A Modern Alternative for the TC Track Rod

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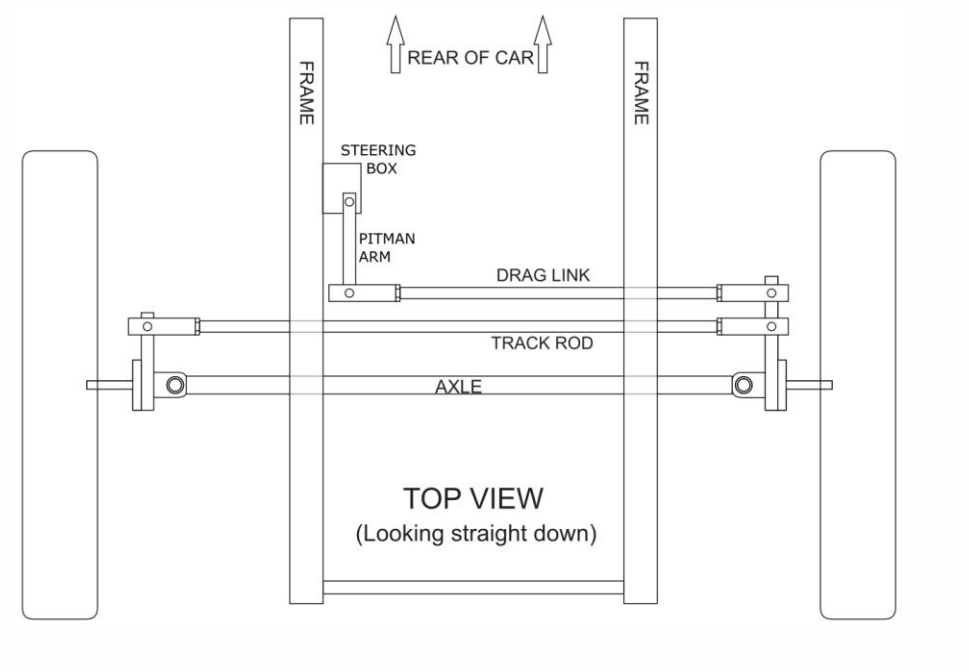
PART ONE: DESIGN ANALYSIS AND SHORTCOMINGS

A recent safety inspection of TC8975 revealed a bent track rod. I took this as an opportunity to experiment with a new steering linkage design. First, a brief explanation of how it all works...

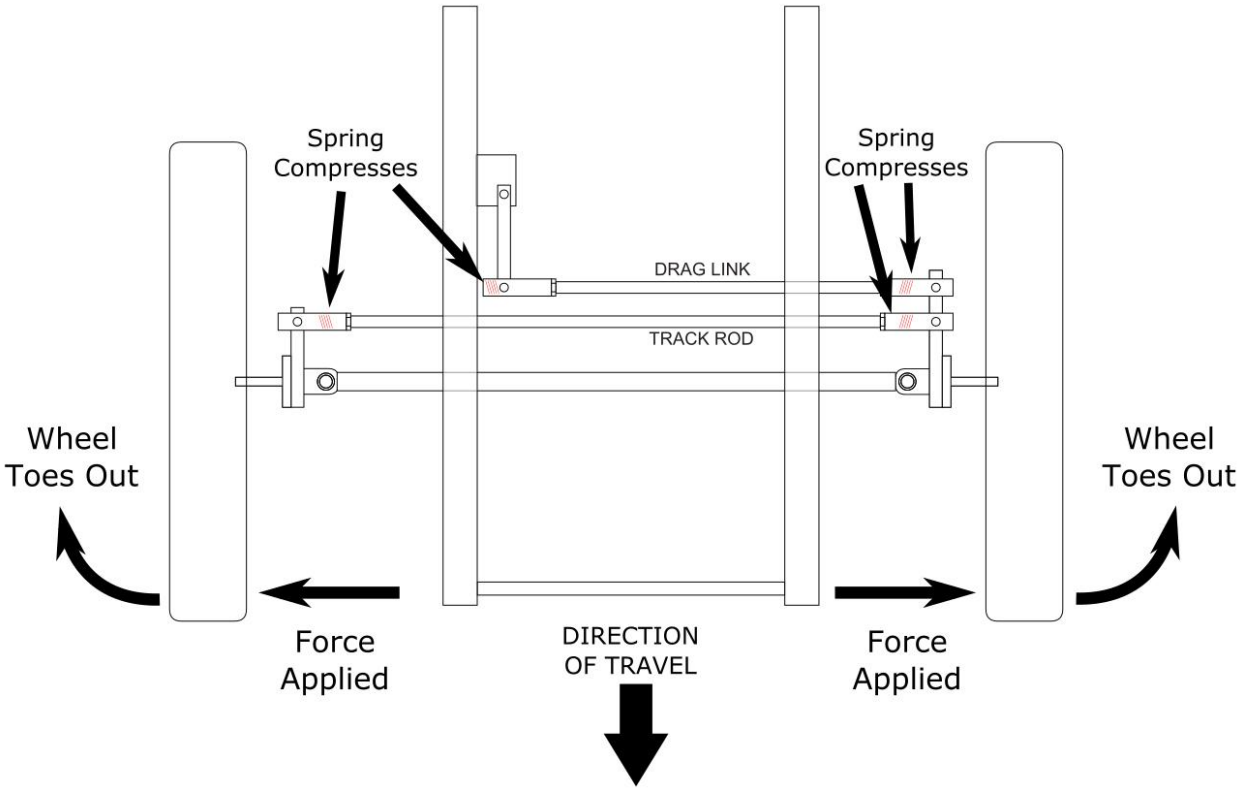


The MG TC has two rods in the steering system. The drag link connects the pitman arm (aka drop arm) on the steering box to the left steering arm. The track rod then connects the left steering arm to the right steering arm so that the wheels turn together. The rods are made from 5/8" steel tubing with male threads on each end. The four rod ends screw onto these threads, and are then attached to the car.

TC Track Rod End Components (L-R): Adjuster, Ball, Cup, Spring, Housing with grease fitting.

The rod ends themselves are internally spring loaded. This helps protect the steering box from shock damage caused by road imperfections. This was especially useful on the poor quality roads around England in the 1940's. Unfortunately it also introduces a bit of added slop in the steering, on top of the play already inherent in the steering box itself. This play not only contributes to the difficulty some people have in holding a straight line at speed, but it also has an effect on alignment. How, you ask? I'll explain...

Due to the geometry of the car's steering system, as you drive forward the wheels want to toe out. The track rod between the wheels is what prevents them from doing so. The faster you drive, the more outward pressure is exerted. Since the rod balls are spring-loaded, this means that the faster you drive, the more your toe-in decreases, up to the point where the springs in the rod ends are fully compressed and can go no further. This reduction of toe-in can reduce stability at higher speeds, and is one reason why you want to eliminate as much play in the rod ends as possible. Normally this is done with the adjusters on the rod ends themselves.



Another weakness of the original setup is the small diameter of the rods. The track rod in particular is known to bend over time and when that happens it must be replaced. Straightening them usually doesn't last. Replacement rods should be checked carefully against your old one, as there is some debate about the original thread form used. Be sure your rod and rod ends are threaded the same.

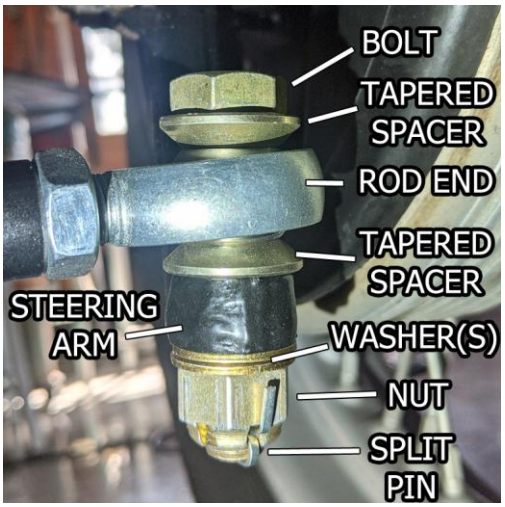
None of this is to suggest that the original system isn't perfectly adequate, just that there are improvements that can be made for those seeking a higher level of performance.

PART TWO: MODIFICATIONS

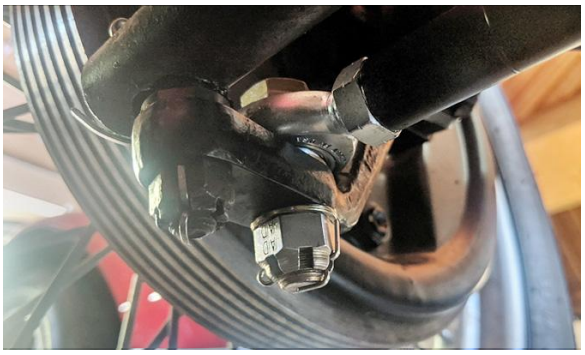
From a durability standpoint, Datsun and VW aftermarket steering units are much stronger than the TC's original Bishop Cam unit (we will not discuss other pros and cons here). For those who have changed their steering box for one of these alternatives, the spring-loaded ends become less important and according to many, completely unnecessary. Some argue that even with a stock steering box, the original style ends are not necessary because the cars are no longer driven in such abusive conditions as they were when new. With modern roads and the average owner driving only for pleasure, they may be right. Also worth noting is that many racers use solid rod ends with the original steering box. For a time, modern style rod ends (like TD, MGA, MGB) with no spring loading were available for TC, but these are no longer being made.

From L-R: Modern aftermarket, Stock TC, Rose / Heim Joint type.

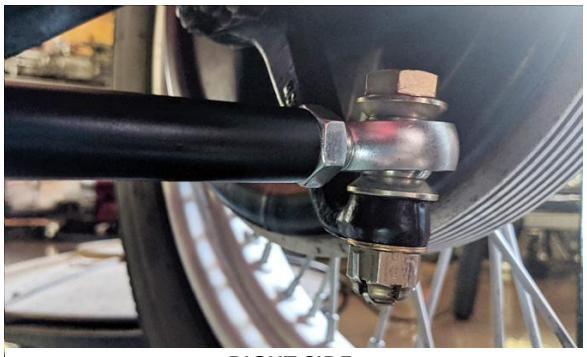
With this in mind, I set out to experiment with solid rod ends on TC8975, which is equipped with a Datsun box. I started with a 3/4" chromoly steel tube which was threaded reverse on one end to allow easy toe alignments. High strength rod ends were added, along with aircraft-grade hardware which is not only very strong, but has the precision necessary to fit into the machined steering arms without any play. The length of the bolt's shank is also important because you need to ensure there are no bolt threads inside the bore of the steering arm. To account for the change in angle of the steering arms as they move back and forth, tapered spacers are used above and below each rod end. Without them the body of the spherical end will contact the steering arm. It may be necessary to add an extra washer to help align the castle nut with the split pin hole in the bolt.



Assembly Order



LEFT SIDE



RIGHT SIDE

PART THREE: RESULTS

The result of installing this new track rod on TC8975 was a noticeable reduction in steering wheel play. The Datsun and VW boxes always have a small amount of play at center, but with the box adjusted correctly and the new track rod installed, it has been almost completely eliminated. On the road, stability and steering response have also improved at all speeds. Wandering at high speeds has been slightly reduced. Theoretically you can also run less toe-in with solid track rod ends since there will be no change in toe alignment as you gain speed. As an experiment I'm calling the new rod a complete success. The next step will be to design a new drag link to match the track rod and further reduce play.

For the most hardcore purists in the crowd, there is a downside... aesthetics. The rod is a little larger than original and the ends, which can be easily seen, are obviously a modern design. Leather boots can be installed which would fool anyone who cared enough to inspect your steering rods.

It should also be noted that depending on the particular rod ends you select, along with how far your wheels are allowed to turn, the new track rod end may contact the original style drag link end before full lock is reached. This is a potentially dangerous situation due to the stress put on the ends when contact is made. Whether this can happen or not depends not just on the size of the rod end, but also what type of steering you have, the length of your steering stops and other factors. Be sure to check this before driving! Changing both rods to the modern style will allow you to remedy this issue, and will be covered in a follow-up article.

PART FOUR: SOURCING COMPONENTS

The following part numbers were relevant at the time of this writing. They are standard parts, so if unavailable today there should be equivalent substitutes on the market.

Track Rod:
Custom made from 3/4"cromoly tubing
Wall thickness: 0.156"
Length: 34.25"
Threading: 1/2"-20 UNF (One side RH thread, the other side LH thread)

Note: Most people don't have the appropriate taps to thread their own tubing. A custom off-road truck shop can easily make the rod for you at nominal cost.

Rose / Heim Joints:
FK part number JMX8T and JMXL8T (one each)
1/2-20 nut for each side (one RH thread, one LH thread)

Tapered spacers (Qty. 4):
Speedway part number 546-4107 (set of 8), 0.225" thickness

Fasteners:
AN8-22 bolts (Qty. 2)
AN-960-816 Washers (Qty. 2 to 4)
AN-310-8 Nuts (Qty. 2)
3/32" x 1" split pins (Qty 2)

Questions, comments or corrections on this article can be sent to the author.

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