# CHAPTER 3 MAIN PLANES

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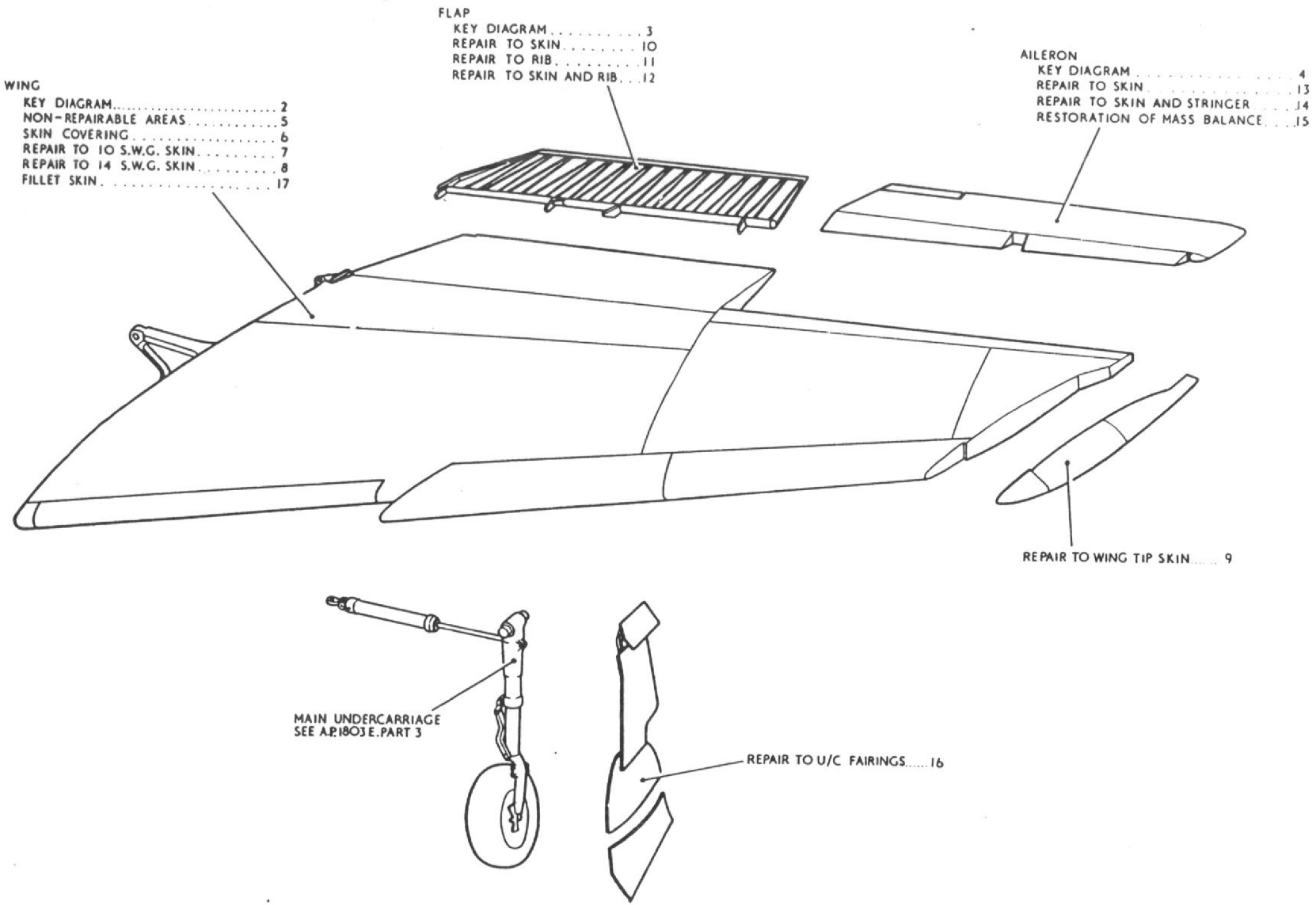
## LIST OF ILLUSTRATIONS




UNLESS OTHERWISE STATED NUMBERS SHOWN ARE FIGURE NUMBERS OF THIS CHAPTER

FIG.I. LOCATION DIAGRAM FOR MAIN PLANES

**General**

1. This Chapter deals with the main planes, flaps and ailerons. The stub wings, which form part of the centre fuselage, are dealt with in Chapter 2. The main planes are of 2-spar, stressed-skin, all-metal construction and have detachable wing tips. Ribs A, G, M and R are heavier than the remaining ribs and with the spars and undercarriage girder, form the major load-carrying members of the framework. The heavy-gauge skins are reinforced with extruded stringers. All nosing skins are joined at the leading edge by internal butt straps, with the exception of the portion which is detachable to provide access to the fuel tanks.

2. With the exception of patch repairs to free areas of the skin, repair of the main planes is at present beyond the scope of User Units; major repairs will be included in Part 2 of this Volume.

**Wing repairs**

3. Unless otherwise stated, all sheet material used for repairs to the wing must be to L.73.

**Repair prohibitions**

4. User Unit repairs to the main planes are not permitted in the areas shown shaded in fig.5.

## WINGS *(fig.2)*

### SKIN

**Negligible damage**

5.(1) Negligible damage forward of a line one-third of the chord measured from the leading edge is confined to smooth isolated dents, free from cracks, abrasions and sharp corners, in free areas of the skin provided they are not deeper than 0.010 in.

(2) Negligible damage aft of the above line is confined to similar damage not exceeding the following depths:-

10 s.w.g. skin – 0·015 in.
14 s.w.g. skin – 0·020 in.

6. In the free areas of the skin, small perforations should be cleaned out if possible, by drilling a hole not larger than 3/16 in. dia. and then fitting a countersunk-head solid rivet. Slight surface scores in the 10 s.w.g. skin may be blended out and neglected provided they do not exceed 0·010 in. deep and do not occur in areas shown shaded in fig.5. Free areas of the internal tank-supporting skins may be repaired as shown in Chap.2, fig.15.

**Repairs**

7. User Unit repairs are only permissible in free areas of the skin in unshaded areas shown in fig.5. These are restricted to flush patches as shown in fig.7 and 8.

### SPARS

8. The front spar is made in three sections as follows:-

(1) Inner portion–high tensile steel. The wing attachment fitting as an integral part.

(2) Centre portion–light alloy 'T' – section booms with plate webs.

(3) Outer portion–heavy light alloy flanged plate.

The rear spar, to which the aileron and flap brackets are attached, is made throughout of heavy gauge light alloy flanged plate. Three sections form the rear spar, as follows:-

(a) Rib A to Rib J.

(b) Rib J to Rib P.

(c) Rib P to wing tip.

**Negligible damage to booms and webs outboard of rib J**

9. (1) Smooth isolated dents, free from cracks, sharp corners and abrasions, may be neglected provided the adjacent fixings have not been strained.

(2) Slight deformations of the spar flanges may be neglected provided there are no cracks.

(3) Small surface scores in free areas, which do not exceed 0·010 in. deep when cleaned out, may be neglected.

**Repair prohibitions**

10. Repairs to the spars cannot be under-taken without first lifting the skin; consequently User Unit repairs are not possible.

### INTER-SPAR RIBS

11. Inter-spar ribs are divided into two groups, as follows:-

(1) Heavy–Ribs A, B, C, D, E, F, G, H, M, R and S.

(2) Light–Ribs J, K, L, N, P, Q and T.

### NOSE RIBS

12. The nose ribs are divided into two groups similar to the inter-spar ribs, as follows:-

(1) Heavy–Ribs A, 1, 2, 3, G, G1, M and R.

(2) Light–Ribs H, J, K, L, N, P, Q, and Q1.

**Negligible damage**

**13.** Negligible damage to light nose ribs is as defined in para. 9.

### MISCELLANEOUS COMPONENTS

**14.** For repair purposes the following are considered as miscellaneous components:-

(1) Aileron shroud supports.

(2) Flap spools.

(3) Undercarriage jack anchorage brackets.

**Aileron shroud supports**

**15.** Aileron shroud supports are made from light alloy stampings attached to the flanges of the rear spar and support the top and bottom skins in way of ailerons.

**Flap spools**

**16.** The flap spools (18 per aircraft) are bolted to the flap spars. They are made in one piece from light alloy stampings.

**Undercarriage jack anchorage brackets**

**17.** The undercarriage jack brackets are light alloy stampings and are bolted to the undercarriage girder. The holes are bushed where they pick up with the jack shackle.

**Negligible damage**

**18.** Scores and nicks clear of fixings, which can be blended out to a smooth contour and do not exceed 0·020 in. deep, may be neglected.

**Drooped L.E. extension**

**19.** The drooped leading edge extension consists of 16 s.w.g. light alloy skins to specification L.72 and a number of nose ribs which are riveted to the leading edge of Post Mod.228 wings. This extension, being at the outer end of the wing is accompanied by a re-designed wing tip.

**Trailing edge of wing fillet**

**19A.** The trailing edge of the wing fillet is detachable with the wing removed from the aircraft, but in cases where the extremity is damaged it may be repaired without removing the wing as shown in fig.17.

### WING TIPS

**20.** The wing tip is readily detachable by releasing the countersunk screws attaching it to the outer rib. Skin details are given in fig. 6,

### NEGLIGIBLE DAMAGE TO SKIN AND RIBS

**21.** Smooth isolated dents, free from cracks and abrasions, may be neglected if they are not deeper than 0·020 in.

### REPAIR PROHIBITIONS

**22.** Only flush repairs to the free areas of the skin are permissible. If the ribs are damaged to an extent greater than negligible or flush patches are impracticable, the wing tip must be renewed.

### SKIN REPAIRS

**23.** Damage confined to the free area of the skin should be repaired as shown in fig.9.

### FLAPS *(fig. 3)*

**24.** There are two flaps, one under each of the main planes. Each flap consists of a single sheet of 20 s.w.g. light alloy riveted to ribs of the same material and a tubular steel spar. The trailing edges of the flaps are stiffened by a sheet of light alloy attached to the ribs on the upper surface by pop rivets.

### NEGLIGIBLE DAMAGE

**25.** Smooth isolated dents, free from cracks, in a free area may be neglected provided they do not exceed 0·030 in.deep in the skin and ribs, and 0·020 in.deep in the spars.

### REPAIRS

**26.** Repairs to the skin and ribs are given in fig. 10 to 12.

### DAMAGE NECESSITATING RENEWAL

**27.** If a rib should be distorted to such an extent that a repair is impracticable, the rib should be renewed or a new rib made up from material of the same gauge and specification as the damaged rib. In the latter case reference must be made to the applicable drawing listed in the key to fig.3.

### AILERONS *(fig. 4)*

**28.** The ailerons are constructed of light alloy sheet. Aft of the main spar they are covered with a 26 s.w.g. (24 s.w.g. - post Mod.781) pre-tensioned skin stiffened by channel - section stringers. Mass balance weights consisting of lead-filled mild steel shells form the leading edge. An electrically-operated trim tab is fitted to the port aileron only.

### NEGLIGIBLE DAMAGE

**29.** Smooth isolated dents free from cracks, occurring in the free areas of the skin may be neglected provided they do not exceed 0·010 in. deep. Similar damage to the stringers may be neglected up to 0·020 in. deep. Two separate cracks are allowed in the skin extending from separate rivet holes provided they are not greater than 0·625 in. long.

### REPAIR PROHIBITIONS

30. All tabs are non-repairable and must be renewed if damaged.

### REPAIRS

31. Damage to the free area of the skin which, when cleaned out, is not larger than 4·0 in. × 3·0 in. should be repaired in a manner similar to that shown in fig.13. If the skin also involves a stringer, reference should be made to fig.14. Not more than two repairs may be made to one aileron, and they must not be in adjacent panels on one skin. After the repair of an aileron, only the area concerned should be repainted. In the event of a complete re-paint being found necessary, *all* the existing paint must first be removed from the component.

### RESTORATION OF MASS BALANCE

32. Repairs forward of the hinge centre-line will not necessitate the re-balancing of an aileron. Aft of the hinge centre-line, a repair may be made without adjusting the mass balance weight provided that the product of the weight added by the repair and the dimension 'B' does not exceed 10 oz. in. The weight added by the repair and the moment arm 'B' should, however, be recorded on the serial number plate together with a note to the effect that the aileron has not been re-balanced. If the product resulting from the first repair made aft of the hinge centre-line exceeds 10 oz.in., or when a second repair is made, it will be necessary to adjust the mass balance weight as shown in fig.15. In the latter case, the weight added by the first repair must also be taken into account when making the adjustment.

## WHEEL FAIRING DOORS

### NEGLIGIBLE DAMAGE

33. Smooth, isolated dents up to 0·030 in. deep may be neglected provided that the door seals are not affected.

### REPAIRS

34. Fig.16 shows a flush repair to damage involving both the skin and a rib.

## KEY TO FIG.2

(Key diagram of outer wing)

| Key No. | Part No. Port | Part No. | Part No. Starboard | Description |
|---|---|---|---|---|
| **Nose ribs** | | | | |
| 1 | D.198228 | — | D.198229 | Nose rib A |
| 2 | C.198253 | — | C.198254 | Rib A.1 |
| 3 | — | B.198255 | — | Nose rib A.1 |
| 4 | D.197770 | — | D.197771 | Nose rib No.1 |
| 5 | | B.198236 | — | Nosing rib |
| 6 | | — | D.197773 | Nose rib No.2 |
| 7 | — | B.198237 | — | Nosing rib |
| 8 | D.197774 | — | D.197775 | Nose rib No.3 |
| 9 | — | B.198238 | — | Nosing rib |
| 10 | D.198226 | — | D.198227 | Nose rib G |
| 11 | D.177861 | — | D.177862 | Nose rib G.1 |
| 12 | C.198349 | — | C.198350 | Nose rib H |
| 13 | C.206090 | — | C.206091 | Nose rib J |
| 14 | C.178339 | — | C.178340 | Nose rib K |
| 15 | C.199992 | — | C.199993 | Nose rib L |
| 16 | C.206092 | — | C.206093 | Nose rib M |
| 17 | C.199994 | — | C.199995 | Nose rib N |
| 18 | C.177795 | — | C.177796 | Nose rib P |
| 19 | C.206258 | — | C.206259 | Nose rib Q |
| 20 | C.206260 | — | C.206261 | Nose rib Q.1 |
| 21 | C.206094 | — | C.206095 | Rib R |
| 22 | D.206102 | — | D.206103 | Outer rib |
| **Interspar ribs** | | | | |
| 23 | C.180168 | — | C.180169 | Interspar rib A |
| 24 | C.179882 | — | C.179388 | Interspar rib B |
| 25 | C.179342 | — | C.179343 | Interspar rib C |
| — | C.179668 | — | C.179669 | Interspar rib C—rear portion |
| 26 | E.202108 | — | E.178633 | Interspar rib D |
| — | C.177609 | — | C.177610 | Interspar rib D—rear portion |
| 27 | E.195650 | — | E.195651 | Interspar rib E |
| — | C.177611 | — | C.177612 | Interspar rib E—rear portion |
| 28 | D.195527 | — | D.195528 | Interspar rib F |
| — | C.195738 | — | C.195739 | Interspar rib F—rear portion |
| 29 | C.195474 | — | C.195475 | Interspar rib F.1—rear portion |
| 30 | E.195555 | — | E.195556 | Interspar rib G |
| 31 | D.168124 | — | D.168125 | Interspar rib H |
| 32 | C.183095 | — | C.183096 | Interspar rib J |
| 33 | C.198733 | — | C.198734 | Interspar rib K |
| 34 | C.195463 | — | C.195464 | Interspar rib L |
| 35 | D.195264 | — | D.195265 | Interspar rib M |
| 36 | C.195269 | — | C.195270 | Interspar rib N |
| 37 | C.195273 | — | C.195274 | Interspar rib P |
| 38 | C.206098 | — | C.206099 | Interspar rib Q |
| 39 | B.195279 | — | B.195280 | Rib S |
| 40 | — | B.195277 | — | Rib T |

| Key No. | Part No. Port | Part No. | Part No. Starboard | Description |
|---|---|---|---|---|
| **Tail ribs** | | | | |
| 41 | E.179211 | — | E.179212 | Tail rib A |
| 42 | C.179243 | — | C.179244 | Tail rib C |
| 43 | C.179245 | — | C.179246 | Tail rib D |
| 44 | C.180367 | — | C.180368 | Tail rib E |
| 45 | C.179247 | — | C.179248 | Tail rib F |
| 46 | C.179249 | — | C.179250 | Tail rib G |
| 47 | C.179251 | — | C.179252 | Tail rib K |
| 48 | C.180369 | — | C.180370 | Tail rib L |
| 49 | D.179348 | — | D.179349 | Tail rib M |
| 50 | C.179452 | — | C.179453 | Tail rib M.1 |
| **Spars etc.** | | | | |
| 51 | C.206246 | — | C.206247 | Front spar |
| 52 | C.177280 | — | C.177281 | Rear spar |
| 53 | G.195639 | — | G.195640 | Undercarriage girder |
| 54 | E.198155 | — | E.198156 | Nose spar—top boom |
| — | E.198157 | — | E.198158 | Nose spar—bottom boom |
| — | — | E.198159 | — | Nose spar—web, rib A, to rib A.1 |
| — | — | E.198160 | — | Nose spar—web, rib A.1 to rib No.1 |
| — | — | E.198161 | — | Nose spar—web, rib No.1 to No.2 |
| — | — | E.198162 | — | Nose spar—web, rib No.2 to No.3 |
| — | — | E.198163 | — | Nose spar—web, rib No.3 to rib G |
| **Wing tip** | | | | |
| 55 | C.216767 | — | C.216768 | Rib No.1 |
| 56 | B.216586 | — | B.216587 | Rib No.2 |
| 57 | B.216588 | — | B.216589 | Rib No.3 |
| 58 | B.216590 | — | B.216591 | Rib No.4 |
| 59 | B.216592 | — | B.216593 | Rib No.5 |
| 60 | B.216594 | — | B.216595 | Rib No.6 |
| 61 | B.216596 | — | B.216597 | Rib No.7 |
| **Leading edge extension** | | | | |
| 62 | D.216807 | — | D.216808 | Nose rib No.1 |
| 63 | C.216725 | — | C.216726 | Nose rib No.2 |
| 64 | C.216762 | — | C.216763 | Nose rib No.3 |
| 65 | C.216831 | — | C.216832 | Nose rib No.4 |
| 66 | C.216723 | — | C.216724 | Nose rib No.5 |
| 67 | C.216809 | — | C.216810 | Nose rib No.6 |
| 68 | C.216797 | — | C.216798 | Nose rib No.7 |
| 69 | C.216819 | — | C.216820 | Nose rib No.8 |
| 70 | C.216773 | — | C.216774 | Nose rib No.9 |
| 71 | C.216787 | — | C.216788 | Fwd. pressure head mounting rib |

*Items that are not "handed" are shown in the centre column*

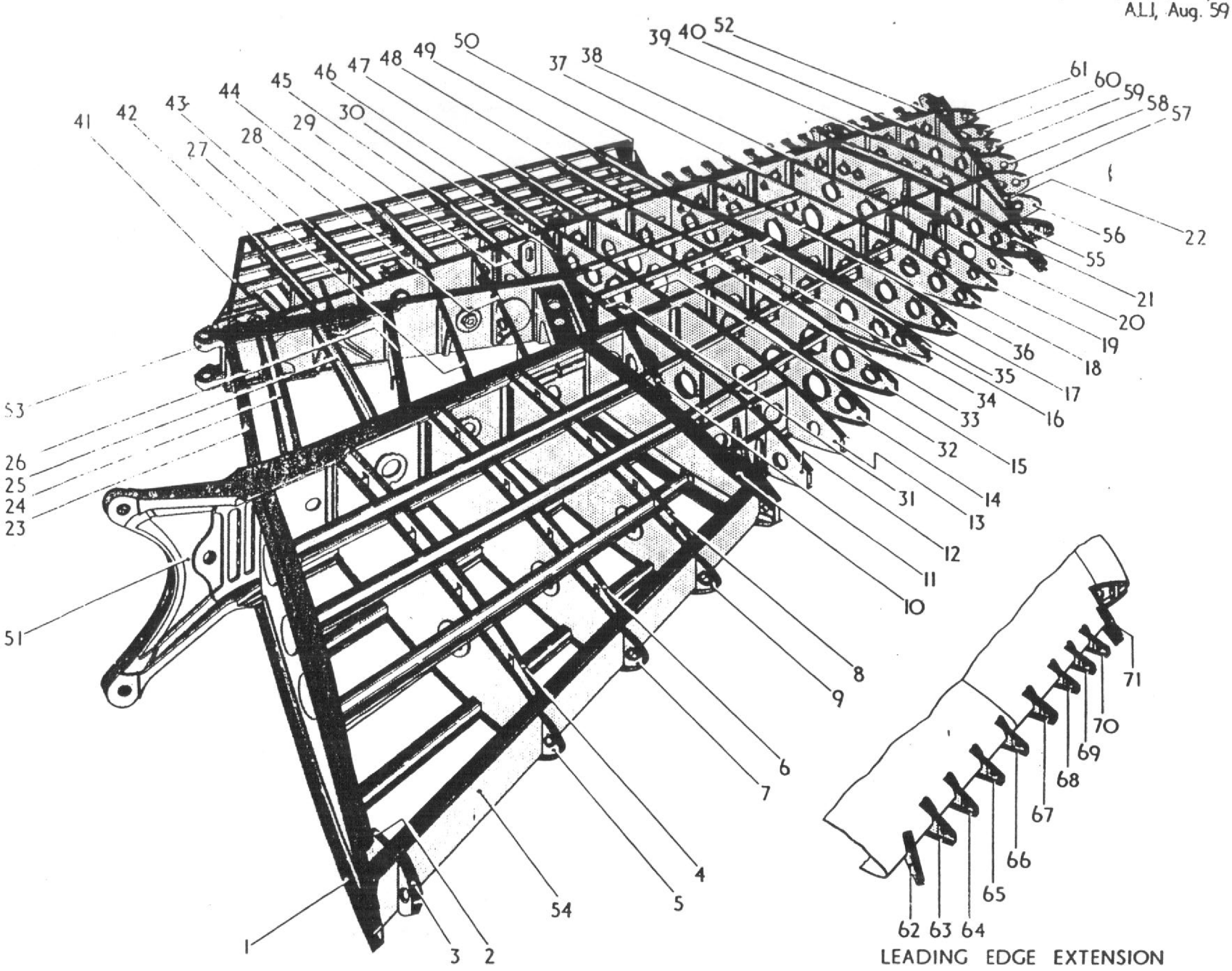
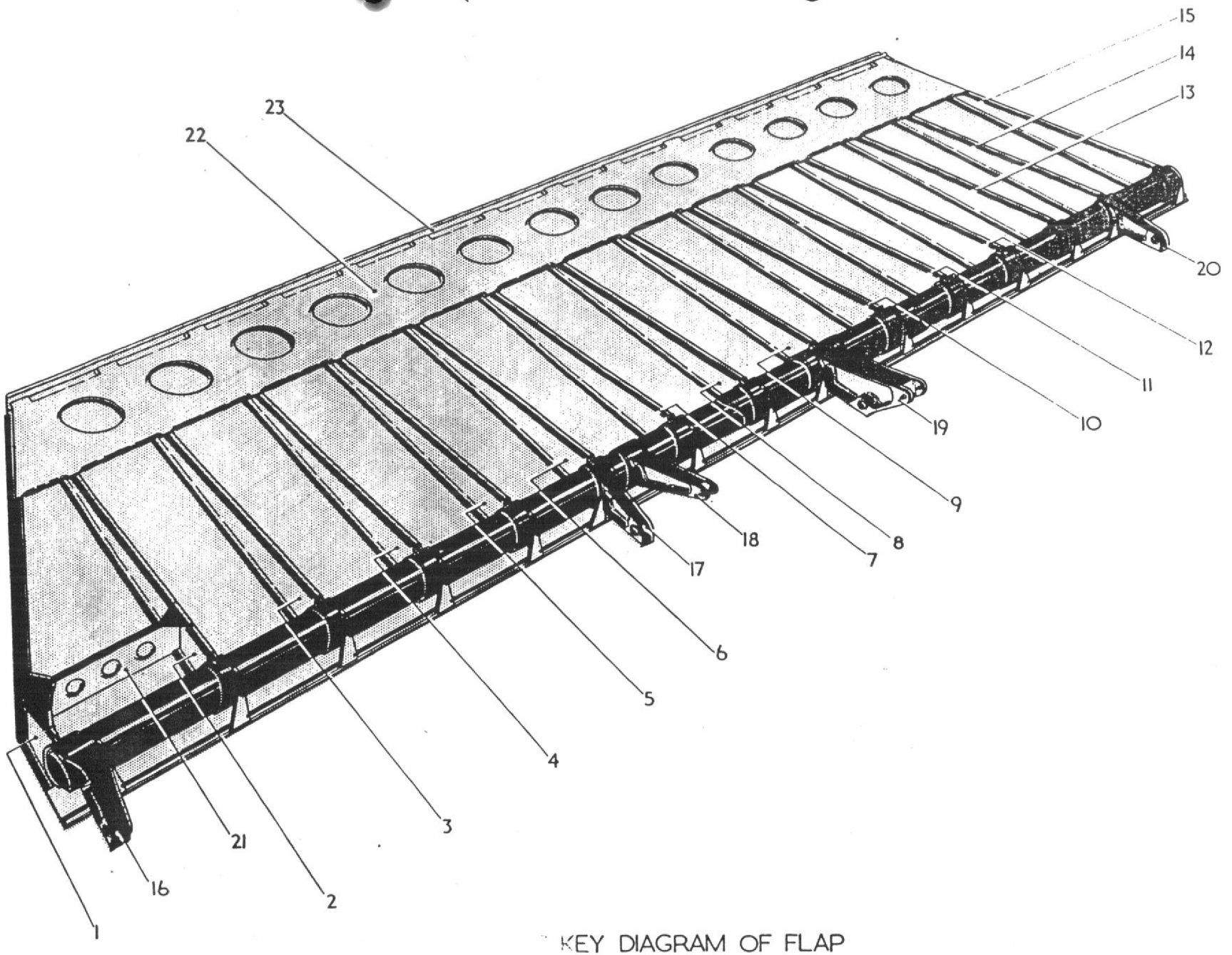



FIG.2. KEY DIAGRAM OF OUTER WING




KEY DIAGRAM OF FLAP

RESTRICTED

## KEY TO FIG. 3

(Key diagram of flap)

| | Key No. | Part No. | | | Description |
|---|---|---|---|---|---|
| | | Port | | Starboard | |
| **Ribs** | | | | | |
| | 1 | C. 181350 | - | C. 181351 | Rib No. 1 |
| | 2 | - | C. 180570 | - | Rib No. 2 |
| | 3 | - | C. 180570 | - | Rib No. 3 |
| | 4 | - | C. 180570 | - | Rib No. 4 |
| | 5 | - | C. 180570 | - | Rib No. 5 |
| | 6 | - | C. 180570 | - | Rib No. 6 |
| | 7 | - | C. 180570 | - | Rib No. 7 |
| | 8 | - | C. 180570 | - | Rib No. 8 |
| | 9 | - | C. 180570 | - | Rib No. 9 |
| | 10 | - | C. 180570 | - | Rib No. 10 |
| | 11 | - | C. 180570 | - | Rib No. 11 |
| | 12 | - | C. 180570 | - | Rib No. 12 |
| | 13 | - | C. 180570 | - | Rib No. 13 |
| | 14 | - | C. 180570 | - | Rib No. 14 |
| | 15 | C. 180571 | | C. 180572 | Rib No. 15 |
| **Miscellaneous** | | | | | |
| | 16 | C. 180717 | - | C. 180718 | Inner bearing spool |
| | 17 | - | B. 186371 | - | Bearing spool |
| | 18 | - | B. 185953 | - | Lever |
| | 19 | - | C. 178804 | - | Operating lever |
| | 20 | - | B. 180716 | - | Bearing spool |
| | 21 | A. 181371 | - | A. 181372 | Channel |
| | 22 | C. 181346 | - | C. 181347 | Reinforcing plate |
| | 23 | C. 181348 | - | C. 181349 | Trailing edge stiffener |

*Items that are not 'handed' are shown in the centre column*

## KEY TO FIG.4

(Key diagram of Aileron)

| Key No. | Part No. Port | | Part No. Starboard | Description |
|---|---|---|---|---|
| **Nose Ribs** | | | | |
| 1 | B.180557 | - | B.180558 | Rib No. 1 |
| 2 | B.187451 | - | C.188586 | Nose Rib No. 2 |
| 3 | B.187452 | - | C.188589 | Nose Rib No. 3 |
| 4 | C.188592 | - | C.188593 | Nose Rib No. 4 |
| 5 | C.181078 | - | B.181079 | Nose Rib No. 5 |
| 6 | B.181089 | - | B.181090 | Nose Rib No. 6A |
| 7 | B.181070 | - | B.181071 | Nose Rib No. 6 |
| 8 | B.181074 | - | B.181075 | Nose Rib No. 7 |
| 9 | B.181092 | - | B.181093 | Nose Rib No. 7A |
| 10 | B.181081 | - | B.181082 | Nose Rib No. 8 |
| 11 | C.188595 | - | C.188596 | Nose Rib No. 9 |
| 12 | C.188598 | - | C.188599 | Nose Rib No. 10 |
| 13 | B.181084 | - | B.181085 | Nose Rib No. 11 |
| 14 | B.181436 | - | B.181437 | Nose Rib No. 12 |
| **Tail Ribs** | | | | |
| 15 | C.188587 | - | C.188588 | Tail Rib No. 2 |
| 16 | C.188590 | - | C.188591 | Tail Rib No. 3 |
| 17 | B.187627 | - | C.188594 | Tail Rib No. 4 |
| 18 | B.181080 | - | B.196740 | Tail Rib No. 5 |
| 19 | - | B.180933 | - | Diagonal Rib |
| 20 | - | B.181091 | - | Inter-rib No. 6A |
| 21 | - | B.181072 | - | Inter-rib No. 6 |
| 22 | - | B.181073 | - | Tail rib No. 6 |
| 23 | - | B.180967 | - | Diagonal rib, centre |
| 24 | - | B.180968 | - | Diagonal rib, centre |
| 25 | - | B.181076 | - | Inter rib No. 7 |
| 26 | - | B.181077 | - | Tail rib No. 7 |
| 27 | - | B.181094 | - | Inter rib No. 7A |
| 28 | - | B.180934 | - | Diagonal rib |
| 29 | B.181083 | - | B.196741 | Tail rib No. 8 |
| 30 | C.188597 | - | B.196742 | Tail rib No. 9 |
| 31 | C.188600 | - | B.196743 | Tail rib No. 10 |
| 32 | B.217254 | - | B.217255 | Tail rib No. 11 |
| 33 | - | A.217256 | - | Rib No. 12A |
| 34 | - | B.217249 | - | Tail rib No. 12 |
| 35 | - | B.181095 | - | Main tip rib |
| **Auxiliary Ribs** | | | | |
| 36 | - | C.238276 | - | Auxiliary rib |
| 37 | C.238277 | | C.238278 | Auxiliary rib |
| 38 | C.238277 | | C.238278 | Auxiliary rib |
| 39 | - | C.238279 | - | Auxiliary rib |
| 40 | - | B.241523 | - | Auxiliary rib |
| 41 | - | B.241523 | - | Auxiliary rib |
| 42 | - | B.241523 | - | Auxiliary rib |
| 43 | - | C.238280 | - | Auxiliary rib |
| 44 | - | C.238281 | - | Auxiliary rib |
| 45 | - | C.238282 | - | Auxiliary rib |
| 46 | - | B.238985 | - | Auxiliary rib |
| **Spar** | | | | |
| 47 | E.180809 | - | E.180810 | Spar |
| **Balance Weights** | | | | |
| 48 | C.238038 | - | C.238039 | Inboard balance weights |
| 49 | C.238036 | - | C.238037 | Outboard balance weights |
| **Miscellaneous** | | | | |
| 50 | C.218045 | - | - | Assembly of trim tab |
| 51 | B.187634 | - | - | Finisher |
| 52 | A.188323 | - | - | Reinforcing plate |
| 53 | C.181671 | - | C.181672 | Trailing edge member |
| 54 | - | C.181455 | - | Diaphragm |
| 55 | - | B.217243 | - | Former |
| 56 | - | B.217246 | - | Former |
| 57 | - | B.217248 | - | Former |
| 58 | - | B.217244 | - | Former |
| 59 | - | B.181365 | - | Tip rib No. 1 |
| 60 | - | B.181366 | - | Tip rib No. 2 |
| 61 | C.181396 | - | C.181397 | Washout nose skin |
| 62 | - | F.180559 | - | Spigot |
| 63 | - | B.233509 | - | Centre hinge block |
| | - | A.181542 | - | Outer hinge block |
| 64 | C.238945 | - | C.238946 | Stiffener, top |
| | C.238947 | - | C.238945 | Stiffener, bottom |
| 65 | C.236885 | - | C.236886 | Stiffener, top |
| | C.236887 | - | C.236885 | Stiffener, bottom |
| 66 | C.236184 | - | C.236185 | Stiffener, top |
| | C.236186 | - | C.236184 | Stiffener, bottom |
| 67 | C.238948 | - | C.238949 | Stiffener, top |
| | C.238949 | - | C.238948 | Stiffener, bottom |
| 68 | C.236888 | - | C.236889 | Stiffener, top |
| | C.236889 | - | C.236888 | Stiffener, bottom |

*Items that are not "handed" are shown in the centre column.*

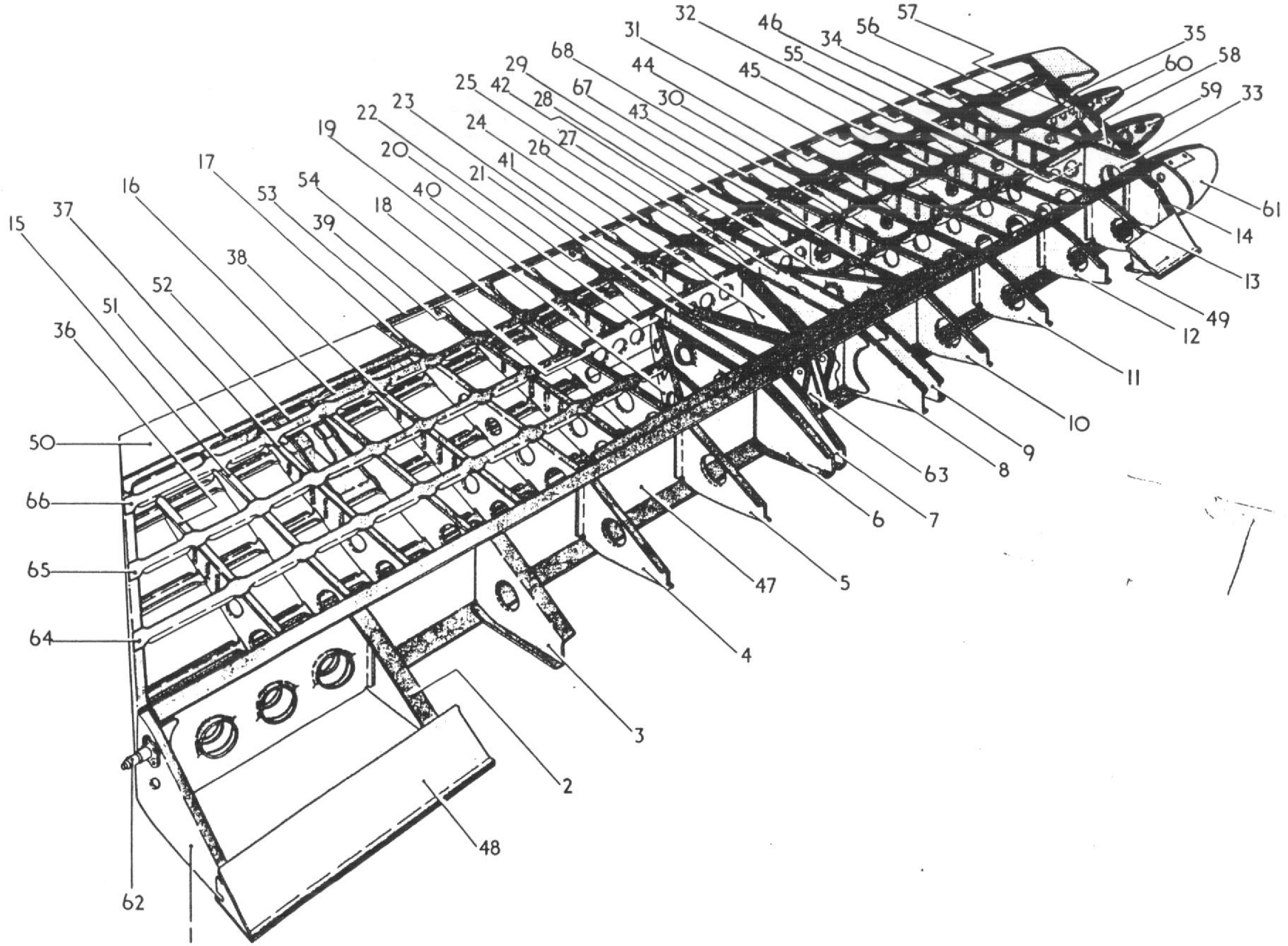



FIG.4 KEY DIAGRAM OF AILERON

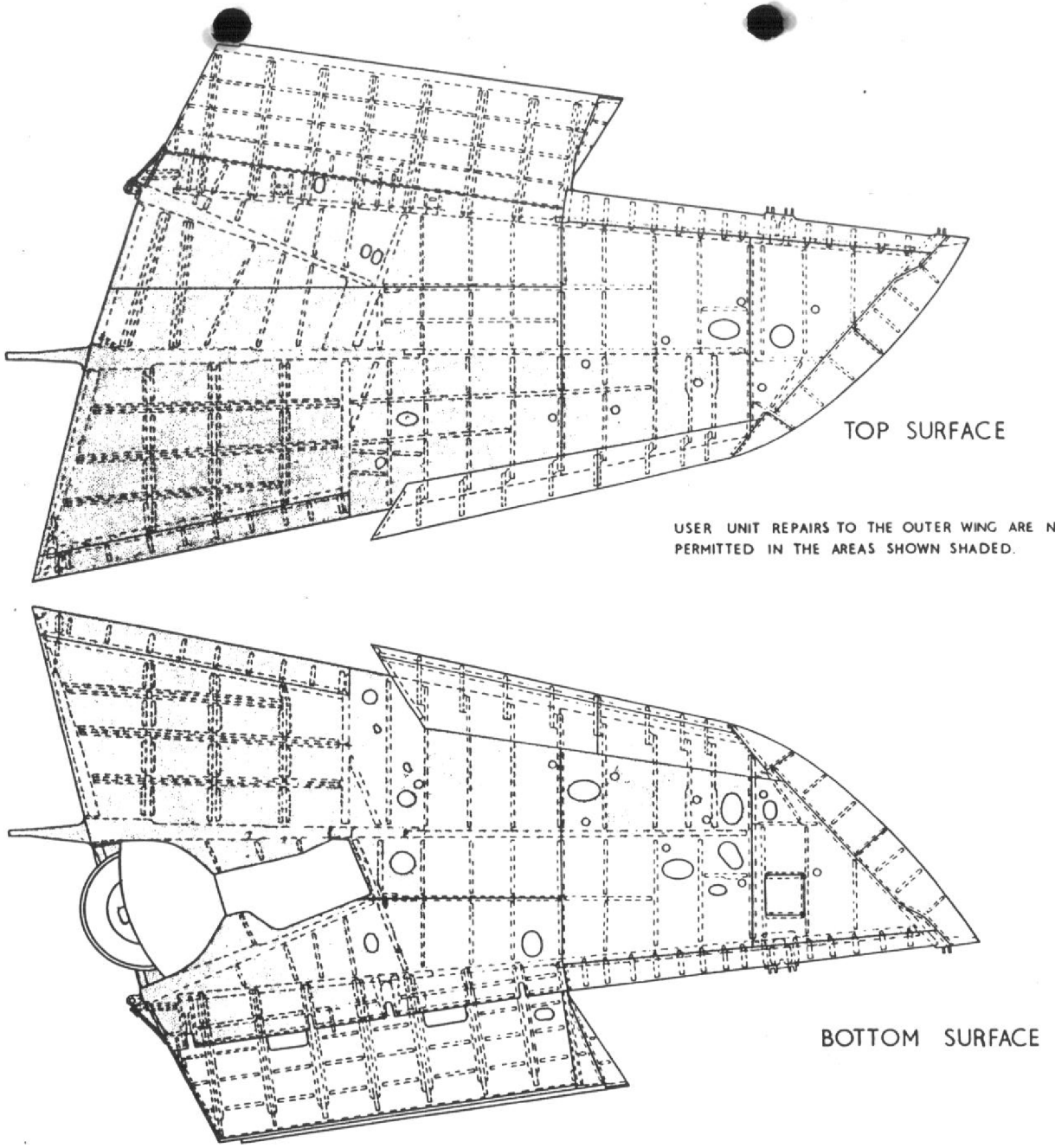



FIG. 5. NON-REPAIRABLE AREAS - OUTER WING.

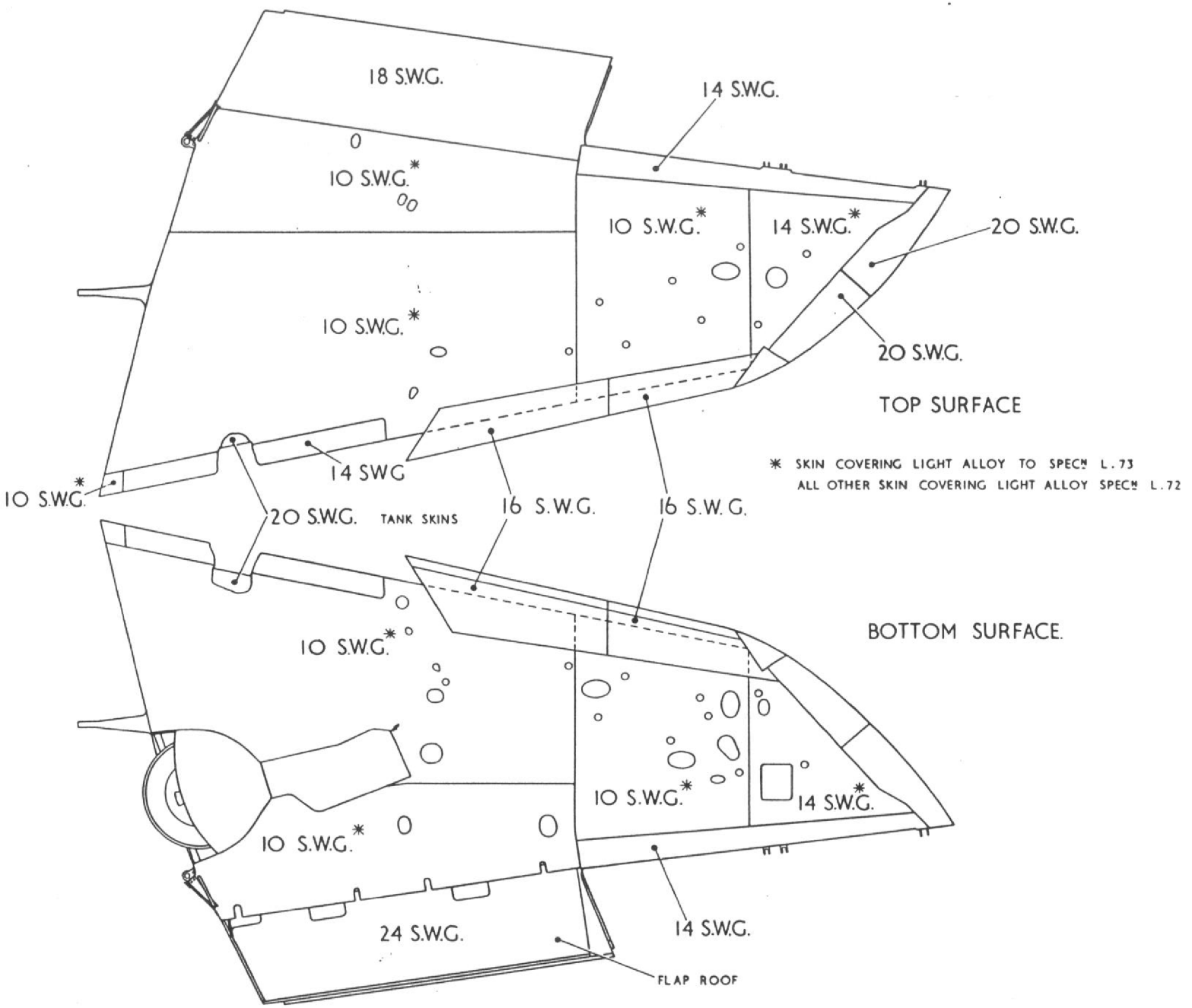
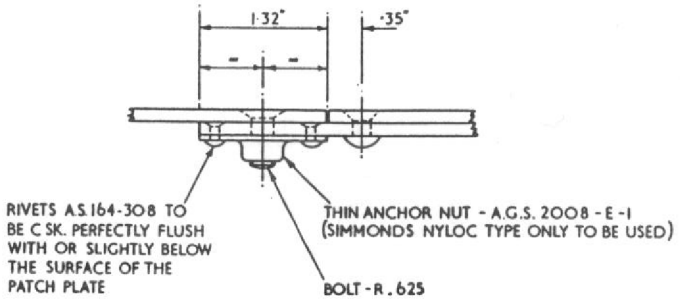
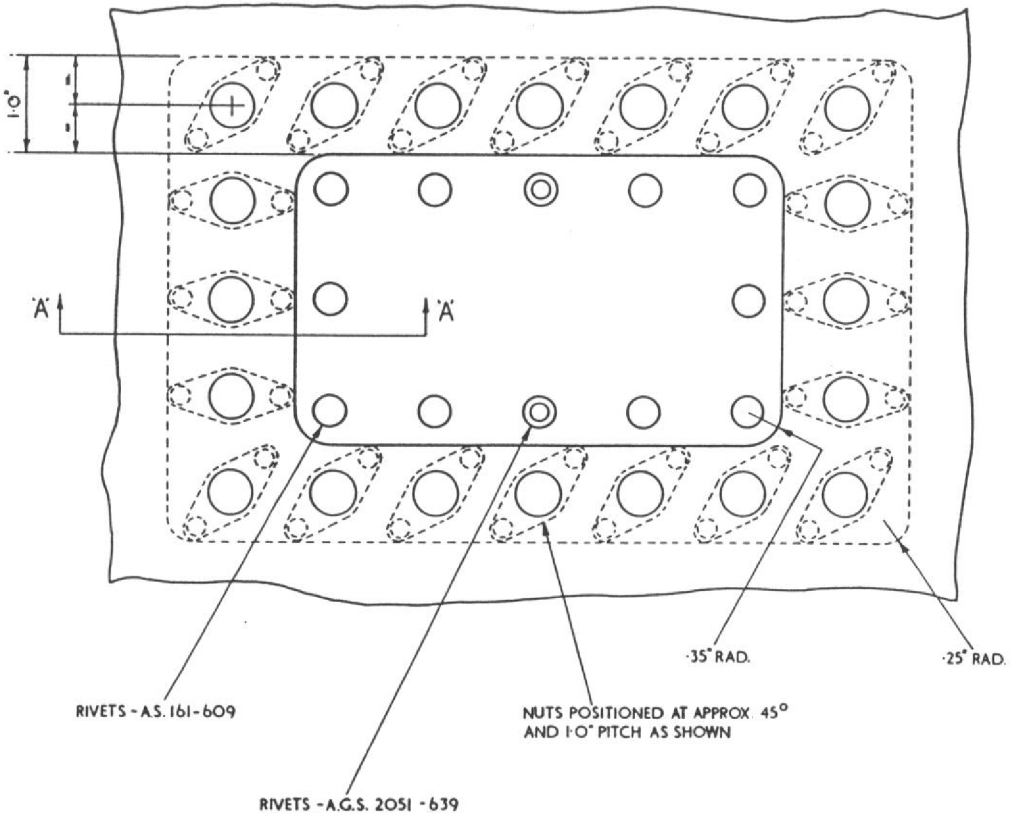



FIG. 6. SKIN COVERING - OUTER WING.




SECTION 'A-A'



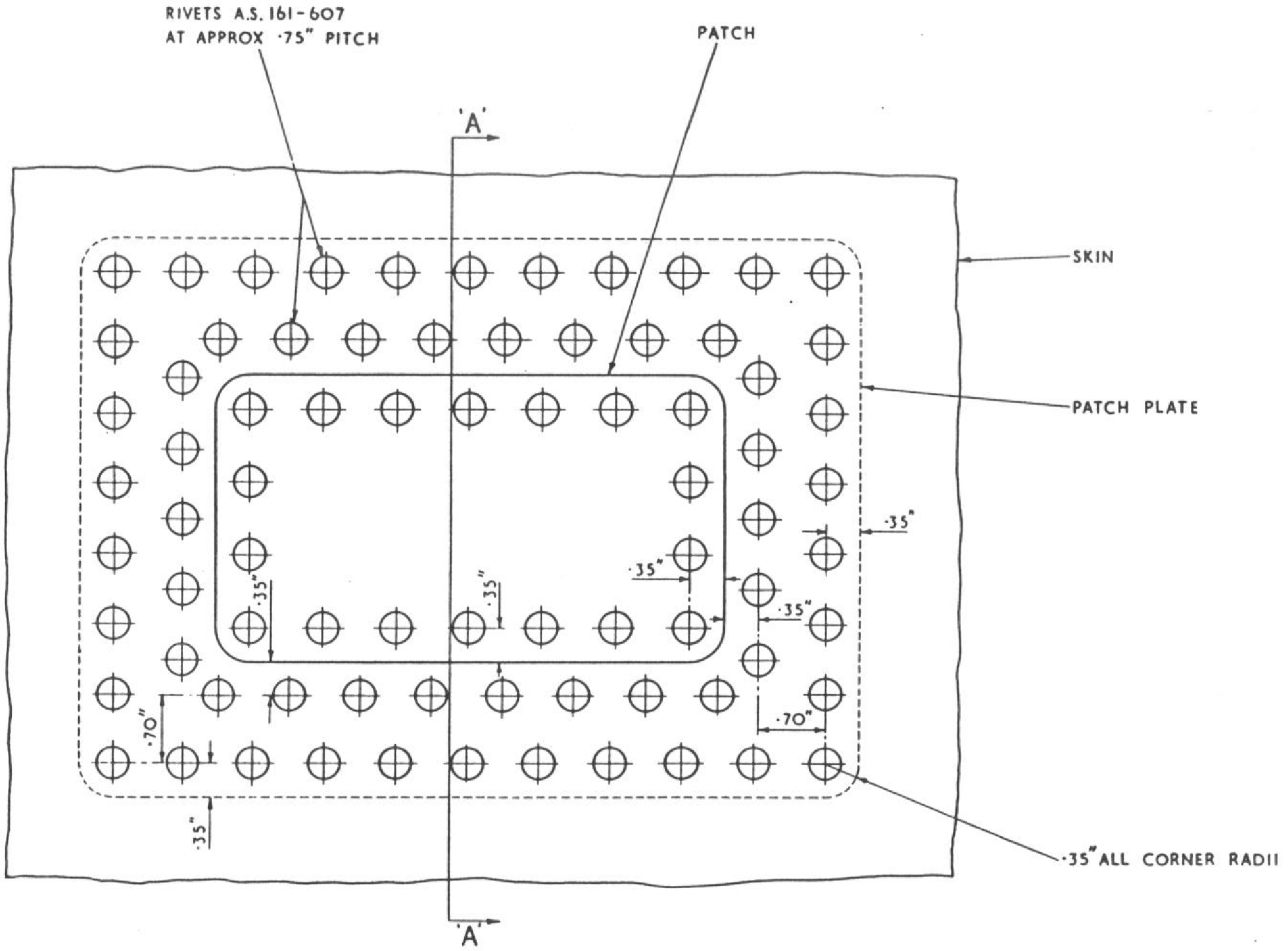

## SEQUENCE OF OPERATIONS.

1. CLEAN OUT THE DAMAGE TO A SMOOTH CONTOUR AND TO SUCH A SIZE AND SHAPE TO ENABLE THE PATCH PLATE TO BE INSERTED THROUGH THE APERTURE.
2. MAKE THE PATCH AND PATCH PLATE FROM 10 S.W.G. L.A. SHEET TO SPEC" L.73. (OR CUT FROM PREFORMED SKIN)
3. MARK ON THE SKIN THE POSITIONS OF THE 1/4" DIA. HOLES FOR THE SECURING BOLTS
4. POSITION THE PATCH PLATE (IT IS SUGGESTED THAT THE TWO [illegible]ES EVENTUALLY TO BE FILLED BY 3/16" DIA. POP RIVE[illegible]HOULD BE DRILLED IN THE PATCH PLATE AND A PIECE OF WIRE THREADED THROUGH FOR EASE OF HANDLING)
5. DRILL 1/8" DIA. HOLES IN THE FOUR CORNER POSITIONS MARKED OUT IN OPERATION 3. PIN THE PLATE IN POSITION.
6. DRILL AND REAM 1/4" DIA. NEWALL 'B' FIT HOLES IN THE REMAINING POSITIONS MARKED OUT IN OPERATION 3.
7. SECURE THE PLATE BY MEANS OF SOME OF THE 1/4" DIA HOLES. REMOVE THE PINS AND DRILL AND REAM THE HOLES AT THE FOUR CORNERS.
8. POSITION THE PATCH AND DRILL THE 3/16" DIA HOLES IN THE PATCH AND PATCH PLATE FOR THE 3/16" DIA SOLID RIVETS.
9. REMOVE THE PATCH AND PATCH PLATE AND RIVET THE ANCHOR NUTS TO THE PATCH PLATE AS SHOWN (TO OBTAIN EXACT ALIGNMENT IT WILL BE FOUND ADVISABLE TO POSITION THE NUTS WITH THE AID OF A BOLT BEFORE RIVETING.)
10. RIVET THE PATCH TO THE PATCH PLATE DRILL TWO HOLES IN THE PATCH TO MATCH THE TWO HOLES DRILLED IN THE PATCH PLATE TO TAKE THE 3/16" DIA. POP RIVETS.
11. CAREFULLY COUNTERSINK THE 1/4" DIA. HOLES IN THE SKIN ·06" DEEP AT 120°
12. INSERT THE PATCH AND PATCH PLATE AND BOLT IN POSITION ENSURING THAT ALL THE BOLTS ARE FULLY TIGHTENED.
13. INSERT THE 3/16" DIA. POP RIVETS IN THE VACANT HOLES IN THE PATCH.
14. FINISH THE PROTRUDING HEADS OF THE BOLTS OFF FLUSH WITH THE SKIN.
15. APPLY SUITABLE PROTECTIVE COATING TO PREVENT CORROSION AS SOON AS REPAIR IS COMPLETED.

## NOTES

1. SIZE OF PATCH MUST NOT EXCEED 5" X 3"
2. IT IS IMPORTANT THAT THE SKIN CONTOUR SHOULD BE ACCURATELY MAINTAINED WHEN EFFECTING PATCH REPAIRS.

FIG. 7. REPAIR TO 10 S.W.G. WING SKIN




SECTION 'A-A'

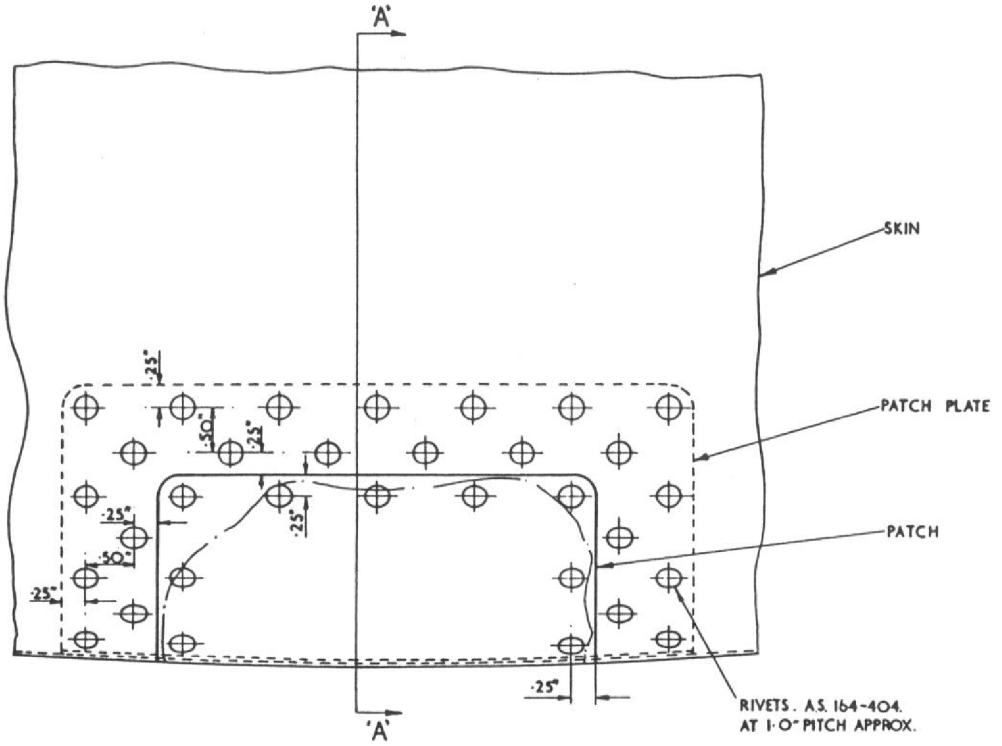
## SEQUENCE OF OPERATIONS

1. CLEAN OUT DAMAGE TO SMOOTH CONTOUR.
2. FROM 14 S.W.G. L.A. TO SPECN. L.73. MAKE PATCH AND PATCH PLATE.
3. FIT PATCH PLATE, DRILL AND RIVET IN POSITION.
4. FIT PATCH, DRILL AND RIVET IN POSITION.

FIG. 8. FLUSH REPAIR TO 14 S.W.G. WING SKIN

## SEQUENCE OF OPERATIONS.

1. CLEAN OUT DAMAGE TO SMOOTH CONTOUR.
2. FROM 20 S.W.G. L.A. SHEET TO SPEC$^{n}$ L.72. MAKE PATCH AND PATCH PLATE.
3. FIT PATCH PLATE, DRILL AND RIVET IN POSITION.
4. FIT PATCH, DRILL AND RIVET IN POSITION.

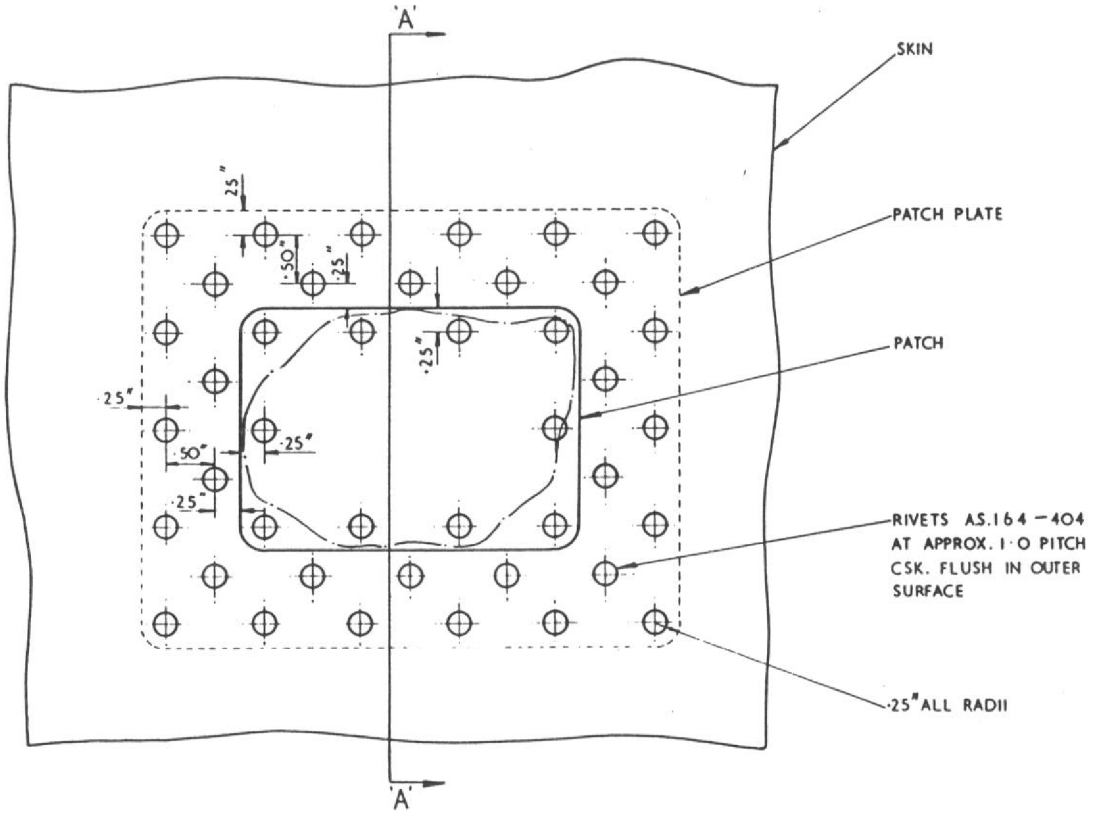



SECTION 'A'-'A'

FIG. 9. FLUSH REPAIR TO WING TIP SKIN

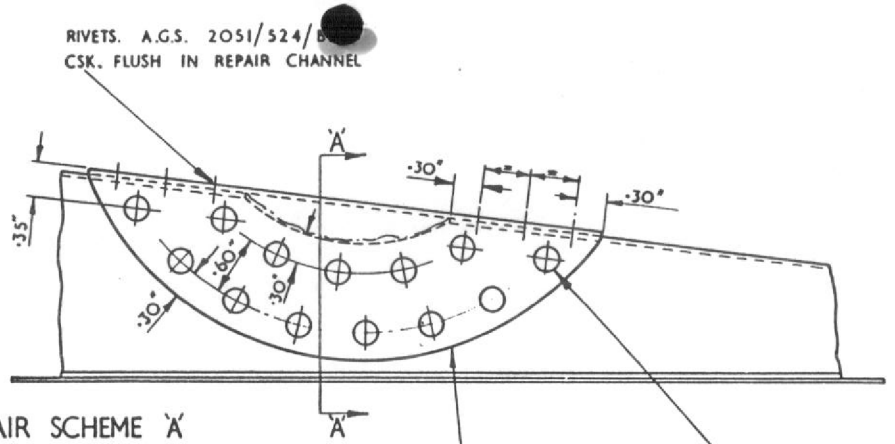
## SEQUENCE OF OPERATIONS.

1. CLEAN OUT DAMAGE TO SMOOTH CONTOUR.
2. FROM 20. S.W.G. L.A. SHEET TO SPECN. L.72. MAKE PATCH & PATCH PLATE.
3. FIT PATCH PLATE, DRILL & RIVET IN POSITION.
4. FIT PATCH, DRILL, & RIVET IN POSITION.



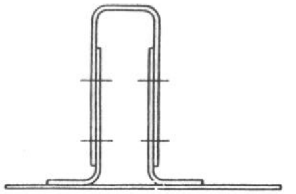

SECTION 'A-A'

FIG. 10. FLUSH REPAIR TO SKIN OF FLAPS

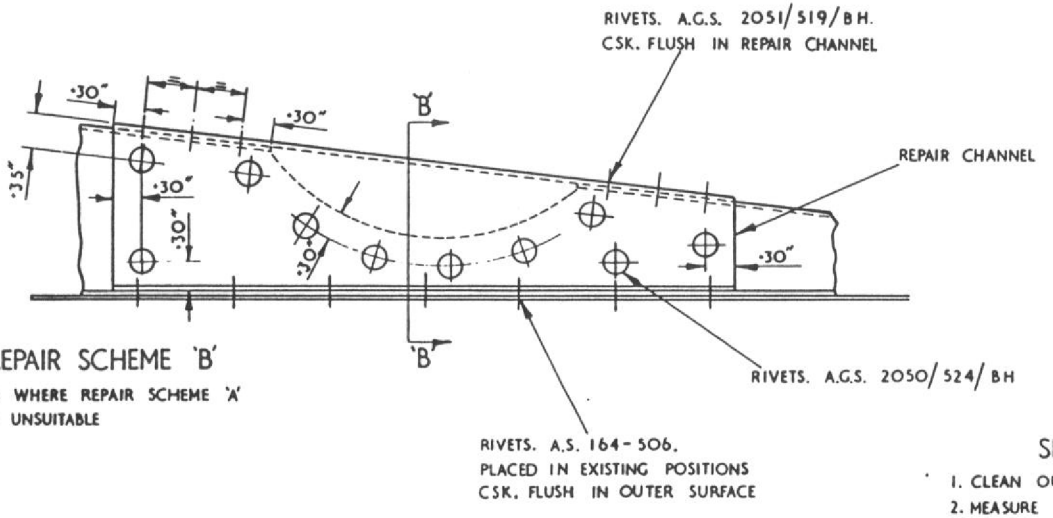



## REPAIR SCHEME 'A'

FOR USE WHERE THE EXTENT OF CLEANED OUT DAMAGE ALLOWS THE INSERTION OF TWO ROWS OF RIVETS AS SHOWN

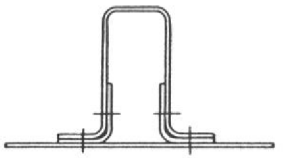


SECTION 'A-A'




## REPAIR SCHEME 'B'

FOR USE WHERE REPAIR SCHEME 'A' IS FOUND UNSUITABLE



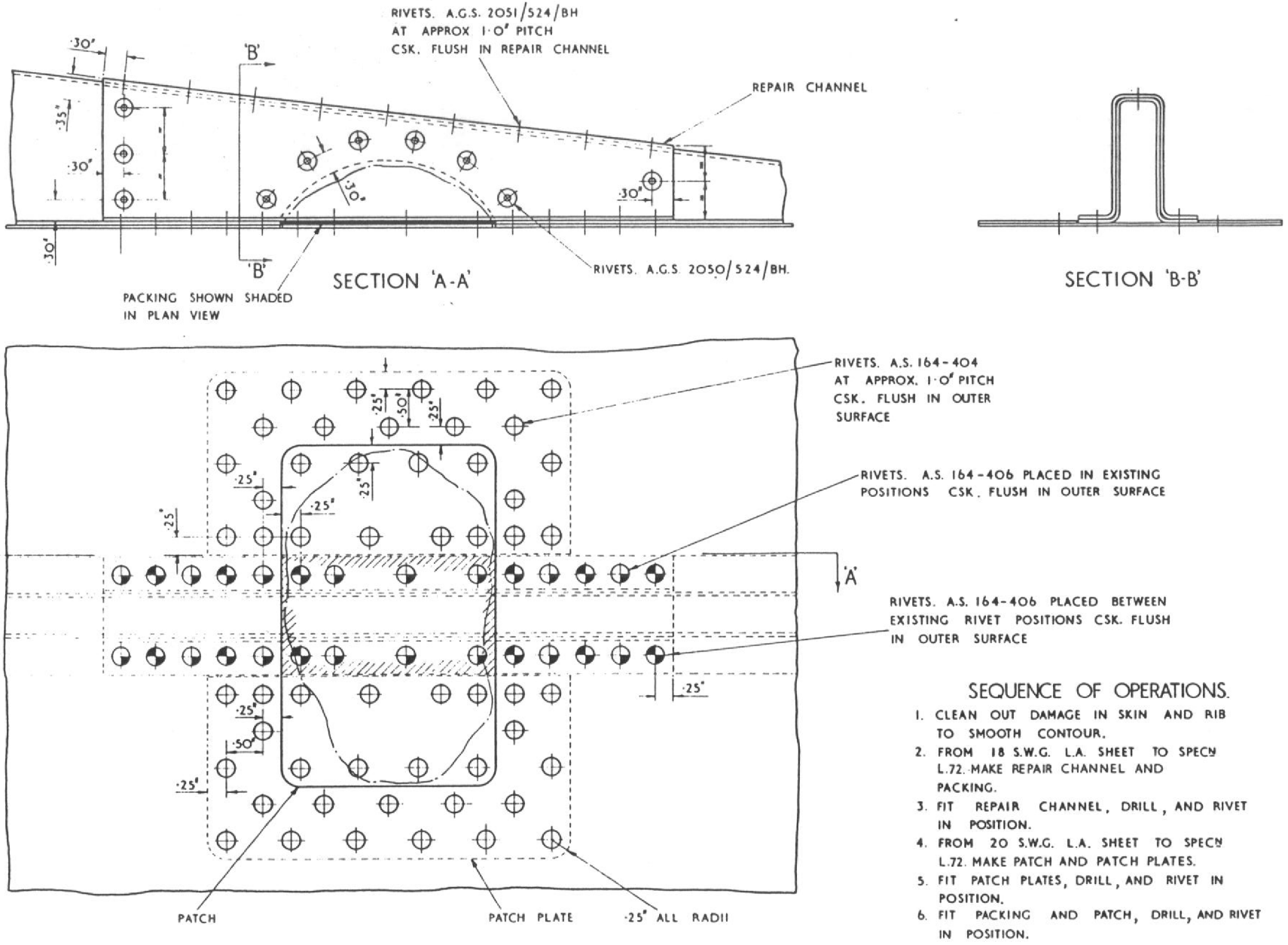
SECTION 'B-B'

## SEQUENCE OF OPERATIONS.

1. CLEAN OUT DAMAGE TO SMOOTH CONTOUR.
2. MEASURE MINIMUM DEPTH OF WEBS UNDER CLEANED OUT DAMAGE IN ORDER TO SELECT APPROPRIATE SCHEME.
3. FROM 18 S.W.G. L.A. SHEET TO SPEC.ⁿ L.72. MAKE REPAIR CHANNEL.
4. FIT REPAIR CHANNEL, DRILL, AND RIVET IN POSITION.

FIG. 11. PATCH REPAIR TO RIB OF FLAP

**RESTRICTED**



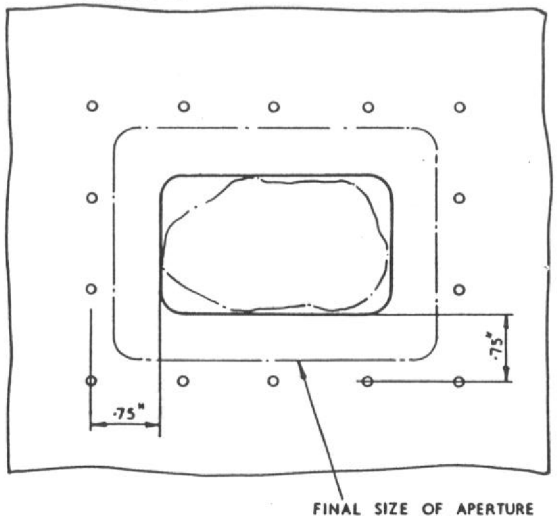

## SEQUENCE OF OPERATIONS.

1. CLEAN OUT DAMAGE IN SKIN AND RIB TO SMOOTH CONTOUR.
2. FROM 18 S.W.G. L.A. SHEET TO SPECN L.72. MAKE REPAIR CHANNEL AND PACKING.
3. FIT REPAIR CHANNEL, DRILL, AND RIVET IN POSITION.
4. FROM 20 S.W.G. L.A. SHEET TO SPECN L.72. MAKE PATCH AND PATCH PLATES.
5. FIT PATCH PLATES, DRILL, AND RIVET IN POSITION.
6. FIT PACKING AND PATCH, DRILL, AND RIVET IN POSITION.

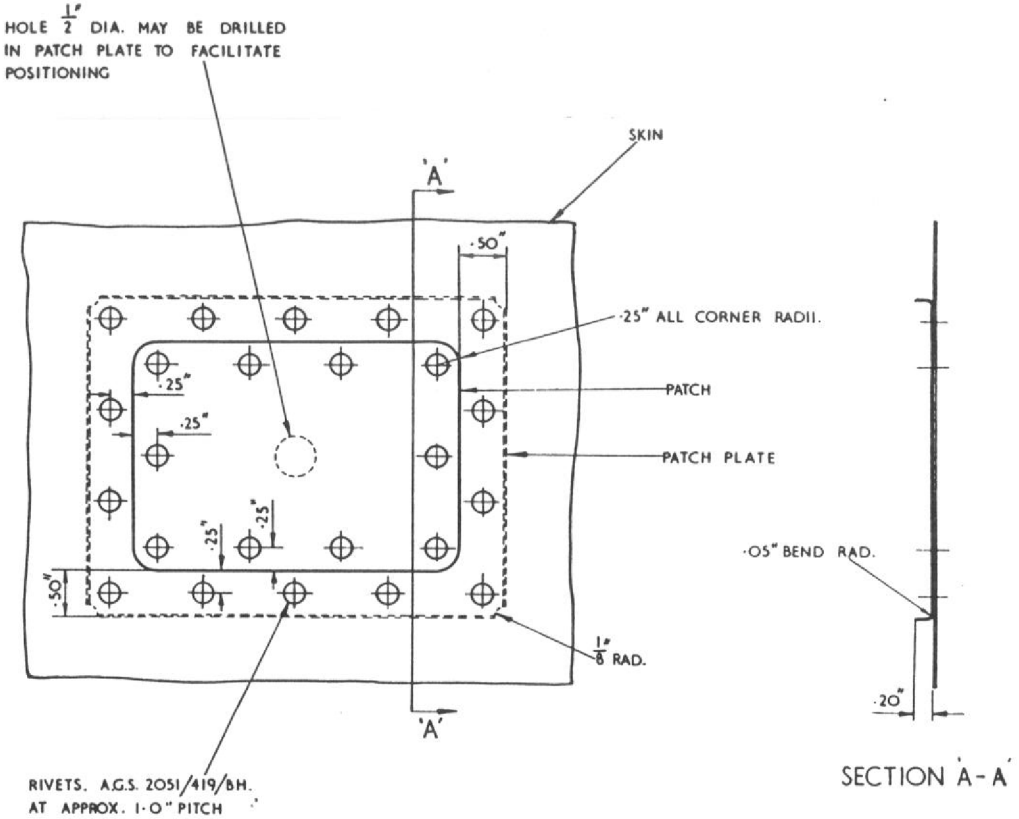
FIG. 12. REPAIR TO SKIN AND RIB OF FLAP

## NOTES

1. SIZE OF PATCH MUST NOT EXCEED 4·0" X 3·0".
2. NOT MORE THAN TWO PATCH REPAIRS ARE TO BE CARRIED OUT ON ONE AILERON.
3. FOR DETAILS OF ADJUSTMENT TO MASS BALANCE SEE FIG. 15.
4. SIZE AND SHAPE OF CLEANED OUT APERTURE TO BE SUCH AS TO ALLOW PATCH PLATE TO BE INSERTED THROUGH IT.




VIEW SHOWING CLEANED OUT DAMAGE PRIOR TO DIMPLING



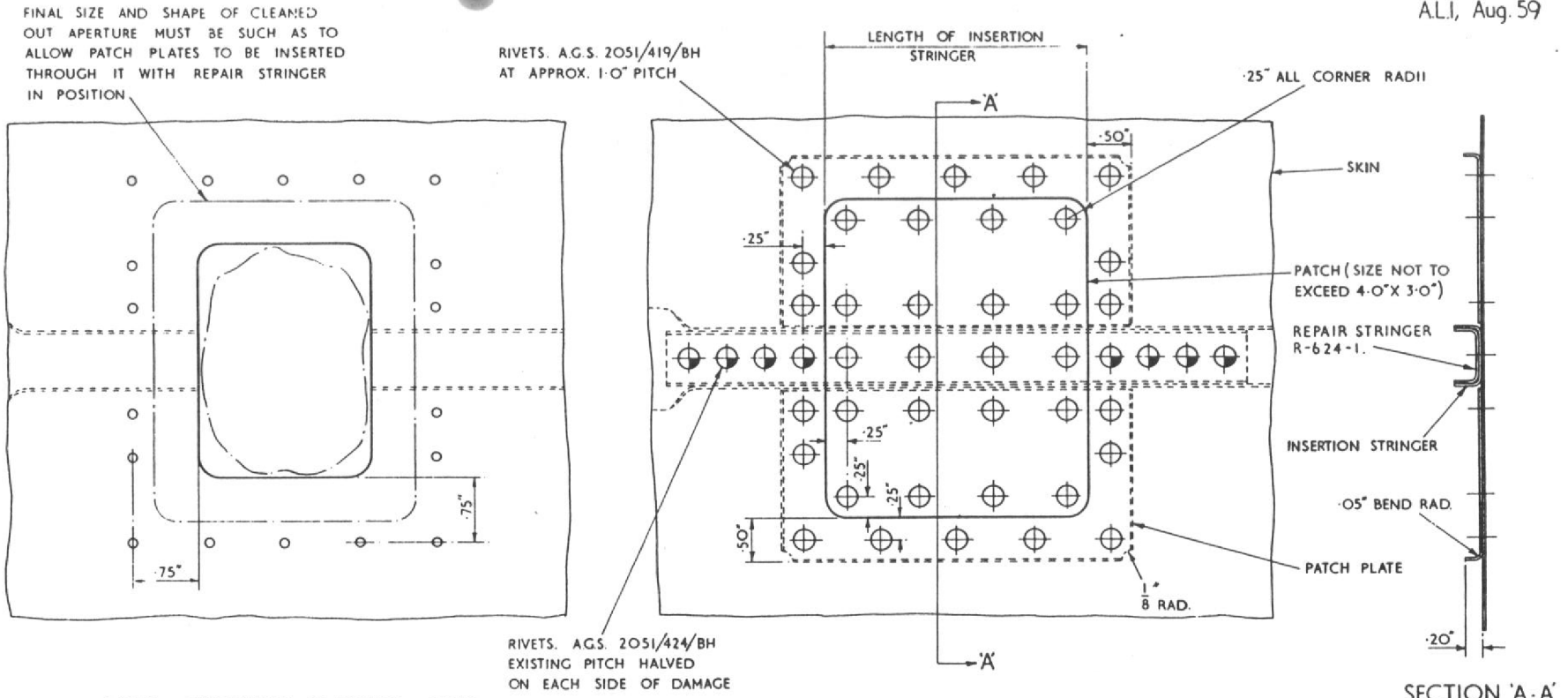

VIEW SHOWING COMPLETED REPAIR

SECTION A-A

## SEQUENCE OF OPERATIONS

1. CLEAN OUT DAMAGE TO SMOOTH CONTOUR.
2. FROM 24 S.W.G. L.A. SHEET TO SPEC" L.72. MAKE PATCH. PLATE TEMPORARILY OMITTING TO FLANGE EDGES.
3. MARK POSITIONS OF RIVET HOLES ON PATCH PLATE
4. ON OUTSIDE OF SKIN MARK OUTLINE OF PATCH PLATE IN ITS CORRECT POSITION RELATIVE TO CLEANED OUT DAMAGE.
5. POSITION PATCH PLATE ON OUTSIDE OF SKIN AND DRILL RIVET HOLES MORSE Nº 41 IN PATCH PLATE AND SKIN.
6. REMOVE PATCH PLATE AND DIMPLE HOLES IN PATCH PLATE AND SKIN AS SHOWN IN CHAP. 1, FIG. 1.
7. ENLARGE HOLE IN SKIN BY ·50" ON EACH SIDE GIVING A MINIMUM DIMENSION OF ·25" BETWEEN CENTRE OF RIVET HOLES AND EDGE OF APERTURE
8. OFFER UP PATCH PLATE AND PIN IN POSITION
9. FROM 26 S.W.G. L.A. SHEET TO SPEC" L.72. (24 S.W.G. - POST MOD. 781) MAKE PATCH.
10. FIT PATCH, DRILL RIVET HOLES MORSE Nº 41 IN PATCH AND PATCH PLATE
11. REMOVE PATCH AND PATCH PLATE, DIMPLE HOLES, AND FLANGE EDGES OF PATCH PLATE.
12. FIT PATCH PLATE AND RIVET IN POSITION.
13. FIT PATCH AND RIVET IN POSITION.

FIG. 13. FLUSH REPAIR TO AILERON SKIN




VIEW SHOWING CLEANED OUT DAMAGE PRIOR TO DIMPLING

VIEW SHOWING COMPLETED REPAIR

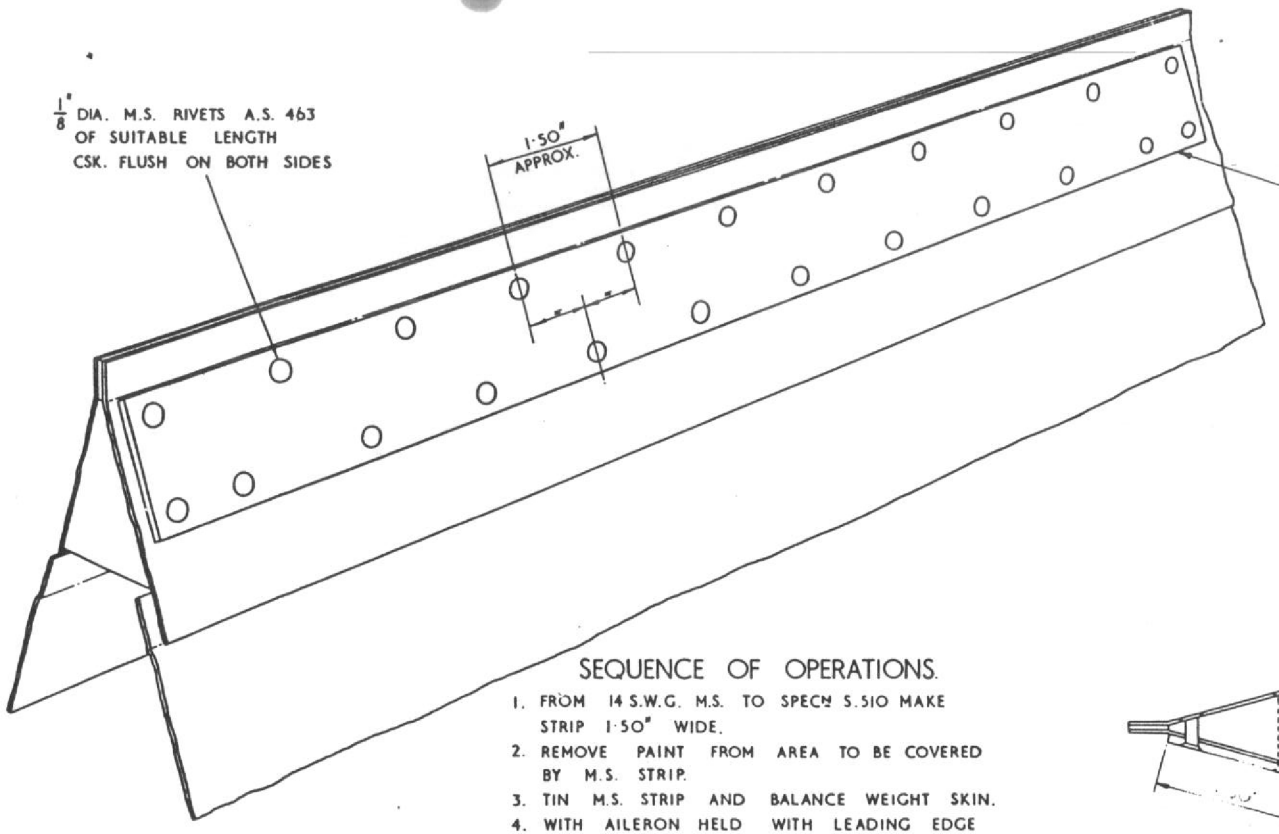
SECTION 'A-A'

## SEQUENCE OF OPERATIONS

1. CLEAN OUT DAMAGE IN SKIN AND STIFFENER TO SMOOTH CONTOUR.
2. FROM 24 S.W.G. L.A. SHEET TO SPEC$^{n}$ L.72. MAKE PATCH PLATES. TEMPORARILY OMITTING TO FLANGE EDGES.
3. MARK POSITIONS OF RIVET HOLES ON PATCH PLATES.
4. ON OUTSIDE OF SKIN MARK OUTLINES OF PATCH PLATES IN THEIR CORRECT POSITIONS RELATIVE TO CLEANED OUT DAMAGE.
5. POSITION PATCH PLATES ON OUTSIDE OF SKIN. DRILL HOLES MORSE Nº 41. IN PATCH PLATES AND SKIN.
6. REMOVE PATCH PLATES AND DIMPLE HOLES IN PATCH PLATES AND SKIN AS SHOWN IN CHAP. I., FIG. I.
7. ENLARGE HOLE IN SKIN BY ·50" ON EACH SIDE GIVING A MINIMUM DIMENSION OF ·25" BETWEEN CENTRE OF THE RIVET HOLES AND THE EDGE OF THE APERTURE. CUT BACK THE DAMAGED STIFFENER FLUSH WITH THE EDGE OF THE HOLE.
8. FROM 22 S.W.G. L.A. SHEET TO SPEC$^{n}$ L.72. MAKE THE INSERTION STRINGER.
9. FROM REPAIR STRINGER SECTION R-624-1 CUT REPAIR STRINGER.
10. FIT REPAIR STRINGER AND DRILL HOLES MORSE Nº 41.
11. REMOVE REPAIR STRINGER, AND DIMPLE THE HOLES.
12. FIT REPAIR STRINGER AND RIVET IN POSITION.
13. OFFER UP PATCH PLATES AND PIN IN POSITION.
14. OFFER UP INSERTION STRINGER.
15. FROM 26 S.W.G. L.A. SHEET TO SPEC$^{n}$ L.72. (24 S.W.G. - POST MOD. 781) MAKE PATCH.
16. FIT PATCH, DRILL HOLES IN PATCH, PATCH PLATES, INSERTION STRINGER AND REPAIR STRINGER.
17. REMOVE PATCH, PATCH PLATES AND INSERTION STRINGER, AND DIMPLE THE HOLES. FLANGE THE EDGES OF THE PATCH PLATES.
18. FIT PATCH PLATES, AND RIVET IN POSITION.
19. FIT INSERTION STRINGER AND PATCH, AND RIVET IN POSITION.

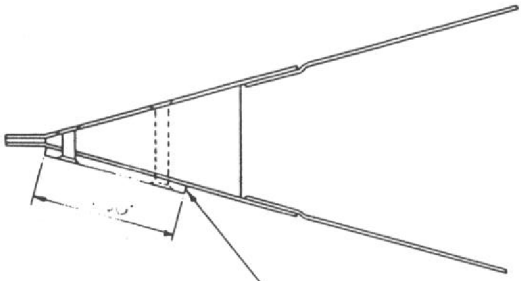
NOTES. 1. NOT MORE THAN TWO PATCH REPAIRS ARE TO BE CARRIED OUT ON ONE AILERON.
2. FOR DETAILS OF ADJUSTMENT TO MASS BALANCE SEE FIG. 15

FIG 14. FLUSH REPAIR TO AILERON SKIN AND STRINGER



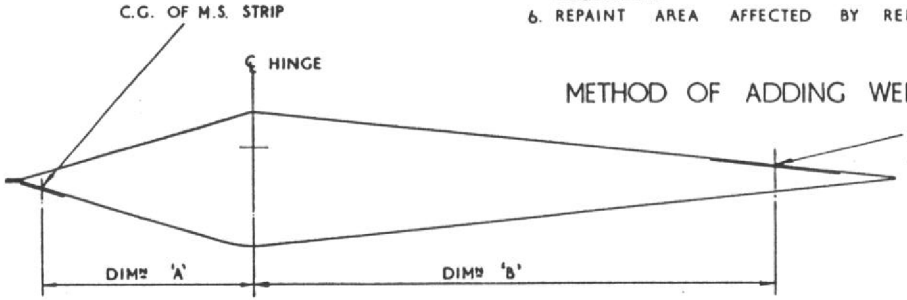

## SEQUENCE OF OPERATIONS.

1. FROM 14 S.W.G. M.S. TO SPECN S.510 MAKE STRIP 1·50" WIDE.
2. REMOVE PAINT FROM AREA TO BE COVERED BY M.S. STRIP.
3. TIN M.S. STRIP AND BALANCE WEIGHT SKIN.
4. WITH AILERON HELD WITH LEADING EDGE DOWNWARDS, SWEAT M.S. STRIP TO NOSING.
5. DRILL AND RIVET IN POSITION AS SHOWN. FILL HEADS FLUSH WITH SOLDER IF NECESSARY.
6. REPAINT AREA AFFECTED BY REPAIR.



M.S. STRIP TO BE POSITIONED ON UNDERSIDE OF NOSING AS NEAR AS POSSIBLE DIRECTLY OPPOSITE REPAIR AND AS CLOSE TO LEADING EDGE AS PRACTICABLE

TYPICAL SECTION THROUGH NOSING




METHOD OF ADDING WEIGHT

WEIGHT TO BE ADDED

$$= \frac{\text{DIMN 'B' x WEIGHT ADDED BY REPAIR x 1·18}}{\text{DIMN 'A'}}$$

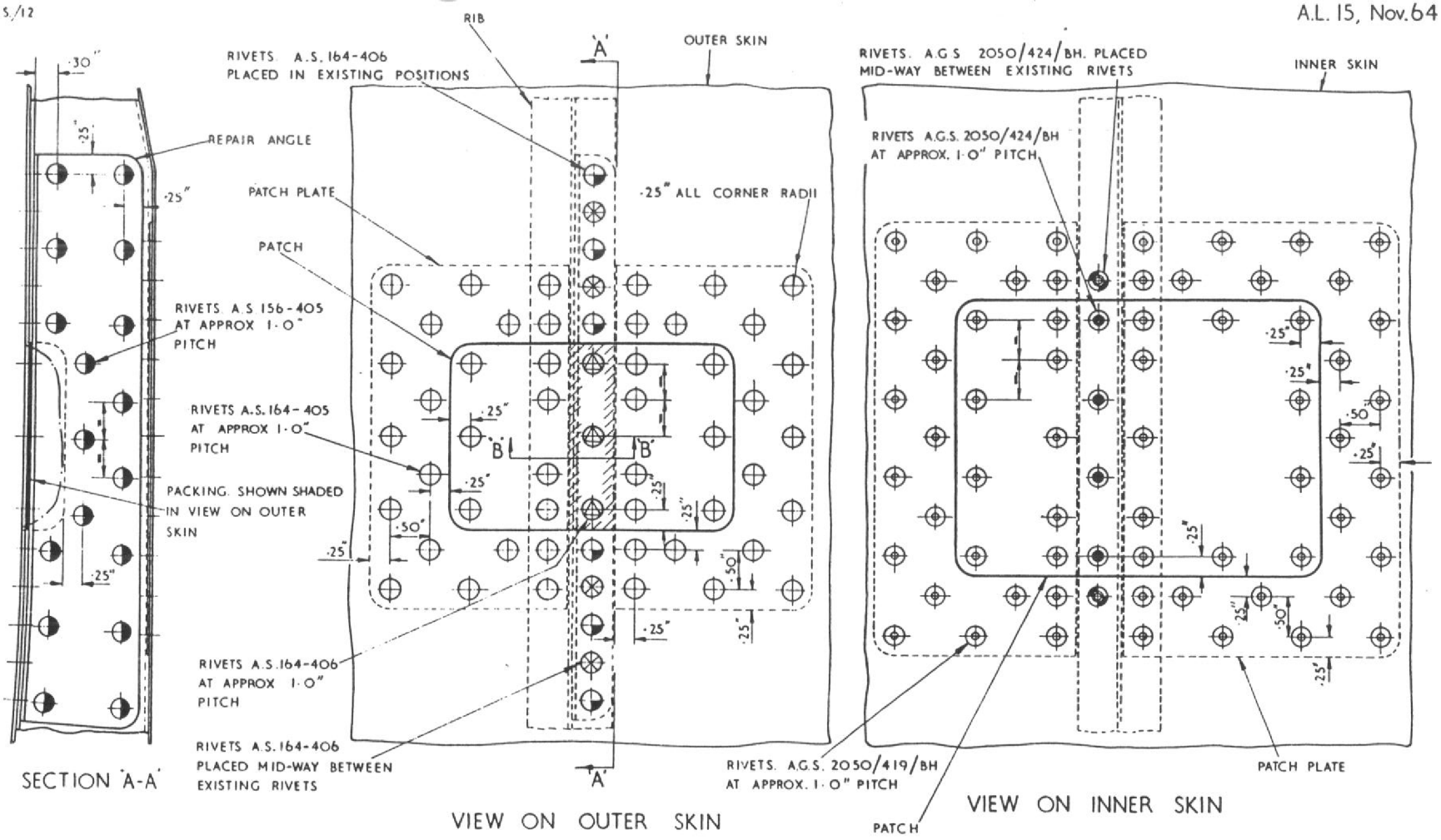
METHOD OF CALCULATING REQUIRED ADDITIONAL WEIGHT

NOTE.

NO ADJUSTMENT TO MASS BALANCE IS NECESSARY IF DIMN 'B' x WEIGHT ADDED BY REPAIR DOES NOT EXCEED 10 OZ. INS.

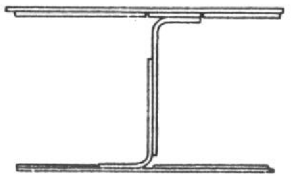
FIG. 15. RESTORATION OF AILERON MASS BALANCE

F.S./12



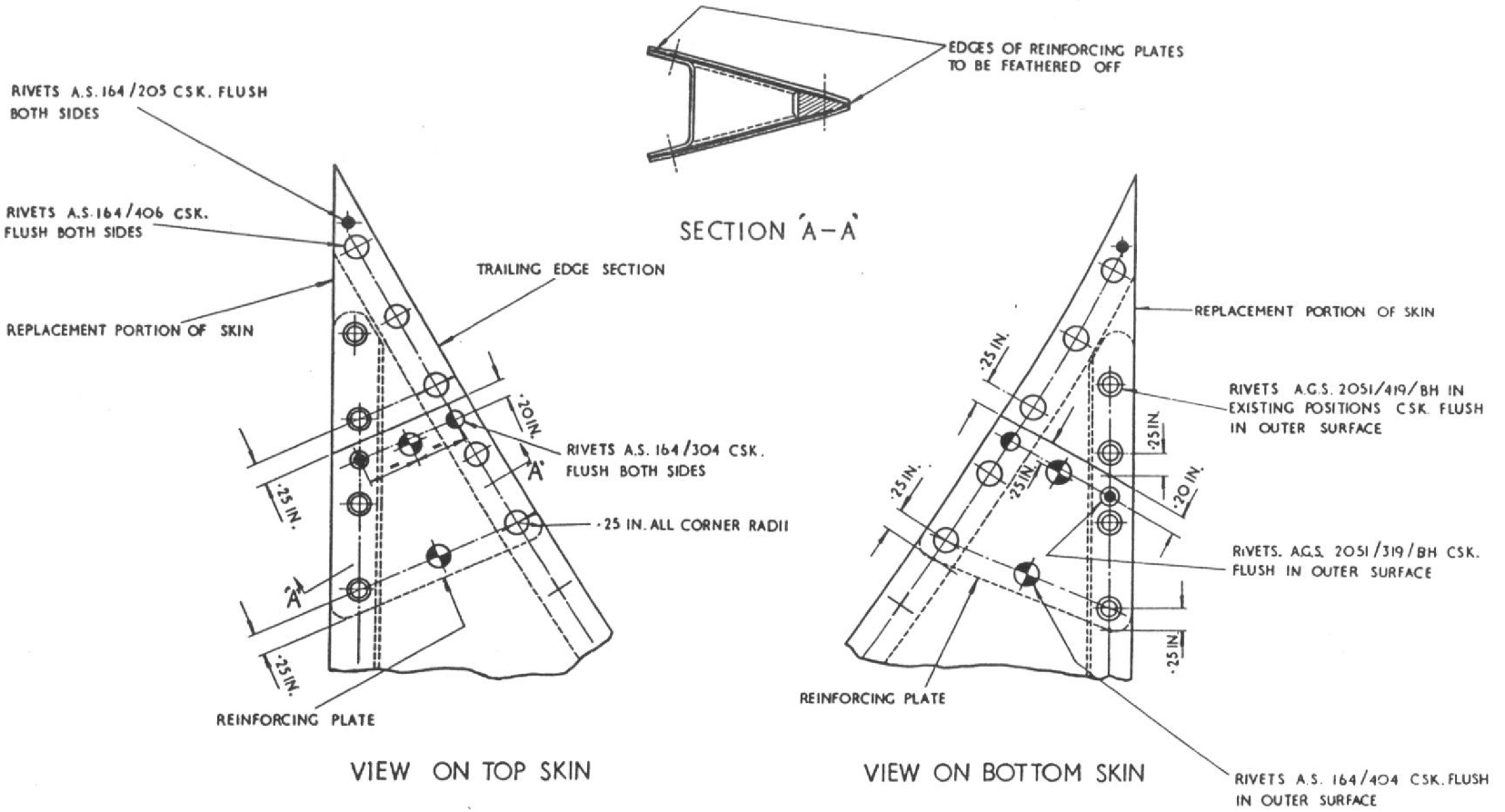

## SEQUENCE OF OPERATIONS

1. CLEAN OUT DAMAGE IN SKIN AND RIB TO SMOOTH CONTOUR.
2. MARK OUT AND REMOVE PORTION OF INNER SKIN IN ORDER TO FACILITATE ATTACHMENT OF REPAIR ANGLE TO RIB AND TO PROVIDE ACCESS FOR SOLID RIVETING ON OUTER SURFACE. HOLE SHOULD THEREFORE BE OF SUCH A SHAPE AND SIZE AS TO ENABLE THIS WORK TO BE COMPLETED AND TO ALLOW INSERTION OF PATCH PLATES.
3. FROM 20 S.W.G. L.A. TO SPEC$^{n}$. L.72. MAKE PATCH AND PATCH PLATES FOR INNER SKIN.
4. FIT INNER SKIN PATCH AND DRILL RIVET HOLES IN PATCH THROUGH HOLES IN RIB. REMOVE PATCH.
5. FROM 18 S.W.G. L.A. TO SPEC$^{n}$ L.72. MAKE REPAIR ANGLE.
6. INSERT AND FIT REPAIR ANGLE AND RIVET IN POSITION
7. FROM 18 S.W.G. L.A. TO SPEC$^{n}$ L.72. MAKE PACKING PATCH AND PATCH PLATES FOR OUTER SKIN.
8. FIT PATCH PLATES TO OUTER SKIN, DRILL AND RIVET IN POSITION.
9. FIT OUTER SKIN PACKING AND PATCH, DRILL AND RIVET IN POSITION.
10. FIT INNER SKIN PATCH PLATES, DRILL AND RIVET IN POSITION.
11. FIT INNER SKIN PATCH, DRILL AND RIVET IN POSITION.



SECTION 'B-B'

FIG. 16 FLUSH REPAIR TO SKIN AND RIB OF MAIN U/C FAIRINGS AND WHEEL DOOR




## SEQUENCE OF OPERATIONS

1. RELEASE NECESSARY RIVETS AND CUT OUT DAMAGED PORTIONS OF SKIN
2. FROM 20 S.W.G. L.A. SHEET TO SPEC$^{N}$ L.72 MAKE REPLACEMENT PORTIONS OF SKIN
3. FROM 24 S.W.G. S.S. SHEET TO SPEC$^{N}$ S.520 MAKE REINFORCING PLATES
4. INSERT REINFORCING PLATES INTO POSITION BETWEEN EXISTING SKIN AND STRUCTURE. DRILL AND RIVET REINFORCING PLATES THROUGH EXISTING SKIN
5. FIT REPLACEMENT PORTIONS OF SKIN, DRILL AND RIVET IN POSITION

## NOTE

TRAILING EDGE SECTION, PART N$^{o}$ A.182776, TO BE RENEWED IF BADLY DAMAGED

FIG. 17. FLUSH REPAIR TO TOP AND BOTTOM WING FILLET SKIN