

# Ford E-Series Manual Conversion Guide

A comprehensive guide to replacing the BTR automatic transmission with a T5 manual gearbox in 6-cylinder E-Series Falcons.

This guide is based on the EF-EL series, but many steps also apply to the EA-ED series Falcons.



Contents:

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# Part 1: Parts Needed

Note:

The bellhousing bolts and sandwich plates listed below can be reused from the auto transmission.



2 Sandwich plates.

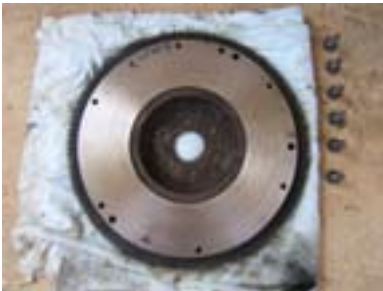


Bellhousing  
Dust excluder (plastic cover)  
8 bolts (6 larger, 2 smaller)  
Clutch fork  
Throwout (release) bearing  
Rubber damper hook



Clutch Assembly:

Driven plate  
Pressure plate  
6 small bolts



Flywheel  
6 bolts (preferably new)  
It is a good idea also to have the flywheel machined



T5 manual transmission  
Crossmember & rubber mount  
4 bolts



Rubber boot (bolts to floor)  
Gear boot  
Shifter & Knob



Clutch Cable  
Either buy new, or ensure that it is in good condition.



Spigot Bearing



Clutch Pedal from Manual Pedal Box

Another view



This is the clip that the clutch cable joins on to



This shows the Mal Wood Clutch Pedal Pin

These are great and save a lot of time stuffing around the with the manual pedal box.



Note:

This guide only covers installation of clutch pedal using Mal Wood clutch pedal pin.  
You can purchase a Mal Wood Clutch Pedal pin via [sales@malwoodauto.com.au](mailto:sales@malwoodauto.com.au)

Installing a manual pedal box involves undoing large portions of the dash.

As a rough guide, some of the steps needed to be taken are:

- Remove dash surround.
- Remove instrument cluster.
- Remove steering column.
- Undo brake pedal from booster.
- Undo the dash cover adjacent to the windscreen, and undo the screws hidden under there.
- Pull the dash forward.
- Undo the pedal box bolts.
- Manoeuvre the pedal box out, being careful not to get caught on any wires.

## Part 2: Tools Needed

- Phillips head screwdriver
- Flat blade screwdriver
- Multi-grips
- 13mm, 15mm, 17mm, 18mm, 19mm Spanners
- 13mm, 15mm, 17mm, 19mm Sockets (1/2" or 3/8" drive)
- 7mm, 8mm, 10mm, 13mm Sockets (1/4" drive)
- 1/4" & 1/2" drive Ratchets preferable
- 1/2" drive Uni-joint
- Various extensions bars for both ratchets
- Torque Wrench
- 3/8" Allen Key
- 4 axle stands
- Trolley Jack
- Long nose pliers.
- Electrical tape
- Methylated Spirits
- Clean Rags
- Bucket or drain-pan
- Hammer
- Soldering Iron
- Solder
- Heatshrink tubing
- A funnel and hose
- Thread locker (such as Loctite 262)



## Part 3: Interior

It is handy to perform some of these steps before you jack the car off the ground, or get too dirty.

First we remove the automatic shifter from the centre console.



Grab a spanner or some multi-grips and loosen the nut on the auto-shifter.

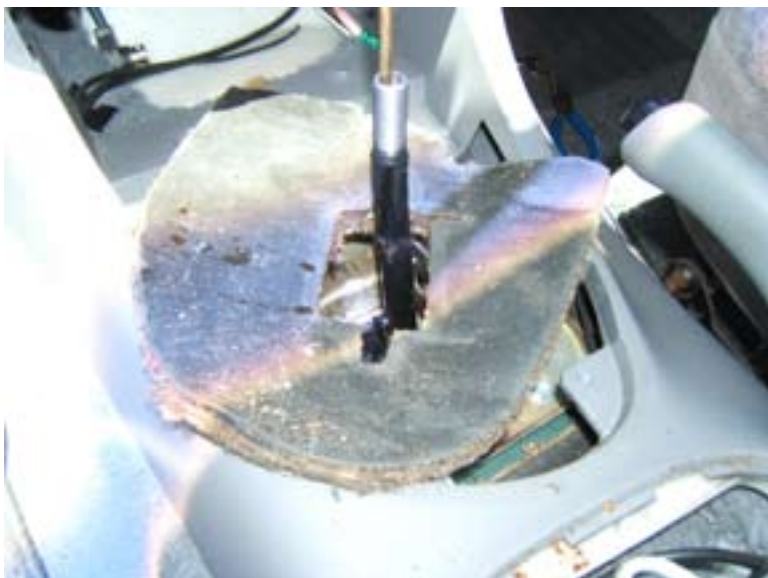
Now you can undo the whole knob by turning anti-clockwise.



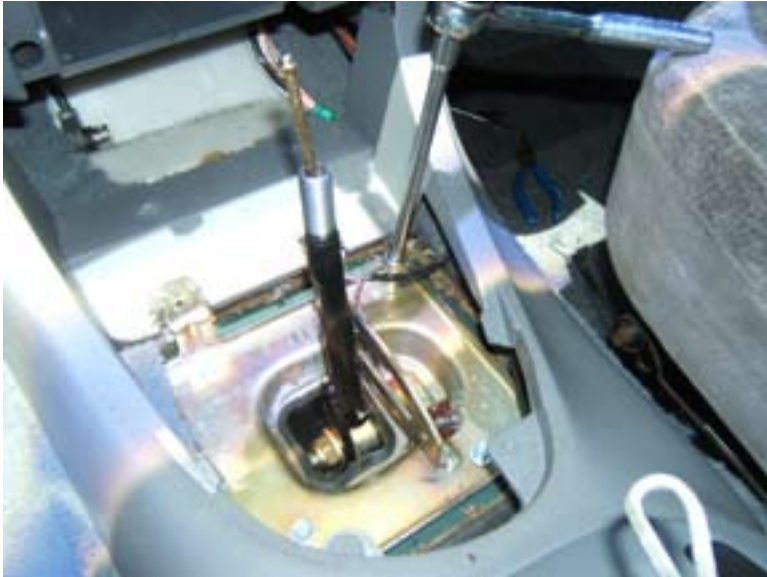
Stick a flat blade screwdriver under the surround and gently lever upwards.

It should pop out without too much effort.

With the rear of the surround elevated, put the car into 'D', as there is a plastic strip underneath that will restrict the surround from coming out easily.



Pull this padding out.



Undo each of the four nuts using an 8mm socket and extension.

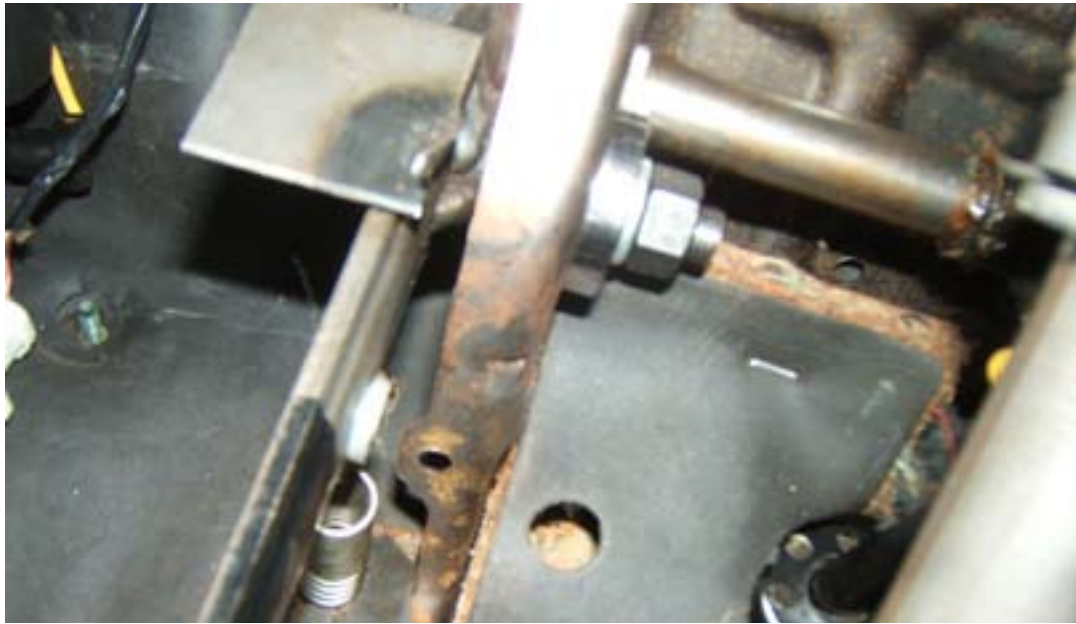


Pull the metal shifter assembly as far out of the console as you can.

Using a 13mm socket or spanner, undo the nut as shown.

The assembly will now come free, and it is now ready to install the rubber boot for the manual shifter.





Installation  
of  
Clutch  
Pedal



Install Mal Wood clutch pedal pin onto clutch pedal  
as shown.



There is a hole in the pedal box that will accommodate the clutch pedal.

Ensure that one of the metal 'rings' with the cut-outs is on each side of the pedal box, and that the cut-outs fit neatly into the shaft above.



With the rubber boot out of the way, it is easier to get the gearbox into the car.



Now install the rubber boot, and tighten down the four screws.



Install the gear lever, and tighten the two bolts.

Put lower dash surround back on.

Install gear boot.

Install Gear Knob.

The last thing that needs to be done is to trim the brake pedal down to size as the auto pedal is a lot wider. Using the method of your choice (hacksaw, angle grinder etc) trim this down so that the manual rubber pedal cover fits on.

Alternatively, if you did purchase a manual pedal box, you can swap the brake pedals over.



# Part 4: Mechanical

Before you begin you may wish to disconnect the negative battery terminal.  
Also note that on EA-ED, you will need to disconnect the handbrake underneath the car.



The first important step is to jack the car up onto four axle stands.

It is important that the car is as high as possible.

If you have lowered suspension this can be quite difficult.

Driving onto planks of wood, and jacking up the front/rear incrementally can be beneficial.



Prepare a bucket (or two) for draining the fluid from the transmission.

You will need a 10mm socket, and you should begin by loosening the rear bolts right off.



Some fluid will begin to drip out, and by loosening the middle/rear bolts you can make it flow out quicker.

When it has stopped flowing completely, do the bolts back up.



Using 15mm & 18mm spanners, undo all of the tailshaft bolts.

Note that if they haven't been undone before they could be very tight.

Rest the rear of the tailshaft on the ground, but leave the other end in the transmission.



Undo the two screws and remove the snorkel from the car.

Undo the 15mm Bolts on each side of the radiator.

This will allow the radiator to move when the engine leans backwards against the firewall later on.



Disconnect the plugs from the thermofans.

Also undo the 10mm bolts on each side of the thermofans.

Remove the thermofans completely from the car.



Using a 17mm spanner undo the top transmission cooler line.



Again, using a 17mm spanner undo the bottom transmission cooler line.





Undo the 8mm bolts on each side of the inhibitor switch.

Undo all the plugs & cut any cable ties.

Clear all of the wiring right out of the way.



Using a 17mm spanner undo both of the transmission cooler lines from the box.



Have the bucket ready again as they may drip.



Undo the 13mm bolts, and separate the cooler lines from the rubber.

There is another piece like this further back towards the box. Separate that with a screwdriver and remove the lines from there also.

I managed to pull the lines out from the front of the car in one piece, but it is much easier to just cut them into smaller sections.





Now we need to remove the starter motor.

Begin by using a 13mm socket and long extension, and removing the top bolt. This will not be an easy task as there are hoses and pipes in the way.

The extension should be long enough so that when the socket is on the bolt, that the ratchet fits neatly behind the starter motor as pictured.

I could not fit a 1/2" drive extension through and ended up using a 1/4" drive.



The bottom bolt is much easier to get out.

When both bolts are removed, pull the starter motor out and rest it out of the way.

There's no need to remove it completely from the car.



There is a bolt on each side of the bellhousing that holds the sandwich plates on.

These can be undone using a 13mm socket.



There are two brackets that go from the engine block to the bottom of the bellhousing.

We need to remove these.

These can also be undone using a 13mm socket.



Remove the brackets from each side of the engine.

These can also be undone using a 13mm socket.

You don't really have to remove these brackets, but it makes life easier with them out of the way.



You can now pull the lower sandwich plate off.

(That's if it hasn't fallen out already)



Wedge a screwdriver or similar into the ring gear to stop the drive-plate from moving when attempting to undo the bolts.



Using a 17mm socket, remove the four bolts on the drive-plate.

Undo the bracket between the transmission and exhaust pipe if it is still present.  
(Not pictured)





Gather a small piece of wood to protect the transmission oil-pan.

Place a jack under the oil pan, and jack it up until it is taking the weight of the transmission.



Using a 13mm socket, undo the bolts in the crossmember.

You can now lower the jack down a bit to create easier access to the top bellhousing bolts.



Using a 19mm socket, undo the bolts on either side of the bellhousing.



Using a 19mm Spanner, undo the bolt retaining the dipstick to the bellhousing.

At the base of the dipstick there is also a 7mm bolt which should be removed.

Withdraw the dipstick tube from the transmission.





Using a 19mm spanner, undo the top bellhousing bolt on the driver's side of the motor.



Using a 19mm spanner, undo the next bolt up on the passenger's side of the bellhousing.

This is one of the most difficult parts of the conversion due to the space limitations.

I found it best if you place the spanner vertically, latch onto the bolt and pull downwards.



This is the last bolt.

It is right at the top of the bellhousing on the passenger's side.

Again, just place a 19mm spanner on it vertically, and pull downwards.

Note: The order of the bellhousing bolts doesn't matter much. This is just the order that I happened to do them in.



If you pull back on the transmission a bit, it should jump off the dowels.

You are now ready to start lowering it.



Lower the transmission carefully, keeping an eye on all sides to make sure it doesn't catch on anything.

When it is all the way down, roll it off the jack and drag it out from under the car.



Wedge a screwdriver or bar into one of the holes in the driveplate and turn until it hits the block.

Then, using a 19mm socket and large ratchet or breaker bar, undo the driveplate bolts.



All that's left is the upper sandwich plate.

It's best to remove it at this point, as it will probably jump off anyway when installing the spigot bearing.

That's it in terms of removing the auto. Now it's time to start installing the manual.



First thing is to gently hammer the spigot bearing into the back of the crankshaft.

If you feel so inclined, now may be a good time to replace the rear main seal.





Clean the flywheel up with a clean rag and metho.



Install the upper sandwich plate back onto the block.

Install the flywheel onto the crankshaft, and rotate until all 6 of the bolt holes line up. Screw the 6 bolts in by hand, use of thread-locker is recommended.

Wedge a screwdriver into one of the clutch holes to prevent the flywheel from spinning.

Use a torque wrench and 19mm socket to do the 6 bolts up to 70-80Nm  
(Check workshop manual for EA-ED specs)



Give the pressure plate a clean with metho and a rag too, if it is second hand.

Make sure that the driven plate sits 'inside' the pressure plate as pictured.



Lift the clutch assembly up onto the flywheel so that it sits on the 3 dowels.

Screw the 6 bolts in by hand.  
Use of thread locker is recommended.





Before tightening too far, we have to align the clutch so that the input shaft on the gearbox can fit.

You can use a special tool, or try aligning it by eye.

The idea is to make all 3 circles (spigot, driven plate & pressure plate) line up perfectly.

When this is achieved, do up the 6 bolts evenly using a torque wrench and 13mm socket to 27Nm.



Make sure the clutch fork and throwout bearing are installed in the bellhousing.

Lift the bellhousing up onto the dowels.

Install lower sandwich plate, and screw in the two small bolts (13mm) that retain it.



Install the engine-to-bellhousing brackets back onto the engine block using a 13mm socket.



Do up the bottom bellhousing bolts now that the brackets are installed.



Don't forget to put the heater pipe bracket back onto the driver's side top bellhousing bolt before tightening.



Screw in by hand the 6 larger bellhousing bolts.

Then, to do up the top bolts you can use a uni-joint and extension bar on a 19mm socket.

This is a lot easier than using the spanner when removing the auto.



Once all the bellhousing bolts are done up we can install the clutch cable.

Screw back the two nuts on the cable so that the threaded part is able to stick through the firewall as far as possible.



Then insert the cable through the hole in the firewall near the brake booster.





Take the split pin off the clutch cable so that you can remove this bracket.

Remove the two plastic bushes, and insert the clutch cable through the bracket as pictured.

Put the two plastic bushes back on, insert onto clutch cable, and re-install the split pin.



Run the clutch cable down the side of the engine bay away from the exhaust manifold, and then along the steering rack.

Ensure there are no sharp bends in the cable.

You can use cable ties to hold it in position if



Insert the other end of the clutch cable through the hole in the bellhousing as pictured.

Install the black plastic dust cover to the bellhousing.



Install the rubber damper onto the clutch fork.

Pull the clutch cable onto the hook.

Close the lid on the dust cover.

Install the starter motor.

Installation is the reverse of removal. If you do up the bottom bolt first, it will hold the starter motor in place while you do up the top bolt.





Now we are ready to install the gearbox.

Apply a small amount of grease to the input shaft, and to the inside of the throwout bearing.



Place the jack under the middle of the box, and start jacking up.

When possible make sure the input shaft goes into the throwout bearing.

Keep jacking up until the crossmember reaches the floor.



Slide the gearbox all the way up to the bellhousing.

If you are finding this difficult, get an assistant to push the clutch in for you.

Do up the four 15mm bolts tightly.



Do up the two 13mm crossmember bolts tightly, and let down the jack.

Install the tailshaft into the back of the gearbox, and bolt it back up to the diff tightly.

Use of thread locker is recommended for the tailshaft bolts.



To finish up, we need to fill up the gearbox.  
You'll need:

A 3/8" Allen key to drain the gearbox.  
2L of DexronIII  
(Castrol Transmax Z is a fully synthetic version for those after higher quality stuff)  
A funnel and some hose.  
A bucket.

Note: Lubrizol 7906 is a recommended additive for the gearbox.  
If you can source it I would suggest you add it when filling with the DexronIII.



Undo the lower drain plug, and let any fluid run out into the bucket.

When it is finished, tighten the drain plug back up.

Undo the top plug.



Feed the hose down through the bottom of the engine bay and stick it into the top plug hole.

Empty the 2L of DexronIII into the funnel.

When done, remove the hose and tighten the drain plug back up.

Re-install the radiator, thermofans, snorkel etc to the car.

Adjust the nuts on the clutch cable so that the pedal sits roughly 140mm from the floor.

That's it for the mechanical side of things, we now need to sort out the electrical.



## Part 5: Electrical



Disconnect the two plugs, and remove this loom from the car.



Remove the conduit and electrical tape from the wiring.

You will be able to separate out two looms, one specifically for the auto, and one for reverse lights, neutral switch and speed sender.



On the auto loom (which is the one with the big round plug), we are going to add some resistors to 'trick' the ECU into thinking everything is OK.

If you have bought a Manual ECU you can skip this step.

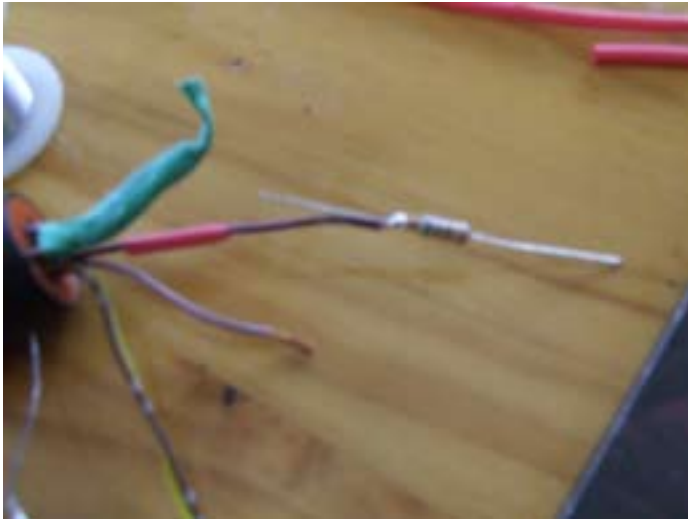


The four wires we need are:  
Light Brown with Red Stripe  
Solid Yellow  
Solid Violet  
Purple with Green Stripe



Two of the wires terminate at their own separate plug, but the other two are grouped in with the rest.

Once you have separated these, you can cut the rest off. I chose to leave a few cm and cover in heatshrink tubing.



Now, you will need to purchase two resistors.

I used 1 watt 1.2K and 6.8K resistors from Dick Smiths. (Note: If you can find a 7k resistor, use that instead of 6.8k)

The 6.8k resistor needs to be attached between the Violet and Purple-Green wires.

I recommend you solder these in, and use some heatshrink to protect the joints.



The 1.2k resistor needs to be attached between the Light Brown-Red wire and the Yellow wire.

You should end up with something similar to the picture.



I added another lot of heatshrink around each resistor for extra protection.



Then finally, I used a larger diameter heatshrink tube around the lot.

This should have plenty of protection from the elements, and looks fairly neat as well.

Note: The following also applies to those with Manual ECU's.

The next step is to grab the 'manual' loom, which is the one with the rectangular plug.

It has the speedo sensor on it, as well as a plug with four wires.

We are going to cut the this plug off right at the end, leaving plenty of room to reach the gearbox.







You will also need to source four female spade plugs.

These wires provide us with the neutral & reverse switches.

Neutral switch:

Black with Green Stripe, Red with Blue Stripe

Reverse switch:

White with red stripe, red with black stripe



Crimp the spade plugs onto the end of the wires.

I used different colour plugs so they didn't get confused.



Once all of the plugs are on, start taping the loom back up.

Try and use a single piece of tape for the whole lot, as this will help prevent the tape from peeling off.



As a final touch, re-fit the plastic conduit and you are now ready to install it back onto the car.

The top switch on the gearbox is the neutral one, and the bottom switch is the reverse one.

If you have cruise control you may also want to set up a switch for the clutch pedal.