

Section 9: Air Brake System Troubleshooting Tests

Please follow all standard safety precautions, including, but not limited to, the general precautions listed on page 4 of this handbook.

TEST ONE

In this test we check the low pressure warnings, pressure buildup and governor cut-out and cut-in.

Park the vehicle and chock the wheels.

1. **Drain all reservoirs (air tanks) to 0 PSI.**
2. **Start the engine and run it at fast idle. Is the low pressure indicator buzzer working?**

OK Not OK

Observe the low pressure warning dash warning light - does it switch off at or above 60 PSI?

OK Not OK

Note: Some vehicles have alternate indicator devices. Also, on vehicles with antilock, the ABS indicator lamp will also come on momentarily when ignition is turned on.

Troubleshooting: If the low pressure warning light or buzzer doesn't come on: (a) Check the wiring and/or bulb, (b) Repair or replace the wiring, buzzer, bulb or low pressure indicator switch(es) as needed.

3. **Time how long it takes to build air pressure from 85 PSI up to 100 PSI. Does this take less than 40 seconds?**

OK Not OK

Troubleshooting: If build up time exceeds 40 seconds:

- (a) Examine the compressor air strainer and clean or replace as needed.
- (b) Check for a restricted inlet line if the compressor does not have a strainer, repair or replace as necessary.
- (c) Check compressor discharge port and line for excessive carbon (more than 1/16" coating). Clean or replace as necessary.

(d) With the air brake system charged, engine off and governor compressor in unloaded mode, listen for leakage at the compressor inlet. If leakage can be heard, apply a small amount of oil around the unloader pistons. If no leakage is indicated, then the leakage is through the compressor discharger valves.

(e) Check the compressor drive for slippage.

4. **Check vehicle manufacturer's recommendation for full air tank pressure. Does the governor cut-out at the correct pressure? (Typically between 100-130 PSI)**

OK Not OK

Troubleshooting: If the governor cut-out is higher or lower than specified by the vehicle manual:

(a) For adjustable governors, adjust using a temporarily-installed gauge of known accuracy. If the vehicle has a non-adjustable governor, replace it.

(b) See the Service Data sheet for the compressor to verify that the unloader mechanism is operating correctly before replacing governor.

5. **Reduce reservoir (air tank) pressure by repeatedly applying the service brakes until the governor cut-in. Is the difference between cut-in and cut-out pressure 25 PSI or less?**

OK Not OK

Troubleshooting: A difference of less than 25 psi indicates a malfunctioning governor. Replace the governor.

Retest to check out all items repaired or replaced.

Make all necessary repairs before proceeding to Test Two.

TEST TWO

Air Leakage

Inspect for air leaks when working on a vehicle and repair them promptly.

Park the vehicle on level ground and chock wheels. Build system pressure to governor cut-out and allow the pressure to stabilize for one minute.

Step 1: Observe the dash gauges for two additional minutes without the service brakes applied.

Step 2: Apply the service brakes and allow the pressure to stabilize. Continue holding for two minutes (you may use a block of wood to hold the pedal in position.) Observe the dash gauges. (Note: The Bendix® BVA-85™ brake valve actuator enables pre-trip brake inspections safely and easily with only one person. See page 46 for more details.)

If you see a decrease of the dash air gauge readings of more than:

- 4 psi for either service reservoir,
- 6 psi for a tractor/trailer combination,
- 8 psi for a tractor with two trailers,

during either two minute test, repair leaks and repeat this test to confirm that the air leaks have been repaired. NOTE: (A leak detector or soap solution will aid in locating the leak.)

Air leaks can also be found in the charging system, parking brakes, and/or other components (e.g. supply lines and fittings, low pressure indicator(s), relay valves, antilock modulators, dual brake valve, trailer control valve, park control valve, tractor protection valve, spring brake actuators, safety valve in supply reservoir, governor, compressor discharge valves) - inspect and repair as necessary.

Retest to check out all items repaired or replaced.

Make all necessary repairs before proceeding to Test Three.

TEST THREE

Brake chamber push rod travel

Check brake chamber push rod travel.

(Refer to chart for allowable tolerances)

| Brake Chamber Size | Maximum Stroke Before Readjustment |
|--------------------|------------------------------------|
| 12 | 1 1/8" |
| 16 | 3/4" |
| 20 | 3/4" |
| 24 | 3/4" |
| 30 | 2" |

The angle formed between the brake chamber push rod and the slack adjuster arm should be approximately 90° with an 80-90 psi brake application (as measured with a test gauge either at the control gladhand or at the brake valve primary delivery). If the angle between the brake chamber push rod and the slack adjuster arm is not approximately 90° then adjust slack adjuster arm to obtain desired setting. If the brake chamber push rod travel exceeds the allowable tolerance, then adjust the adjuster arm to obtain the desired setting.

Retest to check out all items repaired or replaced.

Make all necessary repairs before proceeding to Test Four.

TEST FOUR

Parking Brake Application

Check with air system at full pressure, engine idling between 600-900 RPM

1. Manually operate the park control valve and note that parking brakes apply and release promptly as the control valve button is pulled out and pushed in.

For Tractor/Trailer Combinations:

(Do not use this test for a straight truck, buses, and bobtail tractors:)

1. Manually operate the tractor protection control valve (trailer supply valve usually red octagonal button). Note that the trailer brakes apply and release promptly as the control button is pulled out and pushed in.

2. Manually operate the system park control (usually yellow diamond button) and note all parking brakes (tractor and trailer) apply promptly.

If sluggish performance is noted in either test, check for:

1. Dented or kinked lines
2. Improperly installed hose fitting
3. A faulty relay emergency valve
4. A faulty modulator(s)

If the trailer brakes do not actuate and the trailer supply line remains charged, check the:

1. Tractor protection control
2. Trailer spring brake valve

Retest to check out all items repaired or replaced.

Make all necessary repairs before proceeding to Test Five.

TEST FIVE

Automatic Emergency System

Check with air system at full pressure, with the engine stopped.

1. Drain front axle reservoir to 0 PSI.
 - A. Rear axle reservoir should not lose pressure
 - B. On combination vehicles, the trailer air system should remain charged
 - C. Tractor and trailer brakes should not apply automatically
2. With no air pressure in the front axle reservoir make a brake application.
 - A. Rear axle brakes should apply and release
 - B. On combination vehicles the trailer brakes should also apply and release
 - C. The stop lamps should illuminate
3. Slowly drain rear axle reservoir pressure.
 - A. With the button out, supply either supply port with 120 psi of air. Then push the button in. The air pressure should rise in the delivery volume equivalent to supply pressure. Pull the button out. The delivery pressure should exhaust to 0 psi. Build each supply source to 120 psi and decrease supply pressure at the secondary service reservoir supply port at a rate of 10 psi per second. Primary supply pressure and delivery pressure should not

drop below 100 psi. Repeat the test for decreasing primary service reservoir pressure. Build each supply source to 120 psi. Then decrease both supply pressures to below 20 to 30 psi. The button should automatically "pop" out when pressure drops within that range.

- B. The tractor protection valve should close between 45 PSI and 20 PSI and the trailer supply hose should be exhausted
- C. Trailer brakes should apply after tractor protection closes
4. Slowly drain the rear axle reservoir pressure.
5. Close drain cocks, recharge the system and drain the rear axle reservoir to 0 PSI.
 - A. Front axle reservoir should not lose pressure
 - B. On combination vehicles the trailer air system should remain charged
6. With no air pressure in the rear axle reservoir, make a brake application.
 - A. The front axle brakes should apply and release
 - B. On combination vehicles the trailer brakes should also apply and release
 - C. If the vehicle is equipped with an inverting relay spring brake control valve, the rear axle brakes should also apply and release

If the vehicle fails to pass the tests above, then check the following components for leakage and proper operation:

1. Fittings
2. Check for kinked hoses or tubing
3. Single check valves
4. Double check valves
5. Tractor protection valve
6. Tractor protection control valve
7. Parking control valve
8. Relay valves (antilock modulators)
9. Trailer spring brake control valve
10. Inverting relay spring brake control valve (optional on straight trucks and buses)

Retest to check out all items repaired or replaced.