



Service Data

SD-13-47680

Bendix® TABS-8™ Advanced Single-Channel Trailer Antilock Braking System (ABS) Module

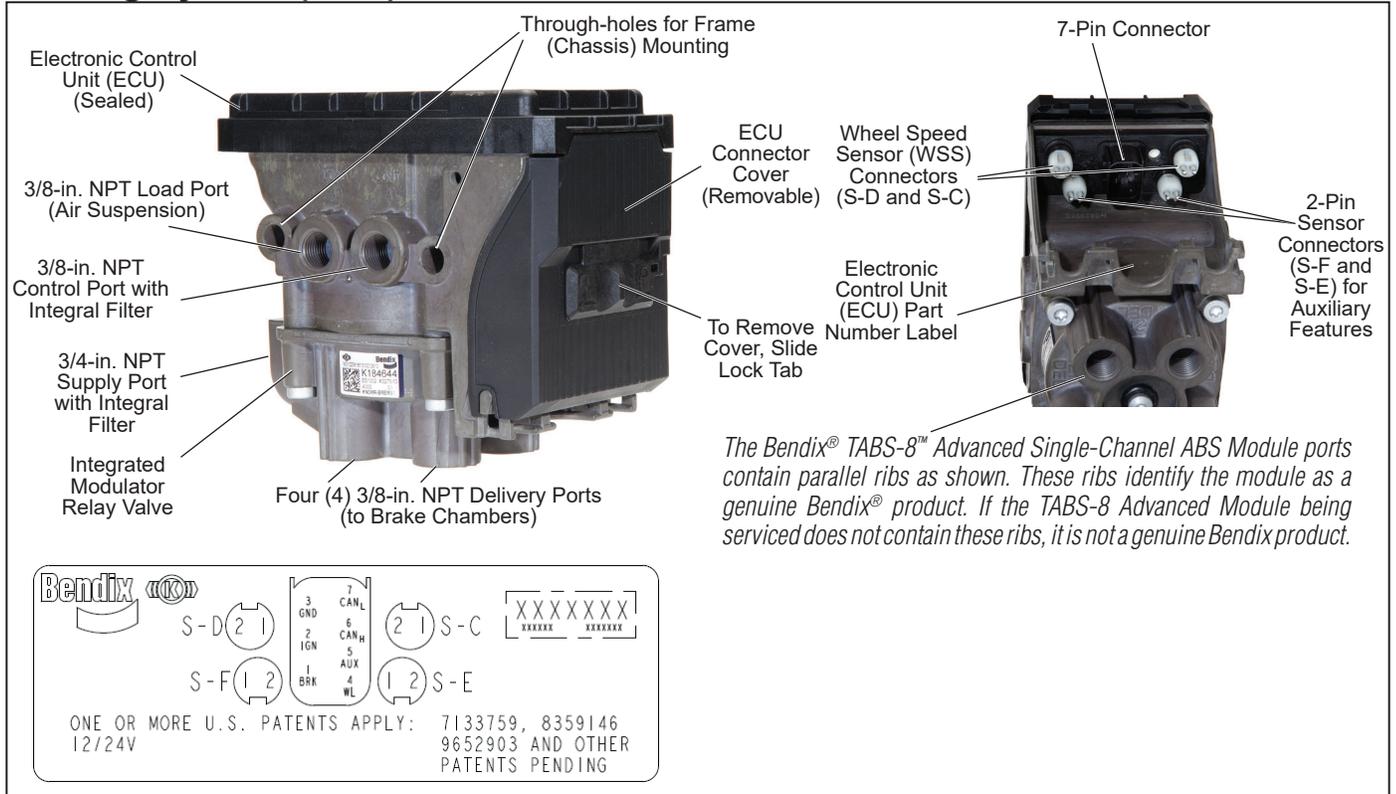


Figure 1 – Bendix® TABS-8™ Advanced Single-Channel ABS Module Plus View of Connector

1. INTRODUCTION

The Bendix® TABS-8™ Advanced Module is an integrated single-channel (2S/1M) trailer service brake module controller for air-braked, heavy-duty semi-trailers that features the Bendix® Antilock Braking System (ABS) and the Bendix® Trailer Roll Stability Program (TRSP®).

Installed on semi-trailers, the TABS-8 Advanced Module acts as a relay valve during normal braking, but during ABS events, it will intervene to help maintain vehicle stability and minimize stopping distance by preventing wheel lock-up. The TRSP monitors the trailer's motion and reduces the risk of rollovers by automatically applying the brakes when a risk of rollover is detected.

The TABS-8 Advanced Module features:

- A modular design with an integrated Electronic Control Unit (ECU); pressure sensors; a lateral acceleration sensor; and Modulator Relay Valve (MRV) – eliminating external pigtail harnesses for these components
- An operating voltage range of 8 - 32 volts
- Optional mounting to the service reservoir or to the chassis, without additional brackets
- 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 variety of electrical inputs and a single output (I/Os) allow the customer to program auxiliary functions such as automatic Lift-Axle Control (LAC), Integrated Speed Switch (ISS), and Auxiliary Design Language (ADL) for customized auxiliary functions
- A wide range of diagnostic tools for flexible troubleshooting such as blink codes; SAE J2497 (PLC); SAE J1939 (CAN) diagnostics; the Bendix® Trailer Remote Diagnostic Unit (TRDU); and the Bendix® Trailer Information Module (TIM)
- Support for SAE J2497 Power Line Carrier (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 Electronic Control Unit (ECU) housing to give improved protection from water, etc.
- Serviceable nylon filters to help prevent foreign material from entering the control port, load sensor port, and supply port
- Locking dust cover to provide electrical connector and cable protection

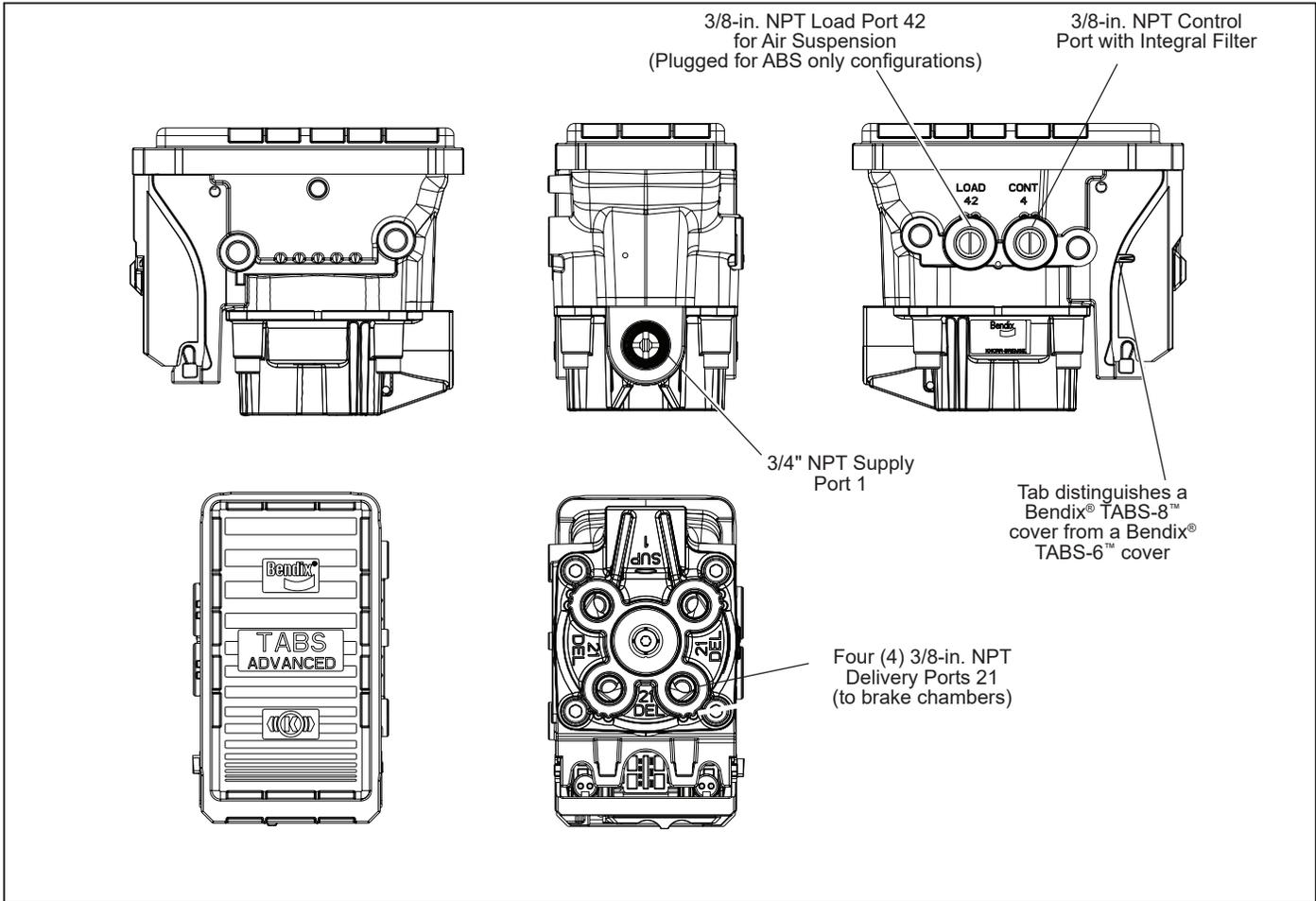


Figure 2 – Ports Used

2. GENERAL SAFETY GUIDELINES



WARNING

Disconnect the electrical connectors from the Antilock Braking System (ABS)/Bendix® Trailer Roll Stability Program (TRSP®) controller before welding on the trailer.



WARNING

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



WARNING

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



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.

Section TABLE OF CONTENTS PAGE

1. Introduction	1-2
2. General Safety Guidelines	3
3. Antilock Braking System (ABS) Operation	4
4. Bendix® Trailer Roll Stability Program (TRSP®) Operation	4
5. Components	5-6
6. Mounting	7
7. Pigtail Wiring Harnesses	7
8. ABS Indicator Lamp	8
9. Bendix® WS-24™ Wheel Speed Sensors (WSS)	8
10. SAE J2497 (PLC) Diagnostic Link	9
11. SAE J1939 (CAN) Diagnostic Link	9
12. Auxiliary I/O	9
13. Bendix® ABS Flex™ Program	10
14. Customer Scratch Pad	10
15. Power-Up Sequence	10
16. Odometer Function	10
17. Non-Standard Tire Size	11
18. Diagnostic Trouble Code (DTC) Detection	11
19. Partial ABS Shutdown	11
20. Blink Code Diagnostics	11-12
21. Auxiliary Features	12
22. Diagnostic Trouble Codes (DTC)	13-19
23. Troubleshooting Section	20-42

3. ANTILOCK BRAKING SYSTEM (ABS) OPERATION

The Bendix® TABS-8™ Advanced Module uses Wheel Speed Sensors (WSS), a Modulator Relay Valve (MRV), and an Electronic Control Unit (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 activate the MRV to apply controlled brake pressure at the wheel ends.

The TABS-8 Advanced Module ECU is able to modulate the brake pressure with greater speed and accuracy than a driver.

Normal Braking

During normal braking, the TABS-8 Advanced Module functions as a standard relay valve. If the ECU does not detect excessive wheel slip, it will not activate the Antilock Braking System (ABS), and the vehicle will stop with normal braking.

Axle Control

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

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



Axle control (select high) 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.

When intervening on regular-traction 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 4S/2M axle configuration should be used. These configurations have the ability to minimize yaw on steerable axles.

ABS Fail-Safe

The TABS-8 Advanced 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. The TABS-8 Advanced 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® Trailer Roll Stability Program - 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 ABS. 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.



For all NPT fittings, use of a thread sealant is required. 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/TRSP valve warranty.

4. BENDIX® TRAILER ROLL STABILITY PROGRAM (TRSP®) OPERATION



During a Bendix® Trailer Roll Stability Program (TRSP®) system intervention, the vehicle automatically decelerates. The Bendix® TABS-8™ Advanced Module can slow the vehicle with or without the driver applying the brake pedal, and even when the driver applies the throttle.



If the TABS-8 Advanced Module faults for any reason, the brakes will not be applied.



Even with TRSP system-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, but cannot prevent them in all cases. 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.



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



The TRSP system is approved for use on A-Double and B-Train combinations. Use on A-Triple combinations must be approved by engineering.

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-8 Advanced 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-8 Advanced Module. This sensor detects the lateral motion (or “roll”) of the vehicle as it moves. The TABS-8 Advanced Module may be mounted either in line with – or at right angles to – the main trailer chassis to function correctly. *Refer to the Troubleshooting section for full details on acceptable installation locations.* **NOTE:** Do not attempt to change the location of the TABS-8 Advanced Module without contacting Bendix for engineering approval.
- **Vehicle Speed:** The TRSP system obtains information about the vehicle speed and rate of acceleration/deceleration from the Wheel Speed Sensors (WSS).
- **Axle/Bogie Load:** The trailer’s axle load information is obtained by the use of an integrated pressure sensor port (P42) of the TABS-8 Advanced Module, where a direct reading of the suspension air spring pressure is taken. Trailer axle load information is configured during the installation test based off of information provided by the trailer/axle manufacturer.

TRSP Intervention with Driver Actions

It is possible the driver will also apply the brakes before or during a TRSP intervention by the TABS-8 Advanced Module. In all cases, the Electronic Control Unit (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) pressures.

5. COMPONENTS

Installation of the Bendix® TABS-8™ Advanced Module use the following components:

Internal Components:

- **Electronic Control Unit (ECU):** The ECU monitors the Wheel Speed Sensor (WSS) signals, lateral accelerometer sensor signal, and various pressure sensors (listed below) to determine when the Antilock Braking System (ABS) and/or the Bendix® Trailer Roll Stability Program (TRSP®) intervention is required. When needed, the ECU actuates the internal pressure modulator valve to optimize the brake pressure. The ECU monitors the system to detect and warn the driver of any malfunctions. Diagnostic Trouble Codes (DTCs) are stored in the ECU and can be reviewed to diagnose the TABS-8 Advanced Module system.
- **Lateral Accelerometer Sensor:** The lateral accelerometer sensor recognizes the lateral movement of the trailer and sends an electrical signal directly proportional to the trailer's lateral acceleration 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 a 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 directly proportional to the trailer's axle load to the ECU.
- **Brake Demand Pressure Sensor:** This internal sensor (P4) monitors the trailer service brake pressure being applied by the driver and sends an electrical signal directly proportional to the driver's brake demand to the ECU.
- **Brake Delivery Pressure Sensor:** This internal sensor (P21) monitors the trailer service brake pressure that is being delivered to the wheel ends through, or by, the TABS-8 Advanced Module system and sends an electrical signal directly proportional to the delivered trailer service brake pressure to the ECU.
- **Modulator Relay Valve (MRV):** An MRV is integrated into the TABS-8 Advanced Module and is 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.
- **MRV Crack Pressure:** The TABS-8 ABS MRVs are supplied with a nominal crack pressure of 4.5 ± 0.5 psi.

External Components:

- **Wheel Speed Sensors (WSS):** See Figure 3. Located at selected hubs, WSS detect the rotation of individual wheels and send an electrical signal to the ECU proportional to the rotational velocity. The primary WSS connectors, S-C and S-D, are used for detecting wheel speeds. The TABS-8 Advanced Module has two (2) additional DIN connectors, S-E and S-F, which can be used as tri-state auxiliary inputs. These sensors do not have wheel speed sensing capabilities.



Use of cable ties/tie wraps to attach Wheel Speed Sensor (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 speed sensor extensions may be damaged. Bendix instead recommends only open-ended clips be used to hold sensor leads to jounce lines.

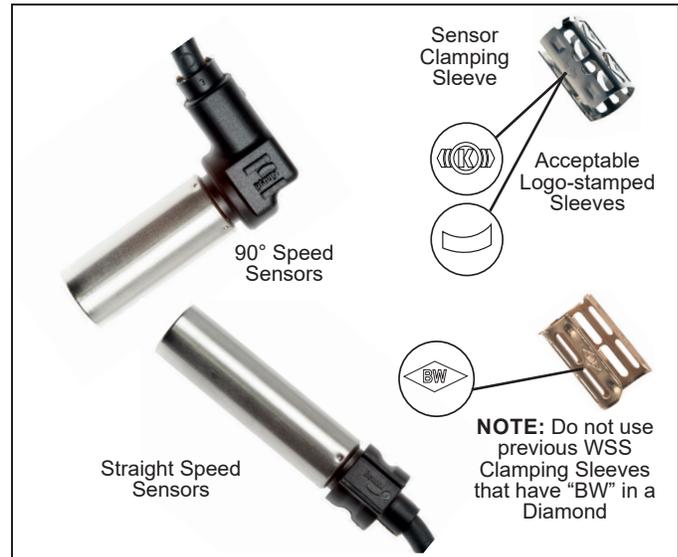


Figure 3 – Bendix® WS-24™ Wheel Speed Sensor

- **Trailer Antilock Braking System (ABS) Indicator Lamp:** See Figure 4. Controlled by the Electronic Control Unit (ECU) to show the ABS status, the trailer ABS indicator lamp illuminates when a Diagnostic Trouble Code (DTC) is active. 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 and up to six (6) seconds at most.

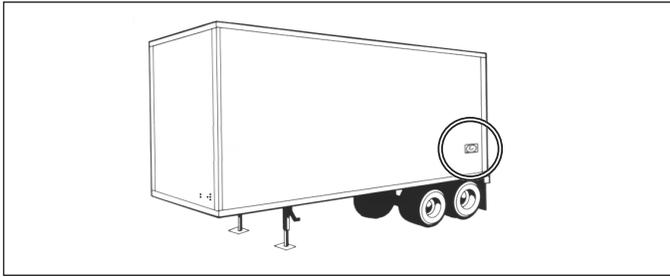


Figure 4 – Trailer-Mounted ABS Indicator Lamp

- **5-pin Power Harness:** See Figure 5. A power harness is required. Variations that include auxiliary sub-harnesses are available as needed.
- **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 (*Refer to the Lift-Axle Control section 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.
- **Lift-Axle Control:** The Bendix® TABS-8™ Advanced Module can be configured to automatically raise (and lower) lift axle(s) when a pre-configured load is sensed.

6. MOUNTING CONFIGURATIONS

- **Tank (Nipple) Mount:** The TABS-8 Advanced Module can be tank-mounted using a schedule 80 (heavy-gauge steel) 3/4-in. NPT nipple directly between the trailer supply tank and the module's supply port. A tank with a reinforced port must be used.

- **Frame (Chassis) Mount:** The TABS-8 Advanced Module provides through-holes for frame mounting directly to the trailer frame rail or cross-member. It is recommended to use two (2) grade 5³/₈-in. 16 bolts, typical length of 5 in., torqued to 180 - 220 in-lbs (20 - 25 N•m).

7. PIGTAIL WIRING HARNESES

See Figure 5. Pigtail wiring harnesses are available to connect the TABS-8 Advanced Module with the ABS and 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 TABS-8 Advanced Module wiring harnesses, Bendix recommends the complete harness be replaced if damage or corrosion occurs.

See Figure 1. The TABS-8 Advanced Module includes two (2) primary Wheel Speed Sensor (WSS) inputs and two (2) additional auxiliary inputs. The harnesses used for them are separate from the main pigtail harness.

ECU Connectors

See Figure 5. TABS-8 Advanced Module ECU connectors use a 7-pin TE Connectivity™ HDCS connector for brake light power, constant power, the trailer-mounted ABS indicator lamp, ground, and – depending on the harness version – it may include the AUX 1 I/O. Note that some parts may be pre-configured with auxiliary features on the AUX 1 I/O and S-E/S-F inputs that may require additional harnessing as shown in Figure 5.

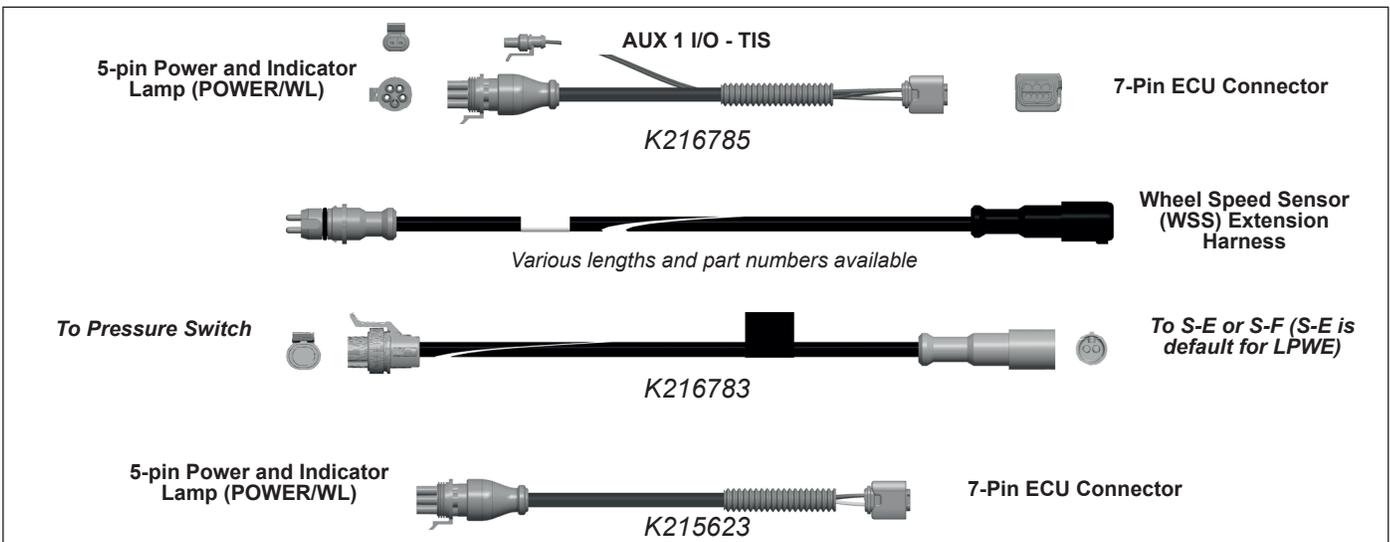


Figure 5 – Examples of Wiring Harnesses

Power/ABS Indicator Lamp Connector

The Bendix® TABS-8™ Advanced Module pigtail uses a TTMA RP 7-99 5-pin Packard® Weather Pack connector for brake light power, constant power, ground, and the trailer-mounted Antilock Braking System (ABS) indicator lamp. See Figure 5.

Auxiliary I/O Connector

NOTE: Some parts may be pre-configured with auxiliary features on the AUX 1 I/O and S-E and S-F inputs that may require additional harnessing.

The two (2) additional Wheel Speed Sensors (WSS) on the TABS-8 Advanced Module have the option to be configured as tri-state inputs. WSS S-E and S-F can also be used for the TABS-8 Advanced Module temperature-monitoring feature on a two-axle trailer.

NOTE: For further information about this feature, refer to TCH-20-001 on b2bendix.com.

SAE J1939 (CAN) Connector

The TABS-8 Advanced Module pigtail harnesses provide a CAN connection for various Electronic Control Unit (ECU) communications. Typical uses include J1939 diagnostics and connection to the Bendix® Trailer Information Module (TIM).

Power and Ground

Trailer electrical power is supplied to the TABS-8 Advanced Module from the ignition and brake light circuits. Refer to 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 Line Carrier (PLC) (Blue Wire)	7	B	2
Brake Light Power (Red Wire)	4	A	1
Ground (White Wire)	1	E	3
Indicator Lamp (White/Green Wire)	N/A	D	4
AUX I/O 1 (See Figure 5)	N/A	N/A	5
CAN H (Pin not populated by default)	N/A	N/A	6
CAN L (Pin not populated by default)	N/A	N/A	7

Table 2 – Main Power Harness and Connector Pins

8. ANTILOCK BRAKING SYSTEM (ABS) INDICATOR LAMP

Trailer-Mounted Lamp

The Bendix® TABS-8™ Advanced Module controls an Antilock Braking System (ABS) indicator lamp to show the trailer ABS status. With power supplied by the towing vehicle – if there is an active Diagnostic Trouble Code (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 4 of the 7-pin connector on the Module.

Dash-Mounted Lamp (PLC Controlled)

TABS-8 Advanced Modules use SAE J2497 standards to support PLC communication. The status of the trailer ABS is transmitted over the ignition power wire (the blue wire of the J560 connector) – Pin 2 of the 7-pin Module connector.

If there is an active DTC, during the bulb check at startup, the TABS-8 Advanced Module will transmit a signal over the power line to the towing vehicle's Electronic Control Unit (ECU), thus illuminating the trailer ABS indicator lamp mounted on the dash.

9. BENDIX® WS-24™ WHEEL SPEED SENSOR (WSS)

See Figure 3. Wheel speed data is provided to the TABS-8 Advanced Module by the Bendix® WS-24™ Wheel Speed Sensor (WSS). Typically, the WS-24 WSS is installed in a mounting block that is welded to the axle housing. The WSS are protected by a stainless steel sheath. They are designed to be used with stainless steel clamping sleeves, sometimes referred to as a “retainer bushing,” “friction sleeve,” or “clip.” The clamping sleeve provides a friction fit between the mounting block bore and the WSS.

Vehicles have an exciter ring (often referred to as “tone ring”) as part of the wheel assembly. (From here on, this will be referred to as a “tone ring” throughout this document.) The default setting expects a 100-tooth tone ring to be used. (See Section 17 for more information.) As the wheel turns, the teeth of the tone ring pass the WSS, generating an Alternating Current (AC) signal which is delivered to the TABS-8 Advanced Module ECU. The signal varies in voltage and frequency as the wheel speed changes.

See Figure 19 for an electrical system schematic showing the WSS connector pin locations.



Correct WSS installation is necessary for optimal ABS operation.

Sensors should not be installed on a lift axle.

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. See Figure 3. Install the new clamping sleeve fully into the block, with the retaining tabs toward the inside of the vehicle. Note that WS-24 WSS must use the correct clamping sleeve to avoid problems associated with reduced retention force, such as sensor movement, and resulting ABS DTCs.
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. (8-15 cm) from the sensor.
4. Apply a small amount of dielectric non-conductive grease to both the sensor 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 WSS to slide back and forth under force, but to retain its position when the force is removed. When the 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 sensor back. Also, normal bearing play will “bump” the sensor away from the tone ring. The combination of these two actions will establish a running clearance, or air gap, between the sensor and the tone ring.



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 sensor is pushed too far away from the tone ring for a good signal to be produced. Maintain wheel bearings per the manufacturer's recommendations.

Antilock Braking System (ABS) Wiring on Towing Trailers

For use on towing trailers, to minimize voltage-drop, the rear-mounted SAE J560 connector **MUST BE** connected directly to the front-mounted SAE J560 connector by a parallel wiring harness to the trailer wiring harness.

Any auxiliary power circuit (non-braking and running gear) shall be powered via the trailer Antilock Braking System (ABS). The trailer ABS shall provide power management to ensure the braking functions are given priority. If the power requirement for the auxiliary power circuit exceeds the maximum current allowed for an AUX I/O, an external relay or electronic relay, which is to be controlled by the trailer ABS, is acceptable for use. In this case, it is the trailer manufacturers' responsibility to ensure this circuit is suitably designed and rated for the application and the switch-off time is fast enough to ensure the braking power supply is protected. This should be proven by practical tests (*Contact your local Bendix representative*).

10. SAE J2497 POWER LINE CARRIER (PLC) DIAGNOSTIC LINK

See Figures 6 and 7. All newer towed vehicles transmit a signal over the power line to the towing vehicle ABS Electronic Control Unit (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.

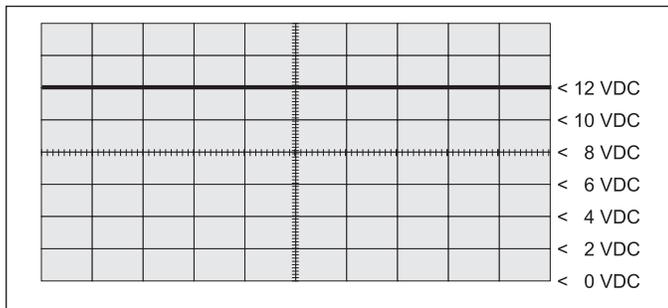


Figure 6 – Power Line without PLC Signal

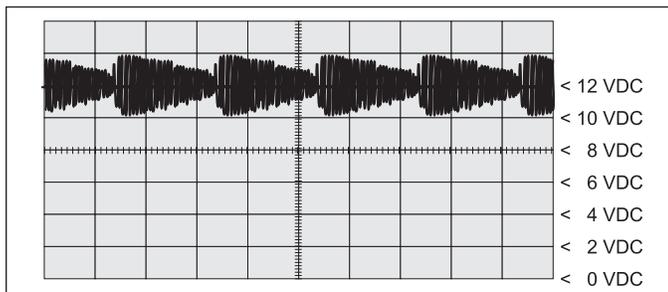


Figure 7 – Power Line with PLC Signal

The Bendix® TABS-8™ Advanced Module provides a data link for PLC communication following the SAE J2497 standard. Bendix® ACom® PRO™ Diagnostic Software and the Bendix® Trailer Remote Diagnostic Unit (TRDU) both support PLC communication with the TABS-8 Advanced Module. PLC communication is applicable for 12-volt vehicle applications only. The PLC communication is disabled for voltages greater than 18 volts.

Identifying and Measuring the PLC Signal

The TABS-8 Advanced Module will continuously broadcast PLC messages that indicate trailer ABS status. At power-up, or during a trailer ABS DTC condition, the TABS-8 Advanced 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 your local Bendix representative 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 Alternating Current (AC) coupling, 1 volt/div, 100 μsec/div. The signal should be measured on Pin 7 of the J560 connector at the nose of the trailer.

11. SAE J1939 (CAN) DIAGNOSTIC LINK

The TABS-8 Advanced Module provides a data link for transmitting CAN information following the SAE J1939 standard. ACom PRO Diagnostic Software and the Bendix® Trailer Information Module (TIM) both support CAN communication with the TABS-8 Advanced Module. Ignition power must be provided to the TABS-8 Advanced Module for the diagnostic link to be active. **NOTE:** Suitable harnessing will be required for this function.

12. AUXILIARY I/O

Refer to Table 3. The Bendix® TABS-8™ Advanced Module provides for up to three (3) auxiliary input/output (I/O) functions.

Name	ECU* Pin	Auxiliary Functions	Auxiliary Type
AUX1	5	High-Side Driver	Output
		Digital Input	Input
SE	WSS** SE	Tri-State Input	Input
SF	WSS SF	Tri-State Input	Input

Table 3 – Auxiliary I/Os

*Electronic Control Unit (ECU)

**Wheel Speed Sensor (WSS)

Refer to Table 4. Bendix® ACom® PRO™ Diagnostic Software supports the configuration of the TABS-8 Advanced Module AUX I/Os. Some parts may be pre-configured with auxiliary features.

Name	Auxiliary Functions	Auxiliary Type
AUX1	Tire Inflation System Sensing	Input
SE	Low-Pressure Warning Emergency	Input
SF	Pad Wear-Sensing	Input

Table 4 – Pre-Configured Auxiliary Features

13. BENDIX® ANTILOCK BRAKING SYSTEM (ABS) FLEX™ PROGRAM

The Bendix® Antilock Braking System (ABS) Flex™ program uses Auxiliary Design Language (ADL) to allow customized auxiliary functions to be carried out by the TABS-8 Advanced 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.

The ABS Flex program monitors the AUX I/Os and/or the SAE J1939 (CAN) and SAE J2497 Power Line Carrier (PLC) data links. Contact your local Bendix representative to discuss an ABS Flex program for your vehicle(s).

14. CUSTOMER SCRATCH PAD

The TABS-8 Advanced 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 PRO Diagnostic Software.

15. POWER-UP SEQUENCE

At power-up, the TABS-8 Advanced Module performs a series of self checks that can assist a technician in determining the ABS system status and configuration.

Trailer ABS Indicator Lamp

See Figure 8. At power-up, with no active Diagnostic Trouble Codes (DTC), the trailer ABS indicator lamp will illuminate for approximately two (2) to six (6) seconds as a bulb check and then turn off. If any active DTCS related to ABS or Bendix® Trailer Roll Stability Program (TRSP®) are present, the trailer ABS indicator lamp will remain illuminated. For non-ABS or TRSP-related DTCs at power-up, such as auxiliary functions, 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-8 Advanced 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-8 Advanced 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 brake pressure applied, a properly installed modulator will cause two (2) rapid audible chuffs of air pressure. **NOTE:** The TABS-8 Advanced Module will not perform a modulator chuff test with an active ABS DTC.

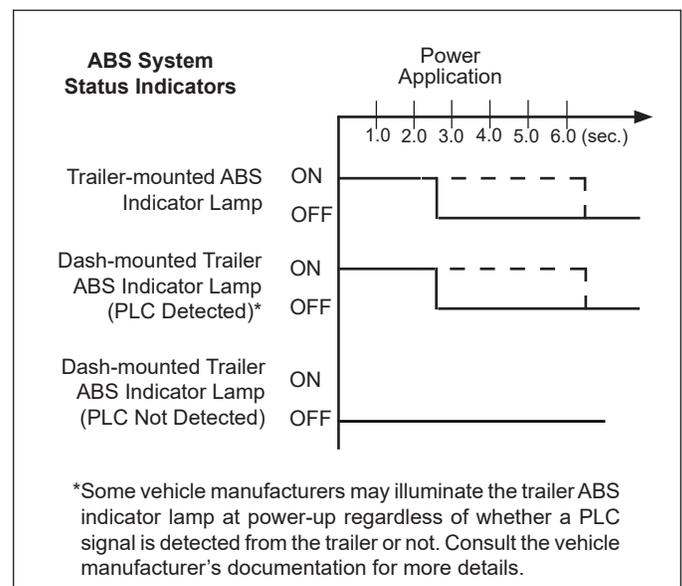


Figure 8 – Trailer Antilock Braking System (ABS) Lamp Power-Up Sequence

16. ODOMETER FUNCTION

Odometer

The Bendix® TABS-8™ Advanced 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 Wheel Speed Sensors (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 PC diagnostics, a Bendix® Trailer Information Module (TIM), Bendix® Trailer Remote Diagnostic Unit (TRDU), or through blink codes.

Whenever the TABS-8 Advanced 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-8 Advanced Module provides a counter to record the trip mileage. The feature can be accessed using PC diagnostics or the TIM.

Service Interval

The TABS-8 Advanced Module provides a feature that can be used to indicate a service interval for the trailer. The service interval can be accessed using PC diagnostics or the TIM. If configured, the TABS-8 Advanced Module can flash the indicator lamp when the vehicle is at a standstill to indicate when the service interval has been exceeded.

17. NON-STANDARD TIRE SIZE

The TABS-8 Advanced Module allows for tire rolling radius and tone ring tooth count parameters to be set for the axle being sensed using the Bendix® ACom® PRO™ 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 revolutions per mile. *Refer to Table 5 for parameter adjustments.*

Tone Ring Size	Tire-Rolling Radius – Allowable Range (in revolutions per mile)
60 teeth	712 to 1005
80 teeth	512 to 801
90 teeth	456 to 711
100 teeth	410 to 640
120 teeth	356 to 502

Table 5 – Tone Ring Size to Tire-Rolling Radius

18. DIAGNOSTIC TROUBLE CODE (DTC) DETECTION

The TABS-8 Advanced Module contains self-testing diagnostic circuitry that monitors the Antilock Braking System (ABS) components and wiring. When the TABS-8 Advanced 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 Bendix® Trailer Roll Stability Program (TRSP®) functions, and it stores the Diagnostic Trouble Code (DTC) in memory, so that the information is retained even when the power is removed. The TABS-8 Advanced Module also uses Power Line Carrier (PLC) communications to send the system status to the towing vehicle.

For some DTCs, the TABS-8 Advanced Module will automatically reset (“self-heal”) the active DTC when the error is corrected. 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.

19. PARTIAL ABS SHUTDOWN

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

ECU DTCs

All ABS functions are completely disabled. The system reverts to normal braking.

Voltage DTCs

The operating voltage range is 8.0 to 32.0 VDC. If the voltage is detected as being out of range, the Antilock Braking System (ABS) and Bendix® Trailer Roll Stability Program (TRSP®) system braking features will be disabled, and the system will revert to normal braking. When the correct voltage level is restored, full ABS and TRSP is typically available again.

20. BLINK CODE DIAGNOSTICS

The Bendix® TABS-8™ Advanced 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, the technician may enter the blink code diagnostics mode by providing constant power to the ignition circuit and then select the desired mode by toggling the brake light power input the specific number of times shown in *Table 6*.

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 6* for the desired mode.

Cycles of the Brake Light Power Input Required 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 6 – Blink Code Information

Depending on the blink code mode activated, the TABS-8 Advanced Module will blink the trailer-mounted ABS indicator lamp to display active DTCs, 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-8 Advanced 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 more than five (5) seconds, blink code diagnostics will be disabled until the next time the ignition power is cycled.

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 Electronic Control Unit's (ECU's) 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 the DTC history. Both blink code diagnostics and 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).

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

Zeros (0s) will be displayed by the Antilock Braking System (ABS) indicator lamp strobing twice.

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

21. AUXILIARY FEATURES

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 Bendix® TABS-8™ Advanced Module may be configured to use this feature. When this feature is used below a pre-determined threshold vehicle speed, the Electronic Control Unit (ECU) will partially exhaust the rear-axle air suspension bags, and then reinflate them when the vehicle speed rises above the threshold. For more information about this feature, contact your local Bendix representative.

Lift-Axle Control (Automatic)

The TABS-8 Advanced Module can be configured to automatically raise a lift axle when the load on the trailer drops below a configured level. Changes to the trailer to allow for this feature to include the use of the auxiliary outputs to operate a Lift Axle Control (LAC) valve. **NOTE:** Suitable harnessing will be required.

Low-Pressure Warning Emergency (LPWE)

The TABS-8 Advanced Module can be configured for Low-Pressure Warning Emergency (LPWE). By monitoring the status of an external pressure switch installed in the emergency line or delivery line of the spring brake valve, the TABS-8 Advanced Module will alert the driver of a low-pressure condition by illuminating the trailer ABS warning lamp. When the vehicle is moving and the pressure in the emergency line is below approximately 65 psi, which is the minimum pressure to release the spring brakes, the ABS warning light will illuminate. The speed threshold at which the alert activates is configurable. The fault will clear once the pressure in the emergency line is above approximately 65 psi. *See Figures 19 and 23* for system schematics.

NOTE: Your trailer may be equipped with a Bendix Power Line Carrier (PLC) relay, which has the ability to indicate when there is a low-pressure condition on the emergency line, using information received from the TABS-8 Advanced Module.

Tire Inflation System (TIS) Sensing

The TABS-8 Advanced Module is capable of monitoring the state of the Tire Inflation System (TIS) flow switch and it can be configured to automatically broadcast the status of this switch over the PLC. Additionally, it is possible to configure a TIS warning lamp that the ECU will control based on the state of the TIS. *See Figures 19 and 23* for system schematics.

NOTE: Your trailer may be equipped with a Bendix PLC relay, which has the ability to indicate when the TIS is active, using information received from the TABS-8 Advanced. For TIS troubleshooting, *refer to Section L*.

Pad Wear-Sensing

The TABS-8 Advanced Module is capable of monitoring the state of the Bendix disc brake pad wear sensors installed on the air disc brakes, and it will activate a Diagnostic Trouble Code (DTC) whenever it detects that at least one (1) of the pads has reached the wear limit. The TABS-8 Advanced Module can broadcast this DTC over the PLC. *See Figures 19 and 23* for system schematics.

NOTE: Your trailer may be equipped with a Bendix PLC relay, which has the ability to indicate when the pad wear-sensing DTC is active, using information received from the TABS-8 Advanced Module.

22. DIAGNOSTIC TROUBLE CODES (DTCs)



FOR ALL REPAIR STEPS, FIRST COMPLETE THE FOLLOWING:

1. Generate a Bendix® ACom® PRO™ Diagnostic Software report.
2. Clear Diagnostic Trouble Codes (DTCs).
3. Continue with repair information for each scenario.

NOTE: After completing all repair steps, drive the vehicle to ensure the repairs were sufficient.

Blink Codes		DTC Description	Internal Code (HEX)	Possible Causes / Repair Information	J1587 (SID/FMI)
1st Digit	2nd Digit				
1	1	No DTC	-	• Bendix® TABS-8™ Advanced system fully operational – no DTCs detected	000/00
Wheel Speed Sensors (WSS); “S-C” & “S-D”					
2	1	Large Air Gap: Sensor “S-C”	0x002400	Dynamic WSS DTC - large air gap between sensor and tone ring. <i>Go to Section E, Dynamic WSS DTC, on page 35.</i>	001/00
3	1	Large Air Gap: Sensor “S-D”	0x002500		002/00
2	2	Shorted or open wire: Sensor “S-C”	0x000D00 0x001200	Static WSS DTC - shorted or open sensor wire. <i>Go to Section E, Static WSS DTC, on page 35.</i>	001/03 001/04
3	2	Shorted or open wire: Sensor “S-D”	0x000C00 0x001300		002/03 002/04
2	3	Dynamic Issue: Sensor “S-C”	0x001800 0x001E00 0x003000	Dynamic WSS DTC - incorrect wheel speed signal detected while vehicle is in motion. <i>Go to Section E, Dynamic WSS DTC, on page 35.</i>	001/08 001/01 001/02
3	3	Dynamic Issue: Sensor “S-D”	0x001900 0x001F00 0x003100		002/08 002/01 002/02
2	4	Tire Diameter Out of Range: Sensor “S-C”	0x003600	• Verify correct tire size and proper tire inflation. • Verify correct number of tone ring teeth. • Verify the TABS-8 Advanced Electronic Control Unit (ECU) has been programmed with the proper tire size and tone ring settings.	001/13
3	4	Tire Diameter Out of Range: Sensor “S-D”	0x003700		002/13
Trailer Power					
6	1	Over-voltage	0x011F00	Power Supply DTC - trailer power above 32 volts. <i>Go to Section D on page 34.</i>	251/03
6	2	Low-voltage	0x012000 0x012100	Power Supply DTC - trailer power below 8 volts. <i>Go to Section D on page 34.</i>	251/04
6	3	Excessive power line resistance	0x012200 0x012300	Power Supply DTC - possible corroded or shorted trailer power circuit. <i>Go to Section D on page 34.</i>	251/13
Pressure Sensors (Internal): “P4,” “P42,” and “P21”					
7	1	Internal Pressure Sensor Reading Incorrect: Control Port “P4”	0x00EE00	• Verify the trailer’s control (service) pressure is < 130 psi. • If the diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module.	077/12
7	2	Internal Pressure Sensor Reading Incorrect: Load Port “P42”	0x00F000	• See the suspension manufacturer’s specifications for load versus pressure. Verify the trailer’s air suspension pressure is <130 psi and is within the allowable range for the specific suspension/airbag combination. (Below 50% of airbag pressure at the unladen weight, or above 50% of airbag pressure at GVWR for axles.) • If the diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module.	069/12

DIAGNOSTIC TROUBLE CODES (DTCs) (CONTINUED)



FOR ALL REPAIR STEPS, FIRST COMPLETE THE FOLLOWING:

1. Generate a Bendix® ACom® PRO™ Diagnostic Software report.
2. Clear Diagnostic Trouble Codes (DTCs).
3. Continue with repair information for each scenario.

NOTE: After completing all repair steps, drive the vehicle to ensure the repairs were sufficient.

Blink Codes		DTC Description	Internal Code (HEX)	Possible Causes / Repair Information	J1587 (SID/FMI)
1st Digit	2nd Digit				
7	3	Internal Pressure Sensor Reading Incorrect: Delivery Port "P21"	0x00F200	<ul style="list-style-type: none"> • Perform a pressure component test using the Bendix® ACom® PRO™ Diagnostic Software. • Verify the trailer's control (service) and brake delivery pressures are comparable and < 130 psi. Control and delivery pressures should be within 3.3 psi of each other. • If the diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	059/12
Lateral Acceleration Sensor (Internal or External)					
8	1	Internal Lateral Acceleration Sensor - Mounting Error	0x014D00	<ul style="list-style-type: none"> • Before troubleshooting, verify the trailer has been parked on level ground. • Verify the Bendix® TABS-8™ Advanced Electronic Control Unit (ECU) has been programmed with the proper ECU orientation, tire size, and tone ring settings. • Verify the TABS-8 Advanced Module has been mounted as per the installation guidelines (<i>See Troubleshooting Section G, page 35</i>): <ul style="list-style-type: none"> • The configured ECU orientation matches the actual ECU orientation. • Verify the Wheel Speed Sensors (WSS) are installed correctly (left/right). <i>See Figure 18.</i> • If diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	099/14
8	2	Internal Lateral Acceleration Sensor - Signal Out Of Range	0x014E00 0x01B800	<ul style="list-style-type: none"> • Before troubleshooting, verify the trailer has been parked on level ground. • Verify the TABS-8 Advanced Module has been mounted as per the installation guidelines. • Perform a lateral acceleration sensor (installation angle) component test using the Bendix® ACom® PRO™ Diagnostic Software: <ul style="list-style-type: none"> • Verify the installation angle of the TABS-8 Advanced Module is within $\pm 5^\circ$. <i>See Figure 15.</i> • If diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	099/14
8	3	Internal Lateral Acceleration Sensor - Offset Error	0x019C00	<ul style="list-style-type: none"> • Before troubleshooting, verify that the trailer has been parked on level ground. • Verify that the TABS-8 Advanced Module has been mounted as per the Installation Guidelines. • Perform a lateral acceleration Sensor (installation angle) component test using the ACom PRO Diagnostic Software. <ul style="list-style-type: none"> • Verify the installation angle of the TABS-8 Advanced Module is within $\pm 5^\circ$. <i>See Figure 15.</i> • If the roll angle is out of tolerance, clear the diagnostic code and test drive the vehicle. • If diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	099/02
8	4	Internal Lateral Acceleration Sensor - Sensor Signal Not Found	0x015000	<ul style="list-style-type: none"> • Verify the TABS-8 Advanced Module has been mounted as per the installation guidelines: <ul style="list-style-type: none"> - TABS-8 Advanced Module mounted either in 0°, 90°, 180°, or 270° orientation. 	099/14

DIAGNOSTIC TROUBLE CODES (DTCs) (CONTINUED)



FOR ALL REPAIR STEPS, FIRST COMPLETE THE FOLLOWING:

1. Generate a Bendix® ACom® PRO™ Diagnostic Software report.
2. Clear Diagnostic Trouble Codes (DTCs).
3. Continue with repair information for each scenario.

NOTE: After completing all repair steps, drive the vehicle to ensure the repairs were sufficient.

Blink Codes		DTC Description	Internal Code (HEX)	Possible Causes / Repair Information	J1587 (SID/FMI)
1st Digit	2nd Digit				
Trailer System Braking					
9	1	Extended Brake Application Detected	0x01C600	<ul style="list-style-type: none"> • Verify there is no residual pressure in the trailer's control (service) line. • If diagnostic code persists, contact your local Bendix representative before replacing the Bendix® TABS-8™ Advanced Module. 	057/07
9	2	Excessive Antilock Braking System (ABS) Activity Detected	0x018E00	Dynamic Wheel Speed Sensor (WSS) DTC - possible incorrect wheel speed signal while vehicle in motion resulted in long ABS event. <i>Go to Section E on page 35.</i>	057/07
9	3	Excessive Bendix® Trailer Roll Stability Program (TRSP®) Activity Detected	0x015100	<ul style="list-style-type: none"> • Clear diagnostic codes. • If diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	057/07
TABS-8™ Advanced Module					
10	1	TABS-8 Advanced Internal Error	<i>Use a Diagnostic Tool to verify specific Internal Code (HEX)</i>	<ul style="list-style-type: none"> • Check for damaged or corroded connectors. • Check for damaged wiring. • If diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	254/12
10	2	TABS-8 Advanced Configuration Error	<i>Use a Diagnostic Tool to verify specific Internal Code (HEX)</i>	<ul style="list-style-type: none"> • Verify the ECU parameters and actual system installation is compatible using the Bendix® ACom® PRO™ Diagnostic Software. • Re-program the ECU as necessary. • If necessary, contact your local Bendix representative to obtain the correct configuration data. 	254/13
10	3	TABS-8 Advanced EEPROM Error	0x018A00 0x018F00	<ul style="list-style-type: none"> • Verify the Electronic Control Unit (ECU) parameters and actual system installation is compatible using the ACom PRO Diagnostic Software. • Re-program the ECU as necessary. • If necessary, contact your local Bendix representative to obtain the correct configuration data. 	254/13
10	4	TABS-8 Advanced Not Configured	0x019900	<ul style="list-style-type: none"> • Reprogram the ECU to be compatible to the actual system configuration using the Bendix ACom PRO Diagnostic Software. • If necessary, contact your local Bendix representative to obtain the correct configuration data. 	254/13

DIAGNOSTIC TROUBLE CODES (DTCs) (CONTINUED)



FOR ALL REPAIR STEPS, FIRST COMPLETE THE FOLLOWING:

1. Generate a Bendix® ACom® PRO™ Diagnostic Software report.
2. Clear Diagnostic Trouble Codes (DTCs).
3. Continue with repair information for each scenario.

NOTE: After completing all repair steps, drive the vehicle to ensure the repairs were sufficient.

Blink Codes		DTC Description	Internal Code (HEX)	Possible Causes / Repair Information	J1587 (SID/FMI)
1st Digit	2nd Digit				
10	5	TABS-8 Advanced EOL Test Not Completed	0x019A00	<ul style="list-style-type: none"> • Perform the installation test using the ACom PRO Diagnostic Software or Bendix® Trailer Information Module (TIM). 	254/14
Auxiliary Design Language (ADL) and Auxiliary I/Os					
11	1	Bendix® TABS-8™ Advanced Auxiliary I/O Error: AUX I/O #7 (Trailer ABS Indicator Lamp)	0x01AF00	<ul style="list-style-type: none"> • Check for corroded/damaged wiring or connectors between the ECU and the Antilock Braking System (ABS) indicator lamp. • Check pin X1-4 of the Electronic Control Unit (ECU) 'Power' connector for the following: <ul style="list-style-type: none"> • Pin not pushed back • Correctly wired to the ABS indicator lamp (pin X1-4 – supply) • Shorted to ground, Vbat, or other ECU pins • Verify the ABS indicator lamp is properly grounded and not burnt out. • If diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	152/12
11	2	TABS-8 Advanced Auxiliary I/O Error: AUX I/O #1	0x006300	<ul style="list-style-type: none"> • Check for corroded/damaged wiring or connectors between the ECU and the auxiliary device. • Check pins X1-5 and X1-3 of the ECU 'Power' connector for the following: <ul style="list-style-type: none"> • Pins not pushed back • Correctly wired to the auxiliary device (pin X1-5 to supply, pin X1-3 to ground) • Shorted to ground, Vbat, or other ECU pins • Verify the auxiliary device is properly functioning and rated for maximum load of ≤ 2 amps. • If diagnostic code persists, contact your local Bendix representative before replacing the TABS-8 Advanced Module. 	152/12
11	9	TABS-8 Advanced Auxiliary Program Error: ADL	0x017E00 0x017F00	<ul style="list-style-type: none"> • Verify the AUX I/O ECU pin-outs match the ADL parameters using the Bendix® ACom® PRO™ Diagnostic Software. • If necessary, contact your local Bendix representative to troubleshoot the Auxiliary Design Language (ADL) program. 	152/12
11	11	WL Information: ADL	0x013300 0x017C00 0x017D00	<ul style="list-style-type: none"> • Verify that the ADL parameters are correct using the ACom PRO Diagnostic Software. • If necessary, contact your local Bendix representative to troubleshoot the ADL program. 	152/14

DIAGNOSTIC TROUBLE CODES (DTCs) (CONTINUED)



FOR ALL REPAIR STEPS, FIRST COMPLETE THE FOLLOWING:

1. Generate a Bendix® ACom® PRO™ Diagnostic Software report.
2. Clear Diagnostic Trouble Codes (DTCs).
3. Continue with repair information for each scenario.

NOTE: After completing all repair steps, drive the vehicle to ensure the repairs were sufficient.

Blink Codes		DTC Description	Internal Code (HEX)	Possible Causes / Repair Information	J1587 (SID/FMI)
1st Digit	2nd Digit				
12	3	Low Pressure Warning Emergency (LPWE) (Parking Brake Circuit)	0x01CD00	<ul style="list-style-type: none"> • Check if the trailer's service reservoir pressure is < 65 psi. • If the trailer's service reservoir pressure is > 65 psi, cycle the ignition power off and on. • If the DTC persists, contact your local Bendix representative before replacing the TABS Module. 	254/1
Miscellaneous					
12	1	Service Distance or Date Exceeded	0x019500 0x019700	<ul style="list-style-type: none"> • Perform the scheduled trailer maintenance and/or reset the service distance or date using the Bendix® ACom® PRO™ Diagnostic Software. 	153/00
12	2	Trailer Load Out of Range	0x01C500	<ul style="list-style-type: none"> • If the trailer is equipped with a raise/lower valve, verify it is in the drive position. • Contact your trailer manufacturer to confirm the specific suspension air pressure parameters. • Verify the ECU parameters for the empty and fully loaded trailer conditions are correct using the ACom PRO Diagnostic Software. Contact your trailer manufacturer for ECU parameters. • If necessary, contact your local Bendix representative to troubleshoot the trailer's loading condition. 	069/13
12	3	Brake Pads Worn	0x017B00	<ul style="list-style-type: none"> • Manually check the condition of the pads on each brake to determine if any require replacement. • If no pads require replacement, check the wear sensors and entire pad wear sensing harnessing for damage or open circuits. 	070/01
12	8	Bendix® Trailer Information Module (TIM) Missing	0x01AA00	<ul style="list-style-type: none"> • TIM and/or harness damaged or not present. 	254/11

23. TROUBLESHOOTING

Using Handheld or PC-based Diagnostics

Troubleshooting and Diagnostic Trouble Code (DTC) clearing, as well as beginning a reconfiguration, may also be carried out using handheld or PC-based diagnostic tools such as the Bendix® Trailer Remote Diagnostic Unit (TRDU), Bendix® ACom® PRO™ Diagnostic Software, or the Bendix® Trailer Information Module (TIM).

Bendix Antilock Braking System (ABS) Diagnostic Tools

ACom PRO Diagnostic Software is an RP-1210-compliant PC-based diagnostic software program that provides the highest level of diagnostic support for the Bendix® TABS-8™ Advanced Module. With ACom PRO Diagnostic Software, maintenance personnel can:

- Obtain DTC information (both active and inactive)
- Retrieve event history
- Clear inactive DTCs and event history
- Verify Electronic Control Unit (ECU) configuration
- Perform system and component tests
- Read/write customer information in the scratch pad
- Save and print information
- Receive troubleshooting assistance

See Figure 9. When diagnosing the TABS-8 Advanced Module using a PC and ACom PRO Diagnostic Software, the computer's USB port can be connected to the vehicle's diagnostic connector through an RP-1210-compliant communication device.

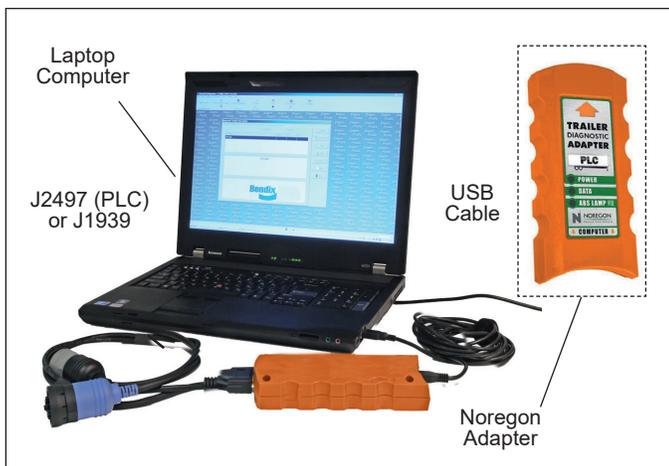


Figure 9 – Laptop Computer with ACom PRO

For more information on the ACom PRO Diagnostic Software or RP-1210-compliant tools, contact Bendix at 1-800-AIR-BRAKE (1-800-247-2725) and follow the prompts for ACom PRO technical support.

TRDU Tool

See Figure 10. The TRDU tool (Bendix kit part number K101595) provides the technician with a visual indication of Antilock Braking System (ABS) component DTC information. The TRDU tool is specifically designed for use with Bendix® Trailer ABS.



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

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



Figure 11 – TRDU Tool and Adapter

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 PRO Diagnostic Software should be used as the primary diagnostic tool.

How the Bendix® Trailer Remote Diagnostic Unit (TRDU) Tool Operates

When the Bendix® Trailer Remote Diagnostic Unit (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 Antilock Braking System (ABS) Electronic Control Unit (ECU) has no active Diagnostic Trouble Codes (DTCs), only the green LED will remain illuminated.

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

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 Figures 12 and 13.

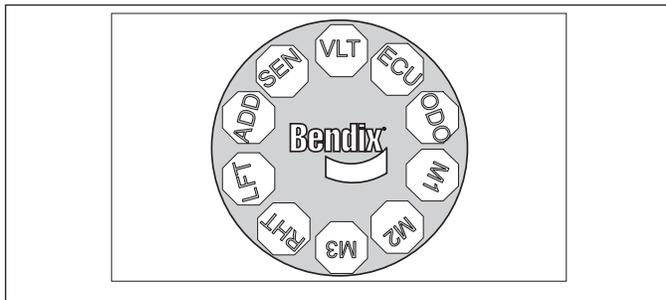


Figure 12 – The Bendix® TRDU Tool Display

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

Example: If the DTC is "Right Additional Sensor," the TRDU tool will display one green and three (3) red LEDs

LEDs
Green
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 Bendix® TABS-8™ Advanced 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 Wheel Speed Sensor [WSS], since its internal magnet will be sufficient.)

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

Bendix® Trailer Information Module (TIM)

The 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 Module functionality when it is mounted on the trailer so it is able to record events that occur during driving. Alternatively, it may also be used as a workshop tool to access diagnostic information or to check the configuration, or to run an installation test. In both cases, the Module is connected to the J1939 5V TI (CAN) connection of the auxiliary connector which supplies the necessary information. Reference BW2867, Bendix® Trailer Information Module (TIM) G2 User Guide, on b2bendix.com for more information.

NOTE: The TIM requires a harness with a 5V CAN.



Figure 14 – Trailer Information Module (TIM)

ADDITIONAL SUPPORT

Visit b2bendix.com for downloads of literature and the Bendix® ACom® PRO™ Diagnostic Software.

BENDIX TECH TEAM

For technical support, contact the Bendix Tech Team by email at techteam@bendix.com or by phone at **1-800-AIR-BRAKE** (1-800-247-2725), Monday through Thursday, 8:00 a.m. to 6:00 p.m. and Friday, 8:00 a.m. to 5:00 p.m. ET. To better serve you, please record the following information before contacting the Bendix Tech Team:

- Bendix product model number, part number, and configuration
- Vehicle make and model
- Vehicle configuration (number of axles, tire size, etc.)
- System performance symptoms: When do they occur?
- What Diagnostic Trouble Codes (DTCs) have been identified using LEDs, blink codes, or diagnostic tools
- What troubleshooting/measurements have been performed
- Copy of the ACom PRO Diagnostic Report

SERVICING THE BENDIX® TABS-8™ ADVANCED MODULE



Special considerations need to be taken to ensure the Bendix® TABS-8™ Advanced Module has been properly installed on the trailer. These include:

- Location and orientation of the Module
- Correct plumbing of the Module
- Correct location of the Wheel Speed Sensors (WSS)
- Configuration of the Electronic Control Unit (ECU) for Antilock Braking System (ABS) and Bendix® Trailer Roll Stability Program (TRSP®) system parameters
- Installation test to verify proper installation of the ABS/TRSP system



Incorrect installation of the TABS-8 Advanced Module can result in impaired ABS and TRSP system functions. It is the responsibility of the end-user to ensure the TABS-8 Advanced Module has been installed correctly and tested as per the Bendix recommended installation guidelines and system drawings.

Prior to servicing the TABS-8 Advanced Module, always perform the following steps:

1. Follow all industry safe maintenance practices including those within this document.
2. When possible, before removing the module, use the ACom PRO Diagnostic Software to save the configuration to the desktop. After the TABS-8 Advanced 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-8 Advanced Module's mounting position on the vehicle.

REMOVING THE TABS-8 ADVANCED MODULE

1. Open the end cover by sliding the locking tab to the left. If the module is to be reinstalled, retain the cover.
2. Disconnect the 7-pin Electronic Control Unit (ECU) connector, any additional harnesses or shorting caps used on the auxiliary sensors, and the 2-pin WSS connectors. Ensure the old connectors are marked appropriately for reinstallation.
3. Mark for reinstallation and then remove all air hoses connected to the TABS-8 Advanced Module.
4. Remove the TABS-8 Advanced Module from the vehicle by removing the mounting fasteners or by rotating the entire assembly counterclockwise from the tank mount.

SERVICING THE CONTROL PORT FILTER



The Bendix® TABS-8™ Advanced Module has an inline filter in the control port and the supply port (See *Figure 2*). These filters 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.

INSTALLATION OF THE TABS-8 ADVANCED MODULE



All service replacement parts for the TABS-8 Advanced Module are configured specifically by part number. As mentioned in the *Servicing the Bendix TABS-8 Advanced Module* section, ideally, before removing the module, use the Bendix® ACom® PRO™ Diagnostic Software to save the configuration to the desktop. The technician can use the ACom PRO Diagnostic Software to restore the previous configuration settings.

Always ensure the correct service replacement Electronic Control Unit (ECU) is being installed for the original TABS-8 Advanced Module. To verify proper installation, perform the installation test using the ACom PRO Diagnostic Software or the Bendix® Trailer Information Module (TIM).

Inspect the original mounting hardware. If replacement hardware is needed, use grade 5³/₈-in. 18 bolts, nuts, and lock washers for the frame-mount unit, or a schedule 80 (heavy-gauge steel) 3/4-in. nipple for the tank-mount unit. Inspect the location selected for installation and clean as necessary.

NOTE: Inspect all components, including the replacement TABS-8 Advanced 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-8 Advanced Module must be installed with the following considerations (See *Figures 15 through 17*):
 - With the exhaust port facing downward and unobstructed with significant free space below (> 1 in. [2.5 cm])
 - Within ± 100 in. (2.5 m) of the center of the axle(s) for proper balanced brake application
 - Within ± 2 in. (5 cm) from the center line of the trailer (default)
NOTE: A left/right offset greater than ± 2 in. (5 cm) may have been programmed in the ECU and can be verified using ACom PRO Diagnostic Software
 - Yaw angle should be ± 10° as measured from the center line of the trailer
 - Pitch angle should be ± 10° as measured from a flat horizontal plane
 - Roll angle should be within ± five degrees (± 5°) as measured from a flat horizontal plane
 - **Tank-mount Modules:** Install the nipple fitting into the modulator valve supply port. Rotate the entire assembly into the tank port until secure. Over-torquing of the tank nipple could cause damage to the valve body.
 - **Frame-mount Modules:** Torque the mounting nuts to 180-220 in-lbs.
2. Reconnect all air hoses and plugs to the Module. Depending on the installation, additional plugs may be necessary. Thread sealant products that contain Teflon 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. Ensure the load sensor port P42 is connected to the suspension system at a location as far away from the height-control valve as possible, preferably directly to a fixed-axle air bag.

3. Reconnect the Electronic Control Unit (ECU) power, auxiliary (if present) and Wheel Speed Sensor (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.

- It is necessary to fix the WSS to the orientation of the lateral acceleration sensor for plausibility checks between the sensors.
 - Care should be taken to ensure the WSS location matches the ECU orientation in Figure 18. If this is not the case, a DTC will be generated and the Bendix ABS indicator lamp will be illuminated.
 - Refer to the large label inside the connector cover for wheel speed designation, "S-C" or "S-D." See Figure 1.
4. Leakage and operational tests must be performed before returning the vehicle to service.

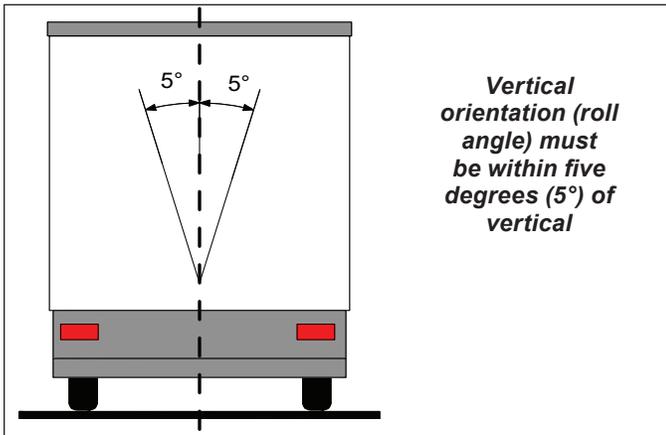


Figure 15 – Installation on Trailer (Vertical)

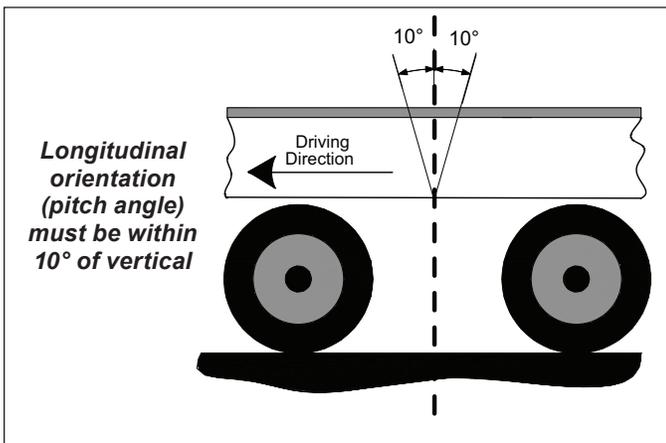


Figure 16 – Installation on Trailer (Longitudinal)

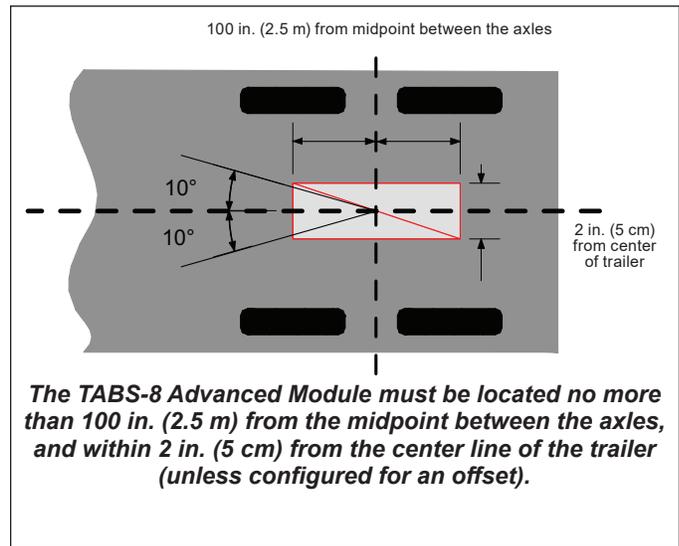


Figure 17 – Installation on Trailer (Center Line)

LEAKAGE AND OPERATIONAL TESTS



For all NPT fittings, the use of a thread sealant is required. 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 ABS/ Bendix® Trailer Roll Stability Program (TRSP®) valve warranty.

1. Before performing the leakage tests, block the wheels.
2. Fully charge the air brake system 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 emergency (red) line and service pressures with a regulator and a pressure gauge on each line.
 - Apply 110 - 120 psi to the trailer emergency (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 emergency (red) line and the service line.

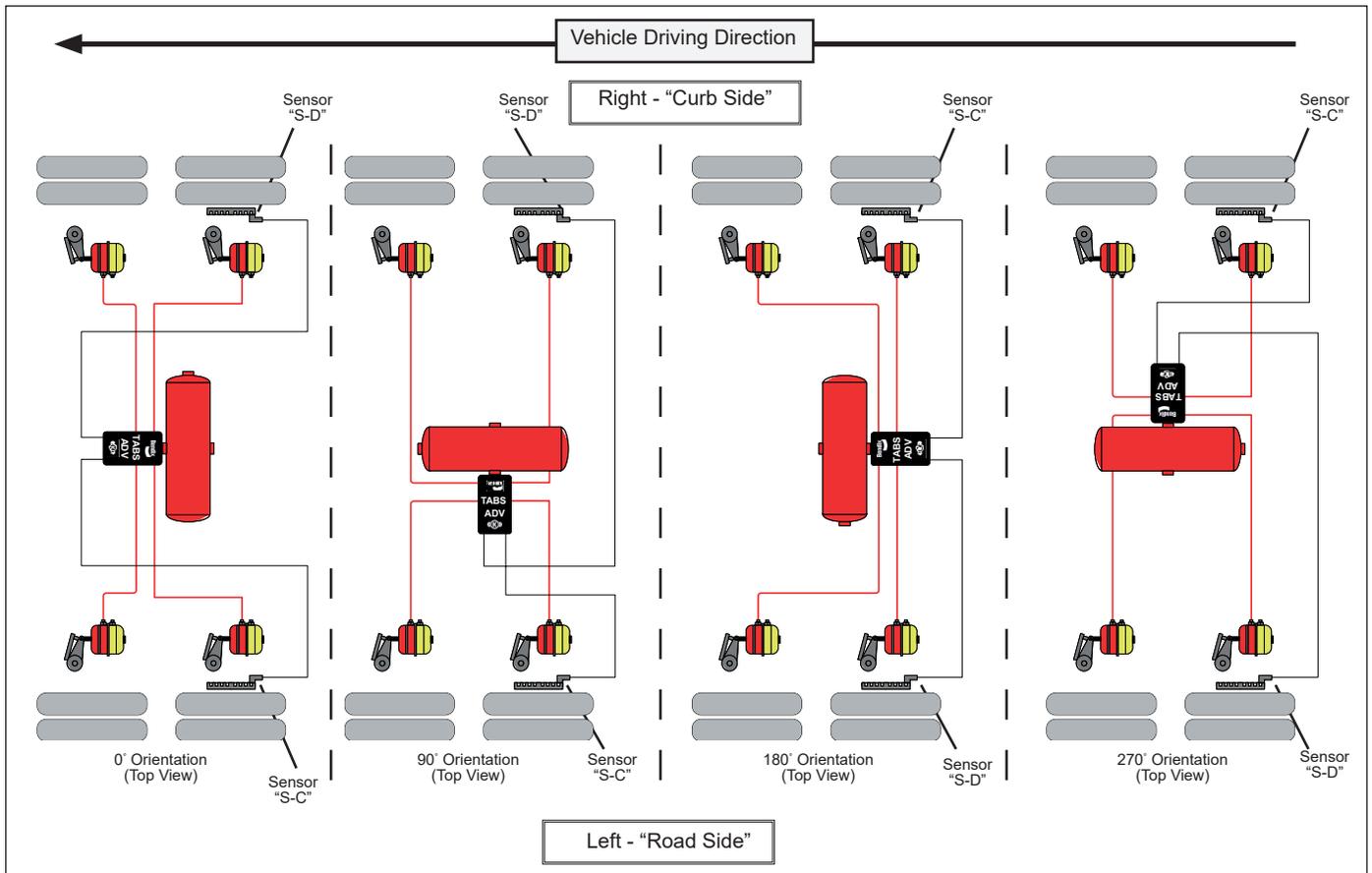


Figure 18 – Wheel Speed Sensor (WSS) Installation

- Cut off the pressure to the emergency (red) line before the pressure gauge and monitor the pressure. If the pressure drops less than three (3) psi in one (1) minute, the emergency (red) line test passes. If the pressure drops more than three (3) psi in one (1) minute, identify and correct the source of the leak on the emergency (red) line.
 - If the emergency (red) line test passes, repeat the test for the service line. If the pressure drops less than two (2) psi in one (1) minute, the test passes. If the pressure drops more than two (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. *See Section 15.*
 6. Calibrate and set the odometer parameters, if necessary, using a diagnostic tool. *See Section 16.*
 7. Perform an installation test using a diagnostic tool. Minimum tests that are required to verify the proper installation of the Bendix® Antilock Braking System (ABS)/Bendix® Trailer Roll Stability Program (TRSP®) system are:
 - **Electronic Control Unit (ECU) Information:** This test provides the user with specific ECU information. It is required that no Diagnostic Trouble Codes (DTCs) (other than “installation 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 Wheel Speed Sensor (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 ($\pm 5^\circ$). This test verifies the unit is installed as close to horizontal as possible.

- **Pressure Sensor Test:** During this test, checks are carried out that verify that 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.
 - **Customer Scratch Pad:** The tester is requested to input data into the fields displayed on the screen. This data will be stored in the Electronic Control Unit (ECU) and also can be stored to a file on the computer or printed out for reference.
8. Where a safe location (i.e. restricted access area or test track) is available, it is possible to road test the Bendix® Antilock Braking System (ABS) function by making an abrupt stop from a vehicle speed of about 20 mph (32 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.

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 (i.e. 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 moderate amount of non-conductive electrical grease to each connector pin before reconnecting.

ABS WIRING



Disconnect the electrical connectors from the ABS/Bendix® Trailer Roll Stability Program (TRSP®) controller before welding on the trailer.



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

All connector leads of the Bendix® TABS-8™ Advanced 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-8 Advanced Module wiring harness and Bendix recommends the complete harness be replaced if corrosion or damage occurs.

MISCELLANEOUS MAINTENANCE



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, which 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/contaminants can cause **TRAILER AIR BRAKE FAILURE** and/or the **INABILITY TO RELEASE** the trailer parking brakes.



BENDIX® ANTILOCK BRAKING SYSTEM (ABS) SYSTEM POWER-UP CHECK

At power-up the trailer ABS indicator lamp should briefly illuminate “ON” as a bulb check.

If the indicator lamp does not illuminate at power-up, the ABS system may not be powered, or the bulb may need to be replaced. Service the trailer ABS system.

- If the lamp remains “ON” after power-up there may be active Diagnostic Trouble Codes (DTC). Service the trailer ABS system. (To ensure full ABS/Bendix® Trailer Roll Stability Program (TRSP®) functionality, service as soon as possible.)
- Other Important Practices:
- Follow all standard industry safety practices.
- Sealant for ABS fittings: Use pre- or hand-applied; Never PTFE tape (voids Bendix ABS warranty).
- Use open-ended clips (never cable ties) to hold sensor leads to jounce lines.
- Drain the trailer air tanks a minimum of every six (6) months.
- Disconnect the electrical connectors from the ABS controller when welding on the trailer.

TROUBLESHOOTING: ELECTRICAL SCHEMATICS

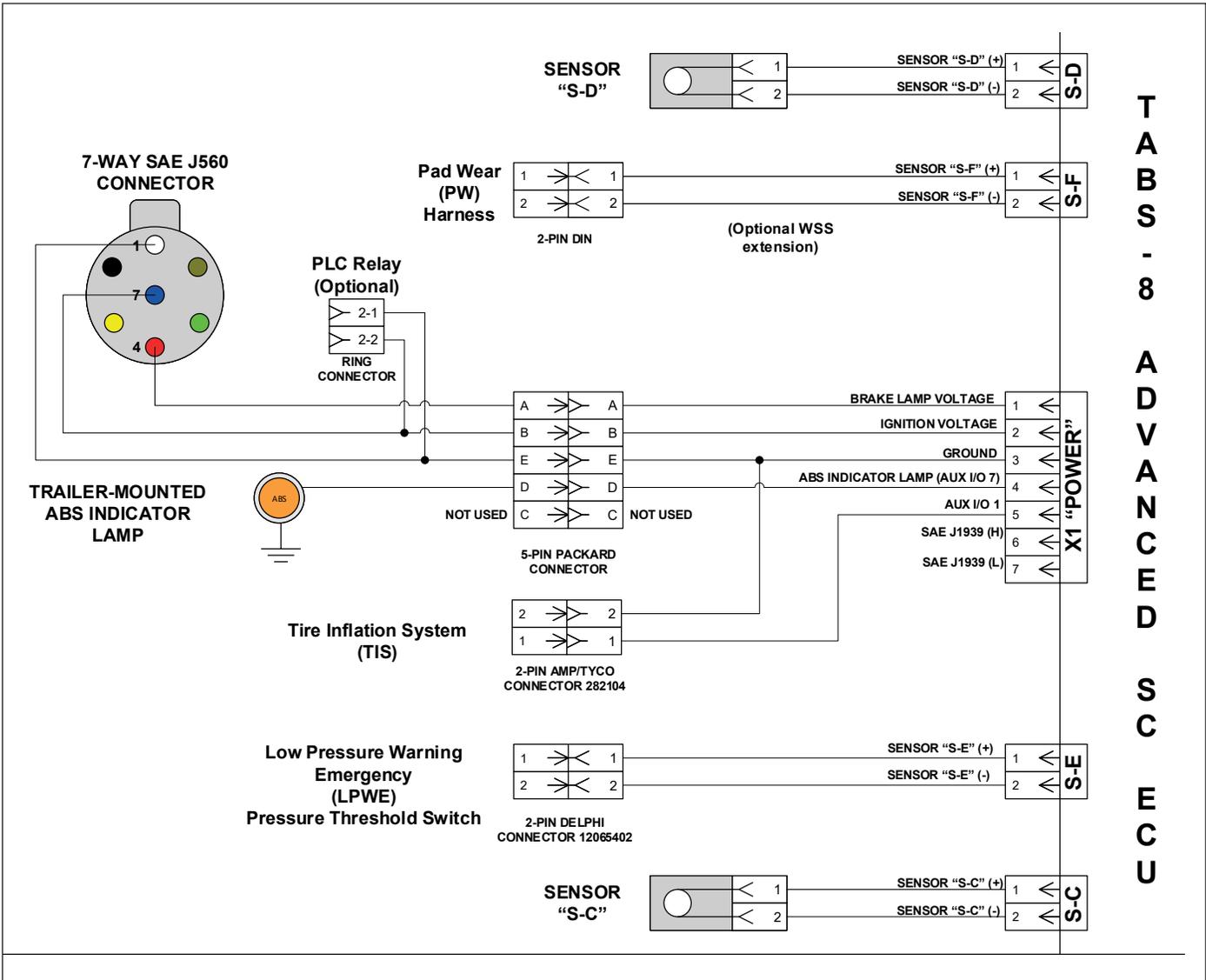


Figure 19 – Bendix® TABS-8™ Advanced Module Electrical Schematic - 2S/1M

TROUBLESHOOTING: SYSTEM SCHEMATICS

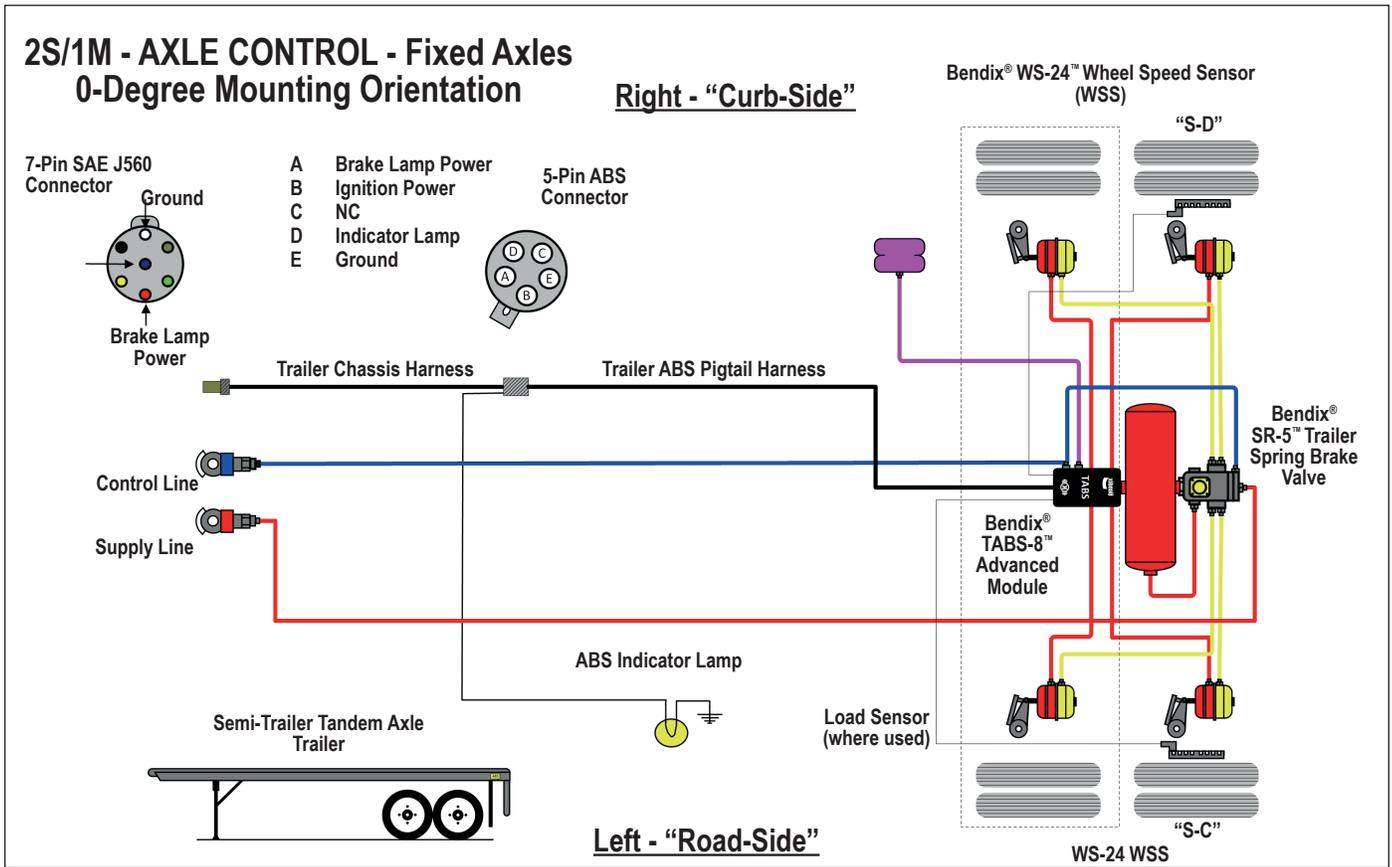


Figure 20 – Bendix® TABS-8™ Advanced Module - 2S/1M Axle Control (0 Degree) Antilock Braking System (ABS) Electrical and Air System

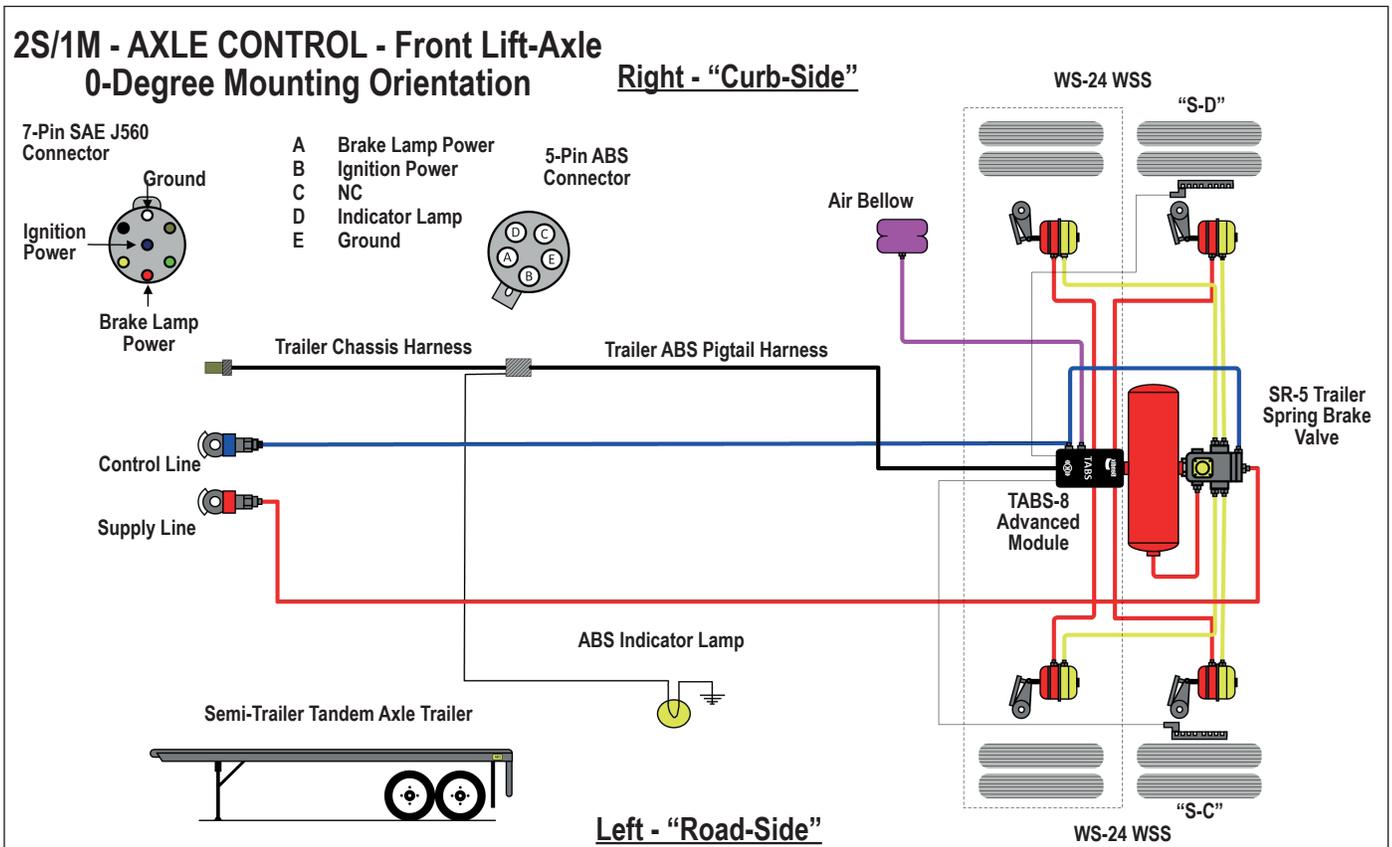


Figure 21 – Bendix® TABS-8™ Advanced Module - 2S/1M Axle Control (0-Degree) with Front Lift-Axle, ABS Electrical and Air System

TROUBLESHOOTING: SYSTEM SCHEMATICS

2S/1M - AXLE CONTROL - Rear Lift-Axle 0 Degree Mounting Orientation

7-Pin SAE J560 Connector

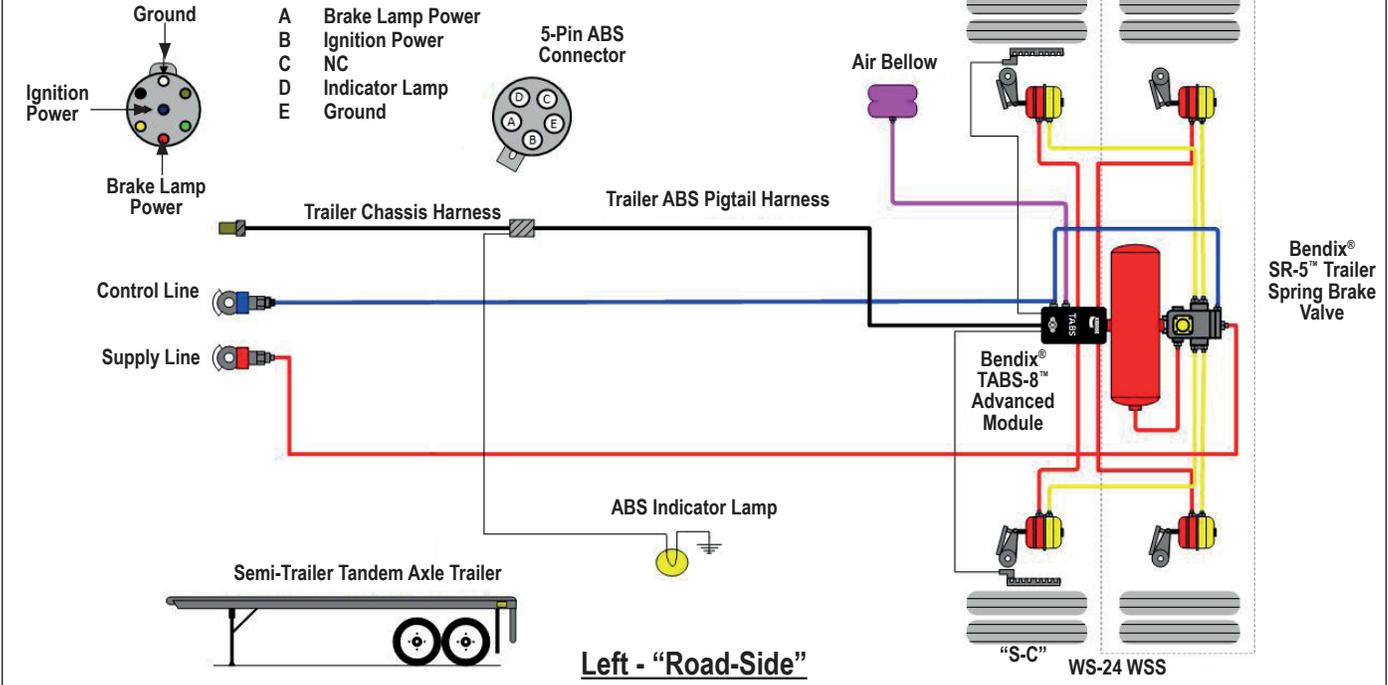


Figure 22 – Bendix® TABS-8™ Advanced Module - 2S/1M Axle Control (0 Degree) with Rear Lift-Axle, Antilock Braking System (ABS) Electrical and Air System

2S/1M - AXLE CONTROL - Fixed Axle 0 Degree Mounting Orientation

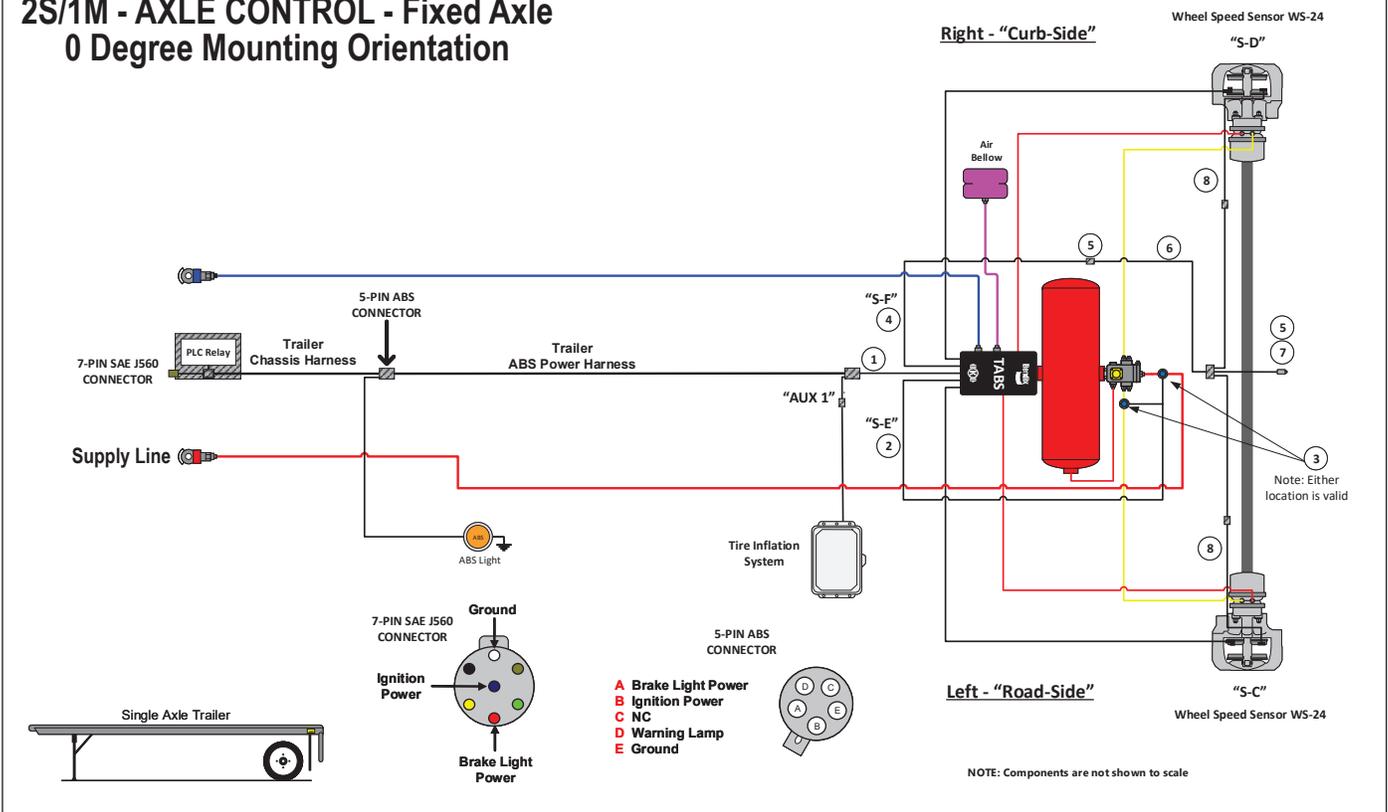


Figure 23 – Bendix® TABS-8™ Advanced Module - 2S/1M Axle Control (0 Degree) ABS Electrical and Air System with Tire Inflation System Sensing, Pad Wear Sensing, and Low Pressure Warning Emergency

TROUBLESHOOTING: FLOWCHARTS

Diagnostic Trouble Code (DTC) information can be retrieved from the Bendix® TABS-8™ Advanced Module by using blink code diagnostics or a diagnostic tool. 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 Bendix® Antilock Braking System (ABS) indicator lamp during the TABS-8 Advanced Module's power-up sequence. If it is necessary to take

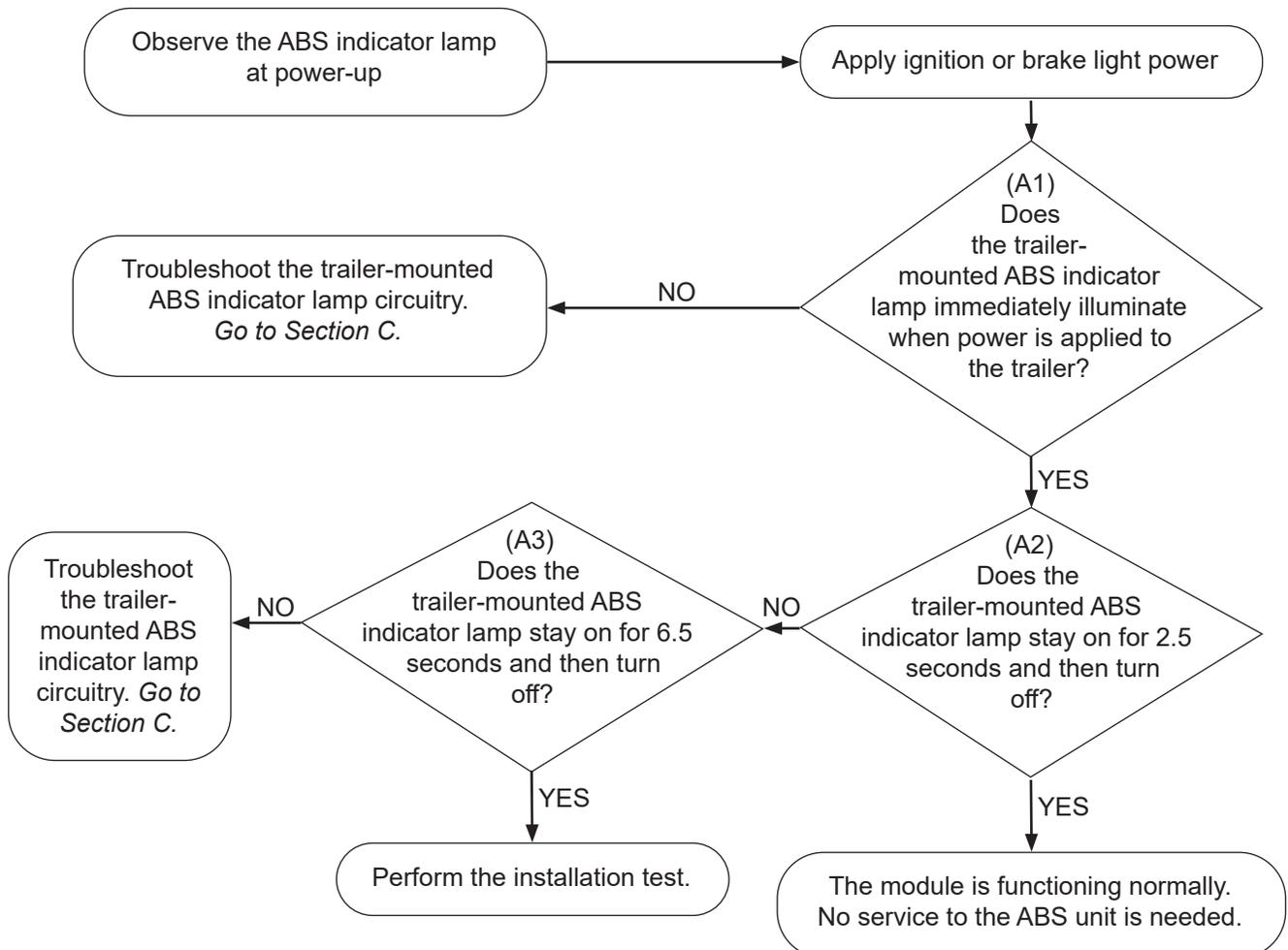
electrical measurements, always begin by taking voltage and resistance measurements at the 7-pin Electronic Control Unit (ECU) pigtail harness connector.

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, Wheel Speed Sensor (WSS), etc.

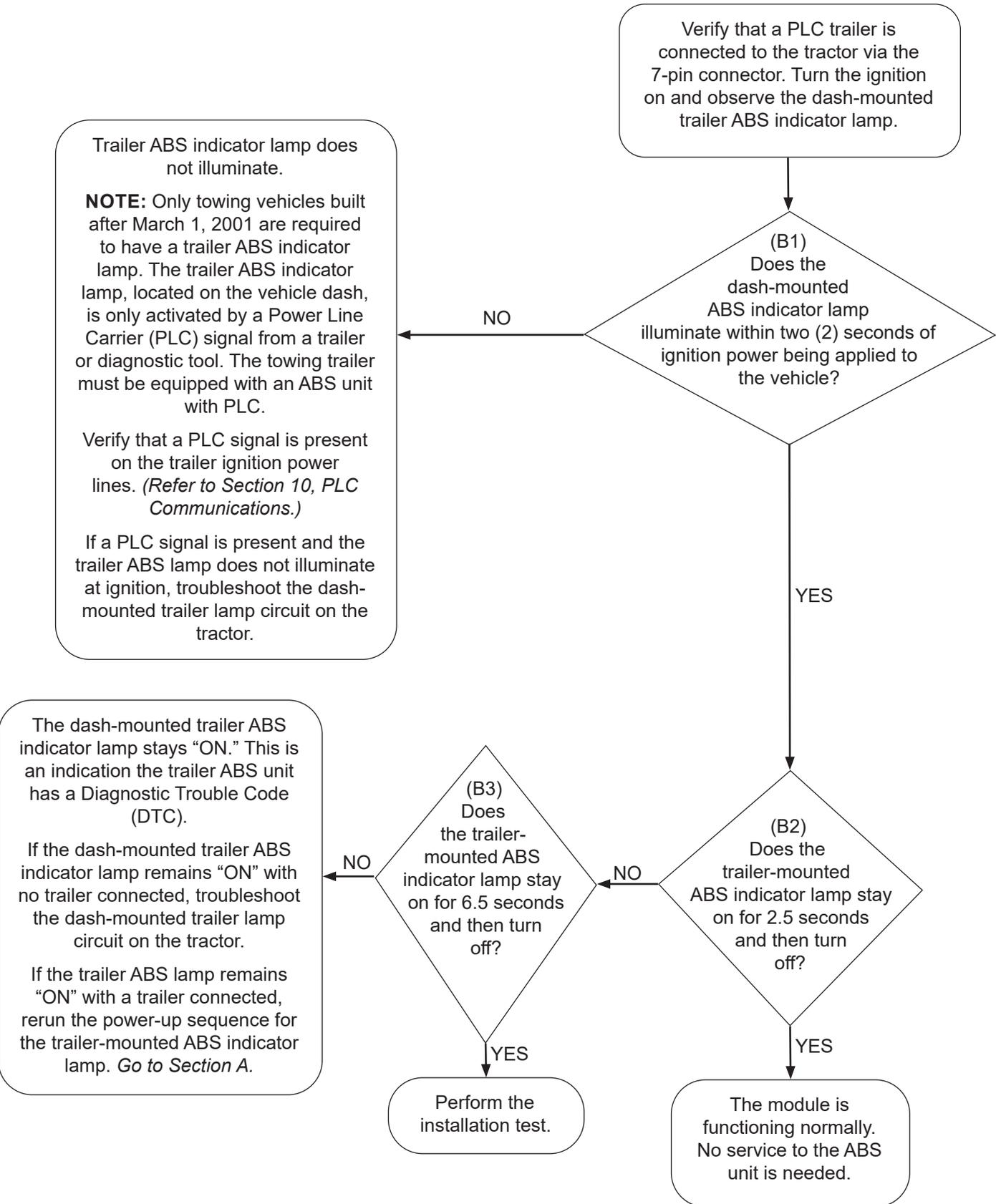
No voltage or resistance measurements are to be made on the ECU electrical header connector pins of the Module.

Section A: (Power-Up Sequence) Trailer-Mounted ABS Indicator Lamp	Page 31
Section B: (Power-Up Sequence) Dash-Mounted ABS Indicator Lamp	Page 32
Section C: Troubleshooting the Trailer-Mounted ABS Indicator Lamp Circuitry	Page 33
Section D: Troubleshooting the Power Supply	Page 34
Section E: Troubleshooting the Bendix® WS-24™ WSS	Page 35
Section F: Troubleshooting the Load Sensor (Out-of-Range Condition)	Page 36
Section G: Troubleshooting the ECU and WSS	Page 37
Section H: Troubleshooting an Automatic Lift Axle that Remains Lowered	Page 38-42
Section J: Troubleshooting an Automatic Lift Axle that Remains Raised	Page 43-45
Section K: Troubleshooting the Tire Inflation System	Page 46-50
Section L: Troubleshooting the Low Pressure Warning Emergency (LPWE) Feature	Page 51-55
Section M: Troubleshooting the Pad Wear Sensing Feature	Page 56-60

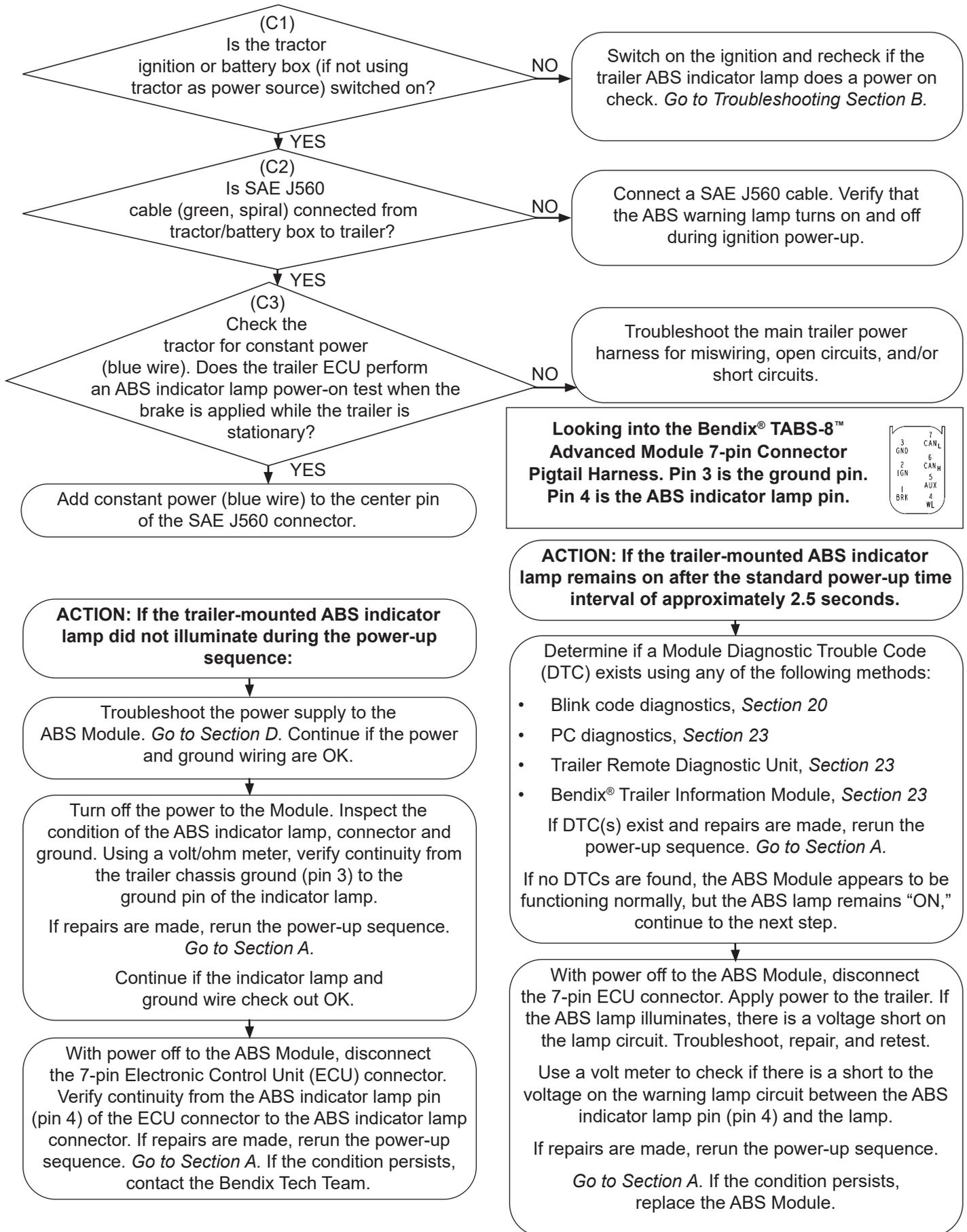
SECTION A: POWER-UP SEQUENCE - TRAILER-MOUNTED ABS INDICATOR LAMP



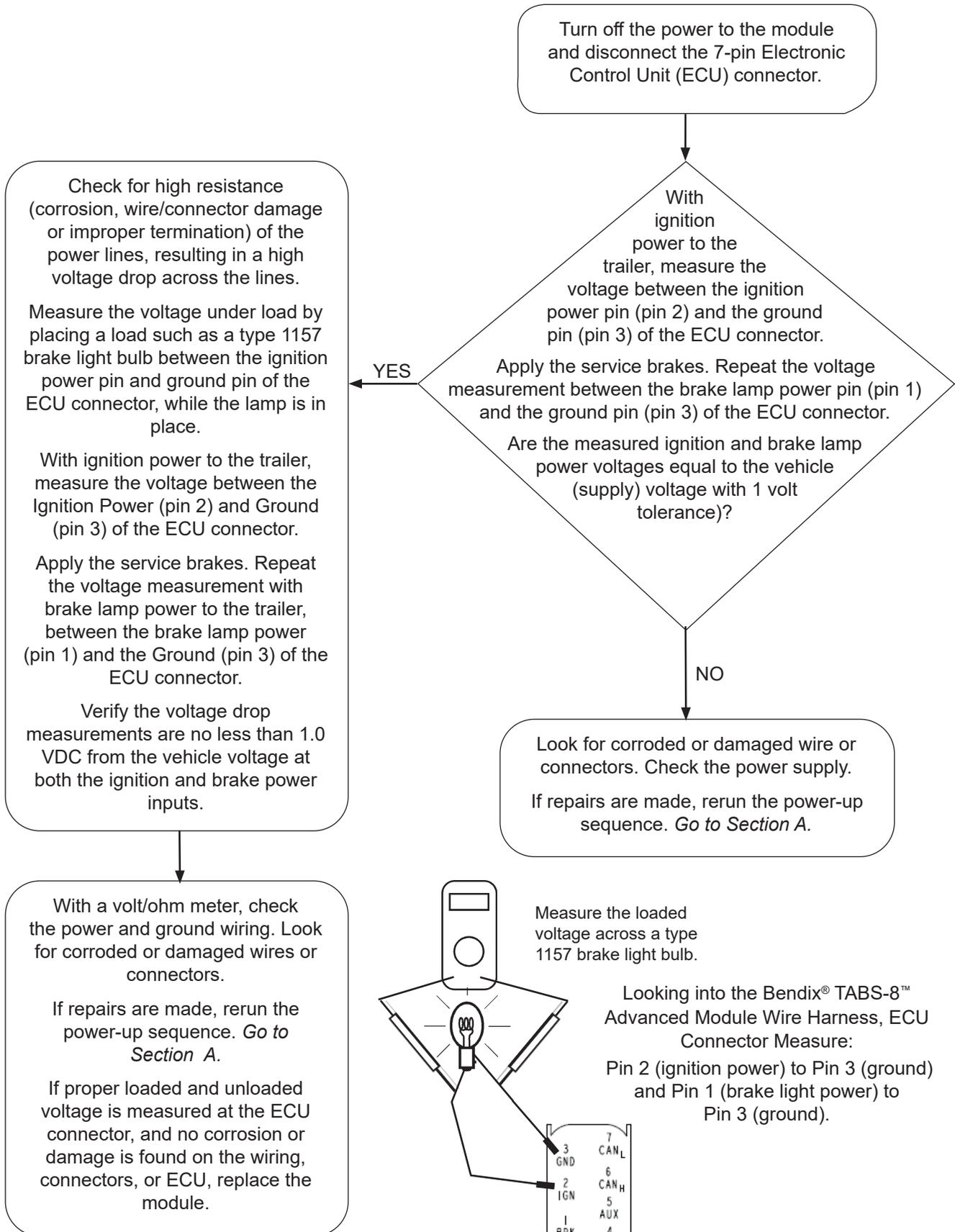
**SECTION B: (POWER-UP SEQUENCE)
DASH-MOUNTED ANTILOCK BRAKING SYSTEM (ABS) INDICATOR LAMP**



SECTION C: TROUBLESHOOTING THE TRAILER-MOUNTED ANTILOCK BRAKING SYSTEM (ABS) INDICATOR LAMP CIRCUITRY



SECTION D: TROUBLESHOOTING THE POWER SUPPLY



SECTION E: TROUBLESHOOTING THE BENDIX® WS-24™ WHEEL SPEED SENSORS (WSS)

Turn off the power to the Module and disconnect the Wheel Speed Sensor (WSS) connector.

*Refer to Section G, Troubleshooting the Electronic Control Unit (ECU) and Wheel Speed Sensors (WSS).
For additional troubleshooting steps, see Service Data Sheet SD-13-4860. Bendix® WS-24™ Antilock WSS.*

If dynamic WSS Diagnostic Trouble Codes (DTCs) are present:

Rotate the affected wheel and verify a minimum of 0.25 VAC sensor output at 0.5 RPS across the WSS pins. A properly positioned sensor can output more than 2.0 VAC at 1 RPS.

Verify/inspect the following:

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

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

Reset active DTCs by using any of the following methods:

- Blink Code Diagnostics, *Section 20*
- PC diagnostics, *Section 23*
- Bendix® Trailer Remote Diagnostic Unit (TRDU) and magnet, *Section 23*
- Bendix® Trailer Information Module (TIM), *Section 23*

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

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

If Static WSS DTCs are present:

Using a volt/ohm meter to measure the connector pins of the sensor with a DTC, verify 950-1950 ohms across the sensor connector pins.

Verify/inspect the following:

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

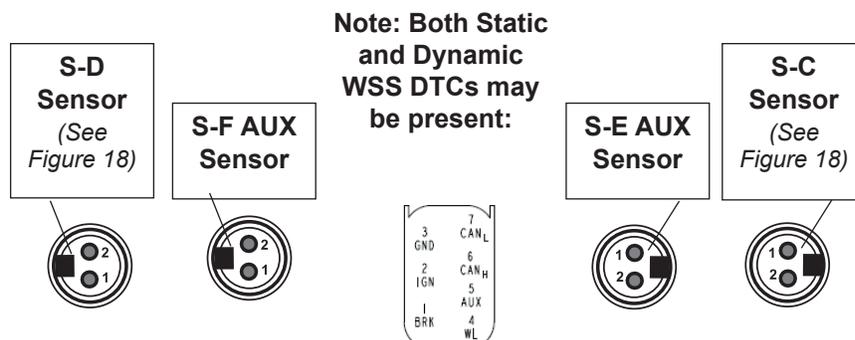
Make repairs as needed (replace wiring and/or ABS components).

Reset active DTCs by using any of the following methods:

- Blink Code Diagnostics, *Section 20*
- PC diagnostics, *Section 23*
- TRDU and magnet, *Section 23*
- TIM, *Section 23*

Then check for Dynamic WSS DTCs (*see left column*)

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



Looking into the Bendix® TABS-8™ Advanced
Module Wire Harnesses

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 off the power to the module.



For air suspension system trailers:

Verify/inspect the following:

1. Check that the reservoir(s) in the system has air pressure.
2. Tee an air gauge into port P42 and physically check that there is air pressure at the port.
3. 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.
4. Switch the power to the module on. Using the Bendix® ACom® PRO™ 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.
5. Check that the suspension height control valve is functioning correctly.
6. Check for air leakage in the suspension system.
 - Using the ACom PRO 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 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 PRO 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 THE ELECTRONIC CONTROL UNIT (ECU) AND WHEEL SPEED SENSOR (WSS)

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

Turn off the power to the Module.

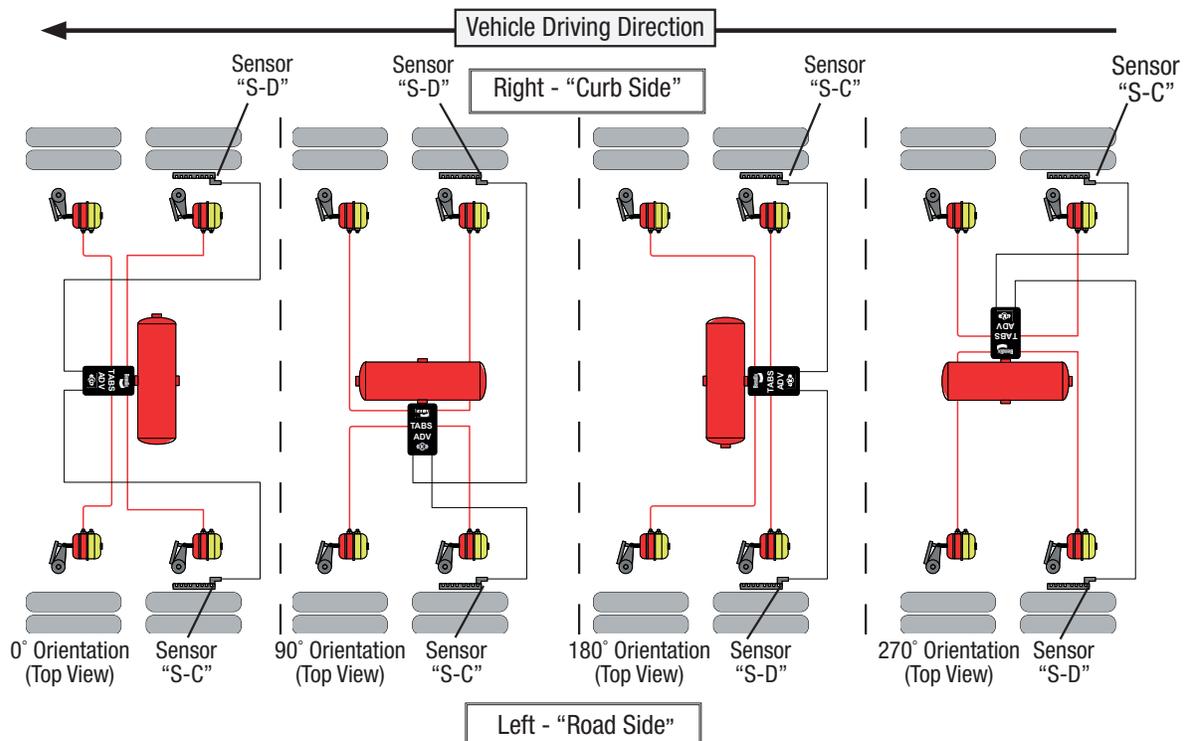
1. Check that the Electronic Control Unit (ECU) is installed correctly (expected orientation to vehicle).

Each Bendix® TABS-8™ Advanced ECU comes preconfigured for a certain orientation (0/90/180/270 degrees from the vehicle driving direction). See the Figure below. Use Bendix® ACom® PRO™ Diagnostic Software to view the current configured orientation of the TABS-8 Advanced ECU on the controller configuration screen. Then use the Figure below to verify the TABS-8 Advanced ECU is installed per the configured orientation. If it is determined that the ECU is not installed per the configured orientation, verify that the configured orientation is correct for the part number of the ECU. This will require contacting a Bendix representative at 1-800-AIR-BRAKE (1-800-247-2725). If the configured orientation matches the orientation for the specific ECU part number, reinstall the ECU to match the configured orientation. After reinstalling the ECU for the correct orientation, perform an installation test using ACom PRO Diagnostic Software or a Bendix® Trailer Information Module (TIM).

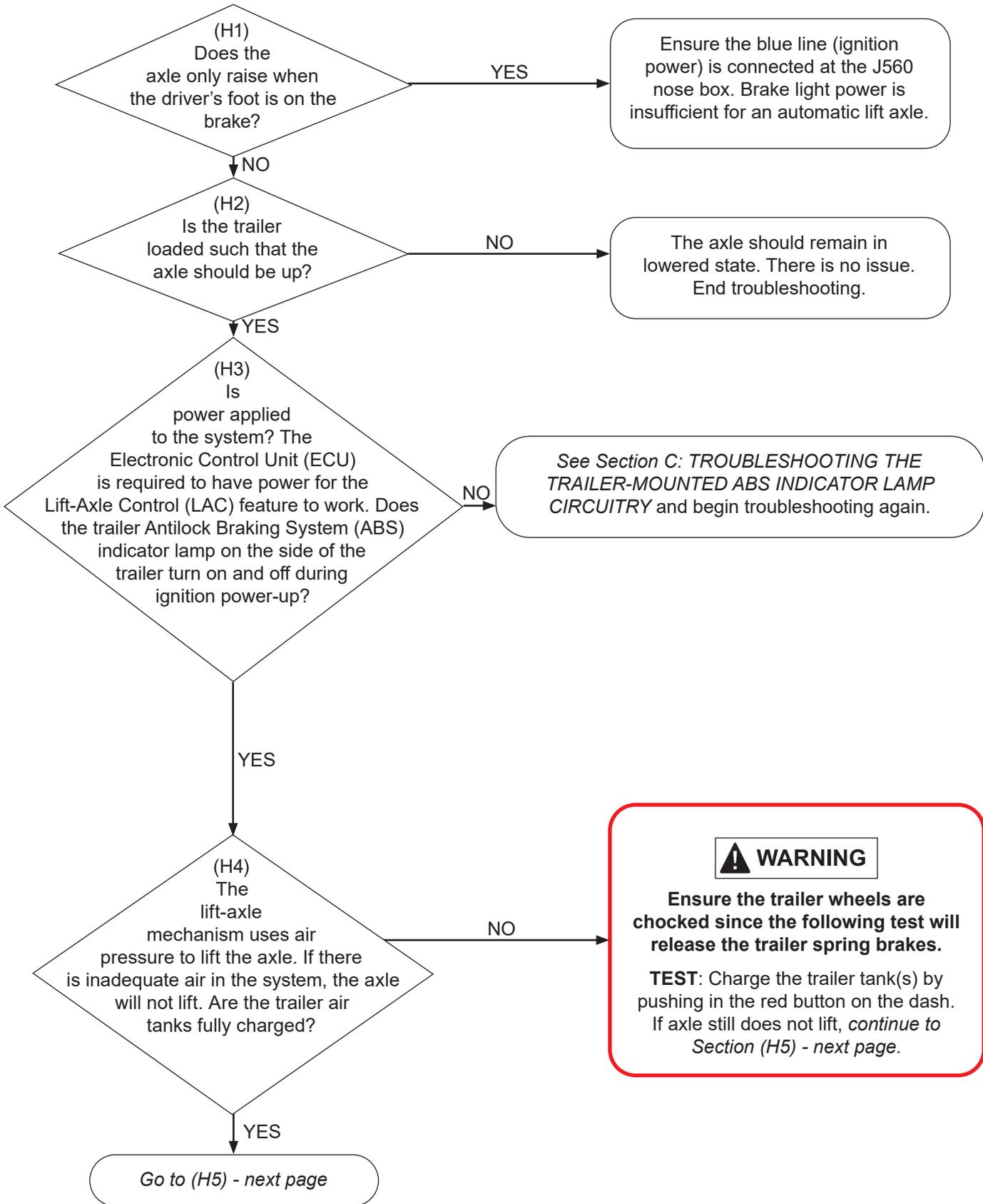
If the configured orientation of the ECU does **not** match the orientation for the specific part number, it is possible that the configured orientation was manually configured using ACom PRO Diagnostic Software at a previous date. If possible, change the configured orientation back to the correct orientation for the given part number. This may require assistance from a Bendix representative at 1-800-AIR-BRAKE (1-800-247-2725). After reconfiguring the orientation of the ECU, reinstall per the new orientation if required. Perform an installation test.

2. Check if the WSS S-C input and S-D input are swapped.

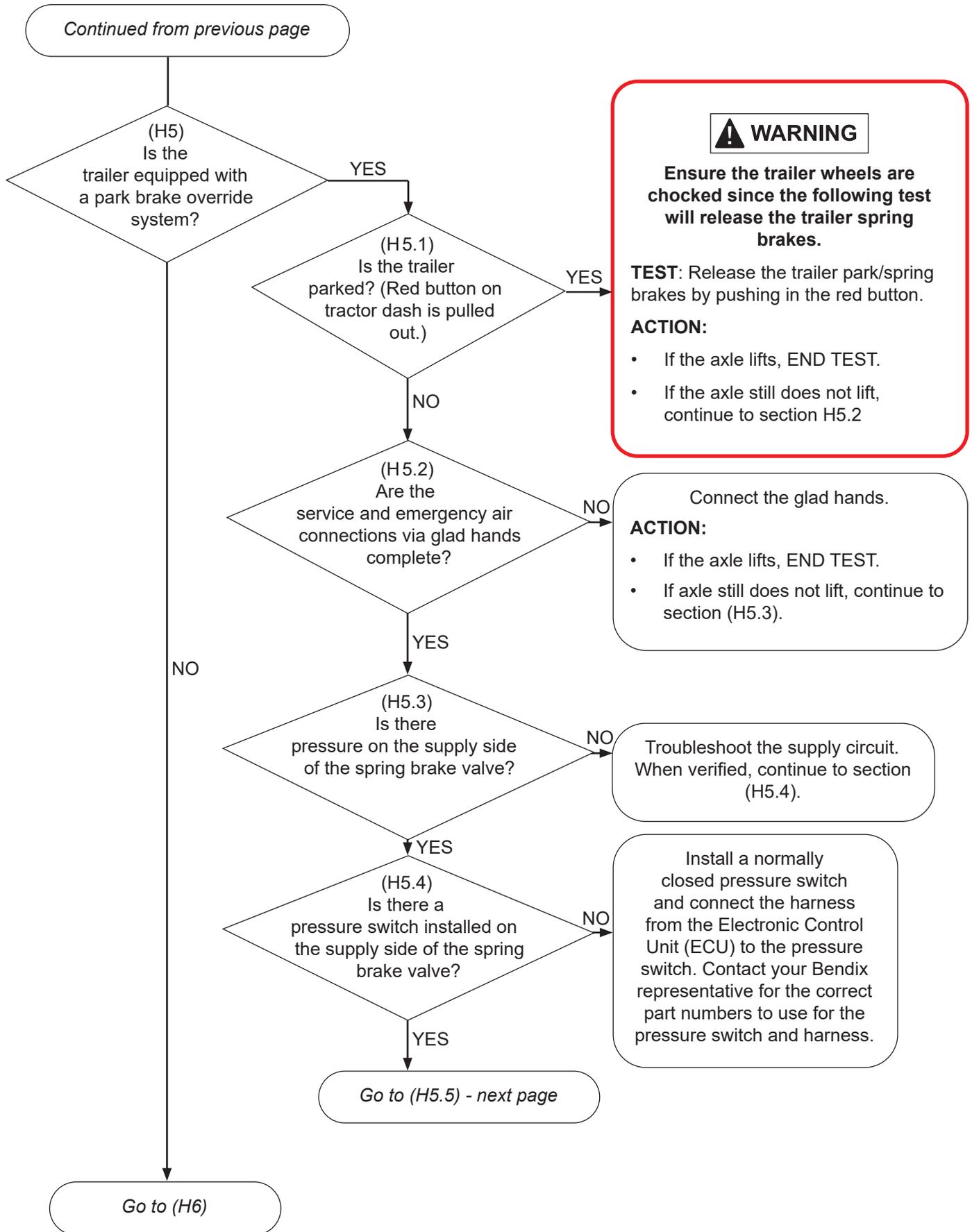
Since this Diagnostic Trouble Code (DTC) is caused by the ECU comparing the difference in wheel speed readings between left and right WSS to cross-check with the on-board lateral accelerometer's data, if the sensors are reversed, a DTC can be triggered. The correct installation location of WSS S-C input and S-D input are specific to the ECU's orientation. Each TABS-8 Advanced ECU comes preconfigured for a certain orientation. Use ACom PRO Diagnostic Software to view the orientation on the controller configuration screen. Then use the Figure below to verify the correct installation of WSS for this orientation. Use ACom PRO Diagnostic Software to run the TABS-8 Advanced installation test to verify if the installation of Wheel Speed Sensors (WSS) S-C input and S-D input is correct.



SECTION H: TROUBLESHOOTING AN AUTOMATIC LIFT-AXLE THAT REMAINS LOWERED



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



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

Continued from (H5.4), previous page

(H5.5)
Is the pressure switch a normally closed switch?

NO

Change to a normally closed pressure switch. Contact your Bendix representative for the correct part number.

Replace the switch.

ACTION:

- If the axle lifts, END TEST.
- If the axle still does not lift, continue to section (H5.6).

YES

(H5.6)
Test the pressure switch with Bendix® ACom® PRO™ Diagnostic Software using the component test for the input configured for Lift Lower.
Using the software, check the configuration screen to see if the Electronic Control Unit (ECU) is configured for a lift-axle.
Is the ECU configured for a lift-axle?

NO

Using ACom PRO Diagnostic Software, configure the appropriate axle as a lift-axle.

ACTION:

- If the axle lifts, END TEST.
- If the axle still does not lift, continue to section (H5.7).

YES

(H5.7)
Is the appropriate auxiliary I/O configured as an output and for function name LAC1 (Lift-Axle Control)?

NOTE: The AUX I/O that is configured, must match the auxiliary pin and wiring on the harness that is connected to the lift-axle solenoid.

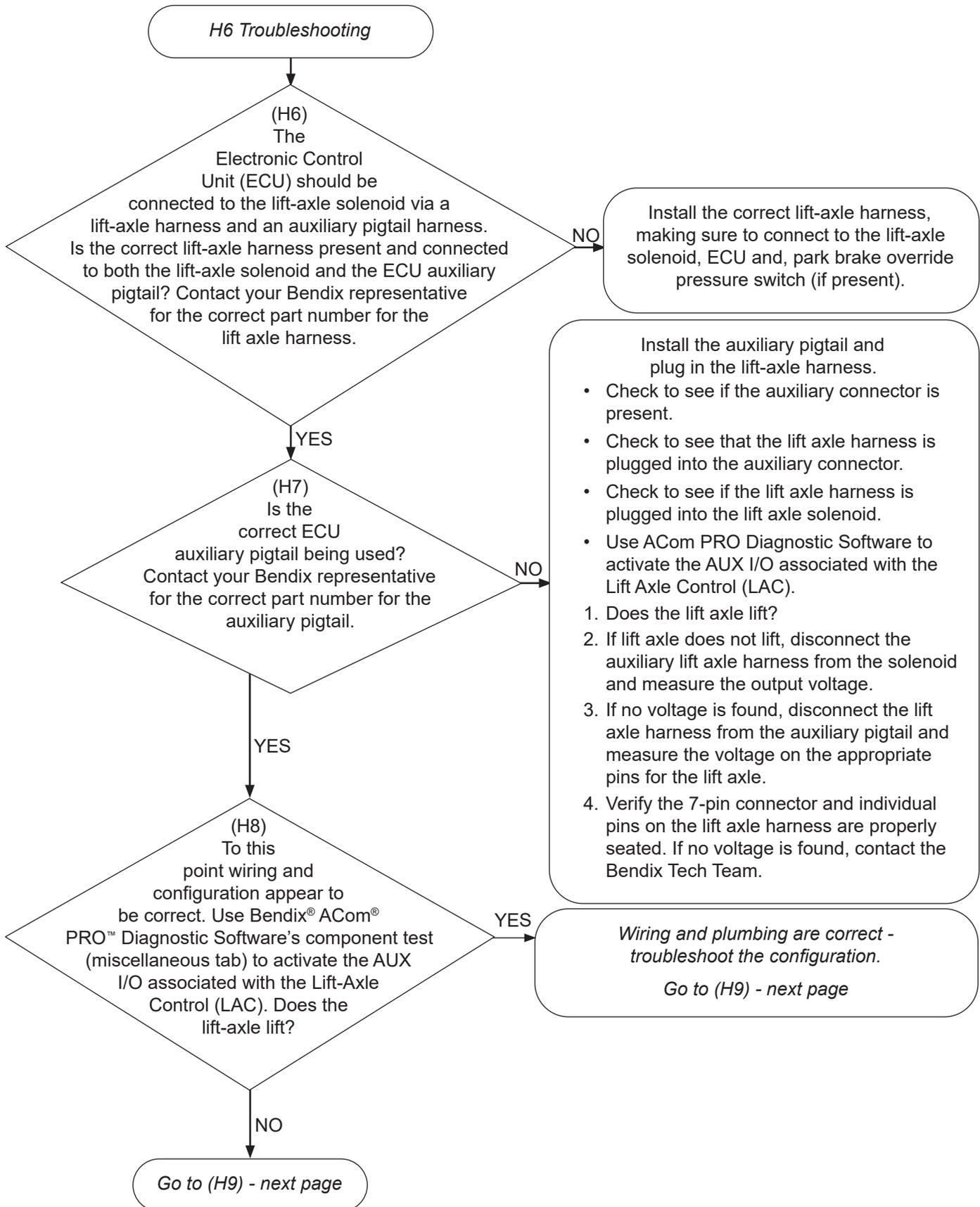
NO

Configure the appropriate output for Lift-Axle Control.
NOTE: For one lift-axle or lift-axle group (lift-axles controlled as a group), use LAC1.

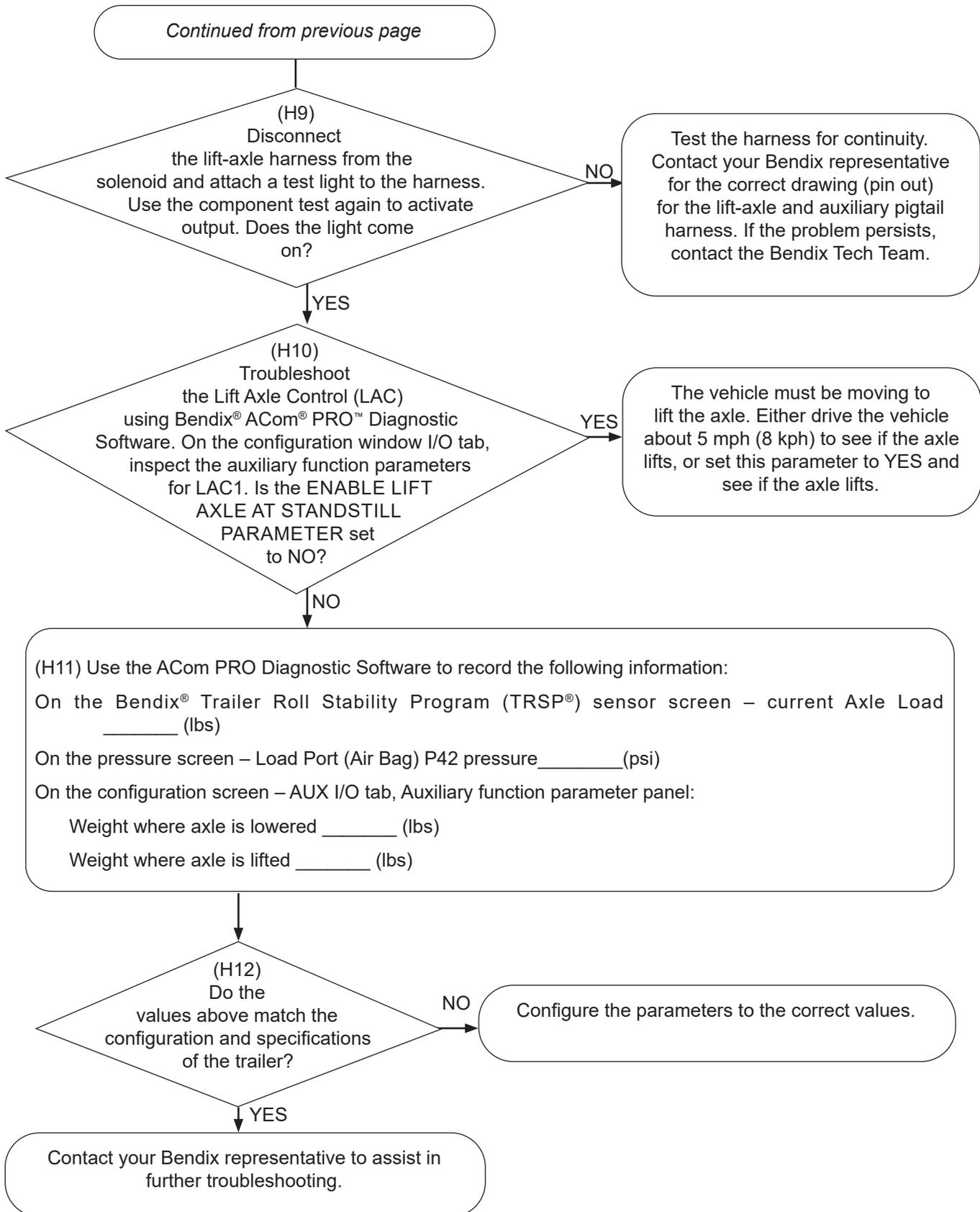
YES

Go to (H6) - next page

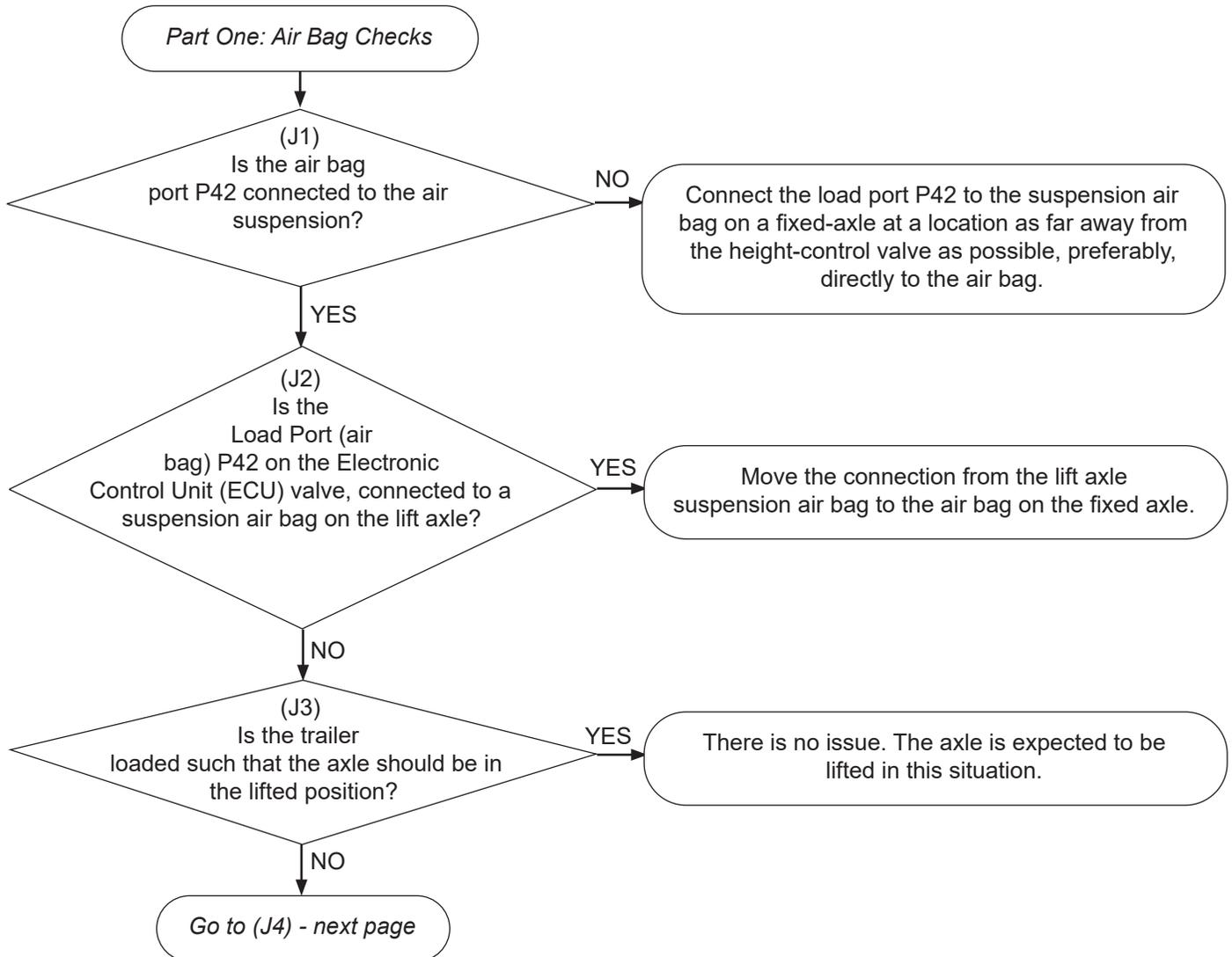
SECTION H: TROUBLESHOOTING AN AUTOMATIC LIFT-AXLE THAT REMAINS LOWERED (CONTINUED)



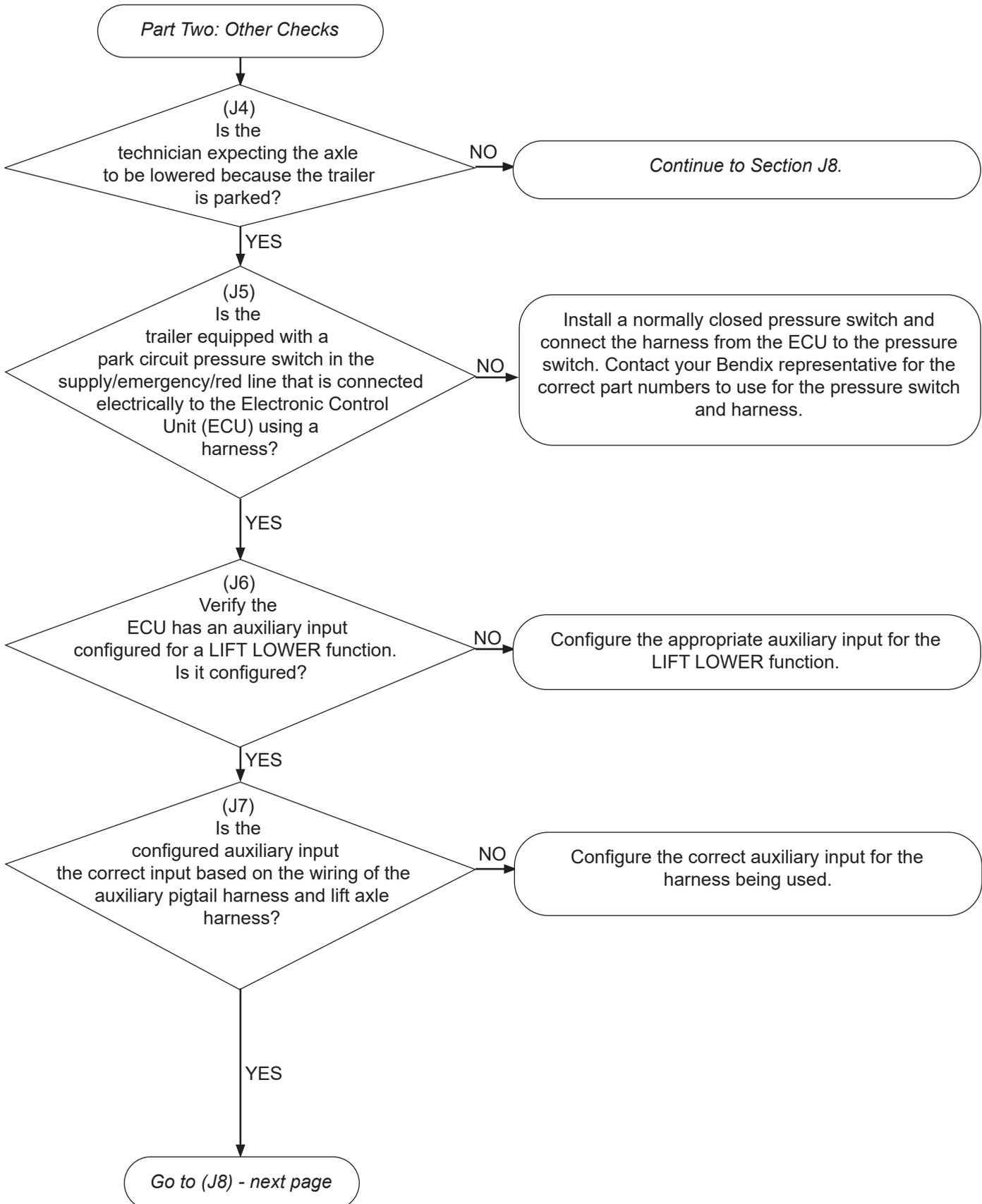
SECTION H: TROUBLESHOOTING AN AUTOMATIC LIFT-AXLE THAT REMAINS LOWERED (CONTINUED)



SECTION J: TROUBLESHOOTING AN AUTOMATIC LIFT-AXLE THAT REMAINS RAISED

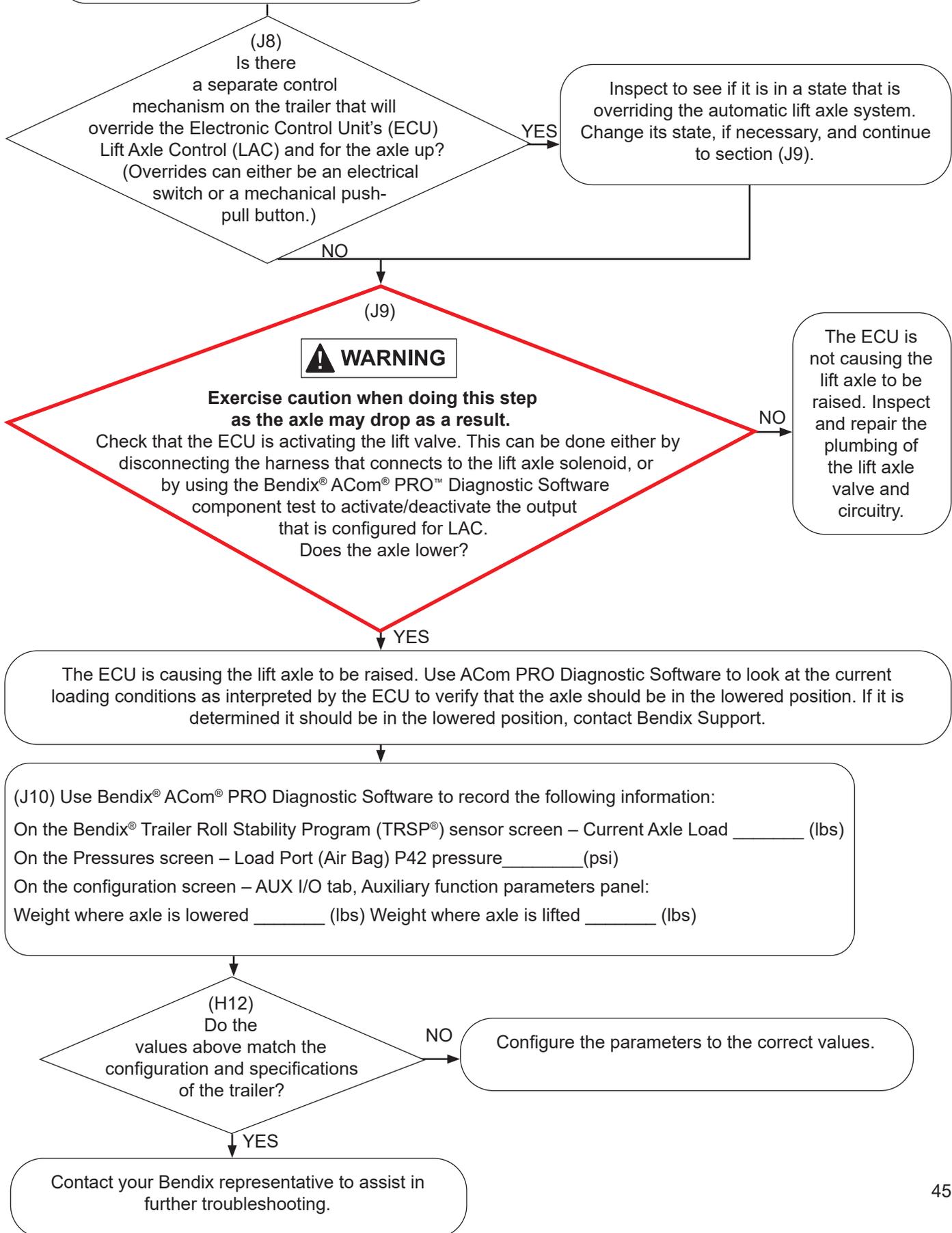


SECTION J: TROUBLESHOOTING AN AUTOMATIC LIFT-AXLE THAT REMAINS RAISED (CONTINUED)



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

Continued from previous page



SECTION K: TROUBLESHOOTING THE TIRE INFLATION SYSTEM (TIS) - SCENARIO 1: TIS IS ACTIVE BUT PLC MESSAGE STATUS IS INACTIVE

The following troubleshooting steps are designed to identify issues with the messaging and performance of the Bendix® TABS-8™ Electronic Control Unit (ECU). Additional functionality for the PLC relay unit should also be considered and confirmed as part of these troubleshooting steps.

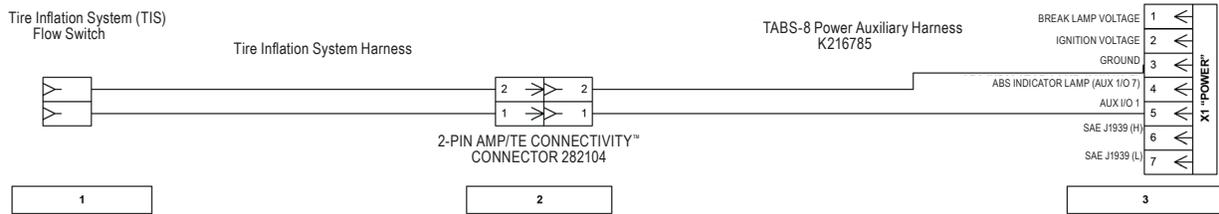
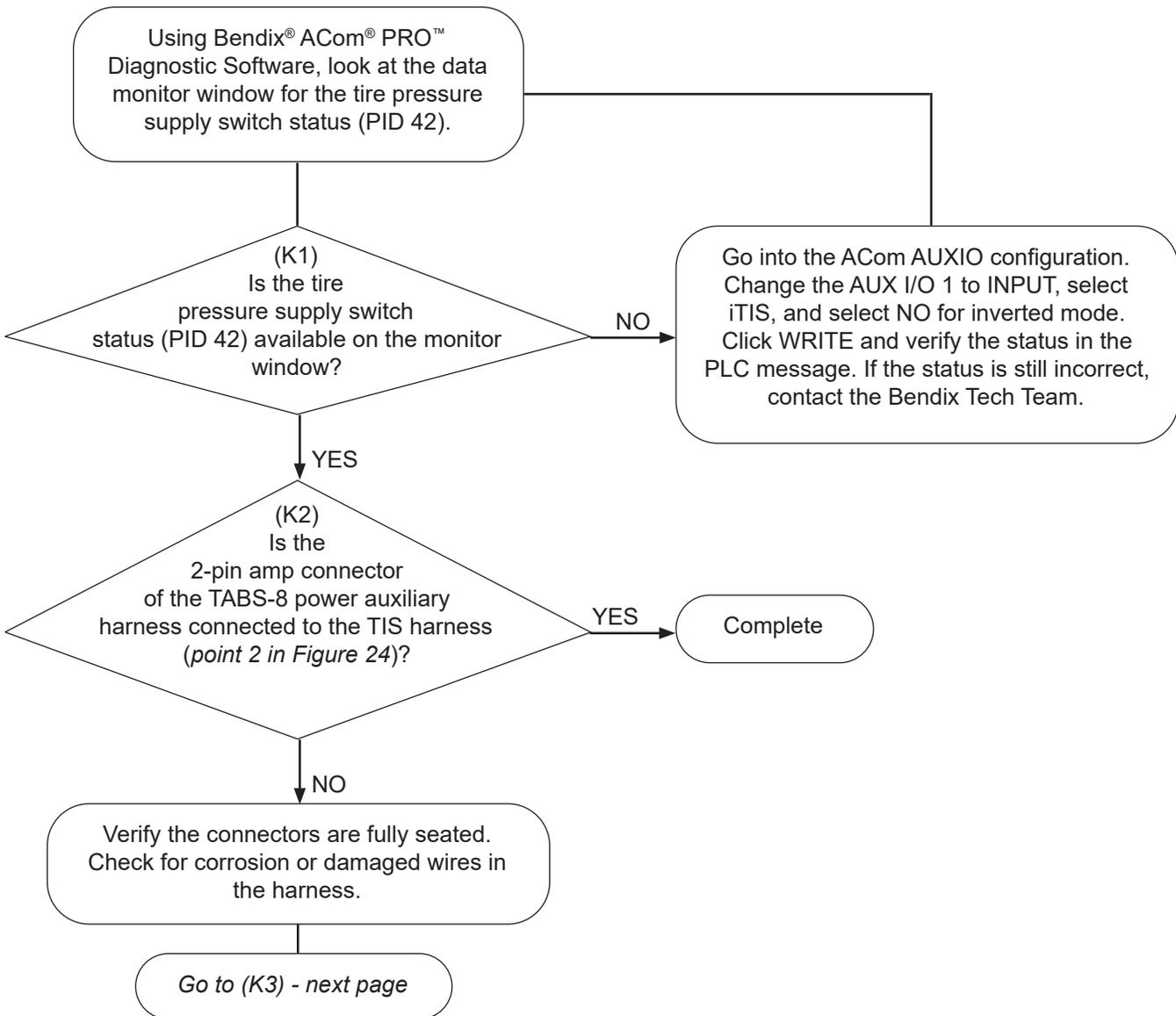
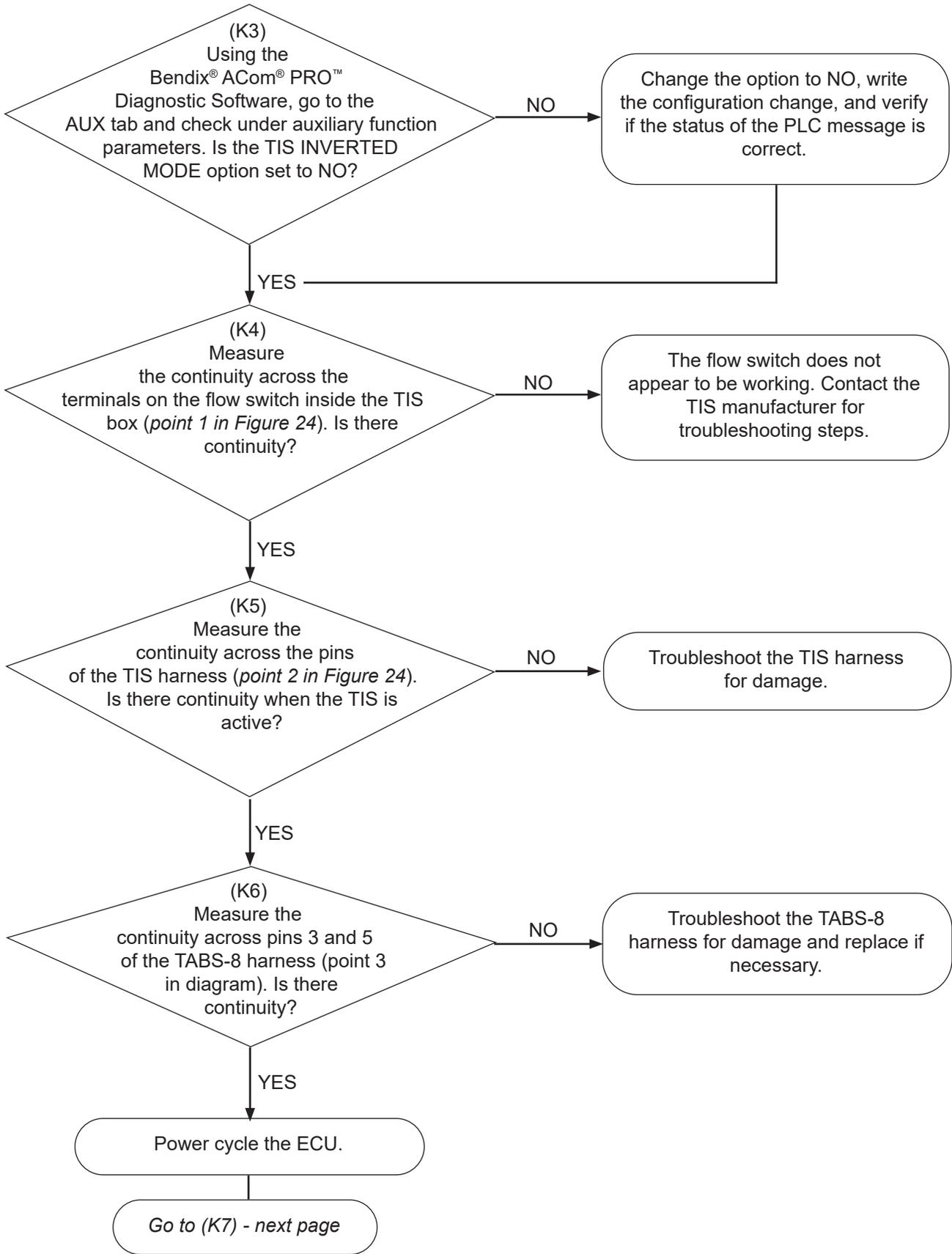


Figure 24 – Tire Inflation System (TIS) Diagram



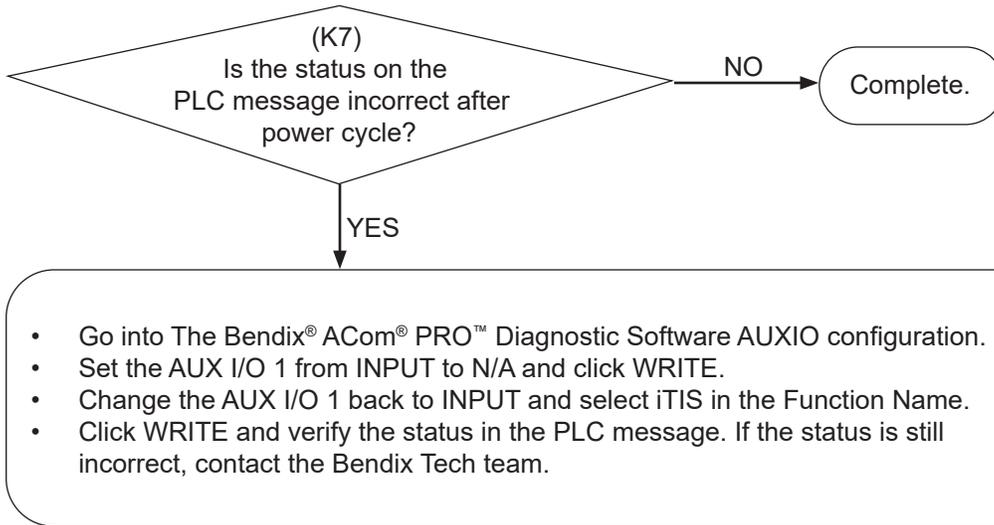
**SECTION K: TROUBLESHOOTING THE TIRE INFLATION SYSTEM (TIS) (CONTINUED)-
SCENARIO 1: TIS IS ACTIVE BUT PLC MESSAGE STATUS IS INACTIVE**

Continued from previous page

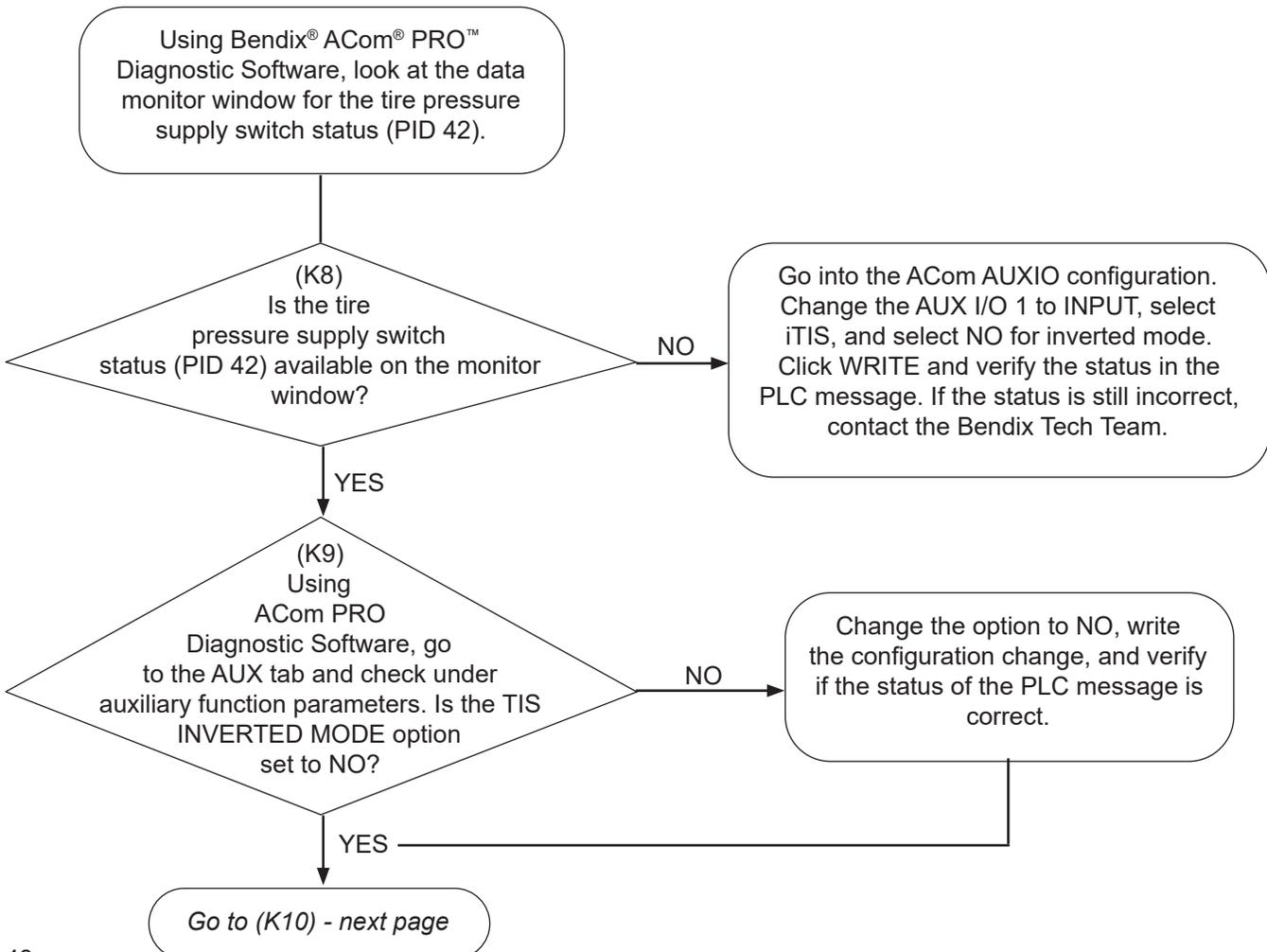


**SECTION K: TROUBLESHOOTING THE TIRE INFLATION SYSTEM (TIS) (CONTINUED)-
SCENARIO 1: TIS IS ACTIVE BUT PLC MESSAGE STATUS IS INACTIVE**

Continued from previous page

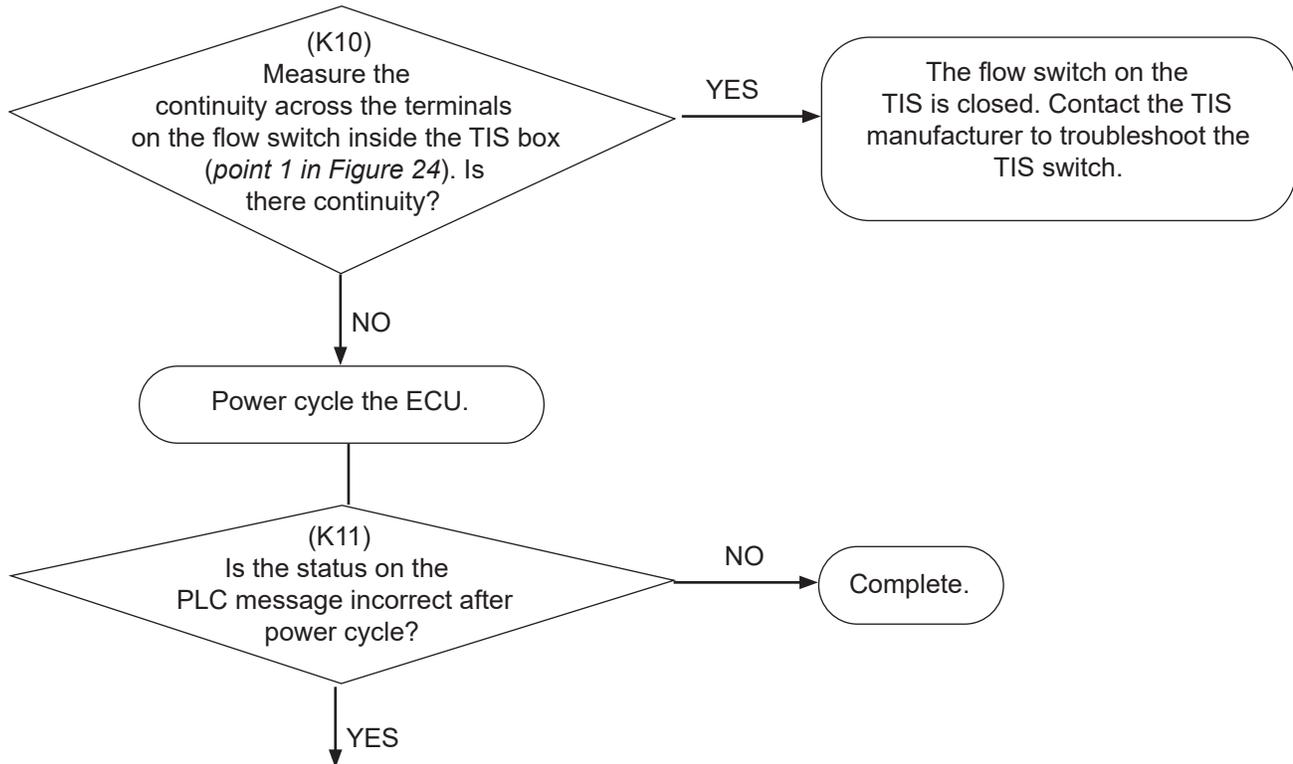


**SECTION K: TROUBLESHOOTING THE TIRE INFLATION SYSTEM (TIS) -
SCENARIO 2: TIS IS INACTIVE BUT PLC MESSAGE STATUS IS ACTIVE**



**SECTION K: TROUBLESHOOTING THE TIRE INFLATION SYSTEM (TIS) (CONTINUED)-
SCENARIO 2: TIS IS INACTIVE BUT PLC MESSAGE STATUS IS ACTIVE**

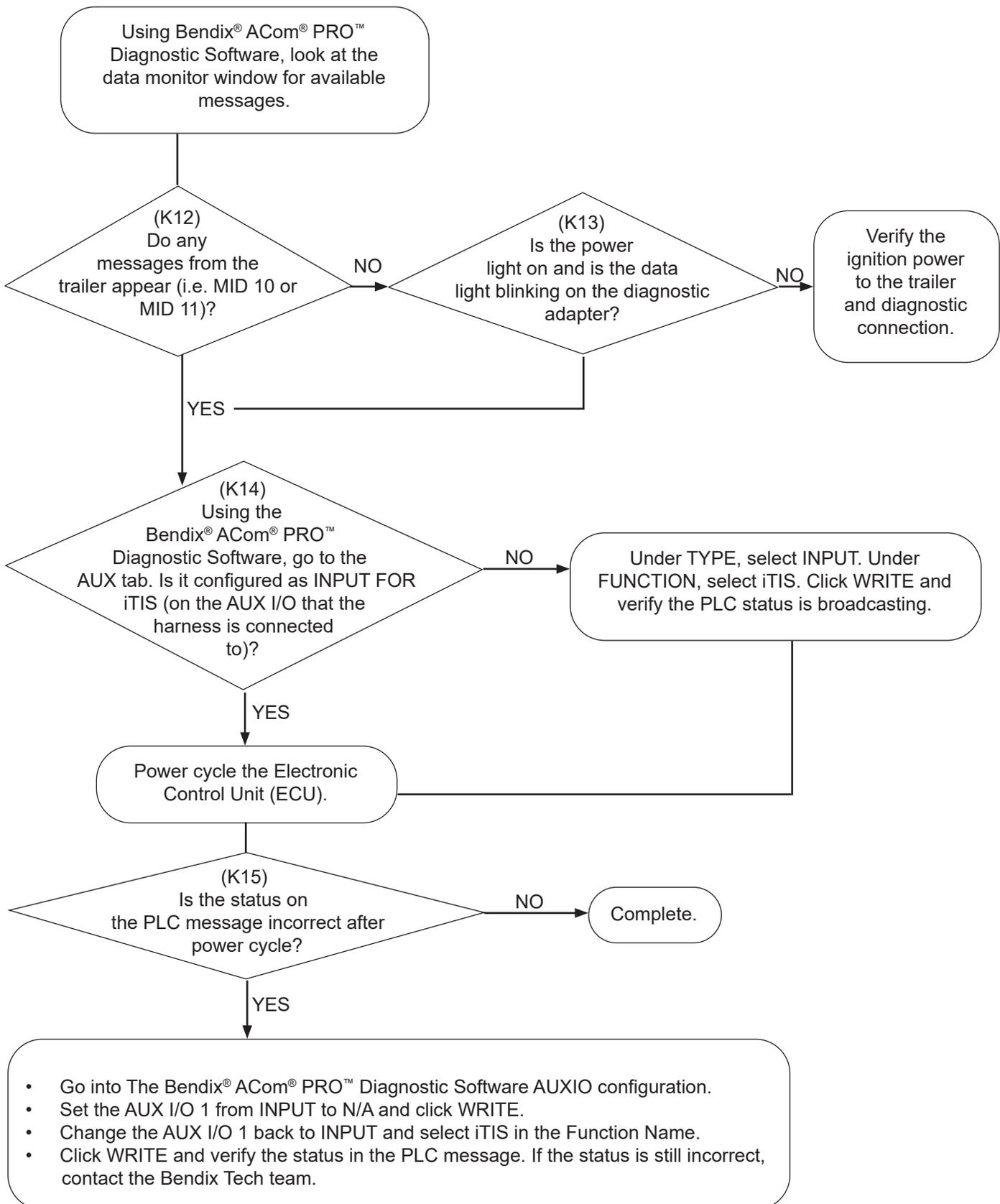
Continued from (K9) previous page



- Go into The Bendix® ACom® PRO™ Diagnostic Software AUXIO configuration.
- Set the AUX I/O 1 from INPUT to N/A and click WRITE.
- Change the AUX I/O 1 back to INPUT and select iTIS in the Function Name.
- Click WRITE and verify the status in the PLC message. If the status is still incorrect, contact the Bendix Tech team.

If using a normally closed pressure switch, reverse the logic of the steps above.

**SECTION K: TROUBLESHOOTING THE TIRE INFLATION SYSTEM (TIS)
(CONTINUED)- SCENARIO 3: PLC MESSAGE IS NOT BROADCASTING**



SECTION L: TROUBLESHOOTING LOW PRESSURE WARNING EMERGENCY (LPWE) FEATURE - SCENARIO 1: LOW PRESSURE CONDITION PRESENT (BELOW 65 PSI WITH NORMALLY OPEN PRESSURE SWITCH), BUT PLC MESSAGE STATUS IS INACTIVE

The following troubleshooting steps are designed to identify issues with the messaging and performance of the Bendix® TABS-8™ Electronic Control Unit (ECU). Additional functionality for the PLC relay unit should also be considered and confirmed as part of these troubleshooting steps.

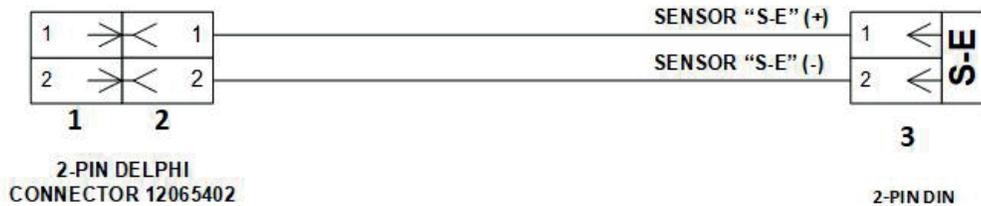
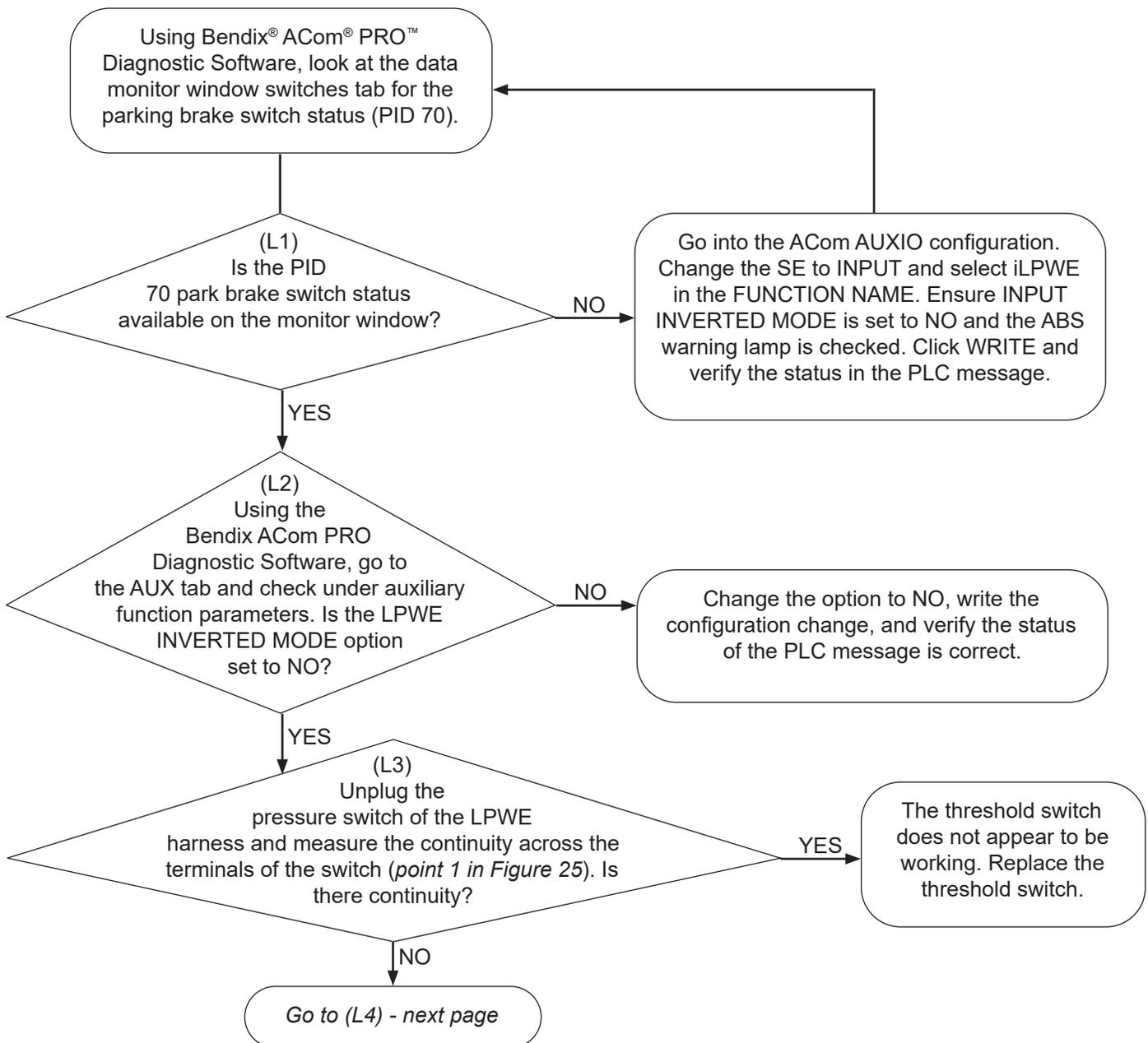
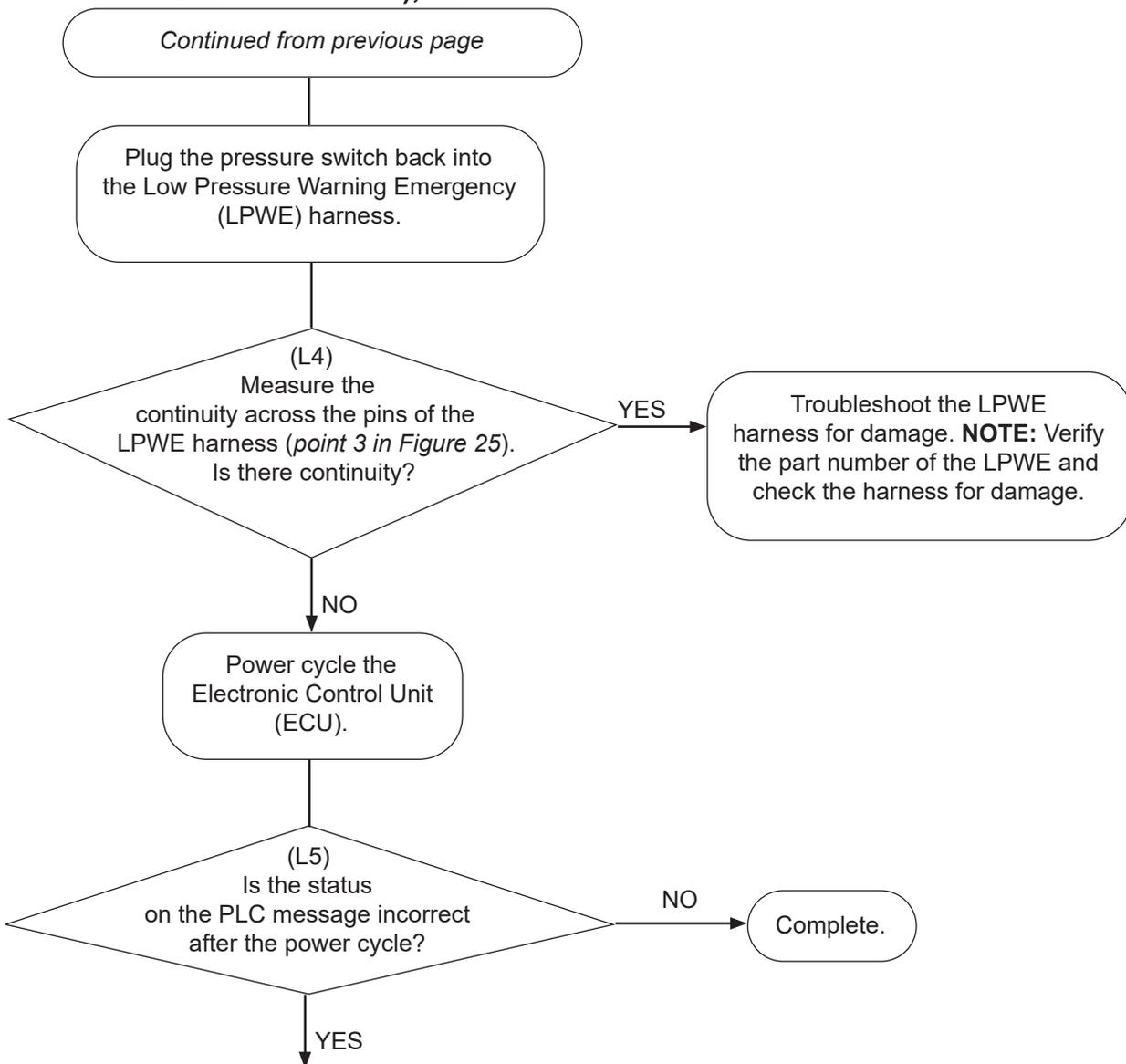


Figure 25 – Low Pressure Warning Emergency (LPWE) Diagram



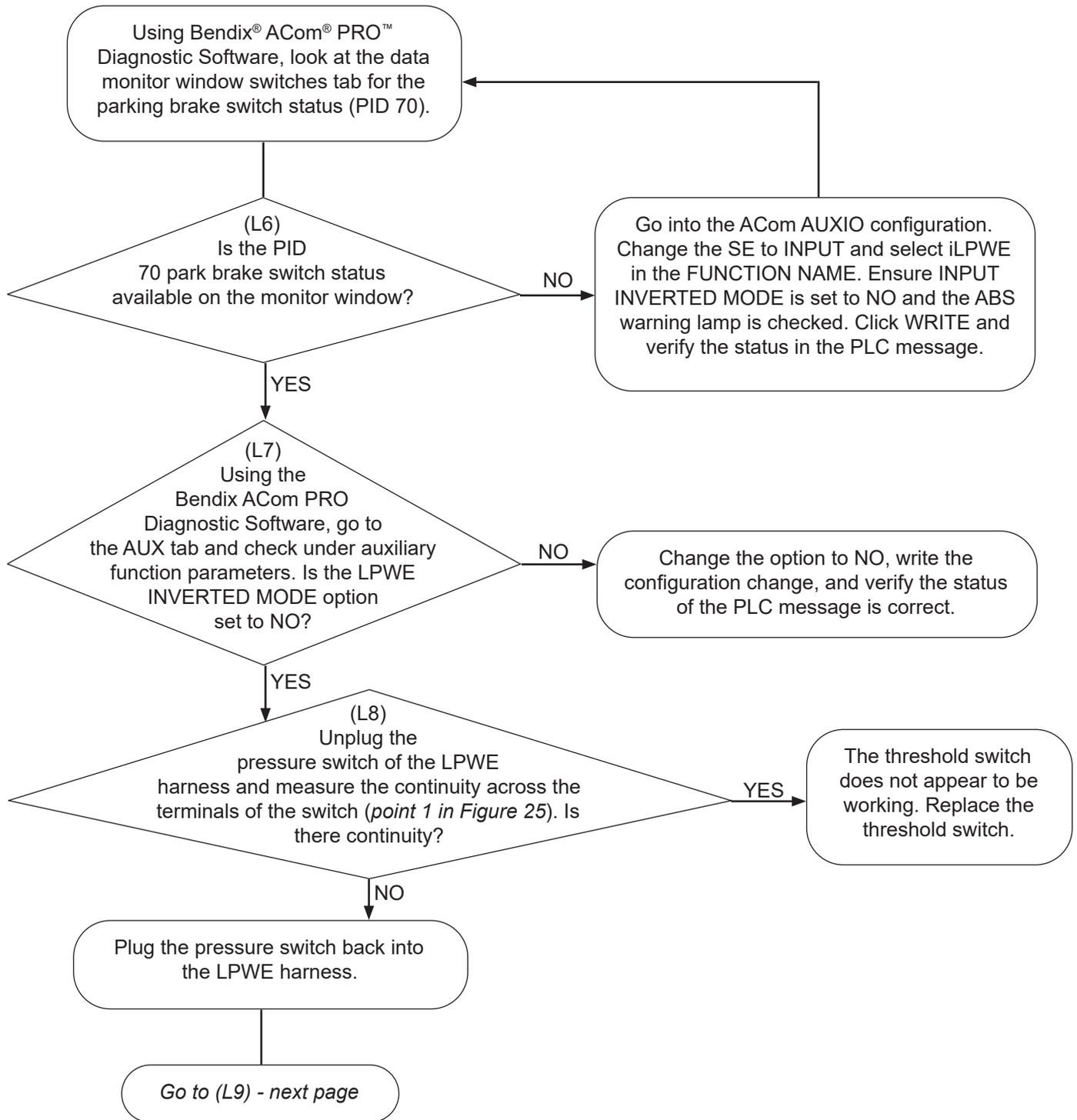
SECTION L: TROUBLESHOOTING LOW PRESSURE WARNING EMERGENCY (LPWE) FEATURE (CONTINUED) - SCENARIO 1: LOW PRESSURE CONDITION PRESENT (BELOW 65 PSI WITH NORMALLY OPEN PRESSURE SWITCH), BUT PLC MESSAGE STATUS IS INACTIVE



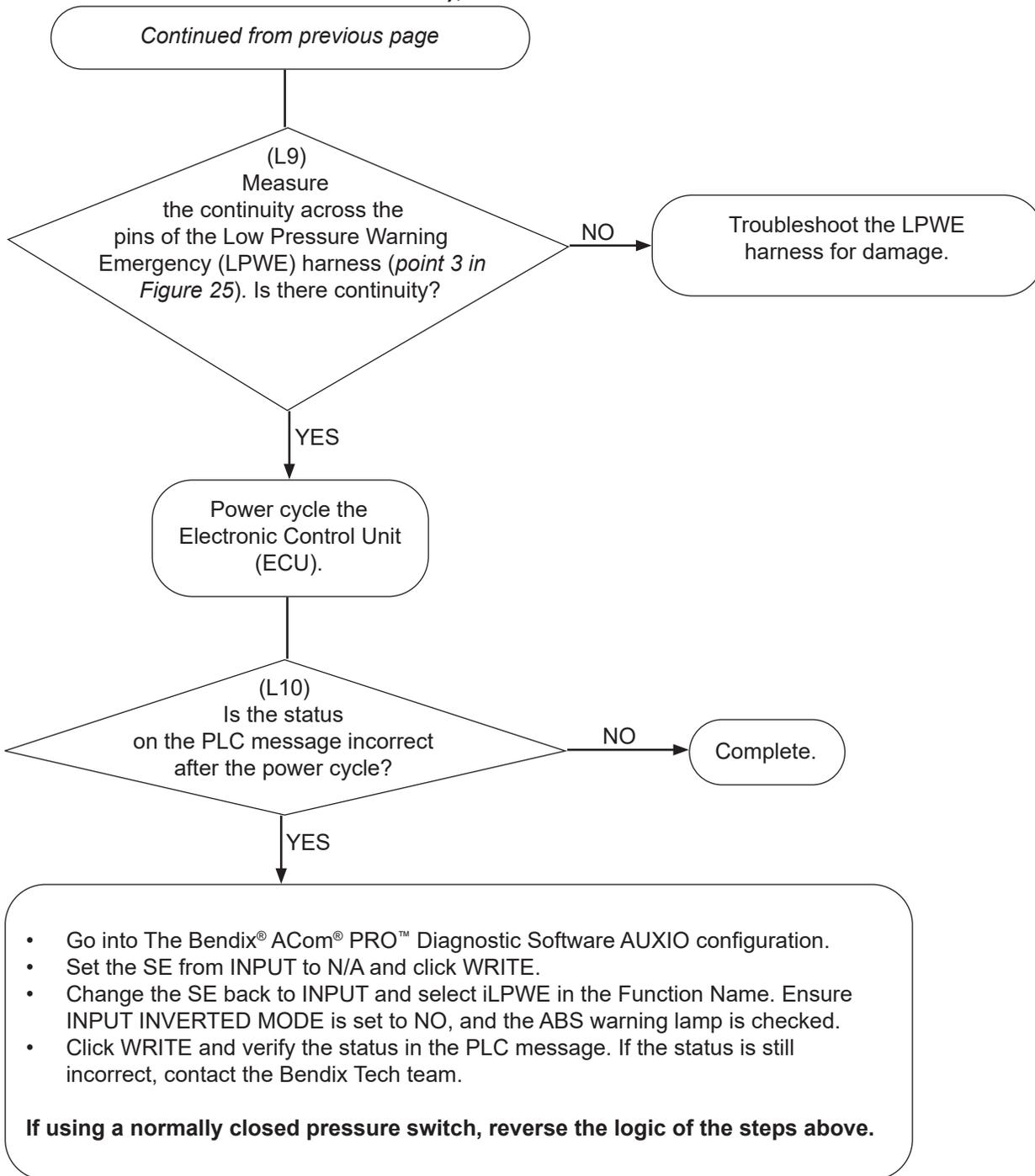
- Go into The Bendix® ACom® PRO™ Diagnostic Software AUXIO configuration.
- Set the SE from INPUT to N/A and click WRITE.
- Change the SE back to INPUT and select iLPWE in the Function Name. Ensure INPUT INVERTED MODE is set to NO, and the ABS warning lamp is checked.
- Click WRITE and verify the status in the PLC message. If the status is still incorrect, contact the Bendix Tech team.

If using a normally closed pressure switch, reverse the logic of the steps above.

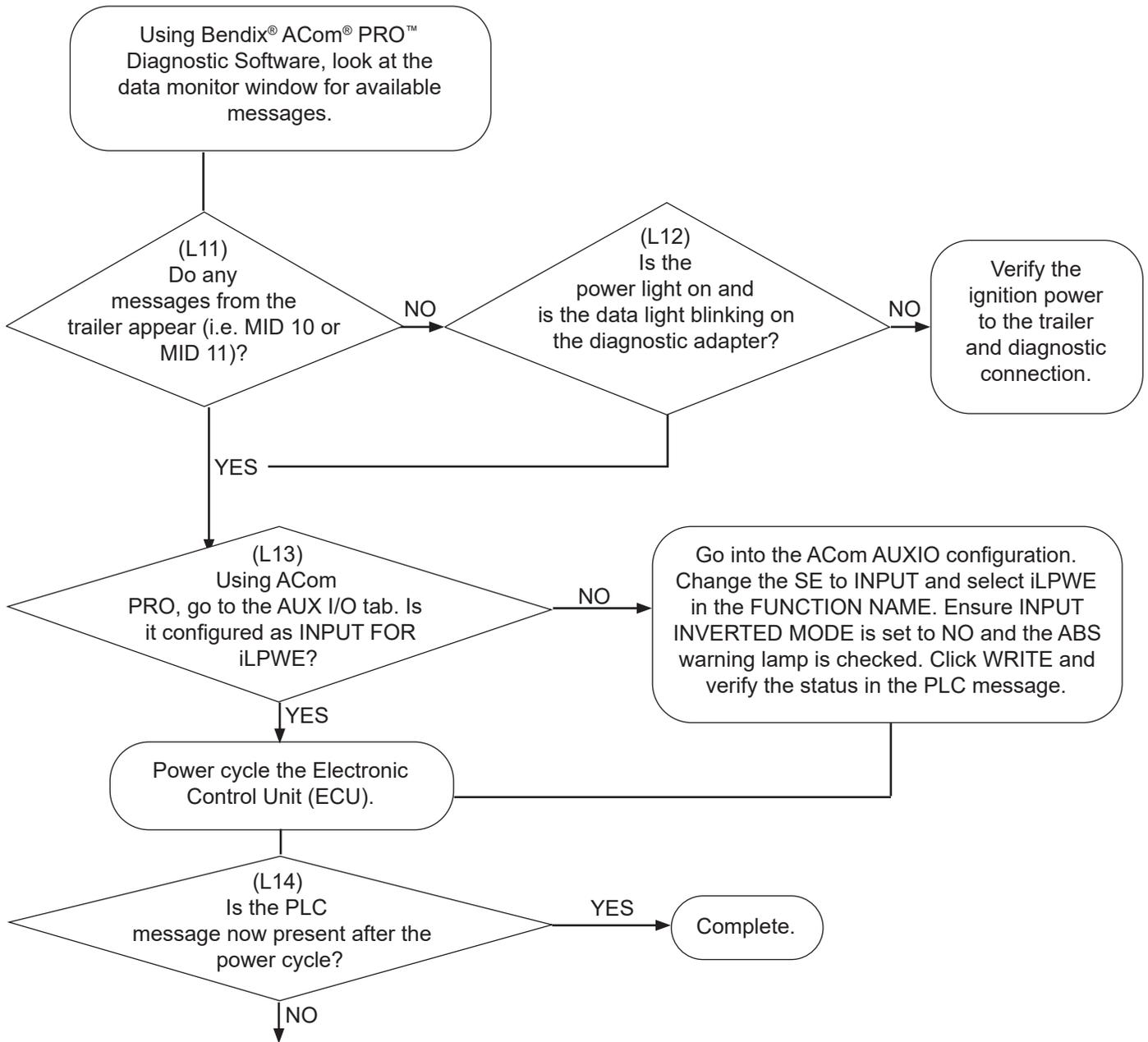
SECTION L: TROUBLESHOOTING LOW PRESSURE WARNING EMERGENCY (LPWE) FEATURE - SCENARIO 2: LOW PRESSURE CONDITION NOT PRESENT (ABOVE 65 PSI WITH NORMALLY OPEN PRESSURE SWITCH), BUT PLC MESSAGE STATUS IS ACTIVE



SECTION L: TROUBLESHOOTING LOW PRESSURE WARNING EMERGENCY (LPWE) FEATURE (CONTINUED) - SCENARIO 2: LOW PRESSURE CONDITION NOT PRESENT (ABOVE 65 PSI WITH NORMALLY OPEN PRESSURE SWITCH), BUT PLC MESSAGE STATUS IS ACTIVE



SECTION L: TROUBLESHOOTING LOW PRESSURE WARNING EMERGENCY (LPWE) FEATURE - SCENARIO 3: PLC MESSAGE IS NOT BROADCASTING



- Go into The Bendix® ACom® PRO™ Diagnostic Software AUXIO configuration.
- Set the SE from INPUT to N/A and click WRITE.
- Change the SE back to INPUT and select iLPWE in the Function Name. Ensure INPUT INVERTED MODE is set to NO, and the ABS warning lamp is checked.
- Click WRITE and verify the status in the PLC message. If the status is still incorrect, contact the Bendix Tech team.

If using a normally closed pressure switch, reverse the logic of the steps above.

SECTION M: TROUBLESHOOTING PAD WEAR (PW) SENSING FEATURE - SCENARIO 1: BRAKE PAD WORN, BUT DIAGNOSTIC TROUBLE CODE (DTC) IS INACTIVE

The following troubleshooting steps are designed to identify issues with the messaging and performance of the Bendix® TABS-8™ Electronic Control Unit (ECU). Additional functionality for the PLC relay unit should also be considered and confirmed as part of these troubleshooting steps.

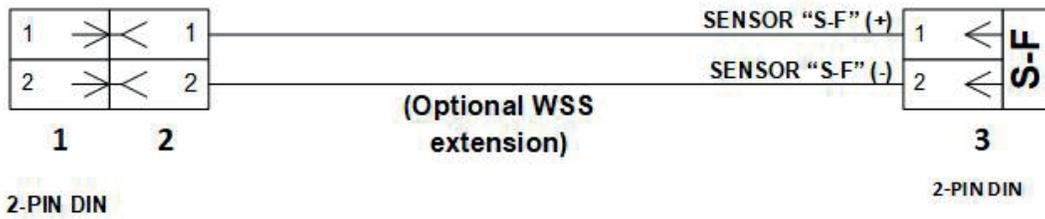
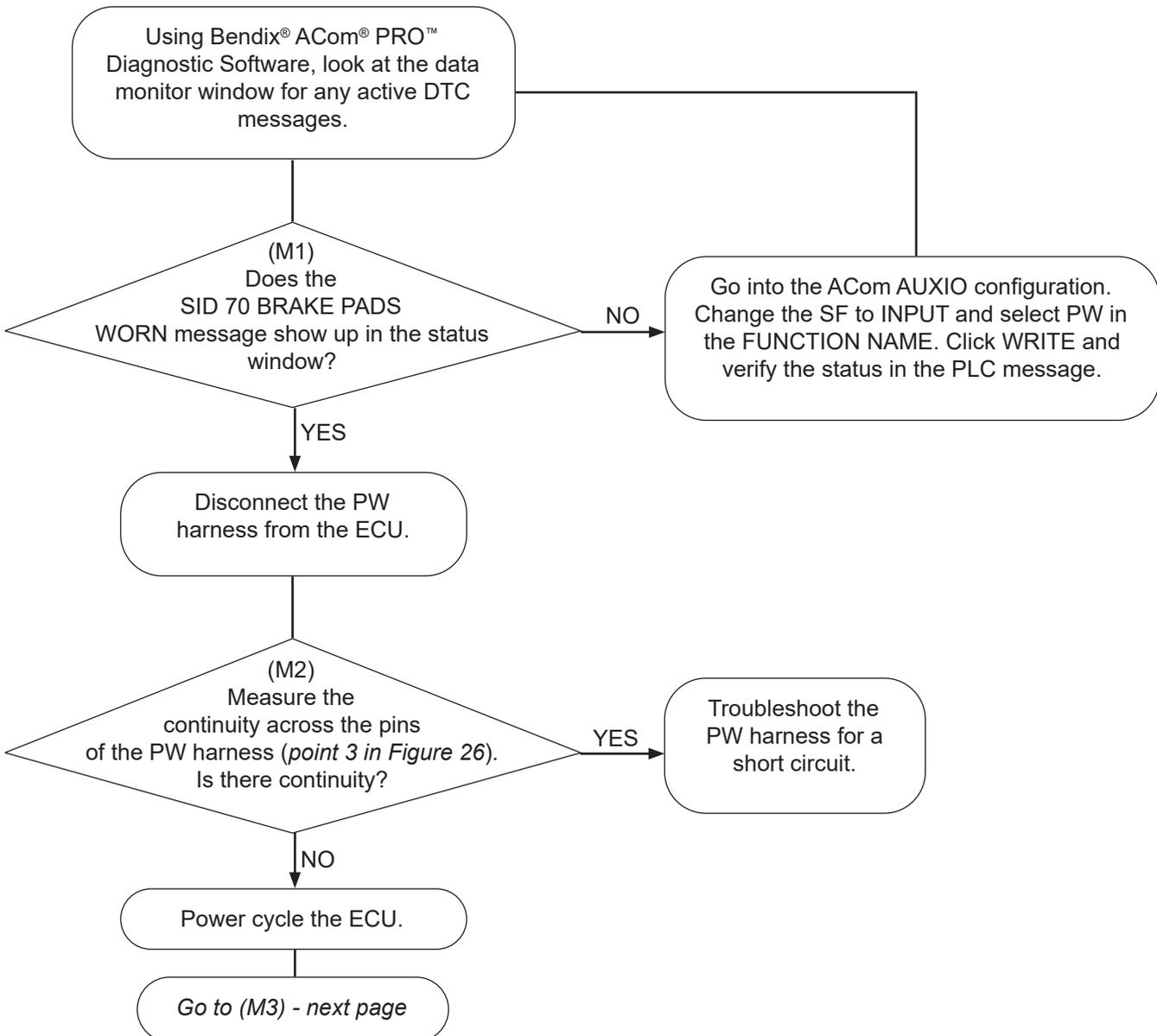
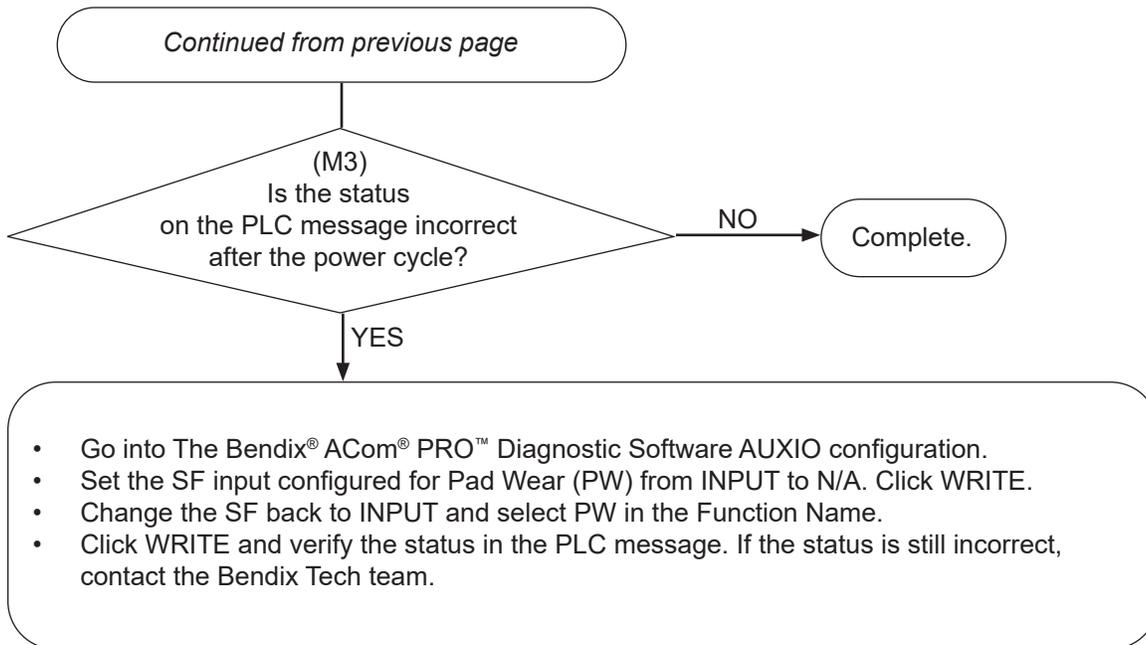


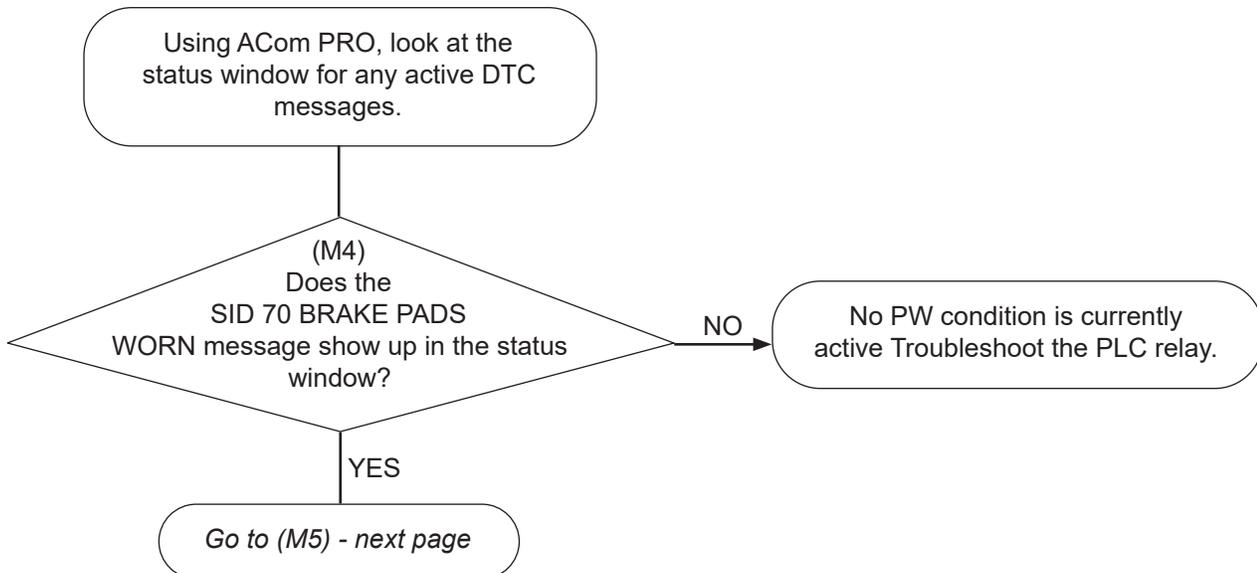
Figure 26 – Pad Wear (PW) Sensing Feature Diagram



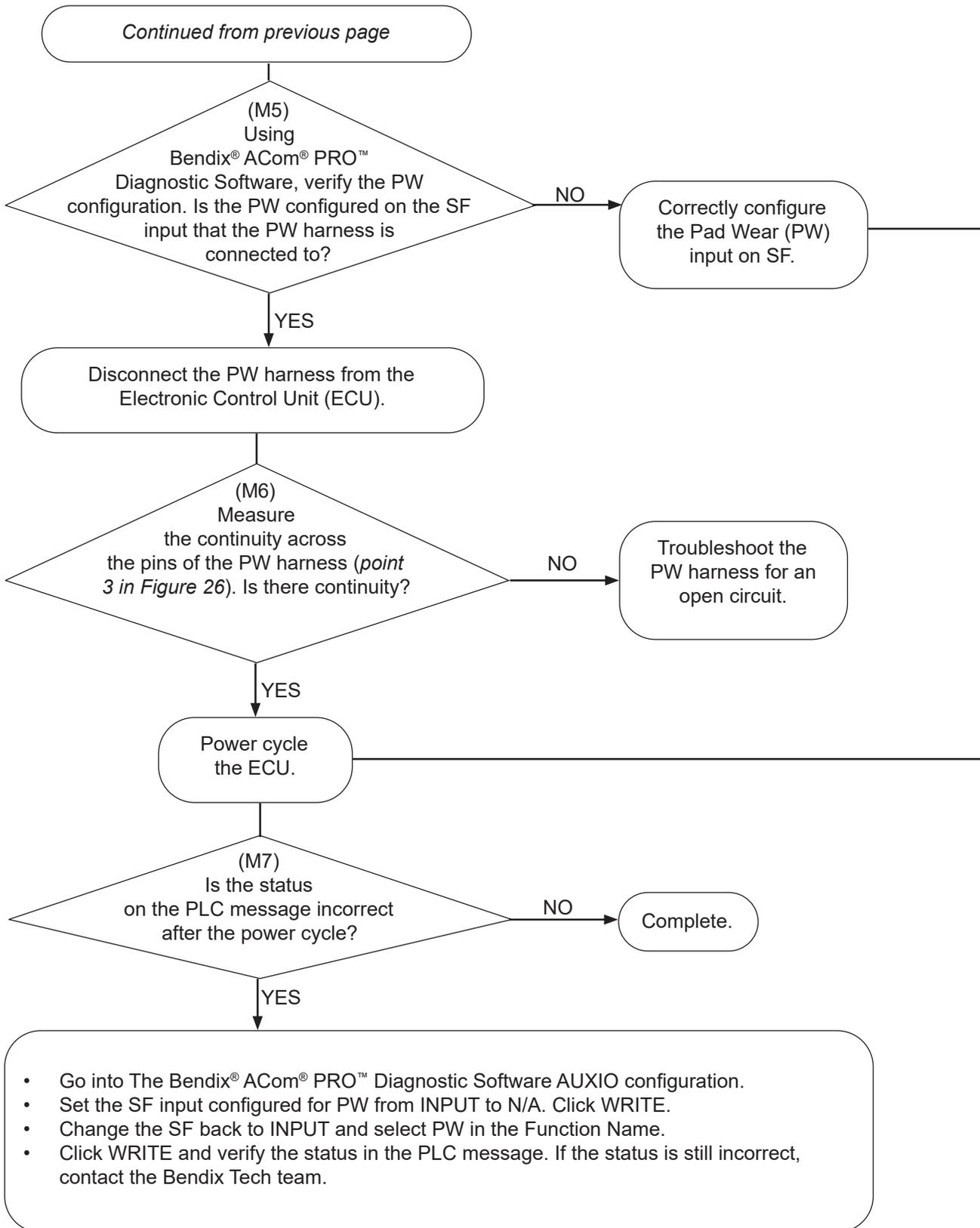
SECTION M: TROUBLESHOOTING PAD WEAR (PW) SENSING FEATURE (CONTINUED) - SCENARIO 1: BRAKE PAD WORN, BUT DIAGNOSTIC TROUBLE CODE (DTC) IS INACTIVE



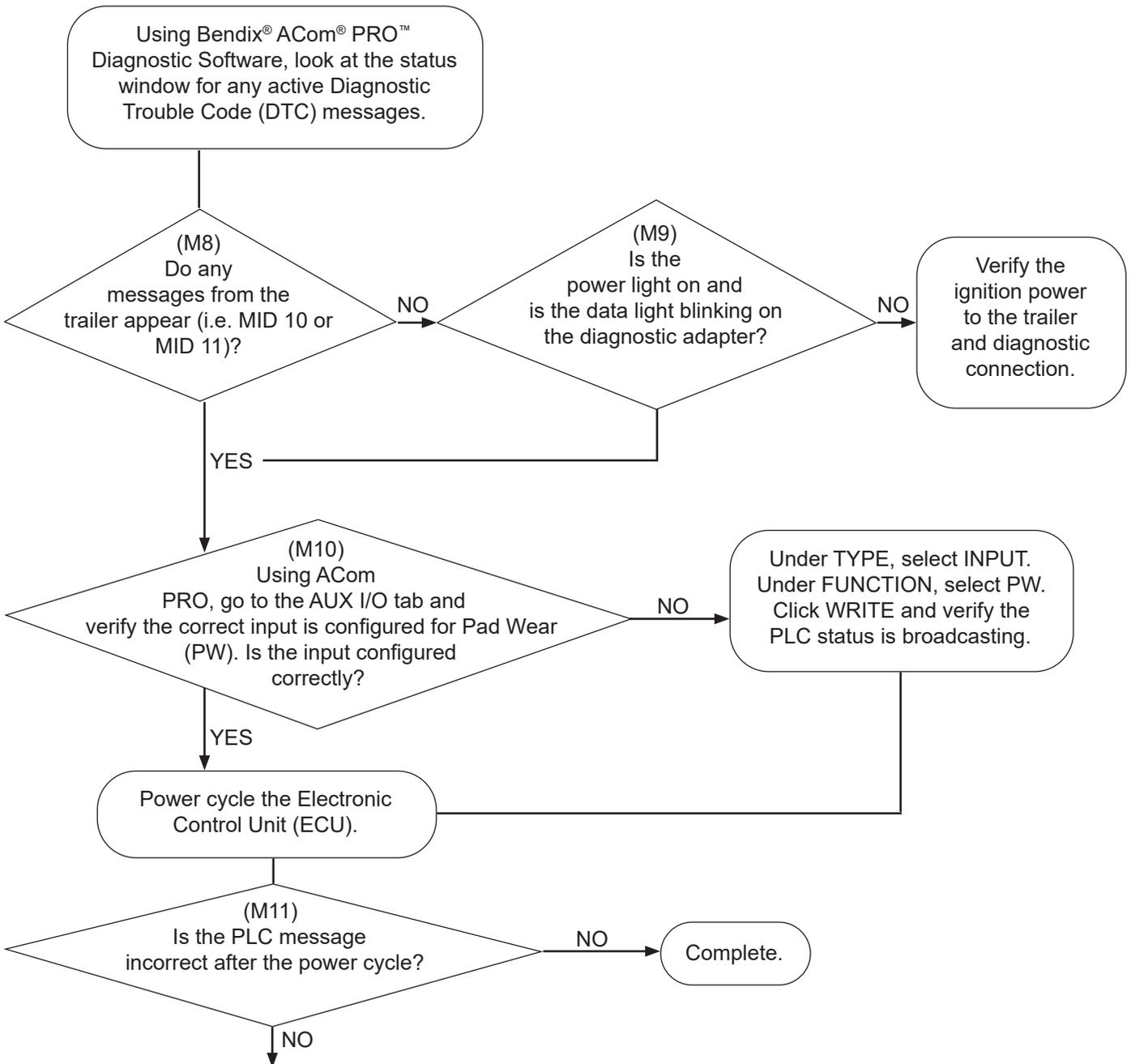
SECTION M: TROUBLESHOOTING PAD WEAR (PW) SENSING FEATURE - SCENARIO 2: BRAKE PAD NOT WORN, BUT DIAGNOSTIC TROUBLE CODE (DTC) IS ACTIVE



**SECTION M: TROUBLESHOOTING PAD WEAR (PW) SENSING
FEATURE (CONTINUED) - SCENARIO 2: BRAKE PAD NOT WORN,
BUT DIAGNOSTIC TROUBLE CODE (DTC) IS ACTIVE**

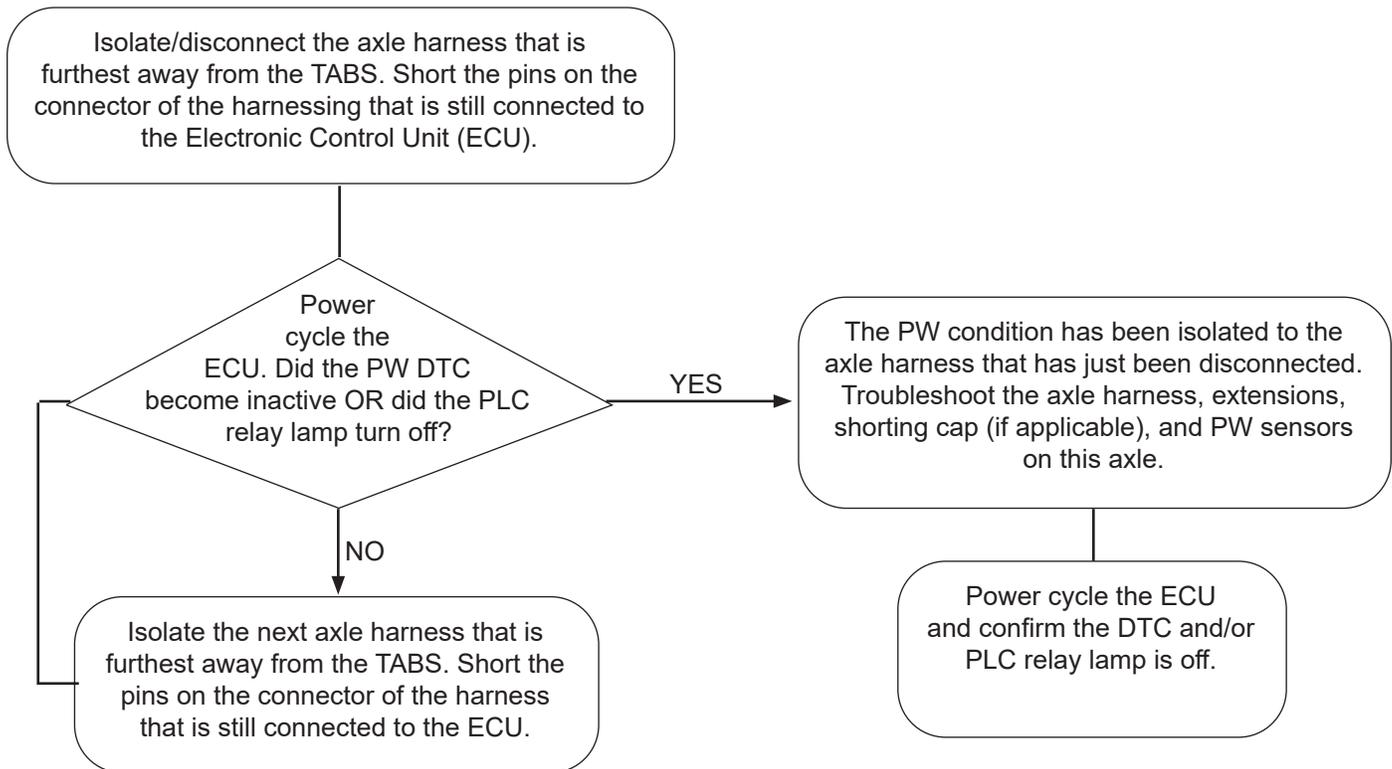


SECTION M: TROUBLESHOOTING PAD WEAR (PW) SENSING FEATURE - SCENARIO 3: PLC MESSAGE IS NOT BROADCASTING



- Go into the ACom PRO AUXIO configuration.
- Set the AUX I/O input configured for PW from INPUT to N/A. Click WRITE.
- Change the AUX I/O back to INPUT and select PW in the Function Name.
- Click WRITE and verify the status in the PLC message. If the status is still incorrect, contact the Bendix Tech team.

SECTION M: TROUBLESHOOTING PAD WEAR (PW) SENSING FEATURE - SCENARIO 4: IDENTIFYING THE SOURCE OF A PW DIAGNOSTIC TROUBLE CODE (DTC)



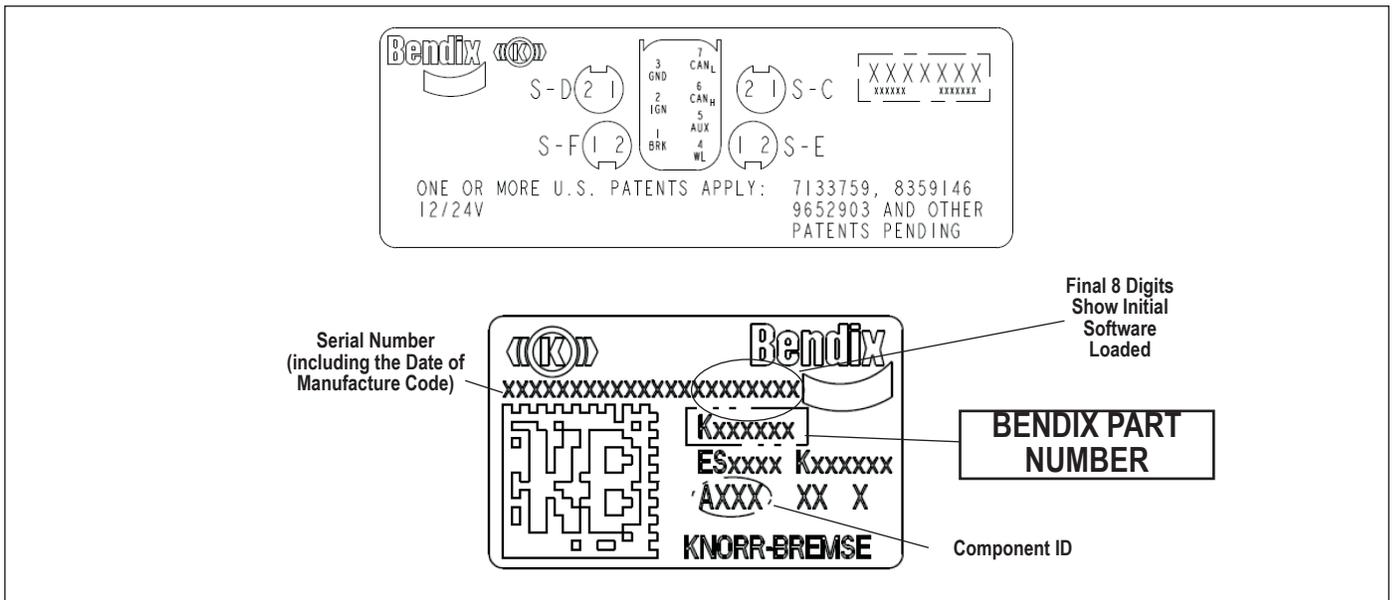


Figure 27 – Label Information

Electronic Control Unit (ECU) Part Number Label

See Figure 27. The external part number label is located above the control port of the Bendix® TABS-8™ Advanced Module. If this label is not readable for any reason, the part number can be read from the Electronic Control Unit (ECU) using Bendix® ACom® PRO™ Diagnostic Software.

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 ACom PRO Diagnostic Software.

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.

- For the Bendix® TABS-6™ Standard and Premium Trailer Antilock Braking System (ABS) Module, use SD-13-4767.
- For the Bendix® Single-Channel TABS-6™ Advanced Module, use SD-13-47671.
- For the Bendix® TABS-6™ Advanced Multi-Channel Trailer ABS Module, use SD-13-47672A.
- For the Bendix® TABS-8™ Advanced Single-Channel Trailer ABS Module, use SD-13-47680.
- For the Bendix® WS-24™ AntiLock Wheel Speed Sensor (WSS), use SD-13-4650.

Part Number Reference Table

Part Number	PART DESCRIPTION
300122N	Cable Retainer Clip
802165	Trailer Remote Diagnostic Unit (TRDU) 7-pin Adapter
K101595	Trailer Remote Diagnostic Unit (TRDU) Kit with 7-pin Adapter
K139901	Bendix® TABS-6™ Brake Pad Wear Axle Harness
K142194	Pressure Switch - Normally Open
K148792	Wiring Harness Shorting Cap Assembly
K192258	In-pad Wear Sensing Wiring Harness - Supply Line
K215624	Bendix® TABS-8™ Advanced Pigtail - Power Only
K216784	Bendix® TABS-8™ Advanced Pigtail - Low Pressure Warning Emergency (LPWE)
K216787	Bendix® TABS-8™ Advanced Pigtail - Tire Inflation System (TIS)

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