

LOCOMOTIVE CORRESPONDENCE COURSE : FIREMEN AND  
ENGINE DRIVERS.

LESSON NO. 9 - PAGE 1.

STEAM DRIVEN AIR COMPRESSOR GOVERNOR : MAIN RESERVOIR : AIR PRESSURE  
GAUGE.

AIR COMPRESSOR GOVERNOR :

The air compressor governor is attached to the steam pipe leading from the boiler to the air compressor, and its function is to regulate automatically the main reservoir pressure by controlling the flow of steam to the air compressor. By its use a saving of steam may be effected, and the air pressure prevented from building up to an amount greater than that required, because it closes the steam passage to the compressor when the required pressure is obtained in the main reservoir.

OPERATION :

Refer to the accompanying diagrammatic sketch. Fig. 2.

Steam from the boiler entering at A flows under the STEAM VALVE and passes by B to the compressor, which is thus put into operation. It will continue to work until the air pressure in the main reservoir, acting upon the under side of the DIAPHRAGM, develops a force in excess of that exerted by the REGULATING SPRING. The diaphragm is then forced upward, lifting the PIN VALVE, and allowing air from the main reservoir to flow into the chamber above the piston. The air pressure forces the Piston downwards, and closing the steam valve, cuts off the supply of steam to the compressor.

During the time the steam valve is closed, the compressor will not operate, and there will be a continual escape of air through the small VENT PORT. When the main reservoir pressure under the diaphragm is reduced, the regulating spring will return the diaphragm and pin valve to the closed position. The compressed air previously admitted to the chamber above the piston escapes through the vent port to the atmosphere, thus relieving the pressure from the top of the piston. The steam pressure then lifts the valve. It is also assisted by a spring under the piston, and steam again passes to the compressor, allowing it to restart.

For further reference see Air Brake Handbook, page 13-14.

The main reservoir pressure at which the governor will stop the compressors from operating may be regulated by altering the compression on the spring by means of the ADJUSTING SCREW. The main reservoir pressure should be 95 lb. per square inch, except when a Duplex Air Compressor Governor is fitted on the locomotive. The pressure may then be 95 lb. or 120 lb. per square inch according to the position of the brake valve handle. To increase the main reservoir pressure, the adjusting screw is turned clockwise, and to reduce the pressure, it is turned anti-clockwise.

The centrepiece of the governor and EXHAUST is provided to prevent the accumulation of any steam or air leakage to the cylinder below the piston.

A small hole is drilled through the steam valve for the purpose of keeping the Air Compressor slowly working when the steam valve is shut.

NOTE : During the normal operation of the governor there will be a constant discharge of air through the vent plug at all times when the steam valve is held closed. When the steam valve is re-opened, this discharge of air will cease.

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DUPLEX AIR COMPRESSOR GOVERNOR :

The Duplex Air Compressor Governor is employed in the operation of A6E.T. locomotive brake equipment.

The principal difference between the single and duplex governor is the addition of another controlling air pressure head, in which case they independently control the movement of the same piston and steam valve (see Air Brake Handbook, pages 43-44 and Fig. 53).

The high pressure head is controlled by the main reservoir pressure to which it is directly coupled, whilst the main reservoir pressure to the low pressure head is controlled by the driver's brake valve through which the air is passed before reaching the governor.

AIR COMPRESSOR GOVERNOR DEFECTS AND FAILURES :

Refer to the Air Brake Handbook, pages 123-124.

Governor Sticking open, Governor Sticking closed.

The design of the No. 8 duplex governor prevents many of the failures encountered with the No. 7 air compressor governor which is shown in Fig. 12, Air Brake Handbook, page 13. It will be noticed that some of the duplex governor parts are called by different names, such as the Diaphragm Valve (Pin Valve) and Choke Plug (Vent Plug), etc.

Refer to the Air Brake Handbook, Fig. 53, page 43.

When the duplex governor steam valve is held closed, the air from the choke (31) exhausts out from under the piston bush (11) and is rather difficult to detect. When testing to see whether the choke is blocked, remove the choke plug cap nut (31) and if the choke is clear, air will discharge.

The exhaust vent at the back of the duplex governor is provided to exhaust any steam leakage that may take place between the steam valve and the steam valve bush, only. The bottom of the piston is open to the atmosphere at all times through the holes in the baffle plate (12).

MAIN RESERVOIR :

The compressor delivers air into the main reservoir, which is situated on the locomotive where it is stored for the purpose of -

- (a) Charging the brake pipes and auxiliary reservoirs.
- (b) Releasing the brakes after they have been applied and
- (c) Cooling and condensing out water or oil.

From the main reservoir the air has a free passage to the Driver's Brake Valve isolating cock and the Driver's brake valve.

The main reservoir capacity must be such as to provide air at a pressure sufficiently high to promptly release the brakes and recharge the auxiliary reservoirs. If the main reservoir capacity is low, the compressor may have to run at a high speed when the brakes are released in order to supplement the air supply, as the air stored in the main reservoir, of itself, will not charge the "auxiliaries" quickly enough.

When water is allowed to accumulate in the main reservoir, it not only reduces the space available for air storage, but it also works through into the brake pipe and auxiliary reservoirs, gumming up and rusting the triple valve. Main reservoirs are provided with drain cocks, and must be opened at each preparation in order to blow out any water that has accumulated. It is considered good practice to open the drain cocks when checking over the locomotive in service.

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The main reservoir pressure begins at the discharge valve of the compressor and ends on top of the rotary valve in the driver's brake valve when the Driver's Brake Valve isolating cock is open.

The main reservoir and piping is tested by closing the brake valve isolating cock, and charging the main reservoir to a pressure of 80 lbs. per square inch. With the main reservoir charged to 80 lbs. per square inch, and the compressor shut off, the pressure must not fall at a greater rate than 3 lbs. per square inch per minute.

At the completion of this test the isolating cock is again opened.

AIR PRESSURE GAUGES :

Refer to the Air Brake Handbook, page 37, Duplex Air Pressure Gauge.

In the study of the Driver's brake valve, it will be shown that there is direct communication between the equalising reservoir and brake pipe when the handle of the Driver's brake valve is in certain positions only. In all cases, however, the air pressure will equalise.

When the brake valve handle is in the release and the running positions the brake pipe and the equalising reservoir are connected. In addition to registering the pressure in the equalising reservoir and the chamber on top of the equalising chamber to which it is connected, the black hand of the Duplex Air Pressure Gauge indicates (substantially) the brake pipe pressure.

In the service position the equalising reservoir and the brake pipe are not connected, and it is only on account of the action of the equalising piston that the black hand gives an indication of the brake pipe pressure.

With the brake valve handle in lap and in emergency positions the black hand registers the equalising reservoir pressure only.

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