AIR BRAKE SYSTEM TROUBLESHOOTING

SYMPTOM

Compressor
- Passes excessive oil
- Excessive build up and recovery time (85-100 PSI in 40 seconds with engine at full governed RPM)

Noisy compressor

Pumps beyond cut-out

Governor
- Flutters

Air Dryer
- Dryer is constantly cycling or purging
- Dryer does not purge or exhaust air

Supply Reservoir
- Excessive water accumulation
- Excessive oil accumulation

Front Brakes Reservoir
- Excessive oil or water accumulation
- Losses air pressure

Rear Brakes Reservoir
- Excessive oil or water accumulation
- Losses air pressure

Safety Valve
- Pops off at 150 PSI
- Pops off below 150 PSI
- Will not function

One-Way Check Valve
- Allows air to bleed back to supply reservoir

CAUSE

Restricted oil return
- Restricted oil return
- Excessive ring wear
- Restricted air intake
- Excessive engine crankcase pressure
- Excessive air leak in system
- Restricted air discharge line, or sticking reservoir inlet check valve
- Unloader valves sticking
- Faulty or mis-adjusted air governor
- Faulty compressor drive
- Loose drive gear or pulley
- Excessive worn drive gear
- Governor is improperly installed
- Unloader valves sticking
- Restricted reservoir line
- Out of adjustment
- Excessive air leak in system
- Defective governor
- Defective check valve between dryer and first tank
- Kinked or plugged discharge
- Excessive air leak in system
- Line between governor and dryer kinked, plugged or frozen
- Faulty heater or thermostat (allowing purge valve to freeze)
- Faulty purge valve
- Failure to drain tank
- Compressor passing excessive oil
- Contaminated air dryer desiccant cartridge
- See #4
- See #8 and #11

REMEDY

Make sure oil return line is free of kinks and sharp bends. Minimum return line should be 5/8" O.D. or 1/2" I.D. Make sure oil return line to compressor and mating engine surfaces are clear and aligned. Use caution when using gasket sealant.

Check air intake to make sure air is properly filtered. Check discharge line for restriction or carbon build up. Clean or replace as necessary. Check compressor cooling system. Min. water line – 1/2" O.D. Min flow rate – 2.5 gal/min at engine governor speed. Water temp. 200°F max.

Check governor or compressor air cleaner – replace as necessary.

Test for excessive engine crankcase pressure. Clean breather or replace positive crankcase ventilation valve.

Check air valves for leaks at exhaust ports. Check lines for cracks or leaks at fittings.

Check discharge line for restrictions and carbon build-up. Clean or replace line as necessary.

Clean and lubricate. If plungers are bent, replace with new unloader kit.

Replace governor.

Check pulley to make sure belt is not slipping. If gear driven check gear. Replace if worn.

Check compressor drive system. Tighten if necessary. Torque the crankshaft nut to 100 ft. lbs. maximum. Do not use impact wrench.

Inspect drive gear and coupling. Sear gears should be replaced when compressor is changed.

Test governor for proper operation. Inspect air lines to and from governor for kinks and restrictions. Replace if necessary.

Clean and lubricate, if unloader stems are worn, replace.

Check governor reservoir line for kinks, restriction. Clean or replace line as necessary.

Only adjust after making sure gauge is accurate. To raise pressure setting, turn adjustment screw counter-clockwise. To lower pressure setting, turn adjusting screw clockwise (1/4 turn = 416 PSI.)

See #1 cause - Excessive air leak

Check governor for proper "cut-out" pressure. Repair or replace governor.

Repair or replace as necessary.

Check to see that air is passing through compressor discharge line. Check for kinks, bends or excessive carbon build up. Clean or replace discharge line.

See #1 cause - Excessive air leak

Check to make sure air flows through purge control line when compressor is unloaded. Clean or replace purge control line.

Repair or replace thermostat/heater.

After determining air reaches purge valve, repair or replace purge valve.

Drain tank daily. Install air dryer or automatic drain valve.

See #1.

Replace desiccant cartridge.

QUALITY HEAVY DUTY PARTS
### AIR BRAKE SYSTEM TROUBLESHOOTING

| Component | Fault | Repair/Replacement
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Pressure Switch</td>
<td>Will not operate at pressures below 60 PSI</td>
<td>Repair or replace #5.</td>
</tr>
<tr>
<td>Buzzer or light will not operate</td>
<td></td>
<td>Check all wiring and ground to buzzer, light and low pressure switch.</td>
</tr>
<tr>
<td>Dash Gauge</td>
<td>Faulty buzzer or light</td>
<td>Repair or replace #10.</td>
</tr>
<tr>
<td>Improper reading</td>
<td>Faulty dash gauge</td>
<td>Calibrate or replace gauge #10.</td>
</tr>
<tr>
<td>Two-Way Check Valve</td>
<td>Foot valve leaks at exhaust port when hand valve is applied.</td>
<td>Replace valve #10.</td>
</tr>
<tr>
<td>Front or rear brake reservoir loses air pressure</td>
<td>Hand valve leaks at exhaust port when brake valve is applied.</td>
<td>Replace valve #12 or #19.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace valve #12.</td>
</tr>
<tr>
<td>Limiting and Quick Release Valve</td>
<td>Front brakes release too slowly.</td>
<td>Replace valve #13.</td>
</tr>
<tr>
<td>Front wheel brake application.</td>
<td>Leaks at exhaust port.</td>
<td>Check valve #21 (Spring brake valve) for bad check valve causing backflow to foot valve. Repair or replace #21.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace check valve #12 or #19.</td>
</tr>
<tr>
<td>Foot Valve</td>
<td>Leaks at exhaust with all brakes released.</td>
<td>Replace foot valve #14.</td>
</tr>
<tr>
<td>Leaks at exhaust with hand valve applied and foot valve actuated.</td>
<td>Leaks at exhaust with foot brake applied.</td>
<td>Replace relay valve #23.</td>
</tr>
<tr>
<td>Leaks at exhaust with foot valve applied.</td>
<td>Brakes not modulating properly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trailer Hand Control Valve</td>
<td>Leaks at exhaust when only foot valve is applied.</td>
<td>Replace check valve #12.</td>
</tr>
<tr>
<td>Leaks at exhaust port when in applied or released position.</td>
<td>Replace hand control valve #15.</td>
<td></td>
</tr>
<tr>
<td>Trailer Charge Dash Valve</td>
<td>Leaks at exhaust port when in applied or released position.</td>
<td></td>
</tr>
<tr>
<td>Foot valve leaks at exhaust port when hand valve is applied.</td>
<td>Foot valve leaks at exhaust port when hand valve is applied.</td>
<td></td>
</tr>
<tr>
<td>Foot Valve</td>
<td>Leaks at exhaust with all brakes released.</td>
<td></td>
</tr>
<tr>
<td>Leaks at exhaust with hand valve applied and foot valve actuated.</td>
<td>Leaks at exhaust with foot brake applied.</td>
<td></td>
</tr>
<tr>
<td>Leaks at exhaust with foot valve applied.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trailer Protection Valve</td>
<td>Leaks at exhaust when only foot valve is applied.</td>
<td>Replace dash valve #16.</td>
</tr>
<tr>
<td>Leaks at exhaust port when in applied or released position.</td>
<td>Replace dash valve #16.</td>
<td></td>
</tr>
<tr>
<td>Leaks at exhaust port.</td>
<td>If dash valve will exhaust, replace tractor protection valve #20.</td>
<td></td>
</tr>
<tr>
<td>Tractor-Trailer Park Valve</td>
<td>Leaks at exhaust port.</td>
<td>Replace dash valve #16.</td>
</tr>
<tr>
<td>(yellow octagon knob)</td>
<td>Leaks at exhaust port. Parking brakes will not release. Parking brakes will not apply.</td>
<td></td>
</tr>
<tr>
<td>(round blue knob)</td>
<td>Leaks at exhaust port. Tractor parking brakes will not release. Tractor parking brakes will not apply.</td>
<td></td>
</tr>
<tr>
<td>Double Check Valve with Stop Light Switch</td>
<td>Brake lights will not come on when foot brake is applied.</td>
<td>Replace dash valve #16.</td>
</tr>
<tr>
<td>Leaks at exhaust port.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Brake Relay Valve</td>
<td>Leaks at exhaust port with service brake applied.</td>
<td></td>
</tr>
<tr>
<td>(red octagon knob)</td>
<td>Leaks at exhaust port with service brake applied.</td>
<td></td>
</tr>
<tr>
<td>(yellow diamond knob)</td>
<td>Leaks at exhaust port with service brake applied.</td>
<td></td>
</tr>
<tr>
<td>Service Brake Relay Valve</td>
<td>Leaks at exhaust port with service brake applied.</td>
<td></td>
</tr>
<tr>
<td>Service Brake Relay Valve</td>
<td>Leaks at exhaust port with service brake applied.</td>
<td></td>
</tr>
<tr>
<td>Tandem Springbrakes</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Park brake slow to apply or release</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Springbrake Valve</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Front brakes release too slowly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diaphragm fails</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Springbrake Control/Relay Valve</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Front brakes release too slowly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diaphragm fails</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Chamber</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td>Leaks</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td>Slow to apply or release.</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td>Springbrake leaks when parking brakes are released.</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor Air Reservoir</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td>Erosive oil or water accumulation</td>
<td>Service brake leaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Springbrake Valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaks at exhaust port. Slow application or release of trailer park brakes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Chamber</td>
<td>Diaphragm fails</td>
<td></td>
</tr>
<tr>
<td>Leaks</td>
<td>Diaphragm fails</td>
<td></td>
</tr>
<tr>
<td>Slow to apply or release.</td>
<td>Diaphragm fails</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QUALITY HEAVY DUTY PARTS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
1.) Before replacing any valve with a new or remanufactured valve, be sure to blow the air lines out either using the vehicle's own air supply or shop air. Dirt is the greatest cause of premature air valve failure.

2.) If pipe dope is used on fittings, use it sparingly. This can also get into the unit and cause a failure.

3.) When installing fittings into a remanufactured valve, do not over tighten or it will crack the casting.

4.) With the introduction of spring brakes, anti-compounding and 121 air brake systems, because a valve is leaking air out of its exhaust, does not mean the valve is at fault. If a spring brake is leaking from the spring brake to the service brake side, that air will travel back up the service line and out the exhaust of the next valve back. Before replacing a valve that has air leaking from its exhaust, disconnect the delivery lines from that valve to determine if air is being fed back from some other valve or unit.

### TRUCKS, TRACTORS and BUSES

<table>
<thead>
<tr>
<th>Issue</th>
<th>Troubleshooting Details</th>
</tr>
</thead>
</table>
| 1.) Insufficient Brakes | - Brakes need adjusting, lubricating or relining.  
- Low air pressure in the brake system (below 60 psi).  
- Brake valve delivery pressure below normal.  
- Wrong size actuators and/or slack adjusters.  
- Failure of part of a dual air system.  
- If remote mounted brake valve, check linkage. |
| 2.) Brakes Apply Too Slowly | - Brakes need adjusting or lubricating.  
- Low air pressure in the brake system (below 60 psi).  
- Insufficient brake valve delivery pressure.  
- Excessive leakage with brakes applied.  
- Restricted tubing or hose.  
- Treadle travel restricted.  
- If remote mounted brake valve, check linkage. |
| 3.) Brakes Release Too Slowly | - Brakes need adjusting or lubricating.  
- Brake valve not returning to fully released position.  
- Restricted tubing or hose.  
- Exhaust port of brake valve, quick release valve, or relay valve restricted or plugged.  
- Faulty brake valve, quick release valve, or relay valve.  
- If remote mounted brake valve, check linkage. |
| 4.) Brakes Do Not Apply | - No air pressure in brake system.  
- Restricted or broken tubing or hose.  
- Faulty brake valve.  
If remote mounted brake valve, check linkage. |
| 5.) Brakes Do Not Release | - Brake rigging binding.  
- Brake not in fully released position.  
- Faulty brake valve or relay valve.  
- Restricted or collapsed tubing or hose.  
- If remote mounted brake valve, check linkage. |
| 6.) Brakes Grab or Erratic Brake | - Grease on brake lining = rel ine brakes.  
- Faulty brake valve or relay valve.  
- Brake rigging binding.  
- Too much brake on vehicle load = high brake pressure. |
| 7.) Uneven Brakes | - Brakes need adjusting, lubricating or relining.  
- Improper axle mounting.  
- Grease on brake lining = rel ine brakes.  
- Brake shoe return spring broken.  
- Brake drum out of round.  
- Brake chamber diaphragm failure.  
- Wrong brake lining.  
- Broken slack adjuster or foundation brake parts. |
| 8.) Air Pressure Will Not Rise To Normal | - Faulty air gauge (registering incorrectly).  
- Excessive valve or fitting leakage.  
- Governor out of adjustment.  
- Slipping compressor drive belt.  
- Faulty compressor.  
- Broken supply line. |
| 9.) Air Pressure Rise To Normal Too Slowly | - Excessive valve or fitting leakage.  
- Excessive reservoir volume.  
- Clogged compressor air strainer.  
- Engine speed too slow.  
- Compressor discharge valve or inlet valves leaking.  
- Compressor drive belt slipping or faulty drive coupling.  
- Worn compressor.  
- Excessive carbon in compressor cylinder head or discharge line. |
| 10.) Air Pressure Rises Above Normal | - Faulty air gauge (registering incorrectly).  
- Governor out of adjustment.  
- Faulty governor and safety valve.  
- Restriction in line between governor and compressor or restricted unloading valve.  
- Too much clearance at compressor unloader valves or compressor unloading mechanism stuck in closed position. |
| 11.) Air Pressure Drops Quickly With Engine Stopped and Brakes Released | - Leaking brake valve.  
- Leaking tubing or hose.  
- Compressor discharge valves leaking.  
- Governor leaking.  
- Excessive leakage elsewhere in the air brake supply system.  
- Inadequate reservoir volume - high air demand. |
| 12.) Air Pressure Drops Quickly With Engine Stopped and Brakes Fully Applied | - Leaking brake chamber, actuator, rotocamber or brake cylinder.  
- Valve left open.  
- Leaking brake valve.  
- Leaking tubing or hose line.  
- Excessive water in reservoirs.  
- Inadequate reservoir volume. |
| 13.) Compressor Knocks Continuously or Intermittently | - Loose drive pulley.  
- Back lash in drive gears or drive coupling.  
- Worn or burnt out bearings.  
- Excessive carbon deposits in compressor cylinder head. |
- Air pressure in the air brake system above normal due to faulty unloader mechanism or faulty governor. |
| 15.) Excessive Oil or Water in the Brake System | - Reservoirs not being drained often enough.  
- Compressor passing excessive oil.  
- Compressor air strainer restricted.  
- Excessive engine oil pressure.  
- Back pressure from engine crankcase.  
- Excessive oil (flooding) in compressor crankcase. |
1.) Before replacing any valve with a new or remanufactured valve, be sure to blow the air lines out either using the vehicle’s own air supply or shop air. Dirt is the greatest cause of premature air valve failure.

2.) If pipe dope is used on fittings, use it sparingly. This can also get into the unit and cause a failure.

3.) When installing fittings into a remanufactured valve, do not over tighten or it will crack the casting.

4.) With the introduction of spring brakes, anti-compounding and 121 air brake systems, because a valve is leaking air out of its exhaust, does not mean the valve is at fault. If a spring brake is leaking from the the spring brake to the service brake side, that air will travel back up the service line and out the exhaust of the next valve back. Before replacing a valve that has air leaking from its exhaust, disconnect the delivery lines from that valve to determine if air is being fed back from some other valve or unit.

TRAILERS

** The air brake system of a trailer is entirely dependent upon the air brake system of the towing vehicle for its air supply and control. Therefore, the air air brake system of the towing vehicle must be in good condition; otherwise it will be impossible to obtain a good brake performance on the trailer. Before condemning the air brake system on a trailer, always be sure the air brake system on the towing vehicle is functioning properly. The following is based on the assumption the tractor air brake system is functioning properly.

1.) Insufficient Brakes
- Brakes need adjusting, lubricating or relining.
- Faulty relay emergency valve.
- No trailer air supply - clogged emergency line.
- Low air pressure in the brake system (below 80 psi).
- Brake valve delivery pressure in towing vehicle below normal.
- Restricted tubing or hose.
- Wrong size actuators.

2.) Brakes Apply Too Slowly
- Brakes need adjusting or lubricating.
- Low air pressure in the brake system (below 80 psi).
- Brake valve delivery pressure in towing vehicle below normal.
- Restricted tubing, hose, or line filter.
- Excessive leakage with brakes applied.
- Faulty relay emergency valve.

3.) Brakes Release Too Slowly
- Brakes need adjusting or lubricating.
- Brake rigging binding.
- Exhaust port of relay emergency valve restricted or plugged.
- Restricted tubing or hose.

4.) Brakes Do Not Apply
- Connecting hoses to trailer crossed.
- Faulty relay emergency valve.
- Tractor protection valve not functioning properly or not in normal position (see operating instructions).
- No air pressure in air brake system.
- Restricted tubing or hose.
- Hoses between tractor and trailer not connected.

5.) Brakes Do Not Release
- Connecting hoses to trailer crossed.
- Brake valve on towing vehicle is applied position.
- Brake rigging binding.
- Relay emergency valve in emergency position.
- Tractor protection valve not functioning properly or not placed in “normal” position.

6.) Brakes Grab
- Grease on brake lining - reline brakes.
- Brake rigging binding.
- Faulty relay emergency valve.
- Faulty brake valve on towing vehicle.
- No trailer load.

7.) Uneven Brakes
- Brakes need adjusting, lubricating or relining.
- Grease on brake lining - reline brakes.
- Brake drum out of round.
- Leaking brake chamber or actuator diaphragm.
- Restricted tubing or hose.
- Broken slack adjuster or foundation brake parts.

8.) Excessive Leakage With Brakes Released
- Relay emergency valve or drain valve leaking.
- Leaking tubing or hose.
- Hose uncoupled or leaking hose coupling.

9.) Excessive Leakage With Brakes Fully Applied
- Faulty relay emergency valve.
- Leaking brake chamber diaphragm.
- Leaking tubing or hose.
- Hose uncoupled or leaking hose coupling.

10.) Excessive Leakage with Relay Emergency Valve in Emergency Position
- Faulty relay emergency valve.

11.) Excessive Oil and Water Present in the Air Brake System
- Reservoirs not drained often enough.
<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
</table>
| **1) Dryer is constantly cycling or purging.** | a. Excessive system leak.  
   b. Defective governor.  
   c. Defective one way valve between air dryer and wet tank.  
   d. Kinked or plugged discharge line. | a. Repair air leak.  
   b. Check governor for proper "cut-in," "cut-out" pressure and excessive leakage. Repair or replace governor.  
   c. Check to see if air is passing through check valve.  
   d. Check to see if air passes through discharge line. Check for kinks, bends, excessive carbon deposits. Clean or replace discharge line. |
| **2) Water and sludge appear in wet tank.** | a. Plugged desiccant cartridge or filter.  
   b. Improper length or material of discharge line.  
   c. Restricted purge orifice.  
   d. No purge cycle.  
   e. Compressor passing excessive oil. | a. Replace desiccant cartridge filter.  
   b. Use minimum of six-foot tubing for two-cylinder compressor; ten-foot for one cylinder compressor. Flex hose can be substituted at a ratio of 1-1/2' of flex hose for each 1' of metal.  
   c. Clean or replace discharge line.  
   d. See cause and remedy for problem #5.  
   e. Check for proper compressor installation. Replace compressor if necessary. |
| **3) Safety valve on air dryer opens during operation.** | a. Plugged or saturated desiccant cartridge or filter.  
   b. Defective one way check valve.  
   c. Restricted discharge line. | a. See remedy 2E, replace desiccant cartridge/filter.  
   b. Check to see if air is passing through check valve. Repair or replace check valve.  
   c. Clean or replace air discharge line. |
| **4) Constant leak of air from purge valve.** | a. Purge control line connected to reservoir or exhaust port of governor.  
   b. Inlet and outlet air connections reversed.  
   c. Purge valve frozen open.  
   d. Restricted discharge line.  
   e. Faulty governor. | a. Purge control line must be connected to unloader port of governor.  
   b. Compressor discharge line must be connected to dryer inlet port.  
   c. Repair or replace thermostat/heater.  
   d. Check to see if air passes through discharge line. Check for kinks, bends or excessive carbon deposits.  
   e. Check governor for proper "cut-in," "cut-out" pressure and excessive leakage. Repair or replace governor. |
| **5) Air dryer does not purge or exhaust air.** | a. Line between governor and dryer kinked, plugged, broken or frozen.  
   b. Faulty heater or thermostat.  
   c. Faulty purge valve. | a. Check to make sure air flows through purge control line when compressor is unloaded. Clean or replace purge control line.  
   b. Repair or replace thermostat/heater.  
   c. After determining air reaches purge valve, repair purge valve. |
| **6) Slow air pressure build up.** | a. Restricted line.  
   b. Plugged desiccant or filter. | a. Check to see if air passes through discharge line. Check for kinks, bends or excessive carbon deposits. Clean or replace discharge line.  
   b. Replace desiccant cartridge. |
| **7) Heater inoperative.** | a. Broken wire or bad connection.  
   b. Blown fuse.  
   c. Defective thermostat. | a. Repair or replace wiring to heater.  
   b. Check fuse and replace if necessary.  
   c. Repair or replace thermostat. |