# How the SVX Shift Kit and Duty Solenoid "A" Function

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The dubious object of the system is to open the OEM resistor circuit so as to increase transmission line pressure under certain conditions. The object was to insert a pressure sensitive switch in the resistor circuit for this purpose, i.e. the wire cut and the switch inserted.

In this situation when the switch operates, the diagnostic fault circuitry will find an open circuit and indicate a fault with a blinking light. In order to prevent this, a high value resistor is connected across the switch contacts, so that the circuit is not fully opened by the switch, but a high resistance inserted in series kills effective operation, as would completely opening the circuit.

Take into account the following information which I have posted several times and in particular note reference to the dropping resistor circuit.

## DUTY SOLENOID VALVE "A"

This is a pulse width modulated duty solenoid valve, ( Sometimes known as a pulsoid). The device is incorporated in the SVX transmission control system in order to adjust line pressure in the following manner :-

The fluid line is provided with a bleed or bypass via an on/off device, in the form of an electrically operated valve. This solenoid valve is opened and closed repeatedly, in a rhythmical manner by a control current which is turned on and off by the transmission control unit (TCU) at a very fast rate. The valve is a normally closed device, and remains closed in the event of the loss off a control current.

After passing through this modulated solenoid valve, the continually interrupted pressure is in the form of a pulsed flow. When the peaks level off with the troughs, there is a resulting overall steady reduced pressure. The level of this pressure is adjusted by varying the on/off intervals. Most often the length of the on time is adjusted and the number of on/off pulses per second is kept constant. The usual rate is around 50 cycles per second.

The resulting adjusted output pressure is therefore delivered as a rapidly fluctuating stream. The system incorporates an expansion chamber as a smoothing element, which works as a sort of cushion. This device is usually in the form of a cylinder and piston or diaphragm, backed by a coil spring. In the SVX system the component is described as a Pressure Modifier Accumulator. The high pressure peaks in the stream press the piston outwards and become rounded off, while the low pressure troughs are filled in as a result of the piston moving inwards under spring pressure. The end result is a smoother level of pressure, such that controlled devices are not materially affected.

An increase in the volume of fluid controlled, is achieved by transferring the solenoid regulated pressure, to a pressure modifier valve and a regulator valve.

It should be clear that by "chopping" the fluid supply in an adjustable way, pressure control is achieved economically using a simple poppet type solenoid valve, with few mechanical or electrical complications. However the valve remains in a continuos cycling mode, which imposes rather arduous mechanical stresses.

## THE DROPPING RESISTOR CIRCUIT

It will be immediately apparent that a sudden on off cycle tends to cause what could be called a hammering of the valve seat, even though this is largely checked by the viscosity of controlled fluid flow. The dropping resistor introduces a second series of current pulses applied in parallel with the control signal. These shorter pulses are applied during the off cycles and timed to check the travel of the armature as it reaches the closed position, thus reducing both shock and noise. These secondary parallel signals in effect, “round off” the closing period and reduce the closing shock. This arrangement can be made even more sophisticated and configured so as to soften the the opening cycle, as well as the closing of the valve.

It will be appreciated that reducing the resistance in the circuit, or opening the circuit by omitting the dropping resistor, has two outcomes. Firstly the relative electrical off time is increased thus increasing the line pressure and therefore makes shifts more abrupt. Importantly as a second issue, increased shock loads are applied to the valve.

The resistor should measure between 9 and 15 ohms to be within specifications. The usual is about 12 ohms.

It is a documented fact that the line pressure control solenoid is the first to fail due to having by far the most arduous duty to fulfill. Failure is usually mechanical resulting in the valve seat not closing properly and as a result line pressure is markedly reduced. The end results are drastic, especially in respect of transmission friction surfaces. The fault will not necessarily be registered as a fault code, as the armature of the valve can be in the fully closed position with the problem confined to a worn and faulty valve seat. In the event of an electrical fault, which will register, the valve being normally closed, will fail safe and result in maximum line pressure.