

## STEERING GEOMETRY IMPROVEMENT TIE ROD LEVERS TR2-3B

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Background on TR2-3B steering geometry and how Revington TR's redesigned Tie Rod Levers will improve TR2-3B steering and ride quality

### Parts Concerned: -

- 106575/6:- Original Triumph Tie Rod Levers  
RTR3130/1:- Revington TR modified Tie Rod Levers. Individual parts suitable for retro fit to existing steering rack conversions  
RTR3314K:- Revington TR modified Tie Rod Lever kit suitable for original steering box arrangements.



Figure 1: New arm assembled

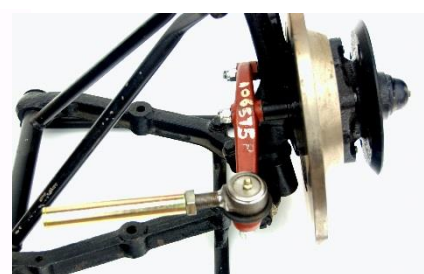


Figure 2: Original arm assembled

### Background: -

TR's 2-3B were designed with very odd steering geometry inasmuch as they have what's called negative Ackerman angle. Positive Ackerman is where the tie rod levers are orientated such that when a line is extended from each swivel point via the outer ball joints the lines meet in the centre of the differential. See figure 3. This ensures that when turning, the inside wheel describes a smaller turning circle than the outer wheel (as you would expect). The result is called 'turn in' and is felt by the driver as the front wheels of the car being pulled in the direction of the steering input.

TR2-3B tie rod levers are orientated such that the lines mentioned above diverge rather than converge thus a standard car has  $-9^\circ$  of Ackerman which means that the inside wheel describes a larger turning circle than the outer wheel (the opposite of what you would expect). The result is that the car displays understeer which is felt by the driver as the front wheels of the car not reacting to the steering input until rather more steering input is applied.

### The benefit of the new levers: -

Our new levers move the outer ball joints outboard as much as is practical given the position of the brake disc or drum (see figures 1 and 2) resulting in  $+6^\circ$  of Ackerman, thus improving the steering geometry significantly. This ensures the front suspension and steering provide toe out on turns which induces neutrality rather than the understeer inherent in the TR2-3B.

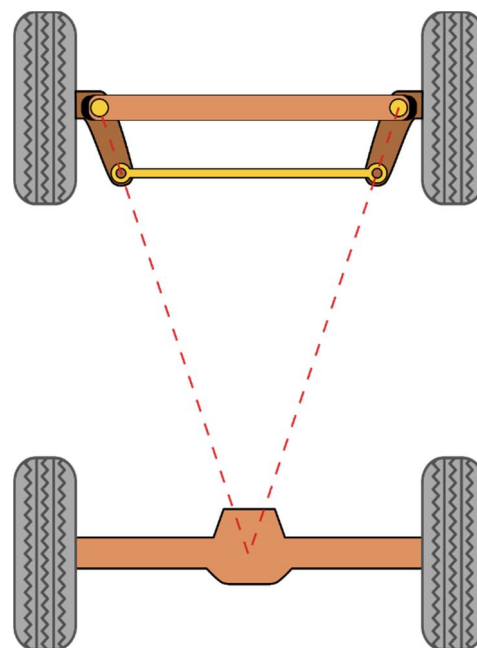


Figure 3 Ackerman diagram

WEB SITE [www.revingtontr.com](http://www.revingtontr.com) TEL 01823 698437 FAX 01823 698109

EMAIL [info@revingtontr.com](mailto:info@revingtontr.com)

Thorngrove Barns Middlezoy Somerset TA7 0PD United Kingdom

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The new tie rod levers incorporate a slight drop in the position of the outer ball joint designed to minimise bump-steer especially where TR4A-6 type upper wishbones have been fitted to introduce the castor angle that these later cars benefited from.

This kit will also improve straight-line stability and steering response, provide turn in as opposed to understeer and improve or eliminated bump steer.

Owners that have already converted to rack and pinion steering but do not have corrected tie rod levers can use the tie rod levers RTR3130 and RTR3131 individually rather than kit RTR3314K to improve their current steering system.



Figure 4: L H modified lever RTR3131      Figure 5: RH modified lever RTR3130

### Kit RTR3314K contents: -

This kit consists of a pair of new tie rod levers, a pair of longer tie rods and the various fittings and these fitting instructions needed to complete the job.

- 2 x new design tie rod levers
- 2 x longer tie rods
- 4 x tab washer
- 4 x Nyloc nut
- 6 x plain washer
- 2 x split pin
- 1 x Fitting Instruction



Figure 6: Kit RTR3314K contents

### Manufacture: -

These parts have been manufactured to our own original drawings; the tie rods have been made in the UK after years of research to ensure material and heat treatment are correct and that the manufacturer is able to produce a quality product.



Figure 9: Raw forging with bent forging



Figure 8: Raw forging with finished part



Figure 7: Original parts with new parts

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To ensure these safety critical parts are reliable in long term service, the material of the original arms and those of the later but similar TR6 arms was analysed at an independent laboratory and a slightly higher modern grade material and heat treatment process was chosen for the new arms. In addition several arms from the batch were subjected to destructive testing (see Figure 7) to ensure their fitness for purpose. These arms were subjected to significant impact loads sufficient to bend the end over to 90°. This simulates a very heavy road wheel impact such as driving into a high kerb at high speed. In this instance a steering component is expected to bend under extreme load and not crack. In the case of our new arms even when bent to 90° no cracking was evident.

There is not another kit on the market that can bring the benefits that this kit does couple with a high degree of long term safety.

**Additional information: -**

Customers should note that the disc back plate will need modifying slightly to allow room for the ball joint as detailed in the fitting instructions or they can be left off. Similarly TR 2-3 owners who still have drum brakes may likewise have to make some small modifications to ensure a satisfactory installation

J. Neil Revington

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