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# Transmission Report

Volume 12, No. 1 March 2021

## Resolving Stalling & Overheat Issues After Performance Tuning on RFE Transmissions

The Chrysler 45RFE, 545RFE, 68RFE family of transmissions has been plagued with complaints of stalling conditions and low cooler flow issues from its inception in 1999. Early on, problems typically pointed in the direction of TC limit valve, as it is in charge of torque converter release pressure, which is the circuit that keeps the torque converter clutch away from the torque converter cover. TC limit valve bore wear was commonly the culprit, especially in early applications. As a matter of fact, the valve was typically so worn that it could be moved easily side to side in the bore (**Figure 1**). The TC limit valve is still a problem area, and most shops make it an automatic replacement during pump overhaul by reaming the bore and installing Sonnax valve kit **44912-03K**.

Although time and technology have progressed since the early days of RFEs, these types of complaints have persisted, just in a slightly different form. The pressure regulator valve in this family of transmissions has now surfaced as being the cause not only of this low cooler flow and partial stall condition, but also a fluid overheat complaint. As it turns out, it is the position of the pressure regulator valve that is causing this issue, not necessarily the valve itself.

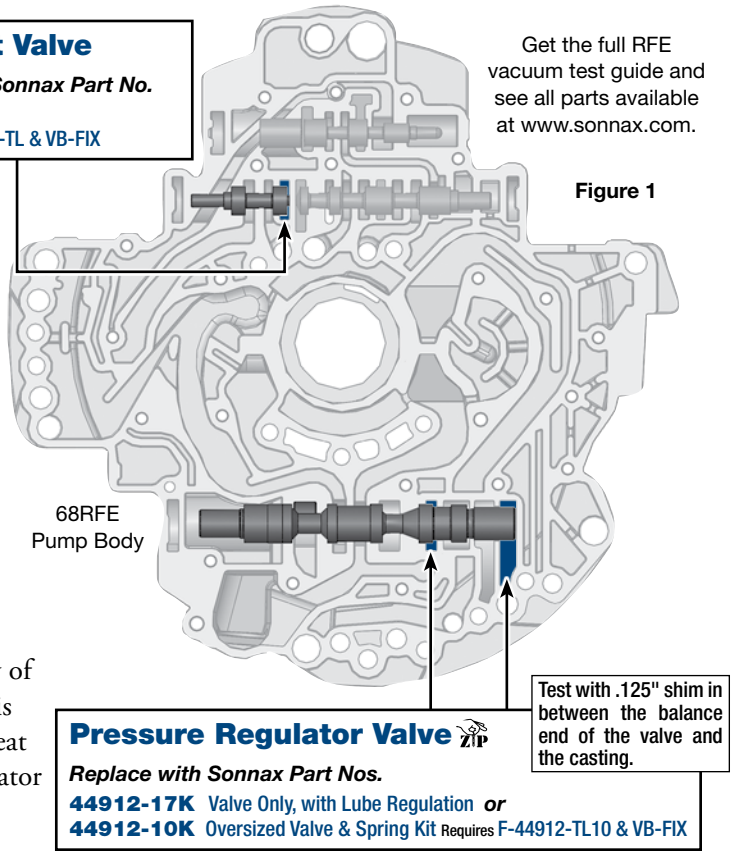


Figure 1


**The new Sonnax fan store is a great place to grab your very own, official Sonnax gear!**

Choose from three cool designs including the popular Sonnax Performance and scary valve body designs, plus a brand-new drivetrain design.

All designs are available in a lightweight T-shirt, heavyweight T-shirt, v-neck T-shirt (for the ladies) or cozy hoodie.

So what are you waiting for? Stock up on your favorite Sonnax gear today!


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# Resolving RFE Stalling and Overheat

A majority of customers driving Ram 2500 series, heavy-duty, 6.7L diesel know that an easy and inexpensive way to get better performance and power out of this truck is through an aftermarket performance software upgrade or "tune" as most call it. This upgrade increases horsepower, torque and even provides better fuel mileage. Software for transmission control will also be upgraded so the 68RFE can hold together behind this increase in torque. Although many customers will have this upgrade done, when a truck rolls into a transmission shop for repairs, it may be completely overlooked or not even thought about. A quick and easy way to verify whether you have stock transmission programming is to look at the desired and actual pressure on the scan tool when in the Drive position at a stop.

- Stock programming will show between 60 psi and 70 psi in both the desired and actual parameters on the scan tool. Line pressure duty cycle will be between 22% and 24%, then 160 psi at stall.
- "Tuned" programming will typically show 100 psi to 105 psi in the desired and actual parameters, with line pressure duty cycle at 5.1%, then over 160 psi at stall. (Note: The desired pressure will still be listed on the scan tool even if the actual is 0 psi, as in the transmission is toast.)

This elevated desired pressure at idle has proven to be the culprit and the cause of the low cooler flow, overheating and torque converter-related complaints, as this low cooler flow issue not only shows up at idle in Drive, it also shows up at any time driving at slower speeds when engine RPM drops back to idle position. **Figure 2** shows the dual-stage pump in operation in a high line pressure and high-demand pressure regulator valve position, where both sides of the pump are supplying pump output pressure. This illustration shows three regulating points on the valve based on its position:

1. Regulating point A is the connection to the secondary stage of the pump and exhaust.
2. Regulating point B is regulating the primary side of the pump and exhaust.
3. Regulating point C is the connection from line pressure to the lube and torque converter circuits.

**Figure 3** shows the same three regulating positions, but the valve and pump are now in the higher speed and engine RPM position where line pressure can be lower, so only the primary side of the pump is supplying output pressure.

**Figure 2** also shows what position the valve and condition the pump are in during idle in Drive at 700 RPM with line pressure increased via tuning to 105 psi. Note that regulating point C has a very small connection to line pressure. This small connection is a small undercut on the valve spool, which creates low flow to the torque converter circuits (note the green arrow on the valve spool). Typically, this will cause the light to come on when monitoring flow on the Sonnax SonnaFlow, as the GPM will be at .5 or lower. When at idle with desired and actual pressure at 105 psi, and the pressure regulator valve in this position, note

**Figure 2 — Tuned Programming: PR Valve Position at Idle/Low Engine RPM**

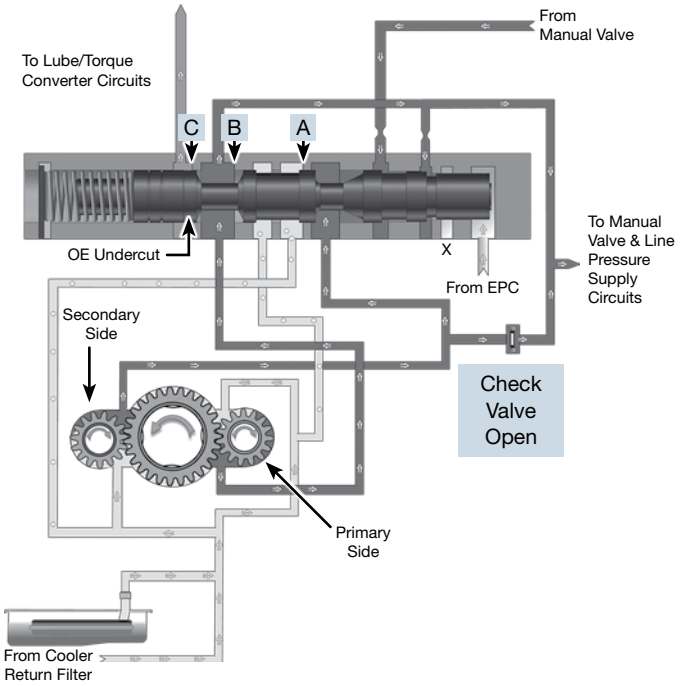
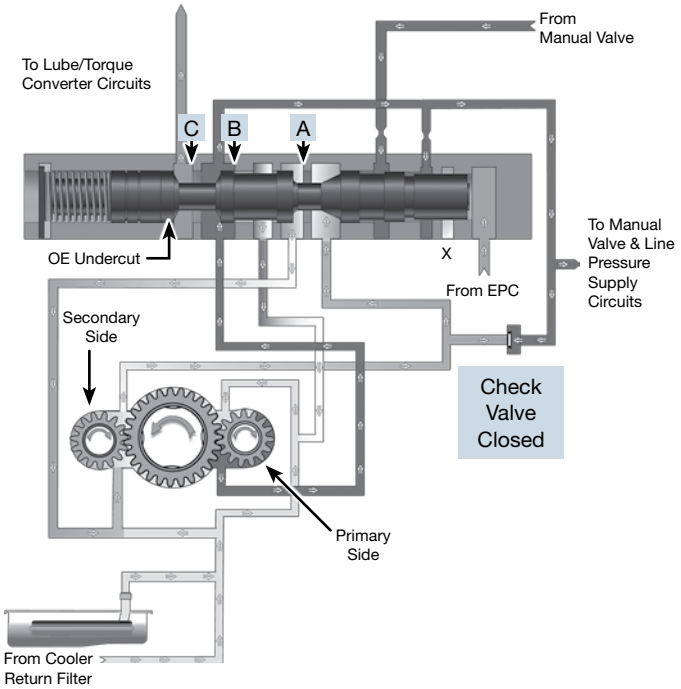



**Figure 3 — Tuned Programming: PR Valve Position at Higher Speed/Engine RPM**




that the line pressure duty cycle is at 5.1%. This indicates that the pump is almost at maximum output. To prove this further, line pressure will only jump to 125 psi when the fuse that provides power through the trans control relay is removed. When pressure is at maximum at idle, cooler flow drops further to .3 GPM.

**Figure 4 — Stock Programming: PR Valve Position**

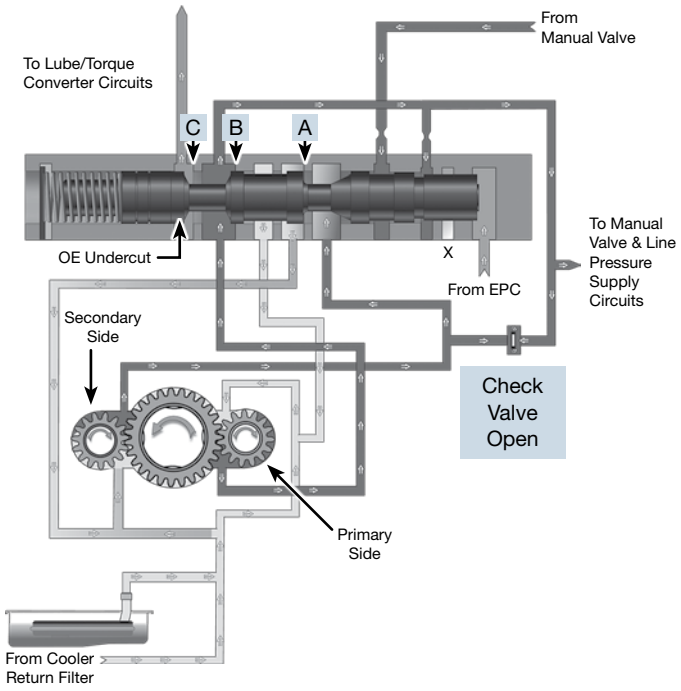
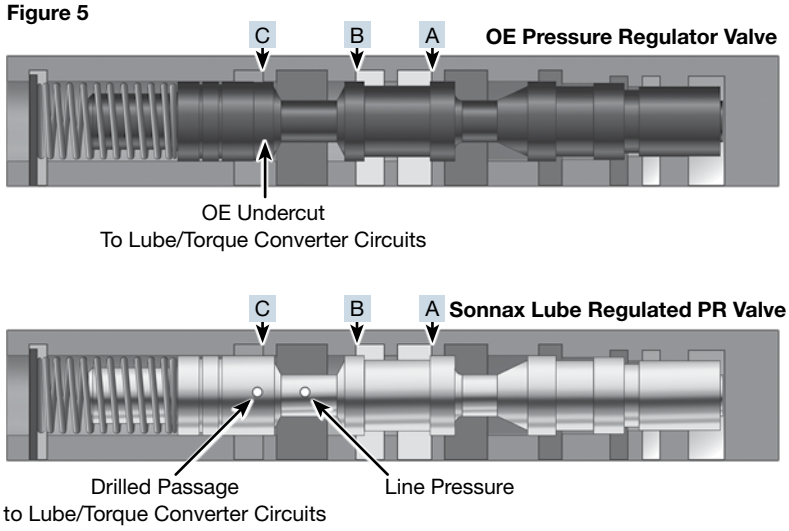



**Figure 4** shows the position of the pressure regulator valve with stock programming when desired and actual pressure is between 60 psi to 70 psi and line pressure duty solenoid percent near 22 to 24. Regulating point A is the connection to exhaust, which is connected back to the suction side of the pump. Notice the position of the valve in regulating point C: the connection from line pressure to the lubrication and TCC circuits is much larger, which in this position cooler flow measures 1.3 GPM at idle. That is a significant difference when 1.3 GPM is compared to .5 GPM.

To use the higher line pressure tuning without the side effects of low cooler flow, restricted converter feed and fluid overheat, Sonnax now offers a quick and easy drop-in solution: lube regulated pressure regulator valve **44912-17K**. This patent-pending valve has a direct connection from line pressure to lubrication that provides a better connection than the small undercut that is on the OE pressure regulator valve (**Figure 5**).

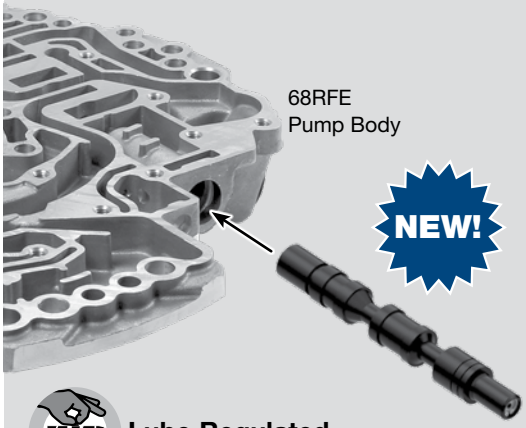
**Figure 5**





# Zip Valve™

**Best-in-class, drop-in repairs for common shift problems.**




**Lube Regulated Pressure Regulated Valve**

**Part No. 44912-17K**

**Fits 45/545RFE, 65-66-68RFE**

- Drop-in, hardcoat anodized aluminum valve combats premature wear
- Charges the converter/lube circuits at low RPM, especially important in 'tuned' vehicles
- Improves converter feed/lube oil flow at critical low RPM and high load conditions
- Redesigned valve prevents fluid drainback and slow engagements
- Annular grooves help center valve in bore to reduce side-load wear


The Sonnax valve provides a 60% increase from stock lubrication and cooler flow when at maximum line pressure. It also prevents converter drain back, as the passage that connects the two circuits closes when the vehicle is turned off. Converter drain back has been a complaint in the past as some shops have tried to remedy this low cooler flow issue by drilling line to lube in the pump casting.

Vacuum testing both the TC limit and PR valve bores in the pump is an ideal way to determine if valve or bore wear is the source of a transmission problem. See **Figure 1** for test locations and visit www.sonnax.com for detailed vacuum testing parameters or more information on these RFE parts. ◄

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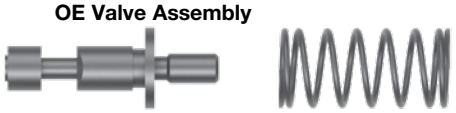
# GM Gen. 3 6T40 Drop-In Pump Repairs

## For 6T31, 6T35, 6T41, 6T46, 6T51 Units

## Unique New Lube-On-Demand Valve Renews Shift Feel & Performance

**OE Valve Assembly**



**Sonnax 144510-19K Valve Assembly**

In 2014 GM moved to Generation 3 on the 6T40 family, featuring a vastly different pump then previous generations:

- The pump moved to an off-axis, binary vane style design that reduces pump flow demands and torque requirements, aiding in better fuel economy.
- A lube-on-demand regulating valve was added to the pump, allowing cooler/lube flow to double when converter feed is above 87 psi. This highly active valve is a huge source of pump wear, opening a path for converter feed pressure to exhaust, resulting in converter apply issues, reduced line pressure and overheating.

Sonnax now offers lube-on-demand valve kit **144510-19K** — a unique, drop-in solution that maintains the integrity of the OE design of double-flow at increased pressure while mitigating any existing bore wear and preventing future pump casting degradation. Patent-pending components reroute fluid to a sleeved limit valve for proper cooler/lube flow, while an O-ring seals the path that previously allowed valuable converter feed pressure to exhaust.

# Zip Valve™

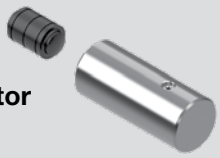
**Best-in-class, drop-in repairs for common shift problems.**

- 350+ offerings covering 200+ units
- Quickly address & correct the root cause of common complaints
- Easy-to-install components, with quality & performance that can't be beat
- Wide range of choices, from single valves to comprehensive Zip Kits


### Lube-on-Demand Valve Kit

**Part No. 144510-19K** *Patent Pending*

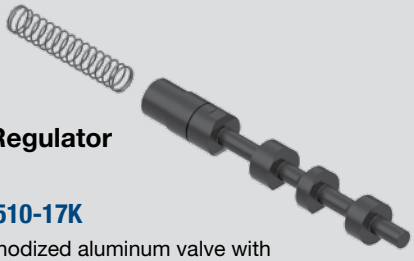
- Highly wear-resistant, billet sleeve seals bore from wear-related fluid loss and provides a new, unworn bore for the hardcoat anodized aluminum valve to operate within
- O-Ringed sleeve stops leaks without requiring reaming
- Drill and plug included to allow for quick rerouting of balance oil



### Pressure Regulator Isolator Valve Kit

**Part No. 144510-15K**

- Hardcoat anodized aluminum valve, with sleeve manufactured from highly wear-resistant aluminum
- Annular grooves help center valve in sleeve to reduce future side-load wear



### Pressure Regulator Valve Kit

**Part No. 144510-17K**

- Hardcoat anodized aluminum valve with extended valve lands guarantees better sealing at critical control areas
- Annular grooves help center valve in sleeve to reduce future side-load wear
- New, calibrated PR spring matches OE calibration

Tech Team **Shop Talk**

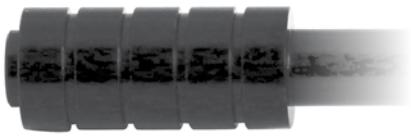
# Why Do I Drill the Pump?

## Preventing Excess Line Pressure with a Drop-In Sonnax 6L80 PR Valve

Here in the Sonnax Tech Center, we get a lot of calls about our drop-in 6L45/50/80/90 pressure regulator valve asking, "Can I install the valve without drilling into the pump?" and "Why do I need to drill?" The answer is simple: combined with the improved Sonnax valve, drilling ensures you're making an effective repair that keeps line pressure at OE specifications. Here's a little background about this valve to help shed more light on the situation.

During our research, we found several areas of the bore that commonly wear and need to be addressed. It is common for the balance end of the valve to wear into the casting, resulting in high line pressure, harsh shifts and overheating due to insufficient cooler/converter lube flow. We also found wear at the outboard spool causing the converter feed pressure to decrease, resulting in low line pressure. Wear at both ends of the valve causing both high and low line pressure unfortunately doesn't even out, and pressure can be erratic if both sides are worn badly enough.

During design of a drop-in PR valve, Sonnax engineers found it necessary to lengthen critical spools to increase stability and prevent future wear. Since fluid introduced into the bore under pressure can cause the valve to side load and increase bore wear, annular grooves were added to one end of the Sonnax valve to help the fluid surround the valve evenly. This centers the valve in the bore, preventing side loading and unnecessary wear.



After redesigning the valve, we needed to ensure the proper amount of balance oil was introduced back into the circuit to stay consistent with OE performance. That's what prompted the additional step of drilling a 45° hole through the adjacent channel: drilling provides balance oil to the valve while in regulating position. If the Sonnax valve is installed without drilling, the result will be excessively high line pressure.

This drop-in valve is available on its own and as part of a more comprehensive Zip Kit®. An oversized version also is available. If you are installing the Zip Kit and decide you don't want to drill, you shouldn't install the PR valve, but know that you will be missing out on addressing a common wear area that can contribute to a handful of problems.


***Andy Jessiman***

**Product Support Representative**

Contact the Sonnax Tech Team
Mon – Fri, 8:30 a.m. to 5 p.m. ET

- Call **(800) 843-2600, Ext. 398**
- Use the "Contact Us" form at www.sonnax.com
- Send an email to sonnaxtechsupport@sonnax.com


Here is a breakdown of the Sonnax pressure regulator valve repair options for 6L45/50/80/90 units:

**Pressure Regulator Valve Kit**
**Part No. 104520-14K**
Valve, spring, drill bit & checkballs

**Zip Kit®**
**Part No. 6L45-6L90-ZIP**
Valve, drill bit & checkballs plus other drop-in components

**Oversized PR & Boost Valve Kit**
**Part No. 104520-07K**
Oversized valve, spring, drill bit, checkballs & boost valve/sleeve assembly; requires F-104520-TL7C, VB-FIX & VB-06

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sonnax® PERFORMANCE

faster | tougher | stronger

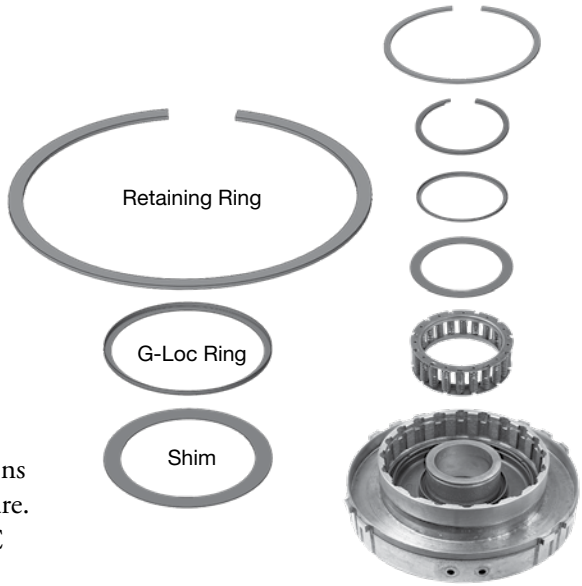
# RFE 4C Retaining Ring & Shim Kit

NEW!

**Part No. 72978-01K** **Fits Chrysler 45/545RFE, 65-66-68RFE**

- **Prevents 4C return spring retaining ring from popping off**
- **Offers more options when setting clutch clearance**
- **Improves 4C to OD shift timing when more aggressive, quicker applying OD clutch packs are used**

The 4C return spring retaining ring in Chrysler RFE series transmissions is known to come unseated and pop off, resulting in transmission failure. This new Sonnax kit includes three crucial pieces for setting up the 4C clutch: .078" thick retaining ring, G-Loc ring and shim.



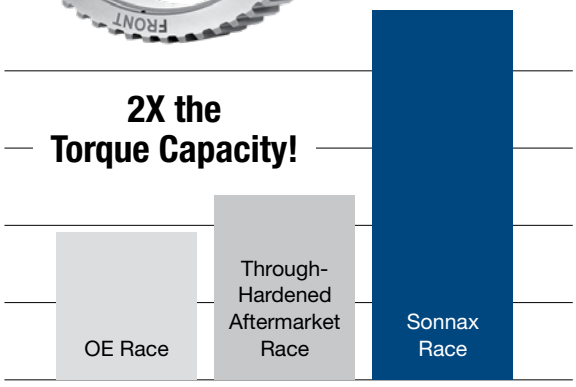

# TH350/350C Heavy Duty Intermediate Overrun Clutch Outer Race

**Part No. 35723HD-02**


- **DOUBLE the torque capacity of OE or other aftermarket races**
- **Improved design significantly reduces risk of fracture at lube holes and splines**
- **Case-hardened steel alloy outperforms brittle, hardened aftermarket races**
- **Direct replacement race reduces need for expensive sprag conversions**

A revolutionary upgrade for both performance and heavy-duty vehicles, this upgraded Sonnax race is the best option available for any power level. This new race has replaced the discontinued **35723HD-01** version previously available from Sonnax.

**TECH VIDEO**
Learn more and see races torque tested at www.sonnax.com!




**Torque Capacity Comparison**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Plan your killer build with the industry's most comprehensive Powerglide product guide! Volume 3 of this classic Sonnax catalog puts all the latest parts at your fingertips and makes a great tool for explaining build options to customers.

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# 48RE Heavy Duty Forward (Rear) Clutch Retainer

NEW!

**Part No. 22554-HD** **Fits Chrysler 46RH/RE, 47RH/RE, 48RE, A727**

- **Made of high-strength 4140 billet steel**
- **Prevents transmission failure due to retainer cracks and wear**

OE Forward (rear) clutch retainers are made of cast material and commonly fail due to cracks and wear, especially in applications with increased power and/or towing loads. The Sonnax retainer is made from high-strength 4140 steel to prevent these problems. It is a direct replacement for OE part number 52854149AA used in Chrysler 46RH/RE, 47RH/RE and 48RE applications. It can also be used to service older applications, including the A727.

Pair with a Sonnax heavy duty input shaft for max durability!

# 4L80-E, TH400 Case Saver Retainers

NEW!

## Allows the Intermediate Band to be Retained

- **Protects case lugs from blow out**
- **Salvages cases with one or two blown lugs**
- **Use with or without intermediate band**

There have been a variety of case saver designs over the years, however, all require eliminating the intermediate band as is often done in drag racing trans-brake applications.

Only the Sonnax case saver retainer supports the intermediate clutch retaining ring, yet is thin enough to allow the intermediate band to be installed, allowing case lug protection in all applications. The retainer fits over the intermediate band anchor lug inside the case and extends rearward to support the intermediate clutch backing plate retaining ring, preventing case lug blow out.

**Part No. 34762-20**
**Fits '99-Later 4L80-E**

**Part No. 34762-10**
**Fits TH400 & '98-Earlier 4L80-E**

# Adapter Flange Yokes

NEW!

## Upgrade Ford Super Duty Driveshafts

- **Reduce driveshaft rotating weight without sacrificing strength**
- **Precision-machined from 6061-T6 aluminum for excellent fit and balance**
- **Show-quality components upgrade OE or custom driveshafts**

These yokes designed for '05–'16 Ford F-250, F-350, F-450 and F-550 Super Duty are custom parts and may fit other vehicles. Ask your driveshaft builder to spec out a build by measuring flange O.D., output flange bolt hole and bolt circle diameters.


**Rear Flange Yoke** **Part No. T3-2-1869**
Connects to differential pinion yoke.

**Front Flange Yoke** **Part No. T3-2-1719**
Connects to transmission output.

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# Transmission Report

Volume 12, No. 1 March 2021

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## Featured in this Issue



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Sonnax is an industry leader in the cutting edge design, manufacture and distribution of the highest quality products to the automotive aftermarket, commercial vehicle industries, and industrial sectors utilizing drivetrain technology.

# Tooling Up to Repair GM & Chrysler Units?

**www.sonnax.com/tool-shop**

## Find Great Deals in the Sonnax Tool Shop!

- **LOW MSRP prices on 70+ popular F-tool & vacuum testing products**
- **1–2 DAY DELIVERY in the U.S. or Canada**

Through customer feedback, we heard you loud and clear: some Sonnax tools have been hard to get, and the prices were too high. We brought your concerns to our distributor partners and worked together to build the Sonnax Tool Shop.

The prices shown here are the price you pay at all participating distributors. Tools are in-stock, ready to ship so you can turn jobs around fast.

Contact your distributor today and visit www.sonnax.com/tool-shop to see dozens more products!

| | Tool | Required By | Part Number | MSRP |
|---|---|---|---|---|
| CHRYSLER | 40-41-62TE, 40-41TES, 41AE, 42LE/RLE, 45/545RFE, 65-66-68RFE | | | |
| | BORE SIZING TOOL | | 92835-BST | $192.02 |
| | 40-41-62TE, 40-41TES, 41AE, 42LE/RLE, 45/545RFE, 68RFE | | | |
| | TOOL KIT | Oversized Solenoid Switch Valve & Plug Kit 92835-32K | F-92835-TL32 | $220.81 |
| | 40-41TE, 40-41TES, 41AE, 42LE/RLE, 45/545RFE, 66-68RFE | | | |
| | BORE SIZING TOOL | | 92835-BST2 | $171.43 |
| | TOOL KIT | Oversized Solenoid Switch Valve & Plug Kit 92835-31K | F-92835-TL31 | $256.49 |
| | 41-62TE, 42LE/RLE, 45/545RFE, 68RFE | | | |
| | TOOL KITS | Oversized Solenoid Switch Valve 92835-21 | F-92835-TL | $191.01 |
| | | Oversized Solenoid Switch Valve Plug Kit 92835-18K | F-92835-TL18 | $199.32 |
| | 45/545RFE, 65-66-68RFE | | | |
| | TOOL KITS | TC Limit Valve Kit 44912-03K | F-44912-TL | $283.27 |
| | | Oversized Lube Regulated PR Valve Kit 44912-15K<br>Oversized PR Valve Kit 44912-10K | F-44912-TL10 | $379.39 |
| | | Oversized TCC Switch Valve Kit 44912-08K | F-44912-TL8 | $221.42 |
| GM | 6L45, 6L50, 6L80, 6L90 | | | |
| | TOOL KITS | Oversized Converter Feed Limit Valve 104520-11 | F-104520-TL11C | $273.13 |
| | | Oversized PR & Boost Valve Kit 104520-07K | F-104520-TL7C | $300.71 |
| | | Oversized Clutch Boost Valve 104740-01 | F-104740-TL | $180.10 |
| | | Oversized TCC Regulator Valve Kit 104740-07K | F-104740-TL7 | $199.35 |
| | VACUUM TEST PLATE KIT | | 104740-VTP | $241.86 |