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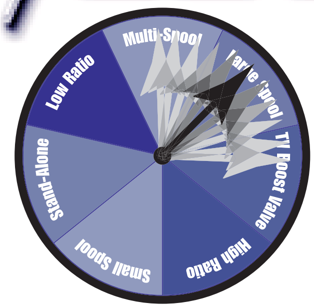

So Many Choices, So Many Valves

Boost valves are an important part of a successful rebuild. Shift feel and clutch life depend on proper boost valve function and selection. But first you have to select the correct valve, and that's where the questions often begin. Why do we often have different ratio boost valves to choose from? Does higher ratio mean higher pressure? If there are two valves to choose from, how can the higher pressure come from the valve with a smaller spool? Why not just put in the valve that will give the higher boost? After all, if boost is good, isn't more boost even better?

To understand why there may be multiple boost valve choices for a given unit, let's remember what the boost valves do. Engaging and holding a clutch or band requires a specific amount of hydraulic pressure, based on the component design and the torque load placed on it. If the pressure is low, the component slips. If the pressure is too high, the application is too harsh or worse, parts can be distorted or broken.

A boost valve can be used to increase line pressure as required for a specific need, such as the higher torque load demands of reverse gear operation. Typical boost valve designs will incorporate a reverse boost spool as part of a multiple spool boost valve or a stand-alone reverse boost valve to match that demand.

The other requirement met by boost valve design is to tailor the line rise to vehicle load and throttle input. A lower increase in pressure is required to apply and hold a component at light throttle than is needed under hard throttle shifts. That's why boost valves are designed to create line pressure increase based on throttle input, guided either by TV cable and valve or Electronic Pressure Control. Again, the TV boost function may be incorporated into a multi-spool design or be a stand-alone TV valve.

The reason there may be more than one boost valve available for a given unit is the variety of vehicle and engine options that

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PRODUCT SPOTLIGHT

SELF-REGULATING REVERSE BOOST VALVE & SLEEVE

PART NO. 34200-10K

Vehicles with 4L80-E transmissions often suffer from uncontrollable line rise, high line pressure in reverse, broken direct clutch drums and/or broken cases. All of these problems can be caused by excessive EPC torque signal pressure.

The Sonnax Self-Regulating Reverse Boost Valve and Sleeve, **34200-10K**, eliminates these problems by limiting EPC pressure. The boost valve has an encapsulated relief valve that allows EPC pressure to exhaust if it exceeds 95 to 105 psi.

FIX THESE COMMON COMPLAINTS

- Broken case, servo or clutch piston
- High line pressure caused by unregulated EPC pressure

A closely toleranced sleeve and o-rings are included to restore the hydraulic integrity between the valve and sleeve and help you salvage your pump body, saving you hundreds in replacement costs.

34200-10K
4L80-E
Self-Regulating Reverse Boost Valve & Sleeve

unit works in. A smaller engine with a lighter vehicle load has a lower pressure requirement to apply and hold a given clutch than a more powerful engine driving a heavier vehicle with the same clutch design. Different boost valve options allow the same unit, with the same pump, PR valve and clutch designs, to be used successfully in applications with different requirements, resulting in the correct pressure increase to obtain holding force and good shift feel in each.

Do so-called “high-ratio” boost valves result in higher boost or greater line rise than medium- or low-ratio valves? In general, yes, but not always for the reasons you might think.

Here’s a case where they do. The valve drawn at the top of Figure 1 is an MTV boost valve from a 4T60-E. This is a good example of a stand-alone TV valve where oil pressure is applied to the cavity between the two spools. Pressure acts on the large exposed face area on the left side of spool B, trying to push the valve to the right. The same pressure is also acting on the smaller exposed face on the right end of spool A, trying to push the valve to the left.

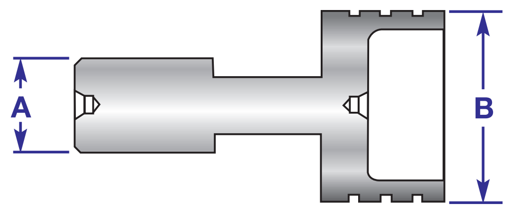
The winner obviously is spool B. The resulting force pushing to the right will be the pressure times the difference between the area of spools A and B (also called the reaction area). If we leave B the same and keep making the A spool smaller, the difference in area gets larger. The larger the area under the same pressure, the more force being applied by the boost valve. That increased force acting on the PR valve translates into more line rise. In this style valve, the higher the ratio between the spool diameters, the higher the boost force. Trying to make a comparison of the changes in boost force, based on diameter ratios alone, will not give an accurate picture. To compare two valves of this design, the ratio of the force each can create is the ratio of the reaction areas (Area Spool B –Area Spool A) of the two valves.

To add to the confusion, let’s take a look at the valve style shown in Figure 2. This boost valve from a 4L30-E is a good example of a multi-spool design used in many units. Here, as before, fluid pressure is introduced between spool A and B and, as is often found in this design, this pressure is to create reverse boost. Notice that both spool diameters change as we compare the three valves. Notice also that in this case, the spool diameter ratio and the resulting reverse boost ratio is lower on the “medium-ratio” valve than it is on the “low-ratio” valve.

Sound like a rule breaker? Although it would appear so, it is not. The difference here is that fluid pressure (TV signal) is also being introduced onto the large lefthand end of the A spool. As the area of spool A increases with each new valve, so does the force applied by the TV signal. Because both TV signal and reverse signal pressures are used when in reverse, their forces are combined. Although the force resulting from reverse signal alone would appear lower in this case, the actual line rise in reverse is higher in the medium-ratio valve than in the low-ratio valve.

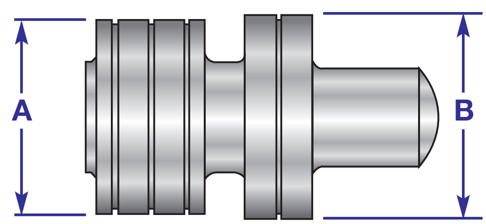
So where does that leave you in your selection? Think back to the reason why there were options to begin with. Options gave the designers the ability to make the common components of the unit perform under a variety of applications and the changing demands those applications create. Your best choice is replace a worn boost valve with one that matches the original, exactly. If no exact match is possible, measure the spools and consider both the A spool area and the B-A reaction areas in a multi-spool valve. When your choices are limited, get as close to the A spool area as you can. In the stand-alone valve design, go for the reaction area (difference in areas of Spool B and Spool A) that most closely matches your original valve.

Figure 1



	Spool A Diameter	Spool A Area (Sa A)	Spool B Diameter	Spool B Area (Sa A)	**Reaction Area (Sa B - Sa A)**	Spool Diameter Ratio (B/A)
82754-12K (low ratio)	0.276	0.0598	0.567	0.2525	**0.1927**	2.054
84754-17K (high ratio)	0.199	0.0311	0.567	0.2525	**0.2214**	2.849
	Boost ratio comparison between the two valves is the ratio of their reaction areas.				**Boost Ratio 1.149**	

Figure 2



	Spool A Diameter	Spool A Area (Sa A)	Spool B Diameter	Spool B Area (Sa A)	**Reaction Area (Sa B - Sa A)**	Spool Diameter Ratio (B/A)
54200-12K (low)	0.564	0.2498	0.605	0.2875	**0.0376**	1.0727
54200-01K (medium)	0.630	0.3114	0.661	0.3436	**0.0321**	1.0503
54200-06K (large)	0.649	0.3311	0.697	0.3813	**0.0502**	1.0732
Throttle Valve (Spool A) Boost Ratio Compared to Low-Ratio Valve	Low 1.00 Medium 1.25 Large 1.33	Reverse Boost (between spools) Ratio Compared to Low-Ratio Valve			Low Medium Large	1.00 0.85 1.33
		Actual reverse boost is a combination forces from both TV signal on spool A & reverse signal between spools A & B				