

Transmission Report

Volume 9, No. 1

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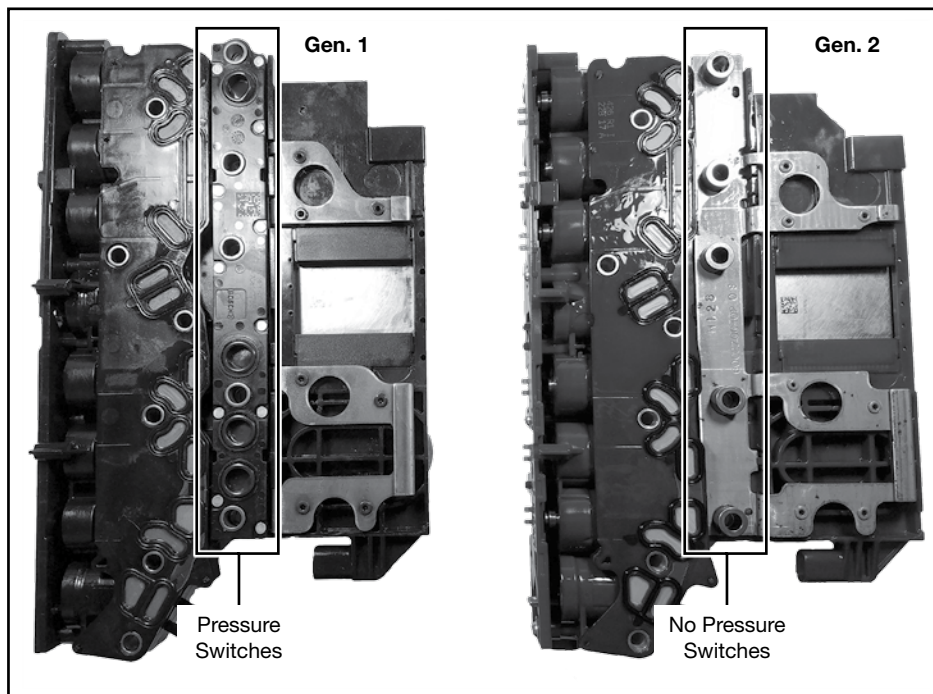
The Greatest Generation

How Small Changes Led to the New Form & Function of Gen. 2 6T70/75 Valve Bodies

It seems these days that when a transmission is introduced, OEMs start making small changes as failures in different areas start to come to the surface. Running changes help keep up with these failures to prevent quality issues and expensive warranty returns, but over time they add up and often trigger larger, more significant redesigns of the transmission. Even though you wind up with a new generation of the same valve body that works much better than the first, it's often a puzzle when you first see it on the bench. Rebuilders occasionally learn of changes through OEM service bulletins, but most of the time, you only find out something's different when you disassemble a transmission to make repairs. Hopefully this article will shed some light on the evolution of 6T70/75 valve bodies so that you can better diagnose and repair these units.

An example of minor changes eventually giving rise to a new and improved transmission is the GM 6T40 journey from Generation 1 to Generation 2 that happened in 2012. Pressure switches were eliminated from the TEHCM after the OEM discovered

Figure 1 — 6T70 Gen. 1 vs. Gen. 2 TEHCMs



Sonnax Parts Fitment in 6T70/75 Gen. 1 & Gen. 2

Part No.	Part Name	Gen. 1	Gen. 2
124740-04K	4-5-6 Accumulator Piston Kit	Yes	No
124740-03K	Isolator Valve Kit	Yes	Yes
124740-16	Isolator Valve Spring	Yes	Yes
124740-02K	O-Ringed End Plug Kit	Yes	Yes
124740-17K	Oversized 2-6 Clutch Regulator Valve Kit	Yes	No
124740-21K	Oversized 3-5-R Clutch Regulator Valve Kit	Yes	No
124740-26K	Oversized 3-5-R Clutch Regulator Valve Kit	Yes	No
124740-01	Oversized AFL/Solenoid PR Valve	Yes	No
124740-40K	Oversized Actuator Feed Accumulator Piston Kit	Yes	No
144740-23	Oversized Clutch Boost/Latch Valve	Yes	No
124740-12K	Oversized Pressure Regulator Valve Kit	Yes	No
124740-14K	Oversized TCC Control Valve Kit	Yes	Yes
124740-24K	Oversized TCC Regulator Valve Kit	Yes	Yes
6T70-ZIP	Zip Kit®	Yes	No

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the pressure switch films were distorting and setting off diagnostic trouble codes. A seemingly small alteration—eliminating the oil circuitry connected to the pressure switches—triggered a much more significant one: most of the valves in the valve body had to be redesigned.

In 2013, General Motors repeated this pattern by creating a second generation of 6T70/75 units, plus an entirely new unit in the 6T80 with additional torque capacity. The changes in this second generation are similar to those of the 6T70/75's little brother, the 6T40, in that the pressure switch assemblies were removed (**Figure 1**). **Figure 2** shows an external location on this second generation valve body for easy ID. Notice the contours on the Gen. 1 lower valve body casting over the empty bore in the casting. The Gen. 2 version does not have the contours in this area.

Figure 3 shows the separator plate ID locations. Gen. 1 may have no notch (as shown) or a U notch in the plate. Gen. 2 may have a V or a double-V notch in this location. This seemingly minor difference is of major importance, as it's directly related to the pressure regulator valve change that came with the second generation.

Figure 4 shows a pressure regulator valve from Gen. 1 on the left and from Gen. 2 on the right. Notice that the Gen. 1 valve is bored down the center and the Gen. 2 valve is not. This change was made to accommodate the addition of the balance orifice in the separator plate for Gen. 2 and is the reason Gen. 1/Gen. 2 separator plates became incompatible.

During disassembly of the Gen. 2 valve body, you will notice in the top cover plate (**Figure 5**) that there are now six solenoid dampers and springs, rather than the three that are in Gen. 1 applications. The Gen. 1 solenoid dampers were used for dampening actuator feed pressure fed to the solenoids. These six solenoid dampers in the Gen. 2 application are tasked with dampening the output pressure from each of the linear-type pressure control

solenoids. This helps to smooth the output pressure acting on the regulating valves that the solenoids are connected to, which in turn helps provide better control of clutch applications.

Upon further disassembly of the Gen. 2 valve body, we see that there is a new checkball location. **Figure 6** shows the nine checkball locations on Gen. 1 applications and the addition and location of the No. 10 checkball for Gen. 2 applications. This new checkball meters a connection to the

Figure 2 — 6T70 Gen. 1 vs. Gen. 2 Lower Valve Bodies

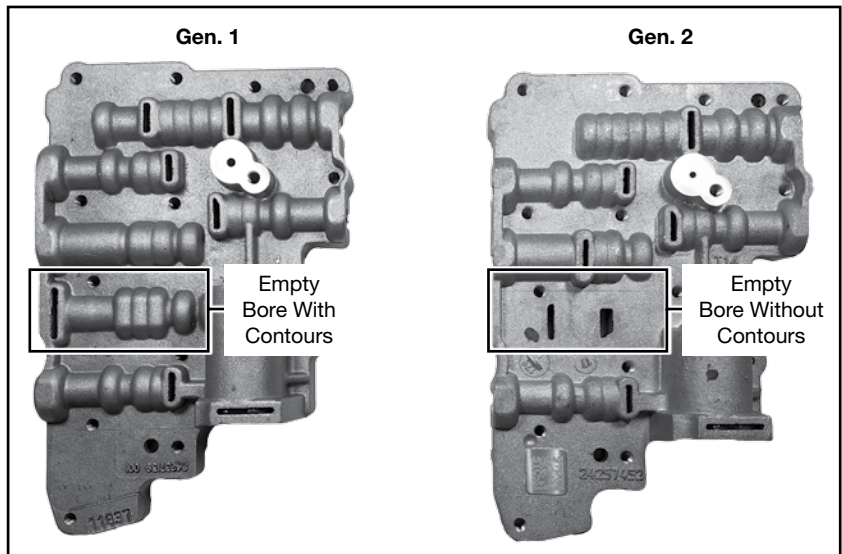


Figure 3 — 6T70 Gen. 1 vs. Gen. 2 Separator Plates

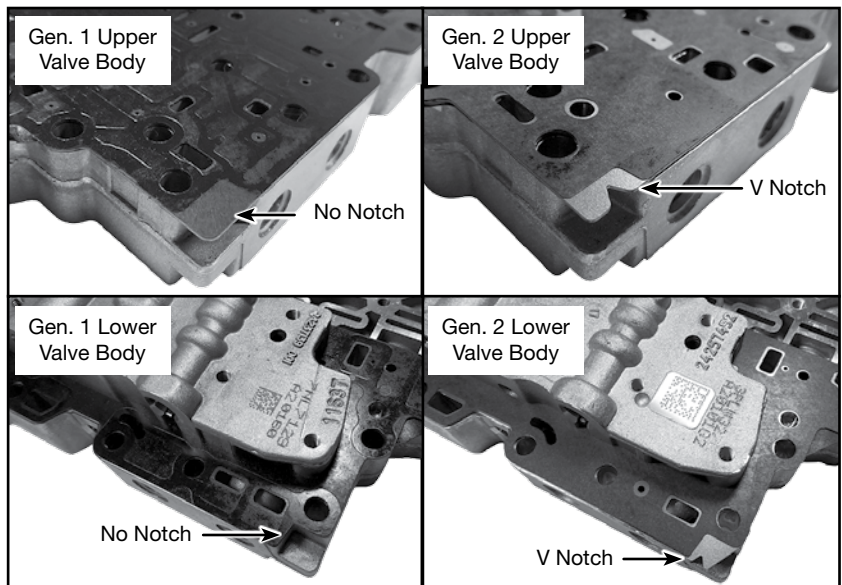
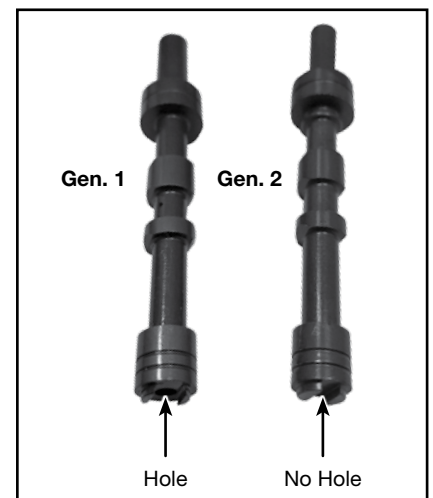


Figure 4 — 6T70 Gen. 1 vs. Gen. 2 Pressure Regulator Valves



Form & Function of Gen. 2 6T70/75 Valve Bodies

compensator feed circuit, which connects to the 3-5-R and 4-5-6 balance pistons through the rear cover of the transmission. Compensator feed pressure for Gen. 2 is connected to the torque converter feed circuit through an orifice, which is a change from the previous connection to orificed line pressure on Gen. 1. The No. 10 checkball allows a passage in the exhaust backfill circuit to seat the No. 10 checkball if exhaust backfill pressure is higher than compensator feed. Numerous design changes were made to the clutch regulator valves as connections to the pressure switches were eliminated.

Figure 7 shows an example of the 2-6 clutch regulator valve: the center valve spool was eliminated and the valve was shortened on the Gen. 2 version. Other valves and components that changed (related to the valve body) include:

- Clutch select solenoid 2 valve
- 1-2-3-4/C4-5-6/C3-5-R clutch boost valve
- Actuator feed limit valve
- Isolator valve spring
- 4-5-6 accumulator spring and retainer

The compensator feed blowoff spring in the rear cover of the transmission was also redesigned. Many of these individual components can be identified by the presence (or lack) of an ID band on the valve. When trying to tell a Gen. 1 from a Gen. 2, however, it's best to stick with the obvious signs, such as the added checkball and separator plate differences as previously explained.

After all of the little changes—that often turn into big changes—are accounted for, it does seem the 6T70/75 finally came into its own as a well-designed transmission in Generation 2. It has turned out to be this way with 6T40, 6F35, even ZF6, and now it looks like we can add 6T70/75 to that list. ◀

Figure 5 — 6T70 Gen. 1 vs. Gen. 2 Solenoid Dampers

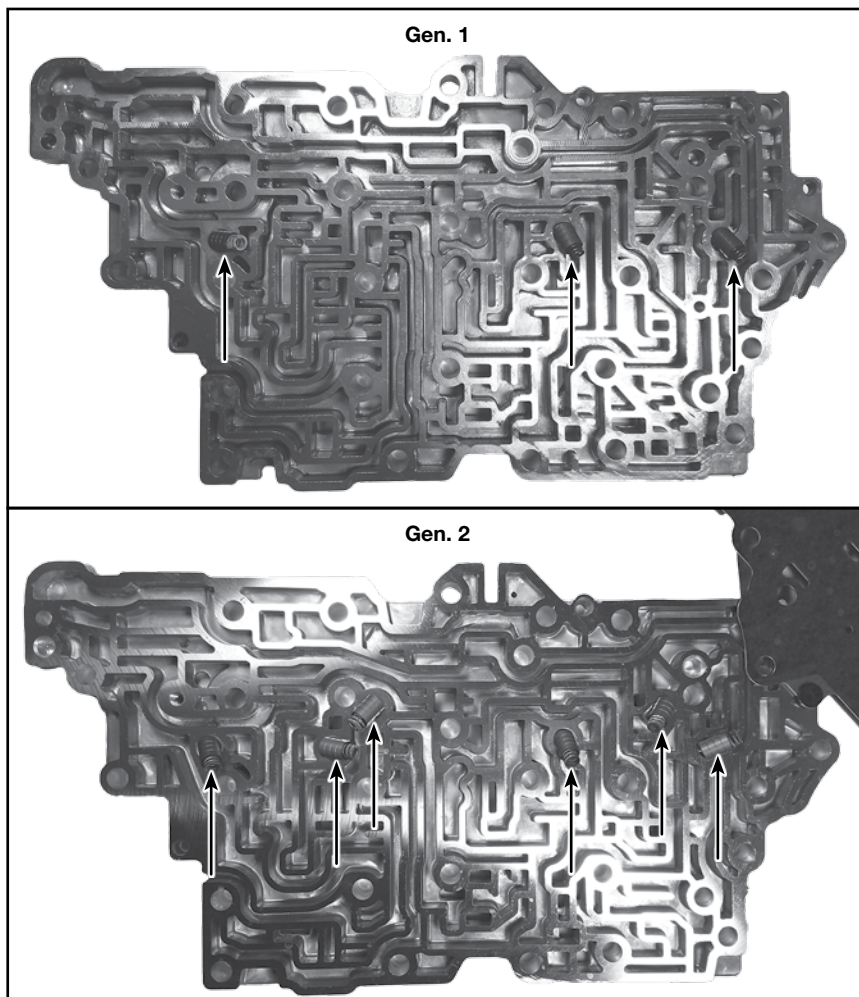


Figure 6 — 6T70 Gen. 1 vs. Gen 2. Upper Valve Bodies

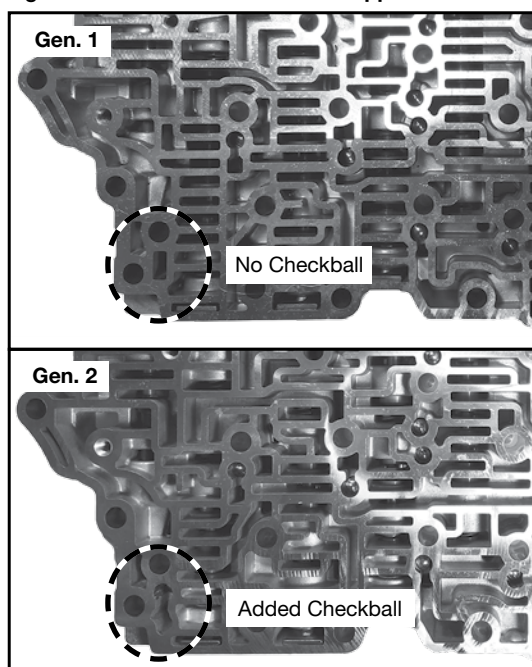
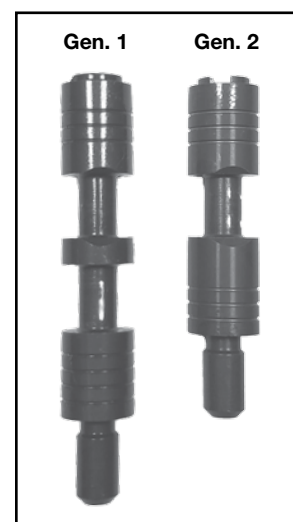


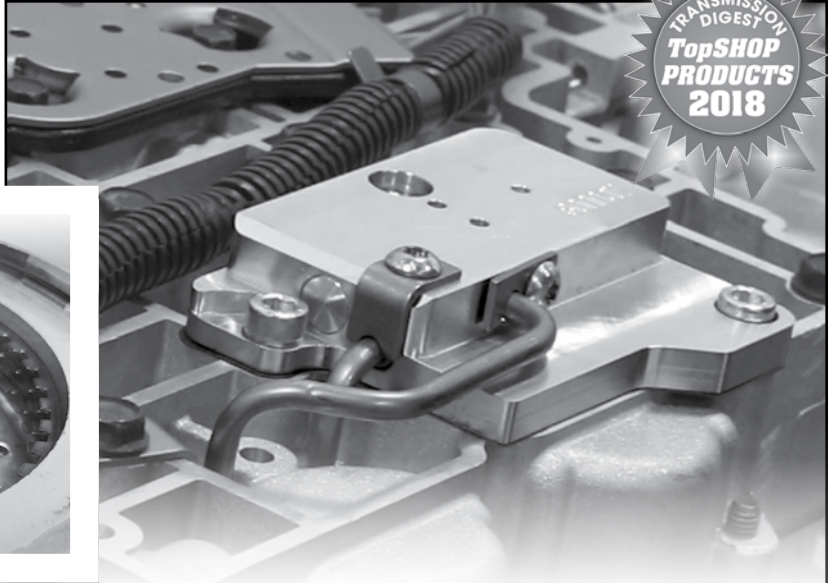
Figure 7 — 6T70 Gen. 1 vs. Gen. 2 2-6 Clutch Regulator Valves



Ramp Up 4L80/85-E Durability & Torque Capacity

Outsmart OD Roller Clutch Failure with the Smart-Tech® Overrun Clutch Valve Kit

The 4L80-E overdrive roller clutch faces a tough challenge: it alone has to deliver ALL the power to the tranny in 1-2-3. Lose the clutch and you're done. There's no coming back from roller clutch failure.



The ONLY way to radically increase OD roller clutch holding power is to bring on two clutches in the lower gears instead of one. Thanks to Sonnax and the Smart-Tech overrun clutch valve kit, this is easy to do.

Via an external manifold that bolts to the valve body, the Smart-Tech kit establishes a hydraulic connection to the overrun clutch as soon as the engine is started. With the overrun clutch on in all ranges other than OD through 4th Gear, it can now share a load the OD roller clutch otherwise struggles with on its own.

Another benefit of the Smart-Tech kit is a feature never available from the stock transmission. With line pressure provided to the clutch, it can be applied in ALL manual valve positions, including Reverse. That's a big help for drivers trying to back up a goose-neck trailer loaded down with a huge tractor.

Working on a plow truck or heavy hauler? Getting ready for racing season? Protect your warranty and improve transmission performance by installing Sonnax **34200-40K** in your next 4L80-E, 4L85-E rebuild.

Smart-Tech® Overrun Clutch Valve Kit

Part No. 34200-40K Patent Pending

Fits '97-Later 4L80-E & 4L85-E

- Improves OD roller clutch holding power in lower gears
- Extends the life of workhorse transmissions while preventing warranty claims & comebacks
- Installs quickly onto the valve body — no transmission removal needed

	Stock Transmission		With Smart-Tech Kit	
	OD Roller Clutch	Overrun Clutch	OD Roller Clutch	Overrun Clutch
Park	Holding		Holding	APPLIED
Reverse	Holding		Holding	APPLIED
OD - 1st	Holding		Holding	APPLIED
OD - 2nd	Holding		Holding	APPLIED
OD - 3rd	Holding		Holding	APPLIED
OD - 4th	Overrunning		Overrunning	



See how easy it is to install!

Watch the step-by-step installation video at www.sonnax.com/34200-40K-install

“I saw it at the show!”

New Parts You Need to Know About

The buzz in our booth at the fall tradeshow was all about the new Sonnax parts lined up for 2018. Here are some highlights from Powertrain Expo, SEMA and PRI.



Part No. 95030-26K

Bushings for:

- Rear Stator Support
- Front & Rear “A” Drum
- Input/Output Shaft
- Sun Gear Shaft
- “B” Clutch



ZF6HP26/28 Tackle Problems Quickly & Easily with a “Perfect Fit” Bimetal Bushing Kit

- Innovative manufacturing process guarantees the most reliable, precise fit—every time
- Upgraded bimetal material prevents premature wear
- All-in-one kit services both “big shaft” (30mm input) and “small shaft” (26mm input) units

Burnt B/E clutches, 3-4/4-5 flared shifts, ratio errors/trouble codes and TCC issues in ZF6 units often can be traced back to failed OE bushings located at hydraulic circuit restriction points. The inferior material of OE bushings makes them highly prone to premature wear, so it's critical to replace them BEFORE they fail.

Sonnax makes it easy to refresh both “big” and “small” shaft units with **95030-26K**, a 12-piece collection of upgraded, precision bushings guaranteed to improve the ease and quality of your next rebuild.

Ford 4R44/55E, 5R44/55E

Fits '97-'08 units (OE Part No. XL2Z-7G383-AA).

Avoid Extra Cost & Comebacks with a Top-Quality Remanufactured EPC Solenoid

Part No. 37947E



Never pay high prices for new solenoids again! Painstakingly returned to “as-new” condition and rigorously tested for proper operation, Sonnax remanufactured EPC solenoid **37947E** costs 35% to 45% less than buying new. It's an ideal way to add affordable protection against comebacks into every one of your guaranteed 4R/5R builds.

Sneak Peak at More to Come in 2018

Chrysler 48RE

Smart-Tech® Big Input Shaft Kit

Chrysler 68RE

Heavy Duty Input Shaft

Ford AOD, AODE, 4R70/75W, 4R70/75E

Smart-Tech® High Capacity Direct Clutch Drum & Shaft Kit

Some kit components also available separately.

Ford 4R100, 5R110W, E40D

Heavy Duty Input Shaft

GM 6L80/90

3-5-R & 4-5-6 Add-A-Clutch Kits

GM 400, 4L80-E, 4L85-E

Max Duty Forward Clutch Hub Kit

ZF8HP45/55/70

Zip Kit® Now Available!

Learn More

Follow Sonnax on Facebook for up-to-the-minute product announcements on these and other parts.

You'll find videos, photos and answers to questions from rebuilders like yourself who want to know more about these new parts.



6F35 Zip Kit® for Gen. 1 & 2 Units



Zip Kit Part No. 6F35-ZIP

- O-Ringed End Plug Kit
- Checkballs (3) .250" dia.
- TCC Regulator Valve Kit, Spring, Shuttle Valve, End Plug & O-Rings
- Damper Piston & Spring
- AFL Balance Plugs (2)
- Drill Bit
- Control Pressure Regulator Valve Kit
- Solenoid Pressure Regulator Valve, Sleeve, Spring & Retainer Clip



MORE

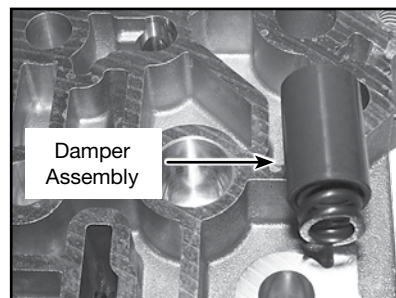
• Zip Kit part instructions feature even more in-depth detail.

• Learn about identifying, diagnosing and repairing 6F35 units in the Sonnax online tech library.

Recently, there has been question in whether the Ford 6F35 Gen. 2 '13-later valve body is compatible with Sonnax Zip Kit **6F35-ZIP**. The good news is that it IS compatible, although some of the components have been modified slightly to account for some small parts changes in the valve body. Whether you have the older or new style valve body, this Zip Kit will work for you!

The Zip Kit replaces the OE rubber-tipped accumulator damper piston found in Gen. 1 and Gen. 2 units with the Sonnax-design damper piston and spring. This means, regardless of which generation you have, the Zip Kit will work. The damper assembly associated with the rubber tip is the only one provided in the Zip Kit, and its location differs between Gen. 1 and Gen. 2.

The biggest changes from Gen. 1 to Gen. 2 that affect assembly are related to the damper assemblies for solenoid output. The location of the 1-2-3-4 solenoid output damper is in the same location, but the damper has changed to a piston and spring rather than a piston with a rubber shock absorber at the end of it as shown like the familiar damper from the ZF6 family. Also, more damper piston assemblies were added on Gen. 2, as the hydraulic circuitry changed and each of the linear solenoids now have a damper assembly to help smooth solenoid output, which connects to clutch regulating valves to provide better shift control.



New Vacuum Testing & Valve Body Guides

Sonnax has an always-expanding library of FREE tech resources. Here's what's new:

Vacuum Test Guides

- Jatco/Nissan JF015E (RE0F11A)
- Toyota/Lexus U760E/F
- Ford E4OD, 4R100
- Download/print from www.sonnax.com
- Learn locations to test on 40+ units
- Identify common problems
- Select parts for repairs



Valve Body Layouts

- Jatco/Nissan JF015E (RE0F11A)
- Ford 6F50, 6F55
- Displays an exploded view location guide for individual valve trains
- Provides active links to view specific part details
- Lists any tools/fixtures required



**Zach
Richardson**

Zach is an automotive enthusiast who joined the Sonnax team as a technical support specialist in 2016. With three years of experience, he came from a management position in parts sales and product support. He has eight years of experience with automotive repair and maintenance, as well as a special interest in sport compact performance.

Have a product question?

Call us toll-free today:

(800) 843-2600

or email

SonnaxTechSupport@sonnax.com

Help Us Help You

Three things to do before contacting the Sonnax tech team

Over time, tech support has found a trend: we end up asking our customers a lot of the same questions on each phone call. We ask these questions so that we can give advice that will steer our customers in the right direction for each given situation. The calls we receive are on everything from clarifying a step in instructions, to whether or not a product may address a specific problem with a transmission. So naturally, the more information that is available to us, the better we can assist with the issue at hand.

The very first thing we ask for on almost every phone call is vehicle information. This would include the year, make, model, engine type/displacement and, of course, the transmission model. While there are some general concepts that apply to every automatic transmission, it's important to understand most units have their own unique problems and symptoms. We've found when pinpointing any transmission issue, it's best to start with a few basic steps:

- **Do a complete scan of the vehicle for codes.** Keep in mind that most DIY-type scan tools are not capable of interrogating the TCM, so a trip to a shop with a compatible scan tool may be necessary. Transmission codes are important, but codes elsewhere can also affect the transmission operation. Shift timing and quality are calculated by load-sensing devices such as MAF, TPS, etc., so codes in systems such as the engine and ABS should not be ignored. Something as simple as an engine misfire can prevent proper command from the TCM, depending on the vehicle.
 - **Check the condition of the fluid.** This is very important to determine what level of repair is required to completely resolve a transmission problem. Whenever there is a flared shift, gear ratio error, TCC slip, etc., this will be something we are looking for to determine whether a valve body or pump repair can resolve the issue. Burnt-smelling or dark, discolored fluid is an indicator of significant clutch damage inside the transmission or the torque converter. If the fluid is in this state, the unit will likely require an overhaul to properly address the issue.
 - Last but not least: **Gather details on the vehicle's recent repair history (if applicable), which can be extremely helpful in tracking down the source of an issue.** This sheds some light on whether a problem was built into the transmission or if it may not have been addressed with a particular repair.

If you find that we are asking these questions, it's because we want to help find out what solution is best for your situation. It can be advantageous to go back to basics when trying to establish a baseline for any given problem. Even if it doesn't result in a call to tech support, these steps can be used as relatively non-invasive technique to begin every diagnosis.

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Featured in this Issue

- **Small Changes Make a BIG Difference for GM 6T70/75 Gen. 2 Units**
- **Outsmart OD Roller Clutch Failure with the Smart-Tech[®] Overrun Clutch Valve Kit**
- **6F35 Zip Kit[®] for Gen. 1 & 2 Units**
- **Tech Team Shop Talk: Help Us Help You**

To update your address or request to stop this mailing, please call 800-843-2600, 8:30 a.m. to 5 p.m. ET, or send an email to news@sonnax.com.

Sonnax designs, manufactures, tests and distributes a wide variety of components used to remanufacture torque converters, rebuild automatic transmissions, upgrade driveshafts and protect the driveline from over-torque damage.

Sonnax is a 100% Employee-Owned Company



Sonnax Roadshow: Now On Demand

The Sonnax Roadshow is now playing on a monitor (or mobile device) near you!

Get started—or get a refresher—on valve body diagnosis and repair with this four-part video series presented by Sonnax transmission technical specialist Randall Schroeder.

If you couldn't make it to a Sonnax Roadshow, or have new techs at your shop, this series is for you! Learn how to troubleshoot valve bodies and evaluate repair options using the best techniques in the industry.

Start watching today at www.sonnax.com/roadshow

Series Overview

Part 1:
Diagnostic Challenges
Where Do You Start?

Part 2:
Isolating the Problem
Methods to Identify Bore Wear

Part 3: Valve Body Reaming

Part 4:
Additional Valve Body Repair Issues