

My Hawk build Part 7 by Stuart Clarke Installing the Engine and Transmission.

The logical next step with my build would normally have been installing the rear axle and suspension. This has taken a bit of a back seat as Gerry is having supply problems with the special rear leaf springs.

So rather than sit back and sulk, I decided to crack on with the engine and transmission. It's something that needs doing and doesn't really affect anything else. It was difficult to find a real idiots guide to doing this so all of the info was collected from a number of forums, "You tube" searches and reading a couple of books.

I managed to collect all the parts I needed over a couple of months ready to assemble. The parts list was as follows.

- Engine
- T5 Gearbox (World class version from Real Steel)
- Clutch (standard Sacks 10.5" clutch kit which included clutch, cover, throw out bearing, pilot bearing and alignment tool.)
- Fly Wheel (cast 157t 28oz this is different to the later 302 engine flywheel)
- Bellhousing (standard aluminium 6 bolt SBF to T5)
- Splash plate (this fits between the engine and bellhousing and stops the crud getting in at the bottom of the bellhousing. I got this from Gerry)
- Starter motor
- Clutch actuator kit (from Gerry. This includes the fork, mounting pivot and spacer and slave cylinder)
- Bolts to mount clutch fork pivot
- Bolt kit to mount Bellhousing to Engine
- Bolt kit to mount Gearbox to Bellhousing
- Bolt kit to mount Flywheel
- Bolt kit to mount clutch cover to Flywheel
- Dowels to mount clutch cover to Flywheel
- T5 to chassis mounts
- Bolts to bolt engine mounts to chassis
- Bolt kit to mount Gearbox to mount and mount to chassis
- Bolt kit to mount starter motor to Bellhousing

I think that's it.

The first job is to drill the holes in the bellhousing to fit the clutch fork mounting pivot. Gerry has got a jig for this and if you ask him nicely and promise to ship it back I am sure that he will lend it to you.



This lug needs to be cut off. (It's much easier to do this now!)

The jig bolts to the Bellhousing and just needs a couple of holes drilling.

The next job is to remove the pivot ball as this isn't needed for Gerry's clutch actuator kit.



I even ordered an extra one of these as I was told that I'd need it. It was promptly sent back for a refund.

The next bit gets a little tricky as you need to check the alignment of the bellhousing to the engine. The reason for doing this is to ensure smooth operation of the clutch and gear changes. The manufacturing tolerances of the bellhousing shouldn't be trusted to be right and there are a number of solutions if the alignment is out. We are checking for centrality of the gearbox mounting face and also parallelism.

I'm lucky as I work for an engineering company and I was able to borrow the equipment I needed. To do this task you need a Dial Indicator and stand with either a magnetic base or some kind of attachment to bolt it to the crankshaft. First the Splash plate and Bellhousing need to be fixed to the engine and torqued up to the correct torque setting.



The dial indicator is then mounted to the crankshaft output face with the DI nib touching the inner edge of the opening for the gearbox.



When the crank is turned (by using the harmonic damper bolt),



readings can be taken from the dial indicator at the “hours of the clock” around the complete circumference of the hole. The more measurements that are taken the more accurate the results. The acceptable tolerance in alignment is < 0.005 ” or $< 0.127\text{mm}$. My readings were as follows.

12 O Clock	0.000mm
3 O Clock	0.030mm
6 O Clock	0.060mm
9 O Clock	0.040mm

This was less than 0.0025 ” which was within tolerance.

If the measurements are out then the fixed dowels can be replaced by offset dowels which can be rotated to shift the centreline of the bellhousing. If this is needed I’d advise you to recheck the readings again to be sure that it is within tolerance.

To check the parallelism, the readings need to be repeated but this time the measurements need to be taken from the front face of the same opening.
(Gearbox mounting face)

My measurements were fine. They were within 0.090mm which I thought was fine. If these measurements aren’t OK then shims will need to be added between the Bellhousing and engine or the Bellhousing to engine face needs to be machined.

The next step is to start the assembly.

First thing is to install the pilot bearing. This fits into the crankshaft output flange. In years gone by, this was a solid bush but nowadays a proper needle roller bearing is used. Using a suitable drift this is just tapped in.



Before the fly wheel is bolted on, it's best to **press** in the dowels. I wouldn't advise hammering them in!



The flywheel can only be bolted on one way as one of the 6 mounting holes is offset. The bolts are special bolts and they also need to have sealer smeared on them as the holes are open to the sump on the other side. I was advised by Tim

Adams, the engine builder, just to use the ARP sealant. He's built hundreds of engines so I took his advice.

Painted splash plate first and then the Flywheel.



All torqued up to 75 ft/lb. You need to lock the flywheel to enable you to get to the torque or else the flywheel turns. I wedged a screwdriver between two teeth against a bellhousing bolt which worked fine.

Clutch plate and alignment tool next and then the clutch cover.



Ensure that the allen cap heads are 12.8 tensile. Nip up the clutch cover bolts to hold the clutch in place then pull out the alignment tool twist it and push it back in

to see that clutch is well aligned. I've seen bent alignment tools that align the clutch off centre so it's best to check.

Torque up the clutch cover bolts to 30ft/lb (opposite to opposite), job done.

Gearbox next.

I've seen that it is good practice to spray the gearbox input shaft with Dry Moly spray. This spray is heavy load dry lubricant and is ideal to lubricate the throw out bearing movement.



The gearbox is then bolted to the Bellhousing and the clutch fork (with pivot



mechanism) and throw out bearing are installed.

The gearbox and bellhousing are then carefully mated to the engine and clutch. I'll be honest, this went together much easier than I thought. I did it myself with the engine on its transport stand and the gearbox slung from my engine lifter. The key is an element of care to ensure that the gearbox input shaft doesn't get damaged. You just need to ensure that the splines on the input shaft line up with those on the clutch.

The gearbox can then be pushed on and the bolts need to be fitted between the bellhousing and engine. My bolts wound up really easily. If they don't it's best to



split the unit again and just check that everything is lined up correctly.

I fixed the gearbox mount to the chassis and lowered the complete assembly into place. 2 bolts to bolt the gearbox to gearbox mount and 2 bolts to attach the



engine mounts to the chassis. I fitted the starter motor in place, all done.

All that is left to do, at a later date, is to fill the fluids. I'll do that when I get the prop shaft and yoke fitted.

