Control Valve Replacement

Replacement

NOTE: Wire repairs may require the use of special tools for certain connectors and terminals. See **Group 54** for information on special terminals and connectors, and on ordering tools for them.

- 1. Chock the front and rear tires.
- 2. Release the pressure from the air reservoirs.
- 3. Disconnect the wiring from the solenoid control valve, or combination solenoid control valve(s).
- Mark the air lines for ease of installation. Disconnect the air lines.
- Remove the two mounting capscrews, washers, and nuts.
- Remove the solenoid control valve. See Fig. 1 or Fig. 2.

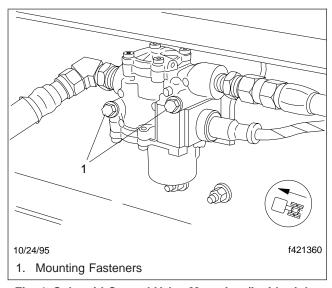


Fig. 1, Solenoid Control Valve Mounting (inside righthand rail mounting shown)

NOTE: The combination solenoid control valve can be disassembled if replacement of the relay valve, automatic traction control valve, or one of the solenoid control valves is needed. For disassembly and assembly instructions, see **Subject 130**.

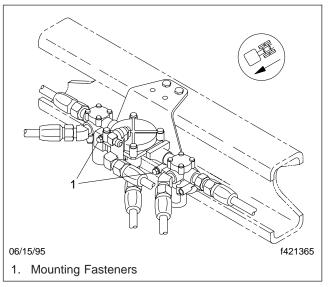


Fig. 2, Combination Solenoid Control Valve Mounting (rear axle mounting shown)

 Install the solenoid valve using the above instructions in reverse order. Tighten the mounting nuts 18 lbf-ft (24 N·m).

Wheel Speed Sensor Adjustment, Rear Axle

Adjustment

NOTE: The following adjustment procedure requires the use of special tool T11–17556–000. Use of this tool, available through the PDCs, eliminates the time-consuming task of removing the wheel and tire assembly, and the brake drum. See **Fig. 1**.

1. Park the vehicle on level ground, set the parking brake, and shut down the engine.

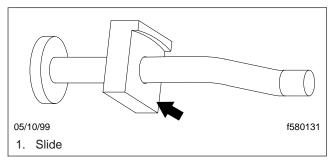


Fig. 1, ABS Sensor Adjustment Tool

- 2. Chock the front tires.
- 3. Find the sensor access hole in the rear axle flange.
 - 3.1 View the brake drum and axle from the rear. The ABS sensor wiring harness should be visible passing through a hole in the 12 o'clock position.
 - 3.2 Find the S cam at either the 3 o'clock or 9 o'clock position.
 - 3.3 Just opposite the S cam is the sensor access hole, approximately 3/4 inch (19 mm) diameter.
- 4. Insert the service tool T11–17556–000 into this hole
- 5. Position the slide of the tool on the axle flange to align the tool. See **Fig. 2**.
- Tap the tool lightly with the palm of your hand.
 This will ensure the sensor is touching the tone wheel.
- Remove the tool from the wheel and repeat the procedure on the other rear axle speed sensor.
- 8. Remove the chocks from the tires.

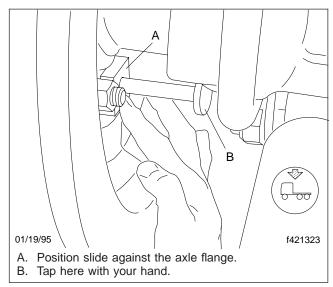


Fig. 2, Position the Tool

Combination Solenoid Control Valve Disassembly and Assembly

Disassembly

- 1. Use a 6 mm allen-head wrench to loosen and remove the allen-head bolts. See Fig. 1.
- 2. Carefully separate the ABS control valve(s) from the relay valve.
- 3. Remove and discard the old O-rings.

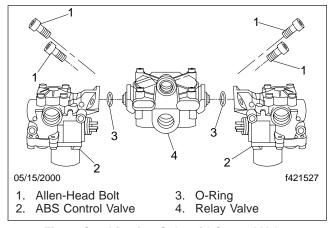


Fig. 1, Combination Solenoid Control Valve

Assembly

- 1. Lubricate the replacement O-rings with the grease provided. See Fig. 1.
- 2. Plug any unused ports on the replacement valve(s).
- 3. Attach the ABS control valve(s) to the relay valve. Tighten the allen-head bolts 13 to 15 lbf-ft (18 to 20 N·m).

ABS Tone Ring Installation on Service Hubs

Installation

IMPORTANT: Some ABS service hubs do not have a tone ring installed on the hub. The tone ring must be ordered separately and installed on the hub before installation of the hub onto the axle. Tone rings are made of a special material and require a specific installation procedure for proper installation.

WARNING

When installing an ABS system, special ABS hubs must be ordered. Machining of older hubs to accommodate the installation of tone rings can cause problems due to insufficient hub bore wall thickness. Machining an older hub with insufficient hub bore wall thickness could result in cracking, causing bearing damage and wheel loss. This could cause an accident resulting in personal injury and property damage.

 Submerge the tone ring in boiling water or place it in an oven at 250°F (121°C) for approximately 15 minutes.



Do not attempt to heat the tone ring with a torch as this can damage the ring.

- 2. Using pliers, remove the tone ring from the boiling water or oven and center it on the machined area of the hub bore. See Fig. 1.
- While the tone ring is still hot, make sure that it is properly centered on the machined surface. Using a rubber mallet, tap the tone ring until it bottoms out around the machined surface on the hub. See Fig. 2.
- 4. Install the hub on the axle. Position a dial indicator with a magnetic base so the dial indicator is against the tone ring teeth. See Fig. 3.
- 5. Rotate the hub and check the ring for runout. The runout should be less than 0.005 inch (0.13 mm). See Fig. 4.
- 6. Install the wheel. For instructions, see **Group 40**.

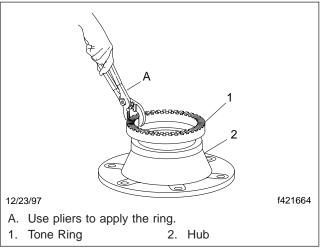


Fig. 1, Install the Ring on the Hub

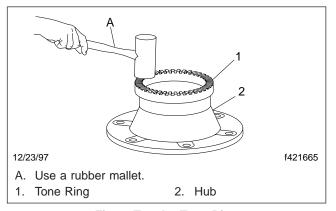


Fig. 2, Tap the Tone Ring

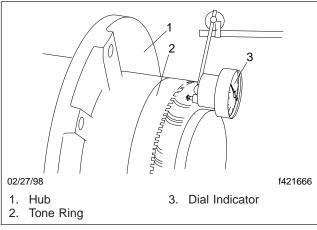


Fig. 3, Position the Dial Indicator

ABS Tone Ring Installation on Service Hubs

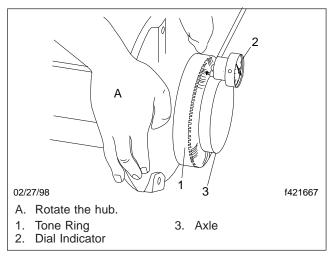


Fig. 4, Check Tone Ring Runout

General Information

General Information

Air reservoirs serve two main purposes:

- They store compressed air used to apply the brakes and operate other air-powered devices, such as window lifts, windshield wipers, and seats.
- They provide a place where air, heated during compression, can cool and water vapor can condense into a liquid. Also, air reservoirs collect small amounts of oil passed by the compressor.

Each vehicle is equipped with three or four air reservoirs, depending on the number of rear axles. On all vehicles, each reservoir is identified as one of three types: supply, primary, and secondary.

A supply reservoir receives compressed air directly from the compressor. Also referred to as the wet tank, its functions are to collect most of the water and oil condensate from the air, and to supply air to the other reservoirs. At the outlet port of the supply reservoir (the port leading to the primary reservoir) is a safety valve, which protects the air system against excessive air pressure buildup. The supply reservoir is usually mounted on the right-hand frame rail.

Primary reservoirs are air sources for the brakes on the rear axles. One or two primary reservoirs are installed on a vehicle, depending on the number of rear axles and the air system configuration. Each primary reservoir is usually mounted behind the supply reservoir on the right-hand frame rail.

A secondary reservoir is the air source for the front axle brakes. It is usually mounted on the left-hand frame rail, and, like the primary reservoir, is equipped with an inline check valve.

The secondary reservoir supplies air to a pressure protection valve. This valve prevents complete loss of secondary air pressure if there is an air leak in any non-brake accessory.

All air reservoirs are equipped with drain valves to eject the water and oil emulsion from the tanks.

42.07

Safety Precautions

Safety Precautions

When working on or around air brake systems and components, observe the following precautions.

- Chock the tires and stop the engine before working under the vehicle. Releasing air from the system may cause the vehicle to roll. Keep hands away from brake chamber pushrods and slack adjusters; they will apply as air pressure drops.
- Never connect or disconnect a hose or line containing compressed air. It may whip as air escapes. Never remove a component or pipe plug unless you are certain all system pressure has been released.
- When working with compressed air, always wear safety glasses, and never exceed recommended air pressure.
- Never attempt to disassemble a component until you have read and understood recommended procedures. Some components contain powerful springs, and injury can result if not correctly disassembled. Use only correct tools and observe all precautions regarding use of those tools.

Drain Valve Replacement and Leak Elimination

A WARNING

Before working on or around air brake systems and components, see Safety Precautions 100. Failure to do so may result in personal injury.

Replacement and Leak Elimination

NOTE: If the vehicle is equipped with an automatic moisture-ejection valve, see **Section 42.12** for replacement instructions.

- 1. Apply the parking brakes, and chock the tires.
- 2. Drain the air system, using the instructions in the vehicle driver's manual.
- Using two wrenches (hold the coupler in place with one of them), unscrew the drain valve from the coupler. Clean off the threads inside the coupler on the reservoir, removing all sludge and sealant build-up.

Obtain a new drain valve if leaks occurred through the body of the valve.

If leaks occurred at the joint of the drain valve and coupler, clean off the sludge and sealant from the threads of the valve. Check for damaged threads on the valve and inside the coupler. Replace damaged parts. If no damage exists, leakage was probably due to inadequate tightening of the drain valve in the coupler.

- Apply Loctite[®], or an equivalent sealant, to the end threads of the drain valve or coupler, as applicable, and install finger-tight. Tighten one and one-half additional turns (use two wrenches if installing the drain valve).
- 5. Perform a leak test after completing the installation. If leaks occur at the joint of the drain valve and coupler, tighten the valve up to one additional turn to stop the leaks.

Air Reservoirs 42.07

Air Reservoir Replacement

A WARNING

Before working on or around air brake systems and components, see Safety Precautions 100. Failure to do so may result in personal injury.

Replacement

- Park the vehicle on a level surface, set the parking brake, and shut down the engine. Chock the rear tires.
- 2. Drain the air system.

NOTE: If access is limited, reverse the order of the next two steps and remove the air lines, couplers, and valves after removing the reservoir from its mount.

- Mark or tag all reservoir air lines, couplers, and valves for later assembly, then disconnect the components. Cap the exposed ports tightly to keep out contaminants.
- 4. Remove the reservoir, as follows. See Fig. 1 for a one-piece strap (under frame rail) mounting and Fig. 2 for a frame rail mounting.
 - 4.1 Loosen the reaction joint clamp bolts.

NOTE: If the reservoir is mounted on the fuel tank bracket, loosen the bottom strap fastener first.

- 4.2 Remove the reservoir strap fasteners.
- 4.3 Remove the reservoir.

NOTE: If access is limited, connect the air lines, couplers, and valves before installing the new reservoir.

- If there is sufficient work space, place a new reservoir in the mount and install the strap fasteners.
 - Tighten the strap fasteners 64 lbf-ft (87 N·m).
 - Tighten the reaction joint clamp bolts 26 lbf-ft (35 N·m).
- Connect all air lines, couplers, and valves to the new reservoir, removing the caps as each component is installed. Tighten the connections as instructed in Section 42.10, Subject 100.

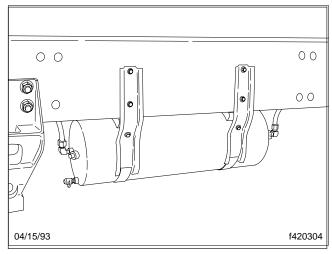


Fig. 1, Air Reservoir, One-Piece Strap (Under Frame Rail) Mounting

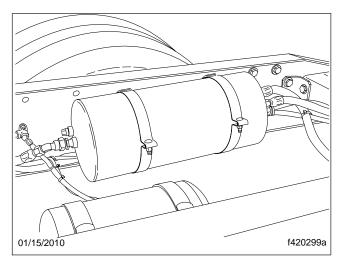


Fig. 2, Air Reservoir, Frame Rail Mounting

42.07

Internal Check Valve Replacement

A WARNING

Before working on or around air brake systems and components, see Safety Precautions 100. Failure to do so may result in personal injury.

Internal Check Valve Replacement, Two-Chamber Air Reservoir

General Information

Contamination in two-chamber, wet/secondary, reservoirs may cause the inline check valve to become clogged or stuck closed. This can result in insufficient air buildup. If insufficient air buildup is noted, replace the check valve. If the check valve can not be removed (due to corrosion), it is acceptable to install a bypass line.

There are two styles of check valves that may have been installed in the tank. An internal check valve is threaded into the internal wall that separates the wet side and secondary side of the reservoir. Or an external check valve is mounted in a port on the top surface of the reservoir.

Internal Check Valve Replacement (located in the separator wall of the reservoir)

- Park the vehicle on a level surface, shut down the engine, and set the parking brake. Chock the tires.
- 2. Drain the air reservoir.
- 3. Disconnect the air lines, then remove the reservoir from the vehicle.
- On the supply (wet) side of the reservoir, disconnect the pressure-protection valve, and the 90-degree elbow located on the end of the reservoir.
- 5. The check valve is located on the interior wall that separates the sides of the reservoir. To reach it, use a 1/4-inch drive, 1/2-inch deep-well socket with a 1/4- to 3/8-inch drive adapter, and necessary 3/8-inch extensions to reach the valve. Tape the socket and extensions, to ensure the valve will stay in the socket, and that the wrench assembly will stay together inside the

tank. Insert the socket assembly through the end port of the reservoir, and remove the valve. See Fig. 1 and Fig. 2.

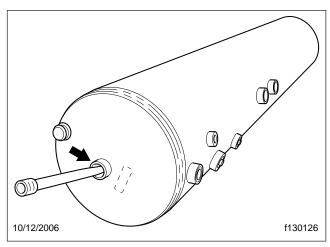


Fig. 1, Accessing the Internal Check Valve

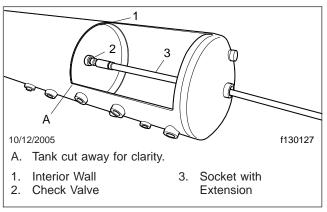


Fig. 2, Cutaway View of Split Air Reservoir

NOTICE -

Take care not to drop the check valve into the reservoir when removing or installing it. The reservoir can not be used if the check valve is lost in it. A loose check valve could scratch the teflon coating of the interior of the reservoir, causing it to corrode. If the check valve is not recoverable, replace the reservoir.

- 6. Install a new check valve.
- 7. Attach the pressure-protection valve and the 90-degree elbow.