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Instruction Pamphlet No. T 5005

Reservoirs

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The Reservoir.

STRAIGHT-AIR BRAKE EQUIPMENT.

The Reservoir is provided for the purpose of storing the compressed air to apply the brakes. It should have a capacity sufficient to supply air for three or four applications of the brakes without reducing the air pressure more than 12 or 15 pounds.

It also entraps any water, oil or dirt that is brought in by the compressed air, thereby preventing same from being carried further into the brake system. It should be drained every day, the drain cock being left open while in the barn, in order to completely remove any oil and water from the space provided for storing air, as a reservoir partly filled with water is correspondingly reduced in capacity.

The Reservoir is made of sixteen-inch tubing with welded heads, having re-enforced tapped openings for the pipe connections. It is of the same construction as those made by the Westinghouse Air Brake Company for passenger car service.

The weight of the car determines the size of brake cylinder to be used, which in turn determines, to a great extent, the capacity of the reservoir. It is very important that the reservoir should have sufficient capacity, and hardly possible for it to have too much. If it is too small, every ordinary application of the brake will throw the compressor into action, thus keeping the latter in a constant state of starting and stopping, and causing unnecessary wear to both compressor and compressor governor. Assuming an average piston travel of eight inches, the volume of an eight-inch cylinder

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is approximately .23 cu. ft. As the piston is against the pressure head of the cylinder before the brakes are applied, it is evident that when it has moved eight inches, .23 cu. ft. of free air must be supplied to equalize the pressure inside the cylinder with that outside. To raise this to 50 pounds gauge pressure will require $\frac{50}{14.7} = 3.4$ volumes of free air additional, or in all $1 + 3.4 = 4.4$ volumes, which $= 4.4 \times .23 = 1$ cu. ft. of free air approximately. Consequently four applications of the brake, where the cylinder pressure becomes fifty pounds, requires four cubic feet of free air. Therefore, the volume of the reservoir should be such that, with sixty-five pounds pressure, the drawing off of four cubic feet of free air should not lower that pressure more than, say, 12 pounds.

Four cubic feet of free air in a reservoir subjected to 65 pounds gauge pressure, or $\frac{65 + 14.7}{14.7} = 5.4$ atmospheres, would be reduced to a volume of $\frac{4}{5.4} = .74$ cu. ft. In reducing the reservoir pressure 12 pounds, the quantity of air taken from it will be $\frac{12}{65 + 14.7} = .15$ of the original volume. Consequently, .74 cu. ft. must be .15 of the entire reservoir volume, making the volume of the reservoir $= \frac{.74}{.15} =$ practically 5 cubic feet. Figuring on this basis, we recommend the following sizes:—

With	8"	brake cylinder	use	16" x 48"	reservoir.
"	10"	"	"	16" x 60"	"
"	12"	"	"	16" x 72"	"

Although the above are considered to be standard sizes, the dimensions may be varied whenever circumstances warrant. The lengths given are "over all."

AUTOMATIC AIR BRAKE EQUIPMENT.

With this equipment two reservoirs are supplied, the first of which is called the Main Reservoir, and receives the compressed air directly from the compressor. The second is the auxiliary reservoir, and stores the air for use in the cylinder of that vehicle only. The main reservoir should have a capacity sufficient to store an abundant supply for the purpose of releasing and quickly recharging the brakes. If possible, it should be located in such a manner that all dirt, oil and moisture entrained in the compressed air will drain into it and be deposited there, but location is a consideration subordinate to that of sufficient capacity.

Main reservoirs should also have a drain cock in the bottom side, and be drained regularly whenever the car comes into the barn, in order to avoid the possibility of its capacity becoming reduced.

The remarks just made under the Straight-Air Brake Equipment concerning the desirability of having sufficient capacity for the reservoir, applies equally well to the main reservoir in the automatic equipment. As in this equipment the auxiliary reservoirs are usually of cast iron and combined with the cylinder directly, their volume is already determined and requires no calculation, but as the governor is connected to the main reservoir in these equipments it is equally important that its volume should be sufficient to meet the requirements. As these requirements are likely to be very different in nearly all cases, we do not give here any standard dimensions for these main reservoirs, but will make them to order to whatever size is desirable.

In mounting reservoirs they should be clamped by means of straps provided for that purpose to suitable cleats bolted to the car framing; the cleats should be hollowed out to fit the curvature of the reservoir. The outlet in the side for the drain cock should be placed on the underside.

AXLE-DRIVEN COMPRESSOR SETS.

The standard size reservoir for these sets is 14" diameter and 40" long, but such sizes and number will be supplied as the type of car and nature of service may demand. When the two-reservoir system is used, as described in Instruction Pamphlet T. 5013, the above mentioned reservoir is called the Main Reservoir, and a smaller one called the Preliminary Reservoir, generally 12" in diameter and 20" long, is connected directly to the discharge pipe of the compressor. This preliminary reservoir connects through a duplex check valve (described in Instruction Pamphlet T. 5009) to the main reservoir. This should be installed as described in Instruction Pamphlet T. 5013, describing the Straight-Air Brake Equipment with Axle-Driven Compressor.

The manner of installing the reservoirs should be similar to that mentioned above, viz., they should be clamped by means of straps provided for that purpose to suitable cleats, bolted to the car framing. Care should be taken that the outlet for the drain cock in the side should be placed on the underside.

STORAGE AIR BRAKE SYSTEM.

The size of storage reservoirs necessary for this system depends upon the conditions under which the road

employing this apparatus operates, and principally upon the distance between charging stations. The storage reservoirs are usually made for a pressure of 300 lbs. to the square inch, and should be fastened to the car framing by being clamped to suitable cleats by means of straps provided for that purpose. Each reservoir is provided with a drain cock, and care should be taken that the outlet in the side provided for this purpose should be placed on the underside. The positions of the storage reservoirs and service reservoirs will have to be decided in reference to the other apparatus which is necessary to be placed under the car, but in all cases we recommend that the relative order of connection between the reservoirs should be made according to the instructions given in Instruction Pamphlet T. 5016.

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