

Transmission Report

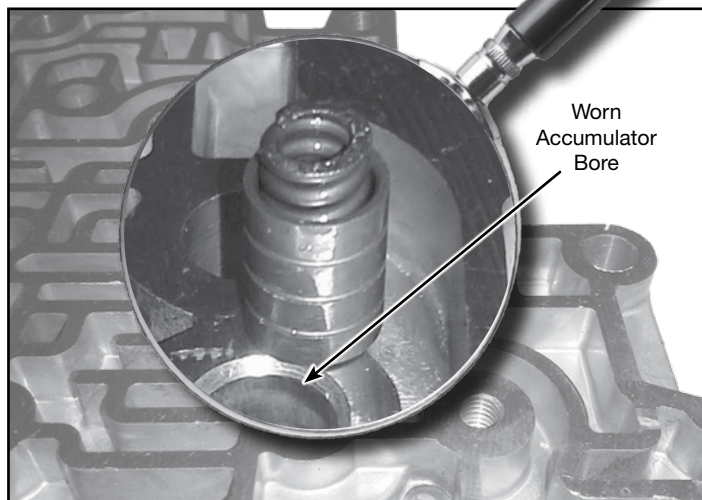
Volume 8, No. 2

July 2017

Recognize & Repair Solenoid Accumulators in Late-Model Valve Bodies

Since the dawn of transmissions, accumulators have been used to cushion the hydraulic apply of clutches and bands. Whether the transmission used modulators or throttle valves and governors, or as the industry moved into EPC and on/off shift solenoids in the '80s, the same general approach was used: line pressure was directed to an on/off shift valve, which directed apply pressure simultaneously to an apply component and a large accumulator piston. These pistons were generally 1–2 inches in diameter, which also necessitated a large spring for resistance, and could be located in the valve body or the transmission case. These pistons and housing bores are examined for wear during a typical rebuild, as oil loss reduces clutch/band apply pressure and results in various shift-related complaints.

Now enter the dawn of transmissions with six-plus Forward gears, clutch-to-clutch shifting and much more sophisticated solenoids and TCMs. Smoothness of shifts is even more critical, as there are more of them, they are occurring more often and timing between the shifts has shrunk significantly. Yet in some of these types of transmissions, the typical



accumulator pistons noted previously do not exist. For instance, in the GM 6L80 the clutches are fed apply pressure through a clutch-specific regulated shift valve and associated clutch boost valve, which are both regulated by a specific PWM pressure control solenoid that is metering actuator feed limit (AFL) pressure to computer demands once input

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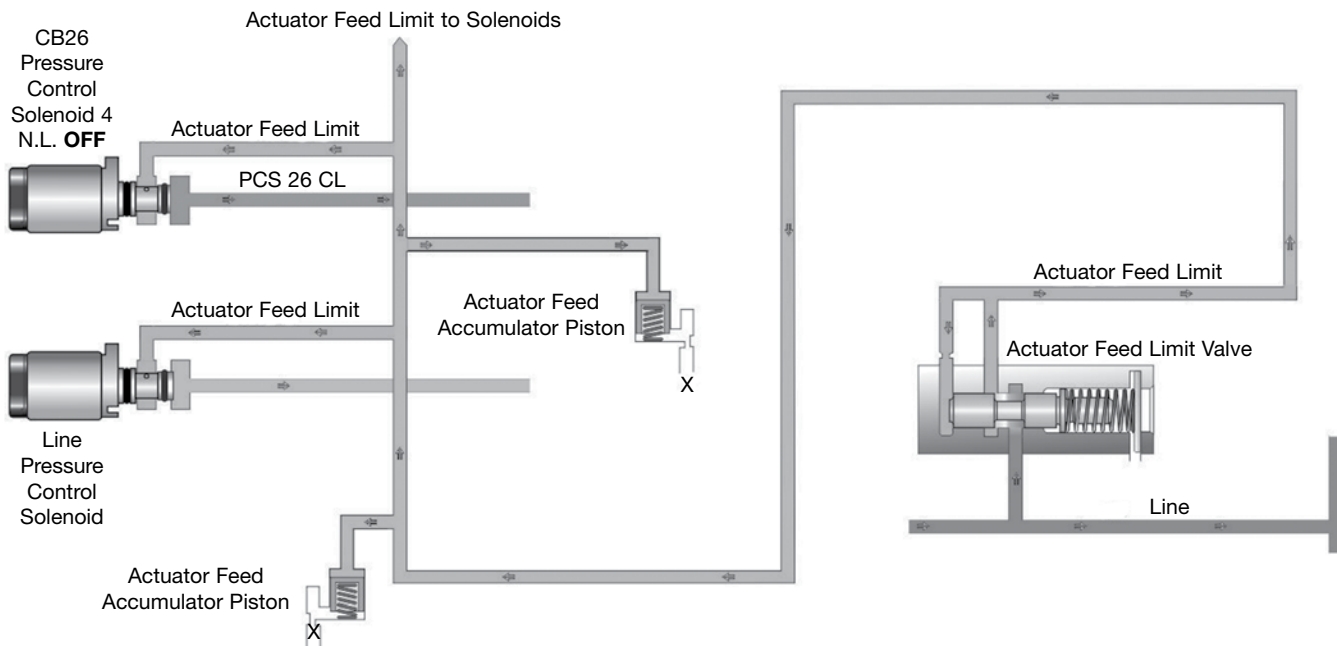
Do you have a drawer like this in your shop? We'll PAY for Your Solenoid Cores!

Sonnax will buy your **Yellow, Orange and Blue** OE ZF6 solenoid cores. Guaranteed FAST and EASY solenoid core returns. It's simple! Here's how:

- 1. Collect Cores:** Five or more cores is recommended.
- 2. Contact Sonnax:** We'll set up a Return Authorization.
- 3. Ship Your Cores:** Sonnax will prepay all shipping charges and provide labels.
- 4. Get Paid!** Receive your check in the mail.

**Start a Core
Return Online TODAY**
www.sonnax.com/solenoidreturn
or call (800) 843-2600, Ext. 379

Figure 1 – GM 6T70 AFL Circuit



Continued from page 1.

and output speed sensors, TPS information and other inputs are analyzed. There are no “traditional” accumulator pistons, but instead waved clutch plates, compensator feed and clutch exhaust backfill circuits, plus computer controls aiding in the cushioning of the apply components. In diagnosing shift complaints, each of these components and circuits will need to be checked.

Examination of the GM 6T70 transmission shows an addition to the 6L80 approach. Along with the clutch-specific valves and solenoids, waved clutch plates and new circuits, three small accumulator pistons (two shown in reduced circuit) have been added to the AFL circuit (**Figure 1**). AFL pressure is being fed to each of the solenoids. It eventually becomes EPC pressure and the modulated pressure directed to each clutch-specific regulated shift valve and related boost valve, thereby controlling apply pressure to the clutches. So these small accumulator pistons are critical for dampening any pressure inconsistencies in the AFL circuit, which aids in smoother shifts. Wear at the casting bores that house these pistons results in loss of AFL pressure and will negatively impact all shifts and EPC pressure. Sonnax oversized actuator feed accumulator piston kit [124740-40K](#), with tool kit [124740-TL40](#), can repair worn

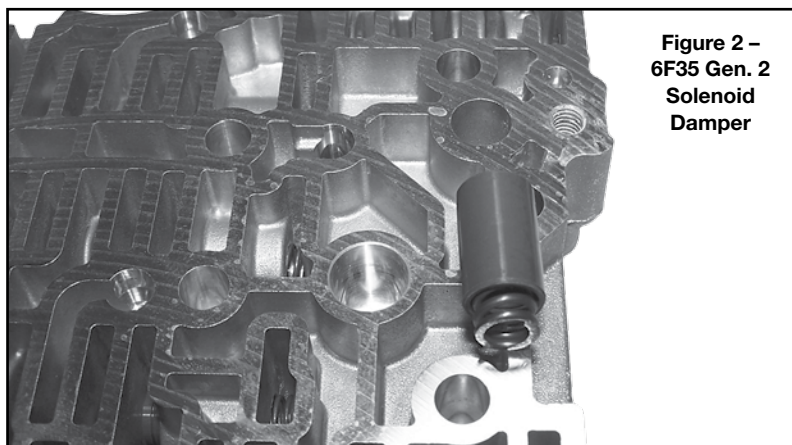
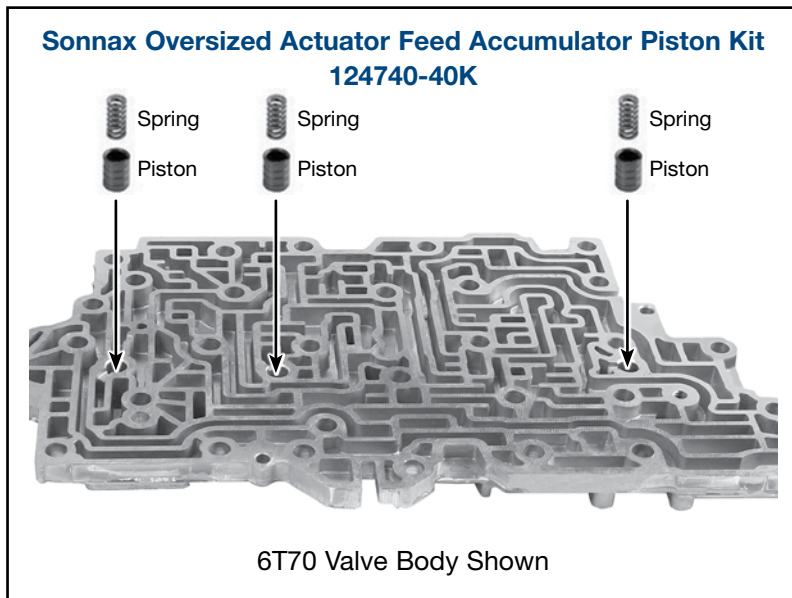
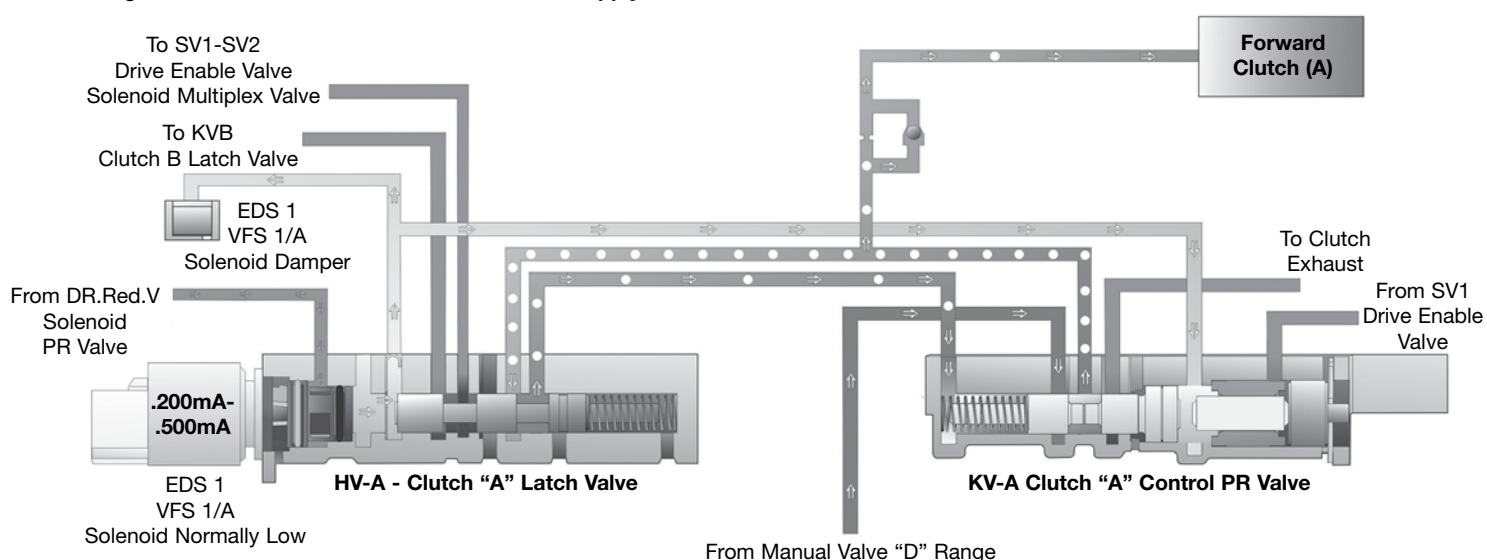


Figure 2 – 6F35 Gen. 2 Solenoid Damper

Figure 3 – Ford 6R60 & ZF6HP Solenoid/Clutch Apply Circuit



castings on 6T70 applications and restore lost AFL pressure. These types of small pistons and springs can also be found in the Ford 6F35 second generation valve body (**Figure 2**).

A similar approach for dampening the solenoid pressures is taken on the Ford 6R60 and ZF6HP transmissions. In these units, however, the accumulator is called a solenoid damper and is placed on the output side of each solenoid (**Figures 3 & 4**). This ensures the stability of the pressures coming from the various clutch apply solenoids and being directed to the specific clutch regulator and associated latch (boost) valves to aid in smoothing the clutch apply. Additionally, instead of a traditional piston and spring approach, OE utilized a rubber tip on the solenoid damper piston for the resistance force. These have been known to flatten (**Figure 5**), which results in no accumulation of force and shift complaints. Replacing these rubber-tip pistons with Sonnax accumulator piston kit 95740-15K will prevent reoccurring problems in this area.

As transmission controls continue to evolve, it's important to understand the purpose of new types of components and what results when their functionality is compromised. Be on the lookout for these small accumulator pistons/solenoid dampers in later-model units and watch for wear that can compromise proper shifting. ◀

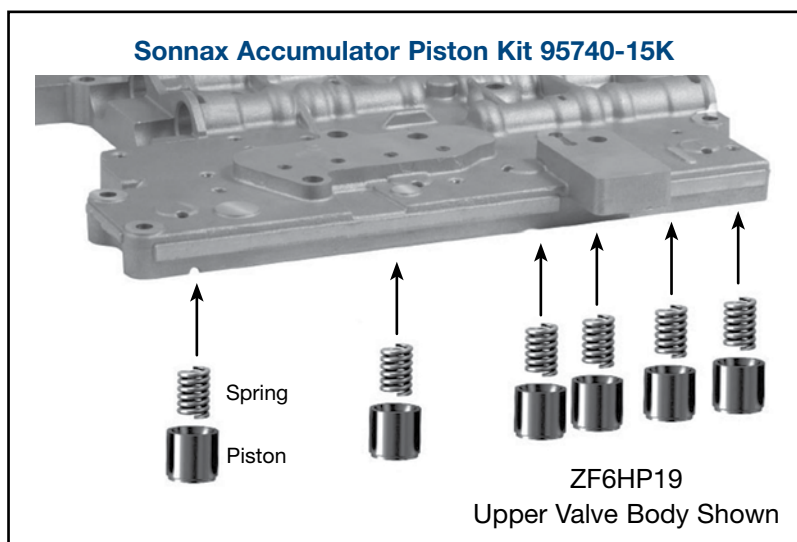


Figure 4

In the Ford 6R60 and ZF6HP units, the accumulator is called a solenoid damper and is placed on the output side of each solenoid.

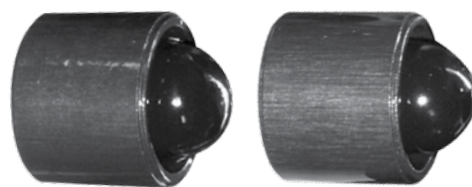


Figure 5

The dampers' rubber tips have been known to flatten, which results in no accumulation of force and shift complaints.



Build It Once, Build It Right

Essential 4L60/E Upgrades Your Customers Can't Miss Out On

If you think the 4L60/E on the bench can't be faster, tougher, stronger, think again. The world has changed and transmission upgrades from back in the day are old news. Using Sonnax components, performance specialists are bringing this veteran tranny roaring back to life with jaw-dropping performance and reliability unimaginable even a decade ago.

The funny thing is, many drivers still don't know what they're missing out on. It's not uncommon to see 4L60/Es badmouthed as troublesome, unreliable trannies that can't handle the demands of modern drivers. Built right, they can, and with Sonnax at their side, any shop can deliver a rock-solid transmission.

Want to wow a racer? Match the tranny to their high-horsepower engine by switching to a close-ratio 1st Gear setup. Haven't tried a Performance Pack or Sonnax SmartShell[®]? Get one into your next build, you and your customers will not be disappointed — there's a reason both were named "Top Shop Products" by the readers of *Transmission Digest*. And in every vehicle, keep the 3-4 clutches alive with Sonnax backing plate and housing kits, the ONLY upgrades proven to overcome root cause of burnup. Find these and many more essential parts for building a killer unit at www.sonnax.com/4L60E.



Performance Pack

Install the Only Shift Upgrade Kit Optimized for Modern Power

Performance Pack [HP-4L60E-01](#) is a must-have for any heavy-duty vehicle and the very best foundation for racing. In most cases, components can be installed without removing the transmission.

- Firmer shifts under load without sacrificing low-speed drivability in 4L60-E ('94-later), 4L65-E, 4L70-E units
- Durable parts target commonly worn areas in the transmission and prevent future damage
- The only way to eliminate PWM function without over-pressurizing converters (optional)

2.84 Input Carrier Kit

Discover the Second Ratio that's Launching the 4L60/E Into a New League



The 4L60 family of transmissions has a 3.06 first gear ratio, the steepest first-gear ratio of any four-speed automatic transmission. That ratio worked great to get a heavy, underpowered vehicle moving, but with today's increased power levels, the steep ratio becomes more of a granny gear and a nuisance.

The Sonnax 2.84 ratio input carrier kit [77284-K](#) converts the transmission from a 3.06-1.63 wide ratio to a 2.84-1.55 close-ratio setup that is far more compatible with late-model performance engines.

This makes a big difference on the track, because it gives a longer pull in 1st Gear and keeps the engine in the power band on both 1-2 and 2-3 shifts. Instead of dealing with RPMs bouncing off the red line before they've gone two car lengths, now drivers have a more controlled launch and can focus on acceleration. This exclusive upgrade really changes the way the transmission works, transforming the 4L60 into a modern, race-ready unit.

SmartShell[®] HD Reaction Shell Kit

Eliminate All Risk of Sun Shell Failure



From daily jobs to extreme builds, the SmartShell heavy-duty reaction shell kit [77749-02K](#) solves multiple problems in all 4L60 series transmissions:

- Stops spline stripping
- Prevents hub breakage
- Eliminates planetary bearing failure

Free Build Charts

Sonnax build charts help you and your customers choose the best combination of upgrades. View, print or download build charts at www.sonnax.com/4L60E.

Stop the Flex to Stop 3-4 Clutch Failure

A problem almost every rebuilder has dealt with in the 4L60/E family of transmissions is 3-4 clutch failure. These popular units have been around for a long time, but running them hard really does a number on the clutch pack, not to mention the patience of customers that have to keep paying for repairs that never stick. For demanding applications, the cost of repeat failure dwarfs the cost of improved parts, so investing in an upgrade is an easy decision to make. The good news is that preventing inconvenient and expensive comebacks is easy: just reduce the apply and backing plate flex.

The issue of 3-4 clutch burnup is so common in 4L60's that, when a repeat failure happens, it's tempting to simply write it off as normal, a fatal flaw in the transmission you just have to accept. While that was true years ago, the story today is very different. Thanks to Sonnax innovation, the 3-4 clutch is NO LONGER the weak link! A unit upgraded with Sonnax components can handle 1,000HP, with hard parts more likely to fail than the clutch pack. **If your customers are experiencing 3-4 clutch failure, you need to change the parts you're installing.**

The main shortcoming with the 3-4 clutch is flex of the apply and backing plates that leads to heat build up and clutch damage. Old-school aftermarket kits that add friction plates, but do so with thinner apply and backing plates, only make the flex worse and therefore do not notably improve 3-4 clutch durability. It has been demonstrated over and over again that the thinner clutches and ESPECIALLY thinner backing plates used in many of those clutch kits don't hold up to higher-energy shifts. The only way to fix the flex is by targeting the root cause of the problem, and Sonnax offers the two best options for doing this.

The ideal upgrade for daily drivers and mild street/strip applications is the new Sonnax heavy-duty 3-4 clutch backing plate kit [74140-01K](#). It's designed to work with an OE seven-friction clutch pack and features a thicker backing plate that's stiffer than any other option on the market. The result is an affordable, drop-in upgrade that significantly improves clutch pack durability and prevents comebacks in a wide range of vehicles.

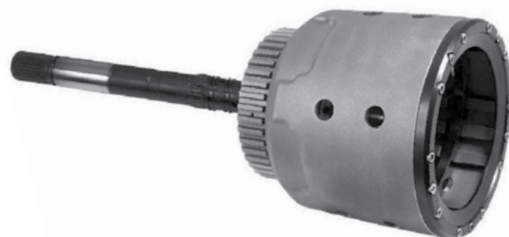
HD 3-4 Clutch Backing Plate Kit

NEW!



- Drop-in kit significantly improves 3-4 clutch durability
- Upgrades OE 4L60 (700-R4) and 4L60-E to seven frictions

Smart-Tech® Input Housing Kits



- Upgraded housing eliminates 3-4 clutch failure
- Key components prevent other chronic issues
- Use with your choice of clutches
- Available with or without heavy-duty input shaft

See the Flex – Watch the Demo Video
www.sonnax.com/smart-tech-input-housing

For higher-power applications where maximum durability AND expanded clutch capacity is the name of the game, you can completely eliminate 3-4 clutch failure with Sonnax Smart-Tech input housing kit [77733-06K](#). The housing apply and backing plates surround a larger clutch pack area to keep the clutches parallel and maximize protection against overheating. Other key housing components guard against common problems like fatigue failure, housing breakage and retaining ring blow-out. The Smart-Tech is the top choice of performance specialists and a must-have for every extreme performance vehicle. ◀

Transmission Kits Upgraded for Better Coverage

Sonnax wants you to have an all-in-one rebuild package for your next job, whether it's for a low-mileage unit or a high-mileage one. So we've reconfigured a few of our transmission kits to make sure we have you covered.

New components not available in discontinued kit.

Zip Kit®

- No reaming or special tools required
- Stops leaks so the valve body works properly
- In-depth tech booklet covers installation, diagnostics & tips for advanced transmission repairs

The Sure Cure®

- Restores OE shift quality
- Repairs biggest trouble areas to reduce comebacks
- Step-by-step instructions for resolving chronic problems in the valve body, pump body & beyond

Ford AODE ('96-Later) & 4R75W/E

Two new kits covering additional later-model units and additional problem areas replaced Sure Cure kit SC-AODE-1.

Part No. AODE-4R75E-ZIP

- Input & Output Shaft Seals
- Main Pressure Regulator Valve
- Boost Valve Kit
- Bypass Clutch Control Plunger Valve Kit
- 2-3 Shift Valve O-Ringed End Plug
- Solenoid Regulator Valve Retainer
- Overdrive Servo Regulator Valve Kit
- Checkballs
- Valve Body Retainer Plate Kit
- Overdrive Servo Pin Kit
- Intermediate Clutch Spiral Retaining Ring Kit
- Pump Cover Seals (Early- & Late-style)

Part No. SC-AODE-4R75E

Same components as Zip Kit AODE-4R75E-ZIP, except for two upgraded valves to repair worn bores:

- Oversized Pressure Regulator & Boost Valve Kit
- Oversized Solenoid Regulator Valve Kit

Requires Sonnax tool kits F-76948-TL, 76948-TL4, 76948-BST, F-76948-TL47 and the VB-FIX reaming fixture.

Chrysler 46RH/RE & 47RH/RE

Two new kits replaced Sure Cure kit SC-46/47RHE.

Part No. 46-47RHE-ZIP

- Line Pressure Plug & Sleeve Kit
- 4-Spool Switch Valve
- Manual Valve
- Line-to-Lube Pressure Regulator Valve
- Throttle Valve Kit
- Boost Valve Spring Retainer
- 3-4 Accumulator Spring
- 4th Accumulator Piston Seals
- Checkballs
- Turbine Shaft Seals
- Output Pilot Bushing
- Intermediate Shaft Pilot & End Plug Kit
- Endplay Shims
- E-Ring
- Drill Bit (for plate modification)

Part No. SC-46-47RHE-OS

Same components as Zip Kit 46-47RHE-ZIP, except for:

...three upgraded valves to repair worn bores:

- Oversized Lube Regulated PR Valve
- Oversized 4-Spool Switch Valve
- Oversized Throttle Valve Kit

...and these additional components:

- Boost Valve Spring Retainer
- Checkballs
- Detent Ball & Sleeve Kit
- Reverse Servo Piston Plug Kit
- Front Servo Piston Cover Kit
- Kickdown Band Strut

Requires Sonnax tool kits F-22771A-TL7, 22771A-TL13, 22771-TL12, F-22771-TL and the VB-FIX reaming fixture.

Ford 4R100 & E40D

A new kit heavily updated to repair aging units and now also covering the 4R100 replaced Sure Cure kit SC-E40D.

Part No. E40D-4R100-ZIP

- 1-2, 2-3, 3-4 Accumulator Control Valve Kits
- Intermediate & Direct Clutch Feed Seal Kit
- Boost Valve Kit
- Line Pressure Modulator Plunger Valve Kit
- TCC Control Plunger Valve Kit
- Low/Reverse Modulator Plunger Kit
- Front Lube/Drainback Valve Kit
- Relief Valve
- Center Support Gasket
- Reverse Planet Endplay Shims
- Bushing Case
- Line-to-Lube Pressure Regulator Valve Kit
- Checkballs
- Sure Lock Spiral Snap Ring

A Sure Cure kit for these units is no longer available. For 4R100 trucks being pushed to the limit, upgrade the transmission with Performance Pack HP-4R100-01.

- Recalibrated shift accumulation, with tuneability for great HD shifts
- Improved accumulator valves for greater clutch durability
- Improved pump components to minimize leaks & maintain pressure, TCC performance & lube
- Sure Lock overdrive retaining ring prevents loss of 4th
- Includes internal parts for setup & to prevent common failures





Tory Royce

4R/5R Zip Kit® Updated for OE Shift Feel

Many of our customers have been using Zip Kit [4R44E-5R55E-ZIP](#) to combat wear issues in the Ford 4R/5R castings for quite some time now. This kit is a great first step in valve body repair, but the calibration was often better suited to larger, four-wheel drive vehicles with the 4.0L engine when it came to preserving OE shift feel.

Some of our users, however, encountered firmer-than-expected upshifts and downshifts in certain applications, particularly two-wheel drive vehicles using the 3.0L V6 and 2.3/2.5L I4 engines.

This came from two of the kit's components: an increased ratio boost valve and elevated main pressure regulator valve spring, which increased pressure slightly from OE.

These firm shifts could typically be addressed by adjusting the EPC

solenoid counterclockwise between 1/8 to 1/4 turn, but doing so required removing the pan again and incurring additional labor allowances.

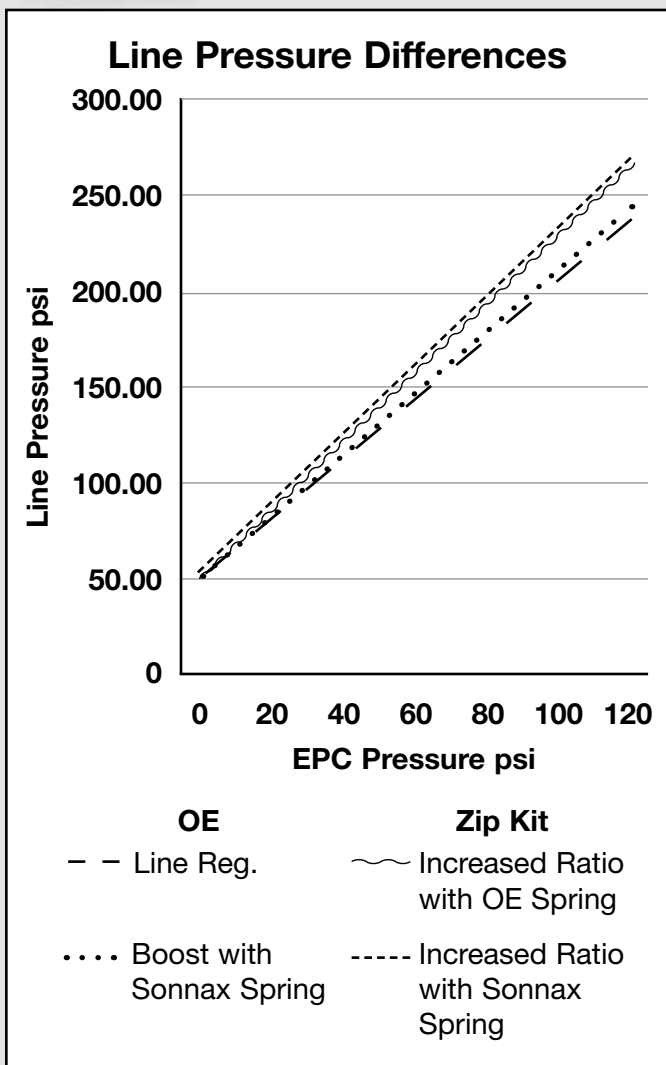
We listened to your feedback and swapped out the increased ratio boost valve for an OE ratio valve so you can maintain OE shift feel with less hassle. This makes [4R44E-5R55E-ZIP](#) a great valve body repair kit for all types of vehicles. The OE ratio boost valve maintains the factory pressure curve while still addressing common points of valve body wear. For firmer shifts and significantly increased line pressure, Sonnax offers increased ratio boost valve kit [37947-03K](#).



Zip Kit [4R44E-5R55E-ZIP](#) has been modified to include an OE ratio boost valve so drivers can get that OE shift feel with less hassle.



Sonnax also offers increased ratio boost valve kit [37947-03K](#) for drivers that want firmer shifts and added line pressure.



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Featured in this Issue

- Recognize & Repair Solenoid Accumulators in Late-Model Valve Bodies
- Essential 4L60/E Upgrades You Can't Miss
- Transmission Kits Upgraded for Better Coverage
- 4R/5R Zip Kit[®] Gets an OE Ratio Update

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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

GM 4L60, 4L60-E, 4L65-E, 4L70-E



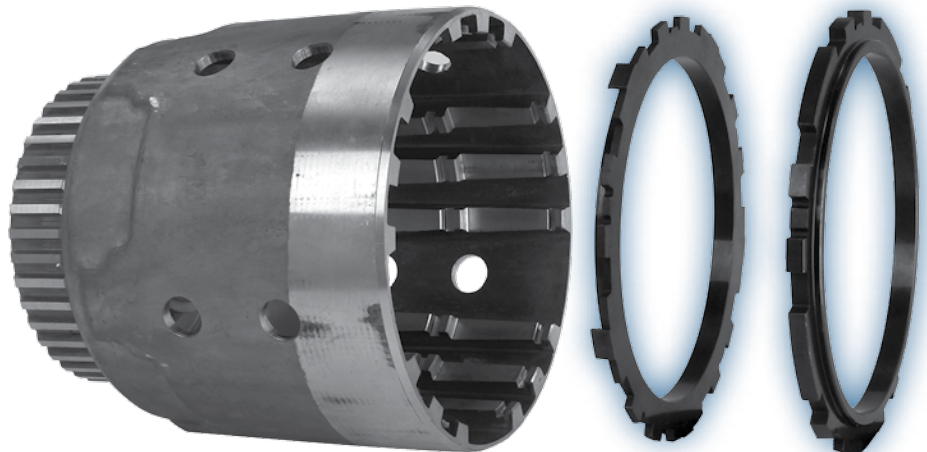
Introducing the Sonnax Heavy-Duty 3-4 Clutch Backing Plate Kit

Part No. 74140-01K

Mid-Level Upgrade Guards Against Clutch Failure

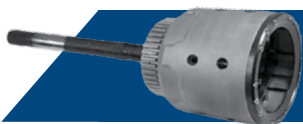
A thin, weak backing plate is the leading cause of 3-4 clutch distortion and burnup – a pervasive problem in the 4L60/E family of transmissions.

Sonnax heavy duty 3-4 clutch backing plate kit 74140-01K significantly reduces backing plate flex for increased 3-4 clutch durability.



Apply Plate Backing Plate

- Backing plate is significantly thicker and stiffer than OE for added durability
- Drop-in upgrade is ideal for daily drivers and mild street/strip applications



Need the ultimate 3-4 clutch solution? Upgrade to a Smart-Tech[®] input housing kit. For more 4L60/E upgrades you can't miss out on, see inside.