ModTiger Engineering LLC

TECHNICAL TIPS

ON THE SUNBEAM TIGER

ModTiger Reinforcement Kit Installation ©

November 2006

Figure 1. Here are the pieces that make up the MTE Reinforcement Kit. They include three plates for the rear spring mount area for both sides and the plates for the front Tubenuts at the front crossemember.

Before we get into the actual procedures to install the various pieces of this kit, I'm going to show you a few pictures that will help you decide if you need this type of reinforcement now, if you can put it off for a while, or your problem is even more serious. Figure 2, below shows the typical Tiger frame in the area of the rear spring attachment. The area shown has obviously been cleaned up and stripped of undercoating. It is much harder to see this failure when it hasn't been cleaned. It remains one of the most common fatugue failure points in the Tiger.

Figure 2. This is what most owners will find when they examine the front mounting area for the leaf springs. This crack is only the most visable failure point. It occurs because this location is a natural "hinge" in the chassis structure where the rear sub frame joins the body tub and X member.

The photo's below are inside the passenger compartment behind the seats. The rear subframe assembly is spot welded to the body tub and these welds are what you are looking at. When the frame tab (shown in Figure 2) cracks, these welds begin to assume the structural loading. They begin pulling apart and the local "dishing" of the floor pan leads to the cracking evident in these photographs.

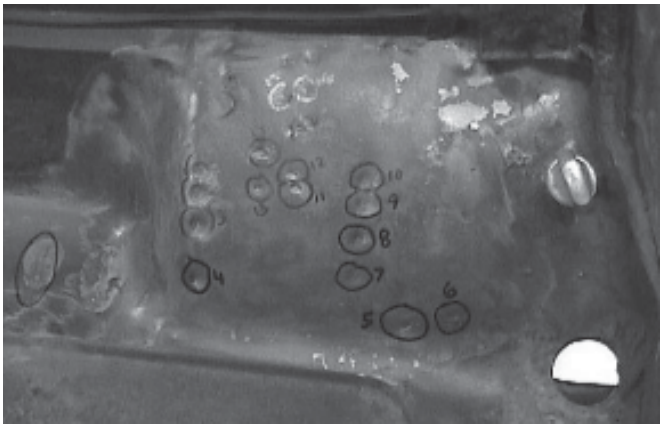

Figure 3. Here we have an overall shot of the spot welds behind the drivers seat. You will have to do a lot of cleanup to get down to this level.

Figure 4. Here we have a closeup of the spot welds shown above. It is clear that the floor plan is failing and that the rear sub frame is pulling away.

The MTE Structural Repair Kit is designed to Bridge the natural hinge existing in the Tiger chassis. The plates are to be formed as required and welded to the various chassis components thus carrying the stress loads across this area. Appropriate repairs to minimize existing damage and separation of chassis components are the responsibility of the owner. If you find damage greater than that pictured, professional chassis repair is recommended.

I personally recommend that every Tiger owner have his vehicle inspected for general overall safety and structural problems on an annual basis. This is a 40 year old high performance vechicle and it deserves this level of respect. This inspection generally requires that the car be placed on a hoist or other mechanism that allows easy and detailed examination. Don't be afraid to apply a wire brush to remove road dirt and undercoating that can mask a potential problem. Undercoat and chassis paint can be found in spray cans to protect bare metal from the elements.

Actually, the wire brush, a putty knife type scraper, and a propane torch are the best tools to remove the accumulated road dirt, undercoating and paint necessary to install this kits components. Make sure that you remove flamable materials on the "other" side of the area you're cleaning at any time you use any heat source to loosen surface materials. A friend, assigned to the duty of fire watch, prepaired with appropriate extinguishing materials, is also a manditory requirement to protect your investment.

Figure 5. Here we have a typical Tiger frame that has "lost" the Weld-On Traction Master frame mount. The Weld-On mount is one of the weaker points and has often been torn off and re-welded to the X-member several times, resulting in this kind of damage. My recomendation is to switch to the Bolt-On design for the traction bars or eliminate them and use the Dan Walters developed Torque Arm (909 926-1572).

Figure 5 above also shows generally the area that needs to be cleaned and prepaired for the kit installation. You need to get down to bare metal to obtain the best welds. If the damage to your chassis is worse than that pictured above, the repairs may well be above the scope of this installation procedure.

The kit has three pieces for each side of the rear spring mount. The smaller rectangular piece should fit in between the two vertical sides of the spring mount. It should have a slight bend near the center to allow it to fit flush with the structure in the front of this opening. The second piece should be bent as shown in Figure 7 allowing it to fit flush with the sides of the subframe and the side of the X-member. The Tiger chassis has minor production variations in this area and each piece must be carefully fit for the specific application.

Figure 6. Here is the rectangular piece, bent and placed into position. Note that is just below flush with the bottom of the chassis. You will be welding this edge, so you don't want it too high.

Figure 7. Here you can see how the side plate is bent to fit. Take your time and work this piece gradually. It's easier to bend it a little at a time than to unbend and rebend. If the location of the bend is not obvious to you, cut a replica out of cardboard and fit that first. Then transfer the bend location to the steel piece.

Remember, this is a universal kit and each chassis may require some minor adjustments to make the "fit" come out right for your application. Figure 8 shows some of this tweeking on the sanding wheel.

Figure 8. Here we "adjust" the shape to make the perfect fit.

Figure 9. "Fitting" the side piece to the chassis.

Figure 10. Here's the side piece and the front piece clamped into position, ready for tack welding.

Now that these pieces are fit, we're ready to tack them into position. Remember to leave a little (approximately 1/16") hanging below the OEM structure for attacment of the bottom piece of reinforcement.

Figure 11. The first two pieces of reinforcment have been fit and tack welded into final position.

Figure 12. The bottom plate should be a pretty close fit to the side and inside piece where they will be welded together. Some angular adjustment may be necessary with the sanding belt. It's also a good idea to hammer the metal to form joints that can be be welded into a tight configuratation so that the end result is as smooth and uniform as possible.

As you get everthing tacked into position, it is likely that you'll have to apply the hammer to the edges of the metal to drive the surfaces into proper position so that they can be welded together. You will also need C clamps and vise grips to pull and manipulate these area's to be welded.

I'm not going to describe the welding process in detail except that your going to want to weld essentially the entire perimeter of the pieces in the kit. Some areas may require more than one pass to make a "proper" weld joint. Don't be afraid to bond to the remains of the OEM structure where applicable. You will also want to stagger your timing and your weld area's to avoid applying excessive amounts of heat in one location. After your done, you can grind the welds reasonably smooth and make the whole job look very professional.

Figure 13. Here we have the finished application to the kit to the rear spring mount. Some minor weld dressing has been done and more can be done, but this gives you the general idea.

With the welding and grinding done, one task remains and that is to complete the 7/16 Dia hole for the spring mounting bolt. I've done this two ways. One was to use a 7/16 reduced shank drill with my angle drill, and simply drill through from the outside. The second requires a piece if threaded stock with a center hole. This allows a smaller pilot hole to be drilled through the reinforcing plate, which can then be enlarged from the center of the chassis, without gouging the OEM hole as the direct 7/16 drill sometimes does.

Figure 14. Here's my drill fixture. It's a piece of 7/16 threaded stock with a 1/4" hole drilled through the center. Inserting this piece and tightening the nut as shown, allows the center of the inner hole to be pilot drilled avoiding any enlargement of the original 7/16 hole.

This completes the reinforcement of the front spring mount. As you can see, these additional pieces effectively bridge the hinge in the OEM design. It's still a good idea to keep an eye on this area, particularly if your frequently applying aggressive driving loads. Now it's on to similiar problems at the front frame horns.

Figure 15. This is what you'd find if you looked inside the front frame horns. As you can see, the tubenut is simply tacked in place.

The front tubenut, located in the frame horn, accepts the connecting bolt from under the crossmember, connecting this structure to the chassis. As you can see in Figure 15, this assembly is rather simple in concept and is now showing up repeatedly as a major weak point in the front of the Tiger chassis. Every application of the brakes applies a twisting load on the front crossmember and the two front bolts take the majority of this loading. The result of 40 plus years of this service frequently points out the weakness of the original design. The tubenut is gradually pulled down in the frame, depressing the area around the tack welds that attach the tubenut to the top rail of the frame stamping. This local "dishing" is only the most visable part of this failure mode. The outside bottom frame flange is spot welded together. As the tubenut is pulled farther and farther down by the crossmember, these spot welds (shown in figure 15 above) begin to fail, opening up the bottom seam of the frame and weakening it substantially. The dished area on top bends and fatigues until it cracks, and then, things get worse in a hurry.

You will also notice this damage whenever you remove the front crossmember. This crossmember connection area of the frame is intended to be very flat and any depression seen in the bottom flange of the frame is a result of the loading and fatigue the chassis has experienced. This dislocation damage should be removed before the reinforcing plate is installed. Figure 17 shows the tooling I developed for pulling the front tube nut back up to the proper position. The outside edges of the frame horn flange may also require cleaning and welding if the OEM spot welds have failed.

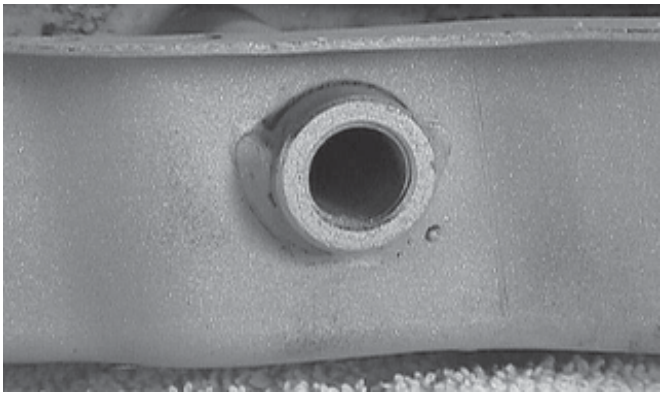

Figure 16. This is an "undamaged" frame connection at the front tubenut. If yours doesn't look like this, some level of repair is in order.

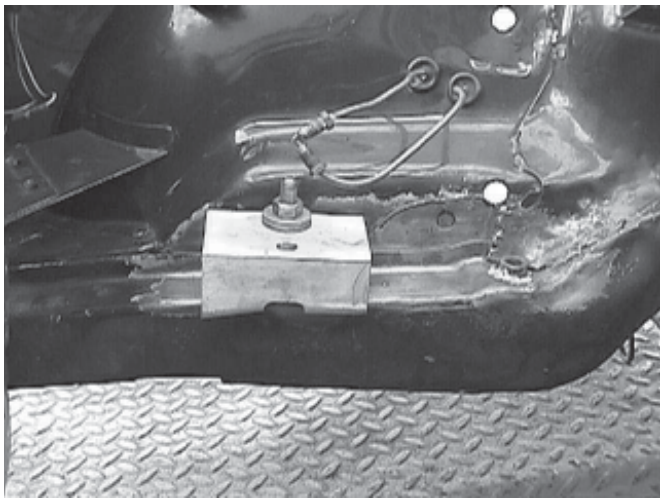

Figure 17. This is a tool I developed to pull the front tube nut back to it's original position, without damaging the shape of the frame.

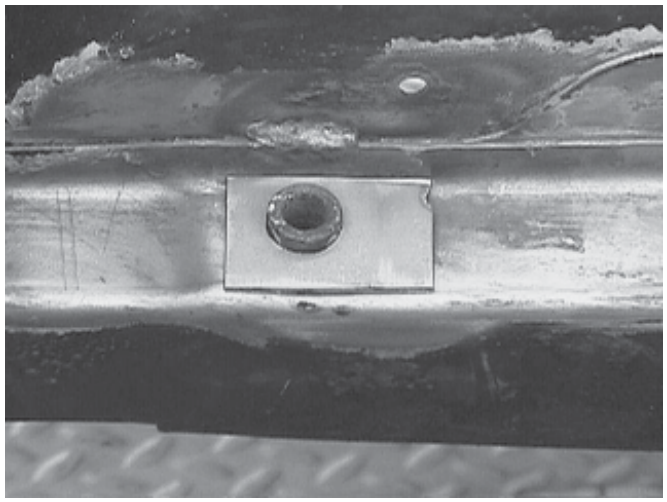

Figure 18 Here's the location of the front tube nut with the reinforcing plate in place, but unwelded. The concept is that this plate, when welded to the top of the tube nut, can carry the loads to the sides of the frame stamping. To assure this load transfer, the perimeter of the reinforcing plate is welded to the frame. In order to get this plate to fit flush as shown, some combination of grinding of the factory welds and countersinking of the hole, from the bottom, is necessary.

Figure 19. Here's the completed front tubenut reinforcement welded and completed. If you get this reinforcement piece applied before the tube nut starts it's typical fatigue failure mode, you can save a lot of future problems and help keep your Tiger structurally sound.

Figure 19 shows the completed reinforcement at the Tubenut. You can make it a little neater with a TIG welder, but in any case, you're going to want to weld all the way around the plate and the tubenut. Be careful when welding the tubenut to the plate, as you don't want to melt into the threads. It's also a good idea to chase the internal 1/2-20 threads after you finish welding. This is a place that collects a lot of debris over the years and chasing the threads will save wear and tear on both the nut and the crossmember connecting bolts.

So now you have the danger signs of the common Creeping Fatigue Failures typical in the Tiger chassis, and the kit that MTE has developed to address these situations. Have a look at your chassis, or if you don't feel confident, have an experienced mechanic examine it for you. Left unresolved, either of the fatigue failure situations outlined in this tip could result in major chassis damage or worse, cause an accident, possibly injuring someone.

Bear in mind that this procedure, the related kit and instructions are intended for early interception of common fatigue failure situations which are occurring with increasing frequency in the world of Tigers. If you already have rust, accident or other damage exceeding that shown as typical in this document, understand that more serious and invasive repairs may well be needed.

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