

TLV-9000™ Lift Axle Valve

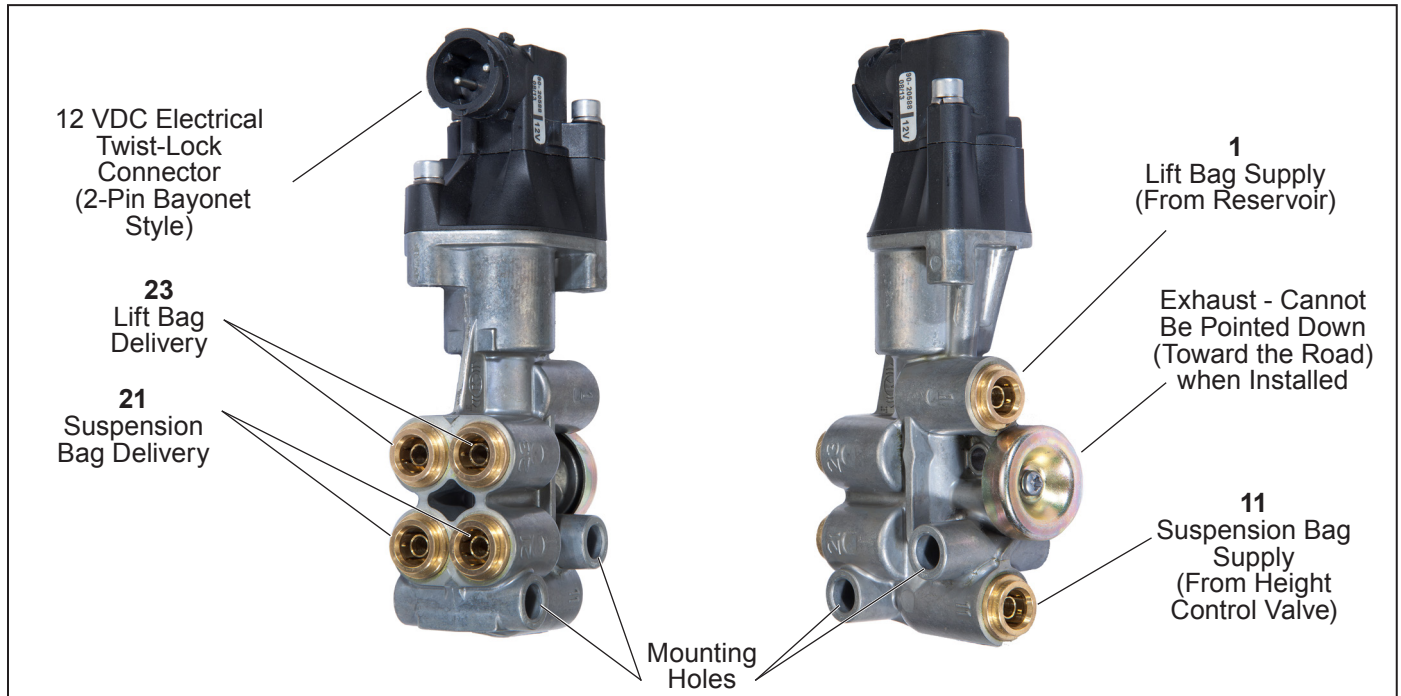


Figure 1 – TLV-9000™ Lift Axle Valve

DESCRIPTION

The TLV-9000™ lift axle valve is used on trailers or vehicles with Bendix® TABS-6™ Advanced single- and multi-channel systems to control the lift axle(s) raising and lowering automatically. This allows the vehicle to use extra axle(s) when required for payload distribution and to be unloaded to save on wheel-end wear and fuel economy.

The lift axle contains a solenoid for electronic switch lifting and lowering actuation. The lift axle valve contains 3/8" push-to-connect fittings for easy installation. Refer to Table 1 for port identification and other valve characteristics.

Port / Function	Embossed ID	Port Size	Quantity
Lift Bag - Supply	1	3/8"	1
Suspension Bag - Supply	11	3/8"	1
Lift Bags - Delivery	23	3/8"	2
Suspension Bags - Delivery	21	3/8"	2
Exhaust	-	-	1
Connector: DIN72585-A1-2.1			
Weight: 1.2 lbs.			
Operating Pressure: 145 psi Max			
Operating Temperature: -40° – 200°F			

Table 1 – TLV-9000 Lift Axle Valve Characteristics



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, or a Bendix® AD-9si® 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.

OPERATION

The TLV-9000™ lift axle valve is a 5/2 way (5 ports and 2 flow positions) electro-pneumatic valve that directionally controls the raising and lowering of the lift axle via an electronic signal from the Bendix® trailer ABS/TRSP (Antilock Braking System/Trailer Roll Stability Program) Electronic Control Unit (ECU) based on pressure sensing. The valve allows the lift axle to be raised and lowered via a 12 VDC command using a standard wiring harness to either exhaust the suspension bags and fill the lift bags or exhaust the lift bags and fill the suspension bags.

The valve, while in a non-voltage applied state, delivers supply pressure to the suspension bags only, providing a ground position for the lift axle. When the lift axle is in the down position, an internal piston prevents pressure from being applied to the lift bags with its circuit open to exhaust. *Refer to Figures 2 and 5.*

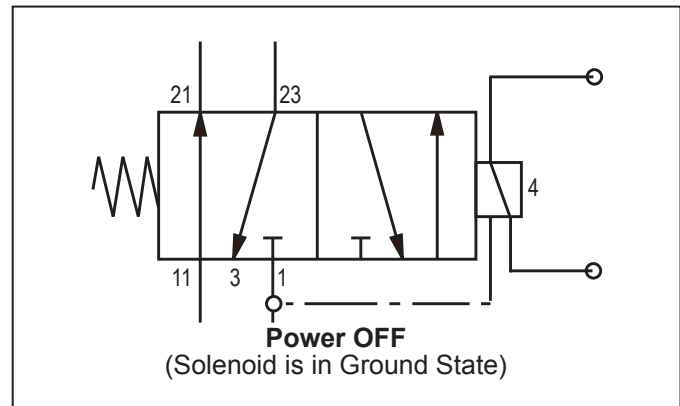


Figure 2 – Suspension Delivery Position (Lift Axle Down and in Normal State)

In the applied voltage state, the valve's solenoid opens and allows air pressure to compress the internal piston spring changing the operation of the valve. During this function, the piston redirects the pressure from the suspension bags and now delivers pressure to the lift bags. The suspension bag circuit opens to exhaust and the lift axle is now in the raised position. *Refer to Figures 3 and 6.*

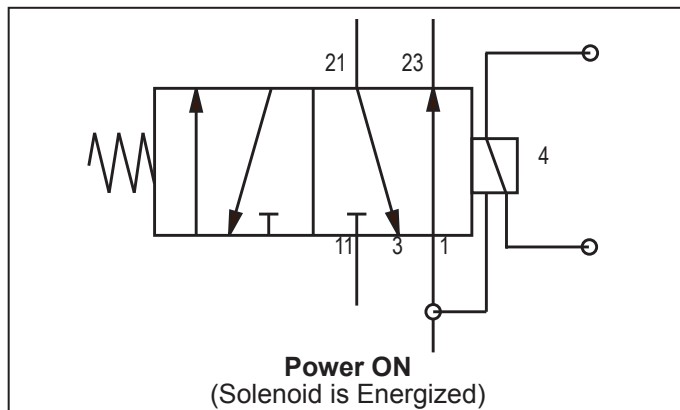


Figure 3 – Lift Bag Delivery Position (Lift Axle in Raised State)

← FRONT

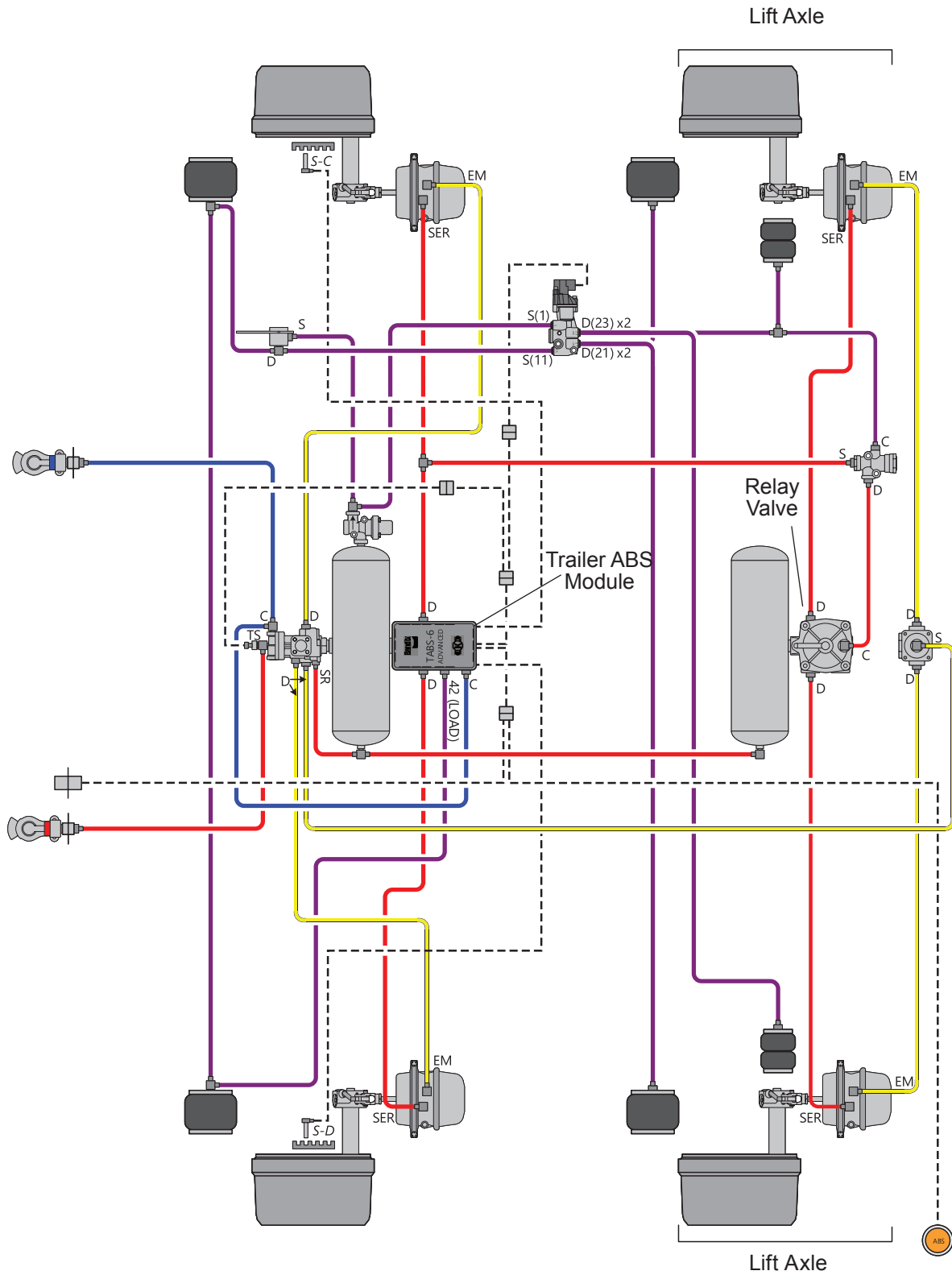


Figure 4 – Typical Trailer Air Brake System with a TLV-9000™ Lift Axle Valve

Suspension Bags Filled, Lift Bags Exhausted

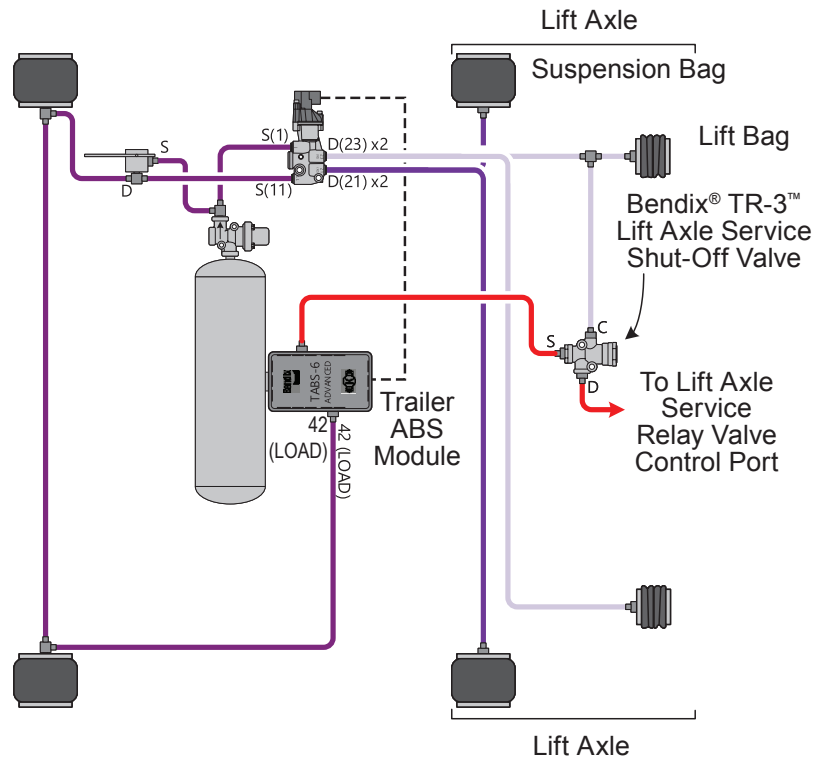


Figure 5 – Normal Operation

TLV-9000™ Valve Lifts the Axle by Exhausting the Suspension Bags & Filling the Lift Bags

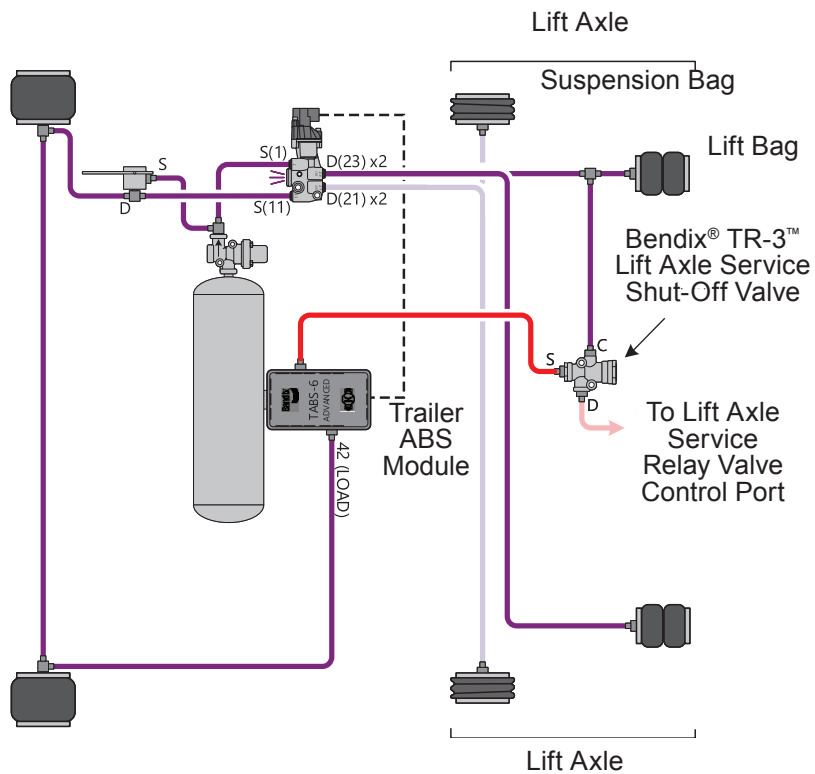


Figure 6 – Lift Operation

TLV-9000™ Valve Fills the Suspension Bags & Exhausts the Lift Bags

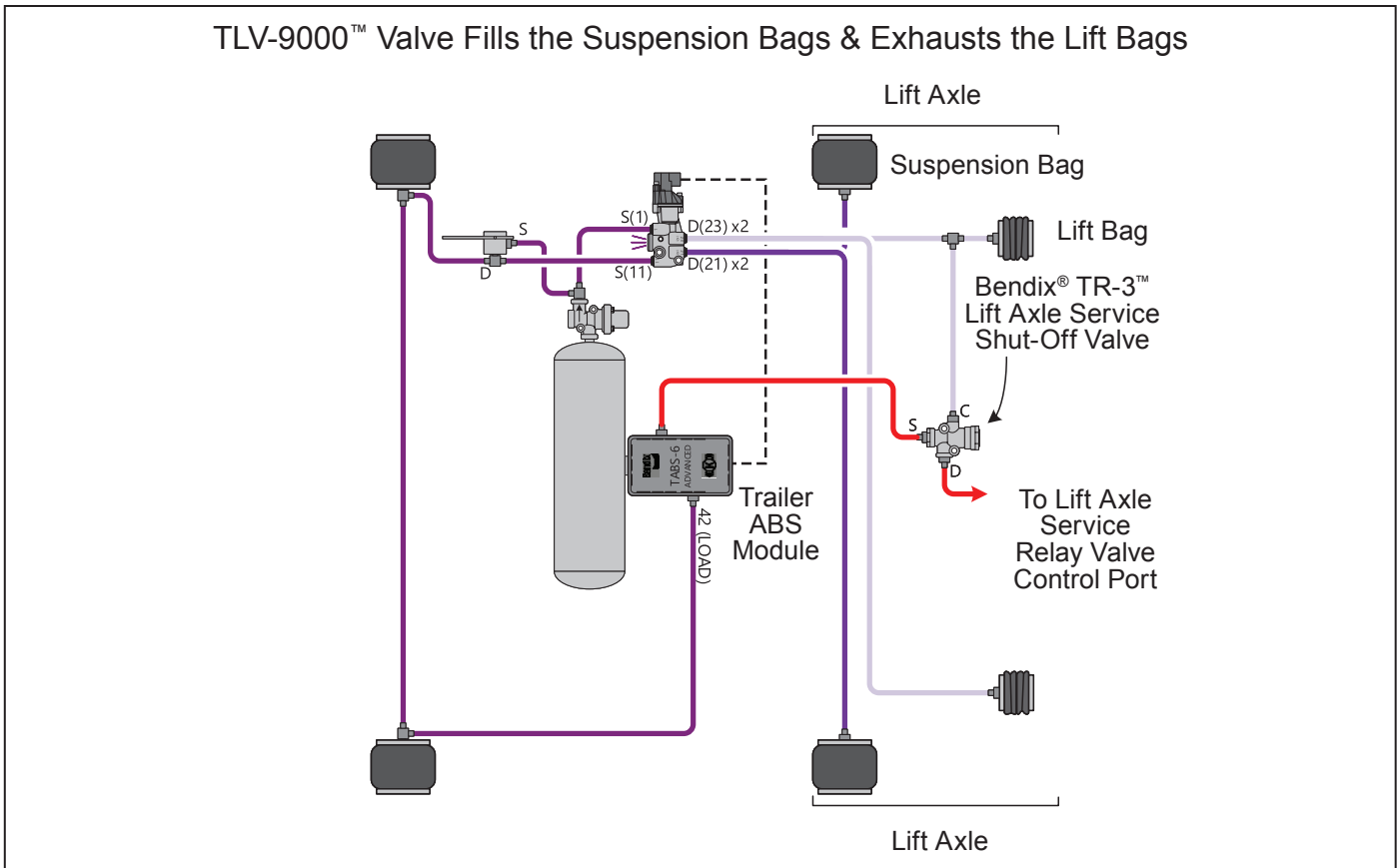


Figure 7 – Return to Normal Operation

MANUAL OVERRIDE FEATURE

The TLV-9000™ lift axle valve is controlled by the Bendix® trailer ABS/TRSP ECU, via a wiring harness, to provide lift axle operation based on load sensing logic programmed into the ECU. During normal operation the driver does not control the lift axle. For drop-axle control Bendix offers a manual override harness available from any authorized service parts outlet. Refer to Figure 8.

The override harness can simply be connected to the existing lift axle wiring harness to manually complete the electrical ground loop circuit. This function allows the driver to drop the lift axle when desired (as opposed to load sensing) and remain on the ground as long as the switch is activated. When the switch is deactivated, the axle will only raise if the trailer payload is under the weight requirement (normal load sensing operation). The switch is provided by trailer OEM only.

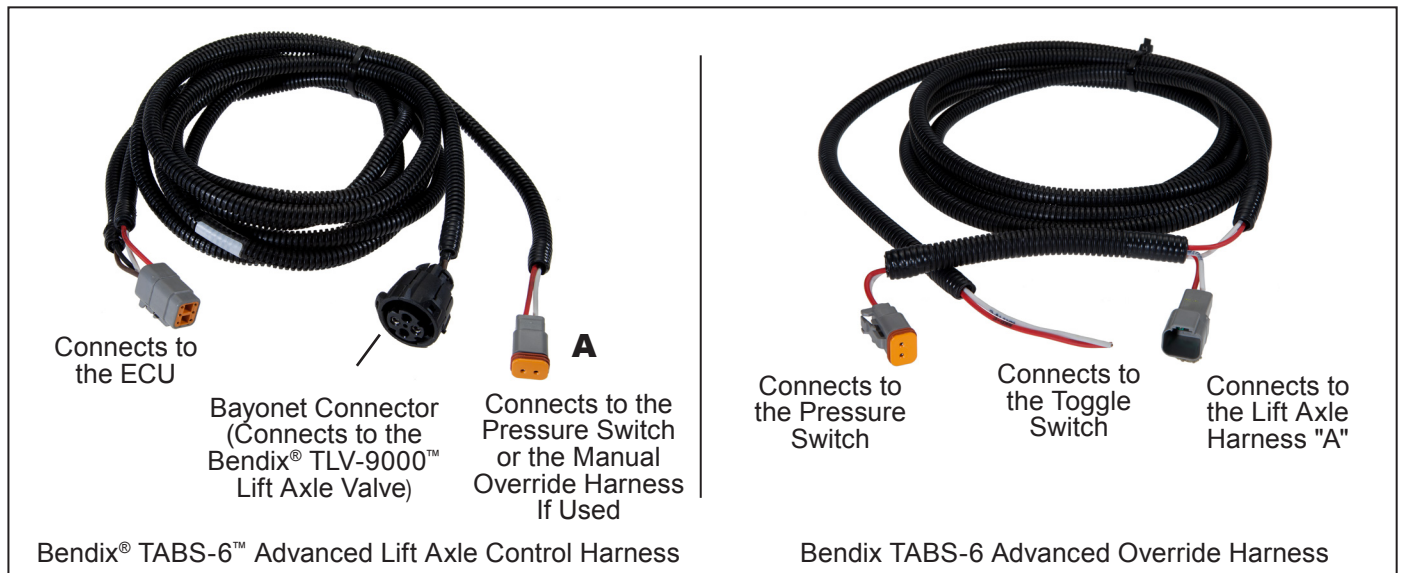


Figure 8 – Wire Harnesses

SYSTEM DIAGRAM

Figure 4 shows a trailer air-brake schematic of a single lift axle controlled by the TLV-9000™ lift axle valve. The lift axle valve operation is electronically controlled with Bendix® TABS-6™ Advanced by using a load (pressure) sensor to indicate payload weight and a leveling valve to control the suspension height.

The valve has two air supply (inlet) ports and four air delivery (outlet) ports. One supply port is the suspension supply (Port 11) and the second is the lift supply (Port 1). The valve has two ports for each delivery; Ports 21 deliver to each suspension bag and Ports 23 deliver to each lift bag. The exhaust port is located on the side of the valve between the two supply ports and allows the lift bags and suspension bags to exhaust. Refer to Table 1 and Figures 1 and 5.

INSTALLATION REQUIREMENT

For proper TLV-9000 valve and lift axle performance, the recommended tubing size from the reservoir pressure protection valve to the S1 supply port shall be 3/8" O.D. (1/4" I.D.) copper or non-metallic per SAE J844, and maintained as such without reductions. Any restrictions in the supply line (including fittings) may delay or prevent the valve from operating as designed.

PREVENTIVE MAINTENANCE

Important: Review the *Bendix Warranty Policy* before performing any intrusive maintenance procedures. A warranty may be voided if intrusive maintenance is performed during the warranty period.

No two vehicles operate under identical conditions; as a result, maintenance intervals may vary. Experience is a valuable guide in determining the best maintenance interval for air supply system components. At a minimum, the TLV-9000 valve should be inspected every 6 months

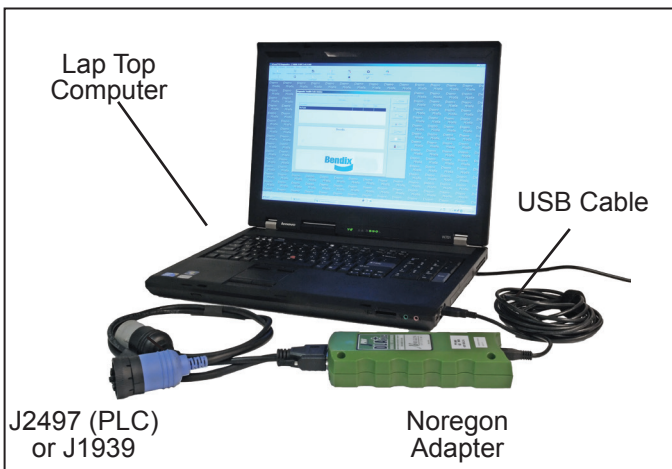


Figure 9 – Laptop Computer with Bendix® ACom® Diagnostic Software

or 1500 operating hours, whichever comes first, for proper operation. Should the TLV-9000 valve not meet the elements of the operational tests noted in this document, further investigation and replacement of the valve may be required.

SERVICE

The TLV-9000 lift axle valve sold in North America is non-serviceable. See your authorized Bendix service parts outlet for a replacement valve or wiring harness, if needed.

OPERATIONAL AND LEAKAGE TESTS

There are two methods of performing operational and leakage tests for the TLV-9000 lift axle valve. The first method can be performed using Bendix® ACom® diagnostic software (which can be downloaded from bendix.com) and the second can be completed by manually testing the valve.

1 - TESTING WITH ACOM DIAGNOSTIC SOFTWARE

ACom diagnostic software (version 6.17.4.3 or higher) is an RP-1210 compliant, PC-based diagnostic software program that provides the highest level of diagnostic support for the air brake systems that use the Bendix® TABS-6 Advanced MC™ module. With Bendix ACom diagnostic software, maintenance personnel can:

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

Connect the computer's serial or parallel port to the vehicle's diagnostic connector through an RP-1210 compliant communications device.

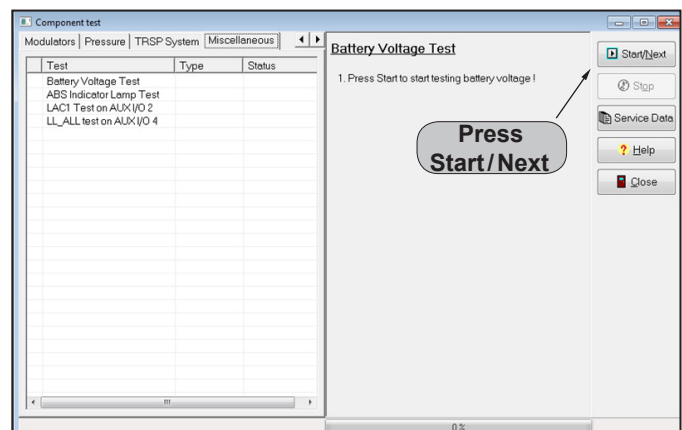


Figure 10 – Bendix ACom Start Screen

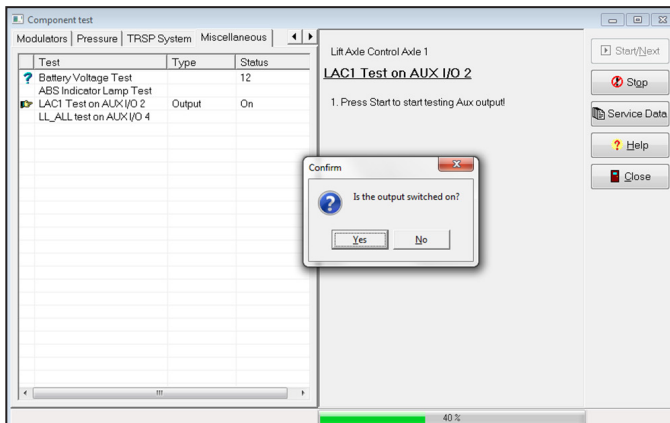


Figure 11 – Testing Aux Output with the Switch On

Launch the Bendix® ACom® diagnostic software program and select component test, LAC1 Test on Configured AUX I/O, to perform functionality/operational checks or diagnose lift axle issues. For general override, select LL_ALL Test on Configured AUX I/O. Refer to Figure 10.

This test will confirm if power is applied to the source. If the output switch is not on, disconnect the electrical connector from the lift axle valve and manually apply 12 VDC to determine if the problem indicates electrical wiring or the TLV-9000™ lift axle valve. For troubleshooting information refer to the Bendix® TABS-6™ Advanced Service Data Sheet referenced in this document. Refer to Figure 11.

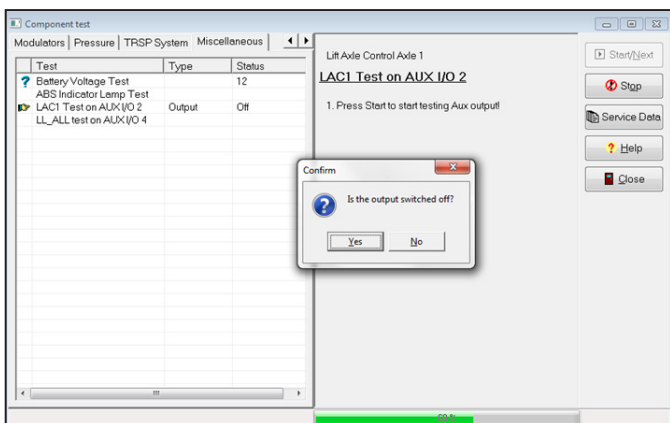


Figure 12 – Testing Aux Output with the Switch Off

The next test will confirm if the power output is turned off at the source. Refer to Figure 12.

A check mark next to the test description indicates a successful test completion. Refer to Figure 13.

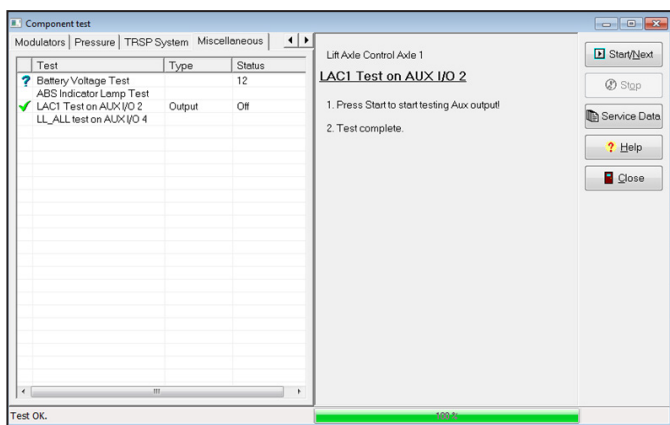


Figure 13 – Test Complete

2 - MANUAL (NON-SOFTWARE) METHOD OF TESTING VALVE OPERATION

1. Block the vehicles wheels and fully charge the tractor and trailer air system. The trailer must not be loaded for this test.
2. Apply the vehicle parking brakes.
3. With the wiring harness disconnected from the TLV-9000 lift axle valve, disconnect both air lines from the lift bag delivery ports (Ports 23) and install test plugs into the fittings. Apply a soap solution around the opening of the exhaust port and check for leakage. Leakage must not exceed a one (1) inch bubble in less than five (5) seconds around the exhaust seal.
4. Remove the test plugs and reconnect both air lines back to the lift bag delivery ports (Ports 23). Apply power (12 VDC) via a separate power supply to the TLV-9000 valve. The lift axle must rise to the desired position.
5. With the lift axle in the raised position, disconnect both air lines from the suspension bag delivery ports (Ports 21) and install test plugs into the fittings. Apply a soap solution around the opening of the exhaust port and check for leakage. Leakage must not exceed a one (1) inch bubble in less than five (5) seconds around the exhaust seal.
6. Remove the test plugs and reconnect both lines back to the suspension bag delivery ports (Ports 21). Turn off the power to the TLV-9000 lift axle valve. The lift axle should return to its original position.

If the valve does not function as described; or if leakage is excessive, replace the valve.

TROUBLESHOOTING

For situations with the TLV-9000™ lift axle valve that result in the lift axle stuck in either the raised or lowered position, please refer to the following Bendix Service Data sheets available at bendix.com:

SD-13-47671 (Bendix® TABS-6™ Advanced Single Channel) - Sections G and H

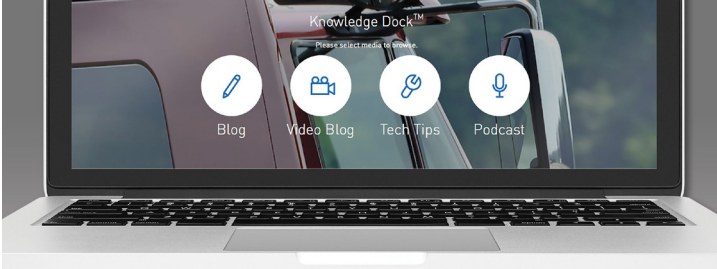
SD-13-47672 (TABS-6 Advanced Multi Channel) - Sections H and J

REMOVAL

1. Identify and mark or label all air lines and their connections to the TLV-9000 lift axle valve. Then disconnect the air lines and the electrical connector.
2. Remove the TLV-9000 valve from the vehicle. Retain the mounting hardware.

INSTALLATION


1. Install the TLV-9000 valve on the vehicle frame using the two M8 x 60 screws that were retained in the removal process. Torque to 19 ft-lbs.
2. Reconnect all air lines to the valve using the identification made during removal.
3. Test all air fittings for leakage. Also, perform OPERATIONAL AND LEAKAGE TESTS before placing the vehicle back into service.



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