

Interested in tools or products that will make life easier as a builder? Here, Nigel, our Technical Editor runs you through this month's 'must-haves' for the kit car garage.

This month's Tech Products is going to primarily focus on a particular offering capable of resolving an issue often confronted by kit car builders considering Rover V8 power. Since the commencement of my Rush project I have received a steady stream of emails concerning this unit's installation; interestingly it's not the engine, but the gearbox. When faced with exactly the same problem, I was pleased to learn RPi Engineering had developed the ultimate solution. Before I run through this well-engineered alternative, let's see what is causing all the fuss.

Until very recently a kit car builder faced with installing a Rover V8 powerplant (regardless of age or state of tune) was faced with the following candidates in the cogs department:

Option 1. The LT77 fitted to the Rover SD1, early Range Rovers, Sherpa Vans, Land Rover Discovery and TVRs, which was in production for well over a decade.

Option 2. The R380 used in the Morgan Plus 8 and MG RV8 models in two wheel drive format. The box is also available in four wheel drive format, as found in numerous Land Rovers, but conversion to rear wheel drive is expensive and involved.

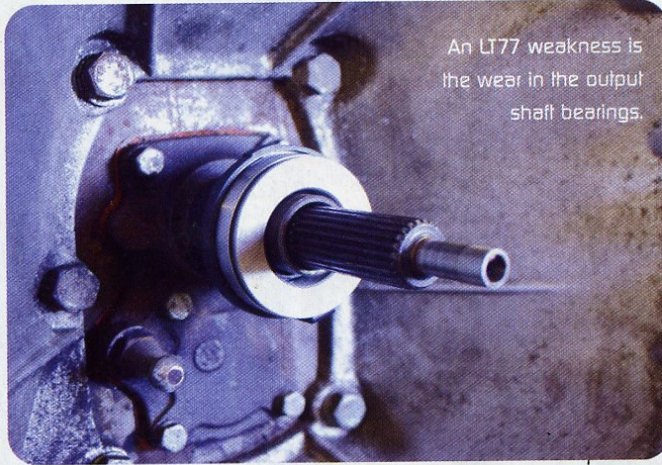


LT77 – the common route to Rover V8 cogs.

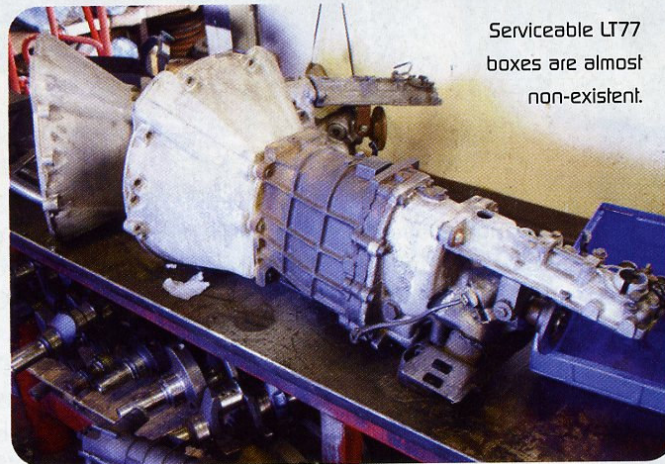


R380 - the later alternative.

Considering option 1 first, apart from the obvious abundance of donor boxes they also come in five speed manual format, bolt directly to the Rover powerplant, cost around £125 to £225 (even more for the bell housing) and provide a perfect spread of ratios. If that



An LT77 weakness is the wear in the output shaft bearings.



Serviceable LT77 boxes are almost non-existent.

were not enough to tempt a kit car builder, a unit in good condition can cope with 250 bhp plus. Sounds great, but the box has an inherent design problem which will cause problems. The input shaft is held into the front casing of the transmission by a 'tapered roller bearing'. This bearing's tolerance is 'pre-set' in the factory with shims of varying thickness and offers no simple adjustment for servicing etc. Over time the input shaft becomes slack within the front cover, causing misalignment which in turn affects the meshing with the layshaft. The net result is extensive damage throughout the box which can potentially start at only 70,000 miles, causing clunking, poor gear selection and whining - all in all, not ideal in a high performance kit car! You may think reconditioning is the answer, however the vast majority of boxes are too damaged for this to be financially viable.

The second option, the R380, is a later and stronger box and on the face of it is an

ideal replacement for the LT77. It has almost identical ratios, the ability to handle 300 bhp and shares almost identical dimensions. Even better, this later box also has the advantage of not having reverse positioned just to the left of first as in the LT77. This negates the risk of selecting reverse rather than first at the lights. Sounds perfect, but ...

The big problem is that nearly all R380 boxes were produced in four wheel drive format and conversion to two wheel drive is both expensive and very involved. Sourcing a secondhand two wheel drive unit from a scrapped Morgan Plus 8 or MG RV8 is obviously extremely unlikely. To make matters worse, new units are no longer available. Hmm ... now you understand the dilemma.

The solution

You may think the solution is just a case of selecting another donor, but unfortunately in latter years the Rover V8 has only been fitted to four wheel drive vehicles. Since conversion of these units to two wheel drive is not viable, the entire Rover V8 specialist industry has been searching for an alternative. RPi Engineering have just launched a bespoke solution and, in collaboration with Transmission Components Ltd, can now supply a set of cogs to meet all requirements - Morgan, TVR, kit cars, in fact anything which needs to transfer serious Rover V8 grunt to the rear wheels. RPi's very first customer for this installation was yours truly, and as I type these words I have just installed the brand new box, bell housing and slave cylinder set-up in my Rush CW460. Details of the carefully selected hardware which solves this age-old problem follow:

The gearbox of choice

Brand new, rear wheel drive gearboxes are more scarce than you would imagine. Add to this the requirement to cope with serious amounts of torque and the search gets even harder. However,



The new Tremec T5 bell housing from RPi Engineering.

there is one brand you will all be familiar with: Tremec. Used in numerous Cobra replicas, these boxes are hard to beat on all counts. The model found in the RPi Rover V8 solution is the legendary T5: a five-speeder developed for a broad range of vehicles including the Ford Mustang, TVR Cerbera, TVR Tuscan and a few less glamorous American SUVs. Dimensionally the box is only very slightly larger than the R380. In some applications its installation may require slight chassis modification (a case in point being my Rush), however this variation is now a standard offering from D J Sportscars and I'm sure more manufacturers will follow suit. As regards the position of the gearlever, this is about 15 mm closer to the bell housing than our older candidates. Having sat in my Rush, the gearstick is perfectly positioned, so

this slight discrepancy has no undesirable side effects. Even though slightly larger, the T5 is considerably lighter than the LT77 and R380 - by a third in fact - shaving off over 16 kilos. This significant saving is thanks to a die-cast aluminium casing, unlike the cast iron affairs of the older duo. Utilizing the latest tapered roller bearings and selector technology, the end result is durability, easy gear change and reduced noise operation. There are no worries about the internals

copied with the Rover V8's grunt as the box is rated at over 300 lb.ft of peak torque. Comparing the ratios of all three boxes is interesting. As can be seen from the table the Tremec has taller gearing in all but fourth (which is a direct drive, as in most boxes). This is absolutely perfect for a V8 powered lightweight kit car, because over-revving is a common problem which can ruin a driving experience.

Gear	LT77 Ratio	R380 Ratio	T5 Ratio
1st	3.321:1	3.321:1	2.950:1
2nd	2.087:1	2.132:1	1.940:1
3rd	1.396:1	1.397:1	1.340:1
4th	1.000:1	1.000:1	1.000:1
5th	0.792:1	0.770:1	0.630:1

Note: The LT77 ratios shown above were the most common, others were also produced.

Mating the T5 with the Rover V8

The next challenge is to mate the Tremec T5 gearbox to the Rover V8 block and this requires a bespoke bell housing. Apart from accommodating the Ford and Rover bolt patterns, care has to be taken to ensure the primary shaft sits perfectly in the spigot bearing once both assemblies are mated. In addition, internal clearance must allow for

standard flywheel and clutch assemblies to be accommodated. As you can imagine, tooling for such a component is not inexpensive. However, RPi could clearly see a significant demand not only from the kit car market but also the Morgan and TVR fraternities. Cast from high quality aluminium, and subsequently CNC machined, RPi can now offer an unlimited supply of these bell housings.

Flywheel, clutch assembly and starter motor

As mentioned above, the new bell housing accommodates the standard flywheel and clutch assembly which means sourcing these components is simple. Lightened and balanced assemblies are also openly available. As for the starter motor, this remains mounted to the engine side of the

coupling and remains totally standard. A bespoke phosphor bronze spigot bearing is also supplied which is pressed into the Rover V8 crank prior to mating.

Slave cylinder set-up

If you are running an underslung exhaust system, the use of an externally mounted clutch slave cylinder can cause problems. The close proximity of the header and hydraulic system can cause the fluid temperature to increase to such a point where 'soft pedal' results. To overcome this and general clearance issues, RPi have incorporated a concentric slave cylinder. This sits within the bell housing and mounts on the gearbox primary shaft. Such a set-up is very popular in motorsport due to the significant reduction of moving parts, such as the release fork, release shaft and guide tube. This not only reduces weight but also provides an extremely positive clutch action, increases reliability and longer working life. Unlike some other offerings, the slave cylinder is not integral to the bell housing, allowing cost-effective maintenance at a later date.

The plumbing is straightforward, with the braided hose from the master cylinder passing through a hole in the bell housing prior to attaching to the slave cylinder. Another braided hose then exits the bell housing casing to allow for the bleeding of the system.

Propshaft

Kit car companies are familiar with the Tremec family of boxes, and already D J Sportscars can offer an off-the-shelf propshaft for the T5 to a Ford Sierra differential. As the T5 becomes more

popular other kit car companies will naturally follow suit. It is worth remembering, due to the larger coupling with the Tremec propshaft compared to the LT77 and R380, clearance within the transmission tunnel must be checked before committing to this route.

The advantages

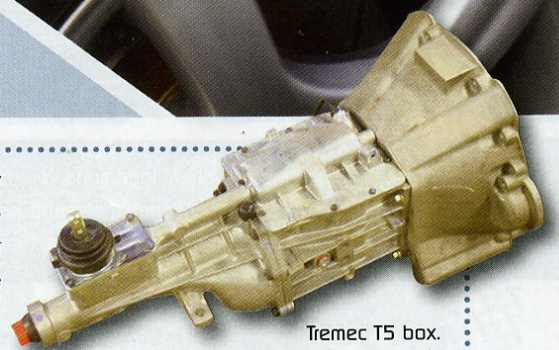
As you can appreciate a considerable amount of research and development has gone into this solution, not to mention investment. If you are considering installing a Rover V8 in a kit car, Morgan, TVR or any other rear wheel drive vehicle, the RPi T5 solution is obviously a serious consideration. Benefits include:

- Stock readily available.
- 100% brand new components.
- Ability to cope with significant power and torque.
- Superb gear change.
- 33% lighter than the LT77 or R380.
- Perfect ratios, well-suited to a V8 torque curve.
- Concentric slave cylinder providing improved chassis clearance and avoiding potential overheating issues.
- Supplied as a complete kit (or in parts) from one of the most knowledgeable Rover V8 specialists in the business.
- Free technical advice.

The price

Prices are as follows:

- Bell housing £225 plus VAT
 - Concentric slave cylinder £225 plus VAT
 - Tremec T5 gearbox £1350 plus VAT
 - Complete installation £1,800 plus VAT
- To some this may sound a little expensive compared to a £400ish for a LT77, slave



Tremec T5 box.

cylinder and bell housing, but compromise on the gearbox or powerplant and you will regret it - I remember piloting a 4.2 litre Rover V8 powered Cobra. Pulling away in first was great, snatching second clamped you against your seat, but could I find third? I had to let the revs drop before the box decided it was OK for me to go above 40 mph. It completely ruined the driving experience.

So if you are interested in this upgrade, RPi Engineering can be contacted on 01603 891209 and they will answer all your questions. Alternatively, visit their website www.v8engines.com and view their extensive range of Rover V8 hardware.



Concentric release bearing.

Sealey's toolbox promotion

Sealey are just launching their 'Toolbox' promotion with offers valid until the 31st December 2008. Sealey are slashing prices on a diverse range of topchests, rollcabs, boxes and benches - this really is toolbox heaven for the kit car builder!

Check out the NEW 'Premier' range of top chests and roll cabs and the NEW and exciting 'Premier Line' tool trays designed to fit the AP24 series. These are rugged plastic moulded trays which hold a bespoke selection of hand tools. Apart from keeping everything in order, you know exactly what's missing

at a glance. Handy for keeping tabs on all those hand tools. Apart from the savings you receive when using this promotion, you can be assured of the quality. Sealey's 'American PRO' and 'Superline PRO' ranges are also featured, again offering you fantastic savings and FREE tools on most deals!

You can get your hands on a copy of Sealey's 'Toolbox' promotion and their latest catalogue from your local Sealey distributor or directly from Sealey by calling their literature hotline on 01284 757525. Alternatively visit the website www.sealey.co.uk for further information.



Sealey tool box promotion