

## Bendix® RE-4™ Relay Emergency Valve

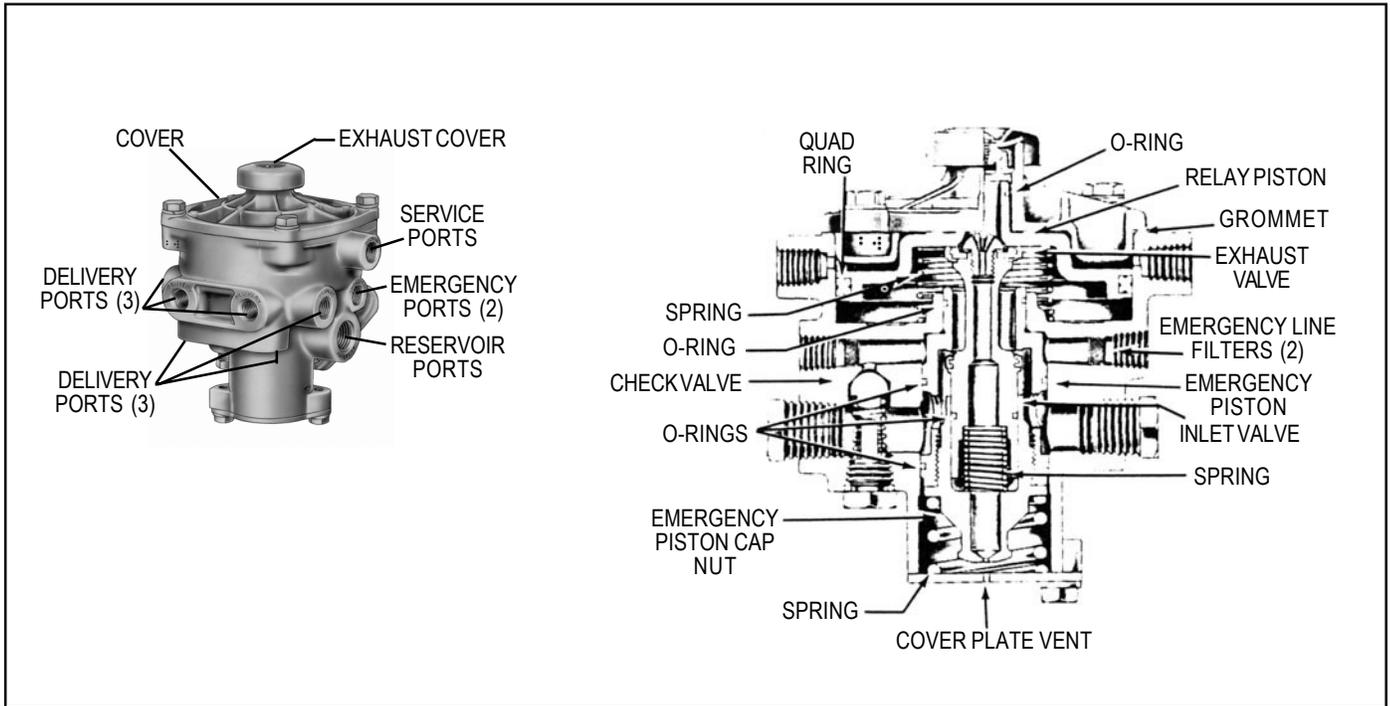


FIGURE 1 - RE-4™ RELAY EMERGENCY VALVE (OLD STYLE)

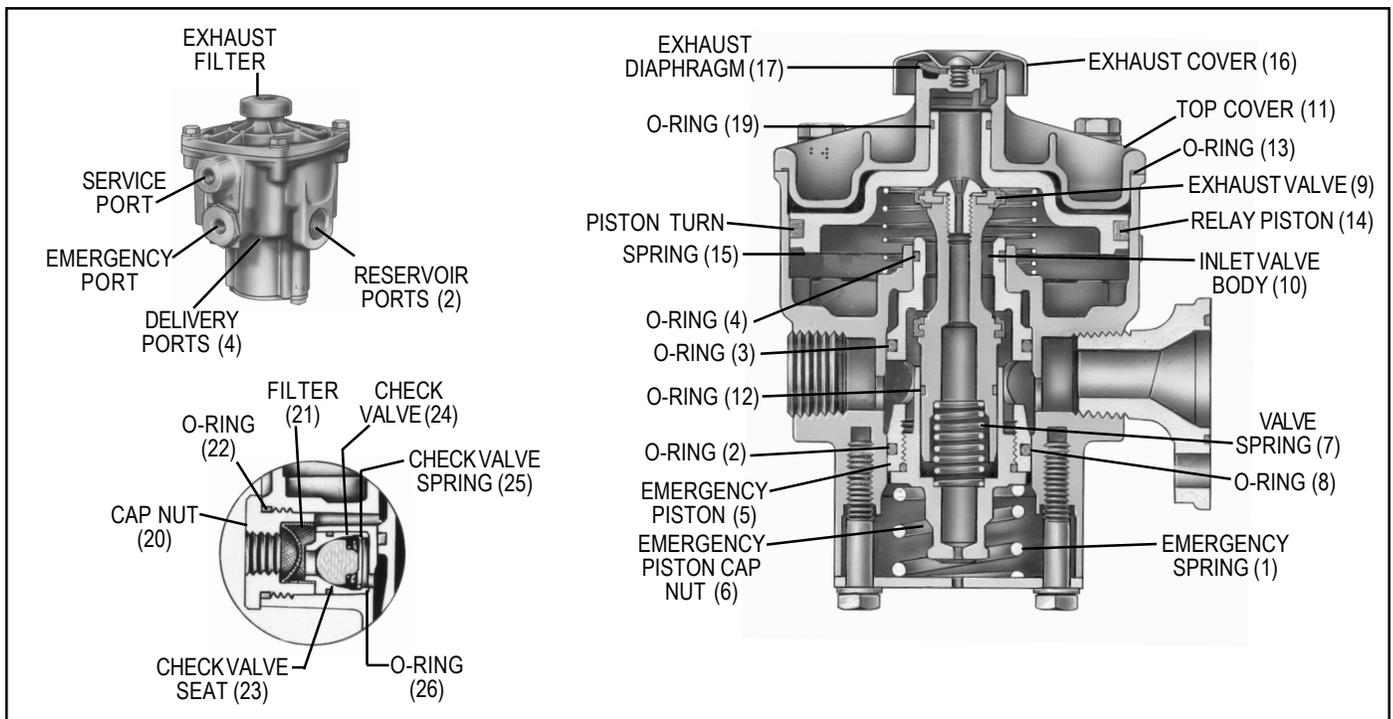


FIGURE 2 - RE-4™ RELAY EMERGENCY VALVE

## DESCRIPTION

The relay emergency valve is normally used in trailer braking systems. It is a dual function valve, combining the functions of a relay valve and an emergency valve.

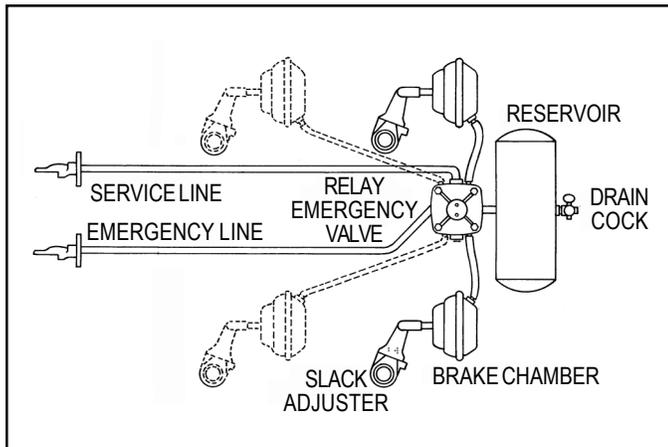


FIGURE 3 - TYPICAL RELAY-EMERGENCY VALVE TRAILER PIPING

The relay function is identical to that of a relay valve, serving the trailer air brake system as a remote controlled brake valve. Control (service) pressure from the towing vehicle is routed through the trailer service line and on to the relay portion of the valve.

The emergency function of the valve automatically applies full trailer reservoir air pressure to the trailer chambers when the trailer supply pressure falls below a predetermined minimum.

For ease of service the valve features an "insert" cartridge consisting of the inlet/exhaust valve and emergency piston. Removal of the insert can usually be accomplished without line removal.

The valve may be flange or reservoir mounted, and identified, convenient porting locations of delivery, service, emergency (supply) and reservoir ports are provided. (Note: Reference Figures 1 and 2, two configurations of the RE-4™ valve are shown). The older configuration (Figure 1) contained a total of 13 ports. Check valve access was via a pipe plug on the bottom of the valve. The newer and current configuration contains 8 ports and check valve access is via a side cap nut. Interior components of both valves are identical.

## OPERATION

### INITIAL CHARGING

When a tractor is connected to a trailer and the service and emergency lines are opened (via the tractor protection system), the valve permits charging the trailer reservoir to approximately the same air pressure as that of the tractor reservoir. Under initial charge conditions, the valve applies trailer service air chambers as the trailer emergency line is

charged. This application is continued until the trailer supply (emergency) line is charged to 60-65 psi, at which time the application is automatically released. The trailer reservoir continues to be charged to full operating pressure.

### SERVICE APPLICATION

During normal service braking operation, the valve serves as a relay valve, synchronizing tractor service (application) air pressure with trailer service (application) air pressure as the service foot brake valve on the tractor is operated. If the tractor is equipped with a trailer hand control (TC) valve, the trailer brakes can also be applied independently of the tractor brakes.

### EMERGENCY APPLICATION

#### (TRAILER AIR SYSTEM CHARGED TO NORMAL OPERATING PRESSURE)

Venting the trailer supply line to atmosphere will cause the emergency portion of the relay emergency valve to apply full trailer reservoir pressure to the trailer air chambers.

If the trailer supply line pressure is reduced to approximately 20 psi due to leakage or conditions other than above, a graduated trailer air chamber application will occur. The rate of this brake application will depend upon the rate of pressure loss in the supply line.

If the trailer is not equipped with parking actuators (such as spring brakes), the trailer wheels should be blocked to prevent trailer movement in the event reservoir pressure would be depleted.

### TO RELEASE AN EMERGENCY APPLICATION

Recharge trailer air system or:

- A. For trailers equipped with standard brake chambers, block wheels and drain trailer reservoir.
- B. For trailers equipped with spring brake chambers, block wheels and mechanically release spring brake chambers via the mechanical release mechanism. (For specific instructions, refer to manufacturer's service literature.)

### PREVENTIVE MAINTENANCE

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

No two vehicles operate under identical conditions, as a result, maintenance intervals may vary. Experience is a valuable guide in determining the best maintenance interval for air brake system components. At a minimum, the valve should be inspected every 6 months or 1500 operating hours, whichever comes first, for proper operation. Should the valve not meet the elements of the operational tests noted in this document, further investigation and service of the valve may be required.

## OPERATING AND LEAKAGE TEST

Check tractor dash air gauge against a test gauge known to be accurate prior to performing these tests. Connect tractor air lines to the trailer on which this valve is to be tested. Block wheels or otherwise hold both vehicles by a means other than air brakes during these tests.

1. Start these tests with no air pressure in the tractor or trailer air brake system. Open cut-out cocks, if installed, and place tractor protection control valve in normal position. As system pressure ascends and the trailer emergency line is charged, note that the trailer brakes are applied. Trailer brake application should completely release as trailer emergency line pressure reaches approximately 60-65 psi.
2. Fully charge tractor and trailer air brake systems. Make several service brake application and check for prompt braking response at all trailer wheels. With brakes released and system reservoir pressure stabilized at 90-100 psi, with engine stopped, a two minute check should result in no more than a six pound pressure drop for the combination vehicle system. If this check indicates possible excessive leakage of valve, soap suds should be applied to cover plate, cover plate vent, and exhaust port of valve to detect possible inlet valve, inlet valve guide o-ring and emergency piston o-ring leakage. A combined leakage as indicated by a 1" soap bubble in not less than 5 seconds is permissible. No leakage is permissible at pipe plugs or fittings.
3. Make and hold a full service brake application with system reservoir pressure stabilized at 100-120 psi with engine stopped. A two minute check should result in no more than an eight (8) psi pressure drop for the combination vehicle system. If this check indicates possible excessive leakage of valve, soap suds should be applied to cover plate, cover plate vent, and exhaust port to detect exhaust valve, valve guide o-ring, emergency piston o-ring and relay piston o-ring leakage. A combined leakage as indicated by a 1" soap bubble in not less than 2 seconds is permissible. Release the service brake application.
4. With tractor and trailer air brake system fully charged, place the tractor protection control valve to "Emergency" position or close the supply line cut-out cock on the tractor and uncouple the trailer emergency line coupling. Note that trailer brakes apply promptly. Check leakage at valve, and at the emergency line coupling. Reconnect and recharge tractor and trailer air brake system, noting that trailer brakes release at a maximum of 65 psi trailer emergency line pressure as the trailer air brake system is recharged to full normal operating pressure.
5. With tractor and trailer air brake system fully charged, stop engine. Reduce pressure by making a series of applications and note that trailer brakes apply automatically at approximately 40 psi tractor reservoir pressure or at the automatic emergency setting of the tractor protection equipment, if installed.

## REMOVING AND INSTALLING

If the valve does not function as described, or leakage is excessive, it is recommended that it be replaced with a new or remanufactured unit or repaired with genuine Bendix parts available at Bendix outlets.

### REMOVING

1. Block trailer wheels.
2. Drain trailer systems air reservoirs.
3. Identify and disconnect air lines from valve. (Note: the emergency piston and valve assembly, generally referred to as the "insert" can be removed without line removal. To remove the insert, remove cover plate and pull insert out.)
4. Remove mounting bolts, then valve.

### INSTALLING

If valve will be flange mounted directly to steel, it is recommended that a flange gasket be utilized to prevent electrolytic action between the unlike metals.

If the valve is adapter or nipple mounted directly to a reservoir, it is recommended that "Never Seez" lubricant be applied to the threads before installation. This will prevent galling of the threads and make removal easier.

1. Clean and inspect all connecting lines and hoses for cracks, deterioration or damage. Replace as necessary.
2. Mount valve securely.
3. Connect all lines and hoses to valve.

### DISASSEMBLY

1. Remove capscrews, lockwasher, then cover plate and emergency spring (1) from bottom of valve.
2. Remove insert (5) through bottom of valve (keep insert centered during removal to avoid damage to exhaust valve.  
(Note: If new insert is to be installed omit steps 3-8).
3. Remove three o-rings (2) (3) & (4) from insert.
4. Using wrench flats provided, remove emergency piston cap nut (6) from emergency piston (5). Use care to avoid damaging finished diameters.
5. Remove valve spring (7) and emergency piston cap nut o-ring (8).
6. Remove Phillips head screw, lockwasher and exhaust valve (9) from inlet valve body (10).
7. Remove inlet body from emergency piston.
8. Remove inlet valve o-ring (12) from inlet valve body. Mark cover and body to assure proper positioning when assembling.
9. Remove capscrews, lockwashers then top cover (11) from body. Remove o-ring (13) from cover.
10. Remove relay piston (14) and piston return spring (15) from body.
11. Remove screw from exhaust cover (16) and remove exhaust diaphragm (17).
12. Remove seal ring (18) and o-ring (19) from relay piston.

13. Remove emergency-supply cap nut (20).
14. Remove filter (21) and o-ring (22) from cap nut.
15. Remove check valve seat (23), check valve (24), and check valve spring (25). Remove o-ring (26).

## CLEANING AND INSPECTION OF PARTS

Wash all metal parts in mineral spirits.

Wipe rubber parts dry.

Inspect all parts for wear, damage or deterioration.

Clean or replace all filters. Replace all rubber parts and any other parts not considered serviceable by these inspections with Genuine Bendix parts.

## ASSEMBLY

NOTE: All torques specified are assembly torques and can be expected to fall off after assembly. Do not retorque after initial assembly torques fall. For assembly, hand wrenches are recommended.

Prior to assembly, lubricate all o-rings and mating surfaces with Dow-Corning 55-M pneumatic grease (Bendix Pc. No. 291126).

1. Install o-ring (13) on top cover (11).
2. Install seal ring (18) and o-ring (19) on piston (14).
3. Install piston return spring (15) in body. Install relay piston in cover; it should be a neat, sliding fit.
4. Install top cover/piston assembly. Torque cap screws to 100 inch pounds.
5. Install exhaust diaphragm (17), cover (16) and retaining screw.  
Note: If new insert is to be installed omit steps 6-12.
6. Install three o-rings (2) (3) & (4) on the emergency piston insert and o-ring (12) on the inlet valve body (10).
7. Install valve spring (2) in inlet valve body (10) and slide inlet valve body into the emergency piston cap nut (6). Use care to avoid damaging the inlet valve o-ring.
8. Install emergency piston cap nut o-ring (8).
9. Install emergency piston cap nut in emergency piston and tighten. Torque to 200-250 in. lbs.
10. Install exhaust valve (9) on inlet valve body using lockwasher and Phillips head screw. (Bead on rubber and recess in valve surface should face head of screw). Torque to 80-120 in. lbs.
11. Install insert assembly in valve body.
12. Install emergency piston spring (1).
13. Install cover plate, lockwashers and cap nuts. Torque cap nuts to approximately 100 in. lbs.
14. Install check valve (24) and check valve spring (25) in check valve seat (23).
15. Install check valve o-ring (26) in body and install check valve seat with check valve in body.
16. Install filter (21) and o-ring (22) on cap nut (20) and install cap nut in body. Torque to 75-175 in. lbs.

17. Install plugs in unused ports.
18. Check valve as outlined in "Operating and Leakage Check" sections before placing vehicle in service.

## **WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:**

When working on or around a vehicle, the following general precautions should be observed at all times.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels. Always wear safety glasses.
2. Stop the engine and remove ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components.
3. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
4. If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with an AD-IS™ air dryer system or a dryer reservoir module, be sure to drain the purge reservoir.
5. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
6. Never exceed manufacturer's recommended pressures.
7. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
8. Use only genuine Bendix® replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
9. Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
10. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.