

# Technical Bulletin



## The Care & Feeding of Your GM



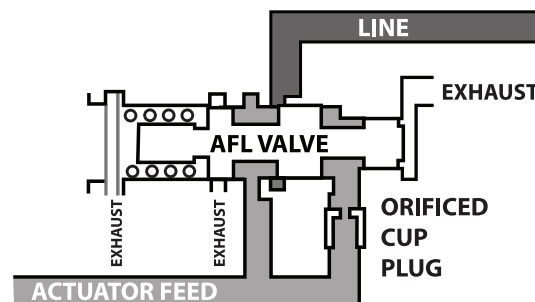
The AFL or actuator feed limit valve is a common valve body component found in many GM electronically controlled transmissions. Familiar rear-wheel-drive units such as 4L60-E and 4L80-E, along with front-wheel-drive 4T40-E and 4T65-E units, all have an AFL valve. However, the circuits fed by the AFL valve vary somewhat among the different units, which is why the complaints or symptoms caused by AFL valve wear are not necessarily the same across the different designs.

What is the same is the purpose and operation of the valve. Rather than subjecting solenoids and certain other feed circuits to full line pressure, the AFL valve is used to limit the pressure that will be fed to these areas. This low pressure signal is not used to fill clutches or servos or activate a component directly. The AFL feed is used to position other valves, which in turn allow a higher pressure signal to be directed to do the heavy work.

***Let's take a look at the valve itself and what is common to all the units that utilize AFL.***

**Figure 1** is a simplified version of the AFL valve found in the 4T65-E. Looking at the drawing, we can see that the AFL valve is a regulating valve. A spring tries to hold the valve open to allow available line pressure to pass

**Figure 1**



through and pressurize the actuator feed signal circuit. Part of the AFL feed circuit is routed back to the balance end of the valve. In this example, balance pressure acts on the difference between the two spool sizes, with the larger lefthand spool winning out. As the valve begins to stroke in the large spool direction, it overcomes the spring force and strokes the valve over to block incoming line pressure and establishes a regulated AFL signal pressure.

**Figure 2** is the 4L60-E AFL valve set-up (shown on next page). A notable difference is that balance oil pressure is routed directly to the end of the valve. Regardless of how balance oil signal is applied to the valve, the result is the same. As pressure builds in the AFL circuit,

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<b>4L60-E</b>	<b>77754-09K</b>	Wrong gear starts, solenoid codes, clutch/band failure	<b>4</b>
<b>4L80-E</b>	<b>34200-16K</b>	Wrong gear starts, solenoid codes, clutch/band failure	<b>5</b>
<b>4T40-E, 4T45-E</b>	<b>33886-01K</b>	High pressure in reverse, blown valve body gaskets, delayed forward or Code 1811	<b>6</b>
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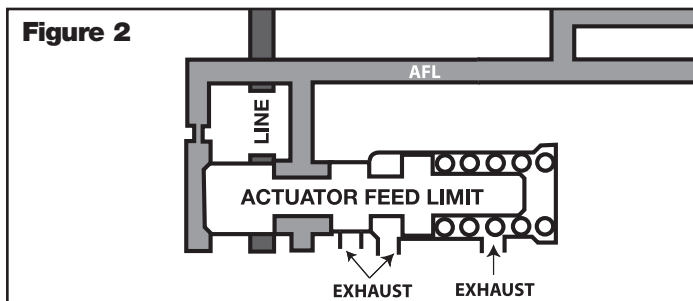
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balance oil strokes the valve back against the spring until a regulation point is established.

As with any regulating valve, the method used to establish the regulating pressure is to balance a calibrated spring force in one direction with fluid

pressure applied to known valve reaction area acting in the opposite direction. As the valve or bore wears, fluid pressure finds a way to leak off and the problems begin. Like all regulating valves, wear in the spool areas controlling the output feed can result in a lower than intended output pressure. Wear and leakage in the balance area reduces the force pushing back on the spring. More pressure is needed to overcome the leak and fight back the spring, which results in a higher output pressure than the original design.

AFL oil is used by the solenoids to position other valves. It is the low AFL signal pressure that creates the bulk of the problems you will see in the shop. Valves that either do not stroke or only partially stroke cause a variety of common AFL-related issues.



*The chart below will give you some common potential issues associated with AFL valve leakage in a variety of units.*

Unit	AFL Valve Feeds	High or Low AFL Signal Problems	Common Complaints
4T40-E & 4T45-E 33886-01K	Pressure Control Solenoid	<b>Low:</b> Reduced torque signal circuit pressure	Code 1811: Maximum adapt or long shifts
		<b>High:</b> Increased torque signal circuit pressure	High line pressure in Reverse, blown out valve body gaskets, harsh 1-2 or 2-3 shifts
	1-2 and 2-3 Shift Solenoids	<b>Low:</b> No stroke or partial stroke of shift valves when commanded by solenoid	Wrong gear starts, solenoid codes, clutch and band failures
	3-4 Shift Valve	<b>Low:</b> No stroke or partial stroke of the 3-4 shift valve	No 4th gear
4T65-E 84596-02K	Pressure Control Solenoid	<b>Low:</b> No stroke or partial stroke of shift valves when commanded by solenoid	Code 1811: Maximum adapt or long shifts, TCC slippage
		<b>High:</b> Increased torque signal circuit pressure	Excessive line pressure, TCC piston damage
	1-2, 3-4 Shift Solenoid and 1-2, 3-4 Shift Signal Circuit	<b>Low:</b> No stroke or partial stroke of shift valves when commanded by solenoid	2nd gear starts
4L60-E 77754-09K	1-2, 2-3 & 3-2 Shift Solenoids	<b>Low:</b> Reduced torque signal circuit pressure	2nd gear starts, no 4th gear, reduced 3-4 clutch life
	Pressure Control Solenoid	<b>Low:</b> Reduced torque signal circuit pressure	Low line pressure, soft shifts
		<b>High:</b> Increased torque signal circuit pressure	Excessive line pressure, harsh shifts
	TCC PWM Solenoid	<b>Low:</b> Reduced CC signal applied to isolator valve, lowers TCC regulated apply pressure	Code 1870, TCC slip
4L80-E 34200-16K	Solenoid A and Solenoid B	<b>Low:</b> No stroke or partial stroke - incorrect position of multiple valves	Wrong gear starts, solenoid codes, clutch and band failures
	3-4 Shift Valve	<b>Low:</b> No stroke or partial stroke of the 3-4 shift valve	No 4th gear
	Force Motor (Pressure Control Solenoid)	<b>Low:</b> Reduced torque signal circuit pressure	Low line pressure, reduced TCC apply pressure under load, codes 68 or 1870
		<b>High:</b> Increased torque signal circuit pressure	Excessive line pressure
4T80-E 72854-01K	Solenoid A and Solenoid B	<b>Low:</b> No stroke or partial stroke - incorrect position of multiple valves	Wrong gear starts, solenoid codes, clutch and band failures
	3-4 Shift Valve	<b>Low:</b> No stroke or partial stroke of the 3-4 shift valve	No 4th gear
	Pressure Control Solenoid	<b>Low:</b> Reduced torque signal circuit pressure	Low line pressure, soft shifts
		<b>High:</b> Increased torque signal circuit pressure	Excessive line pressure, harsh shifts