PENNSYLVANIA RAILROAD

LINES EAST OF PITTSBURGH

Locomotive Maintenance Instructions No. L-4-A.

ISSUED ALTOONA, PA.
DECEMBER 3, 1915

Attention to Air Brake Apparatus.

(SUPERSEDING LOCOMOTIVE MAINTENANCE INSTRUCTIONS NO. L-4, DATED APRIL 1, 1912.)

GENERAL.

For the inspection and repairs to air brake apparatus on locomotives and tenders, the instructions contained in the Air Brake and Train Air Signal Instruction Book No. 99-A-1 must be followed.

When locomotives and tenders are in shop for class repairs, the brake and signal equipment, including compressors, compressor governors, brake valves, feed valves, reducing valves, double check valves, gauges, double heading cocks, distributing valves, triple valves, signal valves, and signal reducing valves must be sent to the proper shop, where they must be cleaned, lubricated, and tested, after which the necessary attention must be given to put them in first class condition. All piping must be put up and securely clamped in accordance with standard tracings. The brake cylinders should be cleaned, lubricated, and tested in accordance with these instructions. After this work has been performed, and the various parts replaced on the locomotive and tender, a metal tag, showing the date and shop abbreviation, must be securely attached to the brake pipe near the automatic brake valve in accordance with tracing No. 51558.

Until otherwise advised the procedure to be followed and the lubricant to be used in repairing and lubricating brake cylinders, brake valves, distributing valves, high speed reducing valves, slide valve feed valves, triple valves, and any other parts covered by these instructions, will be as follows:

When any part of the air brake or train air signal equipment is sent to the shop, it should be thoroughly cleaned and repaired if necessary. Worn out parts should be repaired, when possible; otherwise, renewed. When cleaning, each part should be blown out with compressed air and inspected, to insure that all particles of dirt are removed, to avoid causing a defective valve and consequent serious trouble after the valve is in service.

All valves should be ground to a proper seat, and lubricated with the proper lubricant, as will be hereinafter specified. If the latter is not strictly carried out, the lubricant will become gummed or hardened, and the valve will stick or leak. *Any* valve, receiving the attention specified in these instructions, *must*, before being placed in service, be tested on an improved test rack in accordance with standard code of instructions for testing same. If the valve fails to pass these tests, it must be given the necessary attention, and again tested, until it satfactorily passes the tests.

BRAKE VALVES.

Clean all parts of the brake valve, care being exercised to remove all oil, grease, or gummy deposits from the rotary valve and seat, equalizing discharge valve piston and chamber, and from the equalizing discharge valve and its seat. After making the necessary repairs, the rotary valve and rotary valve seat should be sparingly lubricated with Perfection Valve Oil. The equalizing discharge valve piston and chamber should be lubricated in the same manner, but sparingly with Perfection Valve Oil, as a triple valve piston and chamber.

When facing the rotary valve or seat, the limits shown on tracing No. 48274 must be strictly adhered to.

SLIDE VALVE FEED VALVES.

Clean all parts of the slide valve feed valve, care being exercised to remove all oil, grease, or gummy deposits from the slide valve and its seat, and from the piston and its chamber. Then the slide valve and its seat should be sparingly lubricated with valve oil. No lubricant whatever should be applied to the piston or its chamber.

DISTRIBUTING VALVES.

Clean all parts of the distributing valve, care being exercised to remove all oil, grease, or gummy deposits from the application valve, exhaust valve, equalizing valve, graduating valve, and their seats and chambers; after which the seats and faces of all slide valves should be sparingly lubricated with Marvin's Anti-Friction Oil. The equalizing piston packing ring and its cylinder should be lubricated with Marvin's Anti-Friction Oil, as outlined for triple valves. The application piston packing leather should be sparingly lubricated with brake cylinder compound on the application cylinder side of the piston, placing the lubricant between the expander ring and the leather.

The following table shows the sizes of the various springs for use in the No. 6 distributing valve:

Name of Spring.	Material.	No. of Coils.	Free Height.	Outside Diam.
Application Piston Graduating Spring.	Nickeled Steel.	13½	2⅝"	1¹¹/₁₆"
Equalizing Piston Graduating Spring.	Phospher Bronze.	12	2½"	1¹¹/₁₆"
Quick Action Cylinder Cap Check Valve Spring.	Phospher Bronze.	8½	1¹³/₁₆"	1¹¹/₁₆"

Any spring not conforming to these dimensions must be replaced by the proper spring, to avoid serious trouble with the valve while in service on the road.

TRIPLE VALVES.

Clean all parts of the triple valve, care being exercised to remove all oil, grease, or gummy deposits from the slide valve and its seat, and from the main piston and its chamber; after which the seat and face of the slide valve should be lubricated with Dixon's Dry Air Brake Graphite for Triple Valves, furnished by the Joseph Dixon Crucible Company, of Jersey City, N. J., rubbing it in on the surface of the slide valve and upper portion of the bushing where the slide valve spring bears, so as to make as much as possible adhere to and fill up the pores of the brass, leaving a very thin coating of free graphite. Parts to be lubricated with graphite must be free from oil or grease. Rub in the graphite with a piece of chamois skin secured on the end of a small piece of wood. At the completion of the rubbing operation, a few light taps (using wood) on the slide valve will leave the desired coating of loose graphite.

The triple valve piston packing ring and its cylinder should be lubricated with Marvin's Anti-Friction Oil, as follows:

Before the piston is placed in the triple valve body, apply one drop of Marvin's Anti-Friction Oil to the ring groove, and turn the ring through several complete revolutions. Then, after the piston has been placed in the triple valve body, and moved to *Release* position, apply one drop of Marvin's Anti-Friction Oil to the circumference of the piston bushing, distributing same with the finger; move piston back and forth several times, and then remove the surplus oil with a clean soft cloth.

HIGH SPEED REDUCING VALVES.

These valves must receive the same careful attention as above outlined for triple valves. The same lubricant and method of application to the slide valve and piston should be followed as for triple valves.

BRAKE CYLINDERS.

The brake cylinder piston must be clamped to the non-pressure head by means of a suitable clamp, the head and piston removed; then with a suitable tool remove the heavy grease which is usually found in the cylinder and on the piston and packing leather. After this is done the walls of the cylinder should be well cleaned with rags or waste saturated with kerosene, but rags *must* be used for the final wiping. All rust spots must be thoroughly cleaned off and the leakage grooves cleaned and freed from dirt. The piston and sleeve must be examined, and, if defective, a new or repaired piston should be applied. In case the packing leather is badly worn or defective, a new leather must be applied, in such a manner that the rough or flesh side of the leather is next to the cylinder. If piston and leather are found in good condition, the packing leather should be removed, and thoroughly cleaned with a suitable tool, *without* the use of kerosene; the expander ring should be removed and examined to know that it has the proper contour and will hold the leather uniformly out against the walls of the cylinder. All follower studs must be examined, screwed in with white lead, and, if necessary, tightened. The release spring should be examined, and, if necessary, renewed.

The following quantities of brake cylinder compound should be applied to the walls of the cylinder and to the packing leather with a suitable brush:

8" and 10" Cylinders	4 ounces.
12" and 14" Cylinders	5 ounces.
16" and 18" Cylinders	6 ounces.

For the Lines East of Pittsburgh and Erie the proper brake cylinder compound is Marvin's Brake Cylinder Compound; and for the Lines West of Pittsburgh either the New York and New Jersey Lubricant Company's Non-Fluid Brake Cylinder Oil or Marvin's Brake Cylinder Compound.

In replacing the piston in the brake cylinder, care should be taken to keep the expander ring between the packing leather and follower plate, and that the opening of the expander ring, when put in the cylinder, is at the top, one quarter turn away from the leakage groove; also that portion of the packing leather that had before been at the bottom is now turned to the top of the cylinder. The opening in the expander ring should not be less than one-quarter (¼) inch, or greater than three-eighths (⅜) inches, and the ring should have the ends properly rounded. When the piston head and leather have been well entered into the cylinder, the end of the piston rod should be raised to a horizontal position, at the same time pulling out slightly to prevent the leather from turning in the wrong direction. No sharp tools should be used to help enter the packing leather into the brake cylinder. After the piston is entered it can be ascertained if the expander ring has worked out of position by moving the end of the piston to describe a circle of about eight inches in diameter. In case the ring is out of place this cannot be done, as the piston will stick.

After the piston has been properly entered and the cylinder head has been replaced, all bolts and nuts between the cylinder and reservoir, and those holding these parts to their supports, must be properly tight-

ened. After connecting the piston rod to the brake rigging, and other necessary repairs have been completed, the air brake apparatus must be tested with a special gauge and fittings, as shown on tracing No. 47280.

Brake cylinders on locomotives and tenders which have been cleaned as above, should be tested separately for leakage, which must not exceed 5 pounds per minute from a cylinder pressure of 50 pounds. When locomotives are equipped with triple valves, the test gauge should be placed in the exhaust port of the triple valve. A 25 pound brake pipe reduction should then be made, and the handle of the brake valve returned to release position. This will move the triple valve to release position, and the gauge will then show brake cylinder pressure. If the locomotive is equipped with a distributing valve, the test gauge should then be placed in the oil hole of the brake cylinder, and after a reduction of 25 pounds has been made in the brake pipe pressure, the cut out cock to the cylinder under test should be closed, and the cylinder leakage noted.

ANGLE COCKS AND CUT OUT COCKS.

Angle cocks and cut out cocks which cannot be repaired without renewal of the bushing should be sent to the Westinghouse Air Brake Company for repairs.

TESTING MAIN RESERVOIRS.

Main air reservoirs on locomotives must be tested not less frequently than once in twelve months, at the same time that the hydrostatic test of the boiler is made, as follows:

The entire surface of the main reservoir should be hammer tested with a ball pein hammer, to detect evidence of the sheet being thin due to corrosion. After the hammer test has been completed, the reservoir should be subjected to an hydrostatic test at a pressure of 175 pounds. It should then be stenciled in accordance with tracing No. 44596, and notation as to the test made on the annual inspection report of that locomotive to the Interstate Commerce Commission. *New* reservoirs are to be tested and stenciled in accordance with standard tracings.

PIPE FITTINGS.

Until otherwise advised, "Graphite Pipe Joint Compound" must be used on all pipe connections, and must be applied to the male fittings. New pipe fittings must be ordered in accordance with standard tracings. When threading pipe, the standard pipe die cutter must be used and lubricated with a special mixture consisting of one third cotton seed oil and two-thirds dark neutral oil.

CENTRIFUGAL DIRT COLLECTORS.

Dismantle the dirt collector and thoroughly clean all parts. After assembling the parts, make sure that the air passes freely through the collector in both directions.

J. T. WALLIS,
Gen'l Sup't Motive Power,
Penna. Railroad Lines East of Pittsburgh.