

## Transmission Report

Volume 6, No. 2

June 2015

### Learn LIVE with Sonnax!

Hundreds of rebuilders joined Sonnax in March for the launch of a FREE webinar series with Tech Specialist Steve Garrett. Big thanks to everyone who attended the sessions on GM Gen. 1 6T40/45/50 units! The next event on June 16 and 17 will take an in-depth look at GM Gen. 1 6T70/75/80 and Ford 6F50/55 units. Register today to reserve a spot in any of the five scheduled sessions.

### Catch Up with Past Webinars Online

Can't make it to the live event? No problem! The recorded presentation and slides are posted online after the final session.

If you've got Gen. 1 6T40/45/50 units in the shop, check out the recent webinar's coverage of:

- Hydraulic systems
- Generational differences/identification
- Pressure switch functions
- Valve/Pump body diagnostics

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- Register for upcoming webinars
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## 5R110W Pump Problems & Variations

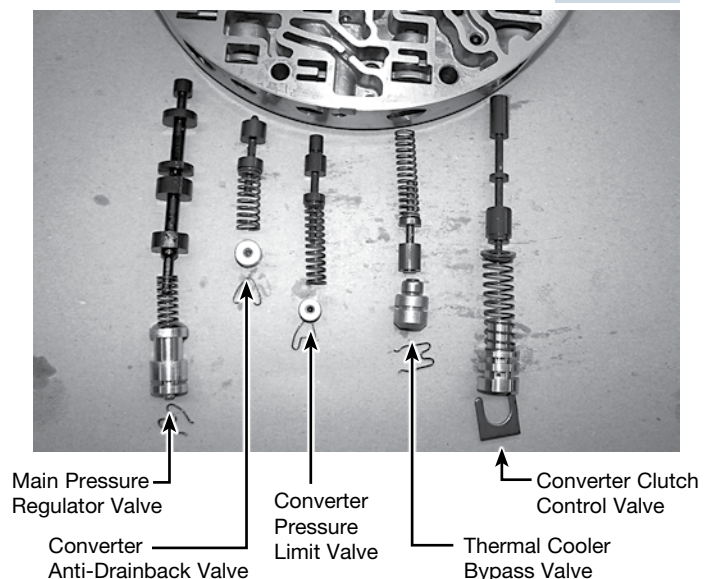
The Ford 5R110W transmission was put into production in 2003 for heavy-duty applications. The hydraulics of this transmission are quite different from others in the Ford product line, as there is only one valve in the solenoid/valve body located in the oil pan. The valve's function is to direct oil to the Park-Reverse-Forward and manual ranges.

The solenoids for clutch and brake control in this transmission are in charge of directing oil to the individual clutches and brakes via a small spool valve in the snout of the solenoid. This type of hydraulic shift control requires precise electronic control for good shift quality and timing. The ramp-up of a solenoid to bring on a component must be timed with the ramp-down of another solenoid to prevent clutch overlap problems.

The solenoids for pressure control and torque converter clutch control are housed with the other solenoids, but they control the pressure regulator and the torque converter clutch via control valves located in the pump housing (**Figure 1**).

*Continued on page 2...*

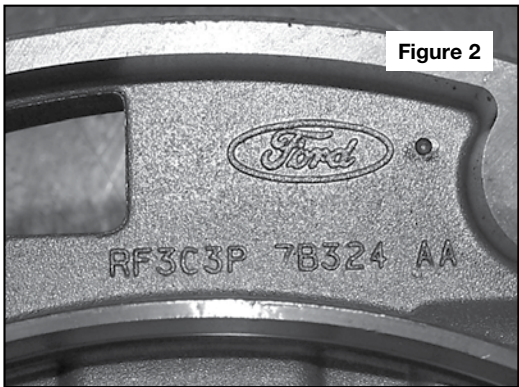
Figure 1



Valves Located in the 5R110W Oil Pump

Continued from page 1

ID Location	Possible IDs	Pump Generation
Front of pump body and rear of pump cover.	RF3C3P-7B324-AA RF3C3P-7B324-AB	Gen. 1
Directly above casting number on rear of pump cover.	Al11Si3Cu	Gen. 2 & 3
Front of pump body and rear of pump cover.	RF5C3P-7B324-AA RF5C3P-7B324-AB RF5C3P-7B324-AC	Gen. 2 & 3
Near pump body bolt circle.	9C3P-7A103-AC	Gen. 3



Gen. 1 Pump Body & Cover ID Location

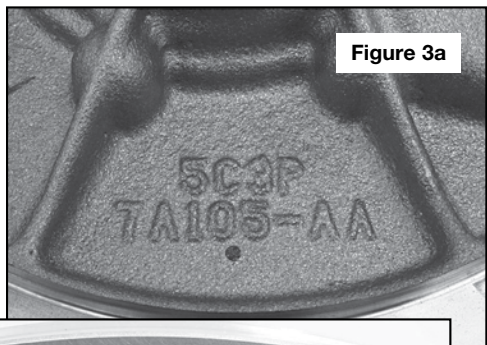


Figure 3a

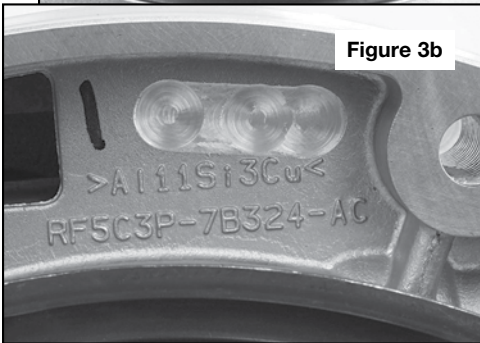


Figure 3b

Gen. 2 & 3 Pump Body & Cover ID Locations



Figure 4

Gen. 3 Pump ID Location

## Three Generations of 5R110W Pumps

Issues with the control valves in the 5R110W led to three different generations of this pump being produced since its inception in 2003. The changes, features and IDs between the different generations are subtle and sometimes overlooked.

- **Gen. 1** has these casting numbers on the front of the pump body and the rear of the pump cover: **RF3C3P-7B324-AA** or **-AB** (Figure 2).
- **Gen. 2** has these casting numbers on the front of the pump body and the rear of the pump cover: **5C3P 7A105-AA** and **RF5C3P-7B324-AA, -AB** or **-AC**. Directly above the casting number on the rear of the cover is another ID: **Al11Si3Cu** (Figures 3a and 3b).
- **Gen. 3** has identical casting numbers as the Gen. 2 on the front of the pump body and directly above the casting number on the rear of the cover. Look for an additional ID on the Gen. 3 pump body to tell these two generations apart. Gen. 3, 2008-later models without an external cooler filter with bypass have a **9C3P-7A103-AC** number near the bolt circle (Figure 4).

## 5R110W Pump Changes

The Gen. 1 pump found in 2003 and 2004 5R110W transmissions was redesigned for 2005-later units. One reason for the change was low pressure, and one area of concern was related to the main pressure regulator valve. In Gen. 2, the design of the valve was updated and the casting of the pump cover made stronger and more resistant to wear.

## Gen. 2 & 3 Material Changes

The **Al11Si3Cu** ID on the Gen. 2 and 3 pump covers indicates the changes made in its material.

- “Al” is the chemical symbol for Aluminum in the periodic table of elements.
- “Si” is the symbol for silicon, and the number before the symbol indicates the percentage of material present (in this case, 11%).
- “Cu” is the symbol for copper, which the casting ID shows as 3% of the cover material.

What does this material makeup mean? Copper bearing alloys typically are used in medium- to high-strength aluminum castings where corrosion resistance is not critical and the pump cover is inside the transmission in an oil bath. Copper-free alloys are used for low- to medium-strength castings.

The amount of copper in a casting ranges from 0–5%. When it comes to silicon, increasing the percentage of material increases hardness and wear resistance. The amount of silicon in a casting ranges from 5–25%. By comparison, a cast piston may have a maximum amount of 22–24%, and we know what kind of stress pistons are under. So the indication of particle percentages on Gen. 2 and 3 pump covers is significant, especially if Ford took on the expense of casting such an ID into the pump cover.

## Gen. 3 Design Change

The Gen. 3 pump found in the 2008-later units was redesigned to eliminate the external cooler filter and bypass assembly. A notch was cut in the pump cover for these versions to prevent low diode failure due to lack of lubrication when vehicles operate in  $-35^{\circ}$  F temperatures (**Figure 5**).

## Save Time & Money with Effective 5R110W Pump Repairs

To service all three generations of the 5R110W pump, Sonnax offers oversized pressure regulator valve kit **36940-03K** and tool kit **F-36940-TL3** (**Figure 6**). The increased silicon and copper percentages in 2nd and 3rd generation pumps will quickly wear out the standard reamer in this tool kit, so Sonnax highly recommends using alternative carbide reamer **F-36940-RM3C**. This tool is available as stand-alone reamer for use with the jig and guide pin from **F-36940-TL3**, or as part of complete tool kit **F-36940-TL3C**.

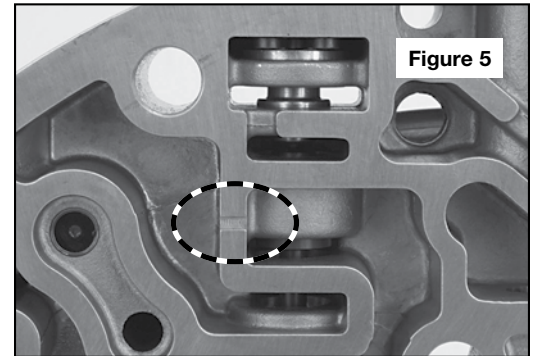
While the carbide reamer is generally twice the cost of the standard reamer, the life expectancy when used in the harder pumps will far exceed that of the standard reamer, making it much more economical per pump repair in the long run.

All tooling options require the use of the patented **VB-FIX** reaming fixture and oversized pump base plate **VB-06**. There also is a modified plate and reaming setup for these pumps available from ATS (Automatic Transmission Service in Janesville, Wis.) that is designed to flow cutting lubricant and support the pump (**Figure 7**).

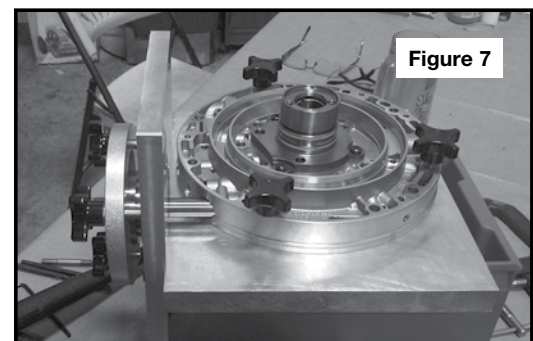
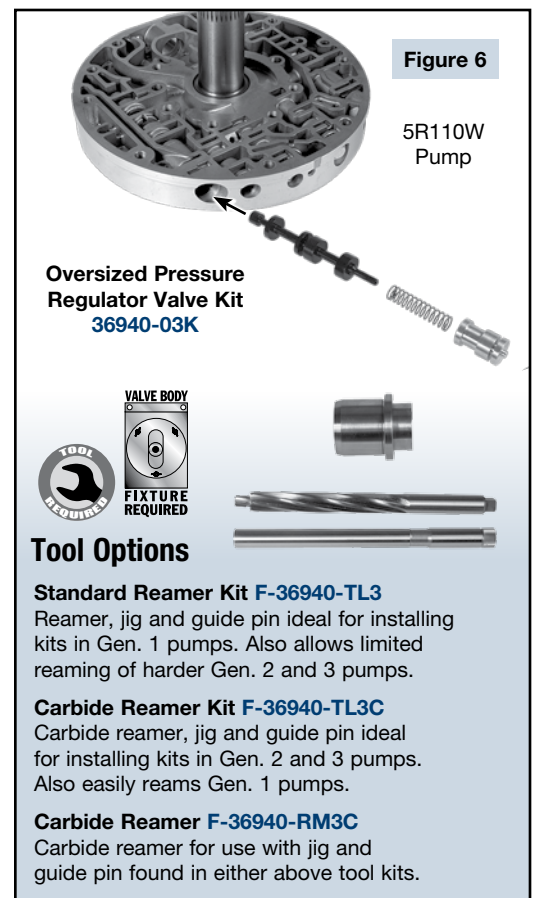
Low pressure is not the only problem area with 5R110W pumps, there also are torque converter clutch-related problems. Common issues include torque converter slip/cycling and diagnostic trouble code P0741, as well as transmission fluid overheat conditions paired with a P1783 diagnostic trouble code. These problems can be related to wear in the TCC control plunger and sleeve, as they are fed regulated converter apply pressure. A loss of this apply pressure can cause TCC slip and cycling. Sonnax offers TCC control plunger valve kit **36940-01K** to restore proper hydraulic clearances in worn sleeves. No reaming is required to install this repair.

The 5R110W converter pressure limit valve also is related to torque converter application problems, especially if the clutch application is extremely harsh or too soft. These extreme pressures commonly cause TCC lining failure. To recover control and renew TCC performance, Sonnax offers converter pressure limit valve kit **36940-06K**. No reaming is required to install this repair. This kit only works in '05-later Torqshift units and *cannot* be used to replace OE valves with .402" dia. balance spools. Visit the part page at [www.sonnax.com](http://www.sonnax.com) for details on verifying Sonnax kit fitment.

In closing, it is always best to know the differences and variations in parts. Small details can change and easily be missed, which can cost you time and money.



Gen. 3 Pump Cover Notch



Modified Plate & Reaming Setup

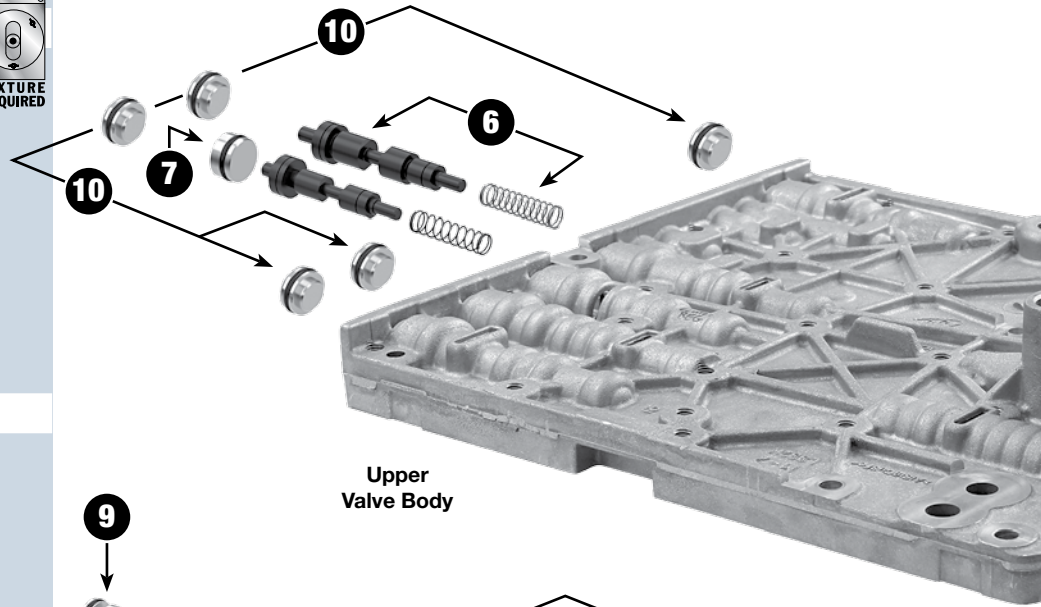
### 1 126740-15K

#### Oversized TCC Apply Regulator & Boost Valve Kit

Helps cure:

- No lockup
- TCC codes
- TCC slip/cycling

**Note:** Requires tool kit F-126740-TL15 & the VB-FIX reaming fixture.



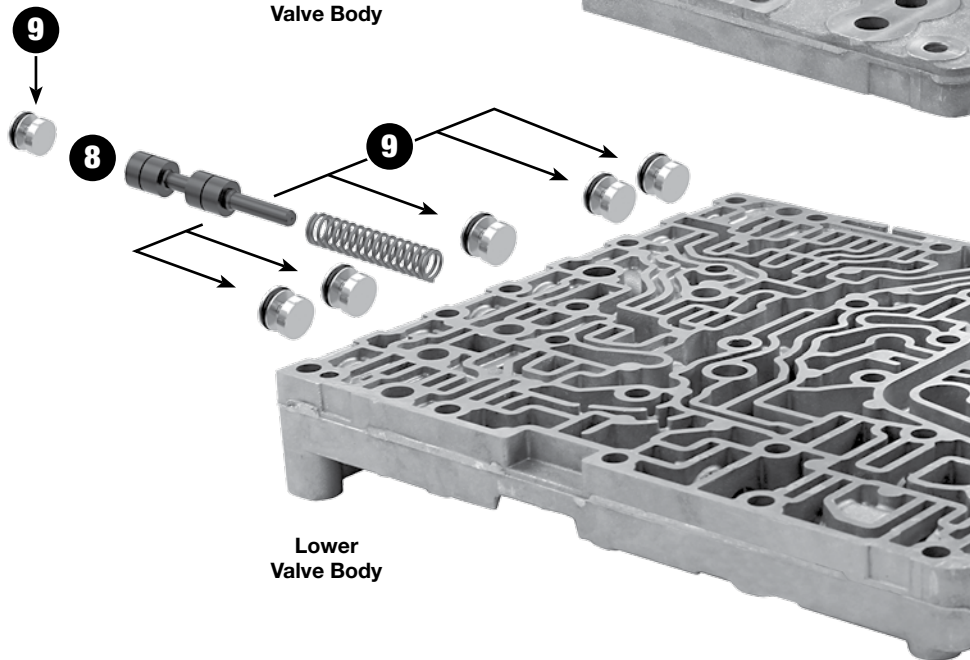
Upper Valve Body

### 2 126740-03K

#### TCC Apply Boost Valve Kit

Helps cure:

- No lockup
- TCC codes
- TCC slip/cycling



Lower Valve Body

### 3 126740-19K

#### Oversized Converter Limit Valve Kit

Helps cure:

- TCC apply/release concerns
- TCC codes
- Excess TCC slip

**Note:** Requires tool kit F-126740-TL19 & the VB-FIX reaming fixture.



### 4 126740-01K

#### Oversized TCC Charge Limit Valve Kit

Helps cure:

- High/Low TCC release pressure
- No TCC release
- TCC lining failure

**Note:** Requires tool kit F-126740-TL & the VB-FIX reaming fixture.



### 5 126740-08K

#### Oversized Line Pressure Control Valve Kit

Helps cure:

- Burnt clutches
- Erratic line pressure
- Poor shift quality

**Note:** Requires tool kit F-126740-TL8 & the VB-FIX reaming fixture.



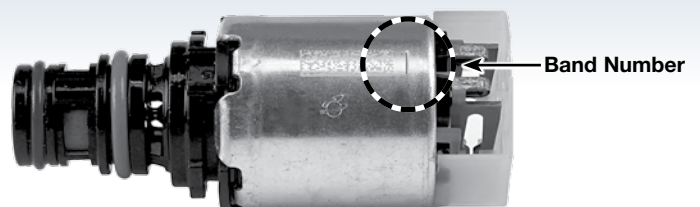
## NEW for 2015

### Direct Replacement Solenoids



Band number of Sonnax solenoid **MUST** match that of OE solenoid, or shift calibration concerns will result.

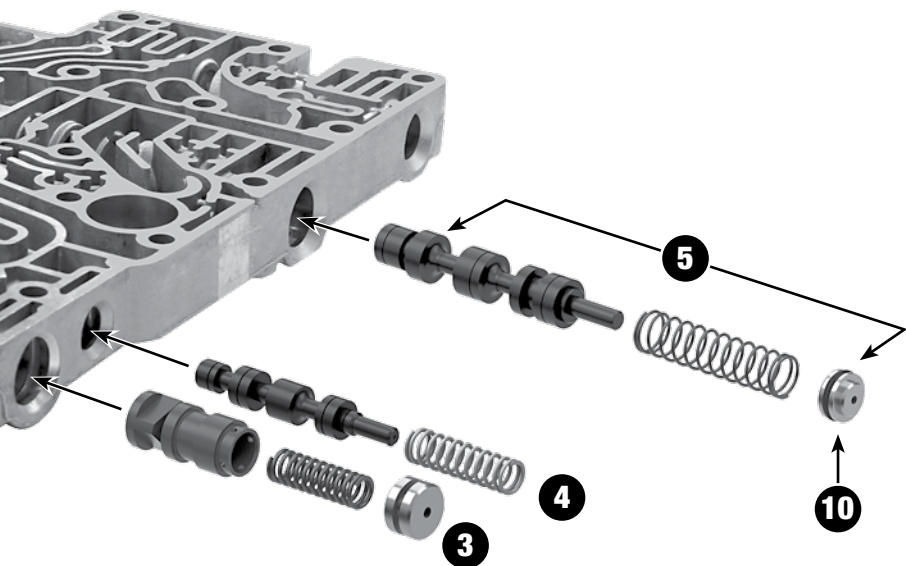
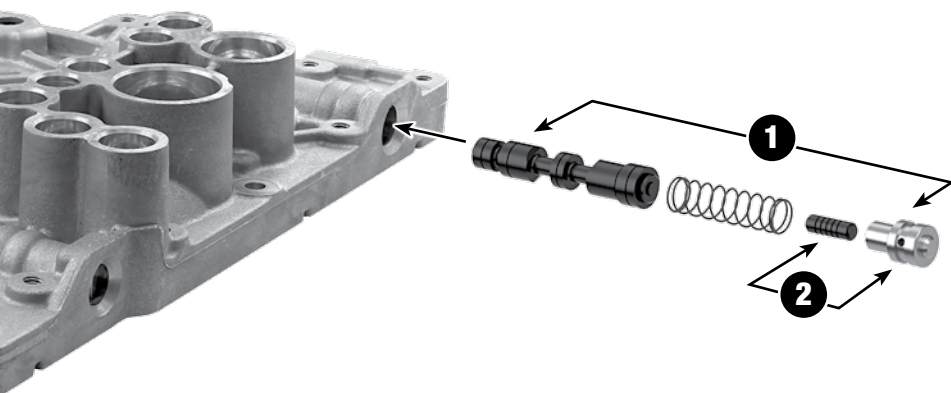
See website for details on solenoid locations and control functions.





## View All Parts

Scan code for a complete listing of Sonnax Ford 6R140 products.



Solenoid Type	Band ID/Location	Part No.
NH (Normally High)	Band #1, fits any of three locations.	<b>126421-NHJ</b>
	Band #2, fits any of three locations.	<b>126422-NHK</b>
	Band #5, fits any of three locations.	<b>126425-NHN</b>
NL (Normally Low)	Band #1, fits any of four locations.	<b>126421-NLR</b>
	Band #5, fits any of four locations.	<b>126425-NLV</b>

### 6 126740-11K

#### Oversized Direct Clutch Regulator Valve

Helps cure:

- 2-3/4-5 Flare
- Slips in Reverse
- Delayed Reverse

**Note:** Requires tool kit **F-126740-TL11** & the **VB-FIX** reaming fixture.



### 7 126740-13K

#### Oversized Forward Clutch Regulator Valve Kit

Helps cure:

- Burnt Forward clutch
- Delayed engagement
- Harsh shifts

**Note:** Requires tool kit **F-126740-TL13** & the **VB-FIX** reaming fixture.



### 8 126740-06K

#### Oversized Forward Clutch Latch Valve Kit

Helps cure:

- Burnt Forward clutch
- Delayed engagement
- Harsh shifts

**Note:** Requires tool kit **F-126740-TL6** & the **VB-FIX** reaming fixture.



### 9 126740-05K Fits 6 Locations

#### Internal O-Ringed End Plug Kit

Helps cure:

- Burnt clutches
- Flare shifts
- Harsh/Soft shifts

### 10 126740-09K Fits 6 Locations

#### O-Ringed End Plug Kit

Helps cure:

- Burnt clutches
- Flare shifts
- Harsh/Soft shifts

## Reaming Update: Chrysler Solenoid Switch Valve & Plug Kits

One of the more prevalent Sonnax product support phone calls revolves around the Chrysler switch valve and plug bore, and how to salvage the valve body by addressing bore wear with available Sonnax tools. This has been a long, strange trip – especially for the .420" dia. spool version, for which Sonnax offers multiple kit and reaming options. We took a much more straightforward approach on the .453" dia. valve, which we have now duplicated on the .420" version to better serve builders.

Previously on the .420" version, a specific reaming sequence was required to avoid casting scrapage. If the (outer) switch valve plug portion of the bore required reaming, it had to be reamed first using either **F-92835-TL18** with the patented **VB-FIX** reaming fixture or by using bench tool kit **92835-RM**. After that, excess wear at the (inner) solenoid switch valve portion of the bore could be addressed using **F-92835-TL** with the **VB-FIX**. This paves the way for installing oversized solenoid switch valve **92835-21** and oversized plug kit **92835-18K**.

If the (inner) switch valve bore was accidentally reamed first, the bore would not be the right size to guide the reamer used for the (outer) plug portion of the bore, so any wear at the plug bore section could not be addressed. Since the outer portion of the bore typically wears faster than the inner portion, this results in a scrapped casting.

The Sonnax approach with the .453" dia. setup does not have this reaming sequencing issue. If only the (outer) plug bore portion is worn, simply use reamer **92835-RM22** to recondition the bore, then install oversized plug kit **92835-22K**. If wear at both the (outer) plug section and (inner) switch valve bore section is noted, use reamer tool kit **F-92835-TL31** in conjunction with the **VB-FIX**, then install oversized solenoid switch valve and plug kit **92835-31K**. Much easier!

A similar system has recently been developed for the .420" dia. version. If wear at both the plug bore and switch valve bore is noted, use new reaming tool kit **F-92835-TL32** with the **VB-FIX**, then install oversized solenoid switch valve and plug kit **92835-32K** (Figure 1).

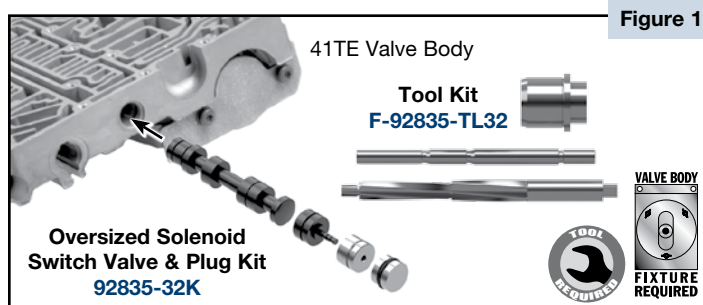


Figure 1

### Chrysler Valve Repair Options



OE valve size is the critical determining factor for proper fitment! Measure large spool diameter on OE switch valve to verify which Sonnax part will fit the unit being repaired (Figure 2). Visit [www.sonnax.com](http://www.sonnax.com) for application details.

Standard-size kits address low to moderate bore wear.  
Oversize kits address excessive bore wear.

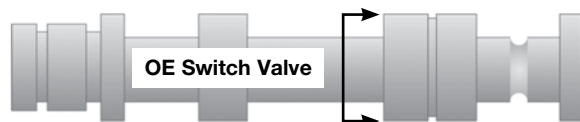


Figure 2

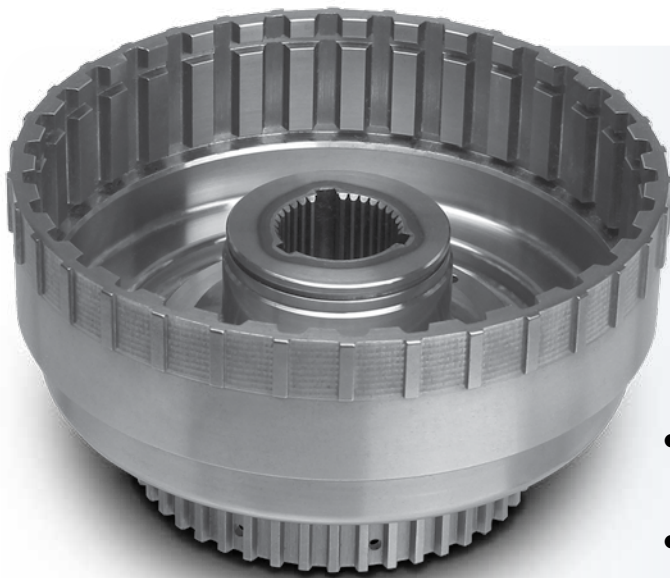
Part	OE Large Spool Dia.	Part No.	Tool Required
Oversized Solenoid Switch Valve	.420"	92835-21	F-92835-TL & VB-FIX
Oversized Solenoid Switch Valve Plug Kit		92835-18K	F-92835-TL18 & VB-FIX or 92835-RM
Oversized Solenoid Switch Valve & Plug Kit		92835-32K	F-92835-TL32 & VB-FIX
Solenoid Switch Valve Plug Kit		92835-02K	None
Oversized Solenoid Switch Valve & Plug Kit	.453"	92835-31K	F-92835-TL31 & VB-FIX
Oversized Solenoid Switch Valve Plug Kit		92835-22K	92835-RM22

Patent No. 7,001,300 applies to all kits listed here except 92835-21.

## Problem...

A common failure of the Ford 4R70W series transmission is breakage of the forward drum at the snap ring groove.

Pressure on the forward clutch piston creates a high stress load at the snap ring groove, causing the upper portion of the drum to split and break away.



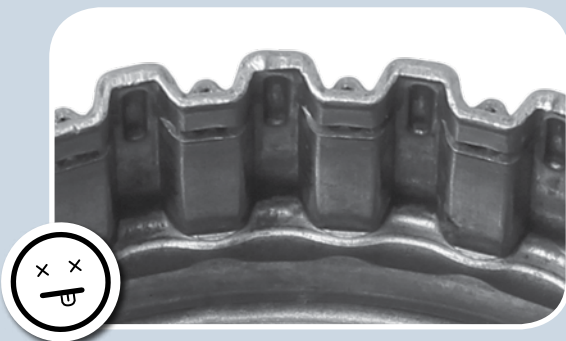
Part No. **76654-01K**  
Patent Pending

## ...Solution! 4R70W Smart-Tech® Forward Clutch Drum

- One-piece forged material for more strength and durability
- Increased groove depth for additional ring support

The Sonnax forged forward clutch drum design provides increased strength in all areas, most importantly at the ring groove, preventing the breakage and resulting transmission damage associated with OE stamped steel drums.

### OE Drum



Check out the new video at [www.sonnax.com](http://www.sonnax.com) to get a closer look at how key Smart-Tech® drum features prevent 4R70E/W and 4R75E/W failures!

### Smart-Tech® Drum



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## Transmission Report

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### Featured in this Issue

**5R110W Pump Problems & ID**

**Ford 6R140 Valve Body Repairs**

**Chrysler Switch Valve Reaming 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**



### Concerns & Repair Techniques:

## GM Gen. 1 6T70/75/80, Ford 6F50/55

- Hydraulic Systems
- Pressure Switch Functions
- Gen. 1 & 2 Differences & ID Tips
- Valve Body & Pump Diagnostics



Choose from any noon session\* with Sonnax Tech Specialist Steve Garrett:

- **June 16 EDT, MDT**
- **June 17 CDT, PDT**

\*A 7 a.m. Australia/Sydney (AEST) session on June 16 also is open for registration.

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