Bendix® RE-6™ and RE-6NC™ Relay Valves

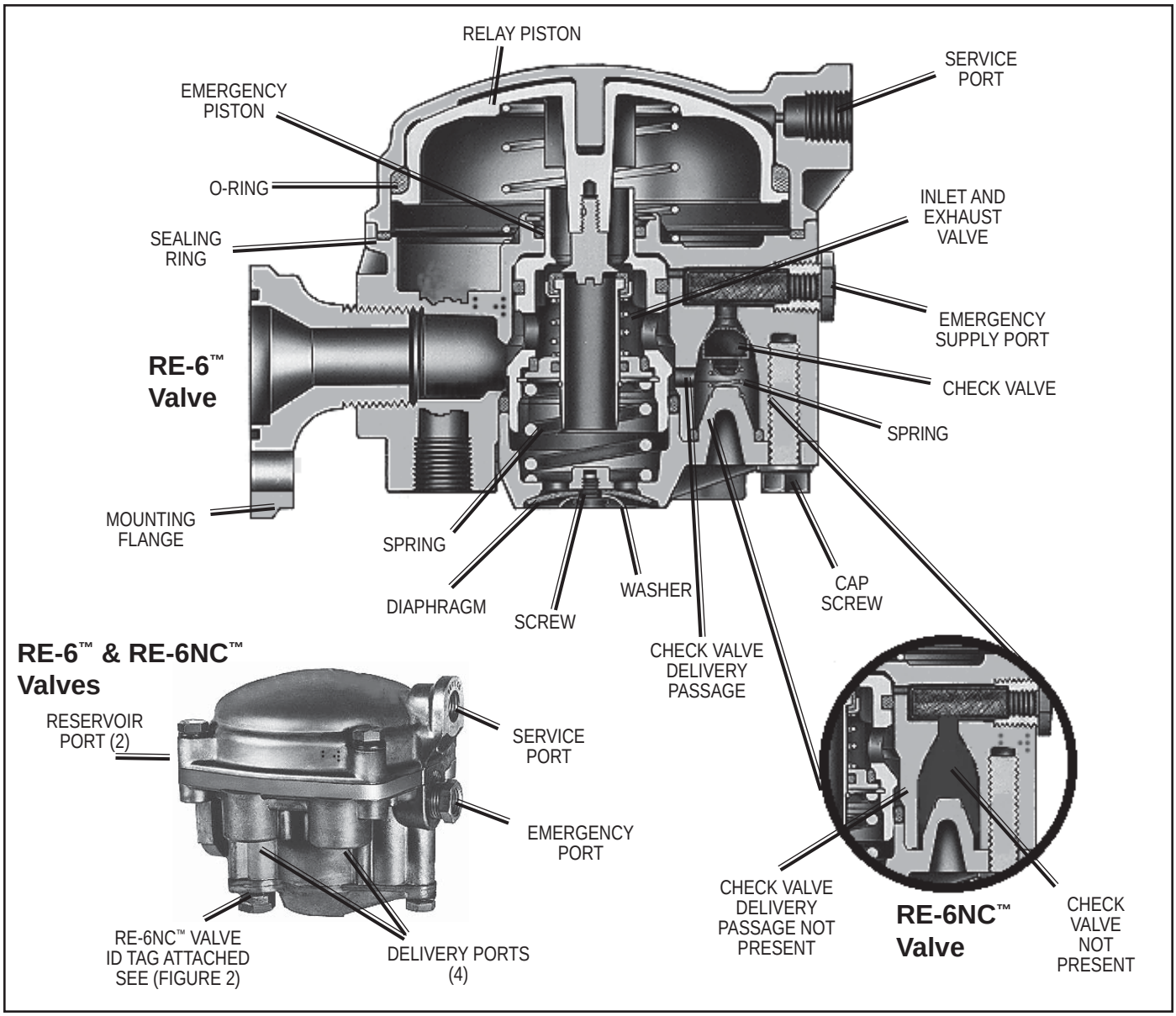


FIGURE 1 RE-6™ & RE-6NC™ RELAY VALVES

RE-6™ VALVE DESCRIPTION

The RE-6™ valve is used in dolly and trailer brake systems. It is a dual function valve, combining the functions of a relay valve and an emergency valve.

The relay function is identical to that of a relay valve, a remotely controlled brake valve. Control pressure from the towing vehicle is routed through the trailer service line and

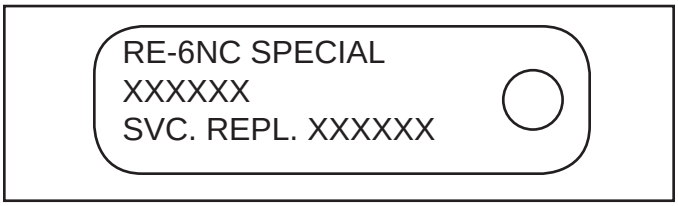
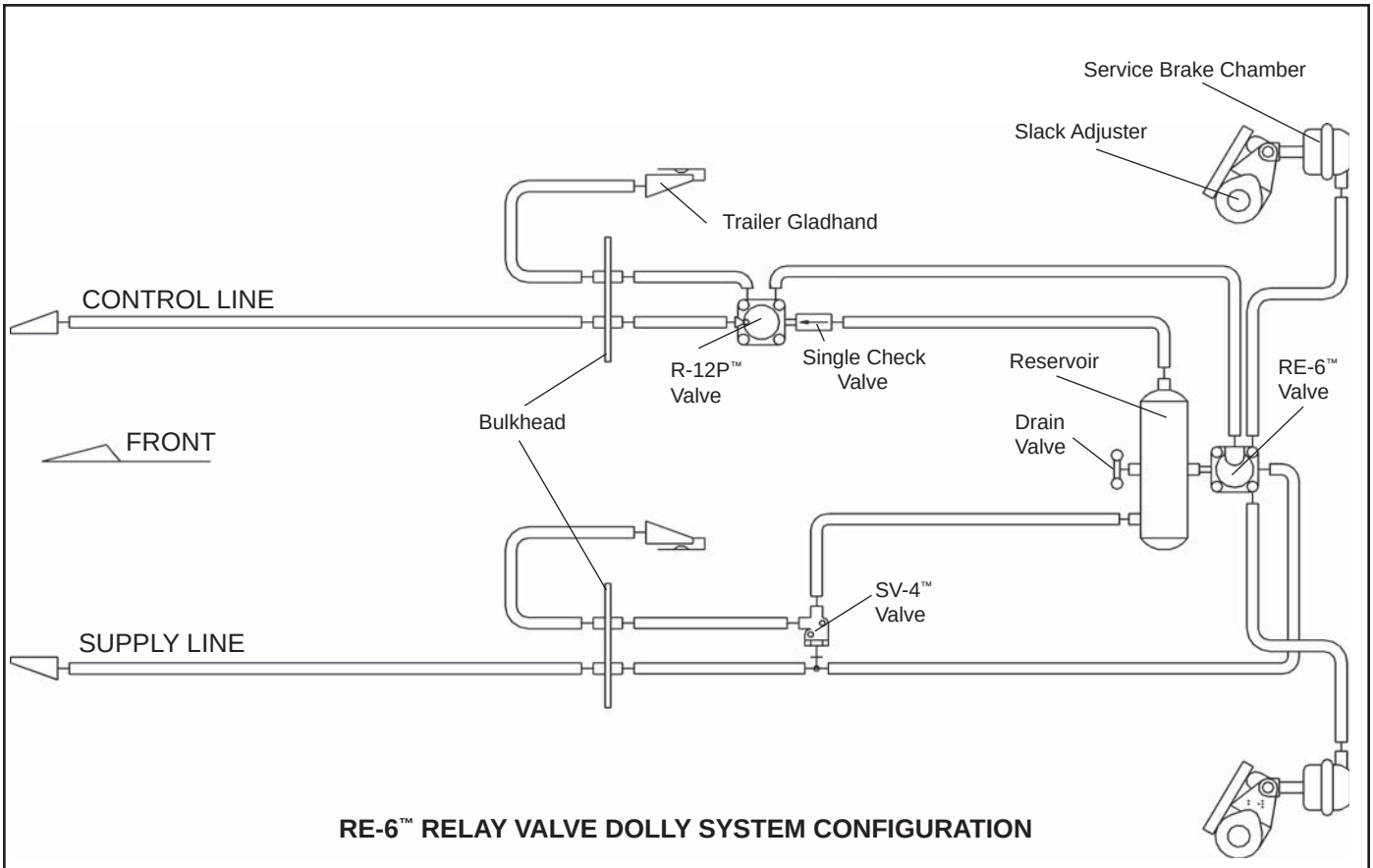
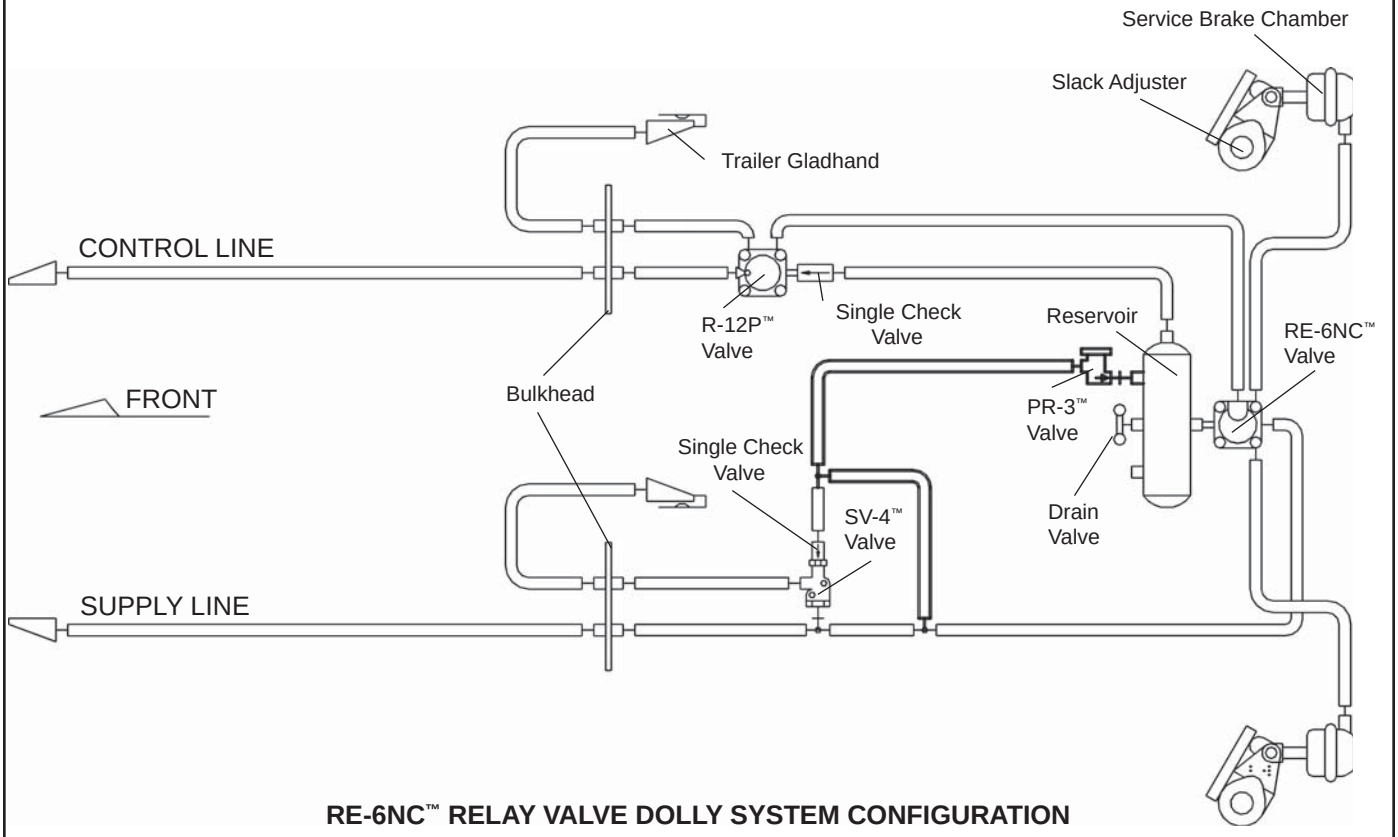


FIGURE 2 RE-6NC™ RELAY VALVE SPECIAL IDENTIFICATION TAG



RE-6™ RELAY VALVE DOLLY SYSTEM CONFIGURATION



RE-6NC™ RELAY VALVE DOLLY SYSTEM CONFIGURATION

FIGURE 3 - RE-6™ & RE-6NC™ RELAY VALVES SYSTEM CONFIGURATION

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 value.

The RE-6™/RE-6NC™ relay emergency valve may be flange or reservoir mounted. Ports are clearly identified for delivery, service, emergency (supply) and reservoir lines.

RE-6NC™ VALVE DESCRIPTION

The RE-6NC™ valve is a special non-charging relay emergency valve. It is used on dollies to comply with FMVSS 121. The RE-6NC™ valve eliminates the need for a protected reservoir to provide the release air for the trailer spring brakes when the following requirements are met:

- The trailer supply line must be 70 psi minimum with any leakage-type service system failure.

- The parking brake must not drag at trailer supply line pressures above 70 psi.

The relay function of the RE-6NC™ valve is identical to that of the RE-6™ valve, serving the dolly or trailer system as a remote controlled brake valve. The emergency function of the valve automatically applies full trailer reservoir air pressure to the trailer or dolly chambers when the trailer supply pressure falls below a predetermined minimum value. The major difference between the RE-6™ and the RE-6NC™ valve is that the RE-6NC™ valve allows supply pressure (initial charge) to release the spring brakes before the dolly or trailer reservoir(s) is filled.

RE-6™ & RE-6NC™ VALVE SYSTEM CONFIGURATION

In the RE-6™ valve dolly system, the supply air flows to the RE-6™ valve, passes through the valve, holding the chambers in the apply position while simultaneously filling the reservoir. In the RE-6NC™ valve dolly system, reservoir air is not supplied through the RE-6NC™ valve, as it is in the RE-6™ valve system. The supply air flows to the RE-6NC™ valve, acts upon the emergency piston, pushing the emergency piston toward the inlet / exhaust valve seat. System pressure in the chambers and reservoir are still at 0 psi in the RE-6NC™ valve system, allowing for faster trailer pull-away. In the RE-6NC™ valve system, air is also flowing to the PR-3™ valve, which will allow the air to flow on to the reservoir at a pressure setting of about 70 psi. The major difference between the RE-6™ valve and the RE-6NC™ valve is that the RE-6NC™ valve does not require the system to charge the reservoir to a predetermined psi before drive away is allowed. Refer to Figure 3.

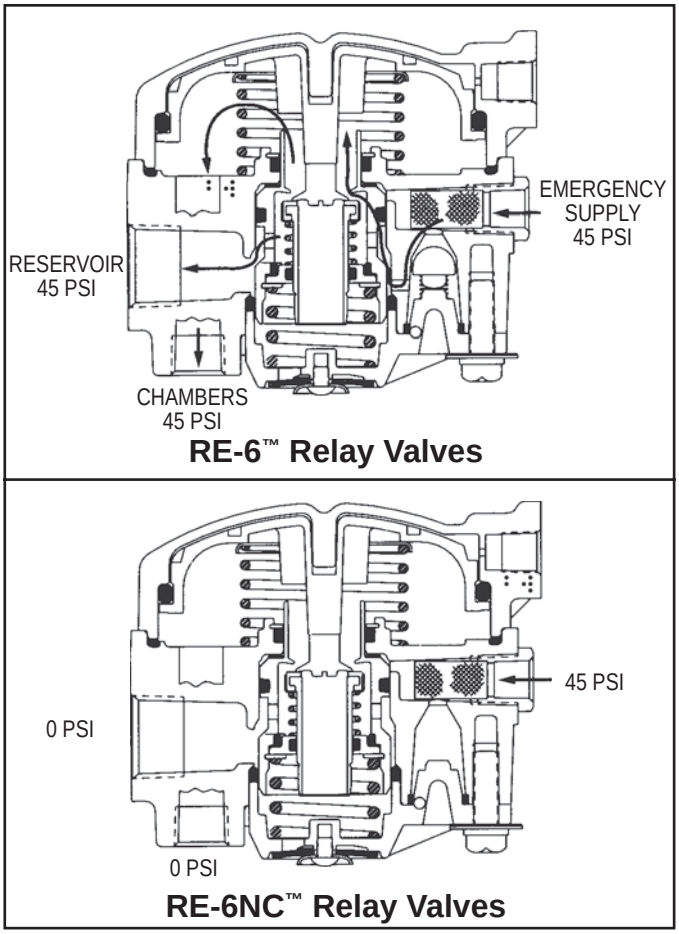


FIGURE 4 RE-6™ & RE-6NC™ RELAY VALVES CHARGING BELOW 45 PSI

CHARGING THE RE-6™ & RE-6NC™ VALVES BELOW 45 PSI

When the air brake system is charging below 45 psi, emergency supply air enters the RE-6™ and RE-6NC™ valves emergency port. In the RE-6™ valve the air acts on the check valve and the emergency piston. In the RE-6NC™ valve the air acts on the emergency piston, because there is no check valve present. This allows for faster drive away (reference FMVSS 121 regulation). In the RE-6™ valve, the supply air is forced past the check valve, flowing through the emergency piston shoulder and past the inlet / exhaust valve. The air flows to the upper portion of the valve, underneath the relay piston and out to the service brake chambers while simultaneously filling the reservoir with the same air that is passing through the emergency piston. In the RE-6NC™ valve, air is only acting upon the emergency piston. The check valve is not present. In replacement of the check valve, the RE-6NC™ valve uses a reservoir control valve (the Bendix® PR-3™ valve), to allow the reservoir to be filled. The PR-3™ valve is totally separate from the RE-6NC™ valve, but is necessary for proper operation of the RE-6NC™ valve. Air acts on the PR-3™ valve piston, but will not flow on to the reservoir until about 70 psi. Refer to Figure 4.

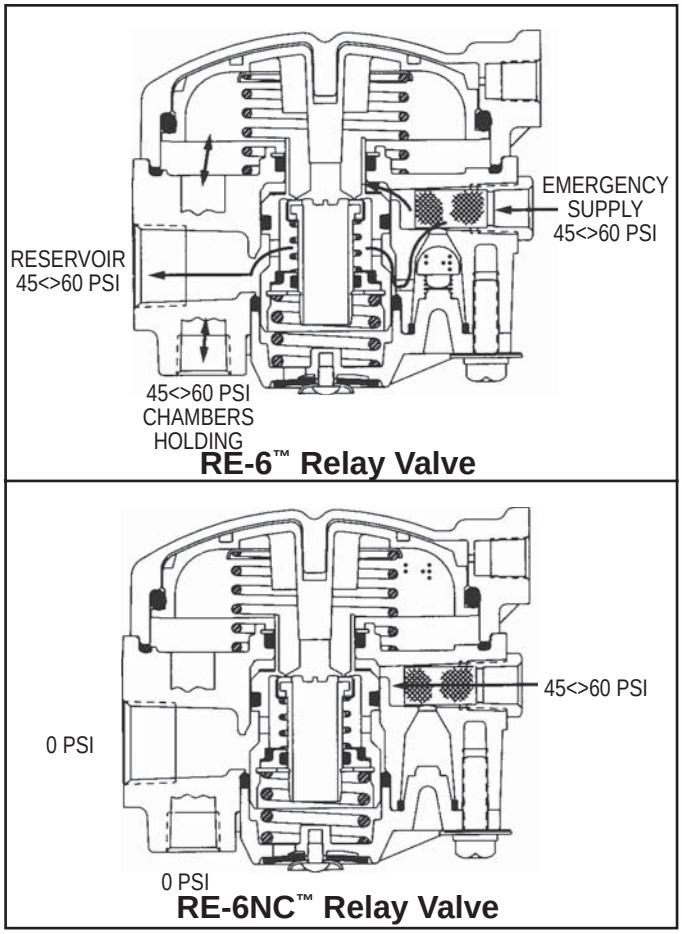


FIGURE 5 RE-6™ & RE-6NC™ RELAY VALVES CHARGING HOLD POSITION

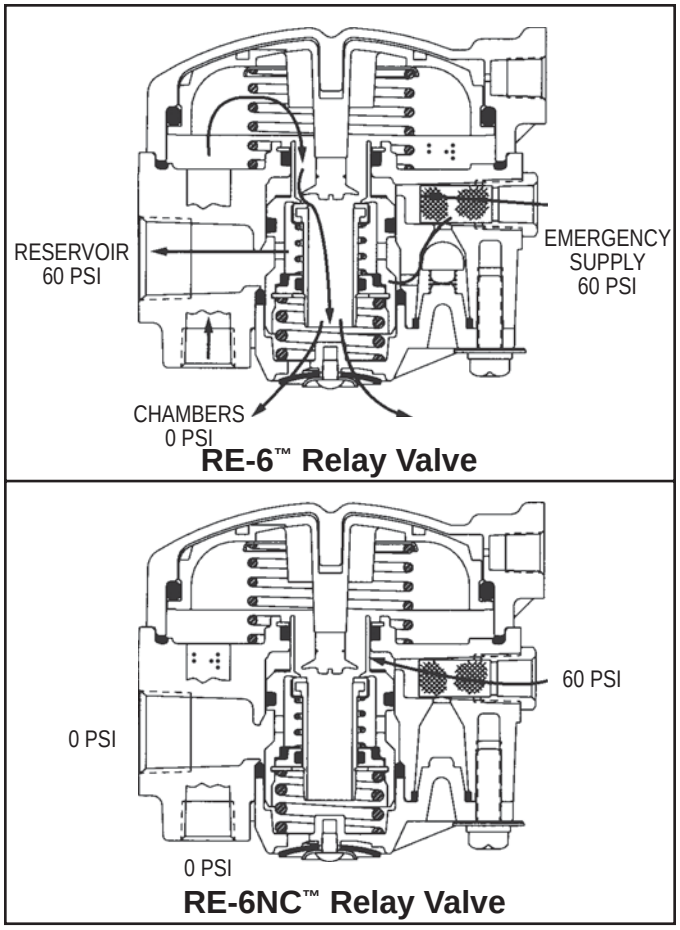


FIGURE 6 RE-6™ & RE-6NC™ RELAY VALVES CHARGING ABOVE 60 PSI

RE-6™ & RE-6NC™ VALVES CHARGING HOLD POSITION

In the RE-6™ valve, as pressure increases in the reservoir, the emergency piston is being pushed toward the seat on the inlet and exhaust valve. When the emergency piston reaches the seat of the inlet / exhaust valve, air is trapped between the new seal and the chambers, holding the chambers in the apply position. The check valve in the RE-6™ valve will continue to remain open, charging the reservoir. In the RE-6NC™ valve, air is acts on the emergency piston, but there is still 0 psi in the reservoir and the chambers. Air is also acting on the piston in the PR-4™ valve, but still has not reached the opening pressure of 70 psi. Refer to Figure 5.

CHARGING THE RE-6™ & RE-6NC™ VALVES ABOVE 60 PSI

In the RE-6™ valve, as pressure increase beyond 60 psi, the emergency piston and the inlet / exhaust valve, move from the seat of the primary piston, opening the exhaust valve to atmosphere allowing the service chambers to be exhausted. The air will flow from the service chambers, back through the RE-6™ valve and out the exhaust of the RE-6™ valve, allowing drive away. In the RE-6NC™ valve, air is still acting upon the emergency piston, but there is no pressure in the reservoir and the chambers. The emergency piston and inlet / exhaust valve have moved to the exhaust position, opening the exhaust portion of the valve to atmosphere. The PR-3™ valve remains closed until reaching 70 psi, allowing air to flow to the reservoir. Refer to Figure 6.

CHARGING THE RE-6NC™ VALVE ABOVE 70 PSI

Once system pressure reaches 70 psi, the PR-3™ reservoir control valve will open charging the reservoir(s). Simultaneously the emergency piston and inlet / exhaust valve of the RE-6NC™ valve is kept away from the seat of the primary piston (keeping the exhaust valve open to atmosphere). This is the major difference between the RE-6™ valve and the RE-6NC™ valve. The RE-6NC™ valve allows for quicker drive away, since the reservoir does not need to be filled before the brakes are released. Refer to Figure 7.

RE-6™ & RE-6NC™ VALVES SERVICE APPLICATION

During normal, service braking operation, the valve serves as a relay valve, synchronizes tractor service (application)

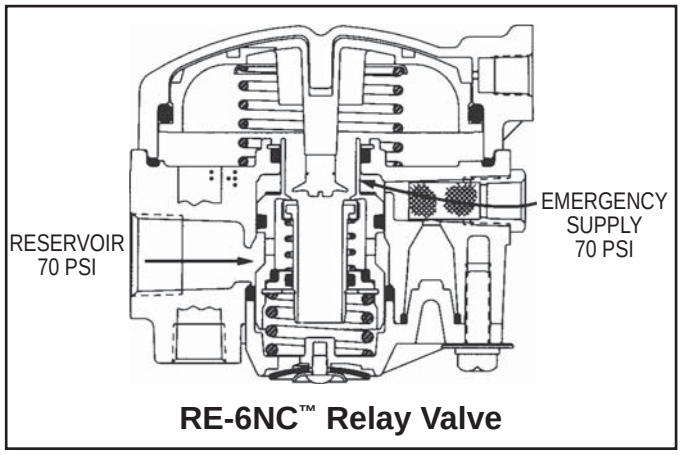


FIGURE 7 RE-6NC™ RELAY VALVE CHARGING ABOVE 70 PSI

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 (TC) valve, the trailer brakes can be applied independently of the tractor

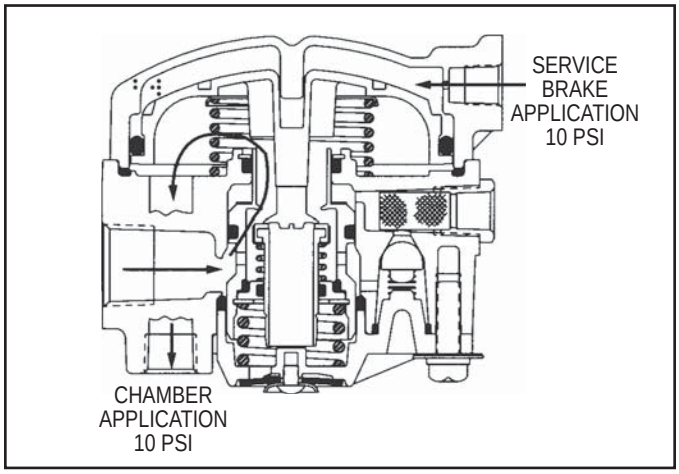


FIGURE 8 RE-6™ & RE-6NC™ RELAY VALVES SERVICE APPLICATION

brakes. Air is applied to the control port of the RE-6™ and RE-6NC™ valves, acting on the primary piston and moving the inlet / exhaust valve away from the seat on the emergency piston. Service application allows air to flow from the reservoir, past the shoulder (on the emergency piston) to the underside of the relay piston and on to the service chambers to apply the brakes. Refer to Figure 8.

RE-6™ & RE-6NC™ VALVES SERVICE HOLD

Air is still being applied to the control port of the RE-6™ and RE-6NC™ valves, but the relay piston has moved

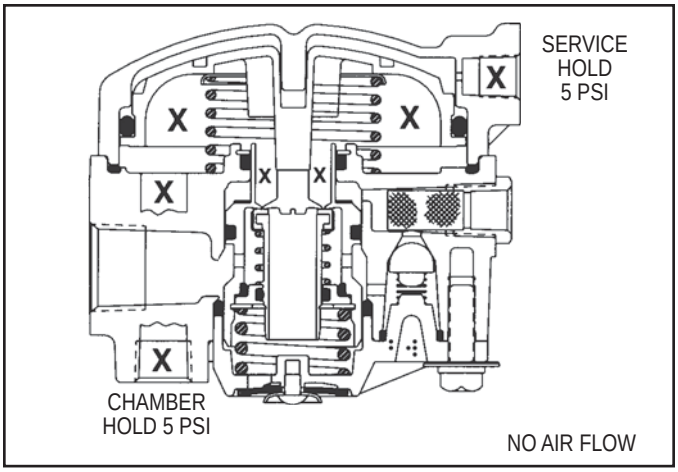


FIGURE 9 RE-6™ & RE-6NC™ RELAY VALVES SERVICE HOLD

enough to allow the inlet / exhaust valve to re-seat on the emergency piston and close the inlet / exhaust valve. Air is trapped between the seal of the emergency piston and inlet / exhaust valve and the service chambers, making the service brake application. The entrapment of air constitutes the holding position of the valve. At this time, no air is flowing through the valve. Refer to Figure 9.

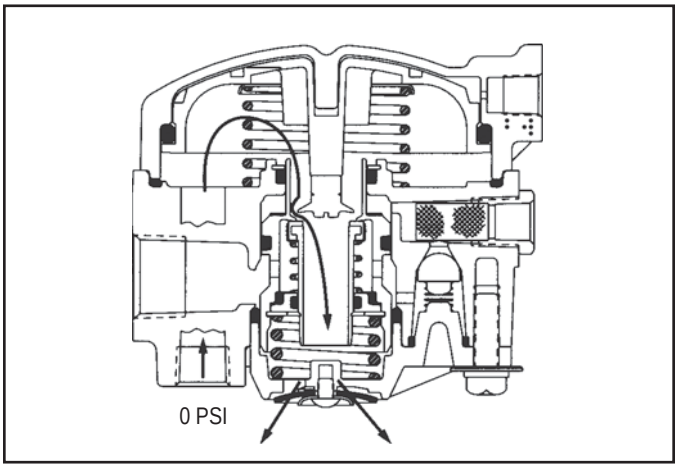


FIGURE 10 RE-6™ & RE-6NC™ RELAY VALVES SERVICE EXHAUST

RE-6™ & RE-6NC™ VALVES SERVICE EXHAUST

When air is removed from the control port of the RE-6™ and RE-6NC™ valves, the relay piston moves upward. As the air is let off the control port, the relay piston moves from its seat on the inlet / exhaust valve, opening the exhaust path to atmosphere. Air flows from the service chambers, past the relay piston, through the emergency piston and inlet / exhaust valve to atmosphere past the diaphragm. Refer to Figure 10.

RE-6™ & RE-6NC™ VALVES EMERGENCY APPLICATION

(Trailer air system charged to normal operating pressure). Venting the emergency supply line to atmosphere will cause the emergency portion of the relay emergency valve to apply full trailer reservoir pressure to the trailer service chambers. If the emergency supply line pressure is reduced to approximately 20 psi, a graduated trailer air chamber application will occur. The rate of this brake application will depend upon the rate of pressure loss in the emergency supply line.

In an emergency, air would be removed from the emergency supply line port of the RE-6™ and RE-6NC™ valves, allowing the emergency piston to return to its released position.

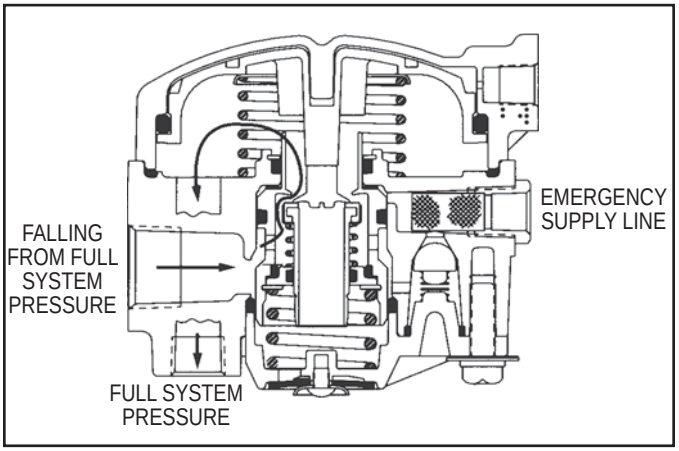


FIGURE 11 RE-6™ & RE-6NC™ RELAY VALVE EMERGENCY APPLICATION

When the emergency piston moves back to its released position, the seal is open between the emergency piston and the inlet / exhaust valve. The open valve allows air to flow from the reservoir, past the shoulder in the emergency piston, past the inlet / exhaust valve, past the underside of the relay piston moving on to the service chambers creating an emergency application. Full reservoir pressure will be applied to the service chambers and will not be removed until the pressure in the emergency port of the RE-6™ or RE-6NC™ valve reaches at least 60 psi. When the emergency port pressure reaches any pressure above 60 psi, the emergency piston and inlet / exhaust valve will move from the seat of the relay piston allowing the service chambers to exhaust the air. Refer to Figure 11.

If the dolly is not equipped with parking actuators (such as spring brakes), the wheels should be blocked to prevent trailer movement.

TO RELEASE AN EMERGENCY APPLICATION

RE-6™ & RE-6NC™ VALVES

Charge the 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 manufacturers service literature.)

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.**
11. **For vehicles with Antilock Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.**

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.

SERVICE CHECKS

1. Remove any accumulated contaminants. Visually inspect the valve's exterior for excessive corrosion or physical damage. Repair/replace the valve as necessary.
2. Inspect all air lines connected to the valve for signs of wear or physical damage. Repair/replace as necessary.
3. Test air line fittings for excessive leakage and tighten or replace as necessary.

OPERATIONAL AND LEAKAGE TESTS

1. Block the vehicle's wheels and fully charge the air system.
2. Apply and release the service brakes several times and check for prompt response of the brakes at all appropriate wheels.
3. With the air system fully charged, apply a soap solution to the RE-6™ or RE-6NC™ valve's exhaust port. Leakage of a 1" bubble in 5 seconds is permissible.
4. Make and hold a full brake application and again apply a leak check solution to the RE-6™ or RE-6NC™ valve's exhaust. Leakage of a 1" bubble in 3 seconds is permissible.
5. With the brakes still applied, apply a leak check solution around the valve where the cover meets the body. No leakage at this point is permitted.

If the valve does not function as described; or if leakage is excessive, repair the valve or replace it at any authorized parts outlet.

REMOVAL

1. Identify, mark or label all air lines and their connections to the RE-6™ or RE-6NC™ valve. Scribe a line across the body of the valve, including the valve cover. When the assembly process is reached, the line will serve as a reference to the position of the valve cover on the valve body. Disconnect the air lines.
2. Remove the RE-6™ or RE-6NC™ valve from the vehicle.

INSTALLATION

1. Use the mounting bracket provided with the valve, or, if securing the valve to a reservoir, use a Schedule 80 (heavy wall) short couple, pipe nipple.
2. Reconnect all air lines to the valve using the identification made during removal.
3. Test all air fittings for excessive leakage and tighten as needed. Also, perform OPERATIONAL AND LEAKAGE TESTS before placing the vehicle back into service.

DISASSEMBLY

The following procedure is for reference only. Always have the appropriate maintenance kit on hand, and use its instructions in lieu of those presented here. Refer to Figure 12 throughout. CAUTION: The RE-6™ & RE-6NC™ valve may be lightly clamped in a bench vise during disassembly. However, over-clamping will cause damage to the valve and result in leakage and/or malfunction. If a vise is used, position the valve so the jaws bear on the supply ports on opposing sides of the valve's body.

1. Remove the four screws that secure the cover to the body, set aside, and then slowly remove the cover.
2. Remove and discard the sealing ring(6) from sealing ring grove located at the top of the valve body.
3. If a spring(5) is present (positioned between the bottom side of the relay piston and the upper portion of the valve body) set aside for the assembly process.
4. Remove the relay piston(3) from the valve body. It may be necessary to tap the valve body lightly in order to dislodge the relay piston from the valve cover.
5. Remove and discard the large o-ring(2) on the relay piston.
6. Remove and discard the exhaust valve seat(4) from the relay piston.

7. Remove and discard o-ring(7) from under the crimped-on retaining ring located in the upper portion of the valve body.
8. Turn the valve over, holding the exhaust cover, remove the 3 cap screws(27) from the exhaust cover(22). Remove the spring(20) and set the cap screws and spring aside for the assembly process.
9. Remove and discard the small o-ring(19) from the exhaust cover (located on the check valve post).
10. The RE-6NC™ valve will not have a check valve(17) and spring(18).
11. Remove and discard the check valve (17) and spring(18) in the RE-6™ valve.
12. Remove and discard the diaphragm(23) from the exhaust cover. Set screw(25) and washer(24) aside for the assembly process.
13. Remove the emergency piston(9) and inlet / exhaust valve(10) assembly by pushing the assembly through the valve body, from the relay piston side of the valve. The whole assembly will come out of the valve body as one unit.
14. Remove and discard o-ring(8) located in the grove of the emergency piston.
15. Remove and discard o-ring(21), which creates the seal between the emergency piston and the exhaust cover.
16. Remove valve retainer(16) with appropriate pliers and set aside for the assembly process.
17. Remove and discard all internal parts. Valve guide(15), o-rings(13&14), spring(12), valve retainer(11), inlet / exhaust valve(10).

CLEANING & INSPECTION

1. Using mineral spirits or an equivalent solvent, clean and thoroughly dry all metal parts. Do not damage bores with metal tools.
2. Wash all non-metallic components in a soap and water solution. Dry thoroughly.
3. Inspect interior and exterior of all metal parts for severe corrosion, pitting, and cracks. Superficial corrosion and/or pitting on the exterior of the body and cover is acceptable. Replace the entire valve if the body or cover interior show signs of corrosion or pitting.
4. Inspect each non-metallic component for cracks, wear, or distortion. Replace the valve if these conditions are found.
5. Make certain the air channel running from the cover through the top surface of the body to the supply port is clear and free of obstruction.
6. Inspect the pipe threads in the body. Make certain they are clean and free of thread sealant.
7. Inspect all air line fittings for corrosion. Replace as necessary. Remove all old thread sealant before reuse.

ASSEMBLY

Before assembly, lubricate all o-rings, seals, and pistons as well as body and cover bores, using the lubricant provided in the maintenance kit. Use all of the lubricant, and spread it evenly on the rubbing surfaces.

1. Install o-ring(8) into the grove on the emergency piston(9).
2. Install the inlet / exhaust valve assembly into the emergency piston. Packaged as 1 unit.
3. With Tru-Arc pliers, install valve retainer(16), making certain it is in the grove in the emergency piston.
4. Install the emergency piston(9) (including the inlet / exhaust valve assembly just installed) into the valve body.
5. Install the spring(20) in body.
6. Install o-ring(19) on to the check valve post, located on the exhaust cover.
7. Install the diaphragm(23) on to the exhaust cover, securing it with the screw(25) and washer(24) set aside in the disassembly process.
8. For the RE-6™ valve, install the small check valve spring(18) on to the check valve(17) and drop into the check valve cavity. The spring will fit in groove on the exhaust cover (making sure spring is positioned in the center of the cavity). If changing the RE-6NC™ valve, discard the check valve(17) and spring(18).
9. Install o-ring(21) into channel between the valve body and emergency piston.
10. Turn the valve over and install o-ring(7) in the channel under the crimped-on retaining ring located in the upper portion of the valve body. (This must be done before the exhaust cover is installed because the emergency piston will cover this o-ring).
11. Turn the valve back over and install the exhaust cover(22). Install cap screws and lock washers, torque to approximately 100 inch pounds.
12. Turn the valve over and install the sealing ring(6) in the grove located at the top of the valve body.
13. Apply the adhesive sealant to the seat(4) threads and install in to the relay piston.
14. Install the o-ring(2) around the relay piston(3).
15. Insert the relay piston(3) into the valve cover(1) and push the piston to the top of the cover.
16. If so equipped, install the piston return spring(5).
17. Install the cover to body, making certain the scribe marks line up marked in the "REMOVAL" section.
18. Torque the cap screws to approximately 100 inch pounds.
19. Perform OPERATIONAL AND LEAKAGE TESTS before returning the vehicle to service.

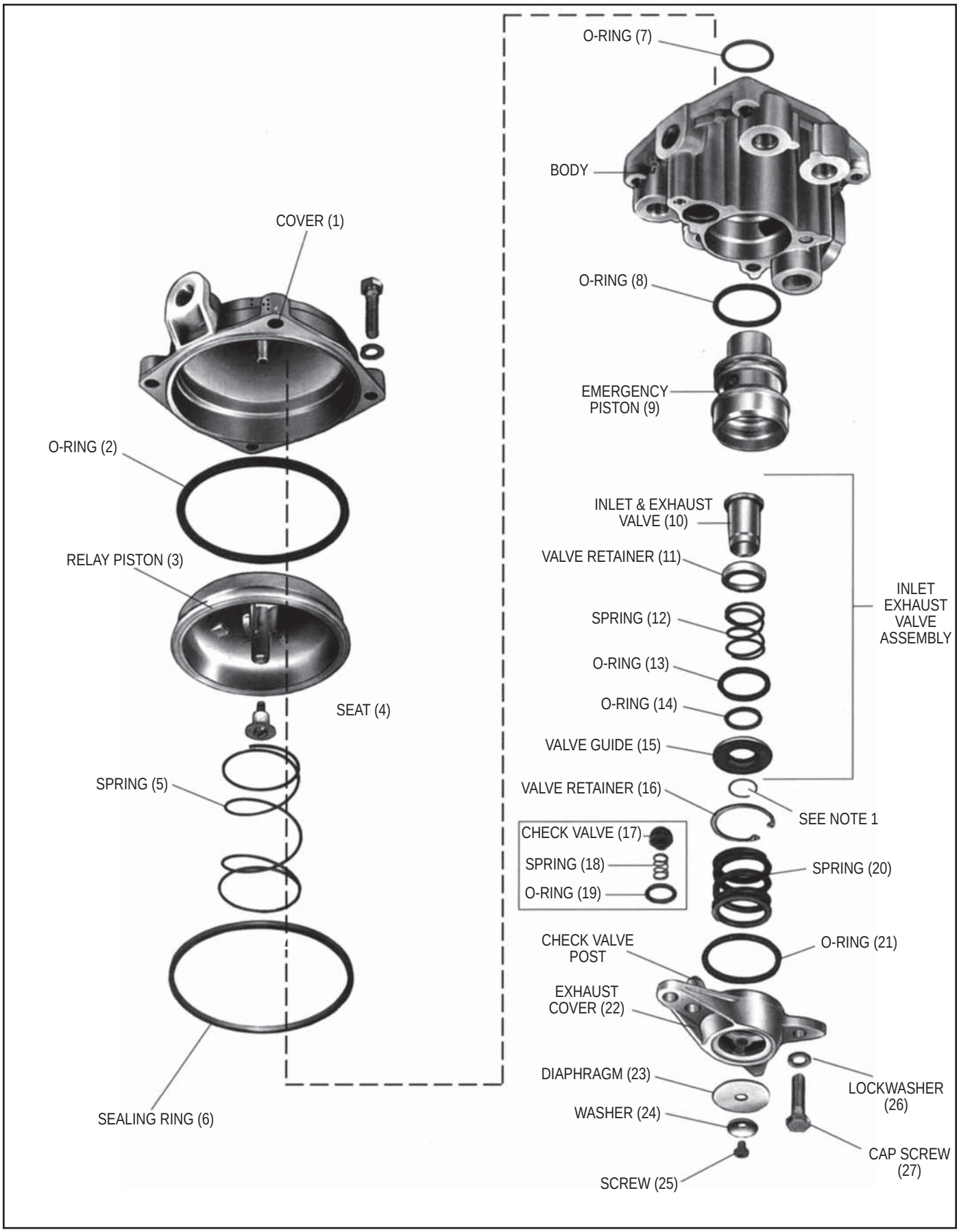


FIGURE 12 EXPLODED VIEW

Note 1: The OE production valve does not have this valve retainer. The maintenance kit includes the retaining ring to hold together the inlet/exhaust valve. The inlet/exhaust valve comes as one piece in the maintenance kit.

OPERATION

Air flow in the normal direction moves the check valve from its seat, and the flow is unobstructed. Flow in the reverse direction is prevented by the seating of the ball or wafer-type disc, which is caused by a drop in up-stream air pressure and assisted by the spring.

PREVENTATIVE MAINTENANCE

Every six months, 1,800 operating hours or every 50,000 miles inspect all parts.

Replace any check valves leaking or showing signs of wear or deterioration. Check for proper operation.

OPERATION & LEAKAGE CHECKS

NOTE: Depending upon installation, it may be easier or necessary to completely remove check valves so that the following checks may be made.

With air pressure present at outlet side of check valve and the inlet side open to atmosphere, coat the open end of the check valve with soap suds; a 1" bubble in 5 seconds is permissible.

If the check valve does not function as described, or leakage is excessive, it is recommended that it be replaced with a new genuine Bendix part available at any Bendix parts outlet.

REMOVAL

Block and hold vehicle by means other than air brakes.

Completely drain all reservoirs.

Disconnect air lines at single check valve and remove.

DISASSEMBLY/ASSEMBLY

Note: There are no Disassembly/Assembly procedures for SC-3™ valves. They are non-serviceable items. If a valve does not meet the Operational and Leakage tests, it should be replaced at any authorized Bendix parts outlet.

TESTING AND TROUBLESHOOTING

Perform “Operating and Leakage Checks”.