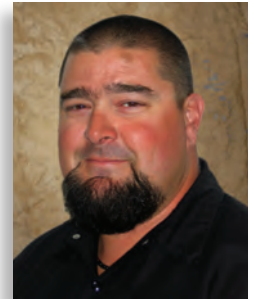


6R140

Overview...

It's the Real Deal



by Lance Wiggins
members.atra.com

Ford's 6R140 TorqShift transmission was designed to compete directly with the Allison, GM 6L80, and other 6-speed, heavy duty applications (figure 1). Ford is diligently moving forward in their use of the Lepelletier-style powerflow. Proven to work in the smaller applications, Ford pushed the boundaries a little further.

We've talked about the Torqshift in other articles but this time we're going to take a closer look at its key features.

A benefit of the Lepelletier powerflow is how it reduces the number of gearset and clutch connections to a minimum. The six speeds require only five clutches, and the speeds of the clutches relative to one another are low, increasing the system's efficiency.

The 6.7-liter Power Stroke, V-8, turbocharged diesel will run anywhere from 735-800 lb-ft of torque at 1600 RPM and an estimated horsepower of 390-400 HP at 2800 RPM. To handle all that power, Ford had to strengthen their transmission by beefing up the Ravigneaux planetary gearset compared to the 6R60 (figure 2).

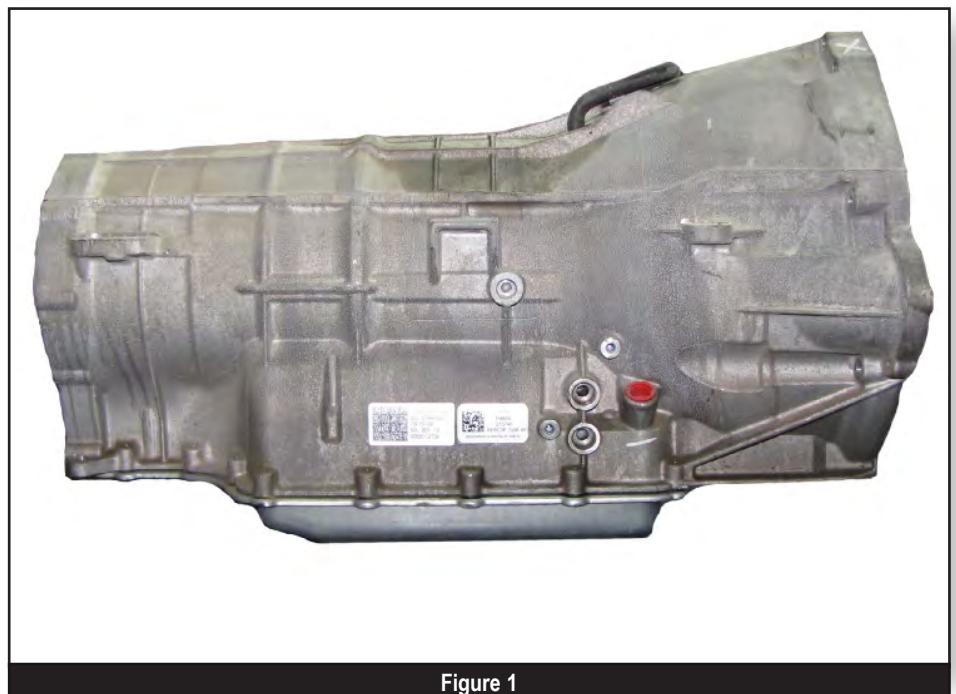


Figure 1

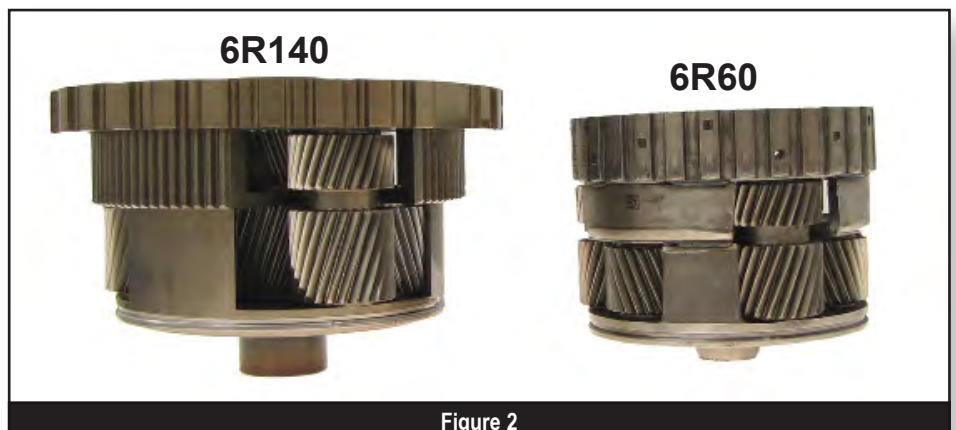


Figure 2



Figure 3



Figure 4

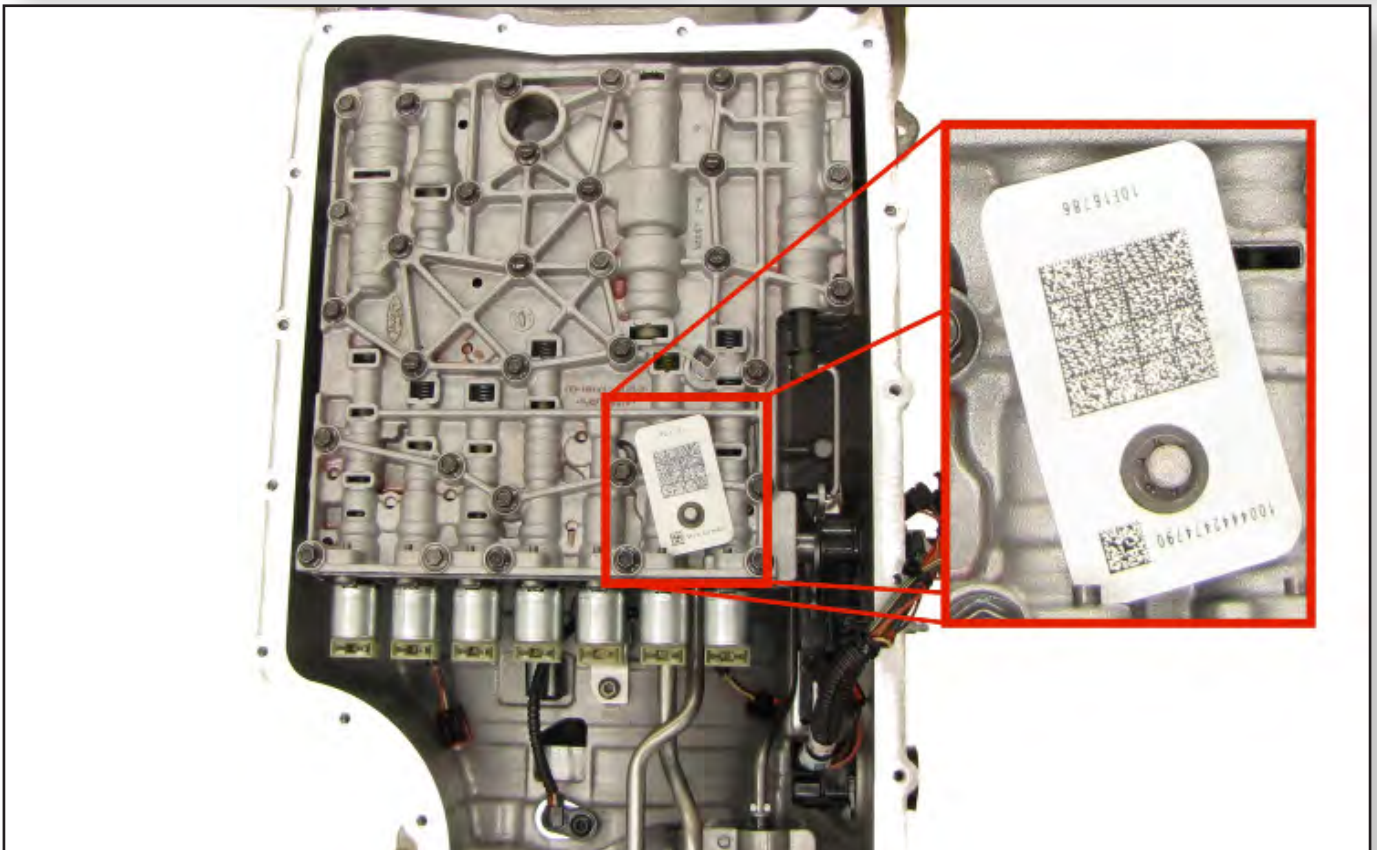


Figure 5

A Ford-patented, rocker one-way clutch is integrated in the carrier to improve 1-2 shift quality through the gearset (figure 3).

The ratios for the 6R140 are:

- 3.97:1 for 1st
- 2.32:1 for 2nd
- 1.52:1 for 3rd
- 1.15:1 for 4th
- 0.86:1 for 5th
- 0.67: 1 for 6th
- 3.13:1 for reverse

The two overdrive gears create a shorter ratio. This, combined with

different available rear axle ratios, gives the Torqshift the pulling power it needs. Let's take a closer look at the internals and how they operate.

The solenoid body strategy is programmed into the PCM or TCM to control the shift, Line Pressure Control (LPC), and TCC solenoids to improve shift quality. The solenoid body tag on the transmission case contains the 13-digit solenoid body strategy and the 8-digit solenoid body identification.

Any time you install a new valve body, you'll need to reprogram the

PCM or TCM with a new solenoid body strategy. A replacement solenoid body tag is supplied with each new solenoid body, which contains the 13-digit solenoid body strategy and the 8-digit solenoid body identification (figure 4 and 5). Place the new tag over the original solenoid body tag.

If the solenoid body strategy printed on the tag doesn't match the solenoid body tag on the side of the transmission case, you'll need to reprogram the PCM or TCM with the correct solenoid body strategy, or you could

end up with erratic shifts.

The valve body consists of a valve body assembly with solenoids and is controlled by a PCM for gas engine applications and a Transmission Control Module (TCM) for diesel engine applications. The PCM or TCM operates the electrical components to provide refined engagement feel, shift feel, and shift scheduling.

In the event of a failsafe, the PCM or TCM defaults to park, reverse, neutral, and 5th gear with TCC unlocked as the only available gears. You still have a manual 1st and manual 2nd operation and when the shifter is engaged in the overdrive position 5th gear. With SSB, SSE, and the LPC solenoid being normally high solenoids, the unit defaults to 5th gear with full line pressure whenever there's no current to the transmission.

The solenoids are calibrated from the factory and aren't all the same. There are two types of solenoids: normally high and normally low.

You can replace the solenoids separately, but only with the same type of solenoid. The replacement solenoid band number must match the band

number of the solenoid being replaced. The band number is printed on the side of the solenoid and will be a 2, 3, 4, or 5 (figure 6).



Figure 6



Solenoid Description	
1	Shift Solenoid E (SSE) Overdrive Clutch (4,5,6) Clutch, Normally Open
2	Shift Solenoid C (SSC) Intermediate (2,6) Clutch, Normally Closed
3	Shift Solenoid A (SSA) Forward (1,2,3,4) Clutch, Normally Closed
4	Shift Solenoid B (SSB) Direct (3,5,R) Clutch, Normally Open
5	Torque Converter Clutch (TCC) Solenoid, Normally Closed
6	Line Pressure Control (LPC) Solenoid, Normally Open
7	Shift Solenoid D (SSD) Low/Reverse (L,R) Clutch, Normally Closed

Figure 7

BorgWarner Transmission Systems

Aftermarket Products

BorgWarner transmission products are manufactured to rigid OEM specifications for the automakers themselves, so the chances for defects or comebacks in your rebuilds are virtually impossible. On your shop's next order, specify BorgWarner for improved fuel economy, reduced emissions and enhanced performance.



Friction Plates, Transmission Bands, One-Way Clutches

In Stock and Ready to Ship

BorgWarner has available for your transmission shop virtually every part we manufacture for the world's leading vehicle makers. We carry hundreds of domestic, import, and high performance, OEM quality products for more than eighty transmissions world-wide.

Our systems and components are:

- Competitively priced
- Readily available
- Guaranteed to fit your rebuilds

For uncompromised reliability, call your authorized distributor today and ask for BorgWarner parts from the global leader in transmission systems technology.



Torque Converter Friction Facings



Sprag and Roller Clutches



Electronic Transmission Solenoids

BorgWarner Inc.
Transmission Systems
1350 N. Greenbriar Drive, Suite B
Addison, IL 60101
(630) 261-9980
www.borgwarner.com

 **BorgWarner**

feel good about driving

Always use a scribe or etching machine to mark the solenoids during disassembly. This will make it easy to return the solenoids to their proper locations during reassembly (figure 7).

Outside the transmission there are only three external controls:

- Brake Shift Interlock System
- Transmission Control Switch (TCS)
- Select Shift Transmission (SST) Switch

The Brake Shift Interlock system prevents the selector from moving out of park without applying the brakes. The system consists of a Brake Shift Interlock Actuator (BSIA) located on the lower right side of the steering column. When you turn the ignition on and the selector is in park, the BSIA is de-energized, and holds the selector in park. When you apply the brakes, the BSIA energizes, allowing you to move the shifter lever out of park.

The Transmission Control Switch (TCS) is a momentary contact switch located on the end of the selector lever. Nothing new here; they've had a switch



Figure 8

like this since 1989. The difference is the TCS isn't an overdrive cancel switch; it's a Tow/Haul switch.

Tow/Haul raises the shift points to take full advantage of engine power. It also changes the downshifts when going down hills and will take advantage of engine braking to help slow the vehicle.

The Select Shift Transmission

(SST) Switch (figure 8) is located on the selector lever. When the selector lever is in the D position the select shift transmission allows the driver to progressively lock out overdrive gears but keeps the transmission shifting automatically through lower gears.

When towing in busy traffic or hilly areas, this prevents the transmission from shift hunting when loads

The curves in the road of life don't need to be dangerous...

When you travel with H&A, the options are unlimited just like our warranty

- Nationwide Unlimited Mileage Warranties
- Four Distribution Locations (NY, CA, TN, IL)
- Multiple Warranty Options Available
- Units In Stock & Ready To Ship
- Friendly & Knowledgeable Staff
- Tech Assistance Available
- ATRA Member Supplier

www.hnatrans.com
(866) 4-A-TRANS, (866) 428-7267



Figure 9

can't be pulled in overdrive gears.

When you move the selector lever to the M position, you take complete control over transmission shifts by manually selecting which gear to operate in. This allows you to hold any gear range, giving you more control of the vehicle.

The select shift switch isn't serviceable. If a new switch is required,

you'll need to install a new selector lever assembly.

You enable the select shift by pressing the toggle switch located on the selector lever (figure 9). Once you've applied the switch, all available gears will be displayed above the PRNDL display. The current gear will be displayed in orange and all other gears will be displayed in ice blue.

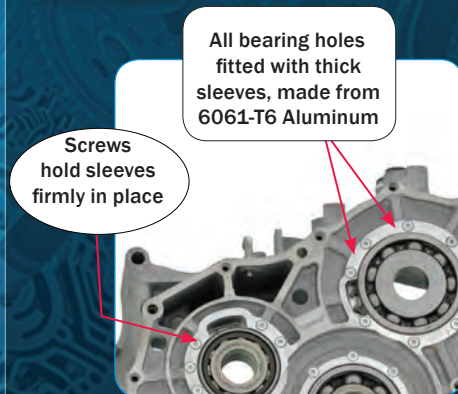
When you shift the selector lever into the M position, all of the gears shown on the instrument cluster will disappear except the gear the transmission is in. Pressing plus (+) on the toggle switch once will shift the transmission to next higher gear. Pressing minus (-) on the toggle switch will shift the transmission to next lower gear.

If downshifting the transmission would cause engine overspeed, the gear desired will flash, then disappear, indicating shift was attempted but not achieved. When select shift isn't enabled, only the PRNDL will remain displayed and the row above will remain dark.

Ford's 6R140 is built to a high standard and capable of competing with other big transmissions. They say competition breeds champions; if so, the future looks bright for Ford. Until next time, keep competing and *let's play ball!*



Slauson has been a pioneer since 1956. We brought you the Slauson Book, the Slauson CD, Slauson.com and NOW:



The Slausonator

The Slausonator Honda Case Fix! The only bullet-proof Honda case bearing fix on the market.

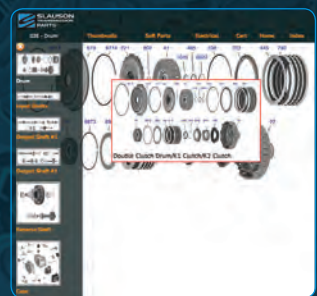


The Slauson App

The industry's first parts identification App for Android (iPhone version coming soon)

Slauson.com 2.0

The fully redesigned Slauson.com website. New look, new features, updated SmartPart™ ID/ordering technology.



Slauson Transmission Parts Over 50 years of innovation and still on the cutting edge!

**Used, New and Rebuilt Hard Parts, Soft Parts
Electrical Components & Flywheels**

**Order Online 24/7 at www.slauson.com • Phone Hours: 7:00 am to 5:00 pm/ PST
Call (800) 421-5580 • Local (310) 768-2099 • FAX (310) 768-8298 • Se habla Español!**

