SLINGSBY SAILPLANES, KIRKBYMOORSIDE, YORK. YO6 6EZ.

TECHNICAL INSTRUCTION No. 71

EXTENSION OF RUDDER CHORD BY 76 mm

SLINGSBY T59 KESTREL - MODIFICATION No. 25

INTRODUCTION

In order to improve the directional stability of the T59C, D and F 19M Kestrels a rudder with an extended chord of 76mm (approximately 3") has been introduced.

COMPLIANCE

This modification is optional.

PROCEDURE

1. Remove the rudder from the aircraft and detach the parachute box.

2. Mark out, with masking tape, the areas of the rudder which are to be removed. These are shown in diagram 1.

3. Trim the trailing edge and cut out the holes in the rudder and also the end rib at the top of the rudder as shown in diagram 2.

4. Carefully chisel out the old rib stiffeners and remove the surface gel coat with aluminium oxide paper for a further 75mm from the trailing edge and top edge of the rudder.

5. Lay up two flat pieces of glass fibre as shown in diagram 3 and allow to cure for 24 hours at room temperature.

   Note: To ensure a smooth surface finish lay the cloth up on a smooth sheet of polythene, perspex or formica.

   Trim off the sharp edges and abrade one side for 75mm.

6. The lower end rib is extended prior to the splicing process with a prelaminated sheet of glass fibre (diagram 5). The trailing edge is slit for a depth of approximately 40mm and the laminated sheet is glued into place in the slit with cotton flock mix. After curing the sheet is cut to the size shown on diagram 5 and covered with microballoons. The correct profile can then be obtained by grinding down the microballoons when they have hardened.

7. Splice the two panels to the trailing edge of the rudder by chamfering down both edges to a gradient of about 1:30 and laying up two layers of 92125 and one layer of 92110 cloth across the joint (diagram 3). The rudder sides are then trimmed to the dimensions shown on diagram 4. (Note: The lightening holes are increased in size).

8. New rib stiffeners are made as shown in diagram 3 and trimmed to their correct sizes. Abrade all the surfaces which come into contact with the stiffeners and also the edges of each stiffener. Bond them in their correct positions shown on diagram 4 by covering them with one layer of 92125 cloth (Section A-A diagram 4).

9. Abrade the trailing edge of both sides of the rudder and bond them together by laying up two rovings along the trailing edge and clamping the two sides of the rudder together.

10. The top end rib is made from rigid polyurethane foam cut to the size shown on diagram 5. Abrade the inside edges of both sides of the rudder at the top and bond the foam into place with cotton flock mix. The end of the rudder is then covered with one layer of 92110 cloth as shown in diagram 5.

11. The parachute box is extended in the same way as the bottom end rib. A slit is made in the middle of the box extending for approximately 40 mm from the trailing edge. A flat piece of glass fibre laminate is glued into position in the slit with cotton flock (diagram 5). The rear half of the box is then covered with micro-balloons, allowed to cure and ground off to give the required shape. The entire box is then covered with one layer of 92110 cloth.

12. The rudder is then post-cured for 8 hours at 54°C and inspected for any air voids or dry patches in the laminate. If either of these defects occur then the laminate must be rejected and carefully stripped from the original structure.

13. Fabric can now be fixed over the rudder. Lightly abrade all the surfaces of the rudder and apply one coat of Necol cement. When this first coat has dried a second coat is applied. Fabric is then stretched over the rudder and a further coat of Necol cement is applied. Three or four coats of clear dope are applied to the fabric and finally a coat of white cellulose is sprayed over the complete rudder.

14. The hinge moment of the rudder must be determined in the following way:-

    (a) Support the rudder on a rig shown in diagram 6 at the top mounting pin and at the parachute release mechanism, so that the rudder can pivot freely. (Note: The empty parachute box is attached to the rudder).

    (b) Measure the load at some point on the trailing edge, to keep the rudder level, (diagram 6).

    (c) The hinge moment is the weight from (b) multiplied by the distance from the point at which the load was measured to the hinge line.

15. If the hinge moment is less than or equal to 3 lbs. ft, the aircraft can be flown without any further action.

16. If the hinge moment is greater than 3 lbs. ft. the rudder should be partially mass balanced to give a hinge moment less than 3 lbs ft. Calculate the required reduction in hinge moment. The mass balance weight can be riveted to the leading edge lip of the rudder to give an effective moment arm of approximately 2 inches. If it is required to correct the hinge moment by 0.5 lbs. ft. (6 lbs. ins.) a 3 lbs weight manufactured from lead strips 20 mm x 1 mm x required length is attached to the rudder as shown.

17. Check the hinge moment as before and also check the maximum rudder movements as given in the Pilots Notes.

JB/MS
24.9.74.

DIAGRAM 1

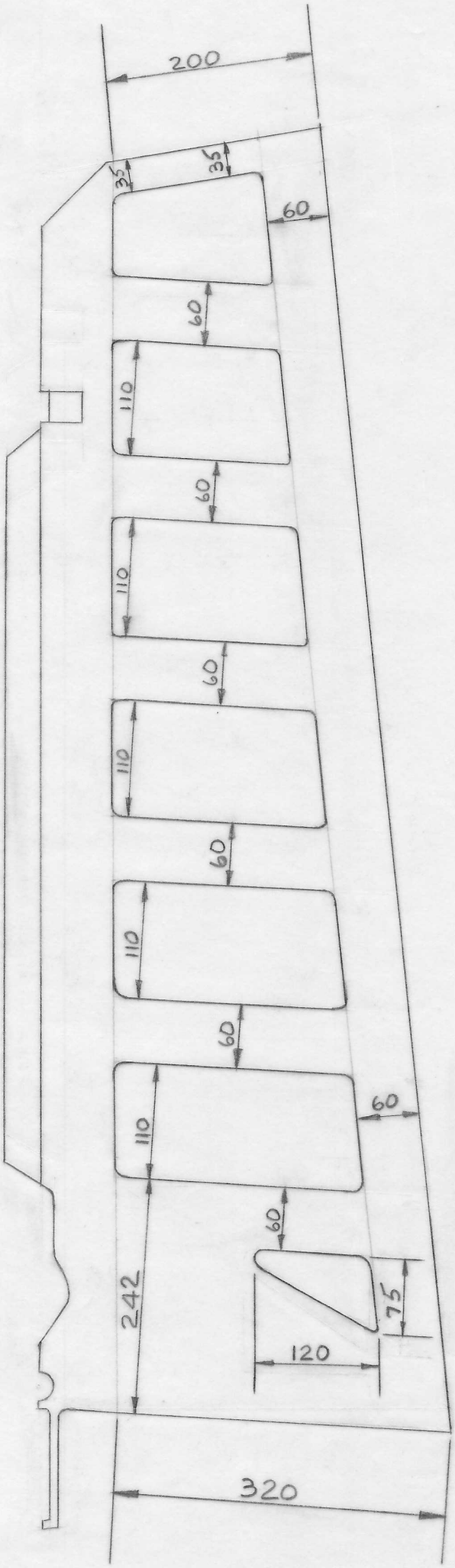


DIAGRAM 2

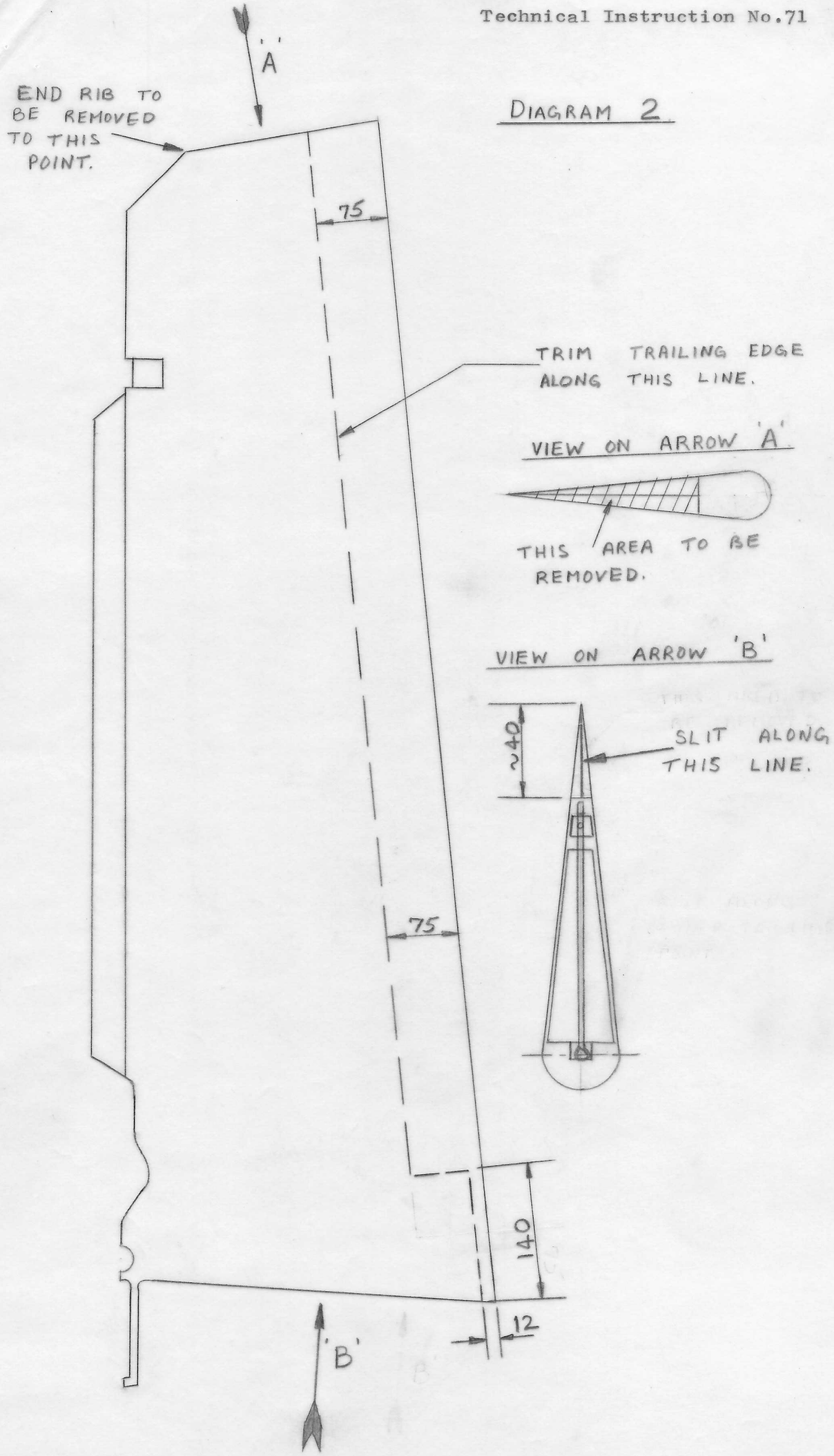
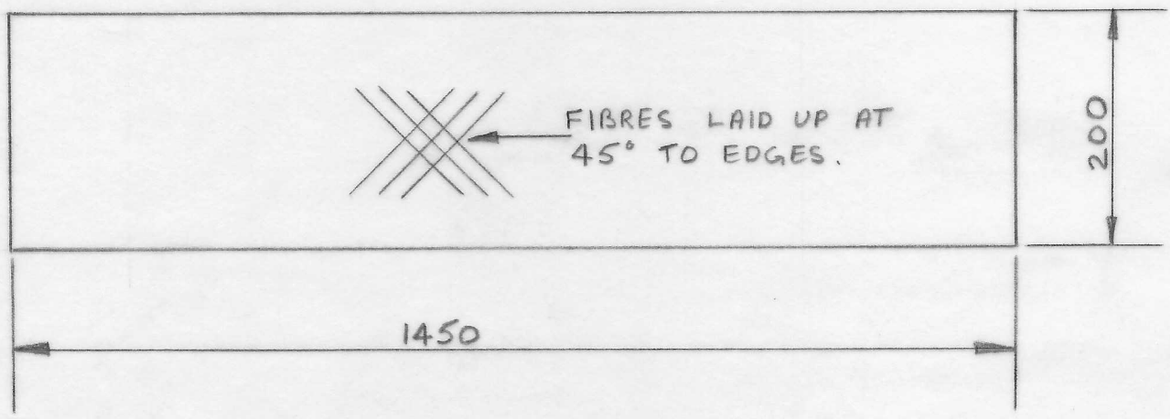
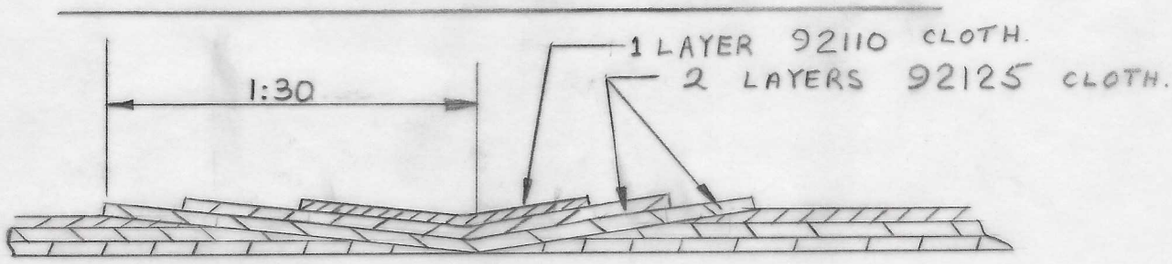

'A'
END RIB TO BE REMOVED TO THIS POINT.
75
TRIM TRAILING EDGE ALONG THIS LINE.
VIEW ON ARROW 'A'
THIS AREA TO BE REMOVED.
VIEW ON ARROW 'B'
240
SLIT ALONG THIS LINE.
75
140
12
'B'

DIAGRAM 3.

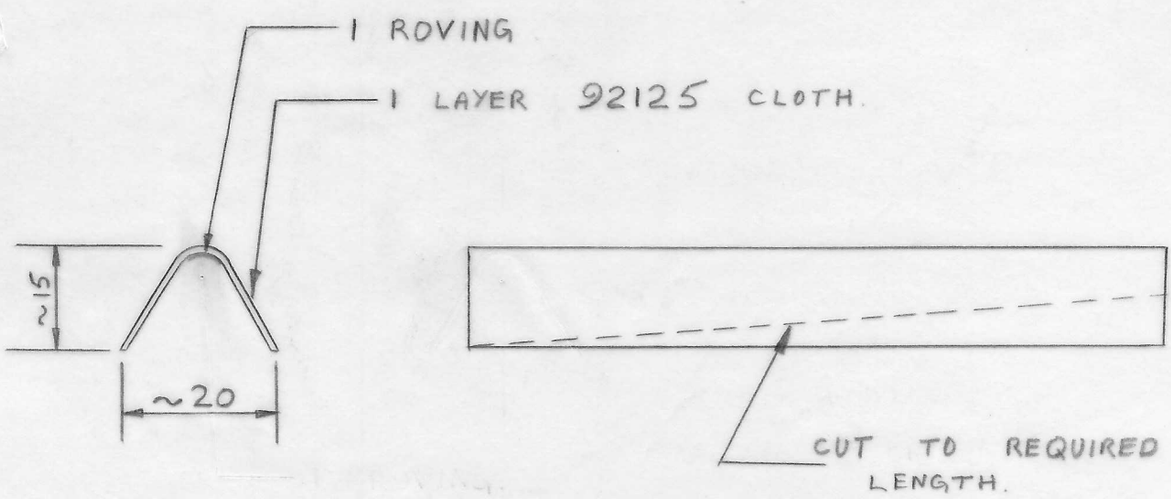
SIDE PANELS FOR RUDDER EXTENSION (2 OFF).



LAYUP :- 1 LAYER 92110 CLOTH.
2 LAYERS 92125 CLOTH.



DETAIL OF SPLICE BETWEEN RUDDER AND PANEL.



LAY UP OF RIB STIFFENER (12 OFF)

DIAGRAM 4.

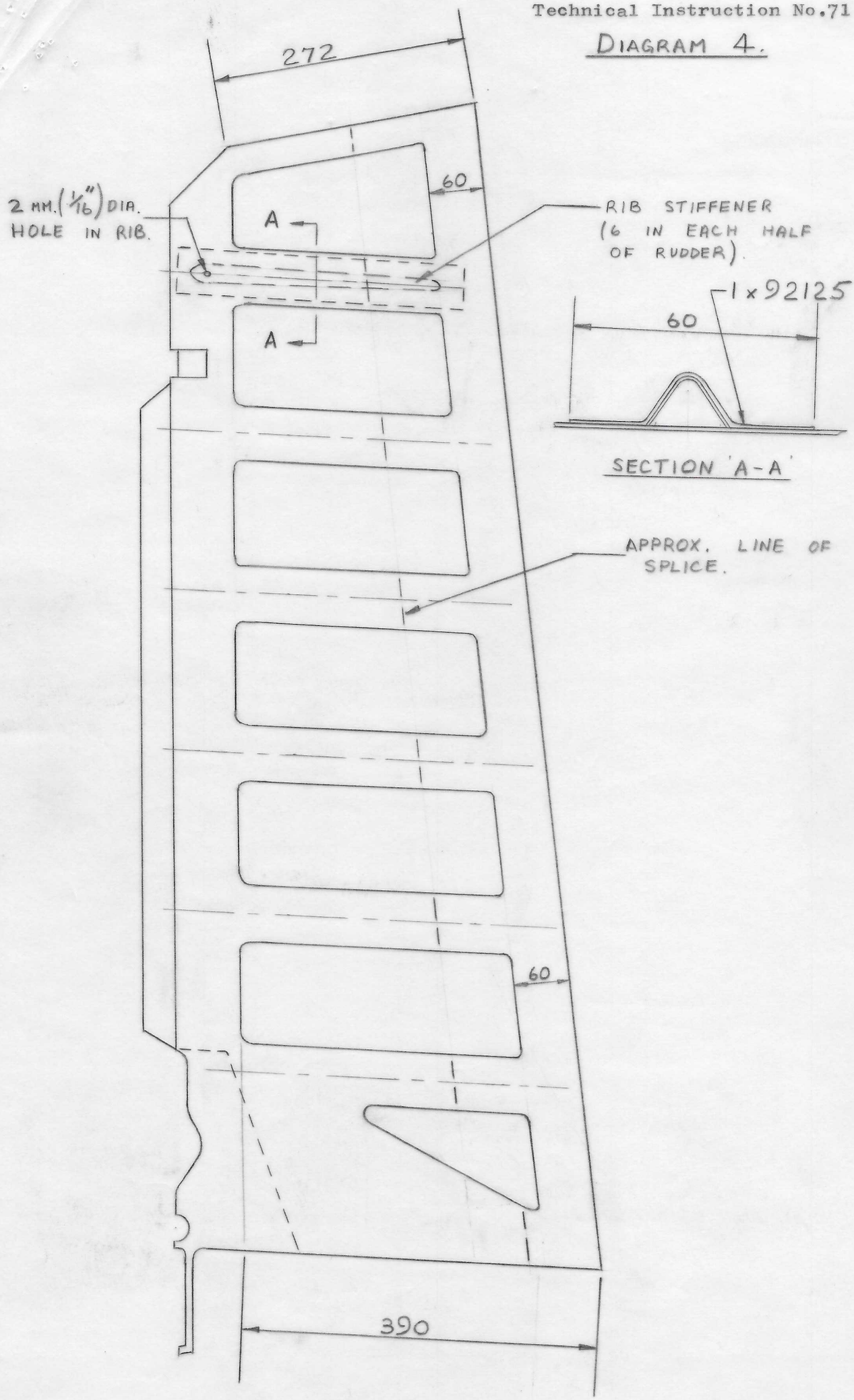
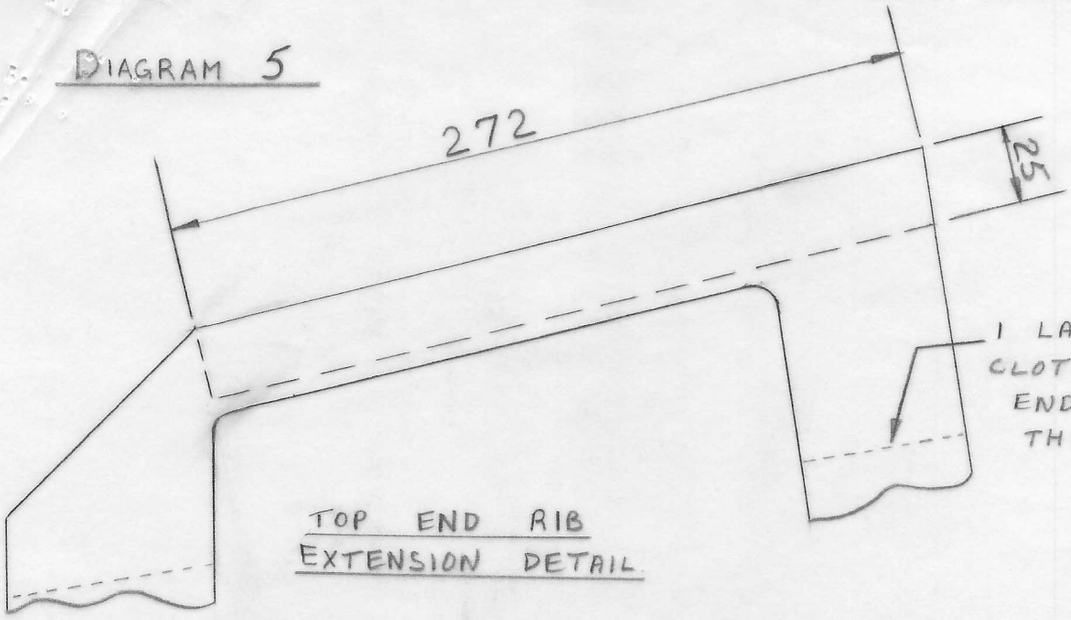
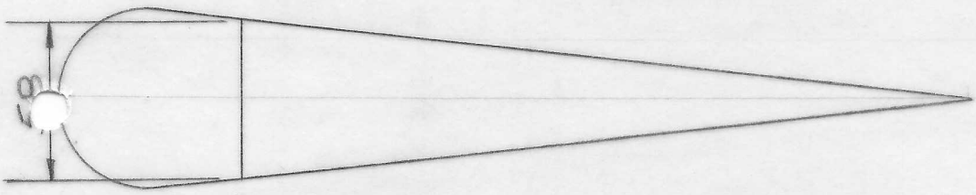

272
60
2 MM.(1/16") DIA. HOLE IN RIB.
A
A
RIB STIFFENER (6 IN EACH HALF OF RUDDER).
1 x 92125
60
SECTION 'A-A'
APPROX. LINE OF SPLICE.
60
390

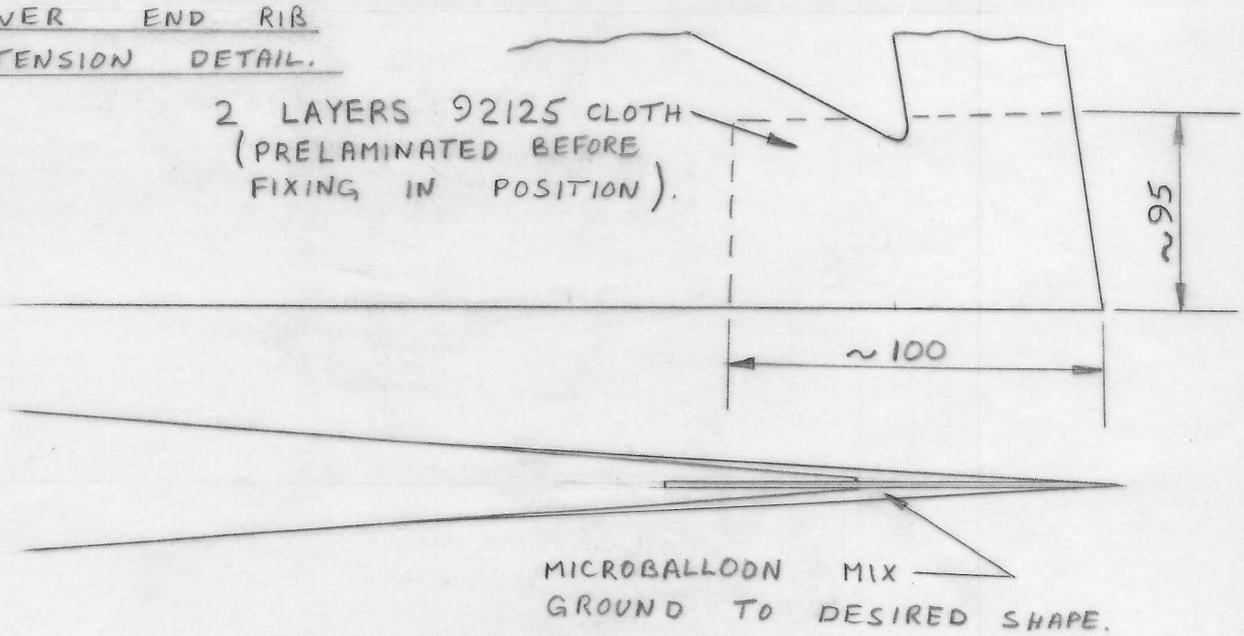
DIAGRAM 5



TOP END RIB EXTENSION DETAIL.



LOWER END RIB EXTENSION DETAIL.



DETAIL OF TRAILING EDGE OF PARACHUTE BOX.

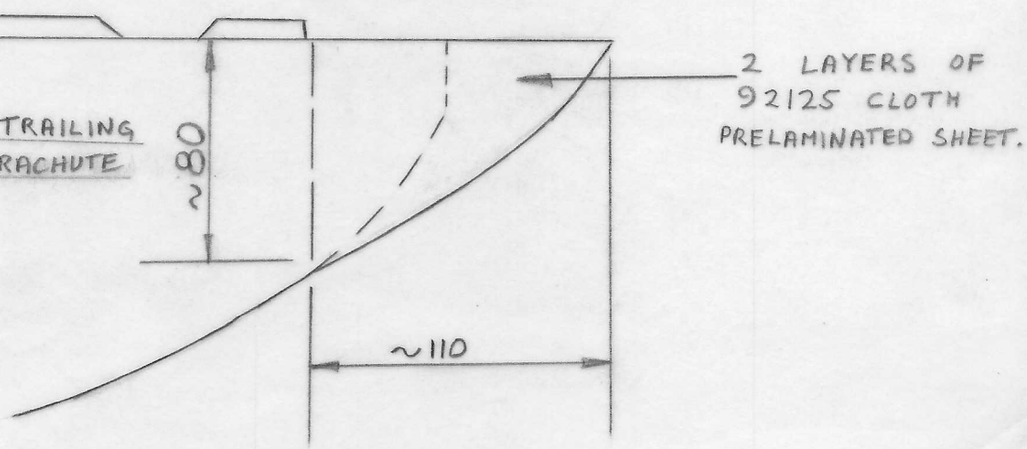
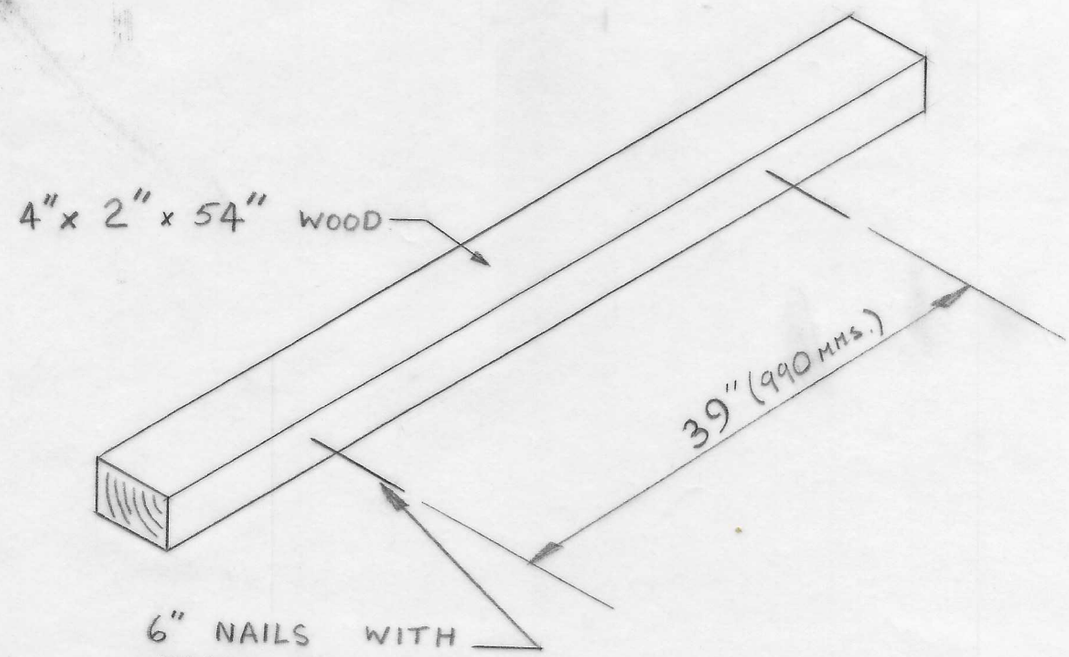
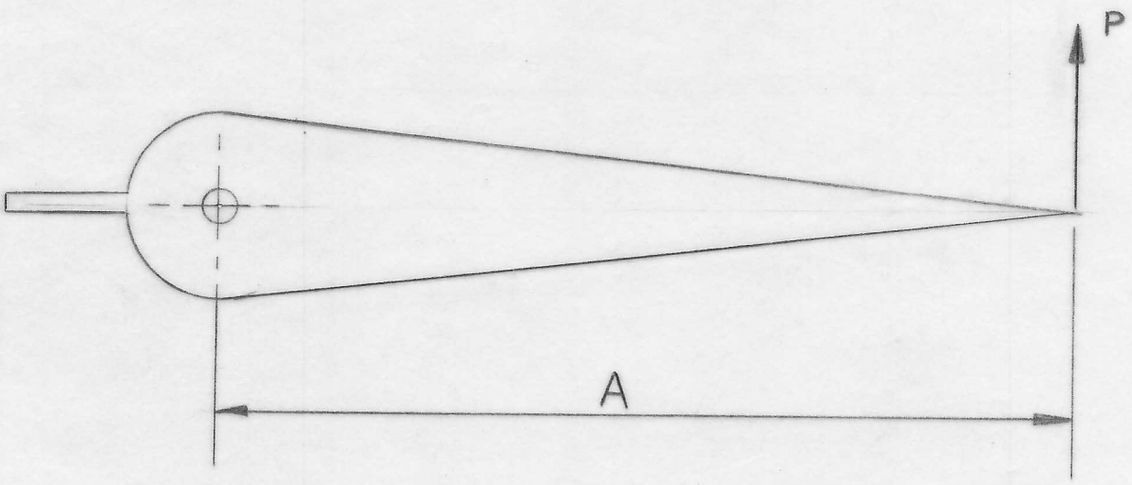
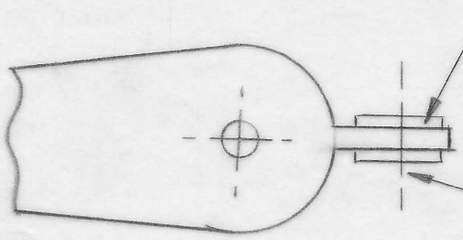


DIAGRAM 6





P x A = HINGE MOMENT.



MASS BALANCE LEAD STRIP 2 OFF 20 MM. x 1 MMS x REQUIRED LENGTH.

SP 77/507 RIVETS WITH SP 122 C WASHERS EACH SIDE AT 2" (50 MMS.) PITCH ALONG LENGTH OF MASS BALANCE.