

KONIS FOR YOUR ELAN

Despite the original title for this article, the following disassembly and installation instructions are valid for any brand of shock absorber. The procedures given for the Elan front dampers are generally applicable to the Europa, and the Elan rear strut disassembly is practically identical to that for the rear of an Elite I and the front of a Lotus Cortina.

The replacement of the stock damper by others such as Koni or Spax is worthwhile because of the advantages of longer life, adjustability for wear, and better performance. Club discounts are available on Konis. The organizations or individuals offering such discounts may be found at the back of the Lotus/West Directory.

You will note in reading through this article that several methods of disassembly of the front and rear coil spring/damper units are presented. All have been used by Club members and, because they have worked, are explained. Choose your own method. Undoubtedly you are reading this with the intention of doing your own work. The best advice is to be patient and systematic. You should reserve at least one day for the front units, and three for front and rear. This gives a margin of safety which may be needed in case of unforeseen events. Theoretical time for both sets could be two days working alone.

FRONT- The dampers manufactured by Koni are adjustable by compressing the shaft until it bottoms, turning until the "tooth" engages. The stiffness may then be set by turning the shaft in the desired direction. With Konis the front units must be removed from the car to be adjusted, so it is crucial that the setting is correct for your overall needs before installation. Although Konis are delivered with a setting to match the factory specified damping, many Club members feel that the fronts are best stiffened for all-around use such as touring, slalom, and commuting. These settings are around one to one-and -one half turns off of full hard. It is probably better to err on the soft side. ~~Stiffer springs may~~ also be used with this adjustment. It is sometimes found necessary to compress the units several times before installation to lubricate the glands around the shaft.

FRONT DAMPER REMOVAL- Jack up the car and remove the wheel. The attachment points for the units are (1) the ends of the antiroll bar, (2) the bolt through the lower A-arm, and (3) the shock perch on the frame. The antiroll bar may be dropped by removing the nuts at the bottom of the damper and rotated out of the way. Remove the lower damper attachment bolt and the nut at the top. The spring/damper assembly will now come out as one. The unit is an hydraulic damper and concentric coil spring with a tube acting as a cover-retainer for the spring. The top of the tube is counter-pressed to accept a

collar which, in turn, is made to accept a flat retainer washer. The flat washer is an important item as it is threaded with a LEFT HAND thread. This washer screws onto the shaft of the new damper and retains the spring. When uncompressed the spring is about two feet long and is potentially lethal when uncompressing. It is necessary to compress the spring far enough to UNSCREW the flat washer (CLOCKWISE), to release the spring fully and allow the removal of the old unit, eventually to recompress and assemble the new unit. A problem may arise in removing the washer. It may be frozen solidly onto its shaft, or TACK-WELDED on the underside to the shaft. Go easy on that washer as you'll need it. With the unit removed check to see if the washer is frozen or tack-welded by tightening the flat portion of the shaft in a vise with it parallel to the floor. Grip the cover assembly and turn clockwise. The entire unit, including the retainer washer may turn. DO NOT UNSCREW THE UNIT MORE THAN TWO TURNS. If the washer will not loosen, use Liquid Wrench and light tapping. If no go, the shaft will have to be hacksawed after the spring is compressed.

FRONT SPRING COMPRESSION- The safest and most obvious method is to take the units down to a shock installation shop or a machine shop and have them complete the job. However, if pride in doing the job yourself drives you on, read on. Two "backyard mechanic" methods will be described. The first requires the construction of two spring compressors, as shown in Figure 1.

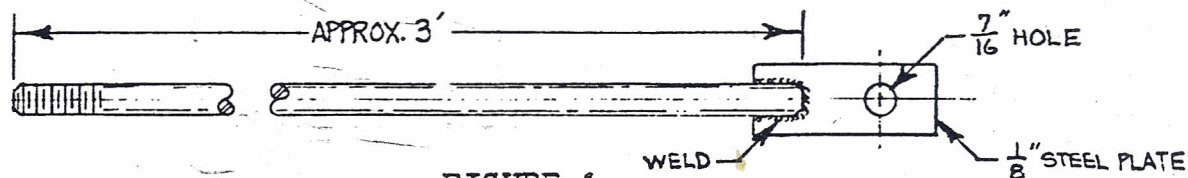


FIGURE 1

The shaft is a three foot section of $3/8$ " diameter threaded steel rod. A rectangular piece of steel is welded to a slot cut in the end of the rod, and a $7/16$ " hole drilled. A stock Elan wheel is securely supported 2 feet or more above the ground. Insert the two threaded rods through those little triangular holes on opposite sides of the wheel, plate ends down. Bolt the two plates, one on each side of the lower end of the spring/damper unit, with the $7/16$ " bolt removed from the lower A-arm. The upper end of the unit fits against the center of the wheel with the shaft poking through. This assembly should roughly resemble Figure 2. Using some large washers and nuts on the top side, tighten up the threaded rods, evenly compressing the spring. The washer described in the previous section will be pushed through the center of the wheel. Compress the spring enough to see if the washer underside is tack welded to the shaft. If no weld is found, unscrew it CLOCKWISE. If welded, it may be necessary to grind it away, which may require cutting off the shaft. However the washer is removed, loosen the nuts

on the rods and slowly and evenly expand the spring.

If using an Elan wheel as a tool wasn't trick enough for you, you may like to try an ingenious method devised by Dick White which uses the car itself and a scissors jack as the only tools required. When done properly this method may take as little as two hours. The jack must have a large enough hole in the riser to accept the lower part of the shock (i.e. the normal jacking procedure for the front). With all washers removed from the spring/damper unit, put it back into the car in a similar position to the one it normally has ... with one exception: Be sure the shock shaft is outside the shock perch hole toward the wheel hub. It will fit. Turn it until the jacking point at the bottom of the shock is reasonably perpendicular to the floor. The top should be set so that the outer edge of the top of the spring cover rests against the shock perch but leaves the retainer washer free to rise when the jack is used. From the front this arrangement looks something like Figure 3. Because of the shape of the inner wheel well, this method seems to work best on the right perch. Put the jack under the unit and leave it until you put the bolt through the lower A-arm holes nearest the wheel hub. This is done to retain the assembly so it can't move sideways as the spring is compressed. Raise the jack. The shaft should rise along with the washer. After making the same inspection as described in the previous method, remove the retainer, lower the jack, and the unit will be separated.

FRONT SPRING/DAMPER REASSEMBLY- Once that left-hand threaded washer is ready, the old shock is replaced with the new unit and, with either of the above methods, reassembly is basically a reverse of previously described procedures (that Old English saw, again!). Locktite may be used on the threads of the new unit. Insert the loosely assembled unit as during disassembly. Compress the unit and guide the shaft through the top of the spring cover. Continue compression until you are able to screw on the washer ... not too tight. You may wish to take the unit out after starting the washer and complete the tightening in a vise as before. Tap unit on top if washer won't seat. Replacing the unit back in the original position is straightforward.

REAR- The rear assembly also consists of a large diameter coil spring concentric with the damper. The Koni replacement inserts into the old housing (strut), which is an integral part of the rear hub. Inside the top of the tube are some delicate threads (right hand this time), into which the shock unit is screwed. The problem is that a point on the top edge of this tube is invariably peened into one of the slots in the top of the damper, destroying the threads in that area. A related problem is finding or making a tool to fit and turn the spanner-type nut which must be loosened to get the unit out of the tube.

REMOVAL REAR- Again jack the car and support it on jack stands and a 2x4 placed beneath the fiberglass runners just ahead of

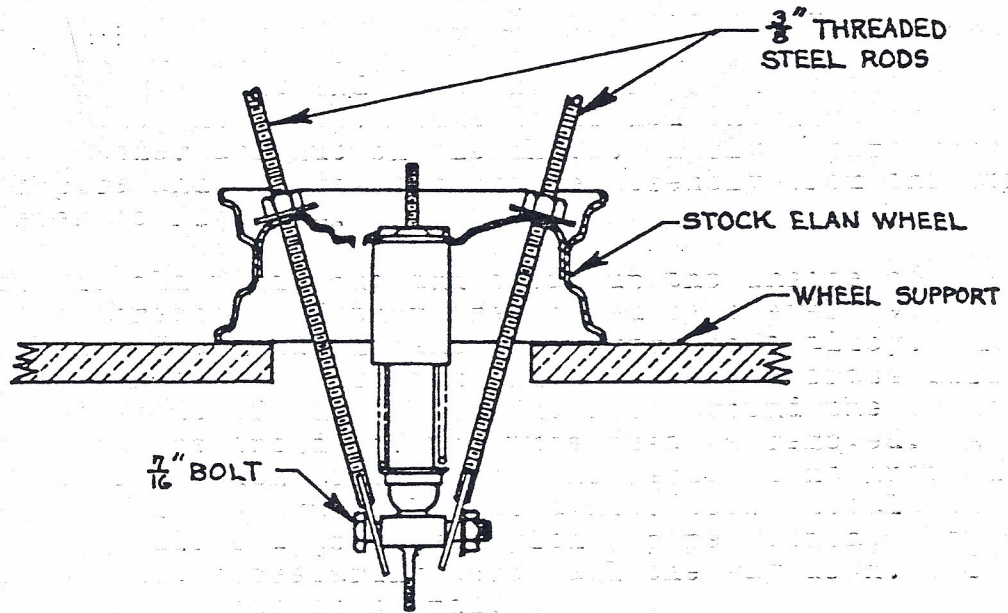


FIGURE 2

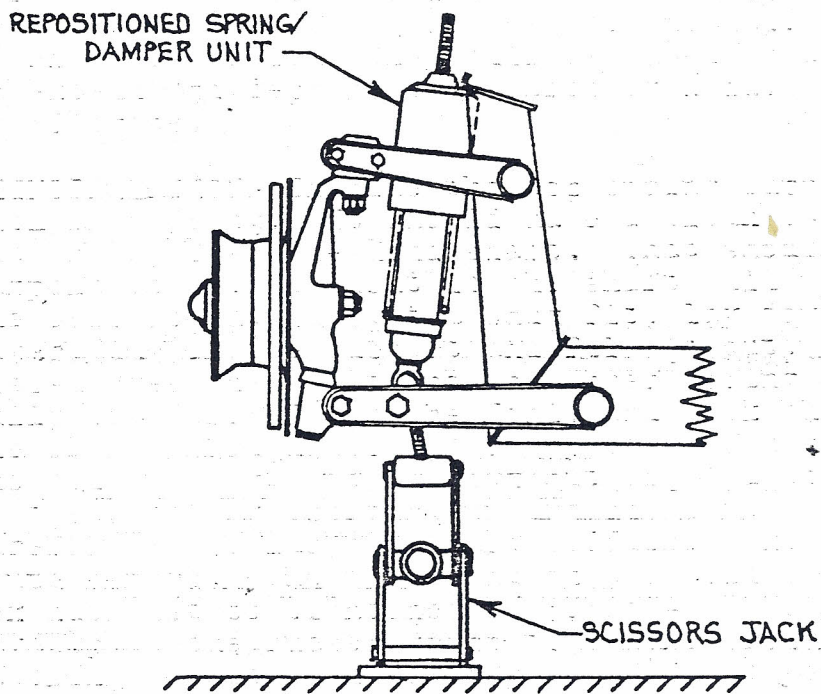


FIGURE 3

the fender well. Remove the wheels. The top attachment point of the Chapman strut is in the frame perch, and access to it varies among Elan models. The castellated nut retaining the top of the strut lies below the two rubber plugs in the rear deck of S1 and S2 roadsters. It is in the bottom of the convertible top storage in S3 and S4 models. Elan coupe owners will find it beneath the rear parcel tray. They must first remove the rear shelf screws on the front bottom edge of the shelf, loosening six spring clips around the rear radius (this is all done inside the trunk, don't worry you'll fit), and finally removing two sheet-metal screws from the inside. Remove the cotter pin from the nut and unscrew the nut. (Coupe owners be careful of that GLASS.) It is suggested that one rear unit at a time be completed.

It is possible to replace the damper while the rear strut is still attached to the lower arms, if the entire strut can swing down far enough to allow the compressed strut to clear the wheelwell. It has been found that compressing the rear spring on the Elan is not really necessary. Even uncompressed it can be removed from the strut if the damper shaft is fully telescoped. A compressed spring does make reinstallation a little easier. Elite I owners will find that their rear springs are held by a top spring seat pinned to the damper shaft. Spring compression is definitely required on Lotus Cortina front struts.

The outboard "donut" must be detached from the halfshaft to allow the strut to swing down. Tighten large diameter hose clamps around the "donut" before removing its retainer bolts and their threads will not be damaged. Disconnect the brake line, plugging the openings to keep out grit.

DISASSEMBLY REAR- Collapse the shaft, work the spring off, and swing the unit out from the fender well with the wishbone attachment acting as a pivot. The spanner nut is now visible with its four square nut sockets, as shown at the left of Figure 4. Look for the punch mark. The threads will be mangled there. A note of WARNING: The metal of the tube is very soft. Be careful if you use a punch to bend the peened area back. One successful method was to grind away a small "U"-shaped area in the side of the tube with a reaming tool or small file... just enough to remove the flattened portion of the threads.

Loosening the spanner nut may be difficult. Liberally apply Liquid Wrench or WD-40. You may now opt to loosen it with a punch and hammer, or construct a tool to fit the slots. The punch-and-hammer method has worked on Elan, Elite, and Cortina struts. It is crude but you do not care how much you mangle the nut because you discard everything inside the tube, anyway. However, if you are unsuccessful with the punch and you destroy all four slots, subsequent application of a tool will be nearly impossible.

FIGURE 4

Various tools have been constructed by Clubmembers, only one will be described here, and it is practically guaranteed to work. Take a piece of $1\frac{3}{4}$ " O.D. water pipe about a foot long and file away one end, leaving four teeth to fit the four recesses in the shock top. This is locked in place over the shaft by a large washer and nut on the shaft. Apply a pipe wrench to the water pipe and unscrew the entire assembly from the strut tube. Refer to Figure 4.

Dump the old fluid out and clean up the inside of the tube. Examine the threads. If they are chewed make every effort to restore them. The Koni threads are a very soft alloy. Knock out the plug in the tube bottom and unscrew the brass filler plug from the side of the tube. The boss around the filler hole thread on the inside of the tube must be removed. A rat tail file does a quick job. Screw the replacement into the tube. The encased Koni now available has a nice beefy metal collar at the top which allows a good grip with a pipe wrench. Note that the Koni does not necessarily screw all the way down. $1/8$ " to $1/4$ " of exposed thread is normal.

It is now necessary to consider damper stiffness, as the rear units are also adjustable. Experience has shown that the softest setting is best for all-around use. This should be from full soft (complete counterclockwise rotation of the collapsed damper shaft, as viewed from the top) to one-half turn clockwise. If shelved for long they will be unbelievably stiff when trying to extend and depress the shafts by hand. They loosen up in 7 to 10 tries.

REINSTALLATION- Examine the top spring support, which came off with the spring. It should have a clean D-shaped hole and should fit snugly over the Koni shaft. That shoulder is reacting the damping force. Without it the shaft will move up and down with the suspension. To get a snug fit, lay down a weld bead on the lower side of the support and file it out. The spring should be placed over the shaft and the upper spring seat on top. Carefully seat the "D" on the Koni, and jack the hub up, forcing the shaft through its upper support. You may have to reach into the coil spring, put the hex nut on, and complete the extension of the shaft by exerting upward pressure with Vise Grips. Be careful not to mar the shaft surface. One final tip, especially coupe owners. The threading on the Koni shaft is tight, but the hex nut must be tightened to 50 ft.-lb. or excessive play will develop at the rubber grommets in the frame, resulting in a rattling effect when driving. DON'T put your deck lid in before driving and checking for the noise.

REASSEMBLY REAR- Reverse the earlier process. Some tips on the "donut": With the spring in place and the hub on a stand, the donut will be in proximity to the hub shaft. It can be attached as follows. First align the donut with the hub shaft by inserting

the bolts through the donut, hub shaft, and disc in REVERSE direction. Start with a spare bolt and insert it through the lowermost hole of the donut and shaft (closest to ground). Follow through with two of the original bolts rotating the donut, shaft, and disc 120 degrees before inserting the second and third bolts. The third original bolt is used to start the process of inserting the bolts in their proper directions. Insert it through the now aligned, uppermost hole across the top of the hub housing, containing one of the original bolts and tap lightly. Use the bolt now removed to knock out the next reversed bolt. First in, the spare is thus the last out. Finally, torque all bolts to 50 ft.-lb., refit emergency brake rod, brakeline (bleed).

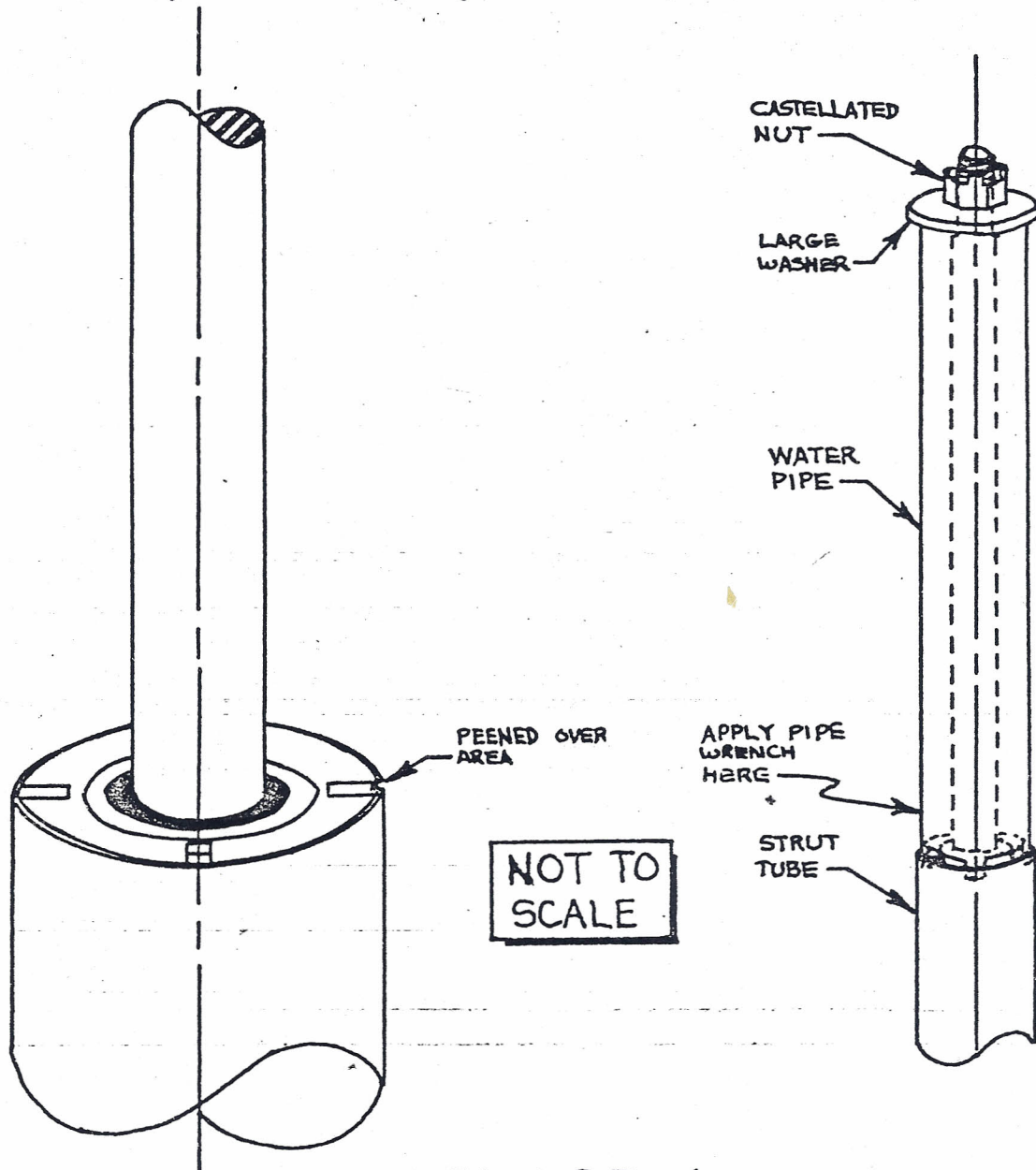


FIGURE 4