

ANDROMAT TODAY

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Servo Valves

"How do they work?"

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Hello friends,

This quarter we will have a brief discussion on the operation principles of the servo valves used to drive the work arm and azimuth of our Andromats.

Servo valves are primarily used for precise, stepless control of 2, 3, and 4-way applications. These valves allow for control of our 2-way hydraulic cylinders where a quick response and precision is required.

Principles of operation:

A varying electrical signal is sent to the valve. This signal is then amplified to provide varying current to the coil of the valve. The coil converts the electrical current to magnetic force or "electromotive" force. This force causes the armature to rotate left or right of center. Connected to the armature is a flex shaft with a "flapper" attached. On either side of the flapper is a nozzle that delivers pressurized fluid onto the flapper. The same pressure is also being supplied to either end of the spool valve. In the absence of a command signal, the flapper and spool will sit an equalized, no flow state, see fig. 1.

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HAPPY THANKSGIVING



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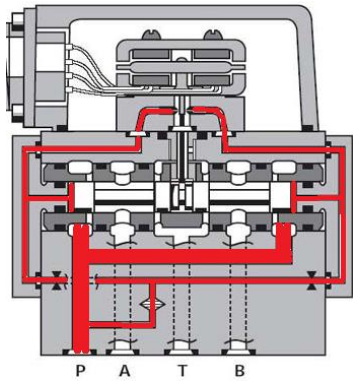


fig. 1

When a command is given, the armature will cause the flapper to move closer to one of the nozzles, increasing the pressure on that side of the chamber while decreasing the pressure to the opposite side. This pressure difference allows the spool to shift toward the low pressure side, allowing flow and return ports to open to the hydraulic cylinder or motor. Additionally, a thin feedback spring attached between the bottom of the flapper and the spool will flex as the spool moves. This flex counteracts the electromotive force on the armature causing the armature to return to center, and hydraulic pressure on each end of the spool to equalize, holding the spool in the position originally shifted to. This is the feedback or "proportional" operation of the servo-proportional valve. See figs. 3 & 4:

Electromotive force-

Also called *emf* (denoted and measured in volts), is the voltage developed by any source of electrical energy such as a battery or dynamo. The word "force" in this case is not used to mean mechanical force, measured in newtons, but a potential, or energy per unit of charge, measured in volts.

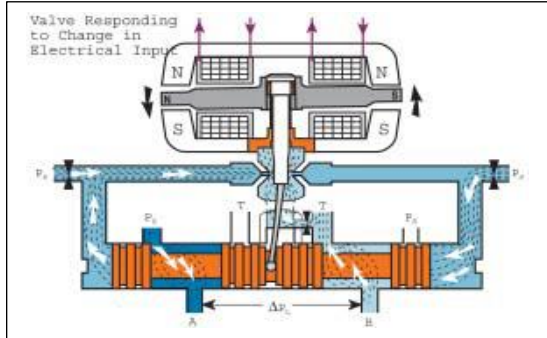


fig. 2

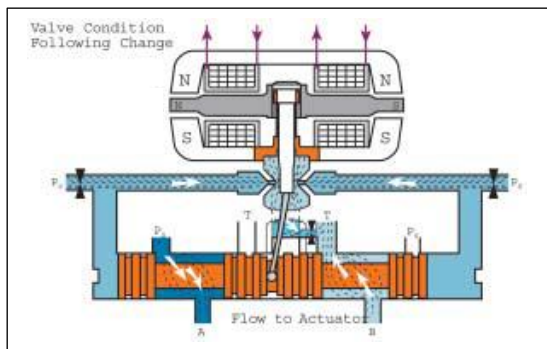


fig. 3

The proportional feature allows for the amount of spool movement in the valve to equal the amount of input given to the coil. For example, if an electrical input equal to 35% of full range is given, the spool should move to 35% of its range. This is the precision we spoke of earlier.

Conclusion:

The method we just laid out is common to the MOOG valves used on the Andromats. Different manufacturers may use different methods to accomplish the same task, but the principles remain the same. Add to this, more electronics to minimize response times or to dither the signal around the set point and your valve can become a superstar in your hydraulic system.

We can all agree this is a Readers Digest® version on the principles of servo proportional valve operation. If you are interested in learning more, we suggest you read this article from MOOG, [link](#).



Since there will not be a December issue of the *Andromat Today*, we want to take a moment to wish all our customers, their families and friends, along with ours as well, a very Merry Christmas and a joyous and prosperous New Year.



December Shipping Schedule:



To ensure deliveries arrive before Christmas, the last day to place orders will be **Friday, November 27**. This will ensure delivery of standard parts before Christmas holidays. Parts orders placed after this date may not arrive before the end of the year.

