

LOTUS ELAN FRAME REPAIR

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(dwg. by JFK)

INTRODUCTION

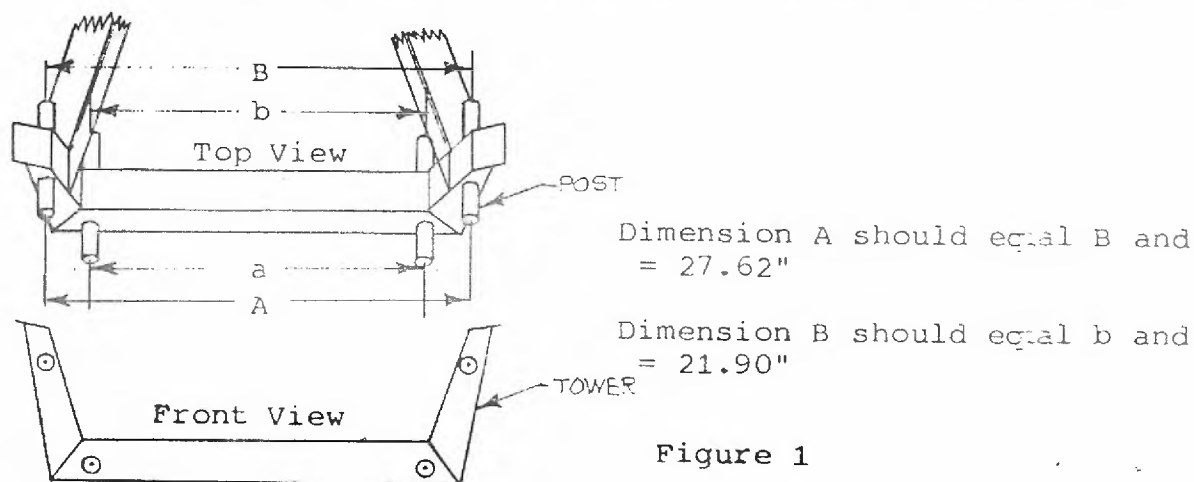
When my Elan was hit, one major concern of mine was how to fix the frame: left front upright twisted back and down, and frame panel of the same area kinked. Also the steering rack "ears" and cross brace were "rippled". The frame shop estimate at that time was \$385 plus parts. These shops prefer to remove the 'glass panels as necessary to expose all frame damage. This can mean additional cost for 'glass repair. Reacting a bit out of character, I felt this repair was beyond me and bought a used frame. Since then I've come a long way in understanding these Lotus frames and have repaired two. One is in my rebuilt Elan and the other is now for sale. Many Elan owners complain of abnormal tire wear, improper camber, tendency of the car to track left or right, and so on. I hope some of the conditions I am describing will allow Club people to locate possible sore points on their own cars and to check their frames regularly, especially if modified with stiff suspensions, with big tires, and/or hard usage.

OBSERVED ROUTINE DEFECTS & FIXES

The Elan frame (I assume Europa also, but I cannot speak hereto) is made of mild steel and is fabricated with resistance and gas welds (I have found the wire Lotus used sticking to some welds: they use .030" dia.) All welding repairs I have made were done with a small oxy-acetylene rig and small rod. Keep pressure and heat down. The steel will "hole out" quickly if excessive heat is used. I will not differentiate defects found from one frame to another because most were common, except for the impact damage. To do a complete job the body must come off and the frame must be cleaned!

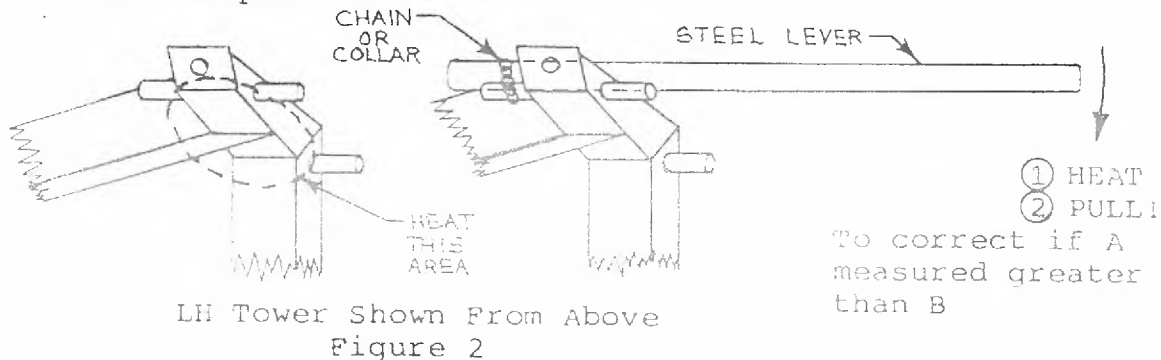
FRONT TOWERS

A major defect was twisted towers such that the dimensions between the "A" arm posts were off. This is illustrated in Figure 1.



Dimensional differences were found on the apparently good frame of 3/4" on the top posts. The upper posts themselves were not bent; (they were perpendicular to the base where welded), therefore, the towers needed "trueing" to regain proper alignment. I used heat and a steel

lever of 3 to 4 foot length. Square tube with 1/8" wall will work if you have it. You will need a large ID metal collar or chain. The whole frame will want to swivel, so one must wedge, hold, or block it. See Figure 2 for the procedure.



LH Tower Shown From Above
Figure 2

Heat around the tower **using** a big tip, a big flame, but the outer flame envelope. The larger the area heated uniformly the better. Allow it to cool slowly after bending.

If small differences are found, one can bend the tower cold. Do not worry about bending the posts - choke up with the chain/collar near the base of the post.

LOWER POSTS

The dimensions on the lower posts were generally good, but I found that the bottom posts are subject to misalignment, possibly due to impacts. See Figure 3. They are "soft" and can be rapped with a copper hammer after protecting the threads. You can make or use a carpenter's square to check.

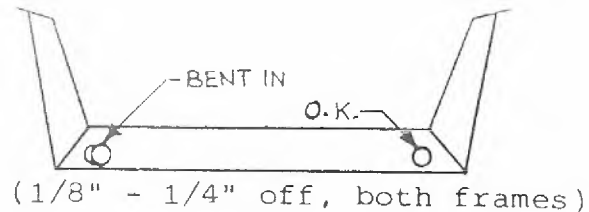


Figure 3

VACUUM RESERVOIR

Because Elans sit low, and even lower as the springs sag, the bottom of the vacuum reservoir can take a beating! Owners may wish to repair/fabricate at this stage. A note of caution: Before heating the chamber make sure it isn't a closed bomb. If necessary drill to allow for expanding heated air and fit a pipe plug to this area afterwards. I had fitted a servo brake unit to my Elan prior to its demise and it may have been responsible for a very scary event. While juggling the frame I heard liquid sloshing and emptied a good pint of fluid from the reservoir. Although it smelled vaguely familiar, I could not place it. Weeks later while heating the front steering rack ears, a "minor combustion event" occurred. It sounded like a huge balloon being emptied. I suspect it was brake fluid fumes igniting and exiting through the check valve hole! Enough said.

MOTOR MOUNTS

AS often as not both motor-mount flanges are cracked in several places. Look for hairline cracks; wire brush or scrape paint off to get a good look! Weak Elan motor mounts, bad and/or loose retaining bolts, and vibration take a toll here. Groove cracks out, clean, and weld with a gentle flame.

TRANSMISSION MOUNTS

Look for hairline cracks. Later mounts are gusseted/designed better, I am told. I have not repaired these.

REAR "A"-ARM TABS

The tabs which are welded to the frame to accept the rear "A" arms have actually been torn off slalom Elans! I can visualize this happening. Check for poor welds at the position shown by A in Figure 4. Such welds do not run continuously from tab to frame, but stop abruptly or dip in and leave an open, non-reinforced trough through which stress can cause the general area to weaken via work hardening.

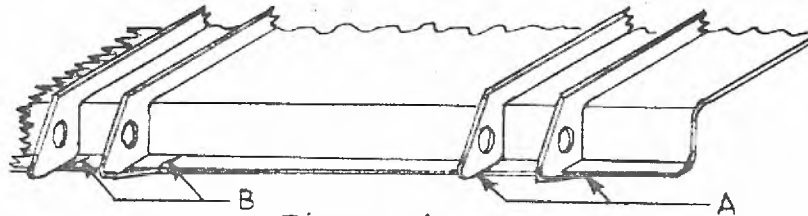


Figure 4

Whether the welds are good or bad, check in these areas for hairline cracks running inward on all four tabs, as shown at B in the Figure. Prepare and fix with good welding procedure: Clean, groove, and weld. Check often under the car! This is one repair that can be made safely with the body in place. A good muffler man could probably handle this one, but the "A"-arm eyes may fry if you are not careful.

REAR BOTTOM CHANNEL

The bottom channel where it leaves the boxed section of the frame rearward is subject to upward bending, as shown in Figure 5. The frame I corrected was off 1".

This is a difficult correction. I finally resorted to heating the two downward braces at point A and striking that point from the outside, thus causing the channel to realign itself. These supports are solid and are difficult to heat. I considered using a small hydraulic jack but didn't have one. I was also leery of applying force to the other pressure point, in this case the bottom of the cross-section which houses the differential mount holes.

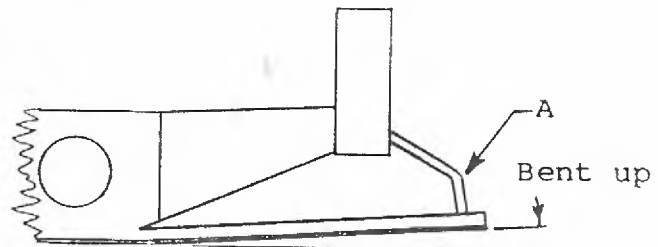
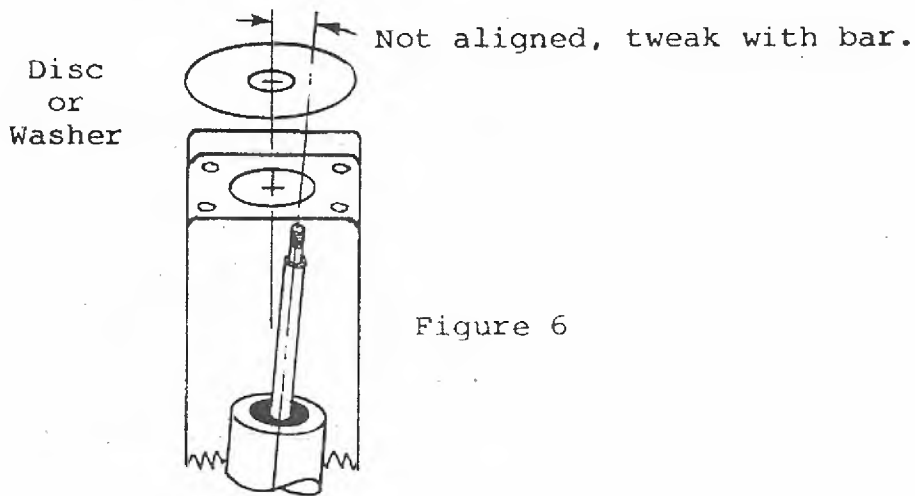


Figure 5 (angle exaggerated)

Another clue to this bent condition is difficulty extracting the differential unit due to insufficient vertical clearance.

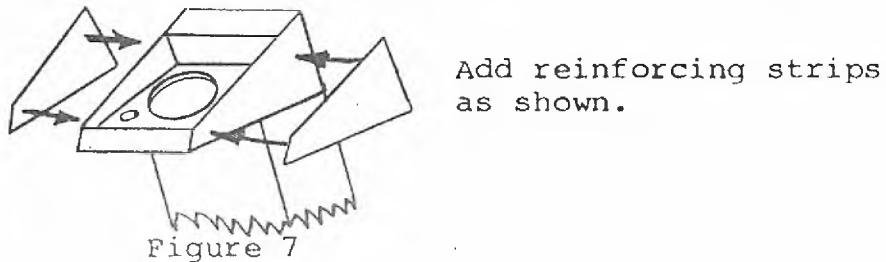
REAR UPRIGHT

These towers are subject to the same type of twisting distortion as the front towers. If you know your rear "A"-arm assembly and shock tower are straight, use them as a test fixture and see if the shock shaft is at the centerline of the upper mount flange area. See Figure 6, next page. Make a disc or washer to allow a closer check of the shaft centerline to the mount flange. Check for spread and front to rear tower dimensions also. To correct see the later discussion of correcting tower damage.



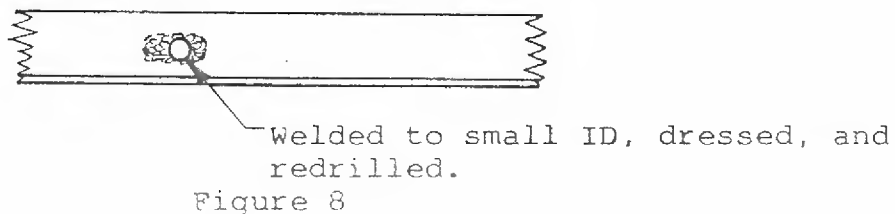
REAR SHOCK MOUNT FLANGES

Some Elans are used so hard without adequate rear suspension travel or with excessive bottoming that the whole mount flange is bent upwards until it contacts the underside 'glass panel. See L/W Tech Article 26MC065. Use mild steel sheet or light plate and reinforce the sides after straightening. Don't go too wide or you'll have trouble with clearance of the new top in the glass enclosure. Figure 7 shows the location of the reinforcing sheet.



TORQUE ROD HOLES

The small hole which is the forward mounting point for the differential torque rods may be elongated due to loose fasteners hammering back and forth. Weld-fill and redrill.



(to be continued)