDirect® Processor by Bendix CVS

Call 1-800-AIR-BRAKE (1-800-247-2725), option 2, or visit bendix.com for additional assistance.

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