

Lotus Elan S3 and S4/Sprint door window frames. Brian Widdowson

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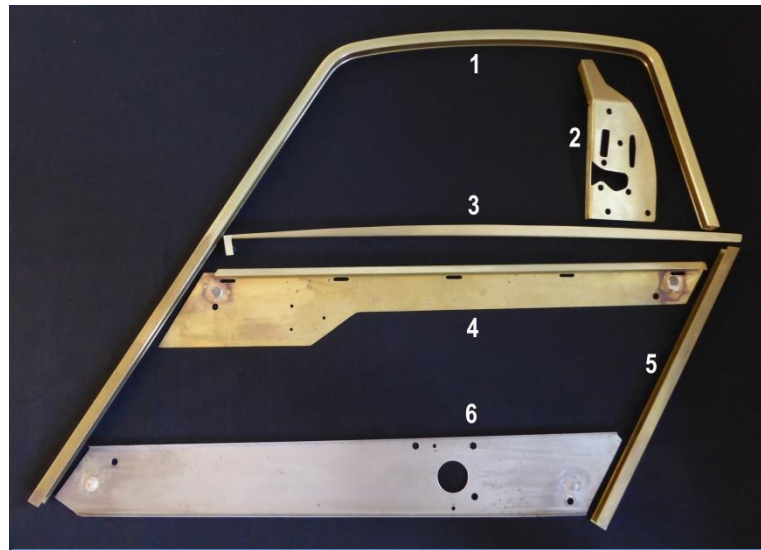
As original frames are now about fifty years old, repair and re-chroming is now usually required during an Elan restoration. This article gives a design overview and advice on how to restore them.

All Elan door frames had a bright chrome plate finish when new. Three variants of frame were produced. Firstly for the S3 Elan, then the S3 'Super Safety' and finally the S4/Sprint type.

Each door frame consists of six component parts as follows:-

1. Window channel frame.
2. Lock mounting plate.
3. Outer door top plate.
4. Upper mounting plate.
5. Rear window channel.
6. Lower mounting plate.

All variants use the same Window channel frame, Outer door top plate, Rear window channel and Lower mounting plate.



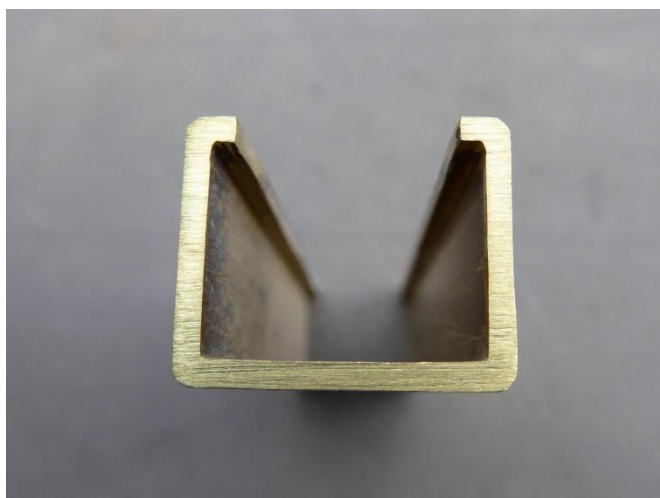
All 6 component parts for a S4 off side

S3 Elan frames: These first type frames have a mounting point with two holes on the upper mounting plate for an interior pull handle. This handle being a chrome plated die cast zinc item fixed with 3/16 UNF screws.

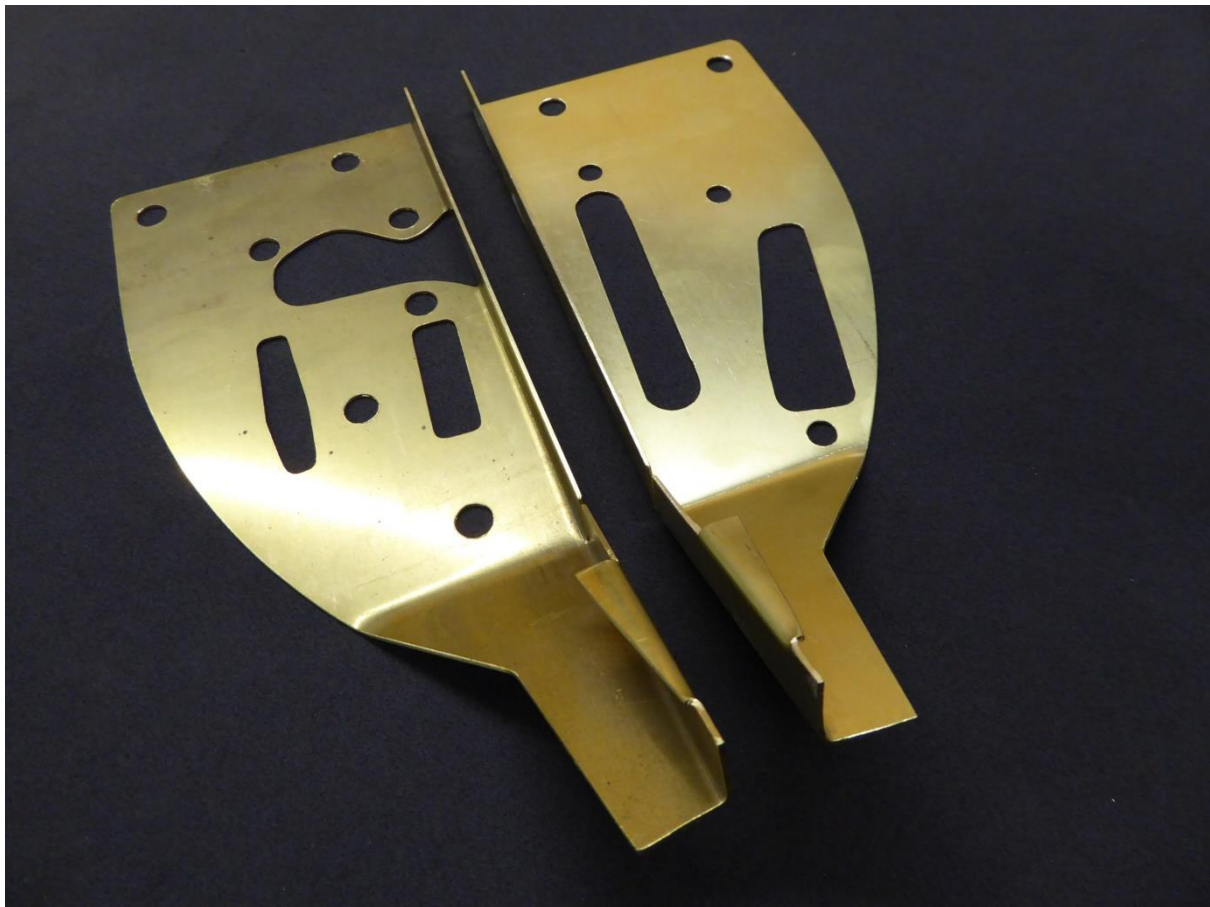
S3 Elan 'Super Safety' frames: The mounting for the interior pull handle on the upper mounting plate has now gone but otherwise the same as S3. All S3 cars used the same door lock mountings.

S4 Elan/Sprint frames: The door lock mechanism has now changed. The lock mounting plate remains the same shape but now with a different set of holes and mounting nuts to match the new door lock. The remote control lock has also changed and is now fixed with 3 self-tapping screws. Very early S4 cars used the upper mounting plates from the S3 'Super Safety' model - only requiring three holes drilling for the self-tapping screws mounting the S4 remote control lock.

The Window channel frame is formed from a brass 'C' section extrusion. Outer dimensions 5/8in X 3/4in. Wall



Window channel frame 'C' section.



S4 and S3 Door lock mounting plates showing the difference in hole patterns

thickness 16G /1.63mm. Opening 1/2in.

Brass plate 18G /1.22 mm thick is used to make all the folded sheet metal parts apart from the lower mounting plate which is formed from cold rolled mild steel plate 18G /1.22mm thick.

Pulley wheel posts. All frames have the same four steel 1/4 in diameter wheel posts. These mount the small plastic pulley wheels for the wire window winding cable which are retained by small 'E' circlips. Early frames had smaller plastic wheels of 19mm diameter which were later changed to a 24mm diameter wheel. Both size wheels will fit all frames.

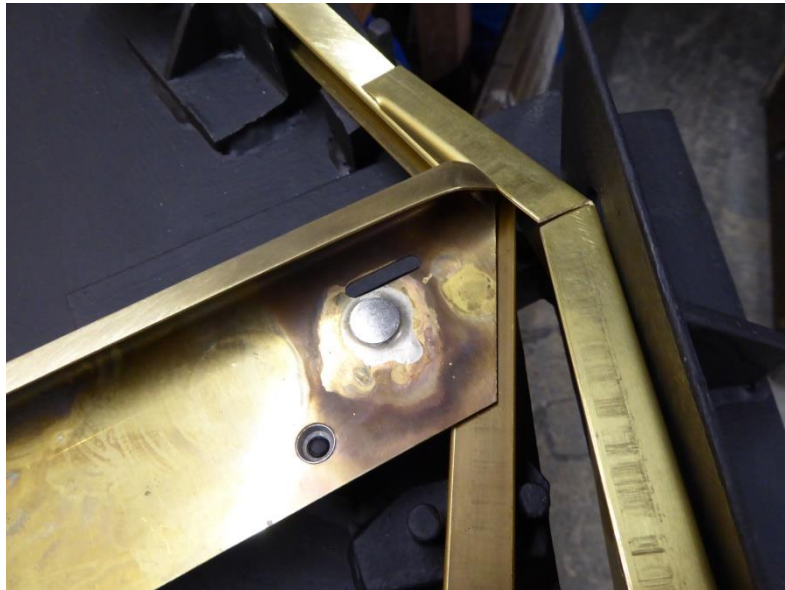
Hexagon riveted mounting nuts. All S3 frames have four 1/4 UNF ones for mounting the frame to the door, three 1/4 UNF ones for the window motor mounting and six 3/16 UNF ones for the door lock and remote control lock mounting. S4/Sprint frames have 1/4 UNF only, using four



New pulley wheel post and riveting nuts

to replace the six 3/16 UNF ones on S3 frames.

The six component parts of each frame were held in position on an assembly jig and joined by brazing with a silver alloy most commonly referred to as 'silver solder' this alloys with the parent metal forming a strong physical bond.



The window channel frame, lock mounting plate and upper mounting plate, assembled on the jig ready for brazing. You can see how the brazing of the pulley wheel post has discoloured the brass; this discolouring will be removed in the pickling process when the frame is being prepared for electro-plating.

If you intend re-chroming your frames you firstly need to remove all attached parts. The window channel felt was glued in at the factory using something similar to Evo Stik and remnants of this adhesive can be softened and removed with thinners.

Hopefully your door frames will need minor repairs only and re-chroming. Initially, the bare clean frame needs examining closely for faults. Look for small breaks or cracks around the brazed joints as these are the most common problem. On the lock mounting plate, the brazed butt joint can split - this is not a strong joint so is prone to fracture.

Check the joint where the window channel frame joins the rear window channel on the outer facing side of the frame, this joint can break and is easy to miss.

Outer door top plate. Look for thinning of the outer edge where it joins the window channel frame. This part of the frame is difficult to polish without catching this edge and some thinning may have occurred from the original polishing. Any re-working of this area can make this edge fragile.

Lower steel mounting plate. This is often badly rusted and may have a crack running from the top motor mounting nut.

The pulley wheel posts can also be badly corroded. Check for any riveted mounting nuts that need replacing. To remove any damaged ones, drill out using drill bit sizes no bigger than 5/16in for the 3/16 UNF nuts and 3/8ins for the 1/4 UNF nuts. This should prevent enlargement of the mounting holes.

Before any repairs can be made to the chrome plated brass the frames will need stripping of all the original electro-plating. Copper and nickel were used as base coats followed by the chrome. For stripping you will need the services of a chrome plating shop. I would advise using one that deals mainly with auto parts and has a good reputation. Stripping or 'de-chroming' is basically a reversal of the electro-plating process and the chemicals used can attack the brass and steel so timing is critical, hence the need for an experienced operator.

With the frames back to bare brass any repairs can now be made. The brazing process will produce toxic fumes so good ventilation and adequate breathing equipment are needed.

Use Oxy- acetylene equipment with a carburising flame. Use Cadmium free Silver alloy flux coated rods [I use Castolin EutecRod. 1020FC 1/6" diameter] with a silver content of around 45% to 65%.and a plastic range medium to wide. Parts should be clean and free of oil and grease. Touch the rod to joint from time to time until the flux can be seen to melt off. At this point feed the silver alloy into the joint keeping the flame cone at least 25mm away and continue melting the rod until the joint is made. Remove all flux residue after brazing with hot water.

If the brazed joints need separating for replacing or repair to damaged parts then this is possible by heating the area with a broad flame until the silver alloy melts but extreme care must be taken not to overheat the brass.

I appreciate that not everyone will be able to make their own repairs. In that case it will be worth the time and effort to have these repairs done professionally by someone used to dealing with similar auto parts.

Most frames will have suffered some corrosion to the brass. This happens when the chrome plating breaks down allowing contaminants, salts etc. to attack and corrode the brass. With the chrome removed the corrosion shows as dark brown spots on the brass.

To achieve a good chrome finish this corrosion must to be completely removed first by sanding or linishing until the spots are removed. All the visible (when fitted) brass is then polished to a mirror finish. Any marks or irregularities left on the brass will never be hidden by the chrome plating process, in fact the opposite occurs and they will be highlighted. Good polishing takes time and considerable skill so again I would try to use someone experienced and with an excellent reputation for this type of re-finishing. Many Elan door frames have been seriously damaged by over zealous or poor polishing.

One area of the frame that proves difficult to achieve an adequate covering of chrome is where the upper mounting plate and outer door top plate meet the door lock mounting plate and window channel frame. Electro-plating does not cover well on internal corners so expect to see a thin covering here. For no apparent reason some frames will plate better than others and there was considerable variation when they left the factory on new Elans.

My involvement with Elan door frames has been reasonably well known in the Lotus Elan community for the last twenty five years or so. In fact, when the Lotus factory were looking to become more involved in supplying spare parts for the early models, they contacted me to see if I would quote for supplying new frames. They even provided me with copies of the

original manufacturing drawings. These drawings then allowed me to see the design tolerances Lotus worked to, which I was then able to use when manufacturing all the component parts for the Elan door window frame.