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BOOST VALVES
REGULATING LINE PRESSURE

Most transmissions use a boost valve to help adjust the position of the main pressure regulator valve to regulate line pressure. If the hydraulic integrity of the boost valve assembly is compromised due to wear, proper line pressure regulation will be affected, which could result in: soft or harsh shifts, slide shifts, slips, flares, burned clutches and bands, broken parts, and/or delayed reverse. Since line pressure is critical to the overall health and proper functioning of the transmission, the boost valve assembly should be inspected for wear during any rebuild. When applicable, Sonnax provides details on how to WAT (Wet Air Test) or perform a captive hydraulic test using ATF and low air pressure on these assemblies while still in the pump or valve body casting. This is a quick and simple method for checking excessive wear that affects function.

When inspecting boost valve assemblies, there seem to be as many different designs as there are transmissions. Some assemblies are made from steel, while others are manufactured from aluminum. Some assemblies have only one valve spool, while others have two or three spools, and a few transmissions (like the 4L60) even have two boost valve assemblies in the pressure regulator bore. Some boost valves have different size ratios available for the same transmission. Why the differences?

The choice of base material for boost valve assemblies is very important, but is best left for its

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PRODUCT SPOTLIGHT

If you are still experiencing a 2-3 upshift flare, soft 1-2 or 3-4 upshift, even after a rebuilt valve body, then the Sonnax Servo Return Spring 73708 could be the solution for you! The Sonnax spring slows the release of the band on a 2-3 shift but allows quicker servo travel on reapplication, resulting in shorter shifts.

CD4E
SERVO RETURN SPRING
PART #: 73708

FIX THESE COMMON COMPLAINTS

- 2-3 upshift flare
- Soft 1-2 or 3-4 shift

Our spring installs in just minutes and should be a standard replacement part on all your CD4E rebuilds.

For more information, see our Transmission Specialties Volume 5 catalog or visit www.sonnax.com.

own technical article. In examining why boost valve assemblies have varying numbers of critical spool valves, it can be generalized that the number of spools coincides with the number of different circuits playing a role in regulating line pressure. These circuits vary by transmission, and whether the unit is hydraulic or electronic also makes a difference.

For example, the C6 *(Figure 1)* and A4LD transmissions each have a 3-spooled boost valve. The valve body bore cross-section of the C6 shows the pressure regulator valve in the maximum line pressure position, as no excess line pressure is being exhausted back to the sump. In this hydraulic unit, modulated line or throttle valve (TV) pressure is always at the small diameter of the boost valve during vehicle operation. The heavier the throttle, the higher the TV pressure, and the higher the line pressure. During reverse line, pressure is applied to the middle boost diameter. The reacting area of the reverse to TV spools is less than the TV area alone. Reverse pressure will be greater than TV because the incoming pressure is the same as line. TV pressure is limited to an average of 80 psi maximum. Pressure is applied at the largest boost valve spool only during increased torque demands, such as heavy throttle, by balancing governor and TV pressures at the cutback and line pressure coast valves.

Another similarity between the A4LD *(Figure 2)* and the C6 is that they each have different size ratios available for the boost valve assembly. Generally speaking, the larger ratio or larger spool diameters are used in vehicles used for heavy duty or high performance applications. This is because the boost pressures react on a greater surface area, resulting in more line pressure and faster line rise.

The E4OD and AXODE transmissions each have a 2-spooled boost valve.The valve body bore cross-section of the E4OD *(Figure 3)* shows the pressure regulator valve in low line pressure position, as excess line pressure is routed back to the sump. In this electronic unit, EPC (electronic pressure con-

Figure 1 **C6 PRESSURE REGULATION**

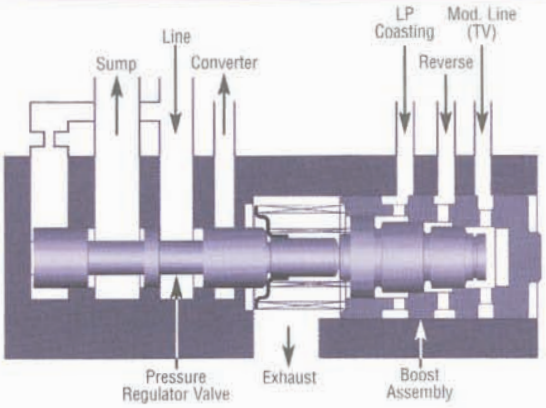
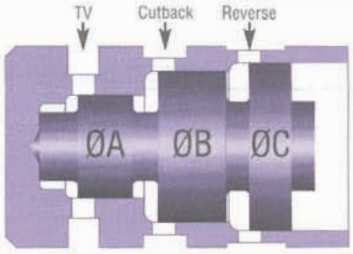
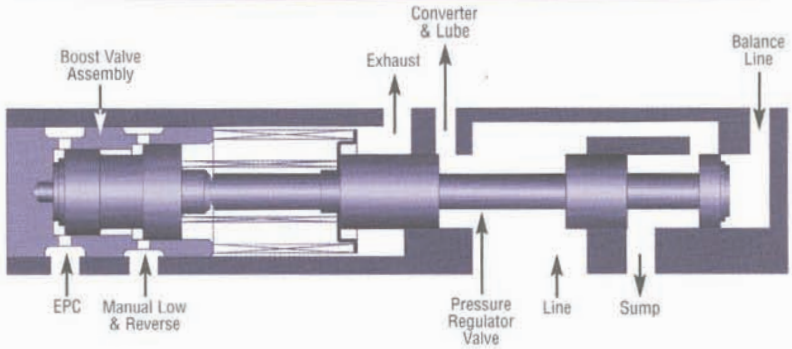


Figure 2 **A4LD BOOST VALVE ASSEMBLY**



	ØA	ØB	ØC
LARGE RATIO (4.0L)	Ø.388"	Ø.571"	Ø.634"
SMALL RATIO (2.3, 2.8, 2.9 & 3.0L)	Ø.323"	Ø.571"	Ø.606"

Figure 3 **E4OD PRESSURE REGULATION**



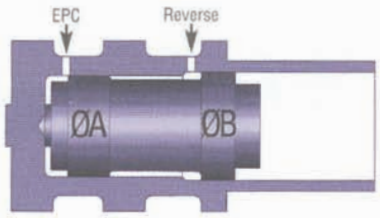
trol) is applied at the small diameter of the boost valve. This solenoid pressure is controlled by the computer within a preset range for precise line control. This causes the boost valve to be more active than in hydraulic units, which can lead to premature wear of the sleeve. During manual low or reverse gear, when increased torque demands are required, additional pressure is applied to the boost valve at the large spool, positioning the pressure regulator valve into a higher line pressure position. In the AXODE *(Figure 4)* unit, only reverse and EPC pressures are used to modify line pressure.

In the AODE, the boost valve only has one reaction diameter. The cross section of this pressure regulator bore *(Figure 5)* shows that only reverse pressure is used to adjust line pressure via the boost valve assembly. EPC pressure applies directly on the pressure regulator valve spool for positioning. So in this instance, a worn boost sleeve will predominantly result in reverse engagement/pressure complaints, but can also allow some EPC pressure to exhaust and create line rise-related problems in forward gears. Shift quality complaints, clutch/band failure and broken parts caused by uncontrollable line pressure will result if excessive wear occurs between the pressure regulator valve and its bore.

In Chrysler RWD units *(Figure 6)*, do not use the conventional "boost valve," but rather a reducing valve, as the function of the line pressure plug is actually to reduce main line pressure. The forces acting to keep the pressure regulator valve in the higher line pressure position are the two springs and TV pressure acting on the throttle pressure plug. Balance line pressure acting on the pressure regulator valve, as well as line pressure on the throttle pressure plug and line pressure plug, combine to reduce line pressure.

Although there are many differences between boost valve assemblies for specific transmissions, they all function to adjust main line pressure. Make a habit of checking these parts during any rebuild, and if excessive wear is found, replace them with a quality assembly. This will improve the shift quality, the clutch and band life and keep the transmission on the road.

Figure 4 **AXODE BOOST VALVE ASSEMBLY**



	ØA	ØB
LARGE RATIO (3.8L)	Ø.492"	Ø.512"
SMALL RATIO (3.0L)	Ø.475"	Ø.512"

Figure 5 **AODE PRESSURE REGULATION**

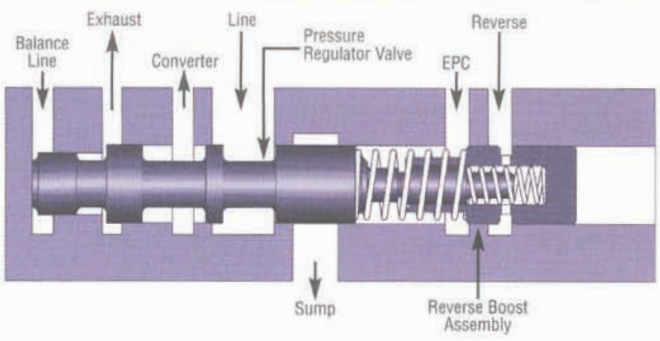


Figure 6 **CHRYSLER RWD PRESSURE REGULATION**