

Seat Belt Retractor Maintenance

Time to effect repair – approx 60 minutes for the first one, 30 for the second!

Tool/parts list:-

17mm socket
Phillips screwdriver
Small flat-bladed screwdriver(s)
Stanley knife
Long-nosed pliers
Sharp scissors/shears
Blowlamp
Old knife
Glue gun
Silicone/PTFE grease
Cleaning solvent (suitable for use on seatbelt webbing)

Since owning the red elan, every time the car has been laid up for a while, there has been a problem with the seat belts failing to retract, which appears to be a common problem, which has traditionally been remedied by getting a better S/H unit, or finding a new one amongst the pile of Rocking Horse Poo at Donington or Stoneleigh.....

....until Sherlock Speck found a source for the originals.....

....but being a low-paid public sector worker (and being similar in many respects to a ducks backside), not to say, thinking 'how hard can it be to sort that out' and prove THEM all wrong.

Okay, so back to the story, I gained access to the seatbelts by undoing the B post covers, pulled all the bits of crap and dog hair out of the mechanism, and gave it a good spray of WD40 (with the belt fully extended, as it wouldn't retract).

Then by winding it in by hand, pulling it out, etc etc etc it freed up enough to make it work

Until the next time, when it was all repeated again - in fact it got to the stage where I never actually bothered to secure the B post covers

Each time, it would work well but would last a shorter time before needing to be re-done - but as it was only a 2 minute job, it didn't worry me. When it got to the stage that I had to 'feed' the belts back in, I knew it was time for another squirt.

And so it went on, until this week when it is time for the car to be used again - no problems with any of the usual suspects (brakes etc), but the seat belts were back to failing to retract - out with the WD40! Job done.

Then I had a thought..... why not try a more permanent remedy, after all, how hard can it be????

The answer is "not at all hard, as long as you follow a few basic principles".

Firstly, the Health & Safety warning/disclaimer.....

....Seat belts are a safety item and legal requirement - if you ain't confident/competent - leave them alone and buy a new one! The process involves some nasty chemicals so only use in a well-ventilated area. There are some sharp bits under tension - go steady.

Okay, if you are confident/competent/too tight to buy a new one, you don't need any special tools.

Firstly, clean the actual belt - if the webbing has got damp (there's always condensation in a UK elan!) it will

expand a bit, and may not fully wind in tight enough to fully retract.

I used carb/choke cleaner, but brake cleaner could also work (naphtha-based solvents) - it needs to be something which won't degrade the material/stitching. Spray the stuff onto the webbing and allow to evaporate (it won't take long - but don't breathe the fumes). It will tighten up the fabric and allow it to settle back nicely.

This may be all that is required in your car.

It will probably help, but may not be enough, so move on to the next stage.

The basic principle of any seat belt (and specifically the elan), is that as you look at it, there are 5 bits to consider - the actual belt material, the bit which grabs the belt in case of exerted inertia, the metal cage/plastic roller, then the 2 plastic boxes on the sides of the cage.

The belt will now be clean and (hopefully), unfrayed - if SLIGHTLY frayed, it will probably be because the mechanism isn't exactly vertical, and the belt edges are rubbing in normal operation - run a blow-lamp up the frayed edge to get rid of stray hairs - don't do it when there is still solvent on the belt, or it will be another elan less on the roads

If the mechanism isn't allowing the belt to feed freely, it needs re-positioning - a 17mm socket to loosen the bolt, then correctly position it rotationally so that the belt edges don't rub.

Make sure the grabber is clean (carb cleaner again), and moves to grab the belt when you give it a tug.

So far, so good. Now consider the 2 plastic boxes - as you look from the front, the one on the left contains all the bits for the safety mechanism (inertia balls/springs) - DONT TRY TO OPEN IT - you will end up with bits all over the place and it ain't gonna go back together again (I learned that years ago on a different car - luckily I had access to numerous spares). Just give the outer ends of the roller spindle a squirt of silicone/PTFE spray - I have used spray grease with PTFE, and also tried dashboard shine (silicone spray) and both work well. - DONT USE WD40 - it washes the correct grease out and leads to the scenario I started with!!!!

The right-hand box is the retractor mechanism and the source of most problems - this is where you need to be.

Now, if you have never squirted WD40 into the mechanism, (after all, what sort of idiot would do that), then the chances are that the moving parts will already be adequately lubricated, but the spring needs a bit more tension after 20 odd years of use. Therefore, you don't need to take it off the cage, or dismantle it at all.

The principle is that there is a large 'clock spring' which tensions up as the roller turns to let the belt out, and the stored energy retracts the belt once it is released. The roller is on a spindle which turns a plastic cog attached to the inside end of the spring - hence the need for silicone lube, not WD40, plastic running against plastic will heat up from friction during operation of the belt and cause it to stick (think headlamp motor bushes).

A bit of extra lube may be all that is required to make it work.

If not, on we go.....

Generally, the belt will either not retract at all, go slowly, go in most of the way then stop, need feeding in (or anywhere in between) - all need the same thought process as explained, but some will be fixed without the need to go any further.

Okay, so assuming that it retracts either slowly (should be fixed with a clean belt, or lube), or most likely,

goes mostly in but not fully.

The spring needs a bit more tension due to old age.

Pull the belt fully out and hold it out by looping it round the seat or steering wheel - you will see that the roller is white nylon (or some other such plastic), with a slit running through it for the belt - luckily, in Lotus tradition, it is lightened by having lots of cut out bits!!!

with the belt fully out, place a small screwdriver (or similar) in one of the holes and release the tension on the belt to allow the roller to jam the screwdriver against the frame (it isn't hugely tensioned anyway, but you need to keep the tension it has got!). you can now feed the belt through the roller and you will see that the end is just a doubled-over thickness of belt.

You need to cut the end off with a good pair of scissors/shears/knife as close to the end as you can, then pull the belt back so it is off the roller - don't pull from the top, or it may go out through the grabber bit and it can be awkward to re-thread it due to the limited clearance (as required to make it work). you can leave the webbing lying on the floor - it'll only be a minute till you put it back anyway - remember not to twist it - it needs to go back as it came out.

Now add some tension to the spring by taking out the screwdriver and winding the roller a bit tighter using your fingers and/or a couple of screwdrivers - DONT LET IT GO or you'll probably have to go to step 5!!!!

As a guide, it will probably only need a couple of full turns to make a great difference.

For your information, there is enough spring movement between fully unwound to fully wound to give 21 turns of the roller, the seat belt going from fully retracted to fully extended moves the roller 11 full turns (and a bit). My belts both had 16 turns of tension on them when I started.

I turned the rollers 3 full turns (easily achieved with just your fingers) and then stuck the screwdriver back in to hold it.

Feed the webbing back through the slot (there is a right and wrong side - it's obvious when you look at it as one side it wide enough for the double thickness end, and the other is slightly offset to allow for a belt thickness as it winds up) and pull about a couple of foot of webbing to allow working space.

You need to finish the end off so it will not pull out of the roller (obviously!).

I did it with a minimum of tools/expertise, but a knowledge of the mechanics/physics/forces involved.

Simply fold over the end by about 5mm and hold in a clamp (pliers, vice, toolmakers clamp etc). Heat up an old knife with a blowlamp flame (could use a soldering iron I suppose), slip the hot blade between the 2 thicknesses of webbing to melt the ends together (don't get it too hot or allow the material to degrade/weaken) and press together. Tidy up any frayed ends with the hot blade, then pull the webbing back through the roller to seat it properly.

Feed the slack webbing back through the cage so that the belt is fully extended, remove the screwdriver and allow the belt to fully retract like it always used to do/does on other peoples cars!

Marvel at how simple it all was, and why you have put up with it for so long.....

.....unless you've been a fool and used WD40 - in which case it needs re-lubricating, or clumsy/unlucky and the roller has gone 'twang' and fully unwound, in which case the plastic cog has probably come off the end of the spring.

If you've got this far, then it gets a bit fiddly, but is straightforward - it is easiest to do the work on the bench, but that means unthreading the webbing totally and then taking the cage out (one 17mm bolt).

It is possible with leaving the webbing in, but without special tools (and luck) you'll never get the roller tensioned properly without taking it out anyway (I know - I tried).

Okay, so the cage is out and the roller is loose in both directions, that means the spring has come off the cog! If it will still tension up, then it needs lubing - either way, it has to come apart.

Don't think that you can just take the outer cover off with 4 little clips - it don't work!

There are plastic pins which go through the outer, inner and then into the frame, heat expanded to keep them in place

You need to cut the excess plastic off the inside of the frame with a Stanley knife and/or narrow chisel so that the whole plastic box comes away (it may need a bit of a lever with a screwdriver to separate it from the frame (because of the plastic pins), and will go twang if the spring is still under tension (which it shouldn't be!).

With the black box (retractor mechanism) separated, it needs opening up - a bit of careful levering with a small screwdriver, and trimming with a Stanley knife, the outer cover will come off (or in my case, pivot open on one remaining plastic pin).

Be careful here, there isn't much inside, so unlikely to loose anything, but the spring will still be under some compression tension within the casing - if it flies out then you'll have a couple of meters of coiled sharp edged metal ribbon flying about - common sense says to wear gloves and goggles (I didn't, because I needed dexterity in my fingers!), so take a risk, but don't blame me if you slice a bit out of your finger!

If it flies out, then it is easy enough to get back in, and it is obvious which way it goes, and how it fits into the casing (just remember, put it the right way round so that it winds up when the central cog goes clockwise!).

If it hasn't flown across the garage, then it's a bonus, and you just need to wipe up the WD40, and lube all moving plastic surfaces/faces with silicone grease (or I suppose Vaseline may do) - but not too much.

Fit the inner cog onto the end of the spring (it will only clip in one way, and if you can't work it out, then this job probably isn't for you!!!)

refit the outer half of the casing, and make sure that it is all working by giving the spline a couple of turns using a screwdriver - it should unwind under its own steam, so don't let it fly, or the cog will come off again

Now you know its all working, put it back onto the cage - you may need to 'weld' the two halves together if you've broken the tiny clips using a hot blade again - but I just gave it a bit of a dab with a hot glue gun.

again, keeping the retractor on the frame will need a dab of hot glue on the inside of the plastic pins (not too much, or it will hit the roller).

Take it back out to the car and follow earlier instructions on how to tension the roller and refit the webbing (can be done with the frame fitted in car, or still in your hands, locking it with a screwdriver until webbing is in situ, then fitting it back in - I found that to be easiest, and is no problem as long as it doesn't go twang when handling it - to prevent this, fit the frame to car without any tension on it, then just wind it up and fit the webbing.

Make sure the frame is fitted so that the webbing will retract without rubbing the side of the frame - a couple of degrees out of rotation is enough to mess it all up.....

...now you can marvel at how easy it was, and promise yourself never to use WD40 on moving plastic parts again