



Service Data

SD-03-1000

Bendix® Dual Relay Valve

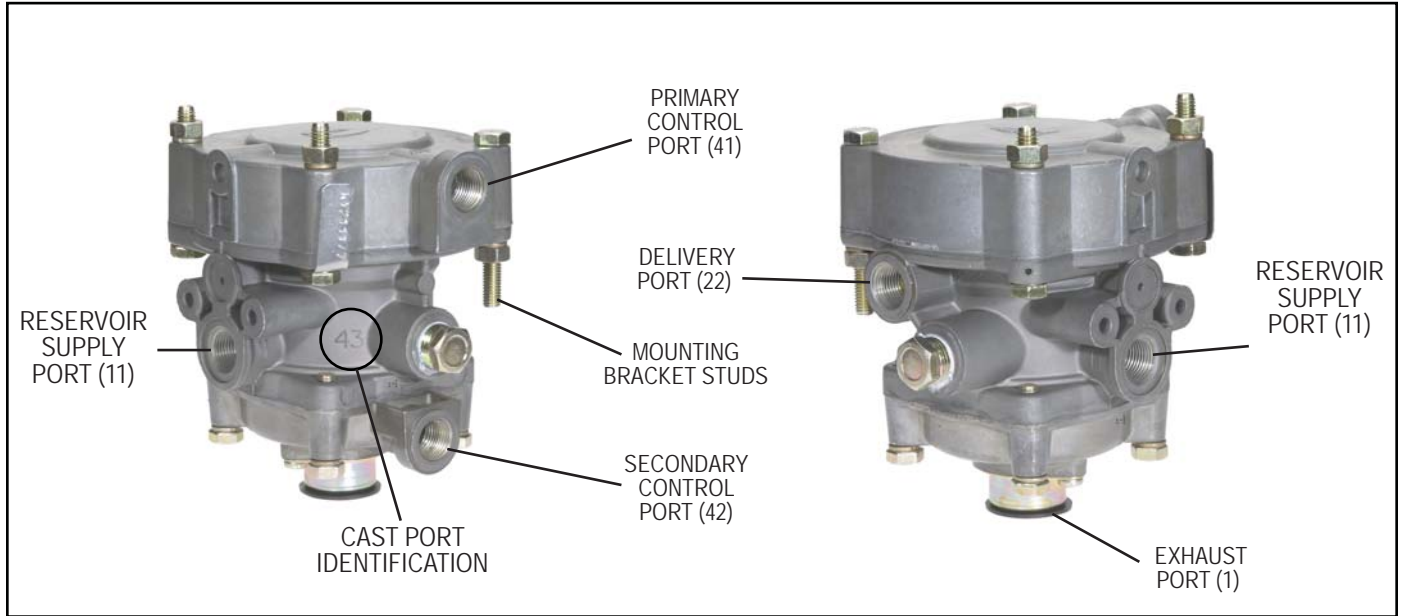


FIGURE 1 - DUAL RELAY VALVE

DESCRIPTION

The Dual Relay Valve is a special purpose, multifunction relay valve. It is typically used on articulated vehicles with three or more axles. Normally mounted at the rear of the vehicle, in proximity to the valves and chambers served, its function is similar to a pilot relay and speeds the application and release of control air pressure to the service relay valve(s) on the rear most axle or axles of the vehicle. The Dual Relay Valve is a pilot relay valve that responds to the control air delivered to it from both circuits of the foot brake valve. The Dual Relay Valve is controlled independently by the front (secondary) and mid (primary) delivery circuits of the dual circuit foot brake valve.

The Dual Relay Valve is supplied air from the rear axle(s) service reservoir that is isolated from the other service reservoirs forming a third service brake circuit on the vehicle. With the addition of a third brake circuit the vehicle will maintain braking on at least two axles in the event of a single service system malfunction. In systems where this valve is used, the brake circuits are designated as Front (steering) Axle, Mid-Axle and Rear Axle.

Although typically nipple mounted to the rear service reservoir the valve can be bracket mounted. Only four (4) ports are utilized in the die cast body of the Dual Relay Valve. All air connections are identified with raised numerals with the following designations:

<u>Port ID</u>	<u>Size</u>	<u>Designation</u>
41	3/8 NPTF	Primary Control Port
42	3/8 NPTF	Secondary Control Port
12, 43	Plugged	Not used
22	3/8 NPTF	Delivery
11	3/8 NPTF	Rear Service Reservoir

OPERATION

Refer to figures 1 and 2. Each service reservoir is isolated and is protected from loss of air in other service reservoirs. The front and mid-axle service reservoirs supply air directly to the secondary and primary circuits of the foot brake valve, as well as antilock and traction components for their respective circuits. The rear axle service reservoir supplies air to the Dual Relay Valve, as well as the rear axle service antilock relay and traction components.

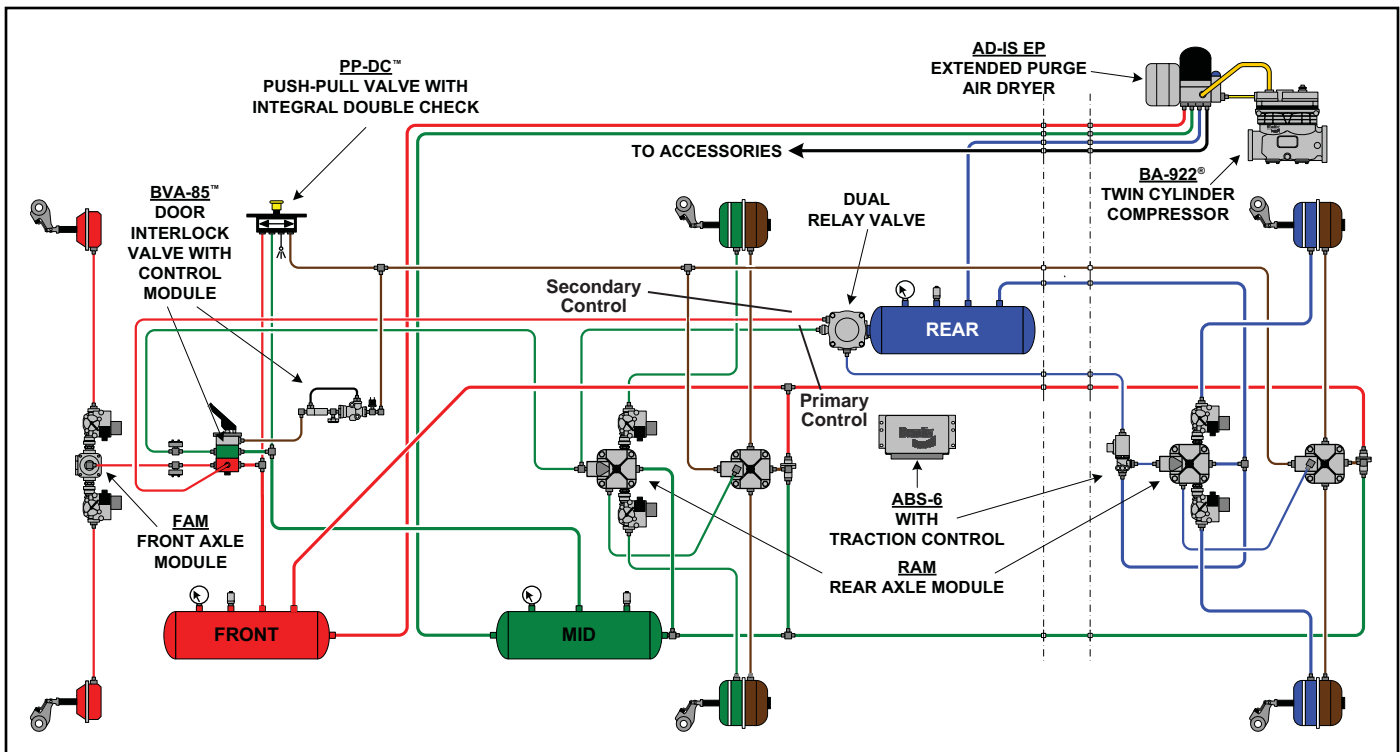


FIGURE 2 - TYPICAL ARTICULATED COACH SCHEMATIC

System Normal

With the system normal and air pressure available in all service reservoirs, brake application pressure is transmitted from the primary and secondary circuits of the foot brake valve.

Application pressure is transmitted simultaneously to the front and mid-axle brakes and to the primary and secondary control ports of the Dual Relay Valve. The Dual Relay Valve applies or releases the rear axle brakes in direct proportion to the control signals received from the foot brake valve. The brake on each axle are applied using pressure from their dedicated respective reservoirs.

Loss of Front Axle Service Reservoir

A service application made with a loss of air in the secondary circuit results in a no or low application of the front axle brakes. Air pressure from the primary circuit of the foot brake valve applies the mid-axle brakes and enters the primary control port of the Dual Relay Valve. The Dual Relay Valve responds to primary control and applies the rear axle brakes. Brake release occurs when foot brake valve pressure is removed.

Loss of Mid-Axle Service Reservoir

A service application made with a loss of air in the primary circuit results in a no or low application of the mid-axle brakes. Air pressure from the secondary circuit of the foot brake valve applies the front axle brakes and enters the secondary control port of the Dual Relay Valve. The Dual Relay Valve responds to secondary control and applies the rear axle brakes. Brake release occurs when foot brake valve pressure is removed.

Loss of Rear Axle Service Reservoir

With a loss of rear axle service pressure, the front and mid-axle brakes will be applied by the foot brake valve. Primary and secondary control pressure is received by the Dual Relay Valve however, a no or low application of the rear brakes will occur due to a loss of pressure in the rear service reservoir. Front and mid-axle brakes will release when foot brake valve pressure is removed.

PREVENTIVE MAINTENANCE

GENERAL

Important: Preventive maintenance for the Dual Relay Valve consists entirely of inspections and tests. The Dual Relay Valve is not serviceable and must be replaced when testing or inspection warrants it. Kits and replacement parts are not available.

Because no two vehicles operate under identical conditions, maintenance and maintenance intervals will vary. Experience is a valuable guide in determining the best maintenance interval for any one particular operation.

Perform the tests and inspections presented at the prescribed intervals. If the Dual Relay Valve fails to function as described or leakage is excessive, it must be replaced with a genuine Bendix unit, available at any authorized parts outlet.

Every 3 months, or 25,000 miles or 900 operating hours:

1. Remove any accumulated contaminants and visually inspect the exterior for excessive corrosion and physical damage.

2. Inspect all air lines connected to the Dual Relay Valve for signs of wear or physical damage. Replace as necessary.
3. Test air line fittings for excessive leakage and tighten or replace as necessary.
4. Perform the Leakage Test described in this manual.

Every year, 100,000 miles, or 3,600 operating hours:

1. Perform the Operation and Leakage Tests described in this manual.

GENERAL SAFETY GUIDELINES

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.

OPERATION & LEAKAGE TESTS

LEAKAGE TESTS

1. Fully charge the air system making certain that the rear service reservoir is fully charged.
2. With the system fully charged, check for leakage at the rubber exhaust flap of the valve. Coat the exhaust flap with a soap solution. A 1 inch bubble in not less then 3 seconds is permitted (175 sccm max.).
3. Make a full brake application and hold it while checking for leakage at the rubber exhaust port check of the valve. Coat the exhaust port with soap solution. A 1 inch bubble in not less then 3 seconds is permitted (175 sccm max.).

OPERATION TESTS

General

To complete the operational tests two accurate test gauges and the appropriate fittings to "tee" the gauges into the various lines are required. Testing requires that one gauge be installed and remain in the line connected to the delivery port 22 throughout the operational testing. The second gauge will be alternately installed in the primary control line leading to port 41 and the secondary control line leading to port 42.

1. Install the gauge in the delivery line leading to port 22.
2. Install the gauge in the primary control line leading to port 41.
3. Remove and PLUG the line leading to the secondary control port 42.

- Charge the air system to governor cutout. While observing both test gauges, make, hold and release several brake applications at various pressures. Delivery port (22) pressure should rise to the pressure indicated below (+/- 5 psi) and promptly return to zero pressure upon release of the brake valve.

Primary Control (41)	Delivery port (22)
20 psi	20 psi
40 psi	40 psi
60 psi	60 psi
100 psi	100 psi

- UNPLUG the line leading to the secondary control port 42.
- Remove the gauge from the line leading to the primary control port 41. Remove and PLUG the line leading to the primary control port 41.
- Install the gauge in the line leading to the secondary control port 42 and reinstall the line in port 42.
- Charge the air system to governor cutout. While observing the test gauges installed in the secondary control line leading to port 42 and delivery port 22 make, hold, and release several brake applications at various pressures. Delivery port 22 pressure should rise to the pressure indicated below (+/- 5 psi) and promptly return to zero pressure upon release of the brake valve.

Secondary Control (42)	Delivery port (22)
20 psi	10 psi
40 psi	30 psi
60 psi	50 psi
100 psi	95 psi

- Remove the gauge from the secondary control line leading to port 42.
- UNPLUG and reconnect the primary control line leading to port 41.
- Remove the gauge from the line leading to the delivery port 22.
- Make certain all lines and fittings are returned to their original pretest positions and tightened sufficiently to prevent leakage. Make and hold a full brake application and test all lines and fittings for leakage and note that the Dual Relay Valve is operating correctly.

If the valve does not function as described or if leakage is excessive, replace the Dual Relay Valve with a genuine Bendix replacement.

