

THIS BOOK WILL HELP YOUR OPERATOR
SEE THAT HE GETS IT

Instruction Book 84564A

Supersedes 84564

STRAIGHT AIR BRAKE
EQUIPMENT

When ordering supplies specify "General Electric"

GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y.

SEPTEMBER, 1919

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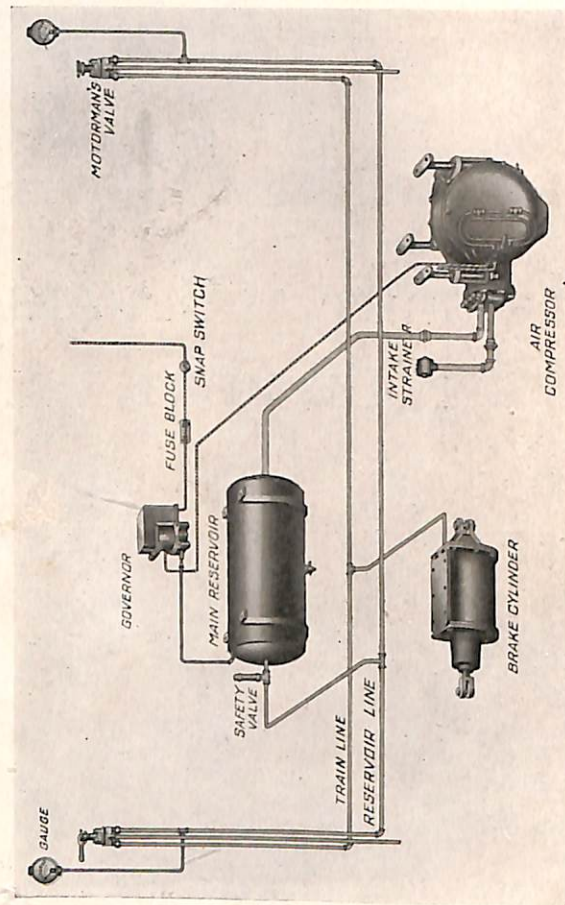


FIG. 1. STRAIGHT AIR BRAKE EQUIPMENT FOR MOTOR CAR

STRAIGHT AIR BRAKE EQUIPMENT

In the straight air brake system the brake cylinder is connected directly to the motorman's valve which governs the admission of air to the brake cylinder and the exhaust of this air from the cylinder to atmosphere. The brakes are applied by admitting air to the brake cylinder and are released when the air in the cylinder is exhausted to atmosphere.

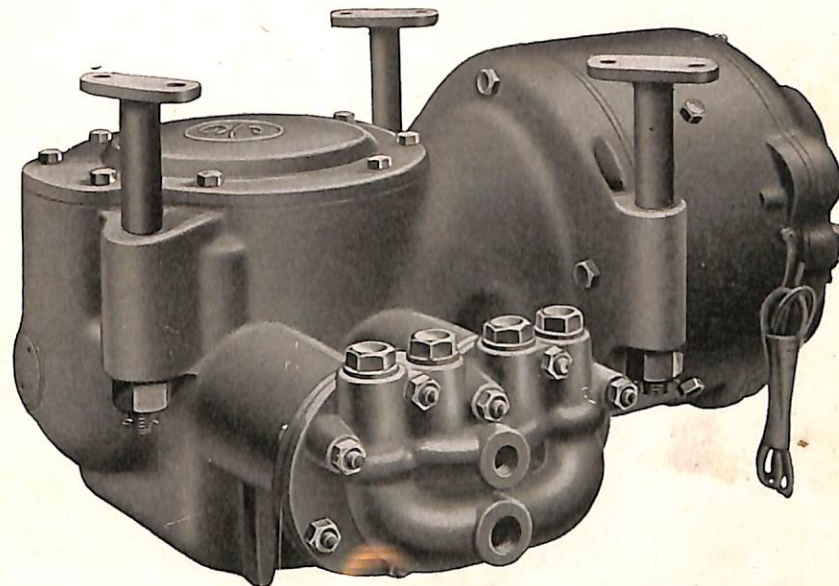


Fig. 2. AIR COMPRESSOR WITH TEE BOLT SUSPENSION

The general arrangement of this equipment is shown in Fig. 1.

EQUIPMENT

A straight air brake equipment comprises the following parts:

COMPRESSOR AND AUXILIARIES

- Motor driven air compressor.
- Intake strainer.
- Suspension set.

PRESSURE REGULATING EQUIPMENT.

- Air compressor governor.
- Insulating connection.
- Safety valve.

CAB EQUIPMENT

Motorman's valves.
 Motorman's valve handle.
 Single hand pressure gauges.
 Snap switch
 Cutout with fuse } or 1-combined switch and fuse.

BRAKE DETAILS

Straight air brake cylinder complete with push rod.

MAIN RESERVOIR AND ACCESSORIES

Main reservoir.
 Reservoir hangers.
 Reservoir drain cock.



Fig. 3. INTAKE STRAINER

MOTOR-DRIVEN AIR COMPRESSOR

For a description of motor-driven air compressors, gear type, see Instruction Book No. 84591-A.

INTAKE STRAINER

The intake strainer is furnished separate from the compressor so that it may be placed inside the car or in some other location free from dust. This strainer should be connected to the compressor by a short length of pipe and a union coupling and should be located near the compressor.

SUSPENSION SET

The compressors furnished with standard equipments are arranged for three-point suspension. Substantial sockets to receive the suspension bolts are cast integral with the compressor frame. The suspension bolts are bolted permanently to the car body. The compressor may be removed from the car by unscrewing the nuts at the ends of the suspension bolts.

When desired, compressors are furnished with suspension cradles consisting of two "U" shaped steel forgings, braced at the corners and fastened together at the bottom by two straight bars to which the compressor is bolted.

This cradle is attached to the car body by means of four malleable iron brackets which form pockets for the ends of the hangers. The brackets are bolted permanently to the car body and the cradle is held into these brackets by four pins.

Locate the compressor under the car so that the center line of the armature shaft is at right angles with the center line of the car, and see that the door at the commutator end of the motor can be opened without striking truss rods or other obstructions. Locate ground joint unions in the outlet and inlet pipes close to the compressor to facilitate removing the compressor from the car.

GOVERNOR

The function of the governor is to stop the air compressor motor when the desired maximum air pressure has been reached in the main reservoir and to start it when this pressure falls below a predetermined minimum.

It is recommended that the governor be placed inside the car in an upright position. It should be insulated from grounded portions of the car framing and should be placed as near as possible to the main reservoir, to which it must be directly connected; a separate connection on one end of the main reservoir is provided for this purpose.

Connect the governor to the reservoir at the end remote from the compressor connection. Have the pipe connection as short as possible and drain towards the reservoir. These governors are provided with an insulating pipe coupling, near which a union should be located.

The working parts of this governor consist of:

(1) A rubber diaphragm which is subject to the main reservoir pressure on the under side, and to the pressure of a regulating spring on the upper side.

(2) A piston and piston rod for transmitting the movement of the diaphragm to a set of operating levers.

(3) A regulating spring, the adjustment of which determines the opening and closing pressures of the governor.

(4) A set of operating levers and tension springs for giving a quick break movement to the contact, and also for maintaining a constant pressure until the tripping point has been reached.

(5) An arc chute which contains a magnetic blowout for extinguishing the arc formed on the contacts when opening the motor circuit.

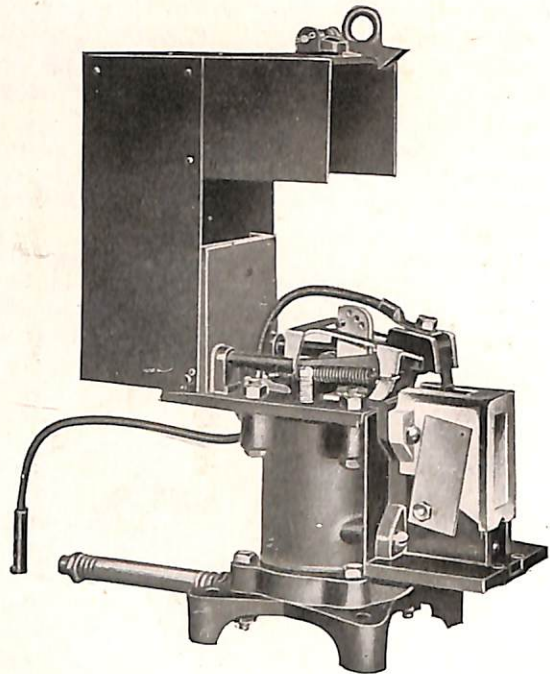


Fig. 4. TYPE ML FORM A AIR COMPRESSOR GOVERNOR

All standard governors are adjusted for an opening pressure of 65 lb. per sq. in. and a closing pressure of 55 lb. per sq. in. The opening pressure may be increased to 100 lb. and the closing pressure to 90 lb. by screwing in the adjusting screws on the upper part of the governor frame.

To renew the rubber diaphragm, remove the cylinder head by unscrewing the nuts from the four bolts holding it to the frame. When inserting a new diaphragm, place a thin disc of oiled or paraffined paper on each side of the diaphragm, to prevent it sticking to the metal. A worn diaphragm is easily detected by the governor opening at an increased pressure, and also by an increase in the operating range.

The Type ML Form A Governor shown in Fig. 4 and 5 is provided with an operating mechanism made from punched steel parts, and all important bearings are provided with hardened knife edges to give a positive snap action to the contact lever. The part of the arc chute surrounding the contact tips can be removed to give access to the contacts for cleaning and repairing. This is done by loosening the bolt which holds the pole pieces together and removing the two screws in the upper part of the frame. This leaves the upper section of the arc chute,

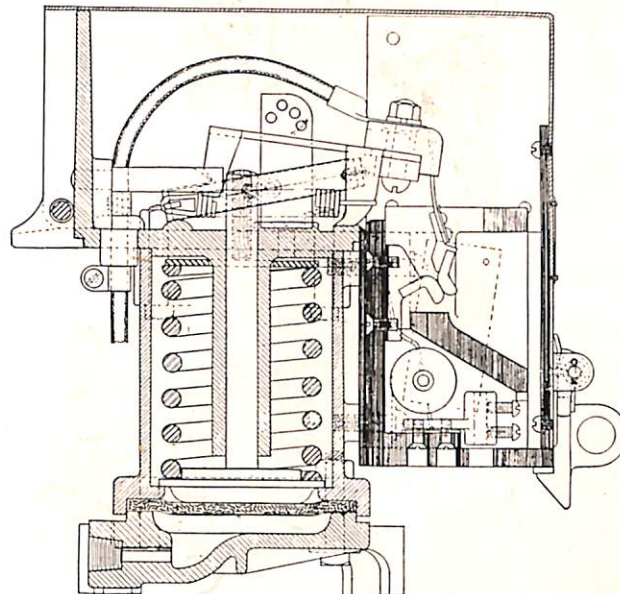


Fig. 5. SECTION OF AIR COMPRESSOR GOVERNOR, TYPE ML

which is made of fireproof material, free to be removed without disturbing the blowout coil or the connections.

The regulating spring is removed from the upper part of the governor by taking off the mechanism and the mechanism base, care being taken to relieve the compression of the regulating spring before unscrewing the bolts that hold the mechanism base to the frame. When replacing the regulating spring, see that it does not touch the inside of the governor frame.

The fulcrum punchings are provided with four holes in one of which the pin for limiting the upward movement of the contact carrying lever is inserted and held in place by means of a cotter pin. The

range, or difference between the opening and closing pressures may be adjusted by inserting this pin in the different holes. By this adjustment, the range of this governor may be made 8 lb., 10 lb., 12 lb., or 15 lb.

In case it is necessary to remove the blowout coil in the arc chute take care to see that it is replaced and connected in the same way as before removal. If this is not done, the arc formed at the contact tips will be blown in against the back of the arc chute, burning the same and interfering with the operation of the governor.

As there is no air circulation through the governors, they are not affected by freezing. It is recommended that the governors be located



Fig. 6. SAFETY VALVE

inside the car in order to prevent moisture and dirt finding its way into the operating mechanism and interfering with the movement of the levers.

The General Electric Company manufactures air compressor equipments for operation on 1200 volt circuits. These can be operated at 600 volts in which case the compressor receives its energy from the dynamotor, or they can be designed with the compressor motor taking 1200 volts direct from the trolley.

On 1200 volt equipments place the governor underneath the car. Additional provision, however, has been made on governors for this service to exclude moisture and dirt.

SWITCH AND FUSE

A combined switch and fuse, or a snap switch and fuse cutout, is provided for protecting the compressor motor circuit. The fuse is of the standard enclosed type.

Connect these parts in the positive side of the circuit and insulate from the grounded portions of the car by mounting on a board or a slate base.

Do not use wire smaller than No. 12 B. & S. for the compressor circuit.

SAFETY VALVE

The function of the safety valve is to prevent an abnormal pressure should the air compressor governor for any reason fail to open the air compressor circuit. Install this valve in the pipe leading from the main reservoir. It should be adjusted to open at 100 lb. pressure. The principal parts of this valve are a body, a lift valve, a compression spring, an adjusting screw, and a cap nut. The lift valve is normally held on its seat by means of the compression spring, the pressure of which can be varied by turning the adjusting screw. After setting the valve to open at the desired pressure, the adjusting screw is locked in place by the cap nut.

MOTORMAN'S VALVE TYPE S FORM L-1

The principal parts of this valve are a body to which all pipe

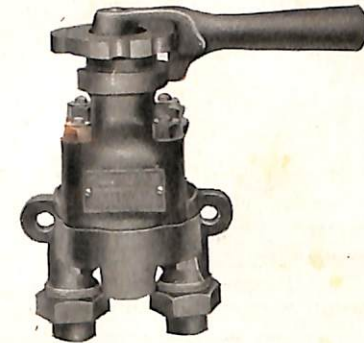


Fig. 7

connections are made, a bonnet, a rotary valve and a valve stem.

Ports leading to the pipe connections are located in the valve body, the upper surface of which is machined to form a seat for the rotary valve. The rotary valve is moved by means of the stem to make the proper connections between the different ports.

The following are the positions and the functions of the valve in moving the handle from the extreme left to the extreme right:

FULL RELEASE (extreme left)

The train line is connected to the exhaust pipe through a large port to give a quick release of the brakes.

SLOW RELEASE

The train line is connected to the exhaust pipe through a restricted port to give a slow release of the brakes.

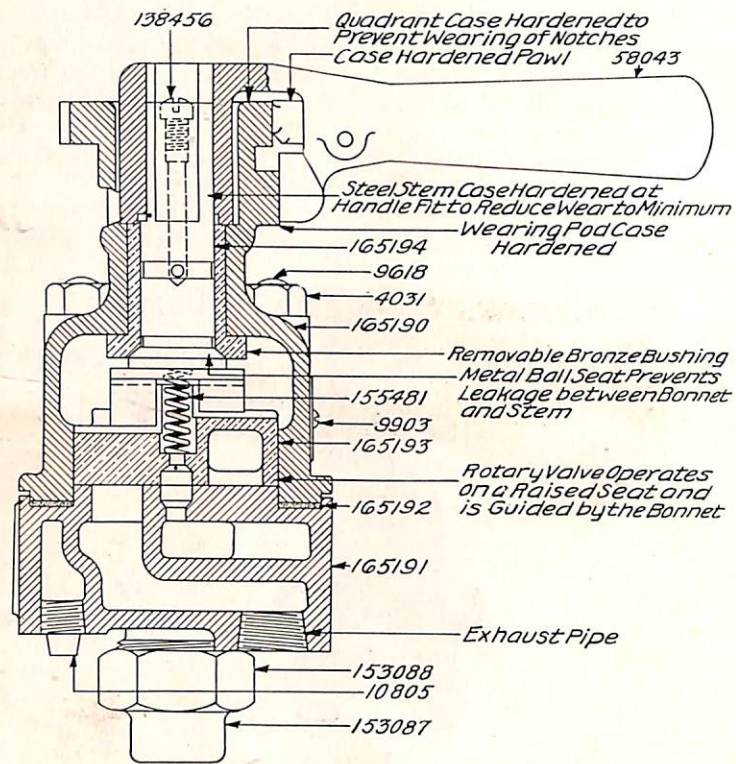


Fig. 8

LAP

All ports are blanked. This is the only position in which the valve handle can be removed.

SERVICE APPLICATION

The reservoir line is connected to train line through a series of small ports.

EMERGENCY (extreme right)

The reservoir line is connected to the train line through a large port.

PRESSURE GAUGES

Single hand pressure gauges are furnished with this equipment. These gauges are connected to the reservoir line close to the motor-man's valve and indicate the pressure in the main reservoir line at all times.

The pressure gauges should be located so that they will not have a strong light for a back ground.

Gauges should be occasionally checked with a test gauge and recalibrated if necessary.

BRAKE CYLINDER

The brake cylinder furnished with this equipment has a tubular piston rod which surrounds the push rod to which one end of the live



Fig. 9

cylinder lever is connected. The push rod is designed so as to move freely inside the tubular piston rod when the brakes are applied by hand. Consequently, hand and power application of the brakes are independent of one another. The pressure head of the brake cylinder is provided with two malleable iron brackets, to which one end of the dead cylinder lever is attached. These brackets may be replaced by a slack adjuster of standard type, provision being made in the cylinder for connection to the slack adjuster by means of a short length of copper pipe. Provisions will be found in the pressure head of the brake cylinder for oiling.

MAIN RESERVOIR

Connect the main reservoirs used with the equipment as shown in Fig. 1 and install below the level of the piping to facilitate drainage. Open the drain cocks and drain the reservoirs thoroughly at least once each day, depending on climatic conditions, to prevent an accumulation of moisture.

MAINTENANCE

AIR COMPRESSOR

For instructions on the care and maintenance of motor driven air compressors, see Instruction Book No. 84591-A.

BRAKE CYLINDER

To clean and oil the brake cylinder, remove the non-pressure head. Place a pin through the hole in the tubular piston rod to relieve the compression of the release spring when the nuts are unscrewed from the non-pressure head bolts. Withdraw the piston from the cylinder. Then clean the walls of the cylinder, and if signs of rust are noted, remove them with sandpaper. Remove the expander ring from the piston, and clean the follower and leather packing thoroughly. Kerosene or gasolene may be used for cleaning the metal parts. Take care to prevent kerosene or gasolene coming in contact with the leather packing.

Examine the follower studs, and tighten any found loose. Coat the walls of the cylinder and the packing leather with heavy cylinder oil or a graphite grease. Work the oil or grease into the leather packing to make it pliable.

MOTORMAN'S VALVES

Take apart the motorman's valves and clean and lubricate them at regular periods. Apply oil to the rotary valve and valve seat and to the valve stem and ball seat at the base of the stem. K-00 non-fluid oil has given satisfactory results in service.

INTAKE STRAINER

Be sure that the air taken into the compressor is clean and free from grit in order to insure good operation of the valves and prevent wear and cutting of the working parts. Locate the intake strainer inside of the car or other place free from dust. Take apart this strainer, blow out the casting thoroughly and clean the curled hair at regular intervals to remove any accumulation of dirt.

AIR COMPRESSOR GOVERNOR

Inspect governor contact tips at regular intervals and clean them with sandpaper when necessary. Remove these tips by unscrewing the screw holding them to the base. Inspect the spring carrying the removable contact tip to see that the contact has the proper wiping action. The amount of the wipe should be approximately $\frac{1}{8}$ in. Check the pressure between the contacts when the governors are overhauled. See that this pressure is approximately 3 lb., or more, measured on the finger spring $\frac{1}{2}$ in. from the center of the stud which attaches the finger spring to the insulated yoke.

RULES FOR OPERATING THE STRAIGHT AIR BRAKE EQUIPMENT

Before starting the air compressor see that the reservoir drain cocks are closed. Next, start the air compressor by turning the switch to the "on" position. When the gauge hand shows maximum main reservoir pressure, and before starting the car, make a service application of the brakes by moving the motorman's valve handle to the service application position to see that the brakes apply, which will be indicated by the brake cylinder piston moving out and forcing the shoes against the wheels. If the brakes apply properly with a service application, move the valve handle to the release position to see that they release properly, which will be indicated by the brake cylinder piston moving back in the cylinder and allowing the shoes to hang free from the wheels.

RUNNING

Have the motorman's valve handle in the **release** position when running.

SERVICE STOPS

In making ordinary service stops, place the motorman's valve handle in the **service application** position and leave in that position until a sufficient amount of pressure has built up in the brake cylinder to give the retarding effect desired. The handle should then be moved to lap position. As the speed of the car is reduced, reduce the brake cylinder pressure in a series of steps by moving the valve handle from lap position to release position, and then back to lap position; repeat this movement until the stop is reached. At the point of stopping there should be only sufficient air in the brake cylinder to prevent the car from rolling.

It will be found that far better braking results will be obtained by making but one application as described above than by admitting only a small amount of air to the brake cylinder at the beginning of the stop, and increasing the pressure as the speed of the car is decreased. The latter method usually results in rough stops, a waste of air, and in many cases flat wheels. The practice of applying and releasing the brakes several times during a stop should be avoided.

EMERGENCY STOPS

If it is desired to stop the car in the shortest possible distance, to avoid an accident, apply sand to the rails and at the same time move the motorman's valve handle to the **emergency** position and leave it in that position until the car comes to a stop or the danger has past.

SANDING OF RAILS

If rail conditions necessitate the use of sand, apply it at the beginning of the stop and allow it to flow until the stop is reached. If the brakes are applied with sufficient force to cause the wheels to slide, quickly move the valve handle to release position before sand is applied, after which the brakes should be re-applied. If sand is thrown on the rails with the brakes applied, and the wheels sliding, flat wheels are bound to result.

If a car is left standing on the road set up the hand brakes or apply the air brakes by moving the motorman's valve handle to the emergency position and leaving it in that position. **Never leave a car standing on the road with the motorman's valve handle in either the release, slow release, or lap positions unless the hand brakes are set up.**

GENERAL

In order to obtain the best results with this equipment, install the parts in a substantial manner and in accessible places. Inspect and maintain them regularly as recommended in the preceding pages. Keep the piping free from sags or pockets in which moisture might collect. Ream the ends of all pipes before installing and make all joints tight and keep them free from leaks.

Proportion the foundation brake rigging so that it applies a force equal to 100 per cent of the weight of the car fully equipped but without load at the brake shoes. Adjust the truck brake rigging so that the brake cylinder piston will not have more than $3\frac{1}{2}$ in. travel when the car is standing. Keep the brake rigging free from excessive lost motion and when the brakes are fully released, the push rod should follow the piston to the extreme end of its travel in order to prevent the piston striking a hard blow against the push rod when the brakes are applied.

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GENERAL ELECTRIC COMPANY

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