ABS Operator's Manual

Bendix® Antilock Brake Systems

With optional advanced
antilock braking features:

• Automatic Traction Control (ATC)

and

• ESP® Stability System

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

⚠WARNING

Read, understand and follow the information in this manual, particularly the Important Safety Information about ABS (page 4) and ESP (page 7).

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Understanding Bendix® Antilock Braking Systems (ABS) For Air Braked Vehicles

What Is ABS?

ABS is an electronic control system that improves vehicle stability and steerability by preventing wheel lock during braking.

How Does ABS Work?

The ABS system monitors wheel rotation, and if it detects any wheel locking up, the system automatically reduces the brake pressure at that wheel. If necessary, the ABS system automatically modulates braking forces at one or more of the wheel ends. The system maintains lateral stability by preventing wheel lock during braking.

What is the optional ABS Off-Road Mode?

This is an optional ABS feature operated by a dash-mounted switch for use when operating your vehicle "off-road" on soft surfaces. Below 25 mph (40.2 kmh), this feature improves ABS performance under off-road operating conditions. If your vehicle is equipped with this feature, toggle the switch to the "ABS off-road" position when operating on soft surfaces. Always remember to turn the ABS off-road feature off when driving on a firm road surface. A new ignition cycle, or a second depression of the Off-road switch, will turn this function off and restore normal ABS functionality and (if installed) full ESP functionality. For more details on optional ATC and ESP features, see pages 6 and 7 of this manual.

WARNING! The ABS Off-Road mode should not be used on normal, paved road surfaces because vehicle stability and steerability may be reduced. The ABS indicator lamp will flash slowly to indicate to the driver that the ABS off-road mode is engaged.

CAUTION: When the ABS Off-Road mode is engaged, stability functions are disabled at speeds below 25 mph (40.2 kmh). The ATC/ESP Indicator lamp will illuminate to indicate that the stability systems are disabled.

Important Safety Information About Bendix® Antilock Braking Systems (ABS)

Braking With ABS

- **Do not pump your brakes.** Use steady, even brake applications. Apply the brake pedal with the same pressure as you would without ABS. If you are towing a vehicle that is not equipped with ABS, you may need to adjust your braking applications in some instances. See below.
- **Do not attempt to modulate your brake applications to prevent wheel lock.** The system controls braking pressure automatically and independently at each wheel end.

Limitations Of ABS

- **ABS does not apply the brakes automatically.** It's still up to you to apply the brakes at the right time and with the right amount of pedal force. A basic ABS system only starts to do its job after you apply the brake pedal. **Note:** The optional ESP® stability system **can** reduce the throttle and **may** apply some or all of the brakes selectively to maintain vehicle stability. See page 7.
- **ABS is not a substitute for safe driving.** Even with ABS, you must remain alert, react appropriately and in a timely manner, and drive defensively. Don't take unnecessary risks. Cautious driving practices, such as maintaining an adequate distance away from the vehicle ahead, not speeding, anticipating obstacles and adjusting your vehicle's speed for traffic, weather and road conditions, are essential for safe operation.

Towed Vehicles Without ABS

Some towed vehicles, especially older trailers built before 2001, may not be equipped with their own ABS systems. **Use extra care when towing a vehicle that is not equipped with its own ABS system.** During emergency braking or braking on slippery surfaces, a non-ABS equipped trailer could lose its lateral stability and swing out if its wheels lock up. Use your mirrors to watch carefully and adjust your brake applications as necessary to keep your tractor and the non-ABS equipped towed vehicle in line with each other. Tractor ABS helps reduce the tendency to jackknife, but it cannot prevent a non-ABS equipped trailer from swinging out.

Understanding Automatic Traction Control (ATC)

What is ATC?

ATC is an optional feature for Bendix® ABS-equipped vehicles. ATC controls wheel spin during vehicle acceleration.

- The ATC system will intervene automatically and apply braking pressure to a spinning wheel transferring engine power to other drive wheels that have better traction. This feature is active only at speeds below 25 mph (40.2 kmh).
- If all of the drive wheels begin to spin, the ATC system will reduce engine throttle to improve traction at all of the drive wheels.

How Do I Operate A Vehicle With ATC?

If drive wheels begin to lose traction during acceleration, ATC will engage automatically to assist the driver in accelerating the vehicle. The ATC/ESP lamp will flash rapidly to let you know whenever ATC is actively functioning.
Note: For vehicles equipped with an interaxle differential lock switch, you should consult the vehicle Operator's Manual for additional information about that feature. Typically, the driver is advised to stop the wheels from spinning and engage the interaxle differential lock switch, but you should always follow the specific instructions given in your vehicle's Operator's Manual for this feature and your vehicle's particular configuration.

What Is The Optional Deep Mud/Snow Switch?

This is an optional ATC feature operated by a dash-mounted switch. This function allows greater engine power and more wheel spin during ATC operation. On vehicles equipped with this feature, toggle the switch to the "Mud/Snow" position when operating on soft road surfaces. The ATC lamp will flash slowly to remind you that this function has been selected, and will flash rapidly whenever the ATC system is actually operating in the Mud/Snow mode. Always remember to turn the Mud/Snow feature off when driving on a firm road surface. A new ignition cycle, or a second depression of the Mud/Snow switch, will turn this function off.

What is Bendix® Smart ATC™?

Bendix® Smart ATC™ traction control monitors the accelerator pedal position to help provide optimum traction and vehicle stability. By determining the driver's throttle input and adapting the drive wheel behavior to the driving situation, the Smart ATC™ traction control allows higher wheel slip when the accelerator pedal is applied above a preset level. In addition, the wheel slip allowed by Smart ATC™ is decreased when driving through a curve for improved stability.

Understanding The ESP® Stability System

What Is ESP?

ESP stability system is an optional feature for Bendix® ABS-equipped vehicles that reduces the risk of rollovers, jackknifing and other loss of control. ESP features include Roll Stability Program (RSP) and Yaw Control.

Roll Stability Program (RSP)

What Is RSP?

RSP roll stability system is an optional feature for ESP stability system-equipped vehicles that reduces the risk of rollovers.

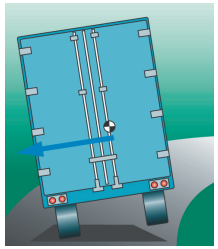
How Does RSP Improve Vehicle Roll Stability?

RSP counteracts the tendency of a vehicle, or vehicle combination, to tip over while changing direction (typically, while turning). The lateral forces during a turn can push a truck or tractor-trailer horizontally and, if the friction between the tires and the road is sufficient, the vehicle may begin to tip and potentially could roll over.

To reduce the risk of rollover, RSP detects potential rollover conditions and slows the vehicle both by reducing engine throttle (and hence, engine torque) and by applying the tractor and trailer service brakes as needed at the appropriate wheels.

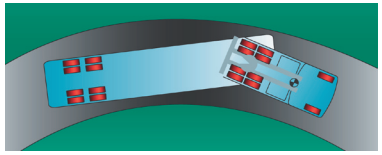
WARNING! During an RSP system intervention, the vehicle **automatically decelerates**. RSP can slow the vehicle with or **without you applying the brake pedal**, and **even when you are applying the throttle**.

During an RSP system intervention, you can always use your service brake pedal to increase the braking pressure that will be applied. However, if you were to apply less braking pressure than needed — or even if you release the brake pedal entirely during an RSP intervention — the RSP system will continue to apply the necessary amount of braking pressure automatically to the appropriate wheels to mitigate a potential rollover.



A Real World Example Of How RSP Operates:
Excessive speed for road conditions creates forces that exceed the threshold at which a vehicle is likely to rollover on a higher-friction surface.

RSP automatically reduces engine torque and applies the service brakes (based on the projected rollover risk) to reduce the vehicle speed, thereby reducing the tendency to roll over.



Yaw Control

What Is Yaw Control?

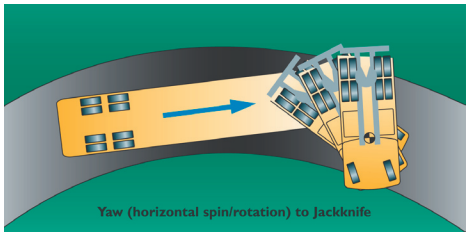
Yaw Control is an optional feature for ESP® stability system-equipped vehicles that reduces the risk of jackknifing and other loss of control.

If a vehicle's tires start to slide during a turn, Yaw Control counteracts the tendency of that vehicle to spin (or "yaw"), thereby reducing the risk of a jackknife or other loss of control. Many factors, including road conditions, load distribution and driving behavior, can contribute to the development of a spin.

Spins occur where either: (a) the rear wheels begin to lose their grip on the road (which could lead to a jackknife when towing a trailer), or (b) the front wheels begin to lose their grip, reducing a vehicle's ability to respond to the driver's steering inputs.

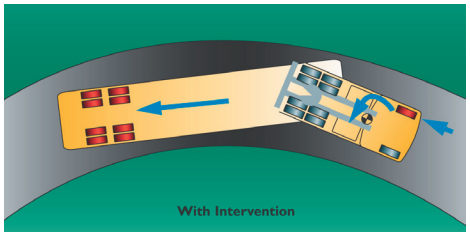
Yaw Control continually monitors the direction in which you are steering the vehicle as well as the vehicle's response to those steering inputs. If the system detects that the vehicle is beginning to spin, Yaw Control reduces the engine throttle, uses selective braking at the four corners of the tractor, and may also use trailer braking, to help you keep the vehicle under control.

WARNING! During a Yaw Control system intervention, the vehicle **automatically decelerates.** Yaw Control can slow the vehicle with or **without you applying the brake**, and **even when you are applying the throttle.**



A Real World Example Of How Yaw Control Operates: Excessive speed exceeds the threshold, creating a situation where a vehicle is likely to spin and jackknife.

The Bendix® Yaw Control system reduces engine throttle and selectively applies brakes to reduce the tendency to jackknife.



Important Safety Information About The Bendix® ESP® Stability System

ESP May Reduce Your Speed Automatically

ESP can make your vehicle **decelerate automatically.** ESP can slow the vehicle with or **without you applying the brake**, and **even when you are applying the throttle.**

To minimize unexpected deceleration and reduce the risk of a collision:

- Avoid aggressive driving maneuvers, such as sharp turns or abrupt lane changes at high speeds, which might trigger the stability system.
- Always operate your vehicle safely, drive defensively, anticipate obstacles and pay attention to road, weather and traffic conditions. ABS, ATC and ESP stability systems are no substitute for prudent, careful driving.

Towing Doubles Or Triples May Greatly Reduce The Effectiveness Of The Stability System

ESP is designed and optimized for trucks and for tractors that tow single trailers. If a tractor equipped with ESP is used to power multiple trailer combinations (known as "doubles" or "triples") **the effectiveness of the ESP system may be greatly reduced.** Extremely careful driving is always required when towing doubles or triples. Avoid excessive speed and aggressive maneuvers, such as sharp turns, sudden steering inputs or abrupt lane changes.

Limitations Of The Stability System

Your ESP stability system's effectiveness may be greatly reduced if:

- Your load shifts due to improper retention, accident damage or the inherently mobile nature of some loads (for example, hanging meat, live animals or partially laden tankers),
- Your vehicle or load has an unusually high or off-set center of gravity (CG),
- One side of your vehicle drops off the pavement at an angle that is too great to be counteracted by a reduction in speed, or
- Your vehicle is used to haul double or triple trailer combinations.

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To Maximize The Effectiveness Of ESP:

- Make sure that the weight of your load is evenly distributed, front to back and side to side, and is properly secured at all times.
- Exercise extreme caution at all times while driving, and avoid sharp turns, sudden steering inputs or abrupt lane changes at high speeds, particularly if:
  - › you haul loads that could shift,
  - › your vehicle or load has a high or off-set center of gravity (CG) when loaded, or
  - › you are towing doubles or triples.

Truck Chassis Modifications

The ESP system was specifically calibrated and validated only for your vehicle's original configuration. If your vehicle's chassis components are altered (for example, a wheel base extension or reduction, tag axle addition or removal, a major body change such as conversion of a tractor into a truck, or an axle, suspension, or steering system component modification) the Bendix® ESP system must be disabled at the same time by a qualified mechanic. If a modified vehicle does not have the ESP system disabled, serious vehicle braking and performance issues could result, including unnecessary ABS interventions. See your Vehicle's Owner's Manual or Bendix Service Data Sheet SD-13-4869 for additional important information about configuration criteria.

Steering Angle Sensor Re-Calibration

Whenever maintenance or repair work is performed to the steering mechanism, linkage, steering gear, adjustment of the wheel track, or if the steering angle sensor is replaced, a recalibration of the Steering Angle Sensor must be performed.

WARNING! If the Steering Angle Sensor is not recalibrated, the Yaw Control system will not function properly, which could result in a loss of control of your vehicle.

WARNING! When replacing a steering wheel, use only vehicle manufacturer recommended components and be sure that the Steering Angle Sensor is not damaged during installation. Recalibrate the Steering Angle Sensor.

Yaw Rate Sensor Location and Orientation

WARNING! The **location and orientation of the Yaw Rate Sensor must not be altered.** When servicing, an identical component must be used in the same orientation (using OEM brackets & torque requirements). During installation follow the OEM leveling guidelines.

See page 12 for sources of additional information.

Understanding Your ABS Indicator Lamps

ABS Indicator Lamp

An amber ABS Indicator Lamp is typically located on the dashboard.

- At each vehicle ignition your ABS indicator lamp should illuminate as a bulb check for approximately three seconds and then turn off. **If the lamp does not illuminate at ignition, you should have the vehicle serviced by a qualified mechanic as soon as possible.** Note: without a functioning indicator lamp, you may not be able to determine the ABS status without using an external diagnostic tool.
- If the indicator lamp remains on for more than three seconds after ignition, or if it illuminates as you are driving, the ABS system may not be fully functional or its operation may be affected by a short or power interruption. If this happens, your vehicle will still have normal service braking and it still can be driven, although without the benefits of ABS. **Have the vehicle serviced by a qualified mechanic as soon as possible to restore full ABS functionality.**
- The ABS lamp is also used to indicate the optional off-road ABS mode. The lamp will flash continually when the vehicle is operating in the off-road mode. (Note: When the ABS Off-Road mode is engaged, stability functions are disabled at speeds below 25 mph (40.2 kmh). The ATC/ESP Indicator lamp will illuminate to indicate that the stability systems are disabled.) See page 12 of this manual for additional sources of information about the ABS off-road operating mode.

Trailer ABS Indicator Lamp

The Trailer ABS Indicator Lamp is also dash-mounted.

- All trailers built since March, 2001 are able to communicate with the towing vehicle and to operate the trailer ABS indicator lamp on the towing vehicle's dash. The trailer ABS indicator lamp functions just like the tractor ABS indicator lamp (on for three seconds after each vehicle ignition, then off unless a problem develops with the trailer ABS during operation). The dash-mounted Trailer ABS Indicator Lamp is in addition to a Trailer ABS Indicator Lamp that is mounted on the side of the trailer itself.

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ATC/ESP Indicator Lamp (Optional)

If your vehicle is also equipped with the optional ABS features, ATC or ESP, a third indicator lamp will be installed on the dash. (The same lamp is also used to indicate the ATC "Mud/Snow" mode.)

- Your ATC/ESP indicator lamp will illuminate for approximately two and a half seconds (during the bulb check at vehicle ignition) and then turn off.
- The ATC/ESP indicator lamp also flashes continually (at different speeds) to show that the off-road mode is being used, or during an ATC or ESP intervention event. See below for sources of additional information.
- If your vehicle is operating in the off-road mode (an optional feature), the ATC/ESP indicator lamp will illuminate and remain on to remind you that ATC/ESP functions are disabled during operation in off-road mode.
- If the ATC/ESP indicator lamp does not illuminate at ignition, or if it remains on steadily (not flashing) after ignition, or if it illuminates steadily (not flashing) while you are driving (except in off-road mode), the ATC or ESP system may not be fully functional or their operation may be affected by a short or power interruption. If this happens, your vehicle will still have normal service braking and it still can be driven, although without the benefits of ATC or ESP. **Have the vehicle serviced by a qualified mechanic as soon as possible to restore full ATC/ESP functionality.**

Sources For Additional Information About Your Bendix® ABS System

Consult the vehicle manufacturer's documentation or visit www.bendix.com to download these publications for free

Order This Service Data Literature:

SD-13-4863 Standard and Premium EC-60™ ABS BW2428

SD-13-4869 Advanced EC-60™ ABS BW2429