Bendix

Service Data

SD-13-47672A

Bendix® TABS-6™ Advanced Multi-Channel (MC) (ABS/TRSP) and MC LITE (ABS Only) Trailer Antilock Braking System (ABS) Modules

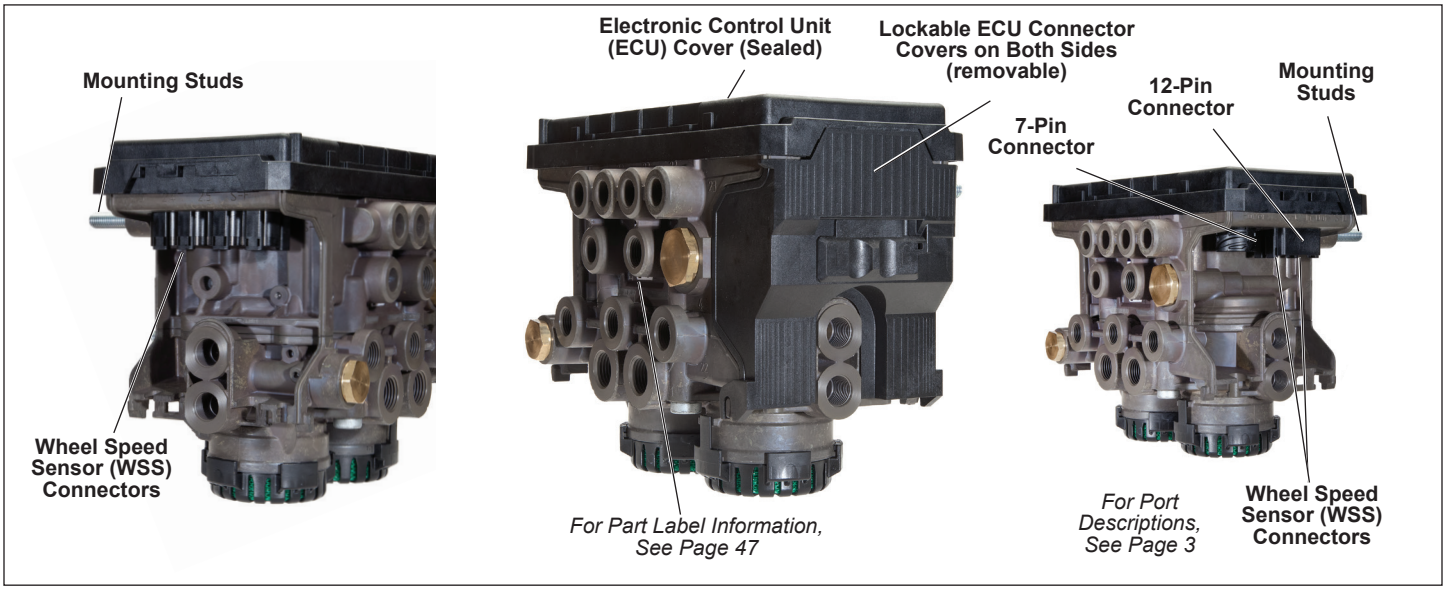


Figure 1 – Bendix® TABS-6™ ADV MC and MC LITE ABS Module

1. INTRODUCTION

The Bendix® TABS-6™ Advanced (ADV) Multi-Channel (MC) module (Generation 2) is an integrated, MC (4S/2M) trailer service brake module controller for air-braked, heavy-duty semi trailers that features the Bendix® Antilock Brake System (ABS) and Bendix® Trailer Roll Stability Program (TRSP®). TABS-6 ADV MC offers a LITE version, which provides an ABS-only functionality while keeping the benefits of having a multi-channel system.

NOTE: All references to the TABS-6 module in this document – aside from TRSP-related references – also include the MC LITE module.

Installed on semi-trailers, the module acts as a relay valve during service braking, but during ABS events, it may intervene to help maintain vehicle stability by modulating brake pressure at the wheel ends. The Bendix TRSP monitors the trailer's motion and reduces the risk of rollovers by automatically applying the brakes when a risk of a rollover is detected.

NOTE: The Bendix TRSP is not available for TABS-6 MC LITE.

Section TABLE OF CONTENTS . . . . . PAGE

GENERAL SAFETY GUIDELINES

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

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

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

⚠ WARNING

Disconnect the electrical connectors from the ABS system/TRSP controller before welding on the trailer.

⚠ WARNING

Dielectric grease should be applied to electrical connectors to help protect against moisture intrusion.

These modules feature:

- A modular design with an integrated ECU; pressure sensors; a lateral acceleration sensor; and Modulator Relay Valves (MRVs) – eliminating external pigtail harnesses for these components
- An operating voltage range of 8 - 32 V
- An electronic odometer with trip counters and service interval options
- A scratch-pad feature with up to 1,008 bytes of freely definable read/write text space available for customer use
- An extended data logging feature, including a resettable drive recorder
- A wide variety of electrical inputs/outputs (I/Os) that allow the customer to program auxiliary functions such as automatic Lift Axle Control (LAC); Integrated Speed Switch (ISS); external load sensors; Auxiliary Design Language (ADL) for customized auxiliary functions; and others
- A wide range of diagnostic tools for flexible troubleshooting such as blink codes; SAE J2497 Power Line Carrier (PLC); SAE J1939 (CAN) diagnostics; the Bendix® Trailer Remote Diagnostic Unit (TRDU); and the Bendix® Trailer Information Module
- Support for SAE J2497 PLC communication to the towing vehicle and diagnostics
- Support for SAE J1939 (CAN) communication for diagnostics and external devices
- A pressure-equalizing valve in the sealed ECU housing to give improved protection from water, etc.
- A serviceable nylon filter to help prevent foreign material from entering the control port
- Locking dust covers to provide electrical connector and cable protection

2. ABS SYSTEM OPERATION

The TABS-6 ADV MC module uses WSS, MRVs, and an ECU to optimize the contact between the tires and the road surface during a braking event where excessive wheel slip – or wheel lock-up – is detected.

When a situation is detected where the system needs to intervene, the ECU will send signals to the MRVs to modulate controlled brake pressure at the wheel ends. Depending on the configuration of the ABS system, interventions may be made on individual wheels, or pairs of wheels. In the case of pairs of wheels, the wheels controlled by a modulator may be either on the same side of the vehicle, or at both ends of an axle.

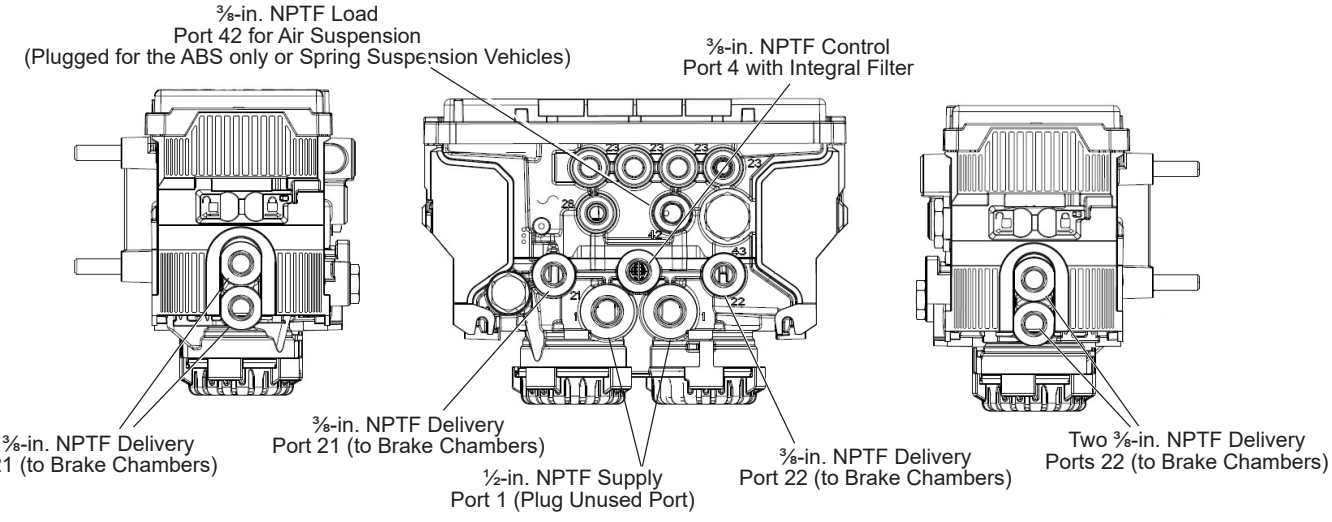
The TABS-6 ADV MC module ECU is typically able to modulate the brake pressure with greater speed and accuracy than a driver.

Service Braking

During service braking, the TABS-6 ADV MC module functions as a relay valve. If the ECU does not detect excessive wheel slip, it will not activate the ABS system, and the vehicle will stop with service braking.

⚠ WARNING

Axle control (*select high*) and side control should not be used on fifth-wheel dollies or steerable axles. In these cases, it could cause a yaw moment during braking that results in unwanted steering of the axle. Use a dolly control (*select low)* configuration.



For NPTF fittings, the use of a thread sealant is recommended. This can be a pre-applied or a hand-applied sealant product (with PTFE) can be used. When using a hand-applied sealant, use caution so as not to over-apply. Always follow the fitting manufacturer's pre-applied or hand-applied thread sealant recommendations. Use of PTFE tape is not approved and will void the Bendix ABS/Bendix TRSP valve warranty.

Figure 2 – Ports Used

Side Control (Independent Control)

Side control uses a single MRV to separately control the braking on one (1) or more wheels, on either side of the vehicle.

In the case of braking surfaces with poor overall traction, the side control ABS interventions will maintain the wheels on each side of the vehicle independently, at just under the speed where they would lock up.

NOTE: Side control should not be used on fifth-wheel dollies or steerable axles.

Axle Control

Axle control uses a single MRV to control the wheels at both ends of a given axle (or multiple axles in cases where a single MRV is controlling several axles).

In the case of braking surfaces with poor overall traction (e.g. roads that are worn, slippery, or are made of loose gravel) – or braking surfaces with areas of poor traction (e.g. asphalt roads with patches of ice) – axle control ABS interventions will maintain the wheel that is not slipping at just under the speed that may lock the wheel. The system permits the other wheel (that is experiencing slippage) temporary periods of wheel-lock during the intervention.

Axle control should not be used on fifth-wheel dollies or steerable axles.

When intervening on regular traction road surfaces, a system configured for axle control performs similar to a side-control, two-modulator system.

Steerable Axles

For applications that have both fixed and steerable axles, such as drawbar trailers (full-pull trailers), a 4S2M axle configuration should be used. These configurations have the ability to minimize yaw on steerable axles.

ABS Fail-Safe

The TABS-6 ADV MC module is designed to react in a fail-safe manner in the event of a system Diagnostic Trouble Code (DTC). For example, if the ECU detects that a sensor is not responding, an ABS system DTC will be set and the TABS-6 ADV MC module will illuminate the trailer ABS indicator lamp and revert to a fail-safe mode where some, or all, advanced ABS functions (including the Bendix TRSP) may not function. Even in cases where the ABS system is completely disabled, the standard pneumatic brake function of the vehicle will still be available, but without the benefits of the ABS system. The TRSP feature is also disabled with an active ABS system DTC. If the indicator lamp is illuminated, always have the ABS system serviced at the earliest opportunity.

3. BENDIX TRSP OPERATION

⚠ WARNING

During a TRSP system intervention, the vehicle automatically decelerates. The TABS-6 ADV MC module can slow the vehicle with or without the driver applying the brake pedal, and even when the driver applies the throttle.

⚠ WARNING

Even with TRSP-equipped vehicles, the driver remains responsible for ensuring vehicle stability during operation. The TRSP system only functions within the limits of physics. The system can help mitigate potential vehicle stability incidents. Other factors – such as driving too fast for the road, traffic or weather conditions, over-steering, an excessively high vehicle Center of Gravity (CG), poor road conditions, or insufficient vehicle maintenance – can cause vehicle instability that is beyond the capability of any stability system to mitigate.

⚠ WARNING

Operating the vehicle with a damaged/disconnected load sensor could lead to serious performance issues that may result in property damage, serious injuries, and/or death. The advanced ABS system used on this vehicle uses sensors, including the load sensor, to assist the TRSP function.

⚠ WARNING

The TRSP system should only be used on specific vehicle platforms that have been validated and approved by Bendix engineering.

⚠ WARNING

For vehicles installed with spring suspension systems, care must be taken to prevent damage to the load sensor when lifting the trailer. The linkage rod must be disconnected from the sensor's rubber boot whenever the frame of the trailer is lifted, dropping the axle(s). This includes situations where a jack is used on the rear bumper or when a crane is used to lift the trailer.

The TRSP system reduces the risk of rollovers during driving by automatic application of the service brakes when the system detects potential rollover conditions. This is accomplished with monitoring sensors both at the trailer wheel ends and within the TABS-6 ADV MC module. The TRSP system reacts by applying the trailer service brakes and slowing the vehicle combination.

The Bendix TRSP system uses the following sensors:

- **Lateral Acceleration:** A lateral accelerometer is located within the TABS-6 ADV MC module. This sensor detects the lateral motion (or "roll") of the vehicle as it moves. The TABS-6 ADV MC module must be mounted either facing forward (0 degrees) or facing the rear (180 degrees) of the trailer to function correctly – *See the Troubleshooting section* for full details of acceptable installation locations. **NOTE:** Do not attempt to change the location of the module without contacting Bendix for engineering approval.
- **Vehicle Speed:** The TRSP system obtains information about the vehicle speed and rate of acceleration from the WSS.
- **Axle/Bogie Load:** The trailer's axle load information is obtained either by the use of:
  a. An integrated pressure sensor port (P42) of the TABS-6 ADV MC module, where a direct reading of the suspension air spring pressure is taken; or
  b. If configured for a mechanical spring deflection sensor, a voltage reading that is proportional to the spring deflection.

TRSP Intervention with Driver Actions

It is possible that the driver will also apply the brakes before or during a TRSP intervention by the TABS-6 ADV MC module. In all cases, the ECU monitors the driver's brake application and compares that to the amount of braking the TRSP program has calculated needs to be applied. The pressure delivered to the brakes will always be the higher of the two (2) values.

4. COMPONENTS

Installations of the TABS-6 ADV MC module use the following components:

Internal

- **ECU:** The ECU monitors the WSS signals, lateral accelerometer sensor signal, and various pressure sensors (and, if configured, external spring deflection sensor) to determine when the ABS and/or TRSP intervention is required. When needed, the ECU actuates the appropriate pressure MRVs to optimize the brake pressure. The ECU monitors the system to detect and warn the driver of any malfunctions. DTCs are stored in the ECU and can be reviewed to diagnose the TABS-6 ADV MC module system.
- **Brake Demand Pressure Sensor:** This sensor monitors the trailer service brake pressure being applied by the driver and sends an electrical signal proportional to the driver's brake demand to the ECU.
- **Brake Delivery Pressure Sensors:** These sensors (P21 and P22) monitor the trailer service brake pressure that is being delivered to the wheel ends through, or by, the TABS-6 ADV MC module system and sends electrical signals proportional to the delivered trailer service brake pressure to the ECU.
- **Internal Load Sensor:** For air suspension systems, the load sensor port (P42) must be plumbed to a fixed axle air ride bellows. **NOTE**: The sensor must not be plumbed to lift axle bellows since they are not charged when the axle is not being used. The function of this sensor is to monitor the pressure and send an electrical signal proportional to the trailer's axle load to the ECU.
- **Lateral Accelerometer Sensor:** The lateral accelerometer sensor senses the lateral movement of the trailer and sends an electrical signal proportional to the trailer's lateral acceleration to the ECU.
- **MRV:** MRVs are integrated into the module and are controlled electrically by the ECU to decrease, hold, or allow the fully applied brake pressure into the brake chamber to control the braking torque at the wheels.
- **Supply Pressure Sensor:** Supply pressure sensors are non-serviceable, and are located within the module.

External

- **External Load Sensor:** For spring suspension systems, an external electrical spring deflection sensor is installed – typically as close to the center (±5 in. / 12.7 cm) as possible of an axle with linkage attached to the center of the axle (but **MUST NOT** be installed on a lift axle), *See Figure 3.* Vehicles with a mechanical load sensor have the port (P42) used for sensing the air suspension system plugged.
- **Load Sensor:** *See Figure 3.* If a trailer is equipped with an external electrical spring deflection sensor, a linkage is attached to an axle (but must not be installed on a lift axle) – within five (5) in. (12.7 cm) of the center of the axle – connects to a load sensor attached to the chassis of the vehicle. The output from the sensor is an electrical signal that is proportional to the spring deflection. The connection to the ECU is via the auxiliary 12-pin or 2.4 connector.
- **Lift Axle Sensing:** If a trailer is equipped with a lift axle, then lift axle sensing must be used, unless configured for automatic lift axle control *(see below)*. A pressure threshold switch must be installed in the lift bag for the lift axle and connected to the ECU. The ECU can then monitor the position of the lift axle and will compensate correctly for the load transfer to the other axle(s) when the lift axle is raised.

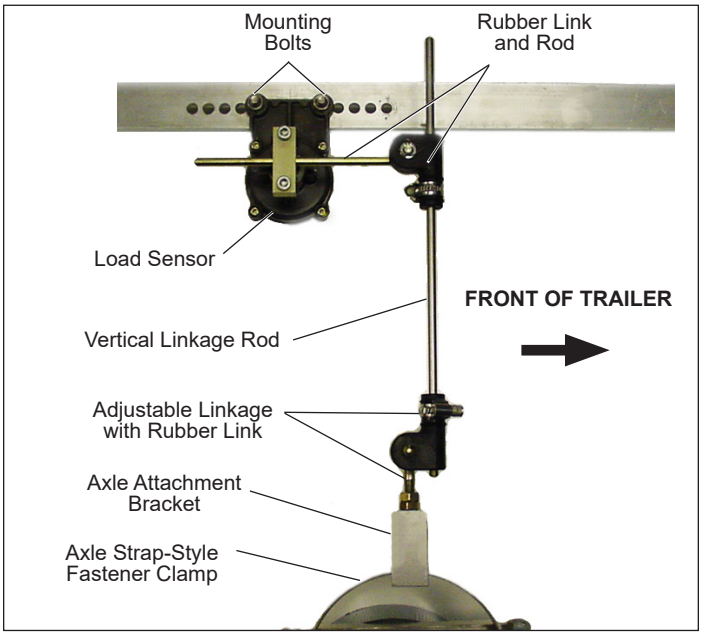


Figure 3 – Typical External Load Sensor Installation

For more information, refer to S-1588, Spring Deflection Sensor, on B2Bendix.com.

- **Lift Axle Control:** The TABS-6 ADV MC module can be configured to automatically raise (and lower) lift axle(s) when a pre-configured load is sensed.
- **Trailer ABS Indicator Lamp:** Controlled by the ECU to show the ABS status, the trailer ABS indicator lamp illuminates when a DTC is active. *See Figure 4*. If there are no ABS DTCs present, when ignition power is applied to the ECU, the lamp will illuminate as a bulb check lasting typically two (2) seconds, up to six (6) seconds at most. If Low Pressure Warning Emergency (LPWE) is active, the ABS indicator lamp will be on until the condition is clear.

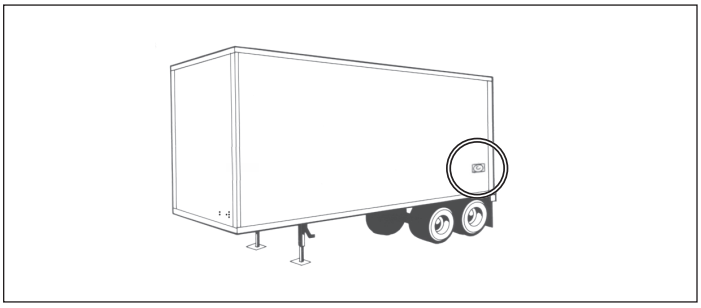


Figure 4 – Trailer-Mounted ABS Indicator Lamp

- **WSS:** Located at selected hubs, WSS detect the rotation of individual wheels and send an electrical signal to the ECU proportional to the rotational velocity. S*ee Figures 5a and 5b*.
- **Pigtail Wiring Harness:** A power pigtail harness is required. Auxiliary harnesses are available, as needed. *See Figure 6.*

⚠ WARNING

Use of cable ties/tie wraps to attach WSS leads to rubber hoses/jounce lines is not approved. The hose may expand during braking due to air pressure and the cable tie may not, so the conductor material/insulation of the WSS extensions may be damaged. Bendix instead recommends only open-ended clips be used to hold sensor leads to jounce lines.

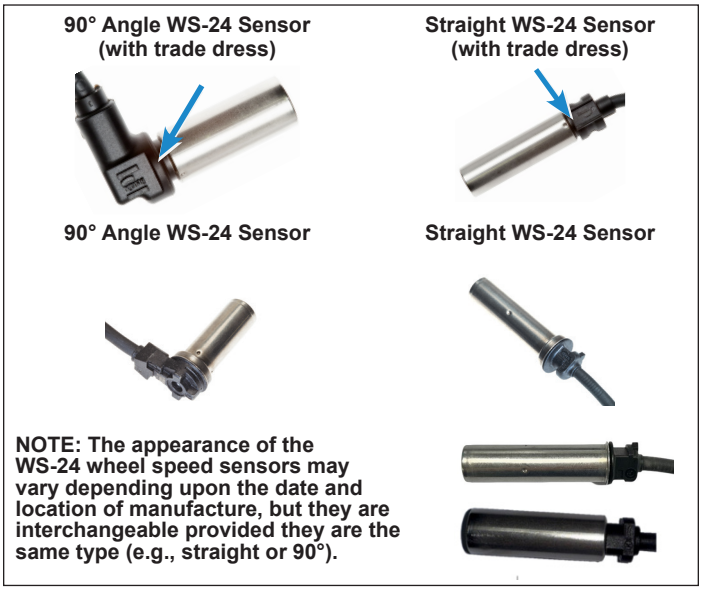
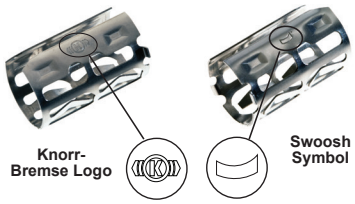


Figure 5a – Bendix® WS-24™ Wheel Speed Sensors

Part No. K134931



NOTE: Stainless steel clamping sleeves require that a high-temperature-rated silicon- or lithium-based grease be applied to the sensor body. This lubrication will keep the movement between the sensor and the clamping sleeve independent from one another.

Figure 5b – Steel Clamping Sleeve

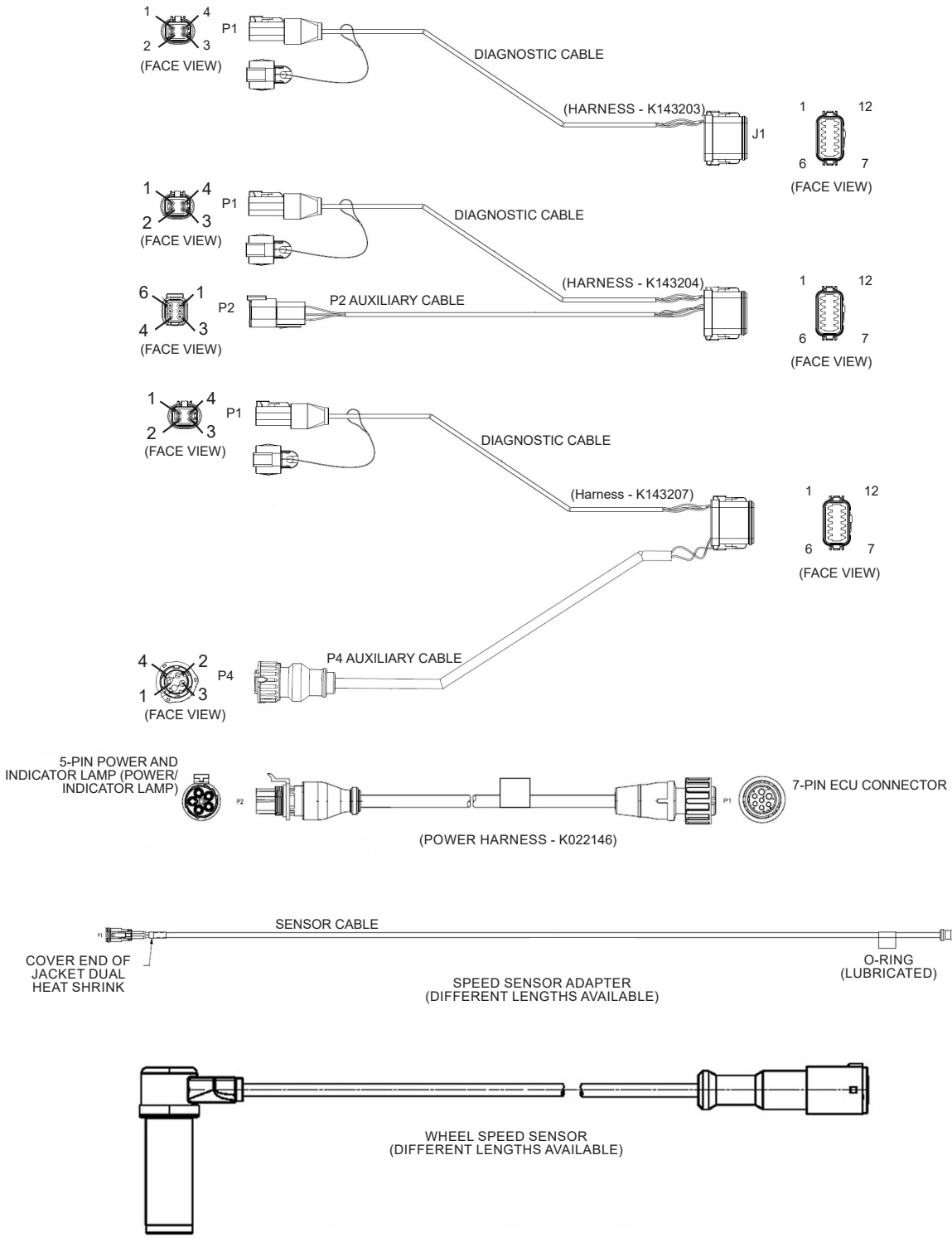


Figure 6 – Examples of Pigtail Wire Harnesses

5. MOUNTING

Frame (Chassis) Mount

The TABS-6 ADV MC module provides three (3) M10, 1.18-in. (30 mm) studs for frame-mounting directly to a trailer cross-member. The TABS-6 ADV MC module uses three (3) Class-8 steel M10x1.5 lock nuts with washers, torqued to 354 ± 44.4 in.-lbs (40 ± 5 N•m). A bracket may be used if direct mounting to a cross-member is not possible.

6. PIGTAIL WIRING HARNESSES

See Figure 6. Several pigtail wire harnesses are available to connect the TABS-6 ADV MC module with other trailer system components. Pigtail harnesses are weather-sealed at the connector interface and are clearly labeled for proper installation. Because of the over-molded design of the wiring harnesses, Bendix recommends that if damage or corrosion occurs, the complete harness be replaced.

WSS Connectors

The TABS-6 ADV MC module includes two (2) primary and two (2) secondary WSS connections separate from the main vehicle pigtail harnesses, and each requires a separate harness. The connector of each WSS is a 2-pin Deutsch DT series.

ECU Connectors

The TABS-6 ADV MC module ECU has four (4) connectors (in addition to the WSS connectors mentioned above). The primary connector is a 7-pin custom series screw-on-type connector used to connect to the vehicle's power pigtail harness. The main connector is a 12-pin Deutsch-DT-series-style connector, used for auxiliary I/Os. Finally, the auxiliary connectors 2.3 and 2.4 are 6-pin Deutsch-DT-series-style connectors, used for additional auxiliary I/Os.

Power and Ground

Trailer electrical power is supplied to the TABS-6 ADV MC module from the ignition and brake light circuits.

See Tables 1 and 2 for output values and pin locations.

Function Mode	Value
Operating Range	8.0 to 32.0 VDC
ECU Active	150 mA @ 12 VDC
ABS Active	2.0 A @ 12 VDC

Table 1 – Values for Outputs

Circuit	7-Pin Trailer Conn.	5-Pin ABS Conn.	7-Pin ECU Conn.
Ignition Power PLC (Blue Wire)	7	B	1
Brake Light Power (Red Wire)	4	A	2
Ground (White Wire)	1	E	4
Indicator Lamp (White/Green Wire)	N/A	D	5
TT-CAN Hi* (White/Green Wire)	N/A	N/A	6
TT-CAN Lo* (White/Brown Wire)	N/A	N/A	7
**Tractor Trailer CAN is only available for ECUs labeled with a component index of M002 and higher.*			

Table 2 – Main Power Harness and Connectors Pin Out

Power/ABS Indicator Lamp Connector

The TABS-6 ADV MC module pigtail uses a TTMA RP 97-99 5-pin Packard Weather Pack connector for brake light power, constant power, ground, and the trailer-mounted ABS indicator lamp.

SAE J1939 (CAN) Connector

See Figure 6.

The TABS-6 ADV MC module 12-pin auxiliary harnesses typically include a 4-pin connector used for various ECU communications. Typical uses include J1939 diagnostics and connection to the Bendix TIM.

Auxiliary I/O Connector

The TABS-6 ADV MC module provides an option for up to six (6) auxiliary I/Os. For a pin-out, *see Section 11.*

Examples of uses of the auxiliary connectors are:

- Lift axle sensing
- Rear axle suspension air bag dump
- SAE J1939 diagnostics
- Automatic lift axle control
- External spring deflection sensor for mechanical spring suspension

7. ABS INDICATOR LAMP

Trailer-Mounted Lamp

The TABS-6 ADV MC module controls an ABS indicator lamp to show the trailer ABS status. With power supplied by the towing vehicle – if there is an active DTC, or during the bulb test at startup – the module illuminates the ABS indicator lamp by providing a 12.0 VDC signal. (The other side of the lamp is grounded.) The ABS indicator lamp output uses pin 5 of the 7-pin connector on the module.

Dash-Mounted Lamp (PLC-Controlled)

The TABS-6 ADV MC modules use SAE J2497 standards to support Power Line Carrier (PLC) communication. The status of the trailer ABS is transmitted over the ignition power wire (the blue wire of the J560 connector) – pin 1 of the 7-pin module connector.

If there is an active DTC during the bulb check at startup, the TABS-6 ADV MC module will transmit a signal over the power line to the towing vehicle's ECU. The towing vehicle's ABS controller will then illuminate the trailer ABS indicator lamp mounted on the dash.

8. BENDIX® WS-24™ WHEEL SPEED SENSORS (WSS)

Wheel speed data is provided to the TABS-6 ADV MC module by the Bendix® WS-24™ Wheel Speed Sensors (WSS). Typically, the WS-24 WSS is installed in a mounting block that is welded to the axle housing. The WS-24 WSS are protected by a stainless steel sheath and are designed to be used with stainless steel clamping sleeves (sometimes referred to as a "retainer bushing", "friction sleeve", or "clip") (*See Figure 5*). The clamping sleeve provides a friction fit between the mounting block bore and the WS-24 WSS.

Vehicles have an exciter ring (or "tone ring") as part of the wheel assembly. (The default setting expects a 100-tooth tone ring to be used. *See Troubleshooting: Section E* for more information.) As the wheel turns, the teeth of the exciter ring pass the WSS, generating an AC signal which is delivered to the TABS-6 ADV MC module ECU. The signal varies in voltage and frequency as the wheel speed changes.

Vehicle axle and ABS control configurations determine if two (2) or four (4) WSS are required. *See Figures 19 and 20* for an electrical system schematic showing WSS connector pin locations.

NOTE: If the trailer is equipped with a lift axle that will use WSS, it is important that secondary sensors SE and SF be used for this axle. *See the system diagrams included in this document.* In all cases, the primary WSS must be located on the fixed axle. For 2S/2M systems, the fixed axle sensors are SC and SD.

1. For increased corrosion protection, Bendix recommends that a high-temperature-rated silicone- or lithium-based grease be applied to the interior of the mounting block, the sensor, and to a new clamping sleeve.
2. Install the new clamping sleeve fully into the block, with the retaining tabs toward the inside of the vehicle. Please note that Bendix WS-24 WSS must use the correct clamping sleeve to avoid problems associated with reduced retention force, such as sensor movement and resulting in ABS DTCs. *See Figure 5.*
3. Gently push (**DO NOT STRIKE**) the sensor into the mounting block hole until it bottoms out on the face of the tone ring. Secure the cable lead wire to the knuckle/ axle housing 3-6 in. (7.62-15.24 cm) from the WSS.
4. Apply a small amount of dielectric non-conductive grease to both the WSS and the harness connectors.
5. Engage the connectors and push them together until the lock tab snaps into place. It is permissible to use an extra wire retainer (Bendix part number 300122, or equivalent), if available, to hold the connectors together.

The friction fit allows the WS-24 WSS to slide back and forth under force, but to retain its position when the force is removed. When the WS-24 WSS is inserted all the way into the mounting block and the wheel is installed on the axle, the hub exciter contacts the sensor, which pushes the WSS back. Also, normal bearing play will "bump" the WSS away from the exciter. The combination of these two (2) actions will establish a running clearance, or air gap, between the WSS and the exciter.

⚠ CAUTION

Correct WSS installation is necessary for optimal ABS operation.

⚠ CAUTION

Wheel bearing maintenance is an important part of keeping the WSS in the correct position. Excessive wheel end play can result in DTCs in cases where the WSS is pushed too far away from the tone ring for a good signal to be produced. Maintain wheel bearings per the manufacturer's recommendations.

9. SAE J2497 (PLC) DIAGNOSTIC LINK

All newer towed vehicles transmit a signal over the power line to the towing vehicle ABS ECU. The signal, using a heavy vehicle industry standard known as Power Line Carrier (PLC/J2497), is broadcast by the trailer ABS ECU over the blue wire (ignition power line) of the SAE J560 connector and controls an in-cab trailer ABS indicator lamp. *See Figures 7 and 8.*

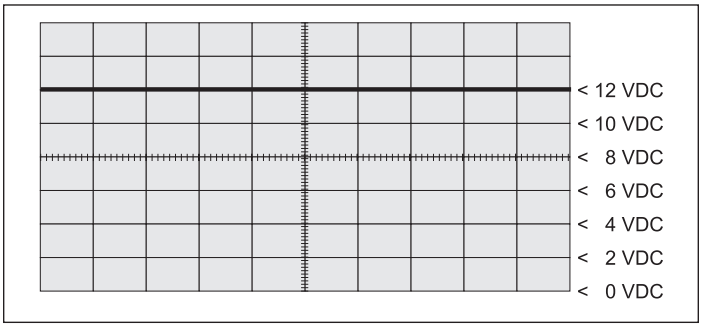


Figure 7 – Power Line Without PLC Signal

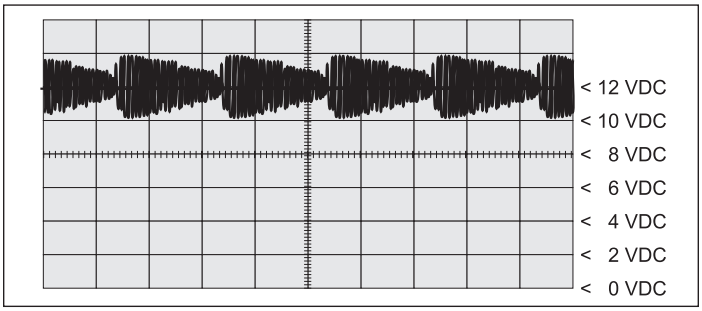


Figure 8 – Power Line With PLC Signal

The TABS-6 ADV MC module provides a data link for PLC communication following the SAE J2497 standard.

Bendix® ACom® Diagnostic Software and the Bendix TRDU both support PLC communication with the TABS-6 ADV MC module.

PLC communication is applicable for 12-V vehicle applications only. The PLC communication is disabled for voltages greater than 18 V.

Identifying and Measuring the PLC Signal

The TABS-6 ADV MC module will continuously broadcast PLC messages that indicate trailer ABS status. At power-up, or during a trailer DTC condition, the TABS-6 ADV MC module will signal the tractor ABS unit to illuminate the dash-mounted trailer ABS indicator lamp.

Diagnostic tools are available that detect the presence of a PLC signal and perform further system diagnostics directly using the power line. For more information on these diagnostic tools, contact Bendix or refer to your local authorized Bendix dealer or distributor.

An oscilloscope can also be used to verify the presence and strength of a PLC signal on the power line. The PLC signal is an amplitude- and frequency-modulated signal. Depending on the load on the power line, the amplitude of the PLC signal can range from 2.5 mV p-p to 7.0 V p-p.

Suggested oscilloscope settings are: AC coupling, 1 V/div, 100 µsec/div. The signal should be measured on pin 7 of the J560 connector at the nose of the trailer.

10. SAE J1939 (CAN) DIAGNOSTIC LINK

The TABS-6 ADV MC module provides a data link for transmitting CAN information following the SAE J1939 standard.

ACom Diagnostic Software and the Bendix Trailer Information Module both support CAN communication with the TABS-6 ADV MC module.

Ignition power must be provided to the TABS-6 ADV MC module for the diagnostic link to be active.

11. AUXILIARY I/O

The TABS-6 ADV MC module provides for up to six (6) auxiliary I/O functions. *Refer to Table 3.*

ACom Diagnostic Software supports the configuration of the TABS-6 ADV MC module auxiliary I/Os.

Name	ECU Conn.	Pin No.	Auxiliary Functions	Auxiliary Type
Aux I/O 1 (AuxIO1)	12-Pin ECU Conn. (X2)	1	High-Side Driver	Output
			Digital Input	Input
Aux I/O 2 (AuxIO2)		2	High-Side Driver	Output
			Digital Input	Input
Aux I/O 3 (AuxIO3)		3	High-Side Driver	Output
			Digital Input	Input
AuxRet 12		12	Low-Side Driver	Output
AuxRet 3		11	Low-Side Driver	Output
Sens_Sup		6	+5V Sensor Supply	Output
Sens_In		5	Analog Input	Input
Sens_Gnd		4	Low-Side Driver	Input
Aux I/O 4 (AuxIO4)	6-Pin 2.3 (X3)	1	High-Side Driver	Output
			Digital Input	Input
Aux I/O 5 (AuxIO5)		3	High-Side Driver	Output
			Digital Input	Input
AuxRet 4		2	Low-Side Driver	Output
AuxRet 5		4	Low-Side Driver	Output
Aux I/O 6 (AuxIO6)	6-Pin 2.4 (X4)	3	High-Side Driver	Input
			Digital Input	Output
AuxRet 6		4	Low-Side Driver	Output
Sens_Sup2		1	+5V Sensor Supply	Output
Sens_In2		5	Analog Input	Input
Sens_Gnd		2	Low-Side Driver	Input

Table 3 – Auxiliary I/Os

12. BENDIX® ABS FLEX™ PROGRAM

The Bendix® ABS Flex™ program uses Auxiliary Design Language (ADL) to allow customized auxiliary functions to be carried out by the TABS-6 ADV MC module. Programs developed in the ABS Flex program may be downloaded at the production line or in the field to control non-braking functions of the trailer.

For example, the ABS Flex program can potentially communicate the status of tire inflation and/or temperature, reefer temperature, load presence, lift axle position, proximity/reverse alarm, and vehicle weight.

ABS Flex programs monitor the auxiliary I/Os and/or the SAE J1939 (CAN) and SAE J2497 (PLC) data links. Contact your Bendix Account Manager to discuss an ABS Flex program for your vehicle(s).

13. CUSTOMER SCRATCH PAD

The TABS-6 ADV MC module has a customer scratch pad feature which allows the customer, or end-user, to store up to 1,008 bytes of information. This information can then be read using the ACom Diagnostic Software.

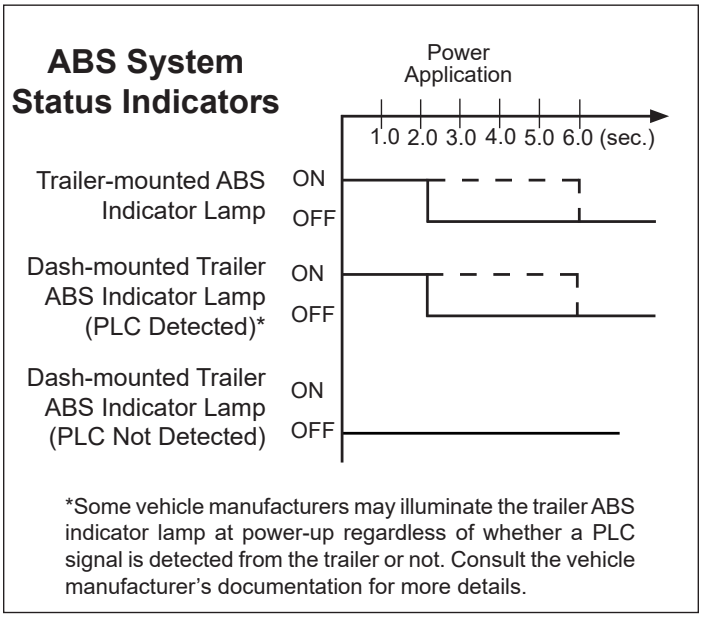


Figure 9 – Trailer ABS Lamp Power-Up Sequence

14. POWER-UP SEQUENCE

At power-up, the TABS-6 ADV MC module performs a series of self-checks that can assist a technician to determine the ABS system status and configuration.

Trailer ABS Indicator Lamp

At power-up, with no active DTCs, the trailer ABS indicator lamp will illuminate for approximately two (2) to six (6) seconds as a bulb check and then turn off. *See Figure 9*.

The Low Pressure Warning Service feature is configured by default. This feature will alert the driver whenever the pressure of the reservoir is below 65 psi via an active DTC that will illuminate the ABS indicator lamp. Once the pressure has reach above 65 psi, the DTC will clear and the lamp will turn off.

If any active ABS or related DTCs are present, the trailer ABS indicator lamp will remain illuminated.

For non-ABS or TRSP-related DTCs, such as auxiliary functions, at power-up, the trailer ABS indicator lamp will turn on for approximately six and a half (6.5) seconds as an extended bulb check, and then turn off.

If a PLC-ready towing vehicle and trailer are powered at the same time, the TABS-6 ADV MC module will also trigger a bulb check on the dash-mounted trailer ABS indicator lamp.

Modulator Chuff Test at Power-Up

At power-up, the TABS-6 ADV MC module activates a modulator chuff test. This electrical and pneumatic ABS modulator test can help the technician identify problems with modulator installations and/or wiring.

With a full reservoir, brake pressure and a properly installed modulator on power-up will cause two (2) rapid groups of five (5) audible air pressure pulses. The TABS-6 ADV MC module will not perform a modulator chuff test with an active ABS DTC.

15. ODOMETER FUNCTION

Odometer

The TABS-6 ADV MC module includes an odometer function to provide a means of storing the accumulated mileage of the vehicle. The mileage is computed by using information received from the vehicle WSS.

This feature is accurate to within 0.62 miles per power-up and will typically store mileage up to 1,000,000 miles. The mileage can be displayed using Bendix ACom Diagnostic Software, a Bendix TIM, Bendix TRDU, or through blink codes.

Whenever the TABS-6 ADV MC module is towed using a pre-1997 tractor (with no constant power supplied to the trailer), no information about mileage will be stored during that time, and the mileage can be considered out of calibration.

Trip Counter

The TABS-6 ADV MC module provides a counter to record the trip mileage. The feature can be accessed using the ACom Diagnostic Software or the Trailer Information Module.

Service Interval

The TABS-6 ADV MC module provides a feature that can be used to indicate a service interval for the trailer. The service interval can be accessed using the ACom Diagnostic Software or the TIM. If configured, the TABS-6 ADV MC module can flash the indicator lamp when the vehicle is at a standstill to indicate when the service interval has been exceeded.

16. NON-STANDARD TIRE SIZE

The TABS-6 ADV MC module allows for tire rolling radius and tone ring tooth count parameters to be set for the axle being sensed using the ACom Diagnostic Software. These adjustments may be necessary for the module to accurately calculate the vehicle velocity and odometer mileage. Wheels of the same axle must have, and be set to the same, rolling radius and tone ring tooth count. *Refer to the manufacturer's tire specification for correct values.*

The tone ring size is defaulted to 100 teeth, and the tire-rolling radius is defaulted to 511 rpm. These parameters can be adjusted *as shown in Table 4.*

Tone Ring Size	Tire Rolling Radius Allowable Range in Revolutions Per Mile (rpm)
60 teeth	712 to 1005 rpm
80 teeth	512 to 801 rpm
90 teeth	456 to 711 rpm
100 teeth	410 to 640 rpm
120 teeth	356 to 502 rpm

Table 4 – Tone Ring Size to Tire Rolling Radius

17. DTC DETECTION

The TABS-6 ADV MC module contains self-testing diagnostic circuitry that monitors the ABS components and wiring.

When the TABS-6 ADV MC module senses an erroneous system condition, it activates the external trailer-mounted ABS indicator lamp, disables all or part of the affected ABS and/or the TRSP functions, and it stores the DTC in memory, so that the information is retained even when the power is removed. The TABS-6 ADV MC module also uses PLC communications to send the system status to the towing vehicle.

For some DTCs, the TABS-6 ADV MC module will automatically reset ("self-heal") the active DTC when the error is corrected [e.g. when a WSS is re-aligned]. However, repeated occurrences of a given DTC can cause the code to "latch" – that is, be retained as active – even if the condition is only intermittent. Once the code is latched, a manual reset will be necessary. Technicians can use these latched codes to assist them in troubleshooting intermittent errors. After the problem is repaired, the DTC can be reset using blink code diagnostics or with a diagnostic tool.

When a DTC self-heals or is manually reset, the code remains stored as an inactive DTC in the ECU memory. This inactive DTC can be retrieved using blink code diagnostics or with a diagnostic tool.

18. PARTIAL OR FULL ABS/TRSP SHUTDOWN

Depending on the DTC detected, the ABS ECU will partially or completely disable the ABS and/or TRSP functionality. In cases where the ABS is completely disabled, the vehicle reverts to standard service braking (without ABS or TRSP interventions). Always repair ABS DTCs at the earliest opportunity.

Voltage DTC

The operating voltage range is 8.0 to 32.0 VDC. If the voltage is detected as being out of range, the ABS and TRSP system braking features will be disabled, and the system reverts to standard service braking. When the correct voltage level is restored, full ABS and TRSP functionality is typically available again.

19. BLINK CODE DIAGNOSTICS

The TABS-6 ADV MC module provides diagnostic functions through blink code diagnostics. This means that the technician – even without diagnostic tools – can read a series of ABS indicator lamp blinks to diagnose the DTCs being generated.

With no towing vehicle attached, enter the blink code diagnostics mode by providing constant power to the ignition circuit then toggling the brake light power input the specific number of times shown in *Table 5*, for the desired mode.

With a parked towing vehicle attached, apply ignition power, and after the power-up sequence is complete, enter the diagnostics mode by depressing and releasing the brake pedal the specific number of times shown in *Table 5*, for the desired mode.

Cycles to Enter Desired Mode	
Mode	Cycles
Active DTC Retrieval	3
Inactive DTC Retrieval (DTC History)	4
Clear Active DTCs	5
Odometer Mileage Display	7

Table 5– Blink Code Information

Depending on the blink code mode activated, the TABS-6 ADV MC module will blink the trailer-mounted ABS indicator lamp to display active DTC codes, inactive DTCs, and odometer mileage. Blink code diagnostics can also be used to clear active DTCs.

Wait until after the modulator chuff test before activating the brake light power. Alternatively, wait five (5) seconds.

NOTE: If certain DTCs are set, typically where modulator DTCs have occurred, the chuff test may not run.

Following a single display of all available messages, the ABS indicator lamp will remain on for five (5) seconds and then return to normal operating mode. Blink code diagnostics can only be activated following a power-up, where wheel speeds have not been detected. If the vehicle moves during the blink code diagnostics mode, the TABS-6 ADV MC module will cancel the blink code diagnostics and return to normal operating mode.

Blink code diagnostics must be activated within the first 15 seconds of ignition power being applied.

If brake light power is continuously applied for greater than five (5) seconds, blink code diagnostics will be disabled until the next time the ignition power is cycled.

NOTE: Blink codes are not unique and can be shared between faults, generally of the same type. If there are doubts over which DTC has occurred, based on the blink code, try using a diagnostic tool to obtain the unique fault code.

Display Active DTCs

To display active DTCs, apply ignition power and depress and release the brake pedal three (3) times within 15 seconds (allowing one [1] second between each application). Following this activation, there will be a five (5) second delay followed by a blink code display sequence of all active DTCs.

Display Inactive DTCs

To display inactive DTCs – those that are not currently set, but have occurred and are stored in the ECU memory – apply ignition power and depress and release the brake pedal four (4) times within 15 seconds. Following this activation, there will be a five (5) second delay followed by a blink code display sequence of all inactive DTCs stored.

Reset Active DTCs

To reset active DTCs, apply ignition power and depress and release the brake pedal five (5) times within 15 seconds. Following activation, there will be a five (5) second delay followed by:

a. If no DTCs remain, a blink code message of 1-1, (System Fully Operational - No DTCs Detected) and the ABS indicator lamp will cease to be illuminated; or

b. If there are remaining active DTCs, a sequence of blink codes will display all of the remaining active DTCs, and the ABS indicator lamp will stay on.

Resetting active DTCs with blink code diagnostics does not clear information from DTC history. Both blink code diagnostics or diagnostic tools can retrieve inactive DTCs, but only diagnostic tools can clear this information.

Display Odometer Mileage

To display the trailer odometer mileage, apply ignition power and depress and release the brake pedal seven (7) times within 15 seconds. Following activation, there will be a five (5) second delay followed by a blink code display of the odometer information (x1000).

E.g. 152,431 miles will be displayed as: 152 (x1000) or one (1) blink (pause); five (5) blinks (pause); two (2) blinks.

Zeros will be displayed by the ABS indicator lamp strobing twice.

Odometer mileage cannot be altered with blink code diagnostics. Complete odometer information can be retrieved using a diagnostic tool.

20. AUXILIARY FEATURES

Low-Pressure Warning Service (LPWS) – Active by Default

The internal pressure sensor on the P1 port the TABS-6 ADV MC module monitors the pressure on the trailer reservoir and alerts the driver when the pressure is below 65 psi by illuminating the ABS indicator lamp. The fault will become inactive dynamically once the pressure of the reservoir is above 65 psi. The P1 port pressure is available via TI-CAN.

Low-Pressure Warning Emergency (LPWE)

By monitoring the status of an external pressure switch installed on the emergency line at the spring brake valve, the ECU is capable of alerting the driver through the ABS indicator lamp, when the vehicle is in movement and the pressure on the emergency line has not reached 65 psi (the minimum pressure required to release the spring brakes). The speed threshold at which the alert activates is configurable. The fault will become inactive dynamically once the emergency line pressure is above 65 psi. It is optional to enable the broadcast of the switch status.

Automatic Lift Axle Control (LAC)

The TABS-6 ADV MC module can be configured to automatically raise a lift axle, or group of lift axles, when the load on the trailer drops below a configured weight. At least one (1) of the auxiliary outputs on the TABS-6 ADV MC module must be configured to provide an electrical signal to operate the lift axle valve.

The TABS-6 ADV MC lift axle control sub-system ensures that the legal requirements are fulfilled by preventing overloading of the axles.

Two (2) LAC outputs are available (LAC1 and LAC2) to allow for independent control of the lift axles.

Traction Help (TH)

The TH function temporarily controls the lift axles of the trailer such that a higher load is imposed on the drive axles of the towing vehicle in order to improve traction. The TH function is only available when configured for automatic LAC.

Maneuvering Help

This function is designed to always reduce the effective wheelbase of the trailer, regardless of where the lift axles are located, thereby enabling the trailer to be maneuvered more easily in confined spaces and reducing the possibility of tire scrubbing. When Maneuvering Help is configured and activated, the TABS-6 ADV MC module controls the appropriate trailer lift axles such that the effective wheelbase is temporarily reduced. This function is only available up to a low speed threshold above which the controlled axles will return to their normal automatic control mode. This function is only available when configured for automatic LAC.

Lower Lift Axle (LLA)

Forcing a lifted axle to lower when the automatic control dictates that it should be in the lifted position is often a desirable function and has been integrated in the TABS-6 ADV MC module. LLA is only available when configured for automatic LAC.

Advanced LAC

Advanced LAC is a combined function which offers the Traction Help (TH) and LLA functions via the same input. The following logic is implemented (for momentary switch only):

- TH: the signal is active for less than five (5) seconds
- LLA: the signal is active for more than five (5) seconds and less than 10 seconds
- Normal LAC Mode: the signal is active for more than 10 seconds and will be ignored

Advanced LAC is only available when configured for automatic LAC.

Lift Axle Status (LAS1 – LAS2)

LAS1 and LAS2 monitor the status of the lift axles to determine if the axle(s) has been lifted. When enabled for the Bendix TRSP, the status of the lift axle(s) is used to properly calculate the trailer weight based on the suspension's load input for the optimum TRSP performance. Two (2) lift axle status inputs are available – LAS1 and LAS2 – each connected to one (1) or two (2) lift axles.

Tire Inflation System (TIS) Sensing

The TABS-6 ADV MC will monitor the state of the TIS flow switch and transmit the status upon request through PID-042 of the J1587 protocol. Additionally, it is possible to configure an ECU controlled lamp to indicate the state of the TIS.

Pad Wear-Sensing

The TABS-6 ADV MC will monitor the state of the pad wear sensors installed on the air disc brakes. It will activate a DTC whenever it detects that at least one (1) of the pads has reached the wear limit.

Speed Pulse

In conventional suspension control systems, the raise/lower valve is often not reset to the drive position before the vehicle is moved, and damage can be caused to the suspension and brakes. To prevent this from happening, the ECU can be programmed to supply an electrical signal to the raise/lower valve. When the vehicle exceeds a pre-determined threshold speed, this signal causes the raise/lower valve to automatically switch to the drive position. The switching "ON" threshold can be set to any speed within the range 2.5 to 25 mph, with a signal duration of five (5) to 30 seconds. The switching "OFF" threshold is pre-set and non-adjustable.

Independent Speed Switch (ISS)

The ISS provides an electrical output signal when a pre-programmed vehicle speed has been reached. This signal may be used to fulfill numerous operational requirements such as locking of the steering axles, rear dump, etc. The switching "ON" threshold can be set to any speed within the range 2.5 to 75 mph. The switching "OFF" threshold can be set to any value within 1.3 mph of the switching "ON" (minimum hysteresis is 1.3 mph).

ABS Active

ABS active provides a trailer output signal whenever an ABS intervention occurs on the trailer. This function is typically used to provide an ABS active signal to a telematics device. In addition, with the aid of this function, it is possible to use the signal to engage a stabilizing function for steering axles.

Roll Stability Program (RSP) Active

RSP active provides a trailer output signal whenever a Bendix TRSP intervention occurs on the trailer. This function is typically used to activate a signal to a telematics device or activate the trailer's brake lamps via a relay during TRSP.

Steering Axle Lock (SAL)

SAL provides a speed-related output signal that may be used for connection to a steering axle locking mechanism. This output signal is a combination of an ISS and ABS active. While it may be used for the locking of steering axles via a solenoid valve using an electrical output, it may also be used for other functions where the operation is to be speed-controlled.

Voltage Supply

The voltage supply provides power to other systems on the trailer associated with braking and running gear functions (brakes, chassis, suspensions, and tires).The power supply for other functions must use a different power source. The maximum current available from each configured AUX I/O output is 1.5 amps.

Tilt Angle

The tilt angle function uses the lateral accelerometer integrated in the TABS-6 ADV MC module to monitor any lateral tilting of the trailer during the tipping operation. If the tilt angle exceeds a programmable threshold, then the TABS-6 ADV MC module will generate an electrical output which can be used as a driver warning or tipping intervention. The warning is only available up to a configurable speed threshold.

TABS-6 MC LITE does not support tilt angle or lateral acceleration, but should still follow TABS-6 ADV MC installation instructions and recommendations.

Rear Axle Suspension Dump

Some spread-axle trailers are equipped with a rear axle suspension air bag dump feature to assist with cornering at low speeds. The TABS-6 ADV MC module may be configured to use this feature. When this feature is used below a pre-determined vehicle speed threshold, the ECU will partially exhaust the rear axle air suspension air bags, and then re-inflate them when the vehicle speed rises above the pre-determined threshold.

Dome Lamp

Acting as a virtual switch, another device on the CAN network (e.g. a telematics unit) can request that a dome lamp, controlled by an auxiliary output on the TABS-6 ADV MC module, can be turned on.

The dome lamp can be configured to automatically turn off, regardless of the state of the virtual switch, if the TABS-6 ADV MC module detects that the trailer is moving above a configured speed. This feature can be turned off by setting the speed to 0 mph.

NOTE: The dome lamp needs to be hard-wired to an auxiliary output on the TABS-6 ADV MC module.

Door Status

The TABS-6 ADV MC module monitors the status of the external door switch connected to one (1) of the auxiliaries and broadcasts the status of the switch through TI-CAN. It is also possible to configure the broadcast of the status through PID 379 of the J1587 protocol on PLC.

21. TROUBLESHOOTING

Read the entirety of this document before performing any troubleshooting.

Diagnostic information is available using ACom Diagnostic Software, TRDU, or the TIM.

IMPORTANT

Bendix®-brand Electronic Control Units (ECUs) are not designed to store data for purposes of accident reconstruction, and Bendix® ACom® 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.

ACom Diagnostic Software

ACom Diagnostic Software is a PC-based program that is designed to meet RP1210 industry standards developed by the Technology and Maintenance Council (TMC). This software provides the technician with access to all available system diagnostic information, including:

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

To search DTCs and receive additional troubleshooting support, *refer to B2Bendix.com > Services & Support > Diagnostic Trouble Code Search.*

For additional information on ACom Diagnostic Software and to purchase the software, *refer to B2Bendix.com.*

Trailer Remote Diagnostic Unit (TRDU) Tool

The Bendix TRDU tool provides the technician with a visual indication of ABS component DTC information. The TRDU tool is specifically designed for use with Trailer ABS systems and Bendix makes no claims for its operation and/or usability with other brands of trailer ABS.

Figure 10 – TRDU Tool

Features of the Bendix TRDU Tool

The TRDU tool attaches to a 7-pin-to-7-pin adapter *(See Figure 11)* and then into the J560 connector of the towing vehicle.

The TRDU tool communicates across PLC and allows the technician to:

- Troubleshoot ABS system component problems using DTC reporting via LEDs.
- Reset DTCs on ABS ECUs by holding a magnet over the reset of the TRDU tool for less than six (6) seconds.

NOTE: The TRDU tool does not cover all possible DTCs. ACom Diagnostic Software should be used as the primary diagnostic tool.

Figure 11 – TRDU Tool and Adapter

How the TRDU Tool Operates

When the TRDU tool is plugged into the adapter – and the adapter/TRDU tool is installed between the trailer connector and the J560 connector of the towing vehicle that has the ignition on – all the LEDs will illuminate, and the green LED will flash four (4) times to indicate communications have been established.

If the ABS ECU has no active DTCs, only the green LED will remain illuminated.

If the ABS ECU has at least one (1) active DTC, the TRDU tool displays the first DTC by illuminating the red LEDs, indicating the malfunctioning ABS component and its location on the vehicle. *See Figure 12.*

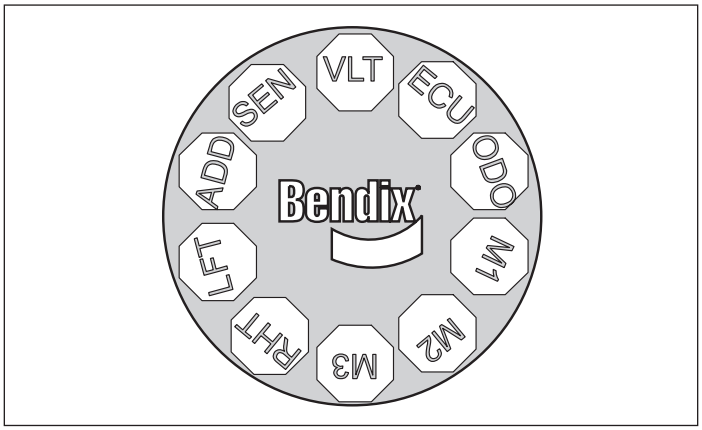
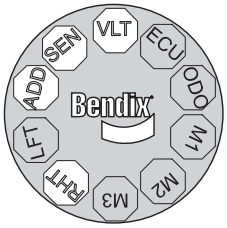


Figure 12 – TRDU Tool Display

LED DTCs

VLT -	Power	MOD3 -	Modulator 3
ECU -	ABS Controller	LFT -	Left
SEN -	Wheel Speed Sensor	RHT -	Right
		ADD -	Additional
MOD1 -	Modulator 1	ODO -	Odometer
MOD2 -	Modulator 2		

Example: If the DTC is "Right Additional Sensor", the TRDU™ tool will display one green and three red LEDs



LEDs
Green
VLT
Blue
ODO
All others are Red

Figure 13 – DTCs using the TRDU Tool

If there are multiple DTCs on the ABS system, the TRDU tool will display one (1) DTC first, then once that DTC has been repaired and cleared, the next code will be displayed.

The TRDU tool repeatedly blinks out the mileage stored once communications have been established. By counting the sequence of blinks and/or strobes on the blue LED, the odometer reading is given.

- VLT (Flashing indicates either an over- or under-voltage condition)

To pinpoint the root cause and to ensure the system DTC is properly corrected the first time, additional troubleshooting may be necessary.

NOTE: When a TRDU tool is connected to a system with a TABS-6 ADV MC module, and has established communications, the ECU will use the ABS indicator lamp to blink codes for all active DTCs.

TRDU Tool Reset Function

The magnetic reset switch is located by the letter "B" in the Bendix logo on the top of the TRDU tool. When a magnet (with minimum of 30 gauss) is held over the switch for less than six (6) seconds, the "clear DTCs" command is sent. [If a magnet is not available, you may use a spare WSS, since its internal magnet will be sufficient.]

Additionally, it is recommended at the end of any inspection that the technician switches off and restores the power to the ABS ECU, and then re-checks the ABS indicator lamp and TRDU tool to see if they indicate any remaining DTCs.

Bendix Trailer Information Module (TIM)

The Bendix TIM is a display device that combines the functionality of system diagnostics with the ability to display and store other trailer-related information of value to an operator, driver, or workshop. Maximum benefit is obtained from the TIM functionality when it is mounted on the trailer so that it is able to record events that occur during driving. Alternatively, it may also be used as a workshop tool to access diagnostic information, to check the configuration, or to run an installation test. In all cases, the TIM is connected to the J1939 EC5V TI (CAN) connection of the auxiliary connector which supplies the necessary information.

Figure 14 – Trailer Information Module

SERVICING THE TABS-6 ADV MC MODULE

Special considerations need to be taken to ensure the TABS-6 ADV MC module has been properly installed on the trailer.

- Location and orientation of the module
- Correct plumbing of the module
- Correct deflection sensor installation (where used)
- Correct location of the Wheel Speed Sensors (WSS)
- Configuration of the ECU for the ABS and the Bendix TRSP system parameters
- Installation test to verify proper installation of the ABS/TRSP systems

⚠ CAUTION

Incorrect installation of the TABS-6 ADV MC module system can result in impaired ABS and TRSP system functions. It is the responsibility of the end-user to ensure the TABS-6 ADV MC module has been installed correctly and tested as per the Bendix recommended installation guidelines and system drawings.

Prior to performing service to the TABS-6 ADV MC module, always perform the following steps:

1. Follow all industry safe maintenance practices including those on *page two (2) of this document.*
2. Ideally, before removing the module, use ACom Diagnostic Software to save the configuration to the desktop. After the module has been replaced, the technician can restore the previous configuration settings.
3. Turn the power off.
4. Drain the air pressure from all reservoirs.
5. Remove as much contamination as possible prior to disconnecting electrical connections and air hoses.
6. Note the TABS-6 ADV MC module's mounting position on the vehicle.

Removing the TABS-6 ADV MC Module

1. Open the end covers by sliding the locking tabs to the left. If the module is to be reinstalled, retain the covers.
2. Disconnect the 7-pin ECU connector, the 12-pin auxiliary/diagnostic harness (if present), and the 2-pin WSS connectors, depending on the configuration, and any additional harness present on connector 2.3 or 2.4.
3. Mark for reinstallation and then remove all air hoses connected to the TABS-6 ADV MC module.
4. Remove the TABS-6 ADV MC module from the vehicle by removing the mounting fasteners.

Servicing the Control Port Filter

The TABS-6 ADV MC module has an in-line filter in the control port (*See Figure 2*). This filter should be inspected and cleaned (if any contamination is found), every four (4) months, 34,000 miles, or 1,200 operating hours. For severe applications, this inspection interval may be reduced. If the filter is found to be damaged, install a replacement. The filter should also be inspected as part of any troubleshooting where the service brakes are slow to apply and other possible causes have been ruled out.

Installing the TABS-6 ADV MC Module

⚠ CAUTION

All service replacement parts for the TABS-6 ADV MC module are configured specifically by part number.

As mentioned in the *Servicing the Bendix TABS-6 ADV MC Module section*, ideally, before removing the module, use ACom Diagnostic Software to save the configuration to the desktop. The technician can use ACom diagnostics to restore the previous configuration settings.

Always verify that the correct service replacement ECU is being installed for the original TABS-6 ADV MC module. To verify proper installation, perform the installation test using the ACom Diagnostic Software or use the Bendix TIM.

If replacement hardware is needed, use Class-8 steel M10 x 1.5 lock nuts and washers for frame-mounting. Inspect the location selected for installation and clean as necessary.

NOTE: Inspect all components, including the replacement of the TABS-6 ADV MC module, for any external damage, such as cracked valve ports, electronic housings, etc. Any components found to be damaged should not be installed on the vehicle and must be replaced.

1. The TABS-6 ADV MC module should be installed with the following considerations *(See Figures 15 through 18):*
   - With the exhaust port facing downward and unobstructed with significant free space below (>1 in.).
   - Within ± 100 in. (2.5 m) of the center of the axle(s) for properly balanced brake applications.
   - Within ± 2 in. (5.1 cm) from the center line of the trailer (default).

     NOTE: a left/right offset greater than ± 2 in. (5.1 cm) may have been programmed in the ECU and can be verified using the ACom Diagnostic Software.
   - The yaw angle should be ± 10° as measured from the center line of the trailer.
   - The pitch angle should be ± 10° as measured from a flat horizontal plane.
   - The roll angle should be within ± 5° as measured from a flat horizontal plane.

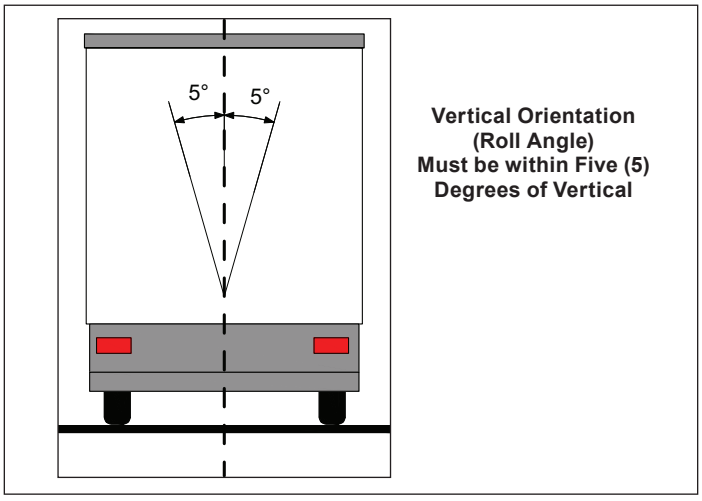


Figure 15 – Installation on the Trailer (Vertical)

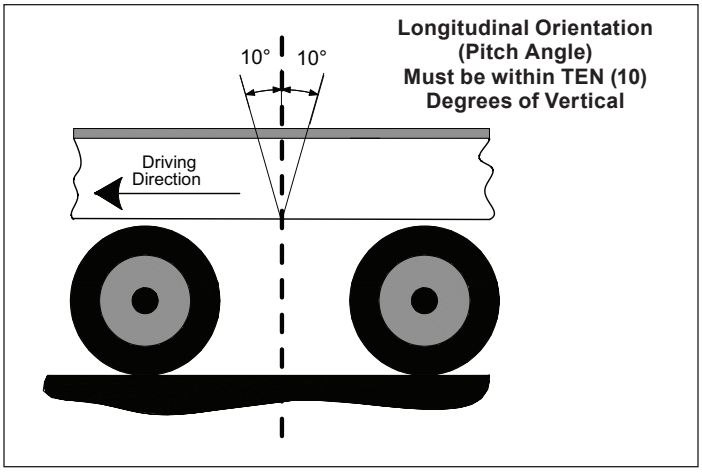
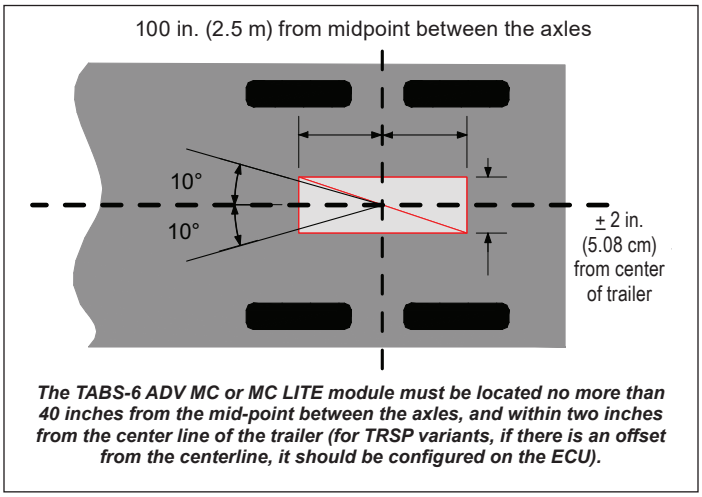


Figure 16 – Installation on the Trailer (Longitudinal)



The TABS-6 ADV MC or MC LITE module must be located no more than 40 inches from the mid-point between the axles, and within two inches from the center line of the trailer (for TRSP variants, if there is an offset from the centerline, it should be configured on the ECU).

Figure 17 – Installation on the Trailer (Center Line)

Frame-Mount Module: The TABS-6 ADV MC module uses three (3) Class-8 steel M10x1.5 lock nuts with washers, torqued to 354 ± 44.4 in.-lbs (40±5 N•m).

2. Reconnect all of the air hoses and plugs to the module. Depending on the installation, additional plugs may be necessary. Thread sealant products that contain PTFE may be used; however, thread sealant tape is not recommended as there is a potential for tape material entering the valve and affecting the valve's operation. Ensure no thread sealant enters the valve. All air hoses and fittings should be checked for leaks prior to returning the vehicle to service.
3. Reconnect the ECU power, auxiliary power (if present), and WSS electrical connectors to the ECU. Apply a small amount of non-conductive electrical grease to each connector pin before reconnecting.

NOTE: The WSS must follow the orientation of the module as shown in *Figure 18* for fixed-axle trailers. Where a lift axle is present, and sensors are to be installed on that axle, secondary sensors "SE" and "SF" must be used for the lift axle.

- It is necessary to fix the WSS to the orientation of the lateral acceleration sensor for plausibility checks between the sensors.
- If the WSS location does not match the orientation of the TABS-6 ADV MC module shown in *Figure 18*, a DTC will be generated and the ABS indicator lamp will be illuminated.
- Refer to the raised lettering on the casting body, or *see Figure 18*, for WSS locations, "S-C," "S-D," "S-E," and "S-F."

4. Leakage and operational tests must be performed before returning the vehicle to service.

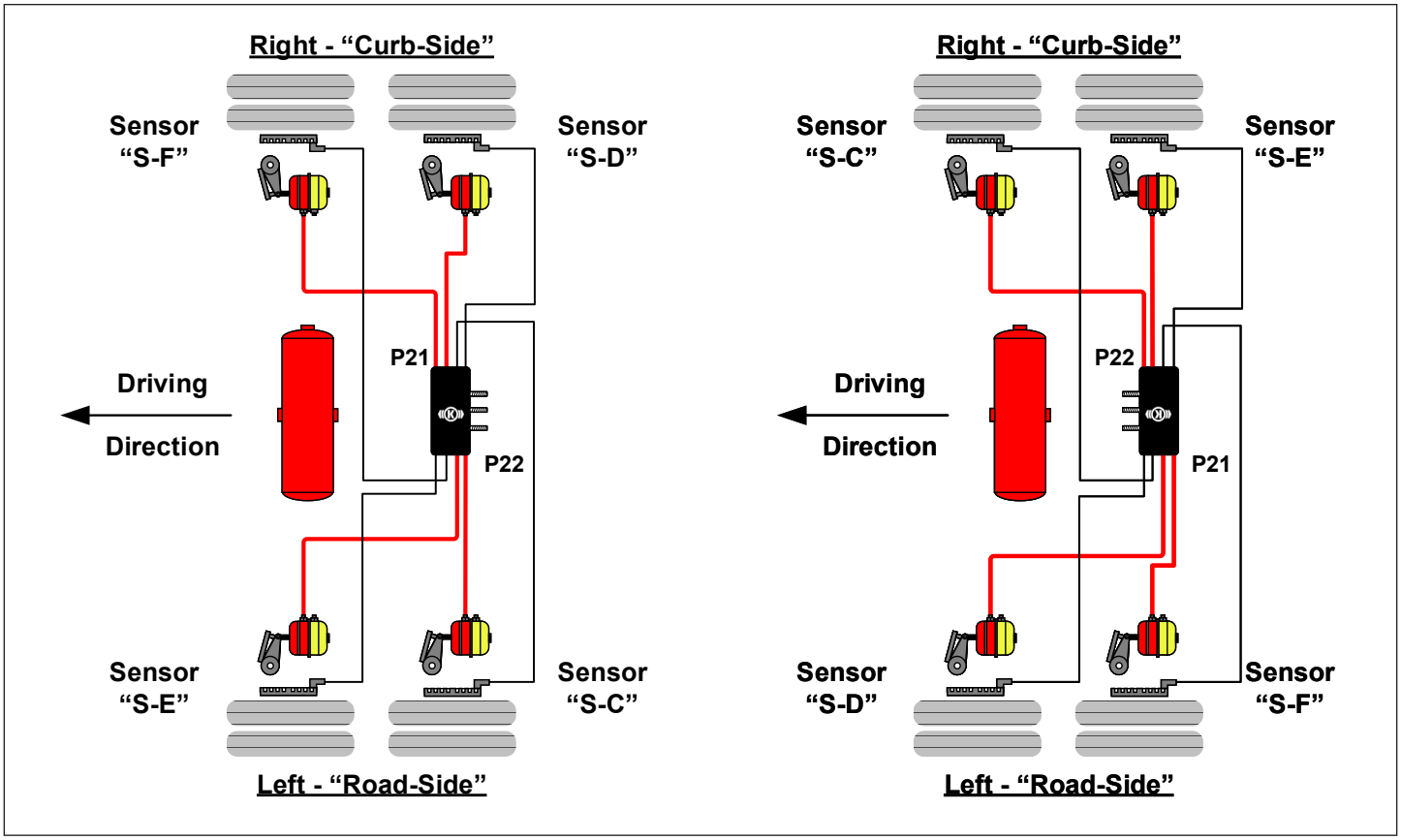


Figure 18 – WSS Locations

LEAKAGE AND OPERATIONAL TESTS

⚠ WARNING

For NPTF fittings, the use of a thread sealant is recommended. This can be a pre-applied or a hand-applied sealant product (with PTFE). When using a hand-applied sealant, use caution so as not to over-apply. Always follow the fitting manufacturer's pre-applied or hand-applied thread sealant recommendations. Use of PTFE tape is not approved and will void the Bendix ABS and the Bendix TRSP valve warranty.

1. Before performing the leakage tests, block the wheels.
2. Fully charge the ABS and verify proper brake adjustment.
3. Make several trailer brake applications and check for prompt application and release at each wheel.
4. Perform the leak-down test procedure:
   - Set up the pressure circuits to apply supply (red) line and service pressures with a regulator and a pressure gauge on each line.
   - Apply 110 - 120 psi to the trailer supply (red) circuit to release the parking brake.
   - Apply the service brakes at 90 - 95 psi.
   - Identify and record the pressure from the gauge on the supply (red) line and the service line.
   - Cut off the pressure to the supply (red) line before the pressure gauge and monitor for the pressure to drop. If the pressure drops less than 3 psi in one (1) minute, the supply (red) line test passes. If the pressure drops more than 3 psi in one (1) minute, identify and correct the source of the leak on the supply (red) line.
   - If the supply (red) line test passes, repeat the test for the service line. If the pressure drops less than 2 psi in one (1) minute, the test passes. If the pressure drops more than 2 psi in one (1) minute, identify and correct the source of the leak on the service line.
   - A soap and water solution can be used to identify sources of leaks on the fittings and valves.
   - If available, a Lite-Check® machine can be used to perform the leak-down test.
5. Apply power and monitor the power-up sequence to verify proper system operation.
6. Calibrate and set the odometer parameters, if necessary, using a diagnostic tool.
7. *Refer to Appendix A and record all applicable information prior to programming the TABS-6 ADV MC or MC LITE module.*
8. **Perform an installation test using ACOM DIAGNOSTIC SOFTWARE. Minimum tests that are required to verify the proper installation of the ABS/TRSP system are:**
   - **ECU Information:** This test provides the user with specific ECU information. It is required that no Diagnostic Trouble Codes (DTCs) (other than "end-of-line test not completed") are present and that the ECU has been configured.
   - **Wheel End Sequence Test:** During this test, checks are carried out that verify the correlation of the wheel installed with a WSS and the pressure modulator that controls the pressure to the associated brake.
   - **Lateral Acceleration Test:** The installation angle information is retrieved from the ECU and compared to the predefined limits (±5°). This test verifies the unit is installed as close to horizontal as possible. **NOTE**: TABS-6 MC LITE does not support lateral acceleration, but should still follow TABS-6 ADV MC installation instructions and recommendations.
   - **Pressure Sensor Test:** During this test, checks are carried out that verify the proper response is received from the pressure sensors during a brake application.
   - **Axle Load Sensing Test (Air Ride):** The test has the user verify the expected measurement of the load pressure sensor, Port 42, for air ride suspensions. The program provides the reading of the sensor.
   - **Mechanical Load Sensor Test (Mechanical Spring Ride):** The test has the user verify the expected measurement of the spring deflection sensor. The program provides the reading of the sensor.
   - **Customer Scratch Pad:** The tester is requested to input data into the fields displayed on the screen. This data will be stored in the ECU and also can be stored to a file on the computer or printed out for reference.
9. Where a safe location is available (e.g. a restricted access area or a test track), it is possible to road test the ABS function by making an abrupt stop from a vehicle speed of about 20 mph (32.19 kph) to check for proper function. The wheels should not enter a prolonged lock condition and the ABS function should be audible. It is the responsibility of the technician to perform this test in a safe location.

ABS WIRING

⚠ WARNING

Disconnect the electrical connectors from the ABS or the TRSP controller before welding on the trailer.

⚠ WARNING

Dielectric grease should be applied to electrical connectors to help protect against moisture intrusion.

All connector leads of the TABS-6 ADV MC module pigtail harness are weather-sealed at the connector interface and are clearly labeled for proper installation.

Bendix provides over-molded versions of the TABS-6 ADV MC module's wiring harness and Bendix recommends that the complete harness be replaced if corrosion or damage occurs.

When troubleshooting ABS wiring, some general rules should be followed where applicable.

1. Check all wiring and connectors to ensure they are secure and free from visible damage (e.g. cuts, abrasions, etc.).
2. Check for evidence of wire chafing due to poor routing or poor securing of wires.
3. Check connectors for proper insertion and locking.
4. Verify the connector pins are properly greased with a non-conductive electrical grease compound.
5. Connector terminals must not show signs of corrosion or exposure to the environment.
6. Never pierce wire insulation when checking for continuity.
7. Do not deform individual pins or sockets during probing with a volt/ohm meter.
8. It is strongly recommended that all wiring harnesses and sensor leads are properly secured at least every 18 in. (46 cm).
9. Apply a small amount of non-conductive electrical grease to each connector pin before reconnecting.

MISCELLANEOUS MAINTENANCE

⚠ WARNING

GLAD HAND MAINTENANCE

NEVER POUR ANY LIQUIDS (alcohol, anti-freeze, additives, etc.) into the glad hands. Liquids may cause the o-rings and seals to swell, or may result in lubrication loss and leave harmful residues.

Prevent nesting insects and contaminants from entering and blocking the air hoses. Check that screens are present and clean.

Drain the trailer air tanks a minimum of every six (6) months.

Liquids/contamination can cause TRAILER AIR BRAKE FAILURE and/or the INABILITY TO RELEASE the trailer parking brakes.

TROUBLESHOOTING: ELECTRICAL SCHEMATICS

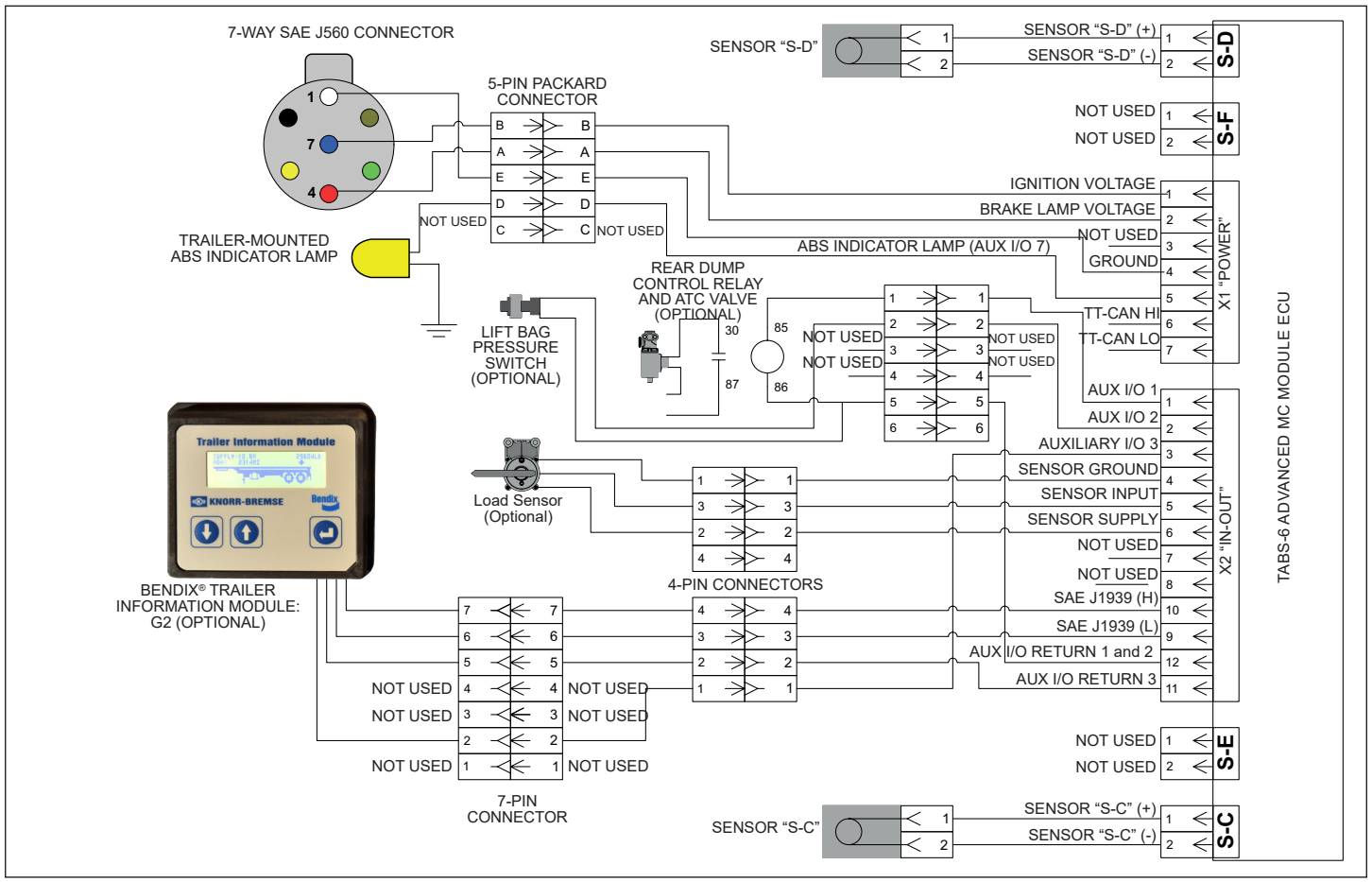


Figure 19 – TABS-6 ADV MC/MC LITE Electrical Schematic - 2S/2M

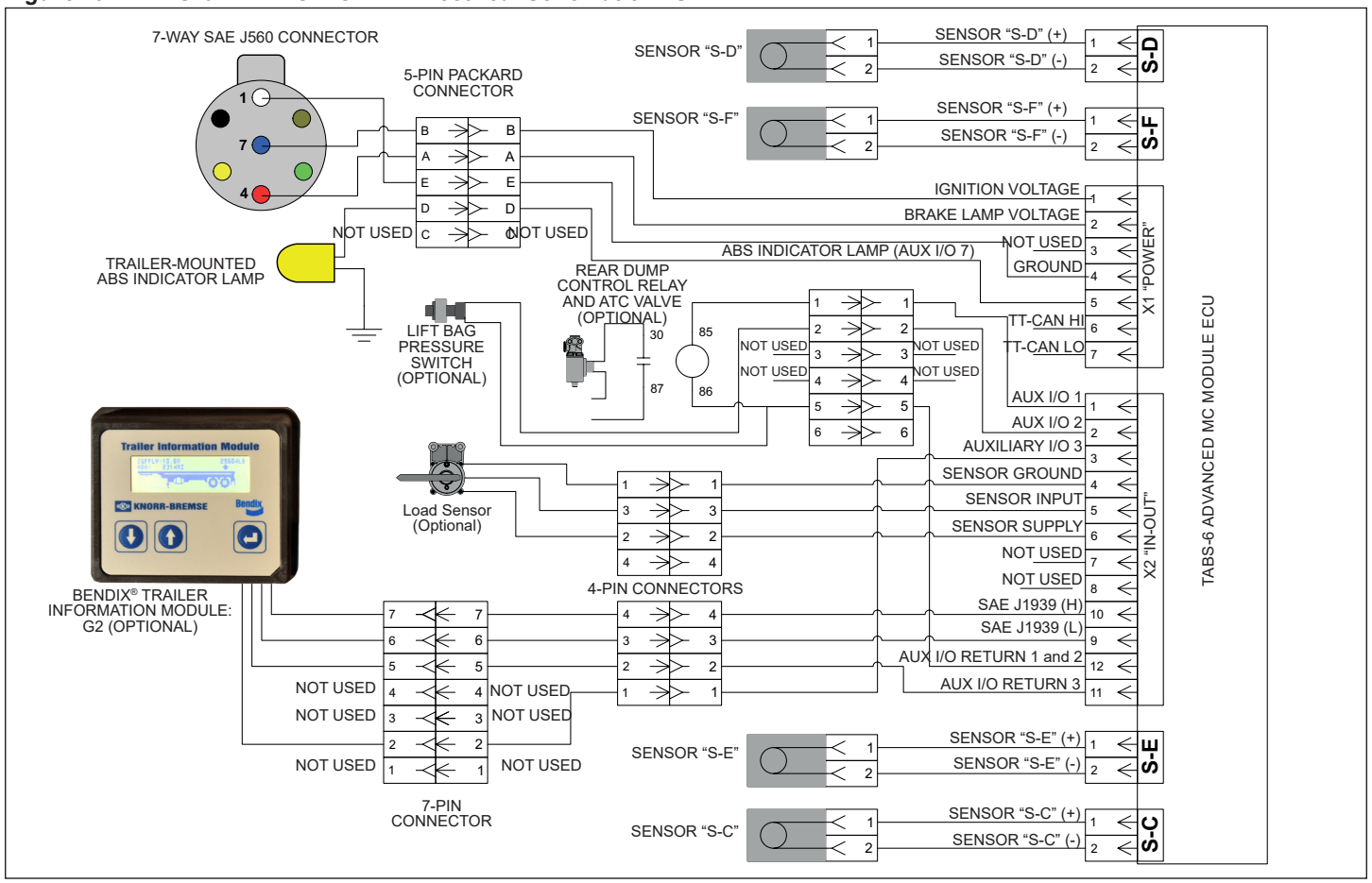


Figure 20 – TABS-6 ADV MC/MC LITE Electrical Schematic - 4S/2M

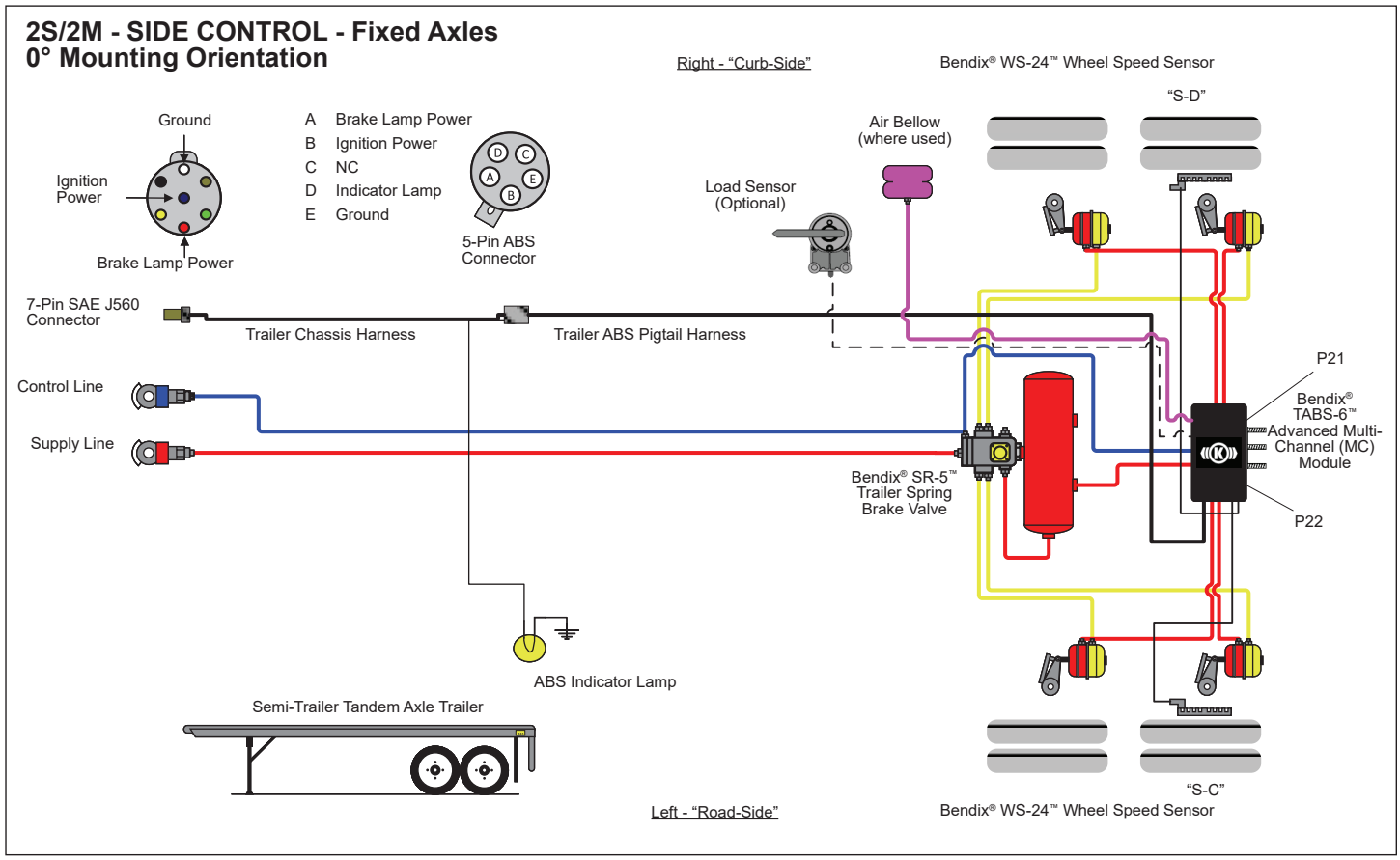


Figure 21 – TABS-6 ADV MC/MC LITE - 2S/2M Side Control (0°) ABS Electrical and Air System

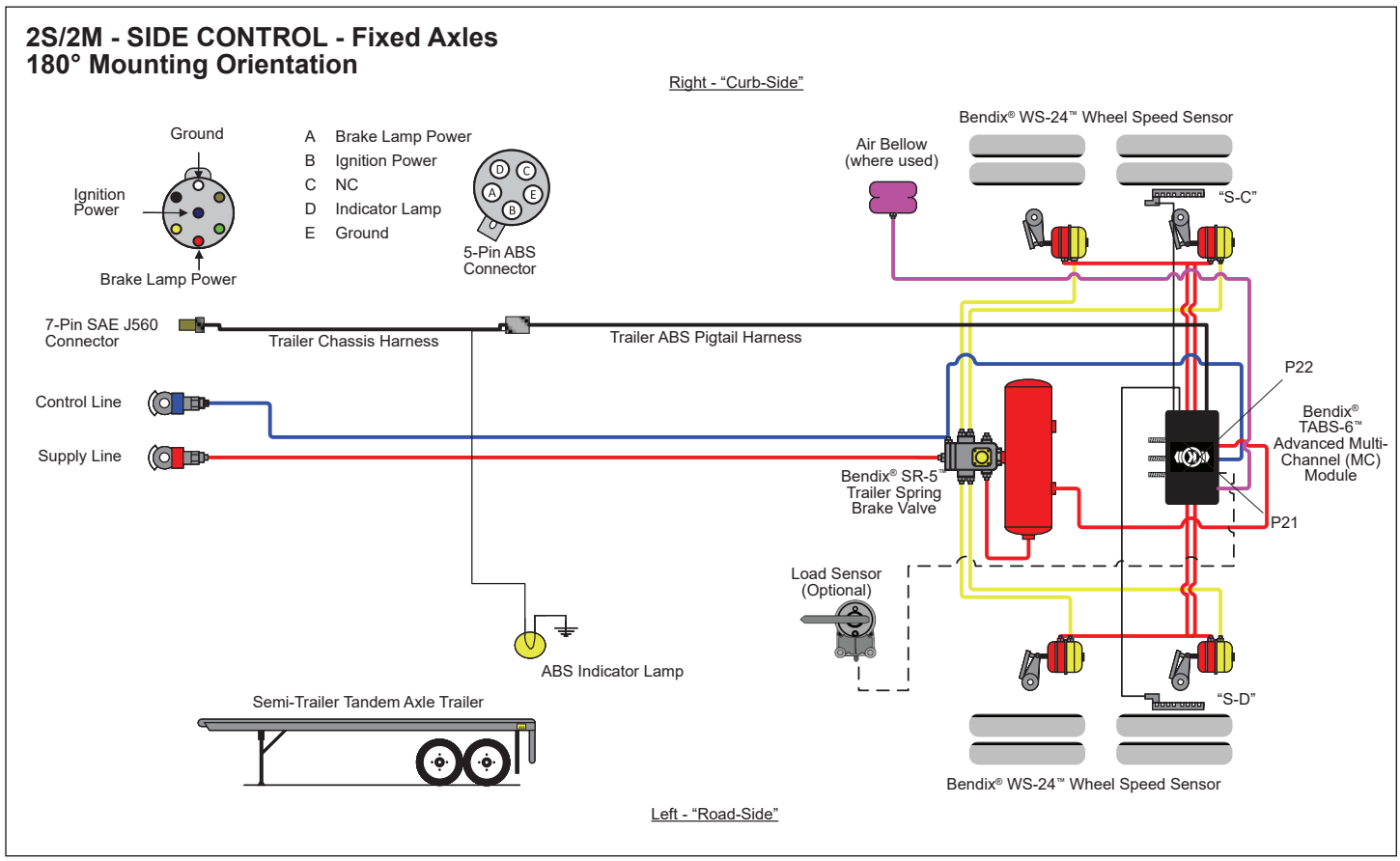


Figure 22 – TABS-6 ADV MC/MC LITE - 2S/2M Side Control (180°) ABS Electrical and Air System

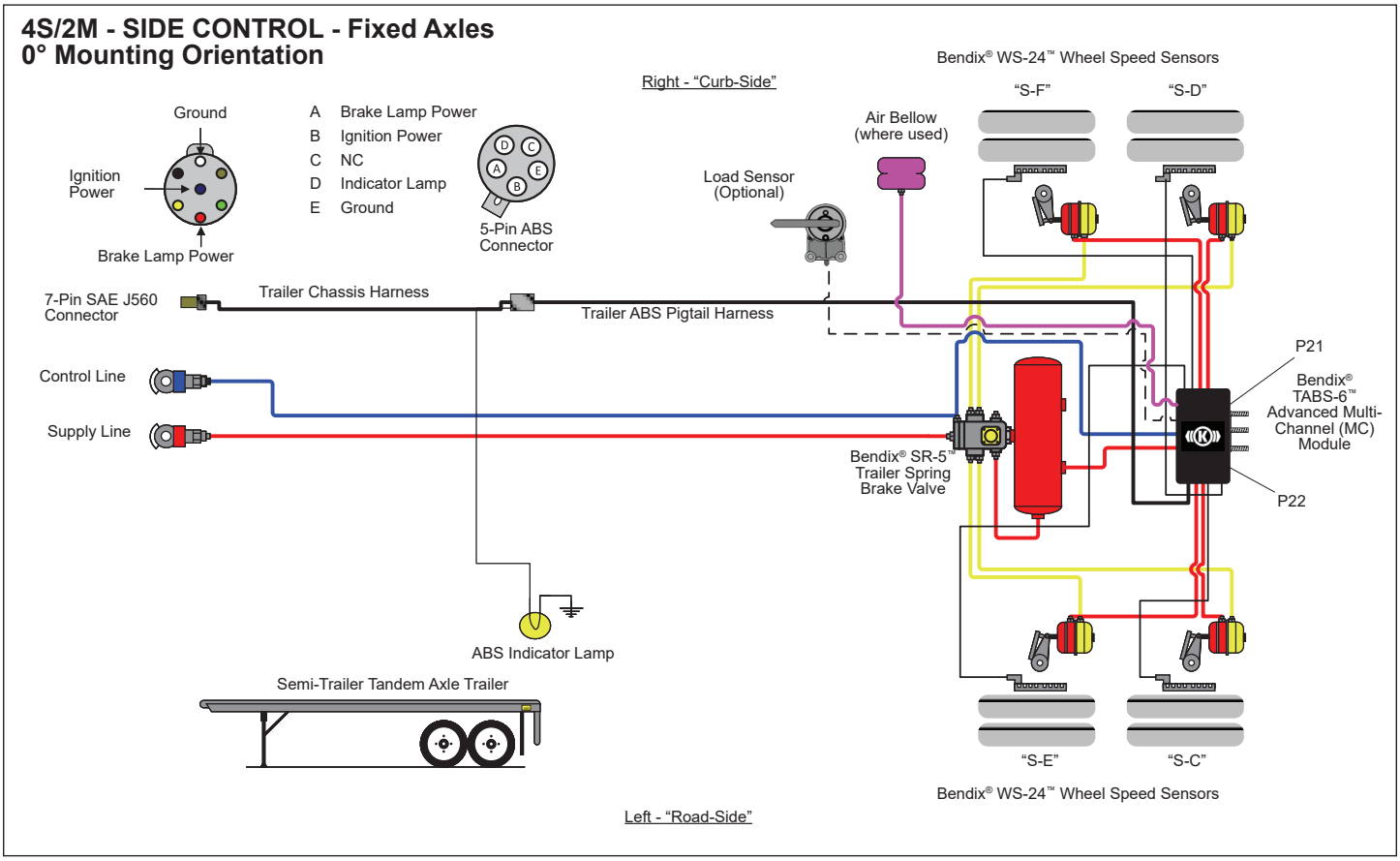


Figure 23 – TABS-6 ADV MC/MC LITE - 4S/2M Side Control (0°) ABS Electrical and Air System

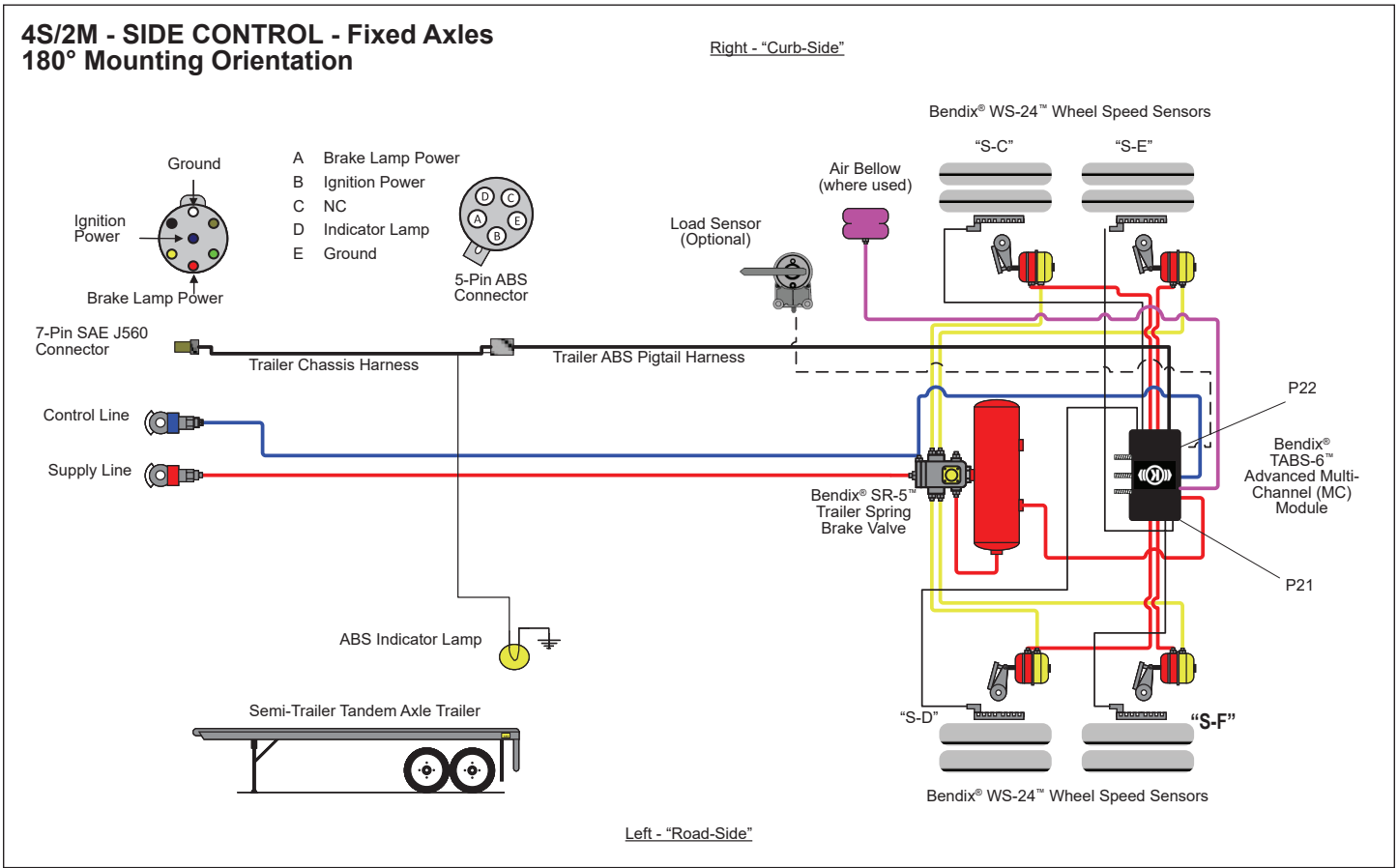


Figure 24 – TABS-6 ADV MC/MC LITE - 4S/2M Side Control (180°) ABS Electrical and Air System

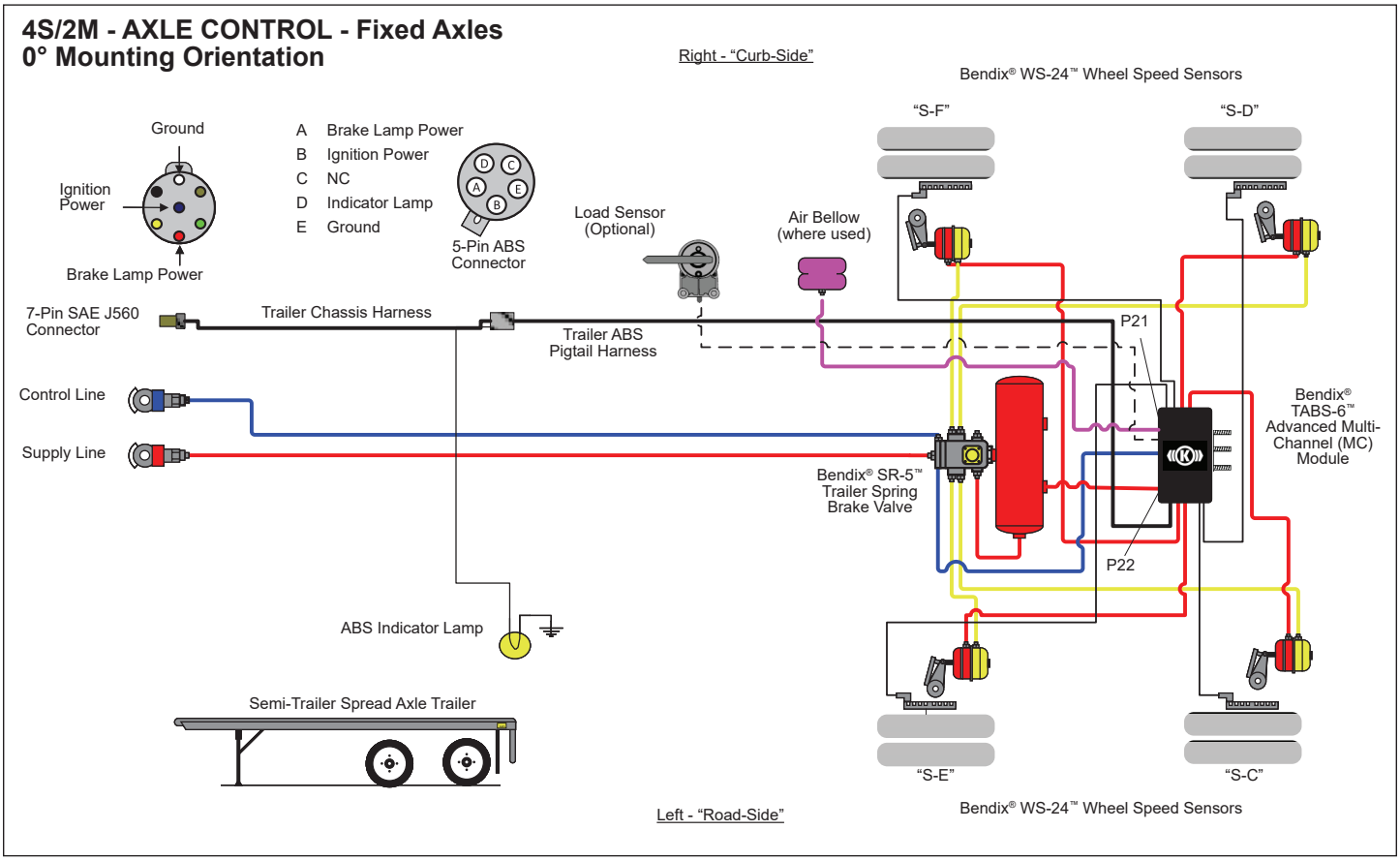


Figure 25 – TABS-6 ADV MC/MC LITE - Typical 4S/2M Axle Control ABS Electrical and Air System

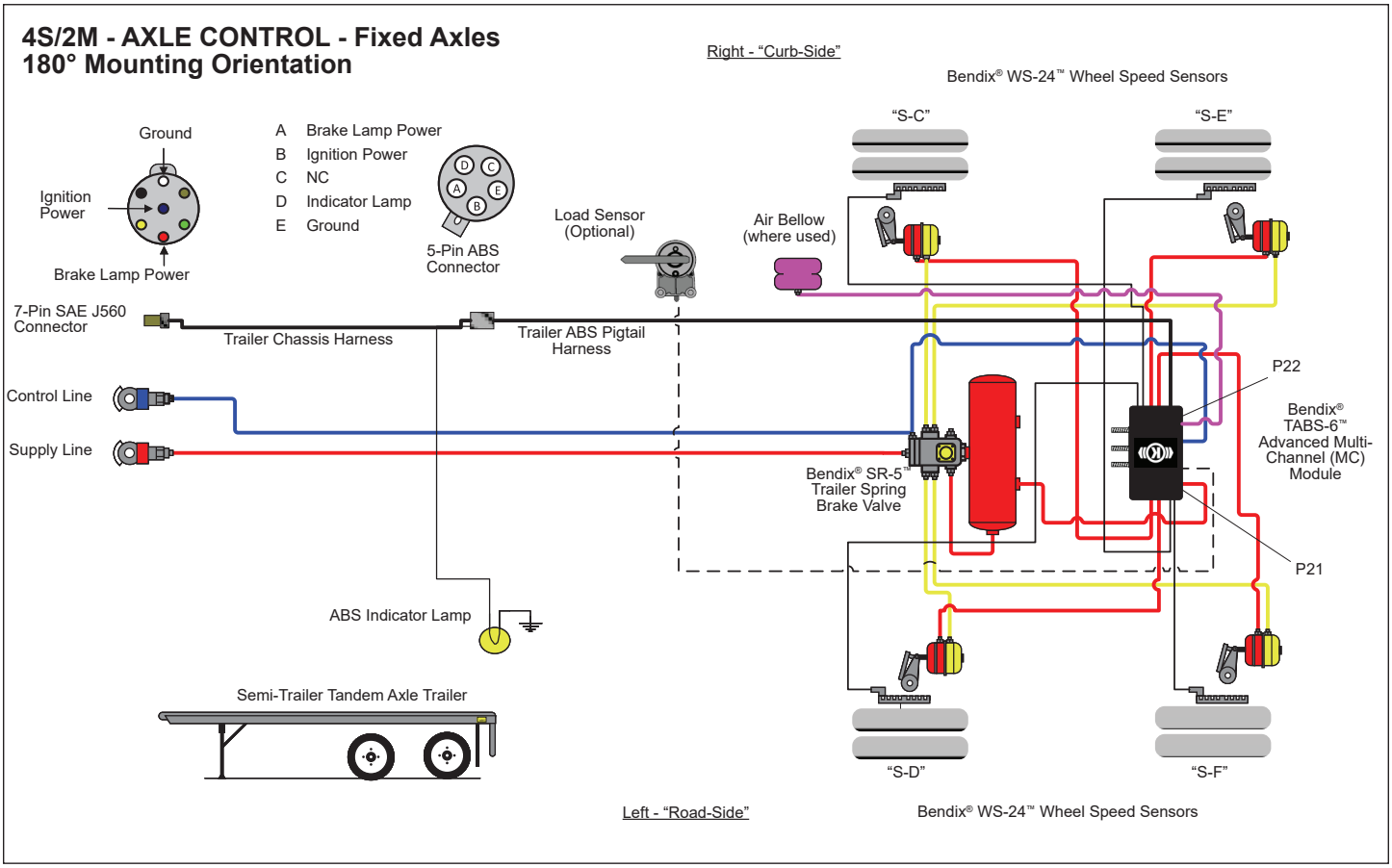


Figure 26 – TABS-6 ADV MC/MC LITE - 4S/2M Axle Control (180°) ABS Electrical and Air System

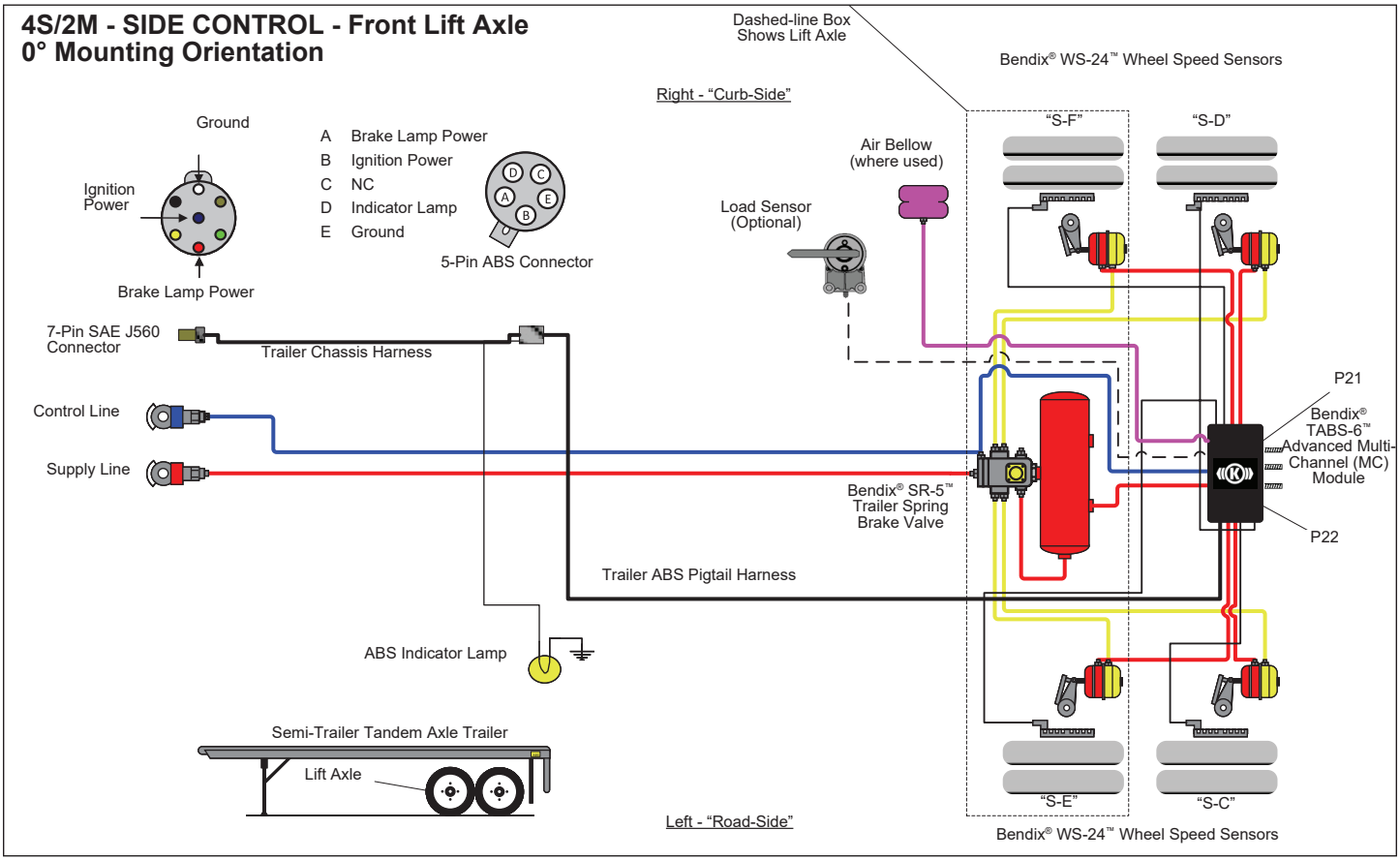


Figure 27 – TABS-6 ADV MC/MC LITE - 4S/2M Side Control (0°) with Front Lift Axle, ABS Electrical and Air System

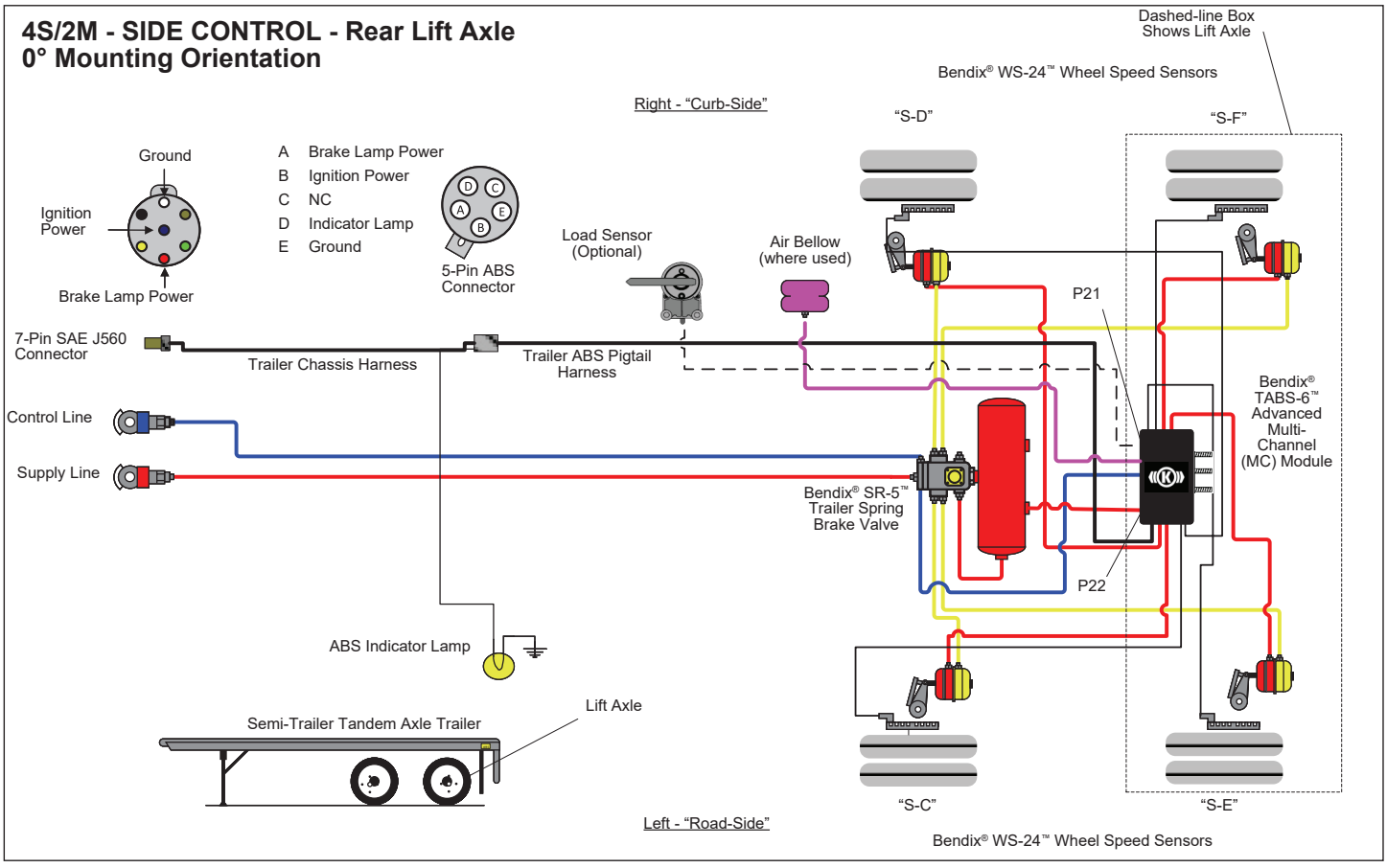


Figure 28 – TABS-6 ADV MC/MC LITE - 4S/2M Side Control (0°) with Rear Lift Axle, ABS Electrical and Air System

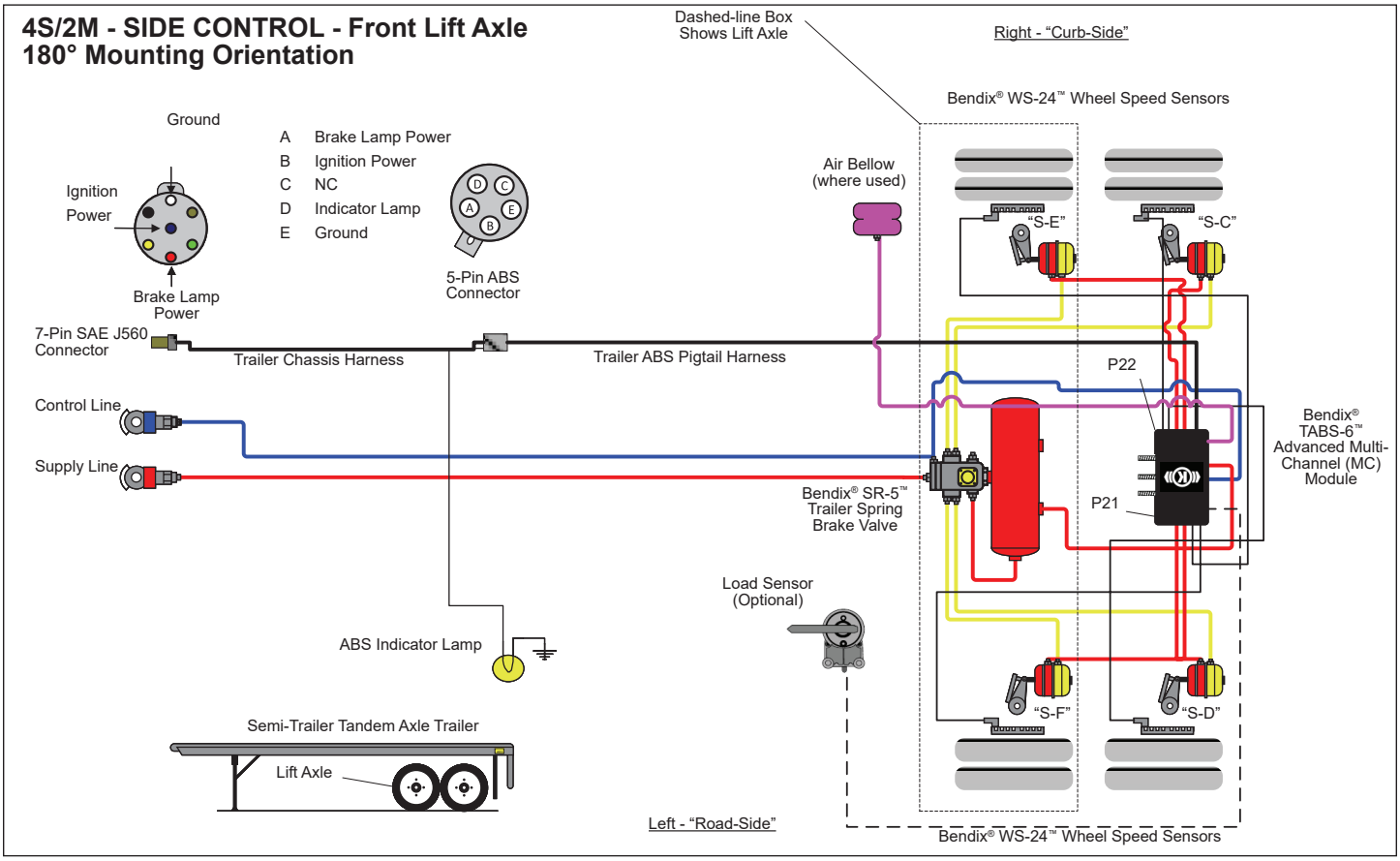


Figure 29 – TABS-6 ADV MC/MC LITE - 4S/2M Side Control (180°) with Front Lift Axle, ABS Electrical and Air System

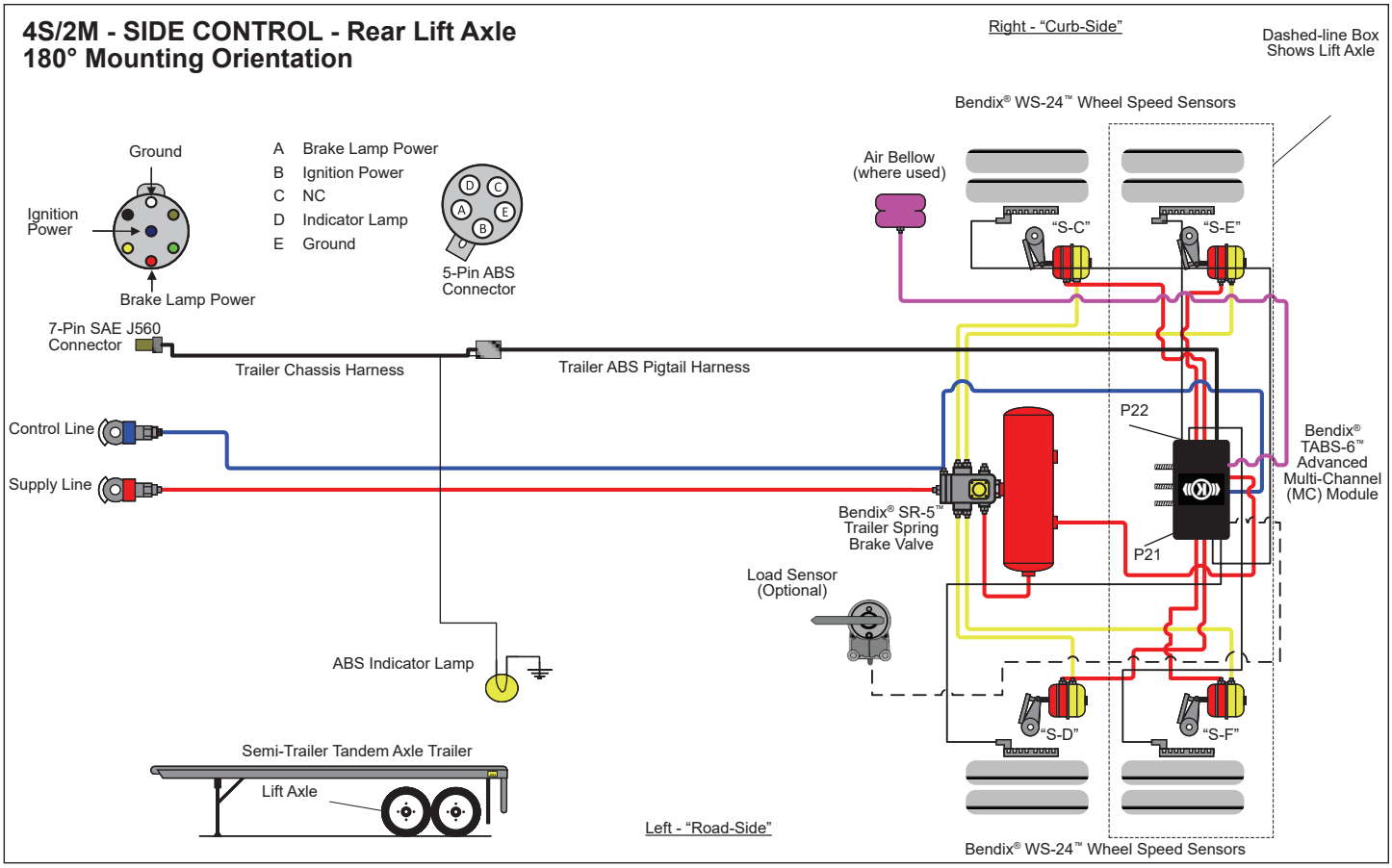


Figure 30 – TABS-6 ADV MC/MC LITE - 4S/2M Side Control (180°) with Rear Lift Axle, ABS Electrical and Air System

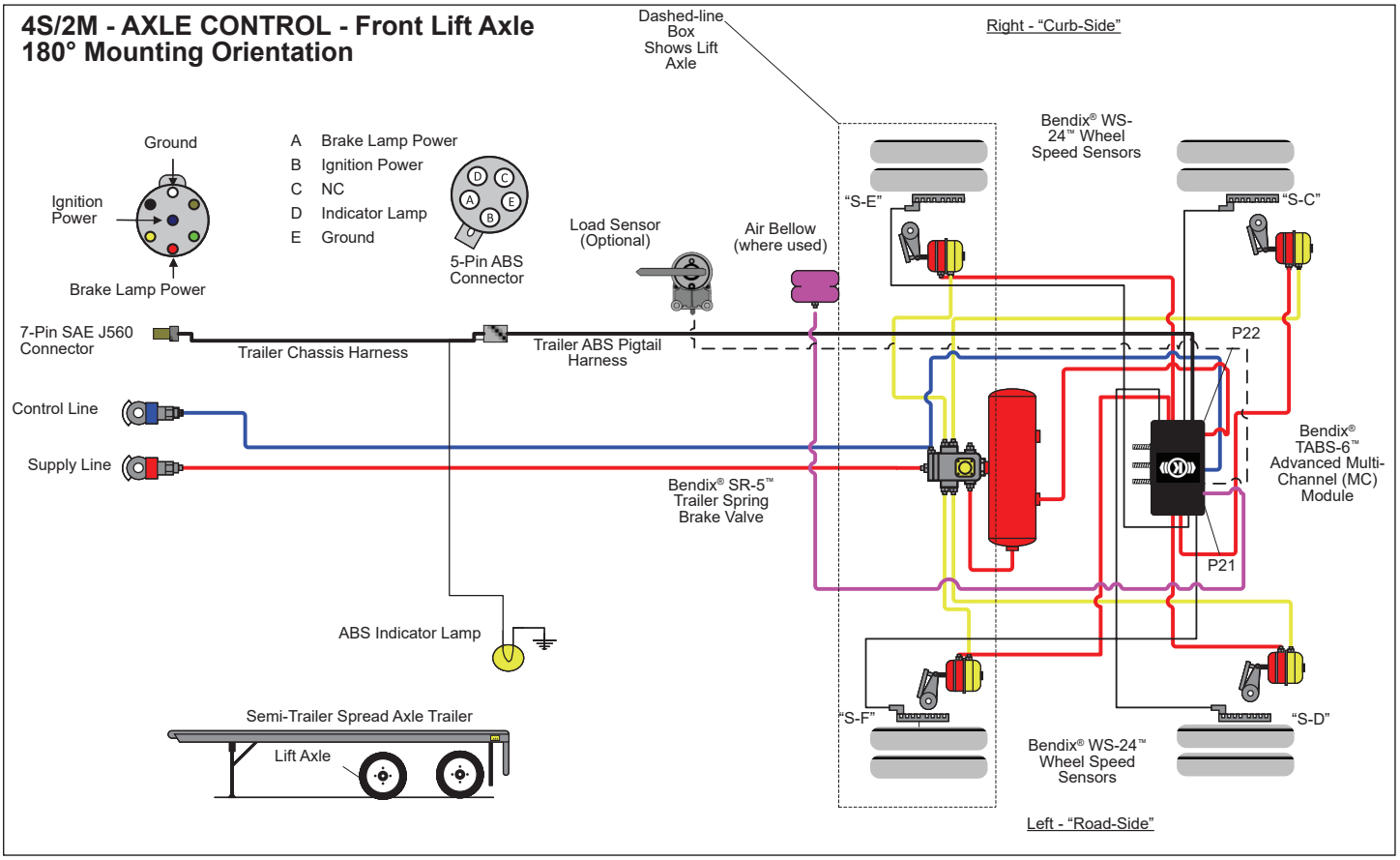


Figure 31 – TABS-6 ADV MC/MC LITE - 4S/2M Axle Control (180°) with Front Lift Axle, ABS Electrical and Air System

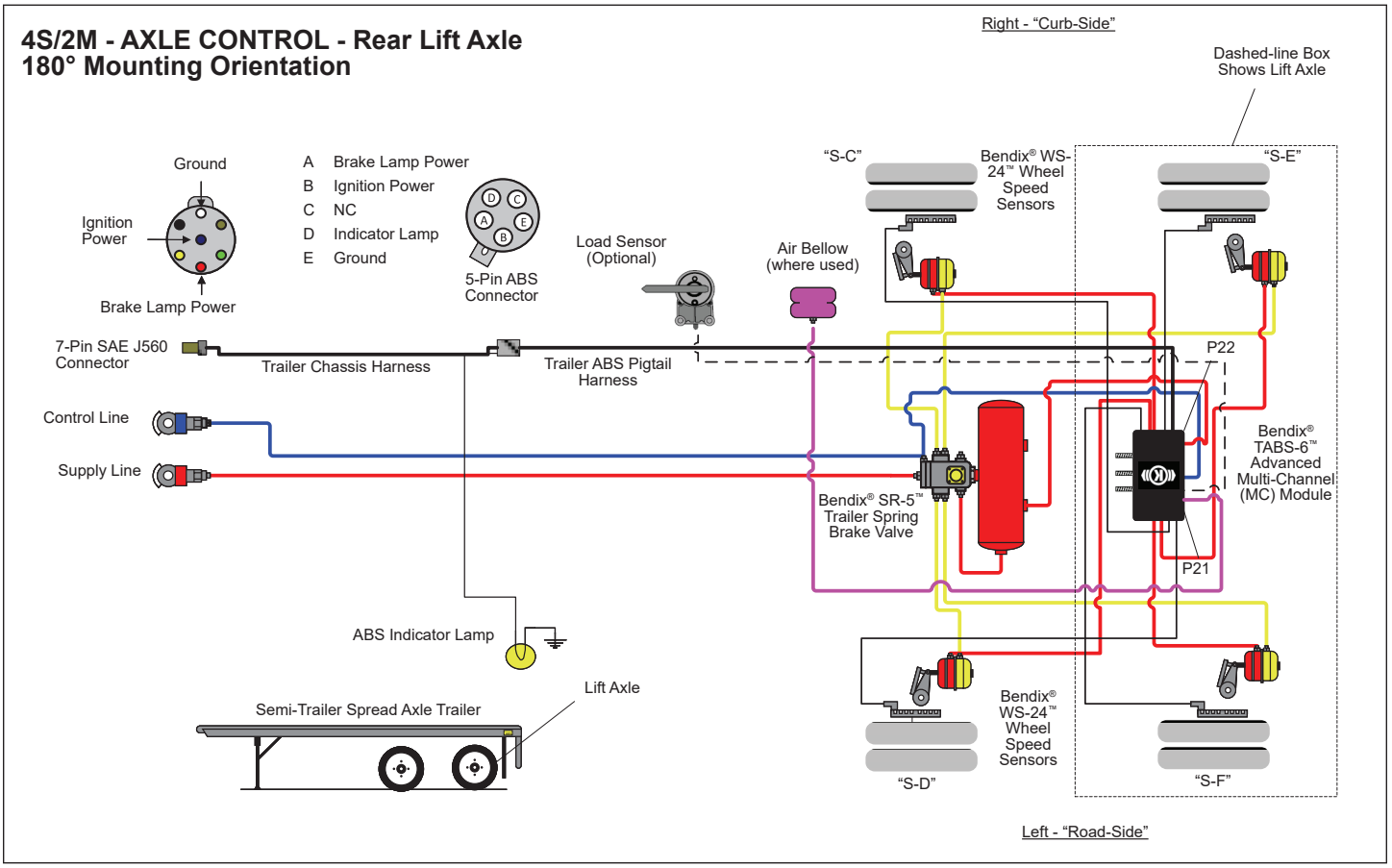


Figure 32 – TABS-6 ADV MC/MC LITE - 4S/2M Axle Control (180°) with Rear Lift Axle, ABS Electrical and Air System

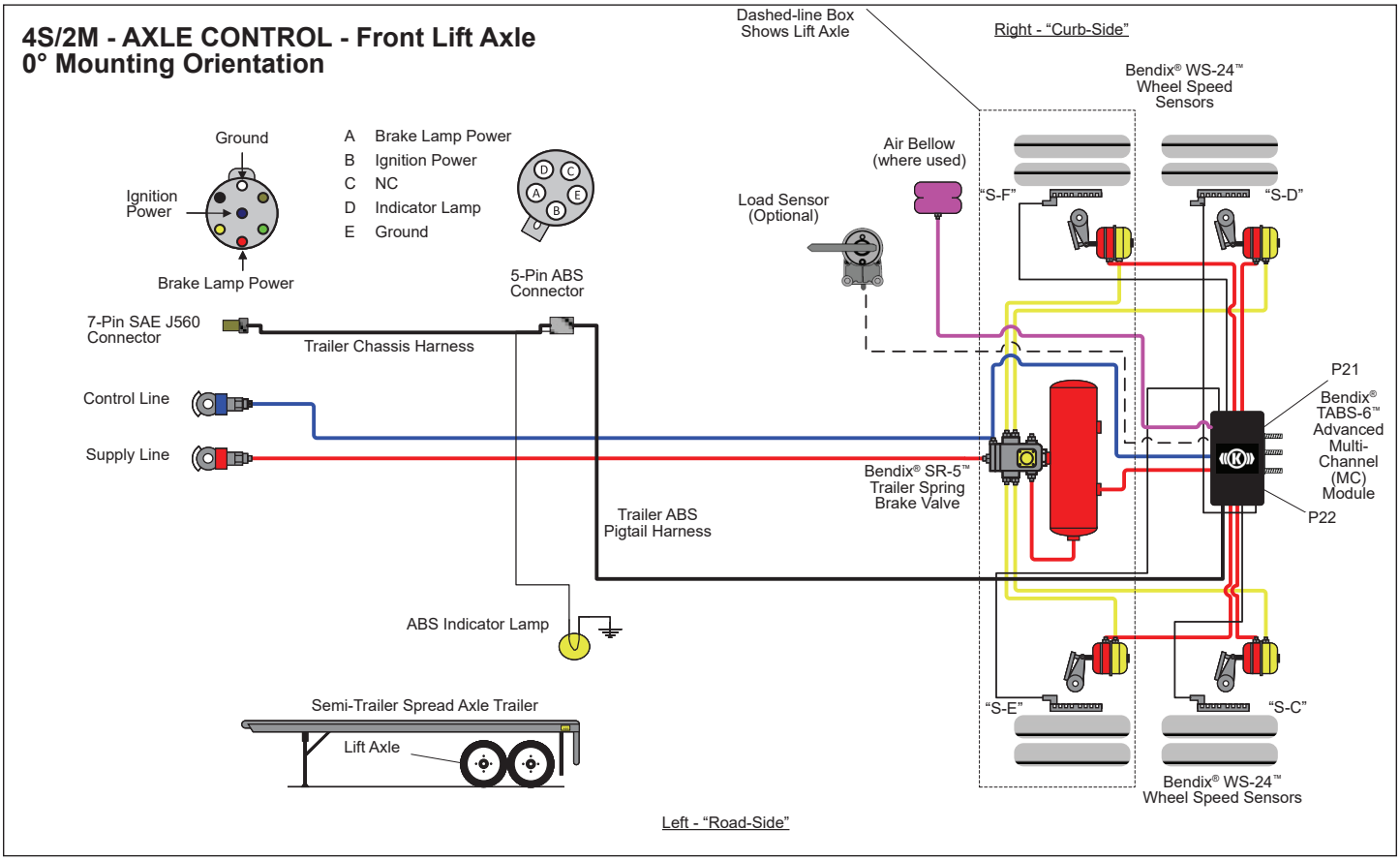


Figure 33 – TABS-6 ADV MC/MC LITE - Typical 4S/2M System with Front Lift Axle

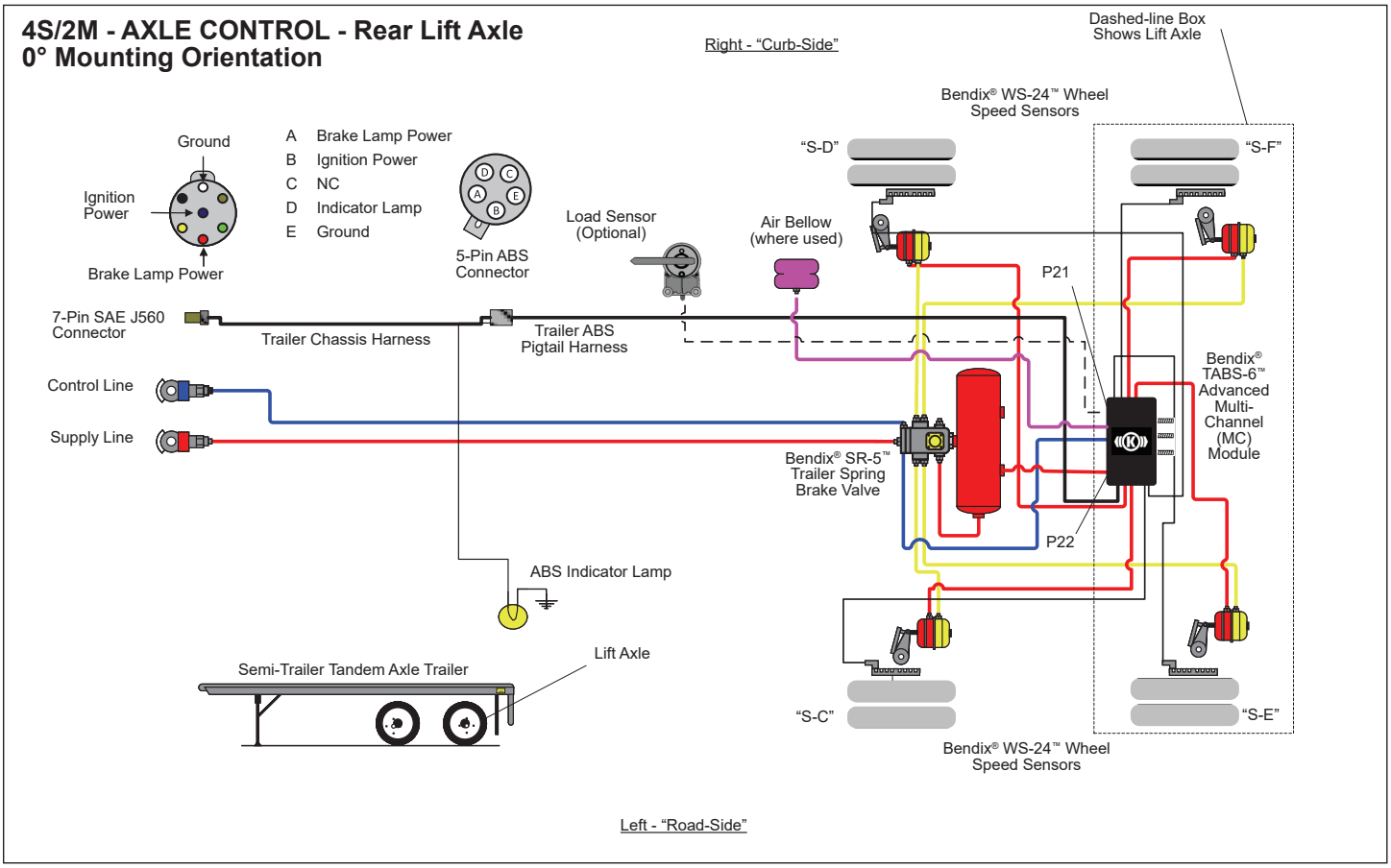


Figure 34 – TABS-6 ADV MC/MC LITE - 4S/2M Axle Control System with Rear Lift Axle

TROUBLESHOOTING: FLOWCHARTS

DTC information can be retrieved from the TABS-6 ADV MC module by using blink code diagnostics or a diagnostic tool.

To search DTCs and receive additional troubleshooting support, *refer to B2Bendix.com > Services & Support > Diagnostic Trouble Code Search.*

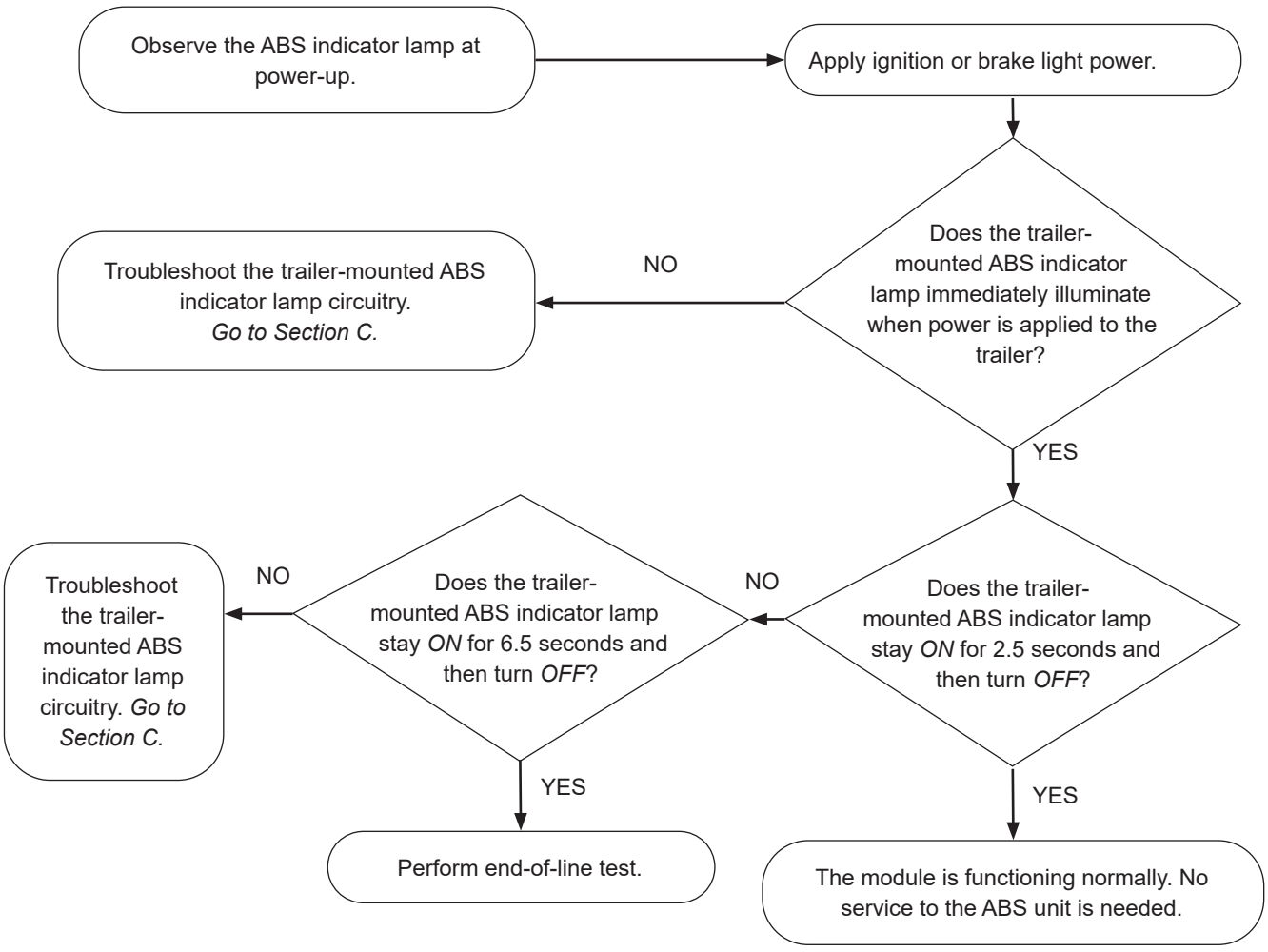
The following troubleshooting flowcharts will help the technician isolate the cause and confirm whether the problem resides in the component, wiring, or connectors.

Troubleshooting should always begin by observing the dash- or trailer-mounted ABS indicator lamp during the TABS-6 ADV MC module's power-up sequence. If it is necessary to take electrical measurements, always begin by taking voltage and resistance measurements at the 7-pin or 12-pin ECU pigtail harness connector.

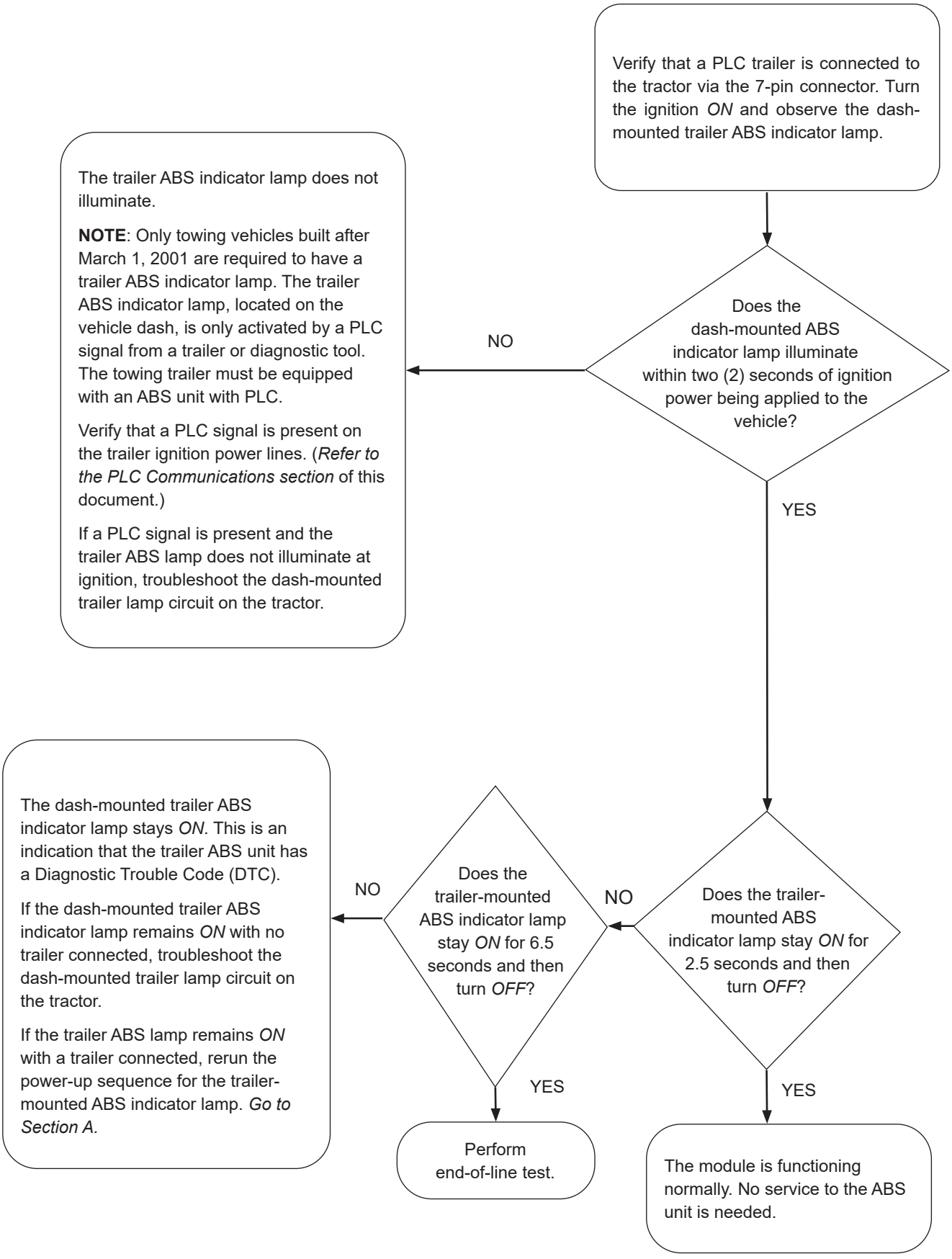
Once the source of the problem is found, isolate the area needing repair by repeating the measurements at all connections in the affected circuit towards the modulator, WSS, etc.

No voltage or resistance measurements are to be made on the ECU electrical header connector pins of the module.

SECTION A: POWER-UP SEQUENCE - TRAILER-MOUNTED ABS INDICATOR LAMP



SECTION B: POWER-UP SEQUENCE
DASH-MOUNTED ABS INDICATOR LAMP



SECTION C: TROUBLESHOOTING THE TRAILER-MOUNTED ABS INDICATOR LAMP CIRCUITRY

Is the tractor ignition or battery box (if not using tractor as power source) switched *ON*?

NO → Switch the ignition *ON* and re-check if the trailer ABS indicator lamp does a power-up check. *Go to Troubleshooting Section A.*

YES

Is SAE J560 cable (green, spiral) connected from the tractor/battery box to the trailer?

NO → Connect an SAE J560 cable. Verify that ABS warning lamp turns *ON* and *OFF* during ignition power-up.

YES

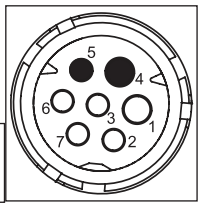
Check the tractor for constant power (blue wire). Does the trailer Electronic Control Unit (ECU) perform an ABS indicator lamp power-on test when the brake is applied while the trailer is stationary?

NO → Troubleshoot the main trailer power harness for mis-wiring, open circuits, and/or short circuits.

YES

Add constant power (blue wire) to the center pin of the SAE J560 connector..

Looking into the TABS-6 ADV MC Module 7-pin connector pigtail harness. Pin 4 is the ground pin. Pin 5 is the ABS indicator lamp pin.



ACTION: If the trailer-mounted ABS indicator lamp did not illuminate during the power-up sequence...

Troubleshoot the power supply to the ABS module. *Go to Section D.* Continue if the power and ground wiring are OK.

Turn the power to the module *OFF*. Inspect the condition of the ABS indicator lamp, connector, and ground. Using a volt/ohm meter, verify continuity from the trailer chassis ground pin (pin 4) to the ground pin of the indicator lamp.

If repairs are made, rerun the power-up sequence. *Go to Section A.*

Continue if the indicator lamp and ground wire check out OK.

With power to the ABS module *OFF*, disconnect the 7-pin ECU connector.
Verify continuity from the ABS indicator lamp pin (pin 5) of the ECU connector to the ABS indicator lamp connector.
If repairs are made, rerun the power-up sequence. *Go to Section A.* If the condition persists, contact the Bendix Tech Team.

ACTION: If the trailer-mounted ABS indicator lamp remains *ON* after the standard power-up time interval of approximately 2.5 seconds...

Determine if a module Diagnostic Trouble Code (DTC) exists using any of the following methods:

- Blink code diagnostics, *Section 19*
- PC diagnostics, *Section 21*
- Bendix® Trailer Remote Diagnostic Unit (TRDU™) and magnet, *Section 21*
- Bendix® Trailer Information Module, *Section 21*

If DTC(s) exist, and repairs are made, rerun the power-up sequence. *Go to Section A.* If no DTCs are found, the ABS module appears to be functioning normally, but the ABS lamp remains on, continue to the next step.

With power to the ABS module *OFF*, disconnect the 7-pin ECU connector.

Apply power to the trailer. If the ABS lamp illuminates, there is a voltage short on the lamp circuit. Troubleshoot, repair, and retest. Use a volt meter to check if there is a short to the voltage on the warning lamp circuit between the ABS indicator lamp pin (pin 5) and the lamp. If repairs are made, rerun the power-up sequence. *Go to Section A.* If the condition persists, replace the ABS module.

SECTION D: TROUBLESHOOTING THE POWER SUPPLY

Turn power to the module *OFF*. Disconnect the 7-pin Electrical Control Unit (ECU) connector.

With ignition power to the trailer (engine running), measure the voltage between the ignition power pin (pin 1) and the ground pin (pin 4) of the ECU connector.

Repeat the voltage measurement between the brake lamp power pin (pin 2) and the ground pin (pin 4) of the ECU connector, while the service brake is being applied (the brake lamp power should be supplied to the ECU).

Can you verify that measurements found are equal to the vehicle voltage (within 1 VDC) at both the ignition and brake power inputs?

YES

Check for high resistance (corrosion, wire/connector damage, or improper termination) of the power lines, resulting in a high voltage drop across the lines.

Measure the voltage under load by placing a load, such as a type 1157 brake light bulb, between the ignition power pin and the ground pin of the ECU connector, while the lamp is in place.

With ignition power to the trailer, measure the voltage between the ignition power (pin 1) and ground pin (pin 4) of the ECU connector.

Repeat the voltage measurement with brake lamp power to the trailer, between the brake lamp power (pin 2) and the ground pin (pin 4) of the ECU connector.

Verify that the voltage drop measurements are no less than 1.0 VDC from the vehicle voltage at both the ignition and brake power inputs.

With a volt/ohm meter, check the power and ground wiring. Look for corroded or damaged wires or connectors.

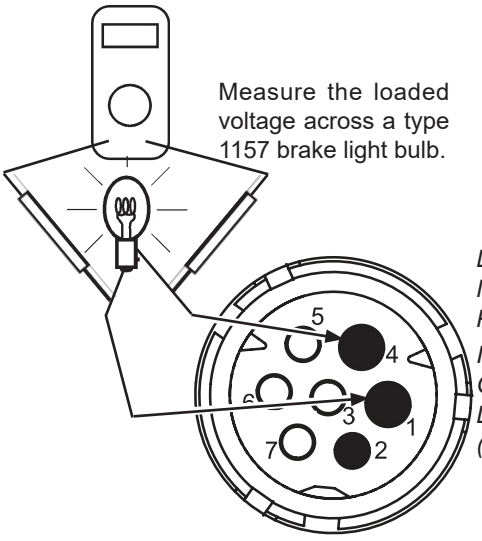
If repairs are made, rerun the power-up sequence. *Go to Section A.*

If proper loaded and unloaded voltage is measured at the ECU connector, and no corrosion or damage is found on the wiring, connectors or ECU, contact the Bendix Tech Team.

NO

Look for corroded or damaged wires or connectors. Check the power supply.

If repairs are made, rerun the power-up sequence. *Go to Section A.*

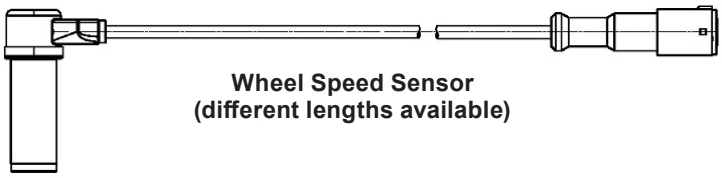


Looking into the TABS-6 ADV MC Module 7-pin Connector Pigtail Harness Measure:

Ignition Power (pin 1) to Ground (pin 4), and Brake Lamp Power (pin 2) to Ground (pin 4).

SECTION E: TROUBLESHOOTING THE WS-24 WSS

Turn the power to the module *OFF* and disconnect the wheel speed sensor connector. **NOTE:** For some troubleshooting steps, both static and dynamic WSS Diagnostic Trouble Codes (DTCs) may be present:



Wheel Speed Sensor
(different lengths available)

For additional troubleshooting steps, *see Service Data Sheet SD-13-4860, Bendix® WS-24™ Antilock Wheel Speed Sensor.*

E1

Are there Static WSS DTCs present?

NO

YES

If Static WSS DTCs are present:

Using a volt/ohm meter to measure the connector pins of the sensor with a DTC, verify 1575 to 2100 Ohms across the sensor connector pins.

Verify/inspect the following:

- No continuity from the sensor connector pins to ground
- Vbat is not measured at either sensor connector pins
- Verify there is no continuity between the sensor leads and other sensors
- Sensor/Electronic Control Unit (ECU) wiring and connectors are not damaged or corroded
- Proper sensor wire routing and clamping

Make repairs as needed (replace wiring and/or ABS components)

Reset active DTCs by using any of the following methods:

- Blink code diagnostics, *Section 19*
- PC diagnostics, *Section 21*
- Bendix® Trailer Remote Diagnostic Unit (TRDU™) and magnet, *Section 21*
- Bendix® Trailer Information Module, *Section 21*

Then, check for dynamic WSS DTCs, *See E3.*

Then, rerun the power-up sequence. *Go to Section A.*

E2

Are there dynamic WSS DTCs present?

YES

NO

End

Go to (E3)

E3: Dynamic WSS Diagnostic Trouble Codes (DTCs) are present

NOTE: If dynamic WSS DTCs are related to a lift axle problem, they will typically occur in pairs ("SE" and "SF") or ("SC" and "SD").

E4
Is the trailer equipped with one (1) or more lift axle(s)?

NO → *Continue to E7: Sensor and wheel inspection.*

YES

E5
Are there WSS installed on the lift axle?

NO → *Go to E7: Sensor and Wheel Inspection.*

YES

E6
Are sensors "SC" and "SD" installed on the lift axle?

NO → Sensors "SE" and "SF" are on the lift axle, as needed. Use the Bendix® ACom® Diagnostic Software to check if the trailer is configured for a lift axle. If the vehicle is not yet configured for a lift axle,use the ACom Diagnostic Software to configure the trailer for a lift axle and configure an auxiliary input/output (I/O) for lift axle sensing using the steps in this document. When configuring a trailer for an automatic lift axle, the system will either require a pressure switch be placed in one of the lift air bags (as near as possible to – or actually in – the air bag), or an automatic lift axle solenoid will need to be installed and configured.

YES

The vehicle setup needs to be rearranged so that sensors "SE" and "SF" are on the lift axle, and "SC" and "SD" are on the stationary axle. Using the schematics, change the vehicle to ensure all of the sensors are in the correct locations for a lift axle, then rerun the power-up sequence.

E7: Sensor and Wheel Inspection

Rotate the affected wheel and verify a minimum of 0.25 VAC sensor output is seen across the WSS pins while rotating the wheel at least 0.5 rps. This voltage output will vary based on how fast the wheel is being rotated.

NOTE: A properly positioned sensor can output more than 2.0 VAC at 1 rps.

Verify/inspect the following:

- WSS properly contact the tone ring
- The condition and retention force of the sensor sleeve
- Proper sensor lead condition, routing, and clamping sleeve
- Condition of the tone ring mounting and teeth
- Proper number of tone ring teeth per sensed wheel
- Proper adjustment of wheel bearings
- Condition of the foundation brakes
- Check for corroded/damaged wiring or connectors between the ECU and the WSS

Then, rerun the power-up sequence. *Go to Section E8.*

E8: Repairs

Make repairs as needed (replace wiring and/or ABS components).

Reset active DTCs by using any of the following methods:

- Blink code diagnostics, *Section 19*
- PC diagnostics, *Section 21*
- Bendix® Trailer Remote Diagnostic Unit (TRDU™) and magnet, *Section 21*
- Bendix® Trailer Information Module, *Section 21*

NOTE: If you do not reset manually, these will typically reset automatically after a power cycle and the vehicle has been driven for a period of time.

Then, rerun the power-up sequence. *Go to Section A.*

SECTION F: TROUBLESHOOTING THE LOAD SENSOR (OUT-OF-RANGE CONDITION)

(**NOTE**: The indicator lamp for this condition is illuminated only after the vehicle moves.)

Turn power to the module *OFF*.

For spring suspension system trailers:

Verify/inspect the following:

1. Inspect the load sensor linkage.
   - Check that the linkage is attached to the axle clamp.
   - Inspect for damage to the linkage components, loose connectors, and improper installation.
   - Check that the load sensor lever rod is in a horizontal position with the trailer empty. Verify that it is a Bendix® sensor.
   - Verify that the sensor linkage has not flipped over so that it faces the opposite direction.
2. Switch the power to the module *ON*. Using the Bendix® ACom® Diagnostic Software, open the *Bendix® Trailer Roll Stability Program (TRSP®) Sensor* screen and select *Start*. Find the load (in lbs.) that the sensor is registering, and verify the actual trailer load is consistent with the value found. *See the **NOTE** below.*
3. Where the value does not appear to be correct, perform the load sensor resistance check:
   - Unplug the 12-pin connector, or the 2.4 (X4 connector), from the module. *Refer to Table 3.*
   - With the load sensor lever in the horizontal position, verify that approximately 2.5K Ohms is measured between the sensor supply pin and the sensor input pin, and between sensor input pin and sensor ground. *Refer to Table 3.*
   - Using the ACom Diagnostic Software, open the configuration screen. Select the *Load and Sensor Configuration* tab, and then view the *Load Sensing* panel. Verify that the current *Sensing Type* is shown as *External*. If not, change the selection to *External*. Perform the external spring deflection sensor calibration. *Refer to Instruction Sheet S-1588, Spring Deflection Sensor.*
   - Note the values shown on the screen for the current load and sensor voltage. Verify that the values shown on the screen for the empty and laden weight and voltage are correct. Where the value does not appear to be correct, enter the correct value(s) on the configuration screen.

NOTE: Use a scale to obtain the actual empty trailer weight. Where possible, obtain the load/deflection curve from the suspension/spring manufacturer for the specific suspension/spring combination to find the expected values for this vehicle.

Then, rerun the power-up sequence. *Go to Section A.*

For air suspension system trailers:

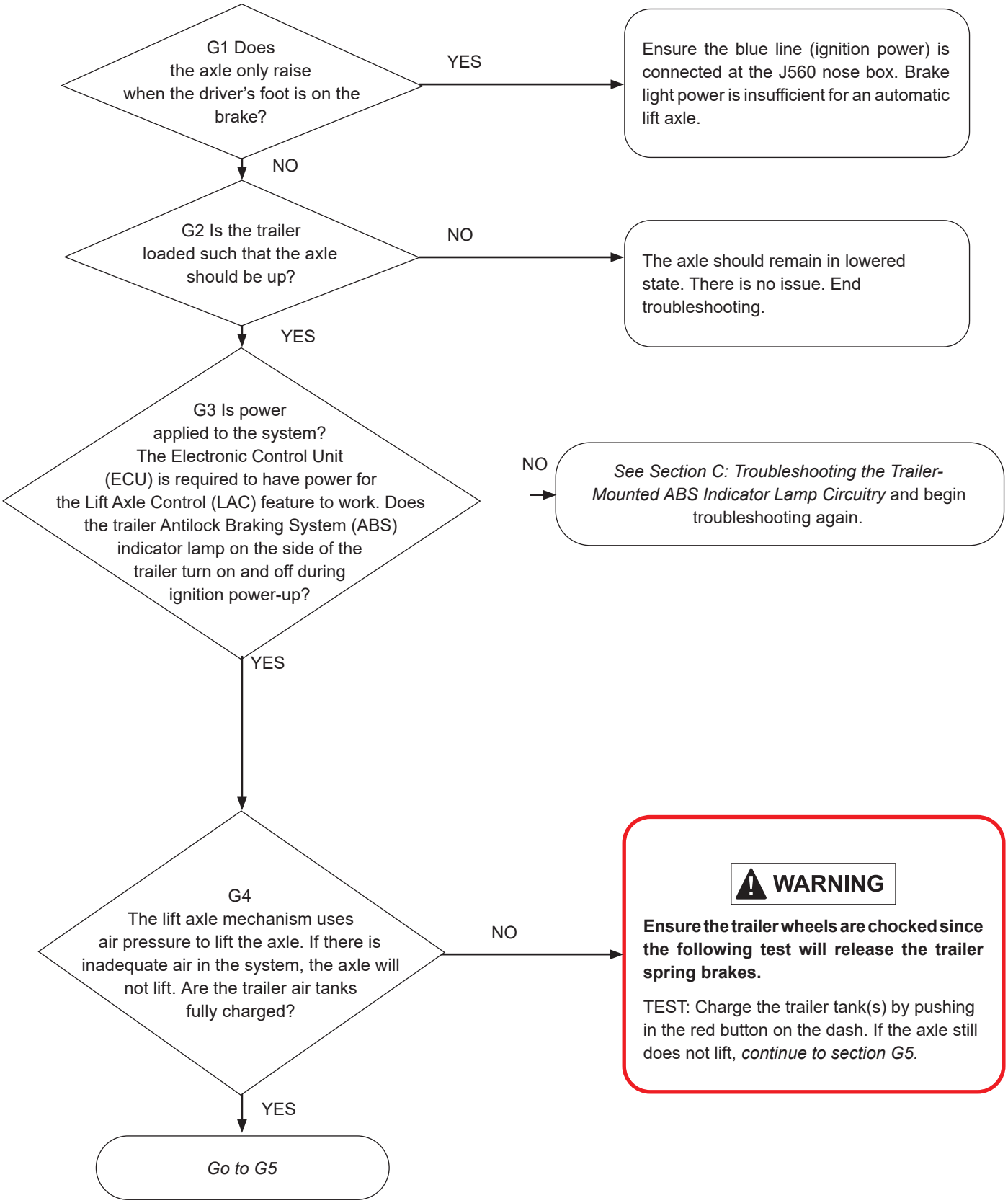
Verify/inspect the following:

1. Check that the load port P42 is connected to the primary suspension air bags ***at a location as far from the height control valve as possible***. Verify that the air hose is not kinked.
2. Switch the power to the module *ON*. Using the ACom Diagnostic Software, open the *Pressure* screen and select *Start*. Read the pressure shown for the load port (p42). If the pressure value is not as expected, close the *Pressure* window and open the *Controller Configuration* window. Then, select the *Load and Sensor Configuration* tab and view the *Load Sensing* panel. Verify that the current *Sensing Type* is shown as *Internal*. If not, change the selection to *Internal*.
3. Check that the suspension height control valve is functioning correctly.
4. Check for air leakage in the suspension system.
   - Using the ACom Diagnostic Software, open the *TRSP Sensor* screen and select *Start*. Find the load (in lbs.) that the sensor is registering, and verify that the actual trailer load is consistent with the value found.
   - Note the values shown on the screen for the current load and pressure. Verify that the values shown on the screen for the empty and laden weight and pressures are correct. *See the **NOTE** below.*
   - Using the ACom Diagnostic Software, where the value does not appear to be correct, select *Modify*, and enter the correct value(s) on the configuration screen.

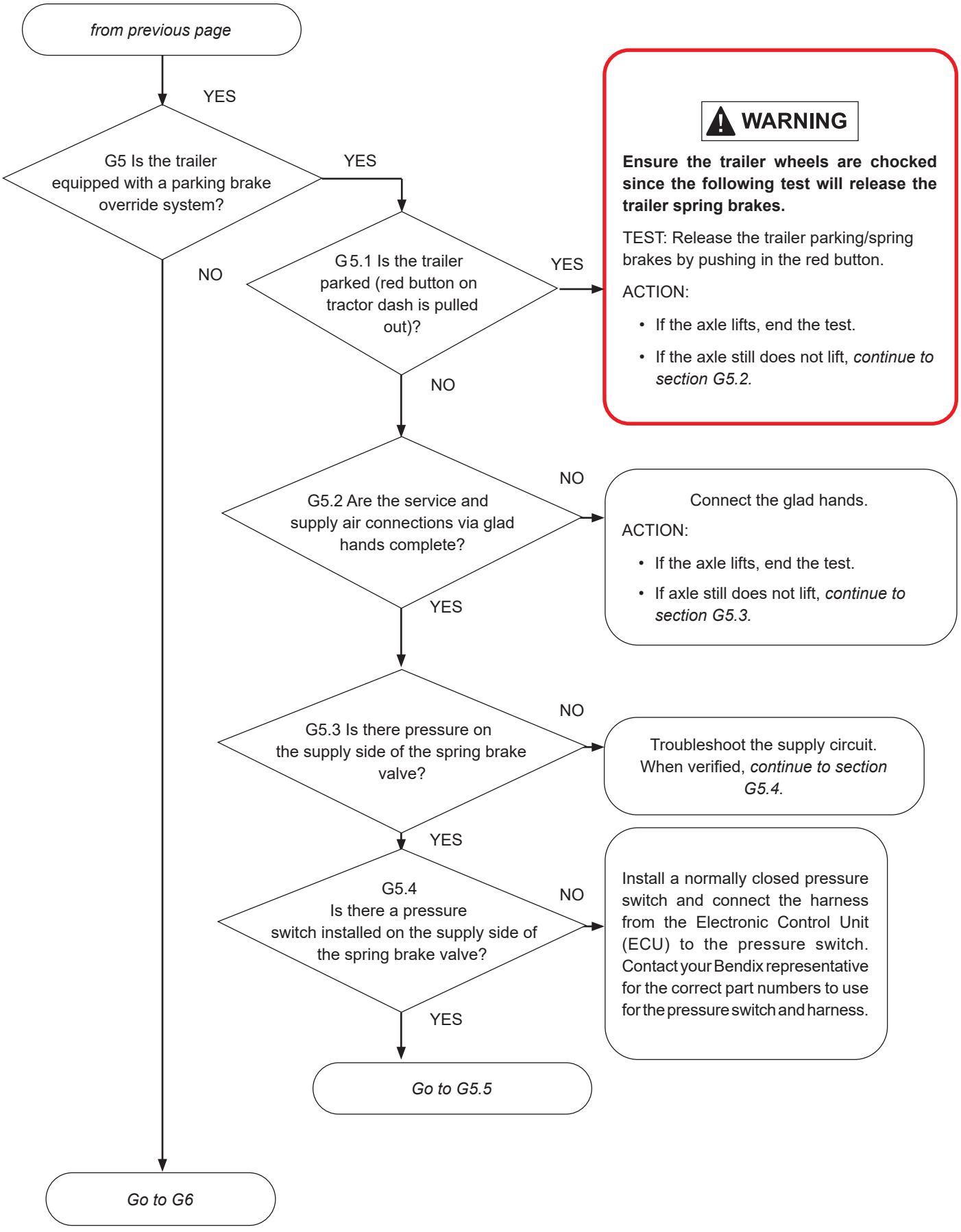
NOTE: Use a scale to obtain the actual empty trailer weight and use a pressure gauge to obtain actual empty trailer suspension air bag pressure. Where possible, obtain the load/pressure curve from the suspension manufacturer for the specific suspension/air bag combination to find the expected values for this vehicle.

Then, rerun the power-up sequence. *Go to Section A.*

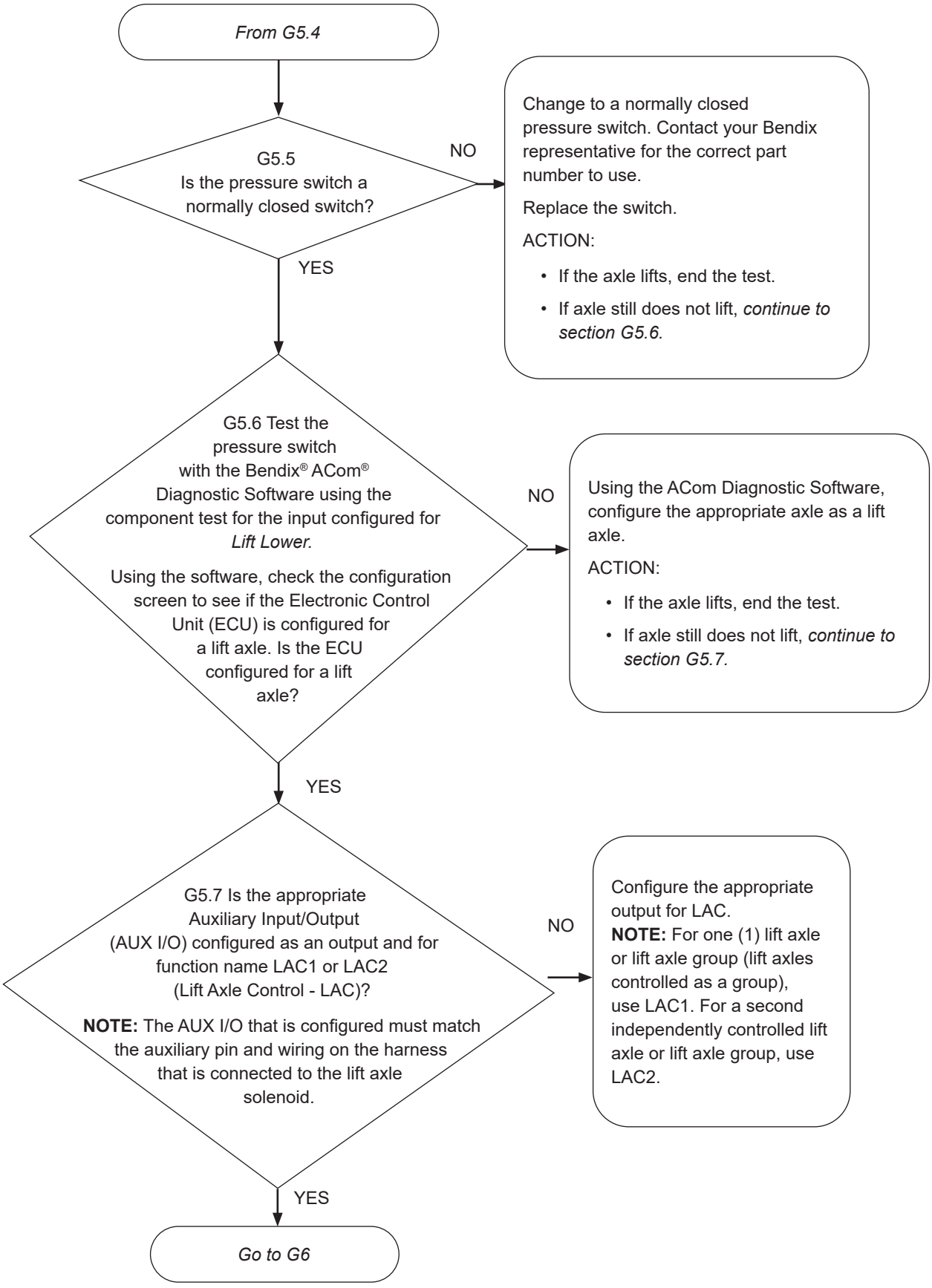
SECTION G: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS LOWERED



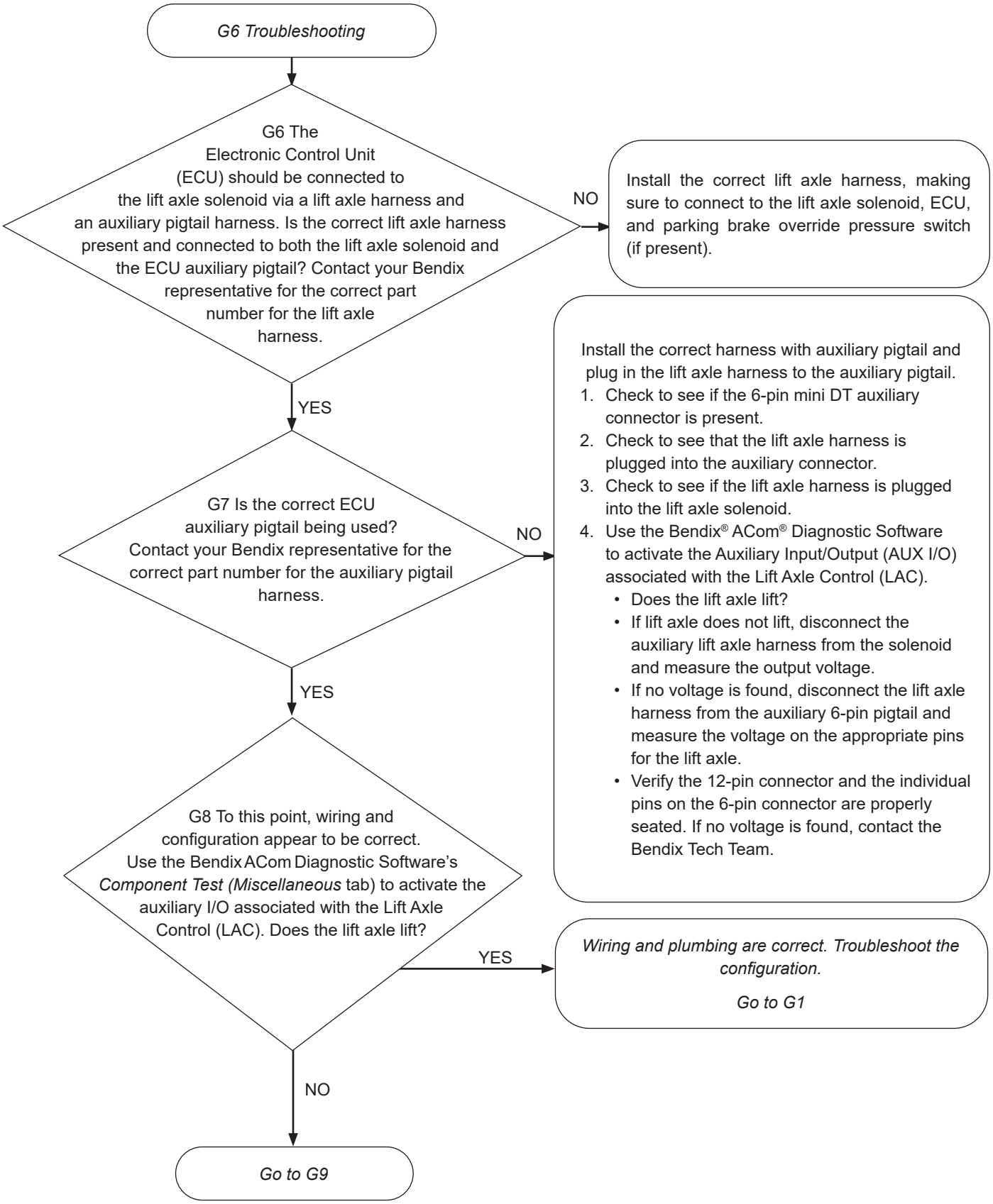
SECTION G: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS LOWERED (CONTINUED)



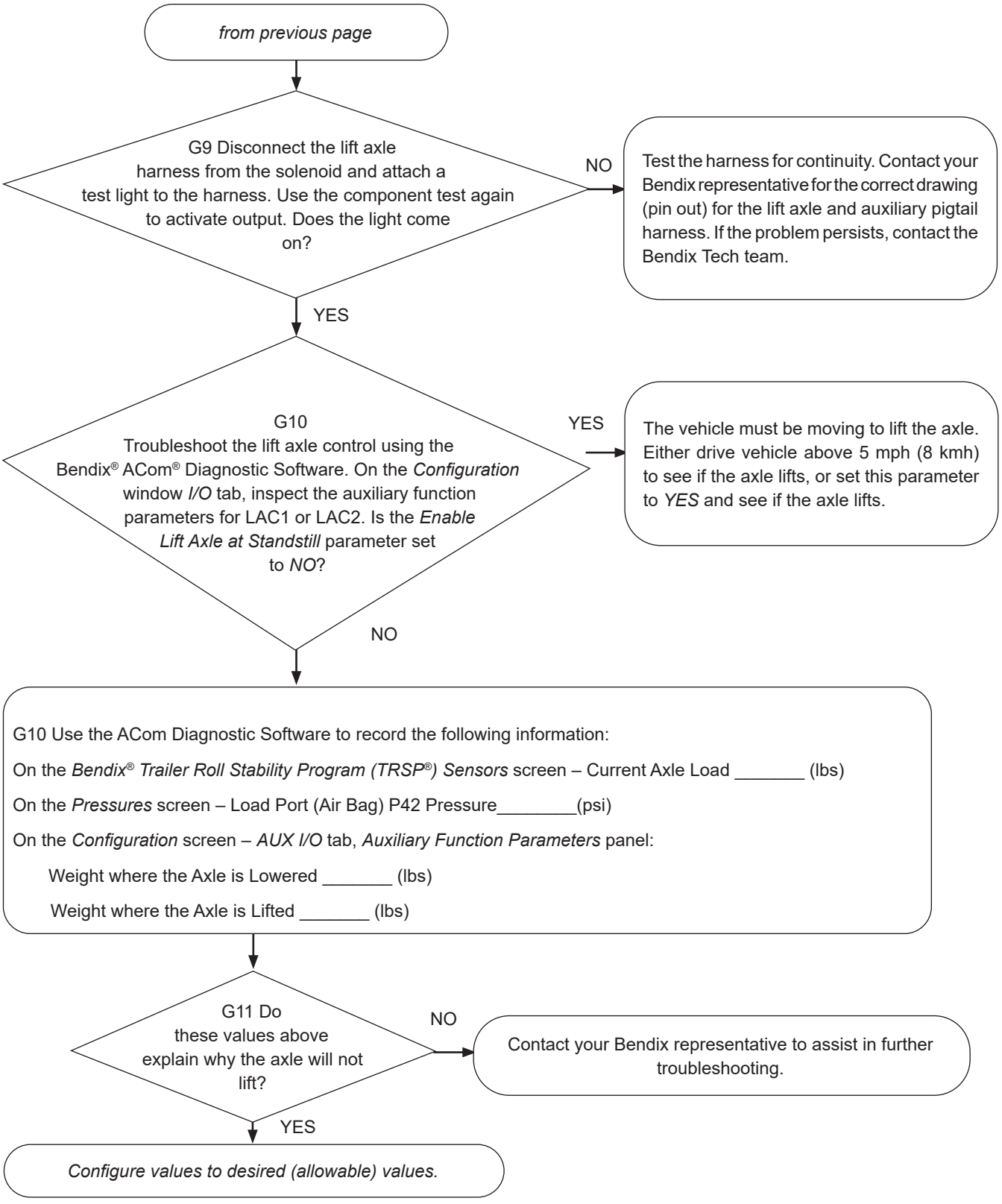
SECTION G: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS LOWERED (CONTINUED)



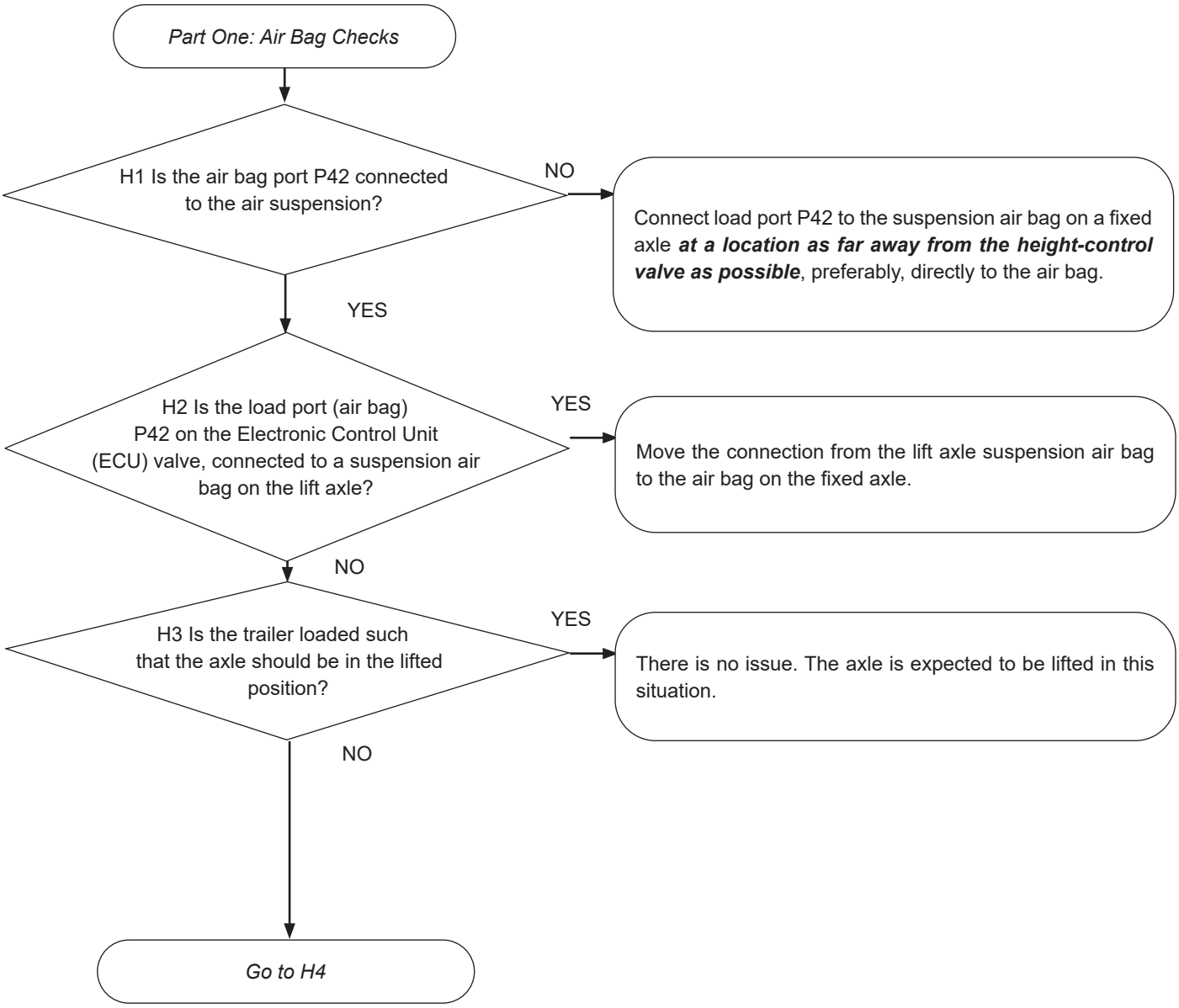
SECTION G: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS LOWERED (CONTINUED)



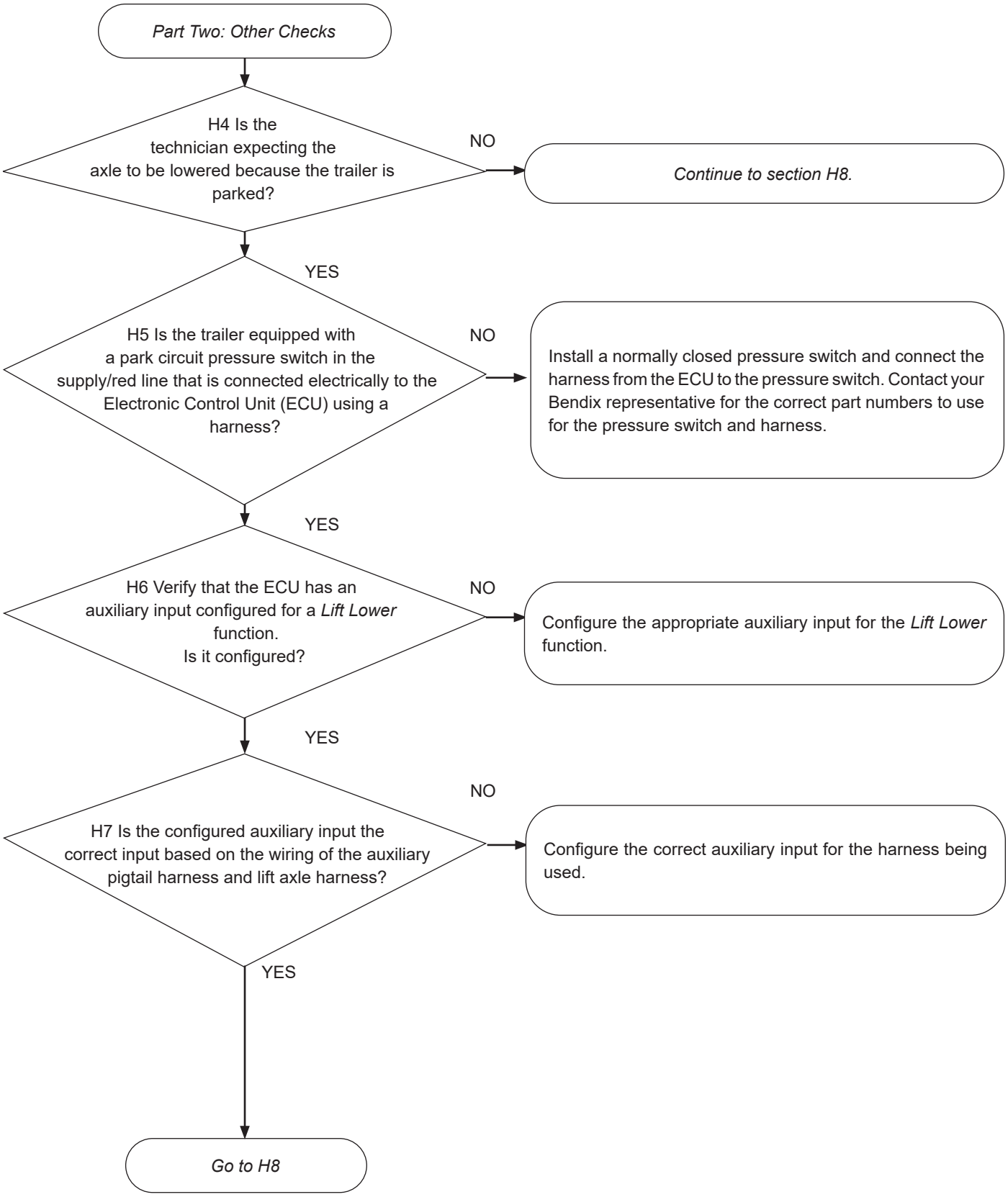
SECTION G: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS LOWERED (CONTINUED)



SECTION H: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS RAISED



SECTION H: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS RAISED (CONTINUED)



SECTION H: TROUBLESHOOTING AN AUTOMATIC LIFT AXLE THAT REMAINS RAISED (CONTINUED)

from previous page

H8 Is there a separate control mechanism on the trailer that will override the Electronic Control Unit (ECU) Lift Axle Control (LAC) and force the axle up? (Overrides can either be an electrical switch or a mechanical push-pull button.)

YES → Inspect to see if it is in the position that is overriding the automatic lift axle system. Change its position, if necessary, and *continue to section H9.*

NO

H9

⚠ WARNING

Exercise caution when completing this step as the lift axle may drop as a result.

Check that the ECU is activating the lift valve. This can be done either by disconnecting the harness that connects to the lift axle solenoid, or by using the Bendix® ACom® Diagnostic Software component test to activate/deactivate the output that is configured for LAC. Does the axle lower?

NO → The ECU is not causing the lift axle to be raised. Inspect and repair, if necessary, the plumbing of the lift axle valve and circuitry.

YES

The ECU is causing the lift axle to be raised. Use the ACom Diagnostic Software to look at the current loading conditions as interpreted by the ECU to verify that the axle should be in the lowered position. If it is determined it should be in the lowered position, contact the Bendix Tech Team.

H10 Use the ACom Diagnostic Software to record the following information:

On the *Bendix® Trailer Roll Stability Program (TRSP®) Sensors* screen – Current Axle Load _____ (lbs)

On the *Pressures* screen – Load Port (Air Bag) P42 Pressure_____ (psi)

On the *Configuration* screen – *AUX I/O* tab, *Auxiliary Function Parameters* panel:

Weight where the Axle is Lowered _____ (lbs)

Weight where the Axle is Lifted _____ (lbs)

H1 Do these values above explain why the axle will not lower?

NO → Contact your Bendix representative to assist in further troubleshooting.

YES

Configure the values to desired (allowable) values.

ECU Part Number Label

The external part number label is located above the control port of the module. If this label is not legible for any reason, the Bendix part number can be read from the ECU using a diagnostic tool.

Software Revision Level

The number of the initial software loaded on the ECU is also indicated. The current software revision number can be read using a diagnostic tool.

Document Revision Level

For additional information on Bendix products and to ensure you have the latest version of the Service Data Sheet, visit B2Bendix.com.

Document Description	Document Number
Bendix® Single-Channel TABS-6™ Advanced Module	SD-13-47671
Bendix® WS-24™ AntiLock Wheel Speed Sensor	SD-13-4860
Bendix® TABS-8™ Advanced Single-Channel Trailer ABS Module	SD-13-47680
Spring Deflection (Load) Sensor Installation for Spring Suspensions	S-1588

BENDIX TECHNICAL ASSISTANCE

For additional assistance, the Bendix Tech Team can be reached by email at techteam@bendix.com or by phone at 1-800-AIR-BRAKE (1-800-247-2725), option 2. Bendix Tech Team representatives are available Monday through Thursday, 8:00 a.m. – 6:00 p.m., and Friday, 8:00 a.m. – 5:00 p.m. ET.

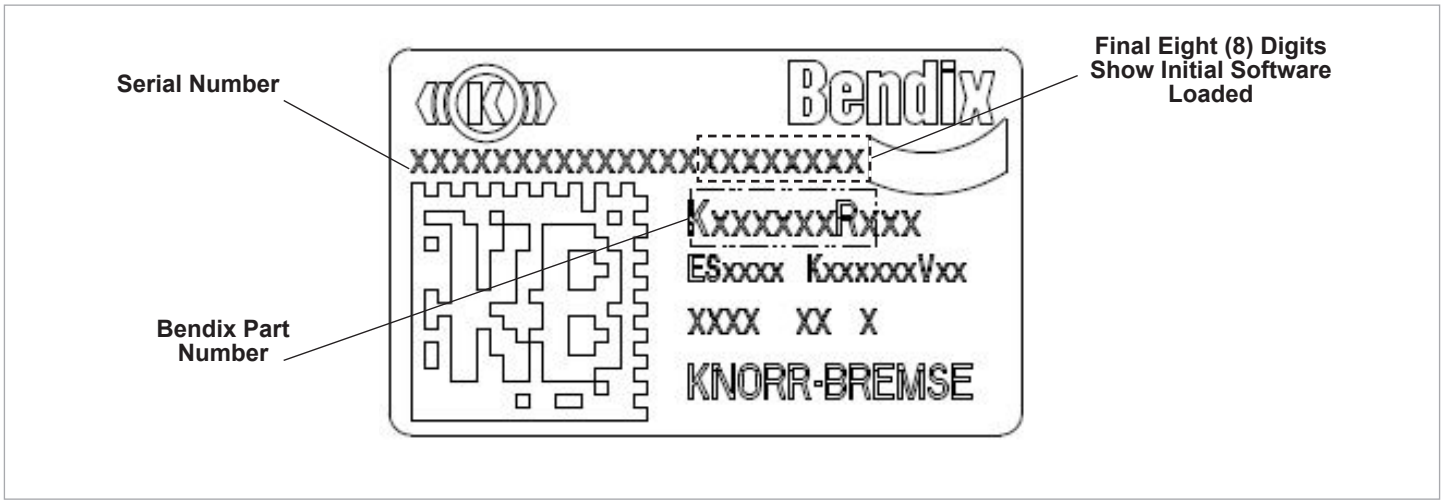


Figure 35 – Label information

APPENDIX A: REQUIRED INFORMATION FOR PROGRAMMING WITH BENDIX® ACOM® DIAGNOSTIC SOFTWARE

Record the following information:

Information for Programming with ACom Diagnostic Software	
ECU orientation	
Number of axles on the trailer	
Tone ring size *(standard size is 100)*	
Tire size in revolutions/mile *(refer to the tire manufacturer's website)*	
Are tires single or doubles for each wheel end?	
Maximum weight in pounds rated for each axle of the trailer	
Trailer weight in pounds when the trailer is empty	
Suspension type used on the trailer *(contact the suspension supplier)*	
Pressure value of the air suspension for the empty weight of the trailer *(contact the suspension supplier*)*	
Pressure value of the air suspension for the fully loaded weight of the trailer (*contact the suspension supplier*)*	
Distance from the kingpin to the center of the first axle	
Distance between center of axle one (1) and axle two (2) for a two-axle trailer *(record the distance between any additional axles)*	
Offset distance in inches and whether the ECU is oriented toward the curbside or roadside *(if the module is offset from the vehicle's center line more than ± 2 in.)*	
Track width *(measurement between the outer edges of the outermost tires on the axle with the WSS installed)*	

**: This information is also available via the Pressures screen in ACom Diagnostic Software (record the pressure value shown for P42 in PSI).*