# The Madness Continues

Fitting an A type Overdrive Gearbox to a TR2

(including upgrading of electrics)



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#### 1. Acquisition of Overdrive Gearbox.

I only sourced an Overdrive gearbox after completion of the rebuild of my TR2 so its fitment became a post rebuild project. The only Triumph overdrive gearbox I could get locally at the time was an A type which turned out to be a basket case as the main shaft was damaged beyond repair. On complaining, the scrap yard miraculously found another unit that appeared to be seized but fortunately, on opening was found to be fine. The task of rebuilding the gearbox and overdrive was initially given to Owen Chandley of Emanual Gearbox Repairs who unfortunately passed away before he could complete the job, so the gearboxes were retrieved and passed on to Eddie Jansen to affect the work and get one serviceable gearbox and overdrive from the two.

When the rebuilt box was received back from Eddie I procrastinated fitting it to my rebuilt TR2 as I was loath to remove all the beautifully fitted carpeting, however my hand was eventually forced when the car started jumping out of second gear with selection of all gears becoming increasingly difficult.

I was now faced with the task of effecting the final adjustments and modifications required in order to fit the unit. However before commencing operations I checked through past copies of Sabrina and found that two articles had previously been published on the subject, the first by Brian Brown, "Overdrive Box Conversions on TR2/3/3A" (December 1990), and the second by Brian Richards titled "Sidescreen Workshop, Triumph 2500 Gearbox and Overdrive Conversion" (September 2006). Both these articles were of assistance and encouragement in tackling this task, though the latter was more relevant to the J type gearbox.

The trials and tribulations experienced in tackling this task have encouraged me to document a more detailed account of what was required, which I hope will be of assistance to anyone else embarking on such a project.

Both the A type overdrive gearboxes I had acquired in order to achieve a working rebuilt unit, had a number of external parts missing which proved to be difficult and costly to source, i.e. overdrive solenoid, speedometer drive and bearing, clutch cross shaft and lever end together with fork, as well as the carrier for the release bearing. In addition neither of the overdrive gearboxes had provision for the fitment of the isolator switches on the gearbox covers, which I found very strange.

Had I realised the above when purchasing the overdrive unit I would certainly have been in a strong position to negotiate down the original purchase price.

# 2. Solenoid and Speedometer Drive.



I was fortunately able to obtain a second hand solenoid from Charles Mitchell but the speedometer drive and bearing proved more difficult and was ultimately sourced from Moss UK. However without a sample or knowledge of what the speedometer drive and bearing looked like it was difficult to identify the correct part as

there are a few variations. As to be expected the one initially supplied was incorrect and had to be returned. This not only was a bit of a mission but also costly.



The speedometer cable was connected to the original 4 speed gearbox on the left and came in to the housing at an angle for easy fitment. However in the case of the A type overdrive gearbox the speedometer drive and housing are on the right hand side of the overdrive at a right angle to the drive shaft plane which necessitated the fitment of a 90 degree angle convertor for the speedometer cable. This also could not be sourced locally and had to be imported from Moss UK, again not cheap.

# 3. Clutch Release Bearing, Carrier, Cross Shaft and Fork.

As these parts were missing from the overdrive gearboxes acquired, I initially thought that I could reuse the parts from the four speed box that was currently in the car. However I found that this is not possible due to the difference in diameter of the gearbox input shaft and front cover extension on which the carrier for the clutch release bearing runs. (Overdrive gear box diameter is much smaller.). I was fortunate to be able to source the smaller carrier and release bearing (TR2 release bearing also much too big) from Alan Dickens in Bloemfontein. Luckily I was able to reuse the clutch cross shaft and lever end together with the fork, from the four speed gearbox. However due to the smaller diameter of the release bearing carrier, the locating pins on the fork were too short to engage in its slot. Consequently new locating pins were machined to fit by Robbie Deysel Engineering.

# 4. Gearbox Input Shaft and Clutch

Of the two Gearboxes I acquired there was strangely a difference in the length of the input shafts, the one being about 10mm shorter than the other and approximately flush with the end of the bell housing, while the other protruded

![](_page_4_Picture_3.jpeg)

past the end of the bell housing. In order to fit into the guide hole in the motor, the longer shaft was required, but it was unfortunately the shorter one that was serviceable and fitted to my rebuilt box! Natt Potgieter solved the problem for me by turning a small extension cap that we fitted on to the shorter shaft. Again, this is something to look out for when making the initial purchase of an overdrive box.

With the thinner input shaft and consequently smaller spline, clearly the old TR2 clutch plate would have to be replaced. Initially I thought that a Triumph 2000 clutch plate should work, however, although the spline fitting was correct, the diameter of the clutch facing was wrong. The TR2 clutch specification was 232x31.8-10 whereas the Triumph 2000 was 212x25.4-10. Accordingly what was needed was a 232x25.4-10 replacement. Going through a Repco catalogue I found that a 1966 Holden HR Series clutch plate matched, and was fortunate to be able to purchase one off the shelf from Ranger Clutch in Uitenhage.

On refitting the pressure plate with the new clutch in place, to my horror one

![](_page_5_Picture_1.jpeg)

of the bolts sheared off at the low torque of only 20ft lbs. I was luckily able to unscrew the broken bolt section by carefully tapping it with a punch and light hammer. On a close inspection of the other bolts I noticed that a number of them had been stretched through over tightening at some

time, so I replaced them all. Lesson learned.

#### 5. Overdrive Isolating Switches.

As the covers to both the gearboxes I had acquired did not have provision for isolating switches, I thought I could just swop over the cover from the old four speed box as it had provision for overdrive conversion with removable plugs in the threaded holes for the isolator switches. Unfortunately this was not possible as the selector mechanism for reverse was different. I ended up taking the gearbox cover to an engineering works and having the required thread

![](_page_5_Picture_6.jpeg)

tapped to accommodate the isolator switches. (I first checked to see that the activation horns on top of the selectors were in fact there!) The original TR's had overdrive on second, third and fourth, so I decided to replicate this and fitted two isolator switches.

The switches were imported from Moss UK together with the specified spacers (one per switch). On reading the workshop manual a lot of importance was placed on getting these switches correctly adjusted with spacers so as to not impede gear selection. Accordingly I fitted the isolators with the spacers purchased, but found that I could add another spacer made from gasket paper and the switch still operated. (Two of these additional spacers and the switch would not activate). I was very pleased with myself and thought that I had it perfectly adjusted. However I ultimately discovered that by fitting my additional spacer I had made the gap too fine as operating vibrations caused the switch to oscillate, so I ended up removing them and sticking to the single spacers supplied by Moss.

#### 6. Gearbox Connecting Flange to Prop Shaft.

The holes in the flange at the rear of the A type gearbox do not align with

![](_page_6_Picture_2.jpeg)

those of the TR2 prop shaft connecting flange, and the recess in the gearbox flange was too small to accept the locating lip of the prop shaft flange. Tubby Bennet came to my rescue here by turning out the recess to the correct diameter so as to accept the locating lip on the prop shaft

flange, and re-drilling the bolt holes after first closing up the old holes.

#### 7. Gearbox Mounting.

The TR2 four speed gearbox mounts on a horizontal plane whereas the A type

![](_page_6_Picture_7.jpeg)

overdrive box has a vertical offset mounting. Initially I thought that I could use the original TR2 mounting by merely making an adaptor bracket to bolt the two together, but this is not possible as it lifts the rear of the gearbox too high causing the prop shaft flange to foul on the

transmission tunnel. I solved this problem by removing the old mounting completely and replacing it with a 25mm piece of high density rubber (acquired from PE Rubber) to cushion a custom made bracket which was bolted to the chassis cross member through the original gearbox mount fixing holes. Because the mounting bolts on the gearbox are at an angle, it is very difficult to manufacture the bracket before having the gearbox in place. I found it easiest to make a cardboard template of the bracket before fitting the gearbox, and then made final adjustments with the gearbox in place, before making the bracket.

#### 8. Fitment of the Gearbox.

It was clear that the solenoid on the A type box, being mounted horizontally rather than vertically as was the case with the original overdrive units, would foul on either the floor pan or chassis and some modification would be needed in

![](_page_7_Picture_0.jpeg)

this respect. Accordingly I fitted the solenoid and made the necessary adjustments to the operating valve (as per workshop manual recommendation) with the gearbox on the bench, and then removed the solenoid before fitting, to protect it from damage.

With the clutch plate correctly aligned I found it easiest to lift the rear of the engine a little before fitting the gearbox unit, and then with the gearbox bolted to the motor lower the unit to facilitate finalising the gearbox mounting and making modifications to accommodate the solenoid. To marry the gearbox to the motor it has to be initially aligned with the gearbox rotated about 30 degrees as the clutch release arm catches on the floor pan. The gearbox can then be located on the clutch spline and then rotated back so as to fit on to the locating pins once the clutch release arm reaches the broader opening in the floor pan. This is actually a lot easier than it sounds but really is a two man job to do it effectively, one under the car supporting the bell housing and locating the input shaft, and the other in the cockpit pushing the box forward and rotating it once the clutch release arm is clear. On bolting the gearbox bell housing to the block I realised that the reused fixing bolts were too short as the flange on the bell housing through which they pass is approx 10mm thick on the old four speed unit, but on the A type box it is beefed up to about 15mm at the fixing points. This necessitated purchasing longer bolts but unfortunately the correct length required was not available so I had to settle for slightly longer ones and cut them to size, which was necessary, especially for the three blind bolts at the top of the bell housing. Similarly, the fixing bolts for the starter motor required replacement with longer ones as well. The pushrod from the clutch slave cylinder to the fork end that attaches to the clutch cross shaft lever also had to be shortened by approximately 5mm to allow adjustment.

#### 9. Modifications to Accommodate Solenoid.

With the gearbox in place it could easily be seen that the solenoid would foul on the floor pan, and also very slightly on the cross member for the gearbox mounting. To clear the solenoid, it was necessary to cut a small section away from the floor pan and cross member, not affecting it structurally in any way. This allowed the solenoid a very fine clearance, but the vertical lip on the floor pan holding the transmission tunnel made it impossible to adjust the operating

![](_page_8_Picture_1.jpeg)

valve lever with the gearbox in place. To facilitate any future adjustment that might be required I made a further small cut in the floor pan lip to allow such adjustment to be made with an offset spanner. I was expecting the transmission tunnel cover to foul on the solenoid but it cleared it nicely, however it did foul on the speedometer angle

drive which necessitated a little panel beating of the transmission cover to stretch a small bulge to clear the angle drive.

#### 10. Electrics.

The electrics for the overdrive were wired according to the diagram in the

![](_page_8_Picture_6.jpeg)

original workshop manual, which required the use of a relay to provide strong clean current to the solenoid. I decided that I might as well upgrade the lighting system at the same time with the fitment of relays to the head lights, (both high and low beams,) as well as the Lucas "flame thrower" spot lights I had fitted, and incorporate all this wiring into one supplementary loom. As I have some time ago decided that my next project will be to fit an electric fan to the radiator I also included the wiring and a relay to accommodate this. The

A type gearbox is fitted with a switch located on the left side of the gearbox cover to activate a reversing light when reverse gear is selected, similar to the overdrive isolating switches, so I also included wiring to accommodate this

![](_page_8_Picture_9.jpeg)

should I find a suitable unobtrusive classic style reversing light. (Might as well make use of the feature that is already there.)

To accommodate the relays, a fuse box, and switches for the spotlights and electric fan, I made an aluminium bracket that was secured to the firewall, behind the master

![](_page_9_Picture_0.jpeg)

cylinder at one end, and the back of the dashboard at the other. The main power source was taken from the starter motor solenoid and the wiring done in accordance with the attached supplementary wiring diagram.

The original type teardrop operating switch

for the overdrive was imported from Moss UK rather than using a non original switch. Once fitted I was pleased with the decision to go this more expensive route as the switch is perfectly located for ease of operation without moving ones hand from the steering wheel, and has a lovely positive click action.

#### 11.Gear Lever

The A type Triumph 2000 gearbox has a longer gear lever which is at an angle and incorporates the overdrive selector switch in the gear knob. However due to

![](_page_9_Picture_6.jpeg)

its length this gear lever fouls on the TR2 dash and consequently needs to be either shortened or replaced with the shorter straight original TR2 gear lever, which is the option I chose. Although the fixing methods of the two gear levers differs, the housing in the gearbox cover for the gear

lever ball is fortunately similar and can accommodate either fixing method without any modification.

#### 12. Trials and Tribulations.

Once the gearbox was fitted and everything back in place (clutch slave cylinder, exhaust bracket, starter motor etc) a test drive revealed that the overdrive was not working. The gearbox was then removed and taken back to Eddie who replaced the entire overdrive unit with the spare one I had. The gearbox was refitted but the overdrive still was not working. I removed the gearbox again (I could now do it with my eyes closed) and again back to Eddie. Eddie was adamant that the mechanical side of the overdrive was fine and I was confident that the electrics were fine so that only left the hydraulics. We again removed and thoroughly cleaned the filter, the non-return valve and the operating valve and blew the ducts out with a high pressure jet before reassembling the unit. I spoke to Alan Dickens and he suggested that I try using normal multi-grade engine oil (20W50) rather than the thicker 80W90 gearbox oil I had used.

Third time lucky, the overdrive worked! I am not sure whether it was the thinner oil or a blockage in the hydraulics or both, but it was working. I was however concerned that on activating the overdrive there was a short delay before it kicked in, but deactivation was immediate. I discussed this with a number people who have overdrive units and the responses vary, some saying that it should be immediate and others that the slight delay is normal.

Brian Brown however had the view that these overdrive units are all rather old now and consequently a little worn so when adjusting the operating valve one should take the lever on the side of the overdrive a little past the 3/16<sup>th</sup> setting hole which will eliminate the delay.

An interesting view. However, I have not yet tested this theory as at the moment I am happy that the unit is working well and is adjusted in accordance with the workshop manual.

# 13. Conclusions.

The overdrive and synchromesh on first gear make a tremendous difference and it is certainly well worth the effort of conversion. The overdrive gearbox has a much nicer feel than the old four speed box, though I am not sure of the usefulness of overdrive on second and third, but that's what the early TR's had. However I can now say I have a seven speed box though I guess overdrive will be mainly used on top gear where it really transforms the car, substantially dropping the revs and giving a more comfortable ride.

# 14.Gearbox Details

Gearbox number; 306812 SM; Overdrive serial number 22/61711/019986

Gearbox Type: Laycock de Normanville overdrive unit (A Type)

Made by Laycock Eng. Ltd Sheffield England under licence from Auto Transmissions Ltd Coventry England

![](_page_11_Figure_0.jpeg)

# Key for Wiring Diagram.

| 1 Blue              | 17 Green            | 41 Red               |
|---------------------|---------------------|----------------------|
| 2 Blue with red     | 18 Green with red   | 49 Purple            |
| 4 Blue with white   | 21 Green with white | 56 Purple with black |
| 5 Blue with green   | 24 Green with black | 57 Black             |
| 9 White             | 33 Brown            | 58 Black with red    |
| 16 White with black | 40 Brown with black | 62 Black with green  |