THE WESTINGHOUSE BRAKE

WITH

ELECTRO-PNEUMATIC CONTROL.

THE WESTINGHOUSE BRAKE COMPANY, LIMITED.

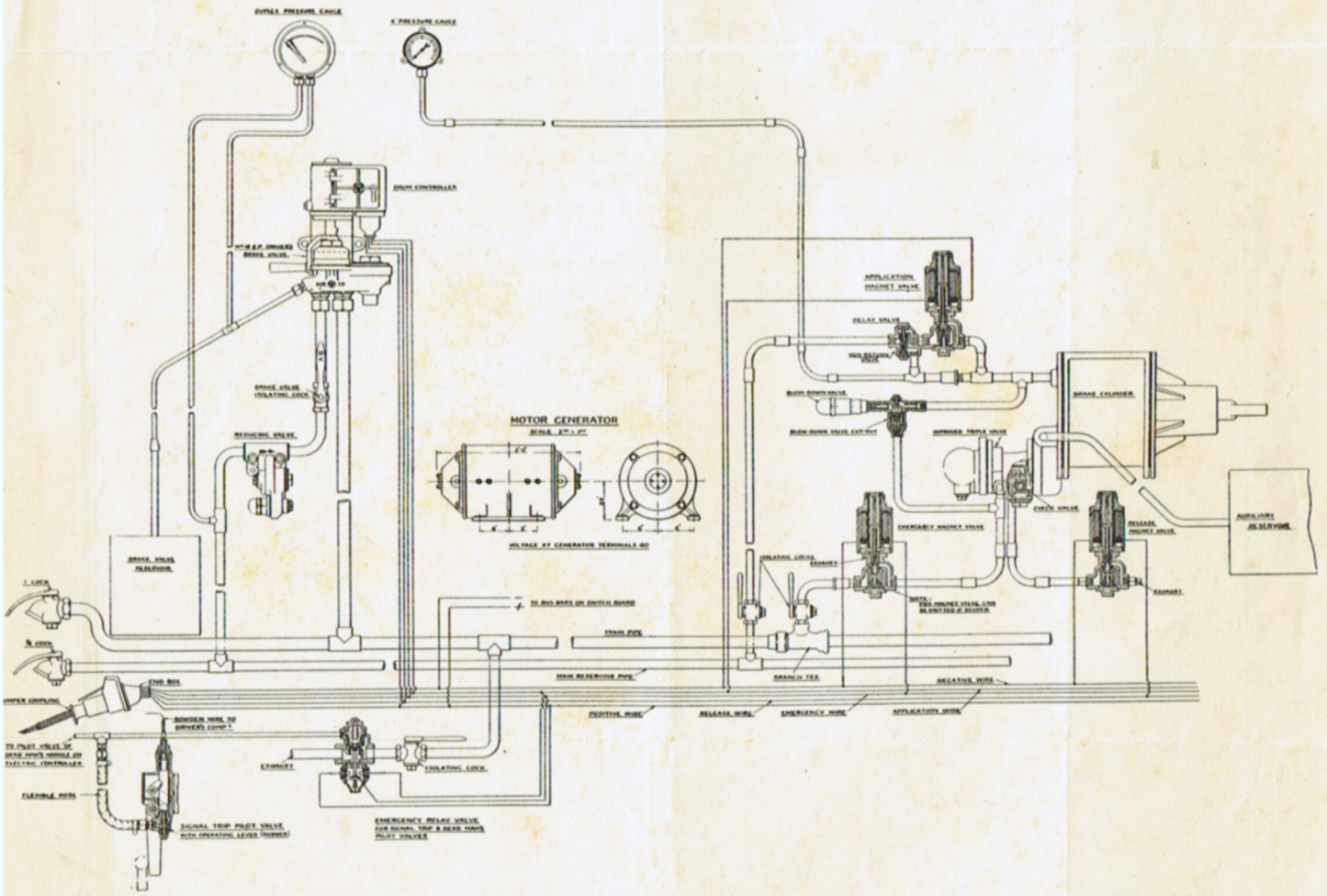
Works and Offices:
82, YORK ROAD, KING'S CROSS, LONDON, N.

1915.

STANDARD BRAKE EQUIPMENTS

FOR ELECTRIC TRAIN SERVICE,

WITH ADDITION OF ELECTRO-PNEUMATIC CONTROL.



This equipment consists of the Westinghouse Brake Co.'s standard pneumatic brake apparatus, including the improved triple valve giving almost simultaneous action in all applications of the brakes. To meet the demand of certain electric train services, which operate with very frequent stops and require to make shorter schedule time at high speeds, certain electric features have been added, which facilitate the increase and decrease of the pressure in the brake cylinders.

The pneumatic features of the brake apparatus are so well known that there is no need for further explanation. The only detail which has been modified is the driver's brake valve, which may be used purely for pneumatic operation, but is designed to permit, without further alteration, the subsequent addition of the parts necessary for electric control, whenever they may be found desirable.

The additional parts which we supply for electric control on each motor car are :—

(1)	THE MOTOR GENERATOR	to reduce the line current from the voltage used thereon to a current of 30/40 volts, or to the voltage desired for the operation of the electro magnets.
(2)	THE TWO END-BOXES	placed at the ends of every car, and into which the jumper ends are inserted for conveying the current between the cars.
(3)	THE DRUM CONTROLLER	fitted above the driver's brake valve, to make connection between the supply line from the motor generator and any desired control.
(4)	THE RELEASE MAGNET VALVE	which when energised closes the exhaust passage through the triple valve body from the brake cylinder to the atmosphere.
(5)	THE APPLICATION MAGNET VALVE	which, when energised, relieves the pressure above
(6)	THE RELAY VALVE	allowing it to admit air from the main reservoir to the brake cylinder.
(7)	THE BLOW-DOWN VALVE	set to the desired maximum pressure, to prevent too high a pressure being reached in the brake cylinder in ordinary service applications.
(8)	THE EMERGENCY MAGNET VALVE	which, when energised, closes the communication between the train pipe and the triple valve, and vents to the atmosphere the spaces below the piston of the triple valve and the piston of
(9)	THE BLOW-DOWN VALVE CUT OUT	which cuts out the blow-down valve and retains full main reservoir pressure in the brake cylinder in emergency applications.
(10)	AN ATTACHMENT TO THE RELAY VALVE OF THE DEAD MAN'S HANDLE	to complete a circuit and actuate the emergency magnet.
(11)	A 4-IN. PRESSURE GAUGE	to show the pressure in the brake cylinder of the motor car.
(12)	A JUMPER COUPLING	for coupling control lines between cars.
(13)	MAIN RESERVOIR ISOLATING COCK	by which the brake apparatus may be isolated from the main reservoir pipe, if required.

The additional parts required for electrical control on each trailer car are Nos. 2, 4, 5, 6, 7, 8, 9, 12 and 13 of the above motor car parts.

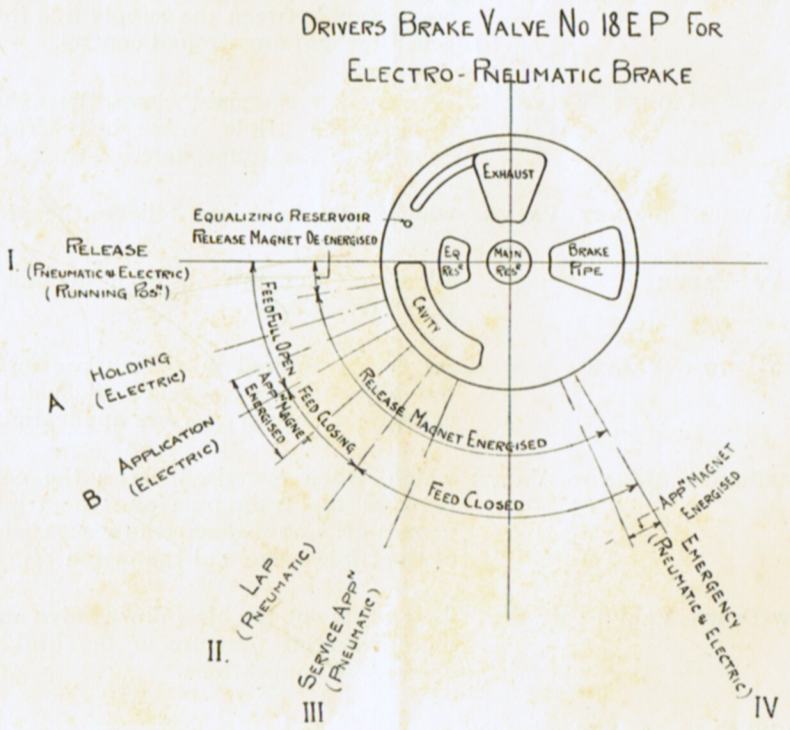
DESCRIPTION OF THE APPARATUS.

The accompanying diagram shows the different positions of the Driver's Brake Valve Handle.

Positions marked I, II, III and IV are the ordinary positions for working pneumatically, viz. :—

I. The release and running position ;
II. The lap position ;
III. The service application position ; and
IV. The emergency application position.

Between positions I and II are two further positions A and B, for electric control.

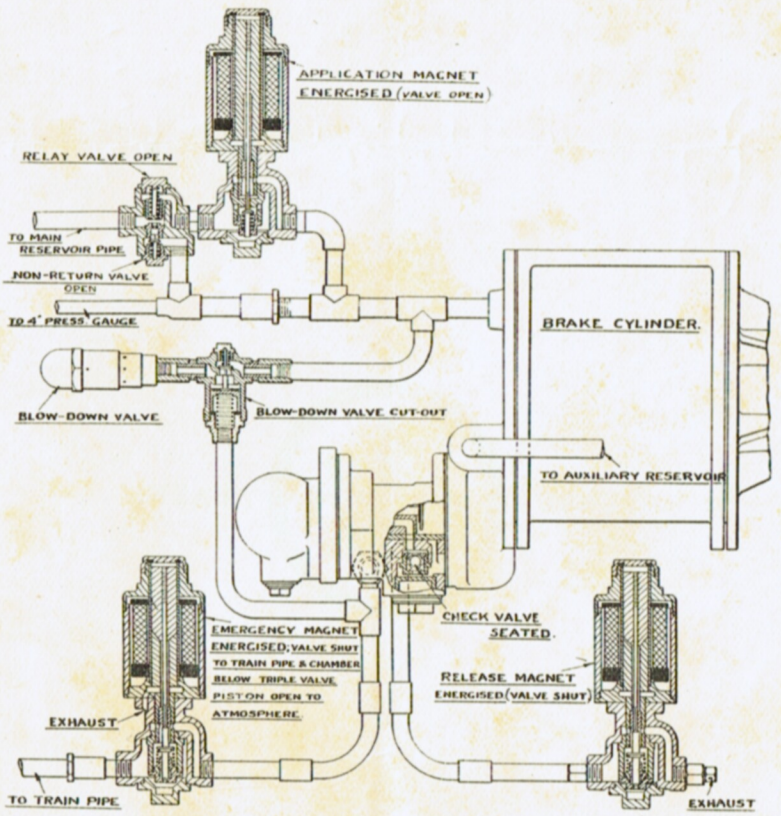


In using the electric control, it will be observed from this diagram that the release magnet is energised and the exhaust of the triple valve is closed from a point between position I and position A up to position IV. Consequently, no matter in what position the triple valve may be, no air can be exhausted from the brake cylinder to the atmosphere, except through the blow-down valve, until the brake valve handle is moved to position I, which is the full release or running position.

When it is necessary to partially release the brakes, the brake valve handle is moved to position I, and when the pressure shown on the cylinder gauge has been sufficiently reduced, the handle is moved to position A, where the exhaust magnets are energised and the pressure retained in the cylinders without change. When it is desired to again increase the pressure in the brake cylinders, the handle is moved to position B, at which the application magnets, as well as the release magnets, are energised, and additional air is admitted to the brake cylinders. The handle can then either be returned to position A and the brakes held, or to position I and the brakes released. In this manner the brakes can be graduated on or off as desired.

The first service application of the brakes should always be made by moving the handle to position III, which enables the much larger quantity of air required to make a first application of the brakes, to be admitted very rapidly to the cylinders through the action of the triple valve. When this has been done, and the handle is moved to position A, the triple valves are at once reversed, but, the release magnets being energised, no release occurs. During the time that subsequent graduations of the brakes are being made by the electric control, the auxiliary reservoirs are being recharged to full pressure, and a subsequent pneumatic application can be made immediately, either partially or, if found necessary, in full emergency with the full pressure of the brake, by moving the handle to positions III or IV respectively.

The electric applications of the brakes are made by admitting main reservoir air direct to the brake cylinder, through the relay valve actuated by the application magnet valve.



To prevent the pressure in the auxiliary reservoir being increased by air flowing into it from the cylinder when the triple valve is in the application position, a ball check valve is inserted in the regulating plug of the triple valve.

To prevent loss of pressure in the brake cylinder, through a fracture of the main reservoir pipe after the brakes have been applied, a non-return valve is inserted below the relay valve, in the passage between the main reservoir and the brake cylinder.

To prevent the pressure in the brake cylinder from being so increased in service applications as to cause skidding of the wheels, a blow-down valve is provided, which can be adjusted to open at a predetermined maximum and blow down the pressure in the cylinder to the pressure at which the valve is set.

In emergency applications of the brake, when the maximum air pressure available should be admitted to the brake cylinder as rapidly as possible, both the application and emergency magnet valves are simultaneously energised. Also the piston of the blow-down valve cut-out, which normally and in service applications holds open the passage from the brake cylinder to the blow-down valve, moves automatically down when the pressure below it is vented to the atmosphere, allowing the valve above it to seat and close that passage; the maximum air pressure available is thus obtained and held in the brake cylinder.

The diagram on this page illustrates the position of all the valves in an emergency application of the brakes.