

## Introduction

We hope that the rebuild of your T18 transmission goes very smoothly and that you achieve the improved results that you intend.

Despite whatever your experience with this type of work may be, we strongly advise you to read these instructions well and save them for future reference and parts numbers. Contained in these instructions are the requirements, tips, hints and tricks of years of performing these conversions, both in our own facility and information we've gained from discussing these transmissions with our customers. Put this information to good use.



JEEP POWERTRAIN SUPERIORITY

## About the T18 Transmission

The Ford & Jeep T18 four-speed was made by Borg-Warner from 1966 through 1986. It is a heavy-duty truck transmission designed for and used in such applications as 1/2, 3/4 and 1 ton trucks. It is the improved successor to the T98. The T18 is fully synchronized in the second through fourth gears. All gears are helically cut except first and reverse, which are spur gears. Very much identical to the T18 in appearance and build is the Ford T19. This four-speed transmission is different from the T18 and others in that it features taller gearing and a synchronized first gear. It is often found in diesel applications.

## Identification

Part of the battle in doing a T18 or T19 conversion is making sure you have the right one, especially if you did not actually witness the transmission's removal from the donor vehicle. Jeep used fourteen different T18s, International used three and Ford used three as well. Though all of these transmissions share many common parts and characteristics, they are all different!

For the Ford T18, the case and top cover are both cast iron, with the top cover being retained by six bolts. The T18 & T19 has a 1-1/16" diameter, ten spline input shaft that has a stickout of 6-1/2" from the front face of the transmission. The pilot tip of the transmission measures .668". The front bearing retainer flange measures 4.850" and the bearing retainer tube is 1.432" in diameter. The front bolt pattern is the symmetrical Ford "butterfly" pattern; 8-1/2" wide by 6-5/16" tall. The input shaft length is 6-1/2". Checking these dimensions will verify that the transmission is a 1966 or newer model, precluding it from being the T98.

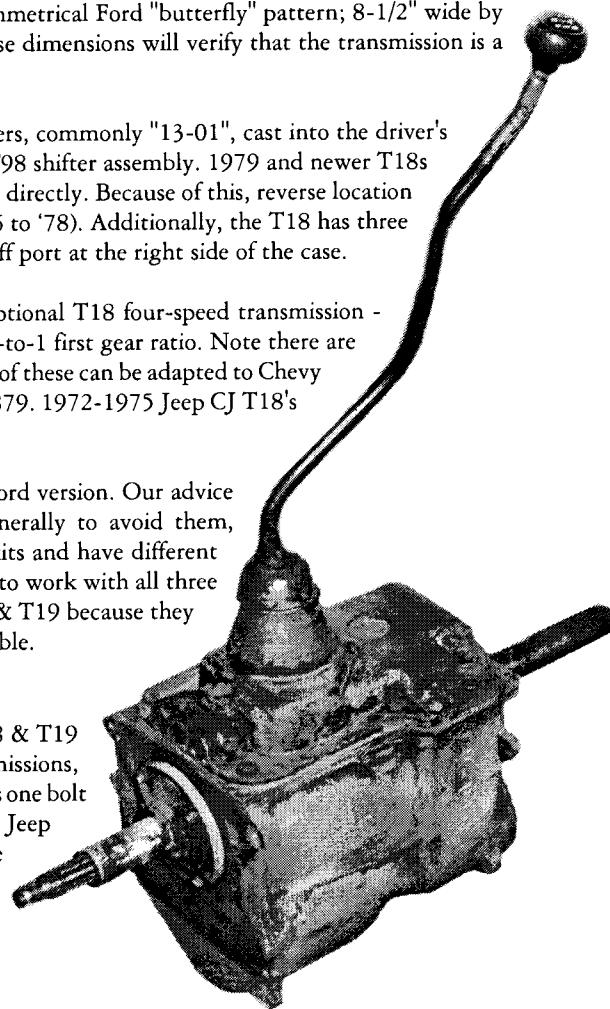
The transmission can also be identified by its casting numbers, commonly "13-01", cast into the driver's side of the case. From 1966 until 1978, many T18s used a T98 shifter assembly. 1979 and newer T18s used a three fork shift cover assembly that shifts reverse gear directly. Because of this, reverse location is on the opposite side of neutral than the earlier version ('66 to '78). Additionally, the T18 has three bronze synchro rings. You will also notice the power-take-off port at the right side of the case.

There were a few later versions of these CJs that had an optional T18 four-speed transmission - although the version that Jeep used with the V6 was only 4-to-1 first gear ratio. Note there are 12 different versions of the Jeep T18 from 1966-1979. Some of these can be adapted to Chevy V8 by use of a T18 adapter kit that we manufacture, kit #1879. 1972-1975 Jeep CJ T18's adapt to GM Engines with our #1415 kit.

Some individuals ask about T18's & T19's other than the Ford version. Our advice concerning some Jeep and I.H. T18 & T19 swaps is generally to avoid them, especially the latter. They will not work with our adapter kits and have different bolt patterns front and rear. We have designed our adapter to work with all three versions (2wd short and long shafts and the 4wd) Ford T18 & T19 because they are a more easily found, adapted and are often more affordable.

## Compatibility

Interestingly, the bellhousing bolt pattern for the Ford T18 & T19 are the same as the Tremec 150 and the Tremec 176 transmissions, so no bellhousing modifications are needed. The Jeep T18 has one bolt hole different, the bolt near the clutch fork is higher on the Jeep version. A 1976 to 1979 Jeep clutch disk is required. Note that the SR4, T4, and T5 use a different bolt pattern from the Tremec series transmissions.



The Ford T18 & T19 are also compatible with GM and AMC bellhousings, following some minor modifications. See *Adapting Ford Transmissions to GM Bellhousings*, and *Adapting Ford Transmissions to AMC Bellhousings*.

## Disassembling the Transmission

### Shift Cover Removal

Begin by removing the transmission shifter stick by pressing downward and rotating counter-clockwise the domed bezel. The bezel will release and allow the shifter to be removed. Now unbolt the eight top cover bolts and remove the top cover assembly. It may require a few firms blows with a soft-faced mallet to break the gasket's hold. If you must pry with a screwdriver, keep it out towards the edge so as not to mar the gasket sealing surfaces.

### Tailhousing Removal

Lock the transmission in first and fourth by sliding the first to second clutch sleeve rearward, and the third to fourth sleeve forward. This will allow you to remove the yoke nut (2wd models) or gear nut (4wd models) from the rear of the original mainshaft. On 2wd models, a large crescent or pipe wrench works well to hold the yoke. Now slide the gear hubs back into neutral position and remove the rear tailhousing or adapter. On pre-1979 Ford and all Jeep versions of the T18, reverse is actuated by a case-mounted pivot arm. The pivot can be removed by driving the taper pin rearward. On some T18 and T19 models, a snap ring or locking washer is used. Follow by removing the tailhousing.

### Bearing Removal

Move to the front of the transmission and remove the input bearing retainer. Using a *good* set of snap ring pliers, remove the snap ring on the input shaft. You would be wise to wear safety goggles during this and every use of snap ring pliers. Then remove the input bearing o.d. snap ring. Using a bearing puller locked into the slot of the input bearing, pull the front bearing off the input shaft. Note here that all Jeep and pre-1979 Ford T18's used a thinner front bearing. Do not mix it up with the rear bearing. Later versions have the same width bearing. Now, remove the large bearing washer. Next, remove the pilot rollers spacer from the hub.

Now, repeat the bearing removal process using the same methods on the rear of the mainshaft. You may need to tap the mainshaft rearward to expose the groove of the outer race.

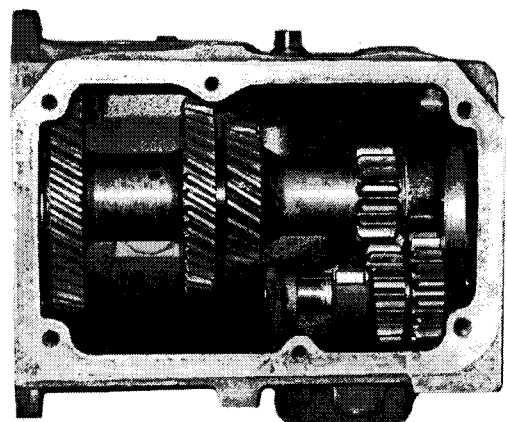
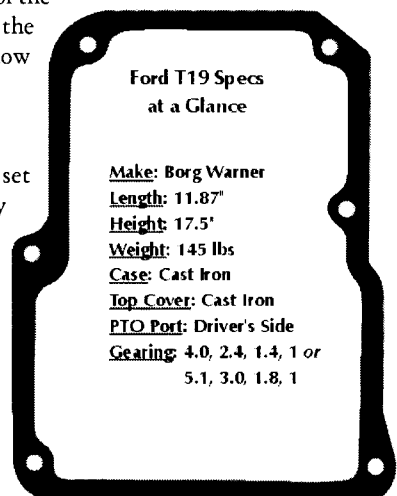
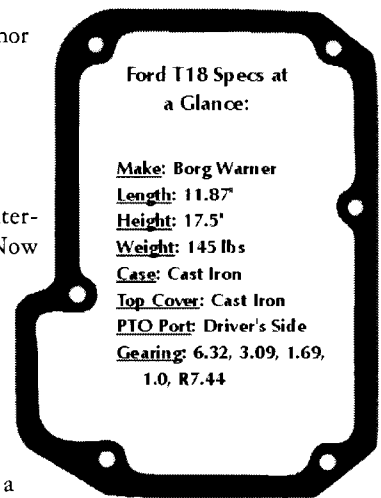
### Mainshaft & Input Shaft Removal

With both bearings now removed, pull the third-to-fourth clutch sleeve rearward to separate the input and mainshaft assemblies. Do this slowly, so as to not drop the mainshaft pilot roller bearings. Once separated, you may now remove the mainshaft assembly by tilting its nose upward and pulling it from the case. The input shaft will now easily be removed from the case. In the event they didn't all fall into the bottom of the transmission case, take out the pilot rollers from the input shaft bore.

### Mainshaft Disassembly

You are now ready to disassemble the mainshaft assembly. Remove the pilot rollers spacer from pilot tip of the mainshaft. Remove the third-to-fourth hub front snap ring (goggles, again). The hub assembly now slips off the shaft. We should mention here that it is a very good idea, especially for the uninitiated transmission builder, to place all components in their proper order and orientation on a secluded (and clean) section of the workbench. This will assist in making reassembly easier.

Moving to the back of the shaft, remove first-to-second gear hub snap ring. If working with the T19, you may have to press first gear off rearward with a press. Remove second gear snap ring, washer and second gear. Note here that it is advisable to be careful if removing the first gear from the synchronizer hub. The detent balls and springs will fly out and into the next dimension if you let the hub slide too far off the gear. You may wrap them in a rag to prevent this if you are going to disassemble them.



### Countershaft Removal

The countershaft is a press fit into the front and rear bores of the case. However, the shaft is larger at the rear than the front. As such, drive the countershaft toward the *rear* (!) of the case using a brass or aluminum drift. You will need an arbor tool just undersized of the countershaft to hold the bearings, spacers and sleeves together during reassembly.

Once the shaft is out, you will be able to easily lift the cluster gear straight up out of the case for inspection.

### Reverse Idler Shaft

After removing the lockplate, the reverse idler should be driven rearward with the assistance of a drift. This is tricky, but the shaft is usually not too tight in the case bore. Inspect the reverse idler and its bushing. This constitutes the end of the main disassembly process. You will now reassemble in reverse manner.

### Inspection Tips

Inspect all parts for discoloration, warpage, brinelling, breakage and wear. We get several questions as to whether gears should be replaced if nicked or otherwise damaged. As a general rule, if the gear tooth can be reasonably smoothed back to its proper shape with a stone or fine file, it can usually be reused. Gear breakage, excessive rust (pitting) and other damage that extends to the pressure faces of the gear teeth themselves are grounds for replacement. Should you need such components, call us. We keep on hand (or can quickly special order) any NP435 parts, new or used. Detent springs should be checked for collapse or damage.

It is difficult to judge the real condition of synchros. Again, as with other components in the transmission, replace them since you are into it this deep. Note that the sharpness of the teeth and the integrity of the striations on the cone side.

### Reassembly

During the assembly process, be sure to grease all the components and their mating parts. This is crucial during initial spin of the rebuild. Be especially generous with coating each gear and their journals. Use sticky grease or petroleum jelly to retain loose rollers while reassembling. This is a great aid.

Install new roller bearings along with their spacers into the cluster gear using a sticky lubricant as mentioned earlier. The last needle will snap in firmly. If the grease is sticky enough you can skip using an arbor or dummy shaft while the countershaft is being driven into the cluster gear. Remember the new thrust washers, and to stick them to the machined faces of the lower case bores. Tap the cluster shaft in with care. Once in place, spin the gear assembly and verify its proper functionality.

Follow up with the reverse counter and its idler shaft.

### Mainshaft Assembly

Assemble the mainshaft in reverse order that you disassembled it. Note here that the latest versions of the T18 used a shouldered mainshaft. If you are replacing such a shaft with a Novak conversion unit, you will need to install a snap ring and special thrust washer. We have these available and ready for shipment for the rare instances where they may be required. The step bore of this thrust washer faces forward and encompasses the snap ring.

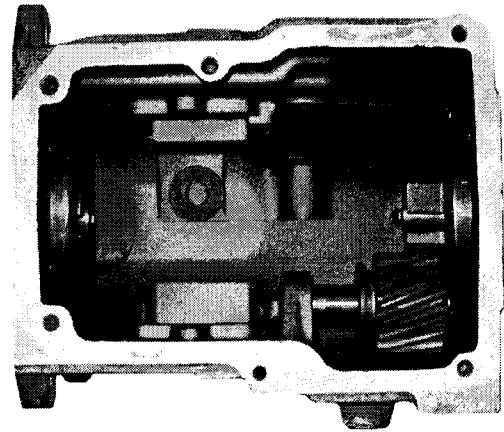
As you are installing the gears and synchro hubs, make sure they fit well and spin on their journals without resistance. While installing the snap rings, make sure they don't provide a source of resistance. Once the sliders are installed, make sure they slide without hitch. Note that on the third gear hub, the chamfered side faces frontwards.

### Input Shaft Assembly

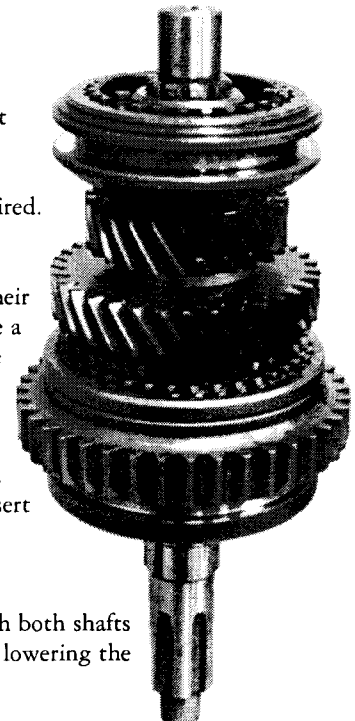
Place the new needle rollers included in the small parts kit into the bore of the input gear. Again, think sticky grease. Place the new synchro onto the cone of the input shaft and insert its nose first through the front bore of the transmission. It will rest there.

### Final Assembly

With the mainshaft now together insert it, tail end first, into the transmission case. With both shafts tilted upward, gently install the pilot tip of the mainshaft into the packed bearings while lowering the



This T19 case has been cleaned to perfection. Notice the difference in the reverse idler gear from the T18, above.



shafts together. Be careful that no needles dislodge. This would ruin the mainshaft pilot during initial spin-up. Watch the 4<sup>th</sup> gear synchro also, that the keys and slots line up.

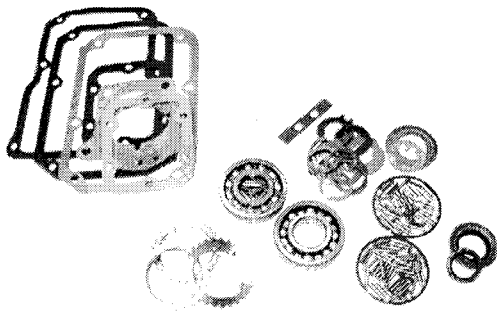
Place the roller bearings on both the input and output shafts. Note now that pre-'80 T18's had a thinner front bearing than rear. Don't mix them up. Later versions use the same bearing front and rear. With the bearings square on the shafts, place the transmission on end in a press and with the appropriate plates, tubes or other jigs, press the two bearings on simultaneously. There is a really swell chance of screwing up here. Don't let the synchros and keys get crooked or misaligned. The press will bring their service days to an unhappy end. When the transmission comes out of the press, the shafts should spin with minimal resistance.

Install the front bearing retainer and its pre-lube its new seal. Now install the tailhousing or your adapter.

### Check Your Work

Check the shafts for endplay with a magnetic dial gauge. You should have .008"-.015" and the shafts should turn freely in neutral and all gears. If end play needs to be adjusted, your small parts kit contains snap rings of varying thicknesses which you may use to adjust this number. It is tedious to pull the bearings off and try again, but it is far more tedious to have the transmission break down prematurely. Fill the transmission with a good gear oil, usually 85W-140 for most climates. Valvoline® and others make good para-synthetic blends that are worthy of a good rebuild. We like to fill through the top cover, as it's a good opportunity to douse the gears and shafts, not to mention the speed to fill.

Put the top cover on, making sure to line up the shifters with their sliders.



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### Legend to the Diagram

- |  |  |  |
|--|--|--|
| 1. Mainshaft pilot bearing roller spacer         | 26. Countershaft gear thrust washer (rear, steel)  | 51. Countershaft reverse idler shaft lockplate     |
| 2. Third to fourth synchro ring                  | 27. Countershaft gear thrust washer (bronze, rear) | 52. Reverse idler gear shaft                       |
| 3. Third to fourth retaining ring                | 28. Countershaft gear bearing washer               | 53. Countershaft                                   |
| 4. Third to fourth synchro snap ring             | 29. Countershaft gear bearing rollers (88)         | 54. Adapter plate gasket                           |
| 5. Third to fourth shifting plate (3)            | 30. Countershaft gear bearing spacer               | 55. Adapter plate seal (spring faces transmission) |
| 6. Third to fourth clutch hub                    | 31. Countershaft gear                              | 56. Speedometer gear spacer                        |
| 7. Third to fourth retaining ring                | 32. Countershaft gear thrust washer, front         | 57. Rear bearing locating snap ring                |
| 8. Third to fourth clutch sleeve                 | 33. Reverse shifting arm                           | 58. Rear bearing                                   |
| 9. Third to fourth synchro ring                  | 34. Reverse shifting arm shoe                      | 59. Reverse shifting arm pivot pin                 |
| 10. Third to fourth gear synchronizer assembly   | 35. Filler plug                                    | 60. Reverse shifting arm pivot                     |
| 11. Third gear                                   | 36. Drain plug                                     | 61. Reverse shifting arm pivot o-ring              |
| 12. Mainshaft snap ring (see instructions)       | 37. Lockwasher                                     | 62. Washers (6)                                    |
| 13. Second gear thrust washer (see instructions) | 38. Transmission to bellhousing bolt               | 63. PTO port cover bolts (6)                       |
| 14. Second gear                                  | 39. C-clip   | 64. PTO port cover                                 |
| 15. Mainshaft                                    | 40. Reverse idler gear snap ring                   | 65. Transmission case                              |
| 16. Second gear synchro ring                     | 41. Reverse idler gear thrust washer               | 66. Mainshaft pilot bearing rollers (22)           |
| 17. Mainshaft snap ring                          | 42. Reverse idler shaft sleeve                     | 67. Clutch shaft                                   |
| 18. First to second clutch hub                   | 43. Reverse idler gear bearing rollers (74)        | 68. Front bearing retainer washer                  |
| 19. First to second shifting plates (3)          | 44. Reverse idler gear bearing washer              | 69. Front bearing                                  |
| 20. Poppet balls (3)                             | 45. Reverse idler gear                             | 70. Front bearing locating snap ring               |
| 21. Poppet springs (3)                           | 46. Lockwasher (6)                                 | 71. Front bearing lock ring                        |
| 22. First to second insert spring                | 47. Adapter plate bolts (6)                        | 72. Front bearing retainer gasket                  |
| 23. Mainshaft snap ring                          | 48. Drive gear locknut                             | 73. Front bearing retainer                         |
| 24. First to second clutch sleeve                | 49. Washer   | 74. Front bearing retainer bolts (4)               |
| 25. Second gear synchronizer assembly            | 50. Adapter plate                                  | 75. Lockwashers (4)                                |

