

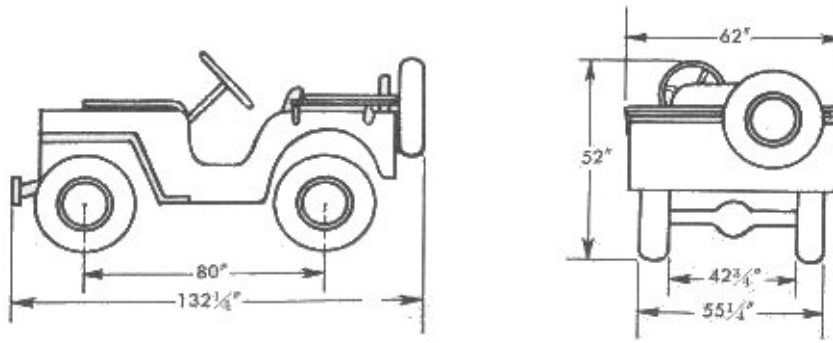
# TROUBLE SHOOTING AND

## REBUILDING THE T-84J TRANSMISSION

**By Robert Notman**



This book is dedicated to those unsung heroes of world war two—the mechanics and drivers. Without their dedication and duty to their machines the troops on the line would not have been the best equipped army in the field.



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**CAUTION:** Working with machinery can be dangerous, please use common sense and use safe practices. Be sure to wear eye and ear protection. Use tools as they were designed to be used. Using screwdrivers can be hazardous.

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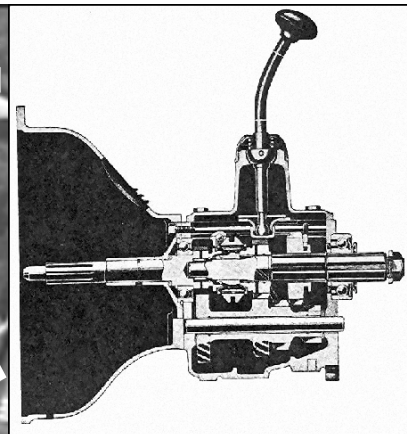
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# TROUBLE SHOOTING AND

# REBUILDING THE T-84J TRANSMISSION INTRODUCTION



By Robert Notman

This book actually started out as a multimedia CD. The CD came about after much discussion about the jeep T-84J transmission. I had a lot of questions, some of which were asked on [www.g503.com](http://www.g503.com) (a great website for WW2 jeep enthusiasts) and so did many others, or so it seemed.

I am not a professional transmission mechanic by any stretch of the imagination but I thought that if I could rebuild a T-84J than just about anyone could.

The purpose of this book, like the CD, is twofold, to show just how "easy" it is to rebuild the T-84J and to perhaps allow the novice to decide whether it is better to have it rebuilt by a pro. The process of recording the rebuilding of a T-84J transmission will hopefully help others who might want to rebuild their own.

Let's clear the air on one thing about this book. This is about trouble shooting and rebuilding the T-84J transmission. But what I call rebuilding may not be the same

as what you call rebuilding. We are not going to cut steel blanks into new gears. We won't press and ream new bushings into existing gears. I do briefly discuss this—frankly, I think this is beyond the capability of most shadetree mechanics and it is worth the expense of either using the services of professionals or purchasing new gears with bushings ready to go. We *will* talk about measuring those bushings for wear.

Sure, just about any shadetree mechanic can install the pressed in bushings and



ream them, but most are not likely to already have the reamers and may not even have a press. Using a reamer takes practice. So I have made the editorial decision not to include those details for all the gears.

What we will look at will include some general transmission information, trouble shooting and suggested repairs. Then we will cover the disassembly, cleaning, inspection, and assembly.

Of course an undertaking like this isn't really completed by just one person. I would like to take this opportunity to thank some of those who helped make this project a reality. I was assisted in putting this information together by:

**John Andreasson**  
**Robert Barrow**  
**Al Brass**  
**Arend "Eagle" Dubois**  
**Paul Fitzgerald**  
**Ron Fitzpatrick**  
**Chris Fourroux**  
**Jim Gilmore**  
**Joel Gopan**  
**Richard Grace**  
**Steve Grammont**  
**Bill Kish**  
**Thomas and Barbie Phillips**

Without their help this project wouldn't have gotten off the ground. Special thanks go to Thomas and Barbie Phillips for allowing me to use their "studio" for as long as I needed it to videotape, shoot stills and do the transmission work. Thanks, also goes to Richard Grace who supplied all of the parts replaced in the transmission.

It may be helpful to first understand what a transmission is and does. "The transmission of a motor vehicle consists of a train of gears in a case immediately back of the clutch housing. Through this train, engine power is transmitted from the clutch shaft to the propeller shaft. When there is a front-

wheel drive, a transfer case is placed between the transmission and propeller shafts to the axles.

The transmission serves several purposes. With the gears in the neutral position, it provides a means in addition to the clutch, of disconnecting the power of the engine from the driving wheels. It also reverses the direction of rotation of the driving wheels when the gears are meshed in this reverse position. This is necessary because the engine crankshaft always rotates in one direction. Further, when the gears are meshed into the low-speed positions, the transmission allows the engine to run at a high speed while the vehicle runs at a low speed.

However, the important function of the transmission is to provide sufficient mechanical advantage to increase the torque, or turning effort delivered by the engine to the driving wheels. More torque is needed when a vehicle is started, heavily loaded, climbing a hill, or traversing rough or soft



terrain, than when it running lightly loaded on a smooth, hard level pavement. An increase in torque is accompanied by a decrease in speed.

The clutch shaft is supported by a ball or roller bearing in the front of the transmission housing and is aligned with the transmission main shaft by a pilot bearing usually of the needle type.



The transmission main shaft is supported by a ball or roller bearing in the rear of the transmission housing. The transmission main-drive gear is integral with the clutch shaft and is in constant mesh with the countershaft drive gear. The countershaft is mounted with bushings and shaft beneath the main shaft and together with all its gears, revolves all the time that the clutch is engaged.

There were at least three types of transmissions in use during World War 2, these include the sliding-gear, constant-mesh and the synchro-mesh type.

In the sliding-gear type of transmission the various speed gears are splined to the main shaft. The desired speed is obtained by sliding the proper mainshaft gear into mesh with the corresponding countershaft gear.

In constant-mesh transmissions the change speed gears rotate freely on the main shaft on needle bearings and are in constant mesh with the countershaft gears. The desired speed is obtained by clutching the proper gear fast to the main shaft by means of a dog (toothed) clutch.

Most modern transmissions are a combination of the two types, having some constant-mesh speeds and some sliding gear speeds the latter usually low and reverse.

The transmissions of tactical vehicles are almost always four or five speed transmissions, that is four or five forward speeds and reverse. The Willys MB and Ford GPW transmission allows three forward speeds and one reverse (not accounting for the low and high range choices allowed by the transfer case).

In all transmissions, direct drive is obtained by clutching the clutch shaft fast to the transmission main shaft by means of a dog clutch. Often heavy duty trucks have one

speed higher than direct drive, that is, an overdrive. Passenger cars often have an automatic overdrive connected at the rear of the transmission as an accessory. An over-drive may be fitted to the MB or GPW but that is beyond the scope of discussion here.

The synchro-mesh transmission is a type of constant-mesh transmission in which the speeds of gears about to be engaged are equalized by friction members which contact slightly before the dog clutch makes the positive engagement. Synchro-mesh is usually provided only in the second and direct speeds of passenger vehicles. The synchro-mesh transmission is the type installed in the MB and GPW jeeps. It is the T-84J.

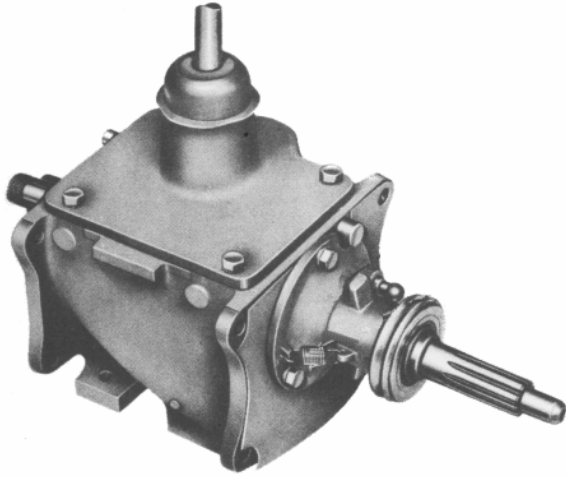
The various change speed gears are meshed and de-meshed by a control lever, shift rails and shift forks. The shift rails are held in position by ball latches, or poppets (poppets in the MB/GPW).

This has been a short introduction into transmissions. The main purpose was to draw attention to several bearings in a transmission and that speeds are changed by sliding gears or dog clutches into mesh by means of shift forks and rails. These are the parts that suffer from improper shifting by the driver and from improper lubrication.”<sup>1</sup>

I hope you enjoy this book as much as I did putting it all together and I wish you great success in rebuilding your own T-84J transmission.



# NOISY T-84J DEBUNKED?



Source: TM 9-1803B

Many times questions were asked about "is it normal for the jeep (T-84J) transmission to be "noisy". I have asked this question myself. It had been too long since I "rebuilt" my transmission...about 15 or so years, so I couldn't remember what it sounded like when it was "new".

Some claim that the jeep transmission is normally noisy...or it's cousin the transfer case is. So according to them it's no big deal. Perhaps it is all a matter of degree. One man's noise is another's music?

Before I rebuilt my transmission last year I was deeply concerned over the noise coming out of the transmission. To be fair to those who responded to my questions, it is difficult if not impossible to diagnose sounds that have been translated into the written word and, of course, this was being done over the Internet.

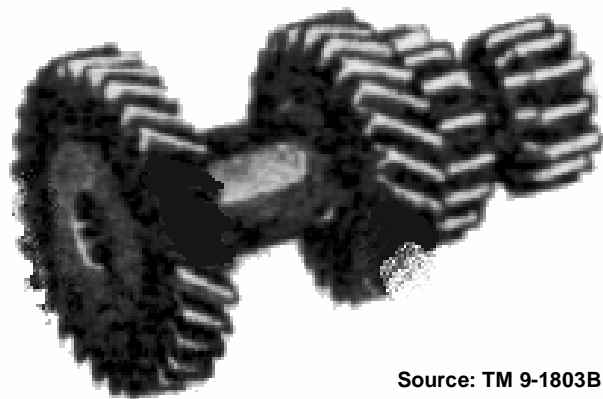
As it turned out, I had right to be concerned, the counter shaft gear was about 1/3 gone! And still Frankenjeep™ lived! It clung to life even as I pushed it to 55mph (with an evil non-sacrosanct or is that syn-

chrosanct over-drive) for a final round trip of about 138 miles before the rebuild. The tranny never let me down.

When I disassembled the T-84J that is when I discovered the damage. Not knowing what other damage might have been caused by bits of metal "floating" around in the case, I elected to buy all new gears and shafts. For this project I purchased most of the parts from three vendors. I repurchased some parts because the brand new synchro from one vendor turned out to be brand new junk...could not get it to slip. Some parts I purchased from Europe through Ebay.

While many of my parts were likely re-useable I felt it best to use all new gears and shafts. I did re-use the shift forks, the case and the tower. Pretty much everything else was new. I figured that if there were any problems with the tower, it's an easy to replace item while the transmission is still installed in the jeep.

Assembling the T-84J is really not difficult. There are about 58 parts, so it isn't rocket science, just following the steps and asking for clarification when the steps aren't as



Source: TM 9-1803B

My counter shaft gear was all tore up but the jeep kept going. Not sure what caused it, I can only suspect that a lack of preventive maintenance did it in. Be sure to check your transmission often!