

74

The cost of this conversion using brand new components is phenomenal, but a gearbox reconitioner will not charge any extra for swapping the second gear ratios during the reconitioning process; my box was reconitioned and up-rated by a small independent gearbox reconitioner..... (who gives a 6,000 miles/6 months guarantee) for £60. (Name and address supplied on request).

This modification is probably only worthwhile if a revision of the rear axle ratio is also being contemplated, since the standard 3.77:1 differential renders first gear virtually useless anyway.

A 3.09 or 3.22 differential will, however, re-instate first gear as a "useful" ratio whilst the use of the uprated second gear ratio will provide an even spread of gearbox ratios, viz:

First	3.163:1
Second	1.95:1
Third	1.412:1
Fourth	1.0:1

The chart below shows that with uprated 2nd gear and differential ratios 60 mph is now attainable in second gear (241 (13 inch 70 series tyres) without over-revving the engine:

#### 60 mph in second gear

Differential ratio, Second Gear Ratio		
3.09:1	1.95:1	2.214:1
3.22:1	5.300 rpm	6018 rpm
3.77:1	5.523 rpm	6271 rpm
	6466 rpm	7342 rpm

#### UPRATED REAR AXLE FOR 3 LITRE V6

After being used to the transmission on a Scimitar, two things struck me about the Marcos when I first bought it three years ago:

1. The rather low rear axle ratio which rendered first gear useless except for "laying down" rubber, and caused the engine to rev unnecessarily fast at

cruising speeds, even in overdriven top gear.

2. The immense gap between the ratios of 2nd and 3rd gear, causing me to be flung forwards the windscreen the first time I changed from 3rd to 2nd on the approach to a roundabout. (See mod., elsewhere in this issue.)

The V6 Ford engine is an extremely torquey unit producing a considerable amount of power at relatively low revs. Accordingly there is no reason why the engine should be 'buzzing' noisily at over 3,000 rpm in overdrive top at 70 mph as was mine when I bought it (I believe the rear axle ratio is 3.77:1). For comparative purposes it is worth noting that the considerably heavier Scimitar has very adequate top gear performance, despite only revving at 2,500 rpm at 70 mph in overdrive top. The adoption of a more sensible rear axle ratio thus improves noise levels/comfort at cruising speeds and re-instates first gear as a useable ratio.

Suitable donor axles are as follows:

- Ford Capri 3 litre GT 1969-Oct. 1971 3.22:1
- Ford Capri 3 litre GT/E Oct. 1971-'73 3.09:1

In my opinion, the seemingly rare 3.09:1 axle is preferable. Before embarking on this modification a few facts should be borne in mind:

1. These axles are both 3 or 4 inches wider than the original axles, so it is necessary to modify the handbrake mechanism used on the Marcos and to consider the need for flared wheel arches or wheels with different offset.
2. The differential pinion flange to which the propshaft is bolted, is a different size and has different drillings to that on the original axle. Consequently, it will be necessary to either re-drill the existing propshaft yoke (at the diff end) or to shorten and re-balance the propshaft from a 3 litre Capri.

75

3. The half shafts and brake drums on the new axle will be drilled to fit Ford wheels; these must be accurately re-drilled to accommodate wheels with Triumph wheel-stud spacings. (Wheels which run eccentrically are not healthy!). Because the Triumph stud spacings have a smaller diameter to Ford spacing it is also necessary to machine some metal from the shoulder of the half-shaft (where it 'bells-out' at the wheel end) to allow the wheel studs to seat properly.

4. All of the Capri brackets welded to the axle must be sawn/ground off so that the equivalent Marcos axle locating brackets can be welded on.

5. The appropriate Marcos brackets must either be made up or bought from Jem Marsh (£45 + VAT) and welded into place on the axle. Details of their location, along the width of the axle casing and of the angle they should bear to the nose-piece of the differential are available from Uncle Jem. Suitably positioned handbrake and flexible brake hose mounting brackets must also be made and welded onto the axle. Uncle Jem is currently charging around £90 + VAT to machine and drill the half-shafts, drill the brake drums and supply and weld all necessary brackets onto a Capri axle.

6. The speedometer (driven from the overdrive unit) will no longer be accurate following the installation of the new axle. Apparently, the speedometer drive gear, which fits into the overdrive can be simply pulled out and replaced by one having a different number of teeth. I gather that obtaining the correct speedo reading is basically a trial and error exercise, which may eventually involve having the the speedometer unit re-calibrated in addition to swapping drive gears. Can anyone advise on this???

7. Consider bank balance and sanity!  
As you can see this isn't exactly a 'Sunday afternoon' job, but is potentially worthwhile, since it should make first

gear useable and make high speed cruising more comfortable for both engine and car occupants. The table below illustrates the effect of different rear axle ratios on the revs necessary to attain 70 mph in overdrive top (overdrive is 0.82:1, tyres 13 inch 70 series).

70 mph overdrive 4th gear	
Differential Ratio	R.P.M.
3.09:1	2,601
3.22:1	2,710
3.77:1	3,173

### DETERMINING YOUR DIFFERENTIAL

Those interested in determining the ratio of the differential fitted to their car, or to any other potential 'donor' car may find the following methods of use:

1) Method 1 - "It's your lucky day"  
If you're really fortunate the differential will have a small alloy tag fixed to it by one of the bolts holding on the backplate or nose-piece; this tag will include, inter alia, the differential ratio. Look carefully because they're usually well hidden by accumulated oily grime. Easy eh?

2) Method 2 - "The nuts and bolts method"  
This method involves dismantling the differential and counting the number of teeth on the pinion and crownwheel, dividing the first number into the second to obtain the ratio. This method gives absolutely definitive results, but will probably not be appreciated by the potential seller of an axle when the Marcos owner announces that it is not the ratio he requires and beats a hasty retreat, leaving a dismembered differential and accompanying pool of oil on the seller's driveway.

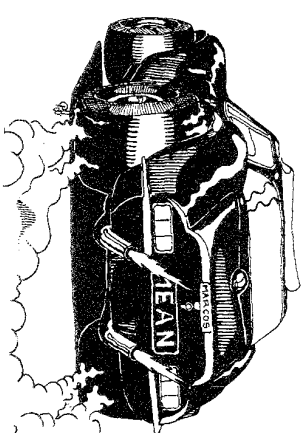
Dismantling other people's axles may seriously damage your health!

3) Method 3 - "A safe compromise"  
Potential sellers of axles can often be persuaded to assist with this method and tend to enjoy the experience, especially if they're a bit short "upstairs" (thick). The exercise is as follows:

- Jack up one of the back wheels.
- Mark the air-borne wheel with a chalk line at its closest point to the ground.
- Mark the differential pinion where it attaches to the propshaft at its nearest point to the ground.
- Rotate the differential pinion by hand counting the number of revolutions of the differential... pinion and of the road wheel. Continue rotating the diff over and over again until the chalk marks on the diff and road wheel are simultaneously in the exact positions that they were in prior to commencing the rotations (i.e. chalk marks both at their nearest points to the ground).
- Divide the number of rotations at the wheel into the number of rotations at the diff and multiply the answer by two. The answer is the diff ratio expressed as the number of revolutions of the diff required to produce one revolution of the road wheel.

### Examples

Rotations of differential pinion	Rotations of road wheel	x 2	Diff Ratio
17	11		3.09:1
8	5		3.22:1
17	9		3.77:1



Dear Friends,  
A few years ago, I think way back in the mid-seventies, I fitted a ram roof to my 1800 GT. After having cut the aperture in the roof panel, I noticed how weak the roof and pillar construction really was. If the windscreen had been taken out, you could definitely swing the whole thing back and forth. This made me think: What happens if your car is turned upside down in an accident? I don't dare think of the consequences! Well, it is a bit strange that the manufacturing company has avoided to include any strengthening devices to the roof construction itself. Many other manufacturers of fibre-glass bodied cars have made excellent jobs in that field. Take, for example, my Reliant Scimitar GTE: a steel tube roll-over bar is integrated in the door pillars and roof. Why not in the Marcos?

It was not until I started with Historic Racing that I decided, I was going to make myself a roll-over bar for my car. I had previously been in contact with the people at Marcos but no assistance there. I had to do it on my own. First of all, I checked in the F.I.A. handbook to get the proper dimensions of steel tubing, as well as, the mounting brackets and bolts. Then the seats, rear window and speaker panels were removed. To get the correct curvature of the roll-over bar itself I made up a cardboard template, giving the right outer size, leaving a clearance of about 5 - 10 mm to the roof. The bar should be installed as given in the sketches.

A specialist firm helped me to bend the tubing after the template. All other pieces of tubing were then cut out of 3 mm thick steel, and countersunk holes were drilled. I used the specified 5/16" UNF bolts and nuts. There should be brackets on both sides of the plywood