

Air Brake System Leakage

By Martin McDonough

One problem sure to be encountered by every PV owner at one time or another is brake system air leakage. If the leakage is discovered during train testing and that leakage is excessive, the car could be switched out of the train consist, thus proving to be costly and bad publicity for the owner. If leakage is discovered during a single car test, it can be a time-consuming process determining exactly where the leakage is.

Here are some examples of leakage which can help an owner not only to pinpoint the problem, but also how to go about making repairs.

Example 1

Question: I discovered a small leak at the fitting which secures the air delivery line to a brake cylinder. I've tightened the fitting as best I can, but the leak persists. What is the cause of this leak?

Answer: Before you deal with the leak, block your car's wheels. Cut out the truck brake and release the hand brake if necessary. Using a long, heavy pry bar or piece of pipe, try to pry up the cylinder. You'll probably discover it is loose due to wear in the cylinder housing's bolt holes. The bolts are probably the originals which were seldom if ever checked.

What has happened to cause your leak? Movement and vibration of the loose cylinder has cracked the delivery line at the point where it is screwed into the fitting. The cylinder should be removed from the car and the elongated bolt holes plug-welded and redrilled to the proper size. The broken piece of delivery pipe will have to be chiseled out and the pipe re-threaded.

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Use a pry bar to check the remaining cylinders for possible indications which could point to the same problem.

Example 2

Question: During a single car test, leakage showed up during an application test and I was not able to pin-point the source. Where should I check?

Answer: One spot always overlooked and never checked is the conductor's valve. The delivery line to the conductor's valve is secured to the valve by a fitting. This fitting may be loose due to vibration or perhaps the mechanic didn't lean enough on the wrench when tightening it. Amtrak has a problem with this union due to the particular location of at least one type of car's conductor's valve. It is behind a partition in the toilet. Imagine trying to find this leak with the AC operating. It is necessary to remove a large plate to check out this valve.

Example 3

Question: I had no leakage problem while I was moving in the train toward my destination. Once there, my PV was switched to another train and when the car was inspected, the carman reported I had no brakes because of excessive leakage.

What could have gone wrong?

Answer: This one is a case of haste on the part of a trainman. Instead of connecting up your brake pipe to the switcher, he pulled the auxiliary reservoir release handle and released the brakes manually. However, the handle, instead of being in down position was left in a cocked position. Now, when air pressure flows into your control valve, the air will flow out through this cocked valve handle. You probably won't hear it, because there is no blast of air when there is no air backup. Be alert and save yourself some grief.

Example 4

Question: Once again, I had no leakage problem while I was moving in the train toward my destination, but, once there, my PV was switched to another train and when the car was inspected, the carman reported I had no brakes because of excessive leakage.

Where should I look for leakage?

Answer: This answer applies only to cars having supply reservoirs equipped with drain cocks. Most trainmen, especially those in freight service, give the auxiliary reservoir valve handle a quick jerk when they pull it and expect the car's brakes to release. This will happen with freight cars AB brake equipment. However, with D-22 and 26-C equipment, the handle must be held in the open position until the brakes release.

The trainman, noticing your car's brakes did not release, now opens up the supply reservoir's drain cocks and drains all the air, thus effecting a brake release. When your car is positioned in an outbound train, the carman will notice the outer supply reservoir's drain cock is open and will close it. However, the inside reservoir's drain cock will still be open. When the brake pipe is pressurized, air will flow out very softly through the open drain cock. You'd be surprised how often this happens. Once again, a little knowledge can keep you out of big trouble.

While we're on the subject of reservoir drain cocks, the following Question & Answer covers a rare happenstance, but one which could very possibly happen to any owner's PV.

Example 5

Question: A carman has notified me that a supply reservoir drain cock was knocked off by a U.F.O. and air is exhausting. What can I do in the way of an emergency repair?

Answer: All private car owners should carry a supply of small wooden wedges about four to six inches long. The taper must be narrow, to allow the wedge to be driven into the hole left by the departed supply reservoir drain cock fitting. Remember, the threaded portion of the broken drain cock is still embedded in the reservoir, thus the need for a very narrow taper on the wedge.

Note: With PV supply reservoirs bolted pretty close to the car floor, it isn't likely that the

above situation will occur. Still, be prepared. Notice, the next time you have an opportunity, that Amtrak's Amfleet cars have the large reservoir located fairly close to the rails. This is the most likely reservoir location to take a hit.

Example 6

Question: My D-22 brakes would not apply. The air brake repairman changed out both the service and relay portions of the control valve. He then made a brake application but the brakes still would not apply. Again, he changed out the service and relay portions. Same result. No brakes. What's wrong?

Answer: Part of the D-22 air brake system is a large three-part reservoir called the combined auxiliary, emergency and displacement reservoir. It is located near the control valve and one end of the reservoir has a removable cover which is bolted to the reservoir by 15 bolts. The cover also has a pipe connection. Inside the cover is a large diaphragm called the displacement reservoir diaphragm. This diaphragm may not have been inspected since the car was built.

When a brake application is made, air under pressure flows onto the displacement reservoir compressing the diaphragm. Then it moves on to the relay valve which activates, allowing air to flow on to the brake cylinders. The amount of air in the displacement reservoir determines brake cylinder pressure. On rare occasions, the diaphragm will split or corrode, allowing air in the displacement reservoir to flow out of the displacement reservoir exhaust hole, located on the bottom of the reservoir close to the removable cover.

To determine if the diaphragm is split, have someone make a brake application for you. While the application is being made, put your hand under the displacement reservoir exhaust. If you feel air escaping, the diaphragm is defective.

In the past, some railroads welded the displacement reservoir exhaust shut. This would allow the brakes to apply but the release might be a little slower, due to the increased volume in the displacement reservoir. The displacement reservoir diaphragm should be checked during your COT&S. Always play it safe!

Example 7

Question: My car is equipped with disc brakes. One of my disc brake cylinders is leaking badly at the cylinder flange air fitting. What is causing this leakage?

Answer: The air delivery line flange fitting is bolted to the cylinder with two half-inch cap screws and lock washers. Due to cylinder action and vibration over a period of time, one of the lock washers will break and fall off, creating an opening between the cylinder and the flange fitting. Now when the brake is applied, air will flow out of this narrow opening. Replacing the lost lock washer with a new one and tightening up the cap screw may eliminate this problem. (A good idea is to replace the split lock washers with Belleville washers. These will do a better job.) However, many times when this problem occurs the flange fitting gasket — round with square edges — may become damaged and must be replaced. Amtrak stocks these gaskets.

If this problem occurs on the road, you will have to cut out the truck and continue on until you have an opportunity to replace the gasket with a new one. Incidentally, if you don't have a spare, in a pinch you can replace the defective one with a brake hose gasket. Though not a perfect fit, it will do the job until you can replace it with the proper gasket.

Brake Cylinder Dust Boots

In the January/February, 1986, issue of Private Varnish, the problem of air pressure leaking through the disc brake cylinder dust boot was covered. Here's a little refresher.

Each of the disc brake cylinders has a rubber bellows-type dust boot attached to the cylinder housing at one end and to the piston tube on the piston end. This boot protects the piston rod and interior of the cylinder from dust, dirt, and water when the piston is in the extended brake-applied position. When the piston is released, the boot prevents all of the above from entering the cylinder.

Each Fall, check each of these rubber boots carefully. There should be no large splits or tears, and preferably none at all (definitely none on the top of the boot). A cracked boot is letting you know that it is time for a change. Changing a boot is an easy job.

A private car usually has more sinks and hoppers than a coach and therefore a lot more drains. If you have a large hole in one of the boots, water and effluent may directly or indirectly empty into this hole and sooner or later into the cylinder. In cold weather, this could develop into a big leakage problem. Now when the brakes release, water is drawn into the cylinder. In bitterly cold weather, the water will freeze to the bottom of the internal wall of the cylinder. When the brake is applied, the piston packing cup (your rubber seal) will attempt to slide over this buildup of ice but most likely will stop at the buildup. The packing cup will lose its seal, causing air to leak and the brake to release. This type of leakage can become the cause of your car being set out at a terminal.

The piston parking cup has a rolled flange at its edge. When air pressure hits the cup, the flange expands into a tight fit against the cylinder wall, thus producing a very tight seal and preventing leakage.

Causes of Leaks

The terminal air test for trains is usually conducted in the yard and leakage discovered should be pinpointed and corrected. A much bigger problem occurs when the terminal air test is conducted at the station. As every owner knows, private cars have been left behind at the station as a result of this test because it is often too close to departure time to correct the problem(s).

The single car test is another one which reveals a lot of leakage problems. Surveys conducted over the years show that almost 85 to 90 percent of air brake problems occur during a COT&S. A few examples:

- Pipe bracket body gaskets were not changed.
- Pipe bracket body gaskets split and were not changed.
- Loose union fittings were discovered.
- Loose brake pipe hoses. Also, if the hoses were in date, new glad hand gaskets were not applied.
- Dirt was allowed to get into new or newly tested valves.
- Pipe bracket gaskets were not applied at all.

The list goes on and on. If a car is having a COT&S, is a good idea for the owner to be present to ensure that all necessary test requirements are property met. Watch out for

short cuts — if you've been an AAPRCO member for a while, I'm sure you can spot most of them by now — such as application valves not changed out due to their position (very difficult and very dirty to replace). Conductor's valves not changed out. Proper brake cylinder piston-travel neglected. Hand brake mechanism not lubricated and not checked by applying and releasing. Hand brake chain not checked for wear. As I said, the list goes on and on.

Finally, there are special leakage problems which can arise on a car having 26-C brake equipment with the main reservoir air line tied in. Are there enough private cars out there equipped with this type of system to warrant an article on leakage? If you're one of those car owners whose car has 26-C, write me and I'll send you notes on some potentially dangerous situations which can and have happened with the 26-C.