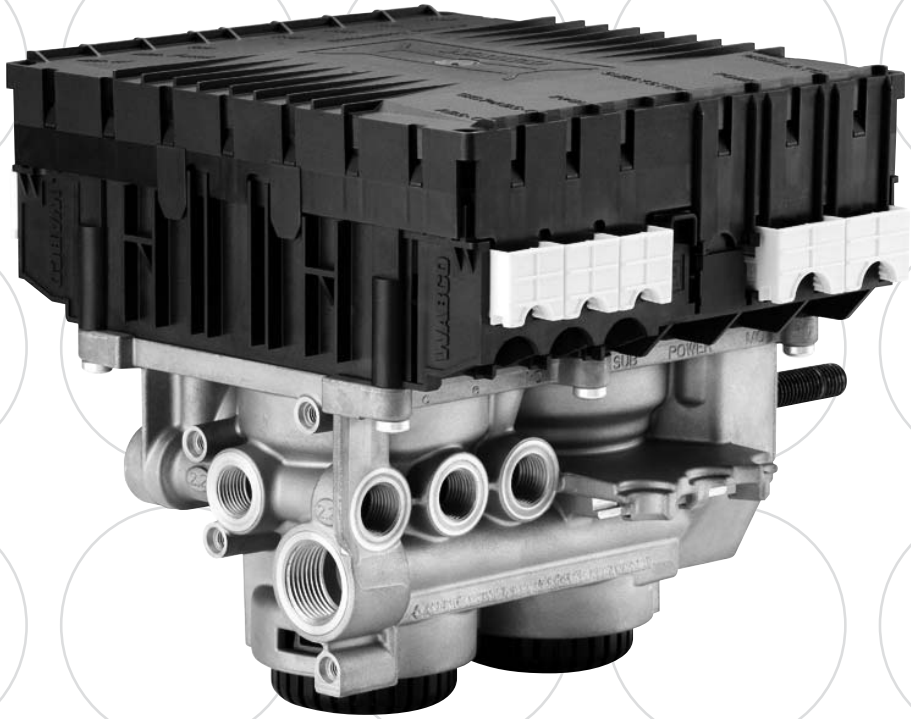
MERITOR WABCO

Maintenance Manual MM-0888

RSS*plus*™ Trailer ABS with Roll Stability Support

2S/2M and 4S/2M

Revised 11-12



About This Manual

This manual contains maintenance procedures for Meritor WABCO's RSS*plus*™ Trailer ABS with Roll Stability Support.

Before You Begin

1. Read and understand all instructions and procedures before you begin to service components.
2. Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.
3. Follow your company's maintenance and service, installation, and diagnostics guidelines.
4. Use special tools when required to help avoid serious personal injury and damage to components.

Hazard Alert Messages and Torque Symbols

⚠ WARNING

A Warning alerts you to an instruction or procedure that you must follow exactly to avoid serious personal injury and damage to components.

⚠ CAUTION

A Caution alerts you to an instruction or procedure that you must follow exactly to avoid damage to components.

This symbol alerts you to tighten fasteners to a specified torque value.

How to Obtain Additional Maintenance, Service and Product Information

Visit Literature on Demand at meritor.com to access and order additional information.

Contact the OnTrac Customer Service Center at 866-668-7221 (United States and Canada); 001-800-889-1834 (Mexico); or email OnTrac@meritor.com.

How to Obtain Tools and Supplies Specified in This Manual

Call Meritor's Commercial Vehicle Aftermarket at 888-725-9355 to obtain Meritor tools and supplies.

Contents

Asbestos and Non-Asbestos Fibers

⚠ ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from Meritor.

Hazard Summary

Because some brake linings contain asbestos, workers who service brakes must understand the potential hazards of asbestos and precautions for reducing risks. Exposure to airborne asbestos dust can cause serious and possibly fatal diseases, including asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). Some studies show that the risk of lung cancer among persons who smoke and who are exposed to asbestos is much greater than the risk for non-smokers. Symptoms of these diseases may not become apparent for 15, 20 or more years after the first exposure to asbestos.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons. OSHA has set a maximum allowable level of exposure for asbestos of 0.1 f/cc as an 8-hour time-weighted average and 1.0 f/cc averaged over a 30-minute period. Scientists disagree, however, to what extent adherence to the maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed either of the maximum allowable levels:

DANGER: ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA.

2. Respiratory Protection. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA for use with asbestos at all times when servicing brakes, beginning with the removal of the wheels.

3. Procedures for Servicing Brakes.

a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.

b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

c. If an enclosed vacuum system or brake washing equipment is not available, employers may adopt their own written procedures for servicing brakes, provided that the exposure levels associated with the employer's procedures do not exceed the levels associated with the enclosed vacuum system or brake washing equipment. Consult OSHA regulations for more details.

d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.

e. **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. Cleaning Work Areas. Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. Worker Clean-Up. After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

6. Waste Disposal. Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

⚠ NON-ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to non-asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from Meritor.

Hazard Summary

Most recently manufactured brake linings do not contain asbestos fibers. These brake linings may contain one or more of a variety of ingredients, including glass fibers, mineral wool, aramid fibers, ceramic fibers and silica that can present health risks if inhaled. Scientists disagree on the extent of the risks from exposure to these substances. Nonetheless, exposure to silica dust can cause silicosis, a non-cancerous lung disease. Silicosis gradually reduces lung capacity and efficiency and can result in serious breathing difficulty. Some scientists believe other types of non-asbestos fibers, when inhaled, can cause similar diseases of the lung. In addition, silica dust and ceramic fiber dust are known to the State of California to cause lung cancer. U.S. and international agencies have also determined that dust from mineral wool, ceramic fibers and silica are potential causes of cancer.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to non-asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons.

2. Respiratory Protection. OSHA has set a maximum allowable level of exposure for silica of 0.1 mg/m3 as an 8-hour time-weighted average. Some manufacturers of non-asbestos brake linings recommend that exposures to other ingredients found in non-asbestos brake linings be kept below 1.0 f/cc as an 8-hour time-weighted average. Scientists disagree, however, to what extent adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling non-asbestos dust.

Therefore, wear respiratory protection at all times during brake servicing, beginning with the removal of the wheels. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA, if the exposure levels may exceed OSHA or manufacturers' recommended maximum levels. Even when exposures are expected to be within the maximum allowable levels, wearing such a respirator at all times during brake servicing will help minimize exposure.

3. Procedures for Servicing Brakes.

a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.

b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

c. If an enclosed vacuum system or brake washing equipment is not available, carefully clean the brake parts in the open air. Wet the parts with a solution applied with a pump-spray bottle that creates a fine mist. Use a solution containing water, and, if available, a biodegradable, non-phosphate, water-based detergent. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.

e. **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. Cleaning Work Areas. Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA, to minimize exposure. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. Worker Clean-Up. After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

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RSS*plus*™ Trailer ABS

This manual contains service and diagnostic information for Meritor WABCO RSS*plus*™ Trailer ABS with Roll Stability Control.

Identification

To identify RSS*plus*™, check the identification tag on the Electronic Control Unit (ECU). The part number is 480 107 000 0. Figure 1.1.

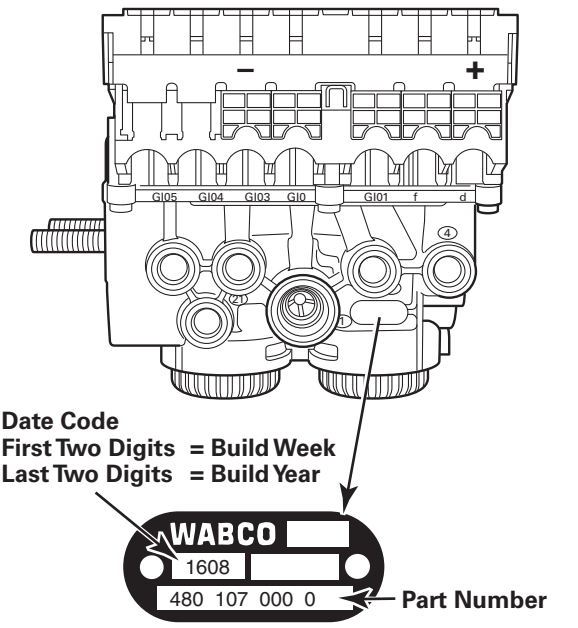


Figure 1.1

RSS*plus*™ Trailer ABS Parts

A list of Meritor WABCO RSS*plus*™ parts can be found in Table A.

For warranty information, contact Meritor's Customer Service Center at 866-OnTrac1 (668-7221) and ask for TP-99128, *Meritor WABCO Trailer ABS Warranty Procedure*.

Table A: RSS*plus*™ Parts List

Part Number	Nomenclature	Detail
480 107 000 0	RSS*plus*™ ECU	4S/2M-2S/2M
441 044 106 0	Transducer	15 bar (1/4″ NPTF)
449 812 100 0	Transducer Cable	10 Meters
449 351 010 0	Power Cable	1 Meter
449 351 047 0	Power Cable	4.7 Meters
449 443 030 0	ATC Generic I/O Cable	3 Meters
884 490 443 0	Tire Inflation Generic I/O Cable	1 Meter
449 639 030 0	Diagnostic Cable	3 Meters
449 639 050 0	Diagnostic Cable	5 Meters
449 723 018 0	Sensor Extension Cable	1.8 Meters
449 723 030 0	Sensor Extension Cable	3 Meters
449 723 051 0	Sensor Extension Cable	5.1 Meters
449 723 120 0	Sensor Extension Cable	12 Meters
449 723 170 0	Sensor Extension Cable	17 Meters
449 535 020 0	Generic I/O Cable	2 Meters
449 535 040 0	Generic I/O Cable	4 Meters
449 535 060 0	Generic I/O Cable	6 Meters
100 001 012 4	RSS Label	Adhesive
441 050 100 0	Distance Sensor	
449 811 020 0	Distance Sensor Cable	2 Meters
441 050 712 2	Distance Sensor Linkage	
441 050 718 2	Extension Lever	Old Style
441 901 715 4	Extension Lever	Current
449 810 148 0	Solenoid Y Cable	3 Meters
894 607 434 0	Stoplight Activation Cable	1 Meter
934 099 003 0	Select High Double Check Valve	
934 099 010 0	Double Check QRV Combination Valve	
100 400 004 0	Axle Clamp	5.8” Diameter

Description

What Is Meritor WABCO's RSS*plus*™ Trailer ABS?

Meritor WABCO's RSS*plus*™ Trailer ABS is an electronic, self-monitoring system that works with standard air brakes. In addition, RSS*plus*™ includes Power Line Carrier (PLC) capability and Roll Stability Support. The major components of the system are the **Electronic Control Unit (ECU)/Valve Assembly, tooth wheel** and **wheel speed sensor.** Figure 1.2.

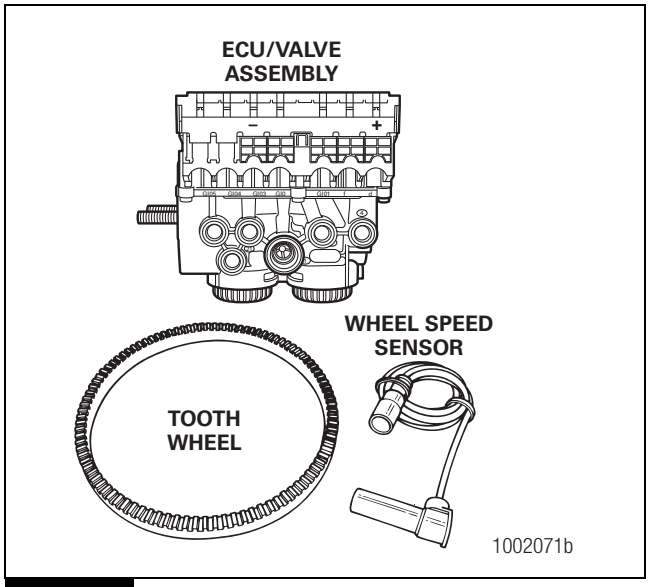


Figure 1.2

System Configuration

The ABS **configuration** defines the number of wheel speed sensors and ABS modulator valves used in a system. For example, a **2S/2M** configuration includes two wheel sensors and two ABS modulator valves. A **4S/2M** configuration includes four wheel sensors and two ABS modulator valves.

How Trailer ABS Works

Meritor WABCO ABS is an electronic system that monitors and controls wheel speed during braking. The system works with standard air brake systems.

ABS monitors wheel speeds at all times and controls braking during wheel lock situations. The system improves vehicle directional stability and control by reducing wheel lock during braking.

The ECU receives and processes signals from the wheel speed sensors. When the ECU detects a wheel lockup, the unit activates the appropriate modulator valve, and air pressure is controlled.

The RSS*plus*™ ECU provides additional assistance in maintaining trailer directional stability with Roll Stability Support. Combining the data received from the wheel sensors and an internal lateral accelerometer, the RSS*plus*™ will proactively engage the Roll Stability Support to increase trailer stability and reduce the possibility of a rollover condition.

In the event of a malfunction in the system, the ABS in the affected wheel(s) is disabled; that wheel still has normal brakes. The other wheels keep the ABS function.

Two ABS indicator lamps (one on the dash and one on the side of the trailer) let drivers know the status of the system.

⚠ WARNING

RSS is an advanced vehicle control system from Meritor WABCO that reduces chances of a rollover and assists the driver in maintaining control of the vehicle. However, any vehicle may overturn in some situations with or without RSS.

Having RSS*plus*™ does not allow drivers to take unnecessary risks. Make sure drivers do not take curves or turns faster than they would without RSS*plus*™ and always use safe driving techniques. Failure to do so can result in serious personal injury, damage to components, or both. An alert unimpaired driver remains the primary element in maintaining control of the vehicle and reducing the chances of rollover accidents.

RSS*plus*™ Components

Hardware

The various system component parts consist of the following:

ECU/Valve Assembly

- 12 volt
- Integrated ECU and ABS relay valve

  — ECU and valve assembly are serviceable items.
- The ECU/Valve Assembly may be mounted with the sensors facing either the front or rear of the trailer. Figure 2.1.

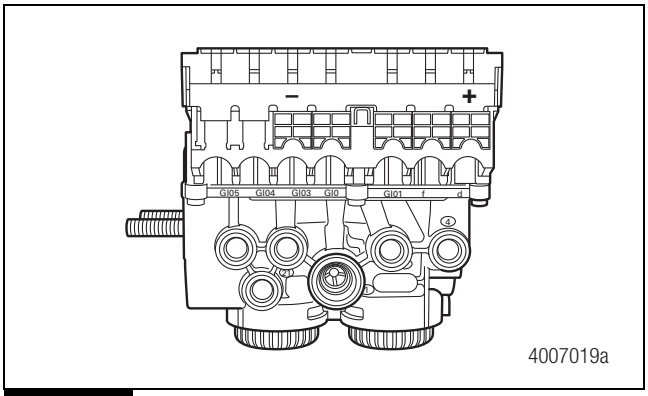


Figure 2.1

Sensor with Molded Socket

- Measures the speed of a tooth wheel rotating with the vehicle wheel. Figure 2.2.
- Produces an output voltage proportional to wheel speed.

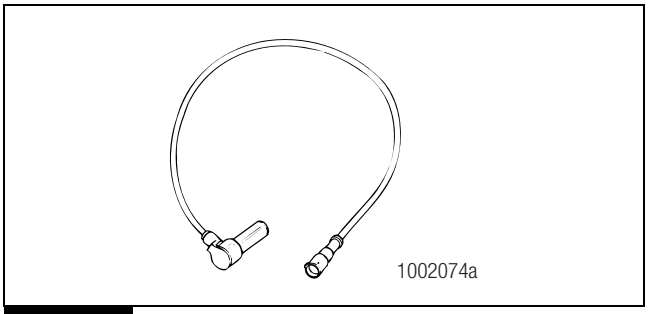


Figure 2.2

Sensor Spring Clip

- Holds the wheel speed sensor in close proximity to the tooth wheel. Figure 2.3.

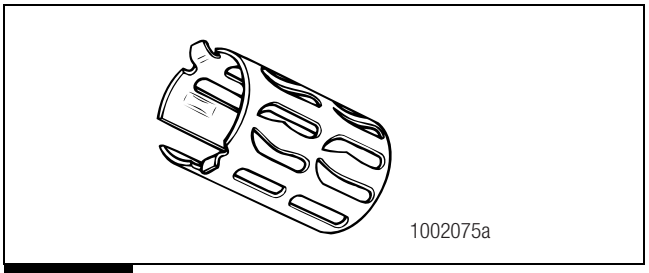


Figure 2.3

Tooth Wheel

- A machined ring mounted to the machined surface on the hub of each ABS-monitored wheel. Figure 2.4.

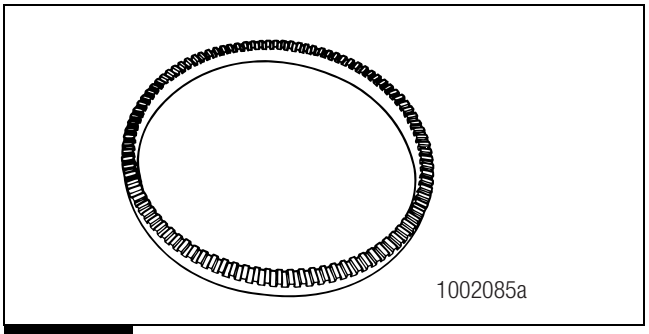


Figure 2.4

Cables for RSS*plus*™

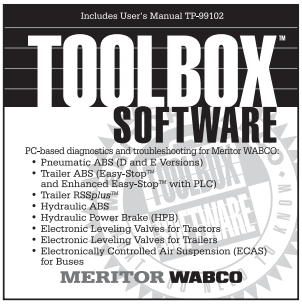
RSS*plus*™ Trailer ABS Indicator Label

- Provides information about the operation of the ABS indicator lamp and illustrates blink code fault locations.
- Label is self-adhesive and is mounted on the trailer near the ABS indicator lamp.
- If there is no warning label on your trailer, let your supervisor know. Labels are available from Meritor WABCO. Ask for Part Number 100 001 012 4.

TOOLBOX™ Software

TOOLBOX™ Software is a PC-based diagnostics program that can display wheel speed data, test individual components, verify installation wiring and more.

Version 9.0 (or higher) supports RSS*plus*™ with PLC, and runs on a Pentium® platform with Windows® 2000, Me or XP. An RS232 to J1708 converter box is required. Figure 2.5.



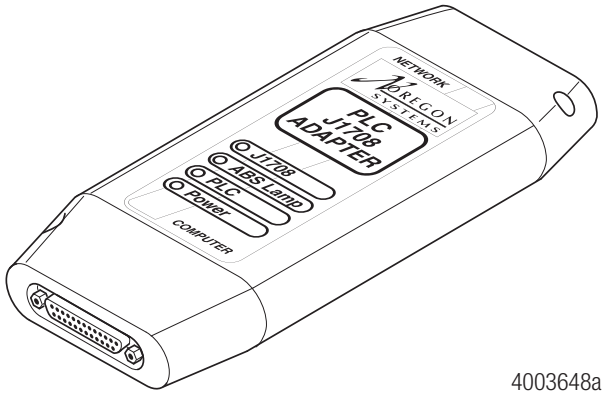
4007045a

Available from SPX (Kent-Moore), 800-328-6657

Figure 2.5

PLC/J1708 Adapter

- Simulates the tractor ABS lamp, ensuring that the trailer ABS is capable of "lighting the light."
- Simulates the trailer ABS lamp, ensuring that the tractor is capable of "lighting the light."
- Use as a trailer/tractor tester to ensure that PLC is functioning correctly. Figure 2.6.



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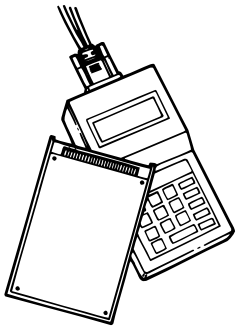
Available from Noregon Systems, 336-768-4337

Figure 2.6

MPSI Pro-Link® 9000 Diagnostic Tool

- Provides diagnostic and testing capability for ABS components.
- Requires a Multiple Protocol Cartridge (MPC) and Meritor WABCO applications card, version 2.0 or higher, for use with RSS*plus*™ with PLC. Figure 2.7.



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Available from SPX (Kent Moore), 800-328-6657

Figure 2.7

RSS*plus*™ Components and Features

The Electronic Control Unit (ECU)

How do you activate the ECU?

In a constant-powered system, the ECU activates and then begins a self-diagnostic check of the system when you turn the ignition ON. In a stoplight-powered system, the ECU activates when you apply the brakes. All trailers manufactured on or after March 1, 1998 will be equipped with ABS that has constant power capability with stoplight power as back-up.

How does the ECU respond to a wheel approaching lock-up?

The ECU directs the ABS relay valve to function as a modulator valve and adjust air pressure to the chambers up to five times a second. This pressure adjustment allows a wheel (or wheels) to rotate without locking.

Roll Stability Support Questions and Answers

What is Roll Stability Support?

Roll Stability Support (RSS) is an integrated capability in the RSS*plus*™ ECU that helps reduce the chances of a trailer rollover. By monitoring the trailer's speed, braking and side-to-side acceleration, the RSS*plus*™ assists the driver in avoiding a potential rollover condition.

How does it work?

The RSS*plus*™ ECU continuously montors the trailer's wheel speed and lateral acceleration. When the ECU detects a potentially unstable condition, it requests data from the suspect wheels with a test pulse. The trailer's reaction to the test pulse determines whether normal braking, ABS braking, or Roll Stability braking is required. The test pulse is not generated under normal braking conditions.

Will trailers with Roll Stability Support work with tractors that have standard ABS only?

Yes. Meritor WABCO's trailer Roll Stability Support systems will work with standard tractor ABS made by different manufacturers.

Will trailers with Roll Stability Support work with trailers that have standard ABS only?

Yes. Meritor WABCO's trailer Roll Stability Support systems will work with non-Roll Stability Support ABS systems. Additional pneumatic considerations are shown in Figure 4.9 in Section 4. Plumbing a non-Roll Stability Support ABS system with a Roll Stability Support system can easily be accomplished by following the patented Meritor WABCO P5 plumbing instructions. Figure 4.9 in Section 4.

RSS is permitted on the B-train configuration, as this configuration provides maximum stability support. Contact your Meritor WABCO representative for additional information relating to pneumatic considerations for this configuration.

Power Line Carrier (PLC) Communications Questions and Answers

What is PLC communications?

PLC stands for Power Line Carrier, which is a method used to communicate information by multiplexing data on the same wire used for the ABS electrical power. PLC communications convert signal message data to a radio frequency (RF) signal on top of the +12V power line providing electrical power to the trailer.

What is multiplexing?

Multiplexing means communicating multiple signals or messages on the same transmission media. This provides an efficient and cost effective means by decreasing the number of wires and connectors which otherwise would be needed. Without multiplexing, it could take several wires and connections in order to transmit several different signals to various locations on a vehicle, but with multiplexing these wires and connectors can be significantly reduced.

Why add PLC technology to tractor and trailer ABS?

By adding PLC technology to the tractor and trailer ABS the industry is able to have the most cost effective means to meet the March 1, 2001 FMVSS-121 in-cab trailer indicator lamp mandate with no additional external hardware, harnesses or connectors. Additionally, this new capability of communicating other information between tractor and trailers provides many more opportunities to further improve productivity and safety. With every tractor and trailer currently built having ABS technology, integrating PLC technology into the PC board was the logical choice.

How does it work?

The trailer ABS with PLC takes message information to be sent to the tractor and converts it to an RF signal. The signal is then sent over the trailer ABS power line (blue wire) and the tractor ABS with PLC receives the signal. Messages can also be sent from the tractor to the trailer via PLC.

What if a tractor is equipped with PLC technology and the trailer is not, or vice-versa? Will the tractor and trailer ABS function correctly?

Absolutely. If the tractor is equipped with PLC and the trailer is not, or vice-versa, your ABS in-cab trailer indicator lamp will not illuminate, but your ABS will continue to function as normal. To ensure that the trailer ABS is functioning correctly, the trailer ABS indicator lamp mounted on the trailer should be utilized.

What if a tractor has one manufacturer's ABS with PLC and the trailer has another manufacturer's ABS with PLC? Will the two systems be compatible and operate the trailer ABS lamp as expected?

Yes. ABS with PLC from different manufacturers are designed to be compatible by controlling the trailer ABS lamp according to the FMVSS-121 standard, even when systems from different manufacturers are connected to each other. However, certain features beyond the control of the trailer ABS indicator lamp may or may not be supported by all devices communicating via PLC. SAE task forces continue to standardize common messages so that maximum compatibility may exist in the future.

How do I diagnose PLC?

PLC can be diagnosed over the J1587/J1708 diagnostic connector on the tractor or on the trailer using tools designed for PLC diagnostics.

Can I use blink code diagnostics on Enhanced Easy-Stop™ to diagnose PLC?

Yes. Section 5 of this manual describes the method of performing a blink code check using Constant Power (ignition activation). Blink Code 17 indicates a PLC failure.

If PLC does not seem to be operating correctly, but I don't get a Blink Code 17 when I run a blink code check, what else could be wrong?

If there is no Blink Code 17, the PLC is functioning correctly and does not need to be replaced; however, there could be a problem in the trailer's wiring harness. Check the wiring system and make the necessary repairs. If the problem persists, contact Meritor WABCO for assistance.

ABS Indicator Lamps

NOTE: When replacing the bulb, to ensure correct lamp operation use an incandescent type DOT-approved lamp, or a LED with integral load resistor.

ABS Indicator Lamp (on Dash)

With RSS*plus*™, there are two ABS indicator lamps; one on the vehicle dash and one on the side of the trailer.

ABS Indicator Lamp (on Trailer)

What is the function of the ABS indicator lamp?

The indicator lamp enables a driver to monitor the ABS at all times. Refer to the OEM operating manual for the mounting location of the indicator lamp.

How does the indicator lamp operate?

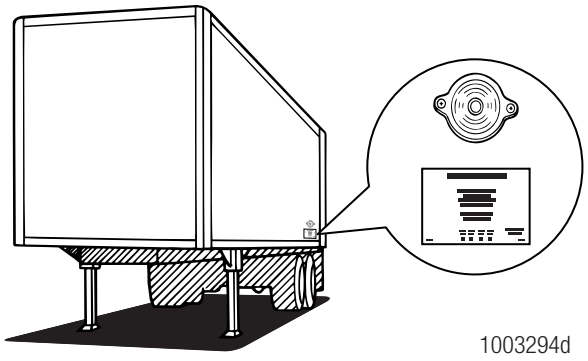
How the indicator lamp operates depends on whether the ABS is powered by stoplight or constant power:

- If the trailer was manufactured prior to February 28, 1998, or was manufactured outside of the United States, the ABS may be either stoplight or constant powered.
- If the trailer was manufactured March 1, 1998 or later — and was manufactured in the United States — it will have constant power capability. This is mandated by Federal Motor Vehicle Safety Standard (FMVSS) 121.

Check your vehicle specification sheet to determine the type of ABS power. Table B in this section illustrates indicator lamp operation on constant powered ABS systems.

What does the trailer ABS indicator lamp mean to service personnel?

The trailer ABS indicator lamp on the side of the trailer indicates the status of the trailer ABS. If it comes ON and stays ON when you apply the brakes to a moving vehicle, there is an ABS malfunction. It is normal for the lamp to come ON and go OFF to perform a bulb check, but it should not stay ON when the vehicle is moving above 4 mph (6.45 kph). As with any safety system, it is important not to ignore this indicator. If the indicator lamp indicates a malfunction, the vehicle can be operated to complete the trip, but it is important to have it serviced as soon as possible using the appropriate maintenance manual to ensure correct braking performance and that the benefits of ABS remain available to your drivers. Typical ABS indicator lamp mounting locations are illustrated in Figure 3.1.



Typical ABS Indicator Lamp Mounting Location on Side of Trailer

Figure 3.1

For more information, call Meritor's Customer Service Center at 866-OnTrac1 (668-7221).

Can you continue to operate a vehicle when the indicator lamp indicates a fault?

Yes. When a fault exists in the ABS, standard braking returns to the affected wheel, and the ABS still controls other monitored wheels. This lets you complete the trip. You should not ignore the indicator lamp and should have the vehicle serviced as soon as possible after the lamp comes ON and stays ON. Indicator lamp operation is shown in Table B.

Table B: Constant Power

System Is Ignition Powered				
Brakes	**Ignition**	**Fault in System**	**Vehicle Speed**	**Indicator Lamps (Trailer and Dash)**
Released	OFF	N.A.	N.A.	OFF
	ON	NO	Less than 4 mph (6.45 kph)	ON for three seconds, then go OFF.
	ON	NO	Greater than 4 mph (6.45 kph)	OFF
	ON	YES	N.A.	ON
Applied	OFF	NO	Less than 4 mph (6.45 kph)	ON for three seconds, then go OFF.
	OFF	YES	N.A.	ON
	ON	NO	Less than 4 mph (6.45 kph)	ON for three seconds, then go OFF.
	ON	NO	Greater than 4 mph (6.45 kph)	OFF
	ON	YES	N.A.	ON

3 ABS Questions and Answers

Types of Faults

What is a "fault" in the system?

A fault in the system is a problem that can exist in the ABS or in the system's components. Faults can be either existing faults or intermittent stored faults.

What is an existing fault?

An **existing** fault is a problem that exists currently in the system. For example, a damaged sensor cable is an existing fault that the ECU will detect and store into memory until you identify the cause, repair the cable and clear the fault from the ECU. An existing fault is also referred to as an "active" fault.

What is an intermittent fault?

An **intermittent** fault is a problem that usually occurs only under certain driving conditions. For example, the ECU may detect a loose cable or wire or receive an erratic signal from a wheel sensor. Since intermittent faults can be unpredictable and may only happen periodically, you can use information stored in ECU memory to find and correct the loose cable or wire. An intermittent fault cannot be retrieved using blink codes. An intermittent fault is also referred to as a "stored" fault.

Is an intermittent fault difficult to locate and repair?

It can be, because you may not be able to easily see the cause of the problem. Meritor WABCO recommends that you write down intermittent faults to help you isolate a fault that recurs over a period of time.

Can the ECU store more than one fault in memory?

Yes. And the ECU retains existing and intermittent faults in memory even when you turn OFF the power to the ECU.

What if the ECU finds a fault in an ABS component during normal operation?

If the ECU senses a fault in the system (with an ABS valve, for example), the ECU turns the trailer ABS indicator lamp on and returns the wheel controlled by that valve to standard braking. Or, if the ECU finds a fault with one wheel speed sensor in a system that has four sensors on a tandem axle, the ECU uses information from the other sensor on the same side of the tandem to ensure continuous ABS function. The ECU continues to provide full ABS function to the wheels unaffected by system faults. However, the ECU will turn the trailer ABS indicator lamp on to tell the driver a fault has been detected in the system.

RSS*plus*™ Installation Diagrams

With RSS*plus*™, standard 2S/2M and 4S/2M sensor location designations will change depending on how the ECU/dual modulator valve assembly is mounted. It may be mounted facing either the front or the rear of the trailer. It is important that you identify the location of these sensors before beginning any diagnostics. Sensor locations for both front and rear-facing installations are depicted in this section. Refer to Table C.

Table C: Sensor Locations

Configuration	Figure Reference
2S/2M Standard Mounted with Sensors Facing Front of Trailer	Figure 4.1 and Figure 4.3.
2S/2M Standard Mounted with Sensors Facing Rear of Trailer	Figure 4.2 and Figure 4.4.
4S/2M Premium Mounted with Sensors Facing Front of Trailer	Figure 4.5 and Figure 4.7.
4S/2M Premium Mounted with Sensors Facing Rear of Trailer	Figure 4.6 and Figure 4.8.

Typical RSS*plus*™ Trailer ABS Installations

NOTE: Meritor WABCO recommends placing sensors on the axle that will provide the most braking performance. The suspension manufacturer can provide this information. Figure 4.1 through Figure 4.11.

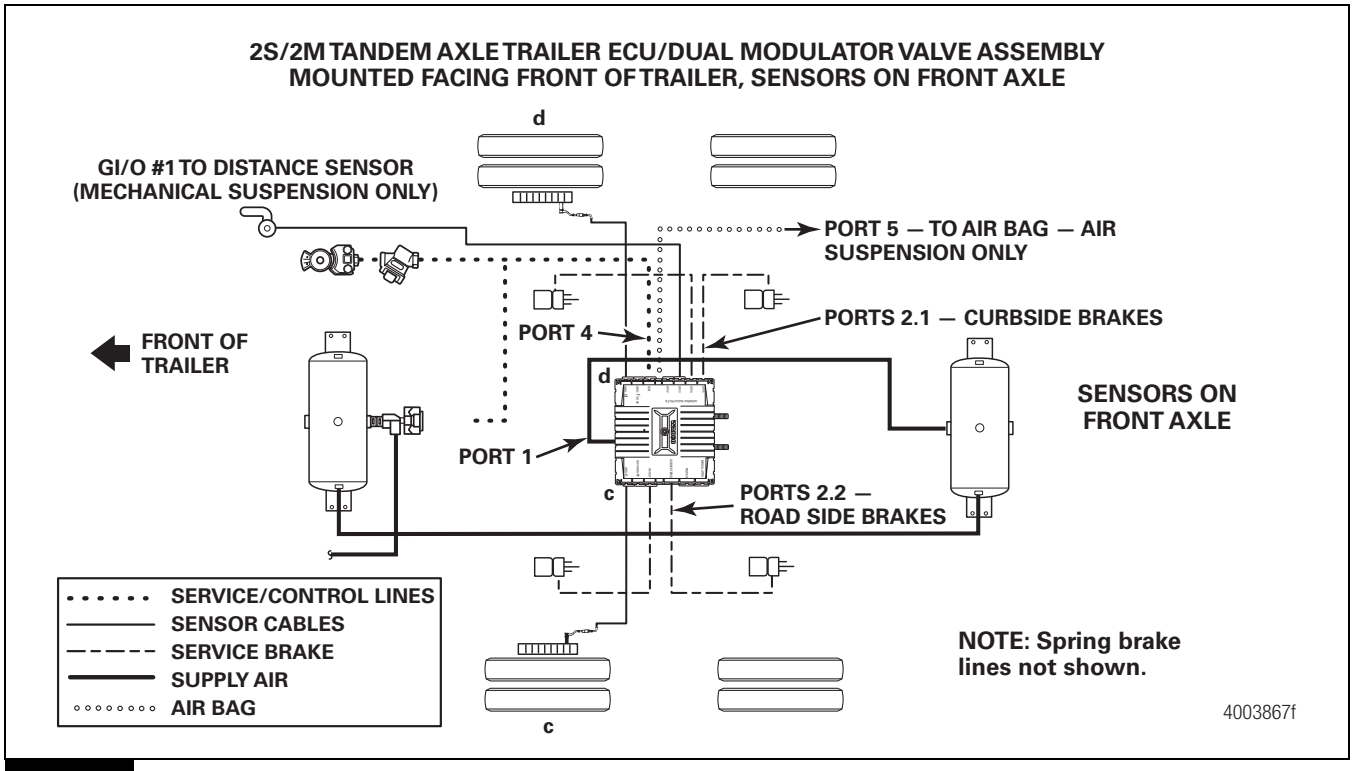


Figure 4.1

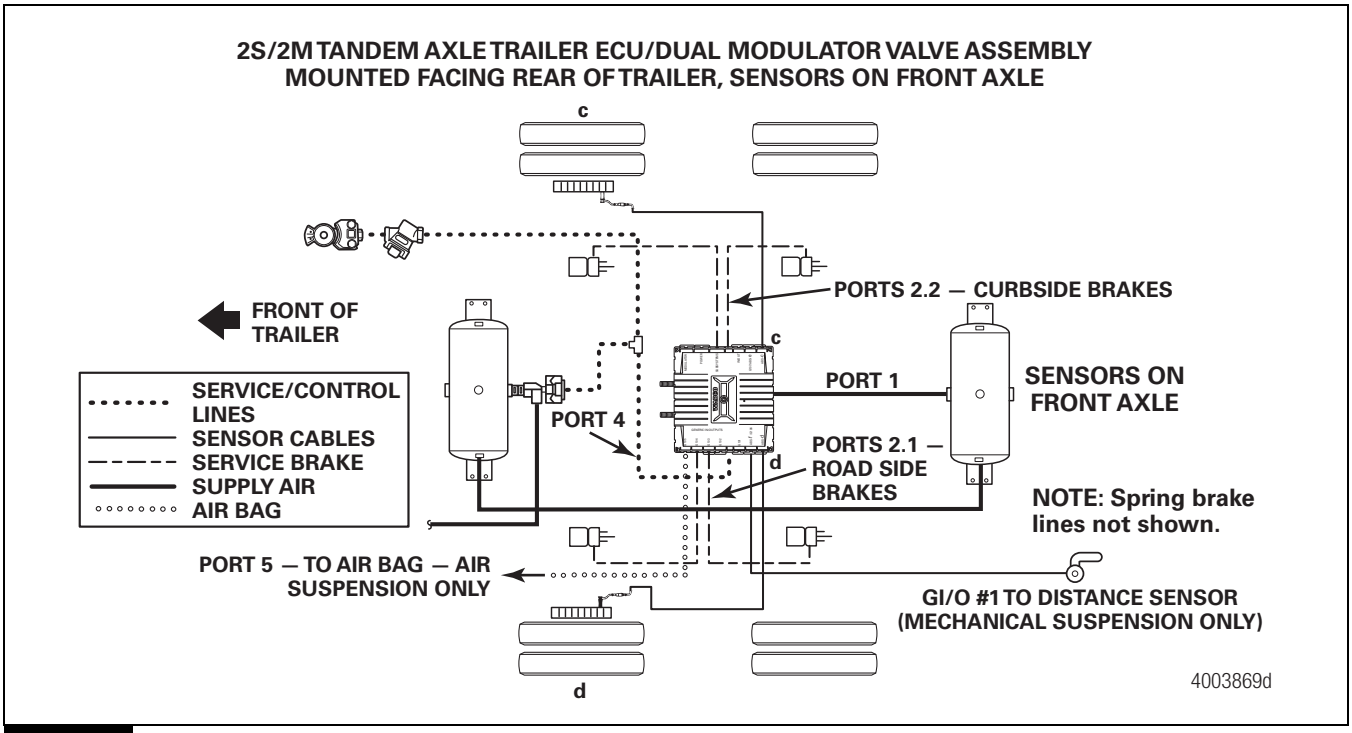


Figure 4.2

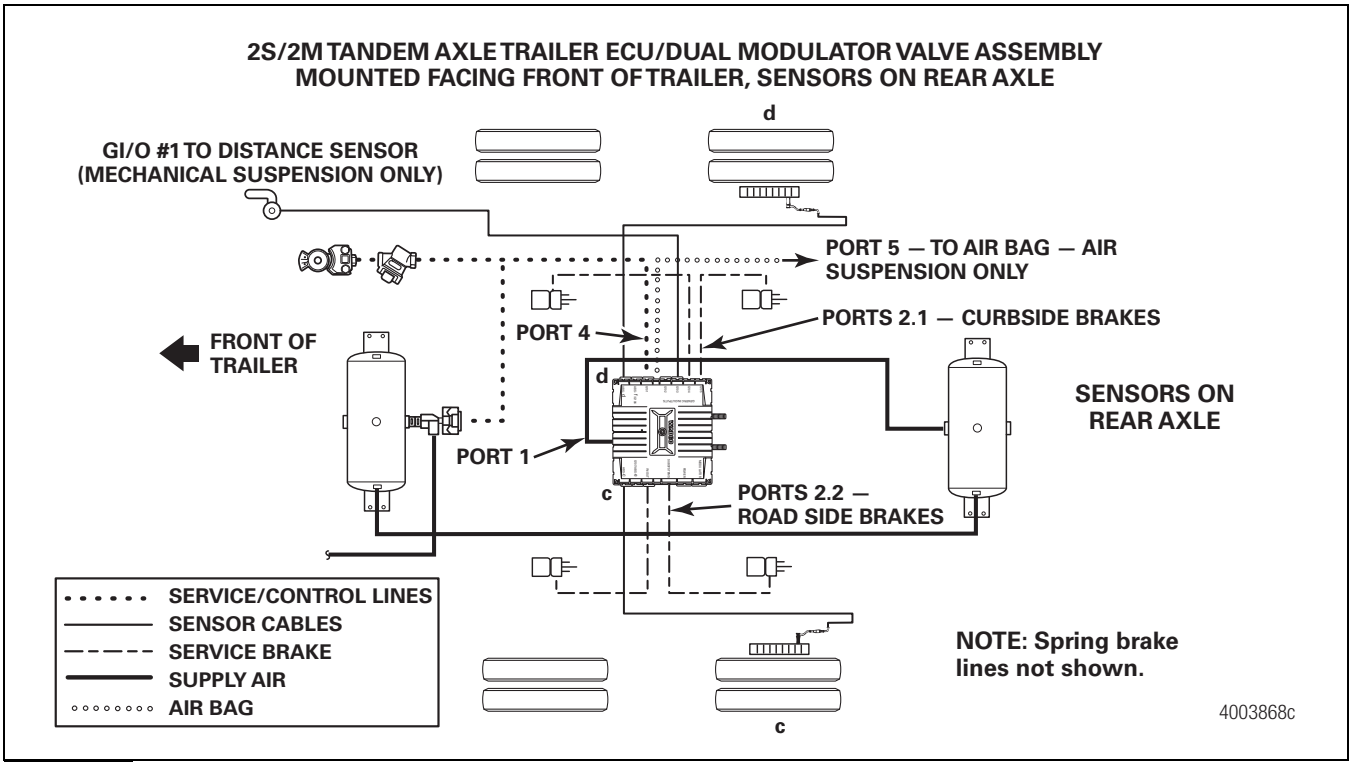


Figure 4.3

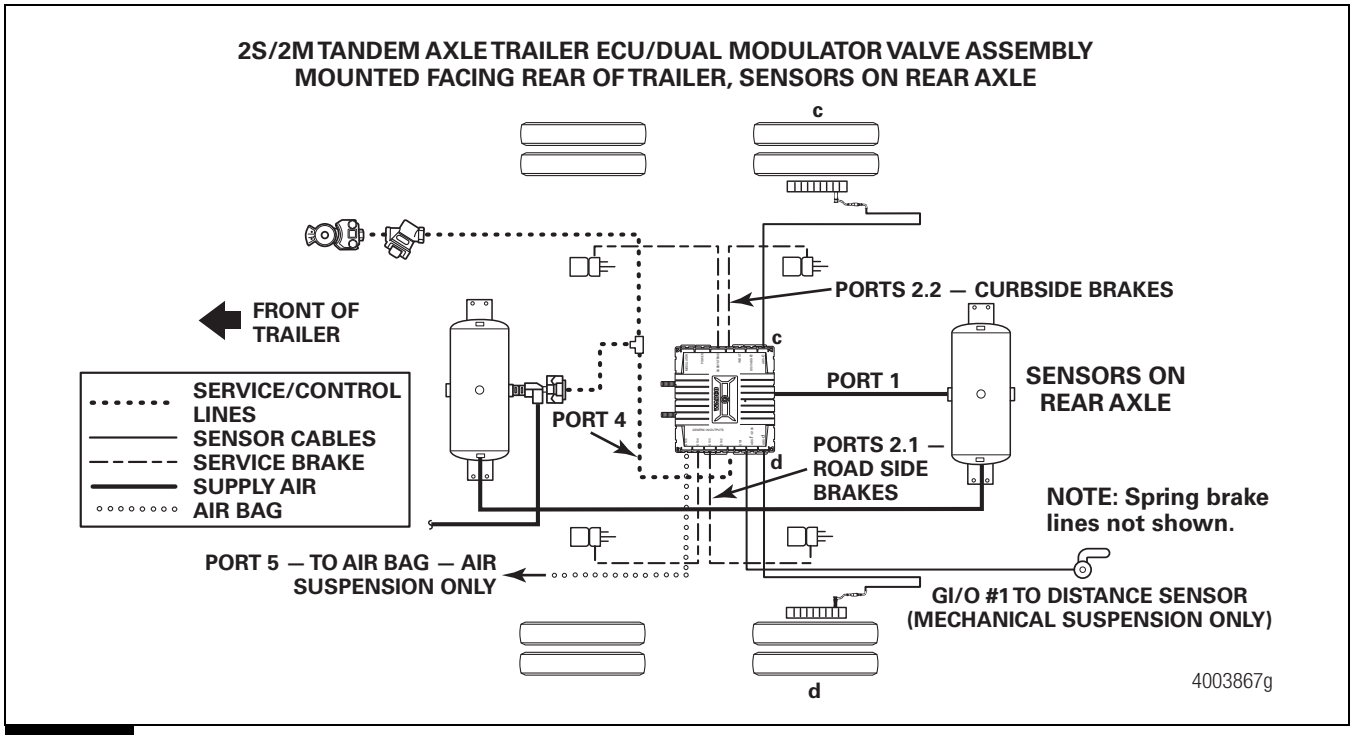


Figure 4.4

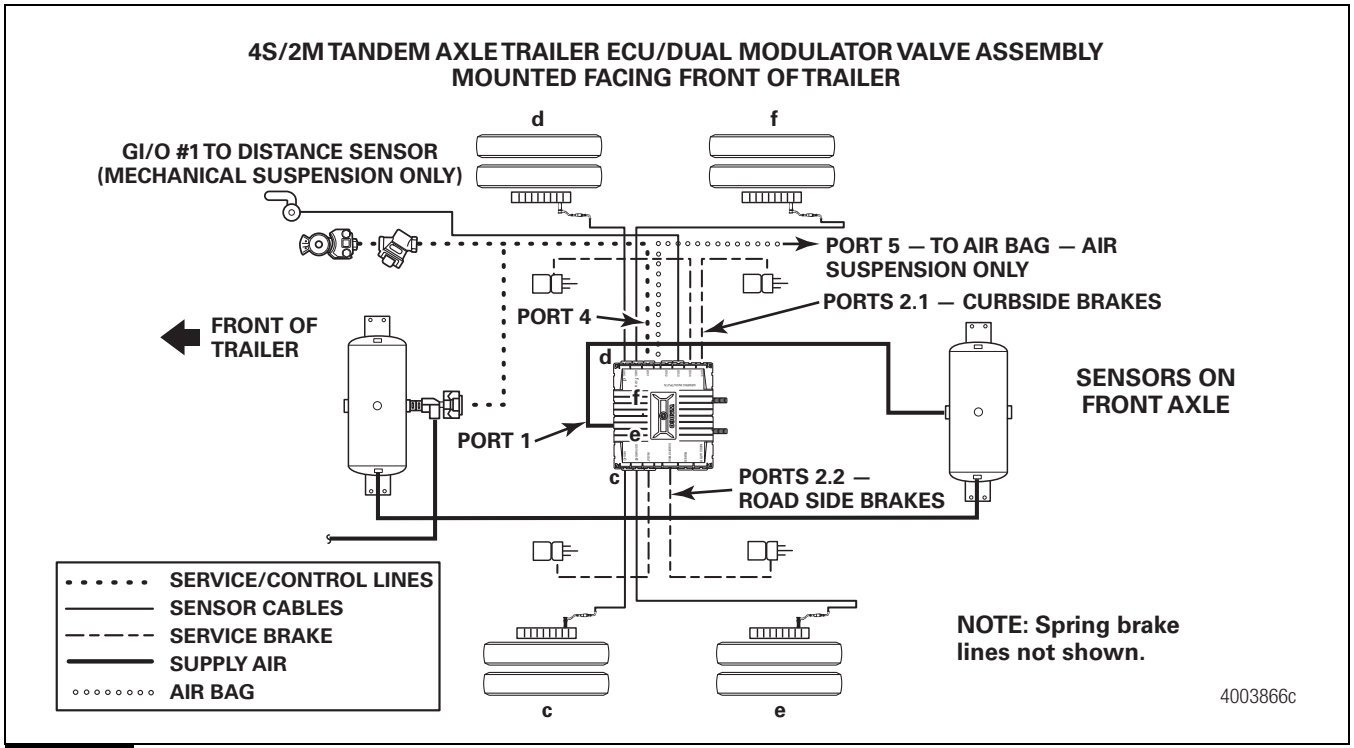


Figure 4.5

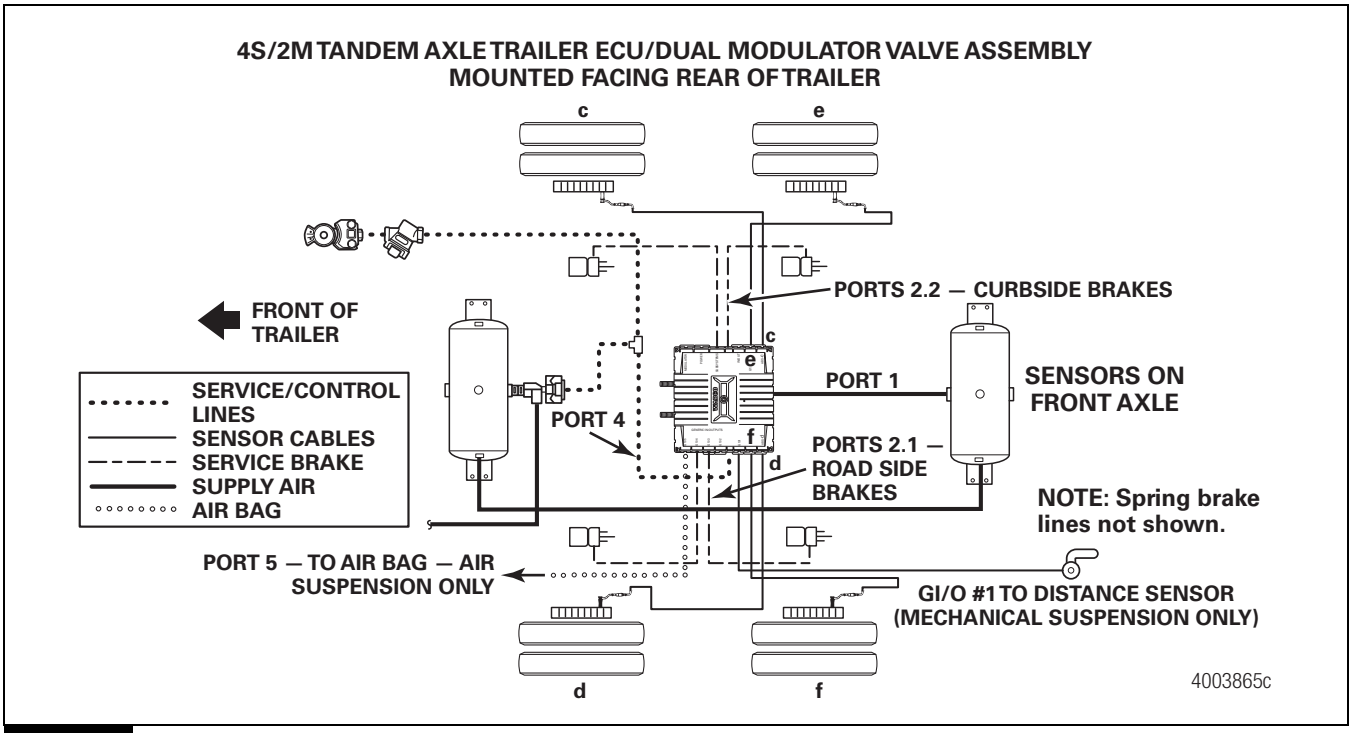


Figure 4.6

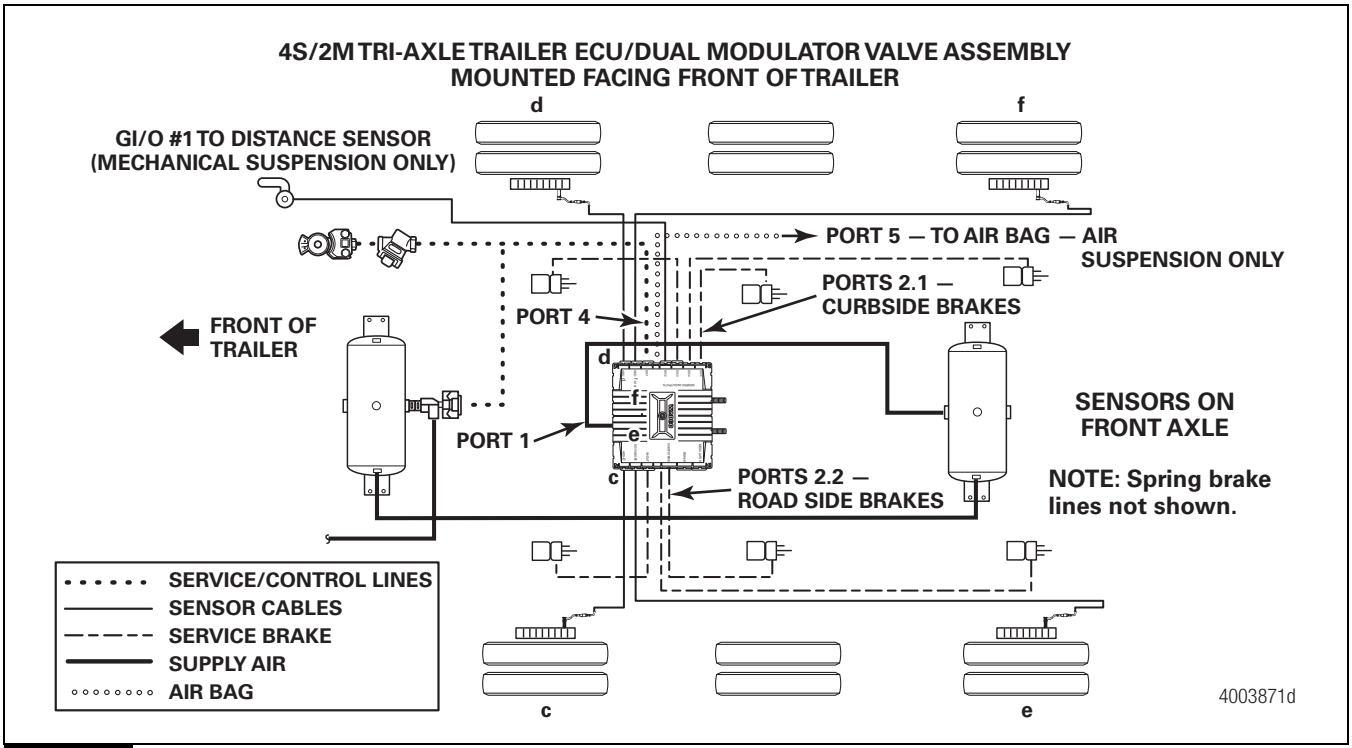


Figure 4.7

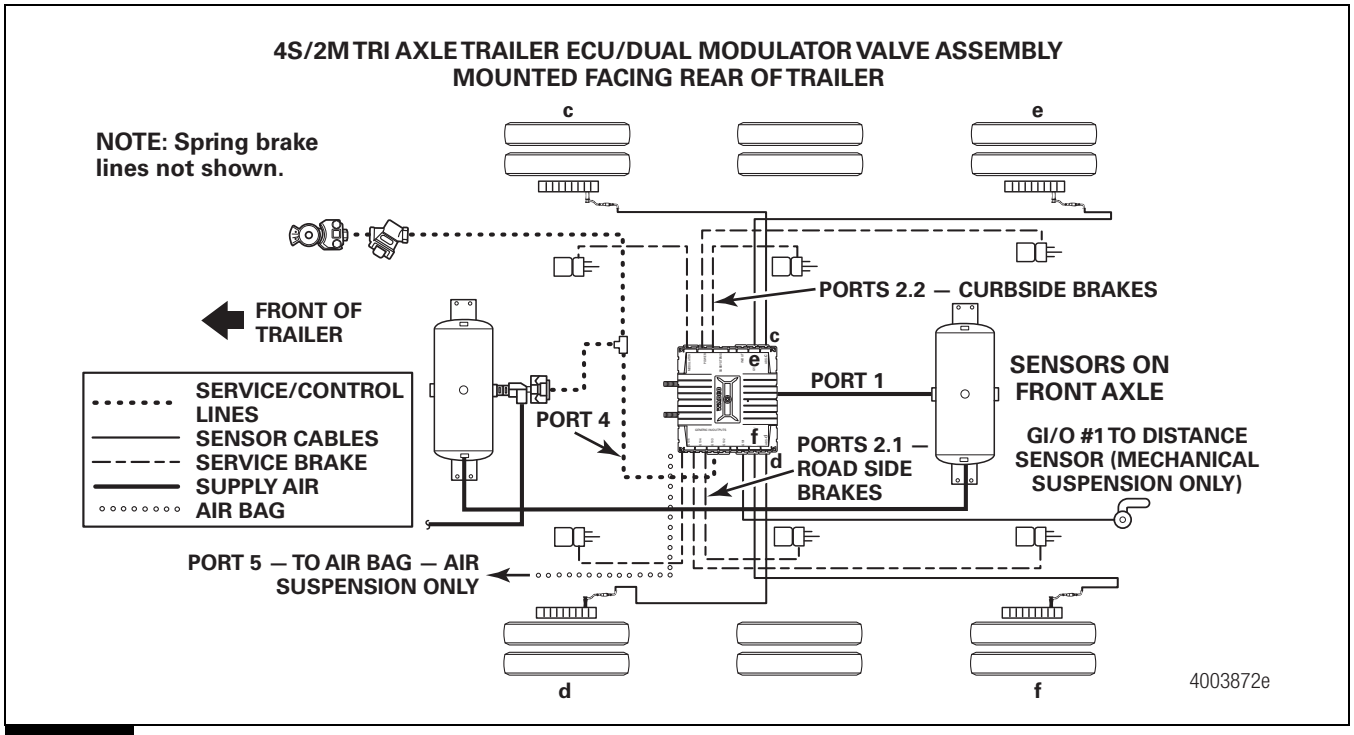

4S/2M TRI AXLE TRAILER ECU/DUAL MODULATOR VALVE ASSEMBLY
MOUNTED FACING REAR OF TRAILER
NOTE: Spring brake lines not shown.
c
e
FRONT OF TRAILER
SERVICE/CONTROL LINES
SENSOR CABLES
SERVICE BRAKE
SUPPLY AIR
AIR BAG
PORTS 2.2 — CURBSIDE BRAKES
PORT 1
SENSORS ON FRONT AXLE
PORT 4
PORTS 2.1 — ROAD SIDE BRAKES
GI/O #1 TO DISTANCE SENSOR (MECHANICAL SUSPENSION ONLY)
PORT 5 — TO AIR BAG — AIR SUSPENSION ONLY
d
f
4003872e

Figure 4.8

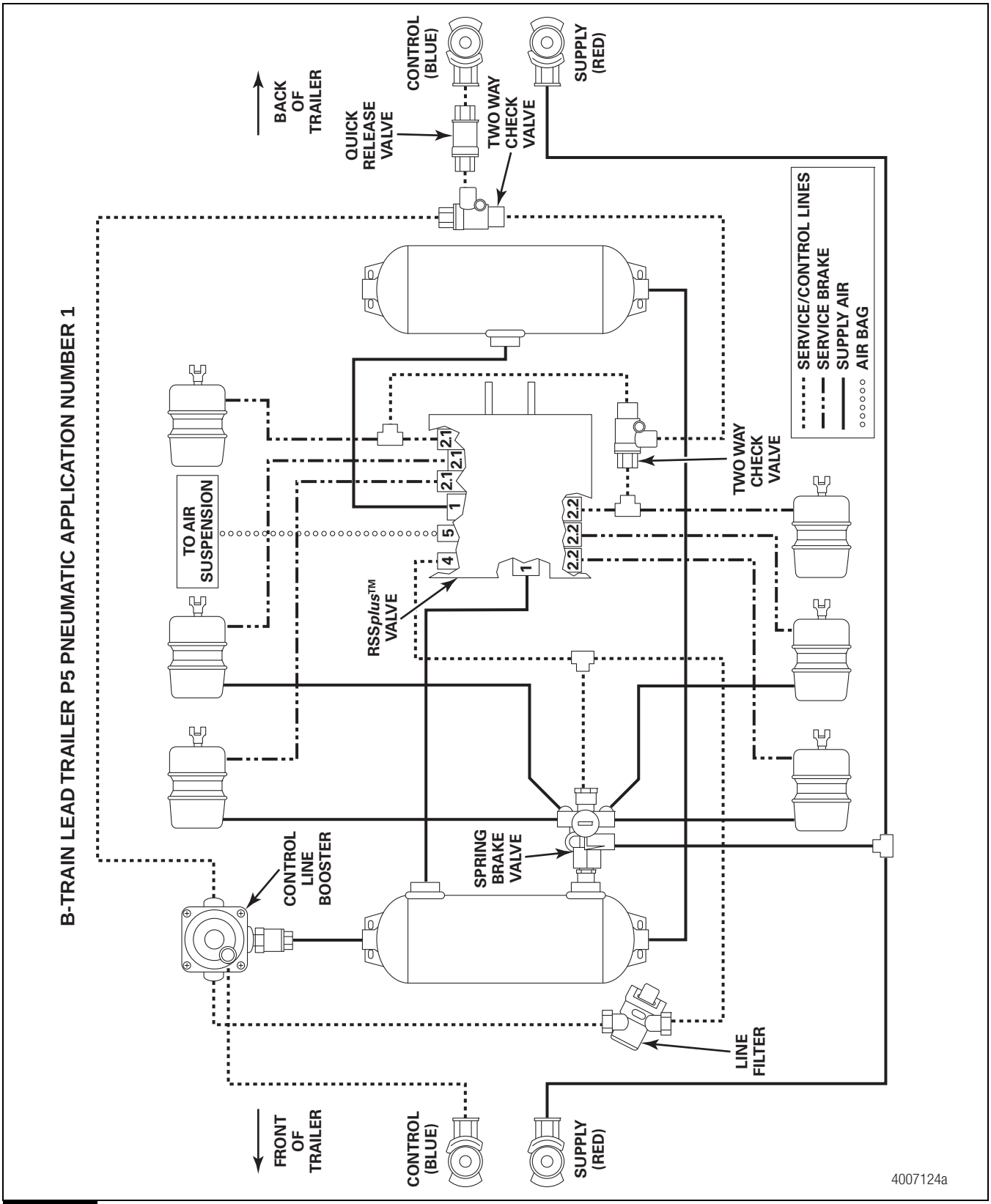

B-TRAIN LEAD TRAILER P5 PNEUMATIC APPLICATION NUMBER 1
BACK OF TRAILER
CONTROL (BLUE)
SUPPLY (RED)
QUICK RELEASE VALVE
TWO WAY CHECK VALVE
SERVICE/CONTROL LINES
SERVICE BRAKE
SUPPLY AIR
AIR BAG
TO AIR SUSPENSION
RSSplus™ VALVE
TWO WAY CHECK VALVE
CONTROL LINE BOOSTER
SPRING BRAKE VALVE
LINE FILTER
FRONT OF TRAILER
CONTROL (BLUE)
SUPPLY (RED)
4007124a

Figure 4.9

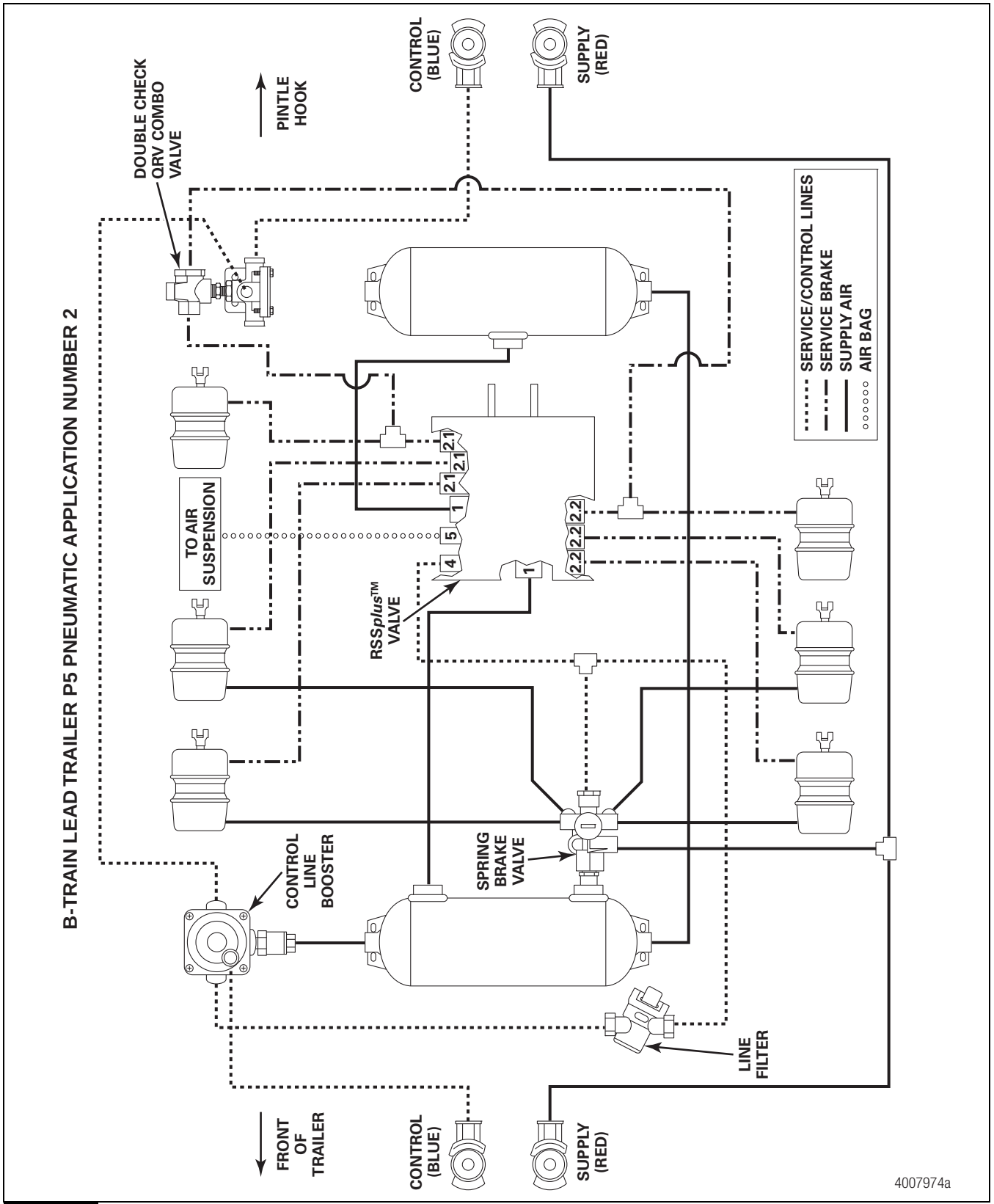

B-TRAIN LEAD TRAILER P5 PNEUMATIC APPLICATION NUMBER 2
DOUBLE CHECK QRV COMBO VALVE
PINTLE HOOK
CONTROL (BLUE)
SUPPLY (RED)
SERVICE/CONTROL LINES
SERVICE BRAKE
SUPPLY AIR
AIR BAG
TO AIR SUSPENSION
RSSplus™ VALVE
CONTROL LINE BOOSTER
SPRING BRAKE VALVE
LINE FILTER
FRONT OF TRAILER
CONTROL (BLUE)
SUPPLY (RED)
4007974a

Figure 4.10

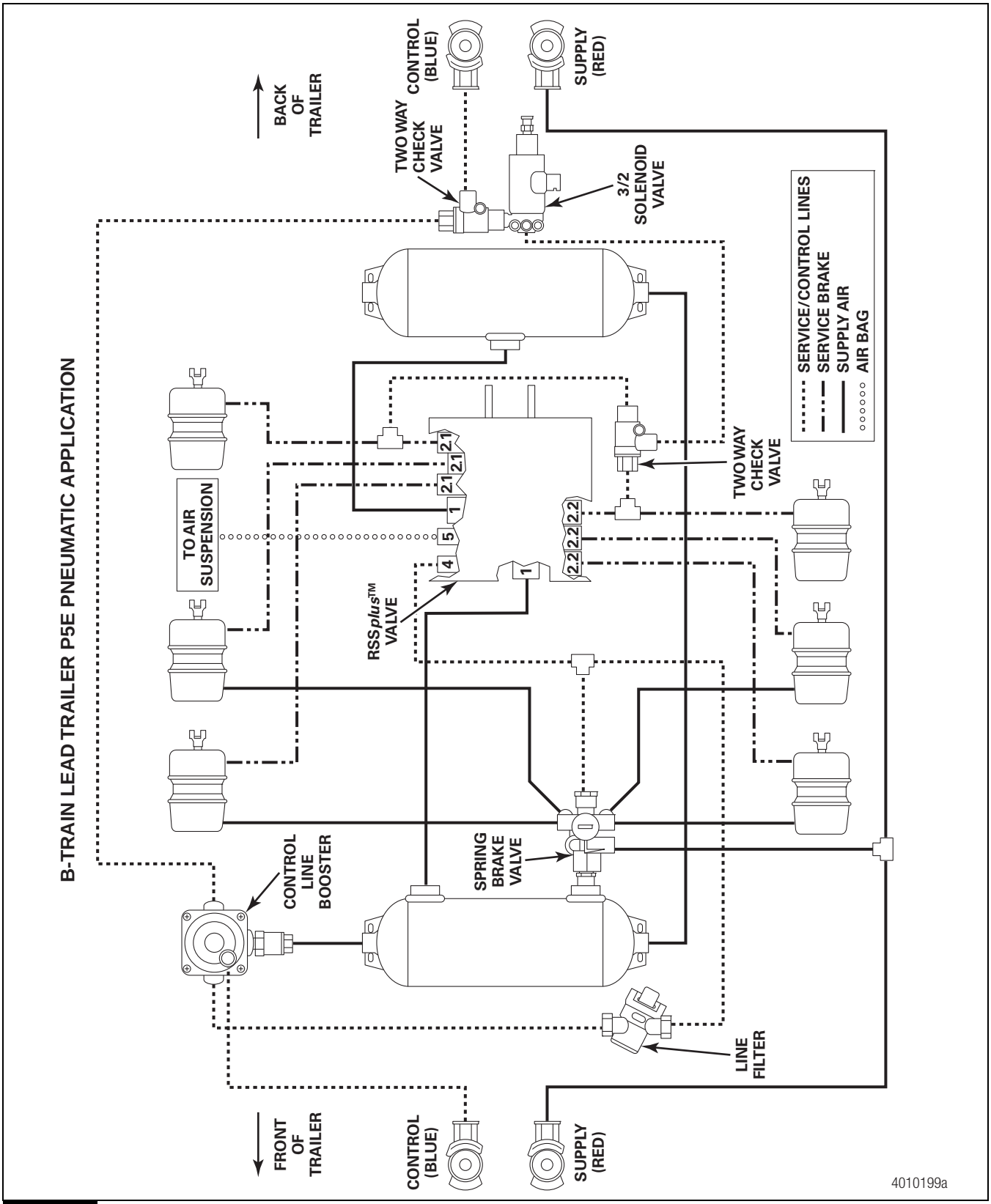

B-TRAIN LEAD TRAILER P5E PNEUMATIC APPLICATION
BACK OF TRAILER
FRONT OF TRAILER
CONTROL (BLUE)
SUPPLY (RED)
TWO WAY CHECK VALVE
3/2 SOLENOID VALVE
SERVICE/CONTROL LINES
SERVICE BRAKE
SUPPLY AIR
AIR BAG
TO AIR SUSPENSION
RSSplus™ VALVE
SPRING BRAKE VALVE
CONTROL LINE BOOSTER
LINE FILTER
4010199a

Figure 4.11

Multiple Trailer Applications

Specific multiple trailer applications require additional plumbing and TOOLBOX™ Software configuration. Not all multiple trailer configurations have been approved. Contact Meritor WABCO prior to installation for guidance on multiple trailer configurations.

P5E

The Roll Stability System can be configured on B-Train trailers through the use of the patented Meritor WABCO P5E pneumatic application. The P5E system ensures that uniform braking occurs on both lead and pup trailers at the same time, similar to standard braking. The RSS*plus*™ valve and the P5E are required on the lead trailer of a B-Train, and it is recommended that an RSS*plus*™ valve be installed on the pup trailer as well. Additional valves are required as illustrated in Figure 4.11.

The ATC - Generic I/O Cable, part number 449-443-030-0, is connected to the GIO 3 port on the RSS+ ECU and on the electronics connector of the 3/2 Solenoid Valve, part number 472 170 997 0. The air system plumbing diagram for integrating the 3/2 Solenoid Valve and the Two Way Check Valves, part number 934-099-003-0, are illustrated in Figure 4.11.

Once the hardware has been installed, TOOLBOX™ Software parameters must be configured to activate the P5E system. When programming the ECU, ensure that “Level 2 RSS Activation Output (GIO 3)” is selected. Figure 4.12. Refer to Section 8 for setting the vehicle parameters.

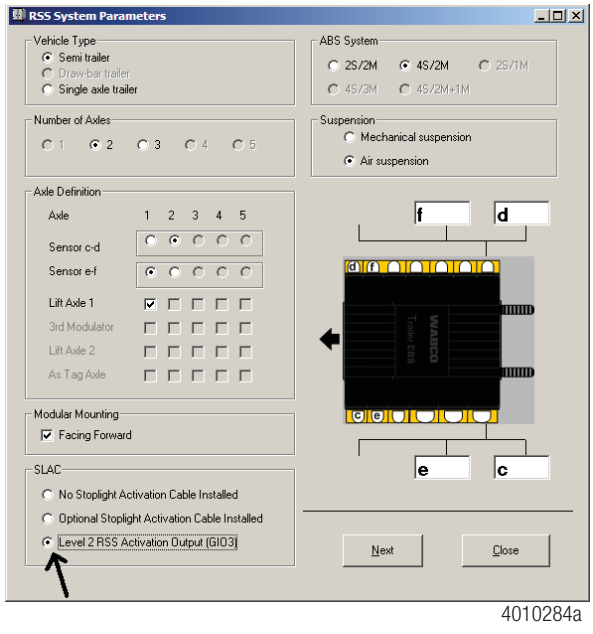


Figure 4.12

After the P5E has been installed and the parameters have been saved to the ECU, the End of Line system sign-off must be performed. Refer to Section 7 for End of Line testing. Once the End of Line testing is complete and the P5E is ready for testing, proceed to the Tests pull-down menu and select Level 2 Function. Figure 4.13.

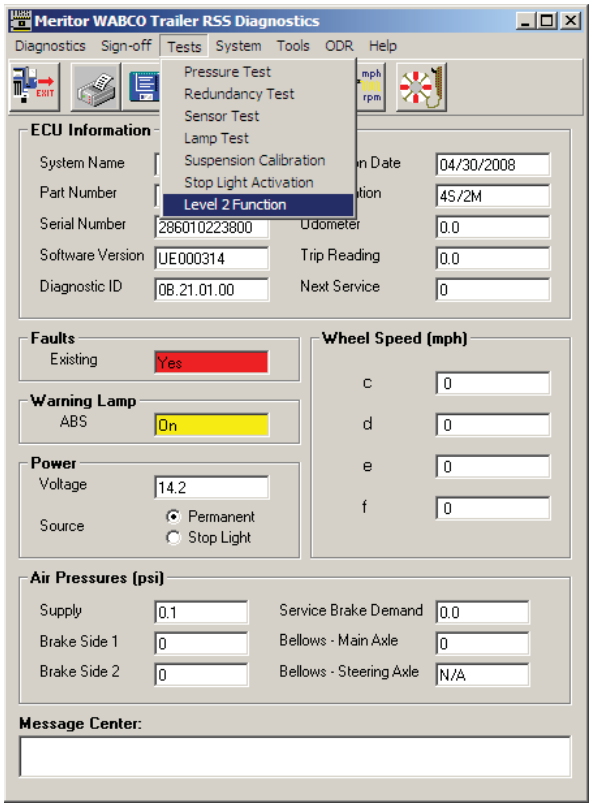


Figure 4.13

Press the Start Test button. Figure 4.14.

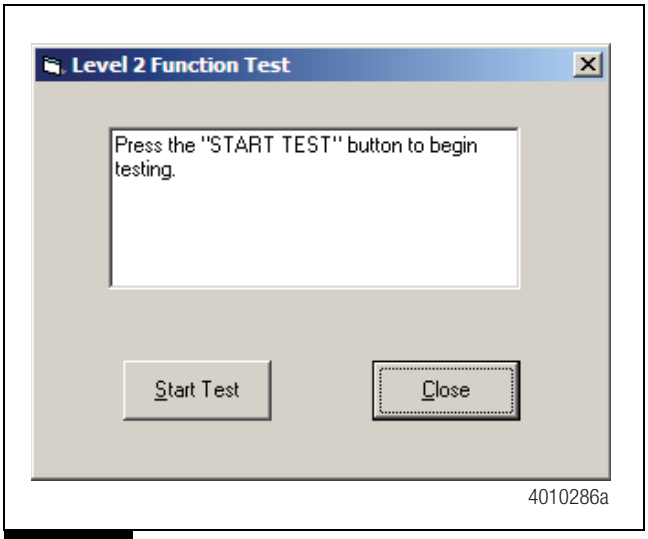


Figure 4.14

During the sign-off procedure, this message will appear asking the technician to monitor the pressure gauge at the rear gladhand to confirm the RSS system is applying 50 psi (3.45 bar). This test validates that the pneumatic and electrical connections are correct. Figure 4.15.

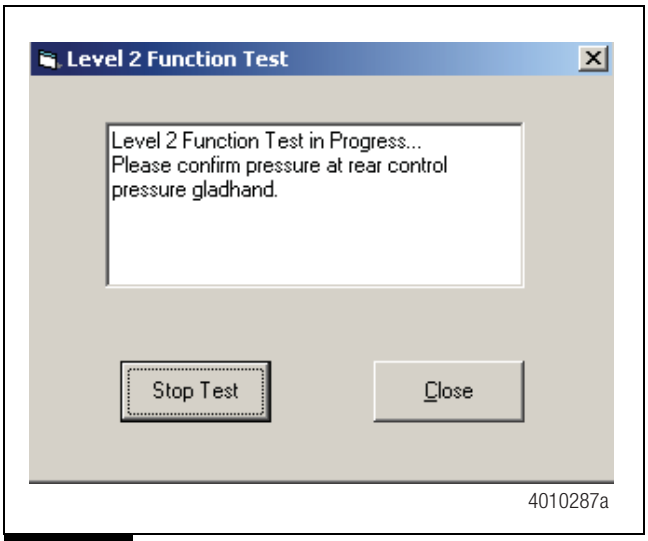


Figure 4.15

Once confirmed that the rear gladhand is maintaining 50 psi (3.45 bar), click the Close button. If 50 psi ± 5 psi (3.45 ± 0.345 bar) is not present, click the Stop Test button, exit the Level 2 test and make the appropriate repairs.

P5

In certain older multiple trailer applications such as the lead trailer in a B-Train application, additional plumbing was added to the standard air system. The P5 plumbing configuration is similar to the P5E, but is used in older applications without the benefit of the electronic control. There are no additional TOOLBOX™ Software parameters required for the P5 configuration. However, note that a Quick Release Valve (such as the Sealco QRV part number 320100) is used in place of the P5E's 3/2 Solenoid Valve for P5 application number 1 (Figure 4.9. A Double Check QRV Combo Valve, part number 934 099 010 0, replaces the 3/2 Solenoid Valve in the P5 application number 2 (Figure 4.10).

Wiring Diagrams

Power Cable

The following illustration shows the Power Line Carrier (PLC) power cable interface. Figure 4.16.

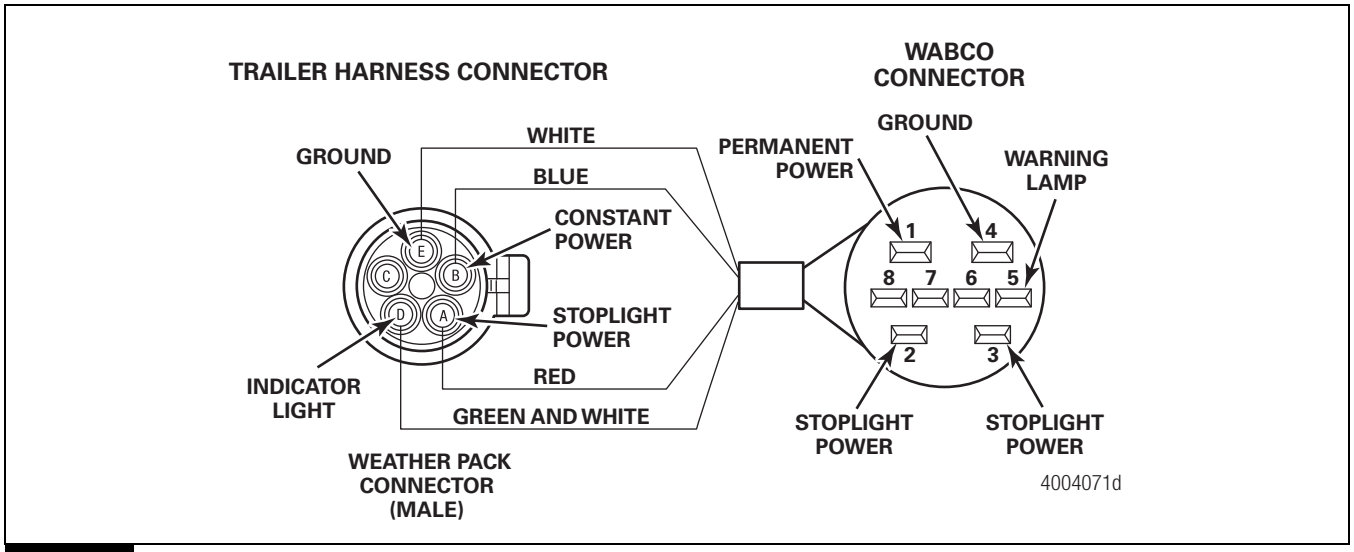


Figure 4.16

Lift Axle

A 4S/2M configuration may be configured with a lift axle on either axle.

— Sensors E and F are installed on the sensed, liftable axle.

— The sensed, liftable axle must be specified in the ECU parameters. Refer to the parameter entry guidelines in Section 8.

Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

⚠ WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

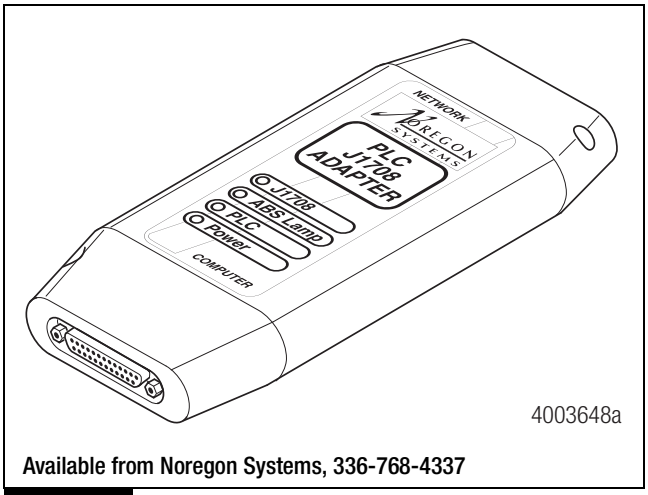
The ABS is an electrical system. When you work on the ABS, take the same precautions that you must take with any electrical system to avoid serious personal injury. As with any electrical system, the danger of electrical shock or sparks exists that can ignite flammable substances. You must always disconnect the battery ground cable before working on the electrical system.

Diagnostics

There are two methods used to get fault information from the ECU:

- TOOLBOX™ Software
- Blink code diagnostics

TOOLBOX™ Software requires the PLC/J1708 adapter. Figure 5.1.



Available from Noregon Systems, 336-768-4337

Figure 5.1

Important PLC Information for Blink Code Diagnostics

Blink Code 17 indicates a PLC failure. If PLC does not seem to be operating correctly, but there is no Blink Code 17, the ECU is functioning correctly and does not need to be replaced; however, there could be a problem in the trailer's wiring harness. Check the wiring system and make the necessary repairs. If the problem persists, contact the customer service center for assistance.

TOOLBOX™ Software

Meritor WABCO TOOLBOX™ Software is a PC-based diagnostic program. Version 9.0 (or higher) runs on a Pentium® platform with Windows® 2000, Me or XP and provides diagnostic capabilities by communicating with the ECU. Trailer ABS screens are described in this manual.

TOOLBOX™ Software has the following functions.

- Supports RSS*plus*™ with PLC and Enhanced Easy-Stop™ ABS
- Displays both constant and changing information from the ECU being tested.
- Displays both active and stored system faults, as well as the appropriate repair instructions.
- Activates system components to verify:
  - — System integrity
  - — Correct component operation
  - — Installation wiring

NOTE: A J1587/J1708 to RS232 or PLC to J1708 interface is required to run this software.

TOOLBOX™ Software is available from SPX (Kent-Moore), 800-345-2233.

Vista™/Windows® 7 Installations

If you have Microsoft Vista™/Windows® 7 installed on your computer, the Vista™ UAC (User Access Control) must be disabled before installing the TOOLBOX™ Software. Have your computer support personnel or your IT (Information Technology) department perform this change. Once disabled, TOOLBOX™ Software can be installed without issue.

Meritor WABCO does not provide computer support.

If TOOLBOX™ Software has already been installed on your personal computer with Vista™/Windows® 7, your computer support personnel (IT department) must disable the UAC manually. Refer to Vista™ support documentation for the procedure.

Blink Code Diagnostics

The Meritor WABCO RSS*plus*™ Trailer ABS ECU detects any electrical fault in the trailer ABS. Each of the faults has a code. When a fault occurs, the ECU stores the code for that fault in the memory.

There are two kinds of faults: active and stored. Active faults are those currently existing in the system, such as a broken wire. Active faults can be diagnosed through blink codes or TOOLBOX™ Software. Stored faults are faults that have occurred but do not presently exist. Active faults can be cleared only after repairs are completed. Stored faults can only be diagnosed with TOOLBOX™ Software.

The ECU signals a malfunction by lighting both the internal and external indicator lamp when a fault exists. The external ABS indicator lamp is usually mounted on the left rear of the trailer, near the rear wheels. Blink codes are activated through Ignition Power Activation.

Ignition Power Activation

Ignition Power Activation is the process of using the vehicle's ignition switch (or interrupting the power on the blue wire by some other means) to display blink codes on the trailer ABS indicator lamp located on the side of the trailer. This method is for constant power vehicles only.

NOTE: For ignition power activation, power is provided by the ignition switch.

To obtain blink codes using ignition power activation, perform the following procedure:

1. Turn the ignition switch on for no longer than five seconds. The ABS indicator lamp will be on.
2. Turn the ignition switch off. The ABS indicator lamp will go out.
3. Turn the ignition switch on. The ABS indicator lamp will then come on, then go out.
4. The blink code error will be displayed three times by the ABS indicator lamp on the trailer.

Blink Code Counts	Component Name
0	No failure
3	Sensor failure c
4	Sensor failure d
5	Sensor failure e
6	Sensor failure f
7	External modulator failure
9	Internal modulator failure H2
10	Internal modulator failure H1
11	No speed failure
12	Control pressure failure
13	Supply pressure failure
14	Power supply failure
15	ECU internal failure*
16	SAE J 1708 failure
17	PLC failure
18	Generic IO failure
19	Load sensing failure
20	Roll stability system failure

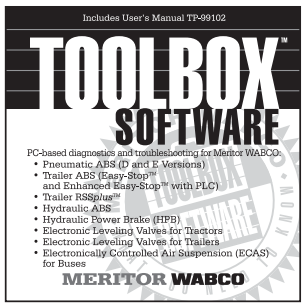
*This error code will also appear on newly installed ECUs that have not been put into service with TOOLBOX™ Software End-of-Line test.

Computer Diagnostics

TOOLBOX™ Software

TOOLBOX™ Software is a PC-based diagnostics program that can display wheel speed data, test individual components, verify installation wiring and more.

Version 9.0 (or higher) supports RSS*plus*™ and runs on Windows® 95 through Windows® 7. An RS232 to J 1708 converter box, such as the PLC/J 1708 adapter, is required. Figure 5.2.



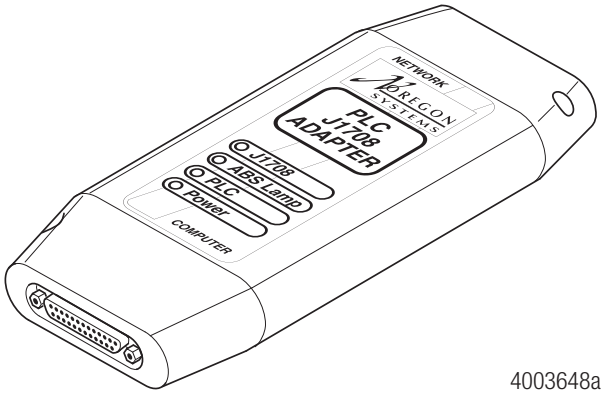
4007045a

Figure 5.2

Available from SPX (Kent-Moore), 800-328-6657.

PLC/J 1708 Adapter

- Simulates the tractor ABS lamp, ensuring that the trailer ABS is capable of "lighting the light."
- Simulates the trailer ABS lamp, ensuring that the tractor is capable of "lighting the light."
- Use as a tractor/trailer tester to ensure that PLC is functioning correctly. Figure 5.3.



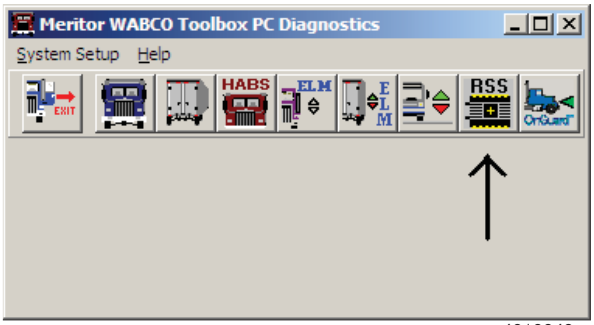
4003648a

Figure 5.3

Available from Noregon Systems, 336-768-4337.

Main Screen

This screen provides icon and pull-down menu task selections. Select the RSS*plus*™ icon to enter the Roll Stability Software. Figure 5.4.



4010040a

Figure 5.4

1. From the main screen of the Meritor WABCO trailer EBS diagnostics software, select **Diagnostics** from the top menu bar. Figure 5.5.

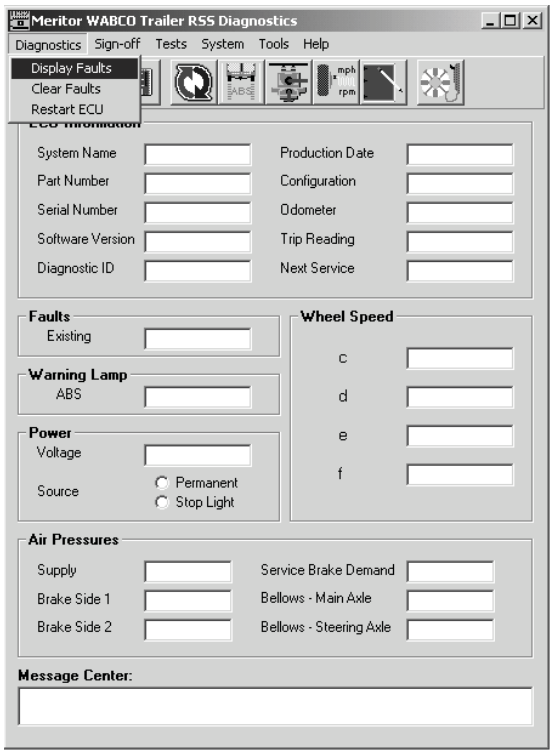


Figure 5.5

2. Select ***Display Faults*** from the pull-down menu. All active and stored faults are displayed. Figure 5.6.

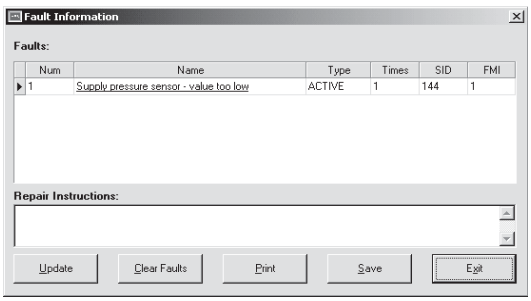


Figure 5.6

3. Repair active faults and take corrective action on stored faults. Once repaired, faults may be cleared by using the **Clear Faults** button.

Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

⚠ WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury and damage to components can result.

The ABS is an electrical system. When you work on the ABS, take the same precautions that you must take with any electrical system to avoid serious personal injury. As with any electrical system, the danger of electrical shock or sparks exists that can ignite flammable substances. You must always disconnect the battery ground cable before working on the electrical system.

NOTE: Disconnect power from the ECU/Valve Assembly before you remove any components. Failure to disconnect power from the ECU can cause faults to be recorded and stored in ECU memory.

⚠ CAUTION

When welding on an ABS-equipped vehicle is necessary, disconnect the power connector from the ECU to avoid damage to the electrical system and ABS components.

⚠ CAUTION

High voltages can damage the electronic control unit (ECU). Disconnect all connectors from the ECU before you perform any welding, electrostatic painting, or any other activity that applies high voltage to the vehicle frame. Install blind plugs into the ECU to protect the connector openings. Ground the welding or painting equipment to the part you are working on. If you are working on a moving or insulated component such as an axle, make sure it is correctly grounded through the frame. Refer to the equipment manufacturer's recommended instructions for correct procedures.

Component Removal and Installation

Cable Connections

All cables connecting to the RSS*plus*™ ECU are secured by means of a yellow locking connector. These connectors slide forward and back in order to lock or release the cable at the ECU. Use a small open-ended wrench to lever the locking connector into the open position. Once an existing cable has been replaced or a new cable installed on an original installation, the connector can be pushed back into the locked position by hand, securely anchoring the cable connection to the ECU. If correctly installed, the use of di-electric grease is not necessary.

Wheel Speed Sensor

Remove the Old Sensor

1. Follow the vehicle manufacturer's instructions to back off the slack adjuster and remove the tire, wheel and drum.
2. Hold the sensor, not the cable, and use a twisting motion to pull the sensor out of its sensor holder.
3. Remove the spring clip from the sensor holder.
4. Remove any fasteners that hold the sensor cable to other components.
5. Disconnect the sensor cable from the extension cable.

Install the New Sensor

Sensor locations vary according to suspension types. Typically, a spring suspension has sensors on the forward axle, and an air suspension has sensors on the rear axle.

1. Apply a mineral oil-based grease that contains molydisulfide to the sensor spring clip and to the body of the sensor. The grease must be anti-corrosive and contain adhesive properties that will continuously endure temperatures from –40° to 300°F (–40° to 150°C).
2. Push the spring clip into the sensor holder from the inboard side, until the spring clip tabs are against the sensor holder. Push the sensor into the spring clip as far as possible. Figure 6.1.

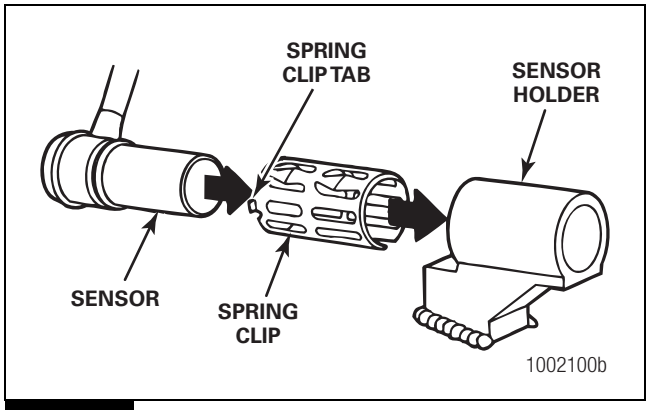


Figure 6.1

3. Route the sensor cable toward the brake chamber, over the brake spider, and behind the axle. Secure the cable to the axle between the brake spider and the suspension brackets. Continue to route the sensor cable behind the spring seats. Secure the cable to the axle one inch from the molded sensor plug. Figure 6.2.

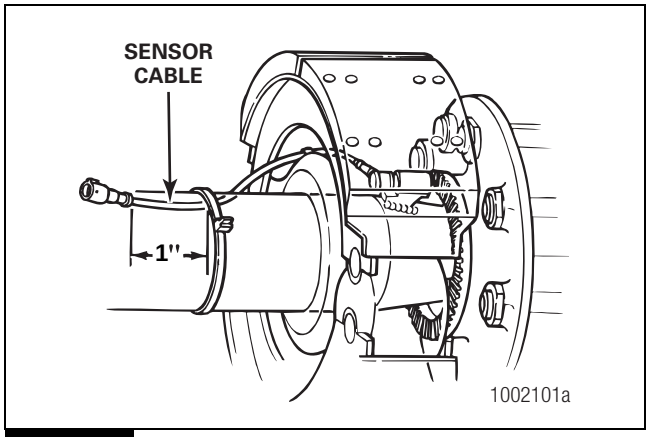


Figure 6.2

4. Install the wheel hub carefully, so that the tooth wheel pushes against the sensor as you adjust the wheel bearings. After installation there should be no gap between the sensor and the tooth wheel. During normal operation a gap of 0.040-inch is allowable.
5. **Sensor Output Voltage Test:** Use a volt/ohm meter to check the AC output voltage of the sensors while rotating the wheel at approximately one-half revolution per second. Minimum output must be greater than 0.2 volts AC. If minimum output is less than 0.2 volts AC, push the sensor toward the tooth wheel. Recheck the sensor output.

ECU/Valve Assembly

⚠ WARNING

Release all pressure from the air system before you disconnect any components. Pressurized air can cause serious personal injury.

Remove the Old ECU/Valve Assembly

1. Release all pressure from the air system.
2. Attach labels to identify all air lines.
3. Disconnect the air lines from the ECU/Valve Assembly.
4. Disconnect the power cable, additional relay valve cable (if used), and all sensor cables from the ECU/Valve Assembly. Figure 6.3.
5. Remove the ECU/Valve Assembly from its mounting location.

   Loosen and remove the two mounting bolts and lock nuts that hold the assembly to the cross member or bracket. Remove the assembly.
6. If the assembly being replaced is under warranty, please return it to the trailer OEM for replacement.

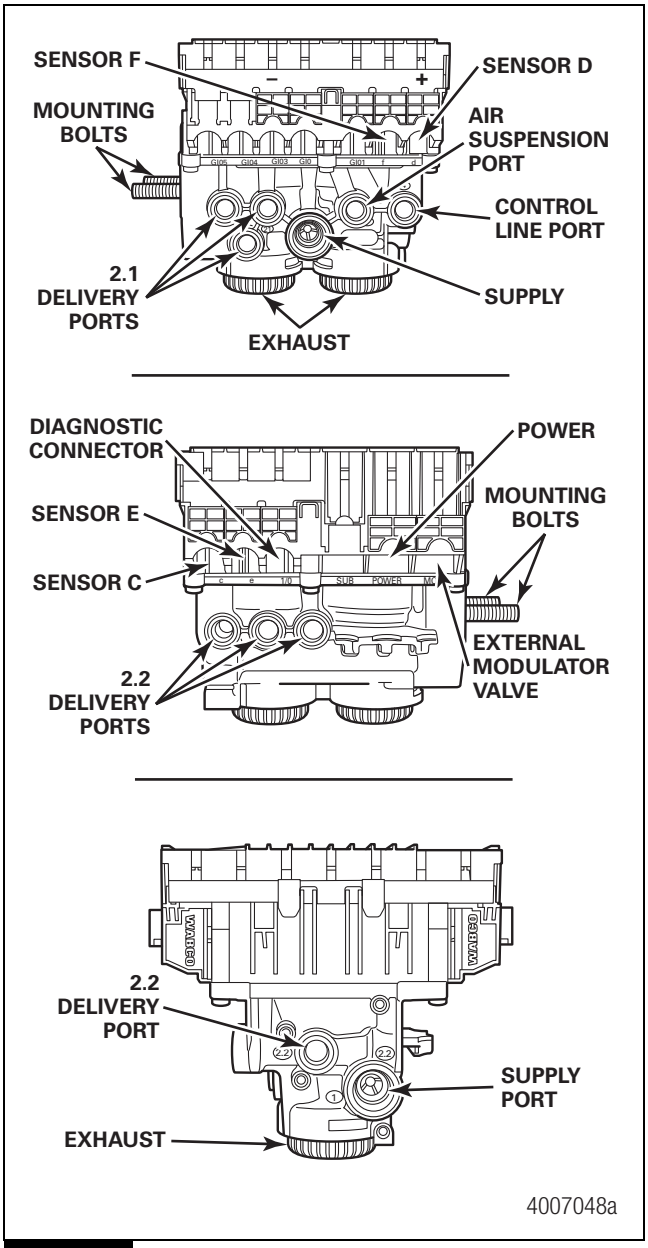


Figure 6.3

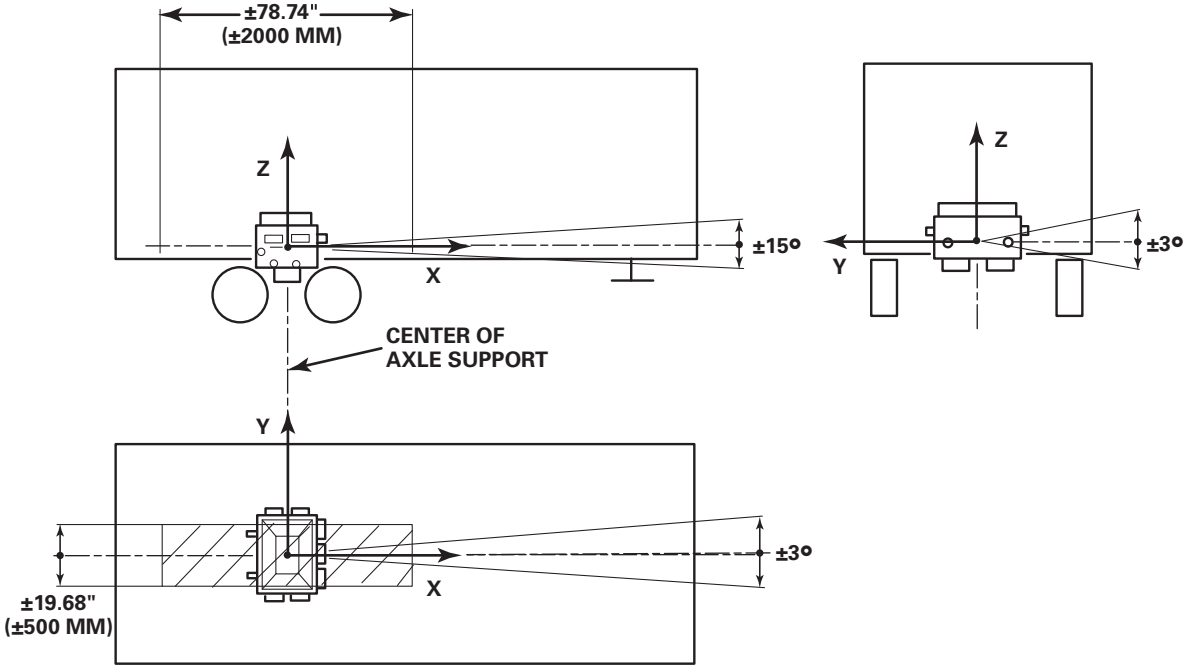
Install the New ECU/Valve Assembly

NOTE: The ECU/Valve Assembly is supplied with black protective caps in each sensor connector.

NOTE: When a sensor cable is not plugged into a sensor connector, the black cap must remain in the connector to protect it from dirt and contamination. Figure 6.3.

Mounting RSS*plus*™ ECU to Cross Member of Vehicle — Bracket Not Supplied

When mounting the ECU/dual modulator valve assembly to the trailer cross member, refer to SAE specification J447, *Prevention of Corrosion of Motor Vehicle Body and Chassis Components*. Follow all recommendations and procedures. Your supervisor should have a copy of this specification. Figure 6.4.



Location or Mounting Position	Permissible Maximum Deviation
Y-direction from the vehicle longitudinal axis	±19.68 Inches (±500 MM)
X-longitudinal direction from the center of the axle support	±78.74 Inches (±2000 MM)
Tilt of the ECU/dual modulator valve assembly around the X-axis (roll angle)	±3 Degrees
Tilt of the ECU/dual modulator valve assembly around the Y-axis	±15 Degrees
Rotation of the ECU/dual modulator valve assembly around the Z-axis (yaw angle)	±3 Degrees

4005548b

Figure 6.4

Preparation

Before beginning the installation procedure, perform the following.

Inspect the ECU/dual modulator valve assembly for damage that may have occurred during shipping or storage.

- Look for crushed or bent connectors.
- Verify that the retainer clips have not been bent or otherwise damaged.
- Do not install a damaged ECU/dual modulator valve assembly. Notify your supervisor, or contact Meritor WABCO if there is any apparent damage.

ECU/Dual Modulator Valve Assembly

⚠ CAUTION

The replacement ECU assembly may not be mounted on an air tank. An air tank will not support the weight of the ECU/dual modulator valve assembly. A bracket may be fabricated using steel at least 3/16-inch (5 mm) thick or mounted directly to the cross member. Figure 6.6.

RSS will not function correctly if the mounting location does not meet the following requirements.

- To complete the RSS*plus*™ replacement, you must have 120 psi air pressure available. A 12-volt DC (10 amp minimum) power supply must also be available.
- The ECU assembly must be mounted level onto a rigid structure of the subframe and must be mounted facing either the front or the rear of the trailer.
- Mount the ECU/dual modulator valve assembly in the center width of the trailer subframe, midway between the axle spacing. Figure 6.4.
- Do not mount to an air tank.
- Do not mount sideways. The ECU mounting bolts must point toward either the front or the rear of the trailer.

Installation Procedure

1. Apply SAE-standard, DOT-approved paste-type thread sealant to all NPTF threads. Do not use excessive amounts of sealant.
   - Supply ports are 3/4-inch NPTF.
   - Delivery control and air suspension ports are 3/8-inch NPTF.
2. Mount the assembly level to a rigid structure of the subframe midway between the side rails, close to the brake chambers the valve serves.
   - Attach to the cross member. The center-to-center distance between the two holes must be 2-3/4-inches (70 mm) and mount directly to a rigid structure. Figure 6.5.

     OR
   - Attach to a mounting bracket with two 9/16-inch (14 mm) mounting holes with 2-3/4-inches (70 mm) center-to-center distance between the two holes. The bracket must be made of cold rolled 1040 to 1080 steel with a reinforcing gusset. Figure 6.6.

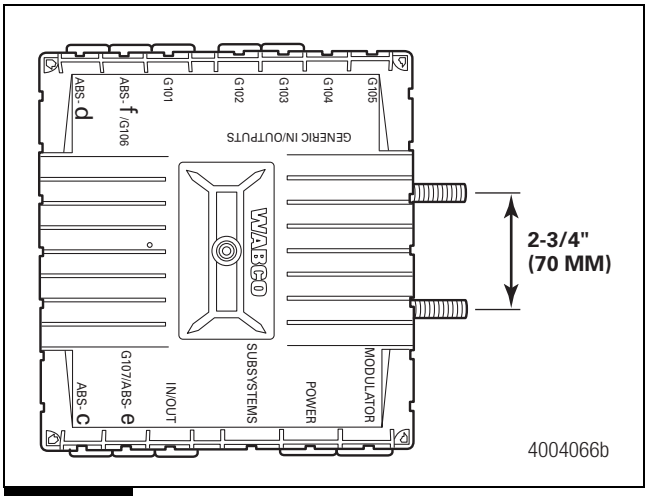


Figure 6.5

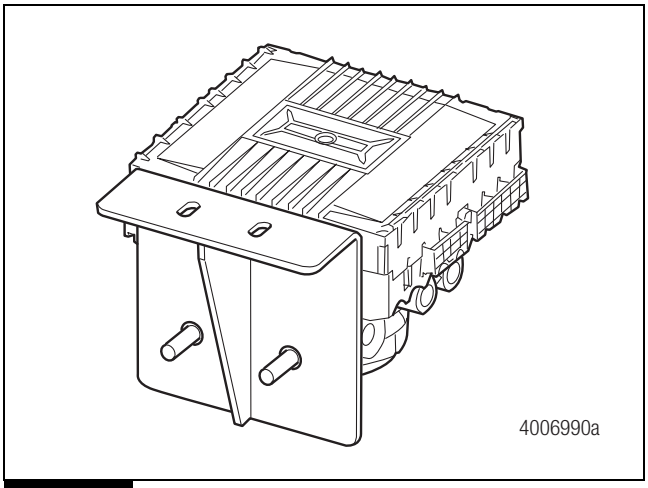


Figure 6.6

3. Use two 1/2-inch nuts to attach to the integral bolts. Tighten the nuts to 62 ft-lb (85 N•m).
4. For additional corrosion protection, the ECU/dual modulator assembly may be painted. Mask the exhaust ports before painting. Remove the masking after painting.
5. Washers or spring lock washers are only permitted directly under the nut.
6. The bracket or mounting area must completely cover the bearing surface of the mounting flange.

Air Lines

1. Connect the air supply line from the supply tank to the 3/4-inch NPTF supply port on the ECU/dual modulator valve assembly. **Use 5/8-inch minimum O.D. nylon tubing.**
2. Connect air delivery lines to the ECU valve assembly. The ports labeled 2.1 and 2.2 are 3/8-inch NPTF. Refer to Figure 6.3 for ECU valve port assignments, and Section 4 for air line configuration.

Replacing the ECU or Modulator Valve

With RSS*plus*™, the ECU and modulator valve may be replaced individually. To do this, follow the instructions for removing the complete assembly, then remove the valve from the ECU.

Loosen and remove the six #27 Torx bolts holding the assembly together. Figure 6.7.

To attach the valve to the ECU, tighten the six #27 Torx bolts to 5 ft-lb (6 N•m).

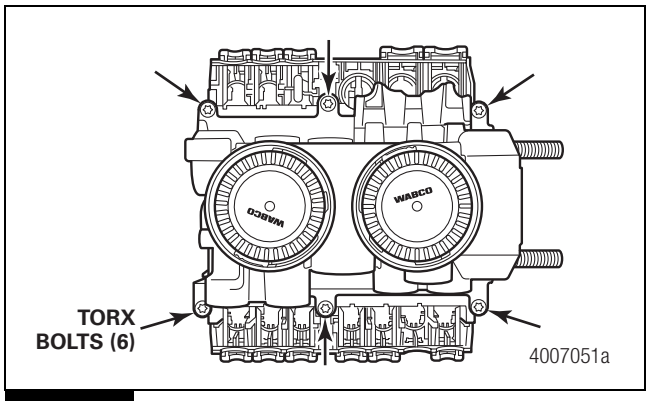


Figure 6.7

Replacing the Distance Sensor

The Distance Sensor is used only with Roll Stability equipped trailers that have mechanical (spring) suspensions. Trailers equipped with air suspensions do not use a Distance Sensor with their RSS*plus*™ system.

The Distance Sensor is attached to the trailer structure or cross member. In some cases, the trailer OEM may have it attached to a fabricated bracket. Figure 6.8.

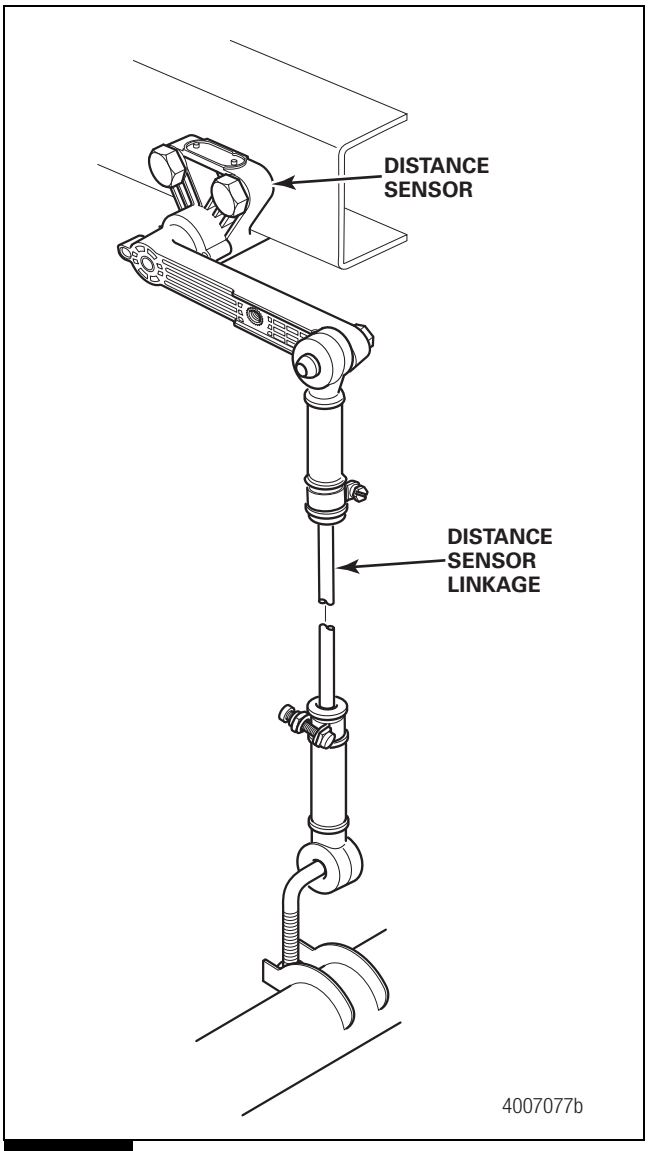


Figure 6.8

Remove the Old Distance Sensor

1. Disconnect the cable attached to the Distance Sensor. Figure 6.9.

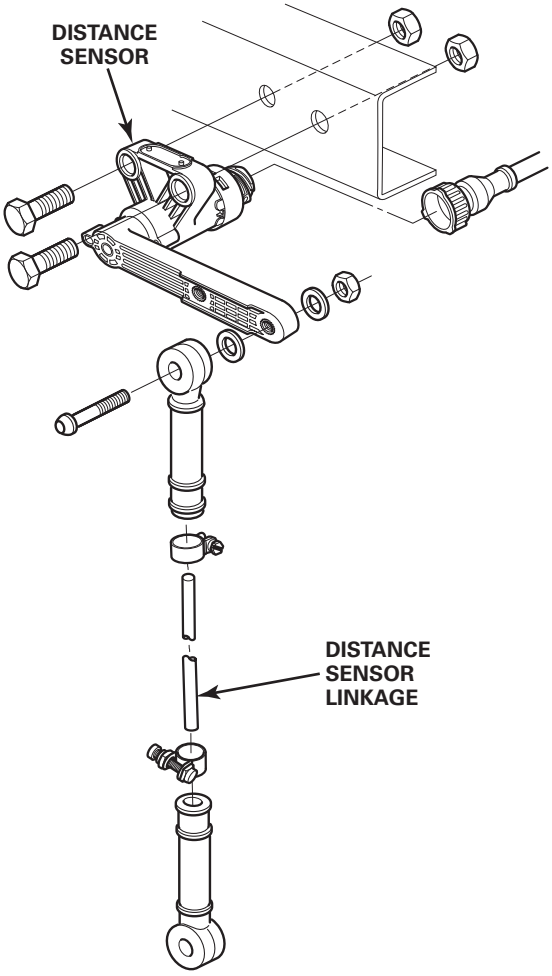


Figure 6.9

2. Remove the bolt that attaches the Distance Sensor Lever to the Distance Sensor arm.
3. Remove the two bolts that attach the Distance Sensor to the cross member or bracket.
4. Remove the Distance Sensor.

Install the New Distance Sensor

1. Install the Distance Sensor to the cross member or bracket near the center of the trailer with the two bolts previously used to mount the replaced sensor. Figure 6.9.
2. Attach the Distance Sensor Lever to the Distance Sensor arm.
3. Connect the Distance Sensor cable.
4. Once the Distance Sensor has been replaced, it must be calibrated before putting the trailer back into service. Refer to Section 7 for Distance Sensor Calibration.

Distance Sensor Extension Lever

Some trailers experience jounce due to certain spring suspensions' characteristics and require an extension of the distance sensor. This extension lever (part number 441 901 715 4) allows the lever length parameter in the TOOLBOX™ Software to be set to 150 mm. Mounting hardware for the extension lever is found in the linkage kit (part number 105 100 002 0). Figure 6.10.

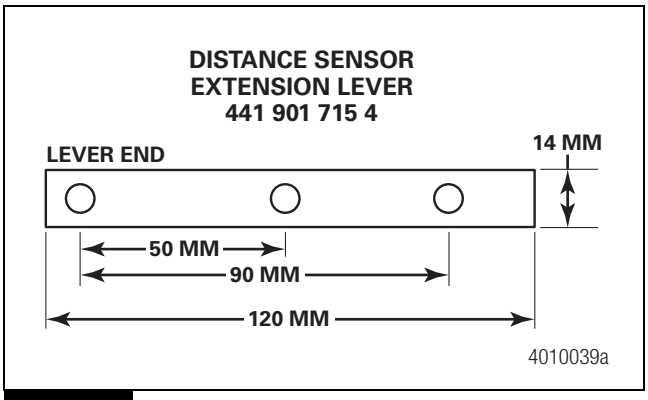


Figure 6.10

Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

⚠ WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury and damage to components can result.

The ABS is an electrical system. When you work on the ABS, take the same precautions that you must take with any electrical system to avoid serious personal injury. As with any electrical system, the danger of electrical shock or sparks exists that can ignite flammable substances. You must always disconnect the battery ground cable before working on the electrical system.

NOTE: Disconnect power from the ECU/Valve Assembly before you remove any components. Failure to disconnect power from the ECU can cause faults to be recorded and stored in ECU memory.

Testing

Test the Wheel Speed Sensors

NOTE: At initial installation, no gap must exist between the sensor and the tooth wheel.

NOTE: After you install a hub, always check that the sensor is adjusted correctly.

Operating the trailer can cause a gap to develop between the sensor and the tooth wheel. If the gap exceeds 0.040-inch, the system may not function correctly.

To adjust the sensor, twist and push the sensor through the sensor bracket as far as possible or until the sensor touches the tooth wheel. There is no need for a feeler gauge as the sensor will correctly gap itself when the wheel rotates.

Sensor Test Procedure

1. Disconnect power to the ECU/Valve Assembly.
2. Disconnect the sensor electrical connector from the ECU/Valve Assembly.
3. Connect the volt/ohm meter leads to the two wire rectangular terminals inside the disconnected connector.
4. When checking the resistance, the meter must read 900-2000 ohms.
5. Check and replace the sensor and cables as required.
6. Repeat Steps 1-5 for each sensor in the system.

Sensor Output Voltage Test

1. Disconnect power from the ECU/Valve Assembly.
2. Connect the AC volt/ohm meter leads to the sensor terminals inside the connector.
3. Rotate the corresponding wheel at a constant speed of one-half revolution per second.
4. The output voltage must be greater than 0.2 volts AC.
5. When there is no reading:
   A. Trace the cable to verify that the cable connects to the wheel you turned.
   B. Check that you turned the correct wheel.
   C. Check that the system is wired correctly.
   D. Check that the sensor touches the tooth wheel.
6. If the volt/ohm meter still indicates no reading or a low reading after following the above procedures, check and replace the component and cables as required.
7. Repeat Steps 1-5 for each sensor in the system.

Check ABS Functions

- Meritor WABCO requires that you test a vehicle's ABS after a new installation and after you diagnose, repair and erase faults in the ABS.
- Perform end of line check using TOOLBOX™ Software.

End of Line Testing

End of line testing is required on all RSS*plus*™ installations. To run these tests, Meritor WABCO requires you use TOOLBOX™ Software.

TOOLBOX™ Software and general test procedures are included in this manual. If you are using a Pro-Link, refer to the operating manual for test instructions.

End of Line Testing Procedure Using TOOLBOX™ Software

NOTE: Refer to the Software Owner's Manual, TP-99102, for instructions for running TOOLBOX™ Software.

1. Display the **Trailer RSS Diagnostics Screen**.
2. Verify power and air supply:
   - Apply 12 volts DC to the blue wire (constant). Check the screen for correct voltage (9.5 to 14 volts). Constant power voltage is displayed in the **Primary** field.
   - Power supply must have a 10 amp minimum.
   - Apply 120 psi to the red (supply) line of the trailer's air system. Be prepared to also apply 120 psi to the trailer's blue (control) line when directed.

Putting the Trailer into Service

Sign-Off Procedure (End of Line Testing)

Once installed, the Meritor WABCO RSS*plus*™ system must go through a sign-off procedure. This ensures that the system has been correctly installed and the pneumatic functions of the trailer are supporting the Roll Stability ABS.

In order to run the sign-off procedure, the trailer must be connected to 12 volt DC power (10 amp minimum), be connected to supply air (120 psi), have the capability to have control line air applied, and have the sensed axles raised off the ground.

The following procedure can be performed immediately if the replacement ECU has been installed in the default configuration (4S/2M, air suspension, ECU facing forward). **If the ECU is installed in a non-default configuration, the ECU must be programmed before the sign-off procedure can be conducted. Refer to Section 8 for details.**

For mechanical suspensions, the vehicle parameters must be changed from the default settings. **Parameter Entry** guidelines can be found in Section 8.

All RSS*plus*™ ECUs have 1:1 air delivery default settings. If trailer specific load proportioning is desired, please contact Meritor WABCO at 866-OnTrac1 (668-7221) for assistance. If no proportioning is desired, air pressures are left at the default settings. The administration of these parameters is covered in the **Parameter Entry** guidelines in Section 8.

From the initial screen of the TOOLBOX™ Software, click on the RSS*plus*™ icon. Figure 7.1.

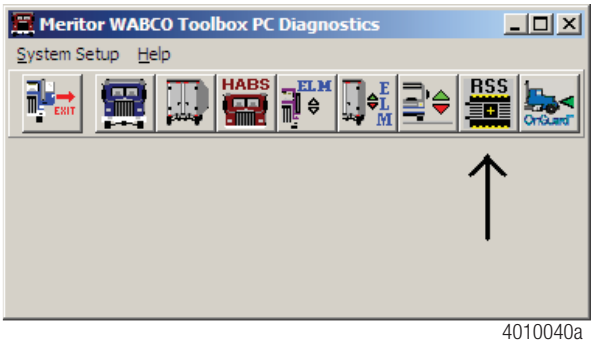
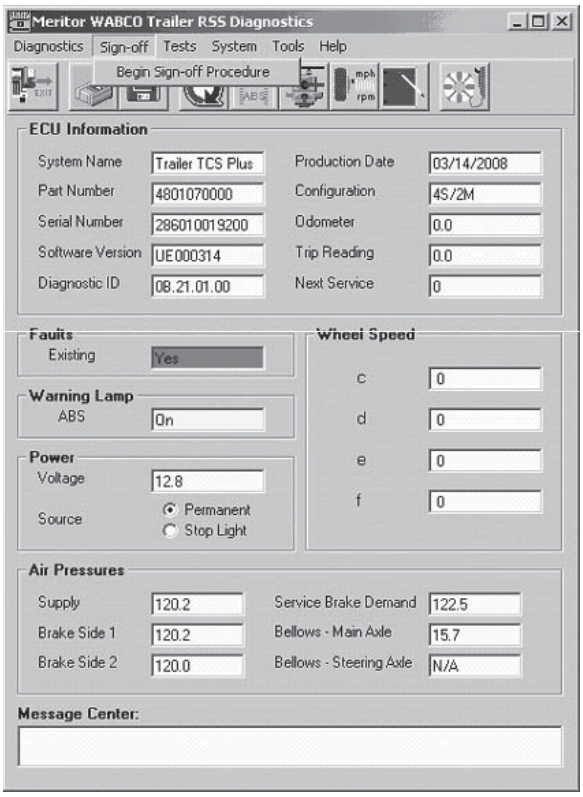


Figure 7.1

From the Main Screen, select ***Sign-Off*** from the pull-down menu bar. Then select ***Begin Sign-Off Procedure*** to begin the automated test procedure. Figure 7.2.

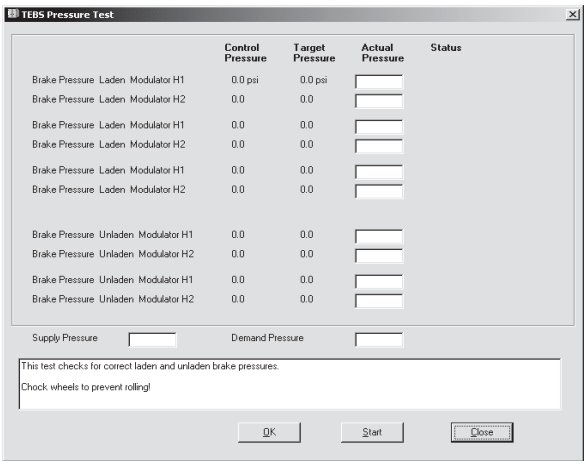


4007039a

Figure 7.2

The Pressure Test

This portion of the sign-off will check the ECU's internal modulator valves for correct operation. The test will begin automatically. Once the test successfully concludes, the sign-off procedure will automatically advance to the Redundancy Test. *There is no input needed from the tester*. Figure 7.3.

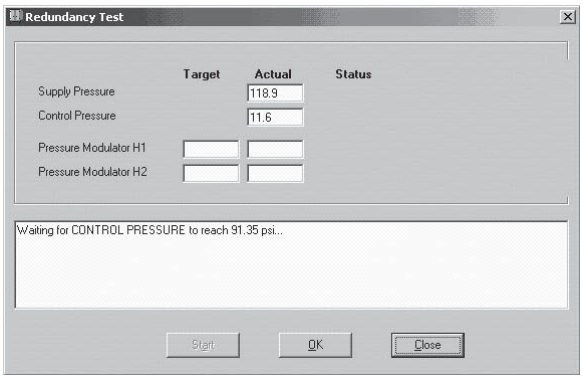


4006943a

Figure 7.3

The Redundancy Test

This portion of the sign-off will check the pneumatic functionality of the trailer's air system to the RSS equipment. The Redundancy Test ensures the air capacity and control to the ECU is correct and measures the pressure at the internal modulator valves. The test will begin automatically. Apply control (blue) line air when prompted in the lower box. Once the test successfully concludes, the sign-off procedure will automatically advance to the Sensor Test. Figure 7.4.



4007040a

Figure 7.4

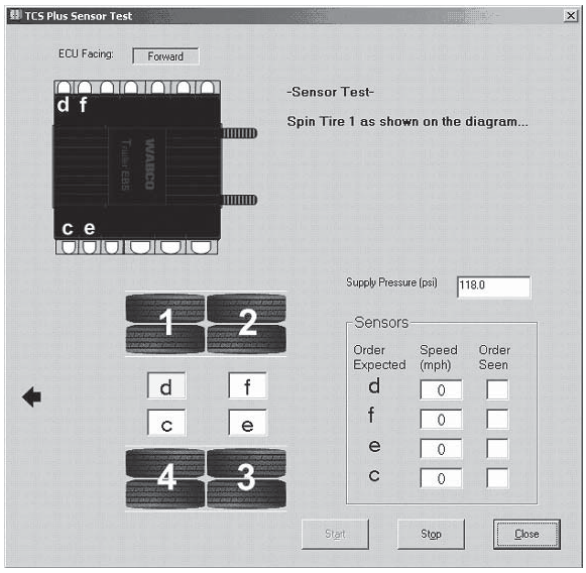
The Sensor Test

This portion of the sign-off will check the placement of the ABS wheel sensors. Ensure there is no pressure on the control (blue) line and that the trailer has all ABS sensed axles up off the ground. The following message will appear. Press ***OK*** after all safety precautions have been taken and release the **blue** air line to begin the test. Figure 7.5.

4006945a

Figure 7.5

Rotate each wheel individually (in the order shown on the screen) and check the on-screen diagram to ensure correct sensor placement. Figure 7.6. Once the placement of all sensors has been correctly verified, the software will automatically advance to the Warning Lamp Test.



4007041a

Figure 7.6

The Warning Lamp Test

This portion of the sign-off will ensure correct operation of the ABS warning lamp. The warning light will flash on and off. Once correct operation is confirmed, press ***Yes***. Figure 7.7.

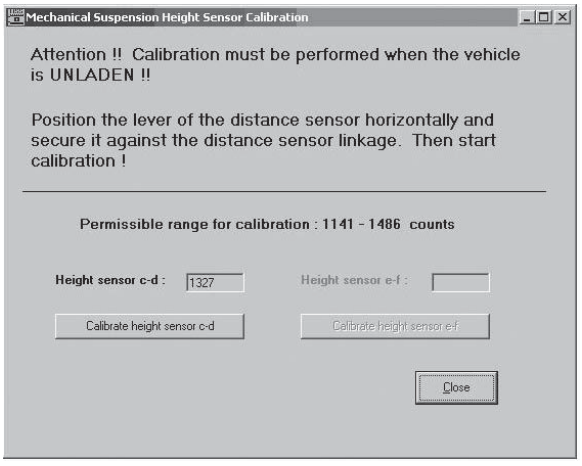
4007042a

Figure 7.7

Distance Sensor Calibration

If the trailer has a mechanical (spring) suspension, the distance sensor is calibrated next. Ensure that the trailer is lowered so that all wheels are fully on the ground before proceeding.

The Mechanical Suspension Calibration screen appears. Figure 7.8.



4007079a

Figure 7.8

Ensure the Distance Sensor arm is parallel to the ground. Figure 7.9. The trailer must be in the unladen (empty) state. Once the value in the "Height Sensor" field no longer changes and is within the displayed acceptable range, press the button labeled **Calibrate Height Sensor**.

A message appears that the calibration is successful. Press OK. Figure 7.10.

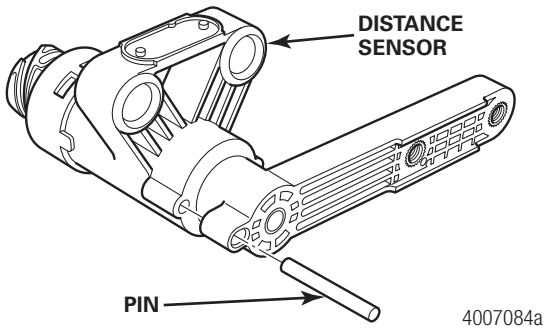


Figure 7.9

Figure 7.10

Successfully signing off the trailer will produce the confirmation screen and allow the tester the opportunity to save the results. Click on the **Yes** button and save the file in the appropriate data directory. Figure 7.11.

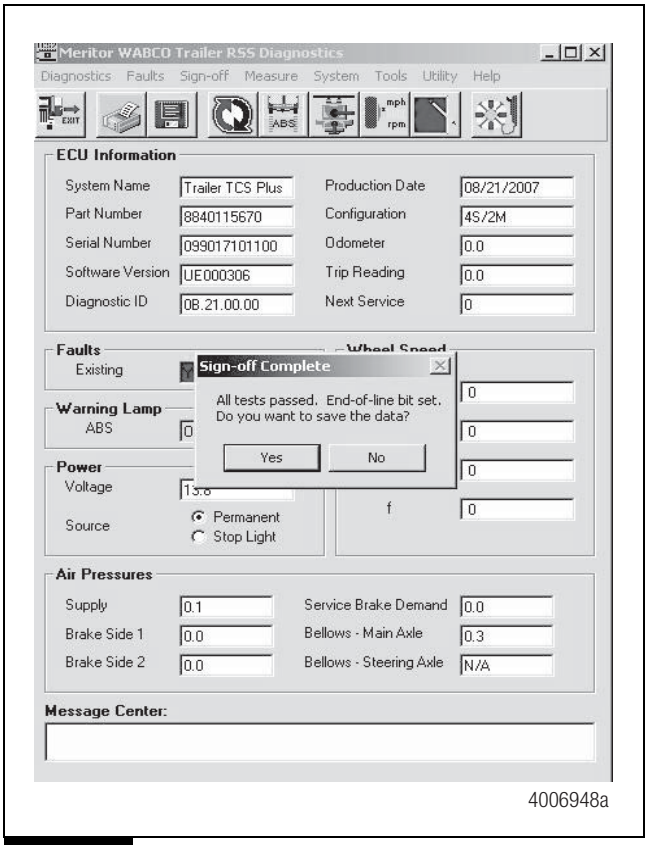


Figure 7.11

A message appears confirming the file has been saved and shows the location of the data. Figure 7.12.

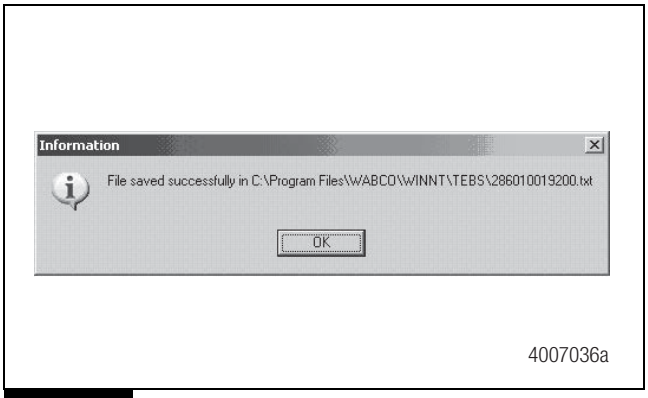


Figure 7.12

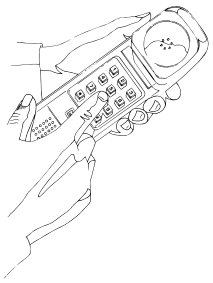
Meritor Customer Service Center

For additional assistance, contact Meritor's Customer Service Center at 866-OnTrac1 (688-7221).

Before calling the Meritor Customer Service Center, be prepared to provide the following information:

1. The trailer's original manufacturer and model year.
2. The SPECIFIC symptom or complaint.
3. What is the ABS blink code or TOOLBOX™ Software reading?
4. Have any resistance and/or voltage measurements been taken?
5. What is the result of visual inspection of connectors, harness and components?
6. When does the symptom occur (vehicle moving, fully loaded, etc.)?
7. Does the trailer have any unusual characteristics (for example, mismatched tires or larger than normal air consumption)?
8. What is the part number of the ECU/Valve Assembly? What is the system configuration?

   By having the above information ready when you call, your customer service technician will be better equipped to assist you. Figure 7.13.



1003301a

Meritor Customer Service Center, 866-OnTrac1 (668-7221)

Figure 7.13

Parameter Entry for RSS*plus*™

Vehicle Parameter Records

All RSS*plus*™ ECUs have default parameters already programmed into the unit. If you are installing a 4S/2M system with the ECU facing FORWARD on an air suspension, there is no need to change any parameters.

If you are installing the RSS*plus*™ system in a non-default configuration, you will need to access the vehicle parameters. Contact your Meritor WABCO representative for assistance with non-default configurations. From the main screen, select ***System*** and then ***Edit Parameters***. Figure 8.1.

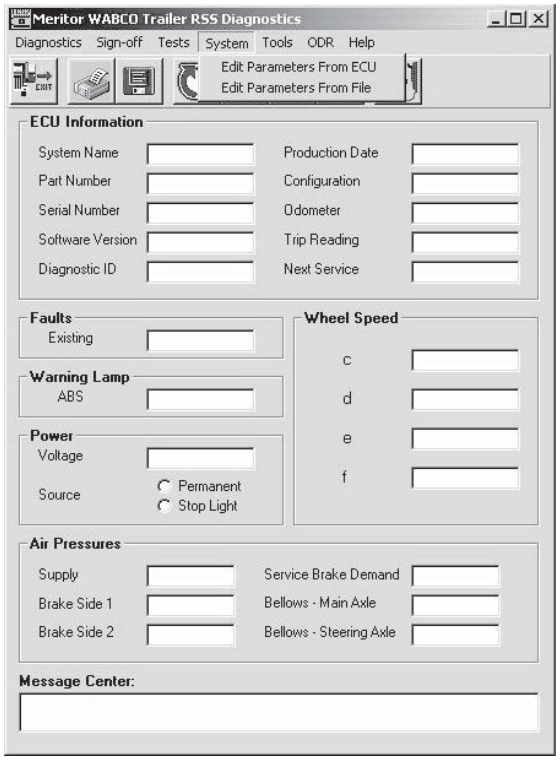


Figure 8.1

RSS System Parameters allows you to correctly configure the system to match the trailer's specific characteristics. The RSS*plus*™ ECU comes preprogrammed with default parameters and requires no further programming. You will need to add vehicle data. Press ***Next*** to continue. Figure 8.2.

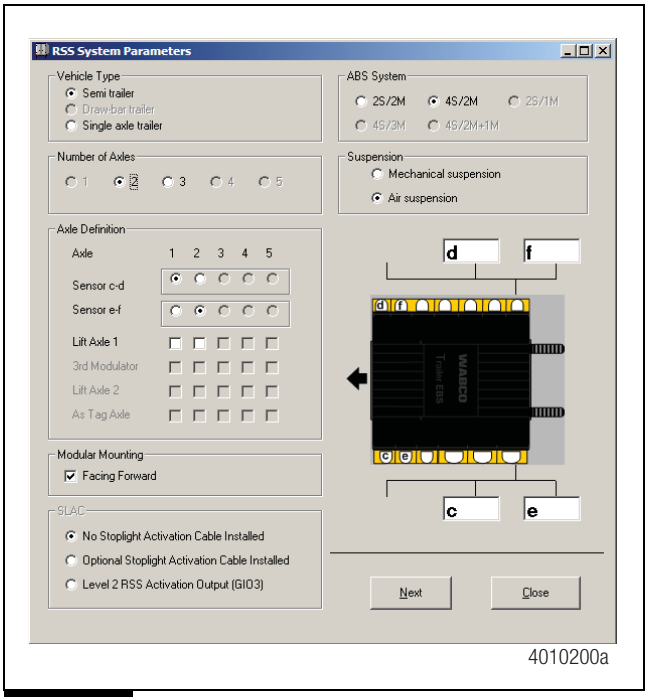


Figure 8.2

Air Suspension Parameters

Add the following vehicle data into the RSS System Parameters screen. Figure 8.2.

Vehicle Type — Select the appropriate trailer type.

Number of Axles — Select the total number of axles on the trailer.

Axle Definition — Select the sensed axles by indicating the location of each sensor pair. Lift axles are not sensed and are controlled by generic I/O function. The on-screen illustration will change to reflect the sensor configuration.

Modulator Mounting — A modulator facing FORWARD will have the mount bolts pointing TOWARD the rear of the trailer. A forward facing ECU will have this box checked.

ABS System — Select the appropriate ABS type being installed.

Suspension — Select air suspension. **NOTE:** Mechanical suspensions are covered in the Mechanical Suspension Parameters section.

Optional Stoplight Activation Cable — Select this field ONLY if the stoplight activation cable is installed. This optional cable has additional capabilities over the standard power cable.

Once all the parameters are correctly input, press the ***NEXT*** button to advance to the next parameter screen. Figure 8.3.

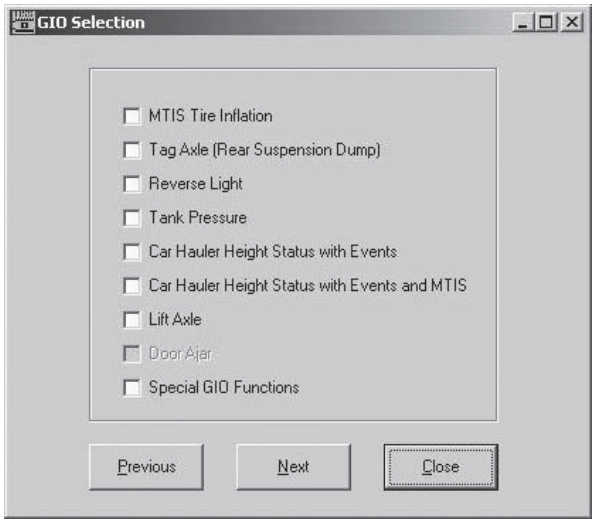


Figure 8.3

The GIO Selection Screen allows the user to pick which Generic Input/Output files are to be loaded into the ECU. Many of these optional functions are utilized in conjunction with the Meritor WABCO PLC Display.

MTIS Tire Inflation – The Meritor Tire Inflation System Remote Warning.

Tag Axle (Rear Suspension Dump) — Releases air from a designated axle to facilitate tight turning.

Reverse Light — Activates a light that should illuminate when the trailer is being moved in reverse.

Tank Pressure — Warns if the trailer air reservoir experiences low pressure.

Car Hauler Height Status with Events — Warns if car decks are not in the locked-down position.

Car Hauler Height Status with Events and MTIS — Warns if car decks are not in the locked-down position, coupled with the MTIS function.

Lift Axle — Activates the automatic Lift Axle function.

Door Ajar — Warns driver if a secure door is not in the locked position.

Special GIO Functions — Customized functions specific to the trailer. Click in the appropriate check box to select the function that has been installed on the trailer. Press ***NEXT*** to advance to the next parameter screen. Figure 8.4.

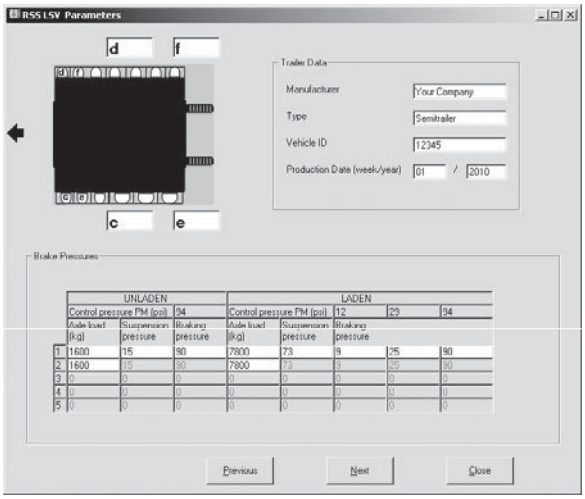


Figure 8.4

Trailer Data — This area contains important data about the trailer.

Manufacturer — Enter the manufacturer of the trailer.

Type — Enter the trailer type such as tanker, flatbed, van, etc.

Vehicle I.D. — Enter the last seven digits of the trailer VIN number or the fleet's trailer number. Do not leave this field blank as the software creates files using what is entered in this field as file names.

Production Date — Enter the trailer's production date by week number and year.

Brake Pressures — This area contains parameters affecting how the trailer brakes perform. These fields are unavailable with mechanical suspensions.

Additional Characteristic Point — This box is normally left blank. Checking this box allows brake pressure characteristics to be altered across four bands instead of the standard three.

Unladen Axle Load (kg) — Enter the amount of weight each axle will bear when the trailer is empty. The weight in kilograms can be converted from pounds with the formula 2.2 pounds equals 1 kilogram.

Unladen Suspension Pressure — The amount of air pressure found in the suspension air bags when the trailer is empty. The suspension pressure is measured in psi (pounds per square inch).

Unladen Braking Pressure — The default setting is 90 psi. If brake proportioning is desired, the setting may be less than 90 psi. Do not set this value below 38 psi.

Laden Axle Load — Enter the amount of weight each axle will bear when the trailer is fully loaded. The weight in kilograms can be converted from pounds with the formula 2.2 pounds equals 1 kilogram.

Laden Suspension Pressure — The amount of air pressure found in the suspension air bags when the trailer is fully loaded. The suspension pressure is measured in psi (pounds per square inch).

Laden Braking Pressure — Values in these output fields affect the trailer's brake performance in the laden condition. There are three columns (left to right) that affect light, medium, and heavy braking. Please contact Meritor WABCO at 800-535-5560 for assistance if changing these values from the default values.

Once all the values have been correctly determined and entered, press the ***NEXT*** button to advance to the last Parameter screen. Figure 8.5.

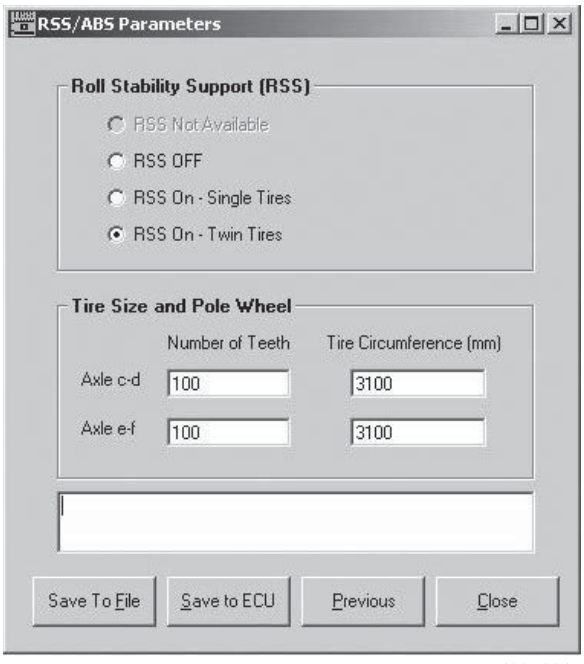


Figure 8.5

Roll Stability Support — If the trailer will have a single wheel on each side of the axle ("Super Singles"), select **RSS ON — Single Tires.** If the trailer will have dual wheels on each side of the axle, select **RSS On — Twin Tires**. Only select **RSS Off** if no roll stability is desired.

Tire Size and Pole Wheel — The Number of Teeth field is for the quantity of teeth on the tone ring. Nearly all tone rings have 100 teeth. The **Tire Circumference** is the dynamic tire radius of the tire in millimeters. The default setting of 3250 will be applicable to most tires, although an exact figure can be obtained from the tire's manufacturer.

Once the parameters have been entered, press the ***Save to ECU*** button. The parameters are then saved to the ECU. You are now ready to proceed to the sign-off procedure.

After storing parameters in the ECU, the End-of-Line Start-Up Procedure must be performed. Proceed to the System Sign-Off procedure in Section 7.

Mechanical Suspension Parameters

There are additional parameters for a mechanical suspension trailer that must be configured before releasing the trailer into service.

NOTE: The distance the springs on a mechanical suspension compress between unladen and laden states is known as "deflection". This value, in millimeters, MUST be obtained from the suspension manufacturer prior to programming the ECU. Meritor WABCO does not have and cannot provide this essential information. If the value cannot be obtained from the suspension manufacturer, the following procedure can be performed to obtain the value.

Determine Spring Deflection Rate

A. With the trailer **unloaded**, measure from the top of the axle tube (A) to a fixed point (B) on the underside of the trailer. Note the distance. Figure 8.6.

B. With the trailer**loaded** (maximum load), measure from the same points (A and B) that were used for the trailer unloaded measurement. Note the distance. Figure 8.6.

C. Subtract the trailer **loaded** distance from the trailer **unloaded** distance. Note the difference. This is the spring deflection rate for this trailer.

NOTE: Provide the deflection rate in millimeters.

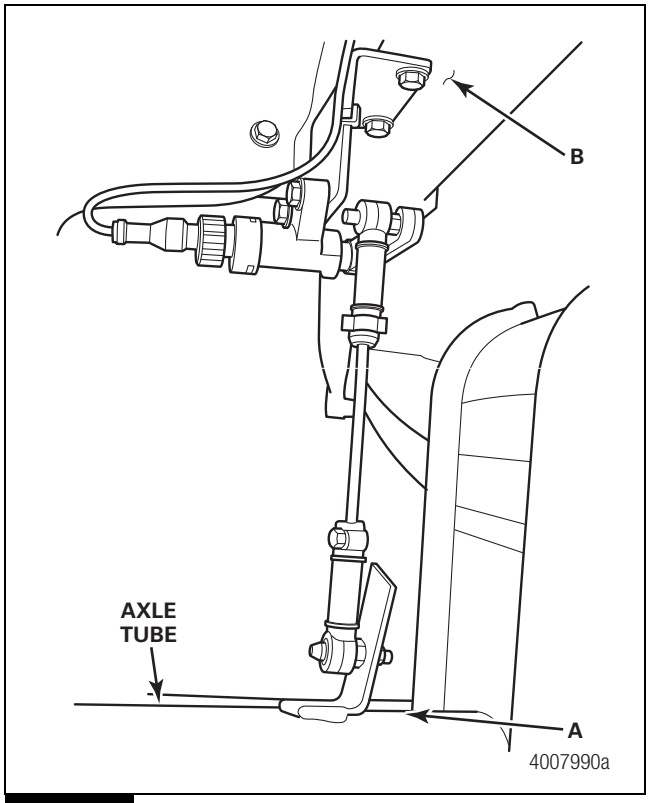


Figure 8.6

From the main screen, select ***System*** and then ***Edit Parameters***. Figure 8.7.

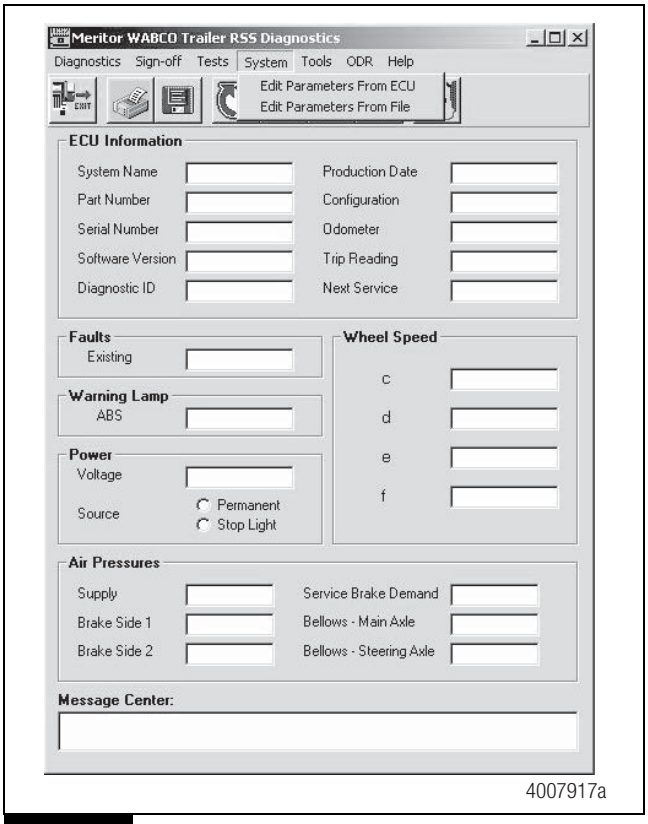


Figure 8.7

Input the correct values for each data area. Figure 8.8.

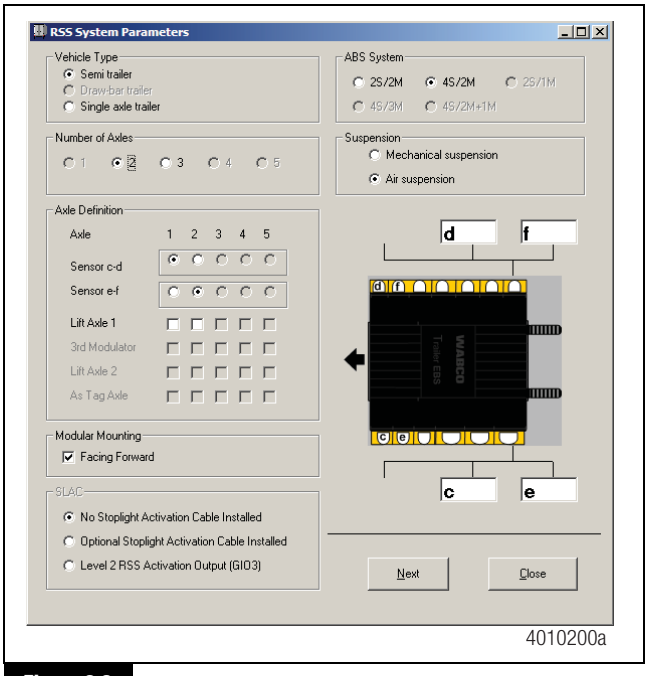


Figure 8.8

Vehicle Type — Select the appropriate trailer type.

Number of Axles — Select the total number of axles on the trailer.

Axle Definition — Select the sensed axles by indicating the location of each sensor pair. Lift axles are not sensed and are controlled by generic I/O function. The on-screen illustration will change to reflect the sensor configuration.

Modulator Mounting — A modulator facing FORWARD will have the mount bolts pointing TOWARD the rear of the trailer. A forward facing ECU will have this box checked.

ABS System — Select the appropriate ABS type being installed.

Suspension — Select Mechanical Suspension.

Optional Stoplight Activation Cable — Select this field ONLY if the stoplight activation cable is installed. This optional cable has additional capabilities over the standard power cable.

When all fields are correctly configured, press ***NEXT*** to advance to the second parameter screen. Figure 8.9.

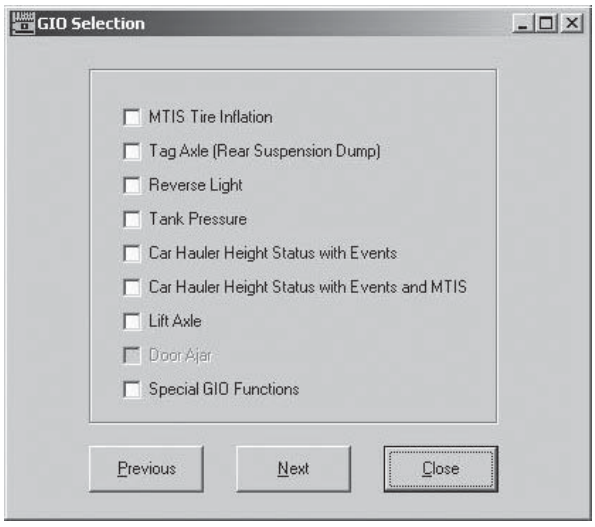


Figure 8.9

The GIO Selection Screen allows the user to pick which Generic Input/Output files are to be loaded into the ECU. Many of these optional functions are utilized in conjunction with the Meritor WABCO PLC Display.

MTIS Tire Inflation – The Meritor Tire Inflation System Remote Warning.

Tag Axle (Rear Suspension Dump) — Releases air from a designated axle to facilitate tight turning.

Reverse Light — Activates a light that should illuminate when the trailer is being moved in reverse.

Tank Pressure — Warns if the trailer air reservoir experiences low pressure.

Car Hauler Height Status with Events — Warns if car decks are not in the locked-down position.

Car Hauler Height Status with Events and MTIS — Warns if car decks are not in the locked-down position, coupled with the MTIS function.

Lift Axle — Activates the automatic Lift Axle function.

Door Ajar — Warns driver if a secure door is not in the locked position.

Special GIO Functions — Customized functions specific to the trailer. Click in the appropriate check box to select the function that has been installed on the trailer. Press ***NEXT*** to advance to the next parameter screen. Figure 8.10.

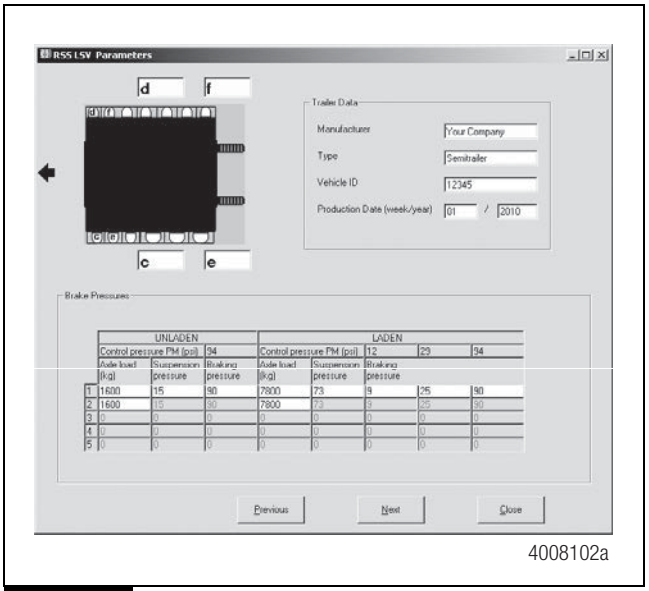


Figure 8.10

Trailer Data — This area contains important data about the trailer.

Manufacturer — Enter the manufacturer of the trailer.

Type — Enter the trailer type such as tanker, flatbed, van, etc.

Vehicle I.D. — Enter the last seven digits of the trailer VIN number or the fleet's trailer number. Do not leave this field blank as the software creates files using what is entered in this field as file names.

Production Date — Enter the trailer's production date by week number and year.

Unladen Axle Load (kg) — Enter the amount of weight each axle will bear when the trailer is empty. The weight in kilograms can be converted from pounds with the formula 2.2 pounds equals 1 kilogram.

Unladen Suspension Path — This value is typically zero for an empty (unladen) trailer.

Unladen Braking Pressure — The default setting is 90 psi. If brake proportioning is desired, the setting may be less than 90 psi. Do not set this value below 38 psi.

Laden Axle Load — Enter the amount of weight each axle will bear when the trailer is fully loaded. The weight in kilograms can be converted from pounds with the formula 2.2 pounds equals 1 kilogram.

Laden Suspension Path — This value is the amount of spring compression (in millimeters) when the trailer is fully laden. This value is obtained by the trailer builder from the mechanical suspension manufacturer.

Laden Braking Pressure — Values in these output fields affect the trailer's brake performance in the laden condition. There are three columns (left to right) that affect light, medium, and heavy braking. Please contact Meritor WABCO at 800-535-5560 for assistance if changing these values from the default values.

Distance Sensor Lever Length — The software defaults to 100 mm. This is the setting when the distance sensor lever is mounted to the farthest integrated nut on the distance sensor. If the lever is mounted to the center integrated nut on the distance sensor arm, the value is 50 mm.

Once all the values have been correctly determined and entered, press the ***NEXT*** button to advance to the last Parameter screen. Figure 8.11.

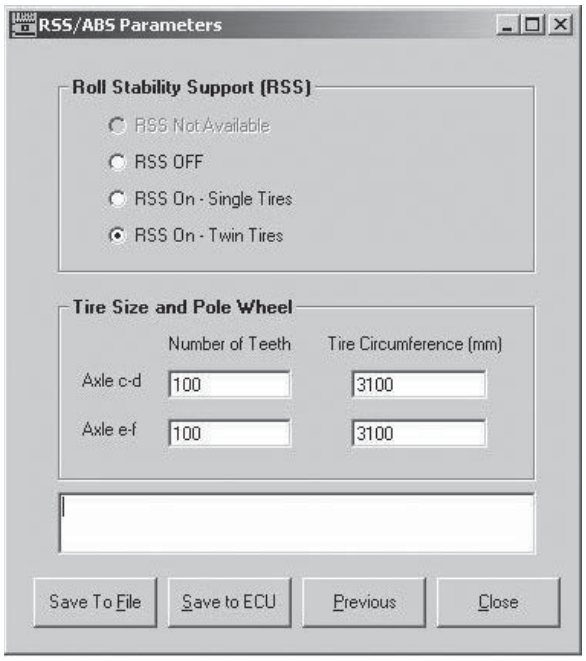


Figure 8.11

Roll Stability Support — If the trailer will have a single wheel on each side of the axle ("Super Singles"), select **RSS ON — Single Tires.** If the trailer will have dual wheels on each side of the axle, select **RSS On — Twin Tires**. Only select **RSS Off** if no roll stability is desired.

Tire Size and Pole Wheel — The Number of Teeth field is for the quantity of teeth on the tone ring. Nearly all tone rings have 100 teeth. The **Tire Circumference** is the dynamic tire radius of the tire in millimeters. The default setting of 3100 will be applicable to most tires, although an exact figure can be obtained from the tire's manufacturer.

Once the parameters have been entered, press the ***Save to ECU*** button. The parameters are then saved to the ECU. You are now ready to proceed to the sign-off procedure.

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