

6T70/6T75;



by Steve Garrett
www.atra.com

The Future is Now

Part 5 OF 5

When we left off last time we explored the 6T70 scan data and how to use that data for diagnostic purposes. In this last part of the series, we'll explore the hydraulic system that controls the 6T70/6T75.

The 6T70/6T75 valve body operates very much like the 6L80/6L90 rear wheel drive valve body. The system uses a chain-driven, variable displacement, vane-style oil pump, sandwiched between the case halves.

Unique Hydraulic/Valve Function

The two major changes to the hydraulics and valving for the 6-speed transmission are the addition of two valve families: *clutch select* valves (figure 1) and *clutch regulator* valves (figure 2).

Clutch select valves control which direction the vehicle will move: forward or reverse. Most of the fluid required for a specific range is routed through one of the two clutch select valves.

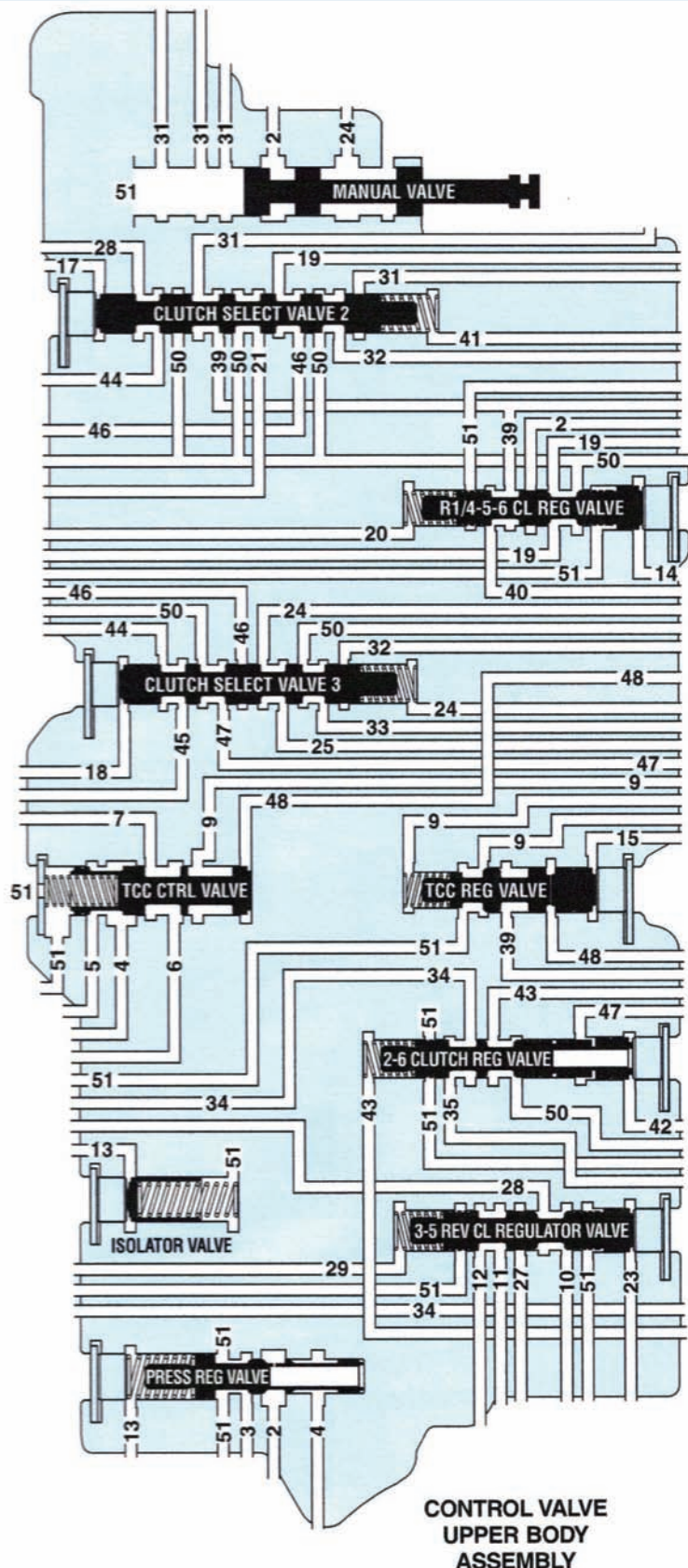


Figure 1

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Clutch regulator valves control how aggressive the clutch apply will be, as well as the actual shift for that specific gear. Four clutch regulator valves control the five, multiple-disc clutches.

As with some other transmissions, the 6T70-6T75 uses several clutch boost valves. If clutch pressure requirements exceed 684 kPa, the valves will open, allowing additional pressure to the clutch assemblies (figure 3).

Compensator Feed Fluid

The clutch apply cavity is kept full of fluid by the clutch exhaust backfill circuit. Compensator feed fluid fills the cavity behind the piston to counteract centrifugal pressure created by the fluid in the apply cavity. The compensator feed fluid assists the clutch return spring to keep the piston in the return position when commanded off.

All the valves, with the exception of the blowoff valve, are located in the valve body. The valve body is separated into two parts: the upper and the lower valve assemblies. Here's where the valves are

housed:

Upper Valve Body (10 Valves)

- Manual Valve
- Clutch Select 2
- R1/456 Clutch Regulator
- Clutch Select 3
- TCC Regulator
- TCC Control
- 2/6 Clutch Regulator
- Isolator
- 3-5 Reverse Clutch Regulator
- Pressure Regulator

Lower Valve Body (5 Valves; 1 Accumulator)

- 1-2-3-4 Clutch Regulator
- 1-2-3-4 Clutch Boost
- 4-5-6 Clutch Boost
- 3-5 Clutch Boost

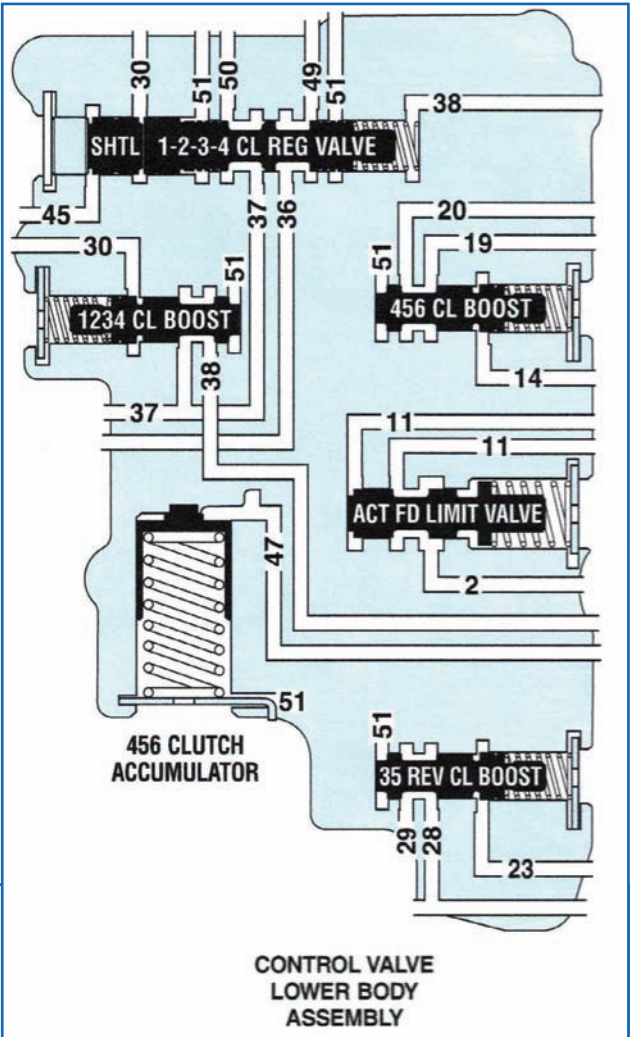
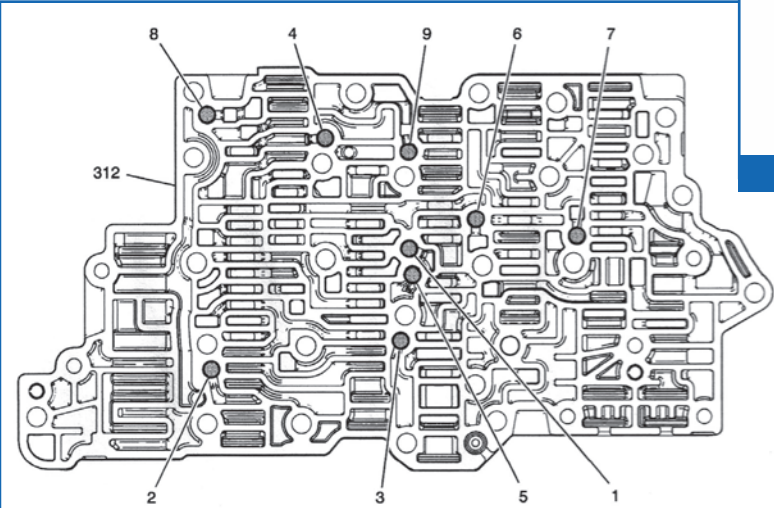


Figure 2



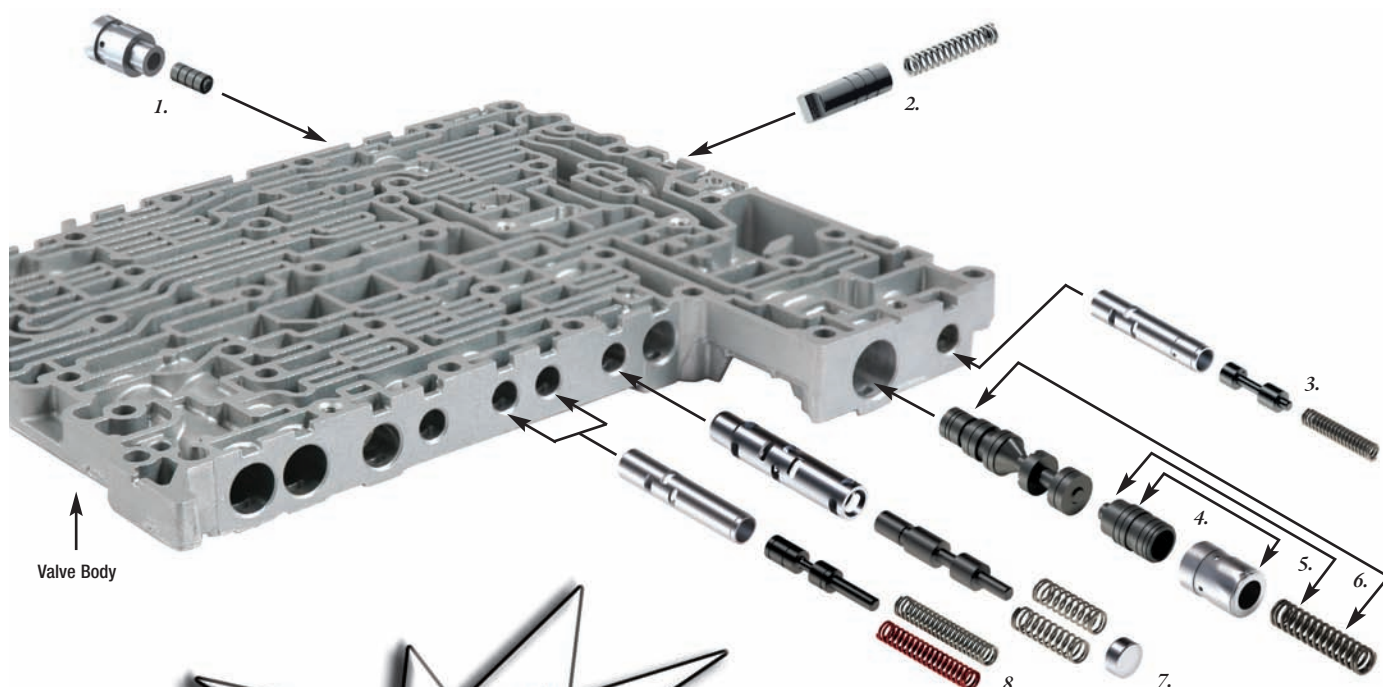
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I.D.	Input Oil	Input Oil	Output Oil
1	Drive 1-6	DRVB	26/1234 CL Feed
2	Solenoid 1	Reverse	CSV2 Enable
3	Solenoid 2	456	CSV3 Enable
4	PS4	456	CSV2 Latch
5	Drive 1-6	35 Rev FD	35 Rev Supply
6	2-6/1234	—	1234 Clutch Feed
7	35R Supply	—	35R Clutch Feed
8	Low/Rev Supply	—	Low/Rev Clutch Feed
9	456 Clutch Supply	—	456 Clutch Feed

Figure 3

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Valve Body

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PROBLEM

SOLUTION

Tool Required

Part Number

<ul style="list-style-type: none"> • Lockup shudder • TCC cycling 	1. TCC Control Sleeve Assembly		63741-05K
<ul style="list-style-type: none"> • Fluid overheat • Diminished lubrication 	2. Cooler Bypass Valve Kit	F-63741-TL7 & VB-FIX	63741-07K
<ul style="list-style-type: none"> • Converter related complaints & codes • Damaged TCC linings 	3. TC Regulator Kit	F-63741-TL13** & VB-FIX	63741-17K
<ul style="list-style-type: none"> • Delay in reverse or slipping • Burnt clutches 	4. Reverse Boost Valve Kit 5. Reverse Boost Valve Kit	Late Style Early Style	63741-09K 63741-12K
<ul style="list-style-type: none"> • High line pressure • Reduced converter & lube flow 	6. Oversized Pressure Regulator Valve & Reverse Boost Assembly	F-63741-TL & VB-FIX	63741-01K
<ul style="list-style-type: none"> • Shift feel complaints • Shift feel related codes 	7. Accumulator Control Valve Kit	F-63741-TL13** & VB-FIX	63741-20K
<ul style="list-style-type: none"> • Delayed engagement • Erratic Shifts 	8. "A" or "B" Pilot Valve Kit	F-63741-TL13** & VB-FIX	63741-13K



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****Note:** Same tool kit can be used in
3 different bore locations!

The solenoids for the transaxle are mounted in the TEHCM (TCM), and aren't designed to be serviced separately.

Shift Solenoid 2:
Controls clutch
select valve 3

TCC Solenoid:
Controls TCC
operation

Pressure Control
Solenoid 1:
Controls line
pressure

Pressure Control
Solenoid 2:
Controls the
3-5-Reverse
clutch regulator
valve

Pressure Control
Solenoid 3:
Controls the
R1/4-5-6 clutch
regulator valve

Pressure Control
Solenoid 4:
Controls the 2-
6 clutch regula-
tor valve

Pressure Control
Solenoid 5:
Controls the
1-2-3-4 clutch
regulator valve

The primary function of shift solenoids 1 and 2 is to control which direction the vehicle will move: forward or reverse. In addition, one of the solenoids is responsible for engine braking.



The primary functions of the pressure control solenoids are to control which clutch applies or releases and the aggressiveness of the apply and release.

Solenoid function is referred to in hydraulic terms, not in electrical terms as with other transmissions you may have worked with in the past.

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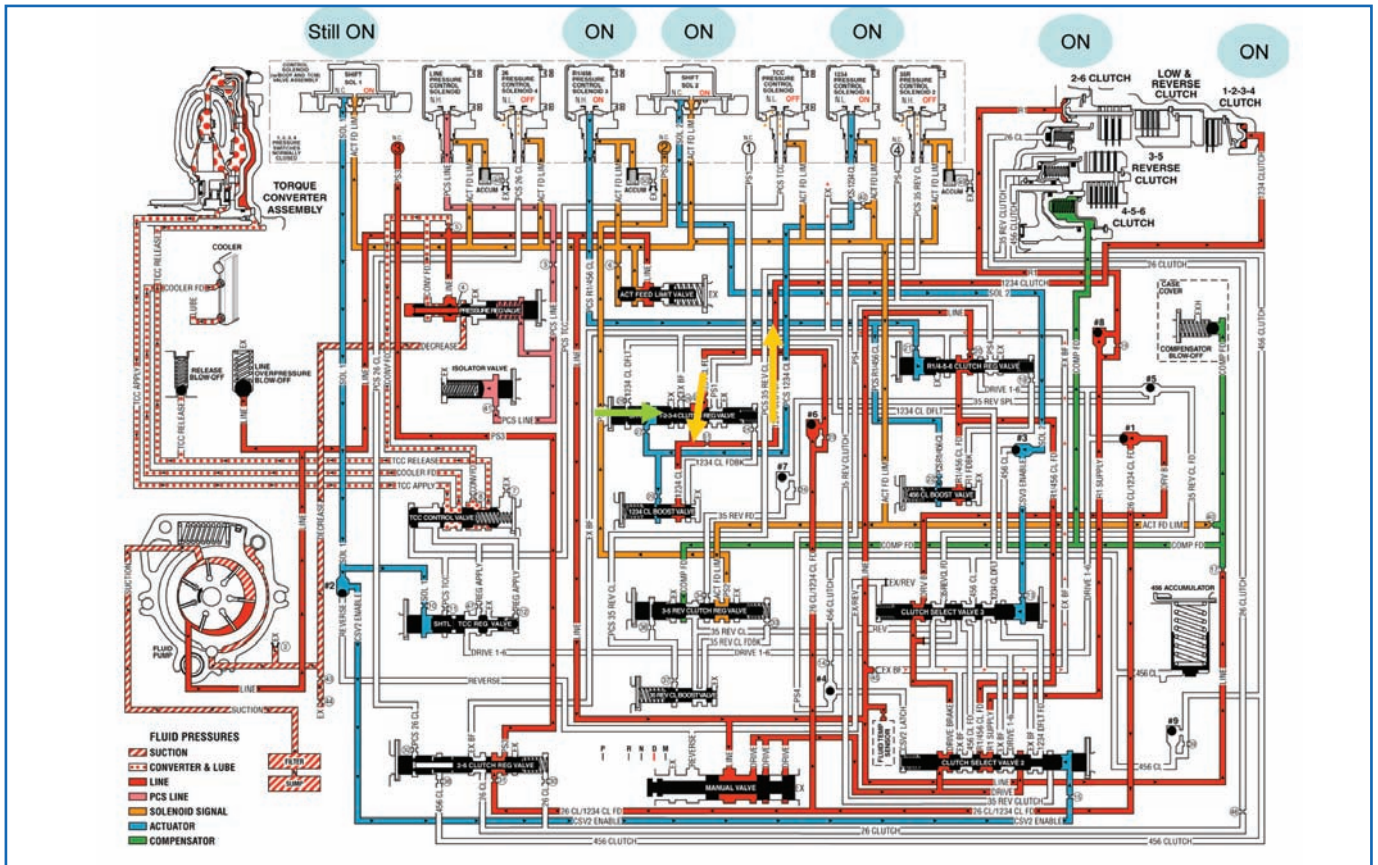


Figure 6

Operation

In this explanation we'll discuss what changes from gear to gear. If a component doesn't change state during a shift, it won't be included in the description. This will hopefully make it easier to follow the progression of the hydraulic system.

Park

In park (figure 4), shift solenoids 1 and 2 are energized. Shift solenoid 1 positions clutch select valve 2 against its spring. Pressure control solenoid 3 (R1/4-5-6 solenoid) is also energized, controlling the position of the R1/4-5-6 clutch regulator valve.

As the solenoid output pressure

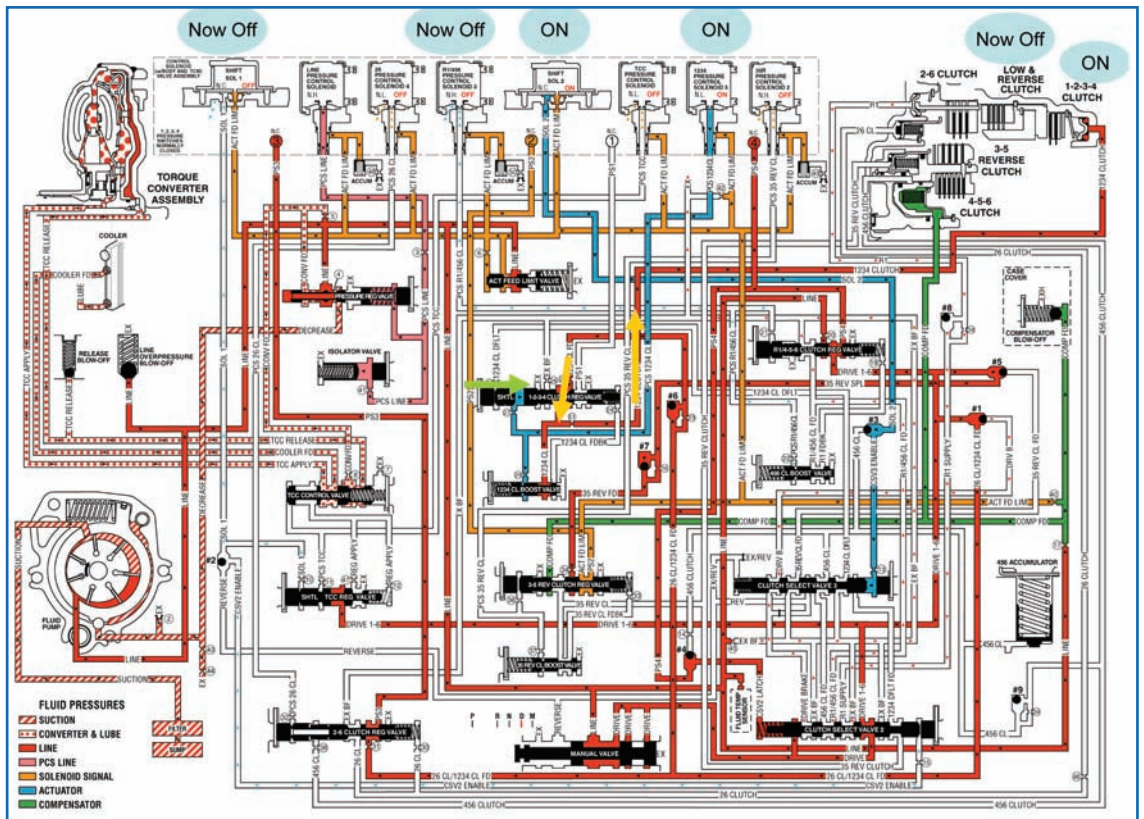


Figure 7

increases, the clutch regulator valve feed channel opens to allow fluid pressure through the clutch regulator valve. Regulated pressure travels through the

R1/4-5-6 clutch regulator valve, through clutch select valve 2, and applies the low reverse clutch.



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Reverse

In reverse (figure 5), shift solenoid 2 is turned off, which allows clutch select valve 3 to move. Pressure control solenoid 2 (3-5 reverse solenoid) is energized, which controls the position of the 3-5 reverse clutch regulator valve.

Line pressure is fed from the manual valve, through clutch select valve 3, through the 3-5 reverse clutch regulator valve, and applies the 3-5 reverse clutch.

1st Gear Engine Braking

At low speeds, engine braking is available. In 1st gear (figure 6), shift solenoid 2, pressure control solenoid 3 (R1/4-5-6 solenoid), and pressure control solenoid 5 (1-2-3-4 solenoid) are all energized.

- Shift solenoid 2 controls the position of clutch select valve 3.
- Pressure control solenoid 3 controls the position of the R1/4-5-6 clutch regulator valve.
- Pressure control solenoid 5 controls the position of the 1-2-3-4 clutch regulator valve.

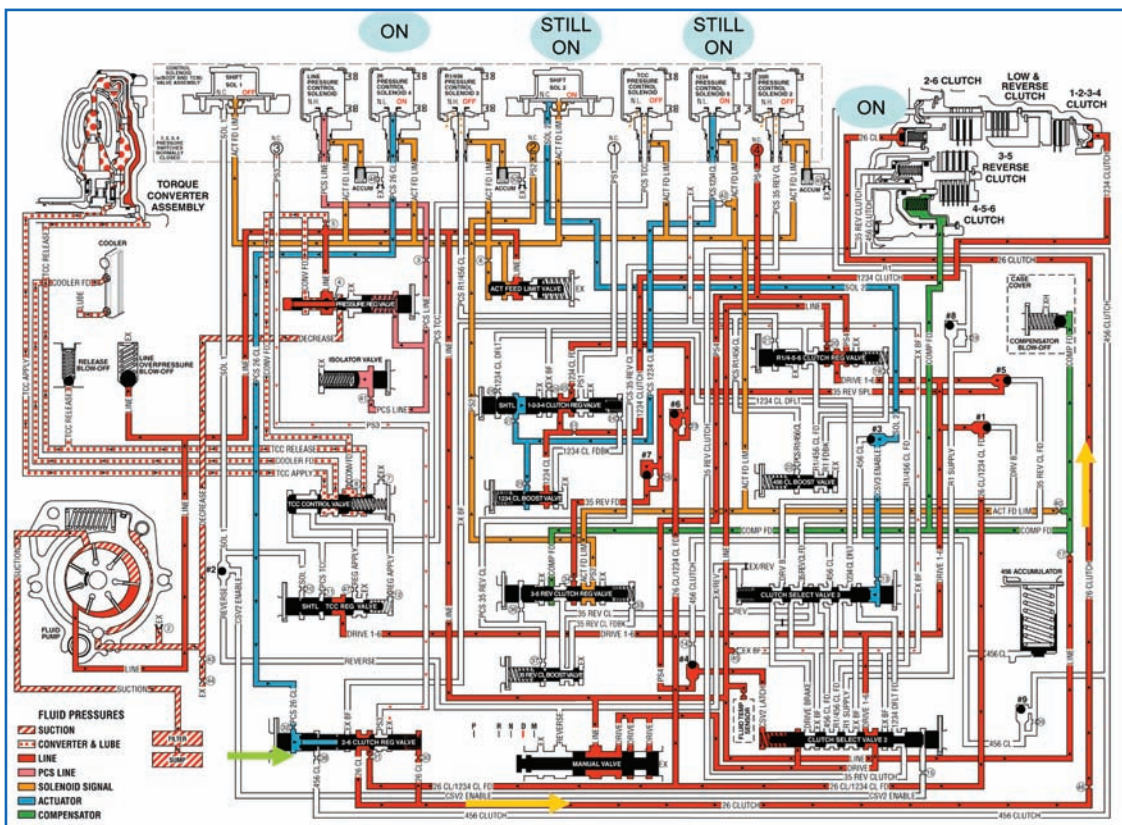


Figure 8

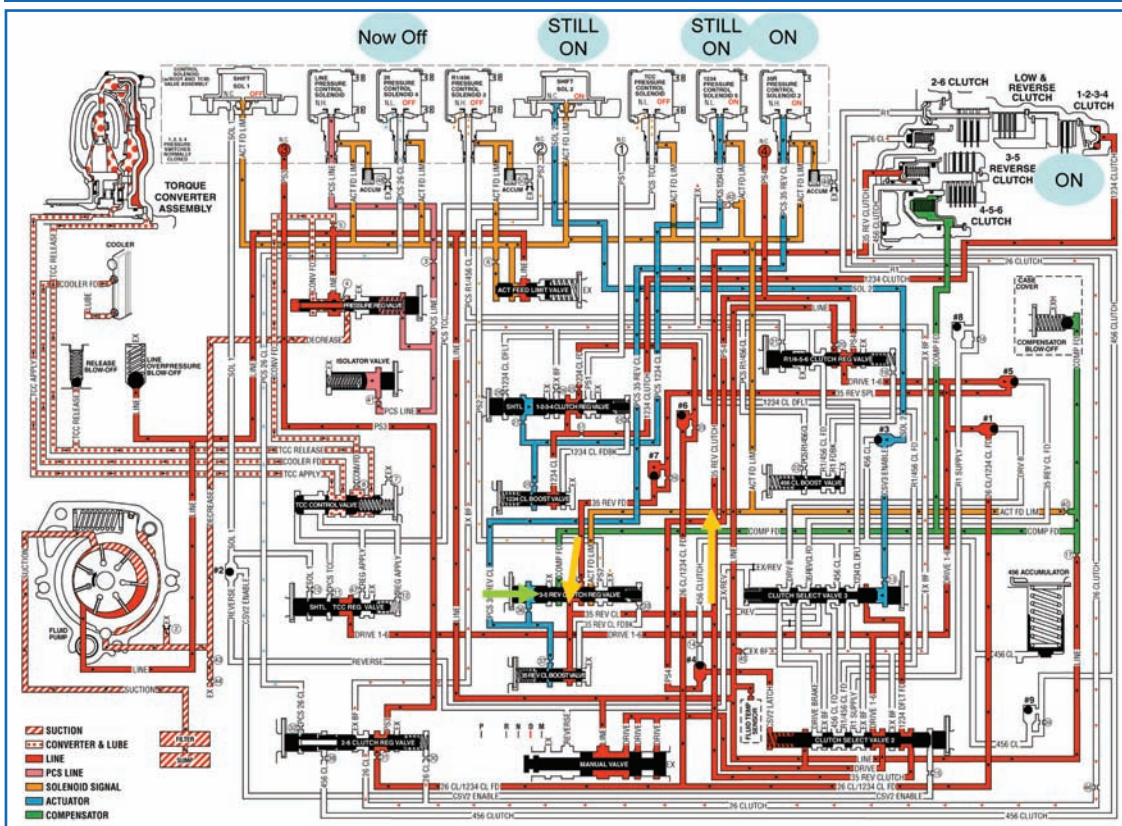


Figure 9

The manual valve sends line oil through the clutch select valve to the 1-2-3-4 clutch regulator valve. The fluid then travels from the clutch regulator

valve to the 1-2-3-4 clutch. How much pressure is fed to the clutch depends on the commanded position of pressure control solenoid 5.

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This gear is the same as 1st engine braking with a couple of exceptions (figure 7). Shift solenoid 1 and pressure control solenoid 3 (R1/4-5-6 solenoid) are now turned off. This releases the Low/Reverse clutch, which releases engine braking.

Pressure control solenoid 4 (2-6 solenoid) is energized. This moves the 2-6 regulator valve, sending fluid to the 2-6 clutch (figure 8). How much oil pressure reaches the clutch depends on the commanded position of pressure control solenoid 4.

Pressure control solenoid 4 (2-6 solenoid) is turned off, which releases the 2-6 clutch (figure 9). Pressure control solenoid 2 (3-5 reverse solenoid) is energized, which moves the 3-5 reverse regulator valve, allowing fluid to apply



Pressure control solenoid 2 (3-5 reverse solenoid) is turned off, releasing the 3-5 reverse clutch (figure 10).

Pressure control solenoid 3 (R1/4-5-6 solenoid) is energized, which moves the R1/4-5-6 regulator valve, allowing fluid to apply the 4-5-6 clutch. How much oil pressure depends on the commanded position of pressure control solenoid 3.

5th Gear

Pressure control solenoid 5 (1-2-3-4 solenoid) is turned off, releasing the 1-2-3-4 clutch (figure 11). Pressure control solenoid 2 (3-5 reverse solenoid) is energized, which moves the 3-5 reverse regulator valve, allowing fluid to apply the 3-5 reverse clutch. How much oil pressure depends on the commanded position of pressure control solenoid 2.

6th Gear

Pressure control solenoid 2 (3-5 reverse solenoid) is turned off, releasing the 3-5 reverse clutch (figure 12). Pressure control solenoid 4 (2-6 solenoid) is energized, which moves the 2-6

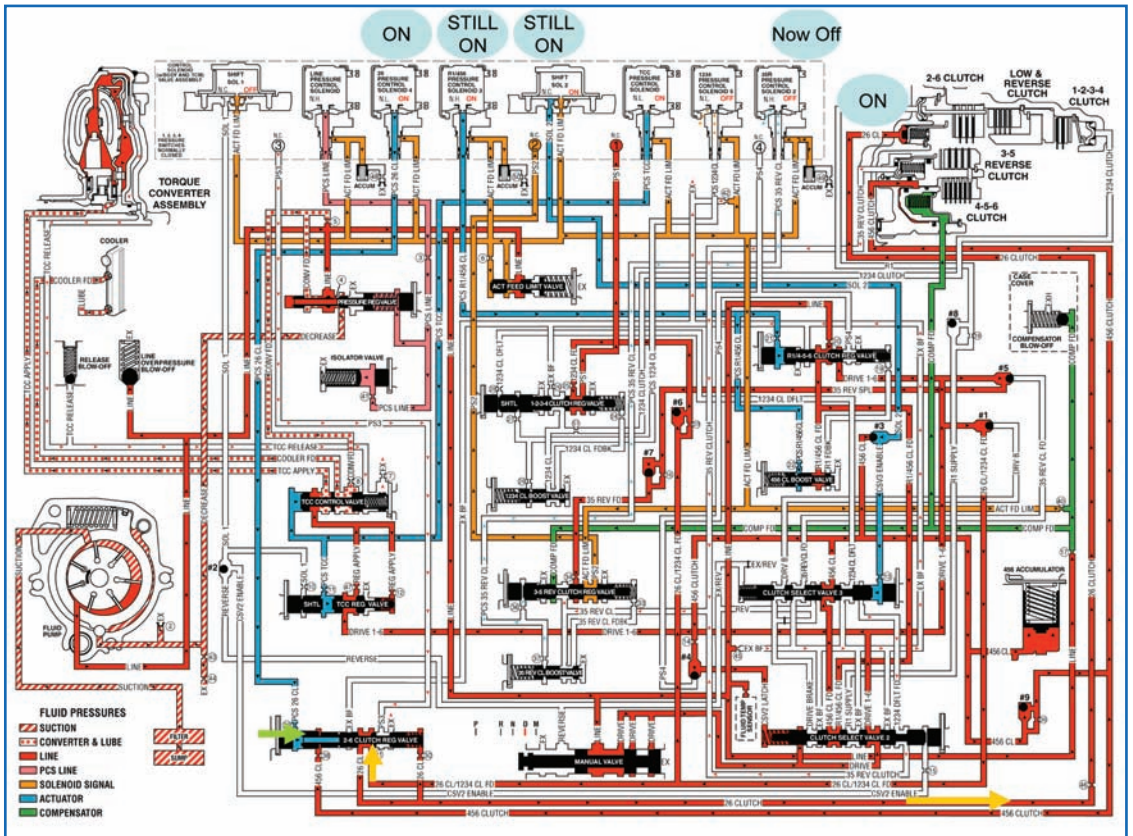


Figure 12

clutch regulator valve, allowing fluid to apply the 2-6 clutch. How much oil pressure depends on the commanded position of pressure control solenoid 4.

As you can see, the 6T70-6T75 hydraulic system is really not that complicated. As with any system, understanding its principles of operation is paramount in developing a diagnostic

strategy. Its simplicity will reduce the stress in all of our lives when you have a unit that requires diagnosis. Until next time, remember: Life is like a bicycle; you don't fall off until you stop pedaling.



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