Mustang T5 Specs

Input Shaft:	Dia	1 1/16
	Pilot	.668
	Splines	10
	Length	7.18

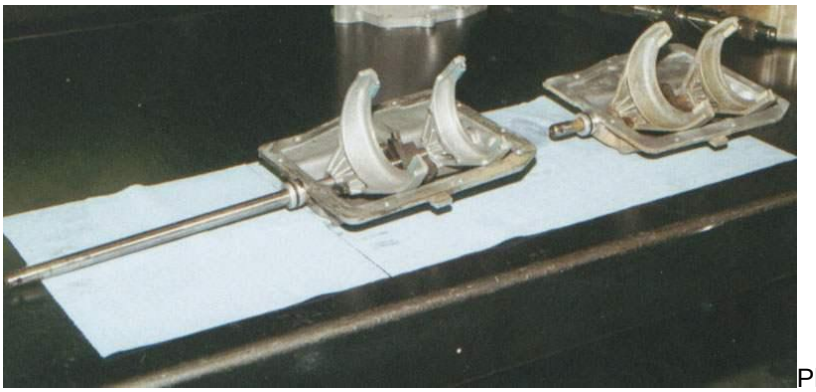
Here's how I put together a T5 transmission for my '51 GMC with no machine work and no worries about clutch disc / spline matching. I started with a '84 F-body (Camaro / Firebird) 5-speed. Later versions had electronic speedometer drive, which can be used but require a $300 adapter to work with a mechanical speedometer. The tranny I used was probably for a car equipped with a V6. It has the following ratios:

1st	2nd	3rd	4th	5th
2.95	1.94	1.34	1.00	.73

These ratios are very nice for street use with a rear axle ratio of 3.90 or 4.11. They are an improvement on the S10 version of the T5, some of which had a 4.03 first gear and .85 overdrive in fifth gear. F-body cars with the above ratios came with a 3.45 rear axle. There is another version for 305 V8 engine cars which has the same ratios except for a .63 5th gear. The V8's used a 3.08 rear.

This T5 has an input shaft and bellhousing bolt pattern which are correct for any early truck (mine is a '51 GMC). The only difference is that the holes to mount the trans to the bellhousing need to be enlaged to 1/2" . The input shaft has 26 splines which is a common count for most any late GM clutch disc. So far so good. The major problem is location of the shifter. F-body cars all have bucket seats and the shifter is located at the rear of the tailshaft housing. If your old truck has bucket seats, it will probably work as is, but I like to use that space for miscellaneous junk in a little console with a cupholder. Sooo...

I was fortunate to find an S10 T5 that was sold as "parts only". On teardown, it had bad synchros and pieces of metal throughout, so it was truly good for parts only. The part I was after was the tailshaft housing. The S10 has a shifter location suited for a truck - about in the center of the floor. And T5's being designed for maximum parts interchange, the tailshaft housings are interchangeable. This can be done with NO disassembly other than removing the tailshafts and side cover/shift fork/rail assemblies - you don't have to get into the transmission itself. So - voila! Swap the tailshaft housings and other parts mentioned and we're good to go!


Photo 1

Pictured above are the side covers, shift forks, and shifter rail from the Camaro (L) and S10 transmissions. These have to be swapped along with the tailshaft housings. Use the shift forks that show the least wear.



photo 2

Whoops....major problem here. The speedometer drive gear is in a different location. On the S10 trans, it's a bit forward of the shifter housing. On the Camaro trans it's well forward. I've heard that some mainshafts had both locations machined, but on mine, no such luck. So, it's gotta move if I want to use the speedometer. "Gee officer, I really don't know how fast I was going - you see, I just put two transmissions together and now my speedometer don't work"....Yeah, right!

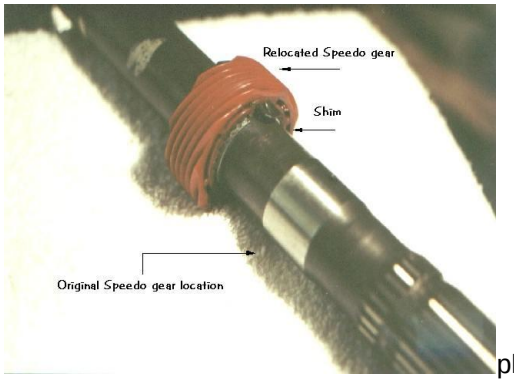
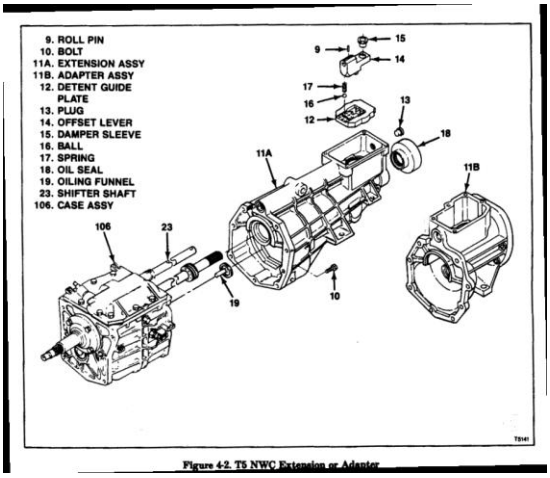


photo 4

So here's what I did. Notice the shiny spot in the picture above? that's where the speedo gear was in the Camaro tranny. There is a little hole drilled in that area, for the retaining clip that holds the gear in place. I carefully measured the S10 shaft for the location of that hole and drilled one the same size, in the Camaro shaft. What's not apparent in the picture is that the shiny area is actually a slightly larger diameter than the rest of the shaft. When you slide the gear over this area, its a fairly tight fit and the little retaining clip is held tightly in place. I my case the difference in diameter was .055". So I made a shim out of .026" stock (remember you have to split the difference) which wraps around the shaft to make it the proper diameter. It doesn't go all the way around, just enough to make the gear a tight fit. I epoxied this shim onto the shaft (using a couple of hose clamps to hold it in place overnight) and tapped the gear and clip into place.

Some background on the T5...originally produced by Borg Warner Gear Division, all T5's are now known as "Tremec" and are manufactured by Transmission Technologies Corp. An excellent repair / disassembly manual is available for the T5 at minimal cost by calling (800) 401-9866. Here is a page from that manual:



Not shown in the above diagram is the side cover and shift fork assembly (photo 1). You will have to use the entire thing from the S10 box, because the shifter shaft (23) must be the correct length for the S10 tailhousing.

Here's an "Aw, S**t !" to avoid. Removal of the tailshaft extension requires driving a roll pin out of the shifter shaft, into the offset lever (14 on diagram). There is a drilled passageway there to hold it. As soon as you get the tailshaft off, **drive this pin all the way out and put it aside where it won't get lost**. It's all to easy to re-install the offset lever with the pin still in there...and you won't realize it's there until you try to drive in a new one. Of course, this will be **AFTER** you have re-installed the tail housing with gasket cement, torqued the bolts, etc, at which point you must remove everything and do it all over again.

Jack Halton / Inliners International May 2001

The Ultimate T-5 Swap Article - There's a lot of confusion regarding the Borg & Warner T-5 and which one to use in an early Ford car. Terms like world-class & non-world class are intermingled with gear ratios and torque ratings, shifter positions and speedometer drive type. This article should help clear up many of these issues.

The confusion surrounding which T-5 is best is understandable. An extremely versatile transmission, B&W modified this tranny to suit different applications several times over its 13-year production run (1982-1995) before being acquired by Tremec and discontinued for OEM use. In truth, the confusion stems from its versatility, and that's a good thing.

Replacing an early floor-shift 3-speed requires a forward shifter location. This location is found in T-5 transmissions used in S-10, T-10, Astrovan, & Jeep transmissions.

While the T-5 was used by AMC, Ford, GM, Isuzu, Nissan, Ssang, & TVR (among others – even an agricultural sprayer!) This article will focus on three main OEM applications – Mustang, Camaro/Firebird, & S-10.

IDENTIFYING A T-5 - There is only one positive way to identify which T-5 you have and that is by using the metal tag attached to one of the tail housing bolts. The number will look like this: 13-52-XXX, where XXX is a three-digit number unique to the specific make/model application. There are several online T-5 number decoders, but one of the easiest to use is found at http://www.5speeds.com/t5/index.html - at the bottom you can use the drop-down menu to select your three-digit suffix and find the original application.

Contrary to popular belief, you cannot tell gear ratios by application – only by tag number and then only if you have a comprehensive chart. So if your buddy tells you to get the T5 out of an S10 with a V6 because it has better gear ratios and/or it's stronger, that's simply not always true and you must reference the tag number.

World Class vs Non World Class

In the beginning, there was no WC/NWC discussion as all transmissions were NWC. The WC designation began in '85 with Ford using it in the 5.0 Mustang first. F-Body (Camaro/Firebird) began using WC units in '88. The S10 didn't use WC until '93. The differences between WC & NWC are principally in the bearings & synchros. Externally, there is one readily identifiable difference between WC & NWC (without having to know input sizes & spline counts) and that's the front countershaft bearing retainer. The NWC has a one-piece design that looks like a large welch/freeze plug while the WC has a two-piece design that looks like two concentric circles. Here's a pic of each (lifted from the HAMB):





'93 and newer GM WC T-5 use the Ford case and bolt pattern, so these will not bolt up to standard Chevy bellhousings.

In general, WC is stronger than NWC, newer transmissions are stronger than older ones, and higher first gear ratios are stronger than lower. The torque ratings are guides and typically represent shock ratings. It is generally accepted that WC units can be made to live behind about 400hp as proven by the 5.0 Mustang crowd. There is no hard and fast rule – if you hammer it, it will break.

Input Shafts -Ford NWC & WC (except 4-cyl) units used a 1-1/16" 10-spline input shaft. The '94-95 Mustang T5 had a 0.67" longer input shaft & uses a unique bellhousing for the SN-95 platform. However, this input shaft can be swapped with an '89-93 Mustang input shaft.

GM used a two different input shafts. The input shaft used behind V8 engines (both WC & NWC) was 1-1/8" 26-spline while the input shaft destined for 4/6 cylinder engines was 1" 14-spline. The exception to that is the '93-'96 V6 F-body applications which used the 26-spline input shaft & the Ford case.

Speedometer Drives

Early T-5 used a typical gear-driven, cable speedometer drive while many late T-5 used an electronic speedometer drive. In GM applications, the changeover is about '89. Ford used cable speedos through T-5 usage.

WHICH T-5 TO USE - The S10 T-5 has garnered most of the attention due to its favorable shifter location. The S10, however, was a NWC unit through '92. There are two basic gearsets available in the S10 T-5:

1st – 4.03 2nd – 2.37 3rd – 1.49 4th – 1.00 5th – 0.86
1st – 3.76 2nd – 2.18 3rd – 1.41 4th – 1.00 5th – 0.72

As a general rule of thumb, regardless of engine, ALL S10 T-5 prior to '85 received the 4.03 gear set, while ALL S10 T-5 after '86 got the 3.76 gearset. The "S10" T-5 was also available in the equivalent GMC T-truck.

The speedometer changed to electronic with the ’90 model year, however, some ’89 model T5 came with electronic speedos if they were equipped with the optional digital dash. These can prove problematic for swaps, but output shafts & tail housings can be swapped with cable-driven speedo models.

The Astrovan T-5 is worth mentioning. With an offset shifter which can be replaced with an S10 shifter, it makes a good candidate for swaps too. The 4-cyl vans used the 3.76 gearset, but the ratios found behind the V6 are better than the S10:
1st – 3.50 2nd – 2.14 3rd – 1.39 4th – 1.00 5th – 0.78
Tag Numbers:
S/T Truck – 4.03 Gearset – 010, 012, 013, 014, 033, 042, 043, 055, 056, 057, 058, 146
S/T Truck – 3.76 Gearset – 107, 108, 110, 136, 145, 186, 191, 192, 193, 201
Astrovan – 3.76 Gearset – 170, 180, 190
Astrovan – 3.50 Gearset – 101, 148, 149, 164, 179, 189
Mustang - Introduced in ’83, the T-5 arguably gained its fame in the Mustang 5.0. The first to take the step up to WC in ’85, Ford used the T-5 through the Fox-body & SN-95 chassis ending in ’95. The strongest T-5 available was found in later Mustangs and available through Ford’s Motorsport & SVO operations.
Available with a few different gearsets, the most common gearing was from ’85 through ’95:
1st – 3.35 2nd – 1.99 3rd – 1.33 4th –1.00 5th – 0.68
The other V8 gearset used was the NWC ’83-84:
1st – 2.95 2nd – 1.94 3rd – 1.34 4th – 1.00 5th – 0.62
Ford rated their T-5 anywhere from 260lb/ft to 335lb/ft depending on the application. In ’89, stronger alloys were used upping the torque rating from 260lb/ft to 300lb/ft. The 310lb/ft rating belonged to the ’93-94 Cobra spec T-5 and an aftermarket-only Z-spec T-5 was available with 335lb/ft.
The late-model (94-95) 3.8 V6 T-5 was rated at 265lb/ft, had the slightly longer input shaft, and had the following ratios:
1st – 3.35 2nd – 1.93 3rd – 1.29 4th – 1.00 5th – 0.73
Tag Numbers
NWC V8 – 034, 065
3.8 V6 – 220, 236
V8 260lb/ft – 126, 165, 169, 141
V8 300lb/ft – 199, 204, 208, 246, 218, 219
Z-spec 335 – 249, 251
SVO – 200, 202
Cobra – 239, 242, 253
GM F-Body
GM used the T-5 in F-body cars behind all engines. In general, the I4/V6 got the following ratios:
1st – 3.50 2nd – 2.14 3rd – 1.36 4th – 1.00 5th – 0.78
Although some 4-cyl cars got the 3.76 gearset as used in the S10 & a few V6 cars actually got the 4.03 gearset.
The V8 F-bodies typically got the following Gearset:
1st – 2.95 2nd – 1.94 3rd – 1.34 4th – 1.00 5th – 0.73
It’s worth noting again that the ’93-95 F-body V6 cars got a Ford case with a GM input shaft. There were no V8 T-5 during these years.
Tag Numbers
V8 2.95 NWC – 028, 062, 070, 072, 157, 185
V8 2.95 WC – 159, 160, 175, 176, 195, 196
3.50 NWC – 015, 027, 061, 156
3.76 NWC – 054, 083, 158
4.03 NWC – 181
4.03 WC – 177
NWC Other (unk app/gears) – 071, 084, 150, 166, 178, 182, 183
WC Other (unk app/gears) – 197, 212, 213, 214
WC Ford Pattern – 210, 245, 247

ADAPTING THE T-5 - The Mustang and F-body T-5 both have rear mounted shifters at the end of the tailshaft. These often make difficult swaps and shifter placement, particularly in early Fords, is untenable.



L-R Early Ford Toploader, S10 T-5 w/Adapter, Mustang T-5

The S10 T-5 is often selected due to the shifter placement (approx 7” further rearward than early Ford), but typically lacks desirable gear ratios or the increased strength of a WC unit. Because of the T-5 excellent interchangeability, the tail housing and top cover from an S10 can be swapped onto other T-5. There are a few issues when doing this.

The first is a small plastic oiling funnel found on the countershaft and retained by the tail housing. These are different from WC to NWC, but it is primarily due to changes in the tail housing casting, not an internal oiling issue. Consequently, this plastic funnel should stay with the tail housing. So, use the S10 plastic funnel when swapping an S10 tail housing onto a WC T-5.

T-5 Countershaft Oiling Funnels

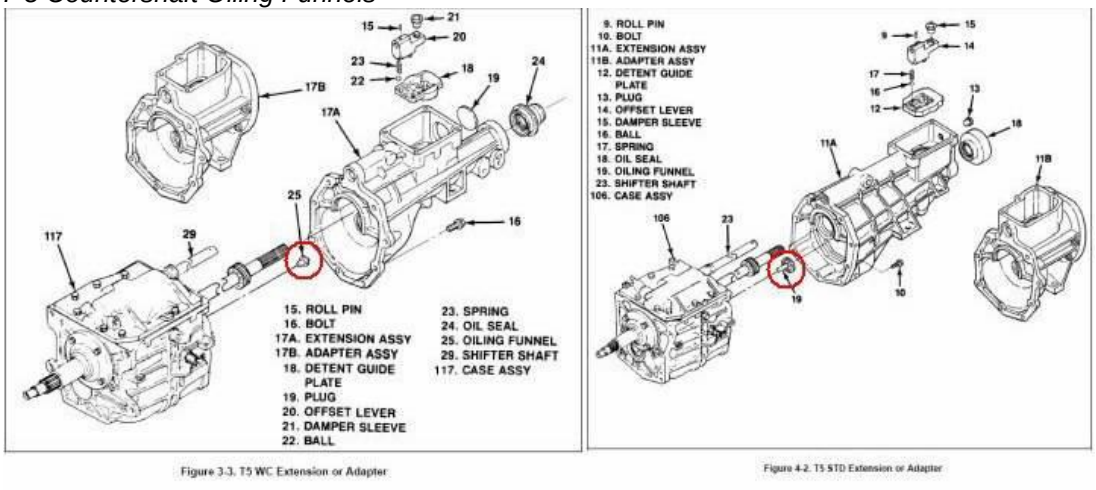


Figure 3-3. T5 WC Extension or Adapter

Figure 4-2. T5 STD Extension or Adapter

The second issue is that of speedometer gear. Typically, when installing an S10 tail housing and top cover onto a WC T5 from a Mustang or F-body, the speedo gear will no longer align with the driven gear mounting hole in the housing. The output shaft has a built up area where the speedo drive gear mounts with a clip. Moving the gear requires building up the output shaft with shim stock. An excellent example of how to do this is found on the inliners websit at: http://www.inliners.org/Jack/T5tech.html

Finally, if putting an S10 tail housing onto a Ford T-5, you will probably have to change the tailshaft bushing for the Ford one. This is due to different diameters of the output shaft.

Adapters - An option is to use a machined flat plate and the “hogshead” or mini-bellhousing from a ’46 and up Ford truck 4-speed. Dwight Bond (eBay ID 007Dwight) in Gibbon, NE sells these for very reasonable and you’d be hard pressed to buy the material and pay for the machining for what he asks. He also has the special pilot bushing and input shave sleeve. There are also plans for the flat plate available from George Greenbaugh (eBay ID community-chest) for the hard-core do-it-yourselfers.



Dwight Bond Flat Plate Adapter on Hogshead

To use the Ford pattern T-5 behind a flathead is a bit more work, but a company in New Zealand, Mac’s Speed Equipment, builds this adapter. Their webpage is: http://www.macsspeed.com/adapters_2.html I believe Vern Tardel also makes an adapter to use the Ford T-5 behind a flathead.

Input Shafts - As mentioned, input shafts vary by application and there are three general sizes, Ford, Chevy V8, and small Chevy. When adapting the T-5 to a flathead, or many other early engines, the input bearing retainer where the throwout bearing rides may be too small if using the original throwout bearing. A simple sleeve-type adapter can be used and are easily made by any competent machine shop, or readily available either in kits from Speedway or Cornhusker, or separately from Dwight Bond and others.

Clutch Disks - As a rule of thumb, any clutch disk that has the correct input shaft size/spline count and correct diameter for the pressure plate will work. The Astrovan clutch disk seems to be popular when doing the flathead conversion, but check the clearance on the flywheel retaining bolts. Some clutch disks will not clear the bolt heads and cause problems later on. The very best option is to have the correct center hub installed on the flathead disk by a good clutch rebuilder.

Shifters - One of the T-5 weak points is the stock shifter. There are no positive stops on the shifter itself, so it is easy to "over shift" the transmission. This can cause bending and cracking of the shift forks and is most notable when really banging the gears hard. This flexing of the shift forks will result in damage to the synchros. One of the best things you can do, especially if you like to shift hard or fast, is to use an aftermarket shifter with positive stops that are correctly adjusted in accordance with the manufacturer's recommendations.

Shifter handles can be modified simply by cutting off the original shifter and welding on the handle of your choice to the stub. Some shifters are two-piece with a rubber isolator that can be torn off and a new handle welded on. If you use a Mustang transmission, the shifter handles merely bolt on to the stub.

Throwout Bearings - Which throwout bearing to use will depend on specifics of your swap. If you're running a flathead in an original Ford frame, it may be best to use one of the adapters that allows you to retain the stock clutch linkage and throwout bearing. This will provide the neatest solution.

Hydraulic slave cylinders are easily adapted in both push and pull configurations and may be the best way if building from scratch or using a less common setup/swap. In this case, use a throwout bearing that will readily adapt to your linkage. In some cases, you may have to sleeve the input bearing retainer, while in others, you may use a T-5 OEM throwout bearing.

Hydraulic throwout bearings are also available, but reviews and results are decidedly mixed and they tend to be quite pricey.

MISCELLANEOUS

Rebuilding - The T-5 is as straight-forward as most other modern manual transmissions and require a minimum of specialized tools. Two excellent resources are available online, the Borg-Warner Technical Service Manual here: http://www.ttcautomotive.com/English/media/pdfs_autogen/T-5_Service_Manual.pdf and a good how-to rebuild manual here: http://pomoforacing.com/tech/T5Rebuild2002.pdf

Endplay is the key to any manual tranny and the T-5 is no exception. Shim packs are still available from Ford and small parts kits are available from several sources online.

Oil - All NWC T-5 use 70WT Gear Oil or Redline MTL.
ALL WC T-5 use ATF.
Do not use gear oil in a WC T-5. Use a quality synthetic oil (regardless of which type you need to use) & change it frequently (every 15-20K). Fill to the fill plug – about 5-1/2 pints or 2-1/2 quarts.

Open Drive - For a flathead conversion, you'll probably need to convert to an open drive setup. Hot Rod Works and Speedway, as well as several others, sell a conversion kit for your banjo rear. Alternatively, you can swap to a modern rear like an 8" or 9" rear. You will need to replace the torque tube with some sort of locating device if modifying your banjo – the stock radius rods simply aren't up to the task.

RESOURCES - The following is a list of various websites. Most are pretty good, nearly all also have errors (like I'm sure this article does too). Most errors, are errors of omission that can lead to misunderstanding or confusion, however, there are some errors of fact on many of these pages.

http://www.vanpeltsales.com/FH_web/t5_fivespeed.htm
http://www.flatheadv8.org/t5-swap.htm
http://www.moderndriveline.com/Technical_Bits/t5_history.htm
http://www.jalopyjournal.com/forum/showthread.php?t=169265
http://www.5speeds.com/t5/index.html

SOURCES

Jim O'Clair, T-5 Transmission Swaps, Hemmings Muscle Machines, July 04
Hokey Assed Message Board, http://www.jalopyjournal.com
Inliners International Board, http://www.inliners.org
POMOFO Racing, http://pomoforacing.com/
Transmission Technologies Corporation, http://www.ttcautomotive.com/