

ASSEMBLY INSTRUCTIONS FOR LEVER FRAME

1.0 Tools / components

- 1.1 Stanley knife for removing item from the fret
Sheet of 1mm grid graph paper
Fine rat tail file approx. 3-4mm dia..
Fine tooth flat file
Pair of tweezers
Soldering iron
145°C solder
Phosflux 12 or Carr's yellow label flux
Loctite Nutlock 242e
- 1.2 2N° Etch sheet 1
1N° Etch sheet 2A and 3A
- 1.3 5N° compression springs
- 1.4 material to make
2N° 75mm lengths of 1/8" x 1/8" square hollow brass sections
5N° 75mm lengths of 3/32" x 3/32" square hollow brass sections
2N° 66mm lengths of 1/8" x 1/8" brass angle
5N° 12.5mm lengths of 1/8" outside diameter brass tube
4N° 3mm lengths of 1/8" outside diameter brass tube
1N° 75mm length of 3/32" outside diameter brass tube or rod
5N° 10mm lengths of 3/32" outside diameter brass tube
5N° 15mm lengths of 1/16" outside diameter brass rod
5N° 3mm lengths of 1/16" outside diameter brass tube
5N° 2mm lengths of 1/16" outside diameter brass tube
2N° 75mm lengths of 0.7mm hard brass wire
5N° 52mm lengths of 0.5mm hard brass wire

2.0 General

- 2.1 Read carefully the complete assembly instructions; study the etch layout diagram and 3D assembly diagrams prior to commencing construction.
- 2.2 Check all etched holes to receive wire, tube or rod sections are cleared for the specified diameter before removing them from the fret.
- 2.3 To remove items from the frets, with minimal distortion, place the etch on an MDF board and cut through the tabs with a sharp knife.
- 2.4 Some items need to be soldered but remain a sliding fit; typical examples are the cruciform locking unit C1 and the pivot point on the catch handle L1. In such instances it is preferable to apply Vaseline or a Teflon based grease over the faces where solder must NOT flow. Use minimum flux and solder to create the joint; do NOT use a solder paint as it will spread too quickly and burn away the grease. To achieve a quick joint the use of Carr's 145°C low melt solder, or equivalent, is recommended in conjunction with removing the soldering iron as soon as you see the solder flow across the joint.

Note: in some cases, such as where a wire or rod is located through more than one hole, only one side of the rod need be soldered in order to retain it.
- 2.5 When curving the top plate as required in 3.3, lay it on carpet underlay, [or carpet!] and then, by using the 'pastry rolling pin' technique, curve it with a timber or metal rod approximately 20 – 25mm in diameter by applying minimal pressure parallel to the long sides. Induce a curve slightly tighter than that of the formers to aid fixing.

- 2.6 If it is intended to use microswitch operation, it is possible to mount them on the front or rear of the lever frame. The exploded drawing shows assembly for mounting them on the front of the frame where, with the levers in the normal position, the microswitches will be in their normal position. To mount them on the rear, follow 3.11 but position the brackets on the opposite side to that shown in the exploded drawing. The pivot unit P1 should be attached to the lever following 4.5, but the opposite way up to that shown in the exploded view, so that P1 sits on top of the lever (see separate drawing). This means that, with the levers in the normal position, the microswitches will be in the reversed position.

3.0 Base frame [from etch sheets ref.: 1 and 3A]

- 3.1 Remove items EP1 and EP2 from etch 1. Bend EP1 up as shown and check EP2 fits exactly over EP1. **Note:** EP2 should be located such that it's base sits on top of the fold on EP1 with all holes aligned. Make any minor adjustments by filing the base of EP2.
- Carry out the same procedure for the other end piece of the lever frame.
- 3.2 Select the two 1/8"x1/8"x75mm lengths of square hollow section; place them approximately 18mm apart on graph paper, to ensure they are parallel to each other, and then align them with the edges of the base plate on EP1. Solder one end piece at right angles across the two hollow sections aligning the ends of the base plate with the ends of the hollow sections.
- 3.3 Remove the top plate from fret 3A. **Do not curve it at this stage.** Use the top plate as a template to locate the other end plate on the square hollow sections described in 3.2 above such that the top plate is a snug fit between the end pieces. Solder the second end piece into position. File or remove any length of hollow section that protrudes beyond the base plate. Before continuing ensure the assembly is square.
- 3.4 Locate the two lengths of 0.7mm hard brass wire through the holes of the end pieces and then, again with the aid of the top plate as a template, solder the wires into position such that the top plate is a snug fit between the end pieces.
- 3.5 Remove two of the formers F1 from etch sheet 3A. Solder them symmetrically to the end pieces with the 0.7mm brass rods located in the notches.
- 3.6 Roll the top plate as described in 2.5 above.
- 3.7 Solder the top plate onto the two located formers F1.
- 3.8 Remove four of the formers F2 from etch sheet 3A. Solder these into position by locating the tabs into the slots. Keep the top plate level along the rods by ensuring the brass wire is trapped in the notches as for formers F1. See 3.5 above.
- 3.9 Select the two 66mm lengths of 1/8"x1/8" brass angle and position these **between** the brass wire and the underside of the top plate. File these to length if they are oversize. Solder into position along the end pieces and top plate. **Ensure that the angle does not overlap the slots in the top plate.**
- 3.10 Select the following:
5N° 12.5mm lengths of 1/8" brass tube
2N° 3mm lengths of 1/8" brass tube
1N° 75mm length of 3/32" brass rod.
- Thread the brass tubes onto the rod such that a 3mm length is located at each end of the five 12.5mm lengths. Position this assembly through the pivot hole in the end pieces; centre the assembly and then solder the two 3mm tubes into the end pieces EP1 and EP2. Refer to the exploded diagram.

- 3.11 If micro-switches are to be used then remove the bracket from each etch sheet 1 and fold them, with the half etch line on the outside, through 180° so that the two holes line up with each other. Tack solder them to the end pieces, as shown on the 3D exploded view, such that the top edge is 5 mm below the top corner of the end pieces. See 2.6

If you use the micro-switches supplied by Brassmasters then you will need to mount them on 3/32" tube. The holes in the bracket have been produced smaller to facilitate other manufacturer's switches.

Alternative: Insert 1/16" brass rod through the brackets and provide sleeves for each micro-switch from 3/32" brass tube.

4.0 Levers [from etch sheet 2A]

- 4.1 Assembly of the lever is shown on the exploded view. Basically all etched elements are bent up as shown with the recommended order of construction being as set out below.
- 4.2 Solder up the lever tops from the 10mm lengths of 3/32" brass tube and 15mm lengths of 1/16" rod and then insert and solder into the top of the 3/32" brass square hollow section. Refer to the 3D assembly drawing.
- 4.3 The hole for the etched catch handle L1 needs to be drilled into the 3/32" square hollow brass section. First bend up the etched catch handle L1 as shown. Then place it over the brass tube, using a 2mm wide piece of 40 thou styrene sheet as a spacer, and locate it so that the pivot is 6 mm below the top of the square section of the lever. Using the etch L1 as a jig, drill 0.7mm dia. holes through the lever. [i.e. one each side]. Insert a length of 0.7mm and solder on one side as set out in 2.4 above.

Select the 2mm length of 1/16" brass tube and thread onto the length of 0.7mm dia. wire, as shown on the assembly drawing, to provide the pivot for locating the end of the spring unit described in 4.7 below. Solder as described in 2.4 above so that the 1/16" tube is left to revolve around the brass wire.

- 4.4 Fold up the cruciform unit C2. Fold over and solder the "wings", ensuring that the 180° bend is made with the etch line on the INSIDE. Before locating onto the lever check that the unit C1 passes through the etched slots in the top plate of the frame assembly. Carefully remove any cusps from the slots in the top plate left by the etching process to ensure a smooth sliding fit. File a chamfer on the edge of the two smaller fold up side pieces adjacent to the wings to ensure they pass smoothly through the top plate. If necessary file a leading edge onto the 'wings' to assist engaging into the slot. **It is essential that this process be carried out for each lever to achieve reliable operation.**

Locate the top piece C1, as shown on the assembly drawing, file so that it fits between the sides of the cruciform unit C2 without distorting it. Solder C1 to C2 following the guidelines stated in 2.4 above. **Ensure this unit slides freely along the shaft, with minimal side play, before proceeding.**

- 4.5 Ensure the cruciform is fitted on to the lever. Bend up and solder into position item B1 (note part B2 is not necessary). Bend up item P1 as shown on the assembly diagram and solder onto the bottom of the lever. See 2.6 and separate sketch.
- 4.6 Once all etched items have been located on the lever check that the complete lever assembly can be threaded through the etched slots in the top plate of the lever frame. Make minor adjustments where necessary taking care not to remove too much from the guide slots in the top plate. It is preferable to make minor modifications to the width of etched units L1 and P1 rather than C1 and C2. [Note that C1 and C2 should already have been adjusted as set out in 4.4 above]

- 4.7 Make up the 5N° spring units, as shown, from 0.5mm dia. hard brass wire and the 3mm lengths of 1/16" brass tube. Thread the wire through a spring and then through the holes on B1 and C1; solder the end to the brass pivot on the catch handle. To achieve maximum compression force from the spring ensure the catch handle etch L1 is in contact with the main stem of the lever assembly. At this stage **do not** solder the spring unit to item C1.

5.0 Final assembly

- 5.1 At this stage you should have the following completed items:

5N° assembled levers
a base frame.

- 5.2 Remove the pivot rod and the five 12.5mm lengths of brass tube from the frame. Insert one of these lengths of tube into the holes of etch unit P1 and thread the lever, from below, through the slot and then insert the 3/32" brass rod through the tube as before. Carry out this procedure until all five levers are located.

Remove the etched jig from etch sheet 3A. Insert the jig between the end pieces EP1 and locate the projecting nose of the pivot P1 into the slots in the jig. The levers should now be 'centred' below their respective slots. Solder P1 of each lever to the brass tube pivot and then clearly mark each lever so that if they are removed for maintenance they are replaced in the correct order.

- 5.3 Slide the cruciform unit C1/C2 up through the locking slot and solder into position on the spring unit so that it disengages from the slot when the catch handle is depressed.

- 5.4 When all levers are performing satisfactorily solder one of the remaining 3mm lengths of 1/8" dia. brass tube to the projecting pivot rod (see 5.2 above). Locate the other remaining 3mm length on the other end with Loctite 242e to facilitate easy removal.

- 5.5 If Brassmasters micro-switches are being used, locate them with the roller bearing onto the lever just above the pivot point on P1. Holes in the micro-switches may need opening up carefully with a needle file before they slide onto the 3/32" brass tube. If the switches do not operate in the central section of the lever-movement then raise or lower the support brackets by 0.5mm. When satisfied with the operation, permanently solder the brackets in place, fix the mounting rods in place using Loctite Nutlock 242e, and secure the microswitches to the tube also with Loctite Nutlock 242e.

6.0 Mounting

- 6.1 The method of mounting the lever frame is left to the builder. However here are a few suggestions.

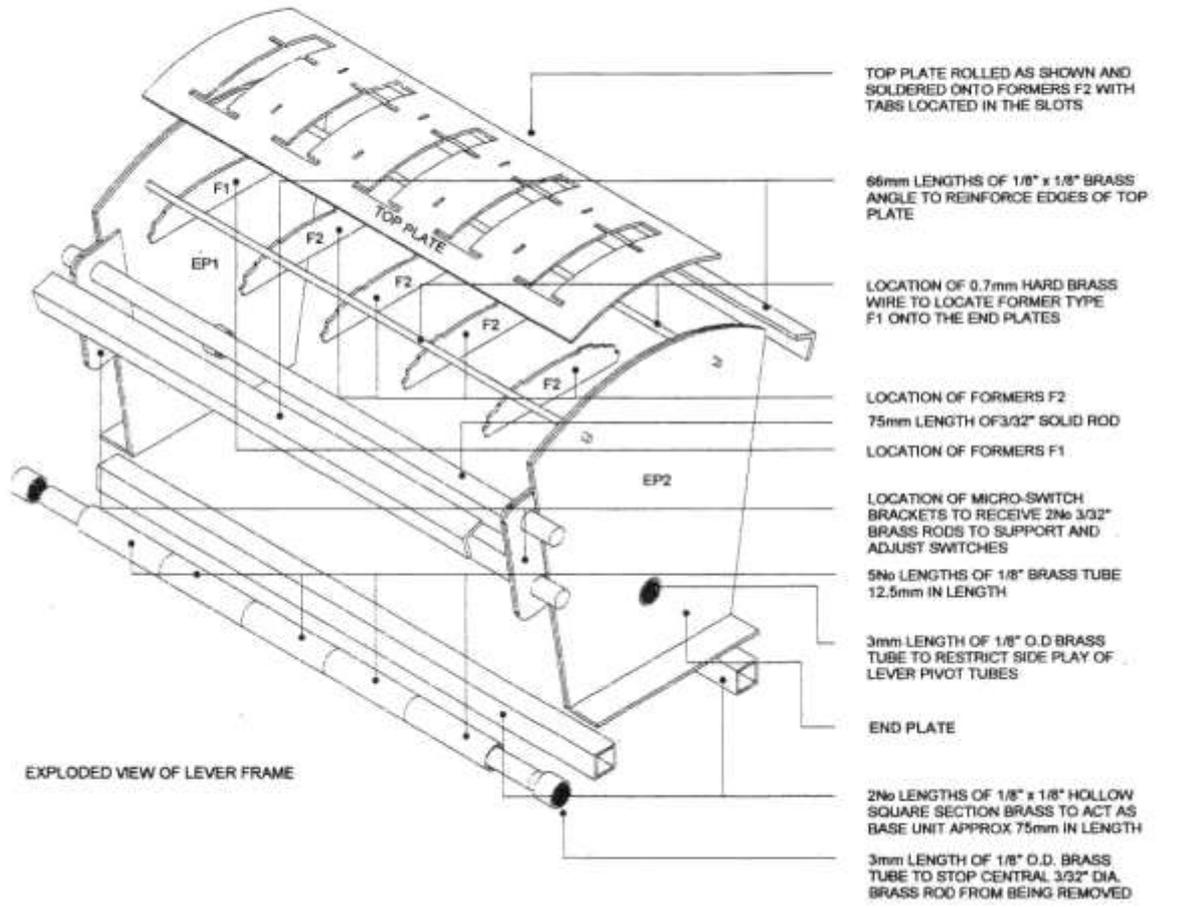
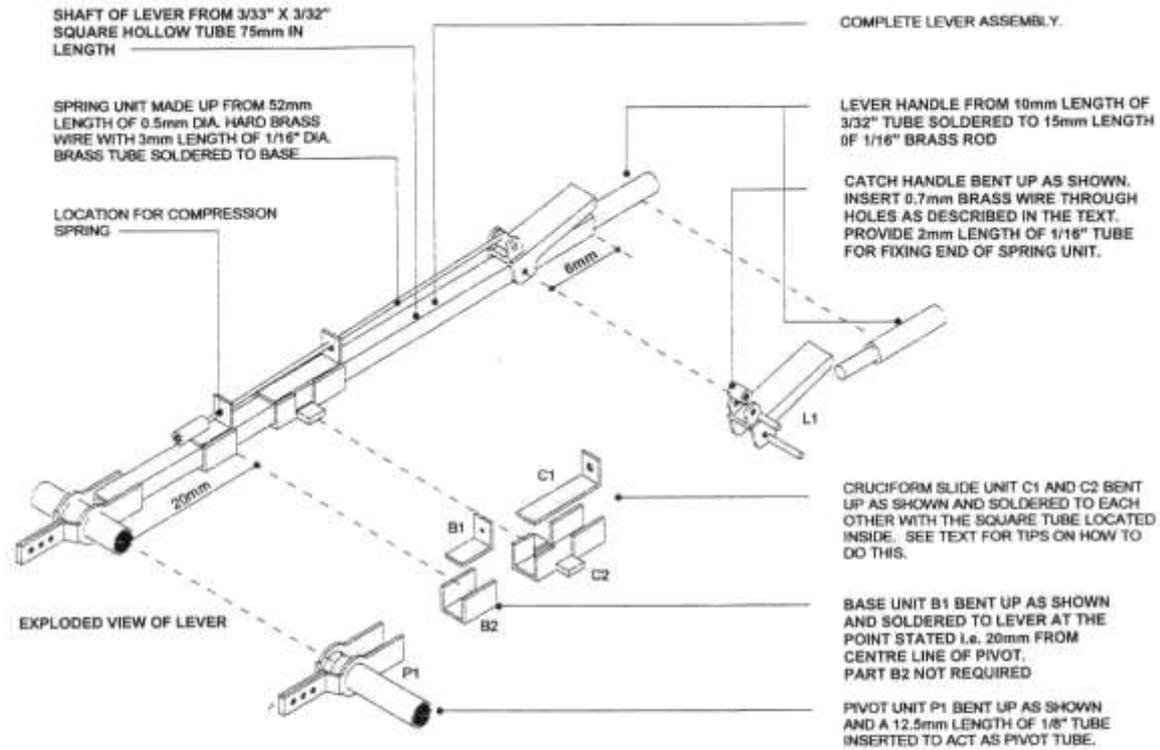
- 6.2 Method 1 – Solder a piece of brass angle to the outside edge at each end of the 1/8" square hollow sections. Drill a hole in the horizontal section of each piece of angle and screw down to the mounting surface.

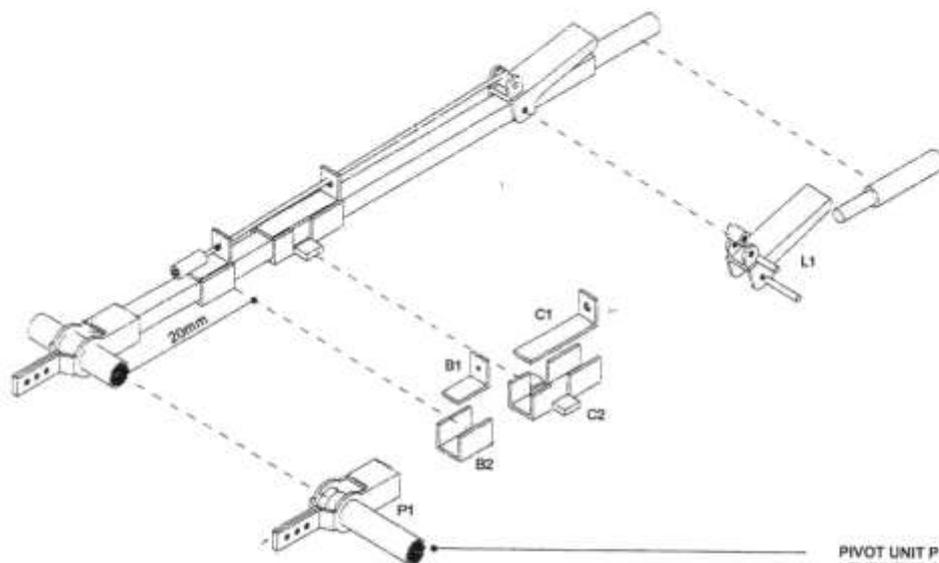
- 6.3 Method 2 – Either solder the lever frame to a solid piece of brass sheet bigger than the base frame and screw to the mounting surface through the brass sheet or, solder two cross pieces from brass sheet, which are longer than the frame is wide, across the base frame at each end, and screw to the mounting surface through these.

- 6.4 Method 3 – Drill and tap 4 holes in the underside of the ends of the 1/8" square hollow sections. Attach to the mounting surface by screwing from underneath.

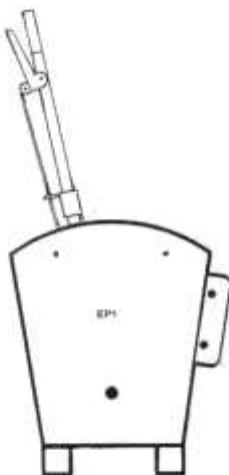
- 6.5 Method 4 – Drill 2 holes in the bottom flange of each of the endplates EP1. Using a suitable spacer between the flange and the mounting surface to prevent the endplate distorting, screw down into the mounting surface.

- 6.6 And there will be many other possibilities.

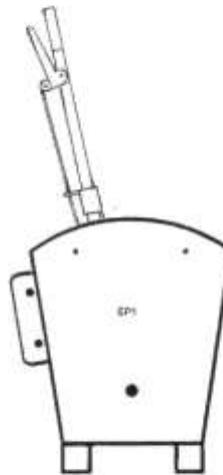




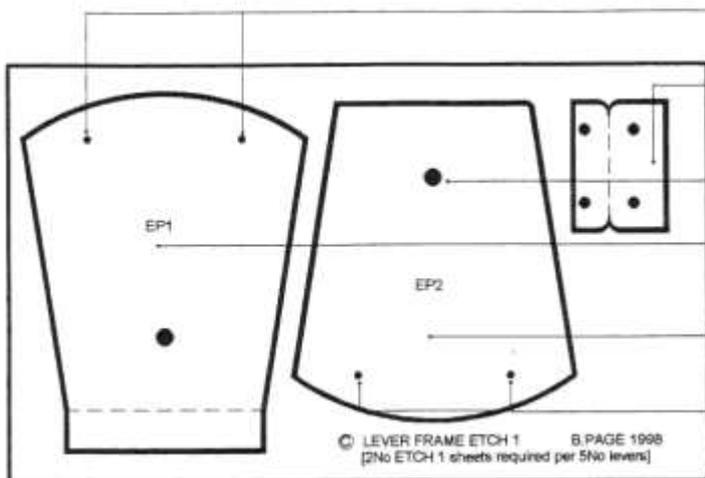
PIVOT UNIT P1 ATTACHED TO THE LEVER THE OPPOSITE WAY UP, TO SUIT MICROSWITCHES MOUNTED ON THE REAR OF LEVER FRAME. SEE INSTRUCTION 2.6



MICROSWITCH BRACKET MOUNTED ON FRONT OF LEVER FRAME. PIVOT P1 ASSEMBLED AS SHOWN ON MAIN DRAWING.



MICROSWITCH BRACKET MOUNTED ON REAR OF LEVER FRAME. PIVOT P1 ASSEMBLED AS SHOWN ON ABOVE DRAWING.



LAYOUT OF ETCH SHEET 1

HOLES TO RECEIVE 0.7mm HARD BRASS WIRE TO ASSIST LOCATION OF FORMERS F1 AND F2

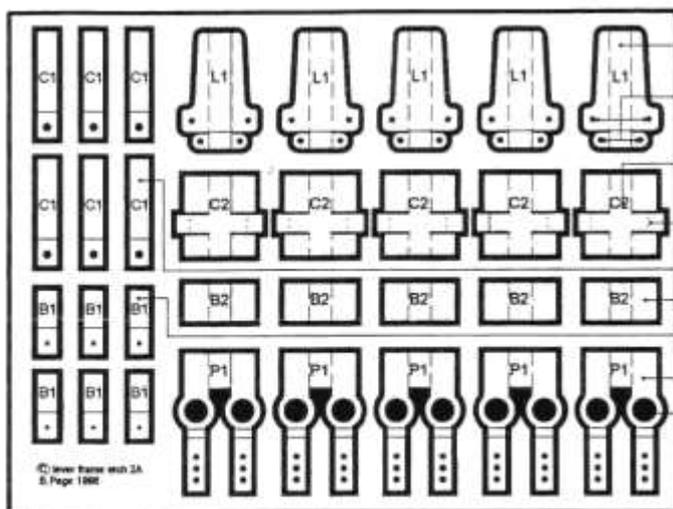
BRACKET TO LOCATE TWO 3/32" BRASS TUBES FOR MICROSWITCHES

HOLE TO RECEIVE 1/8" TUBE WITH 3/32" SOLID ROD FOR PIVOT

1No END PIECE EP1 WITH BASE

1No END PIECE EP2, WITHOUT BASE, TO LAMINATE ONTO EP1 ABOVE

HOLES TO RECEIVE 0.7mm HARD BRASS WIRE



LAYOUT OF ETCH SHEET 2A

CATCH HANDLE L1 BENT UP AS SHOWN ON ASSEMBLY SHEET

HOLES TO RECEIVE 0.7mm BRASS WIRE WITH 1/16" BRASS TUBE PIVOT TO SOLDER TO TOP OF SPRING UNIT

CRUCIFORM LOCKING UNIT C2 BENT UP AS SHOWN ON THE ASSEMBLY DRAWING

180deg BEND WITH ETCH LINE ON THE INSIDE

CRUCIFORM TOP PIECE C1

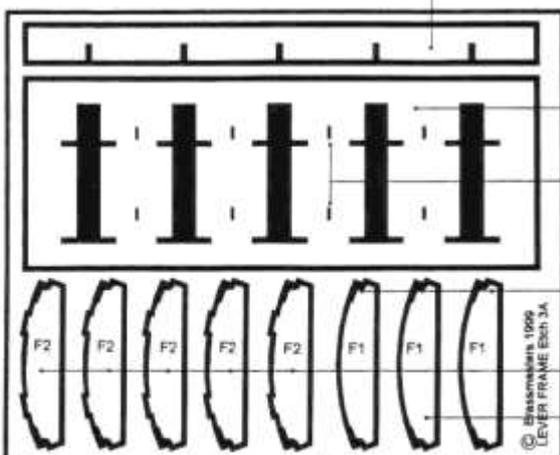
BASE UNIT B2 (NOT REQUIRED)

BASE UNIT TOP PIECE B1

PIVOT UNIT P1 BENT UP AS SHOWN ON THE ASSEMBLY DRAWING

HOLE TO RECEIVE 1/8" BRASS TUBE FOR PIVOT

NOTE THAT ADDITIONAL FORMERS AND LEVER COMPONENTS ARE PROVIDED ON THE ETCH TO CREATE SPARES IN THE CASE OF LOSS.



LAYOUT OF ETCH SHEET 3A

JIG FOR SETTING OUT BASE OF LEVERS TO THE CENTRE LINE OF THE ETCHED LEVER SLOT

TOP PLATE TO BE ROLLED OVER FORMERS TO PROVIDE SMOOTH CURVED SHEET

SLOTS TO RECEIVE TABS ON FORMER F2

FORMER F1 FOR LOCATING ON THE END PIECES EP1 AND EP2

FORMER F2 WITH TABS FOR LOCATING INTO THE TOP PLATE

ENDS OF FORMER SHAPED TO RECEIVE 0.7mm BRASS WIRE AND 1/8" x 1/8" BRASS ANGLE AS SHOWN ON THE ASSEMBLY DIAGRAM