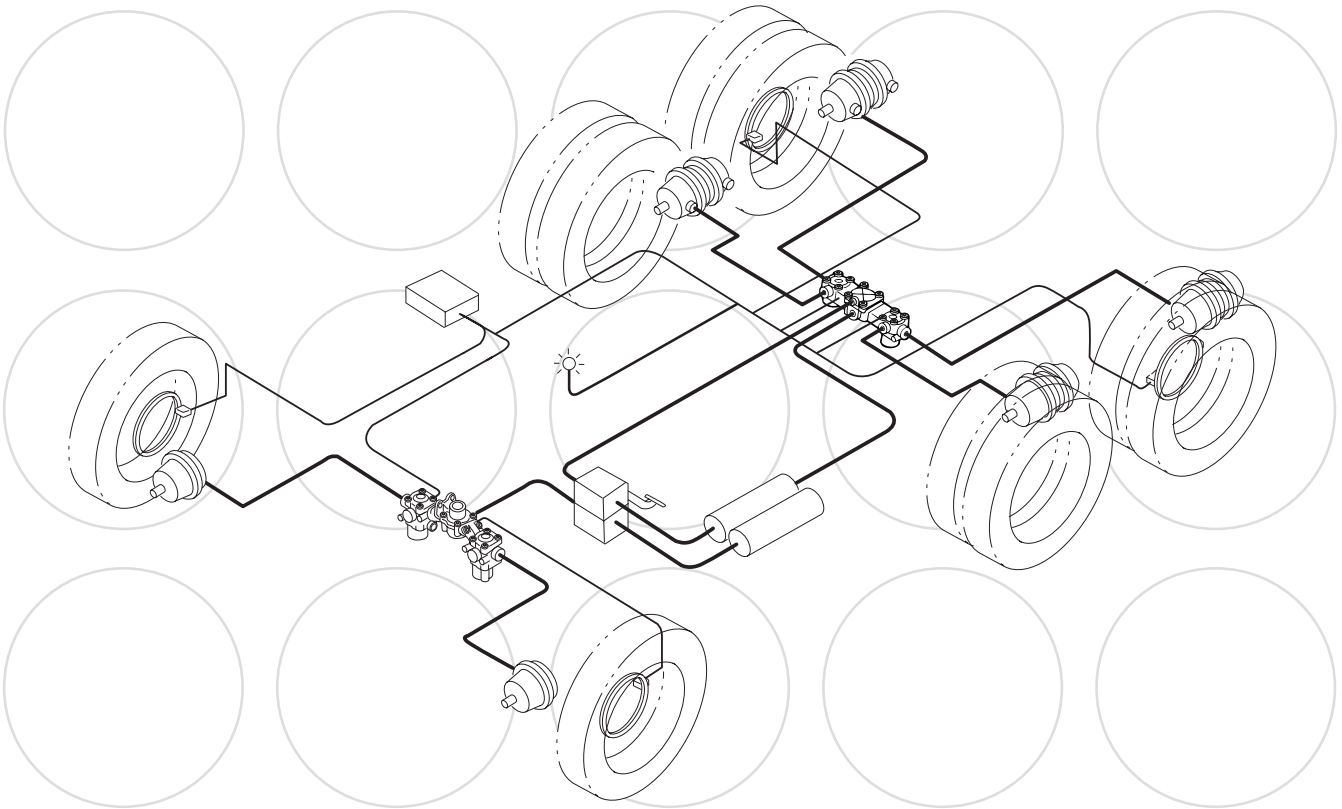
MERITOR WABCO

Maintenance Manual MM-0112

Anti-Lock Braking System (ABS) for Trucks, Tractors and Buses

Revised 07-05



For E Version ECUs
12-Volt Systems

About This Manual

This manual contains maintenance procedures for Meritor WABCO's Anti-Lock Braking System (ABS) for trucks, tractors and buses.

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 and Service Information

On the Web

Visit the meritorwabco.com website to easily access product and service information. The website also offers an interactive and printable Literature Order Form.

ArvinMeritor's Customer Service Center

Call ArvinMeritor's Customer Service Center at 800-535-5560.

Technical Electronic Library on CD

The DriveTrain Plus™ by ArvinMeritor Technical Electronic Library on CD contains product and service information for most Meritor and Meritor WABCO products. $20. Specify TP-9853.

How to Obtain Tools and Supplies Specified in This Manual

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

⚠ 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 ArvinMeritor.

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 ArvinMeritor.

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/m^3 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.

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

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Contents

This manual contains service information for E version Meritor WABCO Anti-Lock Braking System (ABS) and ABS with Automatic Traction Control (ATC) for trucks, tractors and buses. E version ABS incorporates Power Line Carrier Communication (PLC), an optional feature that allows tractor/trailer communication. For the driver, this means that a trailer ABS indicator lamp located on the vehicle dash will come on if a trailer ABS fault occurs on a trailer equipped with PLC.

NOTE: For diagnostic and testing procedures for systems with C version ECUs, use Maintenance Manual 28, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses. For D version ECUs, use Maintenance Manual 30, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses. The ABS version is marked on the ECU. Figure 1.1. If you cannot identify the ECU version installed on your vehicle, contact ArvinMeritor's Customer Service Center at 800-535-5560.

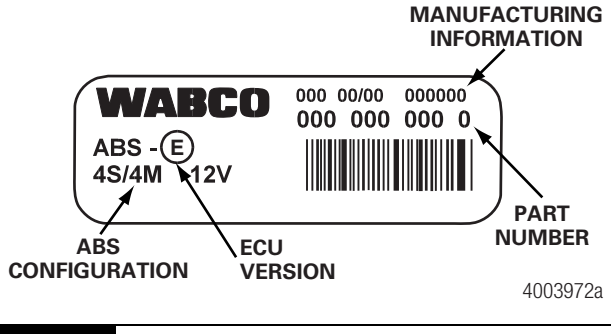


Figure 1.1

Description

How 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 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.

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 for tractor and one for trailer, let drivers know the status of the system. The tractor ABS lamp is also used to display tractor blink code diagnostics. Figure 1.2. The location of the ABS indicator lamps varies depending on the make and model of the vehicle.

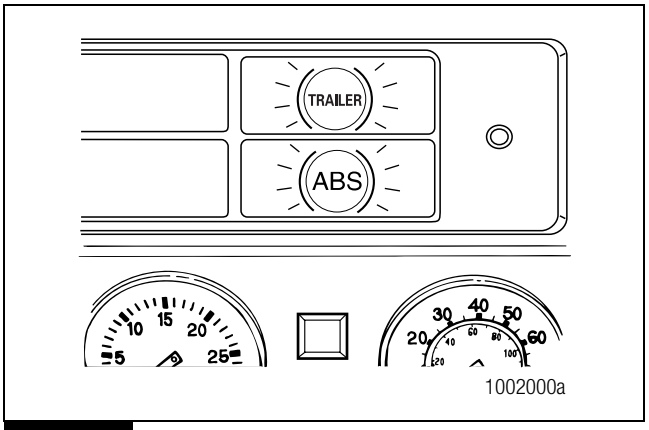


Figure 1.2

Do not open the ECU. Opening the ECU to gain access to the internal components will void the warranty.

If the vehicle is equipped with optional Automatic Traction Control (ATC), or with ATC and Roll Stability Control (RSC), the ATC indicator lamp is used to indicate both ATC and RSC. Refer to Section 2.

Blink code diagnostics information for **trailer** ABS is not included in this manual. Refer to Maintenance Manual 33, Easy-Stop™ Trailer ABS, or Maintenance Manual MM-0180, Enhanced Easy-Stop™ Trailer ABS with PLC, for trailer diagnostics.

ABS Configuration

With the E Basic ECU, 4S/4M is the only configuration used. Figure 1.3.

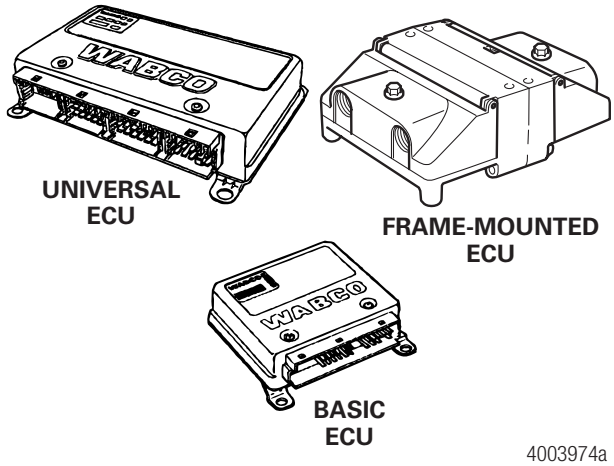


Figure 1.3

The ABS configuration is defined by the number of wheel-end sensors and modulator valves. There are three common ABS configurations used with E version ECUs.

- 4S/4M (4 wheel speed sensors, 4 modulator valves). Figure 1.4.
- 6S/4M (6 wheel speed sensors, 4 modulator valves)
- 6S/6M (6 wheel speed sensors, 6 modulator valves)

Typical illustrations in this manual use the 4S/4M configuration as a sample. Layouts for 4S/4M, 6S/4M and 6S/6M configurations are included in Appendix I.

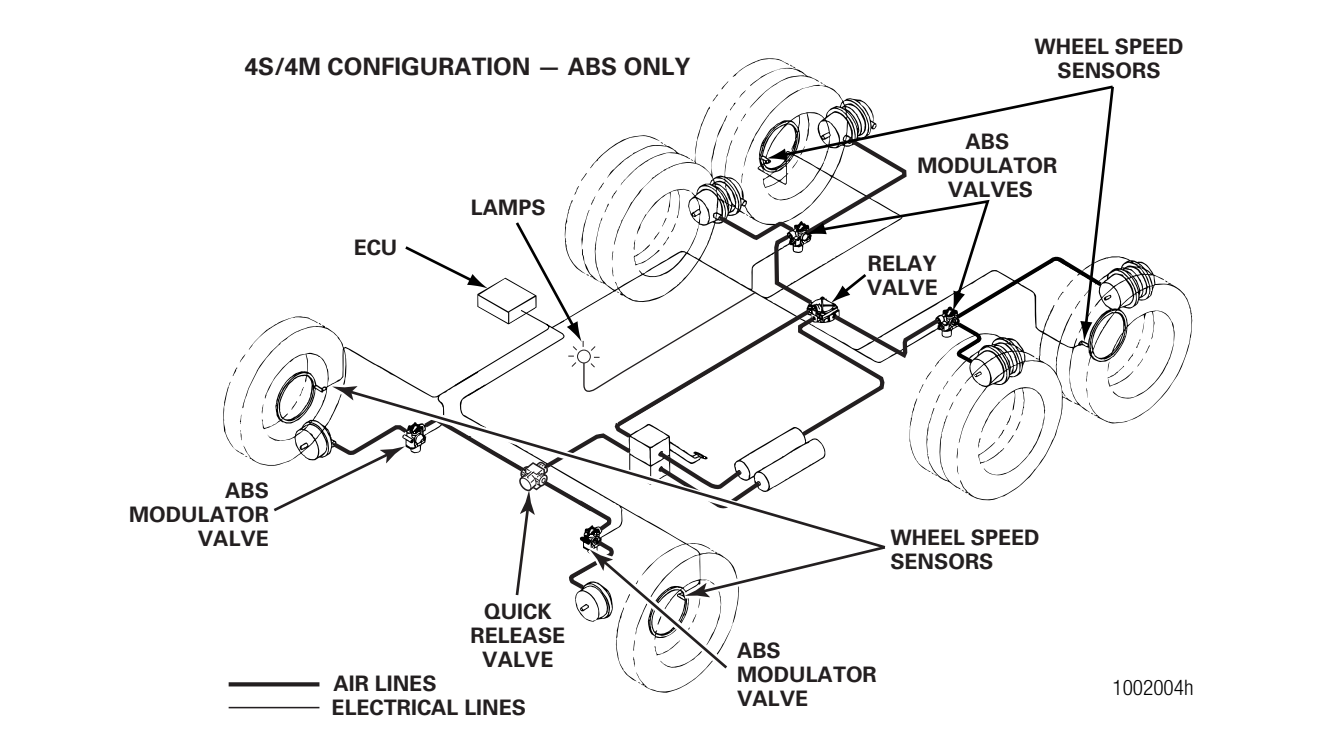
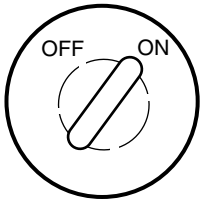


Figure 1.4

ABS Indicator Lamp

The ABS indicator lamp works as follows:

Ignition ON  1002005a	Normal Operation	ABS lamp comes on at ignition momentarily for a bulb check, then goes out.	System is OK.
	After servicing ABS	ABS lamp does not go out at ignition.	When vehicle is driven at speeds above 4 mph (6 km/h), lamp goes out. System is OK.
	Off-road ABS operation. Refer to the off-road ABS information in this section.	ABS lamp flashes during vehicle operation.	The vehicle's normal ABS function is being modified due to road conditions.
	Existing Fault	ABS lamp does not go out at ignition.	Lamp does not go out at speeds above 4 mph (6 km/h) — a fault exists in the ABS system.

NOTE: If the ECU senses a tractor ABS fault during normal vehicle operation, the ABS indicator lamp will come on and stay on.

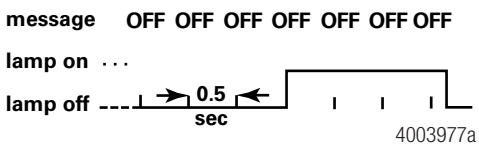
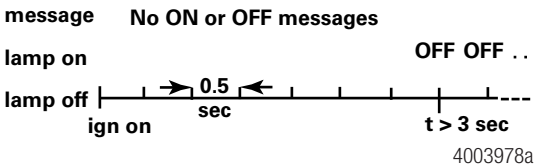
Trailer ABS Indicator Lamp

The trailer ABS indicator lamp on the vehicle dash applies to Trailer ABS only. The lamp is controlled by a signal to the tractor ECU, sent over the power line (PLC function). When a trailer ABS fault is detected, an ON message is sent; when no fault is detected, the ECU receives an OFF message. Table A illustrates trailer ABS lamp operation at power-up, or ignition on. Table B depicts lamp responses that occur during operation.

Lamp turn ON and OFF messages do not turn the lamp ON or OFF instantly. The delay between the receipt of the message and the lamp response time is intentional. It prevents erratic lamp activity.

NOTE: For doubles or triples, the lamp does not distinguish between trailers. A system fault in any of the trailers will activate the trailer ABS indicator lamp.

Table A: Dash-mounted Trailer ABS Indicator Lamp Operation — Bulb Check (Information for Drivers)

Signal from Trailer to Tractor ECU	Status of Trailer ABS Lamp on Vehicle Dash	Explanation
Single or Multiple Trailers  4003977a	Trailer ABS lamp comes on at ignition, OFF message is detected within three seconds of ignition, Trailer ABS lamp goes out.	Bulb Check performed AND Trailer ABS system is OK. In this case, the lamp is ON for a Bulb Check only.
Single or Multiple Trailers  4003978a	Trailer ABS lamp does not come on within three seconds of ignition.	No Bulb Check, trailer added after initial power-up, system OK. There was no trailer PLC message for at least three seconds following ignition ON.

ON = Turn ON message to the "trailer ABS" lamp

OFF = Turn OFF message to the "trailer ABS" lamp

Removing a trailer with a fault will cause the ABS lamp to turn off. Remember to have the trailer with the fault repaired as soon as possible before returning it to service.

Table B: Dash-mounted Trailer ABS Indicator Lamp Operation (Information for Service Technicians)

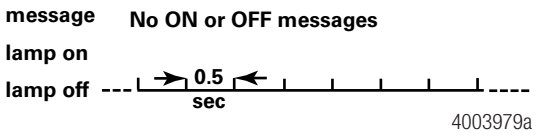
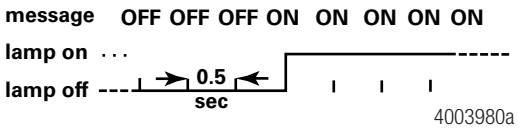
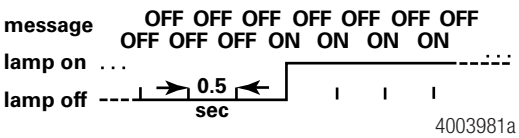
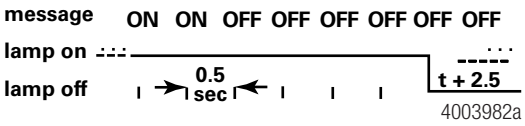
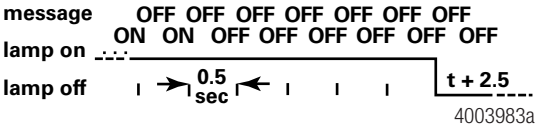
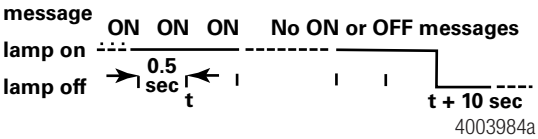
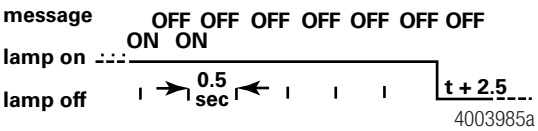
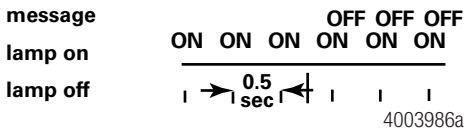
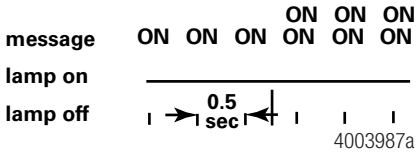
Signal from Trailer to Tractor ECU	Status of Trailer ABS Lamp on Vehicle Dash	Explanation	Action
Single or Multiple Trailers  4003979a	Trailer ABS lamp does not come on within three seconds of ignition.	Not using the PLC system (no trailer connected) or trailer not equipped with PLC or fault in PLC system.	Use lamp on side of trailer to identify fault. Make necessary repairs.
Single Trailer  4003980a	Trailer ABS lamp comes on.	Trailer ABS fault(s) occurred during operation and still exists.	
Multiple Trailers/Dollies  4003981a			
Single Trailer  4003982a	Trailer ABS lamp comes on but goes out after 2.5 seconds after fault is detected.	Trailer ABS fault occurred during operation and the fault was corrected.	None
Multiple Trailers/Dollies  4003983a			
Single Trailer  4003984a	ABS lamp is off, comes on, then goes off, 10 seconds after loss of messages.	ABS fault existed, then signal was lost because trailer disconnected or PLC fault.	Use lamp on side of trailer to identify fault. Make necessary repairs.
Multiple Trailers/Dollies  4003985a		ABS fault existed, then trailer with fault lost signal because trailer was disconnected or PLC fault.	

Table B: Dash-mounted Trailer ABS Indicator Lamp Operation (Information for Service Technicians)

Signal from Trailer to Tractor ECU	Status of Trailer ABS Lamp on Vehicle Dash	Explanation	Action
Single Trailer to Multiples  	ABS lamp is on and stays on when a new trailer with no new fault is added.	There was a fault in existence before the new trailer was added AND the ignition was not turned off before the trailer was added.	Use lamp on side of trailer to identify fault. Make necessary repairs.
Single Trailer to Multiples  	ABS lamp is on and stays on when a new trailer with a new fault is added.	ABS fault was in existence before the new trailer was added AND the ignition was not turned off before the trailer was added AND the new trailer has an ABS fault.	

ON = Turn ON message to the “trailer ABS” lamp

OFF = Turn OFF message to the “trailer ABS” lamp

Removing a trailer with a fault will cause the ABS lamp to turn off. Remember to have the trailer with the fault repaired as soon as possible before returning it to service.

ABS Modulator Valves

Modulator valves control the air pressure to each affected brake during an ABS function.

Valve Arrangement Option

In Figure 1.4, the modulator valves on the rear axle are mounted separately and a relay valve is used to deliver air pressure to the modulator valves. There is also an optional valve package available from Meritor WABCO, the ABS valve package, which may be found on certain vehicle models. The **ABS valve package** may be used on all D and E version units, including D and E Basic, and is available for front or rear axle installation.

Easy Listening Tip!

To ensure the ABS valves are working — just listen! Figure 1.5.

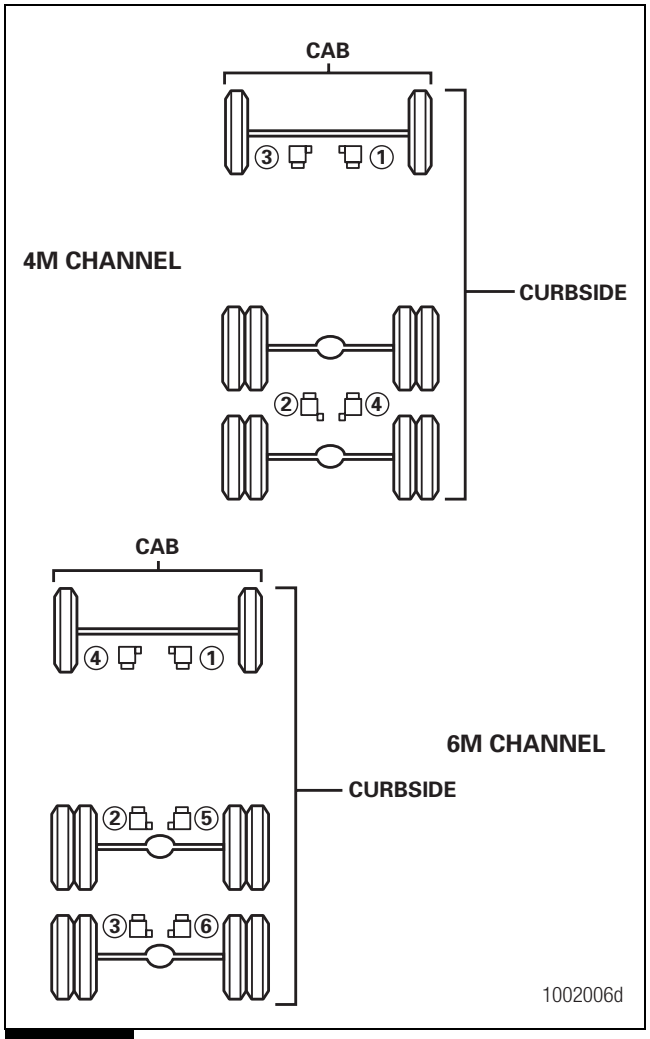


Figure 1.5

1. Apply the brakes.
2. Turn on the ignition.
3. Wait for the ABS indicator lamp to come on.

   NOTE: In previous versions of ABS, the valves are cycled diagonally. Diagonal cycling does not occur with E version ABS.

4. Listen to the valves cycle one by one, then together diagonally, as follows:

   - 4M (channel) valve cycle order:

     1 – 2 – 3 – 4

   - 6M (channel) valve cycle order:

     1 – 2 –3 – 4 – 5 – 6

ABS Valve Packages

The front ABS valve package combines a quick release valve with two ABS modulator valves and is mounted in the front of the vehicle. The rear ABS valve package combines a service brake relay valve with two ABS modulator valves and is mounted in the rear of the vehicle. The valve package, front or rear, must be mounted near the brake chambers it serves. Figure 1.6.

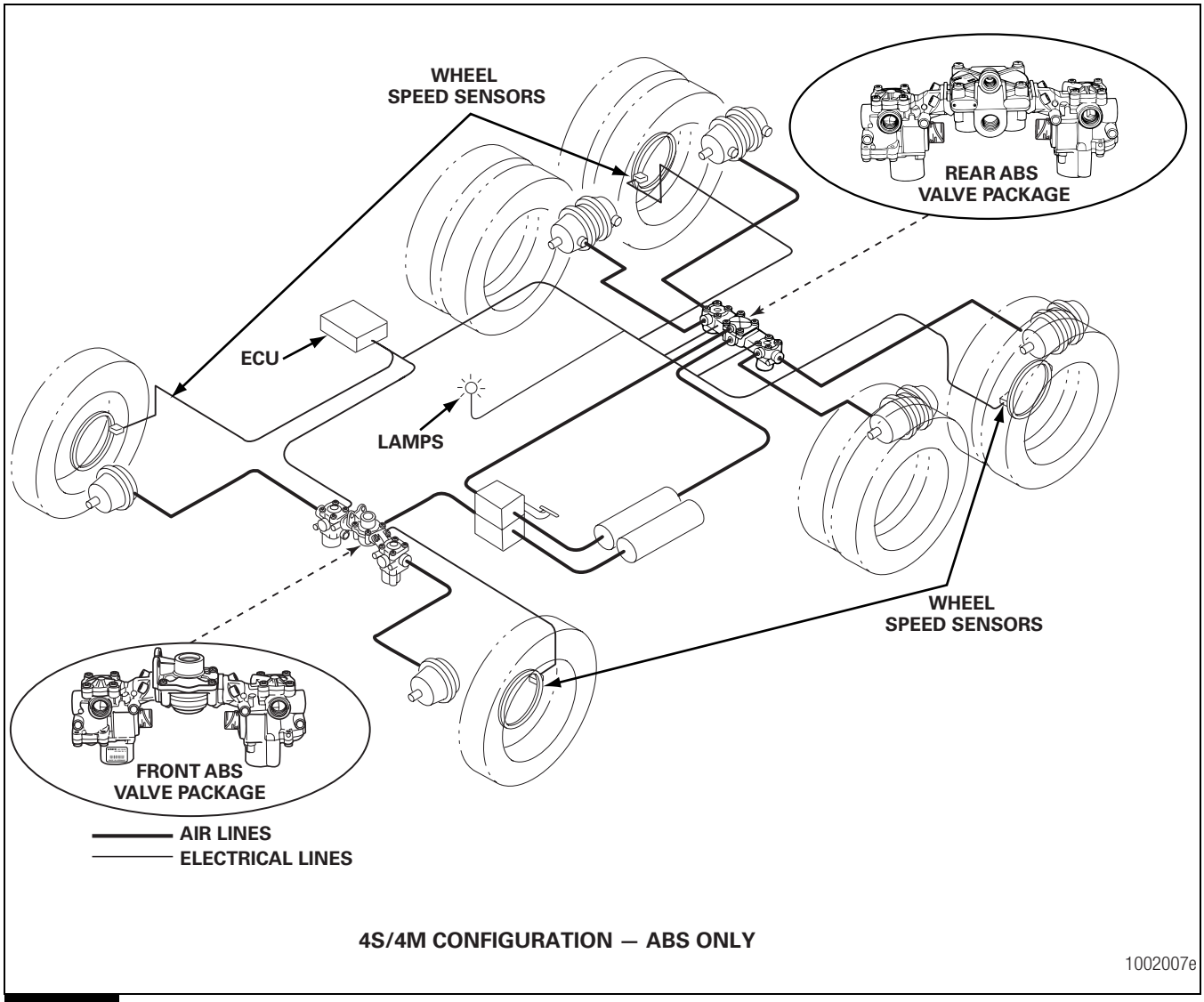


Figure 1.6

ABS Sensors

ABS sensor systems consist of a tooth wheel mounted on the hub of each monitored wheel and a sensor installed so that its end is against the tooth wheel. The sensor continuously sends wheel speed information to the ECU. A sensor clip holds the sensor in place at the tooth wheel.

The type of axle determines sensor mounting location.

- Steering axle sensors are installed in the steering knuckle or in a bolted-on bracket.
- Drive axle sensors are mounted in a block attached to the axle housing or in a bolted-on bracket.

Check the wheel speed sensors for correct alignment and apply lubricant to the sensor and sensor clip whenever wheel-end maintenance is performed. Refer to Section 3 and Section 4.

Off-Road ABS

On some vehicles, an off-road ABS function may be selected. Off-road ABS improves vehicle control and helps reduce stopping distances in off-road conditions or on poor traction surfaces such as loose gravel, sand and dirt. **This option is not available on 4S/4M frame-mounted ECUs.**

NOTE: On vehicles equipped with an off-road switch, the off-road ABS mode is manually selected by the driver. On some vehicles, the off-road mode may be fully automatic. Refer to the vehicle specifications for information about the off-road ABS feature.

The ABS indicator lamp on the dash will flash while the vehicle is in the off-road mode. This alerts the driver that the vehicle's normal ABS function is being modified.

Automatic Traction Control (ATC)

ATC is an option with Basic and frame-mounted E version ECUs and is available with all Universal ECUs. ATC can be used with individual valves, or with an integrated ABS/ATC valve package. Universal and frame-mounted 4S/4M E version ECUs with ATC may have roll stability control. Basic ECUs with ATC do not have RSC. Section 2 describes ATC and RSC in detail.

System Components

The **ECU** is the brain of the ABS system. It receives information from the sensors and sends signals to the ABS valves. ECUs are available for cab- or frame-mounted applications. Basic and universal ECUs are cab-mounted. Universal and frame-mounted 4S/4M E version ECUs with ATC may have roll stability control. Basic ECUs with ATC do not have RSC. Figure 1.7.

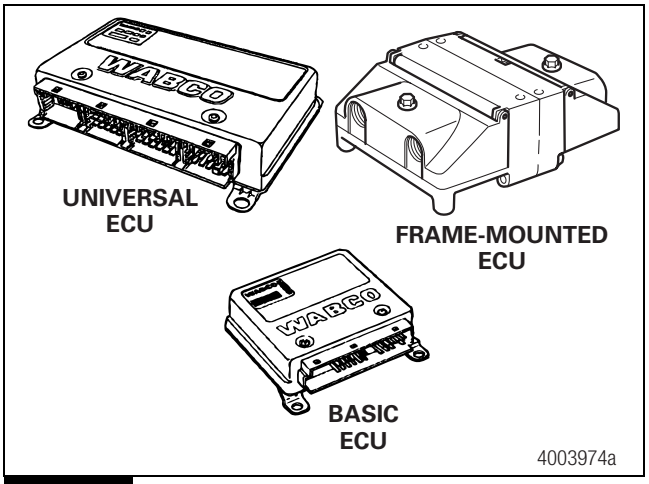


Figure 1.7

A **tooth wheel** is mounted at, or cast in, the hub of each sensed wheel, with a sensor installed so that its end is against the tooth wheel. A sensor clip holds the sensor in place at the tooth wheel. Figure 1.8.

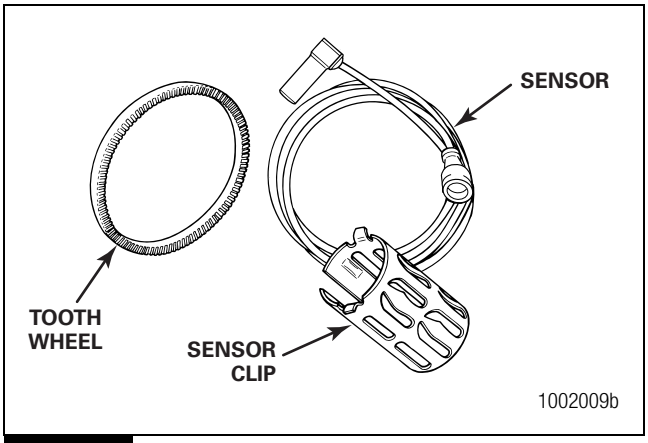


Figure 1.8

NOTE: The sensor and clip must be greased with Meritor WABCO-recommended lubricant whenever wheel-end maintenance is performed. Refer to Section 4 for lubrication specifications.

An **ABS modulator valve** controls air pressure to each affected brake during an ABS event. The modulator valve is usually located on a frame rail or cross member near the brake chamber. The modulator valve is available in bayonet-style, Figure 1.9, or open-style connector.

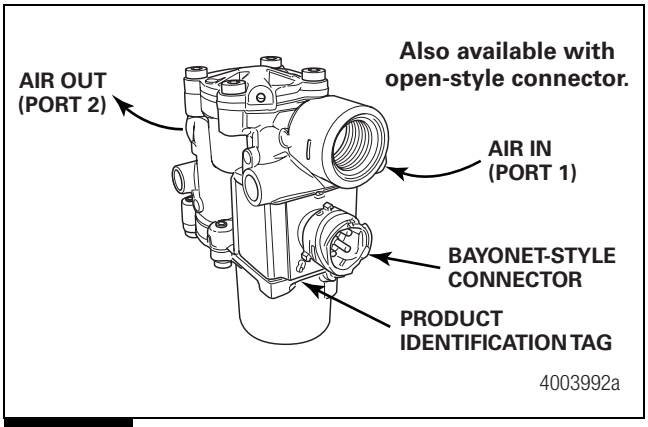


Figure 1.9

The **ABS valve package** is an alternative to individual valves.

The **rear ABS valve package** combines two modulator valves and one service relay valve. Figure 1.10.

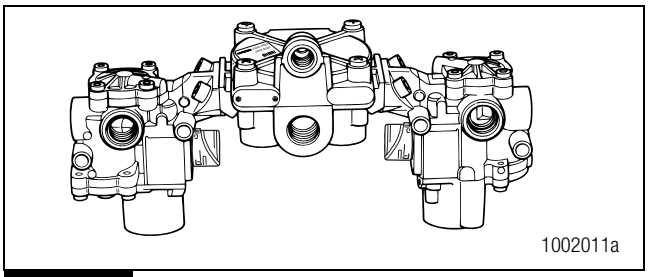


Figure 1.10

The **front ABS valve package** combines two modulator valves and a quick release valve. Figure 1.11.

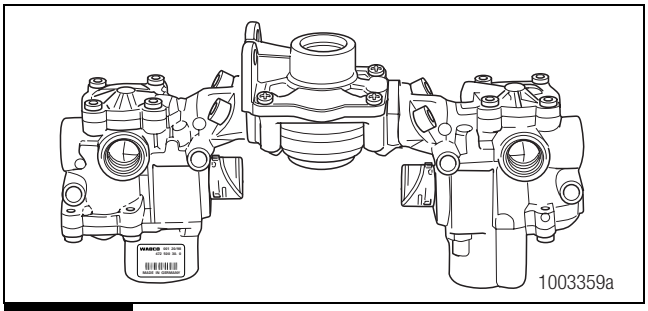


Figure 1.11

Sensor cables connect the sensor to the ECU. Figure 1.12.

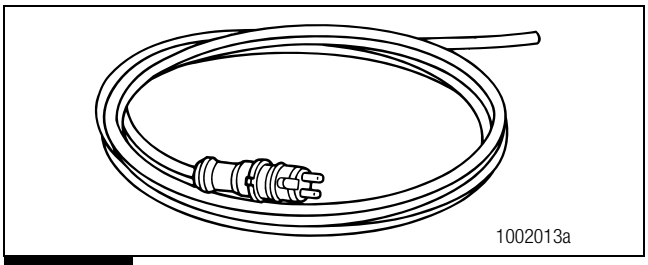


Figure 1.12

ABS modulator valve cables connect the modulator valve to the ECU. Figure 1.13.

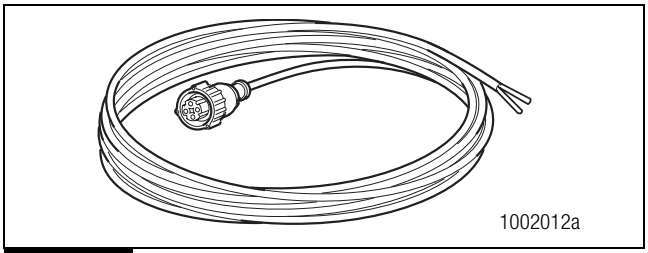


Figure 1.13

TOOLBOX™ Software is a PC-based diagnostics program that can display wheel speed data, test individual components, verify installation wiring and more. Runs in Windows® 98*, Me, 2000 or XP**. Internet Explorer version 3.02 or higher must be installed. RS232 to J1708 convertor box is required. Figure 1.14.

* Not recommended

** Approved for use with TOOLBOX™ as of July 2005

Figure 1.14

The **MPSI Pro-Link® Plus** with a multiple protocol cartridge (MPC) and Meritor WABCO applications card, version 2.0 or higher, provides diagnostic and testing capabilities for the E version ABS. Figure 1.15.

Figure 1.15

NOTE: The RSC functions of E version ABS cannot be tested with the Pro-Link® Plus.

ATC

Automatic traction control is available as an option on all E version ABS ECUs and is standard on most. ATC can be used with individual valves, or with an integrated ABS/ATC valve package. ATC helps improve traction when vehicles are on slippery surfaces by reducing drive wheel overspin. ATC works automatically in two different ways.

A. If a drive wheel starts to spin, ATC applies air pressure to brake the wheel. This transfers engine torque to the wheels with better traction.

B. If all drive wheels spin, ATC reduces engine torque to provide improved traction.

If ATC turns itself on and off, drivers do not have to select this feature. If drive wheels spin during acceleration, the ATC indicator lamp comes on, indicating ATC is active. It goes out when the drive wheels stop spinning. Figure 2.1.

NOTE: Some vehicle manufacturers may refer to ATC as Anti-Spin Regulation (ASR).

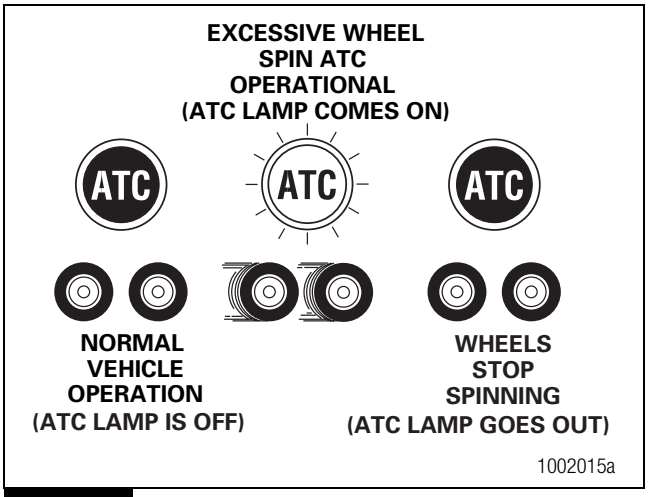


Figure 2.1

If ATC is installed, there will be an indicator lamp on the vehicle dash or instrument panel marked ATC or ASR.

If the ATC lamp goes out before the ABS lamp, there is no ATC.

An ATC installation may use an individually mounted valve, or the valve may be part of the ABS valve package. Figure 2.2.

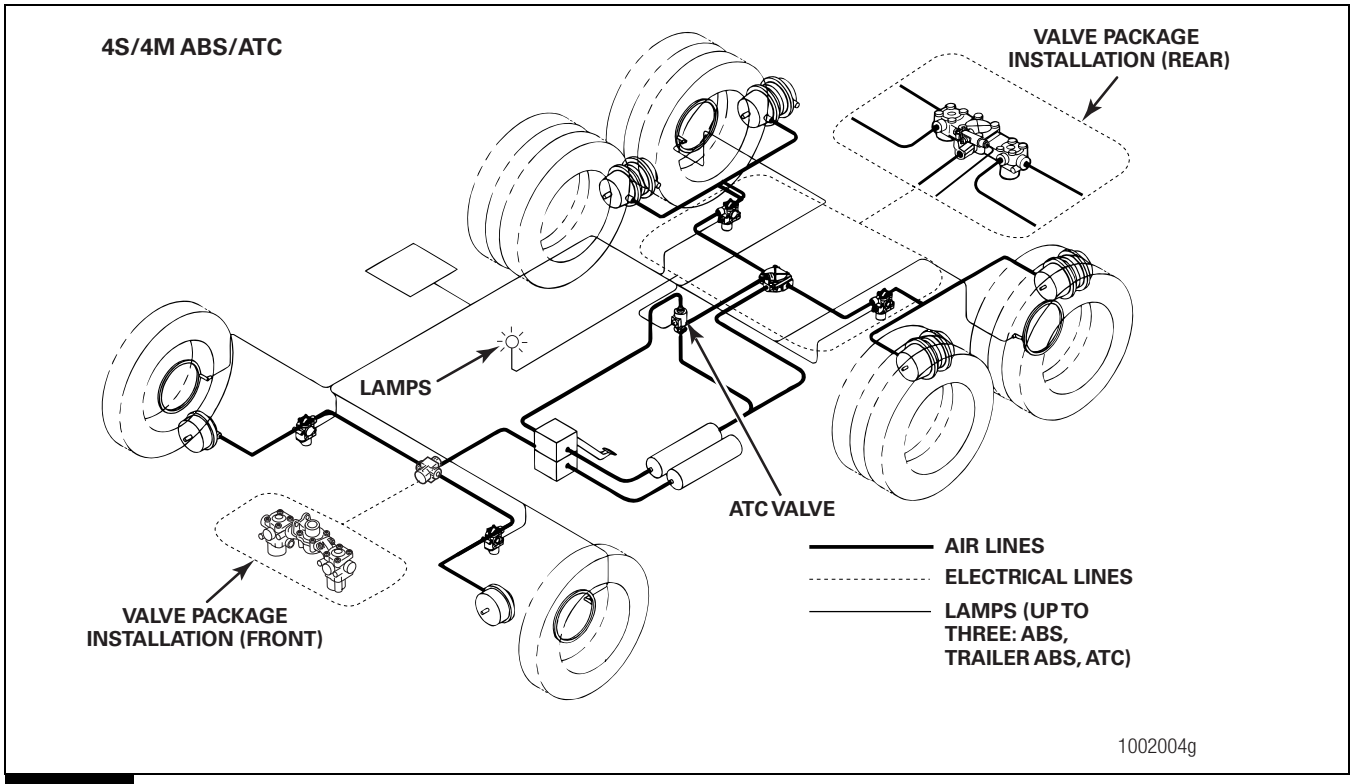


Figure 2.2

ATC Components

ATC may be used with individual ABS modulator valves, or installed with the ABS valve package.

When installed with individual ABS modulator valves, an ATC solenoid valve is mounted on the frame or cross member, near the rear of the vehicle.

When it is part of the ABS valve package, an ATC valve is attached to the relay valve.

A cable connects the ECU to the ATC valve.

ATC components are illustrated in Figure 2.3.

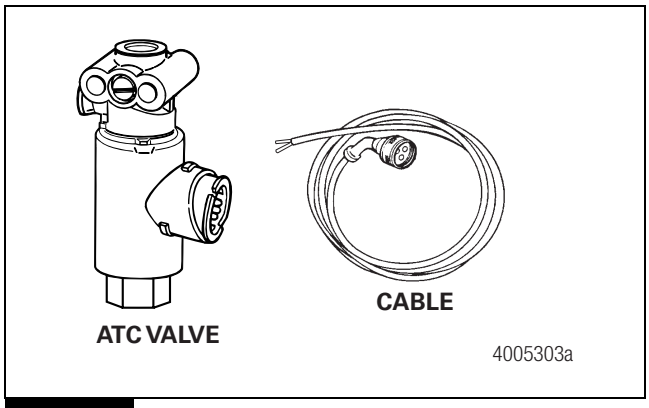


Figure 2.3

Deep Snow and Mud Switch

A deep snow and mud option switch is included with ATC. This function increases available traction on extra soft surfaces like snow, mud or gravel, by slightly increasing the permissible wheel spin.

Drivers use a deep snow and mud switch to select this feature. When this function is in use, the ATC indicator lamp blinks continuously. Figure 2.4.

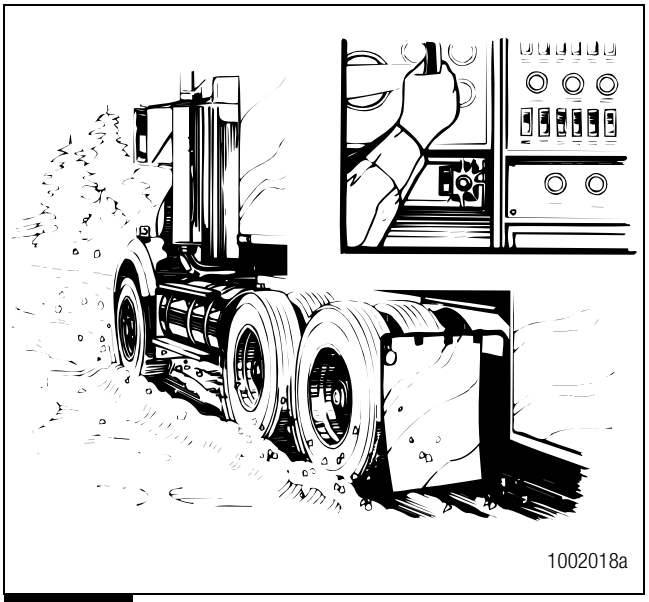


Figure 2.4

Switch and lamp locations will vary, depending on the vehicle make and model.

Here's how the deep snow and mud feature works.

		Function	
Driver Action	**System Response**	**Active**	**Not Active**
Press deep snow and mud switch	ATC lamp blinks continuously	X	
Press switch again	ATC lamp stops blinking		X

NOTE: Turning off the ignition will also deactivate the deep snow and mud feature.

RSC

Roll stability control is an option designed to assist drivers in managing the conditions that result in commercial vehicle rollovers. When RSC senses conditions that may result in a rollover, it reduces engine torque, engages the engine retarder, applies enough pressure to the drive axle brakes and may modulate the trailer brakes to slow the vehicle down. Like ATC, RSC works automatically. The driver does not have to select this feature.

RSC uses many of the same components used by ABS and ATC. A second solenoid valve, the RSC valve, controls the trailer service brakes during an RSC event. This is a stand-alone valve that is not available as part of the ABS/ATC valve package. Figure 2.5.

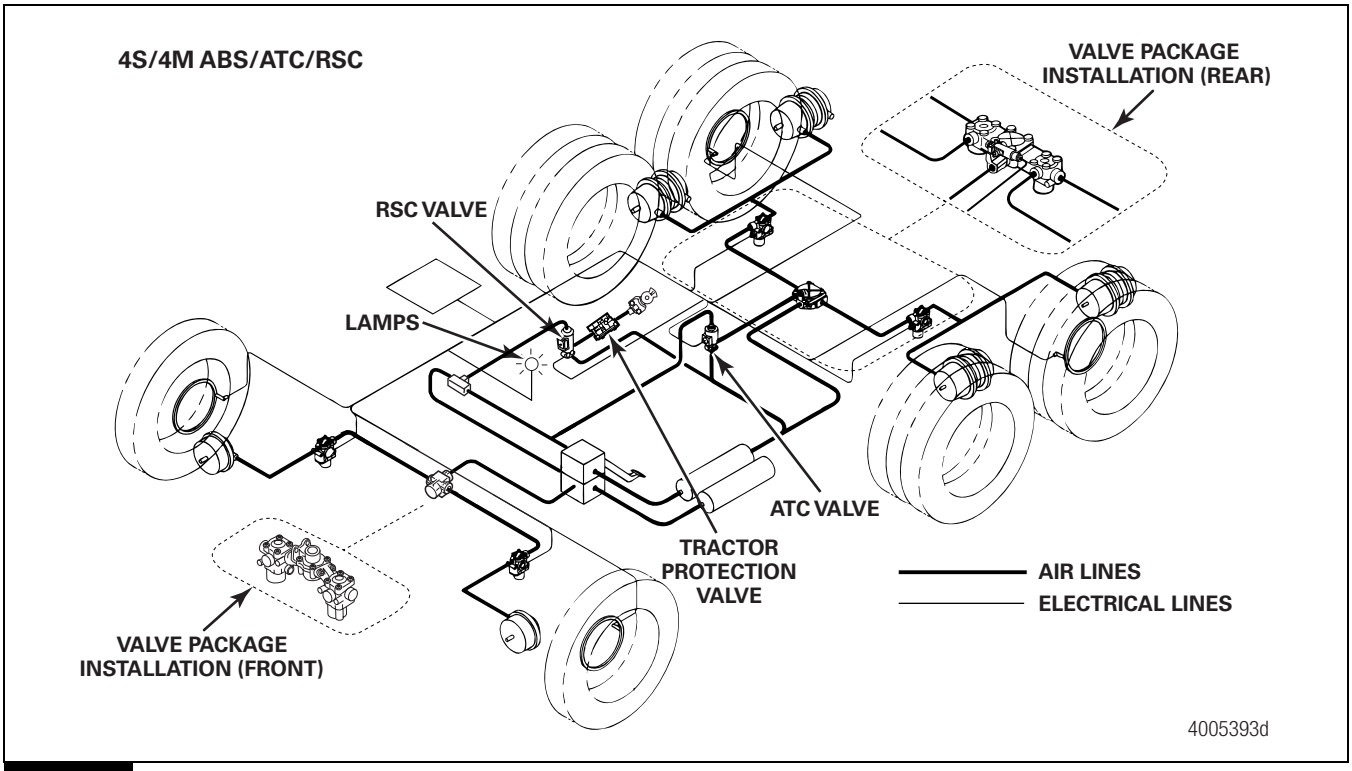


Figure 2.5

Because ATC and RSC functions share the same dash indicator lamp, understanding how the ABS and ATC/RSC lamps work is very important.

- If the vehicle is equipped with ATC, but not RSC, when the ignition is turned to the ON position, the ABS and ATC lamps will light for approximately three seconds, then both lamps will turn off simultaneously. Figure 2.6.
- If the vehicle is equipped with ATC and RSC, when the ignition is turned to the ON position, the ABS and ATC/RSC will both light . . . but the ATC/RSC lamp will stay lit briefly after the ABS lamp goes out.

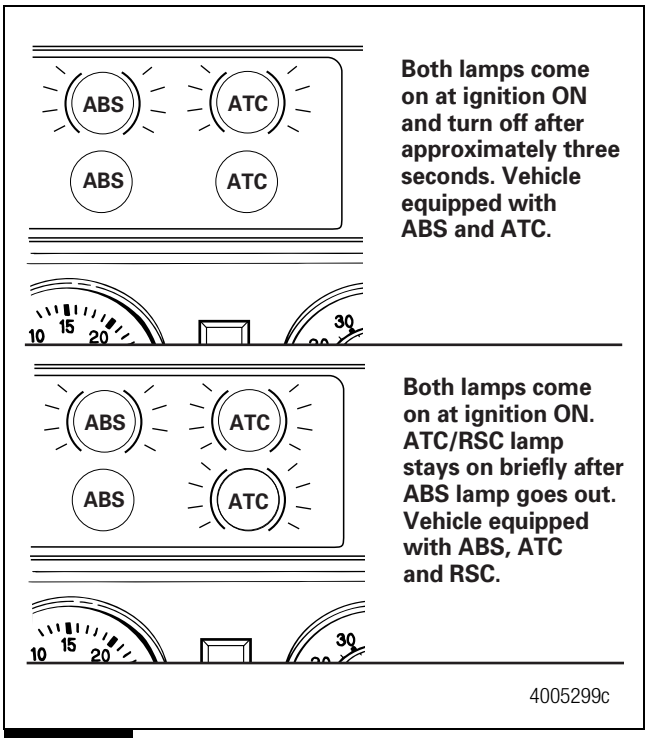


Figure 2.6

NOTE: Active mode means RSC is installed and will become active if it is needed.

TOOLBOX™ Software can also be used to determine if RSC is active. Refer to Section 3.

RSC Components

An additional solenoid valve is needed for RSC. The RSC valve controls the trailer service brakes during an RSC event. The RSC valve is a stand-alone valve. The valve is not part of an ABS valve package. Figure 2.7.

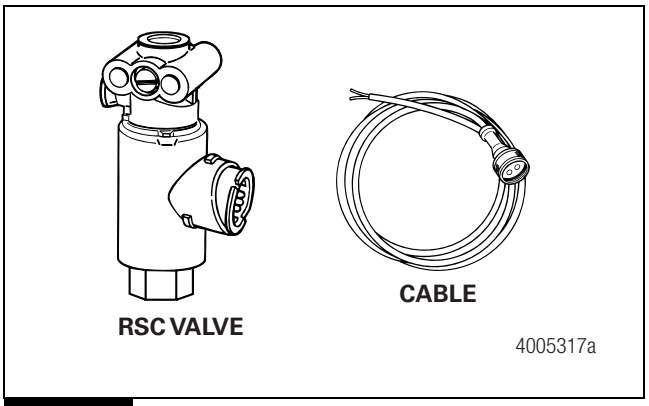


Figure 2.7

General

Maintenance Information

There is no regularly scheduled maintenance required for the Meritor WABCO ABS or ABS/ATC. However, ABS does not change current vehicle maintenance requirements.

- **Lamp Check:** To ensure the ABS tractor lamp is operating, drivers should check the lamp every time the vehicle is started. When the vehicle is started, the ABS lamp should come on momentarily. If it does not come on, it could mean a burned-out bulb.
- **ABS Wheel Speed Sensors:** Check the wheel speed sensor adjustment and lubricate the sensor and sensor clip whenever wheel-end maintenance is performed. Use only Meritor WABCO-recommended lubricant, as specified in Section 4.

Diagnostics

Use any of the following methods to diagnose E version ABS:

- TOOLBOX™ Software, a PC-based ABS diagnostic and testing program that runs in Windows® 98*, Me, 2000 or XP**. Internet Explorer version 3.02 or higher must be installed. Refer to the information in this section.
- Blink Codes. Refer to the information in this section.
- MPSI Pro-Link® Plus with MPC and Meritor WABCO applications card, version 2.0 or higher. Refer to the information in this section.
- OEM Diagnostic Displays. Refer to the vehicle operator's manual.

Information about TOOLBOX™ Software, MPSI Pro-Link® Plus and blink codes follows. If you have any questions about system diagnostics, please contact ArvinMeritor's Customer Service Center at 800-535-5560.

* Not recommended

** Approved for TOOLBOX™ as of July 2005

TOOLBOX™ Software Diagnostics

NOTE: For complete instructions for using TOOLBOX™ Software, refer to the User's Manual. The manual is posted on meritorwabco.com/TOOLBOX.

If you have TOOLBOX™ Software installed on your computer, use it to identify system faults. Then, follow the on-screen repair information to make the necessary repairs or replacements.

To display E version ABS faults:

1. Connect the computer to the vehicle:
   - Attach the cable from your computer to the J1708 to RS232 converter box.
   - Attach the diagnostic cable (Deutsch) to the vehicle. Figure 3.1.

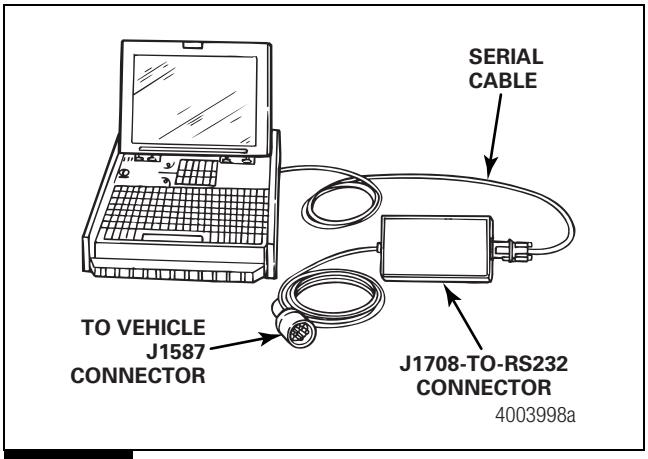


Figure 3.1

2. Select TOOLBOX™ Software from the Desktop or from the Windows Start Menu to display the TOOLBOX™ Main Menu. From the **Main Menu**, select **Tractor ABS**. The **ABS Main Screen** will appear. Figure 3.2.

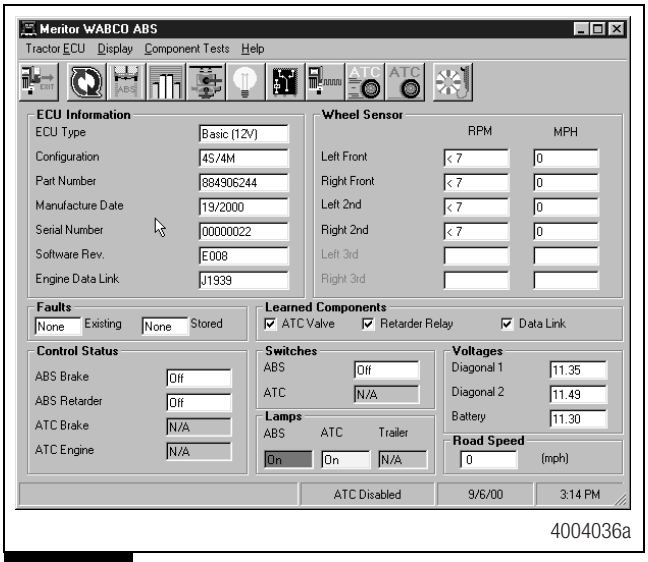


Figure 3.2

3. Select **Display** for a pull-down menu.

4. From the pull-down menu, select **Faults** to bring up the Fault Information screen. Figure 3.3.

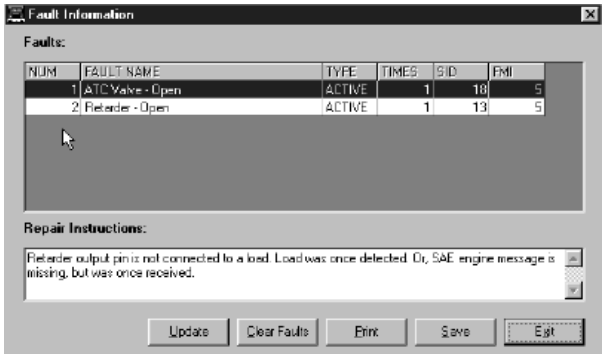


Figure 3.3

5. A description of the fault, the number of times the fault occurred, the system identifier (SID) and the failure mode (FMI) are all displayed in the fault information window. Basic repair instructions for each fault are also provided. Figure 3.3.

   For detailed repair instructions, click on the fault to display a troubleshooting information sheet. **Bookmark** and **Thumbnail** tabs at the side of the troubleshooting information sheet provide additional information. A s ample troubleshooting information sheet appears in the Appendix. This screen also provides a link to the appropriate system schematic.

   Faults that may occur after the screen is displayed will not appear until a screen update is requested. Use the **update** button to refresh the fault information table.

   After making the necessary repairs, use the **clear faults** button to clear the fault. Use the **update** button to refresh the fault information table and display the new list of faults.

   Use the **Save** or **Print** button to save or print the fault information data.

Blink Code Diagnostics (Tractor ABS Only)

Definitions

Before using blink code diagnostics, you should be familiar with a few basic terms. If you used previous versions of Meritor WABCO's blink code diagnostics, review these definitions to identify major changes.

ABS Indicator Lamp: This lamp serves two purposes: it alerts drivers to an ABS tractor fault and it is used during diagnostics to display the blink code.

Blink Code: A series of blinks or flashes that describe a particular ABS system fault or condition.

Blink Code Cycle: Two sets of flashes with each set separated by a one-and-one-half second pause. Blink codes are defined in the blink code identification information in this section.

Blink Code Switch: A momentary switch that activates blink code diagnostic capabilities. Switch types and locations vary, depending on the make and model of the vehicle.

Clear: The process of erasing faults from the ECU.

Diagnostics: The process of using blink codes to determine ABS system faults.

Fault: An ABS malfunction detected and stored in memory by the Meritor WABCO ECU. System faults may be Active or Stored.

Active Fault: A condition that **currently exists** in the ABS system; for example, a sensor circuit malfunction on the left front steering axle. An active fault must be repaired before it can be cleared from memory — and before you can display additional blink code faults.

Stored Fault: There are two types of stored faults:

A. A repaired active fault that **has not been cleared** from the ECU.

B. A fault that occurred but **no longer exists**. For example, a loose wire that makes intermittent contact. Because stored faults are not currently active, they do not have to be repaired before they can be cleared from memory.

Meritor WABCO recommends you keep a record of these faults for future reference.

System Configuration Code: One digit code displayed during the clear mode. Blink codes for common ABS system configurations are shown in Figure 3.4.

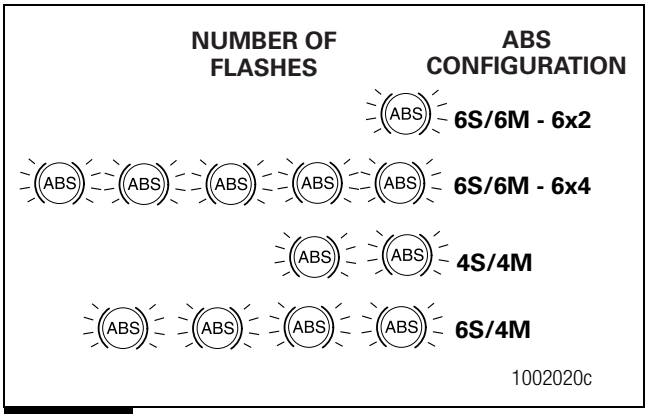


Figure 3.4

Diagnostic Mode

To enter the diagnostic mode, press and hold the blink code switch for one second, then release.

Clear Mode

To erase faults from the ECU, you must be in the clear mode. To enter the clear mode, press and hold the blink code switch for at least three seconds, then release.

If the system displays eight quick flashes followed by a system configuration code, the clear was successful. Stored ABS faults have been cleared from memory.

If you do not receive eight flashes, there are still active faults that must be repaired before they can be cleared.

NOTE: The clear mode is also used to disable the ATC function.

Table C: Troubleshooting with Blink Code Diagnostics

Procedure	System Response	Action
	Diagnostics Mode	
Step I.	Possible responses:	
Turn ignition ON.	ABS indicator lamp comes on momentarily then goes out, indicating System OK.	No recognizable active faults in the ABS. No action required.
	ABS indicator lamp does not light, indicating possible wiring fault or burned-out bulb.	Inspect wiring. Inspect bulb. Make necessary repairs.
	ABS indicator lamp stays on, indicating:	
	• Fault, or faults, in the system.	Continue with blink code diagnostics. **(Go to Step II.)**
	• Sensor fault during last operation.	Continue with blink code diagnostics. **(Go to Step II.)**
	• Faults cleared from ECU, but vehicle not driven.	Drive vehicle — lamp will go out when vehicle reaches 4 mph (6 km/h).
	• ECU disconnected.	Connect ECU.
Step II.	ABS indicator lamp begins flashing two digit blink code(s).	Determine if fault is active or stored:
Press and hold Blink Code Switch for one second, then release.		**Active Fault:** Lamp will repeatedly display one code.
		Stored Fault: Lamp will display code for each stored fault then stop blinking. Faults will be displayed **one time only.**
Step III.	First Digit: 1-8 flashes, Pause (1-1/2 seconds)	Find definition for blink code on blink code chart.
Count the flashes to determine the blink code.	Second Digit: 1-6 flashes, Pause (4 seconds)	
Step IV.	Active Fault	Make the necessary repairs. Repeat Step 1, Step II and Step III until System OK, code (1-1) received.
Turn ignition OFF.		
Repair and record faults.	Stored Fault	Record for future reference.
		NOTE: Last fault stored is first fault displayed.
	Clear Mode	
Step V.	ABS indicator lamp flashes eight times.	All stored faults successfully cleared. Turn ignition OFF.
Turn ignition ON.		
Clear Faults from memory: Press and hold blink code switch for at least three seconds, then release.	Eight flashes not received.	Active faults still exist, repeat Step I through Step V.

Blink Code Illustrations

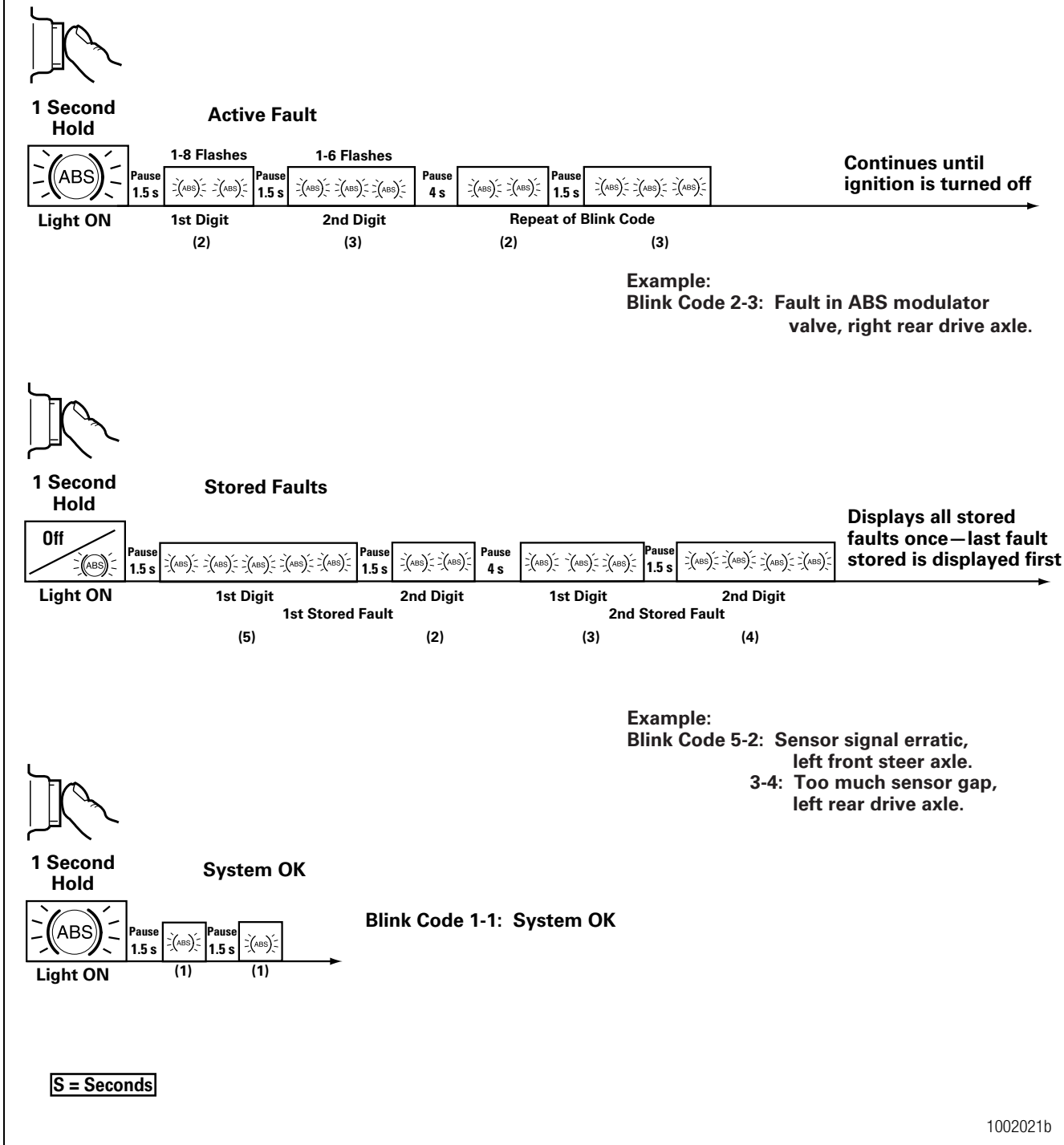


Figure 3.5

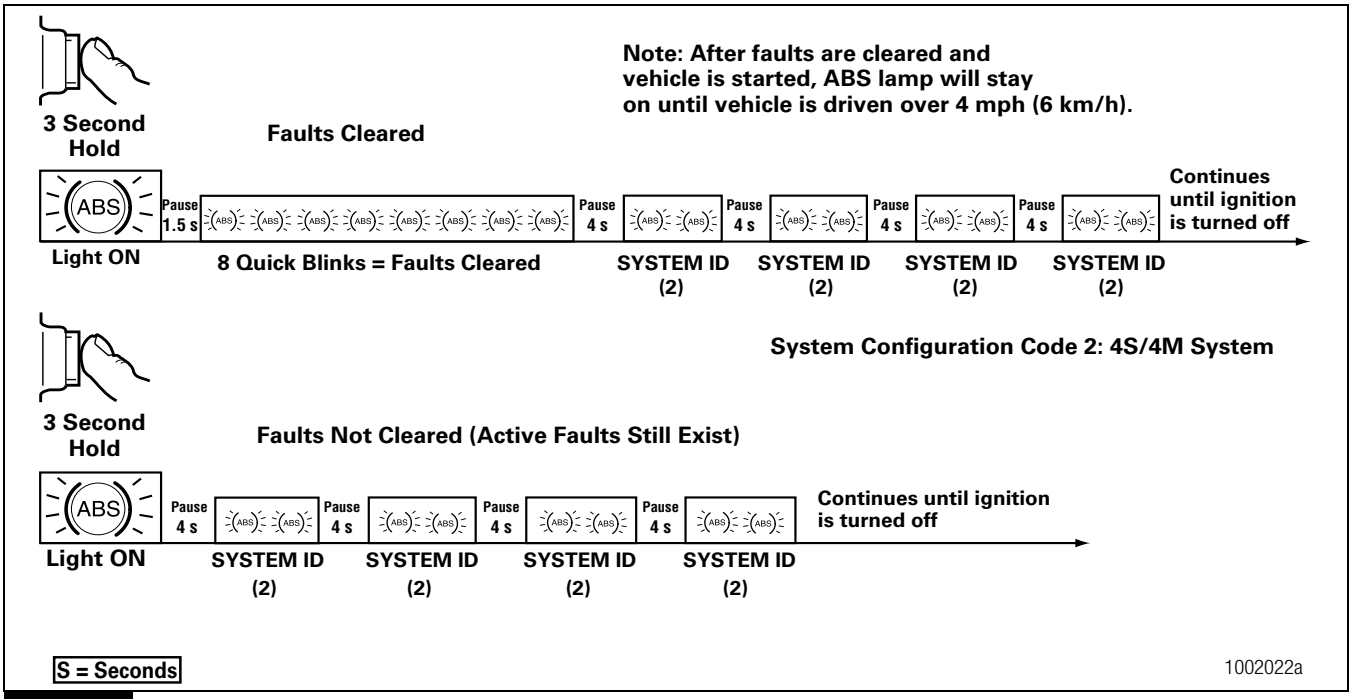


Figure 3.6

Blink Code Conditions

When using blink code diagnostics, the following conditions could occur:

Table D: Blink Code Conditions

Condition	Reason	Action
ABS indicator lamp does not come on at ignition.	Loose or burned-out bulb.	Check bulb. Check connections. Make necessary repairs.
	Voltage not within acceptable range (9.5-14.0 volts).	Check connections. Measure voltage. Make necessary repairs.
Can't use blink code diagnostics. ABS indicator lamp will not go off when blink code is activated.	Switch not held for correct length of time: 1 Second — Diagnostics Mode 3 Seconds — Clear All Mode	Repeat procedure, hold switch for correct length of time.
	Incorrect or faulty wiring.	Inspect and repair wiring.
	Fault not erased from ECU after report.	Repeat procedure until System O.K. code received.
Eight flashes not received after blink code switch pressed for at least three seconds, then released.	Active faults still exist.	Identify active faults, then make necessary repairs. Turn ignition OFF, then repeat Blink Code Diagnostics.

Blink Code Identification

Use the following information to identify the blink code:

First Digit (Type of Fault)	Second Digit — Specific Location of Fault
1 No faults	1 No faults
2 ABS modulator valve	1 Right front steer axle (curb side)
3 Too much sensor gap	2 Left front steer axle (driver's side)
4 Sensor short or open	3 Right rear drive axle (curb side)
5 Sensor signal erratic/tire size	4 Left rear drive axle (driver's side)
6 Tooth wheel	5 Right rear/additional axle (curb side)[1]
	6 Left rear/additional axle (driver's side)[1]
7 System function[2]	1 J1939 datalink
	2 ATC valve
	3 Retarder relay (third brake)
	4 ABS indicator lamp
	5 ATC configuration
	6 RSC valve
8 ECU	1 Low power supply
	2 High power supply
	3 Internal fault
	4 System configuration error
	5 Ground
	6 RSC accelerometer

[1] Tandem, lift, tag or pusher axle depending upon the type of suspension

[2] If this code continues after all repairs have been made — or if you receive a code for a component that is not installed on the vehicle — it may be necessary to reconfigure the ECU. Refer to Appendix III. TOOLBOX™ Software may also be used to reconfigure the ECU (refer to Appendix III). Contact ArvinMeritor's Customer Service Center at 800-535-5560 for reconfiguration information.

Blink Code Troubleshooting and Repair

Blink Code	Action Required	Reference
2-1, 2-4 2-2, 2-5 2-3, 2-6	Check ABS modulator valve, valve cable and connectors. Verify 4.0-9.0 ohms resistance (ABS modulator valve).	Refer to Valve Tests in this section.
3-1, 3-4 3-2, 3-5 3-3, 3-6	Adjust wheel sensor to touch tooth wheel. Check sensor gap. Check for loose wheel bearings or excessive hub runout. Verify minimum 0.2 volts AC output @ 30 rpm.	Refer to Testing Components in this section.
4-1, 4-4 4-2, 4-5 4-3, 4-6	Check sensor, sensor cable and connectors. Verify 900-2000 ohms resistance.	Repair or replace as needed.
5-1, 5-4 5-2, 5-5 5-3, 5-6	Check for tire size mismatch or tooth wheel difference. Check sensor, sensor cable, and connector for intermittent contact.	Refer to Tire Size Range in this section.
6-1, 6-4 6-2, 6-5 6-3, 6-6	Check for damaged tooth wheel.	Repair or replace as needed.
7-1*	Check for correct J1939 data link connection. Verify correct sensor adjustment. Refer to the sensor adjustment information in this section.	Refer to the wiring diagram in Appendix II.
7-2*	Check ATC valve, valve cables and connectors. Verify 7.0-14.0 ohms resistance.	Refer to Valve Tests in this section.
7-3*	Check retarder (third brake) connections.	Refer to the wiring diagram in Appendix II.
7-4*	Check ABS indicator lamp connections. Verify blink code switch was activated longer than 16 seconds.	
7-5*	Verify correct ATC set-up.	
7-6*	Check RSC valve. Verify 7.0-14.0 ohms resistance.	Refer to Valve Tests in this section.
8-1	Check for low voltage. Check vehicle voltage, fuse and supply to ECU (9.5-14.0 volts).	Refer to the wiring diagram in Appendix II and Voltage Check in this section.
8-2	Check for high voltage. Check for vehicle voltage (9.5-14.0 volts). Verify accuracy of blink code and clear from ECU memory.	Refer to Voltage Check and Blink Code Diagnostics (Tractor ABS Only) in this section.
8-3	Verify accuracy of blink code and clear from ECU memory.	Refer to Blink Code Diagnostics (Tractor ABS Only) and Clear Mode information in this section.
8-4	Verify all ECU connectors are in place. Verify accuracy of blink code and clear from ECU memory. *If code does not clear, it may be necessary to replace the ECU.*	Contact ArvinMeritor's Customer Service Center at 800-535-5560.
8-5	Check all ABS, ECU, ATC and RSC valve grounds.	Refer to the wiring diagram in Appendix II.
8-6	Verify accuracy of blink code and clear from ECU memory.	Contact ArvinMeritor's Customer Service Center at 800-535-5560.

* If this code continues after all repairs have been made — or if you receive a code for a component that is not installed on the vehicle — it may be necessary to reconfigure the ECU. Refer to the Appendix III. TOOLBOX™ Software may also be used to reconfigure the ECU (refer to Appendix III). Contact ArvinMeritor's Customer Service Center at 800-535-5560 for additional information or assistance.

Pro-Link® Plus Diagnostics

NOTE: You must use the Multiple Protocol Cartridge (MPC) and Meritor WABCO applications card, version 2.0 or higher, with E version ECUs. **The PLC functions of E version ABS cannot be tested with the Pro-Link® Plus.**

The Pro-Link® Plus may be used in place of blink code diagnostic procedures.

The Pro-Link® Plus screens illustrated appear with E version ECUs. Refer to Maintenance Manual 28, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses, if you are using the Pro-Link® Plus with C version ECUs or Maintenance Manual 30, Anti-Lock Braking Systems (ABS) for Trucks, Tractors and Buses, if you are using the Pro-Link® Plus with D version ABS.

Diagnostic Procedure

1. Slide the MPC into the Pro-Link® Plus keypad until the connection is tight. Then, insert the Meritor WABCO applications card into the cartridge.
2. Block the wheels, apply the parking brake, and verify that the ignition power is off.
3. Locate the 6-pin diagnostic receptacle in the vehicle cab. Insert the 6-pin connector from the Pro-Link® Plus into the receptacle.
4. Turn the ignition to the ON/RUN position. The Pro-Link® Plus screen should power up.

   If the Pro-Link® Plus does not power up, or if the screen indicates NO DATA RECEIVED:

   - Check connections.
   - Verify that the cartridge is correctly connected to the Pro-Link® Plus keypad.
   - Verify 9.5-14.0 volts DC power and ground at the connector and ABS ECU.
   - Check the fuse panel for a blown fuse.
   - Check for correct wiring in the diagnostic connector.
5. Refer to the Pro-Link™ Plus manual for complete diagnostic instructions.

The Pro-Link® Plus is available from SPX, 800-328-6657.

Pro-Link® Plus Screens

This information provides basic screen explanations for the Pro-Link® Plus with an MPC and Meritor WABCO application card. For complete operating instructions and test information, refer to the Pro-Link® Plus manual.

Fault Information Screens

Existing Faults: Use these screens to identify existing faults. The Pro-Link® Plus screen displays a written description of the fault, including the location on the vehicle where each exists. As long as there is an active (existing) fault in the system, the Pro-Link® Plus will not let you clear faults.

Stored Faults: Use these screens to identify faults stored in the ECU memory. Stored faults may be existing faults that have been repaired, or faults that existed for a short time, then corrected themselves. After displaying the stored faults, the Pro-Link™ Plus lets you erase them from memory. All stored faults are cleared at one time.

Pro-Link® Plus Display

Depending upon the ECU being tested, the Pro-Link® Plus screen will display certain options or components only when recognized by the ECU. These include:

- ATC, ATC Indicator Lamps, Trailer ABS Indicator Lamp, ATC Valve
- Engine Datalink
- Retarder Relay
- Retarder Datalink

Component Test Screens (Pro-Link® Plus)

These screens help you test ABS components. Select this function from the Tractor ABS/ATC menu.

ABS VALVES

ATC

ABS INDICATOR LAMP

ABS TRAILER INDICATOR LAMP

ATC INDICATOR LAMP

ABS/ATC SWITCHES

SENSORS

ENGINE DATALINK

RETARDER RELAY

RETARDER DATALINK

VEHICLE VOLTAGES

Select the appropriate function. Each screen has instructions to guide you through the test. Refer to the Pro-Link® Plus Manual for complete instructions.

J1939 Datalink Verification — Pro-Link® Plus

The Pro-Link® Plus diagnostic tool may be used to verify J1939 datalink connection. If you do not have a Pro-Link® Plus, you can use the blink code switch to verify this connection.

1. Turn ignition ON. Press blink code switch — hold for three seconds.

   A. ATC indicator lamp will come on and stay on for the entire test.

   If the vehicle is not equipped with ATC, the ATC indicator lamp will not come on.

   B. ABS indicator lamp will come on and blink eight times.

   If the lamp does not blink eight times, there are faults that must be cleared before you continue with this test.

   C. The eight quick flashes will be followed by the system configuration code. A 4S/4M (two blinks) system is identified here.

   The system configuration code will continue during the entire test.

2. Activate the J1939 engine torque reduction code, as follows:

   A. Step on the accelerator. Bring the engine to 1000 rpm.

   Leave your foot on the accelerator during the entire test.

   B. While the engine is at 1000 rpm, press the blink code switch twice, as follows:

   Press for one second

   Release for one second

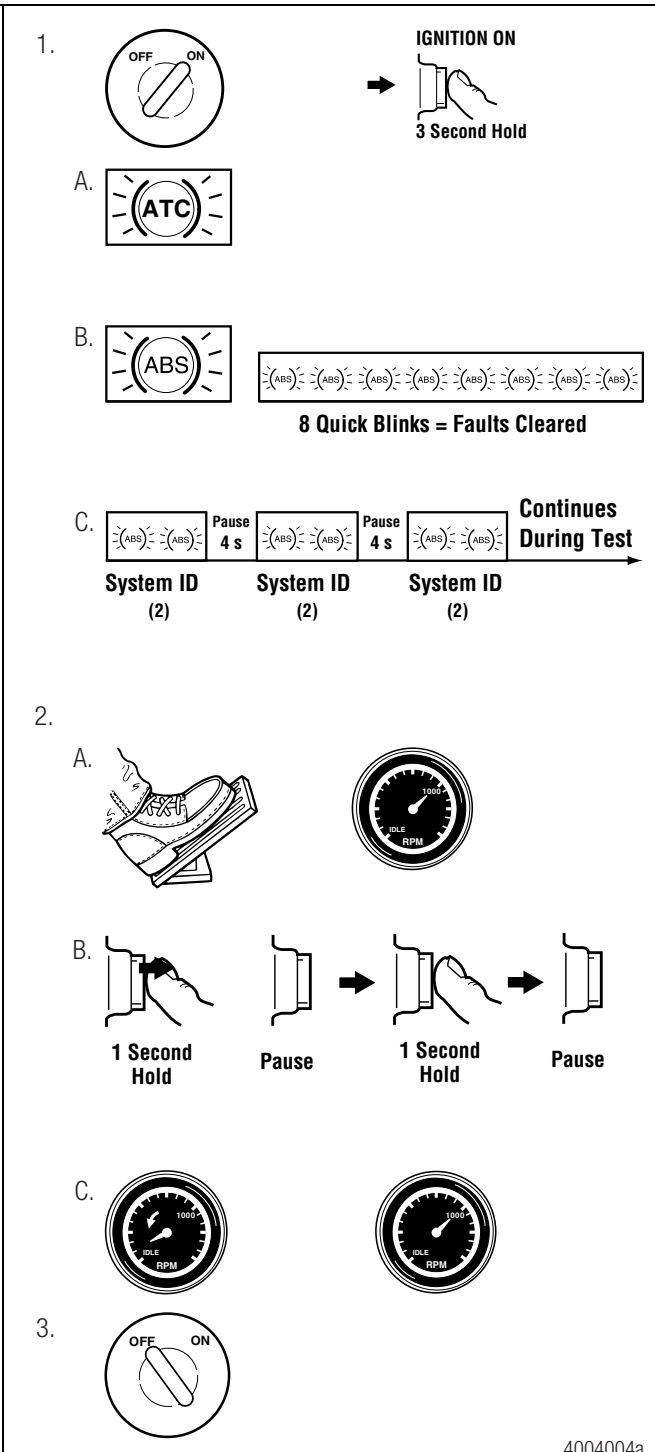
   Press for one second

   Release for one second

   C. The engine will go to idle for approximately 10 seconds and then return to 1000 rpm.

3. Turn ignition OFF.

   Test complete, engine torque reduction command verified.

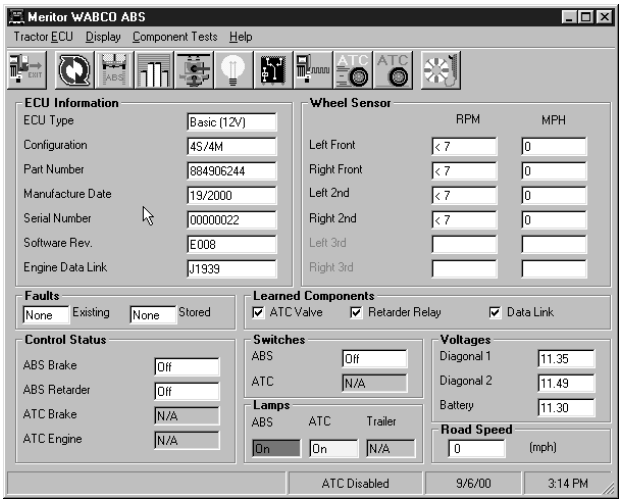


System Information

TOOLBOX™ Software Display

NOTE: Refer to the procedure in this section for TOOLBOX™ Software instructions, or refer to the Software Owner's Manual, TP-99102, for complete operating instructions.

The quickest method of verifying system information is the TOOLBOX™ Software **ABS Main Screen**. Figure 3.7.



4004036a

Figure 3.7

This screen provides information about the current state of Meritor WABCO ABS. ECU information is read once from the ECU and does not change. All other information (e.g., wheel sensors, control status, voltages, faults and road speed) is read and updated continuously.

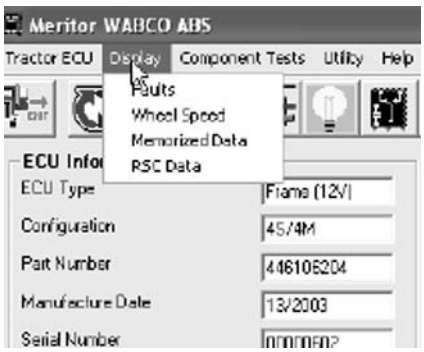
The status of ABS switches and lamps, as well as other data, may also be observed from this screen.

TOOLBOX™ Software

Display

Select ***Display*** from the Tractor ***ABS Main Screen***. A pull down menu will appear.

In addition to fault identification and repair information, the display option on the Tractor Main Screen provides Wheel Speed, Memorized Data and RSC Data. Figure 3.8.

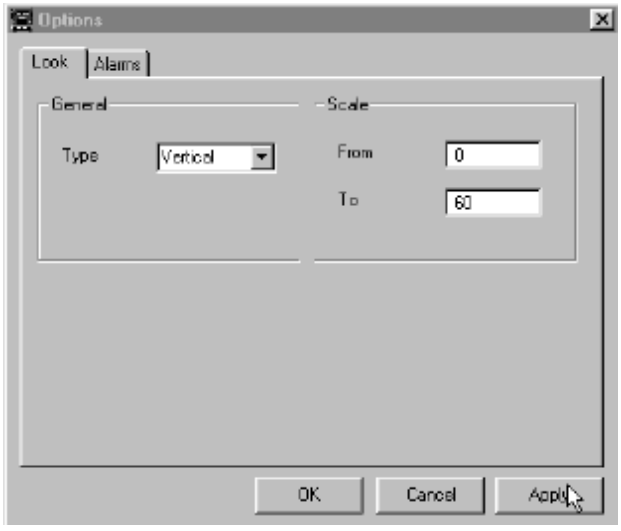


4005305a

Figure 3.8

Wheel Speed

Select the wheel speed icon or use the Display menu from the ABS Main Screen to display wheel speed data in both numeric and graphical form. This data may be shown in RPM or MPH format, Figure 3.9, and in vertical or horizontal graphs, Figure 3.10 and Figure 3.11. Select the appearance and style from the options menu.



4004006a

Figure 3.9

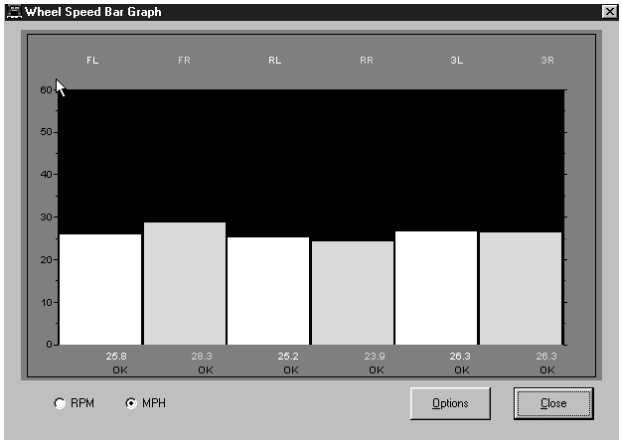


Figure 3.10

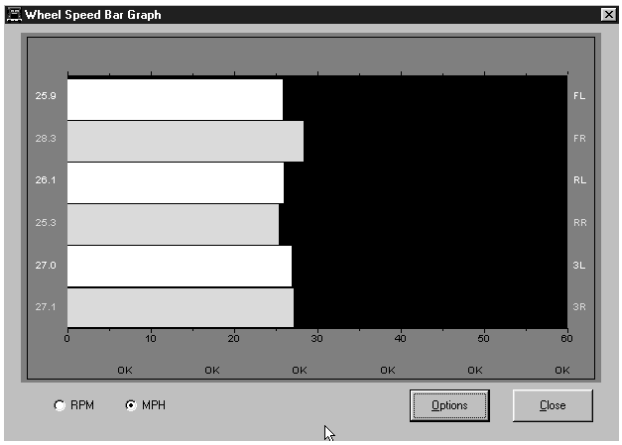


Figure 3.11

Memorized Data

Select ***Memorized Components*** from the Display menu.

NOTE: Use Display/Memorized Components to **view** data. Figure 3.12. To **clear** a memorized component, use the Memorized Components function that appears on the Component Tests Menu.

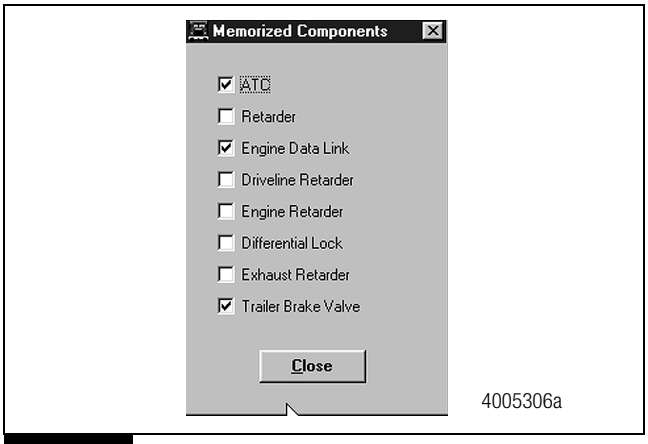


Figure 3.12

NOTE: Trailer Brake Valve = RSC Valve

RSC Data

Select ***RSC Data*** from the pull down menu for RSC status information. Figure 3.13.

For RSC Control Status:

NA — RSC is not an option

OFF — RSC is installed but is not currently active

For Accelerometer sensor:

Acceptable range is 2.21-2.78 volts.

A **red** background in this field indicates voltage is outside of the acceptable range.

A **green** background in this field indicates voltage is within the acceptable range.

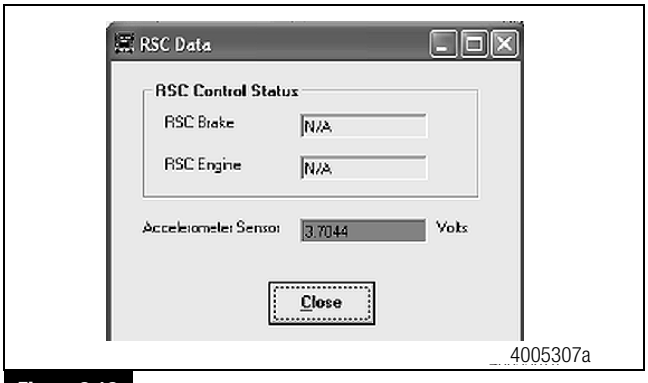


Figure 3.13

NOTE: Trailer Brake Valve = RSC Valve

Component Tests

Select ***Component Tests*** from the Tractor ***ABS Main Screen***. A pull down menu will appear. Figure 3.14.

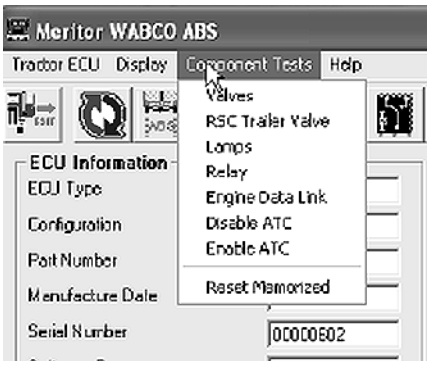


Figure 3.14

NOTE: Components for test may also be selected from the icons on the Tractor ABS Main Screen.

Select ***Valves*** from the pull down menu to select and cycle individual ABS modulator valves. Then, listen to ensure the correct valve is cycling. This is also helpful in verifying correct operation, installation and wiring. Figure 3.15.

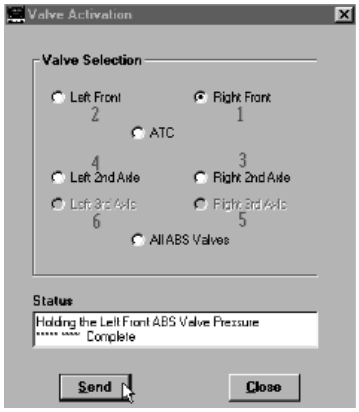


Figure 3.15

Select ***all valves*** from the menu to cycle all available ABS valves in the order shown below.

Verification of the ATC valve is also available from this menu.

RSC Trailer Valve

Select ***RSC Trailer Valve*** from the pull down menu to cycle the RSC trailer valve.

Do not activate the service brake while testing the RSC trailer valve. Figure 3.16.

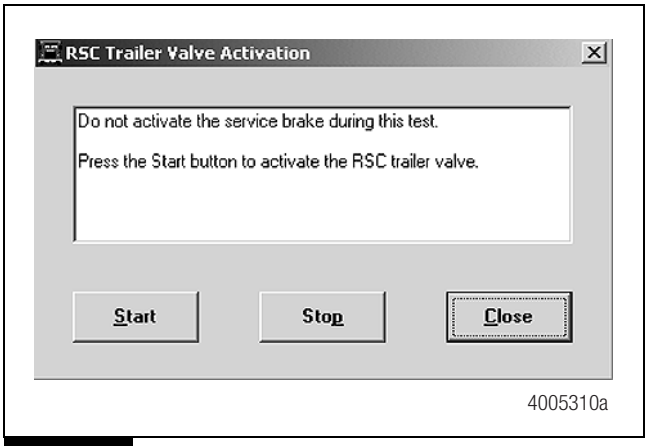


Figure 3.16

Press **Start** to begin the test. Figure 3.17.

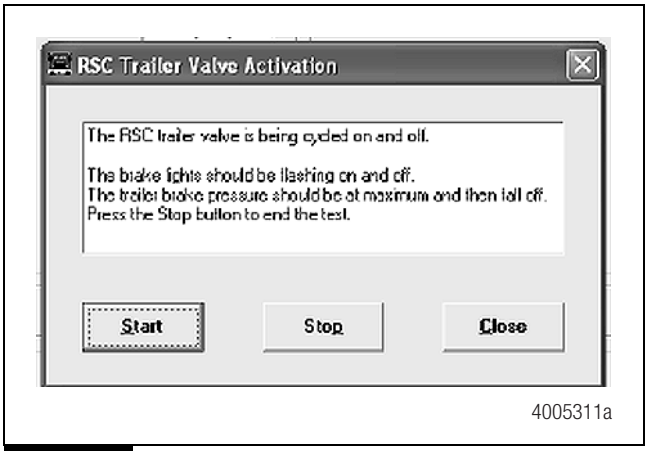


Figure 3.17

Lamps

Select ***Lamps*** from the pull down menu to turn the tractor ABS, trailer ABS or ATC (wheel spin) indicator lamps on or off. Figure 3.18.

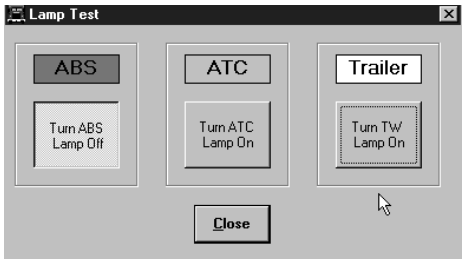


Figure 3.18

This is helpful in verifying correct operation, installation and wiring of the lamps to the ECU.

Relay

Select ***Relay*** from the pull down menu to turn the Retarder Relay on or off. Figure 3.19.

Figure 3.19

This is helpful in verifying correct operation, installation and wiring of the unit under test.

Select ***Engine Data Link*** from the pull down menu to send a "limit engine torque" command to the engine or a "disable retarder" command to the retarder. Figure 3.20.

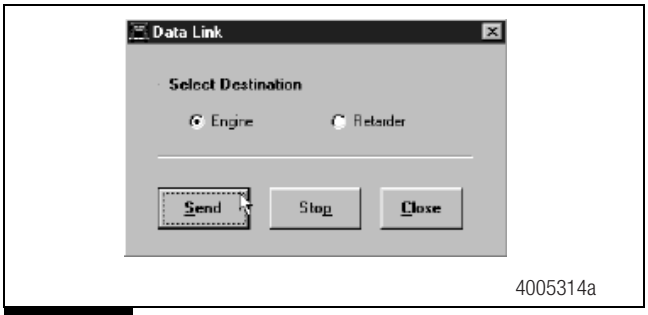


Figure 3.20

Select ***Disable ATC*** from the pull down menu to send a command to the ECU to disable automatic traction control. ATC will remain disabled until the enable command is sent or the vehicle ignition is cycled. The status bar on the Main Screen reflects the current state of the ATC function, either Enabled, Disabled or N/A (not available).

Using the **Disable ATC** command is useful and essential for dynamometer testing. Figure 3.21.

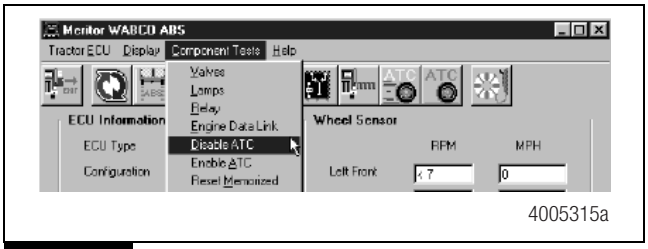


Figure 3.21

Enable ATC

Select ***Enable ATC*** from the pull down menu to send a command to the ECU to enable automatic traction control. This is the normal state of the ECU. The status bar on the Main Screen reflects the current state of the ATC function, either Enabled, Disabled or N/A (not available). Figure 3.22.

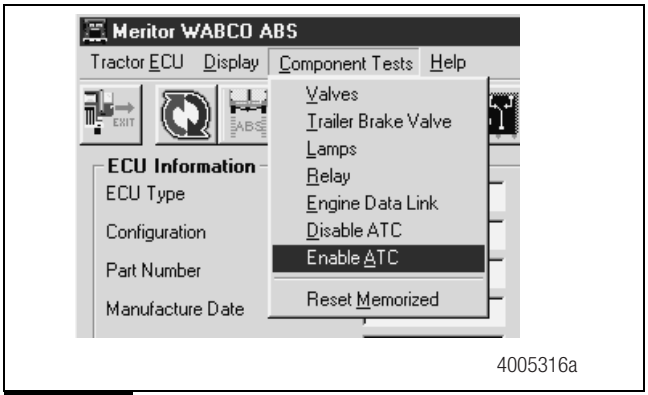


Figure 3.22

Reset Memorized

Select ***Reset Memorized*** from the pull down menu to tell the ECU to reset the memorized or "learned" components.

The ECU has the ability to learn the following components: ATC valve, engine datalink and retarder relay. Once any of these have been detected, the ECU expects to see them each time the ECU is powered on. If they are not seen, the ECU records a fault.

Because there are times when an ECU is moved to another vehicle — or during diagnostic testing — you may want the ECU to disregard these learned components. Use the ***Reset Memorized*** command for this purpose.

Pro-Link® Plus Display

With some ECUs, the Pro-Link® Plus will display system information — components or options supported by the ECU. Access these screens through System Setup (main ABS menu).

The following screens illustrate:

- A 4S/4M ABS/ATC system
- Where the ECU has not recognized a retarder relay
- Where the ECU has recognized a J1939 datalink
- The ECU is capable of supporting ABS and ATC switches.

NOTE: Yes indicates the ECU is capable of supporting these options. These may or may not be installed on the vehicle.

TRACTOR ABS/ATC	
SYSTEM INFORMATION	
SENSORS	**4**
MODULATORS	**4**

ATC VALVE	YES
RETARDER RELAY	NO
J1939	YES
ABS SWITCH	YES
ATC SWITCH	YES

Component Test Screens

These screens help you test ABS components. Select this function from the Tractor ABS/ATC menu.

ABS VALVES

ATC

ABS INDICATOR LAMP

ATC INDICATOR LAMP

ABS/ATC SWITCHES

SENSORS

ENGINE DATALINK

RETARDER RELAY

RETARDER DATALINK

VEHICLE VOLTAGES

Select the appropriate function. Each screen has instructions to guide you through the test. Refer to the Pro-Link® Plus Manual for complete instructions.

Component Tests and Functions (Pro-Link® Plus)

These screens help you test ABS components. Select this function from the Tractor ABS/ATC menu.

TRACTOR COMP TESTS
— SELECTIONS —
↑ VEHICLE VOLTAGES ↓

Select the appropriate function. Each screen has instructions to guide you through the test. Refer to the Pro-Link® Plus Manual for complete instructions.

The following definitions explain the function of each test.

Table E: Definitions

Component Test	Function
Vehicle Voltages	Monitors the voltage signals powering the ECU.
ABS Valves	Cycles the valves, one at a time. With brake pedal applied, you should hear four short air exhausts, then one long air pressure hold. A menu selection lets you choose from four or six valves. This test is used to verify valve locations and correct wiring. **NOTE:** The treadle must be applied to pressurize the brake chambers.
ATC	Checks the ATC valve. You will hear a click as the valve cycles. **NOTE:** TOOLBOX™ Software or the Pro-Link® Plus may be used to shut off ATC for dynamometer testing.
ABS Tractor Lamp	Monitors the commanded (on/off) states of the ABS tractor lamp. Follow the screen prompts (1 On, 2 Off) to change the status of the lamp on the instrument panel.
ABS Trailer Lamp	Monitors the commanded (on/off) states of the ABS trailer lamp. Follow the screen prompts (1 On, 2 Off) to change the status of the lamp on the instrument panel.
ATC Tractor Lamp	Monitors the commanded (on/off) states of the ATC tractor lamp. Follow the screen prompts (1 On, 2 Off) to change the status of the lamp on the instrument panel.
ABS/ATC Switches	Checks the status of ABS and ATC/Deep Snow and Mud switches on the instrument panel.
Sensors	Monitors the input to the ECU from the wheel. Vehicle must be stationary and wheels must be rotated during this test.
Engine Datalink	Checks wiring connections and response between the engine and the ECU.
Retarder Relay	Activates the relay to verify function (a click will be heard). This test also checks wiring connections.
Retarder Datalink	Checks wiring connections and retarder response between the retarder and the ECU.

Tire Size Range

ABS

For correct ABS/ATC operation with the standard ECU, front and rear tire sizes must be within ± 14% of each other. When this tire size range is exceeded without electronically modifying the ECU, the system performance can be affected and the indicator lamp can illuminate.

Calculate the tire size with the following equation:

$$\% \text{ Difference} = \left\{ \frac{\text{RPM Steer}}{\text{RPM Drive}} - 1 \right\} \times 100$$

RPM — tire revolutions per mile

RSC

RSC requires that the steer axle tire size range be no more than 4% of a pre-set value.

Call Meritor WABCO at 800-535-5560 if you plan a tire size range greater than those specified.

Testing Components

⚠ CAUTION

When troubleshooting and testing the ABS system, do not damage the connector terminals.

Voltage Check

Measure voltage at the pins indicated in Table F.

- Voltage must be between 9.5 and 14.0 volts.
- The ignition must be turned ON for this test.

Table F: Voltage Check Pins

ECU	Connector	Pins
Universal	14-Pin	4 and 9
		9 and 4
Basic	14-Pin	7 and 4
		8 and 9
Frame-mounted	X1-Grey	1 and 12
		2 and 11

NOTE: Pin locations are illustrated in Figure 3.23 (Frame) and Figure 3.24 (Basic and Universal).

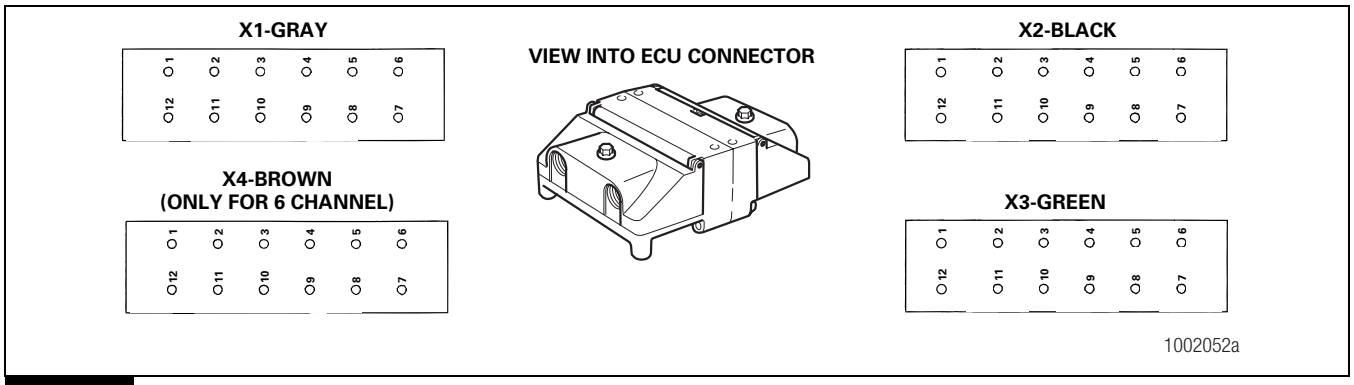


Figure 3.23

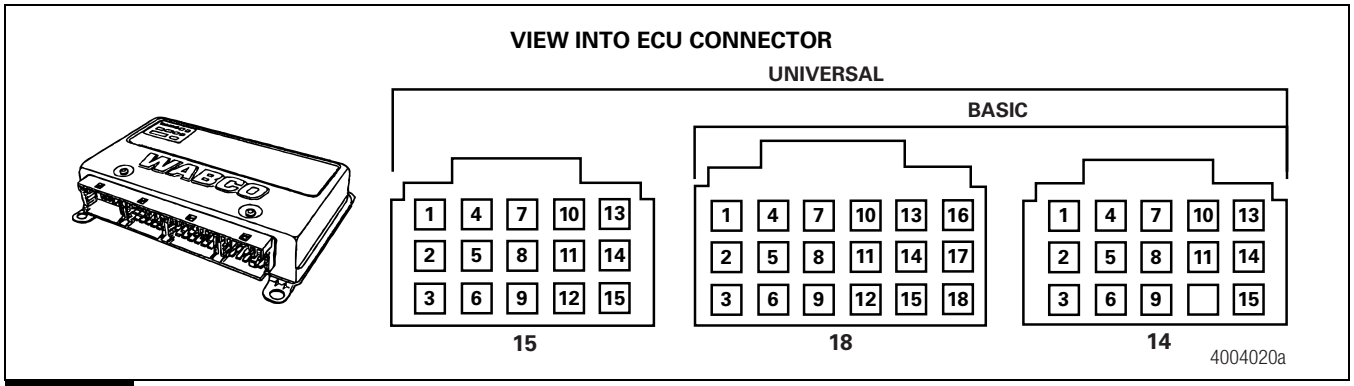


Figure 3.24

Location of Sensors

On steering axles, the sensor is accessible on the in-board side of the steering knuckle.

On drive axles, the drum assembly may have to be pulled to gain access to the sensor.

Sensor Adjustment

- Push the sensor in until it contacts the tooth wheel.
- Do not pry or push sensors with sharp objects.
- Sensors will self-adjust during wheel rotation.

Sensor Output Voltage Test

Voltage must be at least 0.2 volts AC at 30 rpm.

1. Turn ignition OFF.
2. Disconnect the appropriate connector from the ECU (refer to Appendix II).
3. Rotate the wheel by hand at 30 rpm (1/2 revolution per second).
4. Measure the voltage at the pins indicated in Table G.
   - **If the minimum output voltage is less than 0.2:** Push the corresponding sensor toward the tooth wheel, then repeat the measurement.

Table G: Sensor Check Pins

ECU	Sensor	Connector	Pins
Universal	LF	18-Pin	12 and 15
	RF	18-Pin	10 and 13
	LR	18-Pin	11 and 14
	RR	18-Pin	17 and 18
6S/6M	LR (3rd Axle)	15-Pin	2 and 5
6S/6M	RR (3rd Axle)	15-Pin	11 and 14
Basic	LF	18-Pin	12 and 15
	RF	18-Pin	10 and 13
	LR	18-Pin	11 and 14
	RR	18-Pin	17 and 18
Frame-mounted	LF	X2 — Black	7 and 8
	RF	X2 — Black	5 and 6
	LR	X3 — Green	1 and 2
	RR	X3 — Green	3 and 4
	LR (3rd Axle)	X4 — Brown	3 and 4
	RR (3rd Axle)	X4 — Brown	5 and 6

Sensor Resistance

The sensor circuit resistance must be between 900 and 2000 ohms. Resistance can be measured at the sensor connector, or at the pins on the ECU connector. To measure resistance:

1. Turn ignition OFF.
2. To measure resistance at the sensor connector, disconnect the ECU connector from the ECU. To measure resistance at the sensor connector, disconnect the sensor from the sensor extension cable.
3. Measure output at the pins indicated in Table G.

Valve Tests

ABS Modulator Valve

Measure resistance across each valve solenoid coil terminal and ground on the ABS valve to ensure 4.0 to 9.0 ohms. Figure 3.25 and Figure 3.26.

- If the resistance is greater than 9.0 ohms, clean the electrical contacts in the solenoid. Check the resistance again.
- To check the cable and the ABS valve as one unit, measure resistance across the pins on the ECU connector of the harness. Check the diagram of the system you are testing for pin numbers. (Refer to Appendix II.)

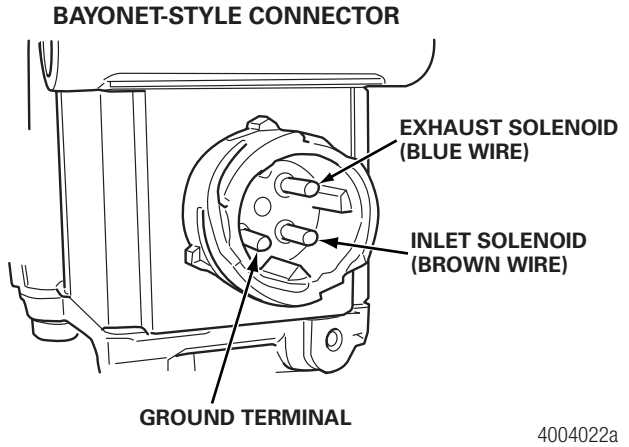


Figure 3.25

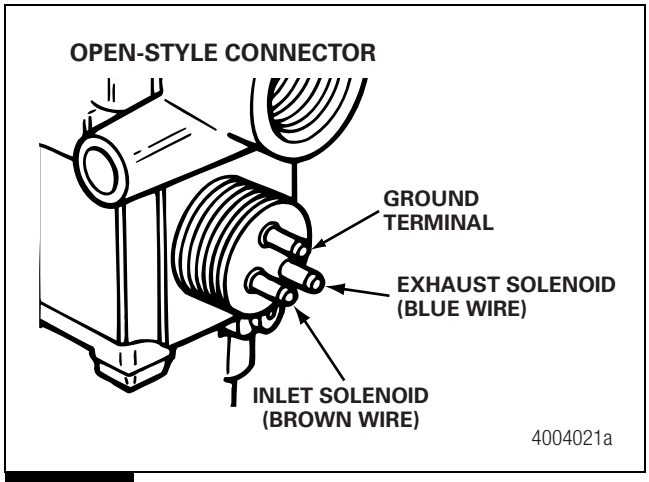


Figure 3.26

ATC Valve

Measure resistance across the two electrical terminals on the ATC valve to ensure 7.0 to 14.0 ohms. Figure 3.27.

- If the resistance is greater than 14.0 ohms, clean the electrical contacts on the solenoid. Check the resistance again.
- To check the cable and ATC valve as one unit, measure resistance across the pins on the ECU connector of the harness. Check the diagram of the system you are testing for pin numbers. (Refer to Appendix II.)

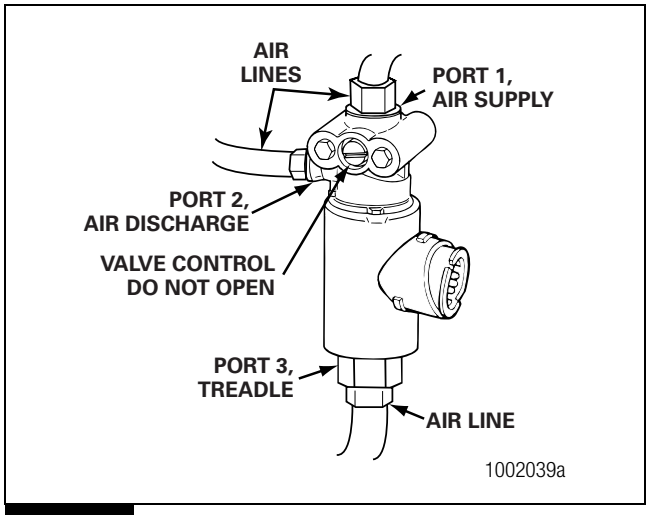


Figure 3.27

Refer to Meritor WABCO ABS Valve Package in Appendix III for ABS Valve Package Troubleshooting information.

RSC Valve

Measure resistance across the two electrical terminals on the RSC valve to ensure 7.0 to 14.0 ohms. Figure 3.28.

- If the resistance is greater than 14.0 ohms, clean the electrical contacts on the solenoid. Check the resistance again.
- To check the cable and RSC valve as one unit, measure resistance across the pins on the ECU connector of the harness. Check the diagram of the system you are testing for pin numbers. (Refer to Appendix II.)

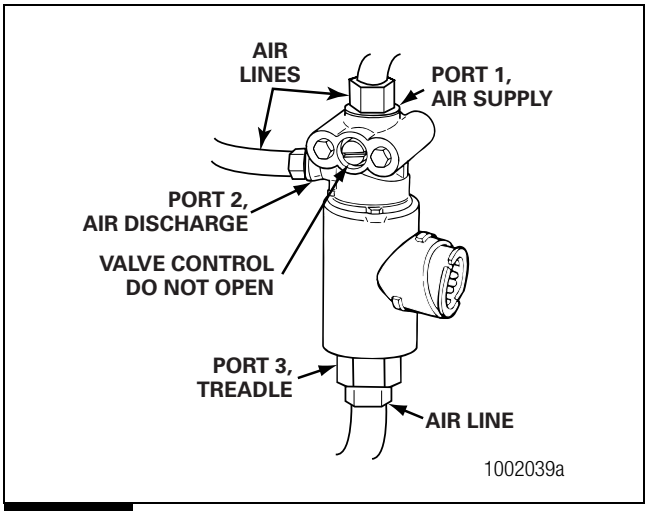


Figure 3.28

Dynamometer Testing Vehicles with ATC

⚠ WARNING

The automatic traction control (ATC) function must be disabled before any type of dynamometer testing is conducted on the vehicle. If the ATC is not disabled, the vehicle ATC may actuate and cause the vehicle to move forward without warning to the operator. If the vehicle moves forward unexpectedly, the vehicle may cause damage or injuries to individuals who are in the path of the vehicle.

⚠ CAUTION

Do not cycle the vehicle ignition while the vehicle is on a dynamometer. Cycling the vehicle ignition will enable the ATC.

Vehicles with ATC must have the ATC disabled to test the vehicle on a dynamometer. To disable the ATC, use one of the following methods:

1. **Blink Code Switch**

   Press and hold the blink code switch for at least three seconds. Refer to the blink code diagnostics information in this section for a description of how the blink code display will appear.

   - Once the system configuration code begins, ATC has been disabled.
   - The ATC lamp comes on and stays on while ATC is disabled.
   - ATC will remain disabled until the vehicle ignition is cycled.
   - After testing, ATC will automatically reactivate the first time the vehicle ignition is cycled.

2. **Remove Power**

   Remove the ABS circuit breaker/fuse or remove the ECU power connector to disable the ABS and ATC.

   - After testing, re-install the circuit breaker/fuse and the ATC will automatically reactivate the first time the vehicle power is applied to the ECU.

3. **TOOLBOX™ Software**

   At the ABS Main Menu, select the ***Disable ATC*** icon or use the pull down menu to send the command to the ECU to disable the ATC. Refer to the TOOLBOX™ Software Owner's Manual for complete instructions for using TOOLBOX™.

   - ATC will remain disabled until the enable command is sent or the vehicle ignition is cycled.
   - After testing, ATC will automatically reactivate the first time the vehicle ignition is cycled.

4. **MPSI Pro-Link® Plus**

   Refer to the MPSI Pro-Link® Plus Owner's Manual for instructions.

   - ATC will remain disabled until the enable command is sent or the vehicle ignition is cycled.
   - After testing, ATC will automatically reactivate the first time the vehicle ignition is cycled.

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.

Release all air from the air systems before you remove any components. Pressurized air can cause serious personal injury.

Component Removal and Installation

Valves

- ABS Modulator Valves
- ATC Valve
- RSC Valve
- ABS Valve Package (Front or Rear)
  - — Modulator Valves
  - — Relay Valve or Quick Disconnect Valve
  - — ATC Valve

Sensor Lubricant Specification

Meritor WABCO specifications call for a sensor lubricant with the following characteristics:

Lubricant must be mineral oil-based and contain molydisulfide. It should have excellent anti-corrosion and adhesion characteristics, and be capable of continuous function in a temperature range of –40° to 300°F (–40° to 150°C).

Lubricants approved for use on Meritor WABCO sensors and spring clips are as follows. Figure 4.1.

- Mobilith SHC-220 (Mobil)
- TEK 662 (Roy Dean Products)
- Staburags NBU 30 PTM (Kluber Lubrication)
- Valvoline EP 633

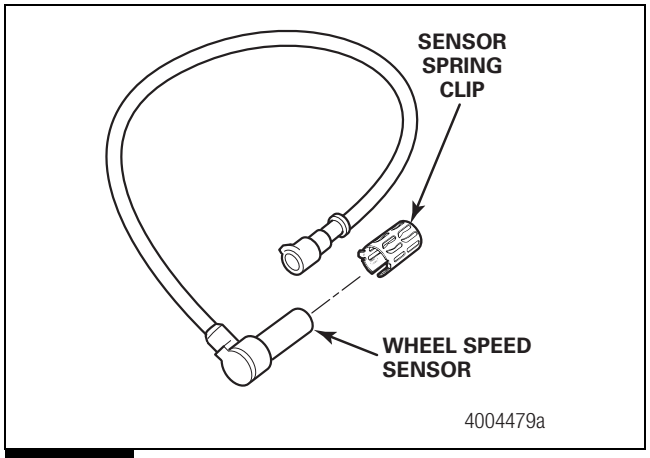


Figure 4.1

⚠ CAUTION

Use the following procedures to avoid damage to the electrical system and ABS/ATC components.

When welding on an ABS- or ABS/ATC-equipped vehicle is necessary, disconnect the power connector from the ECU.

Sensors

NOTE: When replacing the wheel speed sensor, the sensor spring clip must also be replaced.

Wheel Speed Sensor Removal — Front Axle

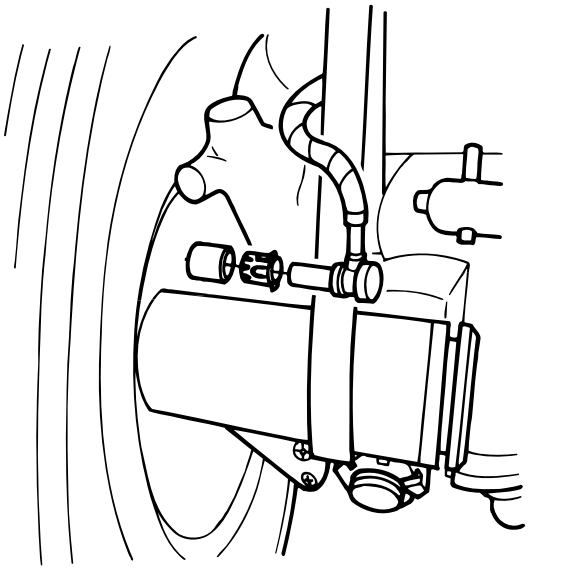
To remove the sensor from the front axle:

⚠ WARNING

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.

1. Place blocks under the rear tires to stop the vehicle from moving. Apply the parking brake.
2. If necessary, raise the front tires off the ground. Place safety stands under the axle.
3. Disconnect the fasteners that hold the sensor cable to other components.
4. Disconnect the sensor cable from the chassis harness.

5. Remove the sensor from the sensor holder. Use a twisting motion if necessary. **Do not pull on the cable.** Figure 4.2.



KNUCKLE-MOUNTED SENSOR

Figure 4.2

6. Remove the sensor spring clip.

Wheel Speed Sensor Installation — Front Axle

To replace the sensor in the front axle:

1. Connect the sensor cable to the chassis harness.
2. Install the fasteners used to hold the sensor cable in place.
3. Apply a Meritor WABCO recommended lubricant to the sensor spring clip and sensor.
4. Install the sensor spring clip. Make sure the spring clip tabs are on the inboard side of the vehicle.
5. Push the sensor spring clip into the bushing in the steering knuckle until the clip stops.
6. Push the sensor completely into the sensor spring clip until it contacts the tooth wheel.

   NOTE: After installation, there should be no gap between the sensor and the tooth wheel. During normal operation, a gap of up to 0.04-inch (1.016 mm) is allowable.

7. Remove the blocks and safety stands.

Wheel Speed Sensor Removal — Rear Axle

NOTE: When replacing the wheel speed sensor, the sensor spring clip must also be replaced.

To remove the sensor from the rear axle:

⚠ WARNING

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.

1. Place blocks under the front tires to stop the vehicle from moving.
2. Raise the rear tire off the ground. Place safety stands under the axle.
3. Release the parking brake and back off the slack adjuster to release the brake shoes.
4. Remove the wheel and tire assembly from the axle.
5. Remove the brake drum.
6. Remove the sensor from the mounting block in the axle housing. Use a twisting motion if necessary. **Do not pull on the cable**.
7. Remove the sensor spring clip from the mounting block.
8. Disconnect the fasteners that hold the sensor cable and the hose clamp to other components.
9. Disconnect the sensor cable from the chassis harness.

Wheel Speed Sensor Installation — Rear Axle

1. Apply a Meritor WABCO recommended lubricant to the sensor spring clip and sensor.
2. Install the sensor spring clip. Verify that the spring clip tabs are on the inboard side of the vehicle.
3. Push the sensor spring clip into the mounting block until it stops.

NOTE: After installation, there should be no gap between the sensor and the tooth wheel. During normal operation, a gap of up to 0.04-inch (1.016 mm) is allowable.

4. Push the sensor completely into the sensor spring clip until it contacts the tooth wheel. Figure 4.3.

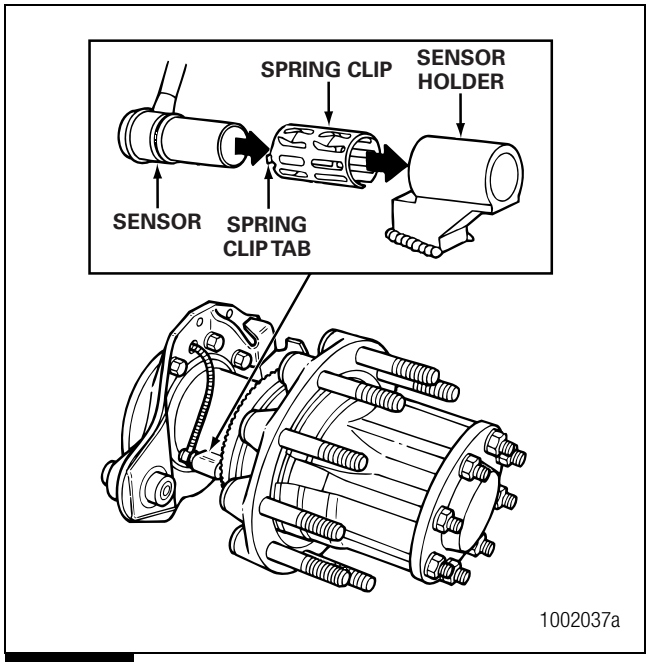


Figure 4.3

5. Insert the sensor cable through the hole in the spider and axle housing flange. Route the cable to the frame rail. Be sure to route the cable in a way that will prevent pinching or chafing and will allow sufficient movement for suspension travel.
6. Connect the sensor cable to the chassis harness.
7. Install the fasteners that hold the sensor cable in place.
8. Install the brake drum on the wheel hub.
9. Complete the installation per the vehicle manufacturer's manual.

ABS Modulator Valve

Removal

1. Turn the ignition switch to the OFF position. Apply the parking brake.

⚠ WARNING

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.

2. Place blocks under the front and rear tires to stop the vehicle from moving.
3. If necessary, raise the vehicle off the ground and place safety stands under the axle.
4. Disconnect the wiring connector from the ABS valve.
5. Disconnect the air lines from Ports 1 (air supply) and 2 (air discharge) of the ABS valve. Figure 4.4.

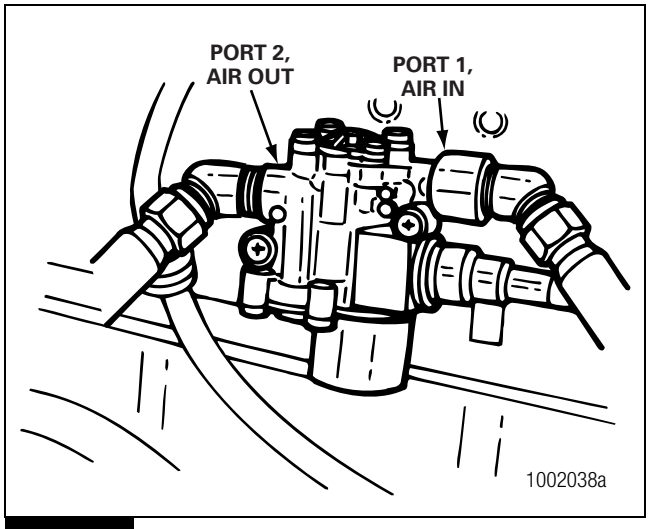


Figure 4.4

6. Remove the two mounting capscrews and nuts.
7. Remove the ABS valve.

Installation

⚠ CAUTION

Moisture can affect the performance of all ABS/ATC systems, as well as the standard braking system. Moisture in air lines can cause air lines to freeze in cold weather.

1. Install the ABS valve with two mounting capscrews and nuts. Tighten the capscrews per the manufacturer's recommendation.
2. Connect the line to the brake chambers to Port 2 of the ABS valve. Connect the air supply line to Port 1 of the ABS valve.
3. Connect the wiring connector to the ABS valve. Hand tighten only.
4. Remove the blocks and stands.
5. Test the installation.

Checking the Installation

1. Apply the brakes. Listen for leaks at the modulator valve.
2. Turn the ignition on and listen to the modulator valve cycle. If the valve fails to cycle, check the electrical cable connection. Make repairs as needed.
3. Drive the vehicle. Verify that the ABS indicator lamp operates correctly.

ATC Valve

Removal

1. Turn the ignition switch to the OFF position. Apply the parking brake.

⚠ WARNING

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.

2. Place blocks under the front and rear tires to stop the vehicle from moving.
3. If necessary, raise the vehicle off the ground. Place safety stands under the axle.
4. **Relieve line pressure by bleeding the air from the appropriate supply tank.**
5. Disconnect the wiring from the ATC valve.
6. Disconnect the air lines from Port 1 (air supply), Port 2 (air discharge) and Port 3 (treadle) of the ATC valve. Figure 4.5.

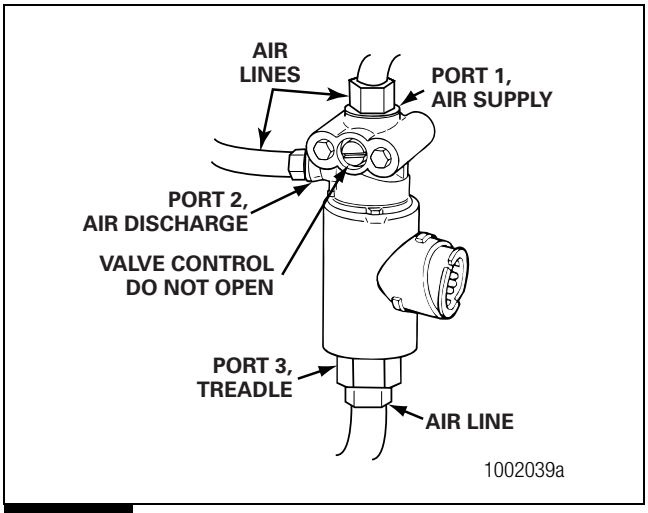


Figure 4.5

7. Remove the two mounting capscrews and nuts. Remove the ATC valve.

Installation

1. Install the ATC valve with two mounting capscrews and nuts.

   Tighten the capscrews per the manufacturer's recommendation.
2. Connect the air supply, discharge and treadle lines to Ports 1, 2 and 3 of the ATC valve.
3. Connect the harness connector to the ATC valve. Hand tighten only.
4. Remove the blocks and stands.
5. Test the installation.

Checking the Installation

To test the ATC valve:

1. Start the vehicle.
2. Fully charge the reservoirs with air. Shut off the vehicle.
3. Apply the brakes.
4. Listen for air leaks at the ATC valve.
5. Release the brakes.
6. Activate the ATC valve using the MPSI tool.
7. Disconnect the MPSI tool.
8. Drive the vehicle. Verify that the ATC indicator lamp operates correctly.

RSC Valve

Removal

1. Turn the ignition switch to the OFF position. Apply the parking brake.
2. Place blocks under the front and rear tires to stop the vehicle from moving.
3. If necessary, raise the vehicle off the ground. Place safety stands under the axle.
4. **Relieve line pressure by bleeding the air from the appropriate supply tank.**
5. Disconnect the wiring from the RSC valve.
6. Disconnect the air lines from Port 1 (air supply), Port 2 (air discharge) and Port 3 (treadle) of the RSC valve. Figure 4.6.

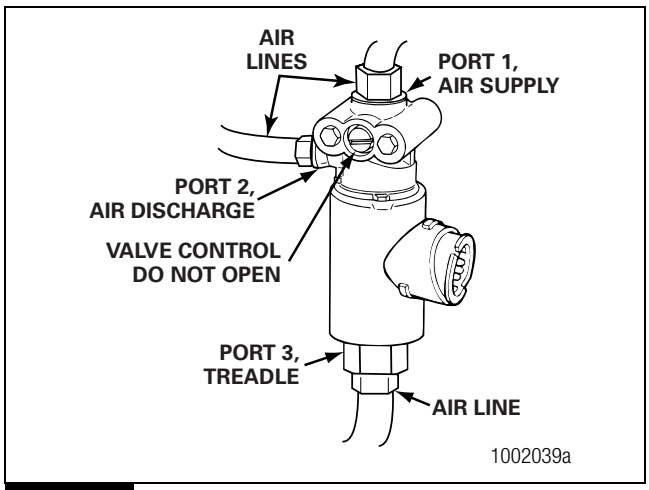


Figure 4.6

7. Remove the two mounting capscrews and nuts. Remove the RSC valve.

Installation

1. Install the RSC valve with two mounting capscrews and nuts.

   Tighten the capscrews per the manufacturer's recommendation.
2. Connect the air supply, discharge and treadle lines to Ports 1, 2 and 3 of the RSC valve.
3. Connect the harness connector to the RSC valve. Hand tighten only.
4. Remove the blocks and stands.
5. Test the installation.

Checking the Installation

To test the RSC valve:

1. Connect the blue glad hand to a 50 cu. in. (819 cu. cm) air tank.
2. Start the vehicle.
3. Fully charge the reservoirs with air. Shut off the vehicle.
4. Activate the RSC valve using TOOLBOX™ Software.
5. Listen for air leaks at the RSC valve.
6. Make necessary repairs.
7. Turn the ignition on. Verify that the ATC/RSC indicator lamp operates correctly.

Front or Rear ABS Valve Package

Removal and Installation — Complete Package

1. Place blocks under tires to stop the vehicle from moving.
2. If necessary, raise the tires off the ground.
3. Drain the air from all system air tanks.
4. Remove all the air lines and connections from the ABS valve package. Figure 4.7 and Figure 4.8.

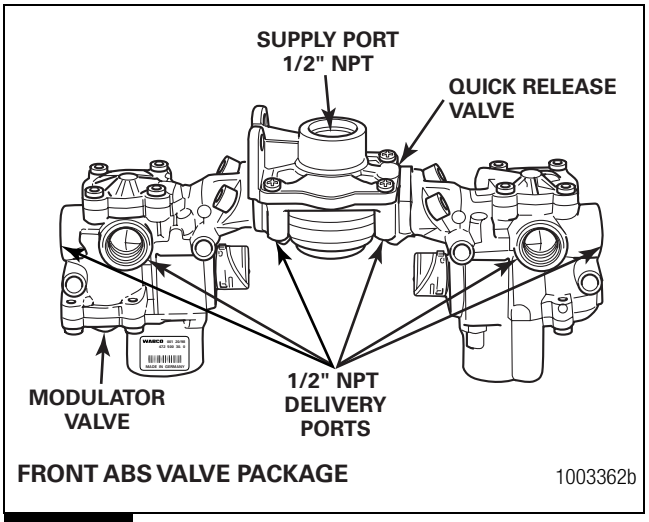


Figure 4.7

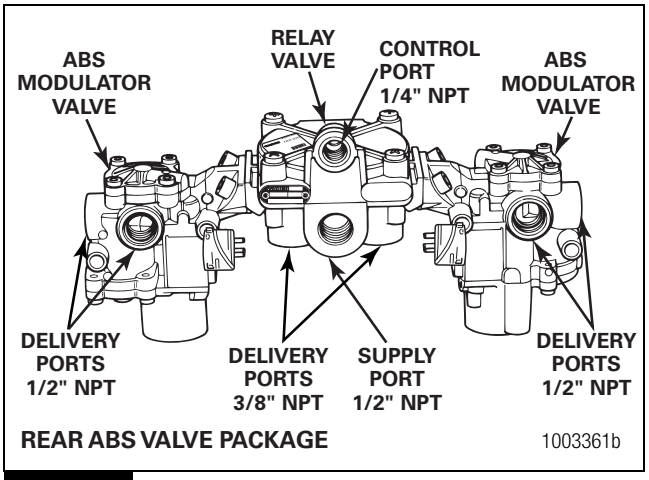


Figure 4.8

5. Remove the mounting bolts from the valve package. Remove the valve package from the vehicle.
6. **Replace the ABS valve package:** Tighten the bolts to the vehicle manufacturer's recommendation. Remove the blocks and safety stands as necessary.
7. Test the installation.

Removal and Installation — Component Valves

1. Remove the ABS valve package from the vehicle. Figure 4.9.

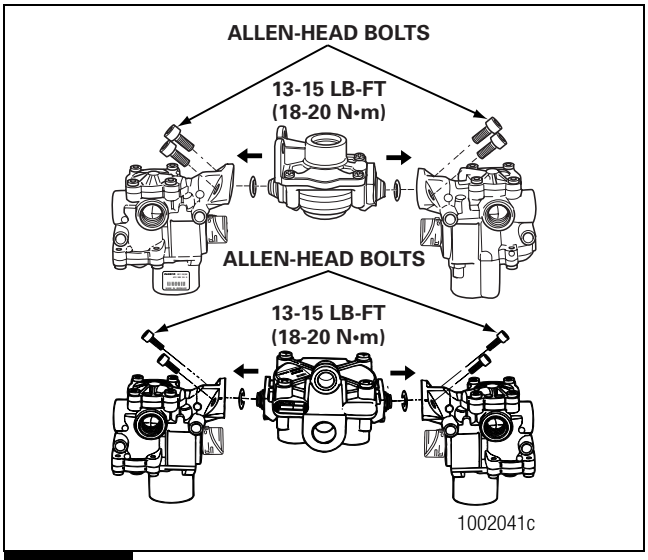


Figure 4.9

2. Use a 6 mm Allen wrench to loosen and remove the Allen-head bolts.
3. Carefully separate the ABS modulator valve(s) from the relay or quick release valve.
4. Remove and discard old O-rings. Lubricate replacement O-rings with the grease provided.
5. Plug any unused ports on the replacement valve(s).
6. Attach the ABS modulator valve(s) to the relay or quick release valve. Use a 6 mm Allen wrench to tighten the Allen-head bolts to 13-15 lb-ft (18-20 N•m).
7. **Replace the ABS valve package:** Tighten the bolts to the vehicle manufacturer's recommendation. Remove the blocks and safety stands as necessary.
8. Check the valves for leaks:
   - Modulator valve(s). Refer to the procedure for checking the modulator valve installation in this section.
   - Relay or quick release valve. Refer to the procedure for checking the quick release or relay valve installation in this section.

ATC Valve on the Rear ABS Valve Package

Removal

NOTE: If there is enough room to work, it is not necessary to remove the valve package from the vehicle before replacing the ATC valve. If the valve package must be removed, follow the instructions for removing and replacing the ABS Valve Package that appear in this section of the manual.

When installing the new ATC valve on the valve package, you must use the new O-rings, seals, mounting bolts and lubricant included with the replacement kit.

1. Turn the ignition switch to the OFF position. Apply the parking brake.
2. Place blocks under the front and rear tires to stop the vehicle from moving.
3. If necessary, raise the vehicle off the ground. Place safety stands under the axle.
4. **Relieve line pressure by bleeding the air from the appropriate supply tank.**
5. Disconnect the wiring from the ATC valve.
6. Disconnect the supply air line from the adapter and the treadle air line from the ATC valve.
7. Use a 5 mm Allen wrench to remove the two screws that hold the adapter piece to the relay valve portion of the valve package.

   Use a 6 mm Allen wrench to remove the two mounting bolts that hold the ATC valve to the adapter piece. Remove the ATC valve from the adapter piece. Remove the ATC valve.

   Remove the adapter piece, seal and O-rings from the valve package. Figure 4.10.

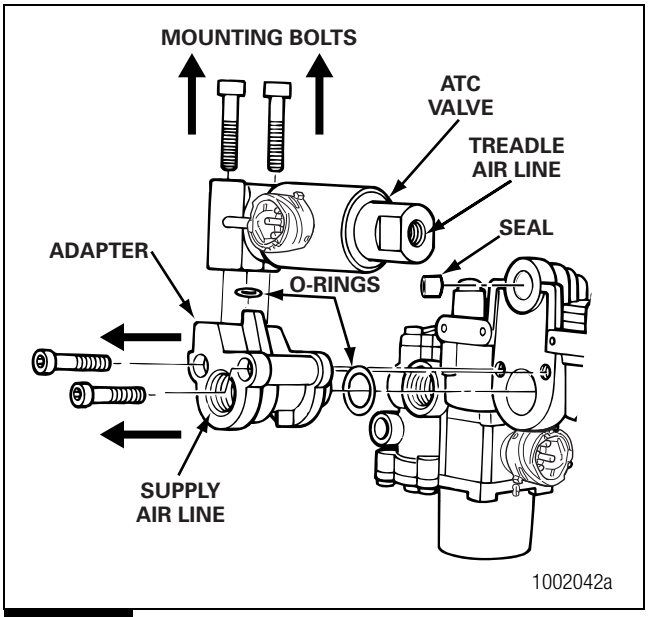


Figure 4.10

Installation

1. Clean and lubricate the small adapter piece O-ring. Install the O-ring on the adapter piece.

   Use the two new M8 Allen-head bolts to attach the ATC valve to the adapter piece. Use a 6 mm Allen-head tool to tighten to 13-15 lb-ft (18-20 N•m). Figure 4.11. ◆T◆

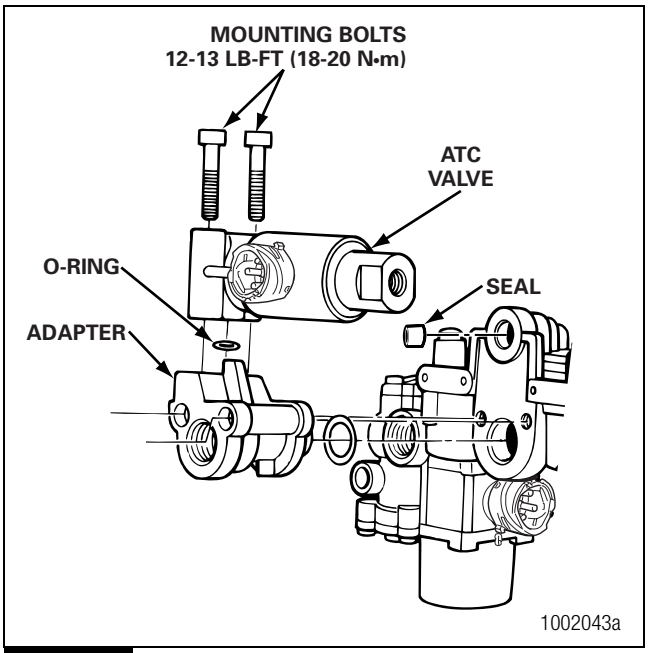


Figure 4.11

2. Lubricate the replacement seal and install it in Port 2 of the ATC valve.

   Lubricate the large replacement O-ring and install it in the groove of the relay valve supply port. Figure 4.12.

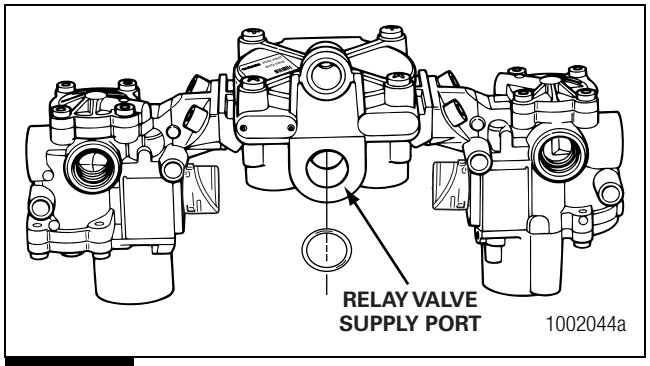


Figure 4.12

NOTE: Use Meritor WABCO-recommended lubricant.

3. Use the two M6 Allen-head bolts to attach the adapter to the relay valve. Use a 5 mm Allen-head tool to tighten to 4-5 lb-ft (6-8 N•m). Figure 4.13. ◆1◆

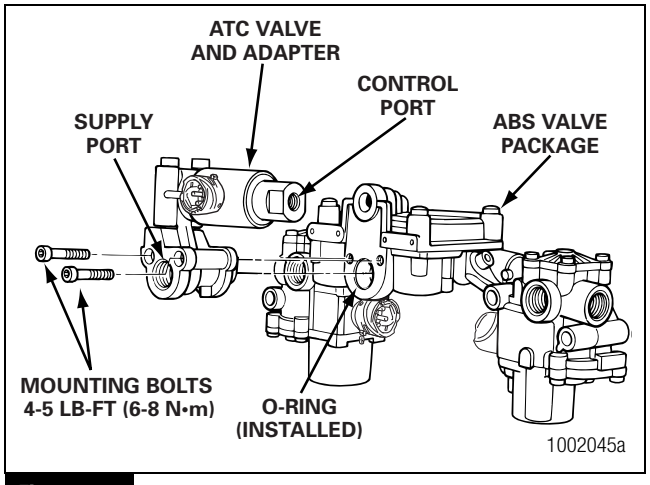


Figure 4.13

4. Connect the supply air line to the supply port on the adapter. Connect the treadle air line to the control port on the ATC valve.
5. Attach the wiring connector to the ATC valve. Hand tighten only.
6. Remove the blocks and stands.
7. Test the installation.

Checking the Installation

1. Start the vehicle.
2. Fully charge the reservoirs with air. Shut off the vehicle.
3. Apply the brakes.
4. Listen for air leaks at all valves.
5. Drive the vehicle. Verify that the ABS indicator lamp operates correctly.

ABS Configurations

Refer to Figure 5.1, Figure 5.2, Figure 5.3, Figure 5.4, Figure 5.5, Figure 5.6 and Figure 5.7 for system configuration layouts.

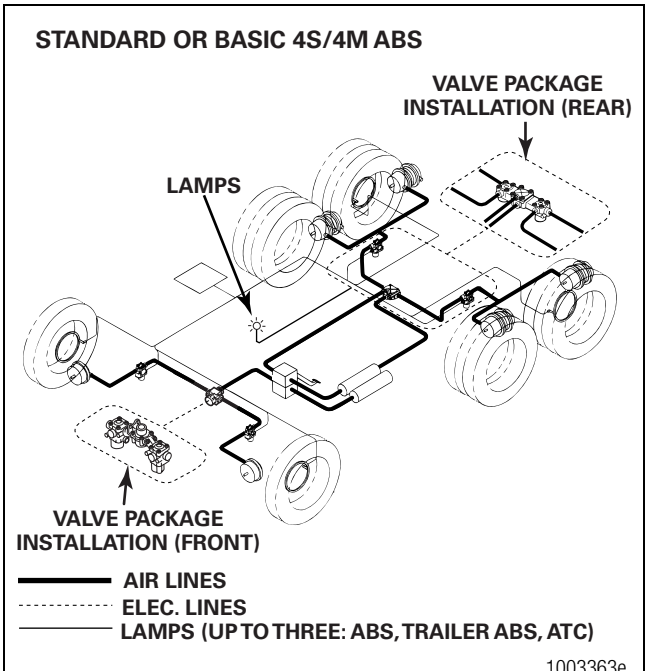


Figure 5.1

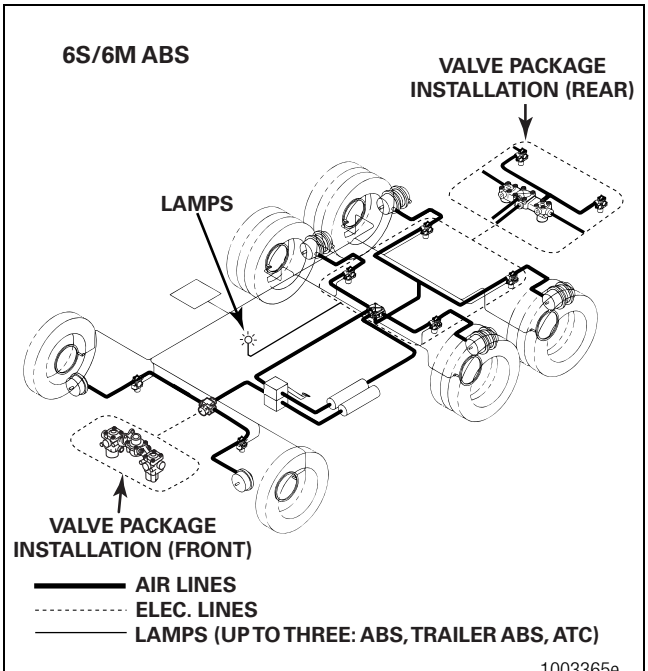


Figure 5.3

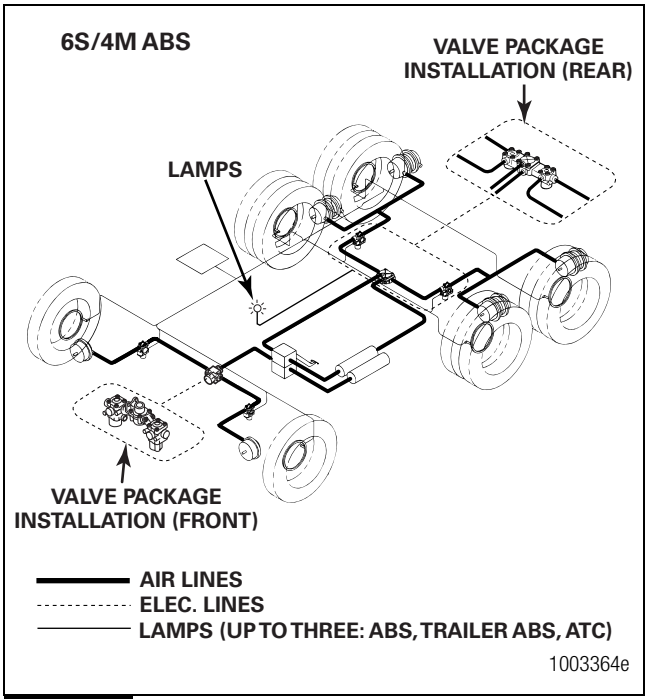


Figure 5.2

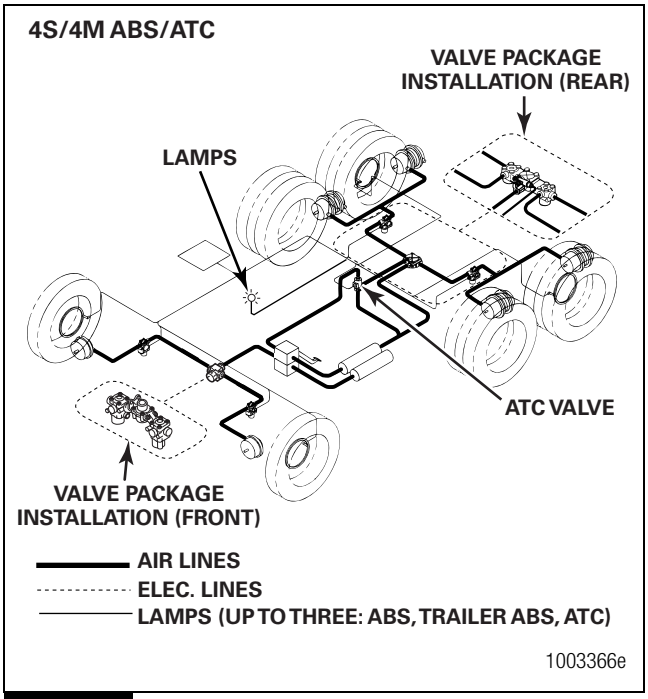


Figure 5.4

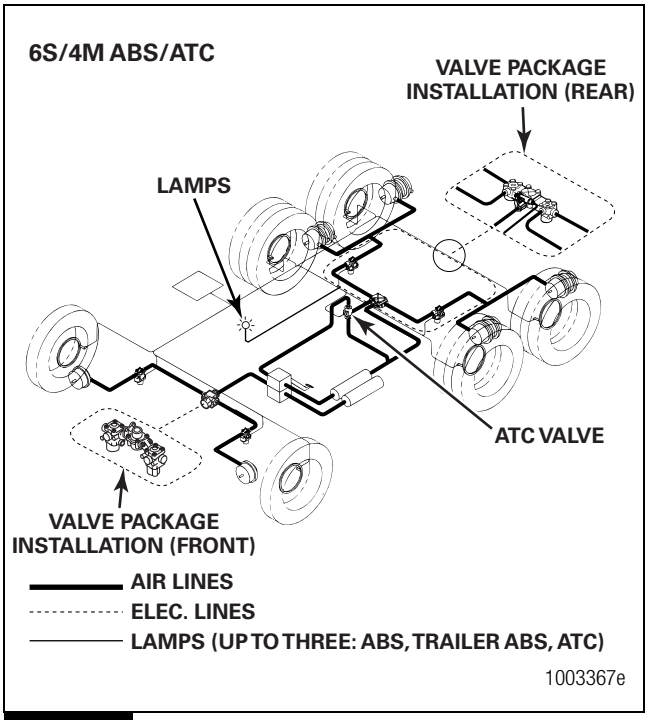


Figure 5.5

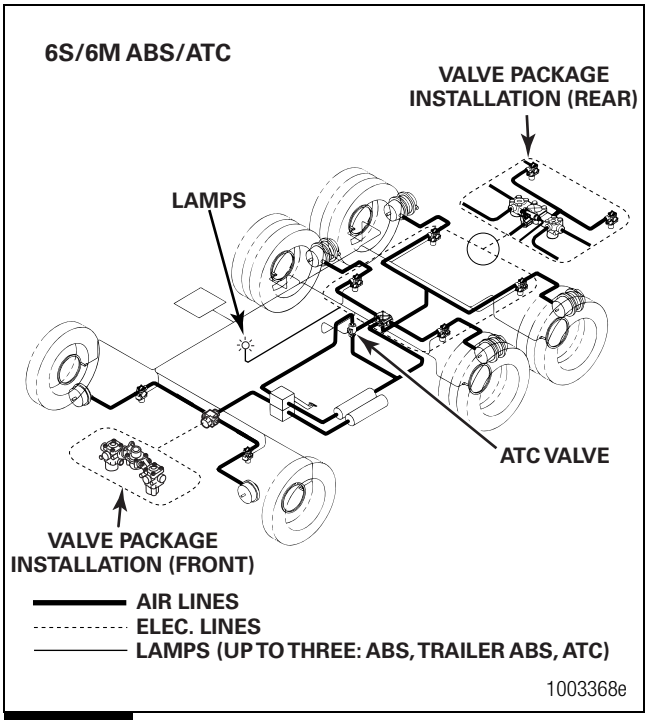


Figure 5.7

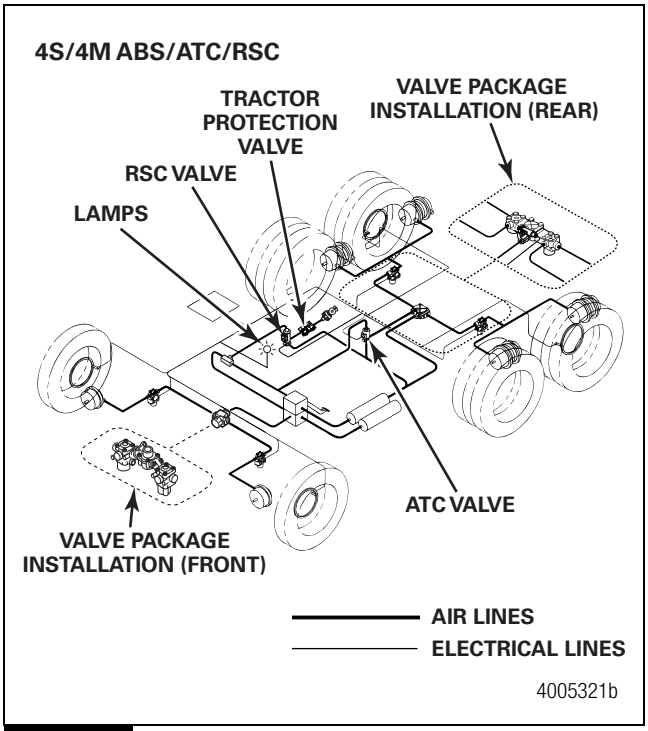
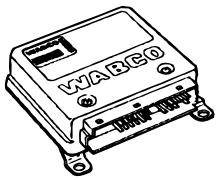
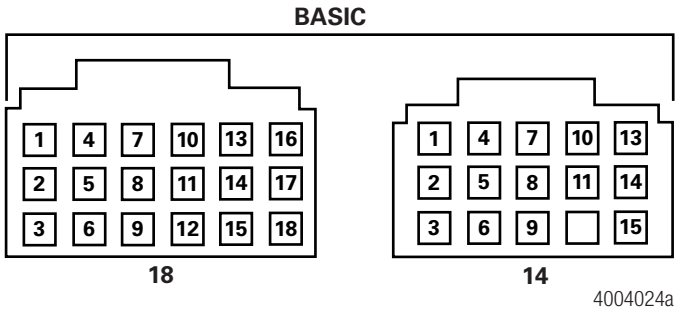


Figure 5.6

ECU Connector Pin Assignments

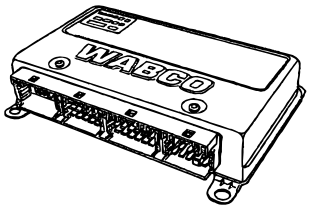
Refer to Figure 6.1, Figure 6.2, Figure 6.3, Figure 6.4, Figure 6.5, Figure 6.6 and Figure 6.7 for ECU wiring diagrams.

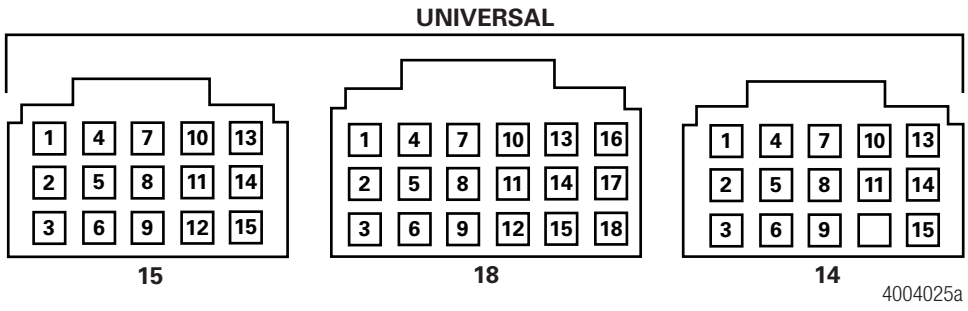




BASIC ECU (CAB-MOUNTED)

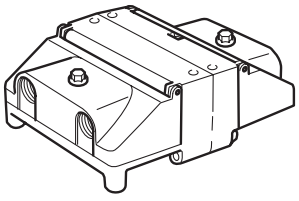
Figure 6.1

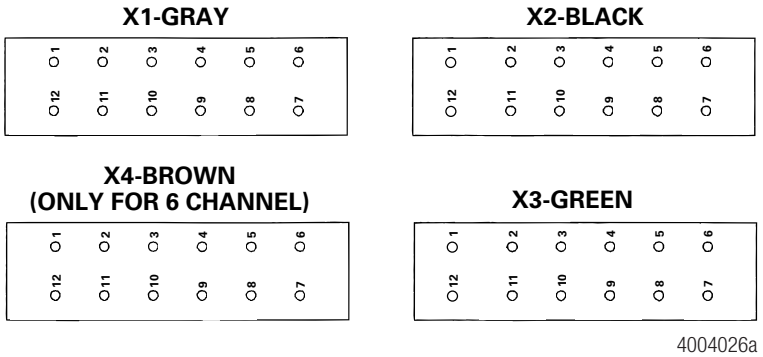




UNIVERSAL ECU (CAB-MOUNTED)

Figure 6.2

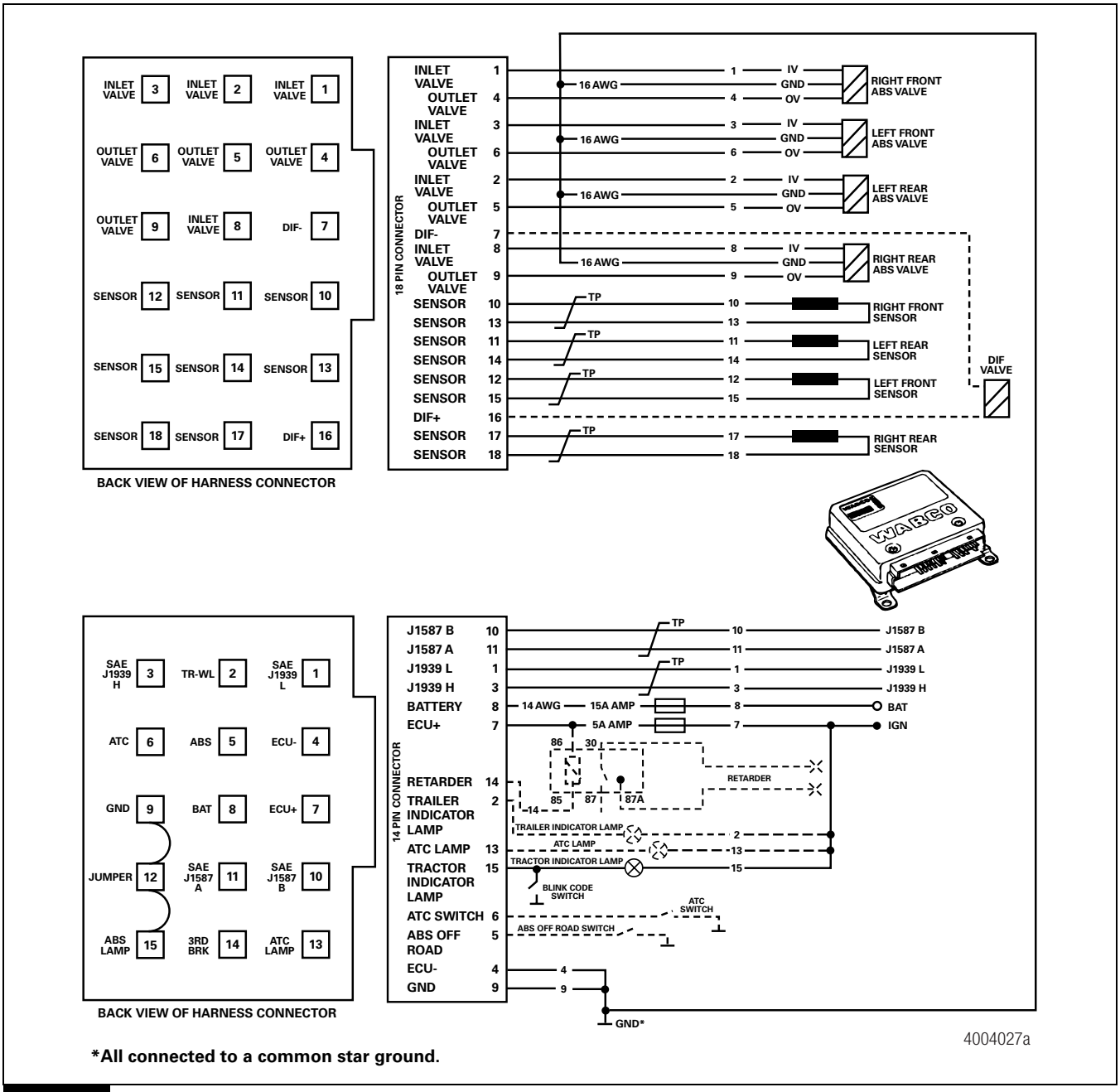




FRAME-MOUNTED ECU

Figure 6.3

Basic ECU (Cab-mounted)



***All connected to a common star ground.**

Figure 6.4

6S/6M Universal ECU (Cab-mounted)

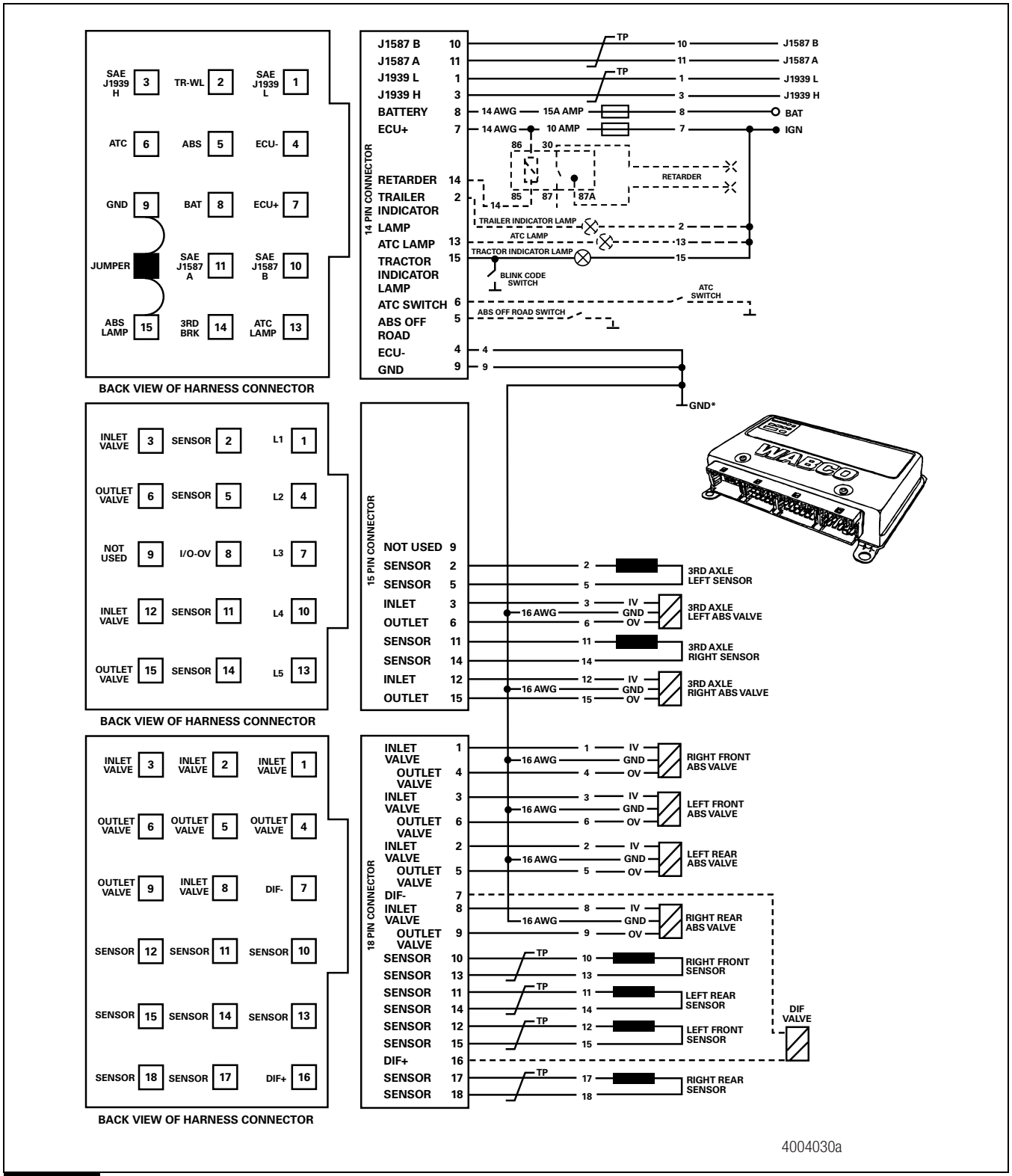


Figure 6.5

4S/4M Universal ECU (Cab-mounted) with RSC

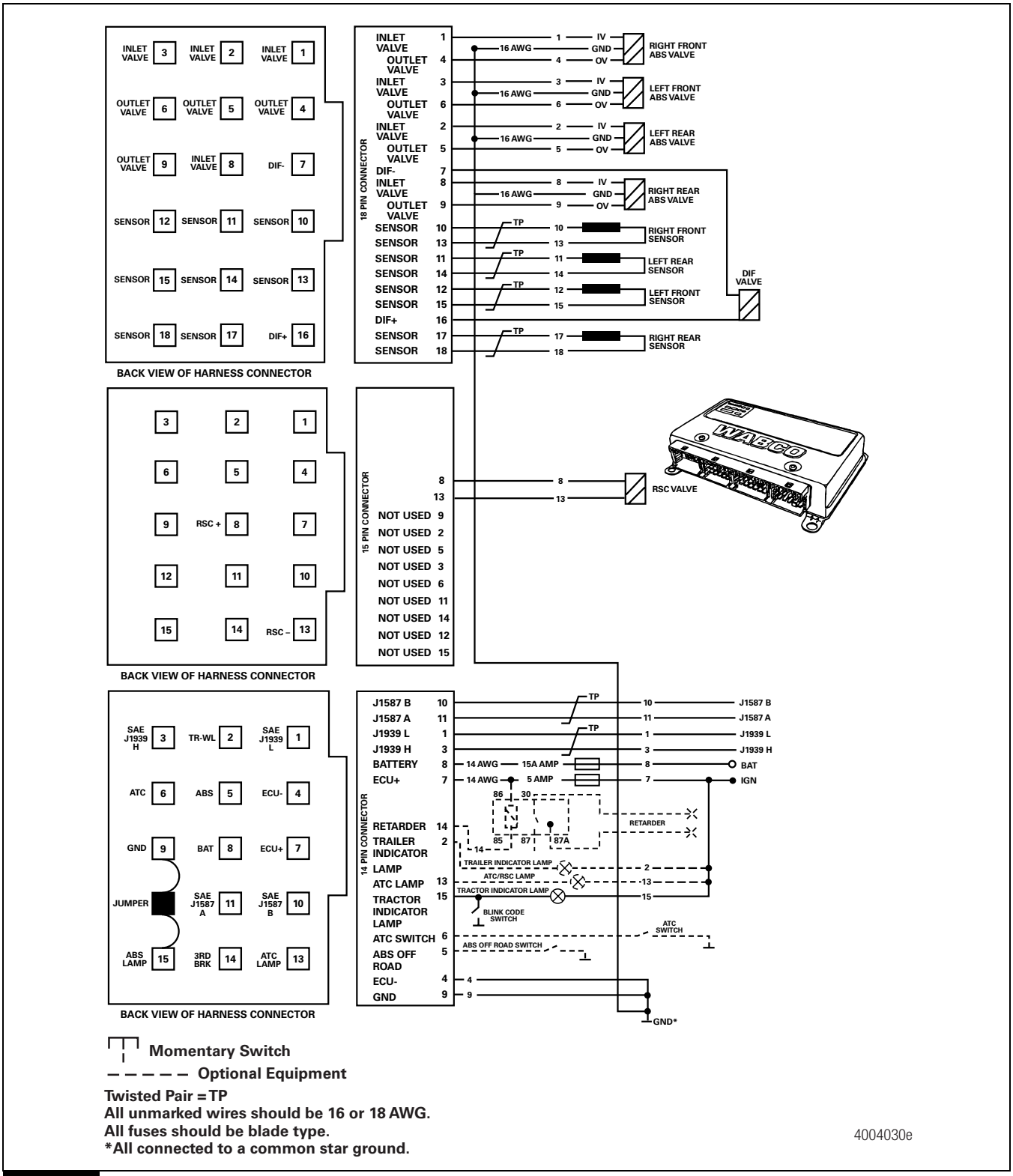


Figure 6.6

Frame-mounted ECU

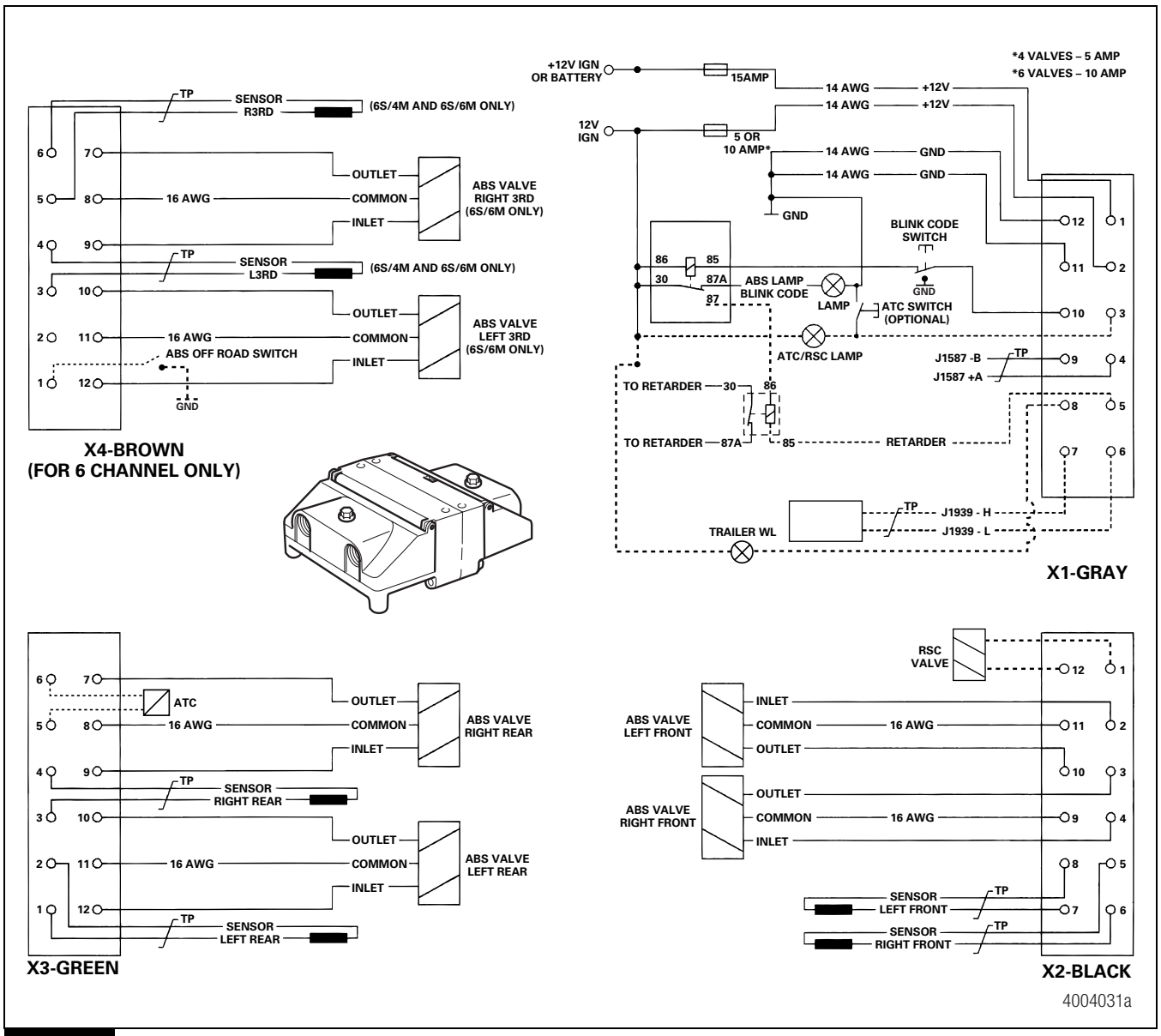
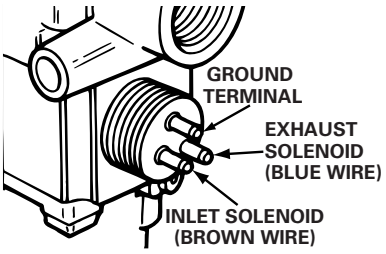
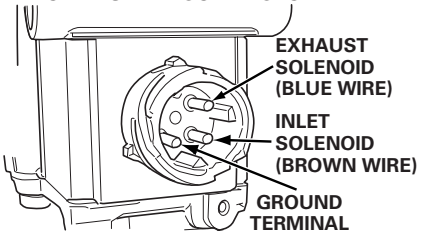


Figure 6.7

Troubleshooting

Meritor WABCO ABS Valve Package

This troubleshooting information is a reference tool to help identify possible malfunctions of the ABS modulator or relay valves. It does not take the place of diagnostic tests or other service instructions.

Condition	Possible Cause	Recommended Action
Air constantly leaks from exhaust port of relay valve.	Internal relay valve problem.	Replace the relay valve.
Air leaks from exhaust port of ABS modulator valve or relay valve when parking brake is released.	Parking brake problem. OR Anti-compound 2-way check valve problem.	Service the appropriate component. • Refer to manufacturer's service manual for instructions.
Rear service brakes releasing slowly (brakes dragging).	Kinked air line. Dirt buildup inside relay valve.	Inspect/repair lines, brakes. If the condition is not corrected: • Replace the relay valve.
Valves don't cycle at power-up. **OR** **Indicator lamp comes on (blink code or diagnostic tool indicates electrical problem with ABS valve).**	Broken wire. OR Loose or broken terminal connection. Corroded connector pins. OR Problem with solenoid. **OPEN-STYLE CONNECTOR**  **BAYONET-STYLE CONNECTOR**  	Check the wires and connections. • Make repairs as needed. **If condition is not corrected:** Measure resistance across each valve solenoid coil terminal and ground on the ABS modulator valve to ensure 4.0 to 8.0 ohms. • If **greater than 8.0 ohms,** clean the valve and repeat the measurement. — If cleaning does not solve the problem, replace the ABS modulator valve. • If **less than 4.0 ohms,** replace the ABS modulator valve.
ABS valve package damaged.	Road hazards. OR Vehicle damage.	Replace the complete ABS valve package or individual component as required.

Reconfiguration Procedure

How to Reconfigure an ECU (E Version)

Before reconfiguring the ECU, contact ArvinMeritor's Customer Service Center at 800-535-5560 for additional information.

E version ECUs memorize the following components if they are connected at power-up:

- ATC valve
- Retarder relay
- Datalink SAE J1939

NOTE: The ATC valve and Datalink SAE J1939 are required for RSC. The RSC ECUs cannot be reconfigured to remove these components. Only the retarder relay is memorized or cleared.

Once these components have been memorized, the ECU will look for them at each power-up. If a memorized component is not present, the ECU will record a fault. For example, if an ATC valve is memorized, but is not present at the next power-up, the ECU records a fault. This can occur if an ECU is moved from one truck to another and one or more of the memorized components are not available on the new truck. If this occurs, use TOOLBOX™ Software to reconfigure the ECU. If you do not have TOOLBOX™ Software, follow the manual reconfiguration instructions in this section.

TOOLBOX™ Software

NOTE: For complete instructions for using TOOLBOX™ Software, refer to the TOOLBOX™ User's Manual, TP-99102.

To reconfigure the ECU with TOOLBOX™ Software, use the ***Reset Memorized*** command.

Select ***Reset Memorized*** from the pull down menu to tell the ECU to reset the memorized or "learned" components. Figure 7.1 and Figure 7.2.

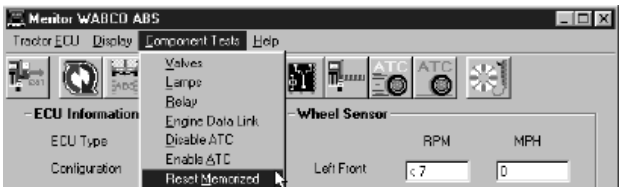


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Figure 7.1

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Figure 7.2

Manual Reconfiguration

Refer to Table H and Figure 7.3 for information on manual reconfiguration.

Table H

Action	Result	Reason
1. **Turn the ignition ON.** 2. **Press and hold the blink switch for at least three seconds.** **NOTE:** Do not hold this switch longer than seven seconds.	The ABS lamp displays the ABS system configuration code: • One blink: 6S/6M • Two blinks: 4S/4M • Four blinks: 6S/4M **NOTE:** The ABS lamp may display eight quick flashes before the system configuration code begins.	Stored faults cleared, no active faults present. Continue with reconfiguration. **NOTE:** The reconfiguration procedure cannot be conducted if there are active faults present. These must be repaired before proceeding with the reconfiguration.
Observe the ABS and ATC lamps.	The ATC lamp comes on and stays on.	A complete ATC system — including an ATC lamp — is installed. If not, the ATC lamp will not come on.
	The ABS lamp will continuously blink the system configuration code.	ECU reconfiguring the system. The ECU checks the following components and reprograms itself based on the new system: • ATC valve AND/OR • Retarder relay AND/OR • Datalink J1939
While the configuration code is flashing, press the blink code switch three times (one second each, with a one second pause between each). **Turn the ignition OFF.**	The ABS lamp displays **four quick flashes**, followed by a continuous display of the system configuration code. **NOTE:** The system configuration code continues until ignition is turned OFF.	Successfully reconfigured.

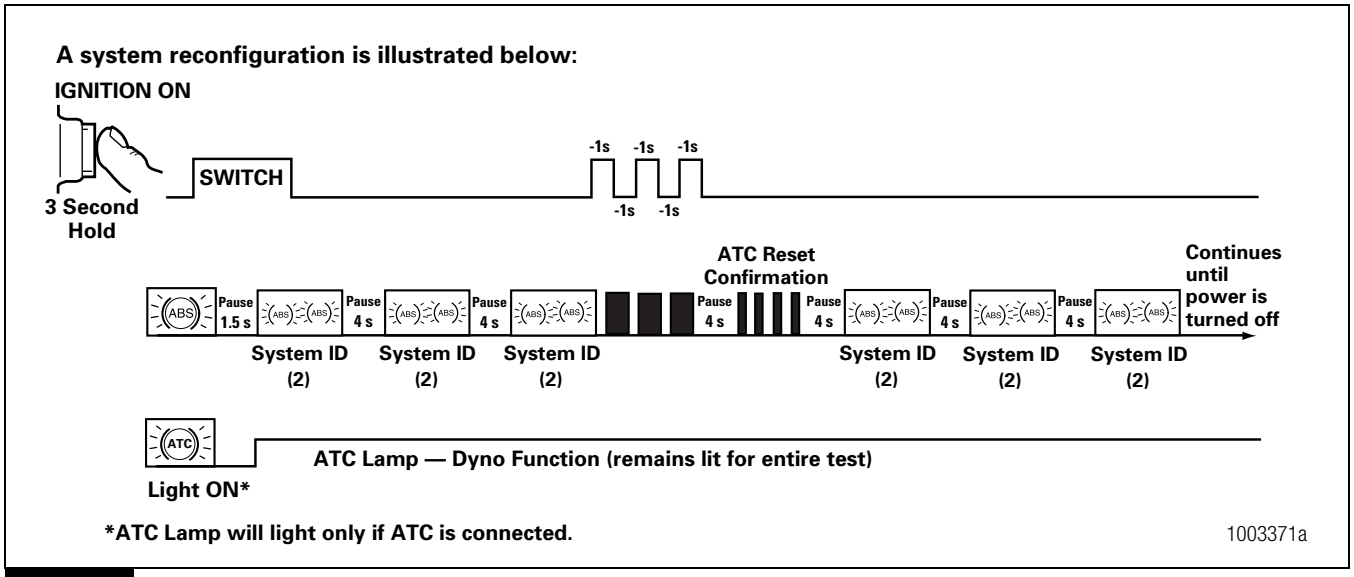
A system reconfiguration is illustrated below:
IGNITION ON
3 Second Hold
SWITCH
-1s
-1s
-1s
-1s
-1s
ATC Reset Confirmation
Continues until power is turned off
ABS
Pause 1.5 s
Pause 4 s
System ID (2)
ATC
ATC Lamp — Dyno Function (remains lit for entire test)
Light ON*
*ATC Lamp will light only if ATC is connected.
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Figure 7.3

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