NON-AUTOMATIC BRAKE SYSTEM : STRAIGHT AIR

The diagrammatic arrangement of the combined and straight air brake is shown in Fig. 5o, page 39, of Air Brake Handbook.

The straight air brake comprises the following parts which are supplementary to those of the automatic brake equipment.

1. A Pressure Reducing Valve to reduce the air pressure to 45 lbs per sq. inch. before it flows into straight air brake valve.

2. A Driver's Straight Air Brake Valve which enables air to be supplied to the brake cylinder.

3. A Double Check Valve which is located at the junction of both air brake systaystems and which automatically opens up communication between either brake system and the brake cylinder as determined by the operation of either of the Driver's Brake Valves.

4. A single Pointer Air Pressure Gauge which is located in the cab of the locomotive and connected to the straight air pipe. It indicates the brake cylinder pressure when a straight air brake application is made.

Refer to Air Brake Handbook, pages 39-41 for further details and pages 112-113 for instructions for the operation.

DEFECTS: If the double check valve does not make an air tight seat on the triple valve side when the straight air brake is applied there will be a continual escape of air at the triple valve exhaust port. On the other hand, if the check valve does not make an air-tight seat on the straight air side with the automatic brake applied, there will be a continual blow at the straight air brake valve exhaust port with the straight air brake valve in release position.

MISCELLANEOUS DETAILS

BRAKE CYLINDERS; Refer to Air Brake Handbook, pages 28-30.

SIZE OF BRAKE CYLINDER AND AUXILIARY RESERVOIR

The size of brake cylinder is determined according to the weight of locomotive, tender, or vehicle and the braking effort required. It is sometimes necessary to provide two cylinders. The auxiliary reservoir is designed to suit the size of brake cylinder to ensure the correct functioning of the brake. These items are determined in the design office and are not a matter for discussion in these lectures.

The brake cylinder and auxiliary reservoir are designed so that with an 8 in brake piston travel and 70 lb per sq in. pressure in the train pipe, a reduction in the auxiliary reservoir will cause the brake cylinder to be charged as follows:-

5 lb. per sq. in. reduction in auxiliary reservoir pressure will put a pressure of 21b. per sq. in in the brake cylinder.
10 lb. per sq. in. reduction gives a pressure of 18 lb per sq. in.
15 lb. per sq. in reduction gives a pressure of 34 lb per sq. in.
20 lb. per sq. in. reduction gives a pressure of 50 lb per sq. in.

Again with 70 lb. per sq. in . in the train pipe and with a brake piston travel of 4 in. the auxiliary reservoir reduction and subsequent brake cylinder pressures are as follows:-

5 lb. per sq. in reduction gives a brake cylinder pressure of 10 lb. per sq. in.
10 lb. per sq. in . reduction gives a pressure of 35 lb. per sq. in.
15 lb. per sq. in. reduction gives a pressure of 56 lb. per sq. in.
20 lb. per sq. in. reduction gives a pressure of 56 lb. per sq. in.

It will be seen from the above that long piston travel decreased the braking power because it gives a lower pressure on the piston for a given reduction. This is more marked with a slight application than with a full one; further, any reduction in the auxiliary reservoir pressure in excess of 20 lb. per sq. in. with an 8 in. piston travel and 70 lb. per sq. in. in the train pipe, or any reduction in the auxiliary reservoir pressure in excess of 15 lb per. sq. in. with 4 in. piston travel and 70 lb. per sq. in. in the train pipe, will not apply the brakes any harder but only cause a waste of air because with these reductions the auxiliary reservoir and brake cylinder pressures will equalise and the brake cylinder pressure cannot be increased.

AUXILIARY RESERVOIR LEAKS.

If a slight leak exists on the auxiliary reservoir side of the triple valve, it will have no other effect than to cause a waste of air when the brake is off, and is equivalent to a train pipe leakage. This slight leak will cause the brake to release after being applied, because the leak will reduce the auxiliary reservoir pressure below that in the train pipe, and the triple valve piston will be forced to the release position.

If, however, the leak is bad it may prevent the auxiliary reservoir from being charged, making the brake on that vehicle inoperative.

For these reasons it is important that no leakage from the auxiliary reservoir should exist.

BRAKE PIPE LEAKS:

If there are leaks in the brake pipe the brakes are liable to creep on when not desired, especially if the train pipe pressure is allowed to fall. When the brakes are applied these leaks will cause the brakes to go on harder than desired, owing to the train pipe pressure falling the whole time the brake valve handle is in lap position.

Brake pipe leakage also slows down the rate of recharge of auxiliary reservoirs throughout a train and should be kept down to a mixiumum of 5 lb. per sq. in. per minute. on a train. Brake pipe leakage can be determined by making a brake application from the engine; placing the driver's brake valve handle in lap position and watching the fall of pressure on the train pipe hand of duplex gauge.

ADJUSTMENT OF BRAKE RIGGING: Brake rigging should be adjusted as soon as the brake cylinder piston travel exceeds the maximum working stroke. This adjustment should be made so that the brake cylinder piston travel is returned to the minimum working stroke and in such a manner that each block stands off the tread of the wheel an equal amount.

The maximum and minimum strokes of Westinghouse Standard brake cylinders are as follows:-

Type of Cylinder	Working Maximum	Stroke in Minimum
Short stroke	5	3½
Long stroke	9	6

SLACK ADJUSTERS:

Refer to Air Brake Handbook, pages 30-32

RELEASE VALVES, COUPLING COCKS, HOSES ETC.

Refer to Air Brake Handbook, pages 34-38

LIST OF QUESTIONS

The student is to study carefully the contents of this lesson BEFORE attempting to answer the questions.

1. Trace the passage of the air from the main reservoir to the brake cylinder when an application of the straight air brake is made.

2. Describe the three positions of the straight air brake valve.

3. What are the advantages of the straight air brake.

4. What damage can result from the mis-use of the straight air brake.

5. What is the function of the double check valve and how does it operate?

6. Describe how you would test for a defective double check valve.

7. Does the piston travel effect the efficiency of the brake?

8. Briefly describe one type of brake cylinder with which you are familiar and the most common defects found.

9. What is the minimum and maximum piston travel allowed on the following locomotives Class Ab, K and J

10. Can any advantage be gained by making over a 20 lb. brake pipe reduction? Give reason for your answer.

11. What effect will a leak have on the auxiliary reservoir side of the triple valve.

12. What are the most essential details to be observed when adjusting locomotive brakes.

13. Two coupling hoses are used between engine and tender of locomotives fitted with combined automatic and non automatic air brake. Are the hoses interchangeable?

14. What effect has brake pipe leakage on the operation of the train brakes.

15. What is the object of the slack adjuster as fitted to vehicles.

16. What position is the handle of the coupling cock when the cock is open.