SVX TRANSMISSION LINE PRESSURE CONTROL

Line pressure is electrically controlled, via pulse width modulated, (PWM), normally- closed, solenoid valve “A”. When open, this valve bleeds off pressure rather than interrupts pressure, as a means of control. It provides precise control, but has only limited flow capacity. Therefore amplification is necessary, in order to achieve final control of the overall operative line pressure.

The adjusted pressure from solenoid “A” is applied as pilot control pressure, to a fully hydraulic pressure modifier valve. The pressure modifier valve, in turn controls the main pressure regulator valve. The result is a system of amplification, in two stages.

The use of a normally closed valve “A”, for the electronic control of line pressure, renders the system fail safe. However maximum pressure must be limited and not allowed to runaway at high pump speeds. This is achieved by including the pilot valve and the pressure modifier valve, within a feed back loop.

Solenoid valve “A” is controlled by means of a PWM signal, delivered by the transmission control unit, (TCU) via two circuits. The control signal comprises a series pulses, delivered at a fixed frequency of nominally 50 cycles per second. The length of the pulses, rather than their frequency, controls the level of fluid delivered via the valve.

The output pressure is therefore delivered in the form of waves at 50 CPS. However, due to the low volume delivered, the high frequency and the reciprocating mass involved in the pressure modifier valve, these waves have little effect.

Furthermore, final control pressure from the pressure modifier valve, is smoothed by the pressure modifier accumulator, a device incorporated for this purpose, as is mentioned in section 3 within the Subaru manuals, under the heading Line Pressure Control.

It will be immediately apparent that the sudden on off pulse width modulation of normally closed solenoid valve “A” tends to cause what

would be effectively a hammering of the valve seat, even though this is largely damped by the flow of the controlled fluid. The control signal is therefore arranged for soft switch off, by adding a second circuit.

A short pulse at full voltage from a direct circuit, fully energizes the solenoid and quickly opens the valve. A parallel circuit containing a dropping resistor delivers a longer, reduced voltage holding pulse, thus fixing the overall pulse length, and which when terminated, closes the valve softly.

A dropping resistor with a high current rating and physical size is required, therefore this wired as a separate unit mounted within the engine compartment. The resistor should measure between 9 and 15 ohms to be within specifications and is usually close to 12 ohms.

It will be appreciated that further increasing the resistance in the circuit, or opening the circuit by omitting the dropping resistor, will shorten the normal pulse length, thus increasing line pressure and making gear shifts more abrupt. Secondly, as an undesirable issue, the soft closing feature is defeated and shock loads applied to solenoid valve “A” are increased and this must effect its life.

N. B. Whenever the car is running, the “A” solenoid valve operates constantly 50 times per second in order to control line pressure. If and when the valve seat become worn damaged and fails to seal properly, or is compromised by an obstruction and leaks, this will reduce the line pressure with drastic consequences.