SUNBEAM TIGER OWNERS ASSOCIATION

TECHNICAL TIPS

ON THE SUNBEAM TIGER

For Information Exchange Write 5712 San Luis Ct., Pleasanton, CA 94566

JUNE 1980

TIGER FRONT CROSSMEMBER

by Tom Hall

When Bruce Fountain dropped off his Tiger crossmember, I gave it a quick routine examination. I was amazed that he had been able to put over 150 thousand miles on an assembly that had not been reinforced before experiencing shocktower failure. I was expecting to do a standard repair and reinforcement of the obviously broken shocktower, but when I found extensive structural cracking, all over the crossmember, I decided that a Tech Tip would be in order, to alert other Tiger owners of the potential for this hidden structural failure. This Tech Tip shows where to look for cracks and how to repair damaged crossmembers.

One of the information items obviously missing from the Sunbeam Factory Workshop Manual are the dimensional details of the removeable front crossmember. This unit was originally designed for the Alpine and the extra weight and power of the Ford small block increases the potential for stress loading in the Tiger. The removal of material to allow installation of the steering rack only aggravates this condition.

Examination of Tiger crossmembers with high milage and high service loads (read horsepower) indicates two modes of failure. The first is the well known structural failure of the shocktower connection to the crossmember body. The shocktower provides location to the upper A-arms and if you haven't experienced problems in this area and haven't reinforced the shocktowers as proposed in earlier STOA Tech Tips, you can look forward to a sudden failure someday. Information on this repair is included in this Tip.

The flexural weakness of the crossmember was first recognized in Tigers prepared for SCCA racing many years ago. The cyclic flexure or bending of the crossmember assembly eventually leads to fatigue failure which shows up as permanent deformation of the crossmember allowing the outer portion of the assembly supporting the shocktowers to deflect inward to a point where correct front end alignment is no longer possible. The cyclic flexure of the crossmember also leads to cracking of the stamped steel body of the assembly in high stress areas.

Crossmember Examination

The attached photo series was taken during the examination and repair of Bruces crossmember. Figures 1, 2, and 3 show the extensive cracking found in high stress areas. These cracks are highlighted for the camera with ¼" wide white tape. As you can see, the cracks were located either at welds or at a sharp bend in the metal. This suggests that the local residual stress from welding and bending, play an important role in the fatigue failure of this assembly and are the most important areas to examine to spot the beginnings of this type of failure.

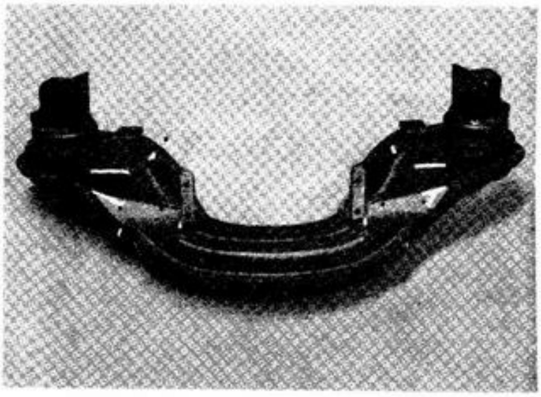


Figure 1 Cracks on the top half

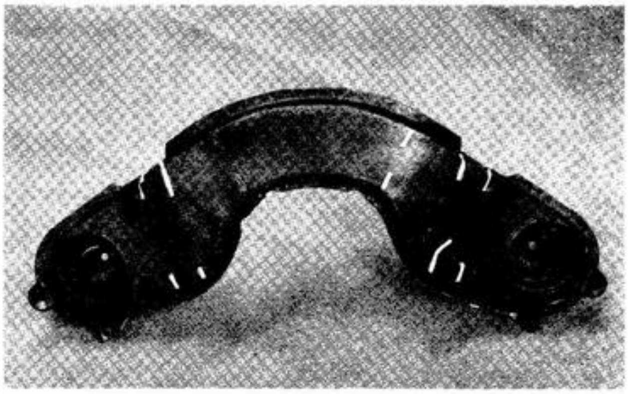


Figure 2 Cracks on the bottom half

Crack Repair

The sheetmetal stampings making up the crossmember are relatively thin and normal metalic arc welding will probably result in burn thru unless the welder is very careful. I always get my best result by TIG welding the sheetmetal stampings and metalic arc welding the thicker shock-towers. I strongly recommend this method. It's also a very good idea to clean off the grease and grime and properly clean and prep the weld area by removing all traces of weld slag, paint, etc.

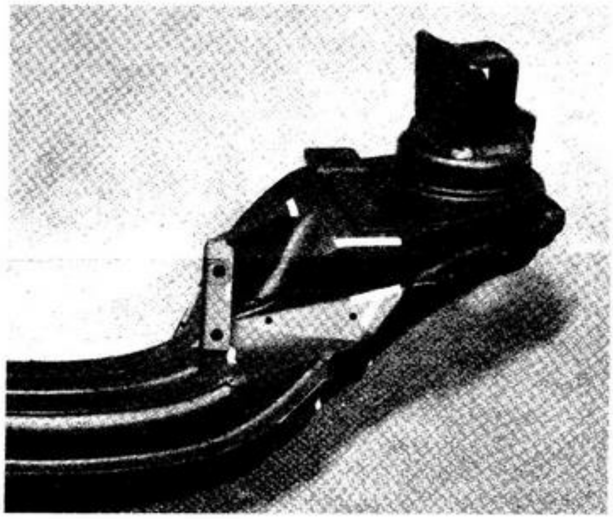


Figure 3 Closeup of crack locations

Crossmember and shocktower Relocation

Figure 4, below, shows the best method I have found to return the shocktowers to their correct location and at the same time, to remove most of the fatigue bending in the crossmember itself. A length of threaded rod, nuts, and a strip of 3/4" or thicker plywood, wide enough to span the spring opening, can be used to apply a downward force to the shocktower during the bending operation. The rod protrudes through a hole in the center of the plywood and nuts top and bottom are tightened to pull the assembly into the correct position. The base of the steering rack support is used to hold one end of the hydraulic ram while the other end pushes against the upper A-arm fulcrum pin, or suitable replacement. This avoids bending the back of the shocktower. I recommend getting the towers back into position tack welding them, and reinforcing them as shown, before attempting to apply the pressure necessary to spread the shocktowers to the correct specification.

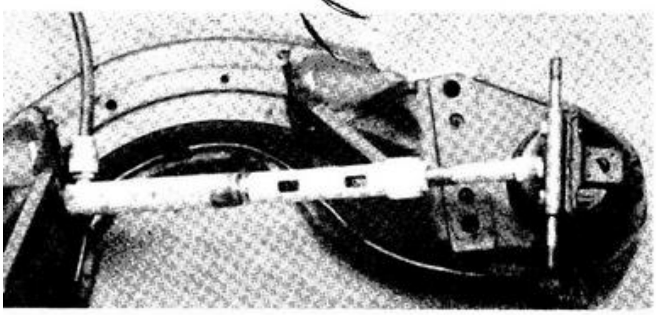


Figure 4 Hydraulic ram application

Specifications

I have found that the closest distance between the rear corners of the shocktowers should be 28" to 28 3/16", and that the intercept angle of the shocktower and the upper A-arm should be 16° to 18° from straight ahead. Figure 5 is the best I could do to demonstrate this data. Since there is nothing in the area that is flat, straight or helpful, these angle measurements are very difficult. I think that if you can get it close to the numbers given above, the shimming process will allow the correct wheel alignment to be obtained.

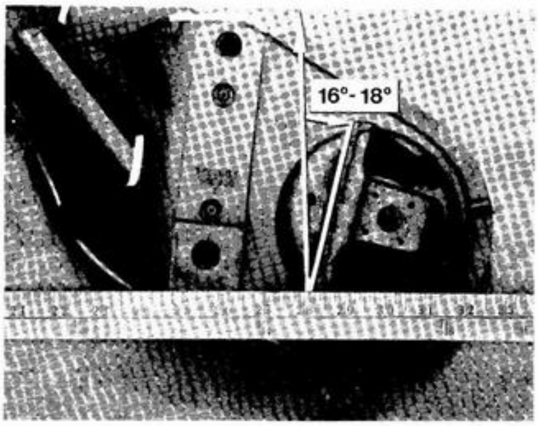


Figure 5 Shocktower measurements

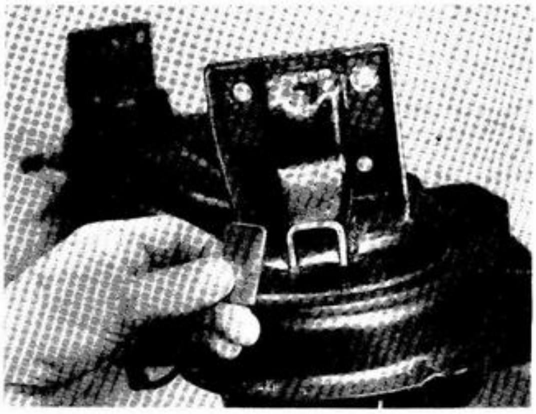


Figure 6 1/8" snubber insert

Reinforcement of Shocktowers

Figures 6 and 7 show the 1/8" thick steel insert which is placed in the open end of the snubber stop. This piece is vital, as it prevents the first crack which always occurs in the side of the snubber stop. Without it, you will be lucky to prevent future failures. After this insert is installed, you should apply a good filet weld on the three sides of the shocktower at the spring dome. If you can weld the crack (or there is none) in the side of the snubber stop, do so; otherwise you should fabricate a small 1/8" plate to spread the load down to the spring dome. Figure 8 shows the completed job ready for painting and reassembly.

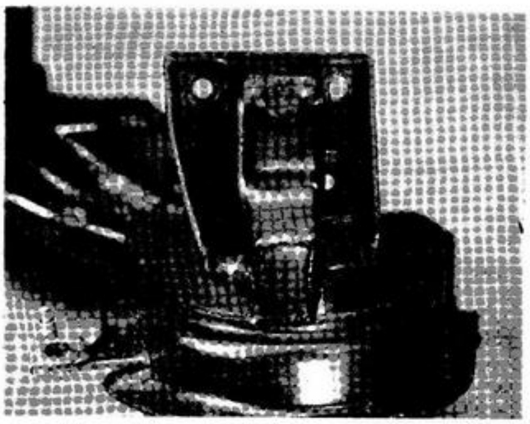


Figure 7 Insert welded inplace

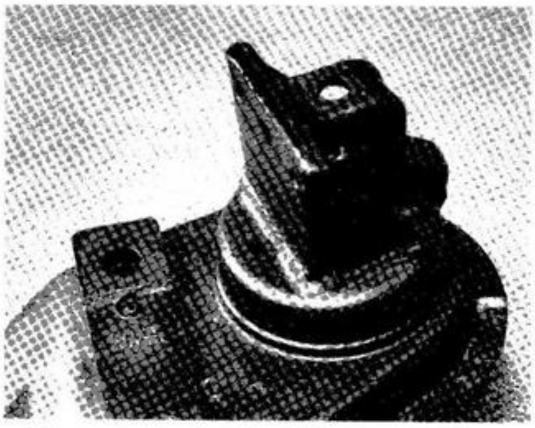
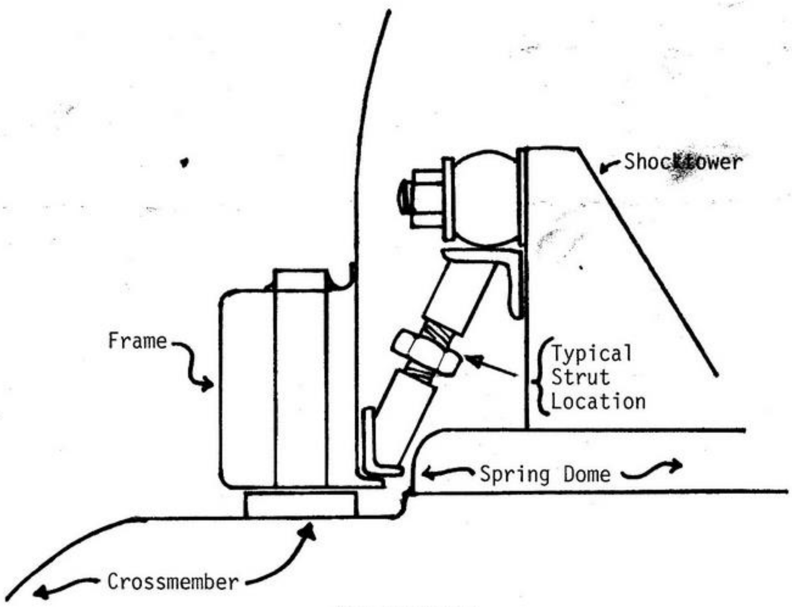


Figure 8 Completed reinforcement job

Suspension Tuning 1980 Update

After many years of experience with the modified upper A-arm mounting locations, we find that our previous advice is no longer applicable for most applications. A great deal of tire development has occured which nullifies the advantages of this modification, particularly at higher speeds.

Another trick that has crossed my mind recently is the installation of an expanding fixture which would fit between the upper fulcrum pin and the unit body frame adjacent to the bolts that hold the crossmember to the frame. The small shelf in that area, which makes it difficult to lower the crossmember straight down, could be used as the lower pressure point. This would really stiffen the whole front-end assembly and could prevent the reoccurance of the problems described in this Tech Tip. If anyone thinks enough of this to do the development before I do, please write and let us know.



Not to Scale