

Replacing a T400 3 speed transmission with a 4 speed transmission (4L80E) in an early Humvee (pre A1)

Note: A1 Humvee's and early 3 speed Hummers are very similar and most of the differences are noted in the text.

You will need to perform/obtain the following:

1/ 4L80E transmission to Hummer/Humvee specs. There are different versions as well as a few changes according to the production date of the transmission.

Earlier models have the same connections as the T400 for the cooling circuit pipes, later ones (post 97) have quick connect fittings as well as having the return line farther down towards the rear of the transmission. You cannot retrofit the screw in fittings from the T400 or earlier 4L80E's to the later trans as they have pipes on the internal side of the fittings.

The necessary male pipe ends for the plug in connections are available from GM/Holden as VY and later Commodores use the same fittings, part number 92118269 will give you a 700mm length of pipe with a rubber section in the middle with the necessary fitting on one end which can be cut and bent to suit. These pipes were approx \$AU33 each retail. Any US made vehicle post 1997 with a 4L80E will use the same fittings.

Hummers have the same connectors from 1997 on so the genuine parts can also be ordered. The necessary part numbers are 12460492 & 12460493, this will give you the pipe between the trans and transfer and the one from trans to chassis rail. These two pipes were \$US25 and \$US20 each. Hummers and Humvee's fitted with a 4L80E from the factory also have a pressure relief valve in the cooler lines to bypass the transfer case intercooler until the pressure/temperature drops/increases above a certain point. There have been a few 4L80E's retrofitted into earlier trucks without the bypass valve that have not had any problems during operation. Mine included and the trans runs at a constant 70 -85 deg C without problems.

Hummer transmissions depending on the year model have a **TISS** (Transmission Input Speed Sensor) and may have a **TOSS** (Transmission Output Speed Sensor).

You will need a new 2 piece torque converter cover, part no's RCSK 18343 (big bit) & 12342107 (little bit) both prices includes gaskets.

The dipstick and tube are also different as well as being Hummer/Humvee specific, you can however heat and bend the T400 tube to fit and recalibrate the dipstick to the correct levels.

There are also different pans for the auto, some may not fit as the transmission pan sits above the crossmember. Very deep pans won't fit above the crossmember. There is a deeper alloy pan suitable for the Hummer/Humvee which does clear the crossmember available from PATCO.

The T400 uses a kickdown switch and a mechanical modulator cable both of which will have to be removed from the engine. I just coiled the kickdown switch wiring up and cable tied it at the rear of the valley.

The 4L80E has a longer shift lever out the side and fouled the front tailshaft. I had to slot the centre bearing mounting holes on the engine mount and lower the tailshaft so it would clear. When the trans was first installed on the modified crossmember I noticed it sat about half an inch higher than the T400, closer to the floor, this is probably because of the longer shift lever too.

2/ Decide how you intend to control the transmission as it is electronically controlled. It can be controlled with either the original military Humvee ECU and associated bits (TPS, brake switch, crank sensor, TISS and TOSS etc), with Hummer ECU and associated bits or with an aftermarket controller. Both systems will need a clean 12v supply to run them. (our Humvee's have 24v

electrics). The military system will require a new wiring harness and lot's of Humvee specific bits as will the Hummer setup.

Our injection pumps will not allow fitment of the standard Hummer or Humvee TPS so an injection pump replacement may also be required.

A Compushift controller (www.hgm.com) comes with a generic **TPS (Throttle Position Sensor)** and wiring to connect up to the TOSS in the Hummer transfer case. You have to make a bracket to mount the TPS and also run the wiring to connect to the trans. If you decide to fit a Compushift or similar you will also need an electronic speedo if using the TOSS in the transfer case. You can also use the TOSS in the rear of the trans and keep the cable speedo drive. Some 4L80E's do not have the rear tone ring for a TOSS (mine didn't) and it is cheaper and easier to use the TOSS on the transfer case than have the transmission pulled apart to fit the tone ring. Quotes to fit the tone ring from a transmission workshop were around \$250.

You can also go for a manual throttle body and perform all the gear changes manually.

3/ Transmission to transfer case adapter to suit the 4L80E and 242 transfer case, part number 12447172. The early adapter will not fit the rear of the 4L80E as the pan runs right to the end of the transmission housing.

The thread in the rear of the transmission is 10 x 1.5 and the bolts needed are 35mm long if there are no studs in the rear of the transmission. If using bolts instead of studs you may have to skim the bolt heads to get them through the holes in the adapter.

The studs on the front of the transfer are 3/8 UNF on the adapter end. You will also require a 1/8 BSP plug for the drain hole in the adapter.

Use anerobic sealant between the mating surfaces and torque the bolts/nuts correctly as per the workshop manual.

4/ A New Process 242 transfer case for either a Hummer or Humvee (depends on whether you are going to use the standard military ECU or an aftermarket one to control the transmission). If you intend to use the military control box you will need a Humvee 242 as it has a speedo cable drive on the tail housing and a Hummer one has a TOSS. Both the rear housings for either speedo or TOSS are interchangeable as are the necessary tone ring or speedo worm drive on the output shaft.

Early Humvee's may also need exhaust/muffler mods to clear the speedo drive on the back of the transfer due to the standard long muffler. Hummers have a catalytic converter and a shorter muffler which allows more room.

The 242 with a Hummer rear housing and TOSS clears the muffler by about 20mm, the closest thing is the range switch mechanism. It is also close enough to prevent the use of a 30mm socket on the transfer case filler plug.

The Compushift will provide an output signal to drive an electronic speedo. This is a reproduction of the TOSS signal.

You will need to swap the front output flange on the 242 (90mm across the cups) with the one from the 218 transfer (85mm across the cups) to suit the smaller uni's on the front tailshaft on the A0 Humvee's.

The 242 has switches to indicate via a light for centre diff lock and hi/lo range selection. You can install wiring and indicator lights for trans lock and hi/lo range indication.

The Compushift will need the hi/lo connected so it can adjust the speedo reading in low range.

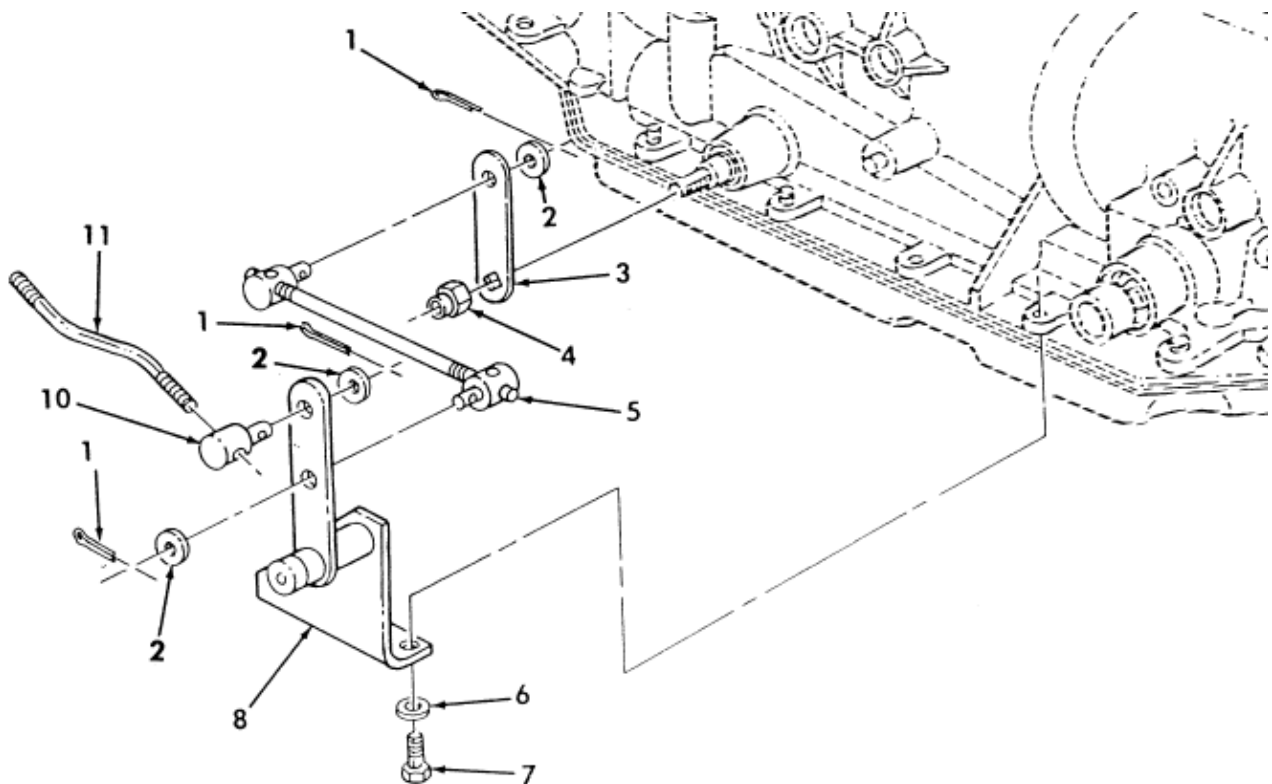
If required the front output seal in the 242 is the same as a 218 and the rear output seal is the same as a T400 auto. Both were available at the local bearing place.

5/ As the 4L80E and the 242 transfer are different lengths to the originals the transmission mount is approximately 50mm further rearward and the crossmember has to have a new mount fabricated on the back of it. Following on from this the front tailshaft has to be lengthened by

40mm. The back section of the front tailshaft should end up being 840mm in length to the outside of the cups. (NOTE: this measurement only applies to Humvee's with 218 transfer case, those with 242 transfer cases (A1 models) may be slightly different. I noted earlier that because the 4L80E is longer and the trans mount on the crossmember is at the same height the rear of the trans will be slightly higher, this is needed for the front tailshaft to clear the shift lever.

6/ The rear tailshaft has to be replaced entirely as the 242 has a sliding yoke on the output whereas the 218 has a flange. The old rear tailshaft ends are too small in diameter to suit the tube required for the sliding yoke so nothing from the old shaft can be used. The part number for a new rear tailshaft is 12447113 and is approx \$us230. Early trucks with tailshaft handbrakes will either need to have a tailshaft made to suit or retro fit the rear caliper handbrakes to use the rear tailshaft quoted above. They will also need to change the rear diff pinion flange to the later 90mm (across the cups) style.

7/ If you are using the existing mechanical lever and linkages then the transmission will require a new bracket and linkage on the side of the trans. This is a standard part available from AM General. See the picture below. The transfer linkage will have to be lengthened as the transfer case is approx 45mm further back. I used a B & M Sportshifter when I did the original RHD conversion and it just needed a grub screw to be removed to give me the extra gear position.



I suspect that part of the reason for the linkage setup above is so that nothing hangs down below the shift shaft on the side of the trans, the front tailshaft is very close.

8/ The exhaust will fit ok if the heat shield where it crosses the transfer is relocated approx 50mm rearwards, right up against the muffler. You will also have to loosen the bracket on the transfer case to allow the exhaust to sit in the correct position. As mentioned earlier the muffler may

require heating and denting ;-)) to clear the range lock switch and speedo drive on the rear of the transfer case. Mine cleared by about 20mm but removing the filler plug will be a squeeze. The exhaust mounting bracket off the 218 transfer fits onto the 242 transfer case.

9/ While replacement of the old style fuel tank with the later tank as fitted to Hummers and A2 Humvee's isn't strictly necessary it does provide increased clearance between the transfer case and the fuel tank.

The 218 transfer case is actually larger in most dimensions than the 242 and fitting a later style tank to a truck with a 218 puts the fuel tank very close to the transfer case.

Fitting a later style tank to a vehicle with a tailshaft handbrake is not possible. If the later tank is fitted when changing the handbrake to the rear calipers the front diff mount that incorporates the handbrake mount must also be changed to provide clearance for the tank.

The innards of the old tank will fit the later tank but the metal baffles are discarded as the later tanks don't have any, they won't fit anyway. If changing tanks get a spare drain bung as they can be impossible to remove when old.

10/ As the engine and drivetrain are on a slight slope down from front to back and the transmission mount is approximately 50mm further back but still at the same height it lifts the transmission slightly which made it hard to close the doghouse so I had to doctor the sound proofing to get it down tight. This might explain why all the Hummers have a half inch spacer on the body mounts.

11/ The whole exercise is well worth while, the difference in driveability is amazing, never mind the drop in engine revs in overdrive. At 60kph there is a 550 RPM drop in overdrive, at 110kph the engine is ticking over at 2200 rpm, 95kph =2050 rpm whereas before at 95kph it was on maximum sustained rpm of 2850.

Getting rid of so much engine noise has its downside though, you can now hear little squeaks, rattles and wind noise which will lead to another few jobs to try and eliminate them.

If anyone intends to fit a Compushift trans controller I have also written an article of tweaks and tricks involved with it's programming. Ask and I'll send a copy.

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