BENDIX

Installation Instructions

Bendix® Lift Axle Control Retrofit Kit Contents

Key No	Item Description	Without Park Brake Override		With Park Brake Override			With Park Brake Override and Manual Override		
		Bendix®	WABCO/ Haldex	Bendix	Hendrickson	WABCO/ Haldex	Bendix	Hendrickson	WABCO/ Haldex
		K134533	K134538	K134534	K134531	K134536	K134535	K134532	K134537
1	TLV-9000™ Lift Valve	✓	–	✓	–	–	✓	–	–
2	Wire Harness	✓	✓	–	–	–	–	–	–
3	Wire Harness	–	–	✓	✓	✓	✓	✓	✓
4	Pressure Switch	–	–	✓	✓	✓	✓	✓	✓
5	Override Harness	–	–	–	–	–	✓	✓	✓
6	Warning Label	✓	✓	✓	✓	✓	✓	✓	✓

Figure 1 – Lift Axle Control Kit Contents

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.

⚠ WARNING

Bendix safety technologies complement safe driving practices. No commercial vehicle safety technology replaces a skilled, alert driver exercising safe driving techniques and proactive, comprehensive driver training. Responsibility for the safe operation of the vehicle remains with the driver at all times.

⚠ WARNING

Before installing an automatic lift axle system, check Department of Transportation (DOT) regulations for all areas where the vehicle will be operated to determine all applicable weight restrictions for the specific vehicle configuration.

Table of Contents

KIT DESCRIPTION

This instruction sheet covers various lift axle control kits as shown in Figure 1. There are three different types of kits shown that contain the electrical components necessary to complete the electrical wiring connections. Kit contents vary depending upon the functionality desired and the lift axle valve (1) to be used.

Important Note: These installation instructions address field installation and the configuration of Bendix® Lift Axle Control for trailers already equipped with Bendix® TABS-6™ Advanced Single-Channel/TABS-6 Advanced Multi-Channel ABS and an operational single lift axle. If TABS-6 Advanced/TABS-6 Advanced Multi-Channel or a lift axle are not installed on the trailer, that must be done first by an appropriate aftermarket installer. It is the responsibility of the trailer OEM or aftermarket installer to inspect all lift axle components for damage and make any necessary repairs before installing lift axle automation components. **For TABS-6 Advanced 2S/1M,** the lift axle should not be equipped with wheel speed sensors. **For TABS-6 Advanced 4S/2M, only wheel speed sensors SE and SF can be on the lift axle.** The electrical connectors for the wheel speed sensors, SE and SF, are identified on the controller body. It is recommended that the installer download the appropriate service data sheet for the Bendix® ABS Trailer Roll Stability Program (TRSP) Electronic Control Unit (ECU) that will control the lift axle, prior to the installation from bendix.com Document Library.

TABS-6 Advanced Single-Channel Trailer ABS Module *Service Data Sheet SD-13-47671.*

TABS-6 Advanced Multi-Channel Trailer ABS Module *Service Data Sheet SD-13-47672.*

BASIC AUTOMATIC LIFT AXLE OPERATION

The Bendix® TABS-6™ Advanced/TABS-6 Advanced MC™ Trailer ABS system ECU has the ability to continuously monitor suspension air bag pressure to: determine trailer loading and automatically raise a lift axle whenever the remaining axles can

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> ### ⚠ WARNING
>
> **If the axle is in the up position, at any time the axle may drop with loss of power or air to the unit!! Take precautions so the axle is secured if it is in the up position!**

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support the load; or lower it, when necessary, without unwanted raising or lowering due to dynamic weight changes.

Lift axle will be UP if _BOTH_ of these conditions exist:

Loading conditions are such that the remaining axles on the ground are not overloaded.

AND

The park brake is **OFF** (if configured for lift lower override), and the optional override switch is open (not active).

The axle will be DOWN if _ANY_ of these conditions exist:

• Loading conditions are such that the remaining axles on the ground would be overloaded if the axle were lifted;
• The park brake is engaged (automatically lowers when the park brake is engaged if configured for lift lower override);
• The trailer is not powered;
• The trailer air supply is insufficient to raise the axle; or
• The optional override switch is closed (active)

NOTE: The default position of the lift axle is down.

OPTIONAL LIFT AXLE CONTROL FUNCTIONALITY

Three different levels of functionality are available with Bendix® lift axle control. Different parts kits are required for the features desired.

Lift Axle Control Without Park Brake Override

With this configuration, the axle will be lifted if loading conditions are such that axles remaining on the ground will not be overloaded regardless of whether the trailer is parked or not.

Lift Axle Control With Park Brake Override

This option uses a normally-closed pressure switch in the park brake air circuit to sense that the parking brake is applied to automatically lower the lift axle and keep it lowered while the vehicle remains parked, regardless of trailer load.

Lift Axle Control With Park Brake Override and Manual Override

This option adds a manual driver-activated switch in parallel with the pressure-switched park brake override function, which **allows the driver to lower the lift axle at any time regardless of trailer load.**

NOTE: This option does not allow manual lifting of the lift axle.

ADDITIONAL FEATURES AVAILABLE FROM BENDIX (SOLD SEPARATELY)

Axle-Up Indicator Light

A retrofit kit (*Bendix Part No. K115648*) is available to add a trailer-mounted indicator light to signal the driver when the lift axle is in the raised position. Lift axle lift bag pressure is monitored to provide a true indication of lift axle position. This feature is compatible with both manual and automatic lift axles.

Service Brake Override

Additional components are available from Bendix to add a service brake override function so lift axle service brakes do not apply when the axle is up. If this feature is desired, the additional components required should be installed before installing the automatic lift axle control retrofit kit.

COMPONENT INSTALLATION AND PLUMBING

NOTE: All air lines and fittings required to plumb system components during installation of this kit are the responsibility of the installer.

It is the responsibility of the trailer manufacturer or aftermarket installer to inspect all lift axle components prior to installation on the vehicle for any external damage, such as damaged harnesses, pressure switches or electro-pneumatic valves. Any components found to be damaged should not be installed on the vehicle and must be replaced. *Refer to Figure 1 for the kit contents and component identification.*

Lift Valve Installation

The TLV-9000™ lift axle valve (1) replaces the existing manual lift valve, and should be installed in the same location in a vertical orientation with the solenoid on top. Plumb according to the air connections shown in Figure 2.

Detailed lift axle valve installation instructions can be found in *Bendix® Service Data Sheet SD-03-3430*.

NOTE: If a non-Bendix lift valve is to be used, see the valve manufacturer's instructions for proper installation of the valve.

WARNING LABEL

The warning label (6) included in this kit should be placed in clear view – near eye level – on the under side of the trailer directly above the lift axle, if possible. After the label (6) is placed on the trailer, using a permanent marker, add the installation date and weight where the axle will lower. *See Figure 3.*
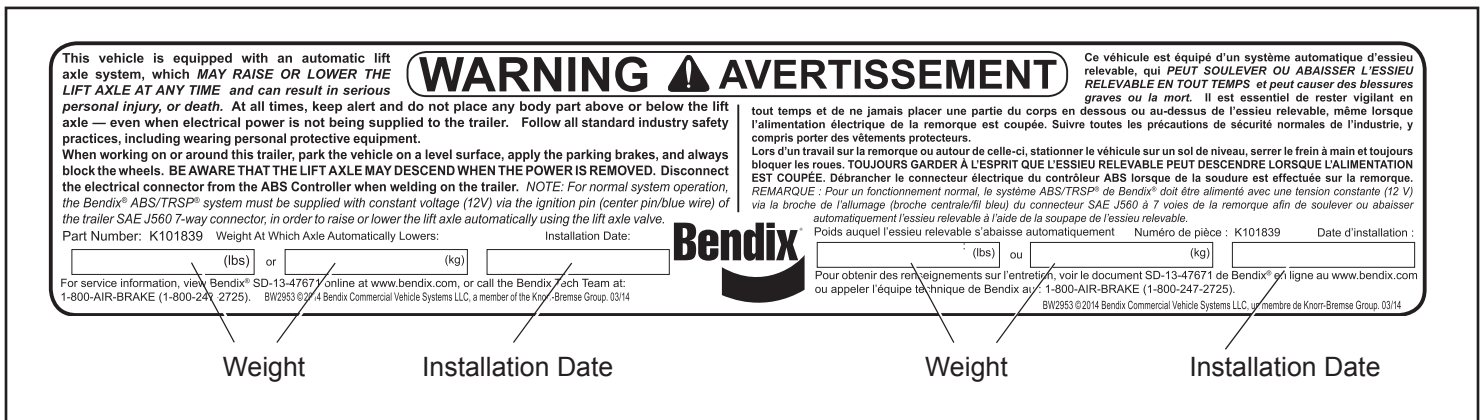

23 Delivery
21 Delivery
1 Supply
11 Supply

TLV-9000™ Lift Axle Valve Air Connections:

Port S1 – Lift Bag Supply (from reservoir)

Port S11 – Suspension Bag Supply
                    (from height control valve)

Port D23 (x2) – Two lines to lift axle lift bags

Port D21 (x2) – Two lines to lift axle suspension air bags

Figure 2 – Air Connections

Weight   Installation Date   Weight   Installation Date

Figure 3 – Warning Label

WIRING INSTALLATION

Locate the diagram for the kit being installed to determine wiring harnesses locations. Route and secure harnesses in accordance with standard practices.

All diagrams show Bendix® TABS-6™ Advanced. The wiring diagram is the same for systems using Bendix® TABS-6™ Advanced MC.

NOTE: All electrical connectors should be greased with dielectric grease to prevent contamination or corrosion. Prior to any painting being done, exposed connectors should be masked with tape or otherwise protected.
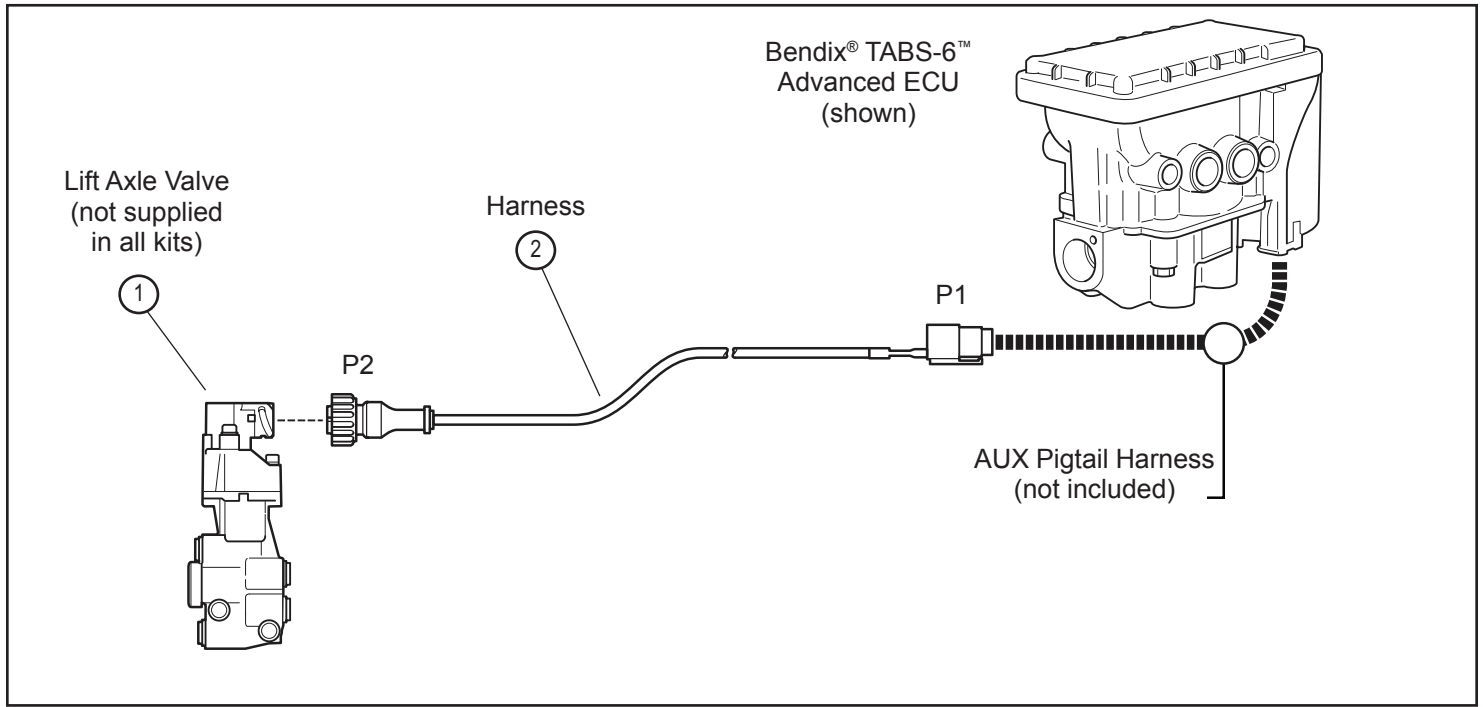
Figure 4 – Lift Axle Control Without Park Brake Override
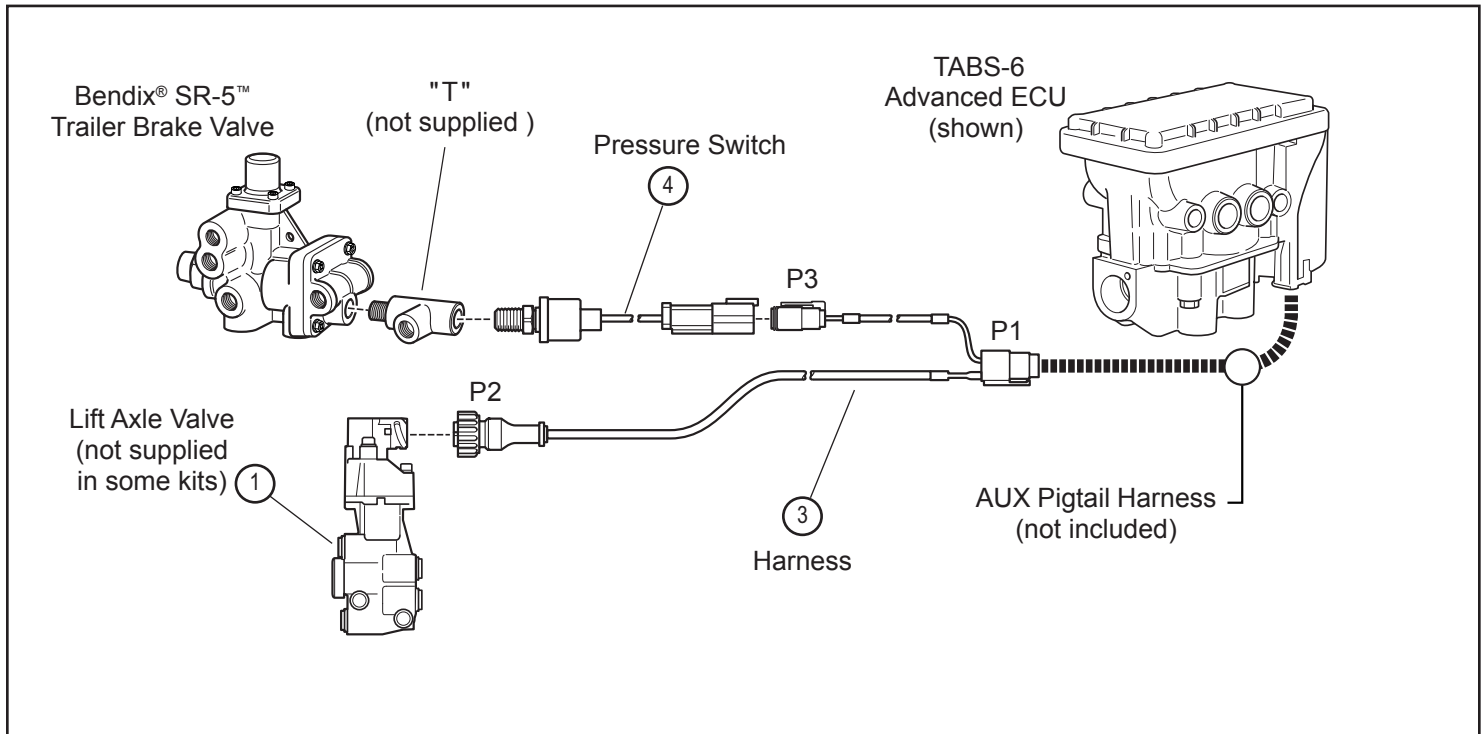
Figure 5 – Lift Axle Control With Park Brake Override

5
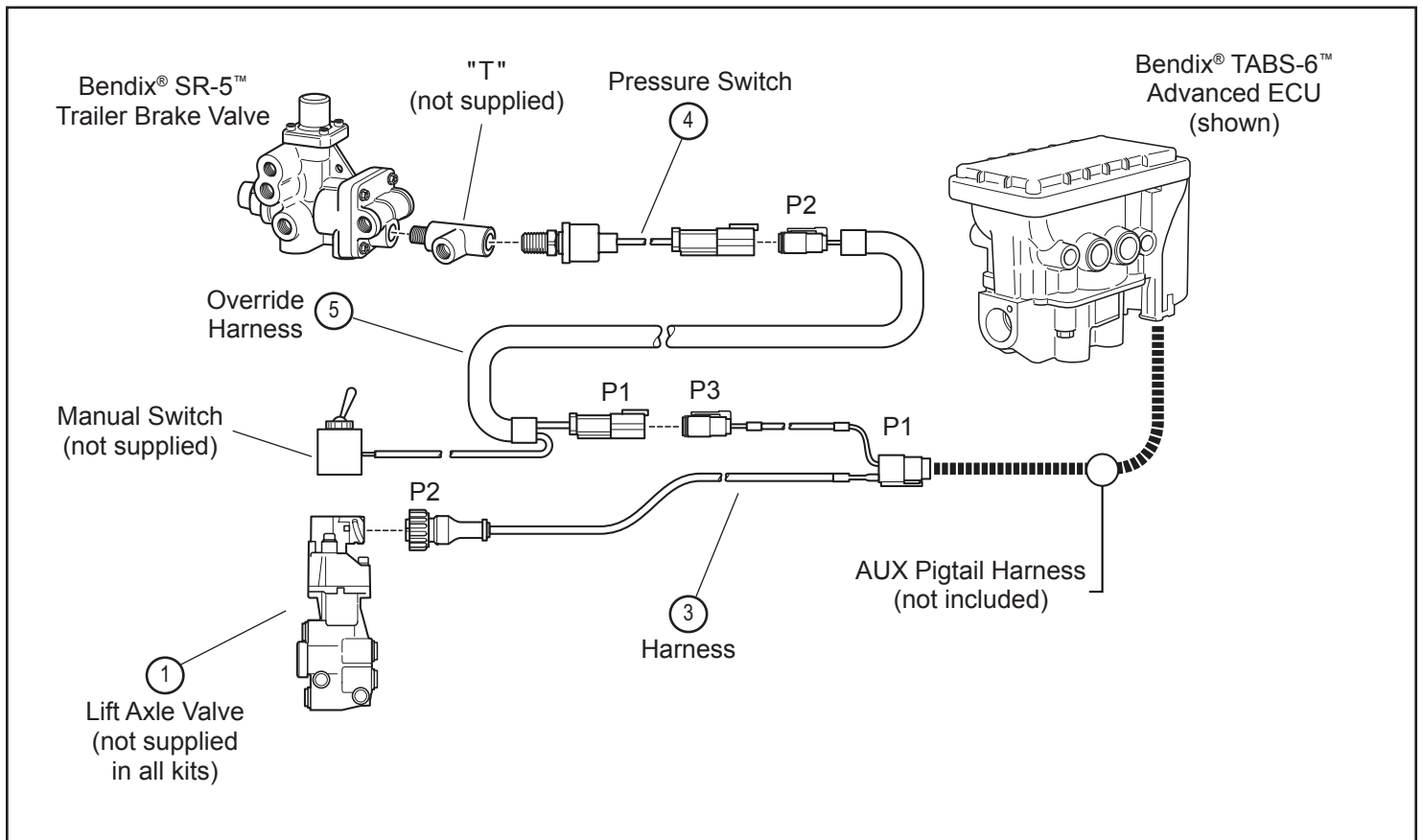
Figure 6 – Lift Axle Control With Park Brake Override and Manual Override

NOTE: Bendix does not supply the switch for manual override feature installation. Selection and installation of an appropriate weather-resistant switch is the responsibility of the installer. The switch should be of a weather-resistant construction similar to *Cole Hersee* (*Part No. 5558*) with a rubber boot (*Part No. 81264*) or equivalent. *See Figure 7.*

NOTE: It is possible to have two lift axles controlled by either LAC1 or LAC2 (reference in Bendix® ACom® diagnostic software for the lift axle control) if the axles lift together. This requires that the correct cable harness – to connect two electrically controlled lift axle valves to one AUXIO output – be used. If so, the lift axles will then operate simultaneously. In this case it may be required to install a single automotive grade relay, which in turn, provides power to the two lift axle solenoids.

Figure 7 – Cole Hersee Weather Resistant Switch & Boot

ECU CONFIGURATION

The logic to determine when to raise or lower the lift axle, based on trailer load and axle capacity, is in the Bendix® TABS-6™ Advanced Electronic Control Unit (ECU). To control the lift axle automatically, the ECU must be configured for:

1. A lift axle;

2. An input for sensing when the trailer is parked to override the lift axle;

3. An output to drive a lift axle solenoid; and

4. The appropriate weights for when the axle should be lifted and lowered.

Required Equipment: To set up the ECU for automatic lift axle control, the following equipment is required:

• A personal computer (PC) equipped with Bendix® ACom® Diagnostic Software, version 6.10 or later; and

• The appropriate TMC RP1210A Compliant Interface Adapter.

To Configure the ECU for Automatic Lift Axle Control:

1. Connect the PC to vehicle, and start the Bendix ACom program.
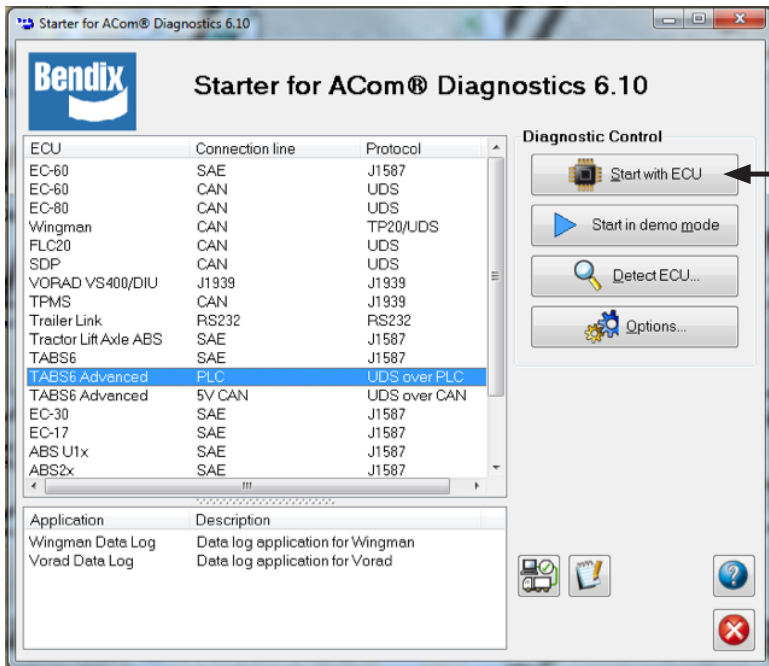
2. Click the **Start with ECU** button.

3. When the **ECU Status** window appears, click the **Configure** button.
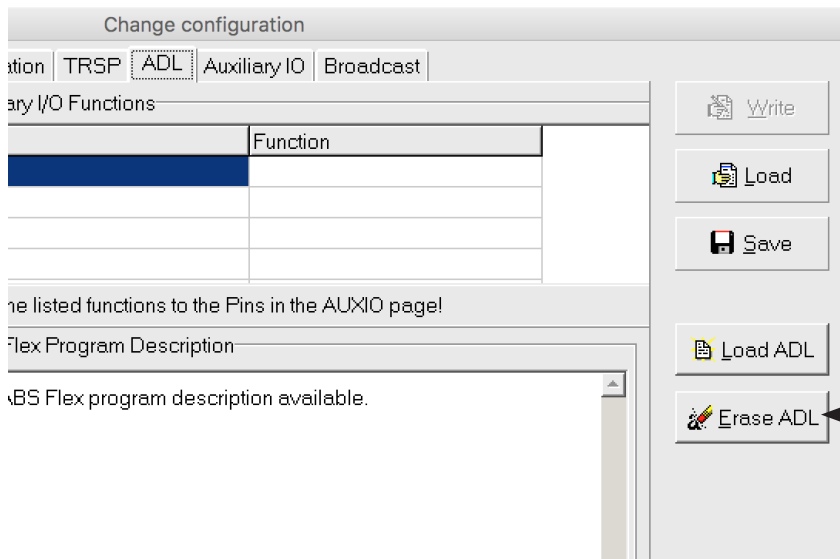

7
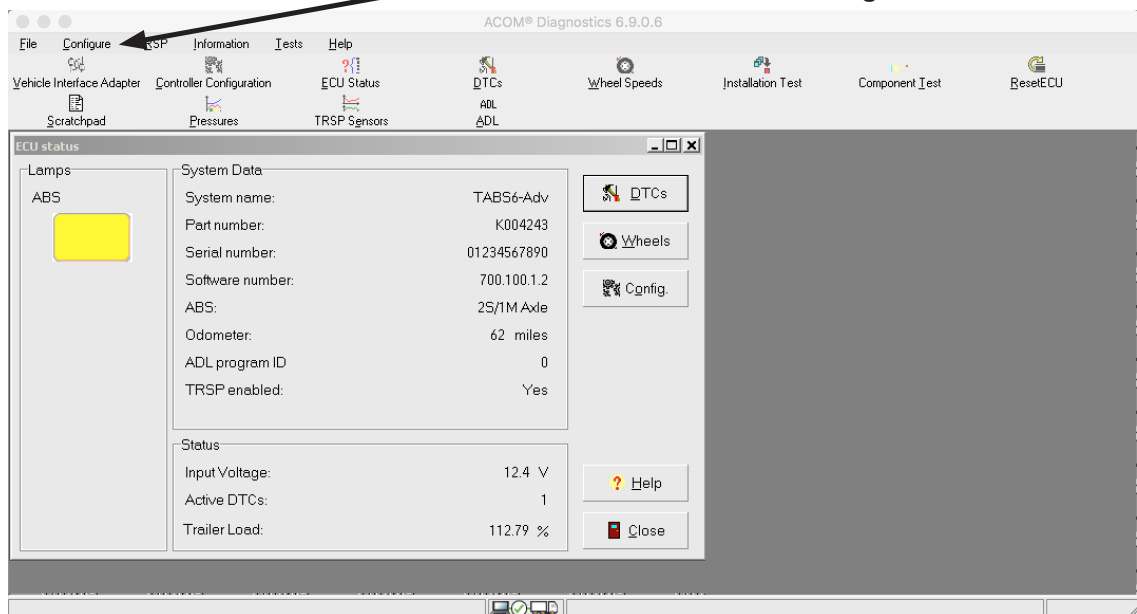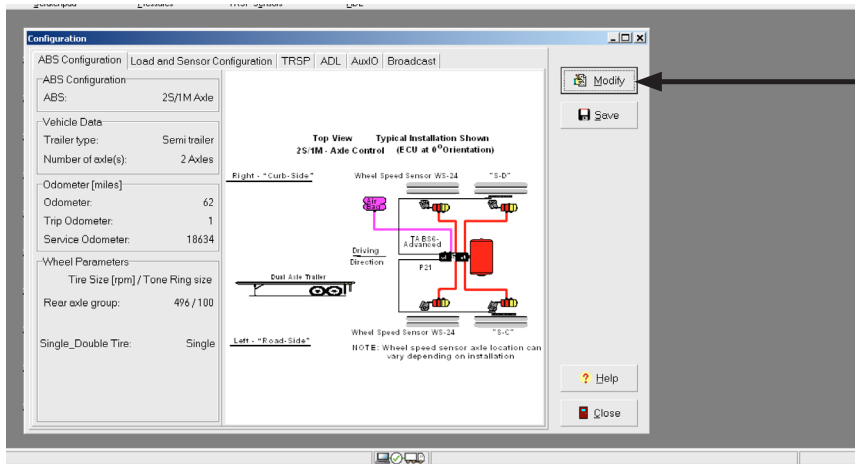
4. When the **Configuration** window appears, click the **Modify** button.
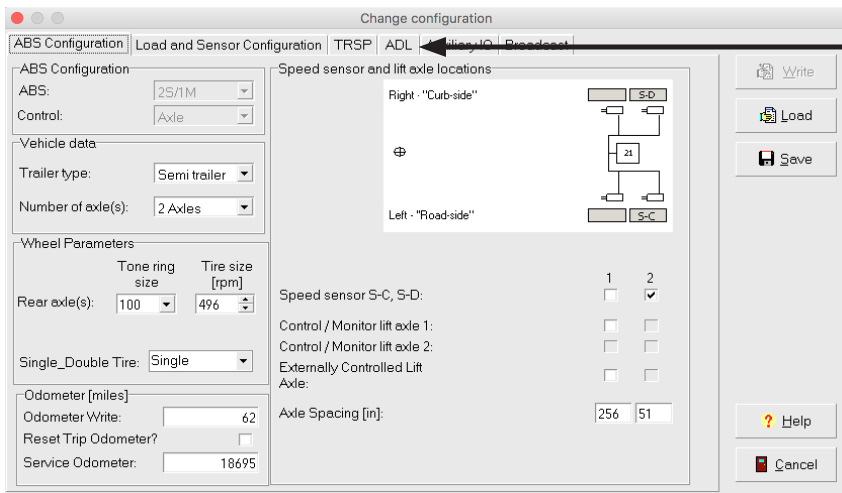
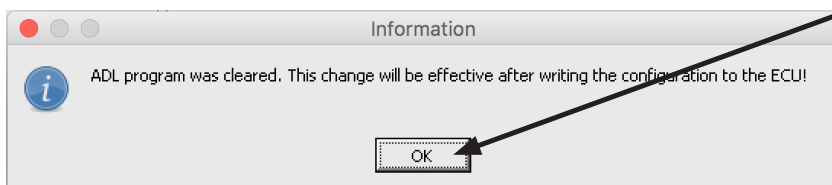5. At the **Change Configuration** window, select the **ADL (Auxiliary Design Language)** tab.

If an ADL program is present, it must be erased.

NOTE: The program is only required if the ECU is preprogrammed for an ADL program.

6. Click the **Erase ADL** button to delete any existing ADL program. Click **OK** in the pop-up dialog box.
If an information message appears, click **OK** again.

7. Select the **Auxiliary IO** tab and change any **Auxiliary Function Type** associated with the **ADL** program to **N/A,** as well as the **Function Names** to **Disabled** using drop-down menus.
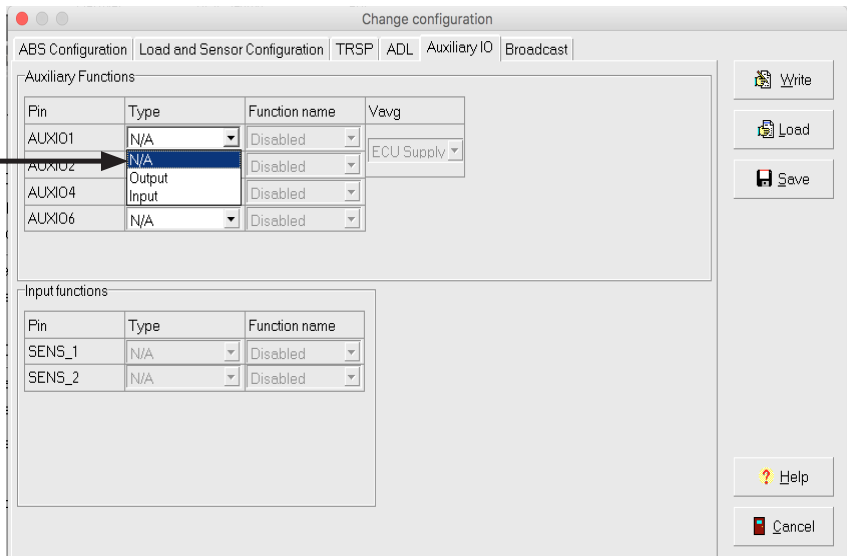
8. Select the **ABS Configuration** tab and click the appropriate check boxes as follows:
   - If the forward axle is the lift axle then *go to Steps 9 and 10*.
   - If the rearward axle is the lift axle then g*o to Steps 11 and 12*.
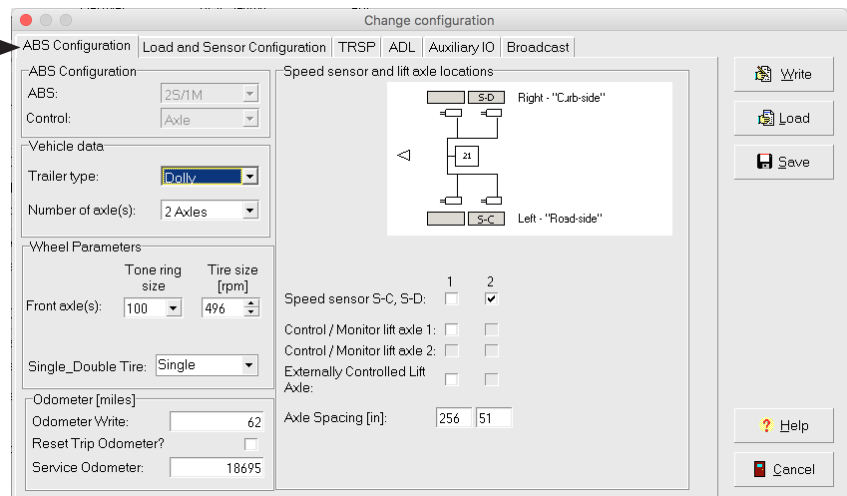
9. **Front lift axle configuration:**

   To select **Speed Sensor S-C/S-D,** check box **2.**

   This step ensures that the speed sensors are installed on the non-lift axle.
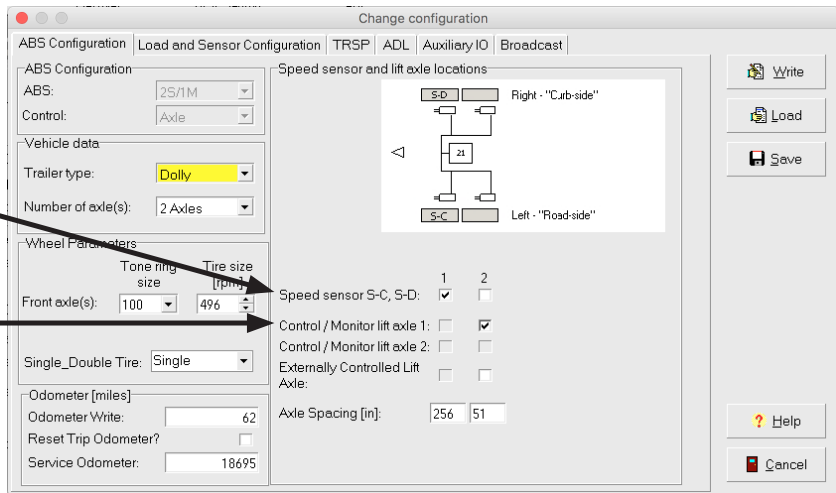
10. **Control/Monitor lift axle 1** check box **1.**

    This step ensures that the lift axle is the forward (first) axle and will be controlled by the Electronic Control Unit (ECU). *Go to Step 13.*
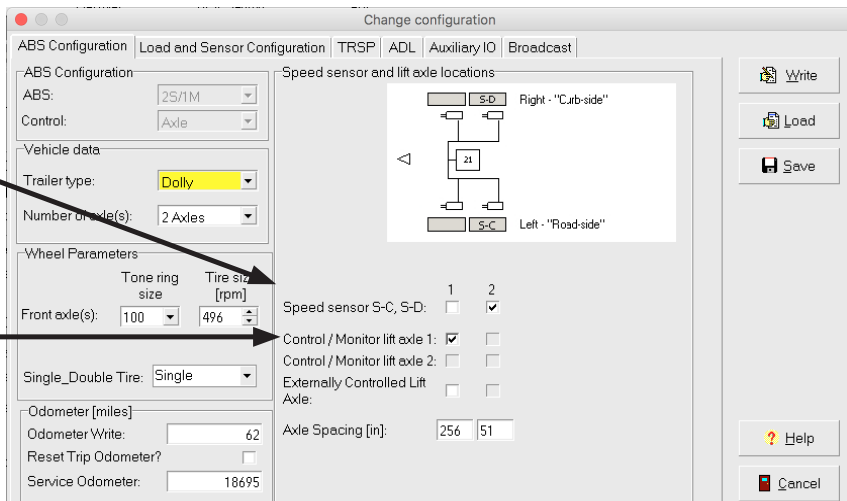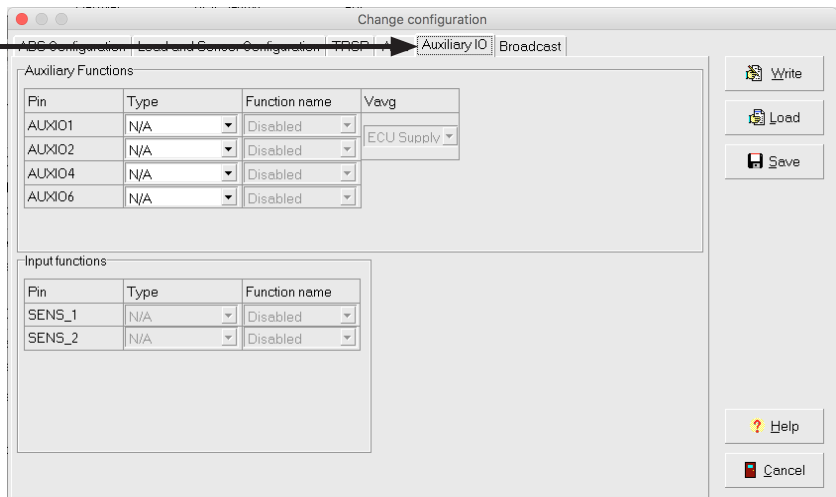
11. **Rear lift axle configuration:**

    To select **Speed Sensor S-C/S-D,** check box **1**.

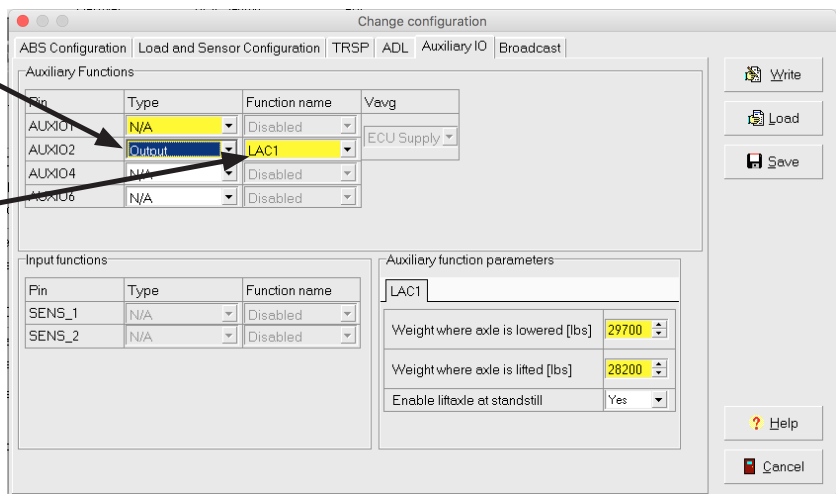12. **Control/Monitor lift axle 1,** check box **2**.

13. Select the **Auxiliary IO** tab and use the drop-down menus to set **Auxiliary Functions** (items 14–17)

14. Set the **AUXIO2 Type** to **Output.**

15. Set the **AUXIO2 Function name** to **LAC1.**

16. Set **AUXIO4 Type** to **Input**

NOTE: Bendix® TABS-6™ Advanced MC uses SENS_IN1, not AUX I/O 4.
For TABS-6 Advanced, set AUXIO4 Type to Input.
For TABS-6 Advanced MC, set SENS_IN1 type to Input. This is the input that will be used to monitor if the trailer is parked.
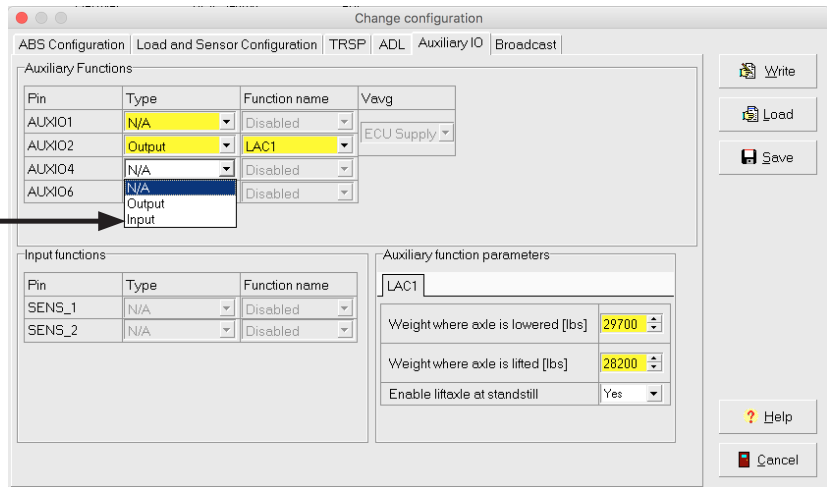
17. Set the **Function name** to LL_ALL_P. This stands for Lift Lower All controlled lift axles Permanently.
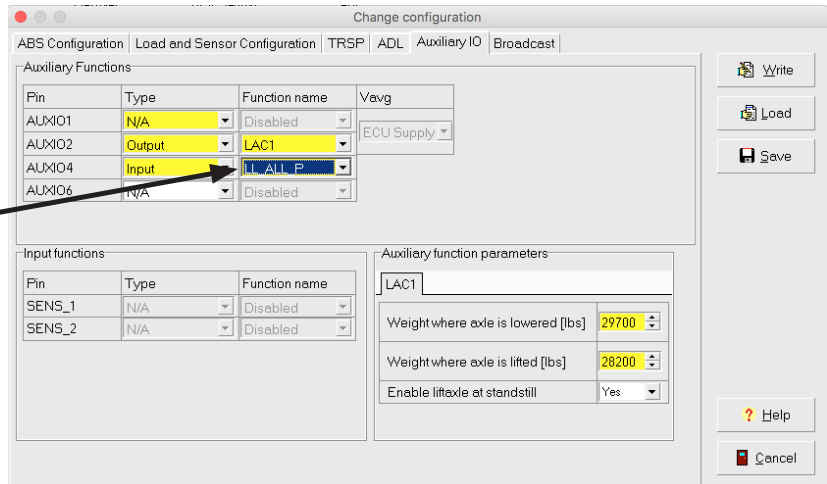
18. Configure the **Auxiliary function parameters** by selecting the LAC1 tab and using the up/down arrows – or directly entering weights where the lift axle is lowered or lifted – in accordance with the guidelines detailed below.

Auxiliary function parameters

LAC1

Weight where axle is lowered [lbs]   29700

Weight where axle is lifted [lbs]   28200

Enable liftaxle at standstill   Yes

? Help

⬛ Cancel

Weight where the axle is lowered:

This parameter is governed by the maximum allowable weight on the trailer axles – as determined by the GVWR (Gross Vehicle Weight Rating). The ECU will not allow this parameter to be programmed to a value greater than the maximum allowed, protecting the remaining axles from overload. This parameter may be lower than the maximum.

Weight where the axle is lifted:

This parameter is based on the maximum allowable weight on the remaining axles on the ground. There is a minimum of 5% difference between the lowered- and the lifted-weight values. This prevents the axle from lowering again due to the load change that occurs when the lift axle lifts. A default value is automatically set for the weight where the axle is lowered. This value may be decreased but not increased.

NOTE: When defining the lift axle control parameters, the axle/bogie load at which the lift axle lowers is, by default, the maximum load permitted for the fixed axle (or axles). It is possible to configure a lower value to comply with specific governmental axle loading requirements. For example, in the Province of Alberta, Canada, the requirement for an automatic lift axle system is that it should only lift the axle when the trailer is empty with a + 2,000 kg margin of error.

TYPICALLY, LEAVING THE DEFAULT VALUES SHOULD BE ADEQUATE.

NOTE: The default setting of "Yes" allows the lift axle to lift or lower while the trailer is not moving if loading conditions change sufficiently. If "No" is selected, the lift axle is disabled until the trailer is moving.

⚠ **IMPORTANT**

Unsure about setting the lift and lower weights? Contact your Bendix representative for assistance.

The **Park Brake Override** feature will overrule this setting and keep the lift axle lowered while the vehicle is parked, regardless of the weight on the trailer.

19. Choose **Yes** to allow the axle to lift when the trailer is stationary, or **No** to allow the axle to lift only when the trailer is moving.

Auxiliary function parameters

LAC1

Weight where axle is lowered [lbs]   29700

Weight where axle is lifted [lbs]   28200

Enable liftaxle at standstill   Yes

? Help

⬛ Cancel

NOTE: The lifted value must be, at a minimum, 5% less than the lowered value.

20. Save the configuration by clicking the **Write** button. Allow the **progress bar** to complete. Click **OK** when successful write confirmation message appears as shown here.

21. Click the **Close** button to close the controller configuration window and then exit the Bendix® ACom® program. Restart ACom and confirm the configuration changes as follows:

TO CONFIRM CONFIGURATION CHANGES:

Testing LAC1 output:

When the ECU is configured for **Lift Axle Control output**, the ACom program automatically adds a step to the installation test for the auxiliary output controlling the lift axle.
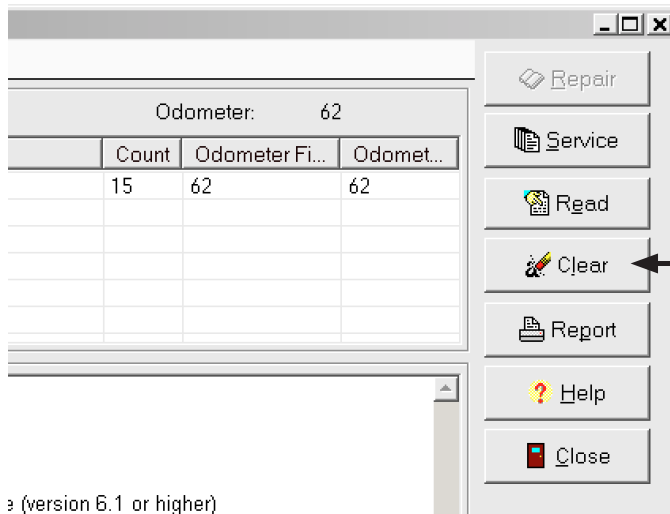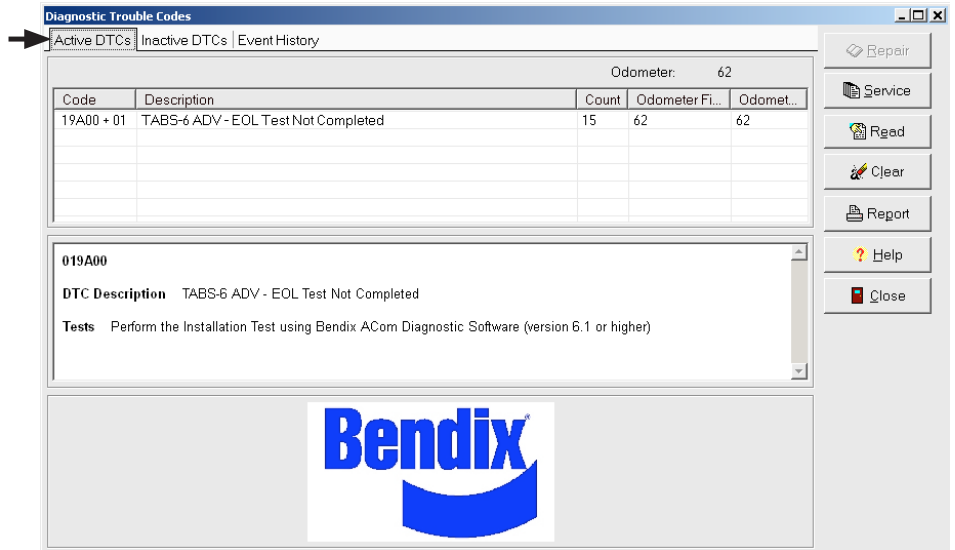
When the ECU is configured for Lift Axle Control, the ACom program automatically adds a step to the component test window, under the Miscellaneous tab, for the auxiliary output controlling the lift axle.

Testing LL_ALL_P input:

When the ECU is configured for a **Lift Lower input**, ACom automatically adds a step to the installation test for the auxiliary input that monitors the lift lower switch.

When the ECU is configured for Lift Lower input, ACom automatically adds a step to the component test window, under the Miscellaneous tab, for the auxiliary input being monitored for a lift lower switch.

22. Click on the **Active DTCs** tab at the top of main Bendix® ACom® screen to view the Diagnostic Trouble Codes (DTCs). Verify no active or inactive DTCs are present—except the "TABS-6 ADV EOL Test Not Completed" which will clear when the installation test is completed successfully.

Diagnostic Trouble Codes					
Active DTCs	Inactive DTCs	Event History			
			Odometer:	62	
Code	Description		Count	Odometer Fi...	Odomet...
19A00 + 01	TABS-6 ADV - EOL Test Not Completed		15	62	62

019A00

DTC Description   TABS-6 ADV - EOL Test Not Completed

Tests   Perform the Installation Test using Bendix ACom Diagnostic Software (version 6.1 or higher)

Repair · Service · Read · Clear · Report · Help · Close

23. Clear any inactive DTCs by clicking the **Clear** button.

The ECU programming is now complete.

NOTE: The input for all lift lower controlled axles permanently (LL_ALL_P) is different between Bendix® TABS-6™ Advanced and TABS-6 Advanced MC. The TABS-6 Advanced system uses AUX4, while TABS-6 Advanced MC uses SEN_IN1. The examples on the following page only illustrate TABS-6 Advanced.

ADVANCED: END OF LINE TEST

When an output is configured for **Lift Axle Control (LAC)**, a test is added to the Installation test for this auxiliary _output_. When an input is configured for **Lift Lower** (LL_ALL_P for example), a test is added to the Installation test for the associated auxiliary _input_.
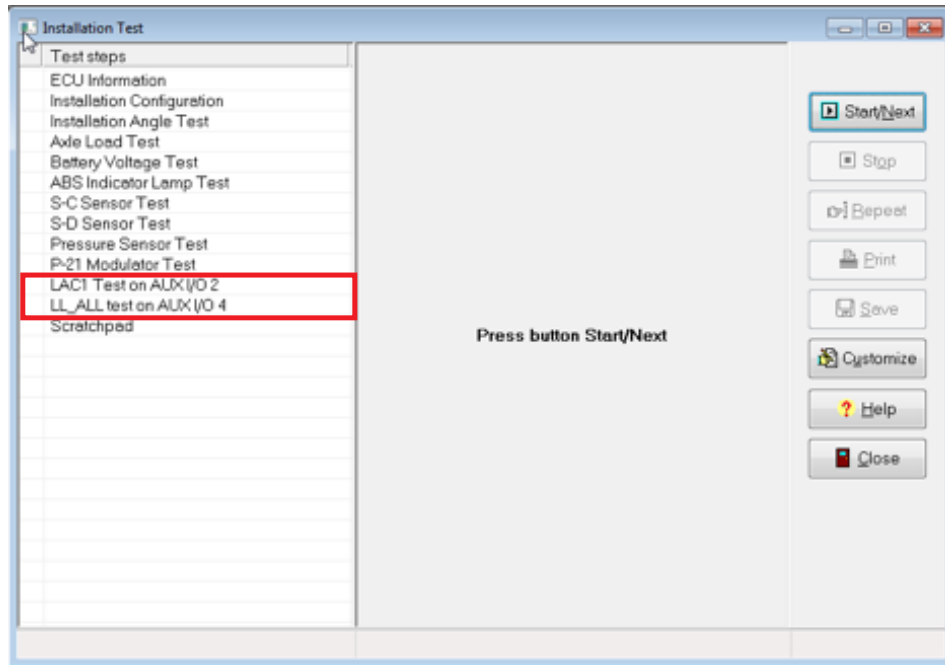

ADVANCED: COMPONENT TEST LAC1 TEST ON AUX I/O 2

When an output is configured for **Lift Axle Control (LAC)**, a test is added to the Miscellaneous tab of the Component test screen for this auxiliary _output_. When an input is configured for **Lift Lower** (LL_ALL_P for example), a test is added to the Miscellaneous tab of the Component test screen for the associated auxiliary _input_.
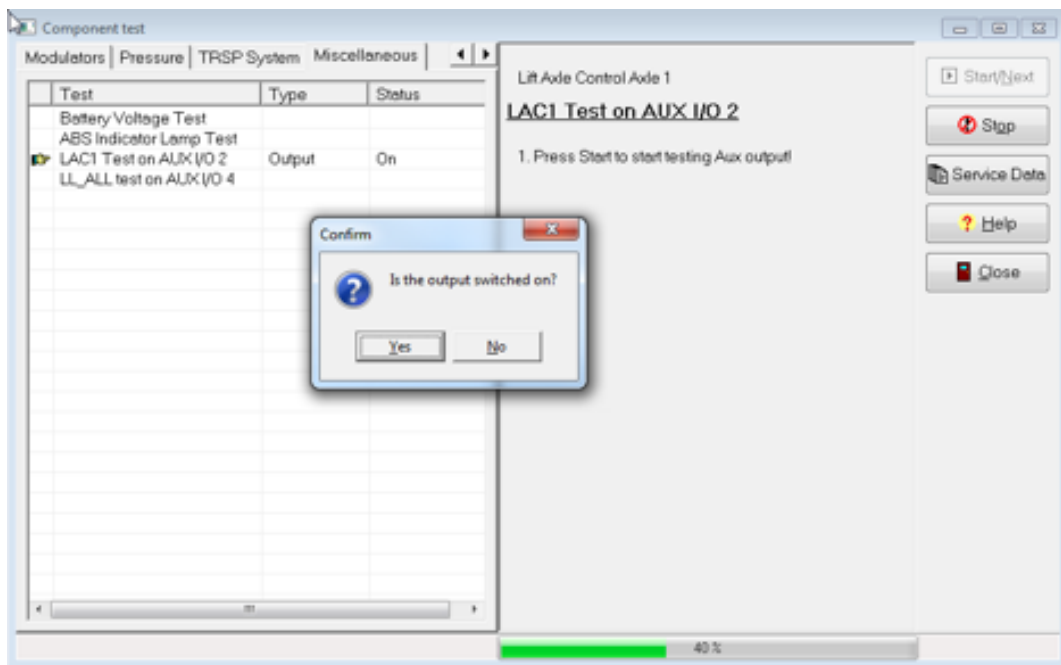
To run the test for the output configured to drive the lift axle solenoid:

1. Highlight LAC1 Test on AUX I/O 2.
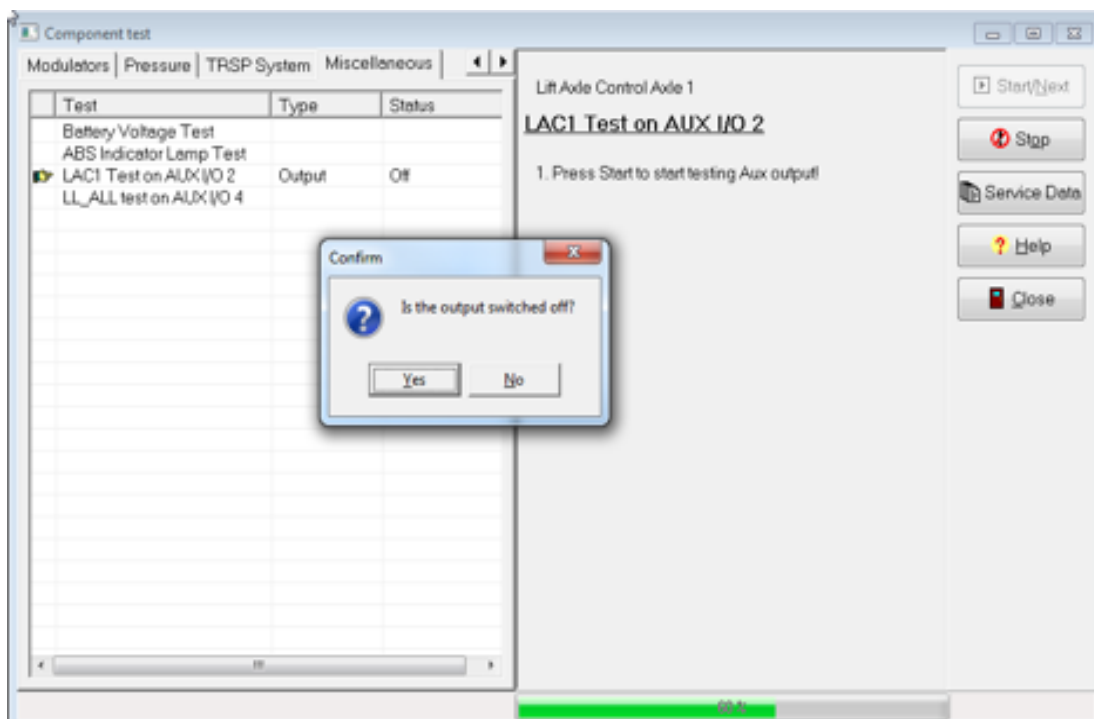2. Select the Start/Next button.

15
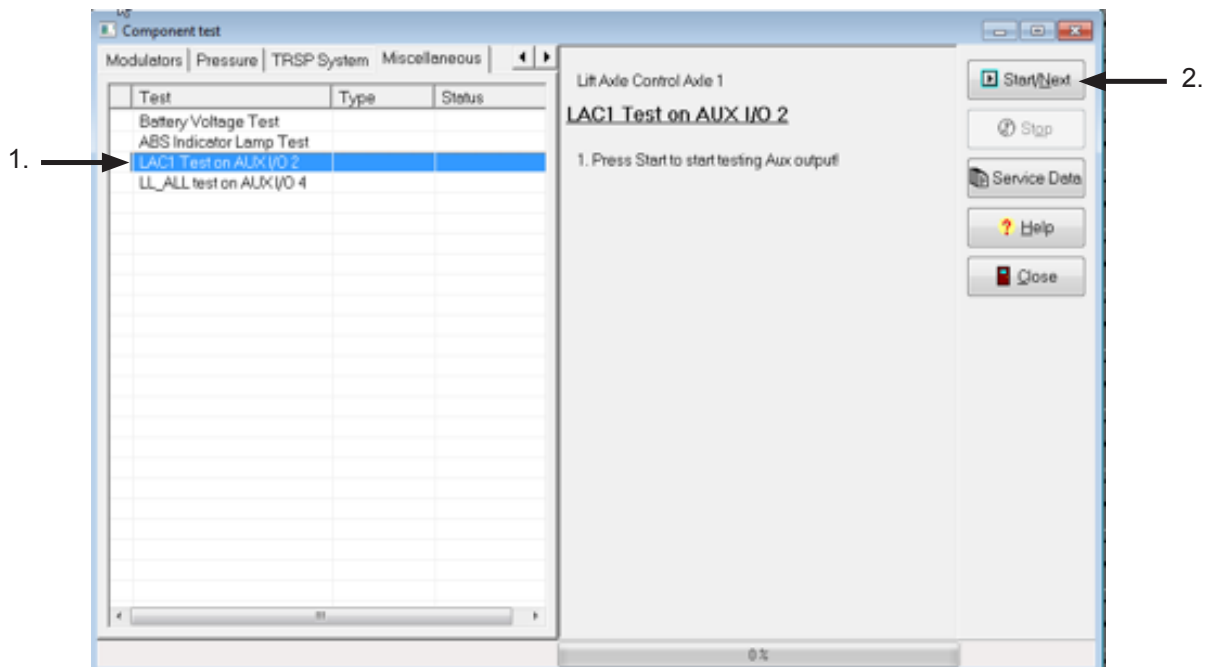
ADVANCED: IS THE OUTPUT SWITCHED ON?

The Bendix® ACom® diagnostic software program will ask if the output is switched on. This will turn on the solenoid that lifts the lift axle. Respond **"Yes"** if it is on, or **"No"** if it is not on. If not on, you need to troubleshoot why it will not activate. See the Troubleshooting section in this document.


ADVANCED: IS THE OUTPUT SWITCHED OFF?

If you answered **Yes** to the previous section, this will turn off the solenoid that lifts the lift axle, lowering it. Following this, the ACom software will ask if the output is switched off. Respond **Yes** if it is off, or **No** if it is not off. If not off, you need to troubleshoot why it will not deactivate. See the Troubleshooting section in this document.

ADVANCED: LIFT LOWER ALL TEST ON AUX I/O 4

To run the test for the input configured to override the lift axle:

1. Highlight LL_ALL_P Test on AUX I/O 4.

2. Select the Start/Next button.
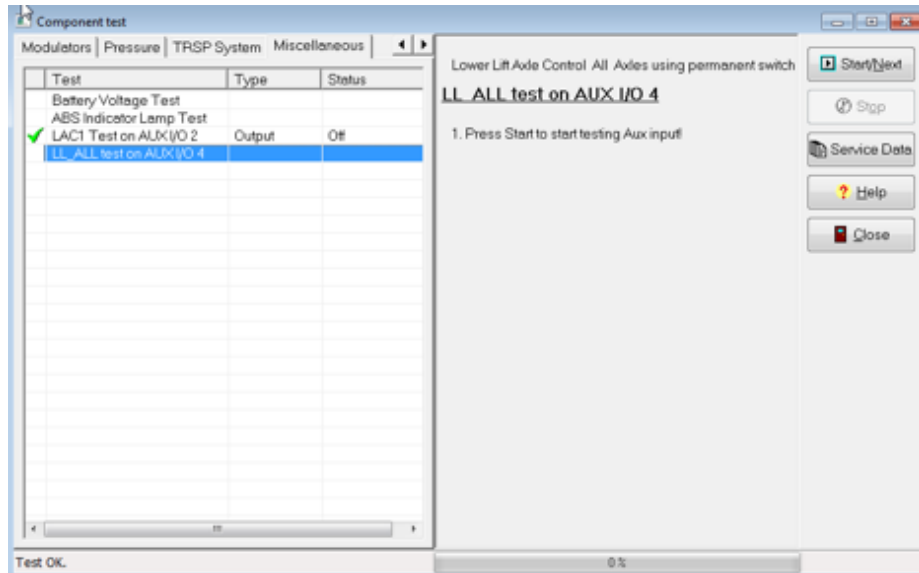
ADVANCED: ACTUATE THE CONFIGURED SWITCH

The Bendix ACom® program will display a pop up box asking to Actuate the configured switch.

1. If the switch is a pressure switch in the emergency/red line for park override, then park the trailer. Let all the air out of the emergency red line; or-

2. If the switch is a manual override switch, put the switch in the closed state. The closed state lowers the lift axle.

Once the switch is in the correct position, select "OK". The ECU will read the state of the input that the switch is connected to and pass if it sees the switch is closed, or fail if it sees the switch is open. If the test fails, you must troubleshoot why the switch is not closing. See the Troubleshooting section in this document.
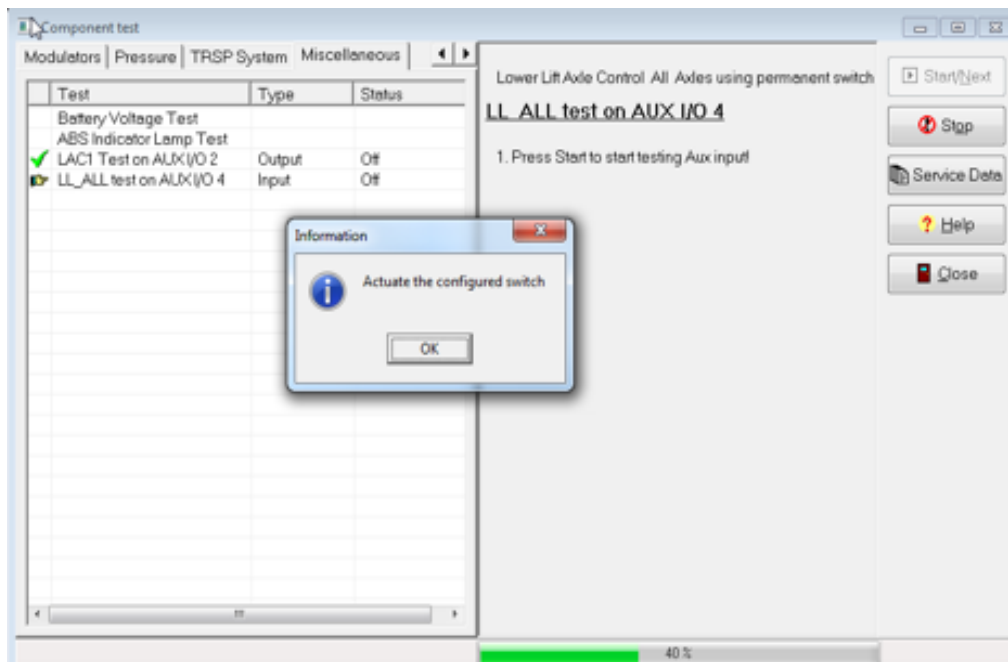
ADVANCED: RELEASE THE CONFIGURED SWITCH

If the first (actuated switch) test passed, then a second pop up box will appear asking to release the configured switch.

1. If the switch is a pressure switch monitoring the park circuit, release the brakes (supply air to the emergency/red line).

2. If the switch is a manual override switch, open the switch.

3. Select the "OK" button.

Once the switch is in the correct position, select "OK." The ECU will read the state of the input that the switch is connected to and pass if it sees the switch is open or fail if it sees the switch is closed. If the test fails, you must troubleshoot why the switch is not opening. See Troubleshooting section in this document.

The steps for testing both the output and the input for lift axle control in the Installation test (end of line test) are similar to the Component test.

ALTERNATIVE TEST FOR AN EMPTY TRAILER

With the lift axle in the up position, add an air line to one of the fixed axle suspension bags and increase the air pressure to the bag until the lift axle drops. Remove the air line and allow air to escape until the axle lifts. Plug the port. This verifies that the lift axle is working appropriately.
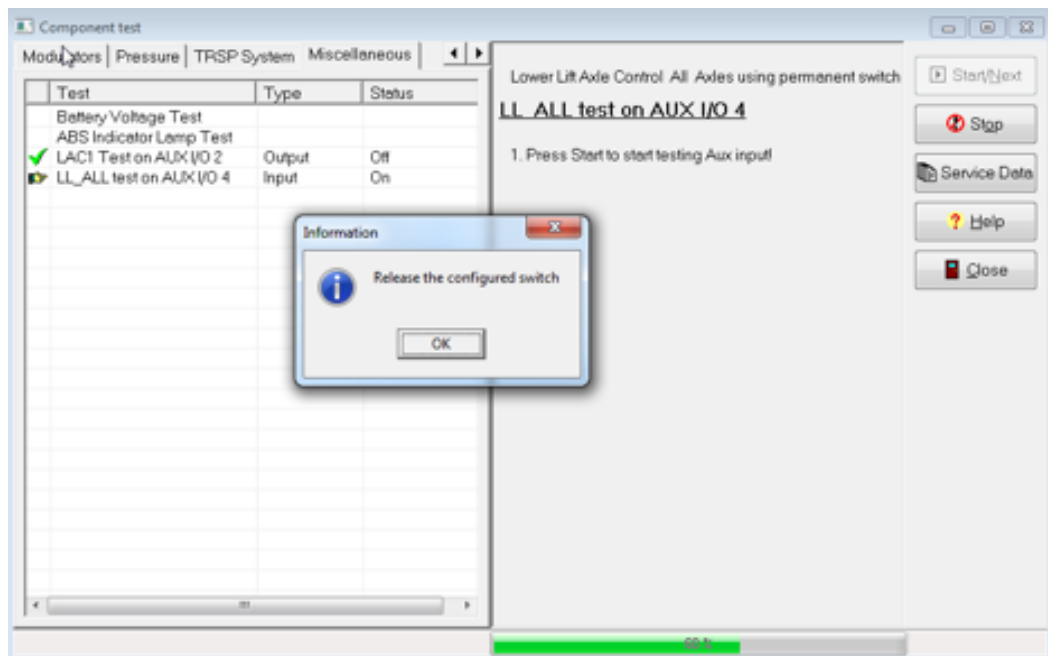
TROUBLESHOOTING

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

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

SD-13-47672 (Bendix® TABS-6™ Advanced Multi-Channel Trailer ABS Module) - Sections H and J.

ADDITIONAL INFORMATION SOURCES

SD-03-3430 TLV-9000™ Lift Axle Valve Service Data sheet.

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