

Supplement 1
to
Air brakes on the Golden Valley Light Railway
Adaptation for a higher brake cylinder pressure on a locomotive.

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A locomotive (Baguley Drewry 3753 of 1980) was acquired which was already fitted with a form of air brakes. The parking brake was spring applied, air released, controlled solely by the deadman's pedal air valve. The loco had no external air connections. The brake cylinders are inaccessible without the use of a pit or jack. This concept, as explained in the main article, has a degree of nuisance value, in that a dead locomotive cannot be moved.

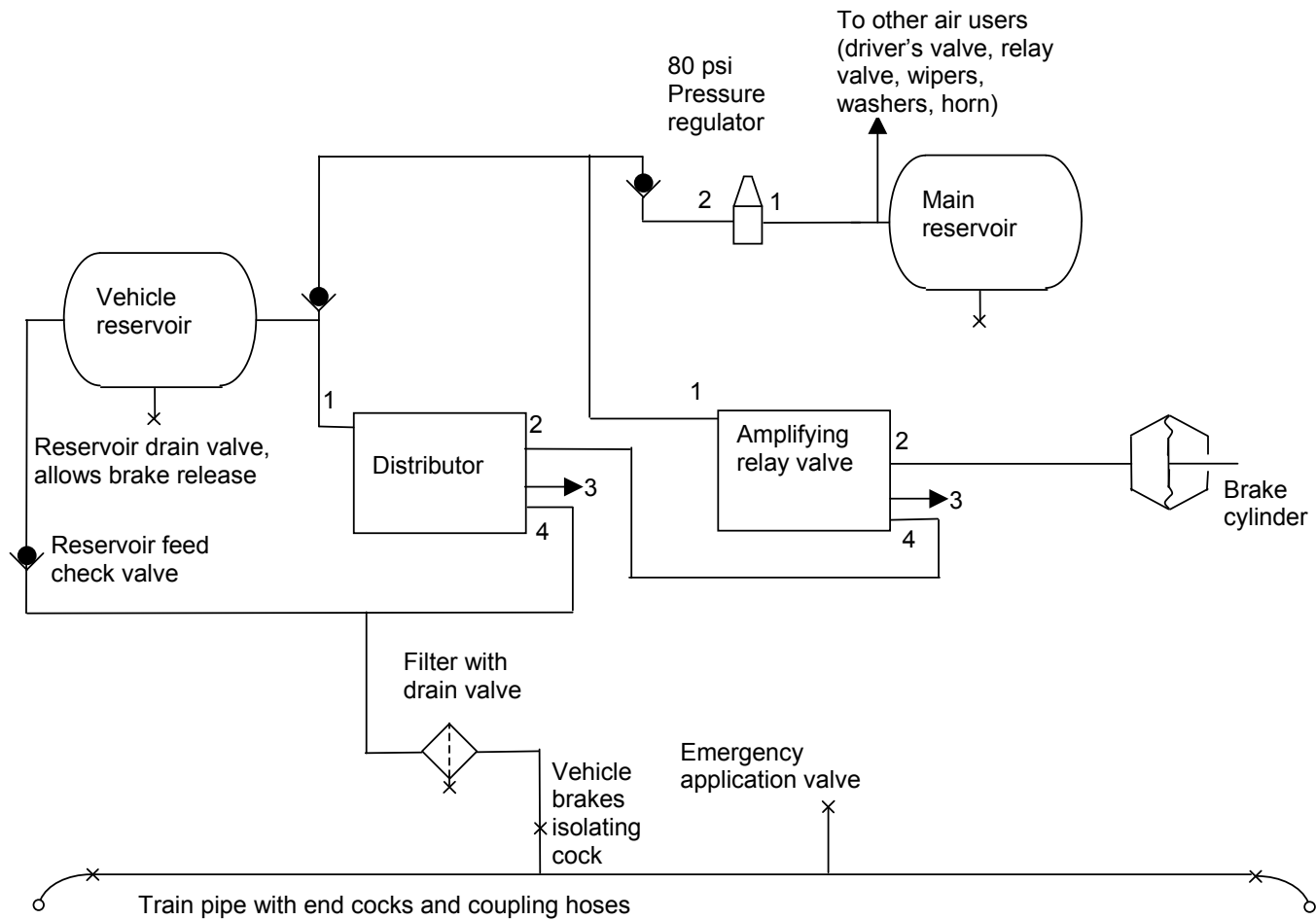
The service air brake was a direct acting air brake, incorporating a driver's valve of moderate size acting through a single relay valve to both brake cylinders.

The operating pressure of both direct and spring brakes was 80 psi, which would have meant that if a simple conversion to the GVLR auto brake system had been applied, with its standard train pipe pressure of 50 psi, only approximately half the required loco brake force would have been available without releasing the deadman's pedal on every occasion. A number of concepts were considered, including additional brake cylinders or arranging for a supplementary reduction of parking brake pressure to be controlled somehow by either the train pipe or the brake cylinder pressures, but no appropriate equipment could be discovered which would achieve this.

A particular type of commercial vehicle relay valve was discovered. This operates just like a standard relay valve, but has a larger diameter piston on its input or control chamber than it does on its output chamber. This allows a small change in input pressure to provide a larger change of output pressure. It needs to be fed with air of adequate pressure, and to this end, a feed is made from the pressure regulator which formerly fed the parking brake at 80 psi. To cater for occasions when there is no air in the main reservoir, and to permit the loco to behave as a fitted wagon, albeit with limited brake force, a feed is also taken from the auxiliary reservoir which is still required for distributor control. These 2 feeds are necessarily separated by check valves. This new "amplifying valve" is controlled by the output from the distributor.

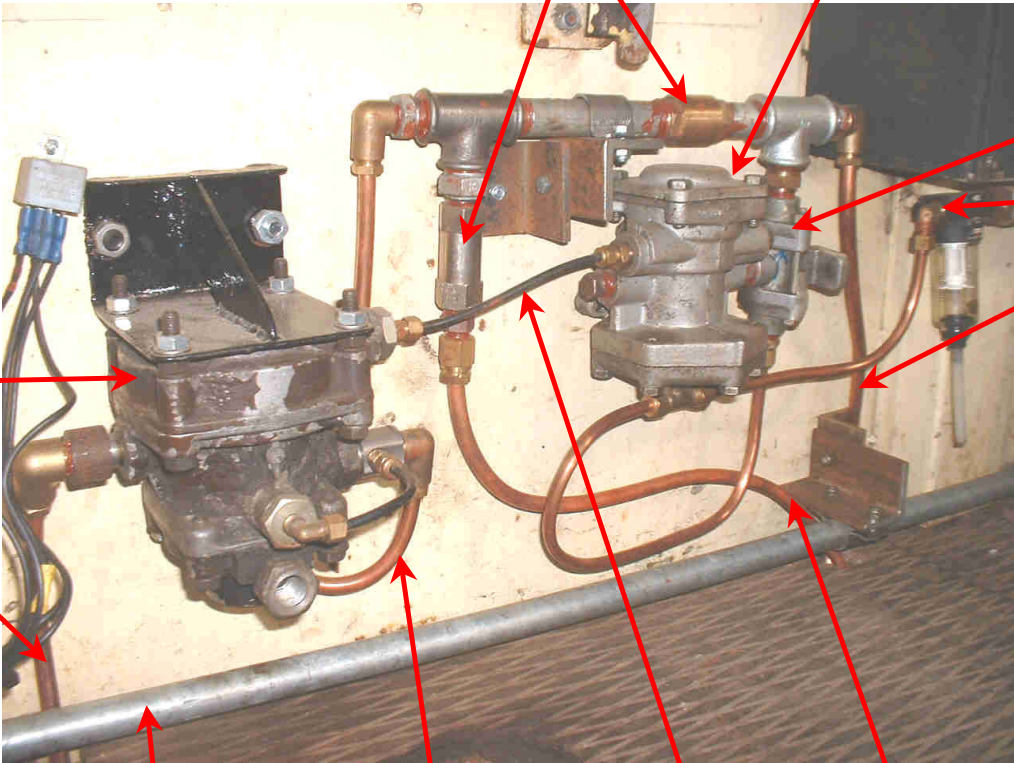
The existing drivers valve and its relay valve have been disconnected from the brake cylinders, and now control the train pipe pressure instead. Their existing pressure regulator output has been reduced from the original 80 psi to provide a maximum train pipe pressure of the standard 50 psi.

The following schematic diagram illustrates how a 50 psi train pipe controls a 80 psi brake cylinder in the manner described above.



Schematic diagram of loco brakes to provide higher brake force by use of amplifying valve downstream from the distributor, including a high pressure source from the main reservoir. Port numbers as main air brake description.

The installation on BD 3753 (1980)



Check valves

Distributor

Double check valve used as combined check valve / Tee

From train pipe connection and isolating cock

To/ from vehicle reservoir

Amplifying valve

To brake cylinder

Train pipe

Feed to amplifying valve

Amplifying valve control by distributor

HP feed