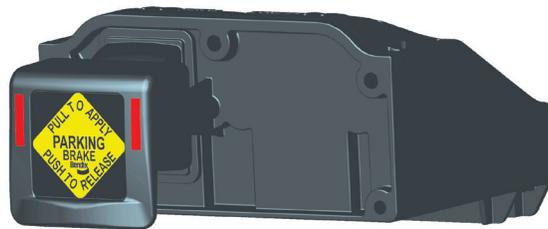


Bendix® Intellipark® Electronic Park Brake (EPB) System



**Dash Electronic Control Unit (DECU)
Towing Vehicle Variant
(similar to the Bendix® MV-3® Dash Control Valve)**



**Dash Electronic Control Unit (DECU)
PP-Left Non-Towing Vehicle Variant
(similar to the Bendix® PP-DC® Park Control Valve)**



**Dash Electronic Control Unit (DECU)
PP-Right Non-Towing Vehicle Variant
(similar to the Bendix PP-DC Park Control Valve)**

Figure 1 - Bendix® Dash Electronic Control Unit (DECU) Variants

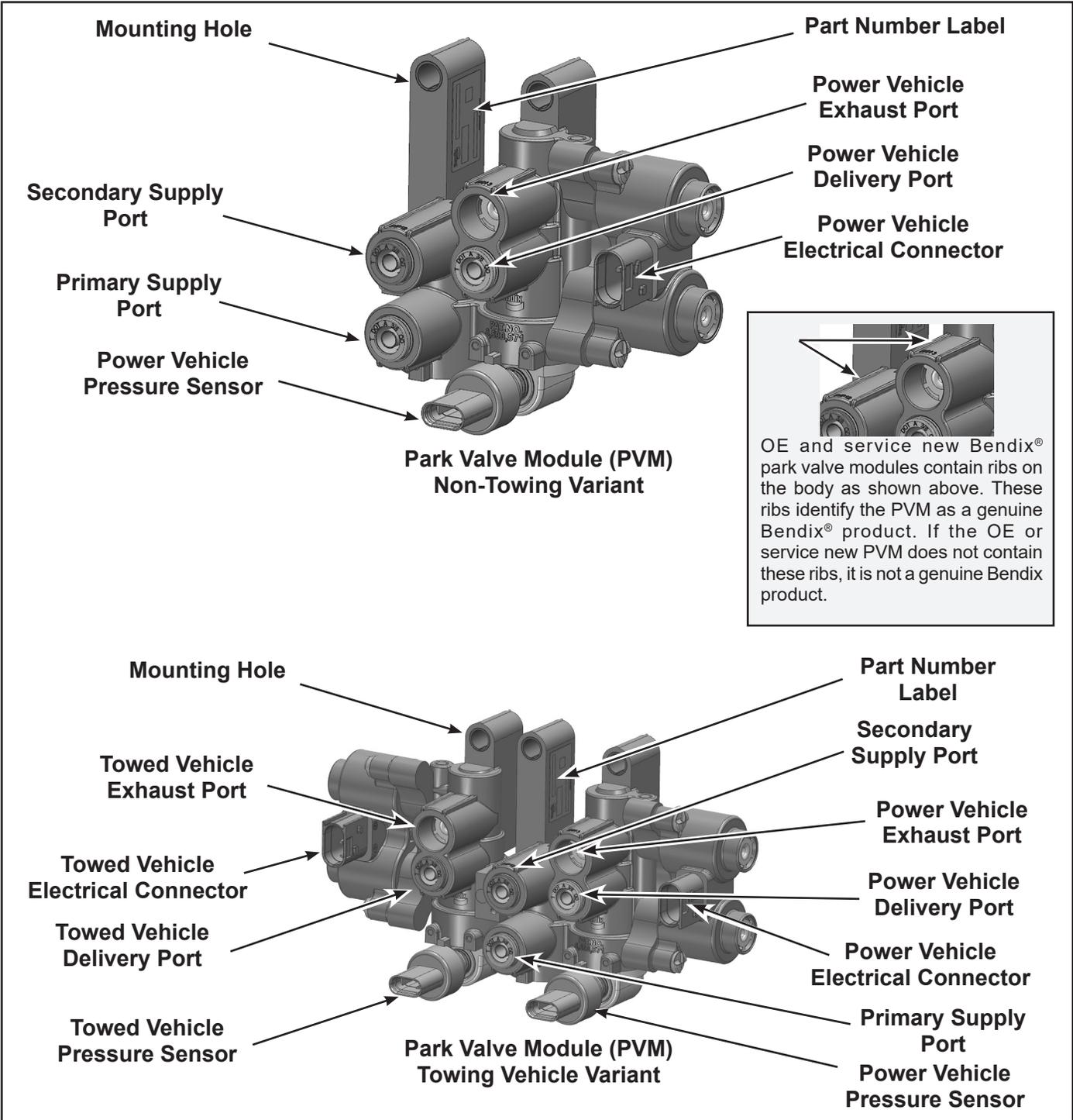


Figure 2 - Bendix® Park Valve Modules (PVM)



GENERAL SAFETY GUIDELINES

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS

TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following guidelines should be observed AT ALL TIMES:

- ▲ Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲ Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲ Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲ If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, a Bendix® AD-9si®, AD-HF®, or AD-HFi™ air dryer, be sure to drain the purge reservoir.
- ▲ Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲ Never exceed manufacturer's recommended pressures.
- ▲ Never connect or disconnect a hose or line containing pressure; it may whip and/or cause hazardous airborne dust and dirt particles. Wear eye protection. Slowly open connections with care, and verify that no pressure is present. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲ Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, wiring, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲ Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲ Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲ For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲ The power **MUST** be temporarily disconnected from the radar sensor whenever any tests USING A DYNAMOMETER are conducted on a vehicle equipped with a Bendix® Wingman® system.
- ▲ You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.

INTRODUCTION

The Bendix® Intellipark® Electronic Park Brake (EPB) System provides parking capability for commercial vehicles (tractors, trucks, and buses) that utilize air brakes. It is available in various models to support a wide range of applications. The system contains the Dash Electronic Control Unit (DECU), the Park Valve Module (PVM), and a Peripheral Human-Machine Interface (pHMI) – provided by the vehicle Original Equipment Manufacturer (OEM) or by Bendix.

The Intellipark EPB system functionally replaces previous Bendix® park brake dash valves such as the MV-3® dash control valve, the Bendix® PP-1® control valve, and the Bendix® PP-DC® park control valve with an electromechanical valve and an electronic controller which includes a driver interface. The Intellipark EPB system provides many of the same features and functions as manual park brake dash valves, but also provides advanced features and functions not available in the previous park brake valves.

Proper integration of the Intellipark EPB system by the vehicle OEM provides the following vehicle operation functions:

- Allows solo vehicle (bobtail tractor, solo truck, or bus) to be parked and unparked
- Allows combination vehicle to be parked and unparked
- Allows power unit with towing provisions to couple to, and uncouple from, a towed unit (power unit brakes to be released while trailer brakes are set)
- Allows power unit with towing provisions to charge towed unit(s) while parked
- Allows power unit with towing provisions to be operated as a solo vehicle (bobtail)
- Allows driver to determine vehicle spring brake status
- Allows driver to determine availability of park system
- Allows control of vehicle while driving

Proper integration of the Intellipark EPB system by the vehicle OEM provides the following vehicle driver assistance functions:

- Assists in mitigating driver error of leaving the vehicle unparked while not present to control the vehicle
- Assists in mitigating driver error of attempting to unpark while not in control of the vehicle
- Reduces the likelihood of damage in a drive-away with the trailer parking brakes applied (trailer air charge assist)

 **WARNING**

The Bendix® Intellipark® Electronic Parking Brake (EPB) system cannot detect issues with other components of the park brake system, such as the spring brake chambers. Accordingly, drivers and maintenance personnel must perform inspections and maintenance on the park brake system in accordance with established procedures. For proper operation of the Intellipark EPB system, all other components of the park brake system must be functioning as designed.

 **WARNING**

Improper use of the Intellipark EPB system can result in an unsafe park state, causing property damage, serious injuries, or death. Drivers must be responsible for the safe operation of the vehicle at all times. The Intellipark EPB system does not replace the need for a skilled driver, reacting appropriately and in a timely manner, and using safe driving practices.

 **IMPORTANT**

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

VEHICLE OPERATION FEATURES

Towing Vehicle: Single-Button Park

The Intellipark EPB system provides the ability to park all units of a combination vehicle with a single input. This feature is similar to the single-button park feature of the Bendix® MV-3® dash control valve. Upon pulling the yellow switch of the Dash Electronic Control Unit (DECU), the Park Valve Module (PVM) will exhaust the air from the power unit and towed unit channels. The behavior of this feature is modified if the vehicle is moving. *See the section SPRING BRAKE CONTROL AT SPEED* for more details.

Towing Vehicle: Independent Trailer Air Control

The Intellipark EPB system provides the ability to charge or evacuate the trailer supply (red) line independent of the state of the power unit spring brakes. This feature allows

operation of a vehicle with towing provisions as a solo vehicle, supports coupling and uncoupling operations, and allows trailer emergency brake control. Upon pulling the red switch of the DECU, the PVM will exhaust the air from the towed unit channel, with no change in state of the power unit (yellow) channel. Upon pushing the red switch of the DECU, if the trailer air charge interlocks have been satisfied, the PVM will deliver air to the towed unit channel, with no change in state of the power unit (yellow) channel.

Towing Vehicle: Independent Trailer Air Charge Interlock

The Intellipark EPB system provides the ability to restrict the air charge function of the trailer based on inputs from the vehicle, including the service brakes and ignition switch. This feature is intended to help mitigate the possibility of release of the trailer park brakes without a driver in control of the vehicle, while allowing the trailer(s) to be charged with the power unit parked. This functionality supports coupling and uncoupling operations, including pre-trip inspections for some types of combination vehicles.

The standard configuration of this feature inhibits the release of the towed unit spring brakes unless the ignition is “on” and the driver’s foot is on the service brake.

Spring Brake Control at Speed

Also known as “exhaust-at-speed,” the Intellipark EPB system provides functions to help the driver achieve a controlled stop when the yellow or red switch is pulled while the vehicle is in motion, while at the same time helping to mitigate the possibility that accidental switch operation will cause the spring brakes to apply while driving. This feature provides a short, programmable delay before an exhaust event is initiated when the driver pulls the yellow or red switch when the vehicle is in motion. The delay time is dependent on vehicle speed; at low speeds, no delay is initiated.

This function is intended to fulfill emergency brake operation requirements while reducing the likelihood of unintended activations of the spring brakes at normal on-road speeds. In an emergency situation where the service brakes are not available while driving, if activating the spring brakes is needed to reduce vehicle speed, pull and hold the parking (yellow) and/or trailer emergency (red) switch until the desired spring brakes have been activated. Pull-and-hold of the parking (yellow) switch will activate the spring brakes of the tractor and trailer. Pull-and-hold of the trailer emergency (red) switch will activate the spring brakes of the trailer.

The exhaust-at-speed feature provides an automatic release of the spring brakes once the driver has released the switch and it has returned to its neutral position (dependent on the speed of the driver since at low speeds the vehicle will be parked).

Once an exhaust-at-speed event has been initiated, the driver may push the red and/or yellow switch as needed to indicate intent to charge the spring brakes. Pushing the yellow switch will charge only the tractor channel, while pushing the red switch will charge only the trailer channel. This would only be necessary at low speeds when the system would fully park the vehicle.



Never attempt to test the exhaust-at-speed feature or use it in the course of normal driving. This feature is intended for use only in emergency situations where the tractor and/or trailer service brakes are not available while driving. Testing the exhaust-at-speed feature can only be safely performed on a test track with a trained driver. Failure to follow this warning could lead to vehicle damage, property damage, injury, or death. Drivers and maintenance personnel must read and understand the contents of the Intellipark owner's manual before operating a vehicle equipped with the Bendix® Intellipark® Electronic Parking Brake (EPB) System.

Activation of the spring brakes while driving should only be performed by qualified drivers in emergency situations where the safest action available to the driver is to activate the spring brakes while driving. Activation of the spring brakes while driving can result in a degradation of vehicle control, causing property damage, serious injuries, or death.

The Bendix Intellipark EPB system is designed with features to lessen the possibility of accidental activation of the spring brakes while driving. The driver must pull and hold the switch for 0.25 seconds [a vehicle Original Equipment Manufacturer (OEM) configurable delay] to activate the spring brakes at road speeds. This delay allows emergency brake control while protecting against accidental activation of the spring brakes.

Roll Away Mitigation (Driver Assistance Feature)

The Intellipark EPB system's roll away mitigation feature is intended to mitigate the possibility of a roll-away resulting from the driver failing to park the vehicle. The Intellipark EPB system provides the ability to detect some situations where the vehicle is unparked and the driver is not present in the driver's seat, based on inputs from the vehicle including the cab doors, service brakes, and engine throttle

pedal. In response to a predetermined sequence of inputs, roll away mitigation will automatically set the parking brake. The roll away mitigation feature is not intended to be a primary automation feature. In all cases, the driver remains responsible for activating the park switch for each drive cycle. Roll away mitigation includes a feature to reinforce proper driver behavior: If this feature has parked the vehicle, the driver will be informed by flashing LEDs and must pull the park switch prior to the system allowing the driver to unpark the vehicle.



Drivers and maintenance personnel must not rely on the Intellipark EPB system to automatically park the vehicle. Drivers continue to be responsible for safe and proper operation of the vehicle.

Power Unit Park Brake Release Interlock (Driver Assistance Feature)

The Intellipark EPB system provides the ability to restrict the release of the parking brakes based on inputs from the vehicle including the cab doors, service brakes, and ignition switch. This feature is intended to help mitigate the possibility of unauthorized operation of the vehicle or release of the park brakes without a driver in control of the vehicle.

The standard configuration of this feature inhibits the release of the power unit spring brakes unless the ignition is "on," the cab doors are closed, and the driver's foot is on the service brake.

Towing Vehicle: Trailer Air Charge Assist (Driver Assistance Feature)

The Intellipark EPB system provides the ability to detect some situations where the driver attempts to drive a combination vehicle with the trailer(s) parked, based on inputs from vehicle speed data, powertrain data, engine throttle pedal, service brakes, and measurement of the air pressure in each Intellipark channel. In response to a predetermined sequence of inputs, the Intellipark EPB system will automatically charge the trailer channel, thereby releasing the trailer parking brakes if the parking brake system downstream of the Intellipark valve is healthy.

This feature is not intended to be a primary automation feature. In all cases, the driver remains responsible for pressing the trailer charge switch at the beginning of each drive cycle. The trailer air charge assist feature will activate every time the conditions are met unless the system is in bobtail mode.

WARNING

Under certain conditions, the Bendix® Intellipark® Electronic Parking Brake (EPB) system can automatically release the trailer park brakes. Drivers and maintenance personnel must read and understand the contents of the Intellipark owner's manual before operating an Intellipark-equipped vehicle.

UNIT SUMMARY

The Intellipark EPB system is designed to operate with the Dash Electronic Control Unit (DECU) and Park valve Module (PVM). Substitution of either component is not permitted. Additionally, the system also requires a Peripheral Human-Machine Interface (pHMI) [either provided by Bendix or the vehicle Original Equipment Manufacturer (OEM)].

DECU - Dash Electronic Control Unit

- The DECU is an Electronic Control Unit (ECU) with an integrated Peripheral Human-Machine Interface (pHMI) with a push-pull switch for the power unit (yellow) channel, and if needed, a similar push-pull switch for the towed unit (red) channel. The DECU interprets switch motion into driver intent. Based on that input and other inputs from the vehicle (via discrete I/O or J1939 CAN), it activates solenoid valves to produce the desired pneumatic response. **NOTE:** Units may have various switch orientations (horizontal or vertical) and mounting brackets. *As shown in Figure 3*, the DECU PP variant is available in both PP-Right and PP-Left variants.

DANGER

Obstruction of the motion of the Intellipark switches may prevent proper operation of the spring brakes. Failure of the spring brakes to operate properly may cause undesired vehicle behavior such as a roll-away, resulting in property damage, serious injuries, or death.

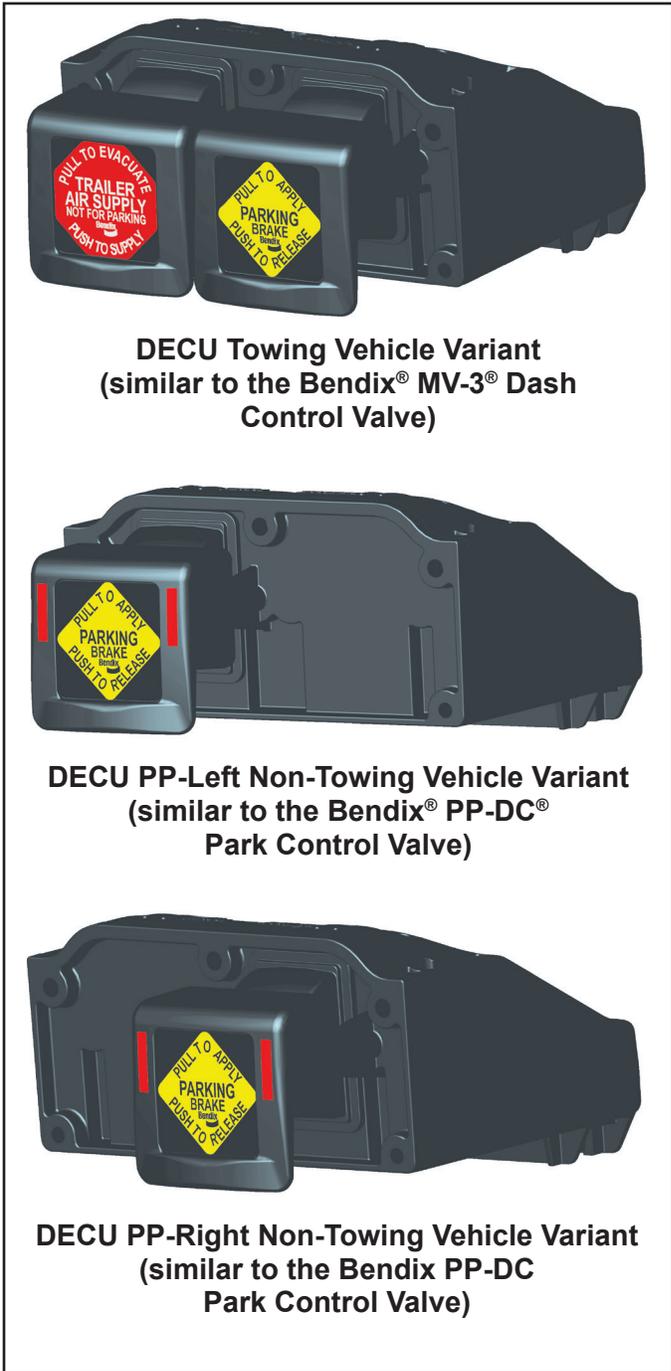


Figure 3 - DECU Variants

The switches must only be used for operating the spring brakes of the vehicle. Under no circumstances should the driver or others use the Bendix® Intellipark® Electronic Parking Brake (EPB) system switches as a hook, tray, support, holder, or for another purpose that could cause their accidental activation. Further, under no circumstances should the driver or others use the Intellipark switches as a handle, grab point or step point, or apply more than normal finger force to the switches. While the Intellipark switches are designed to withstand the commercial vehicle environment, damage may occur if excessive force is applied. The vehicle operator should move the switches using only their fingers. Using feet, shoes, tools, hooks, straps, strings, additional levers, or other objects is not necessary and may damage the Intellipark switches.

Park Valve Module (PVM)

- The PVM is an electromechanical valve assembly with a solenoid-piloted, pneumatically stable valve for each channel. The pneumatically stable valve is spring biased, much like the Bendix® MV-3® dash control valve, which provides a mechanical trip function on low reservoir pressure. The valve module also contains a duplex single-check valve to isolate the primary and secondary supply air, and a pressure transducer for each channel to allow direct measurement of the delivery pressure. See *Figure 4* for both PVM configurations.



Accumulation of road debris on the PVM may cause blockage of the PVM exhaust ports. If the exhaust ports are blocked, some valve functions may be compromised, leading to undesirable performance of the park system. Undesirable performance of the park system may cause property damage, personal injury, or death.

The PVM must be mounted as described in this section to minimize the possibility of accumulated debris on the exhaust ports. The exhaust ports must have a minimum of 1" clearance from all obstructions. The exhaust ports must not be covered or painted over.

If replacing the PVM, use the same mounting location and, if necessary, bracketry as installed by the Original Equipment Manufacturer (OEM). The PVM is designed to be secured to a bracket or the chassis using either 5/16 or M8 bolts.

Peripheral Human-Machine Interface (pHMI)

- The Intellipark EPB system also requires a pHMI to perform system monitoring and driver information functions. This pHMI may be provided by Bendix as the Intellipark EPB system's pHMI device, or the vehicle OEM may choose to use the instrument cluster or another existing pHMI on the vehicle to perform the necessary functions. For additional information on the pHMI, see *the Bendix® pHMI Service Data Sheet*.

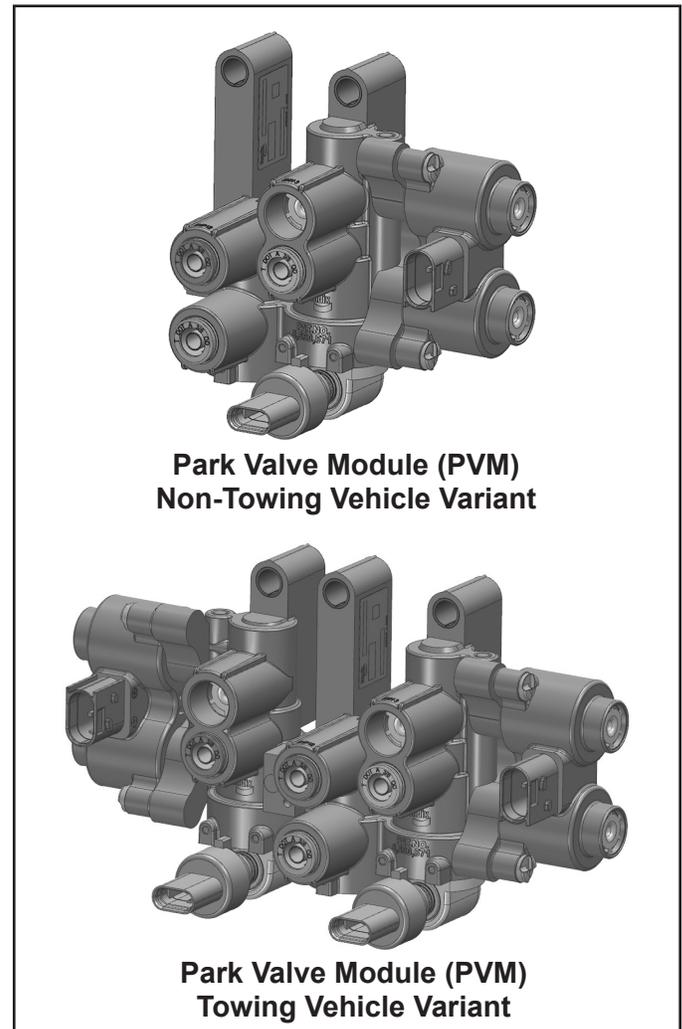


Figure 4 - Park Valve Modules

SPECIAL MODES OF OPERATION

The Bendix® Intellipark® Electronic Parking Brake (EPB) system can operate outside the standard operating mode to accommodate situations such as maintenance, bob-tail, installation, etc.

Interlock Override Mode

Interlock driver override is intended to allow a driver to operate a vehicle that has a failure in one of the inputs to the park brake release interlock (e.g.: if the door sensor has faulted, this mode allows the driver to override that fault to drive the truck). A vehicle requiring this mode should be serviced as some features of the Intellipark EPB system may not be available.

The following conditions must be met to enter the interlock override mode:

NOTE: If the park brakes are released while performing the switch pattern, the entry sequence will be aborted and you will have to restart.

1. Verify that the vehicle is stationary and parked.
2. Turn the ignition key ON.

NOTE: The next steps should be performed within 92 seconds.

3. Pull the yellow Dash Electronic Control Unit (DECU) switch for three seconds, then release the switch.
4. Keep the DECU switch in the neutral position for three seconds.
5. Push the DECU switch for three seconds, then release the switch.
6. Turn the ignition key to OFF, then back ON within five seconds.
7. Repeat steps 3-6 two more times.
8. Push the switch for 20 seconds (continue holding until you see the special blink pattern start).

Vehicle Maintenance Mode

Vehicle maintenance mode allows maintenance or service personnel to ensure that the Intellipark EPB system will not change from its current state and all advanced features shall be disabled (e.g.: roll away mitigation, trailer air charge assist, etc.). Vehicle maintenance mode is only intended for use when the vehicle is in a controlled workshop environment and has been secured from rolling.

Once the Intellipark EPB system has entered vehicle maintenance mode, it will remain in its current state regardless of switch input. For example, if the Intellipark EPB system is unparked and the DECU is placed into the vehicle maintenance mode, the Intellipark EPB system will remain in the unparked state, even if the red and yellow switches on the DECU are pulled.



While in vehicle maintenance mode, the wheels must be chocked as the system will not change state (unparked to parked).

The Bendix® ACom® PRO™ Diagnostic Software can be used to place the DECU into the maintenance mode. The software will require that the vehicle is stationary, and certain other conditions must be met. Once vehicle maintenance mode has been entered, the integrated LED display will blink a unique pattern for the duration of the cycle.

The DECU will exit the vehicle maintenance mode when any of the following conditions are met.

- The DECU detects steer axle wheel speeds
- ACom is used to send a command to the DECU to exit vehicle maintenance mode
- The battery power cycle is performed
- The following switch pattern is performed successfully

The Intellipark EPB system also provides a method to enter and exit vehicle maintenance mode without using the ACom PRO diagnostic software. Entry is accomplished by using a predefined sequence of inputs that is sufficiently unique to prevent accidental entry, and sufficiently inconvenient to discourage inappropriate use of the mode, while still allowing access to the mode for emergency conditions or at remote locations.

Entry to the vehicle maintenance mode via the switch pattern shall be only possible when all preconditions are met.

- Battery voltage is normal
- Ignition key is on
- Vehicle speed is \leq 4 mph

After successfully meeting the preconditions, the below pattern will put the vehicle into maintenance mode:

1. Release the park brakes (if the desired state is RELEASED while the system is in maintenance mode).
2. Verify that the vehicle is stationary, the ignition key is ON, and the DECU switches are in the neutral position.

NOTE: The next steps should be performed within 10 seconds.

3. Press the foot brake pedal.
4. Release the foot brake pedal.
5. Push the yellow button and hold it in the pushed state continuously (until the end of step 15).
6. Press the foot brake pedal and keep it pressed (until the end of step 15).

NOTE: The next steps should be performed within 40 seconds.

7. Cycle the ignition key from ON to OFF three times.
 - ON > OFF > ON > OFF > ON > OFF
8. Keep the ignition switch in the OFF position for at least two seconds.
9. Cycle the ignition key from OFF to ON three times.
 - OFF > ON > OFF > ON > OFF > ON
10. Keep the ignition switch in the ON position for at least two seconds.
11. Cycle the ignition key from ON to OFF three times.
 - ON > OFF > ON > OFF > ON > OFF
12. Keep the ignition switch in the OFF position for at least two seconds.
13. Cycle the ignition key from OFF to ON three times.
 - OFF > ON > OFF > ON > OFF > ON
14. Keep the ignition switch in the ON position for at least two seconds.
15. Verify that the diagnostic LEDs start to blink in the special pattern.

Bobtail Mode

When the towed unit channel of the Bendix® Intellipark® Electronic Parking Brake (EPB) system is evacuated, the two red LED displays on the trailer air supply (red) switch will be illuminated. This is a normal operation scenario for vehicles that are equipped for towing but are used without a trailer ("bobtail"). Bobtail mode gives the driver the ability to extinguish the two red LED displays on the trailer air supply switch when driving "bobtail."

The following conditions must be met to enter the bobtail mode:

- The driver must release the tractor (power vehicle) park brakes.
- The vehicle must be below a configurable speed.
- The Park valve Module (PVM) trailer (towed vehicle) pressure sensor reading must be below a configurable pressure.
- The driver must pull and hold the red trailer air supply switch for a minimum of three seconds.

The Dash Electronic Control Unit (DECU) will exit the bobtail mode when any of the following conditions are met:

- The vehicle ignition power is removed and re-applied.
- The driver applies the tractor (power vehicle) park brakes.
- The vehicle experiences a roll away mitigation event

Towing an Intellipark-Equipped Vehicle

In the event an Intellipark-equipped vehicle must be towed, there are two ways to tow the vehicle:

- Mechanically cage the spring brakes.
- Put the truck into vehicle maintenance mode which will prevent the vehicle from changing state (unparked to parked or parked to unparked). The front axle must be raised, otherwise the vehicle will exit maintenance mode.

Vehicle Configurations

The Bendix® Intellipark® Electronic Parking Brake (EPB) system provides parking capability for commercial vehicles (tractors, trucks, and buses) that utilize air brakes. It is available in various models to support a wide range of applications. See *Figures 5 and 6* for examples of conceptual installations and connectivity of the Intellipark EPB systems units on different vehicle configurations.

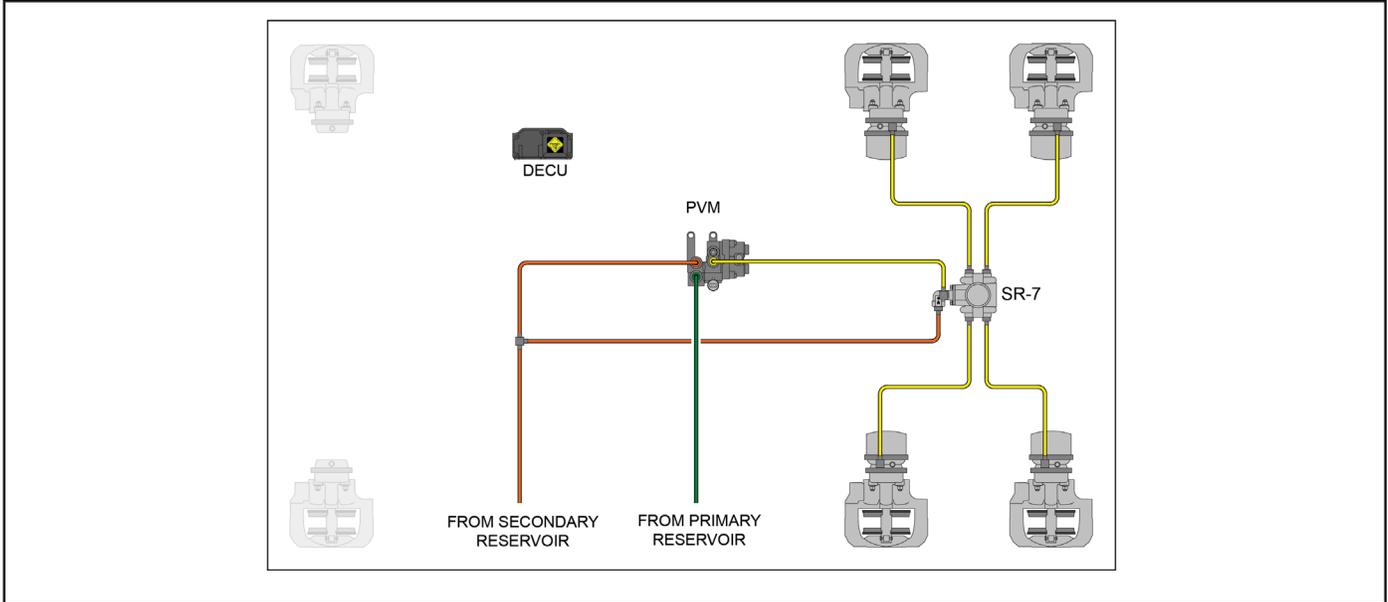


Figure 5 - Conceptual Schematic: Solo Truck or Solo Bus

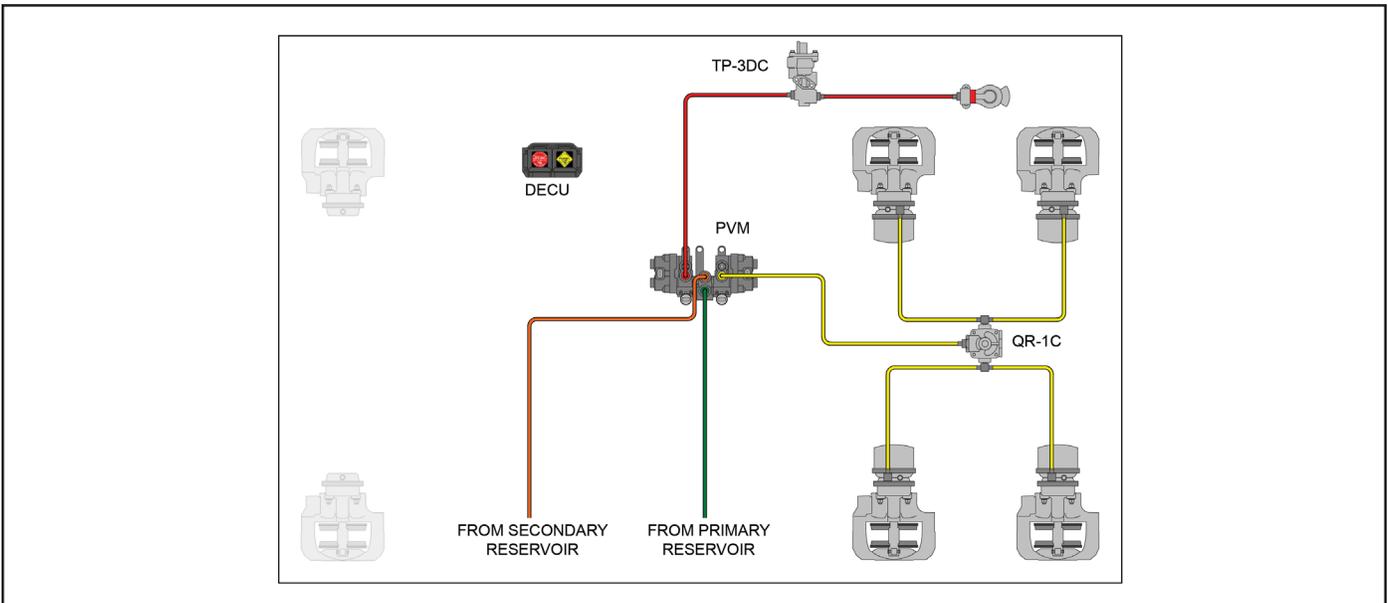


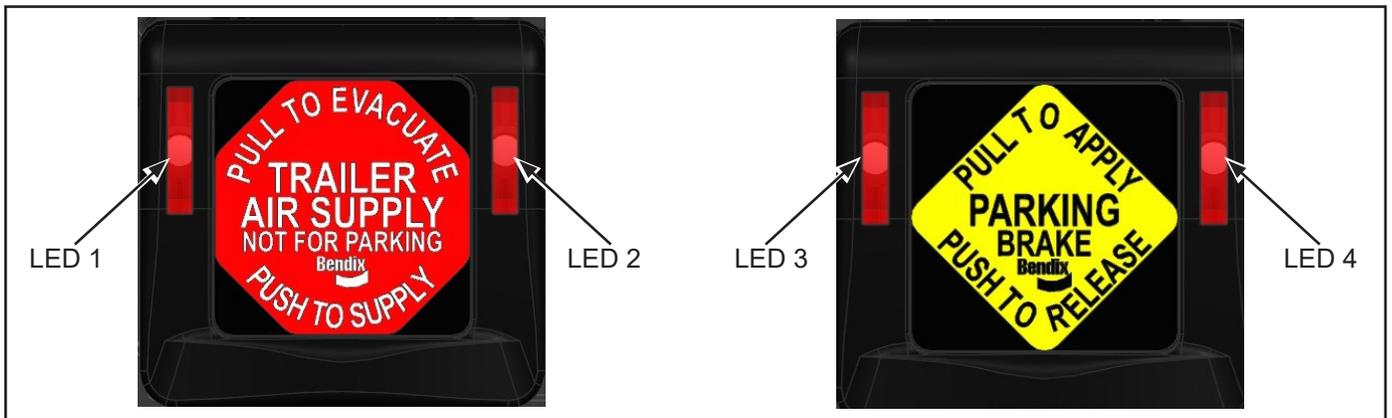
Figure 6 - Conceptual Schematic: Tractor

OPERATIONAL CONDITIONS: NORMAL

The LEDs on the Dash Electronic Control Unit (DECU) are one indicator the Bendix® Intellipark® Electronic Parking Brake (EPB) system is performing under normal operating conditions.

LED Operation				
LED1	LED2	LED3	LED4	Status
On	On	On	On	All LEDs illuminate for three (3) seconds when ignition is applied.
On	On	On	On	Three (3) seconds after ignition is applied, and both the power vehicle and the towed vehicle are parked.
Off	Off	Off	Off	Three (3) seconds after ignition is applied, and both the power vehicle and the towed vehicle are unparked.
On	On	Off	Off	The towed vehicle is parked, and the power vehicle is unparked.
Off	Off	On	On	The towed vehicle is unparked and the power vehicle is parked.
Blinking	Blinking	Blinking	Blinking	A roll away mitigation event has occurred for both the tractor and the trailer.
On	On	Blinking	Blinking	A roll away mitigation event has occurred for the tractor only.

Table 1 - DECU LED Operations



Refer to Table 2 for the Bendix® Intellipark® Electronic Parking Brake (EPB) system's performance under normal operating conditions.

Switch	Driver Action	Intellipark® EPB System Reaction	Spring Brake Reaction	Vehicle Parking State
Trailer Air Supply	Pushes Switch	Applies air to the trailer supply glad-hand through the Tractor Protection Valve (TPV)	Towed vehicle spring brakes are released	Towed vehicle is unparked
Parking Brake	Pushes Switch	Applies air to the power unit spring brake system	Power vehicle spring brakes are released	Power vehicle is unparked
Trailer Air Supply	Pulls Switch	Exhausts air from the trailer glad-hand through the TPV	Towed vehicle spring brakes are applied	Towed vehicle is parked
Parking Brake (DECU Towing Variant)	Pulls Switch	Exhausts air from the power unit spring brake system and the trailer supply glad-hand through the TPV	Power vehicle spring brakes and the towed vehicle spring brakes are applied	Vehicle combination is parked
Parking Brake (DECU Non-Towing Variant)	Pulls Switch	Exhausts air from the power unit spring brake system	Power vehicle spring brakes are applied	Power vehicle is parked

Table 2 - Operation Under Normal Conditions

The following images represent the Dash Electronic Control Unit (DECU) following different driver actions. The images show the DECU interface in one specific orientation; while units may have different orientations, the LED lighting combinations shown will remain the same.

UNPARKING A TRACTOR-TRAILER COMBINATION

Initial State

- Apply ignition power.
- Verify all LED displays illuminate and remain illuminated. The Intellipark EPB tractor-trailer system outputs are exhausted.

Required Driver Actions

- Close the drive door.
- Apply the service brakes.
- Start the engine and allow the air system to build pressure to the governor cut-out.

Unpark the Tractor

- Push the yellow switch.
- After the LEDs stop blinking, verify the LED displays on the yellow switch extinguish. The Intellipark tractor system output is delivering pressure.
- Verify the LED displays on the red switch remain illuminated. The Intellipark EPB trailer system output remains exhausted.



Unpark the Trailer

- Push the red switch.
- After the LEDs stop blinking, verify the LED displays on the red switch extinguish. The Bendix® Intellipark® Electronic Parking Brake (EPB) trailer system output is delivering pressure.
- Verify the LED displays on the yellow switch remain extinguished. The Intellipark tractor system output remains delivered.
- Once driving, verify all the trailer wheels are free-rolling.



PARKING A TRACTOR-TRAILER COMBINATION

Required Driver Actions

- Bring the vehicle to a complete stop.
- Continue to apply the service brakes.
- Place the transmission in the appropriate gear.
- Verify all LEDs are extinguished. The Intellipark tractor-trailer system outputs are delivered .



- Pull the yellow switch.
- After the LEDs stop blinking, verify all LED displays illuminate. The Intellipark tractor-trailer system outputs are exhausted.



Unparking A STRAIGHT TRUCK OR BUS

Initial State

- Apply ignition power.
- Verify all LED displays illuminate and remain illuminated. The Intellipark power vehicle system output is exhausted.



Required Driver Actions

- Close the driver door.
- Apply the service brakes.
- Start the engine and allow the air system to build pressure to governor cut-out.
- Push the yellow switch.
- After the LEDs stop blinking, verify the LED displays on the yellow switch extinguish. The Bendix® Intellipark® Electronic Parking Brake (EPB) power vehicle system output delivers pressure.



PARKING A STRAIGHT TRUCK OR BUS

Required Driver Actions

- Bring the vehicle to a complete stop.
- Continue to apply the service brakes.
- Place the transmission in the appropriate gear.
- Verify all LEDs are extinguished. The Intellipark power vehicle system output is delivered.



- Pull the yellow switch.
- After the LEDs stop blinking, verify all LED displays illuminate. The Intellipark power vehicle system output is exhausted.



OPERATIONAL CONDITIONS: FAULTED

If the Bendix® Intellipark® Electronic Parking Brake (EPB) system has a fault, one indicator will be the LEDs on the Dash Electronic Control Unit (DECU) as shown in Table 3. For specific fault details, see the TROUBLESHOOTING - DIAGNOSTIC MODES section.

NOTE: Blinking indicates a continuously blinking LED independent of any driver input (e.g. button push or pull, ignition cycle, etc.).

LED Operation				
LED1	LED2	LED3	LED4	Status
On	Blinking	On	On	A fault is present on the towed vehicle park brake system. Both the towed vehicle and the power vehicle are parked.
Off	Blinking	Off	Off	A fault is present on the towed vehicle park brake system. Both the towed vehicle and the power vehicle are unparked.
On	On	Blinking	On	A fault is present on the power vehicle park brake system. Both the towed vehicle and the power vehicle are parked.
Off	Off	Blinking	Off	A fault is present on the power vehicle park brake system. Both the towed vehicle and the power vehicle are unparked.
Off	Blinking	Blinking	Off	A fault is present on both the power and towed vehicle park brake system. Both the towed vehicle and the power vehicle are unparked.
On	Blinking	Blinking	On	A fault is present on both the power and towed vehicle park brake system. Both the towed vehicle and the power vehicle are parked.
Blinking	Blinking	Off	Off	The system is unparked. First, the driver should pull the button to ensure it is not a roll away mitigation event. If the blinking persists, a fault with the towed vehicle PVM pressure sensor has been detected. Both LEDs blinking indicates the state of the Intellipark towed vehicle system cannot be determined by the DECU. Immediately chock the wheels and have the system serviced as soon as possible.
Off	Off	Blinking	Blinking	The system is unparked. First, the driver should pull the button to ensure it is not a roll away mitigation event. If the blinking persists, a fault with the power vehicle PVM pressure sensor has been detected. Both LEDs blinking indicates the state of the Intellipark towed vehicle system cannot be determined by the DECU. Immediately chock the wheels and have the system serviced as soon as possible.
Blinking	Blinking	On	On	The system is parked. First, the driver should pull the button to ensure it is not a roll away mitigation event. If the blinking persists, a fault with the towed vehicle PVM pressure sensor has been detected. Both LEDs blinking indicates the state of the Intellipark towed vehicle system cannot be determined by the DECU. Immediately chock the wheels and have the system serviced as soon as possible.
On	On	Blinking	Blinking	The system is parked. First, the driver should pull the button to ensure it is not a roll away mitigation event. If the blinking persists, a fault with the power vehicle PVM pressure sensor has been detected. Both LEDs blinking indicates the state of the Intellipark towed vehicle system cannot be determined by the DECU. Immediately chock the wheels and have the system serviced as soon as possible.
Off	On	On	Off	An internal DECU fault has been detected. Immediately chock the wheels and have the system serviced as soon as possible.

Table 3 - DECU LED Faults

Missing / Corrupted Input	Fallback Mode
Ignition: Loss of Input	<ul style="list-style-type: none"> • System fault displayed on LEDs • Dash Electronic Control Unit (DECU) power-up via CAN wake-up • LED power-up check not performed • Park brake release interlock available • Roll away mitigation available • Trailer air charge assist available • Manual switch operation available • Ability to detect complete loss of J1939 degraded
Battery: Voltage Out of Range	<ul style="list-style-type: none"> • System fault displayed on LEDs (if voltage supports DECU operation) • 8 - 9 V or >18 V: Automatic protection of solenoids via shutdown of output circuits • Status display available on LEDs • Park brake release interlock not available • Roll away mitigation not available • Trailer air charge assist not available • Manual switch operation not available • < 8V: DECU shutdown
Battery: Loss of One Output	<ul style="list-style-type: none"> • System operates using remaining input • All features available • System fault displayed on LEDs
Red / Yellow Switches	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit status available on LEDs • Park brake release interlock not available • Roll away mitigation not available • Trailer air charge assist not available • Manual switch operation not available
Power Unit Solenoid or Wiring Harness	<ul style="list-style-type: none"> • Power unit fault displayed on LEDs • Power and towed unit status available on LEDs • Park brake release interlock available on towed unit • Roll away mitigation not available • Trailer air charge assist available • Power unit manual switch operation not available • Towed unit manual switch operation available
Towed Unit Solenoid or Wiring Harness	<ul style="list-style-type: none"> • Towed unit fault displayed on LEDs • Power and towed unit status available on LEDs • Park Brake Release Interlock available on power unit • Roll away mitigation available • Trailer air charge assist not available • Power unit manual switch operation available • Towed unit manual switch operation not available
Vehicle Speed: Loss of Electronic Brake Control (EBC2) or Cruise Control Vehicle Speed (CCVS)	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit status available on LEDs • Park brake release interlock available • Roll away mitigation available • Trailer air charge assist available • Manual switch operation available

Missing / Corrupted Input	Fallback Mode
J1939: All Data Lost	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit park status is available • Park brake release interlock available • Roll away mitigation not available • Trailer air charge assist not available • Manual switch operation available • Includes exhaust-at-speed delay on switch pull even when vehicle is stationary
Occupancy Sensors (Driver Door Status) (Passenger Door Status) (SLS Input) (Seat Belt Status - if applicable) Input Missing, Input Stuck, Not Satisfied	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit park status is available • Park brake release interlock prevents vehicle from being unparked • Roll away mitigation not available • Trailer air charge assist not available • Manual exhaust switch operation available • Manual deliver switch operation available when moving
Power Unit Pressure Sensor	<ul style="list-style-type: none"> • Power unit fault displayed on LEDs • Power unit park status not available • Towed unit park status available • Park brake release interlock available • Roll away mitigation not available • Trailer air charge assist available • Manual switch operation available
Towed Unit Pressure Sensor	<ul style="list-style-type: none"> • Towed unit fault displayed on LEDs • Power unit park status available • Towed unit park status not available • Park brake release interlock available • Roll away mitigation available • Trailer air charge assist not available • Manual switch operation available
Occupancy Sensor (Wire Harness Resistor RA Open) <i>See Figure 9 for more details.</i>	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit park status is available • Park brake release interlock prevents vehicle from being unparked • Roll away mitigation not available • Trailer air charge assist not available • Manual exhaust switch operation available
Occupancy Sensor (Wire Harness Resistor RA Shorted) <i>See Figure 9 for more details.</i>	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit park status is available • Park brake release interlock prevents vehicle from being unparked • Roll away mitigation not available • Trailer air charge assist not available • Manual exhaust switch operation available
Occupancy Sensor (Wire Harness Resistor RB Open) <i>See Figure 9 for more details.</i>	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit park status is available • Park brake release interlock prevents vehicle from being unparked • Roll away mitigation not available • Trailer air charge assist not available • Manual exhaust switch operation available

Missing / Corrupted Input	Fallback Mode
Occupancy Sensor: (Wire Harness Resistor RB Shorted) <i>See Figure 9 for more details.</i>	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit park status is available • Park brake release interlock prevents vehicle from being unparked • Roll away mitigation not available • Trailer air charge assist not available • Manual exhaust switch operation available
Occupancy Sensor: (No Wire Harness Resistors RA and RB Missing) <i>See Figure 9 for more details.</i>	<ul style="list-style-type: none"> • System fault displayed on LEDs • Power and towed unit park status is available • Park brake release interlock prevents vehicle from being unparked • Roll away mitigation not available • Trailer air charge assist not available • Manual exhaust switch operation available

Table 4 - Fallback Modes

OPERATING THE BENDIX® INTELLIPARK®-EQUIPPED VEHICLE UNDER FAULTED CONDITIONS

If the Intellipark Electronic Parking Brake (EPB) system faults while driving, the driver can continue their route.



If the system has faulted, the capability of the Intellipark® EPB system may be reduced. Drivers must not rely on the Intellipark EPB system to automatically park the vehicle. Drivers continue to be responsible for safe and proper operation of the vehicle.

- Parking with a faulted Intellipark EPB system requires the following steps to ensure safety:
- Stop on a level surface.
- Shut off the engine and roll down the driver's window so the exhaust of air from the parking brakes can be heard.
- Attempt to park the trailer (if able) by pulling the red switch. Listen for the exhaust of air.
- Attempt to park the tractor by pulling the yellow switch.
- Listen for the exhaust of air.
- If either the tractor or trailer did not park, "fan down" the air reservoirs.
- Chock the wheels.
- Remove the vehicle battery power if possible.

It may be necessary to unpark with a faulted Intellipark EPB system. If so, follow these initial steps:

- Leave the wheel chocks in place.
- Apply ignition power if necessary.
- Apply vehicle battery power. Do not start the engine.
- Observe the Dash Electronic Control Unit (DECU) LEDs.

If the Intellipark EPB system is reporting a fault and the vehicle must be operated, perform the following steps:

- Check dash gauges to ensure the air reservoirs are fully depleted of air. If not, "fan down" the reservoirs, if necessary, by repeatedly applying and releasing the service brakes to automatically apply the spring brakes on both the tractor and trailer.
- Once the air reservoirs are depleted of air, remove the wheel chocks prior to starting the engine.
- Start the engine and stay in the driver's seat as the air reservoirs charge.
- Use the service brakes to hold the vehicle stationary in case the spring brakes unintentionally release as air pressure builds.



In case of emergency, the service brakes can be "fanned down" by repeatedly applying and releasing the service brakes to automatically apply the parking brakes on both the tractor and trailer.

TROUBLESHOOTING - DIAGNOSTIC MODES

If the Bendix® Intellipark® Electronic Parking Brake (EPB) system is powered and is faulted, the inner LEDs will blink. Loss of features is communicated through either the vehicle instrument cluster or a standalone Peripheral Human-Machine Interface (pHMI). Diagnostic information is available by interfacing with the Intellipark EPB system using the Bendix® ACom® PRO™ Diagnostic Software.

ACom PRO is a PC-based program that is designed to meet RP 1210 industry standards developed by the Truck Maintenance Council (TMC). This software provides the technician with access to all available Intellipark controller's diagnostic information and configuration capability, including:

- Electronic Control Unit (ECU) information
- Diagnostic Trouble Codes (DTCs) and repair information

Refer to Table 5 for the corrective action once the cause of the fault is identified.

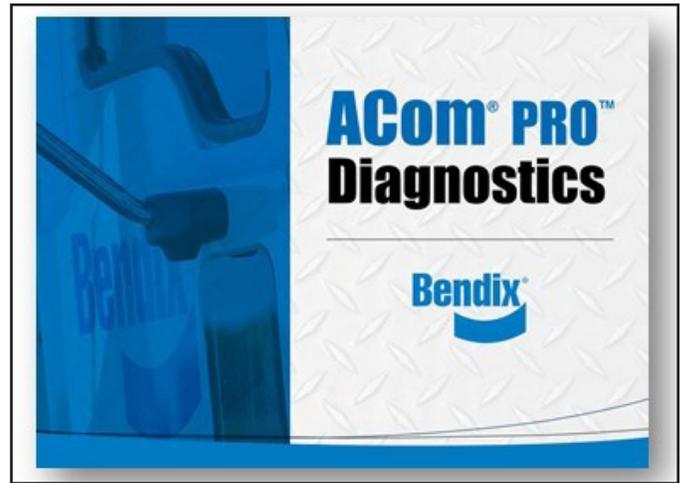


Figure 5 - Bendix® ACom® PRO™ Diagnostic Software

SPN	FMI	Component	Fault	Cause	Corrective Action
168	3	Battery potential or power input 1	Battery Voltage Above Normal - ECU DTC (2_27)	Battery voltage is above 17v	Check the battery
168	4	Battery potential or power input 1	Battery Voltage Below Normal - ECU DTC (2_28)	Battery voltage is below 10v	Check the battery
597	2	DECU	J1939 CCVS1 Message - Error (Brake Switch)	DECU	Replace the DECU
597	7	Brake switch	J1939 CCVS1 Message - Data Not Available (Brake Switch)	No brake switch message on J1939	Check the ECU transmitting brake switch J1939 message
597	19	Brake switch	J1939 CCVS1 Message - Invalid Configuration (Brake Switch)	Brake switch message on J1939 reporting error	Check the ECU transmitting brake switch J1939 message
629	2	DECU	Contact Manufacturer for details - ECU DTC (1_2)	DECU	Replace the DECU
629	12	DECU	Contact Manufacturer for details - ECU DTC (8_8)	DECU	Replace the DECU
1067	3	Tractor unit pressure sensor	Tractor Pressure Sensor - Shorted to Voltage	Power unit pressure sensor shorted to 12v / pressure sensory supply or loss of pressure sensor ground	Repair the wire harness or contact the OEM for a replacement harness
1067	4	Tractor unit pressure sensor	Tractor Pressure Sensor - Shorted to Ground	Tractor pressure sensor shorted to ground	Repair the wire harness or contact the OEM for a replacement harness

SPN	FMI	Component	Fault	Cause	Corrective Action
1068	3	Trailer unit pressure sensor	Trailer Pressure Sensor - Shorted to Voltage	Trailer pressure sensor shorted to the battery or pressure sensor supply or loss of ground	Repair the wire harness or contact the OEM for a replacement harness
1068	4	Trailer unit pressure sensor	Trailer Pressure Sensor - Shorted to Voltage	Trailer pressure sensor sorted to ground or output is out of range low	Repair the wire harness or contact the OEM for a replacement harness
1821	7	Driver door	J1939 DC1 Message - Data Not Available (Position of doors)	No door switch message on J1939	Check the ECU transmitting door switch J1939 message
1821	19	Driver door	J1939 DC1 Message - Error (Position of doors)	Door switch message on J1939 reporting error	Check the ECU transmitting door switch J1939 message
1856	7	Driver seat belt	J1939 CM1 Message - Data Not Available (Seat Belt Switch)	No seat belt message on J1939	Check the ECU transmitting seat belt J1939 message
1856	19	Driver seat belt	J1939 CM1 Message - Error (Seat Belt Switch)	Seat belt message on J1939 reporting error	Check the ECU transmitting seat belt J1939 message
3509	3	DECU	Contact Manufacturer for details - ECU DTC (7_3)	DECU	Replace the DECU
3509	4	DECU	Contact Manufacturer for details - ECU DTC (7_4)	DECU	Replace the DECU
3511	2	Occupancy sensor 1	J1939 Message - Erratic, Intermittent, or Incorrect (Occupancy Sensor 1)	Incorrect DECU or DECU configuration	Replace the occupancy sensor, repair the wire harness, or contact the OEM for a replacement harness
3511	3	Occupancy sensor 1	Occupancy Sensor 1 - Shorted to Voltage	Occupancy sensor 1 input shorted to battery	Repair the wire harness or contact the OEM for a replacement harness
3511	4	Occupancy sensor 1	Occupancy Sensor 1 - Shorted to Ground	Occupancy sensor 1 input shorted to ground	Repair the wire harness or contact the OEM for a replacement harness
3511	5	Occupancy sensor	Occupancy Sensor 1 - Open Circuit	Occupancy sensor 1 open circuit	Repair the wire harness or contact the OEM for a replacement harness
3511	7	Occupancy sensor 1	J1939 Message - Not Responding Properly or Timeout (Occupancy Sensor 1)	Wrong ECU configuration, no error, or NA signal value received via J1939 message CM1	Check the message from ECU transmitting occupancy sensor 1
3512	2	Occupancy sensor 2	J1939 Message - Erratic, Intermittent, or Incorrect (Occupancy Sensor 2)	Incorrect DECU or DECU configuration	Replace the occupancy sensor, repair the wire harness, or contact the OEM for a replacement harness
3512	3	Occupancy sensor 2	Occupancy Sensor 2 - Shorted to Voltage	Occupancy sensor 1 input shorted to battery	Repair the wire harness or contact OEM for a replacement harness
3512	4	Occupancy sensor 2	Occupancy Sensor 2 - Shorted to Ground	Occupancy sensor 1 input shorted to ground	Repair the wire harness or contact OEM for a replacement harness

SPN	FMI	Component	Fault	Cause	Corrective Action
3512	5	Occupancy sensor 2	Occupancy Sensor 2 - Open Circuit	Occupancy sensor 1 open circuit	Repair the wire harness or contact OEM for a replacement harness
3512	7	Occupancy sensor 2	J1939 Message - Not Responding Properly or Timeout (Occupancy Sensor 2)	Wrong ECU configuration, no error, or NA signal value received via J1939 message CM1	Check the message from ECU transmitting occupancy sensor 2
3513	3	Tractor unit pressure sensor supply	Powered Unit Pressure Sensor Supply - Shorted to Voltage	Powered unit pressure sensor supply line shorted to battery	Repair the wire harness or contact the OEM for a replacement harness
3513	4	Tractor unit pressure sensor supply	Powered Unit Pressure Sensor Supply - Shorted to Ground	Powered unit pressure sensor supply shorted to ground	Repair the wire harness or contact the OEM for a replacement harness
3513	6	Tractor unit pressure supply sensor	Powered Unit Pressure Sensor Supply - Current Above Normal	Powered unit pressure sensor supply regulator taking pulling excessive current	Check the pressure sensor
3514	3	Trailer unit pressure sensor supply	Towed Unit Pressure Sensor Supply - Shorted to Voltage	Powered unit pressure sensor supply line shorted to battery, or high voltage source	Repair the wire harness or contact the OEM for a replacement harness
3514	4	Trailer unit pressure sensor supply	Towed Unit Pressure Sensor Supply - Shorted to Ground	Powered unit pressure sensor supply shorted to ground	Repair the wire harness or contact the OEM for a replacement harness
3514	6	Trailer unit pressure sensor supply	Towed Unit Pressure Sensor Supply - Current Above Normal	Towed unit pressure sensor supply regulator taking pulling excessive current	Check the pressure sensor
7902	2	Battery 1 voltage	Battery 1 Intermittent Connection	Battery input terminal loose connections	Check the battery line to the DECU
7902	4	Battery 1 voltage	Battery 1 Connection Shorted to Ground	Battery input is either low or not connected	Check the battery line to the DECU
7910	2	Battery 2 voltage	Battery 2 Intermittent Connection	Battery input terminal loose connection	Check the battery line to the DECU
7910	4	Battery 2 voltage	Battery 2 Connection Shorted to Ground	Battery input is either low or not connected	Check the battery line to the DECU
516101	2	DECU	Power Unit Park Brake Exhaust Valve - Harness Related Fault	DECU	Replace the DECU
516101	3	DECU	Power Unit Park Brake Exhaust Valve - Shorted to Battery	DECU	Replace the DECU
516101	4	DECU	Power Unit Park Brake Exhaust Valve - Shorted to Ground	DECU	Replace the PVM or replace the DECU as required
516101	5	DECU	Power Unit Park Brake Exhaust Valve - Open Circuit	Solenoid valve	Inspect and repair the PVM wire harness, replace the PVM, or replace the DECU as required

SPN	FMI	Component	Fault	Cause	Corrective Action
516102	2	DECU	Towed Unit Park Brake Exhaust Valve - Harness Related Fault	DECU	Replace the DECU
516102	3	DECU	Power Unit Park Brake Deliver Valve - Shorted to Battery	DECU	Replace the DECU
516102	4	DECU	Power Unit Park Brake Deliver Valve - Shorted to Ground	DECU	Replace the PVM or replace the DECU as required
516102	5	DECU	Power Unit Park Brake Deliver Valve - Open Circuit	Solenoid valve	Inspect and repair the PVM wire harness, replace the PVM, or replace the DECU as required
516103	2	DECU	Towed Unit Park Brake Exhaust Valve - Harness Related Fault	DECU	Replace the DECU
516103	3	DECU	Towed Unit Park Brake Exhaust Valve - Shorted to Battery	DECU	Replace the DECU
516103	4	DECU	Towed Unit Park Brake Exhaust Valve - Shorted to Ground	DECU	Replace the PVM or replace the DECU as required
516103	5	DECU	Towed Unit Park Brake Exhaust Valve - Open Circuit	Solenoid valve	Inspect and repair the PVM wire harness or contact the OEM for a replacement harness; replace the PVM; or replace the DECU as required
516104	2	DECU	Towed Unit Park Brake Deliver Valve - Harness Related Fault	DECU	Replace the DECU
516104	3	DECU	Towed Unit Park Brake Deliver Valve - Shorted to Battery	DECU	Replace the DECU
516104	4	DECU	Towed Unit Park Brake Deliver Valve - Shorted to Ground	DECU	Replace the PVM or replace the DECU as required
516104	5	DECU	Towed Unit Park Brake Deliver Valve - Open Circuit	Solenoid valve	Inspect and repair the PVM wire harness or contact the OEM for a replacement harness; replace the PVM; or replace the DECU as required
516105	2	DECU	Power Unit Solenoid - Harness Related Fault	DECU	Replace the DECU
516105	3	DECU	Power Unit Solenoid Common - Shorted to Voltage	DECU	Replace the DECU
516105	4	DECU	Power Unit Solenoid Common - Shorted to Ground	DECU	Replace the DECU
516105	5	DECU	Power Unit Solenoid Common - Open Circuit	DECU	Replace the DECU
516106	2	DECU	Towed Unit Solenoid - Harness Related Fault	DECU	Replace the DECU

SPN	FMI	Component	Fault	Cause	Corrective Action
516106	3	DECU	Towed Unit Solenoid Common - Shorted to Voltage	DECU	Replace the DECU
516106	4	DECU	Towed Unit Solenoid Common - Shorted to Ground	DECU	Replace the DECU
516106	5	DECU	Towed Unit Solenoid Common - Open Circuit	DECU	Replace the DECU
516107	3	DECU	High Side Relay - Shorted to Battery - ECU DTC (13_3)	DECU	Replace the DECU
516107	4	DECU	High Side Relay - Voltage Below Normal - ECU DTC (13_4)	DECU	Replace the DECU
516108	2	DECU	Occupancy Sensor 1 shorted to Occupancy Sensor 2	Occupancy sensor 1 and occupancy sensor 2 connectors are shorted to each other	Repair the wire harness or contact the OEM for a replacement harness
516115	2	DECU	Powered Unit Switch - Erratic, Intermittent, or Incorrect - ECU DTC (42_17)	DECU	Replace the DECU
516115	5	DECU	Powered Unit Switch - Open Circuit - ECU DTC (42_9)	DECU	Replace the DECU
516115	7	DECU	Powered Unit Switch - Plausibility Check Error - ECU DTC (42_18)	DECU	Replace the DECU
516115	19	DECU	Powered Unit Switch - Data Error - ECU DTC (42_19)	DECU	Replace the DECU
516116	2	DECU	Towed Unit Switch - Erratic, Intermittent, or Incorrect - ECU DTC (43_17)	DECU	Replace the DECU
516116	5	DECU	Tower Unit Switch - Open Circuit - ECU DTC (43_9)	DECU	Replace the DECU
516116	7	DECU	Towed Unit Switch - Plausibility Check Error - ECU DTC (43_18)	DECU	Replace the DECU
516116	19	DECU	Towed Unit Switch - Data Error - ECU DTC (43_19)	DECU	Replace the DECU
516117	12	DECU	ECU unable to determine appropriate vehicle motion state - ECU DTC (44_14)	DECU	Check the speed source on CAN
516118	12	DECU	ECU unable to determine appropriate vehicle motion state - ECU DTC (44_14)	DECU	Check the speed source on CAN
516119	2	DECU	Rollaway Mitigation Fault - Erratic, Intermittent, or Incorrect - ECU DTC (46_1B)	DECU	Restart the DECU and check if fault clears; if not, replace the DECU
516119	12	DECU	Rollaway Mitigation Fault - ECU DTC (46_18)	DECU	Restart the DECU and check if fault clears; if not, replace the DECU
516120	2	DECU	Contact Manufacturer for details - ECU DTC (47_1A)	DECU	Replace the DECU
516121	12	DECU	ECU ETC (48_14)	DECU	Replace the DECU
516122	3	DECU ignition	DECU Ignition Line - Shorted to Voltage	Ignition line short to battery	Check the ignition line to the DECU

SPN	FMI	Component	Fault	Cause	Corrective Action
516122	5	DECU ignition	DECU Ignition Line - Open Circuit	Ignition line open	Check the ignition line to the DECU
516123	2	ABS mode	J1939 ABS Node - Timeout or Communication Loss	ABS CAN messages not received by DECU	Check CAN communication of ABS ECU with the DECU
516124	2	J1939 engine	J1939 Engine Node - Timeout or Communication Loss	Engine CAN messages not received by DECU	Check the engine J1939 messages
516125	2	PVM pressure sensor	Tractor Pressure Sensor Shorted to Trailer Pressure Sensor	PVM pressure sensor outputs shorted together	Repair the wiring
516126	2	DECU	DECU Configuration Dataset - Erratic, Intermittent, or Incorrect	DECU	Replace the DECU
516127	2	DECU	Anti Trailer Brake Drag Feature Erratic, Intermittent, or Incorrect	DECU	Restart the DECU and check if fault clears; if not, replace the DECU

Table 5 - Troubleshooting

ELECTRICAL INTERFACE DETAILS

See figures 7 and 8 for the electrical interface details.

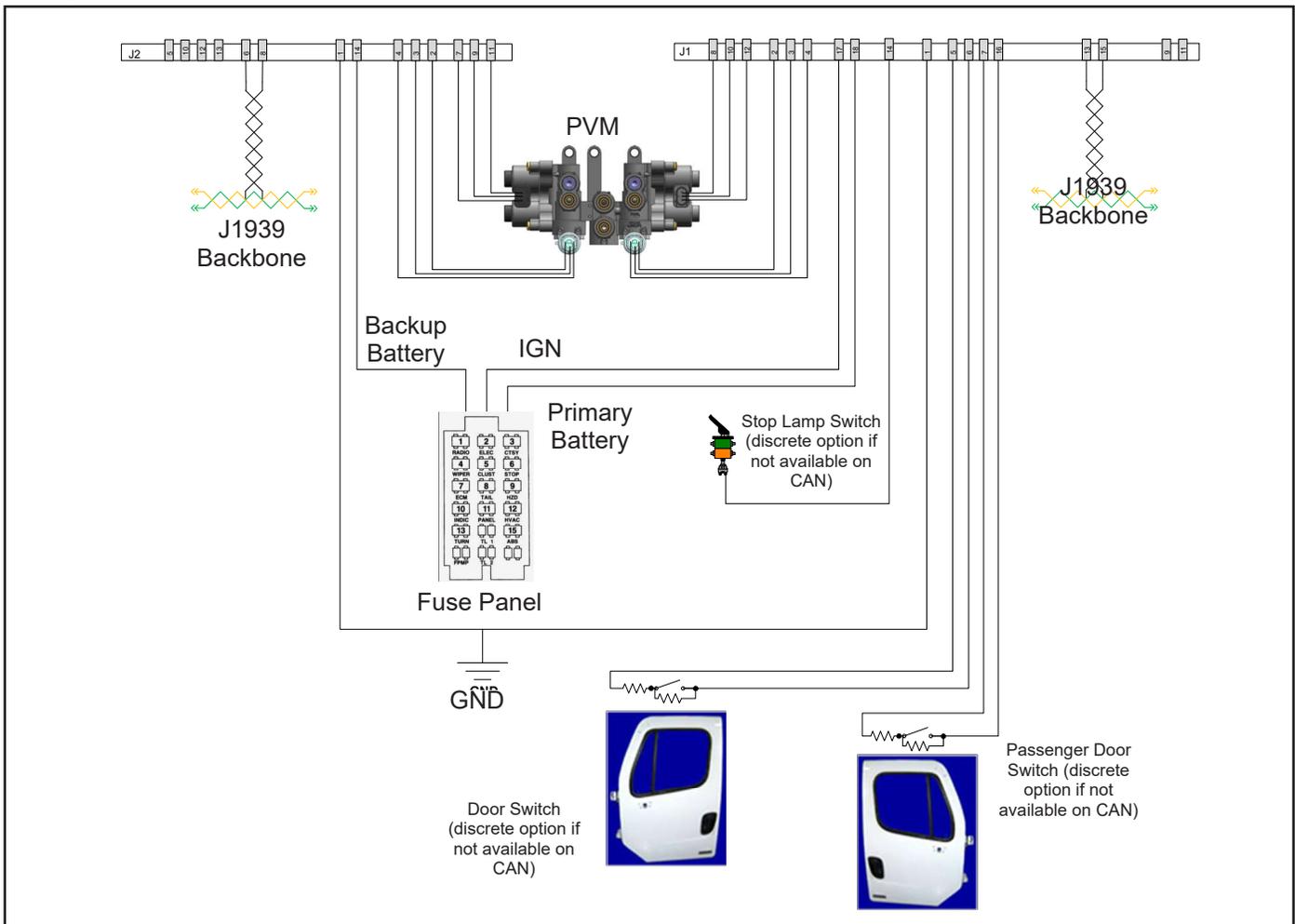


Figure 7 - Towing Vehicle Variant

NOTE: Bendix does not supply the connectors listed.

PVM Feedback Connections

The Park Valve Module (PVM) contains the exhaust and delivery solenoids for the power vehicle (tractor) and the towed vehicle (trailer). The Dash Electronic Control Unit (DECU) monitors the PVM state via feedback signals. The DECU supplies +5VDC to the external pressure sensors.

PVM Location	TYCO/AMP Harness Connector Part Number
Power Unit	1-1418448-1
Towed Unit	2-1418448-1

PVM Connector Part Numbers

The PVM utilizes TYCO/AMP connectors for solenoid connections to the vehicle wire harness.

PVM Location	Aptiv Connector Part Number
Power Unit	54200378
Towed Unit	54200379

PVM Connector Pin Assignments

The PVM utilizes Aptiv® connectors for pressure transducer connections to the vehicle wire harness. All wire harness connectors must be properly seated. The use of secondary locks is strongly advised.

Pin	Name
1	Solenoid Exhaust
2	Solenoid Common
3	Solenoid Deliver

PVM Pressure Transducer Connector

The pressure transducers utilize the following connect pin assignments.

Pin	Name
1	Output
2	Ground
3	Power

PVM Solenoid Resistance

Parameter	Value	Unit
Solenoid exhaust	11.0 ± 1.0	Ohms
Solenoid driver	11.0 ± 1.0	Ohms

DECU Input Voltages

Parameter	Value	Unit
Maximum voltage	18.0	VDC
Minimum voltage	9.0	VDC
Nominal voltage	13.5	VDC

DECU Connector Part Numbers

The DECU utilizes two TYCO/AMP connectors for connections to the vehicle wire harness. All wire harness connectors must be properly seated. The use of secondary locks is strongly advised.

DECU Location	TYCO/AMP Harness Connector Part Number
J1	929504-6
J2	929504-5

DECU: J1 Connector Pin Assignments**(Towing and Non-Towing Dash Electronic Control Unit - DECU - Variants)**

Pin	Name	Description
1	GND_1	Ground
2	PS_GND	PVM pressure sensor supply ground
3	PU_PS_SPL	PVM power vehicle pressure sensor supply (5V)
4	PU_PS_SIG_1	PVM power vehicle pressure sensor signal 1
5	OCC_SEN_GND	Driver occupancy sensor 1 ground
6	OCC_SEN_1	Driver occupancy sensor 1
7	OCC_SEN_GND	Driver occupancy sensor 2 ground
8	PU_SOL_EXH	PVM power vehicle park brake exhaust solenoid
9	NC	No contact
10	PU_SOL_COM	PVM power vehicle solenoid common
11	NC	No contact
12	PU_SOL_DEL	PVM power vehicle park brake deliver solenoid
13	J1939_LO	CAN1 low
14	SLS	Stop lamp switch input
15	J1939_HI	CAN1 high
16	OCC_SEN_2	Driver occupancy sensor 2
17	VIGN	Ignition input
18	VBATT_1	Battery input 1

DECU: J2 Connector Pin Assignments**(Towing DECU Variant)**

Pin	Name	Description
1	GND_2	Ground
2	PS_GND	PVM pressure sensor supply ground
3	TU_PS_SPL	PVM towed vehicle pressure sensor supply (5V)
4	TU_PS_SIG_1	PVM towed vehicle pressure sensor signal 1
5	NC	No contact
6	CAN2_LO	CAN2 low
7	TU_SOL_EXH	PVM towed vehicle park brake exhaust solenoid
8	CAN2_HI	CAN2 high
9	TU_SOL_COM	PVM towed vehicle solenoid common
10	NC	No contact
11	TU_SOL_DEL	PVM towed vehicle park brake deliver solenoid
12	NC	No contact
13	NC	No contact
14	VBATT_2	Battery input 2

**Dash Electronic Control Unit (DECU): J2 Connector
Pin Assignments (Non-Towing DECU Variant)**

Pin	Name	Description
1	GND_2	Ground
2	NC	No contact
3	NC	No contact
4	NC	No contact
5	NC	No contact
6	CAN2_LO	CAN2 low
7	NC	No contact
8	CAN2_HI	CAN2 high
9	NC	No contact
10	NC	No contact
11	NC	No contact
12	NC	No contact
13	NC	No contact
14	VBATT_2	Battery input 2

COMMUNICATIONS INTERFACE

CAN1

The DECU provides support for a CAN transceiver. "CAN 1" is intended for use on the vehicle J1939 bus. It can be configured for either 250 kbps or 500 kbps operation.

CAN2

A second DECU CAN channel, designated "CAN 2," is also available. It can be configured for either 500 kbps or 50 kbps operation.

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