

Shropshire & Herefordshire Area Group (S.H.A.G.) Lever Frame

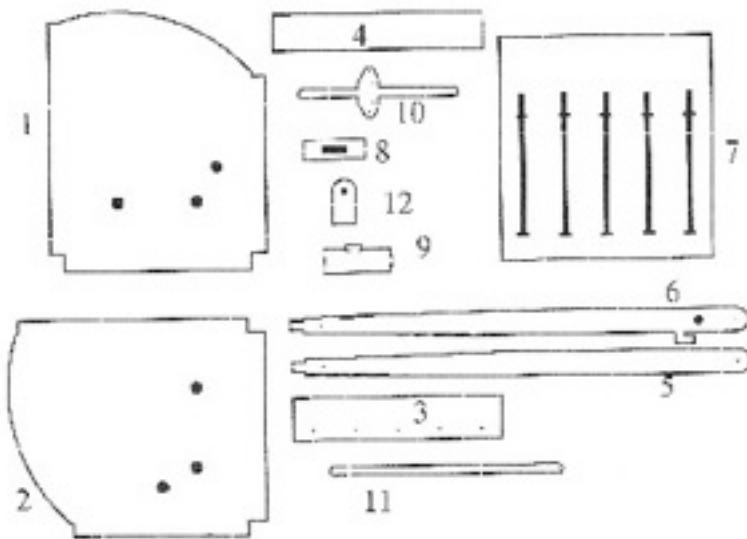
The etch makes up into a frame of five levers. A larger frame may be readily produced by the addition of extra lever groups. Provision is made for mechanical and/or electrical operation,.

To complete the frame the following will be required :-

- 1/8th o.d. 3/32nd bore brass tube for spacers (K&S Metal Centres or Squires - KS 127)
- 3/32nd dia. brass rod (K&S Metal Centres or Squires - KS 163)
- Wire for Trigger pivots (0.7mm dia.)
- Tube or rod for handles - the turned ones shown are sold by Scalefour Stores.
- For electrical switching , miniature micro switches - 9.5 mm mounting hole spacing (Squires Cat. No. MSR500).



General notes



- 11 - Lifting rod
- 12 - Mounting foot

The Frame

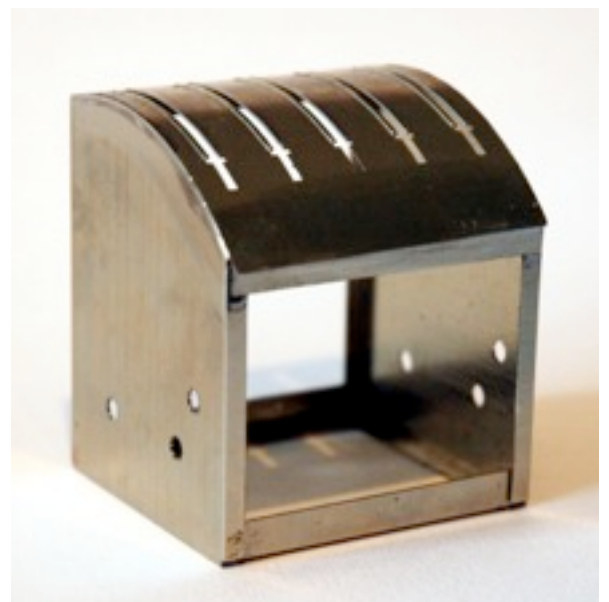
Open out the three holes in each side plate (parts 1&2) to accept the 1/8th o.d. tube. The two frame lower bars (part 3) incorporate guide holes for the point rodding. These should be opened out to suit your choice of rodding.

Fold at all half etch lines to 90 degrees. It is easier if the side plate bottom edge is folded first.

Carefully remove all etch cusps and any tab remnants before assembly. Fold lines are to the inside except where noted in these instructions.

Be aware that there are sharp edges and points on the etch.

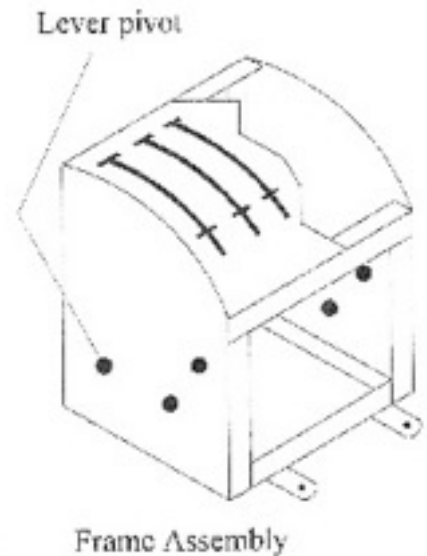
- 1 & 2 - Side Plates
- 3 - Lower bar
- 4 - Top bar
- 5 & 6 - Lever
- 7 - Top plate
- 8 - Link shoe
- 9 - Drop box
- 10 - Trigger



Solder the frame side plates and bars 3&4 together ensuring that the frame is square in all directions. The lower bars (3) fit inside the bottom and side folds, the top bars (4) (without the rodding guide holes) attach outside the side folds.

The top plate (part 7) should be rolled to the radius of the top edge of the side plates. It is fairly stiff but can be rolled on a foam mat with a suitable section of round bar. If you elect to anneal it first , take care to avoid distortion.

The top plate sits on top of the side plates and is soldered to them. The tee end of the slot should be at the tall side of the frame. (See sketch). As an aid to alignment tack two pieces of scrap etch or rod to one frame side so that they project above the top edge. Tack the top plate in position and when satisfied with its fit, remove the scrap bits and complete the soldering. The mounting feet are now soldered to the underside of the lower bars avoiding conflict with the line of point rodding.



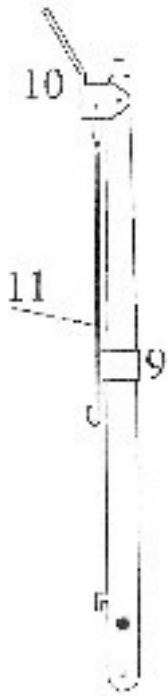
Cut two pieces of 1/8 OD tube about 25mm long and scribe a mark 4.2 mm from the end of each. Fit these two pieces of tube into the side plates such that the marked lines are flush with the outside of the side plates with the marked length projecting to the inside. Insert a length of lightly oiled 3/32nd rod through both tubes to hold them square whilst carefully soldering the tube to the side plate from the inside. If you are making up only a single frame then cut the tubes off flush with the side plates. If making up a multiple frame then cut the tubes to leave stubs 4.2mm from the side plates onto which the next frame will fit. Repeat this fiddly process for the microswitch mounting bars but making the mark 2mm from the tube ends and cutting them off either flush or leaving 2mm stubs as appropriate.

Whilst in a tube cutting mood four spacers 8.5mm long will be required for the levers and eight 3.5mm long for the switches. You could of course cheat and use 8BA threaded rod and nuts to locate the switches.

Levers.

The levers are laminated from two off part 5 and one off part 6 which forms the middle of the sandwich. Open out the holes at each end of the levers to 0.7mm or slightly less to take a small pin or piece of wire. Align all three layers using the pins taking care to ensure that the shallow slots for the number plate are on the same edge. Clamp firmly and solder around the edges, removing the locating pins before completing the soldering. I find that it is unnecessary to tin the individual laminates first as capillary attraction draws sufficient solder into the joint, and in fact tinning the faces can result in an assembled lever that is very tight in the frame slots.



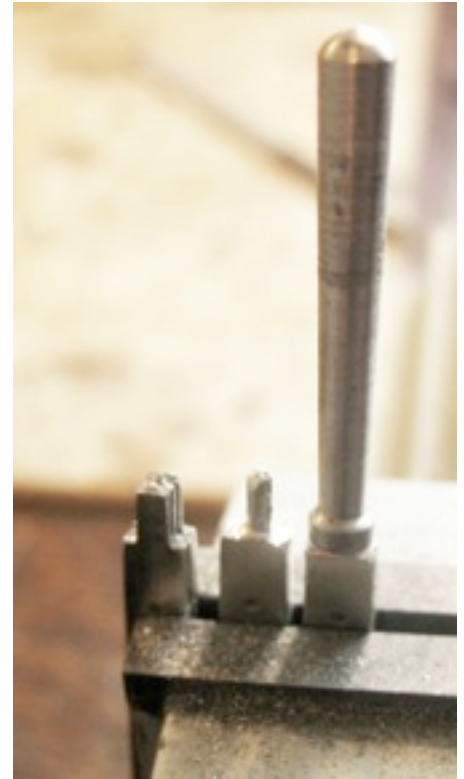


Open out the large hole to a running fit on the 3/32nd dia. rod and the small hole at the tapered end to a running fit on the pivot wire. Clean up all sides and edges. The completed lever should be between 1.4 and 1.5 mm thick.

Dependent on the fitting for your chosen lever handle the short stub at the tapered end can be filed to give a neater circular cross section of approx. 1.4 mm. dia.

Drop Box (Part No 9)

Fold to form a rectangular tube and solder. It helps the folding if the parallel part of a made up lever is used as a former to complete the bends. Clean out any solder that has strayed inside to achieve a free sliding fit on the parallel part of the lever.



Trigger (Part No 10)

Open out the four holes to 0.7 mm for a good fit on the pivot wire.

Fold the "ears" down to 90 degrees and reinforce with solder fillet.

Fold the end of the trigger back onto the main part (i.e. through 180 degrees) WITH THE HALF ETCH LINE ON THE OUTSIDE OF THE FOLD.

Grip the "eared" part of the trigger and bend the double thickness end up through 30 degrees. Solder the two layers together and file top to shape.

Lifting rod.(part No. 11)

Open hole out to running fit on the pivot wire.

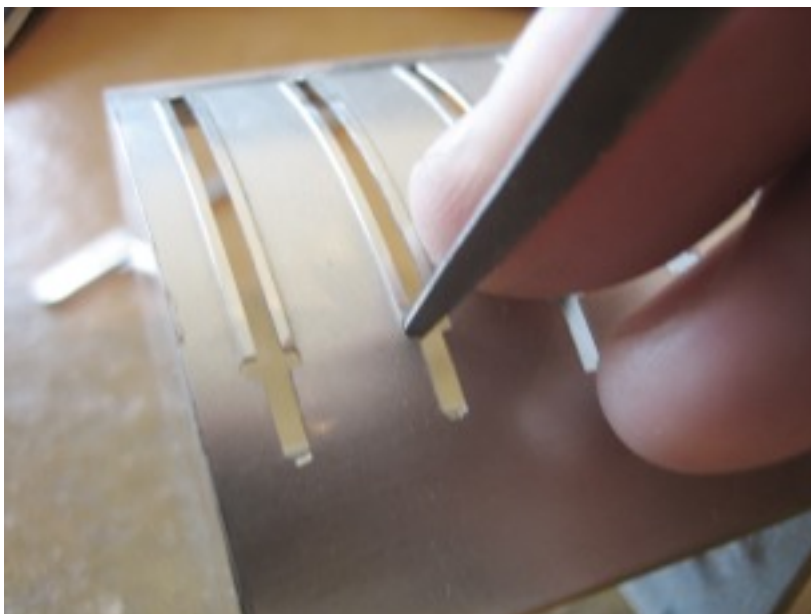
Hold the strip in a vice with 8 - 10 mm projecting at the hole end and twist this end through 90 degrees.

At the other end form a "U" bend such that the length of the U is approx. 3mm.

Fitting it all together

Remove etch cusp from the slots in the top plate so that the levers move freely throughout the full travel. Similarly with the tee slots at each end to allow the drop box latching tab to enter freely.

It is now necessary to make a temporary assembly in order to connect the lifting rod to the drop box.



Take a lever and slide the drop box on to it from the tapered end ensuring that the drop box latching tab is the same side as the hook on the lever. Temporarily pin the trigger to the lifting rod and this assembly to the lever. Fit the lever assembly through the slot in the frame top with the hook and drop box latching tab facing the taller side of the frame and engage on the pivot rod. Move the lever to either end of the slot and engage the drop box in the tee slot. Attach a spring between the "U" bend of the lifting rod and the hook on the lever. Carefully mark the lifting rod at a point level with the top edge of the drop box. Dismantle and, holding the drop box on a balsa or paxolin support, solder the lifting rod to the drop box where marked ensuring that it is central.

Repeat for the remaining levers.

If mechanical operation is required the linkage to the lever may now be fitted as below.

Cut a 50 mm. length of your chosen point rodding wire and solder it to the link shoe (part No. 8), using the half etched line for location, so that 30 mm projects beyond one end. Cut away the rod that lies across the slot in the shoe to allow the lever end to pass through.

Assembly

The levers can now be reassembled and the trigger pivot pins secured with a touch of solder (a scrap of aluminium foil between fixed and moving elements usually ensures free movement).

Select the appropriate number plate from the etch and solder into the recess in the lever.

The hot iron work is now complete and after cleaning up, careful painting of the levers and frame may be undertaken.

Fit the link shoe to the frame with the 30 mm length of rod passing beneath the microswitch locating bars and through the guide holes.

Fit the levers into the frame on the pivot rod with spacers between to give free movement without slop, engaging the lever in the link shoe with the rodding to the underside.

The pivot rod may now be cut off to length and secured with a dab of super glue.

The microswitches are fitted alternating with spacers so that the operating roller faces upwards and towards the lever.. (see sketch below).

Many thanks to Paul Willis for the photographs - and see MRJ 225 for his article on constructing one of these Lever Frames.

