ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT

MAINTENANCE INSTRUCTION

SOLENOID (MAGNET) VALVES

DESCRIPTION

Solenoid valves are used in electrically controlled pneumatic systems in many locomotive applications. The two basic types of valves which are used are the single unit valve, Fig. 1, and the duplex valve, Fig. 2. Each of these valves, through the "building block" technique of assembly, can be adapted to perform varied functions. The addition of components such as override devices, terminal boxes, and mounting adapters provides flexibility and interchangeability of application, using the same basic valve.

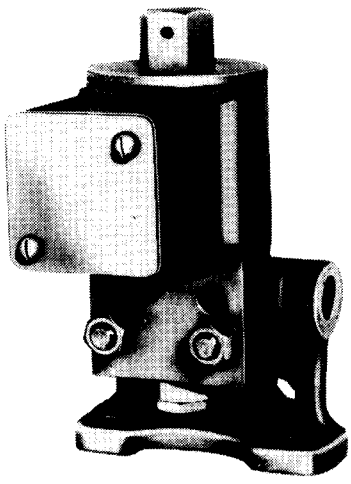
The single unit valve has one electrical coil and one air valve. The duplex valve has two coils and two air valves attached to a common mounting bracket with a single air intake. The two coil and valve assemblies of the duplex valve function independently and can control different devices simultaneously.

An epoxy encapsulated coil with integrally molded terminals is the electrical portion of the basic valve and when energized or de-energized, depending on the specific application, positions a plunger to provide air or shut off air to a pneumatically controlled device.

The pneumatic portion of the basic valve consists of a valve body, plunger and seat assembly, coil pole, spring, "O" ring, and bottom cap. The valve seats are made of molded "Viton" which is a high tensile synthetic compound. The seats are not only replaceable, but are reversible as well, providing long service life.

OPERATION

A cross-sectional view of a typical basic single unit solenoid valve is shown in Fig. 3.



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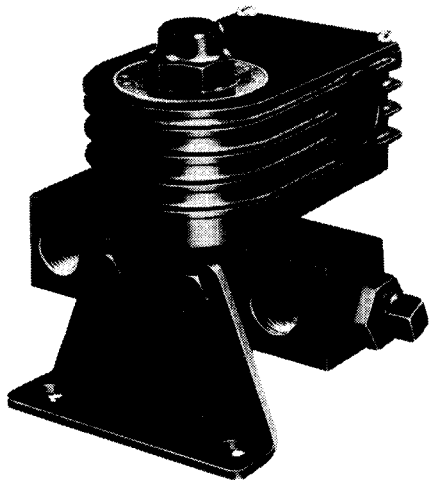

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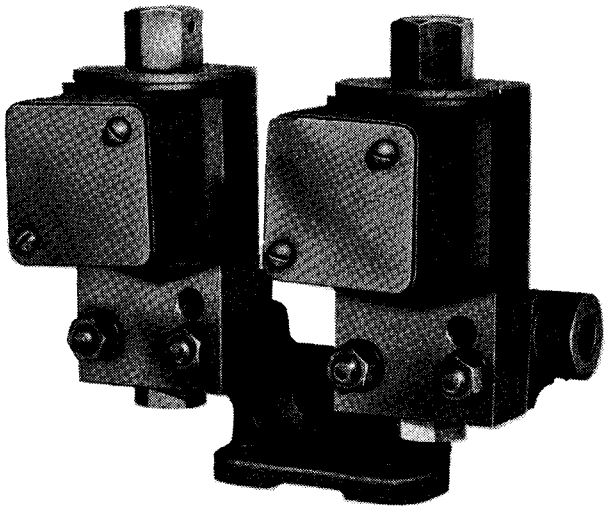
Fig. 1 – Typical Single Unit Valves

*This bulletin is revised and supersedes previous issues of this number.



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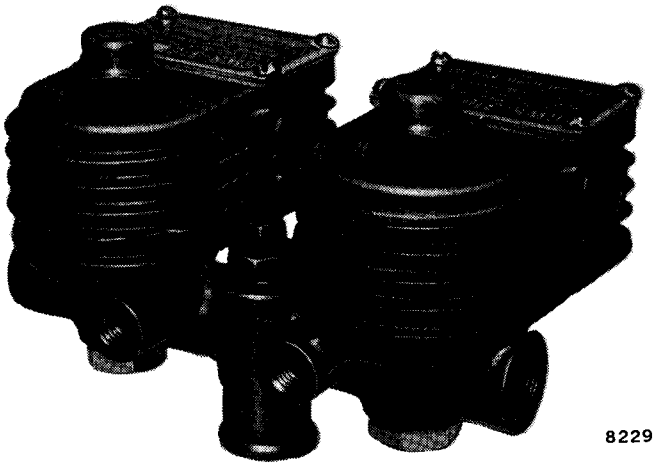

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Fig. 2 – Typical Duplex Valves

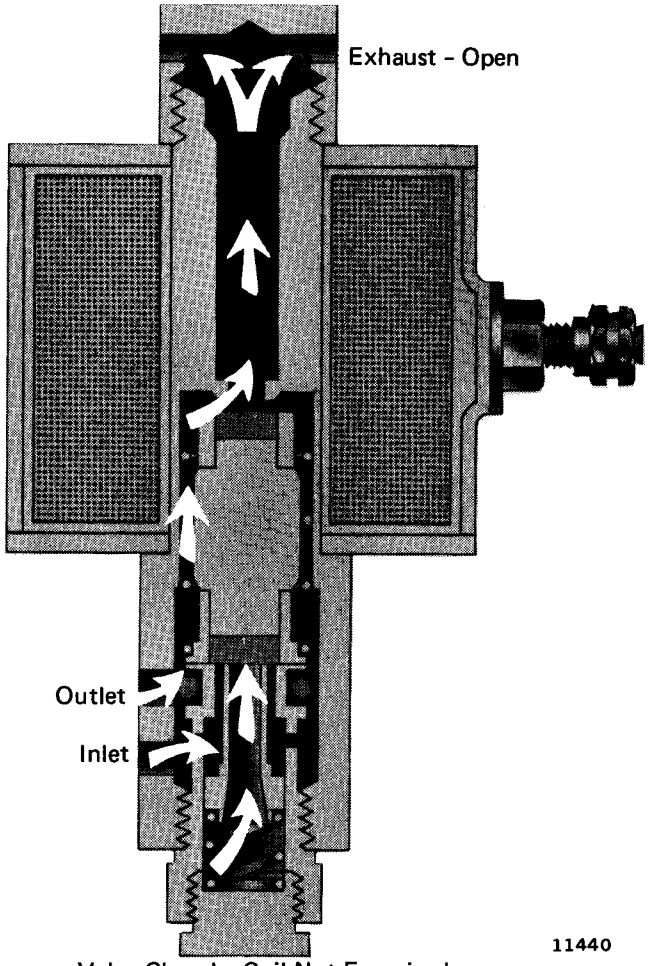

Fig. 3 – Single Unit Valve Cross-Section

Air enters the valve through the inlet port of the mounting bracket, into the bottom hole of the valve body. It then enters into small drilled passages in the bottom cap of the valve upward through the middle of the cap to the outlet port. An "O" ring on the cap prevents any air flow to the outlet port, except that air which is admitted through the passage in the center of the cap.

In the closed position, the plunger is seated on the machined upper surface of the cap. The plunger is held in this position by a spring, preventing the flow of air through the center of the cap to the outlet port. There is a "Viton" seat in each end of the plunger. The lower seat serves as the inlet air valve and the upper seat as the exhaust air valve.

The coil pole, running through the center of the coil and the valve body, is the armature for the solenoid. When the coil is energized, the magnetic field pulls the plunger off of the inlet port. This movement of the plunger positions it so that the upper seat of the plunger seals off the exhaust port at the top of the valve. The inlet air is now free to flow through the outlet port.

When the coil is de-energized, the spring forces the plunger down until the lower seat shuts off the flow of air to the outlet port. It also opens the exhaust port allowing air to enter the atmosphere through the drilled holes in the exhaust nut, which screws onto the top of the coil pole.

MAINTENANCE

These solenoid valves are designed for ease of maintenance as there are no air gaps, valve lifts, or any close tolerances with which to be concerned.

CLEANING

Cleanliness is an important factor to efficient operation and long service life. The frequency of

cleaning is dependent upon the conditions to which the air passing through the valve has been subjected. To clean the valve, use a good commercial solvent and thoroughly clean all moving parts and air passages.

COIL REPLACEMENT

It is not necessary to completely disassemble the solenoid valve to replace a coil. Disconnect the leads from the terminals. Remove the exhaust nut from the top of the solenoid valve, then slip the coil off of the coil pole. When connecting a new coil, make certain that incoming wires and coil leads are not grounded on the coil housing.

"O" RING AND SEATS

Air leaks at the exhaust ports indicate either a worn "O" ring or faulty seats. If a leak is detected when the coil is not energized, the cause can be traced to either the inlet seat or the "O" ring on the bottom cap. If a leak is detected while the coil is energized, the exhaust seat is worn. To replace seats, remove the bottom cap and remove the plunger assembly, and remove the seats. Determine through inspection of the seats whether new seats should be installed or whether reversing the seats would provide satisfactory operation. Inspection and, if necessary, replacement of the "O" ring can be made when the bottom cap is removed from the valve.

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