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RESTRICTED

R.A.A.F. Publication No.
MAY, 1947

# Australian Lincoln MK. 30

## REPAIR MANUAL

## PART I — MINOR REPAIR SCHEMES

## PART II — MINOR REPAIR SCHEMES

NOTES TO OFFICIAL USERS

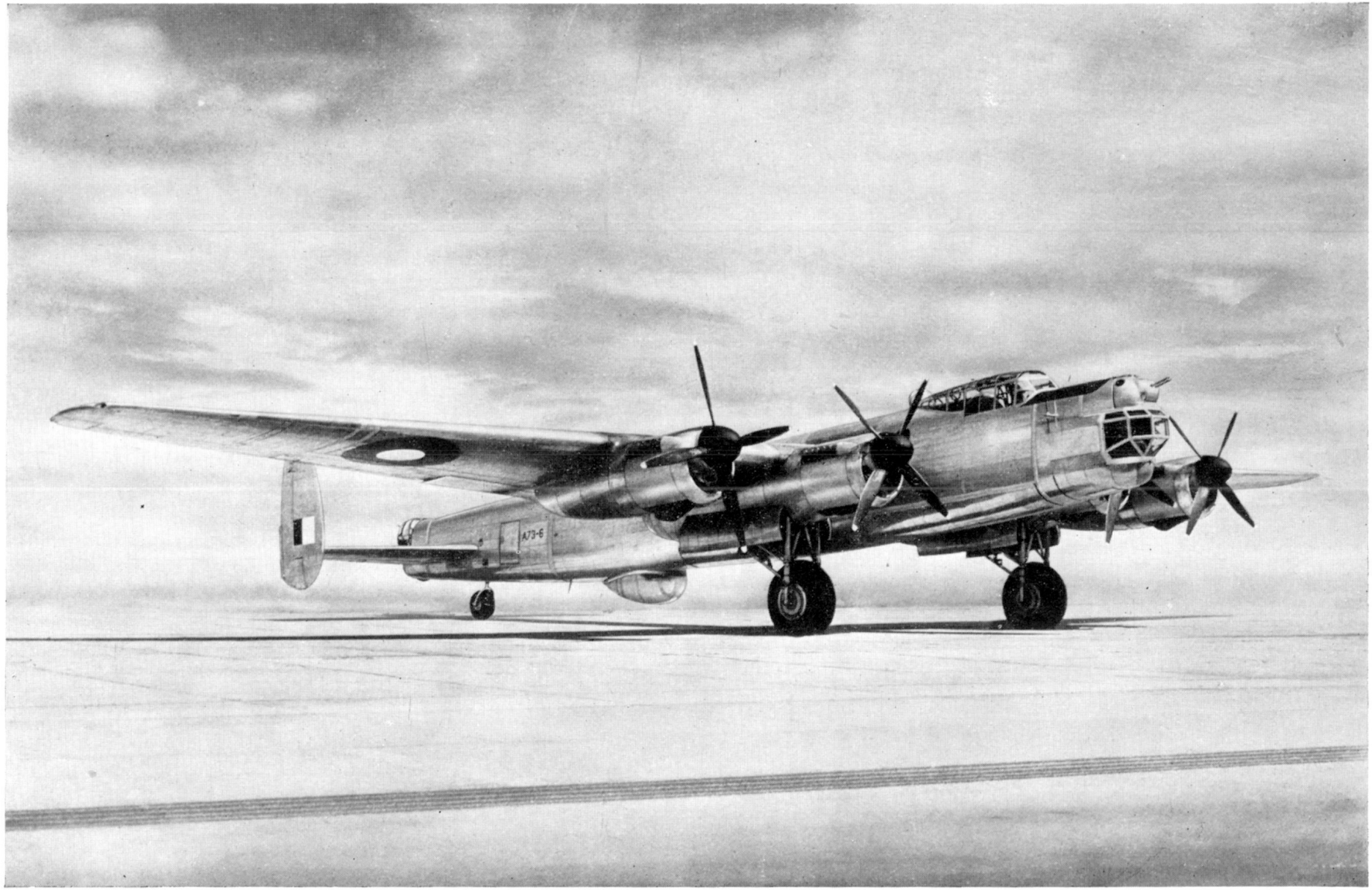
Air Board and R.A.A.F. Technical Orders and Instructions as issued from time to time may affect the subject matter of this publication.

Where an Order or Instruction contradicts any portion of this publication, an amendment list will generally be issued, but when this is not done the Order and Instruction must be taken as the over-riding authority.

ISSUED FOR THE INFORMATION AND GUIDANCE OF ALL CONCERNED BY COMMAND OF THE AIR BOARD.

SECRETARY,

AIR FORCE HEADQUARTERS, MELBOURNE, S.C.1




AUSTRALIAN LINCOLN MK. 30.

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AUGUST, 1946.

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## REPAIR MANUAL

# Part I — Squadron Repair Schemes

The repairs described in this part have been devised with a view to avoiding, as far as possible, the use of non-portable special tools, jigs or other equipment which it is not practicable to provide as standard unit equipment, and are necessarily limited in scope.

Repairs which are beyond the scope of this part will be found described in part two of this volume.

### KEY TO INFORMATION.

So that information contained in this part may be readily found, the data has been set out in nine Chapters, each Chapter dealing with a specific part of the aircraft. To facilitate quick reference, detailed lists of contents and illustrations are provided at the front of each Chapter, and an alphabetical index is provided after Chapter nine of Part 2.


CHAPTER 1.—GENERAL.
CHAPTER 2.—ENGINE SUB-FRAMES.
CHAPTER 3.—FUEL, OIL, HYDRAULIC AND PNEUMATIC SYSTEMS.
CHAPTER 4.—FUSELAGE.
CHAPTER 5.—ALIGHTING GEAR.
CHAPTER 6.—MAIN PLANES.
CHAPTER 7.—TAIL PLANE AND ELEVATORS.
CHAPTER 8.—FINS AND RUDDERS.
CHAPTER 9.—MISCELLANEOUS REPAIRS.
LIST OF SPECIAL TOOLS.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART I — CHAPTER I

# GENERAL

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# GENERAL

## Construction

1. The Lincoln Mk. 30 Aircraft is a four engine mid-wing monoplane, fitted with Merlin 85 or "102" engines.

2. The fuselage is of light alloy monocoque construction comprising transverse channel section formers braced with rolled and extruded section longitudinal stringers, to which the skin is secured with countersunk-head, or alternatively, mushroom-head rivets.

3. The main planes and tail planes are of similar construction, each comprising two main spars about which the ribs are built. The main plane centre portion ribs are braced with top-hat section and lipped angle section stringers. The inner outer, and outer outer portions of the main planes are devoid of stringers apart from the trailing edge of the inner outer portion, which is braced with "L" section stringers between the ribs. The tail plane ribs are also braced with lipped-angle section stringers. The skin covering of the main plane and tail planes consists of aluminium alloy sheet, secured to ribs and stringers with mushroom-head rivets, except at the leading edge where countersunk head rivets are used.

4. All the control surfaces are metal covered, aluminium alloy skin being employed.

5. The engine sub-frames are fabricated from steel tubes pinned or welded into sockets; the outer sub-frames are each secured to two pressed steel channels bolted to the front spar, and a bracket integral with the centrally disposed engine rib, at the rear spar; the inner sub-frames are attached to the spar and the undercarriage support beams.

6. The centre plane fuel tanks and the oil tanks are constructed of welded aluminium alloy sheet, and are fitted with a self-sealing protective covering. The outer plane tanks are constructed of flexible self-sealing rubber sheet.

## Identification of Components

7. To enable members of the structure or the plating to be identified, reference should be made to the relevant illustration for the component concerned. Further details regarding the key diagrams will be found at the beginning of each Chapter.

## Selection and Use of Materials

8. Most of the aluminium alloy sheet used is to specification D.T.D. 390, D.T.D. 275 and D.T.D. 546. For repairs to components made from these materials, sheet to specification D.T.D. 390 or D.T.D. 275 is used, but if stocks of material to D.T.D. 546 are held this material may be used.

9. Aluminium alloy sheet to specification D.T.D. 213 is used for parts where welding operations are necessary, and any replacement or repair to such parts must be made of material to the same specification.

## Heat Treatment of Light Alloy Sheet

10. No heat treatment is necessary for carrying out repairs with light alloy sheet unless the bend radius required is smaller than that indicated in the following table for finally heat treated and aged sheet (condition "A").

| CONDITION | MINIMUM RADIUS | | | |
|---|---|---|---|---|
| | Angle of bend 18 S.W.G. and thinner | | Angle of bend thicker than 18 S.W.G. | |
| | Through 120° or less | Over 120° | Through 120° or less | Over 120° |
| "A" Finally heat treated and aged | 2T | 3T | 2.5T | 3T |
| "B" Finally heat treated and within one hour of quenching | 0.5T | 1.5T | 1.5T | 2T |

T = Thickness of sheet.

11. If a smaller radius is required the sheet should be heat treated and worked within one hour of quenching, during which time the radii specified for condition "B" are the minimum allowable. Heat treament is carried out by heating the aluminium alloy sheet to a uniform temperature of 490°C + 10°C and quenching in water. This heat treatment must be accurately performed by means of efficient apparatus with approved temperature recording devices.

## Welding

12. Except where authorized, in these instructions only those parts which were welded during manufacture may be repaired or replaced by welding. All welded repairs must be carried out in strict accordance with the instructions given in A.G.I. 3, (D) 45, and

the weld must be similar to the original weld.

13. The above paragraph applies to welding of steel and aluminium alloy and also to bronze welding, but does not apply to other forms of brazing, such as atmosphere brazing, or to spot welding. In general, gas welding is not permissible on aluminium alloy parts which have been spot welded, such parts should be repaired by riveting unless spot welding equipment is available. Where spot welding is used the instructions given in A.G.I. 3, (d) 51 must be followed.

14. It is essential that any structure upon which welding is being carried out is suitably supported against distortion.

**Support of Structure During Repair**

15. It is important that the fuselage or main plane is suitably supported against distortion when any member or part of a member is removed for repair or replacement. This also applies to the fuselage when the skin plating is removed.

**Extent of Damage**

16. When estimating the extent of damage, especially when caused by impact, the surrounding parts must be carefully examined to ensure that no secondary damage remains unnoticed, as for example, damage caused by transmission of force from one end of a member to its opposite end, causing bolt or rivet holes to be drawn or plates to bend, even at a considerable distance from the point of impact. A feeler gauge should be used to ensure that rivets have not stretched or failed, leaving the heads intact. In order that careful inspection of a damaged part can be made, it is essential that all paint and other substances are thoroughly cleaned from any areas which may be affected by damage. Corroded areas must be taken into consideration when estimating the extent of the damage (see para. 20).

**Dressing Damage for Repair**

17. It is essential that all damage be suitably dressed before any attempt is made to effect a repair, since failure to do this may, in the case of an extrusion, permit a crack to spread along or through the member as illustrated in Fig. 2 at Detail A. The drilling of a hole in an extruded member at the apparent end of a crack may not necessarily terminate it. An example of this is given in Fig. 2 at Detail B. Damage to the plating should be dressed to form a hole of regular shape with a radius of $\frac{1}{2}$ in. at each corner, but where this is impracticable the radius should be made as large as possible. When the damage is extensive, the plating should be cut back to the nearest member as shown in Detail C. 3/32 in. dia. holes should be drilled at the extremities of cracks in plating to prevent them from spreading.

**Detection of Cracks**

18. Great care must be taken to ensure that no cracks in the structure remain undetected. If any doubt exists as to whether a part is cracked or not, the procedure laid down in the relevant part of A.P. 1464A, Vol. 1, should be observed.

**Treatment of Abrasions**

19. Abrasions to either the inside or the outside of the fuselage skin must be smoothed out with emery cloth before protective paint is applied. Details of protective treatment are given in paras. 20 and 21.

**Prevention of Corrosion**

20. Every precaution must be taken during repair to prevent corrosion, and to ensure that no existing corrosion goes undetected, especially in places where it would not be visible after repair. Corrosion cannot always be detected by visual examination alone, but it may be shown up under paint or enamel by flaking of the paint or enamel when pressed. Severe corrosion may necessitate a more extensive repair than would otherwise be necessary, the corroded portion being added to the damaged area when estimating the extent of the damage. The original protective covering must be maintained intact as far as possible, but when it has to be removed the instructions given in A.G.I. 3 (C) 11, must be observed. When making repairs, all joints, patches, etc., must bed down on pigmented varnish jointing compound D.T.D. 369, while it is still wet.

**Protective Treatment**

21. The following is a brief summary of the protective treatment:—All internal surfaces and components are primed with one coat of zinc chromate primer to R.A.A.F. specification K.7.

The internal surface of the fuselage is finished, forward of the front spar, with one coat of matt black lacquer, and aft of the front spar with one coat of matt green lacquer, in each case to R.A.A.F. specification K. 18.

All parts that come in contact with dope are painted with one coat of paint to B.S. specication X.4, and parts which are likely to be splashed with acid from the accumulators are painted with two coats of paint to B.S. specification X.19.

**Bowed Tubes**

22. Bowing of tubes may be neglected provided that it does not exceed 1/600 of the length of the tube (i.e. 0.02 in. per foot length), measured between adjacent joints. Tubes bowed in excess of this must be replaced if they cannot be straightened. Heat must not be applied to straighten tubes.

**Holes for Bolts, Rivets, Ferrules**

23. For rivets and bolts under ¼ in diam., drill holes with a drill approximately .003" larger than the nominal size of the bolt or rivet. For example, holes for 4BA bolts (.142" nominal size) should be drilled with a No. 27 drill (.144"), holes for 2BA bolts (.185" nominal size) should be drilled with a No. 12 drill (.189") and holes for ⅛" rivets wih a No. 30 drill (.1285").

For ferrules and bolts of ¼" diameter and larger holes should be reamed to the limits +.002", —.000", except where otherwise specified; the hole is first drilled 1/64" diameter undersize and then reamed.

**Holes for Taper Pins**

24. Holes for taper pins should first be drilled 1/64" under final size, each hole then being carefully finished with a taper reamer until the larger end of the taper pin projects not less than ⅛" above the surface of the material. The small ends of the pin should, if necessary, be trimmed to the required length before it is locked (see para. 27).

**Locking of Attachment Bolts and Pins**

25. Cut off the ends of all attachment bolts nearly flush with the tops of the nuts; secure all plain nuts by making three equally spaced centre pops at the edge of each bolt (refer to A.G.I. 3, (d), 11). The above method of locking is not applicable to bolts fitted with spring washers and plain nuts, bolts fitted with castellated nuts, which latter are to be locked by split pins of the correct sizes, or bolts fitted with self locking nuts.

26. To lock countersunk head screws in tapped holes, make three centre pops in the head (see para. 25). Lock hexagon head screws with a length of 20 S.W.G. steel wire passed through a hole previously drilled in the screw head, and then attached to a fixed part of the structure or to an adjacent bolt.

27. Secure taper pins by lightly riveting the small ends, or by making three equally spaced centre pops. Support the large ends whilst carrying out locking by either method. When a pin is in position the small end should project approximately 1/16 in.

**Riveted Repairs**

28. Unless otherwise stated, the material used for all sheet repairs should be of the same gauge and specification as that of the part being repaired. The arrangement of the rivets used in the repair should generally be the same as that employed in the surrounding skin, but the following points must also be observed:

(i) All rivet holes should be drilled and not punched.

(ii) New parts or patches must be held firmly in position with bolts and nuts, or clamps, before riveting.

(iii) Rivet holes should be regularly and equally spaced.

(iv) Rivets should not be closer to the edge of a patch or strap than a distance equal to two rivet diameters, measured from the centre of the rivet.

**Countersunk Holes**

29. Holes that have been too deeply countersunk may be rectified by fitting special washers of the type shown in Fig. 3 and listed in Table A. This method of repair is applicable only to 1/4 in. dia. and 5/16 in. dia. holes. Holes below ¼ in. dia. should be drilled to the next larger size so that the larger rivet head will fill the oversize countersunk hole.

**TABLE A.**
**Material for Repair of Countersunk Holes**

| IDENT. NO. | PART NO. | DESCRIPTION | SIZE SPECIFICATION | REMARKS |
|---|---|---|---|---|
| | 1.Z.1698 | Washer | 20 S.W.G. | For ¼ in. dia. hole |
| | 2.Z.1698 | Washer | 22 S.W.G. | For ¼ in. dia. hole |
| | 3.Z.1698 | Washer | 24 S.W.G. | For ¼ in. dia. hole |
| | 4.Z.1698 | Washer | 26 S.W.G. | For ¼ in. dia. hole |
| | 5.Z.1698 | Washer | 20 S.W.G. | For 5/16 in. dia. hole |
| | 6.Z.1698 | Washer | 22 S.W.G. | For 5/16 in. dia. hole |
| | 7.Z.1698 | Washer | 24 S.W.G. | For 5/16 in. dia. hole |
| | 9.Z.1698 | Washer | 26 S.W.G. | For 5/16 in. dia. hole |

**Types of Rivets**

30. All solid rivets used in the construction of the aircraft are of light alloy, the pop rivets being either of light alloy or nickel alloy. The various types of rivets used are listed in Table B. It should be noted that plug rivets and plug pop rivets are not used in the manufacture of the Lincoln Mk. 30. However, since English built components have been used in a few aircraft, these rivets may occasionally be

encountered. For this reason paragraphs dealing with plug and plug pop rivets have been included.

**TABLE B.**
**Types of Rivets**

| IDENT. No. | PART No. | RIVET TYPE | MATERIAL SPECIFICATION | REMARKS |
|---|---|---|---|---|
| | (E)D2528/2CW Series | 120° Countersunk head | D.T.D. 327 | No heat treatment |
| | (E)D2528/2B Series | Brazier head | D.T.D. 327 | ,, |
| | (E)D2528/1B Series | Brazier head | L. 36 | ,, |
| | (E)D2528/2S Series | Snap head | D.T.D. 327 | ,, |
| | (E)D2528/2F Series | Flat head | D.T.D. 327 | ,, |
| | SS. 3123 | Pop dome head | D.T.D. 237 | ,, |
| | SS. 3124 | Pop countersunk head | D.T.D. 237 | ,, |
| | SS. 3222 | Pop dome head | D.T.D. 180 | ,, |

**Rivets and Methods of Riveting**

31. Reaction riveting is employed for the attachment of the skin to the fuselage, the upper surfaces of the main planes and tail plane, and the outside of the bomb doors. The various types of reaction riveting which are employed are illustrated in Fig. 5. For normal reaction riveting a steel block should be employed in conjunction with the appropriate snap for the type of head required, and the snap should be fitted to a suitable riveter for the size and type of rivet. Where a riveter is not available, a hammer may be used to strike either the snap, steel block or the projecting rivet shank. Formed heads of rivets should be concentric with the shank, and the size should correspond with the following table of nominal and minimum dimensions. To achieve these dimensions, the projecting length of rivet shank should be approximately 1.1/2 times the diameter of the rivet.

**FORMED HEAD SIZES**

| DIAMETER | DIAMETER - INCHES | | HEIGHT - INCHES | |
|---|---|---|---|---|
| | Nominal | Minimum | Nominal | Minimum |
| 3/32'' | 5/32'' | 9/64'' | .060'' | .040'' |
| 1/8'' | 7/32'' | 3/16'' | .080'' | .050'' |
| 5/32'' | 15/64'' | 13/64'' | .105'' | .060'' |
| 3/16'' | 9/32'' | 15/64'' | .125'' | .070'' |
| 1/4'' | 3/8'' | 5/16'' | .140'' | .080'' |
| 5/16'' | 15/32'' | 25/64'' | .170'' | .100'' |
| 3/8'' | 9/16'' | 15/32'' | .200'' | .120'' |

32. Pop riveting is used in the attachment of the skin covering to the fins, rudders, and the undersurfaces of the main plane and tail plane where inaccessibility renders reaction riveting impossible. Standard hand pop riveting tools may be used for all light alloy rivets, but it will be necessary to use the pop riveter either with the foot pump or the air intensifier (see Figs. 4 and 6), when nickel-alloy rivets are being used. When pop rivets are used externally they should be fitted with an approved rivet filler.

33. Plug riveting is not used in entirely Australian built Lincoln aircraft, but may be encountered in some English built components. When it is necessary to remove plug rivets, they should be replaced by 2 B.A. screws in a similar manner to that described in para 39 for replacement of self-tapping screws by 2 B.A. screws.

34. The following points should always be observed when carrying out any form of riveting:—

(i) The preformed head should be on the outside surface in the case of skin repairs.

(ii) Unless specifically stated, no rivet pitch should be less than $\frac{1}{2}$ in. or greater than 1 in.

(iii) In cases where the last rivet pitch would not equal the rivet pitch throughout the row, the last two pitches should be made equal provided they are within the dimensions given in sub-para. (ii).

(iv) Unless otherwise stated, all rivets should be fitted in rows parallel to the edges of the plating.

(v) For the replacement of skin covering on the fuselage, and aft of the front spars on main planes and tail plane, brazier

head rivets must be employed. Forward of the front spars on both main planes and tail plane, countersunk head rivets will be required.

(vi) When a panel or patch is being secured by rivets, the end rivets should be fitted first, then those in the centres of the rows, and finally the intermediate rivets. If the part is riveted from one end progressively, the material will be stretched and the end rivet holes will not line up.

## REMOVAL OF RIVETS

### Solid Rivets

35. To remove a solid rivet, drill the centre of the head to the depth of the head with a drill of the same diameter as that of the rivet shank, then shear the head off with a sharp chisel held parallel to the edge of the plate. If after removal of the head, the remaining shank is unduly tight, the rivet should be drilled right out and not forcibly extracted. Care should be taken during these operations to avoid damaging the surrounding material. If rivet holes are enlarged, oversize rivets are to be used.

### Pop Rivets

36. When removing pop rivets, a pneumatic drill fitted with the special attachment, Part number Z1473 should be used, and the rivets drilled out as shown in Fig. 1. It will be necessary, however, to punch out the mandril heads before drilling out the rivets.

### Plug Rivets

37. To remove countersunk head plug rivets, a 3/32 in. dia. hole should be drilled down the centre of the rivet, the tang of a small file or a square punch inserted into the hole and the rivet screwed out. To remove a dome head plug rivet, two flats should be formed on the head and the rivet screwed out with a pair of pliers.

### Self-Tapping Screws

38. Self-tapping instrument head screws are used for the attachment of the outer wing skin to the spars; it is important that the size of the drill used is correct (i.e., Morse No. 29) otherwise screw will either strip or bind in the hole.

### Removal and Replacement of Self-Tapping Screws

39. If a self-tapping screw driven into the spar boom of the outer wing has stripped the thread it should be removed, and replaced by a 2 B.A. screw raised countersunk 120° head, part No. SS.3780/2. The tapping of those holes for replacement is as follows:—

(i) The stripped hole will not require drilling for either depth or diameter.

(ii) The holes should be tapped out 2B.A., care being taken to tap the full length of the hole.

(iii) The screw should be locked when driven into the spar boom by centre punching the edges of the skin into the screw slot.

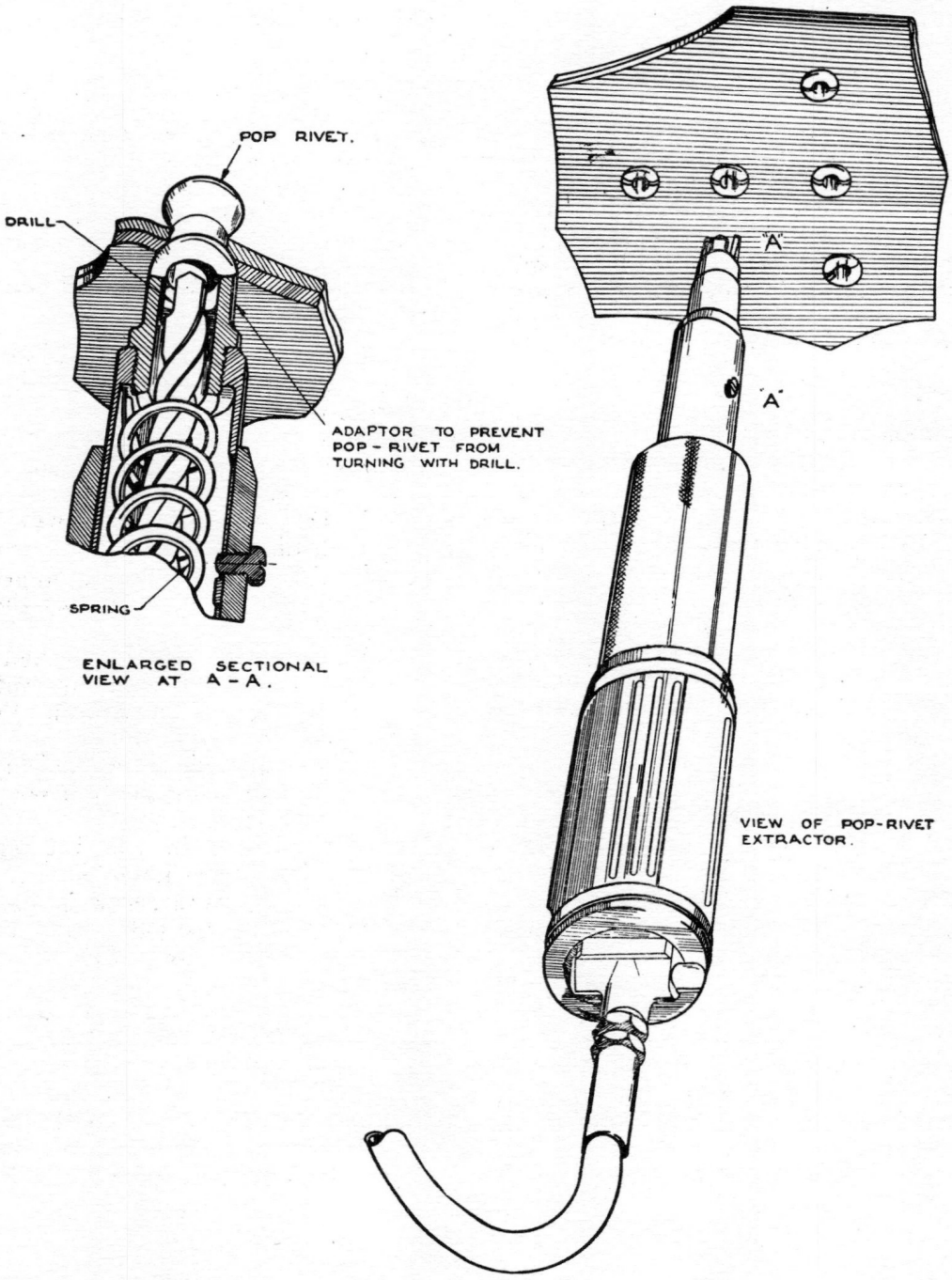
(iv) Where a self-tapping screw head has broken off, it is impracticable to remove the shank and the following instructions must be observed:—

Between each main rib, i.e., approximately every 20 ins. in the inner portion of the outer wing, only one such screw is allowed. In the outer portion of the outer wing, only one such screw is allowed every 18 ins., i.e., every two ribs.

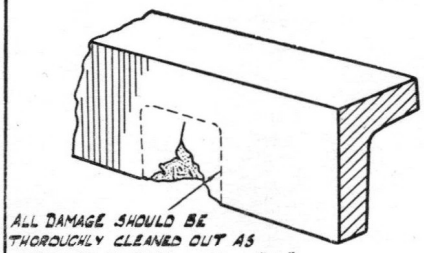
Damage greater than that described above must be repaired, see Part 2.

### Special Tools

40. A detailed list of special tools required to effect repairs described in this Publication is provided after Chapter 9 of this Part.

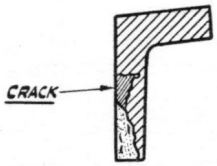



| 1. | METHOD OF REMOVING POP-RIVET. | 1. |
|---|---|---|

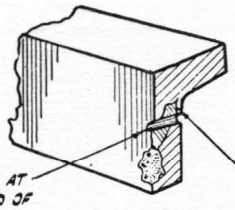


ALL DAMAGE SHOULD BE THOROUGHLY CLEANED OUT AS SHOWN BY DOTTED LINE.

"A"



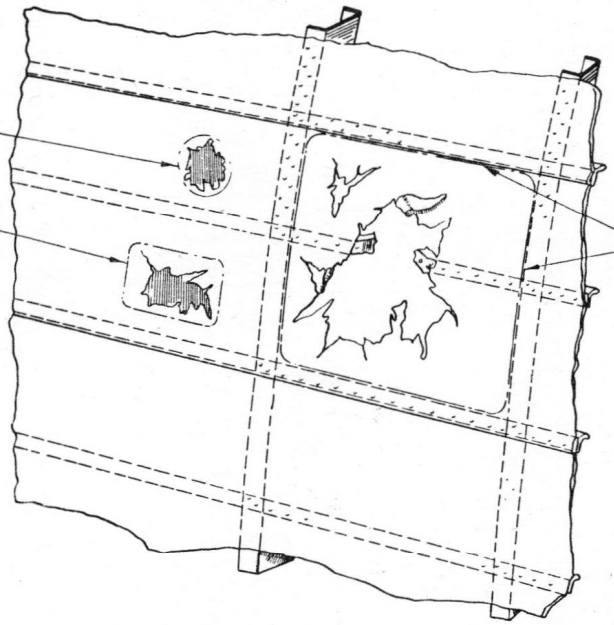

SECTION THROUGH DAMAGE SHOWING POSSIBLE EXTENT OF CRACK.



HOLE DRILLED AT APPARENT END OF CRACK

"B"

CRACK ACTUALLY EXTENDING INWARDS BEYOND DRILLING.



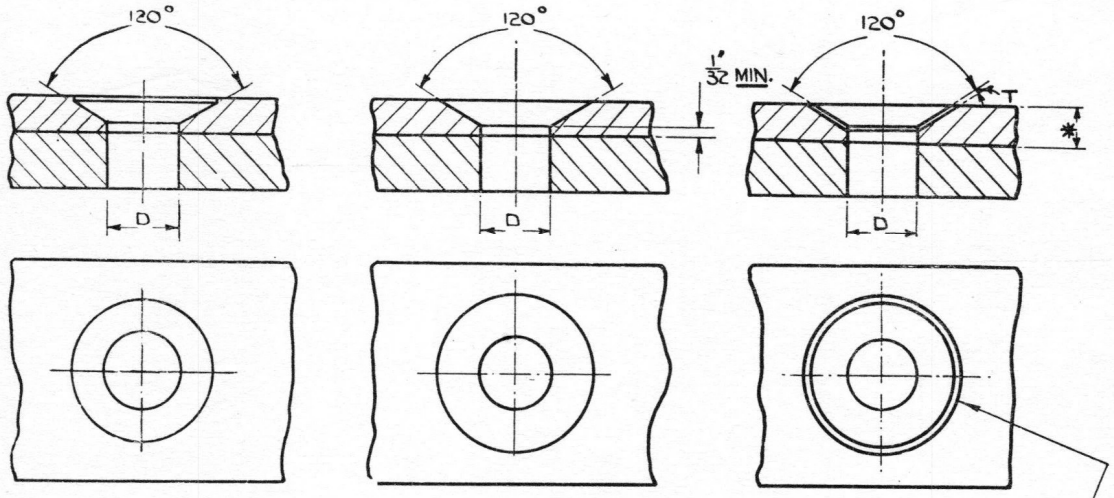
DAMAGE CUT AWAY TO FORM A CIRCULAR APERTURE.

DAMAGE CUT AWAY TO FORM A RECTANGULAR APERTURE NOTE LARGE RADIUS ON CORNERS.

SKIN CUT BACK TO NEAREST MEMBERS WHEN DAMAGE IS EXTENSIVE.

"C"

| 2 | METHOD OF CLEANING OUT DAMAGE | 2 |
|---|---|---|

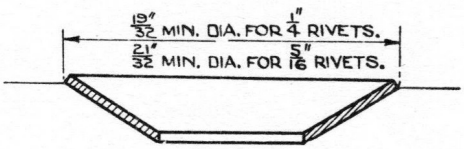



MATERIAL COUNTERSUNK TOO DEEPLY.

COUNTERSINKING OPENED OUT.

WASHER FITTED.

WASHER SHOULD PROTUDE ABOVE THE SURFACE OF THE PLATE & SHOULD THEN BE FILED FLUSH.




DETAIL OF WASHER BEFORE FILING.

FOR (E)D2528/2 CW COUNTERSUNK RIVETS.

TABLE OF WASHERS.

| DRAWING NOS. | 'O' DIA. OF HOLES | 'T' SWG. OF MAT. |
|---|---|---|
| Z.1698 — 1 | 1/4" DIA. | 20 S.W.G. |
| " — 2 | 1/4" DIA. | 22 S.W.G. |
| " — 3 | 1/4" DIA. | 24 S.W.G. |
| " — 4 | 1/4" DIA. | 26 S.W.G. |
| " — 5 | 5/16 DIA. | 20 S.W.G. |
| " — 6 | 5/16 DIA. | 22 S.W.G. |
| " — 7 | 5/16 DIA. | 24 S.W.G. |
| " — 8 | 5/16 DIA. | 26 S.W.G. |

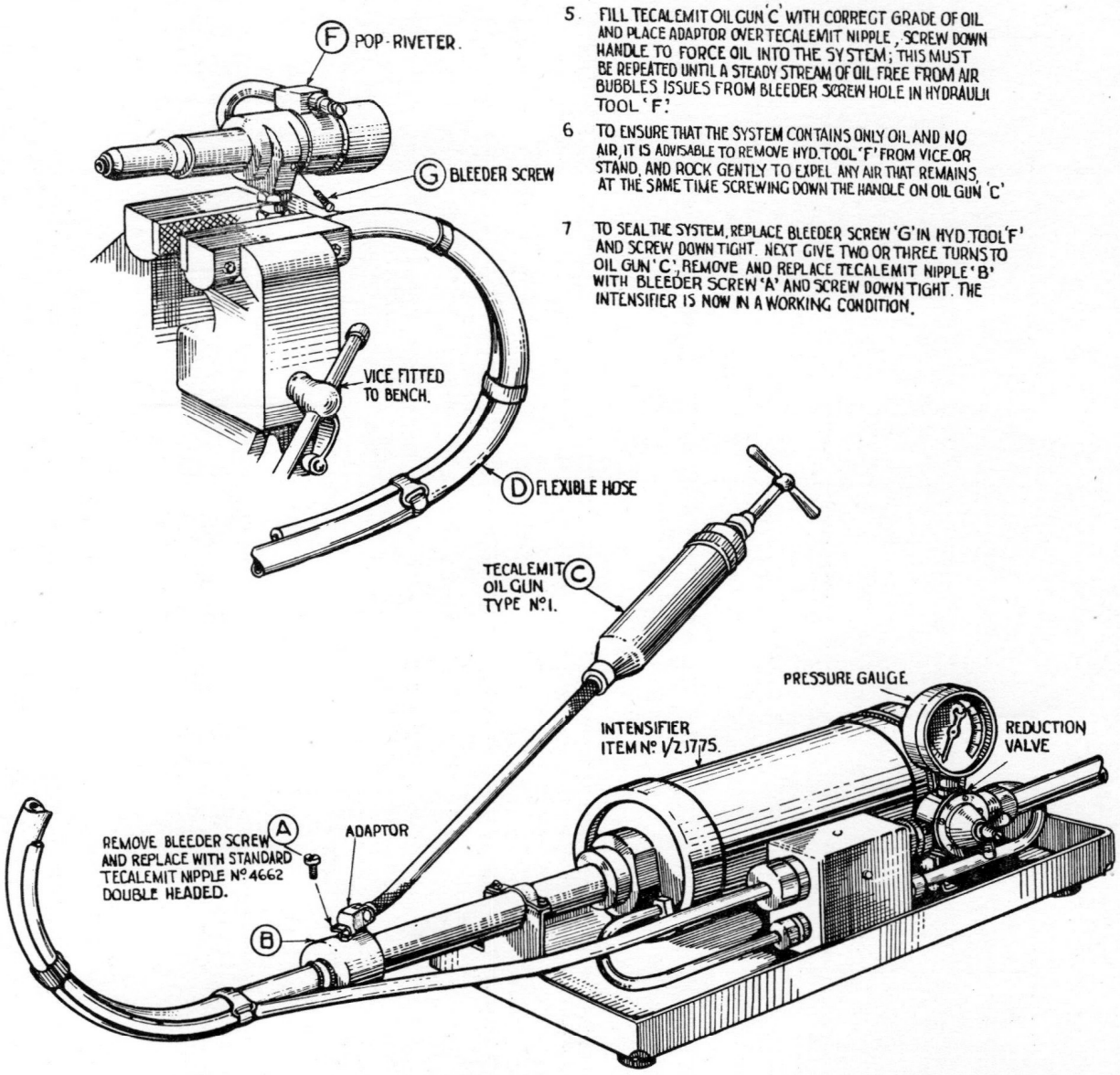
* THE MINIMUM THICKNESS OF PLATE IN WHICH WASHERS CAN BE FITTED IS 10 S.W.G.

MATERIAL:- ALUM ALLOY.
SPEC:- D.T.D. 275 OR 390.

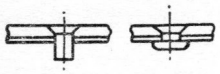
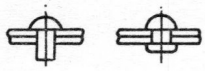
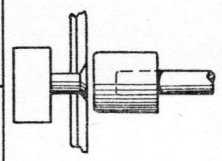
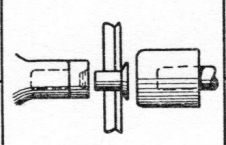
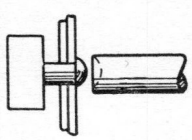
| 3 | METHOD OF FITTING WASHERS TO DEEP C'S'K. RIVET HOLES | 3 |
|---|---|---|

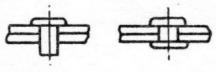
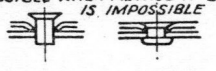
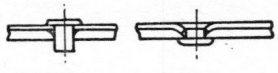
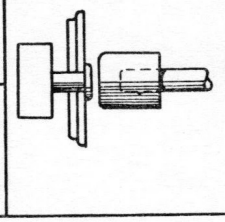
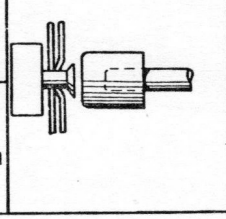
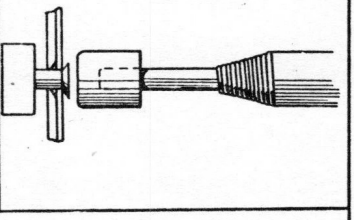
INSTRUCTIONS FOR PRIMING HYDRAULIC INTENSIFIER

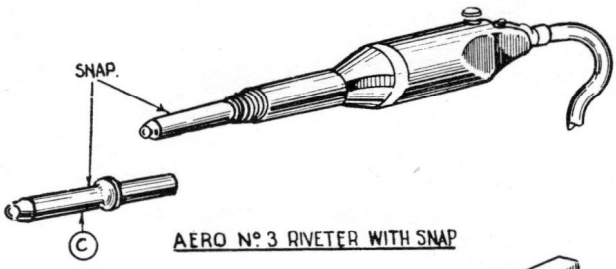
1. PLACE INTENSIFIER 'E' ON FLOOR.
2. PLACE HYDRAULIC TOOL 'F' IN VICE OR STAND AT REASONABLE HEIGHT ABOVE FLOOR LEVEL MAKING SURE THAT FLEXIBLE HOSE 'D' RISES IN A GRADUAL SWEEP AND AT NO POINT IS PERMITTED TO DROOP, CAUSING AN AIR LOCK.
3. REMOVE BLEEDER SCREW 'G' FROM HYD. TOOL 'F' AND SEE THAT HOLE IS CLEAR AND FREE FROM AIR BUBBLE
4. REPLACE BLEEDER SCREW 'A' IN INTENSIFIER 'E' WITH STANDARD TECALEMIT NIPPLE Nº 4662 (B).
5. FILL TECALEMIT OIL GUN 'C' WITH CORREGT GRADE OF OIL AND PLACE ADAPTOR OVER TECALEMIT NIPPLE, SCREW DOWN HANDLE TO FORCE OIL INTO THE SYSTEM; THIS MUST BE REPEATED UNTIL A STEADY STREAM OF OIL FREE FROM AIR BUBBLES ISSUES FROM BLEEDER SCREW HOLE IN HYDRAULI TOOL 'F'.
6. TO ENSURE THAT THE SYSTEM CONTAINS ONLY OIL AND NO AIR, IT IS ADVISABLE TO REMOVE HYD. TOOL 'F' FROM VICE OR STAND, AND ROCK GENTLY TO EXPEL ANY AIR THAT REMAINS, AT THE SAME TIME SCREWING DOWN THE HANDLE ON OIL GUN 'C'
7. TO SEAL THE SYSTEM, REPLACE BLEEDER SCREW 'G' IN HYD. TOOL 'F' AND SCREW DOWN TIGHT. NEXT GIVE TWO OR THREE TURNS TO OIL GUN 'C', REMOVE AND REPLACE TECALEMIT NIPPLE 'B' WITH BLEEDER SCREW 'A' AND SCREW DOWN TIGHT. THE INTENSIFIER IS NOW IN A WORKING CONDITION.



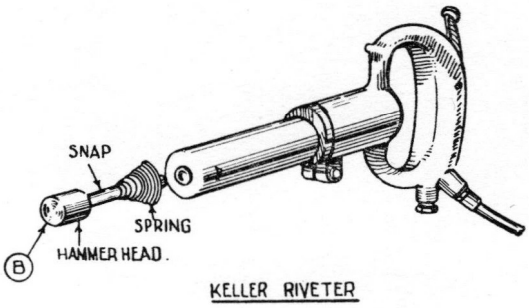

| 4 | METHOD OF PRIMING HYDRAULIC INTENSIFIER | 4 |
|---|---|---|

| | 1 | 2 | 3 |
|---|---|---|---|
| | TOP PLATE TO BE 22SWG OR THICKER  BEFORE RIVETING AFTER RIVETING | THIS METHOD TO BE USED ONLY WHEN TOP PLATE IS 24 S.W.G OR THINNER  BEFORE RIVETING AFTER RIVETING |  BEFORE RIVETING AFTER RIVETING |
| RIVET | (E) D 2528/2 CW | (E) D2528/2 CW | (E) D2528/2S |
| PLATES | MACHINE C'S'K PRIOR TO RIVETING | RIVETED & PRESS C'S'K IN ONE OPERATION | DRILLED ONLY |
| TOOL USED ON RIVETER SEE FIG 7 | B | B | C |
| REACTION TOOL SEE FIG. 7 | A  | D  | A  |
| L = RIVET LENGTH T = THICKNESS OF PLATE D = DIA. OF RIVET | L = T + D | FOR $\frac{3}{32}$" DIA. RIVETS L=T+1·8D FOR $\frac{1}{8}$" DIA. RIVETS L=T+1·4D | L = T + D |

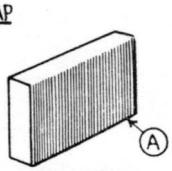
| | 4 | 5 | 6 |
|---|---|---|---|
| |  BEFORE RIVETING 'AFTER RIVETING | TOP PLATE TO BE THINNER THAN 22 S.W.G. & BOTTOM PLATE THINNER THAN 18 S.W.G THIS METHOD IS ONLY PERMISSIBLE WHEN METHOD N° 2 IS IMPOSSIBLE  BEFORE RIVETING AFTER RIVETING | TOP PLATE TO BE THINNER THAN 22 S.W.G. BOTTOM PLATE 16 S.W.G OR THICKER.  BEFORE RIVETING AFTER RIVETING |
| RIVET | (E) D 2528/2 F | (E) D 2528/2 CW | (E) D 2528/2 CW |
| PLATES | DRILLED ONLY | TOP-DRILLED & DIMPLED BEFORE RIVETING SEE BELOW BOTTOM:-DRILLED ONLY | TOP-DRILLED & PRESSED INTO BOTTOM PLATE BY MEANS OF RIVETING HAMMER & DOLLY. BOTTOM:- MACHINE C'S'K. |
| TOOL USED ON RIVETER SEE FIG. 7 | B | B | B |
| REACTION TOOL SEE FIG. 7 | A  | A  | A  |
| L = RIVET LENGTH T = THICKNESS OF PLATE D = DIA. OF RIVET | L = T + D | L = T + D | L = T + D |




AERO Nº 3 RIVETER WITH SNAP

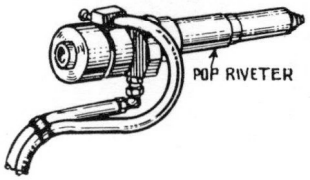


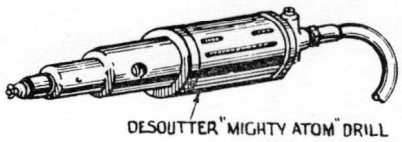

KELLER RIVETER



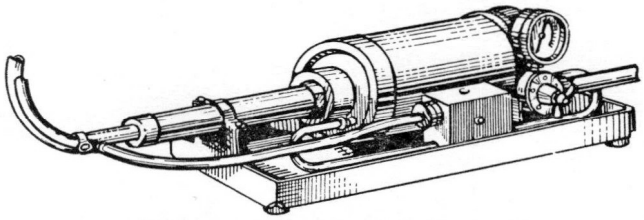

RE-ACTION BLOCK

THE DIMENSIONS & WEIGHT OF THIS BLOCK ARE AS SMALL AS IS CONVENIENT. THE SHAPE CAN BE VARIED TO SUIT PARTICULAR REQ^TS, PROVIDED THAT ONE EDGE IS FLAT & GREATER IN SIZE THAN THE RIVET HEAD. IT IS USED IN ALL CASES REQUIRING A FLAT HEAD.

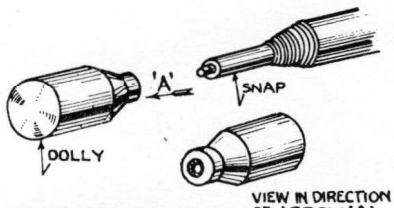



POP RIVET REMOVER – PART No 1/Z.1473.

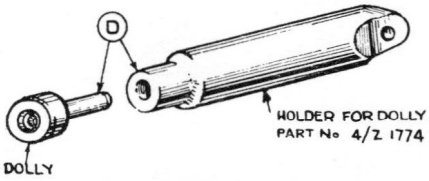


POP-RIVETER AND INTENSIFIER. PART No. 1/Z.1775



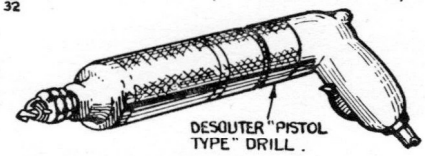

TOOLS FOR PRE-DIMPLING SKIN.
VIEW IN DIRECTION OF ARROW 'A'

FOR $\frac{1}{8}$" RIVETS – Pt Nº OF SNAP – 2/Z.1983 – Pt Nº OF DOLLY – 4/Z.1983
FOR $\frac{3}{32}$" " " " " " 3/Z.1983 – " " " " – 5/Z.1983

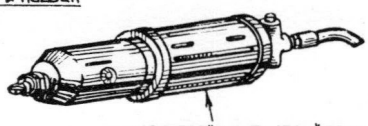



ENLARGED VIEW OF PRESS C'S'K DOLLY & HOLDER

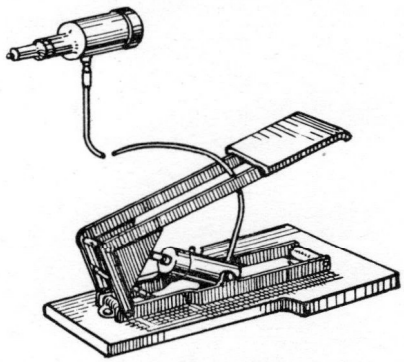
2/Z.1774 DOLLY FOR $\frac{3}{32}$" RIVETS
3/Z.1774 " " $\frac{1}{8}$" "




DRILL WITH COUNTERSINK CUTTER.
1/Z.1773 C'S'K DRILL FOR $\frac{3}{16}$" TO $\frac{5}{16}$" RIVETS.



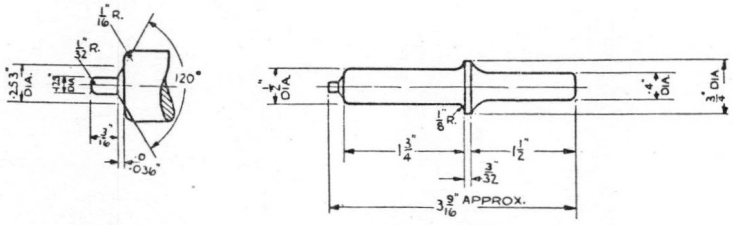

DRILL WITH C'S'K. CUTTER
1/Z.1772 C'S'K DRILL FOR $\frac{3}{32}$" TO $\frac{5}{32}$" RIVETS



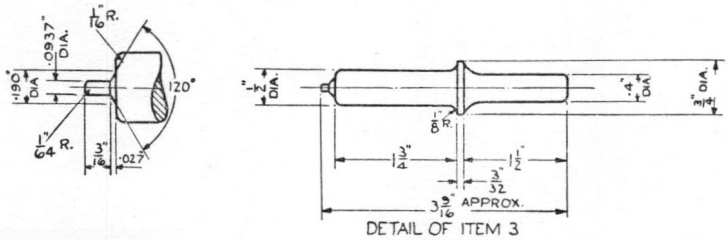
POP RIVETER & FOOT PUMP.
PART No. 1/Z 1474.

1/Z.1770. SNAPS FOR HAND & PNEUMATIC RIVETING
2/Z.1770 FOR $\frac{3}{32}$" RIVET, USED WITH AERO Nº 3 RIVETER.
3/Z.1770 FOR $\frac{1}{8}$" RIVET, USED WITH AERO Nº 3 RIVETER.
4/Z.1770 FOR $\frac{5}{16}$" RIVET, USED WITH AERO Nº 3 RIVETER
5/Z.1770 FOR $\frac{1}{4}$" RIVET, USED WITH KELLER RIVETER.
6/Z.1770 FOR $\frac{5}{16}$" RIVET, USED WITH KELLER RIVETER
7/Z.1770 FOR $\frac{3}{32}$" MUSHROOM H'D., USED WITH AERO Nº 3 RIVETER.
8/Z.1770 FOR $\frac{1}{8}$" MUSHROOM H'D. USED WITH AERO Nº 3 RIVETER
9/Z.1770 FOR $\frac{5}{16}$" MUSHROOM H'D. USED WITH AERO Nº 3 RIVETER.
10/Z.1770 FOR $\frac{3}{32}$" MUSHROOM H'D HAND RIVETING
11/Z.1770 FOR $\frac{1}{8}$" MUSHROOM H'D. HAND RIVETING.
12/Z.1770 FOR $\frac{5}{16}$" MUSHROOM H'D HAND RIVETING

1/Z.1771. HAMMER H'D. USED WITH AERO Nº 3 RIVETER.
2/Z.1771. HAMMER H'D USED WITH KELLER RIVETER.

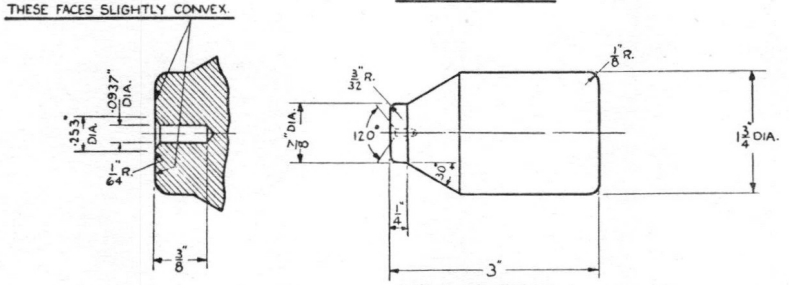



DETAIL OF ITEM 2



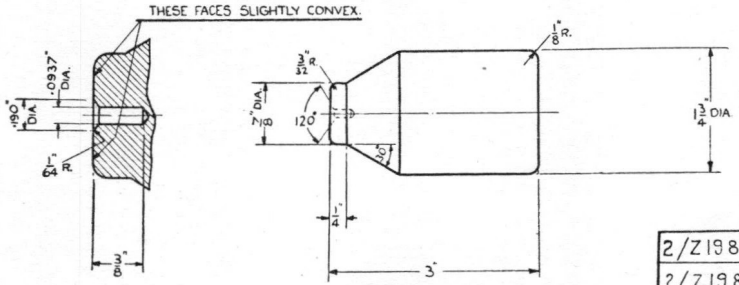

DETAIL OF ITEM 3

THESE FACES SLIGHTLY CONVEX.




DETAIL OF ITEM 4
COMMERCIAL MILD STEEL.

THESE FACES SLIGHTLY CONVEX.




DETAIL OF ITEM 5
COMMERCIAL MILD STEEL.

| | |
|---|---|
| 2/Z1983 | SNAP |
| 2/Z1983 | SNAP |
| 3/Z1983 | DOLLY |
| 5/Z1983 | DOLLY |
| | |

FOR (E)D2528/2CW C'S'K. RIVETS

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART I — CHAPTER 2

## ENGINE SUB-FRAMES

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### ILLUSTRATIONS.


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## ENGINE SUB-FRAMES.

### General

1. The engine mounting sub-frames are built from steel tubes and sockets with pinned or welded fittings. The inner sub-frames are mounted on the undercarriage support beams and the outer sub-frames are mounted on channels bolted to the front spars. For definitions of damage and methods of repair to the engine mountings which carry the Merlin 85 or "102" engines, reference should be made to Vol. 11, Part 3 of A.P. 2861A.

### Engine Attachment Sockets—Sub-frames Inboard and Outboard

#### Negligible Damage

2. Damage which, when cleaned up, does not exceed $\frac{1}{2}$ in. dia. and is confined to one wall of a socket, may be neglected provided that it does not occur at a lug. This damage must not be closer than $\frac{1}{4}$ in. to any of the pins which secure the socket or, if the socket is welded, the damage must not be within $\frac{1}{4}$ in. of any weld. On the lug portion of a socket, only superficial scratches not deeper than 0.03 in. may be neglected.

### Sockets, General

#### Negligible Damage

3. Damage, which, when cleaned up, does not exceed 1 in. dia., and occurs only in one wall of a socket, may be neglected provided that it is not within $\frac{1}{2}$ in. of any pin or weld and is not on a lug. On the lug portion of a socket, only superficial scratches not deeper than 0.03 in. may be neglected.

### Tubular Members

4. Smooth isolated dents, not deeper than 1/30th of the tube diameter, may be neglected provided that they show no signs of cracks, abrasions, and sharp corners. Bulges, free from cracks and abrasions, may also be neglected provided that they do not protrude more than 0.05 in.

### Rear Attachment Bracket — Attachment Mounting, Outboard Sub-frames

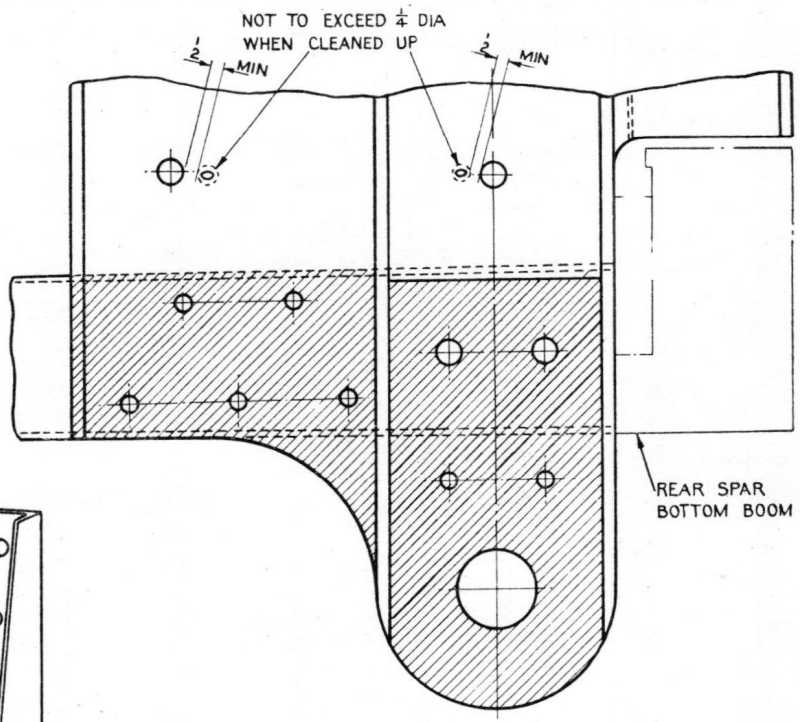
#### Negligible Damage

5. In the shaded area of the rear attachment brackets indicated in fig. 1, negligible damage is restricted to superficial scratches not deeper than 0.03 in. Outside the shaded area the maximum extent of negligible damage to the web and the flanges is specified in the illustration.

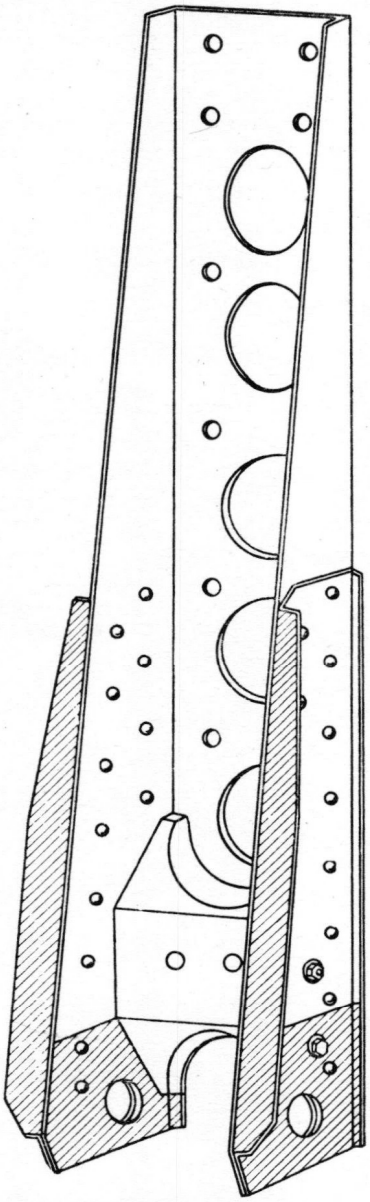
### Front Spar Channel

#### Negligible Damage

6. In the shaded area of the front spar channel indicated in fig 1, negligible damage is restricted to superficial scratches not deeper than 0.03 in. In any part other than the shaded area, damage which, after being cleaned out, is not larger than 3/8 in. dia., may be neglected provided that it is not within $\frac{1}{2}$ in. of any edge, corner or attachment hole.




REAR ENGINE MOUNTING BRACKETS



FRONT ENGINE MOUNTING CHANNEL
OUTBOARD

THE ONLY NEGLIGIBLE DAMAGE IN THE SHADED AREAS TO BE ABRASIONS WHICH WHEN CLEANED OUT NOT TO EXCEED ·03" DEEP

| | | |
|---|---|---|
| 1 | NEGLIGIBLE DAMAGE-OUTER SUB-FRAME ATTACHT CHANNELS | 1 |

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART I — CHAPTER 3

## FUEL, OIL, HYDRAULIC AND PNEUMATIC SYSTEMS

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PIPING.


| | Para. |
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| HYDRAULIC AND PNEUMATIC SYSTEMS | 6 |

## FUEL, OIL, HYDRAULIC AND PNEUMATIC SYSTEMS

### TANKS

#### General

1. The centre section fuel tanks are made of aluminium alloy with welded seams and are stiffened by baffle plates and top-hat section members which are spot welded to the shell. The material used for these tanks is of 18 SWG. The oil tanks are of similar construction but are made of 16 SWG and 18 SWG, also the hydraulic header tanks, these being 16 SWG. The fuel and oil tanks are also fitted with a self-sealing protective covering. For repairs to tanks, reference should be made to the relevant parts of A.P. 1464A, Volume 1.

2. The outer plane fuel tanks are constructed of semi-flexible self-sealing rubberised material, stiffened internally with tubular bracing of the same material.

### PIPING

#### Fuel System

3. Any piping in the fuel system which is in any way damaged should be replaced.

#### Oil System

#### Negligible Damage

4. Smooth, isolated dents may be neglected provided that they are free from cracks, abrasions and sharp corners.

5. Damage greater than the above necessitates replacement of the piping concerned.

#### Hydraulic and Pneumatic Systems

6. Any piping in the above systems which is in any way damaged should be replaced. For the method of connecting the "Fixed-olive" type of coupling, reference should be made to the relevant part of A.P. 1464A, Volume 1.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

PART I — CHAPTER 4

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## FUSELAGE

1. The fuselage is constructed in five sections, viz., nose, front centre, intermediate centre, rear centre and rear. Each section is of light-alloy and is similar in construction. The aluminium-alloy skin is riveted to transverse channel-section formers and longitudinal stringers, and the fuselage floor, under which the bombs are carried, is built up from transverse channel-section members, braced by intercostals. To enable members of the structure to be identified, reference should be made to the relevant illustration of the component in which the member occurs. Figs. 21 to 25 illustrate the sections of the fuselage, and details of the bomb door are given in fig. 26. For the gauge and specification of the plating on the fuselage and bomb doors, reference should be made to figs. 27 to 32.

### SKIN

#### Negligible Damage

2. Smooth, isolated dents, free from cracks, abrasions and sharp corners, may be neglected. Damage to the skin which does not exceed 1 in. dia. when cleaned out, may be neglected provided that it does not occur within 1 in. of, and is also not between, formers Nos. A and 2, 4, 6 and 12 and 14, nor in the shaded areas marked "A" shown on figs. 28 and 30. Only one such hole is permissible in a panel bounded by formers and stringers, and it should be sealed with a doped-on fabric patch. If the protective coating of the skin has been damaged, it must be restored. (See Chapter 1, para. 20.)

#### Repairable Damage

3. Plating which is not perforated but is dented or buckled beyond the limits indicated in the previous paragraph, should be carefully restored to the original contour. Before hammering, the plating should be released from any distorted formers or stringers, and the damaged members renewed or straightened to allow the plating to be reformed. Care is necessary during the latter operation, since, owing to its age-hardened condition, the material may be brittle and therefore not easily worked. All parts must be well backed up during the hammering operation, and cracks which occur as the result of such work will necessitate the repair or replacement of the damaged part. Perforations in the skin, which, when cleaned out, are larger than 1 in. dia., but do not exceed 2 in. dia., should be repaired as shown in fig 1.

4. Where cracks radiate from a perforation in the plating, the hole should be cleaned out to a regular shape, and the cracks, provided that they do not extend to within 1 in. of adjacent structural members, should be prevented from spreading by drilling 3/32 in. dia. holes at their ends. When estimating the size of the patch plate the cracks must be considered as part of the damaged area and the patch made to overlap all round on to at least 1 in. of sound material. A reasonably straight isolated crack should have a 3/32 in. dia. hole

**TABLE 1.**
**Material for repair of skin**

| Ident. No. | Part No. | Description | Size | cation | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, Aluminium Alloy | 24 SWG | DTD. 390 | |
| | — | Sheet, Aluminium Alloy | 22 SWG | DTD. 390 | |
| | — | Sheet, Aluminium Alloy | 20 SWG | DTD. 390 | |
| | — | Sheet, Aluminium Alloy | 18 SWG | DTD. 390 | |
| | — | Sheet, Aluminium Alloy | 16 SWG | DTD. 390 | |
| | — | Sheet, Aluminium Alloy | 14 SWG | DTD. 390 | |
| H128F/30288 | (E)D2528/2S6/6 | Rivet, snap-head | 3/16 in. dia. x 3/8 in. | DTD. 327 | |
| H128F/31627 | (E)D2528/2S4/3 | Rivet, snap-head | 1/8 in. dia. x 3/16 in. | DTD. 327 | |
| H128F/30267 | (E)D2528/2S4/4 | Rivet, snap-head | 1/8 in. dia. x ¼ in. | DTD. 327 | |
| H128F/30268 | (E)D2528/2S4/5 | Rivet, snap-head | 1/8 in. dia. x 5/16 in. | DTD. 327 | |

drilled at each end, and should be repaired by patching as shown in fig 2. Where a crack is closer than 1 in. to a structural member, the entire damaged area should be cleaned out to a regular shape and repaired as shown in fig. 3.

5. Damage to the skin at a lap joint should be repaired with a joggled patch, the joggle being formed by clamping the patch between two stepped pieces of hardwood inserted in a vice.

## FORMERS

### General

6. In addition to the light channel formers (up to 3 in. wide) and heavy channel formers (4 in. and 6 in. wide) used in the construction of the fuselage, special formers Nos. 35 and 38 are used for the attachment of the tail plane, and formers E and No. 27 to facilitate transport.

### Light formers

#### Negligible Damage

7. Damage which, when trimmed to a regular shape does not exceed 1½ in. dia., may be neglected provided that it is not within 1 in. of any stringer cut-out, lightening hole, or fitting, or in the top portion of formers 12 to 27, bounded by stringer No. 4, port and starboard.

8. Negligible damage to the top portions of formers Nos. 12 to 27, referred to in para. 7, is confined to smooth isolated dents, free from cracks, abrasions and sharp corners.

#### Damage Repairable by Patching

9. In the centre of a former web, a small crack which does not exceed 2 in. in length should be repaired as shown in fig. 2. A crack which is confined to either the inner or the outer flange of the member should be repaired as shown in fig. 4, provided that it does not exceed the limit specified in that illustration.

10. Where a former web is damaged to an extent greater than that referred to in para. 9, it should be repaired by patching in a manner similar to that shown in fig. 5, the damaged area being cut away to a regular shape and, if distorted, restored to its original shape.

11. Cracks which occur at the inner extremity of a stringer cut-out in a light former should be repaired by patching, as shown in fig. 6, after a 3/32 in. dia. hole has been drilled at the ends of each crack. Damage to the cockpit rail attachment flange should be repaired with an angle made and fitted as shown in fig. 7.

### Heavy Formers

#### Negligible Damage

12. In the heavy formers, within the section bounded by a line 20 in. above the floor, negligible damage is restricted to smooth isolated dents, free from cracks, abrasions and sharp corners. Above this line, damage confined to the web of a former, which does not exceed ½ in. dia. and is not closer than 1 in. to a lightening hole, may be neglected. Damage to the edge of a flange which does not penetrate more than ¼ in. into a section, may be neglected after it has been smoothed out to blend into the undamaged portion of the flange. No limit is imposed regarding the extent of flange affected by the smoothing out, but the maximum amount of material which may be removed to a depth of ¼ in. must not exceed 2 in. in length.

#### Damage Repairable by Patching

13. Damage to either the inner or the outer flange of a former should be repaired as shown in fig 8, provided that the crack or damage does not penetrate more than 5/8 in. into the web. Cracks which occur at the inner extremity of a stringer cut-out should be repaired by patching, as shown in fig. 9 after a 3/32 in. dia. hole has been drilled at the end of each crack.

### Former E

14. In the portion of former E above the cockpit rail, damage to the edge of a flange which does not penetrate more than ¼ in. into the section, may be neglected after it has been smoothed out to blend into the undamaged portion of the flange. No limit is imposed regarding the extent of flange affected by the smoothing out, but the maximum amount of material which may be removed to a depth of a ¼ in. must not exceed 1 in. in length. In the portion below the cockpit rail negligible damage is restricted to smooth isolated dents, not deeper than 1/16 in. and free from cracks, abrasions and sharp corners.

### Former 27

#### Negligible Damage

15. Damage to the edge of a flange which does not penetrate more than 3/16 in. into the section, may be neglected after it has been smoothed out to blend into the undamaged portion of the flange. No limit is imposed regarding the extent of flange affected by the smoothing out, but the amount of material that may be removed to a depth of 3/16 in. must not exceed 1½ in. in length.

**FORMERS No. 35 and 38**

**Negligible Damage**

16. In the bottom portion, and that portion up to stringer No. 20, port and starboard, negligible damage is restricted to smooth isolated dents, which when cleaned out are not deeper than 0.03 in. Above stringers No. 20, port and starboard, damage to the edge of a flange which does not penetrate more than $\frac{1}{4}$ in. into the section may be neglected after it has been smoothed out to blend into the undamaged portion of the flange. No limit is imposed regarding the extent of flange that may be affected by the smoothing out, but the maximum amount of material which may be removed to a depth of $\frac{1}{4}$ in. must not exceed 2 in. in length, and a minimum distance equal to two rivet diameters must be maintained between the edge of the damage and the nearest rivet. Between stringer No. 20 on the port side and the centre of the tail plane attachment bolt hole, and for a similar distance on the starboard side of the former, damage which does not exceed $\frac{1}{2}$ in. dia. when cleaned out may be neglected provided that it is not closer than $\frac{1}{2}$ in. to any lightening hole or fitting. Above the tail plane attachment bolt holes, port and starboard, 1 in. dia. holes in the web of the former may be neglected provided that they are not closer than 1 in. to any lightening hole or fitting.

**TABLE 2.**
**Material for repair of formers**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 18 SWG | DTD. 390 | |
| | — | Sheet, aluminium alloy | 16 SWG | DTD. 390 | |
| | — | Sheet, aluminium alloy | 14 SWG | DTD. 390 | |
| | — | Sheet, aluminium alloy | 10 SWG | DTD. 390 | |
| H128F/30267 | (E)D2528/2S4/4 | Rivet, snap-head | 1/8 in. dia. x $\frac{1}{4}$ in. long | DTD. 327 | |
| H128F/31627 | (E)D2528/2S4/3 | Rivet, snap-head | 1/8 in. dia. x 3/16 in. long | DTD. 327 | |
| H128F/30289 | (E)D2528/2S6/7 | Rivet, snap-head | 3/16 in. dia. x 7/16 in. long | DTD. 327 | |
| H128F/30288 | (E)D2528/2CW6/6 | Rivet, countersunk head | 3/16 in. dia. x 3/8 in. long | DTD. 327 | |
| H28C.2863 | A.G.S. 245/22 | Screw | 4 B.A. | — | |
| H28.5850 | 2/SS.3782 | Nut | 4 B.A. | — | |

**STRINGERS**

**Negligible Damage**

17. Smooth isolated dents, not deeper than 1/64 in., free from cracks, abrasions and sharp corners, may be neglected provided that they have not caused loosening or adjacent attachments.

**Damage Repairable by Patching**

18 Damage greater than negligible, but not exceeding the following limits, should be repaired by backing up with a length of stringer or similar section and securing with rivets, as shown in figs 10 and 11 according to the size of the stringer. In a small section stringer the maximum permissible damage repairable by patching is $1\frac{1}{4}$ in. long by 5/16 in. wide; in a large section stringer the damage must not be longer than 2 in. and not wider than 5/8 in.

**Damage Repairable by Insertion**

19. Stringers which are distorted or damaged beyond the limits specified in para. 18 should be repaired by insertion. The damaged portion of the member should be cut away and replaced by a new portion secured with butt-strap angles as shown in figs. 12 or 13. On the sides of the fuselage, only one insertion joint per three stringers in each former bay is allowed, i.e., between stringers Nos. 7 to 18 inclusive. Only one insertion joint per former bay is allowed on the top of the fuselage between stringers Nos. 7 to 7 inclusive. On the bottom of the fuselage, between stringers Nos. 18 to 18 inclusive, only one insertion joint is allowed, per former bay.

**TABLE 3.**
**Material for repair of stringers**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 1.SS.3075 | Stringer, section, aluminium-alloy | Reynolds extruded section No. A.773 | L. 4 or DTD. 423 | For stringer repairs |
| | 2.SS.3075 | Stringer, section, aluminium-alloy | Reynolds extruded section No. A.564 | L4 or DTD. 423 | For stringer repairs |
| | 1.D.2967 | Steel, angle | 16 SWG | DTD. 124A | For stringer insertion |
| | 1.D.2968 | Steel, angle | 20 SWG | DTD. 124A | For stringer insertion |
| H128F/30267 | (E)D2528/2S4/4 | Rivet, snap head | $\frac{1}{8}$ in. dia. x $\frac{1}{4}$ in. | DTD. 327 | |
| H128F/30289 | (E)D2528/2S6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | DTD. 327 | |
| H128F/30288 | (E)D2528/2S6/6 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | DTD. 327 | |
| H128F/5719 | (E)D2528/2CW4/4 | Rivet, countersunk head | $\frac{1}{8}$ in. dia. x $\frac{1}{4}$ in. | DTD. 327 | |
| H128F/5725 | (E)D2528/2CW4/5 | Rivet, countersunk head | $\frac{1}{8}$ in. dia. x 5/16 in. | DTD. 327 | |

## LONGERONS

### General

20. The port and starboard main longerons are heavy TT-section, the front and rear portions being dealt with in para. 21, and the deeper intermediate centre portions in para. 22. The port and starboard mid-upper turret longerons are of built-up TT-section, and are dealt with in para. 23.

## FUSELAGE FRONT AND REAR CENTRE PORTIONS

### Negligible Damage

21. Damage to the face of the main longeron which when cleaned out, does not exceed $1\frac{1}{2}$ in. dia. may be neglected provided that it is not closer than 1 in. to the corner radius of either flange, nor occurs in the portion between formers Nos. 12 and 14. Damage to the longeron flanges and to all portions of the longeron between formers 12 and 14 which when cleaned out, does not exceed $\frac{1}{2}$ in. dia. may also be neglected, provided that it is not closer than 1 in. to any edge or corner radius; such a hole should be sealed with a doped-on fabric patch.

## FUSELAGE INTERMEDIATE CENTRE PORTION

### Negligible Damage

22. Damage to the face of the main longeron, which when cleaned out, does not exceed 2 in. dia., may be neglected, provided that it does not occur within 1 in. of the corner radius of either flange, nor occurs in the portion between formers Nos. 10 and 12. Damage to the longeron flanges and to all portions of the longeron between formers 10 and 12 which when cleaned out, does not exceed $\frac{1}{2}$ in. dia. may also be neglected, provided that it is not closer than 1 in. to any edge or corner radius; such a hole should be sealed with a doped-on fabric patch.

## FUSELAGE TURRET LONGERON

### Negligible Damage

23. Smooth isolated dents, not deeper than 1/32 in. free from cracks, abrasions and sharp corners, may be neglected.

## FLOOR

### General

24. The fuselage floor is constructed in three portions, each comprising transverse beams braced with intercostals and covered with light-alloy skin.

## SKIN

### Negligible Damage

25. Smooth isolated dents, clear of structural members, may be neglected provided that they are free from cracks, abrasions and sharp corners and have not caused loosening of adjacent attachments.

**Damage Repairable by Patching**

26. Damage which does not exceed 1 in. dia., when trimmed to a regular shape should be repaired by patching in a manner similar to that shown in Chap 6, fig 1. More extensive damage should be repaired by the more appropriate of the methods described in paras. 3 and 4. Pop rivets should be used to secure the patches to the skin.

**INTERCOSTALS**

**Negligible Damage**

27. Smooth isolated dents, or damage which, when trimmed to a regular shape does not exceed $\frac{3}{4}$ in. dia., may be neglected provided that it is not closer than 1 in. to any lightening hole, flange or fitting.

**Damage Repairable by Patching**

28. Damage greater than that defined in para. 27 as negligible should be repaired by patching. Typical repairs to the flanges and web of an intercostal are shown in figs. 14 and 15 respectively.

**TRANSVERSE BEAMS**

**Negligible Damage**

29. Damage to the web of a beam which, when cleaned out, does not exceed 1 in. dia., may be neglected provided that it is not closer than 1 in. to any rivet hole or fitting. Negligible damage to the top and bottom flanges of a beam is restricted to superficial scratches which, when smoothed out, are not deeper than 0.03 in., and to smooth isolated dents which are not deeper than 1/16 in. and can be encompassed by a $\frac{3}{4}$ in. dia. circle.

**Damage Repairable by Patching**

30. Damage to the flange of a beam greater than that defined in para. 29 should be repaired by patching as shown in fig. 16. The damage must not exceed the limits given on this illustration.

**Table 4**
**Material for repair of main floor**

| Indent No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 20 SWG | DTD. 390 | |
| | | Sheet, aluminium alloy | 18 SWG | DTD. 390 | |
| | | Sheet, aluminium alloy | 16 SWG | DTD. 390 | |
| | 3/D.1872 | Standard angle | | | |
| H128F/30267 | (E)D2528/2S4/4 | Rivet, snap-head | $\frac{1}{8}$ in. dia. x $\frac{1}{4}$ in. | DTD. 327 | |
| H128F/30268 | (E)D2528/2S4/5 | Rivet, snap-head | $\frac{1}{8}$ in. dia. x 5/16 in. | DTD. 327 | |
| | (E)D2528/2S5/4 | Rivet, snap-head | 5/32 in. dia. x $\frac{1}{4}$ in. | DTD. 327 | |
| H128F/30280 | (E)D2528/2S5/5 | Rivet, snap-head | 5/32 in. dia. x 5/16in. | DTD. 327 | |
| H128F/30289 | (E)D2528/2S5/7 | Rivet, snap-head | 5/32 in. dia. x 7/16 in. | DTD. 327 | |
| H128F/61176 | 5/SS.3123 | Rivet, pop dome head | 1/8 in. dia. x .22 in. | DTD. 10B | |
| H128F/61188 | 19/SS.3123 | Rivet, pop dome head | 5/32 in. dia. x .3 in. | DTD. 10B | |

**FAIRING UNDER REAR TURRET**

**General**

31. The fairing skin under the rear turret is reinforced with top-hat section stiffeners and encloses a tubular structure supporting the rear turret.

**SKIN**

**Negligible Damage**

32. Smooth, isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they can be encompassed by a 1 in. dia. circle, and that adjacent attachments are undisturbed.

**Damage Repairable by Patching**

33. If the fairing is cracked or perforated, it should be repaired by patching in a manner similar to that employed for the fuselage skin (see paras 3 and 4).

## STIFFENERS

### Negligible Damage

34. The definition of negligible damage is the same as that given in para. 32.

## TURRET SUPPORTING STRUTS

### Negligible Damage

35. Smooth isolated dents not deeper than 1/32 in., free from cracks, abrasions and sharp corners may be neglected.

### Damage Necessitating Replacement

36. Damage greater than that defined in para. 35 necessitates replacement.

## BOMB DOORS

### General

37. A 4,000 lb. bomb door is fitted to the aeroplane. The door construction comprises a central spar, hinge, and edge channels connected by plate ribs of light alloy, and inner and outer skins of light alloy sheet. The inner skin is secured by pop rivets.

## SPAR BOOM

### Negligible Damage

38. Between ribs Nos. 1 and 13 and ribs Nos. 25 and 37, damage to the free edges of the spar boom may be neglected provided that, when smoothed out, it is not longer than 1½ in. and not deeper than ⅛ in. Between ribs Nos. 13 and 25 any damage must be repaired.

## SPAR WEB

### Negligible Damage

39. Smooth, isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they have not caused loosening of adjacent attachments. Between ribs Nos. 10 and 26, damage which, when trimmed to a regular shape does not exceed ½ in. dia. and is not within 1 in. of any lightening holes or fittings, may also be neglected. Beyond the area bounded by ribs Nos. 10 and 26, damage other than smooth isolated dents should be repaired by the methods referred to in para. 40.

### Damage Repairable by Patching

40. Reasonably straight cracks which are not longer than 1½ in. should be repaired by patching, as shown in fig. 2. Damage to the web, at or between lightening holes, should be repaired as shown in fig. 17. Before fitting a patch any distortion in the web should be suitably dressed out.

## HINGE AND EDGE CHANNELS

### Negligible Damage

41. Damage to the edge of a channel which, when trimmed to a regular shape, is not deeper than 3/16 in. and not longer than ¾ in. may be neglected. Smooth, isolated dents, free from cracks, abrasions and sharp corners, may also be neglected provided that they have not caused loosening of adjacent attachments.

## RIBS

### Negligible Damage

42. Damage which, when trimmed to a regular shape, does not exceed 1 in. dia. and is not within 1 in. of any edge, hole or fitting, may be neglected.

### Damage Repairable by Patching

43. Damage greater than that defined in para. 42 should be repaired by patching as shown in fig. 18.

**TABLE 5**
**Material for Repair of Bomb Door**

| Ident No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 24 SWG | DTD. 390 | |
| | — | Sheet, aluminium alloy | 20 SWG | DTD. 390 | |
| H128F/31627 | (E)D2528/2S4/3 | Rivet, snap-head | 1/8 in. x 3/16 in. | DTD. 327 | |
| H128F/30267 | (E)D2528/2S4/4 | Rivet, snap-head | 1/8 in. dia. x 1/4 in. | DTD. 327 | |
| | | Rivet, pop dome head | 1/8 in. dia. x .19 in. | DTD. 10B | |

## BOMB AIMER'S GLASS PANELLING AND SUPPORTING STRUCTURE

### General

44. The glass panelling is built on to a welded tubular steel structure, which in turn is supported at the base by the angle section glasshouse support rail and at the top by the front turret support rail which is of channel

section. The edges of the glass panels are encased in moulded rubber section and gripped in position by capping strips and corner pieces.

## CAPPING STRIPS AND CORNER PIECES

### Negligible Damage

45. Smooth, isolated dents, not deeper than 1/16 in., free from cracks, abrasions and sharp corners, may be neglected provided that they have not caused distortion of adjacent attachments.

### Damage Necessitating Replacement

46. Damage greater than that defined in paragraph 45 necessitates replacement.

## WELDED TUBULAR STEEL STRUCTURE

### Negligible Damage

47. Damage to the tubes is confined to smooth, isolated dents not greater than 1/16 in. deep, free from cracks, abrasions and sharp corners, which may be neglected, provided that the surrounding structure is not distorted in any way.

### Damage Repairable by Patching

48. Damage to the tubes which has not distorted the surrounding structure in any way whatsoever, should be repaired as shown in fig. 19, provided that the damage does not exceed the limit specified in that illustration.

### Damage Necessitating Replacement

49. Damage to the tubular structure which is greater than that defined in para. 48 or has distorted the structure in any way necessitates replacement of the whole structure.

## GLASSHOUSE SUPPORT RAIL

### Negligible Damage

50. Betwen formers E and G, the damage is confined to smooth, isolated dents not deeper than 1/16 in., free from cracks, abrasions and sharp corners, and may be neglected.

51. Damage to the free edges of the rail which does not penetrate more than 3/8 in. into the section may be neglected after it has been cleaned out to a regular shape, provided that the maximum amount of material removed to a depth of $\frac{3}{8}$ in. does not exceed 3 in. in length, and also does not occur between formers E and G.

### Damage Repairable by Patching

52. Damage greater than that defined in paras. 50 and 51 should be repaired as shown in fig. 20, provided that the damage is not greater than that specified on this illustration and does not occur between formers E and G.

## FRONT TURRET SUPPORT RAIL

### Negligible Damage

53. Damage to this rail is confined to smooth, isolated dents, not greater than 1/16 in. deep, free from cracks, abrasions and sharp corners.

**TABLE 6**

**Material for Repair of Bomb Aimer's Glass Panelling and Supporting Structure**

| Ident No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, non-corrosive steel | 22 SWG | DTD. 171 | |
| | — | Steel, angle | 16 SWG | DTD. 124A | |
| | — | Sheet, aluminium alloy | 10 SWG | DTD. 390 | |
| H128F/6062 | (E)D2528/2CW6/6 | Rivet 100° countersunk head | 3/16 in. dia. x 3/8 in. | DTD. 327 | |
| H128F/30313 | (E)D2528/2B4/6 | Rivet, mushroom head | 1/8 in. dia. x 3/8 in. | DTD. 327 | |

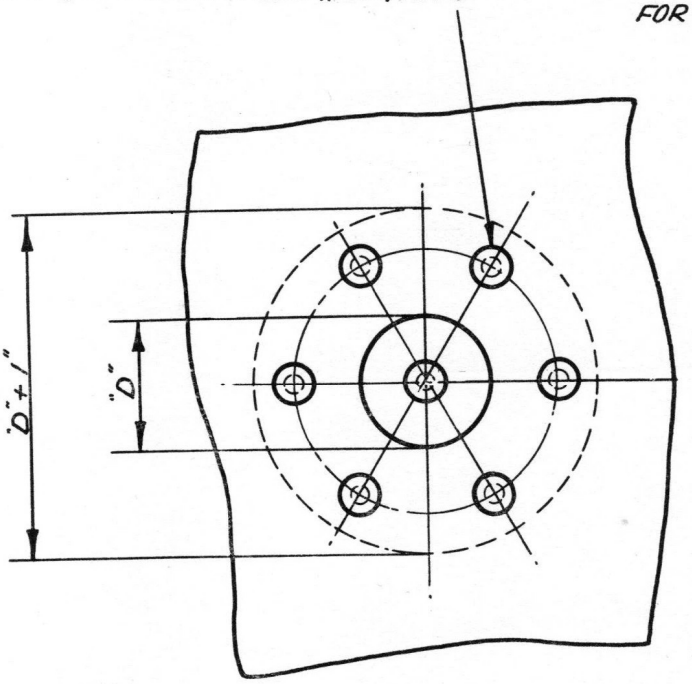
6 HOLES DRILL MORSE Nº 11 (.191") FOR 3/16 DIA. RIVETS EQUALLY SPACED ON A "D" + 1/2" P.C.D. FOR 14 G ONLY.

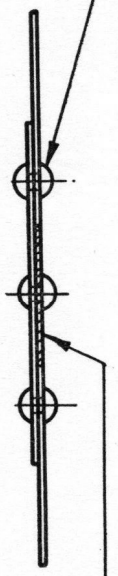
6 HOLES DRILL MORSE Nº 30 (.1285") FOR 1/8 DIA. RIVETS EQUALLY SPACED ON A "D" + 1/2" P.C.D. FOR 16 G. 18 G, 22 G & 24 G

FOR 14 G. SKIN (E)D 2528 256/6

FOR 22 G. & 24 G SKIN (E)D 2528 253/3

FOR 16 G. & 18 G. SKIN (E)D 2528 254/4



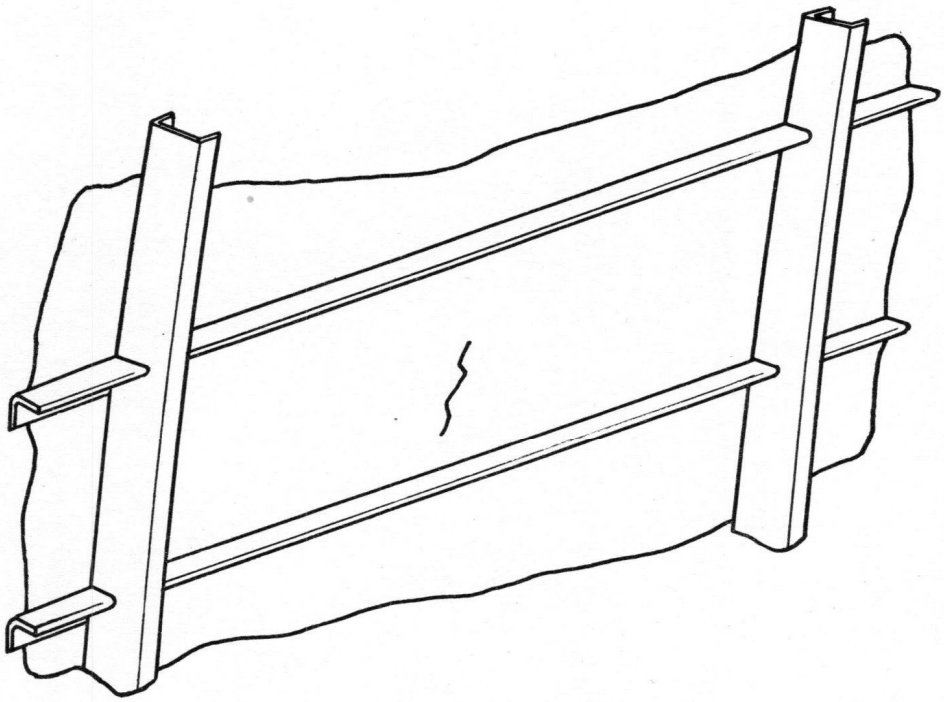



CENTRE DISC RIVETED TO THE BACK PLATE WITH ONE RIVET

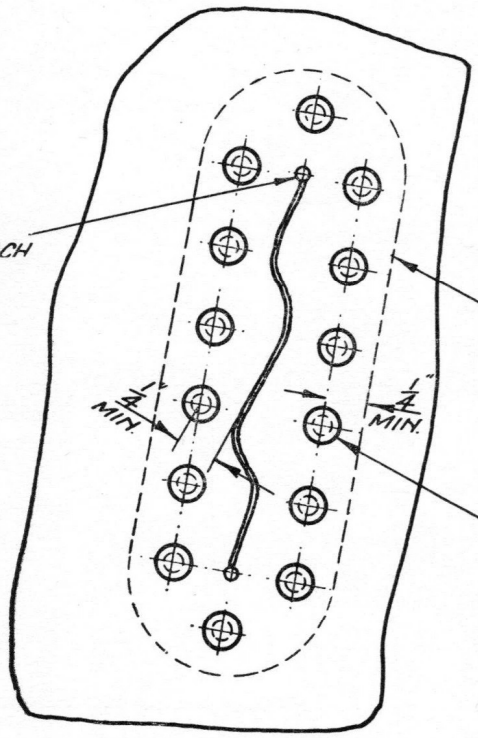
NOTE :- "D" MUST NOT EXCEED 2" DIA.

MATERIAL :- ALCLAD. SPEC. :- D.T.D. 275 OR 390. TO BE THE SAME THICKNESS AS EXISTING SKIN. APPLY JOINTING COMPOUND BETWEEN FACES IN CONTACT

| | | |
|---|---|---|
| 1 | PATCH REPAIR TO SMALL HOLE IN FUSELAGE SKIN | 1 |

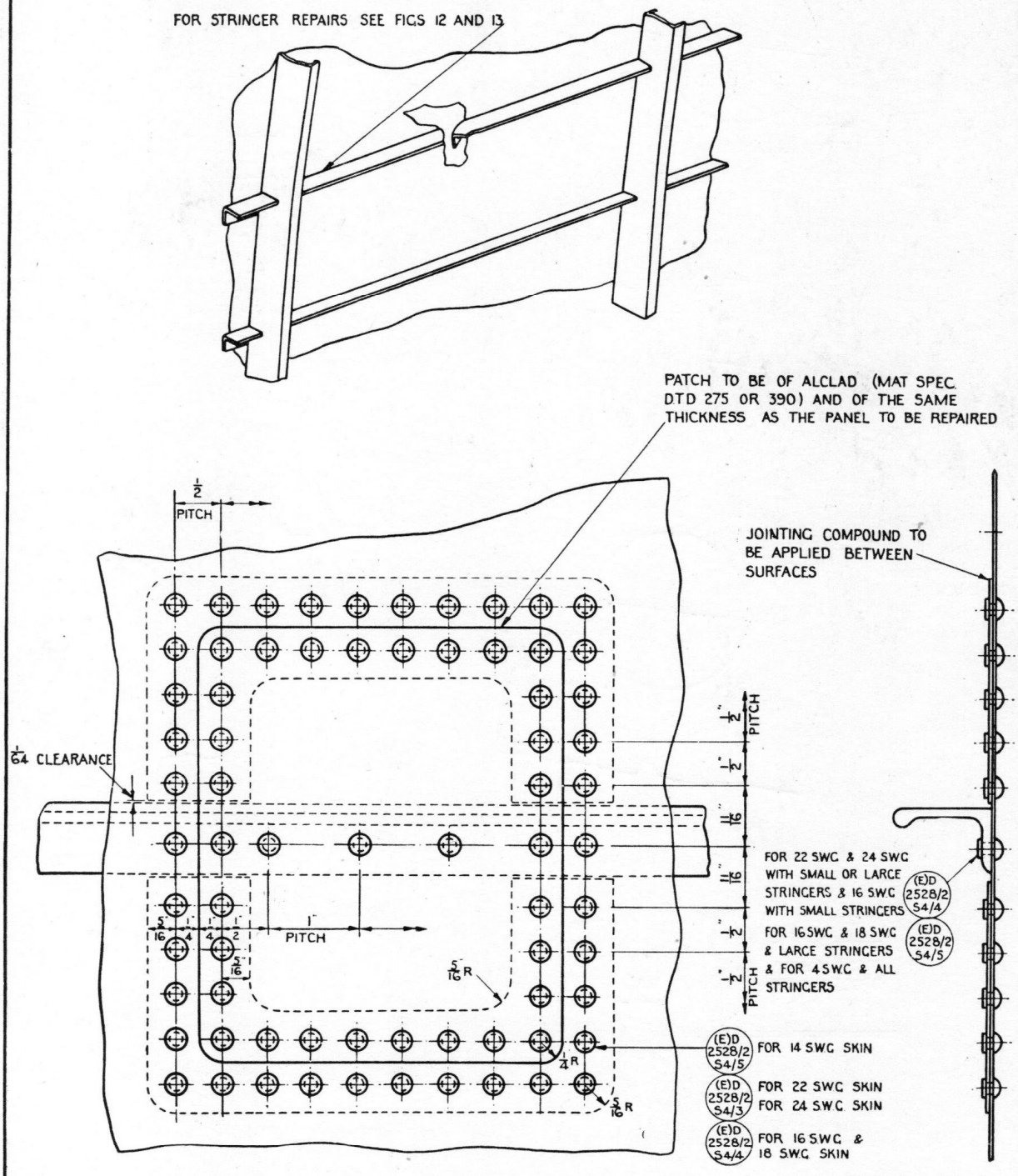


TYPICAL CRACK IN FUSELAGE

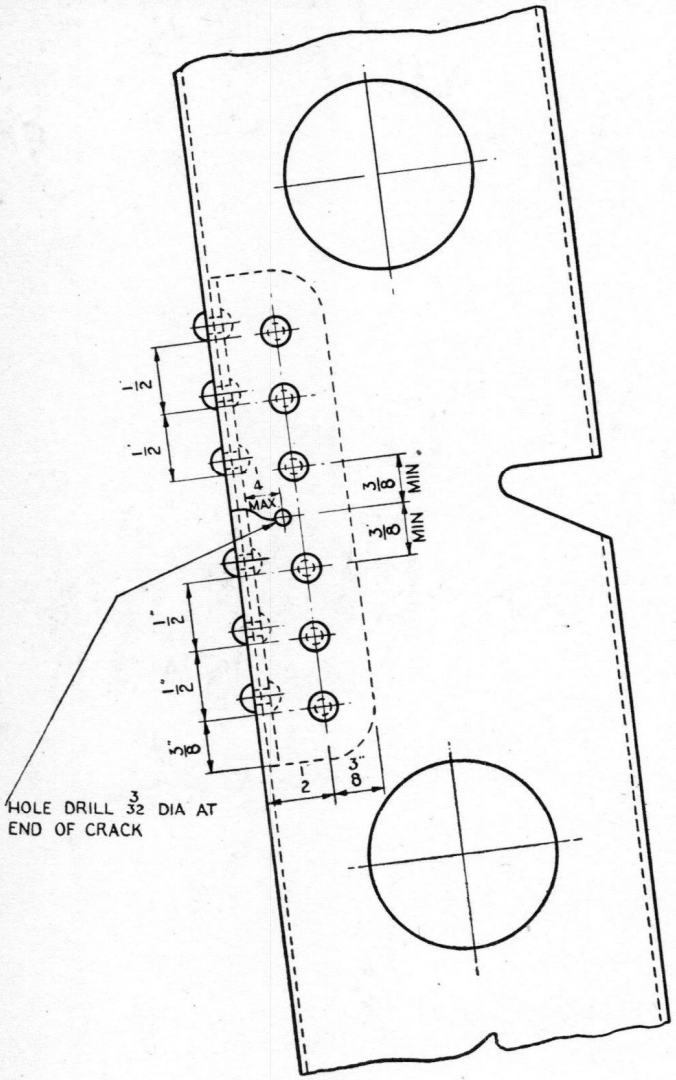


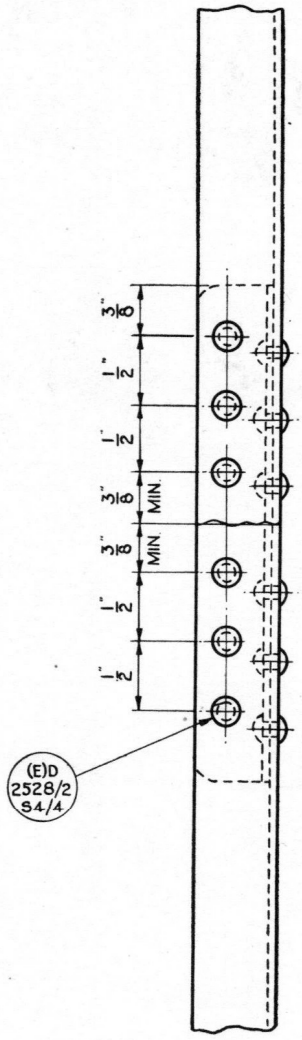

PATCH PLATE IN POSITION ON OUTSIDE OF FUSELAGE

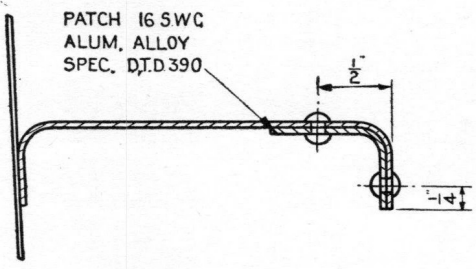
| 2 | REPAIR TO CRACK IN FUSELAGE SKIN | 2 |
|---|---|---|

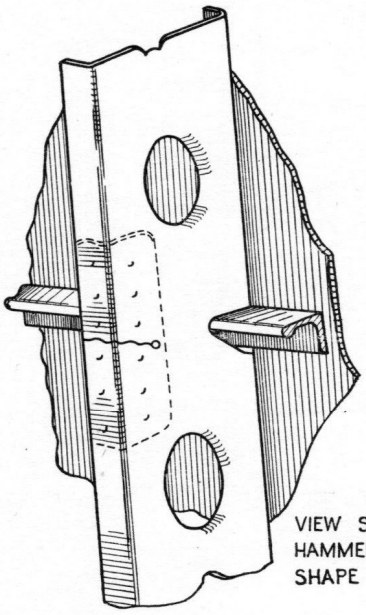



| 3 | PATCH REPAIR TO FUSELAGE SKIN STRINGER POSITION | 3 |
|---|---|---|



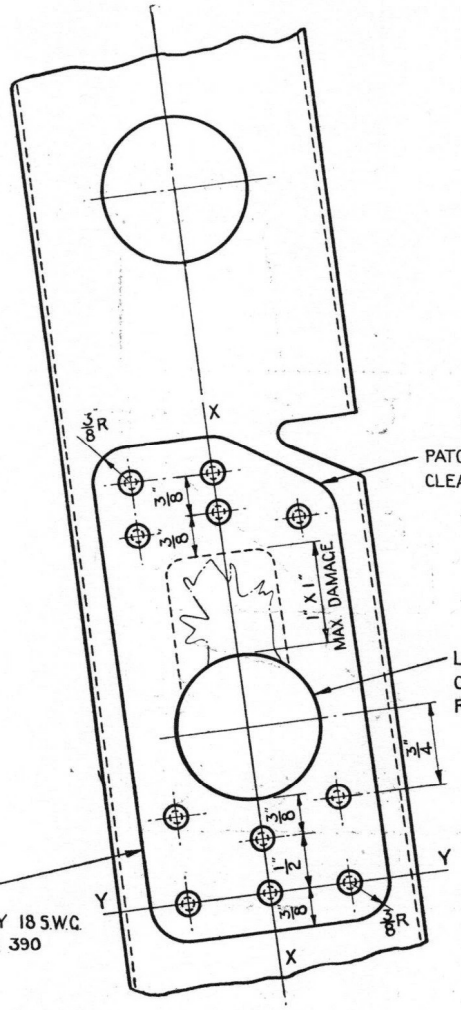
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

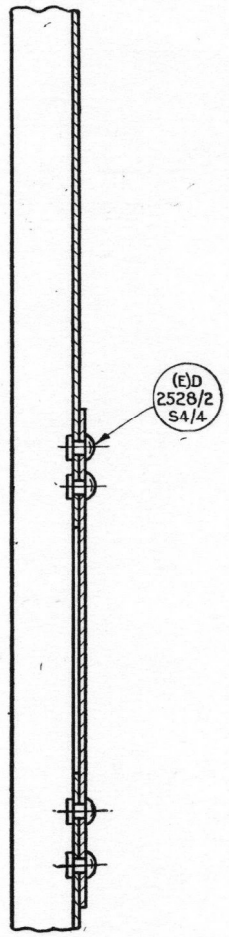
MINIMUM OF 6 RIVETS EACH SIDE OF DAMAGE

VIEW SHOWING FLANGE HAMMERED BACK TO SHAPE AND REPAIRED

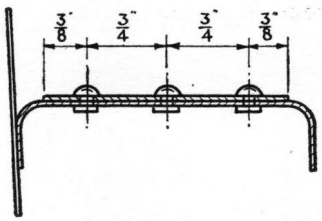
TYPICAL REPAIR TO LIGHT-SECTION FORMERS - 3" x 5/8" AND 2 3/4 x 5/8

| 4 | PATCH REPAIR TO FLANGE OF LIGHT-SECTION FORMERS | 4 |
|---|---|---|



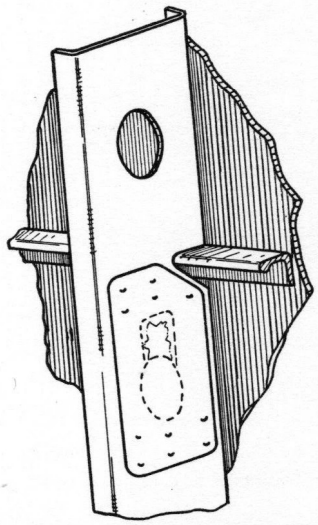




SECTION X-X




SECTION Y-Y

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

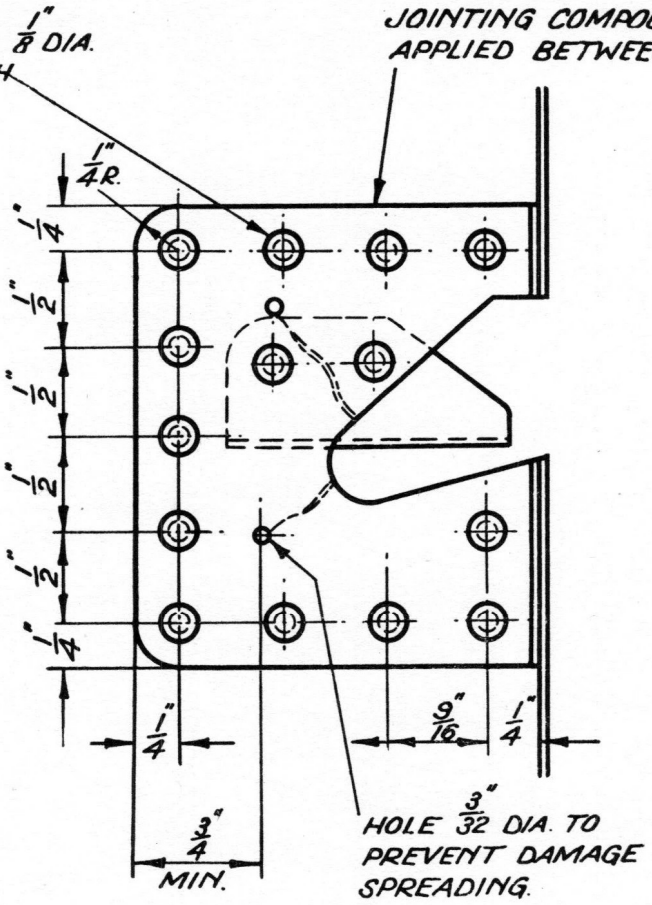


VIEW SHOWING PATCH REPAIR TO FORMER WEB

TYPICAL REPAIR TO LIGHT-SECTION FORMERS - 3" x 5/8" AND 2 3/4" x 5/8"

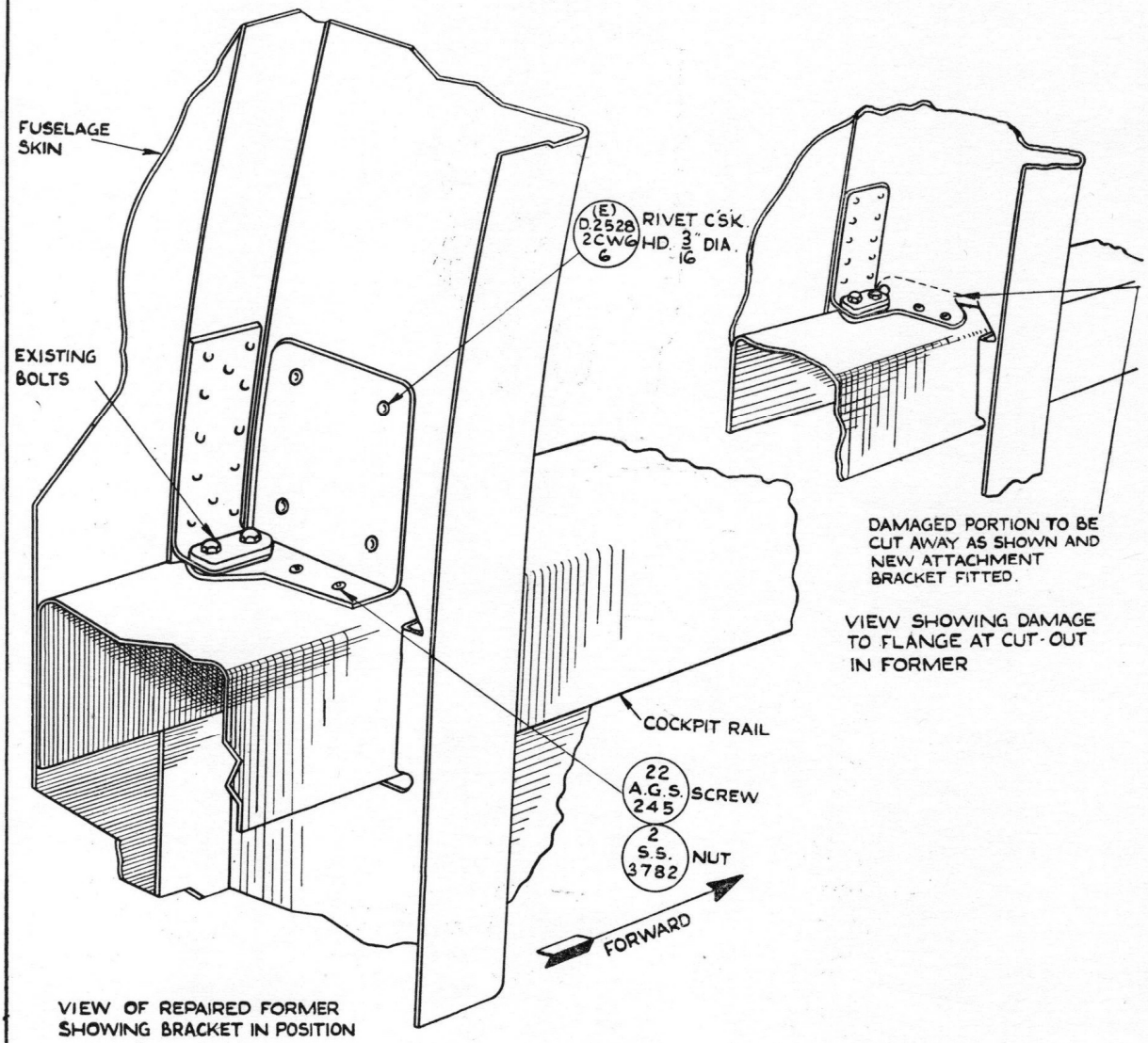
| 5 | PATCH REPAIR TO WEB OF LIGHT-SECTION FORMERS | 5 |
|---|---|---|

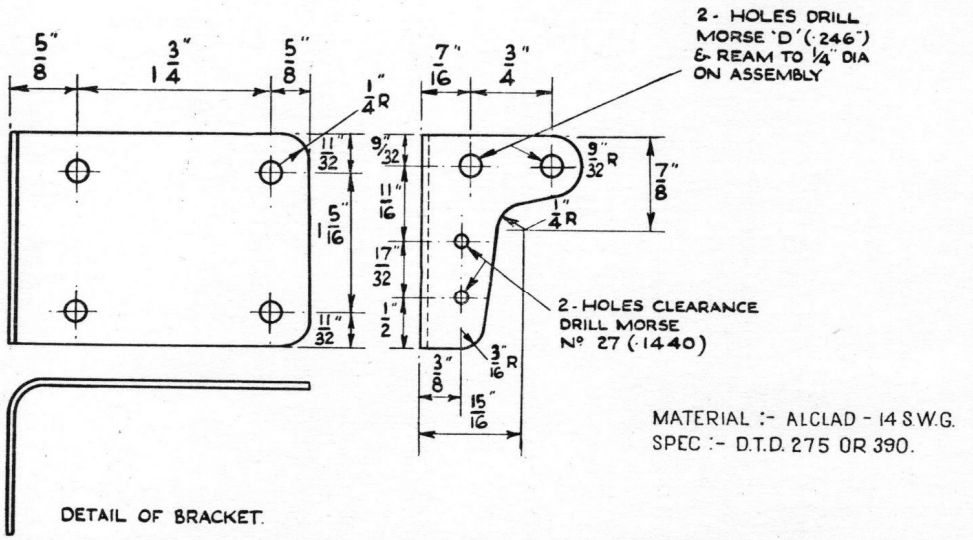
(E)D 2528/254/4




PATCH PLATES TO BE ALUM ALLOY 18 S.W.G. SPEC. D.T.D. 275 OR 390 FOR ALL RIBS

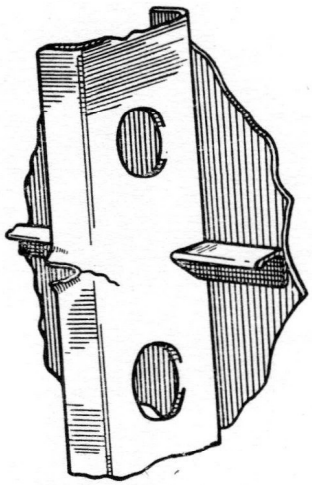
| 6 | REPAIR TO STRINGER CUT-OUT LIGHT SECTION FORMER | 6 |
|---|---|---|

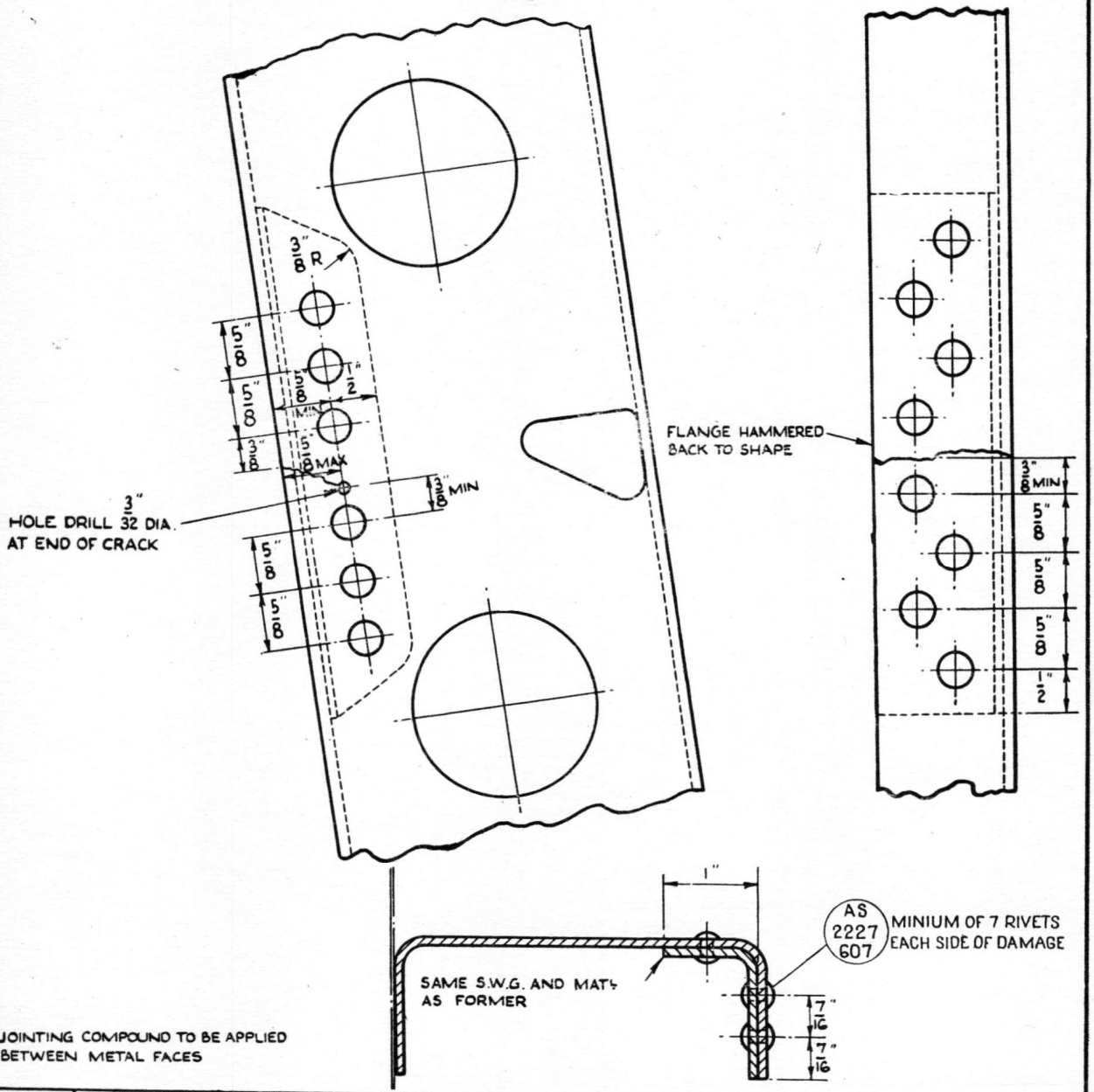



MATERIAL :- ALCLAD - 14 S.W.G.
SPEC :- D.T.D. 275 OR 390.

| 7 | REPAIR TO CRACK IN FLANGE OF FORMER AT CUT-OUT FOR COCKPIT RAIL | 7 |
|---|---|---|



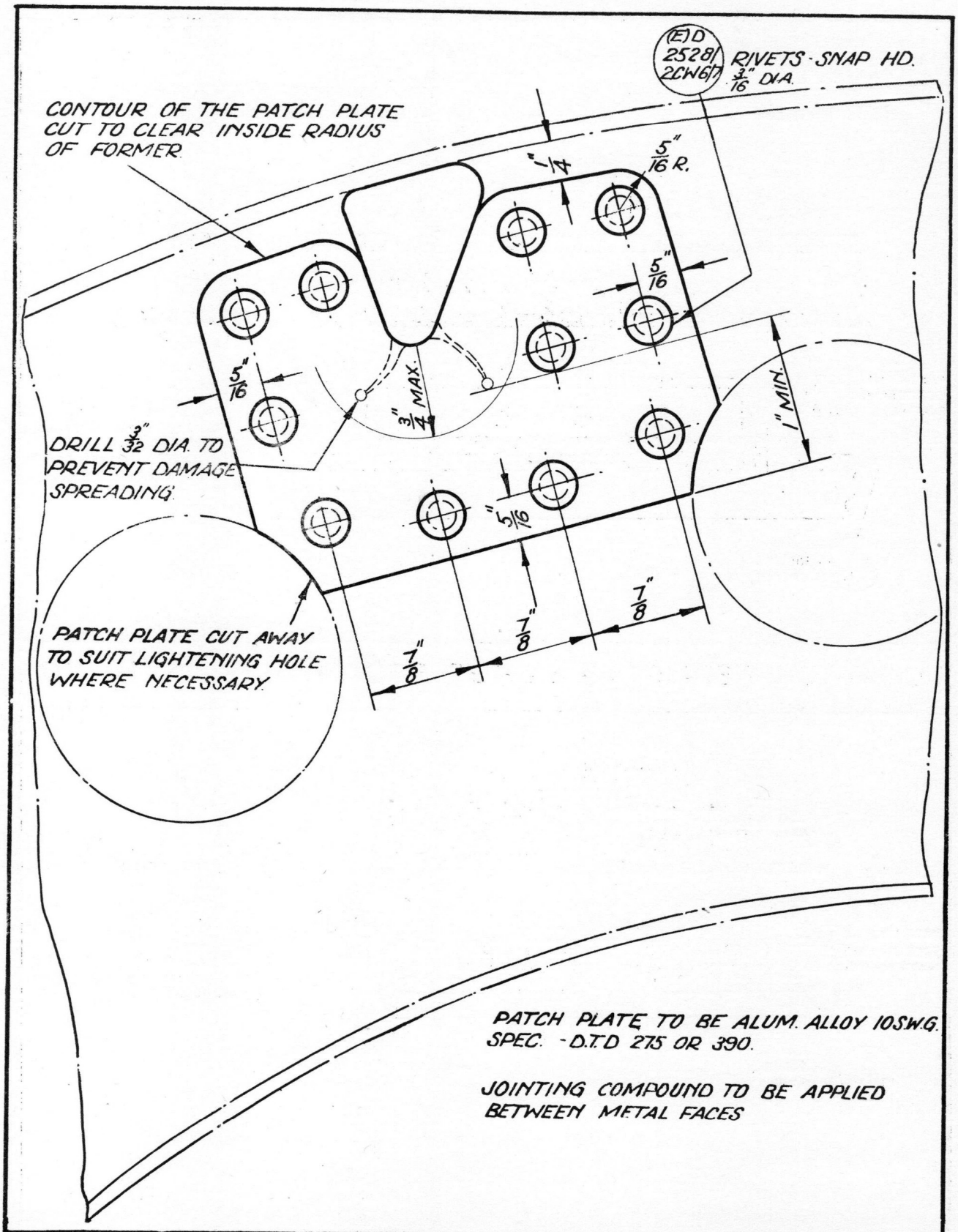




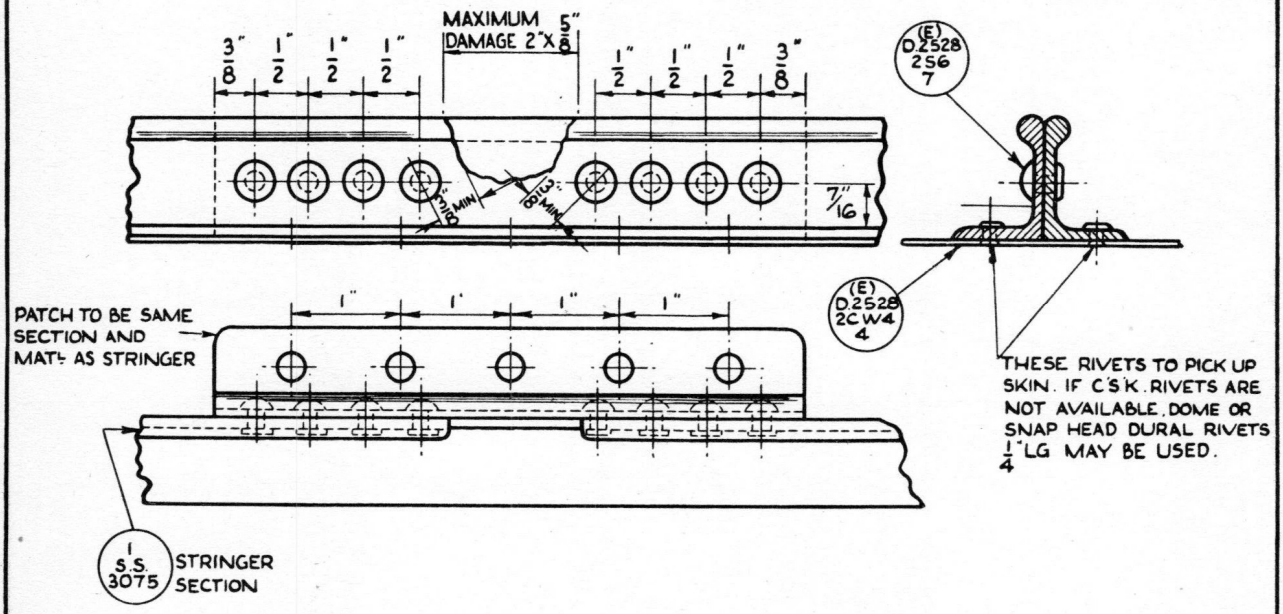


JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

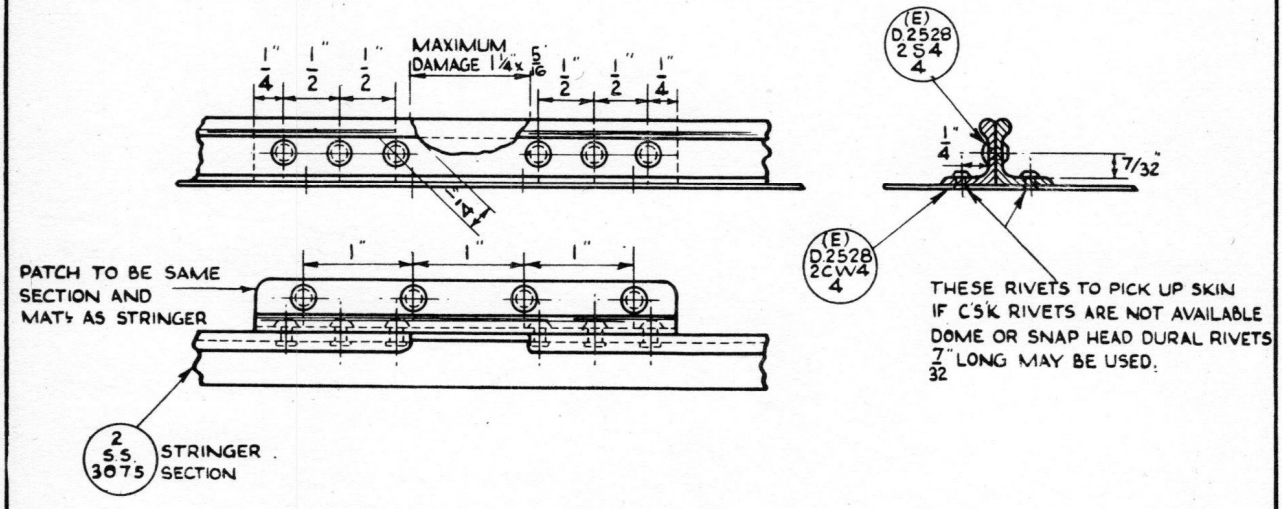
| 8 | PATCH REPAIR TO FLANGE OF HEAVY-SECTION FORMER | 8 |
|---|---|---|



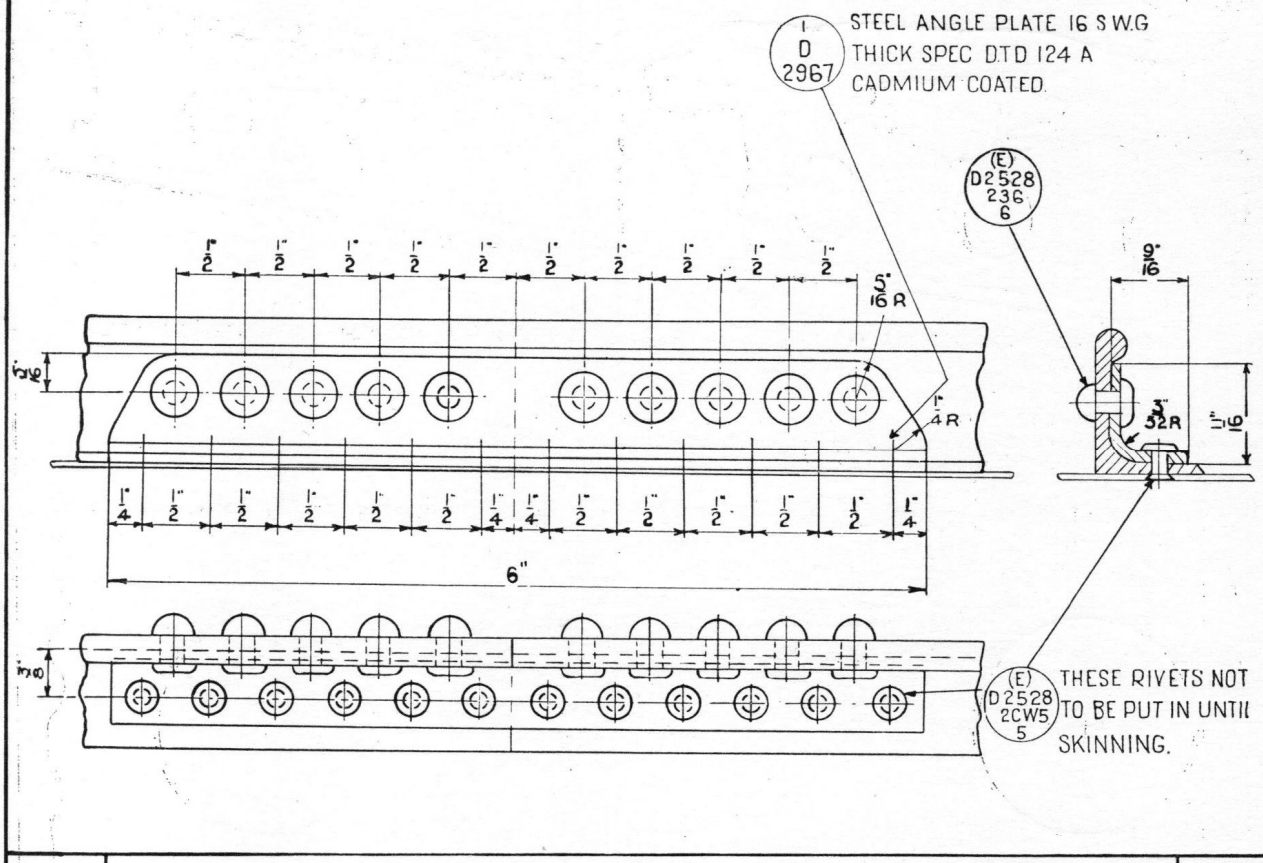

| 9 | REPAIR TO STRINGER CUT-OUT HEAVY FORMER | 9 |
|---|---|---|



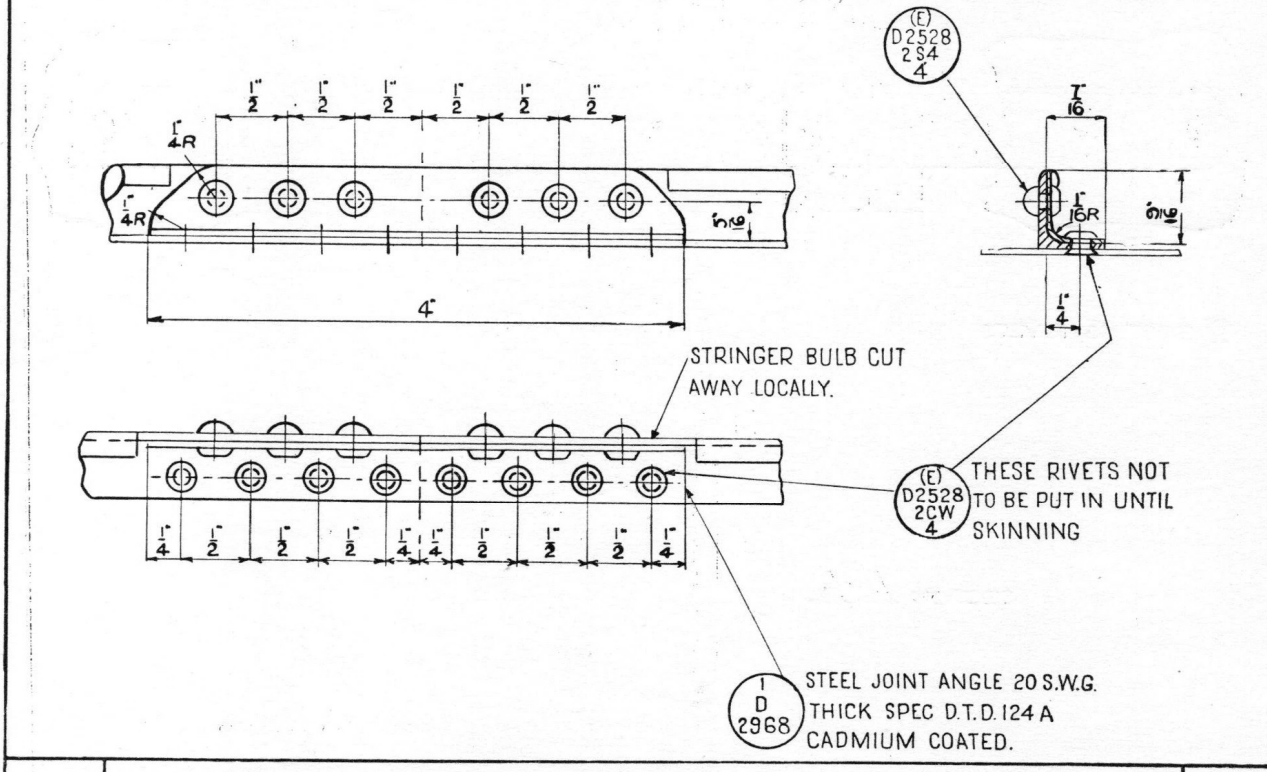

| 10 | PATCH REPAIR TO LARGE SECTION STRINGER | 10 |
|---|---|---|



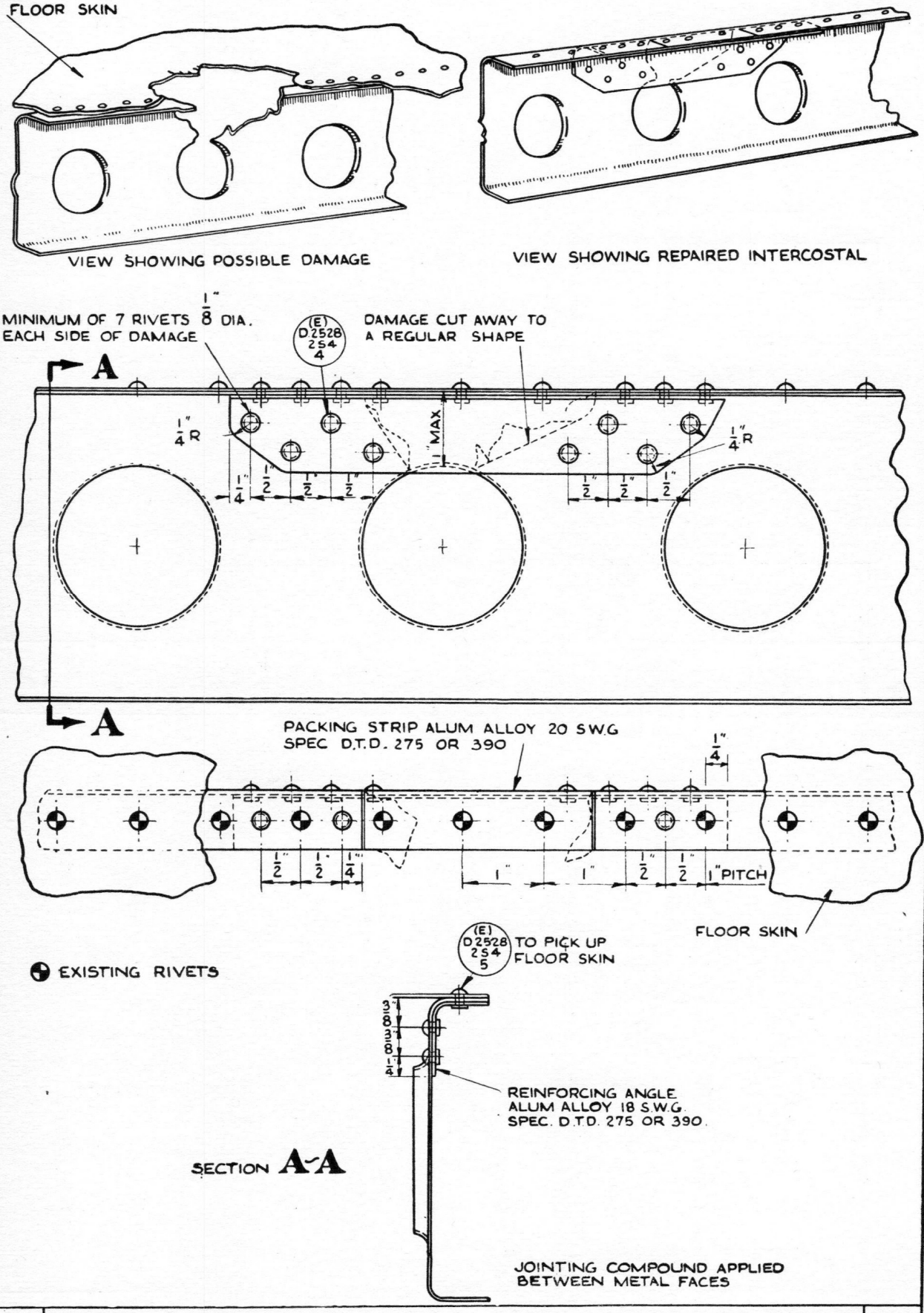

| 11 | PATCH REPAIR TO SMALL SECTION STRINGER | 11 |
|---|---|---|



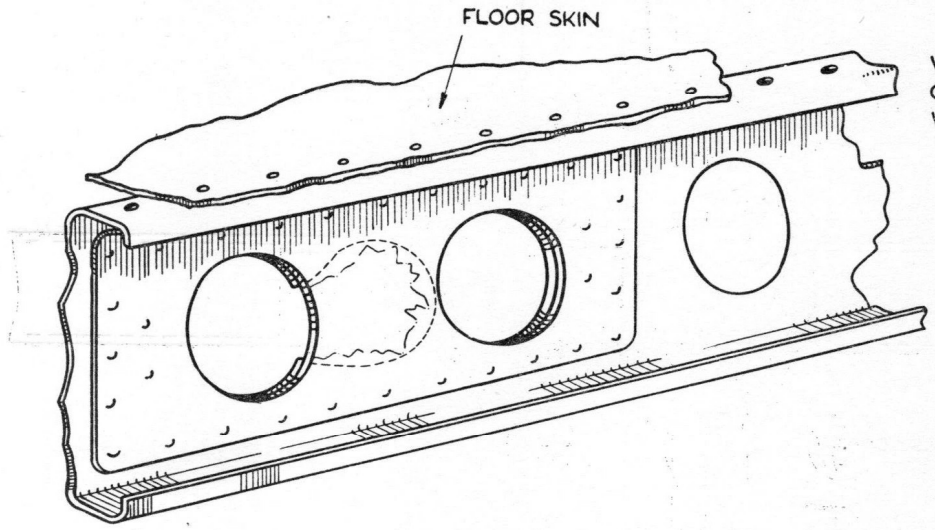

| 12 | JOINTING OF FUSELAGE STRINGER (LARGE) | 12 |
|---|---|---|



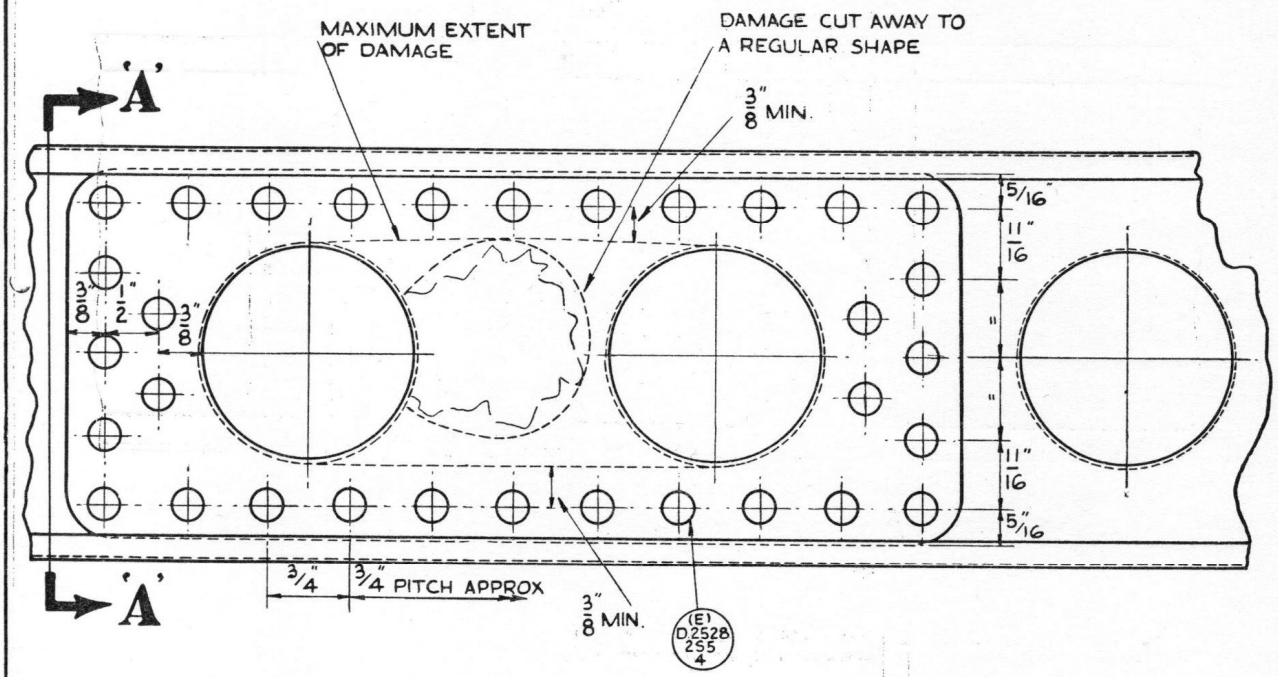

| 13 | JOINTING OF FUSELAGE STRINGER (SMALL) | 13 |
|---|---|---|



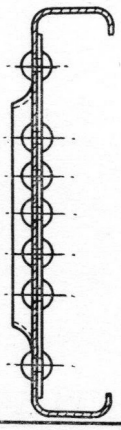

| 14 | PATCH REPAIR TO WEB & FLANGE OF FLOOR INTERCOSTAL | 14 |
|---|---|---|




VIEW SHOWING PORTION OF FLOOR INTERCOSTAL WITH REPAIR.



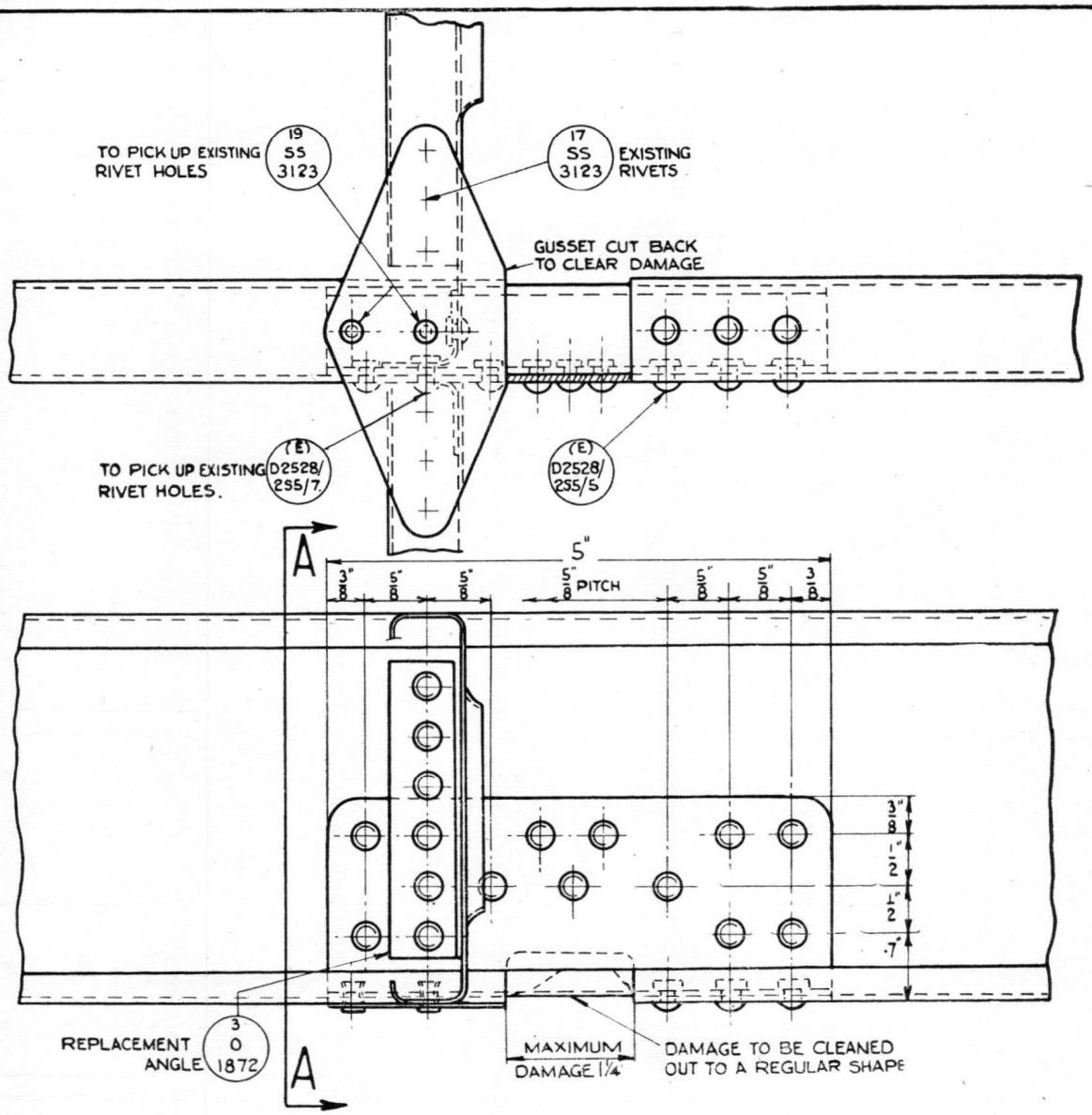

MATERIAL :-
ALUM ALLOY, 22 S.W.G.
SPEC. D.T.D. 275 OR 390

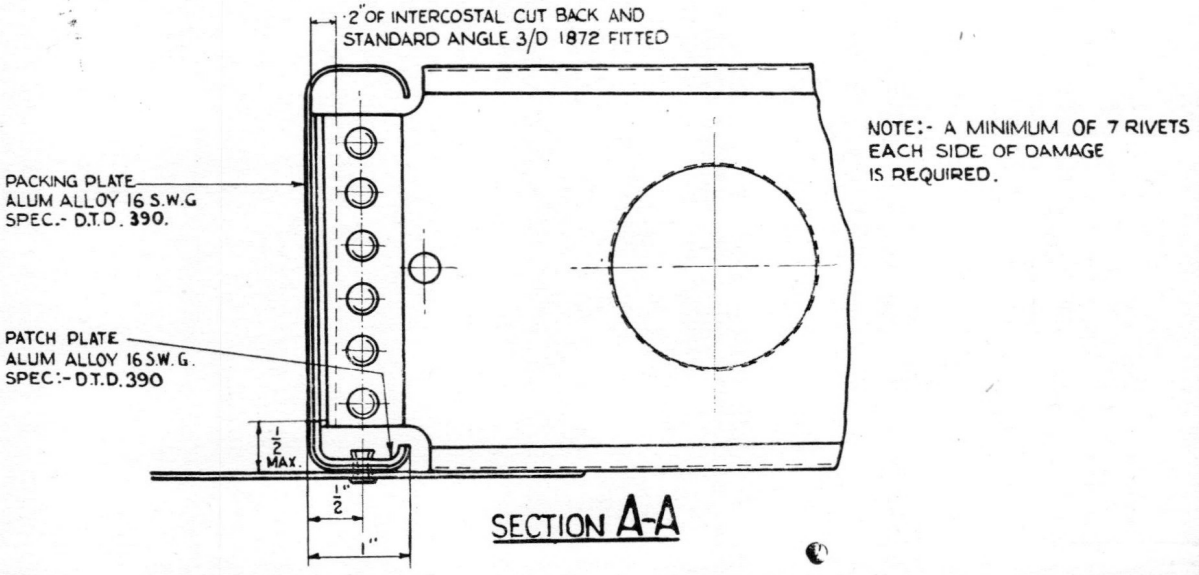


JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

SECTION **'A-A'**

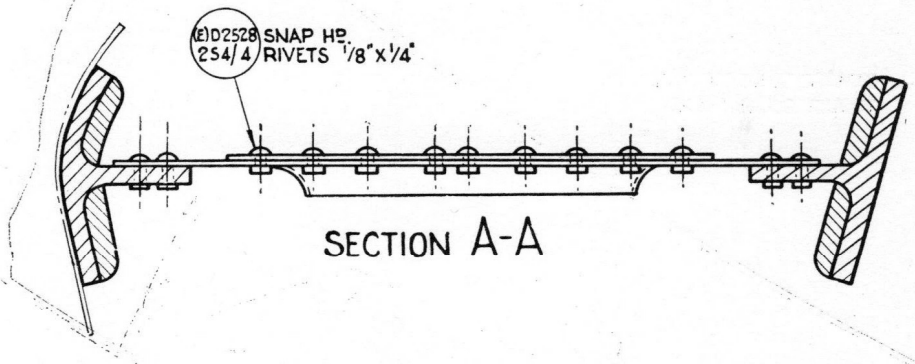
| 15 | FLOOR, INTERCOSTAL-WEB REPAIR | 15 |
|---|---|---|




SECTION A-A

16 PATCH REPAIR TO FLANGE OF LIGHT SECTION FLOOR BEAM 16



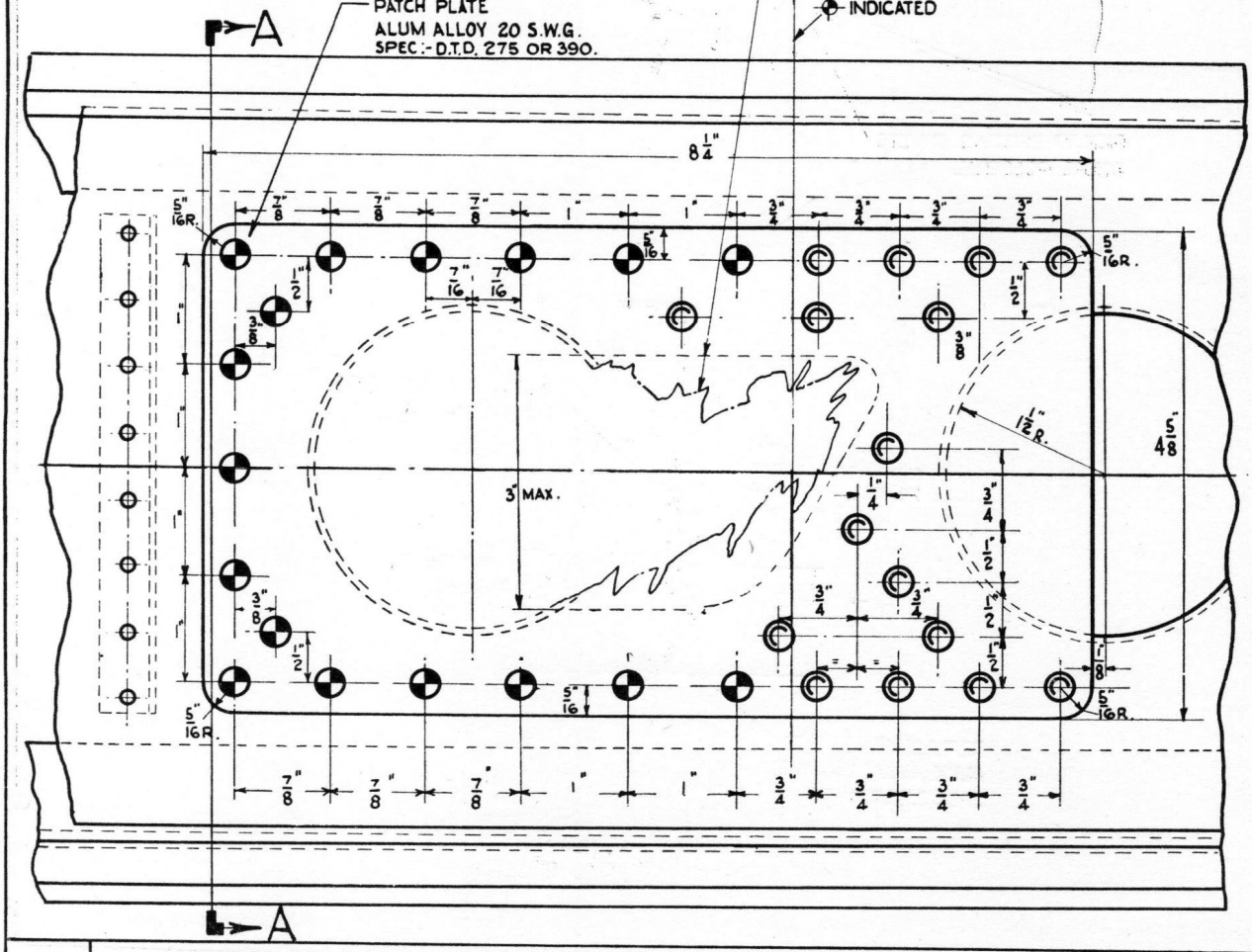

SECTION A-A

PATCHES MUST BED DOWN ON JOINTING COMPOUND.

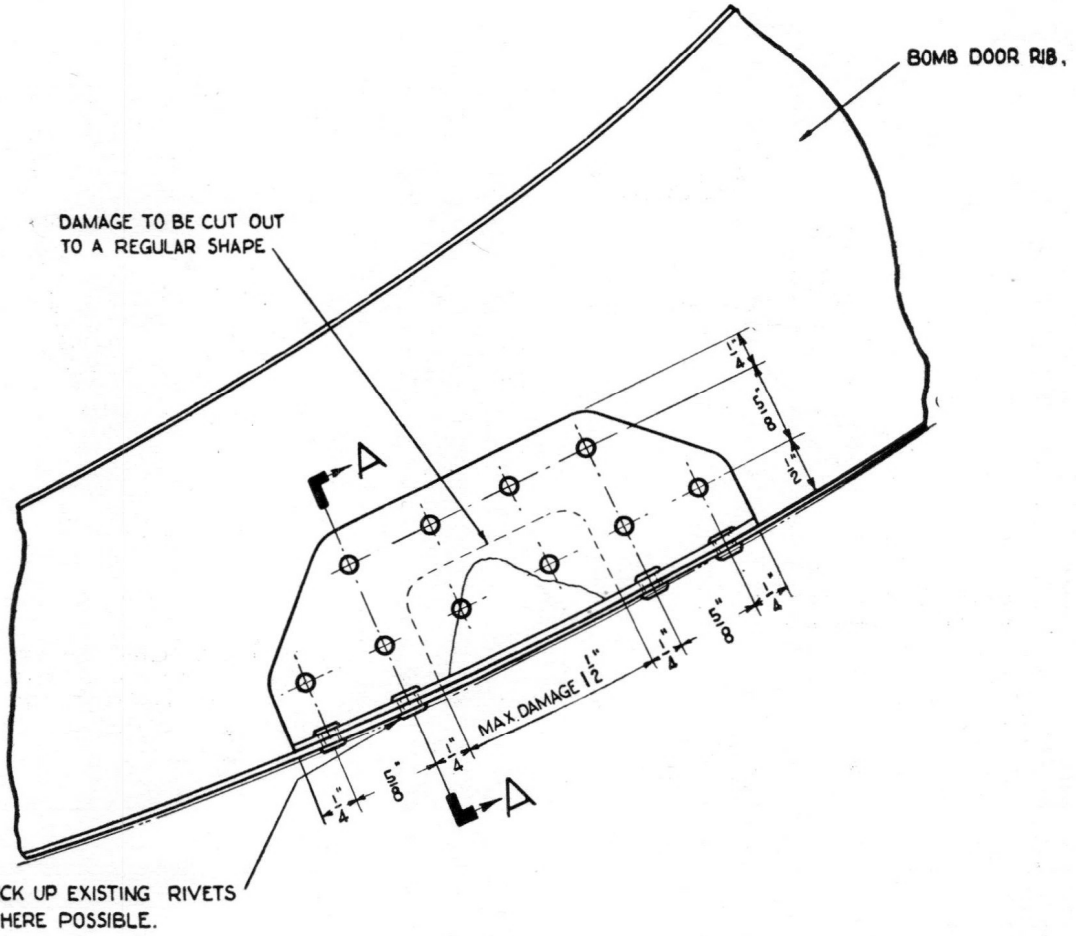
DAMAGE CUT AWAY TO A REGULAR SHAPE.

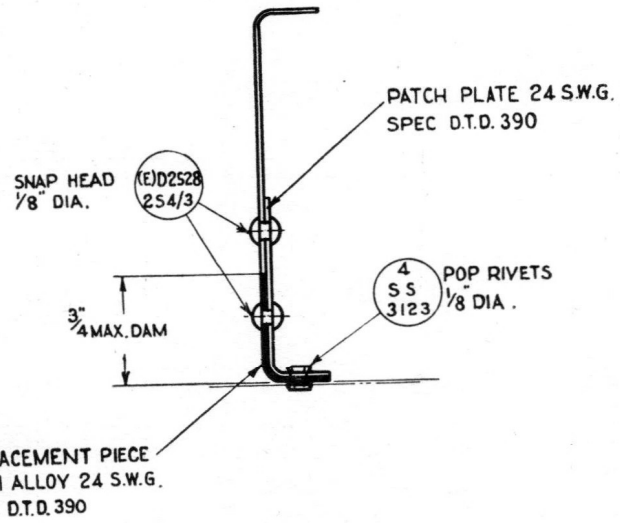
PATCH TO BE SYMMETRICAL ABOUT THIS ℄ IF DAMAGE PENETRATES BOTH LIGHTENING HOLES, AND RIVETING SHOULD BE AS ⊕ INDICATED

PATCH PLATE
ALUM ALLOY 20 S.W.G.
SPEC:- D.T.D. 275 OR 390.



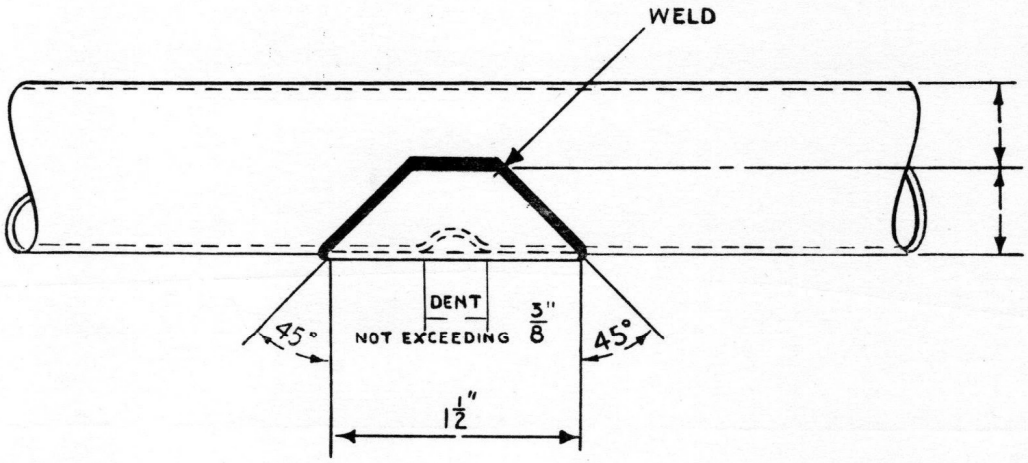

17 REPAIR TO BOMB DOOR SPAR WEB 17




SECTION A-A

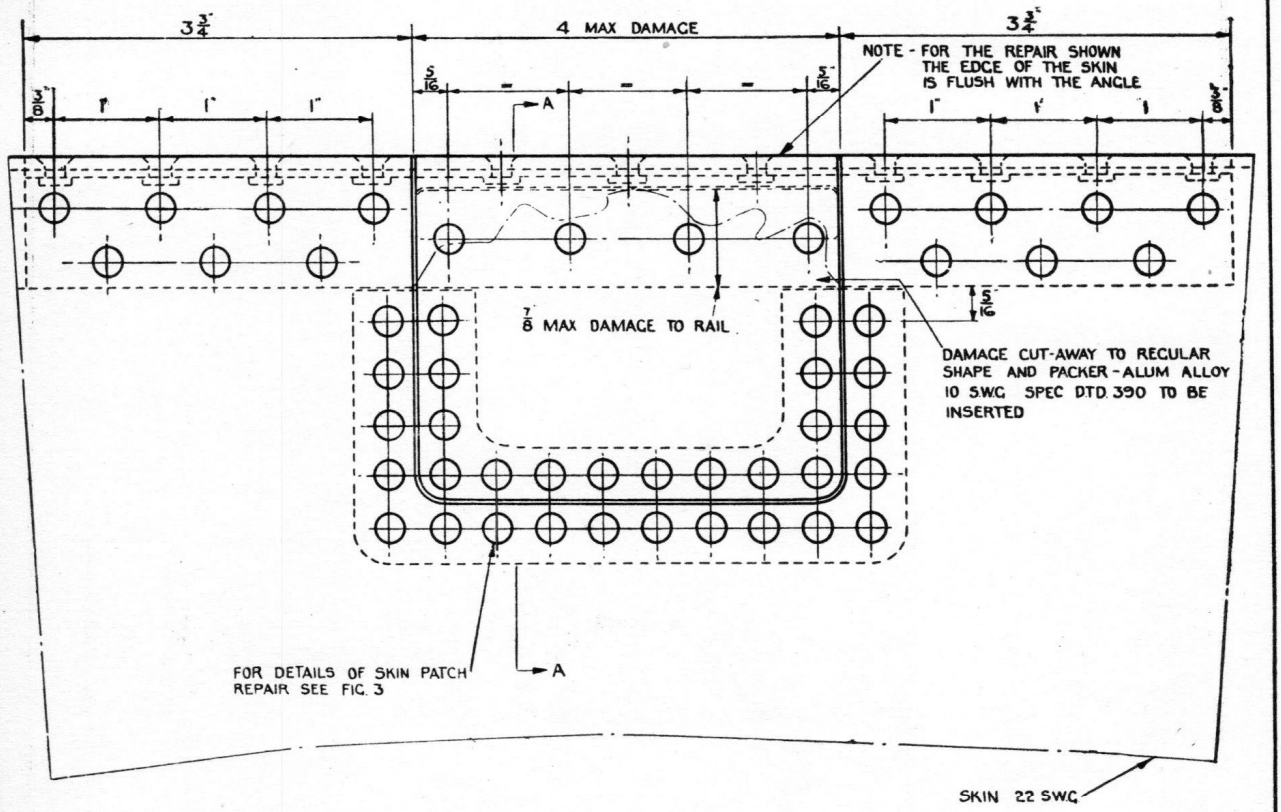
| 18 | PATCH REPAIR TO BOMB DOOR RIBS | 18 |
|---|---|---|

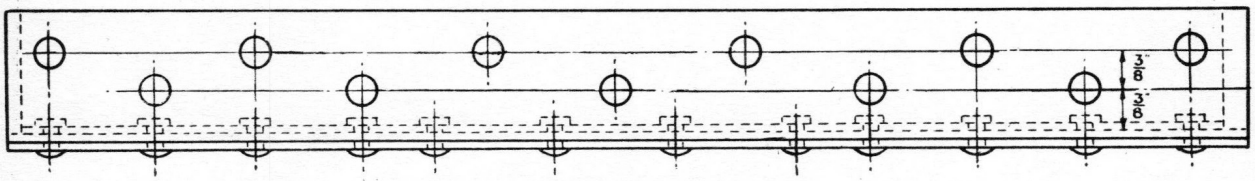



REPAIR MATERIAL :- NON CORROSIVE STEEL 22 S.W.G

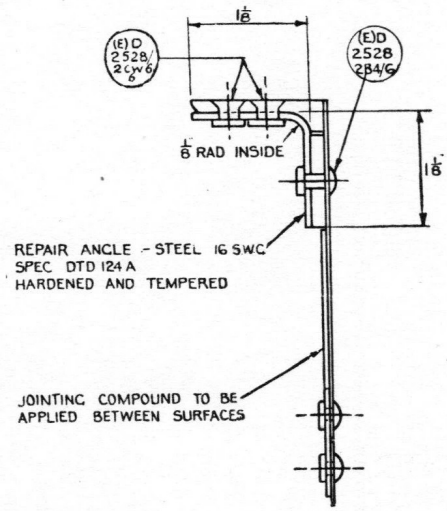
SPEC :- D.T.D. 171.

| 19 | PATCH REPAIR TO DENT IN TUBULAR GLASSHOUSE STRUCTURE. | 19 |
|---|---|---|



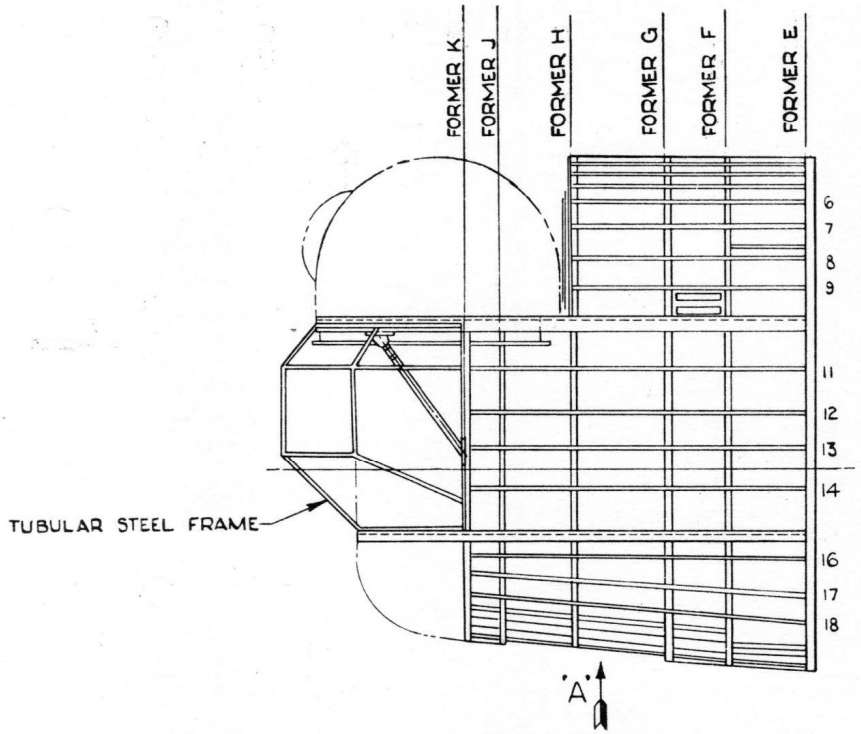



PLAN ON TOP OF ANGLE



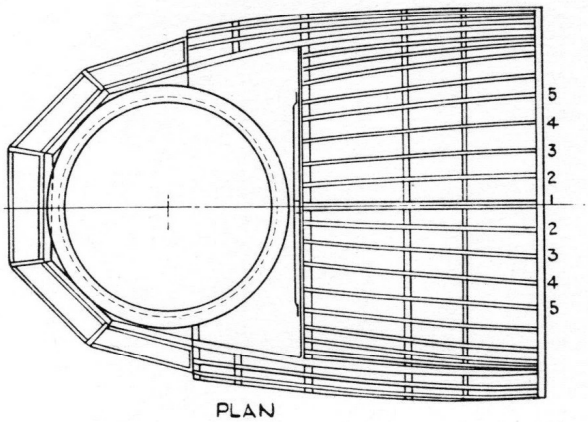

SECTION "A-A"

| 20 | PATCH REPAIR TO COVER GLASS HOUSE SUPPORT RAIL | 20 |
|---|---|---|

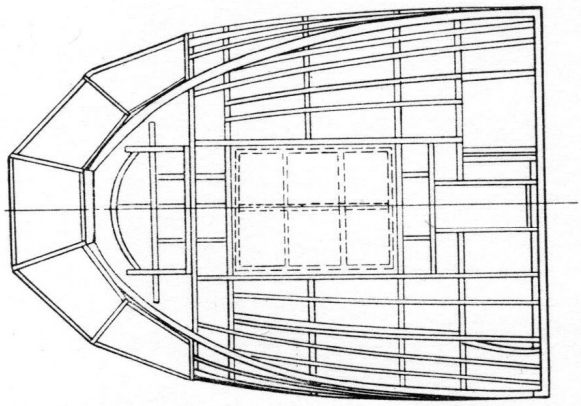



SIDE ELEVATION.

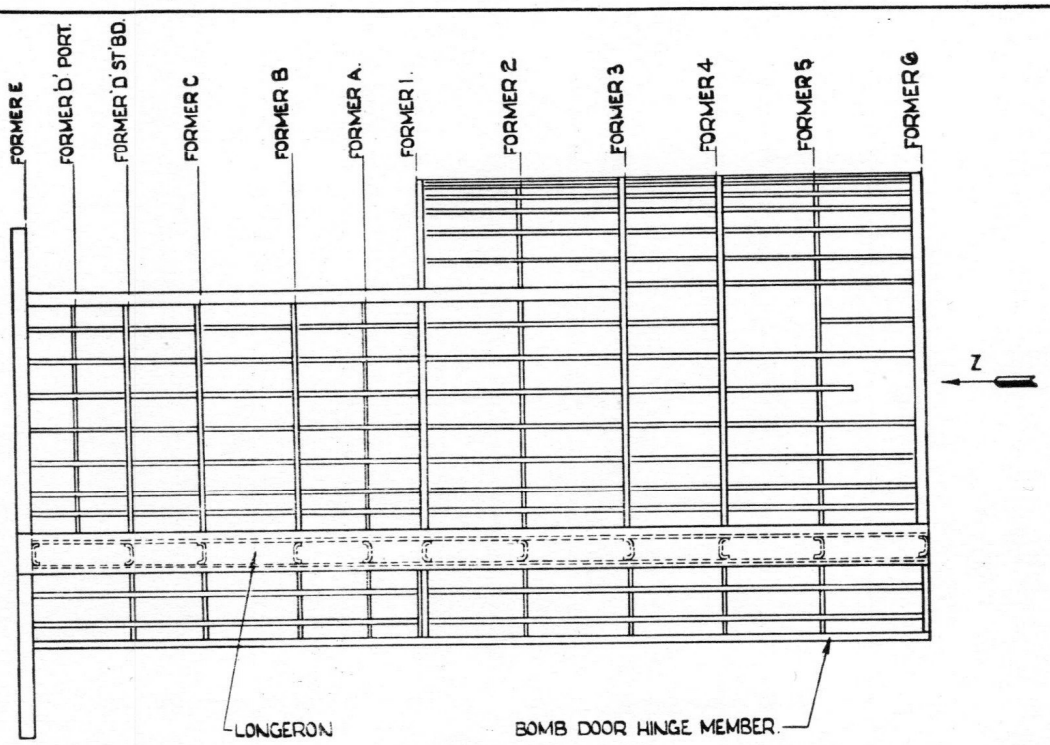
ALL STRINGERS EXCEPT Nº1 MADE FROM EXTRUDED SECTION 2/SS 3075 (L40)
STRINGER Nº1 IS MADE FROM EXTRUDED SECTION 1/SS 3075(L40)

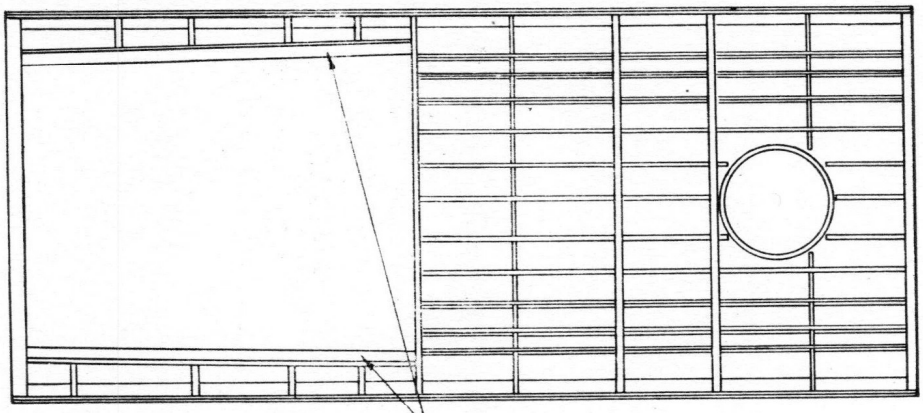


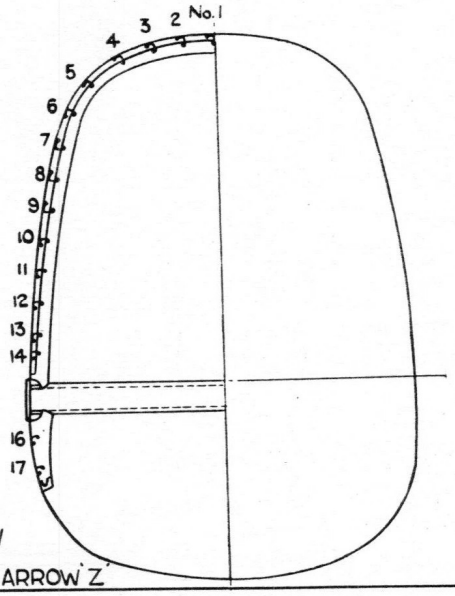

PLAN



UNDERSIDE PLAN IN DIRECTION OF ARROW "A"



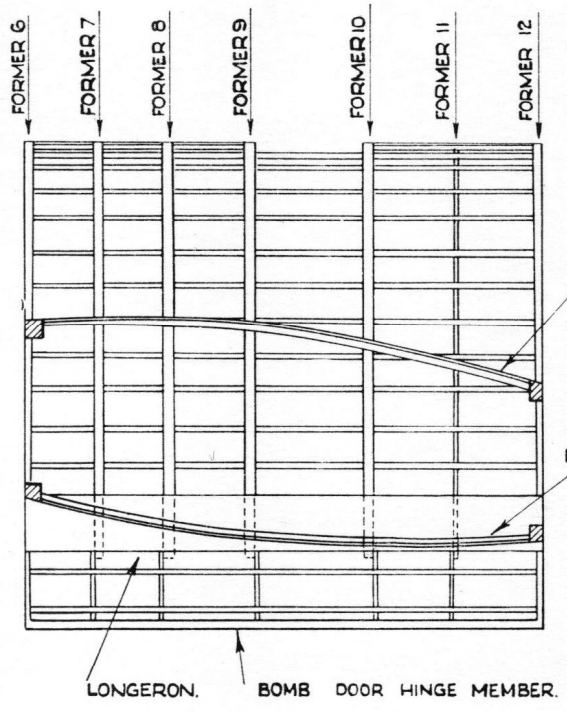



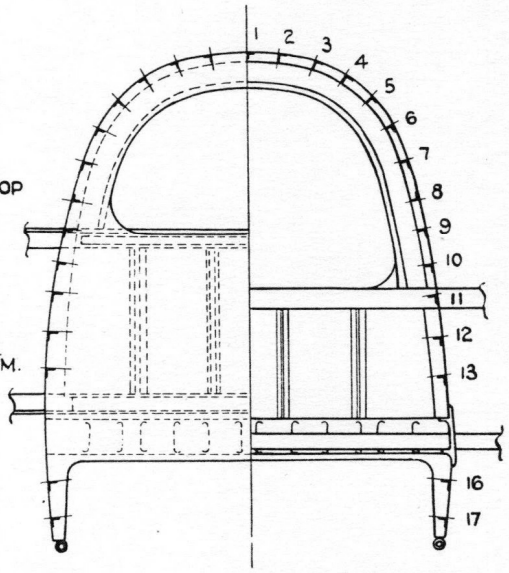




HALF END VIEW
IN DIRECTION OF ARROW 'Z'

## STRINGERS

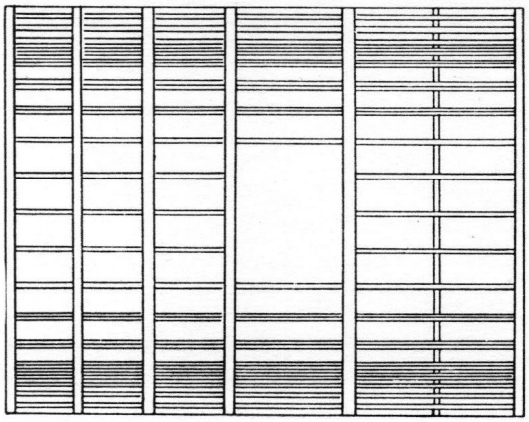
STRINGERS Nos 1 TO 14 ARE MADE FROM EXTRUDED SECTION 1/SS 3075 (SPEC L40)
STRINGERS Nos. 16 & 17 ARE MADE FROM EXTRUDED SECTION 2/SS 3075 (SPEC. L40)




HALF SECTION VIEW LOOKING AFT ON FRONT FACE OF FRONT SPAR

HALF SECTION VIEW LOOKING AFT ON FRONT FACE OF REAR SPAR



NOTE :-

ALL STRINGERS EXCEPT Nos 16 AND 17 ARE MADE FROM EXTRUDED SECTION 1/SS 3075 SPECIFICATION L40

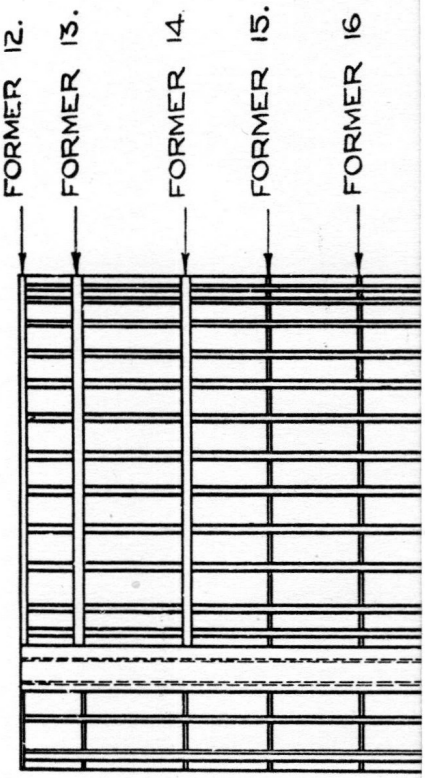
STRINGERS Nº 16 AND 17 ARE MADE FROM EXTRUDED SECTION 2/SS 3075 SPECIFICATION L40

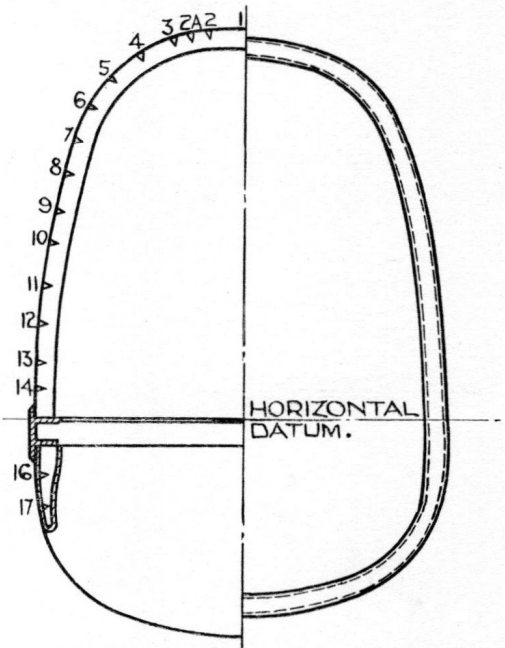
NGERS.

ALL STRINGERS EXCEPT No.1 AND PARTS OF Nos. 16 & 17 ARE MADE FROM EXTRUDED SECTION 1/SS 3075 SPEC. L.40 OR D.T.D. 423.

STRINGER No.1 IS MADE FROM EXTRUDED SECTION 151/S.S.3075 SPEC. L40 OR D.T.D. 423.

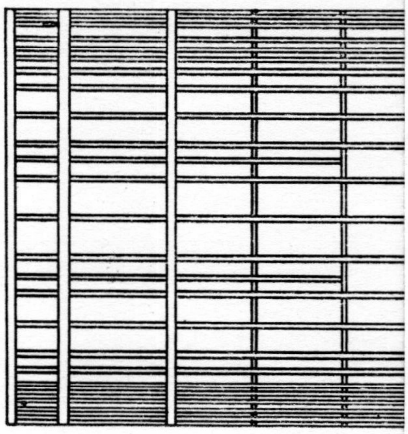
STRINGERS Nos. 16&17 BETWEEN FORMERS 12&22 ARE MADE FROM EXTRUDED SECTION 2/S.S.3075 SPEC. L.40 OR D.T.D.423.

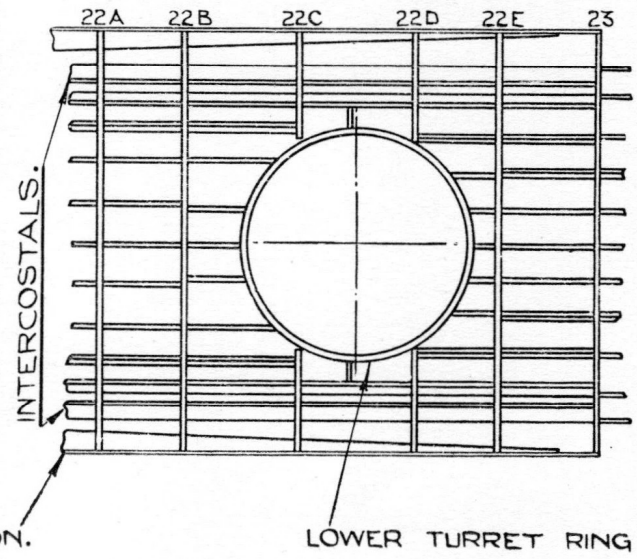



VIEW LOOKING AFT ON FORMER 15.

VIEW LOOKING FORWARD ON FORMER 27.

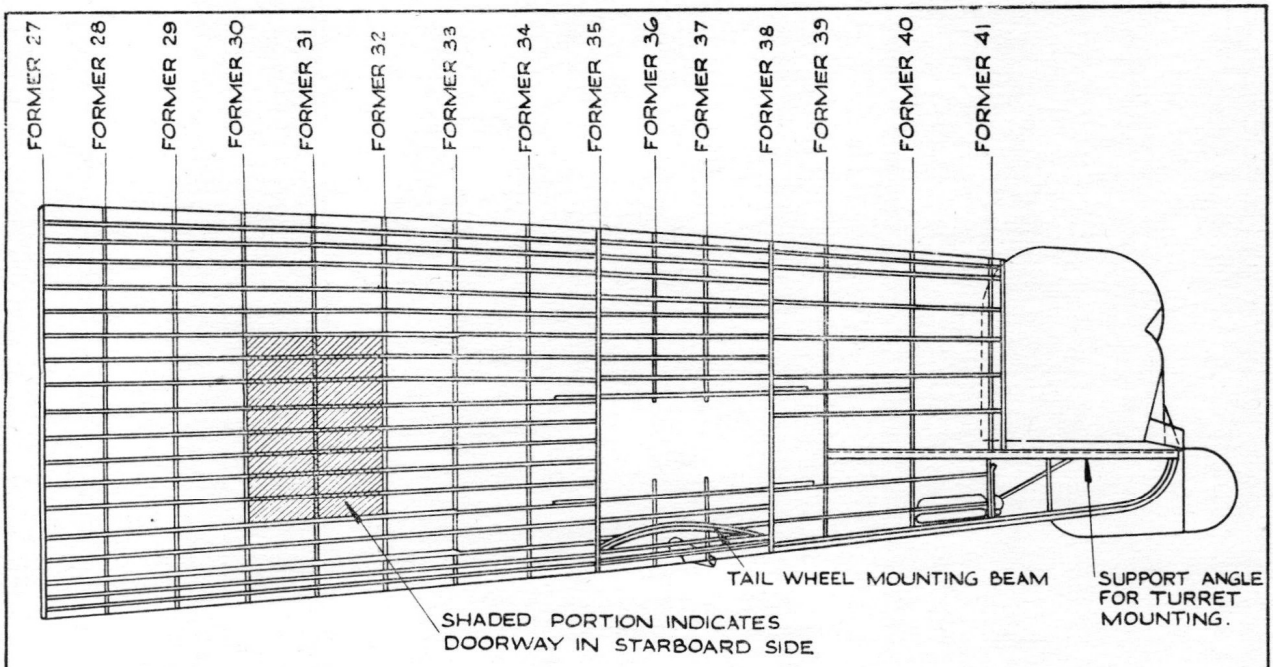


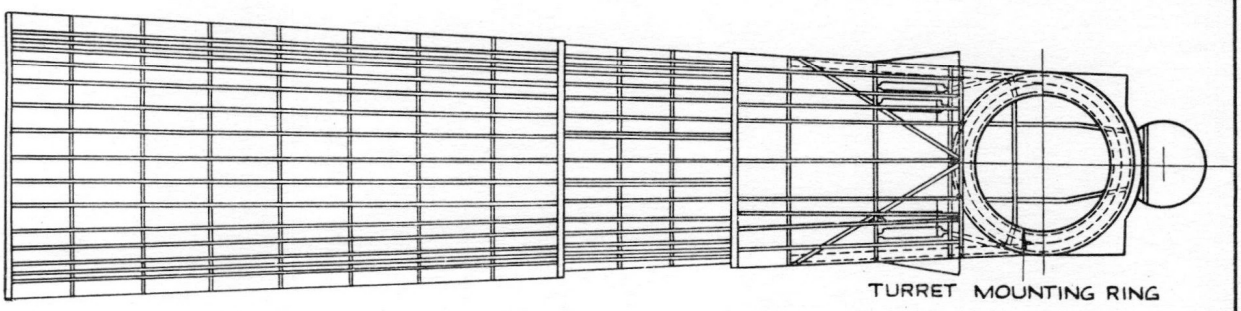


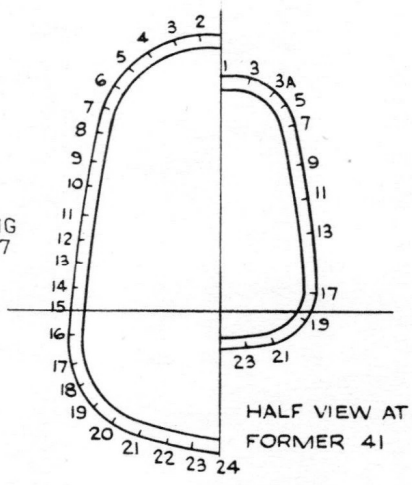

FLOOR PLAN OF REAR END.



24



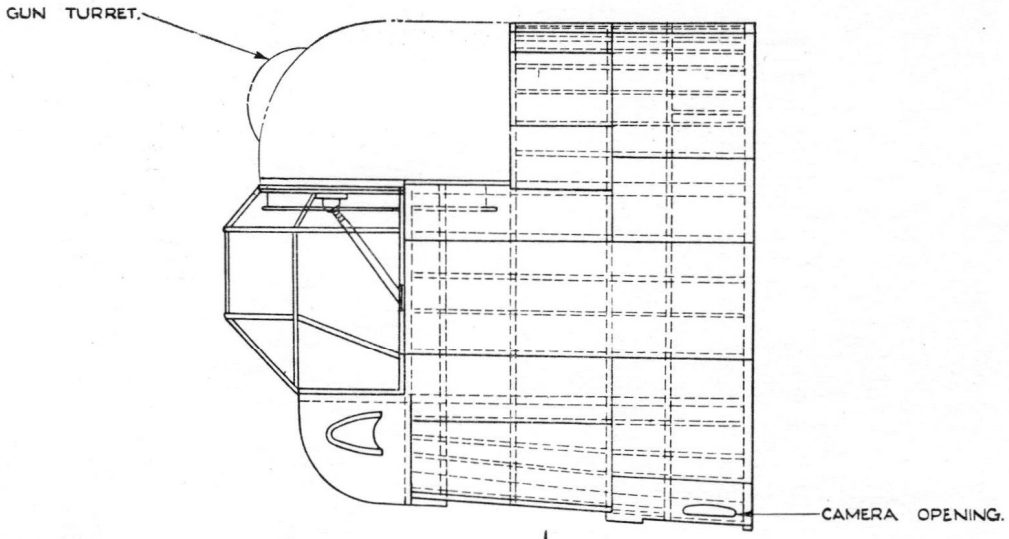

HALF VIEW LOOKING AFT AT FORMER 27

HALF VIEW AT FORMER 41

NOTE :-

ALL STRINGERS EXCEPT PARTS OF Nos 12 & 17 ARE MADE FROM EXTRUDED SECTION 2/SS 3075 SPEC. L40. STRINGERS N° 12 & 17 BETWEEN FORMERS N° 34 & 39 ARE MADE FROM EXTRUDED SECTION 1/SS 3075 SPEC. L40

| 25 | FUSELAGE REAR PORTION | 25 |
|---|---|---|

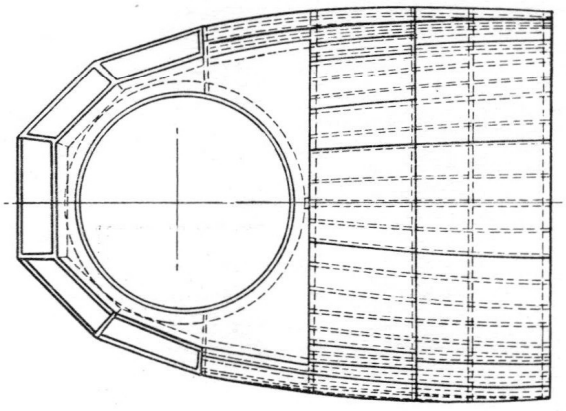



SIDE ELEVATION.

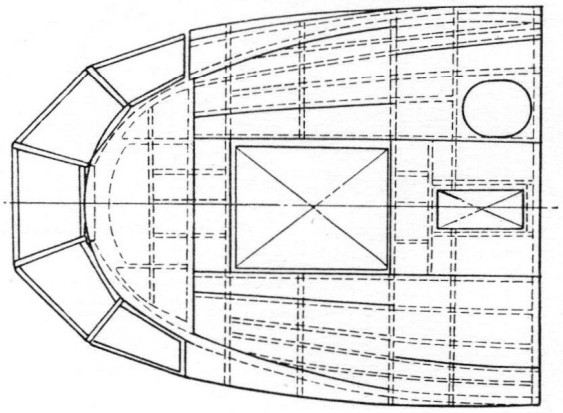
SKIN:- ALCLAD 22 S.W.G
SPEC:- D.T.D 390

FLOOR PLATES 20 S.W.G,
SPEC:- D.T.D. 390.

FOR RIVETING DETAIL SEE D. 4239 SHT. 3.

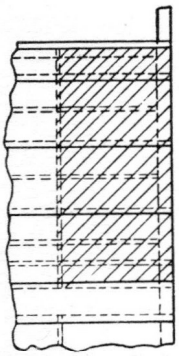


PLAN

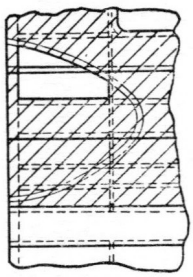


UNDERSIDE PLAN IN DIRECTION OF ARROW 'A'

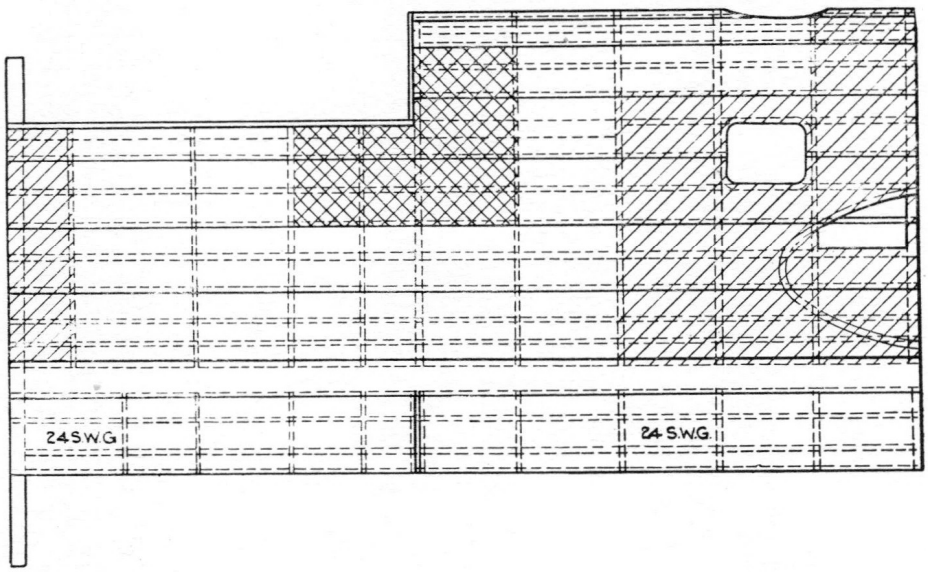
SKIN ALCLAD. SPEC. D.T.D. 390, 22 S.W.G.
EXCEPT PANELS OTHERWISE MARKED
REINFORCING SKIN 22 S.W.G. INDICATED
BY SHADING
NOTE :- FOR RIVETING DETAILS SEE
D 4505 SHEET 4.

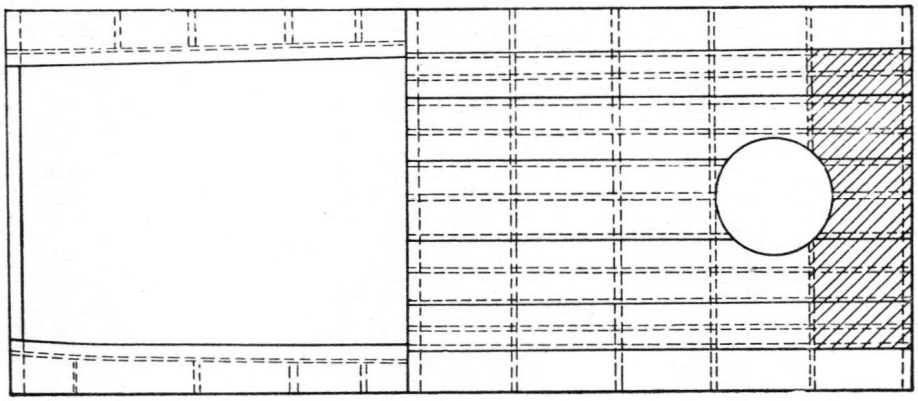


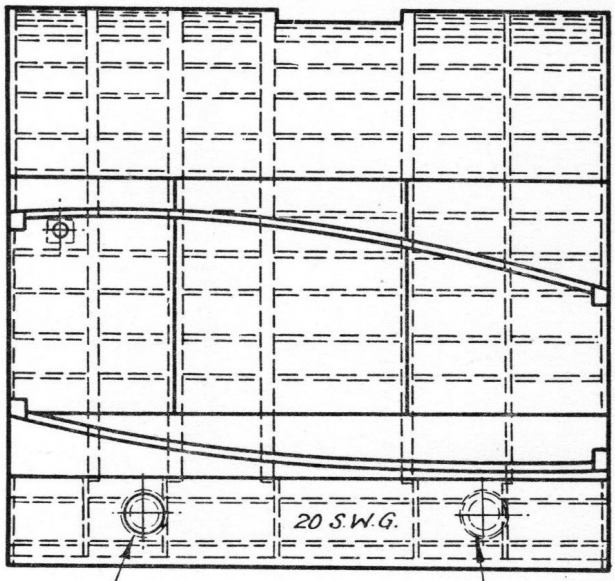
FORWARD END STARB'D SIDE.



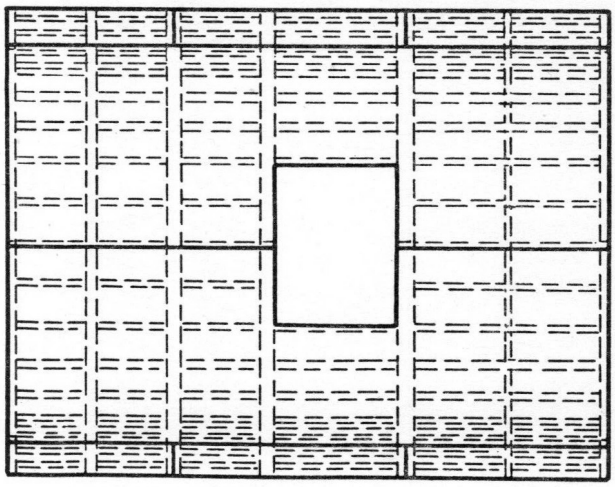
REAR END STARB'D SIDE.





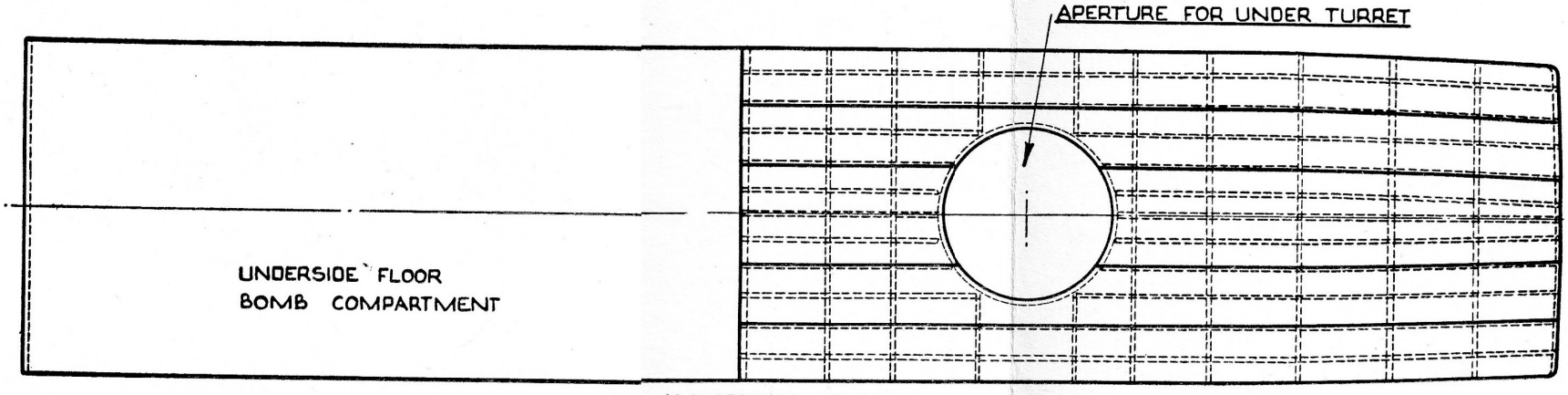

SIDE ELEVATION



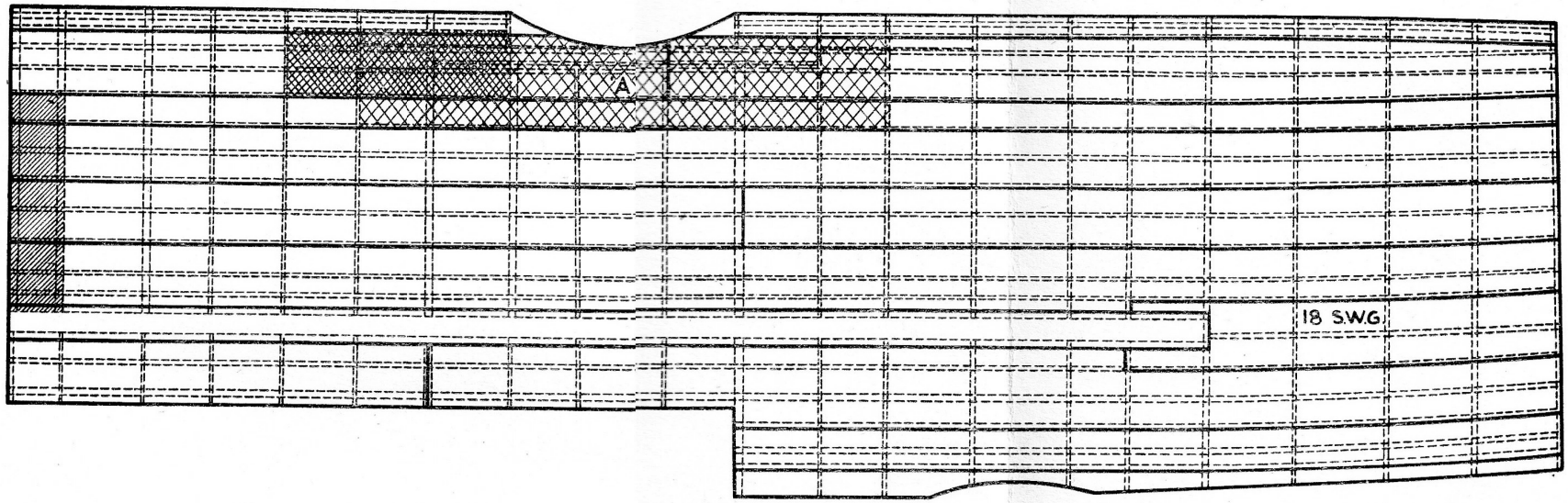
PLAN

SKIN- ALCLAD 16 S.W.G. SPEC D.T.D. 390.
EXCEPT PANEL MARKED 20 S.W.G.

NOTE :- FOR RIVETING DETAILS SEE D.4205 SHT. 2
AND D. 2973 SHT 2.

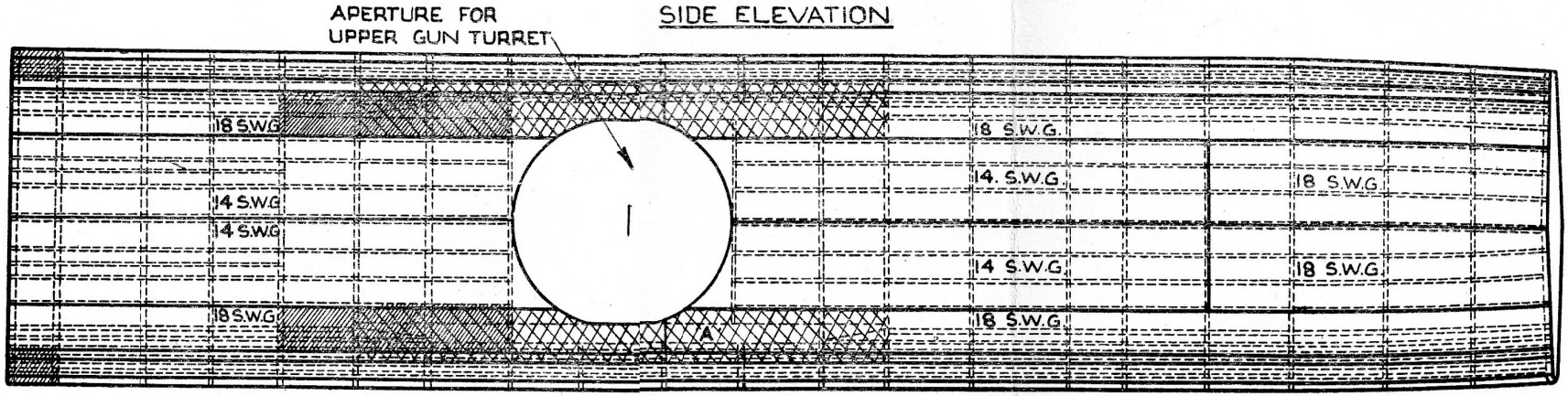



INVERTED PLAN




NOTE :-
FOR DAMAGE WITHIN SHADED AREAS 'A' SEE PARA. 2 CHAP. 4

SIDE ELEVATION




SKIN - ALCLAD 22 S.W.G. SPEC. D.T.D. 390 EXCEPT PANELS OTHERWISE MARKED

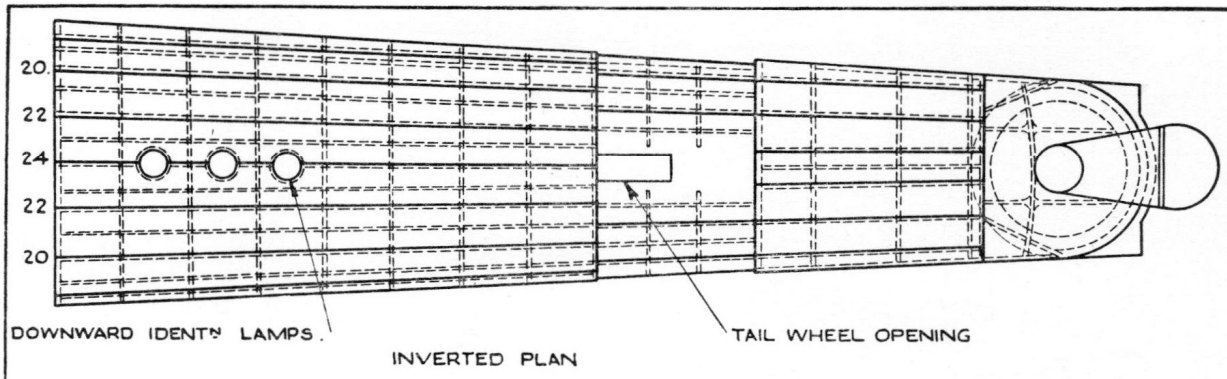
REINFORCING SKIN 22 S.W.G. INDICATED BY SHADING.

NOTE :-
FOR RIVETING DETAILS SEE 0.4573

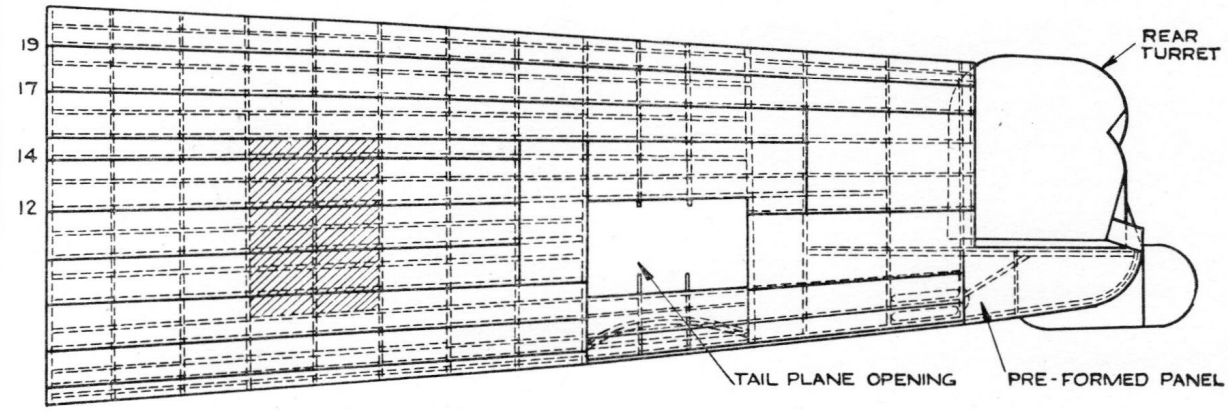
PLAN



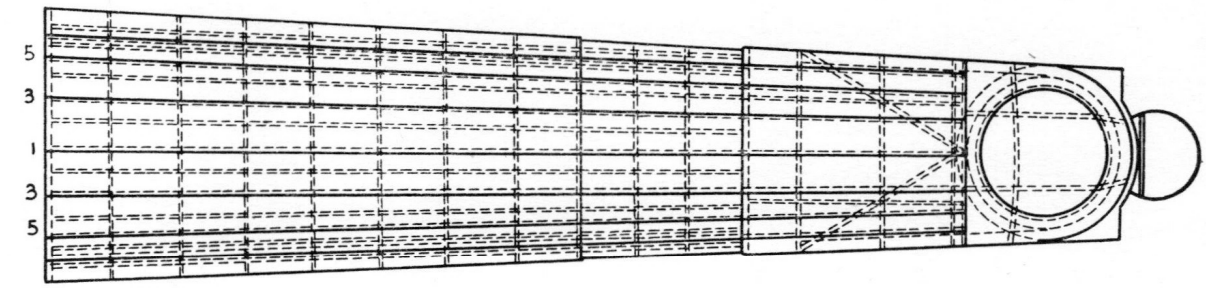
PLATING AND RIVETING - FUSELAGE - REAR CENTRE SECTION



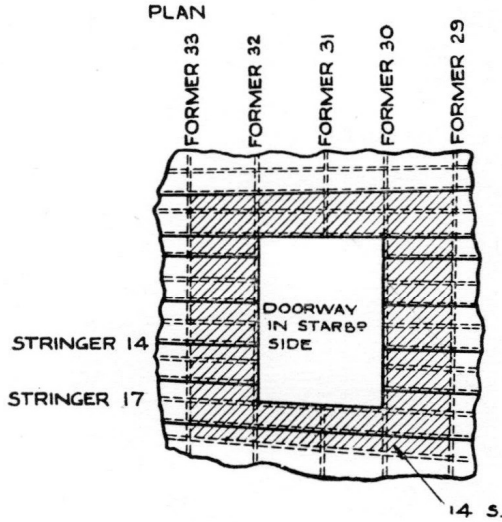

INVERTED PLAN




SIDE ELEVATION




PLAN




SKIN ALCLAD 22 S.W.G. D.T.D.390 INCLUDING THE REINFORCING SKIN AT DOORWAY IN STARBOARD SIDE WHICH IS SHOWN SHADED ON THE INSIDE.
FOR RIVETING DETAILS SEE D 2061 SHEETS 3 AND 7.

| 31 | PLATING & RIVETING FUSELAGE REAR PORTION | 31 |
|---|---|---|

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

PART I — CHAPTER 5

## Alighting Gear

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## ALIGHTING GEAR

### General

1. The alighting gear consists of two retractable undercarriage units and a fixed tailwheel. The undercarriage units are mounted on support beams which are bolted to the front spar. The tailwheel is mounted on a built-up box-section beam fitted between formers No. 35 and 38.

2. Abrasions or scores classed as negligible should have all sharp corners removed, and if they occur on external surfaces other than bearing surfaces, should be coated with pigmented oil varnish and primer D.T.D. 260, or cellulose enamel and primer D.T.D. 63A.

3. Where a jointing compound is required, a pigmented varnish jointing compound D.T.D. 369 should be used.

4. Before dismantling any two mating parts which may be used again, they should be carefully marked to ensure that they are reassembled correctly.

5. Certain threads, nuts, bolts, etc., have been locked, and the locking device is often a burr raised on the screw thread by a punch, to prevent the part working loose. If this burr is not removed before unscrewing, both the threaded parts will be damaged. It should be noted that all such parts must be locked after re-assembly.

6. The damage, and repairs, described in this chapter, may only be carried out on parts that are correct to drawing.

### Extensive damage and replacement

7. For damage greater than that defined in the following paragraphs reference should be made to Part 2 of this manual.

## UNDERCARRIAGE SUPPORT BEAM

### Negligible Damage

8. Negligible damage to the beam is clearly defined in fig. 1.

## UNDERCARRIAGE

### General

9. The undercarriage comprises two retractable undercarriage units, one of which is shown in fig. 2. Each unit consists principally of two identical shock absorber struts which are held rigidly together by a K-form of bracing and a radius rod which is secured at its lower end to the strut, and at its upper end to a bracket on the rear spar of the main plane.

10. Each undercarriage unit is retracted by two hydraulic jacks whose piston rods are attached to the latch mechanism; these piston rods are also braced by a K-form of bracing.

## AXLE

### Negligible Damage

11. Circumferential scores, free from cracks, and not deeper than .005 in. longer than 1½ in. may be neglected, provided that they are not less than 1½ in. apart. Longitudinal scores, free from cracks, up to .01 in. deep, may also be neglected, provided that in any 2 in. arc of the circumference the total width of all scores is less than 0.2 in. Sharp edges must be removed from all scores.

## TORQUE ADAPTOR PLATE

### Damage Repairable by Re-drilling

12. Damage to the bolt holes used in securing the torque adaptor plate to the axle should be repaired by re-drilling the holes 41/64 in. or 21/32 in. diameter, and fitting oversize bolts Part Nos. R197-1X, or R197-1Z.

## RADIUS ROD ATTACHMENT FITTING

### Damage Repairable by Re-drilling and Re-tapping

13. Damage to the 4 B.A. holes for securing the locking plates should be repaired as follows:—turn the locking plate through 180°, and using it as a means of location, drill and tap a new 4 B.A. hole. Then re-assemble.

14. An alternative method of repair is as follows:—re-drill existing damaged hole and tap 2 B.A. and re-assemble with a new screw Part No. S.P. 229-46A.

15. Damage to the hole for the dowel pin may be repaired by re-drilling a new hole, using a No. 31 (.120 in. dia.) drill at 45° to the original hole. This repair can be repeated once only on the opposite side to the original hole.

## STRUT BRACING FITTING

### Damage Repairable by Re-drilling and Re-tapping

16. Damage to the 4 B.A. holes for securing the locking plates may be repaired as follows:—

### TABLE 1

### Material for Repair of Undercariage

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R197-1X | Oversize bolt | | | For torque adaptor plate |
| | R197-1Z | Oversize bolt | | | |
| | S.P. 229-46A | Screw | 2 B.A. | S. 1 | For radius rod attachment fitting and strut bracing fitting |

turn the locking plate through 90°, and using it as a means of location drill and tap a new 4 B.A. hole, then re-assemble.

17. An alternative method of repair is as follows:—re-drill the existing damaged hole and tap 2 B.A. and re-assemble with a new screw Part No. S.P. 22-46A.

## BOTTOM SLIDING TUBE

### Negligible Damage

18. Longitudinal scores not more than .005 in. deep may be neglected, provided that in any 1 in. arc of the circumference the total width of all scores is less than 0.1 in.

## TAIL WHEEL

### General

19. The tail wheel is of the oleo-pneumatic, self-centring type (see fig. 3) with a shock absorber strut which consists mainly of two sliding tubes. The wheel and axle are held in a forged fork-fitting which is fixed to the lower end of the inner sliding tube.

### Negligible Damage

20. Over a distance of 3 in. at the top of each leg of the fork, superficial scratches only may be neglected. In all other places on the fork, smooth dents, free from cracks and not greater than 0.50 in. dia. and 0.05 in. deep, may be neglected.

### Damage Repairable by Re-drilling and Re-tapping

21. Damage to the threads of the 2 B.A. screw hole for locking the axle and flange should be repaired by drilling, 0.55 in. deep with a No. 26 drill (0.147 in. dia.) at any convenient point, 5/16 in. from the axle centre. This hole should be tapped 2 B.A. by $\frac{1}{2}$ in. deep and fitted with a new screw, Part No. A.G.S. 246-13

## CENTRE FITTING

### Negligible Damage

22. On that part of the fitting around the $1\frac{3}{4}$ in. dia. bearing hole, smooth dents, not deeper than 0.05 in. and free from cracks, and which can be encompassed in a $\frac{1}{2}$ in. dia. circle, may be neglected provided they do not distort the bearing hole.

## BEARING

### Negligible Damage

23. Smooth isolated dents or abrasions, free from cracks, whose depth is not more than 1/3rd of the original thickness of metal at that point, may be neglected.

### Damage Repairable by Re-drilling and Re-tapping

24. Wear or damage to any of the $\frac{1}{4}$ in. B.S.F. holes should be repaired as follows:—drill out all existing $\frac{1}{4}$ in. B.S.F. threads to prevent their being used again. Turn the bearing through 15° (i.e., 0.70 in. measured around the circumference), then drill ten new holes with a No. 7 drill (0.201 in. dia.) to correspond with existing holes in the centre fitting, tap $\frac{1}{4}$ in. B.S.F. and re-assemble with bolts, Part No. 483634.

## END PLUG

### Negligible Damage

25. Damage on the $4\frac{3}{4}$ in. dia. flange which, when cleaned out, does not exceed $\frac{1}{2}$ in. long and 3/8 in. deep, may be neglected.

### Damage Repairable by Re-drilling and Re-tapping

26. Damage to the 2 B.A. hole for securing the inflation valve locking plate should be repaired as follows:—turn the locking plate through 180° and, using it as a means of location, drill a new hole on the opposite side of the inflation valve through the outer tube and into the end plug, a No. 26 drill (0.147 in. dia.) being used. Drill 5/8 in. deep and tap 2 B.A. by 9/16 in. deep, and when re-assembling use a new bolt, Part No. A15Y/4C.

## AXLE AND FLANGE

### Negligible Damage

27. Damage to any part of the flange may be neglected provided that when it is smoothed out it does not remove more metal than 2 3/16 in. dia. hole through the head.

### Damage Repairable by Re-drilling

28. Wear or damage to the two $\frac{1}{4}$ in. dia. spanner holes, rendering them useless for tightening or loosening the flange, should be repaired by drilling two new $\frac{1}{4}$ in. dia. holes at 90° to the original holes on a 1-5/16 in. pitch circle diameter.

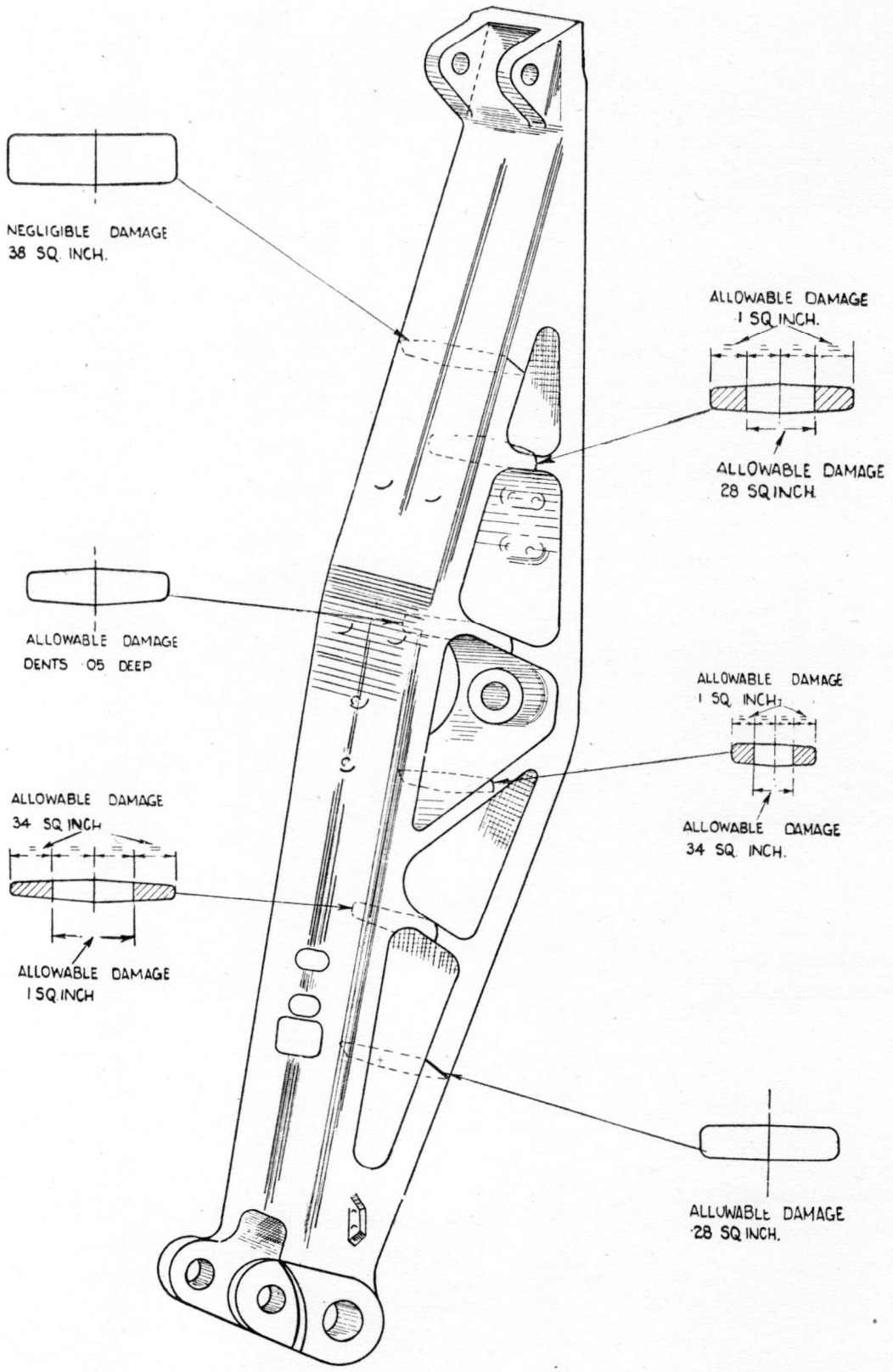
## OUTER TUBE

### Negligible Damage

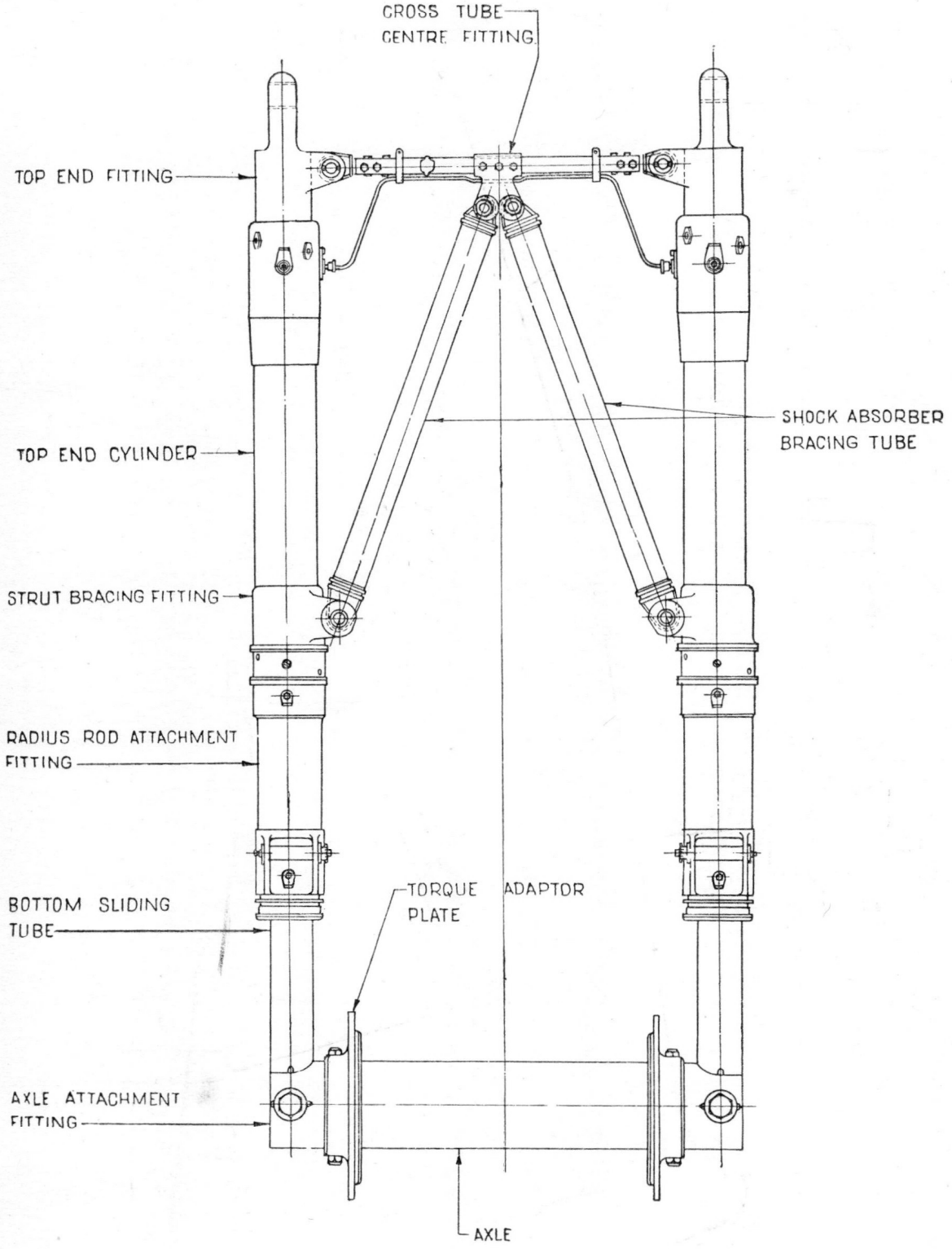
29. Isolated scores on the outer surface may be neglected provided that they do not distort the bore of the tube and are not more than 0.015 in. deep.

**TABLE 2**
**Material for Repair of Tail Wheel**

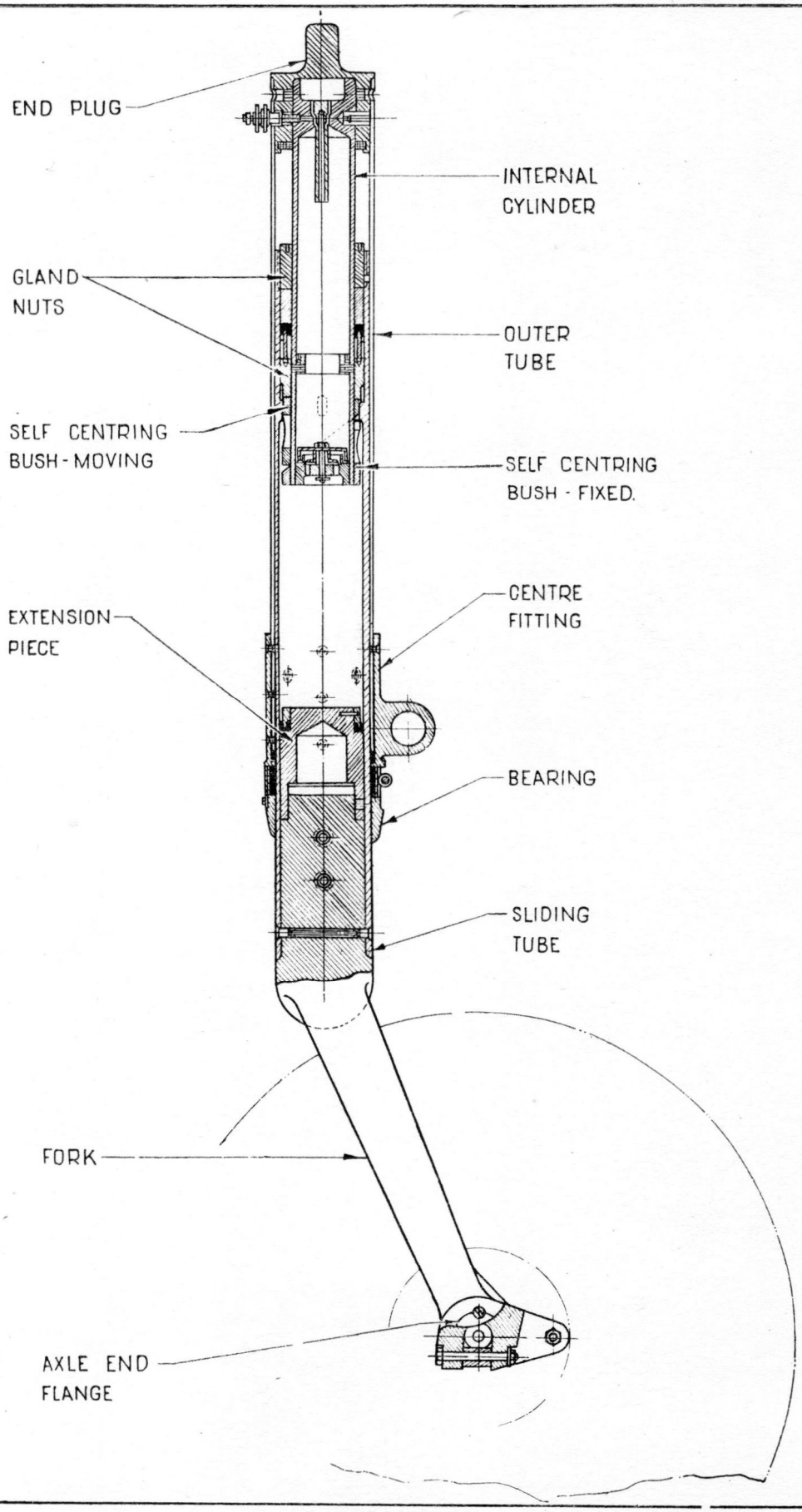
| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| H28C/2072 | A.G.S. 246/13 | Screw | 2 B.A. | — | For tail wheel fork |
| T27Q.3076 | 483634 | Bolt | $\frac{1}{4}$ B.S.F. | — | For tail wheel bearing |
| | A15Y/4C | Bolt | 2 B.A. | — | For tail wheel end plug |




| 1 | NEGLIGIBLE DAMAGE TO UNDERCARRIAGE BEAM | 1 |
|---|---|---|




| 2 | SHOCK ABSORBER UNIT | 2 |
|---|---|---|




| 3 | TAIL WHEEL UNIT | 3 |
|---|---|---|

R.A.A.F. Publication No.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

PART I — CHAPTER 6

## Main Plane

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## MAIN PLANE

### General

1. The main planes are built up of seven main portions for the purpose of transport, the material used in construction being generally of light-alloy. To enable members of the structure to be identified and to ascertain the gauge and specification of the plating on the main planes, reference should be made to figs. 15 to 22. For details of the plating and rivetting of the inboard and outboard flaps, reference should be made to figs. 23 and 24. Details of the aileron are illustrated in figs. 25 and 26.

2. Great care must be taken to prevent the accumulation of moisture within the main planes as this will cause corrosion. All repair patches on the outer skin must therefore be rendered water-tight in accordance with the appropriate instructions given in Chapter 2.

## SKIN CENTRE PLANE

### Negligible Damage

3. Smooth isolated dents free from cracks, abrasions and sharp corners may be neglected provided that they can be encompassed by 1½ in. dia. circle and are not deeper than 3/32 in. If, however, the dent occurs in way of a stringer or rib, it will be necessary to remove a number of adjacent rivets in order that the skin may be dressed back into position.

### Damage Repairable by Patching

4. Small holes which, when cleaned out, are not larger than 1¼ in. dia. should be repaired by patching in a manner similar to that shown in fig. 1. More extensive damage should first be trimmed to a regular shape and then repaired with a flush patch fitted in a manner similar to that shown in fig. 2. For a patch repair in way of a rib or stringer, it will be necessary to cut the backing piece into two portions. A crack not longer than 1¼ in. should be repaired as shown in fig. 1, but a more extensive crack should be cut away to leave a hole of square or rectangular shape, and a patch fitted as shown in fig. 2.

## SKIN—OUTER PLANE

### Negligible Damage

5. Smooth isolated dents free from cracks, abrasions and sharp corners may be neglected, provided that they can be encompassed by a 1½ in. dia. circle and are not deeper than 3/32 in.

### Damage Repairable by Patching

6. Small holes which, when cleaned out, are not larger than 1¼ in. dia. should be repaired by patching as shown in fig. 1. More extensive damage should first be trimmed to a regular shape, and then repaired with a flush patch fitted in a manner similar to that shown in fig. 3. A crack no longer than 1¼ in. should be repaired as shown in fig. 1, but a more extensive crack should be cut away to leave a hole of square or rectangular shape, and a patch fitted as shown in fig. 3.

**TABLE 1**
**Material for Repair of Main Plane Skin**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 18 S.W.G. | D.T.D. 390 | |
| | — | Sheet, aluminium alloy | 20 S.W.G. | D.T.D. 390 | |
| | — | Sheet, aluminium alloy | 22 S.W.G. | D.T.D. 390 | |
| | — | Sheet, aluminium alloy | 24 S.W.G. | D.T.D. 390 | |
| H128F/61359 | 2.SS.3123 | Rivet, pop, dome head | 1/8 in. dia. x 0.13 in. | D.T.D. 10B | |
| H128F/61174 | 3.SS.3123 | Rivet, pop, dome head | 1/8 in. dia. x 0.16 in. | D.T.D. 10B | |
| H128F/61175 | 4.SS.3123 | Rivet, pop, dome head | 1/8 in. dia. x 0.19 in. | D.T.D. 10B | |
| H128F/61176 | 5.SS.3123 | Rivet, pop, dome head | 1/8 in. dia. x 0.22 in. | D.T.D. 10B | |

## STRINGERS
## LIPPED-ANGLE SECTION

### Negligible Damage

7. Smooth isolated dents, free from cracks, abrasions, and sharp corners may be neglected provided that they are not deeper than 3/32 in. and have not caused loosening of adjacent attachments. Damage to an edge of a stringer, which, when cleaned out, is not deeper than 1/16 in. and not longer than 1/2 inch, may also

be neglected. Where damage to a stringer involves distortion of the adjacent skin, the attachment rivets must be removed and the skin and stringer carefully restored to shape.

**Damage Repairable by Patching**

8. Damage to the web of a stringer which, when cleaned out, is not longer than 2 in. and not wider than 5/8 in. should be repaired by patching in a manner similar to that shown in fig. 4. Where a stringer flange is damaged to an extent greater than that defined in para. 7 as negligible, it will be necessary to make an insertion repair. Before patching, distorted stringers should be carefully restored to shape, care being taken to avoid cracking the material; cracks which occur as a result of this operation must be considered a part of the damaged area.

## TOP-HAT SECTION—CENTRE PORTION MAIN PLANE

**Negligible Damage**

9. In the top-hat section stringers, negligible damage is restricted to superficial scratches which, when smoothed out, are not deeper than 0.015 in. All other damage must be repaired.

**Damage Repairable by Patching**

10. Dents of any size, and any other damage greater than that defined in para. 9 as negligible, must be repaired as shown in fig. 5.

## T-SECTION STIFFENER—LEADING AND TRAILING EDGES

**Negligible Damage**

11. Damage to the edge of a flange which, when smoothed out, is not longer than 1 in. and not deeper than 1/8 in. may be neglected provided that all adjacent rivets are undisturbed. Damage to any of the rivet holes must be repaired by patching.

**Damage Repairable by Patching**

12. Damage greater than negligible (see para. 11) but not longer than $1\frac{3}{4}$ in. and not wider than 1/2 in. should be repaired with a 16 s.w.g. light alloy patch riveted to the damaged flange. The length of the patch should be such that it can be secured at each side of the damage by a minimum of five rivets, as shown in fig. 6.

## TRAILING EDGE STRINGER, CENTRE PLANE AND INNER PORTION, OUTER PLANE

**Negligible Damage**

13. Where cleaned out, damage does not affect more than 40% of the area of cross-section it may be neglected, but if the damage is deeper than 3/16 in. it must be covered with a doped-on fabric patch.

## TRAILING EDGE STRINGER, OUTER PORTION—OUTER PLANE

**Negligible Damage**

14. Where cleaned out damage does not affect more than 20% of the area of cross-section it may be neglected, but if the damage is deeper than 3/16 in. it must be covered with a doped-on fabric patch.

### TABLE 2

**Material for Repair of Stringers**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 22 S.W.G. | D.T.D. 390 | For lipped angle-section stringer |
| | — | Sheet, aluminium alloy | 14 S.W.G. | D.T.D. 390 | |
| | — | Sheet, aluminium alloy | 16 S.W.G. | D.T.D. 390 | For T-section stringer |
| | 219.SS.1793 | Stringer section | 18 S.W.G. | D.T.D. 390 | For top-hat section stringer |
| | 220.SS.1793 | Stringer section | 24 S.W.G. | D.T.D. 390 | |
| H128F/31627 | (E)D2528/2S4/3 | Rivet, snap-head | 1/8 in. dia. x 3/16 in. | D.T.D. 327 | |
| H128F/5719 | (E)D2528/2CW4/4 | Rivet, countersunk head | 1/8 in. dia. x $\frac{1}{4}$ in. | D.T.D. 327 | |
| H128F/61178 | 7.SS.3123 | Rivet, pop, dome-head | 1/8 in. dia. x 0.29 in. | D.T.D. 10B | |
| H128F/61181 | 11.SS.3123 | Rivet, pop, dome-head | 3/16 in. dia. x 0.3 in. | D.T.D. 10B | |

## WING TIP END SWEEP

### Negligible Damage

15. Where cleaned out damage does not affect more than 40% of the area of cross-section it may be neglected provided that it does not occur in way of the attachment rivets; such damage must, however, be covered with a doped-on fabric patch. Damage which causes loosening of attachment rivets must be repaired.

## SPARS—CENTRE PLANE AND INNER AND OUTER PORTIONS OF OUTER PLANE

## SPAR BOOMS

### Negligible Damage

16. Damage to any corner of a boom which when smoothed out is not deeper than 7/16″ and not longer than 1 in. may be neglected, provided that the web attachment holes are not affected, and the area of the boom cross-section is not reduced by more than 3%. Transverse, diagonal or longitudinal damage to any face of a boom which, when cleaned out, does not reduce the area of the boom cross-section by more than 3% may also be neglected provided that the web attachment holes are not affected. The above negligible damage may be in the form of cracks, abrasions or scores.

## SPAR WEB—CENTRE PLATE

### Negligible Damage

17. Smooth dents, not deeper than 3/32 in. free from cracks, abrasions and sharp corners, which can be encompassed by a 2 in. dia. circle may be neglected. Superficial scratches, not deeper than 0.04 in. deep, may also be neglected.

## WEB—OUTER AND INNER PORTIONS OF OUTER PLANE

### Negligible Damage

18. Between Ribs Nos. 1 to 25 damage which when cleaned out can be encompassed by a 2 in. dia. circle may be neglected. A crack which is not longer than 2 in. should be cleaned out to a regular-shaped hole with pronounced radii in the corners, and may then be neglected, provided that the total area removed between any two spar web stiffeners does not exceed 3 sq. in.

19. Between rib No. 25 and the wing tip, damage which when cleaned out can be encompassed by a 1½ in. dia. circle may be neglected. A crack which is not longer than 1½ in. should be cleaned out to leave a regular-shaped hole with pronounced radii in the corners, and may be neglected, provided that the total area removed between any two spar web stiffeners does not exceed 2 sq. in.

20. Damage, however slight, which involves any of the web attachment holes, must not be neglected, and should be repaired by insertion.

## TRAILING EDGE SPAR BOOM

### Negligible Damage

21. Damage to the free edge of the boom which, when cleaned out, is not deeper than 1/8 in. and not longer than 1 in. may be neglected.

## BRACING ANGLES

### Negligible Damage

22. Damage to the middle of a flange which, when cleaned out, does not exceed ½ in. dia. may be neglected. More extensive damage which, when cleaned out, does not reduce the area of the section by more than 25% may also be neglected.

## RIBS

## NOSE RIBS

### Negligible Damage

23. Smooth isolated dents, free from cracks, abrasions and sharp corners may be neglected provided that they have not caused loosening of adjacent attachments.

## INTER-SPAR AND TRAILING EDGE RIBS

### Negligible Damage

24. Damage to the free edge of an extruded boom, in the form of smooth isolated dents not deeper than 1/8 in. or other damage which, when cleaned out, is not deeper than 1/16 in. and not longer than 1 in. may be neglected. No attempt should be made to straighten a distorted rib boom.

25. Smooth isolated dents in a rib web may be neglected, provided that they are clear of lightening holes, and that they are free from cracks, abrasions and sharp corners. Other damage which when cleaned out does not exceed ½ in. dia. may also be neglected. Any damage in way of a lightening hole must be repaired by patching.

26. In the web stiffeners, smooth isolated dents not deeper than 1/8 in. or damage to a free edge which, when cleaned out, is not deeper than 1/8 in. and not longer than 1 in. may be neglected.

## INTER-SPAR RIBS

### Damage Repairable by Patching

27. Where a web is damaged to an extent greater than that defined in para. 25 as negligible, it should be repaired by patching as shown in Chapter 4, fig. 2.

## TRAILING EDGE RIBS

### Damage Repairable by Patching

28. Where a web is damaged to an extent greater than that defined in para. 25 as negligible, it should be repaired by patching as shown in Chapter 4, fig. 2. A crack at the inner extremity of a stringer cut-out should be repaired as shown in Chapter 4, fig. 6, using a patch plate of the same gauge as the rib.

## ENGINE MOUNTING AND ROLLED SECTION RIBS

### Negligible Damage

29. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/16 in. and can be encompassed by a 1 in. dia. circle. A nick in a free edge of a channel which, when smoothed out is not deeper than 1/16 in. and not longer than 1½ in. may also be neglected.

## TANK BEARER RIBS

### Negligible Damage

30. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/8 in. and can be encompassed by a 1 in. dia. circle.

**TABLE 3**
**Material for Repair of Ribs**

| Ident No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 20 s.w.g. | D.T.D. 390 | |
| | — | Sheet, aluminium alloy | 22 s.w.g. | D.T.D. 390 | |
| H128F/30250 | (E)D2528/2S3/3 | Rivet, snap-head | 3/32 in. dia. x 3/16 in. | D.T.D. 327 | |
| H128F/31627 | (E)D2528/2S4/3 | Rivet, snap-head | 1/8 in. dia. x 3/16 in. | D.T.D. 327 | |

## TANK ACCESS DOOR

### Skin

31. The definition of negligible damage and the method of repair by patching are the same as for the main plane top skin (see paras. 3 and 4).

## STIFFENERS, CENTRE PLANE

### Negligible Damage

32. In any part of a stiffener, smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/8 in. Damage to the middle of either web which, when cleaned out to a regular shaped hole, does not affect more than 30% of the depth of the web, may be neglected.

### Damage Repairable by Patching

33. Damage greater than that defined in para. 32 as negligible, should be repaired by patching as shown in fig. 8. Where the cleaned out damage affects more than 50% of the area of the section it will be necessary to fit four additional rivets as shown. Damage which extends more than 4 in. along a stiffener necessitates an insertion repair.

## STIFFENERS, INNER PORTION, OUTER PLANE

### Negligible Damage

34. The definition of negligible damage is the same as that given in para. 30. Damage greater than negligible should be repaired by patching as defined in fig. 9.

## FLAPS

### General

35. The flaps are fitted to the centre section and outer planes. Each flap comprises an inverted U-shaped spar, plate-type ribs, and an aluminium-alloy skin covering which is reinforced with a corrugated inner skin. Each flap is attached by a piano-type hinge to an auxiliary spar situated at the centre of the main plane trailing edge portions.

## SPAR

### Negligible Damage

36. Smooth isolated dents, free from cracks, abrasions, and sharp corners, may be neglected provided that they are not deeper than 1/16 in. and can be encompassed in a 1 in. dia. circle.

### Damage Repairable by Patching

37. A dent which involves a crack not longer than 3/8 in. should be carefully restored to shape, and after drilling a 3/32 in. dia. hole at each end of the crack to prevent it from spreading, a patch repair should be made as shown in fig. 10. This repair is also applicable for damage which, when trimmed to a regular shape, is not larger than ¾ in. diameter.

## RIBS

38. The definition of negligible damage is the same as that given in para. 36.

### Damage Repairable by Patching

39. Dents to the flanges of the ribs, more extensive than those defined in para. 36 as negligible, should be carefully restored to shape and then repaired by patching, as shown in fig. 11. Damage in the form of a perforation or a broken flange should be restored to shape, cleaned out to a regular-shaped hole, and then repaired in a manner similar to that shown in fig. 12.

## SKIN

## OUTER SKIN

### Negligible Damage

40. Smooth isolated dents, free from cracks,

abrasions and sharp corners may be neglected provided that they do not cause distortion of adjacent parts of the structure.

## CORRUGATED INNER SKIN

### Negligible Damage

41. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/16 in. and have not caused loosening of adjacent rivets.

## TRAILING EDGE STRIP

### Negligible Damage

42. Damage which, when trimmed to a regular shape does not exceed ½ in. dia. and smooth isolated dents which show no signs of cracks, abrasions and sharp corners, may be neglected.

### Damage Repairable by Patching

43. Damage greater than that defined in para. 42 as negligible should be repaired by the more appropriate of the methods shown in figs. 13 and 14. Where the repair has necessitated loosening the corrugated or outer skins, solid rivets should be used to secure the patch, but otherwise it will be necessary to use pop rivets.

## TRAILING EDGE

### General

44. The trailing edge member is of light-alloy extruded section.

### Negligible Damage

45. Damage which, when smoothed out does not reduce the area of the section by more than 30% may be neglected. If, however, the damage is deeper than 1/8 in. it will be necessary to dope a fabric patch over the damaged portion after it has been smoothed out.

**TABLE 4**

**Material for Repair of Flaps**

| Ident. No. | Part. No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | For flap spar |
| | — | Sheet, aluminium alloy | 20 s.w.g. | D.T.D. 390 | For flap ribs |
| | — | Sheet, aluminium alloy | 24 s.w.g. | D.T.D. 390 | For flap trailing edge strip |
| H128F/30267 | (E)D2528/2S4/4 | Rivet, snaphead | 1/8 in. dia. x ¼ in. | D.T.D. 327 | |
| H128F/5720 | (E)D2528/2CW3/4 | Rivet head, countersunk | 3/23 in. dia. x ¼ in. | D.T.D. 327 | |
| H128F/6047 | (E)D2528/2CW3/6 | Rivet head, countersunk | 3/23 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/ | (E)D2528/2CW3/7 | Rivet head, countersunk | 3/32 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/58085 | (E)D2528/2CW3/8 | Rivet head, countersunk | 3/32 in. dia. x ½ in. | D.T.D. 327 | |
| H128F/5719 | (E)D2528/2CW4/4 | Rivet head, countersunk | 1/8 in. dia. x ¼ in. | D.T.D. 327 | |
| H128F/61359 | 2.SS.3123 | Rivet, pop, dome-head | 1/8 in. dia. x 0.13 in. | D.T.D. 10B | |
| H128F/61174 | 3.SS.3123 | Rivet, pop, dome-head | 1/8 in. dia. x 0.16 in. | D.T.D. 10B | |
| H128F/61175 | 4.SS.3123 | Rivet, pop, dome-head | 1/8 in. dia. x 0.19 in. | D.T.D. 10B | |
| H128F/61176 | 5.SS.3123 | Rivet, pop, dome-head | 1/8 in. dia. x 0.22 in. | D.T.D. 10B | |

## AILERONS

### General

46. The ailerons are metal covered structures of light-alloy, and each comprises a D-spar to which trailing edge plate ribs are attached. The D-spar consists of a channel-section member to which nose ribs and a nose covering of heavy gauge light-alloy sheet are riveted.

## SKIN

### Negligible Damage

47. Smooth isolated dents, free from cracks, abrasions and sharp corners may be neglected, provided that they do not cause distortion of adjacent parts of the structure.

### Damage Repairable by Patching

48. Damage greater than that defined in para. 47 should be repaired with a flush patch as described in para. 4 of this chapter.

## SPAR

## SPAR CHANNEL

### Negligible Damage

49. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/16 in. and can be encompassed in a 1 in. dia. circle. Before the dents are classified as negligible, the structure should be carefully examined to ensure that the primary cause of the dent has not resulted in the loosening of rivets or damage to any other part.

## NOSE RIBLETS

### Negligible Damage

50. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they have not caused loosening of rivets or distortion of adjacent structural parts.

## NOSE SKIN PLATING

### Negligible Damage

51. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/16 in. and can be encompassed in a 1 in. dia. circle.

## RIBS

### Negligible Damage

52. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/8 in., and do not occur on the rib flanges within 9 in. of the spar channel web. Damage to a rib web which when trimmed to a regular shape is not larger than ½ in. dia. and is not within in. of a flange or lightening hole, may also be neglected.

## TRAILING EDGE

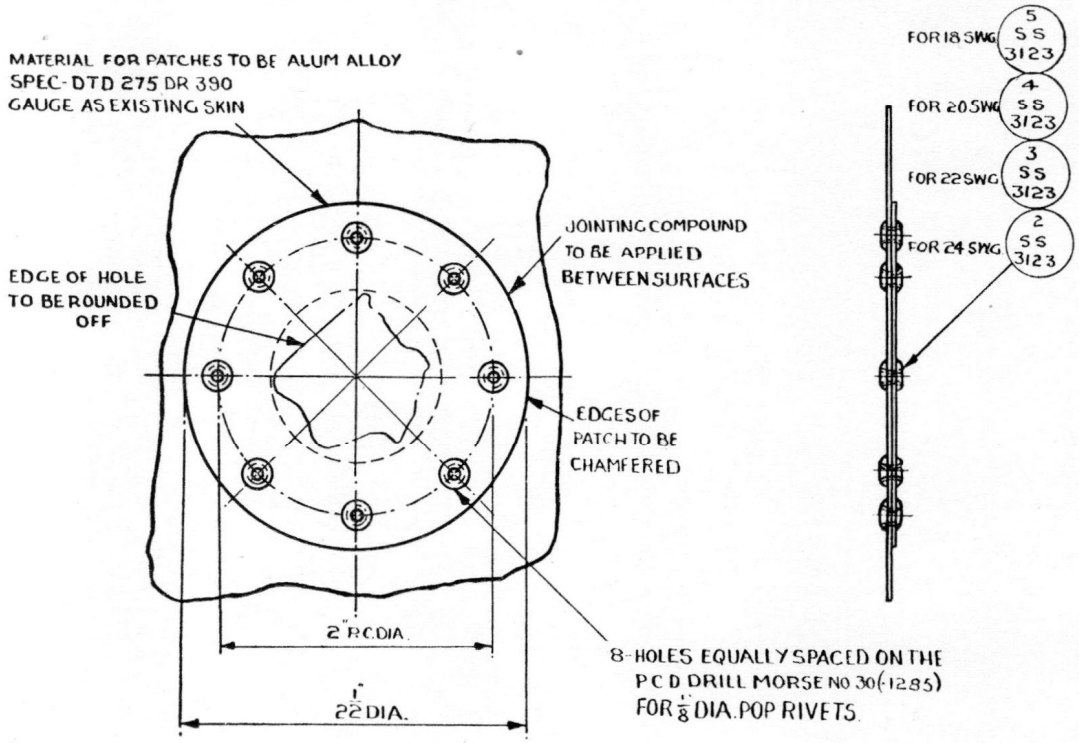
### Negligible Damage

53. Smooth isolated dents, free from cracks, abrasions and sharp corners may be neglected provided that they are not deeper than 1/8 in. and have not caused loosening of adjacent rib attachments.

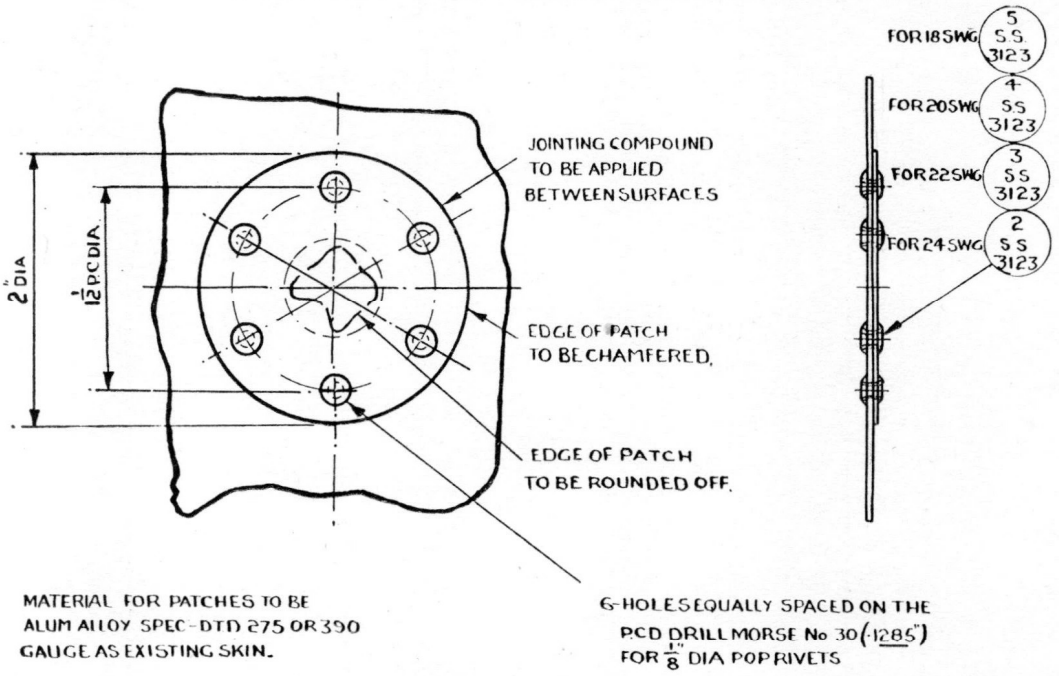
## MASS BALANCE

### General

54. As the damage to the ailerons which may be repaired in accordance with this part is of a minor nature only, the mass-balance will not be affected.

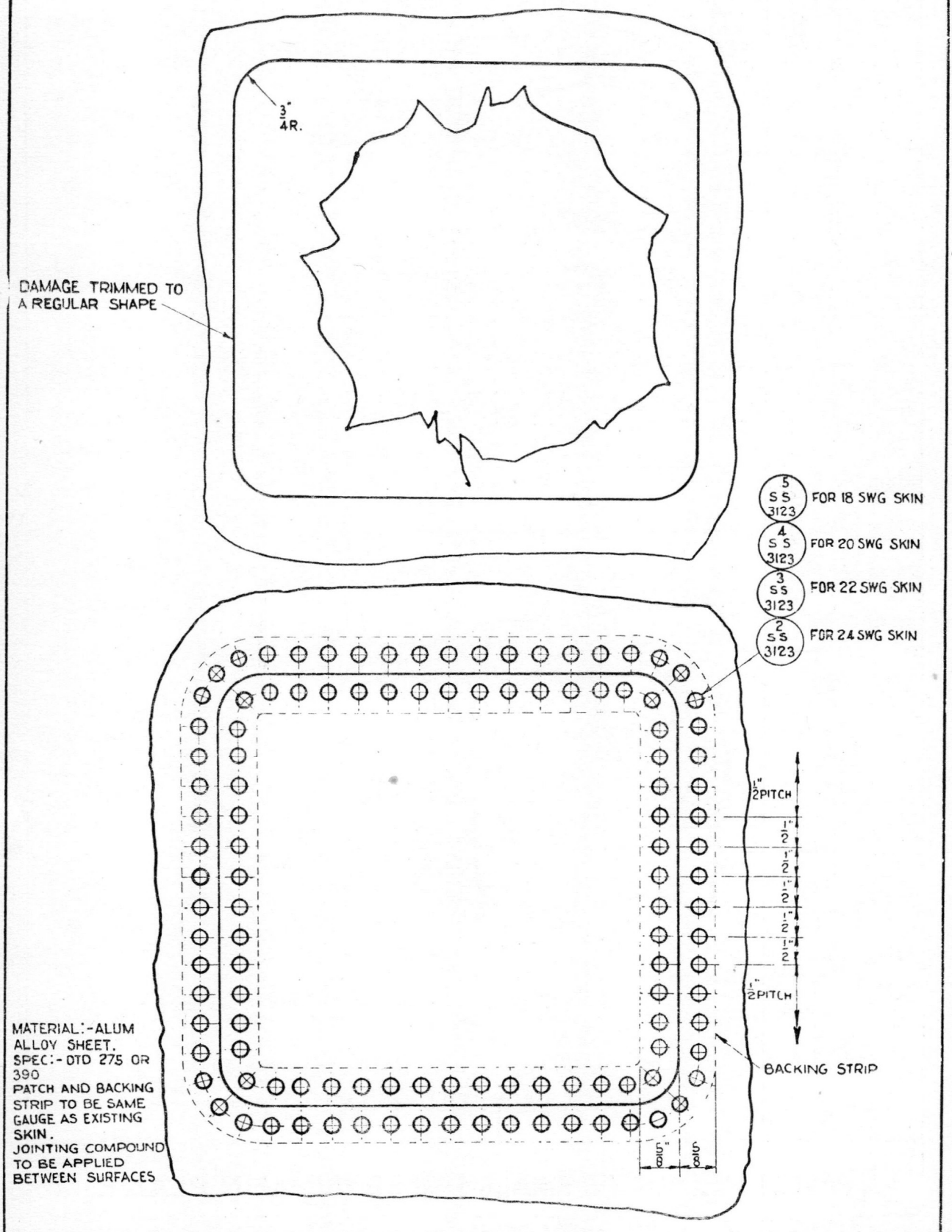



REPAIR PATCH FOR HOLE NOT EXCEEDING 1/4" DIA.

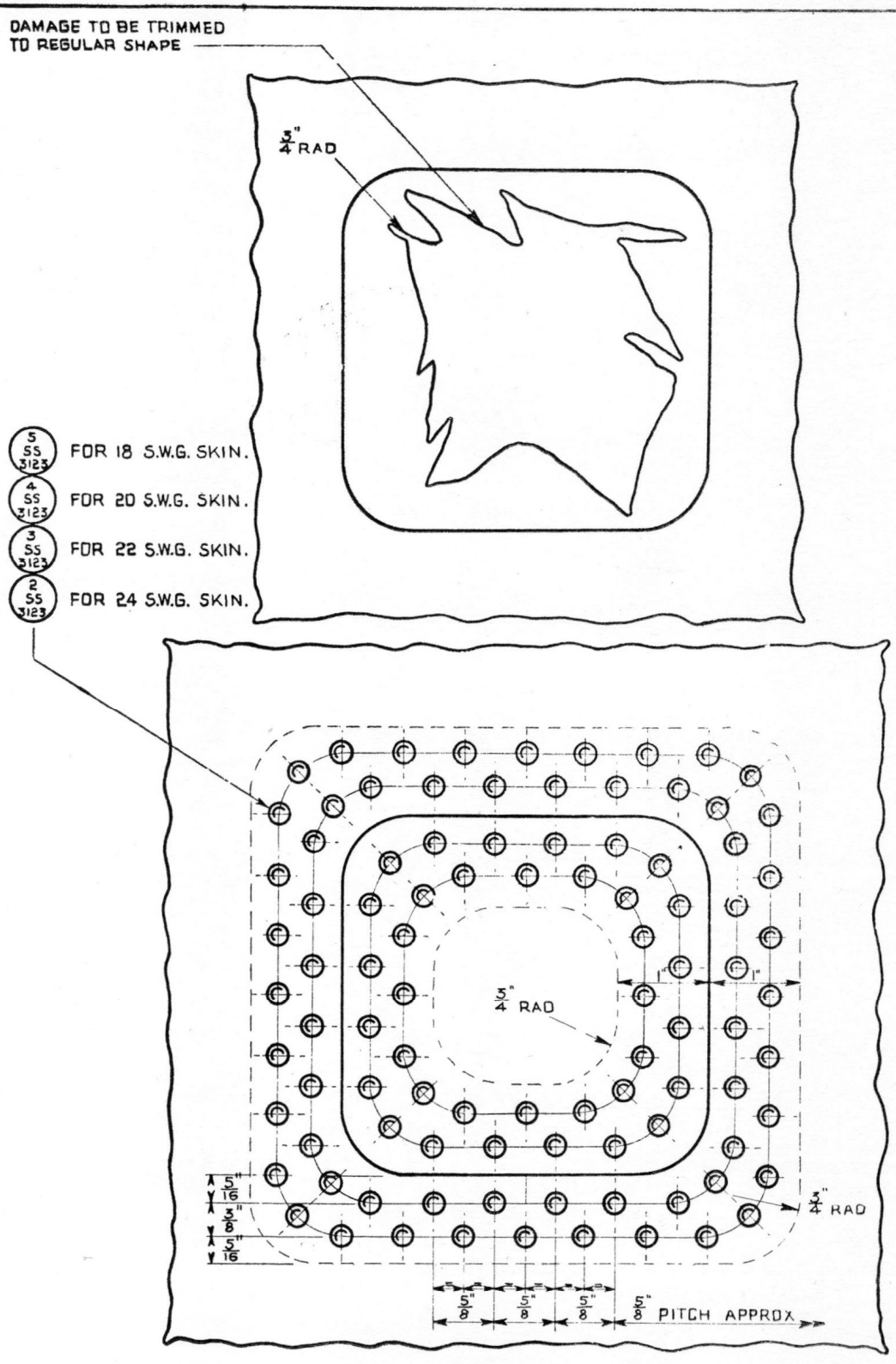



REPAIR PATCH FOR HOLE NOT EXCEEDING 3/4" DIA

| 1 | PATCH REPAIR TO SMALL HOLES IN MAIN PLANE | 1 |
|---|---|---|




# 2 PATCH REPAIR TO MAINPLANE SKIN 2



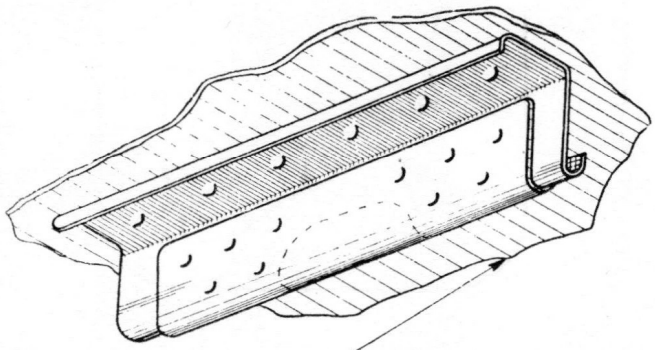

BACKING STRIP

MATERIAL:- ALLUM ALLOY SHEET
SPEC:- D.T.D. 390

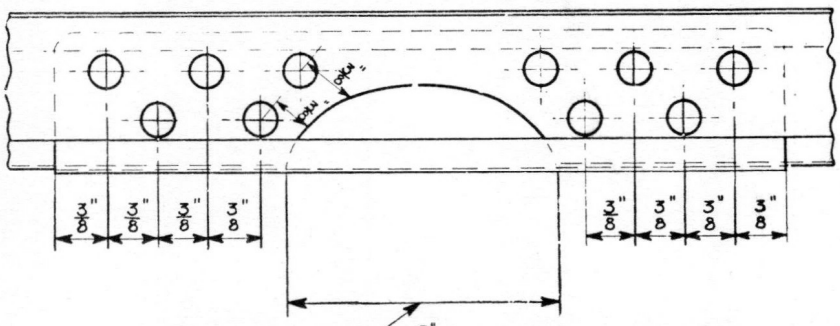
PATCH AND BACKING STRIP TO BE SAME GAUGE AS EXISTING SKIN

JOINTING COMPOUND TO BE APPLIED BETWEEN FACES.

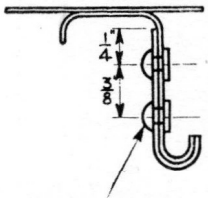
| 3 | PATCH REPAIR MAIN PLANE SKIN-OUTER PORTION | 3 |
|---|---|---|



MAINPLANE SKIN




MAXIMUM DAMAGE 2"X 5/8" MORE EXTENSIVE DAMAGE NECESSITATES AN INSERTION

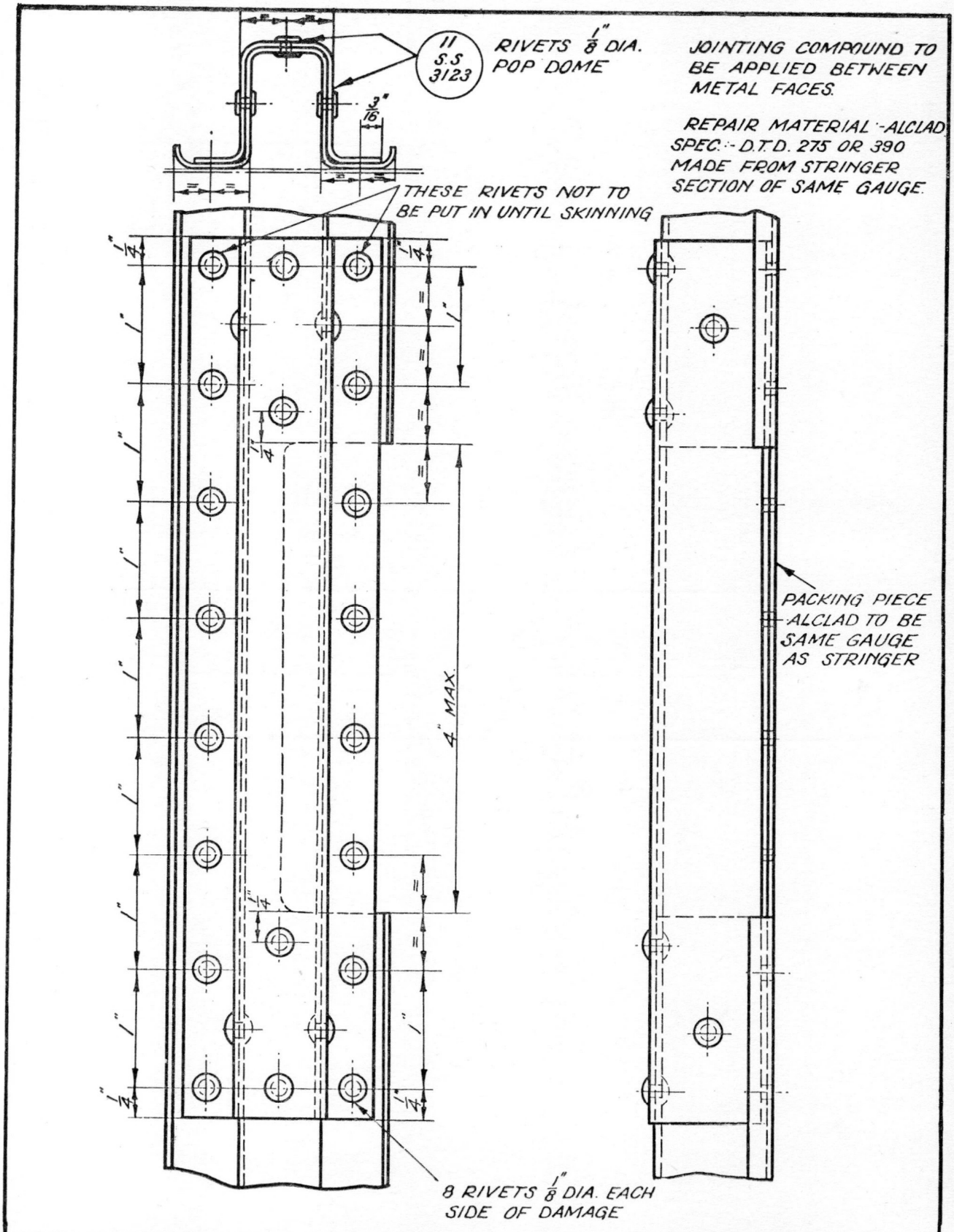



(E)D 2528/2S4/3.

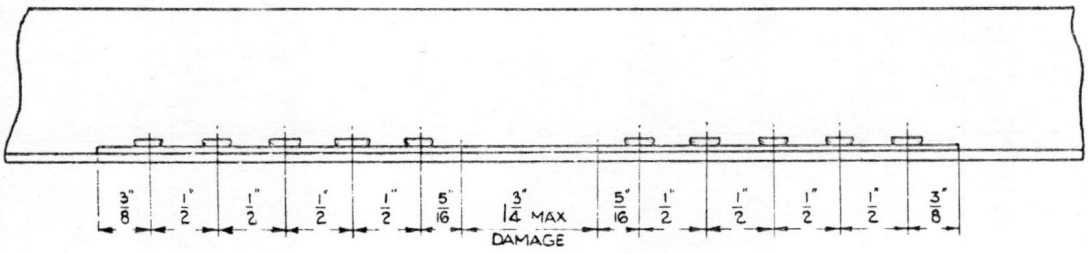
MINIMUM OF 5 RIVETS EACH SIDE OF DAMAGE.

PATCH MATERIAL :- ALCLAD 22 S.W.G. - SPEC :- D.T.D. 275 OR 390.
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

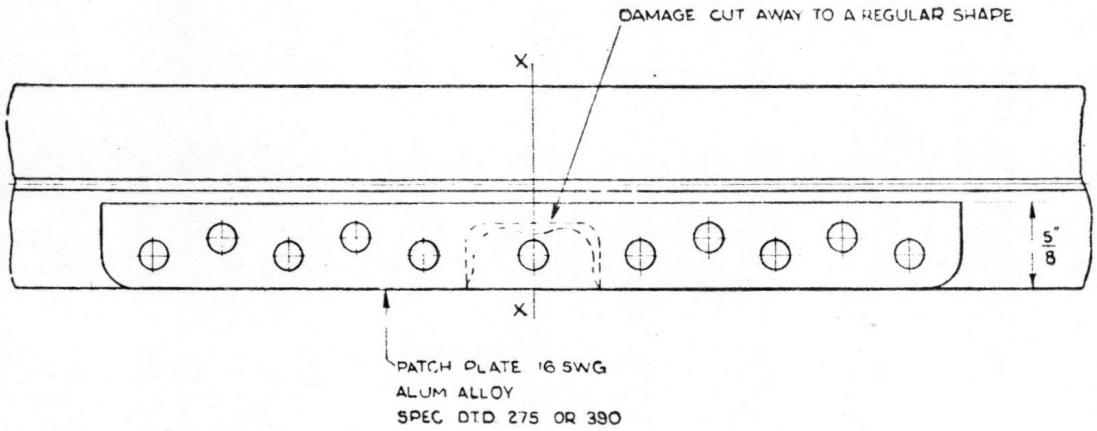
| 4 | PATCH REPAIR TO MAIN PLANE STRINGER | 4 |
|---|---|---|

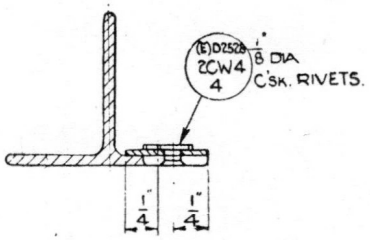



| 5 | PATCH REPAIR TO MAINPLANE STRINGER | 5 |
|---|---|---|



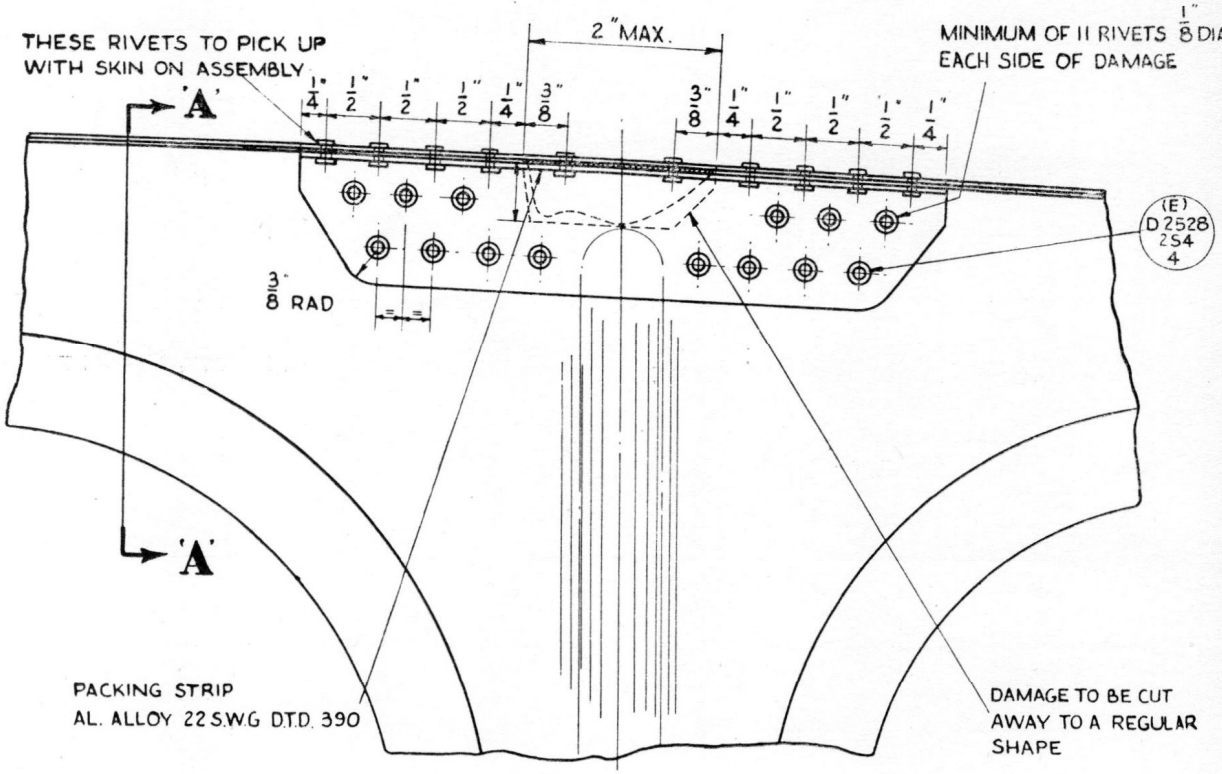

MINIMUM OF 5 RIVETS PER SIDE



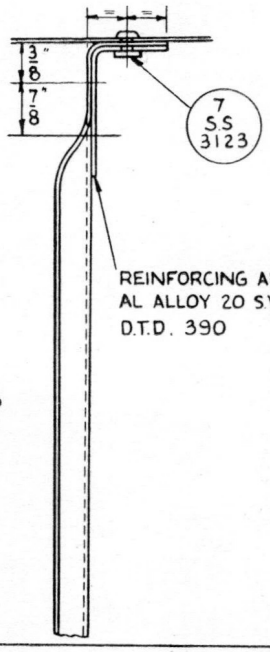

SECTION X-X

| 6 | PATCH REPAIR TO T-SECTION STRINGER | 6 |
|---|---|---|



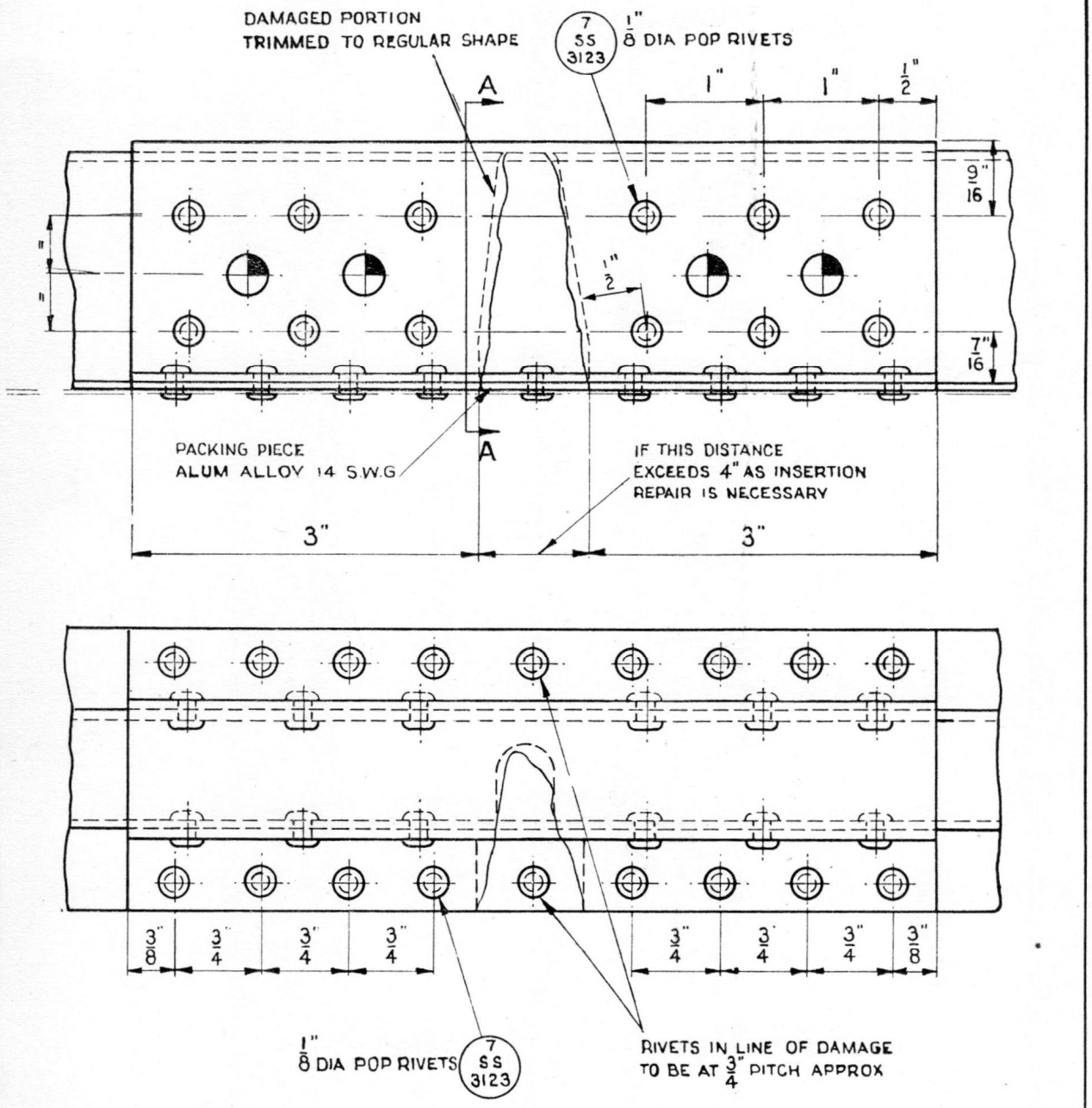

NOTE -

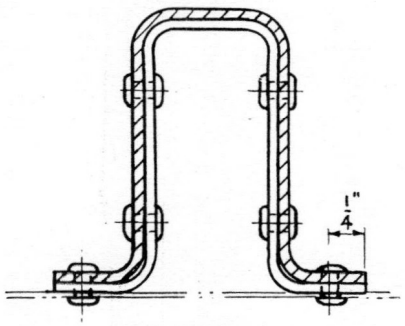
IT WILL BE NECESSARY TO REMOVE A SECTION OF SKIN BEFORE CARRYING OUT THIS REPAIR.
FOR REPLACEMENT OF SKIN DAMAGE SEE FIGS 2 & 3.
JOINTING COMPOUND APPLIED BETWEEN METAL FACES




SECTION 'A-A'

| 7 | PATCH REPAIR TO FLANGE OF OUTER WING RIB | 7 |
|---|---|---|




SECTION A-A

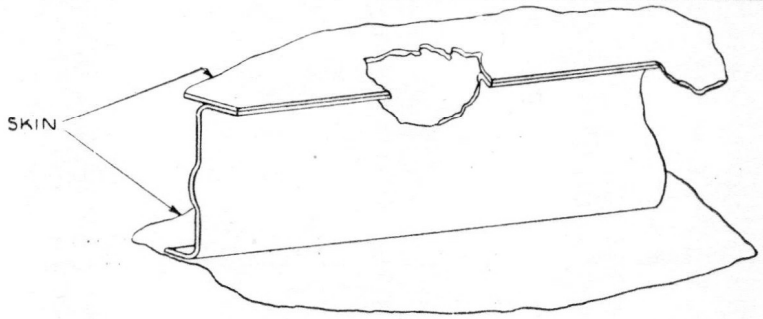
PATCH MADE FROM 14 S.W.G. ALUM ALLOY SPEC. D.T.D. 275 OR 390.

IF STIFFENER IS COMPLETELY BROKEN AWAY AN EXTRA 4 - POP RIVETS 3" 16 DIA. MUST BE ADDED EACH SIDE OF DAMAGE AS SHOWN THUS :- ⊕

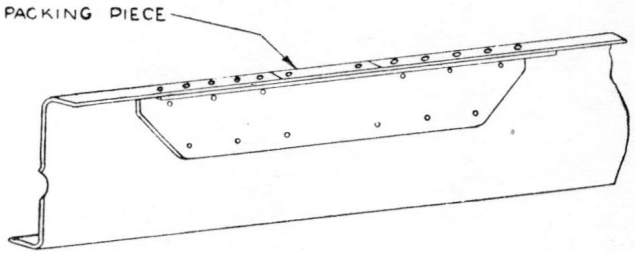
NOTE :-

PATCH PLATE TO BED DOWN ON JOINTING COMPOUND

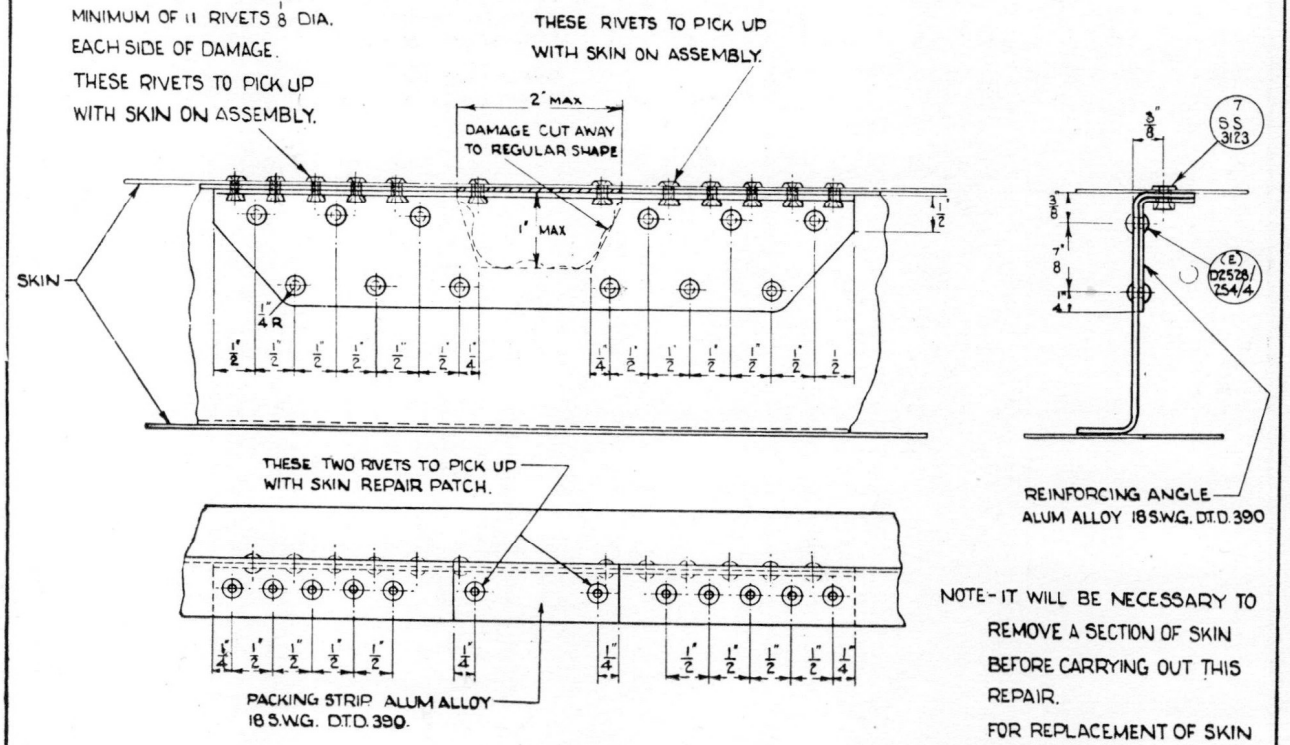
| 8 | PATCH REPAIR TO TANK – ACCESS DOOR STIFFENER | 8 |
|---|---|---|




VIEW SHOWING POSSIBLE DAMAGE




VIEW SHOWING REPAIRED RIB



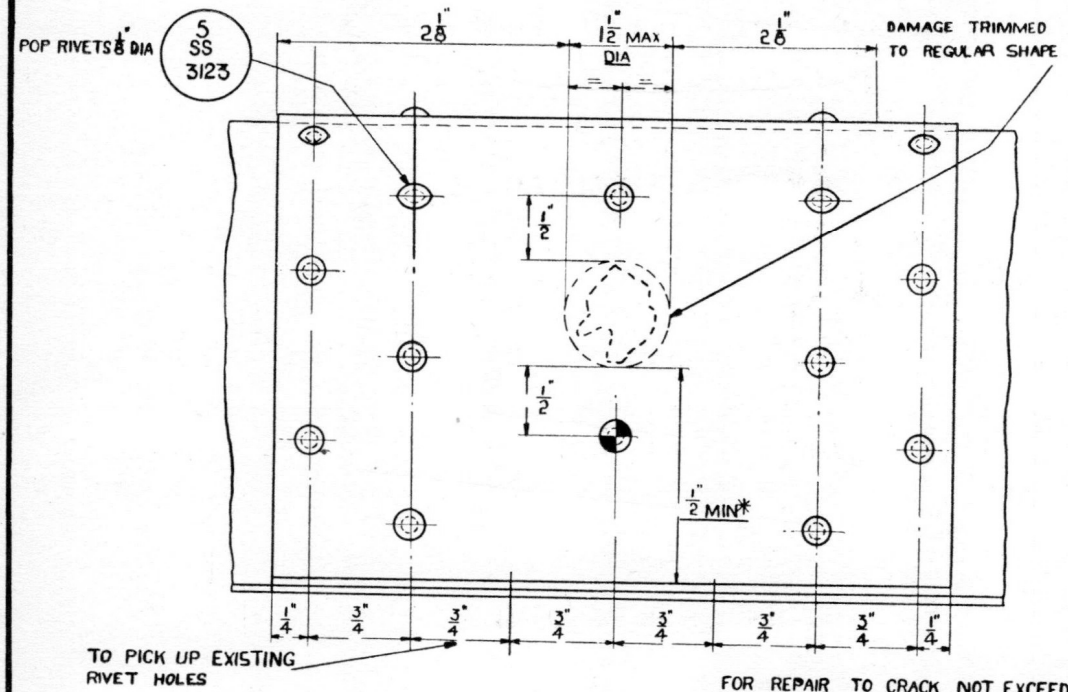

NOTE - IT WILL BE NECESSARY TO REMOVE A SECTION OF SKIN BEFORE CARRYING OUT THIS REPAIR.

FOR REPLACEMENT OF SKIN DAMAGE SEE FIG. 20

JOINTING COMPOUND APPLIED BETWEEN METAL FACES.

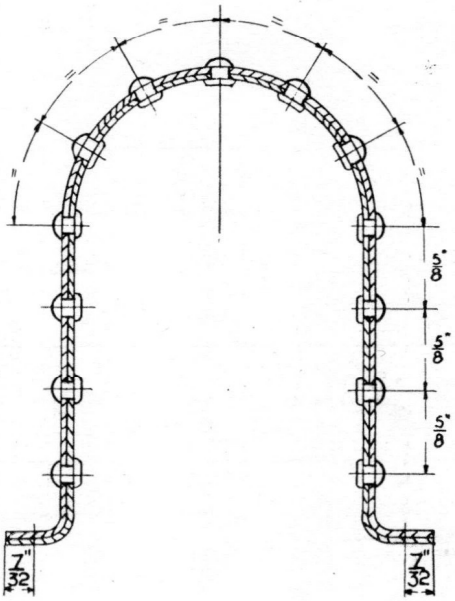
| 9 | PATCH REPAIR TO WEB & FLANGE OF WING TANK ACCESS DOOR RIB | 9 |
|---|---|---|

* WHEN THIS DIMENSION IS LESS THAN $\frac{3}{4}$" THE RIVET ⊕ MUST BE OMITTED.




FOR REPAIR TO CRACK NOT EXCEEDING $1\frac{1}{2}$" IN LENGTH A $\frac{3}{32}$ DIA TEAR HOLE MUST BE DRILLED AT EACH END OF CRACK & ALCLAD PLATE EACH SIDE OF DAMAGE

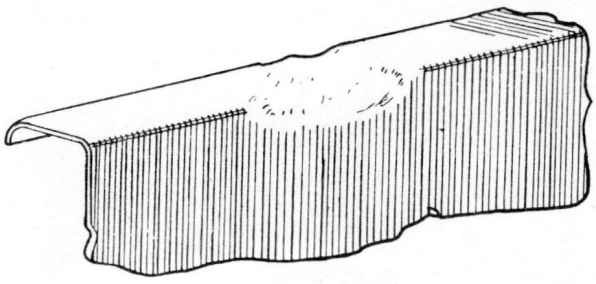
WHERE DAMAGE EXCEEDS $1\frac{1}{2}$" DIA AN INSERTION IS NECESSARY.




JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

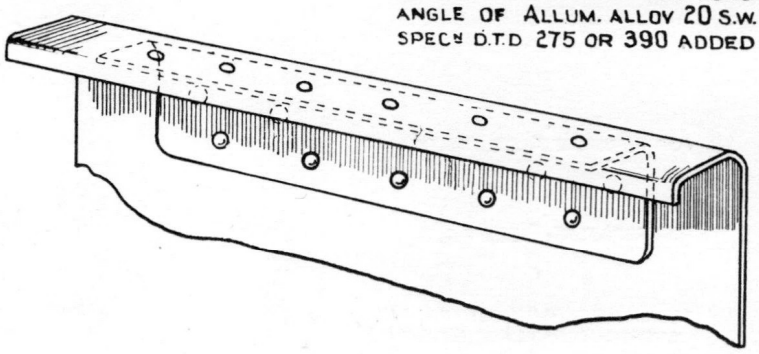
MATERIAL.- ALUM ALLOY 18 SWG
SPEC:- DTD 275 OR 390

| 10 | PATCH REPAIR TO FLAP SPAR | 10 |
|---|---|---|

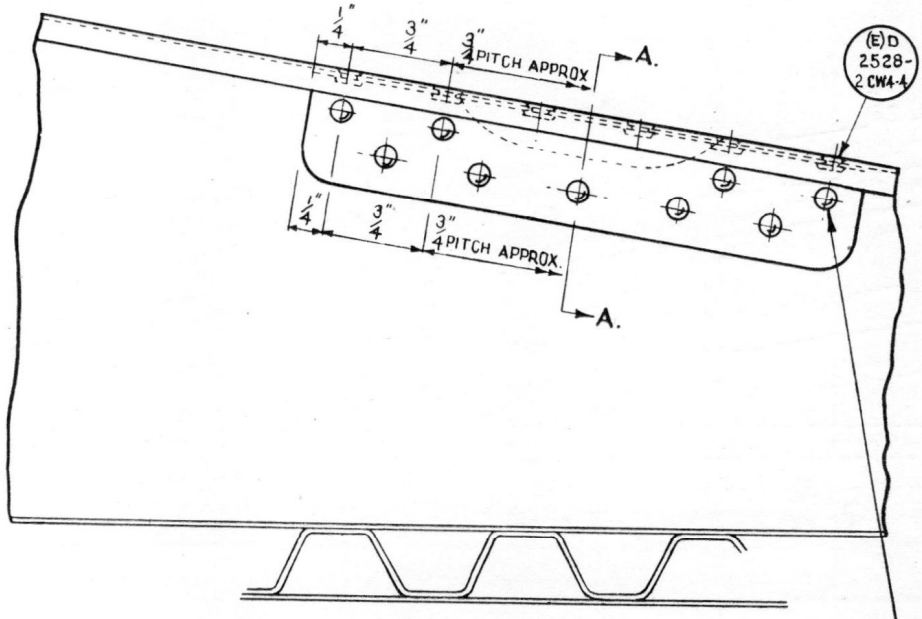


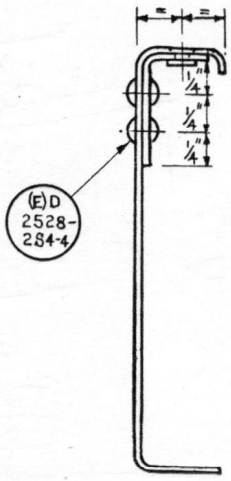
VIEW SHOWING DENT
IN FLANGE

FLANGE HAMMERED BACK TO NORMAL SHAPE AND REINFORCING ANGLE OF ALLUM. ALLOY 20 S.W.G SPECN D.T.D 275 OR 390 ADDED



JOINTING COMPOUND TO BE APPLIED BETWEEN FACES

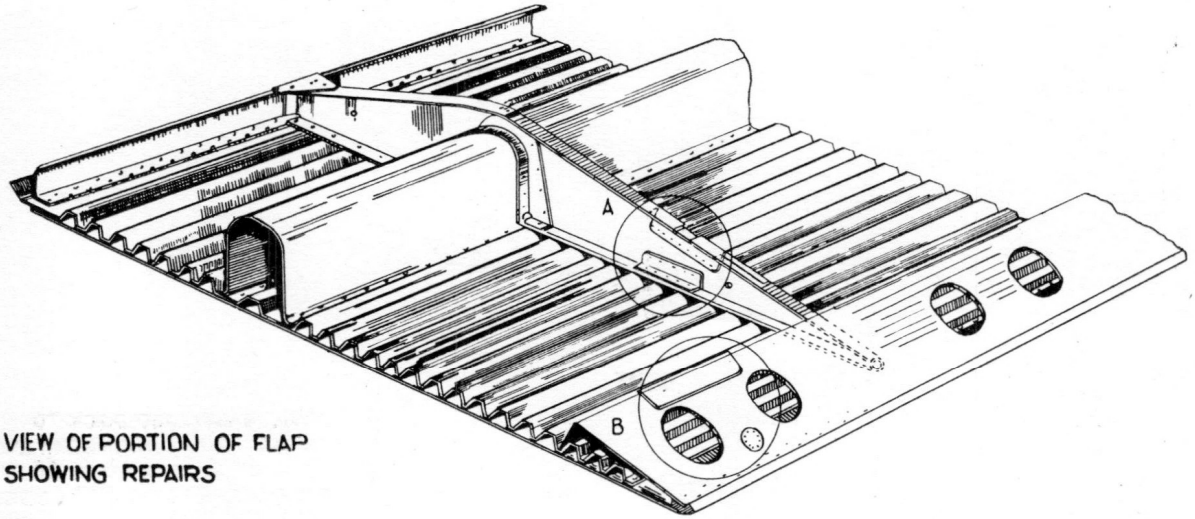



SECTION AT A-A

MINIMUM OF 4 RIVETS 1/8" DIA. EACH SIDE OF DAMAGE

| 11 | REPAIR TO DENT IN FLANGE-FLAP RIB | 11 |
|---|---|---|

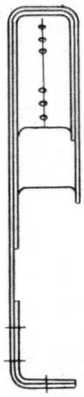



VIEW OF PORTION OF FLAP SHOWING REPAIRS

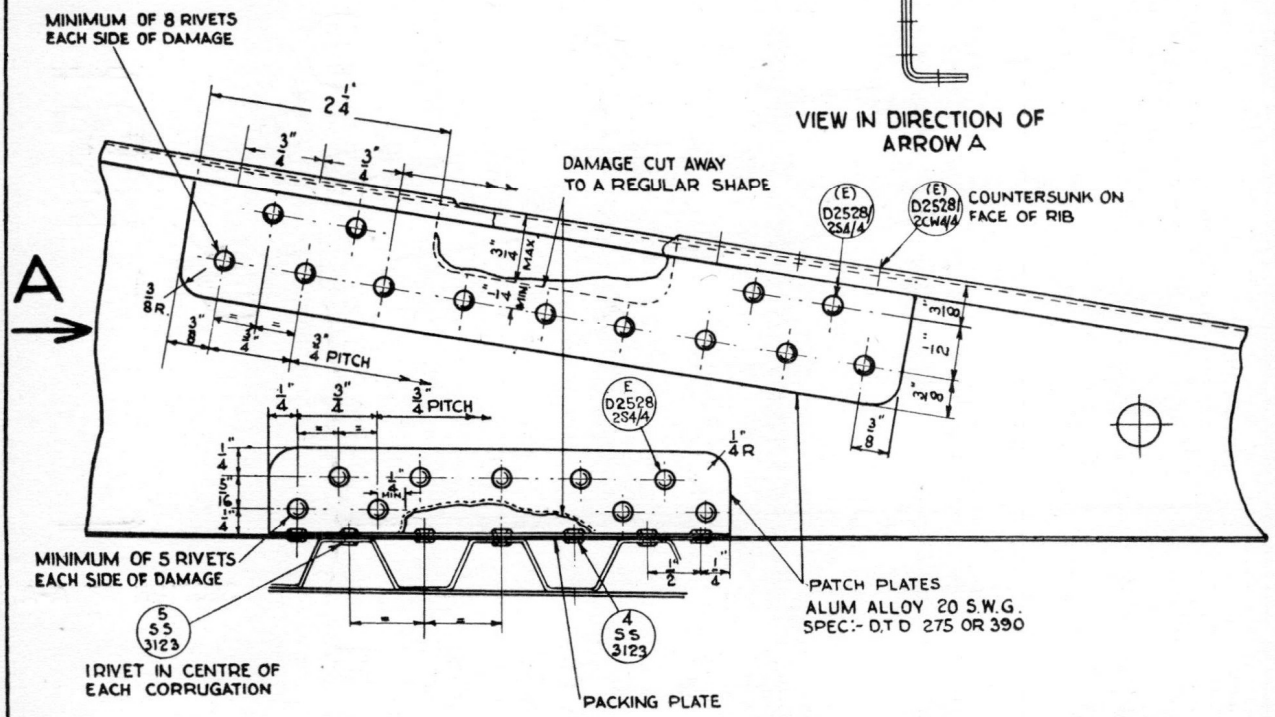
FOR REPAIR AT A SEE THIS FIG

FOR REPAIR AT B SEE FIG. 13

MAXIMUM PERMISSIBLE DAMAGE COVERED BY REPAIRS BELOW = 3" x $\frac{3}{4}$"

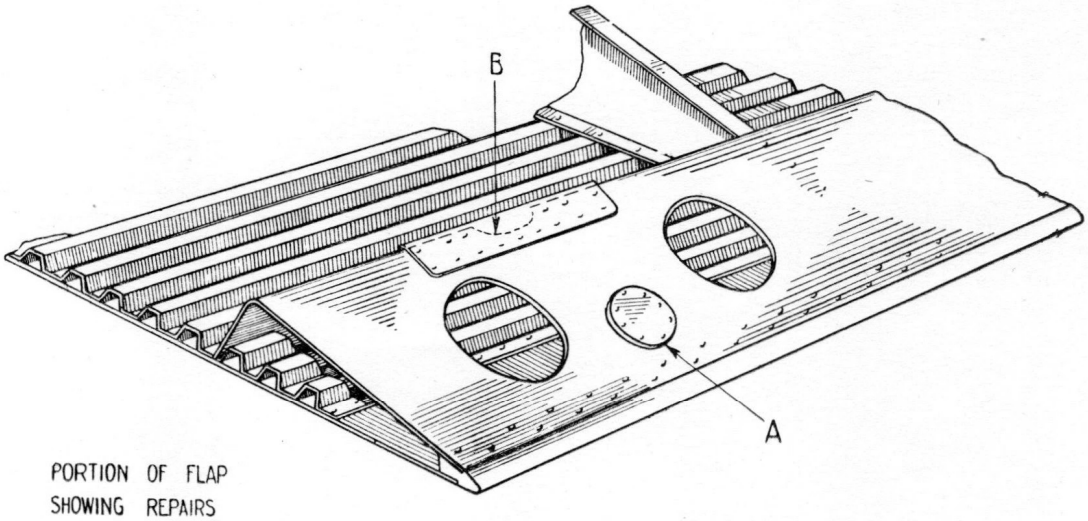


VIEW IN DIRECTION OF ARROW A

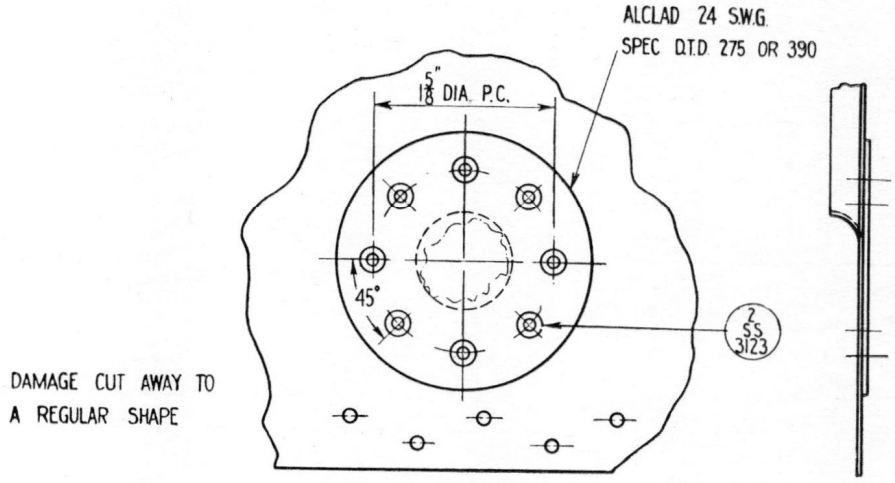



JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

| 12 | REPAIR TO FLAP RIB | 12 |
|---|---|---|

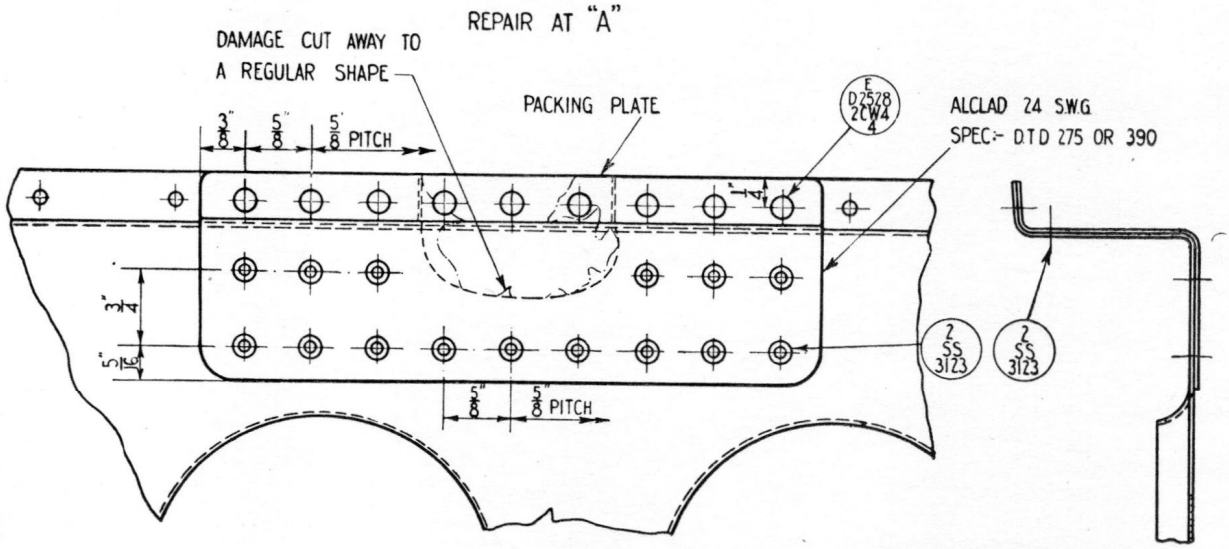



PORTION OF FLAP
SHOWING REPAIRS




DAMAGE CUT AWAY TO
A REGULAR SHAPE

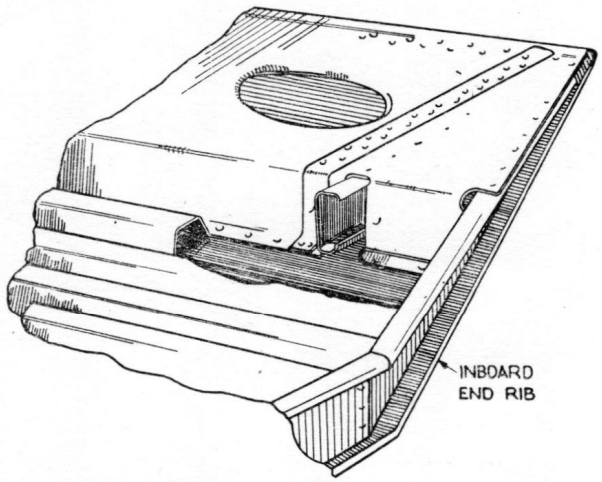
REPAIR AT "A"



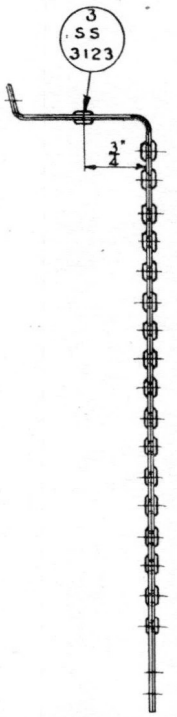

REPAIR AT "B"

JOINTING COMPOUND TO BE APPLIED
BETWEEN METAL FACES.

| 13 | REPAIR TO FLAP TRAILING EDGE STRIP | 13 |
|---|---|---|



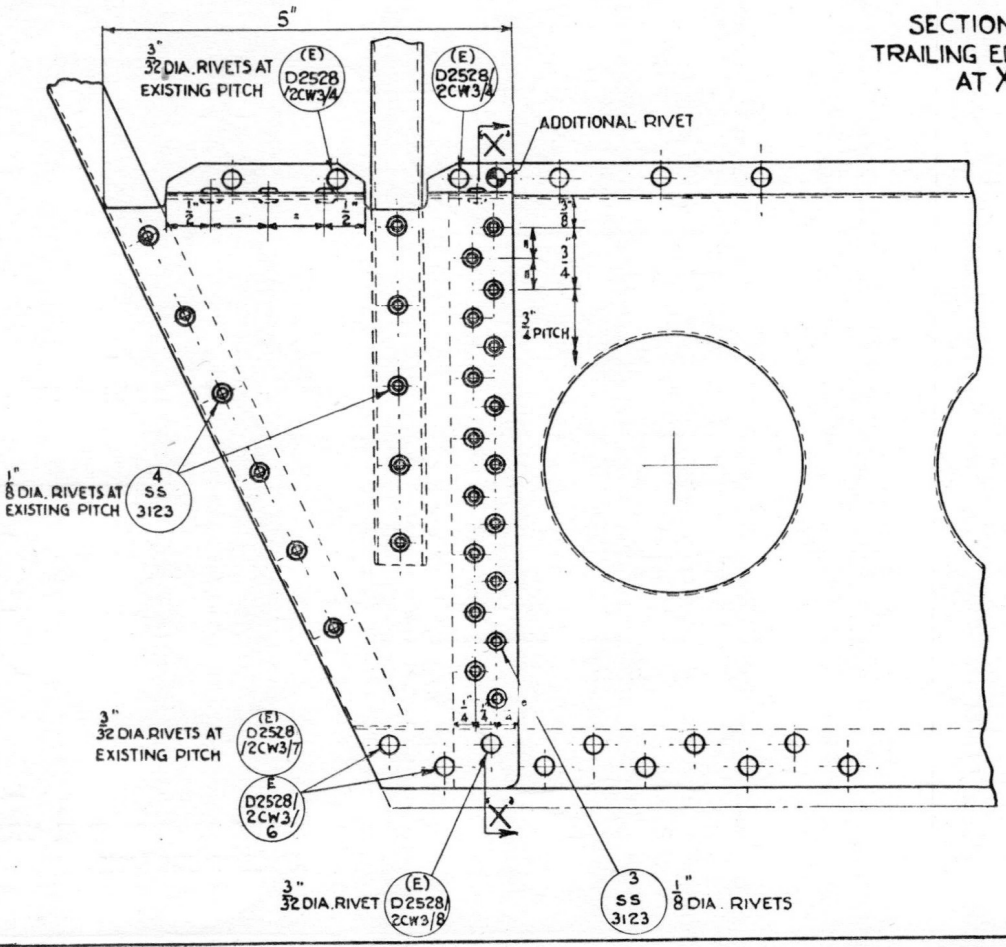

VIEW SHOWING REPAIR




SECTION THRO' TRAILING EDGE STRIP AT X-X

MATERIAL :- ALUM ALLOY SHEET 24 S.W.G.
SPEC :- D.T.D. 275 OR 390.

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES



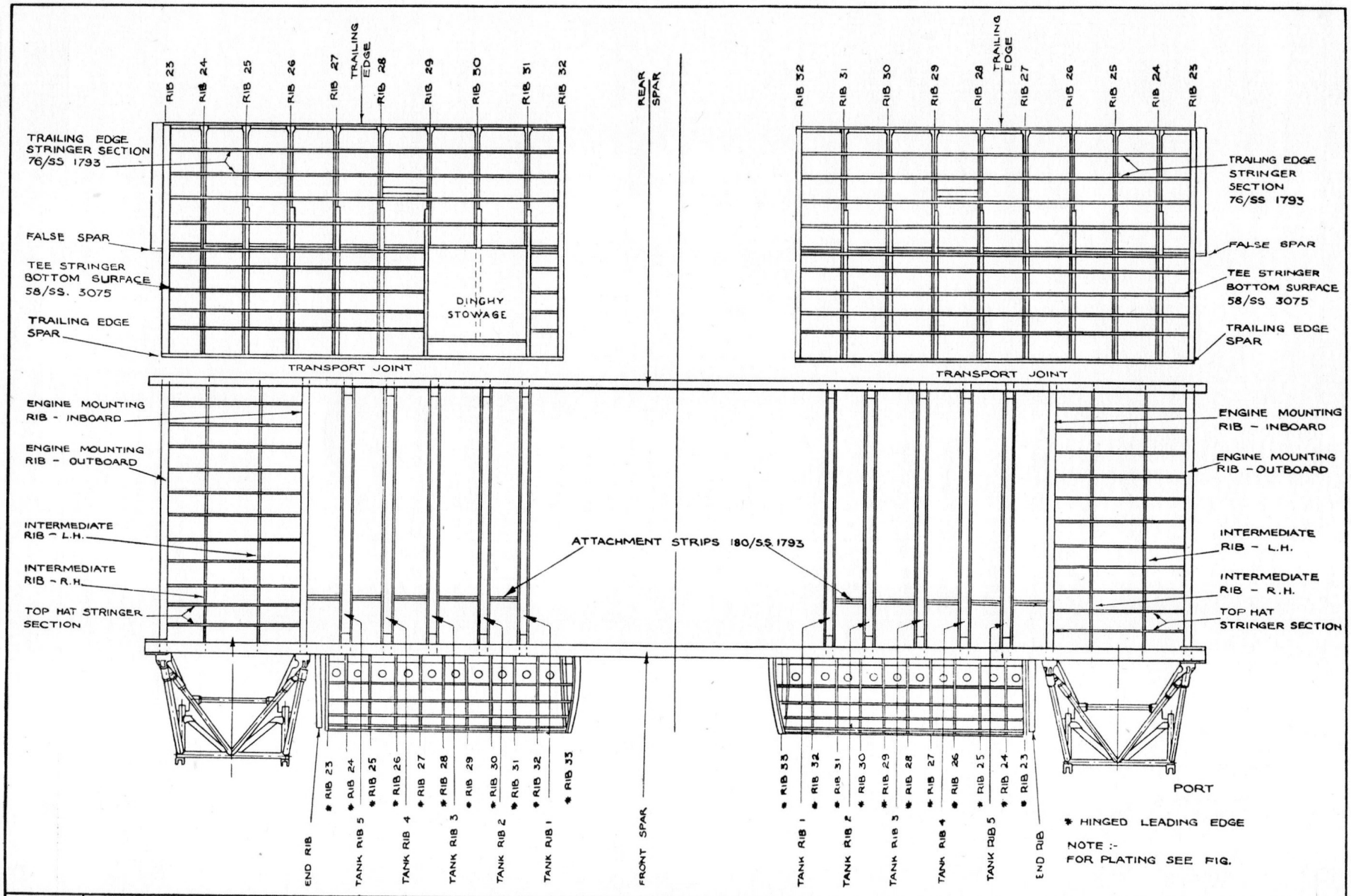
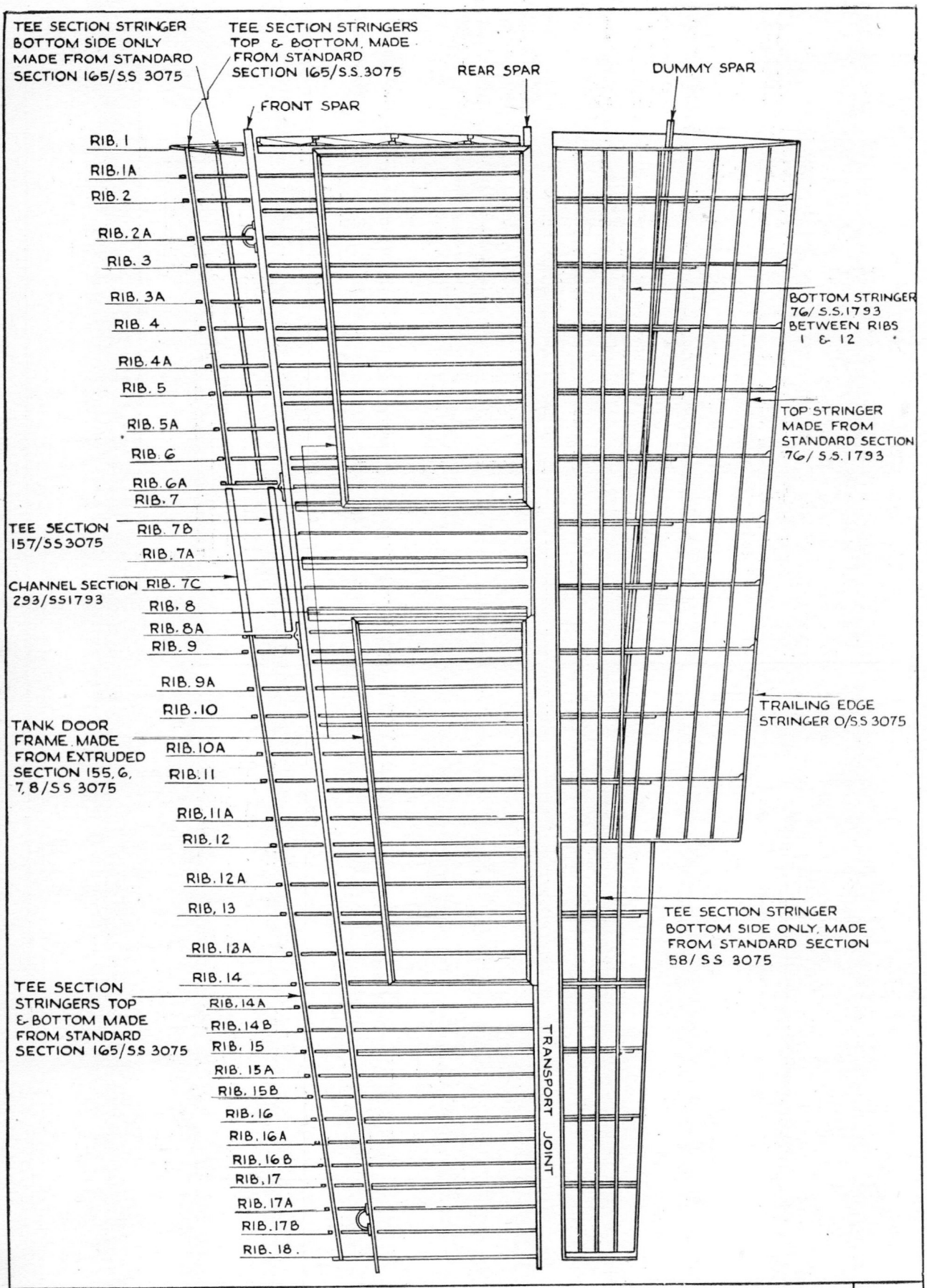
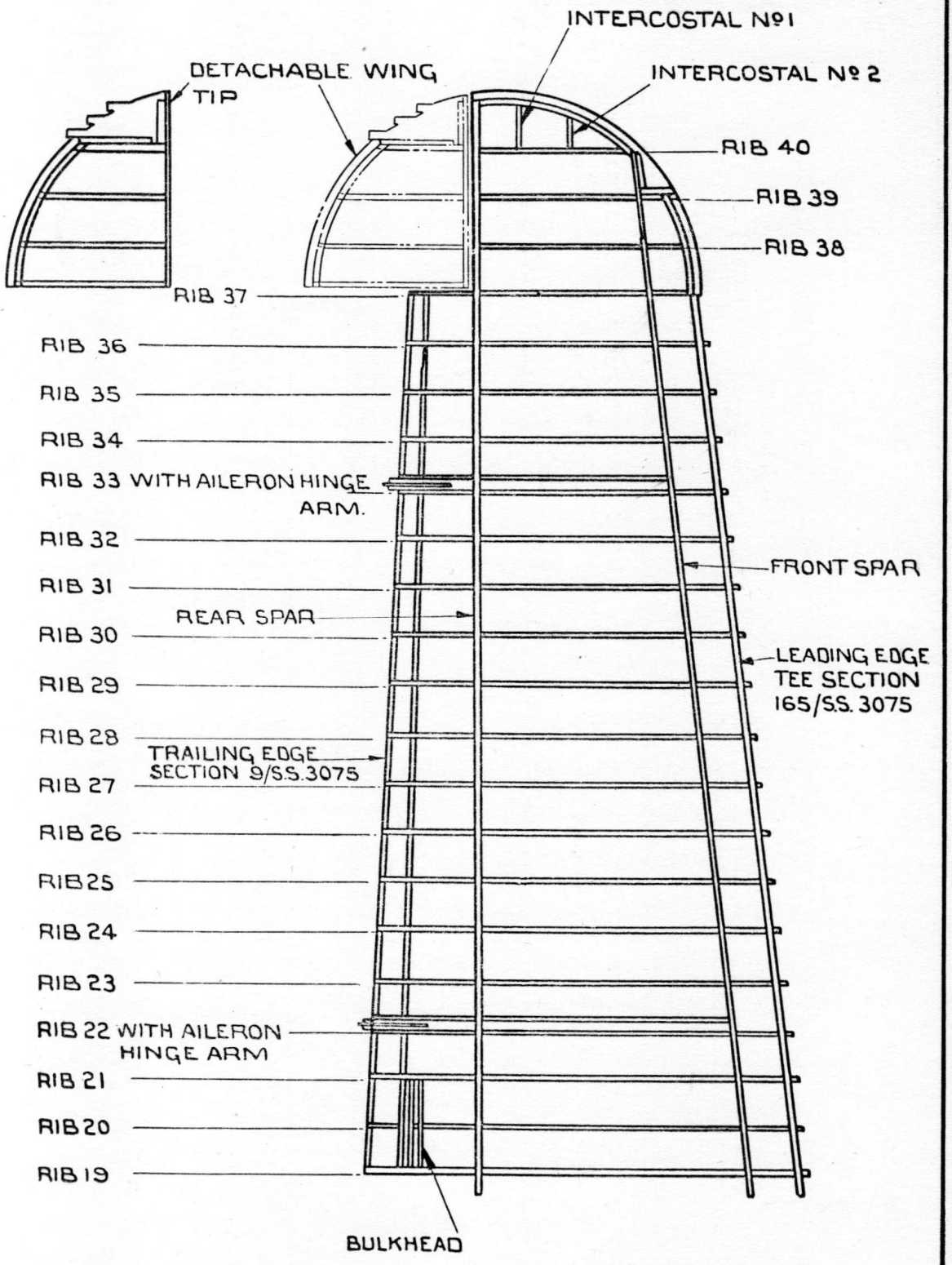



FIG.15

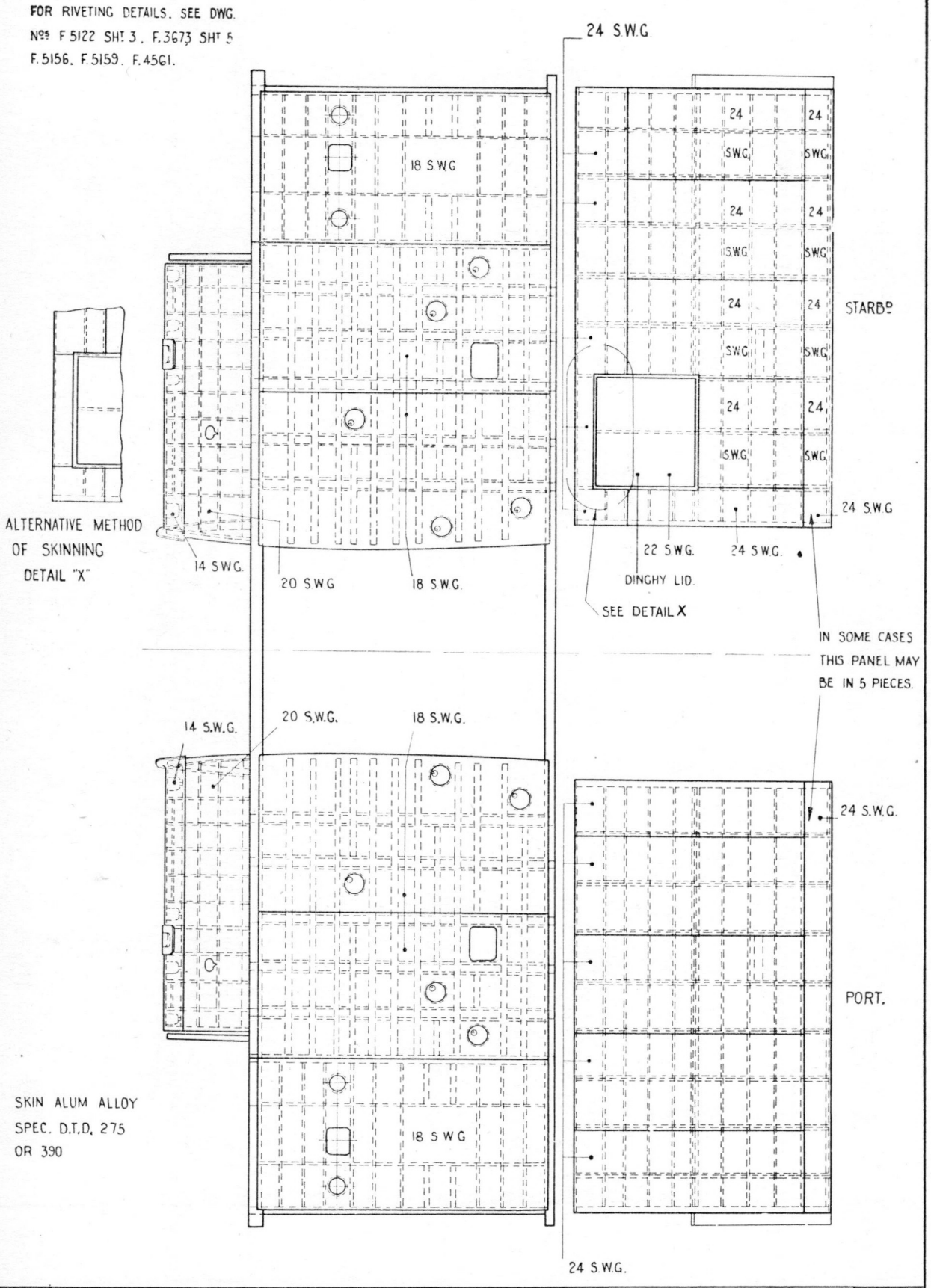
MAIN PLANE — CENTRE PORTION

FIG.15

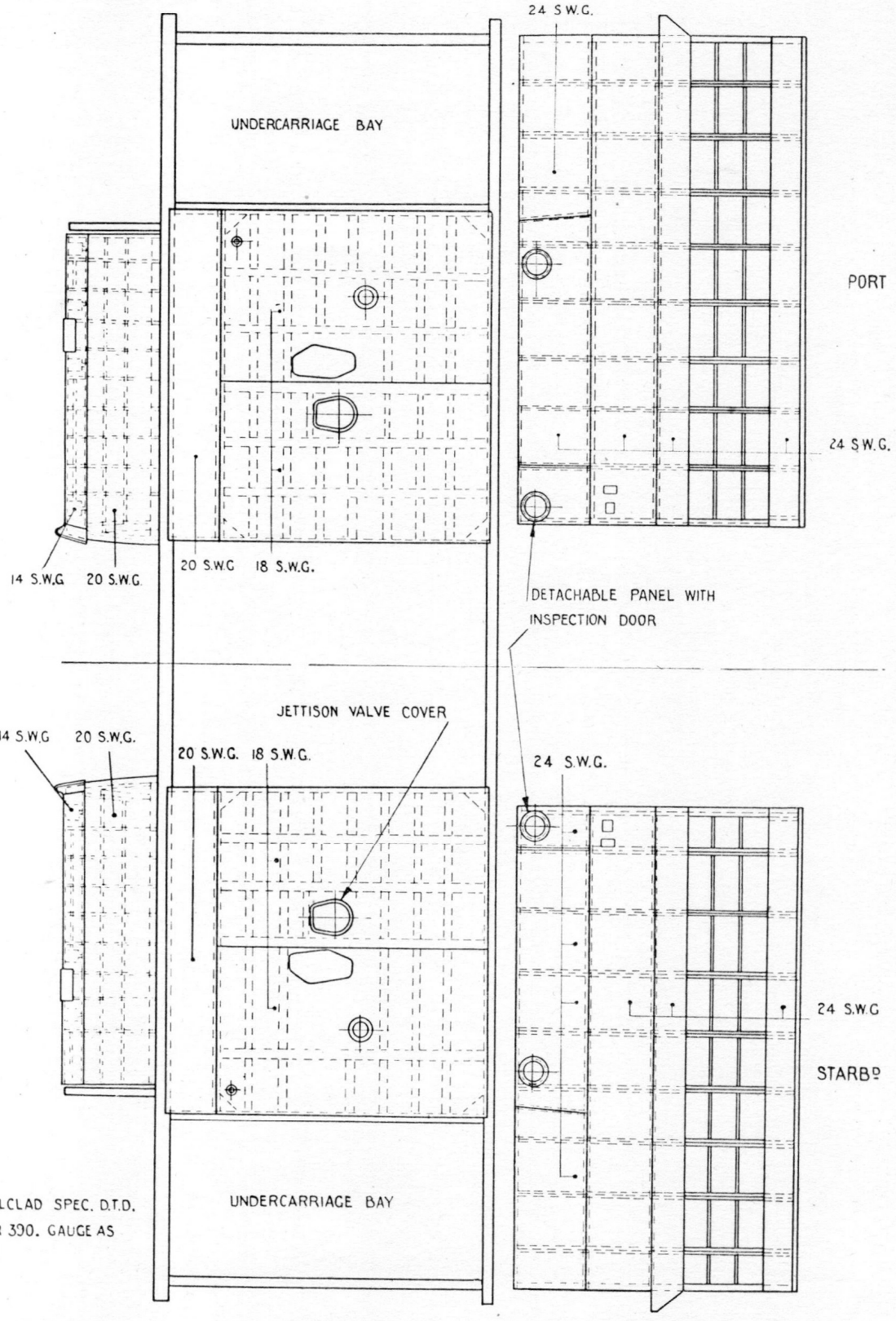

TEE SECTION STRINGER BOTTOM SIDE ONLY MADE FROM STANDARD SECTION 165/S.S 3075
TEE SECTION STRINGERS TOP & BOTTOM, MADE FROM STANDARD SECTION 165/S.S.3075
FRONT SPAR
REAR SPAR
DUMMY SPAR
RIB. 1
RIB. 1A
RIB. 2
RIB. 2A
RIB. 3
RIB. 3A
RIB. 4
RIB. 4A
RIB. 5
RIB. 5A
RIB. 6
RIB. 6A
RIB. 7
TEE SECTION 157/SS3075
RIB. 7B
RIB. 7A
CHANNEL SECTION 293/SS1793
RIB. 7C
RIB. 8
RIB. 8A
RIB. 9
RIB. 9A
RIB. 10
TANK DOOR FRAME MADE FROM EXTRUDED SECTION 155, 6, 7, 8/SS 3075
RIB. 10A
RIB. 11
RIB. 11A
RIB. 12
RIB. 12A
RIB. 13
RIB. 13A
RIB. 14
TEE SECTION STRINGERS TOP & BOTTOM MADE FROM STANDARD SECTION 165/SS 3075
RIB. 14A
RIB. 14B
RIB. 15
RIB. 15A
RIB. 15B
RIB. 16
RIB. 16A
RIB. 16B
RIB. 17
RIB. 17A
RIB. 17B
RIB. 18.
TRANSPORT JOINT
BOTTOM STRINGER 76/S.S.1793 BETWEEN RIBS 1 & 12
TOP STRINGER MADE FROM STANDARD SECTION 76/S.S.1793
TRAILING EDGE STRINGER O/S.S 3075
TEE SECTION STRINGER BOTTOM SIDE ONLY, MADE FROM STANDARD SECTION 58/S.S 3075



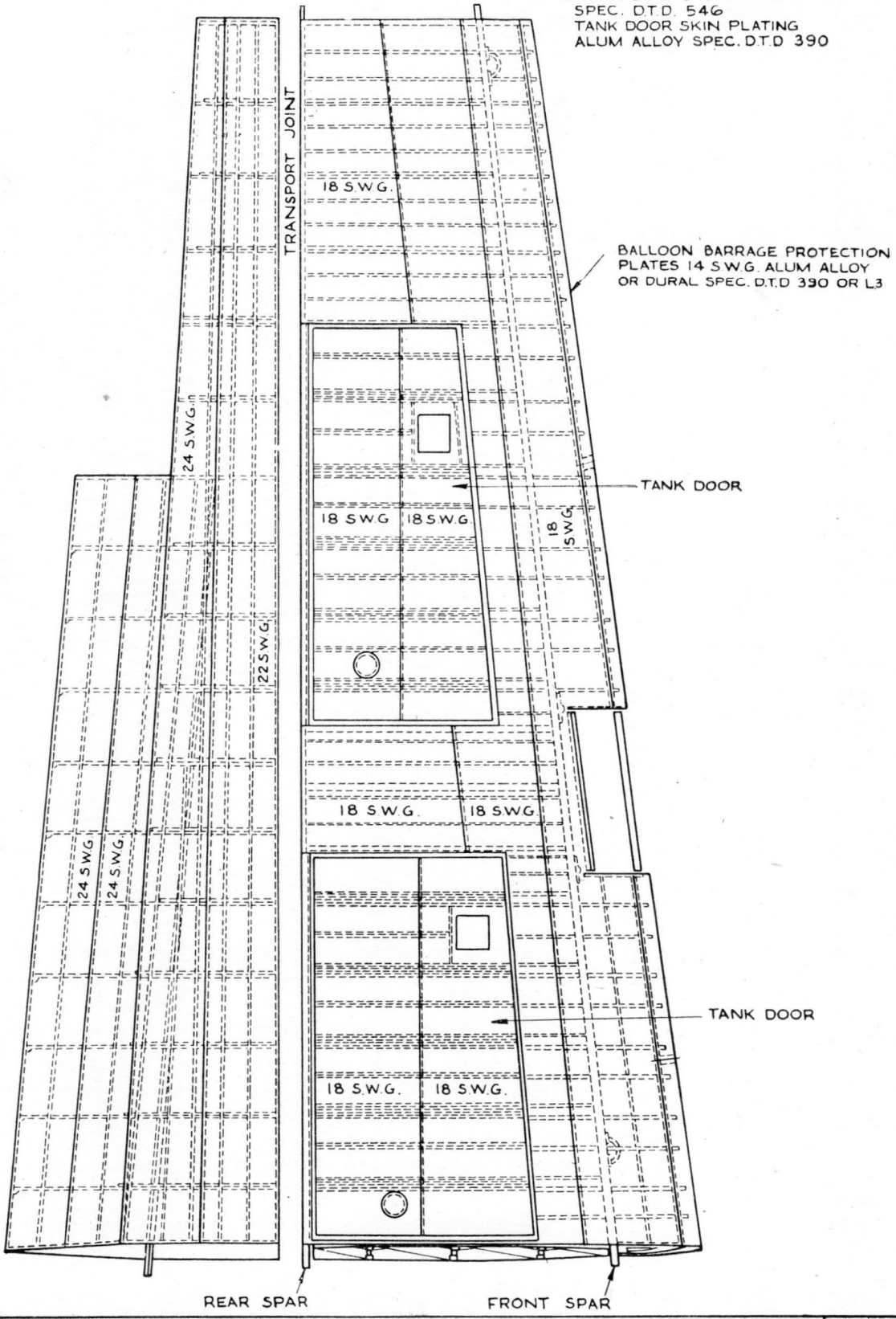

| 17 | OUTER PORTION - OUTER PLANE | 17 |
|---|---|---|



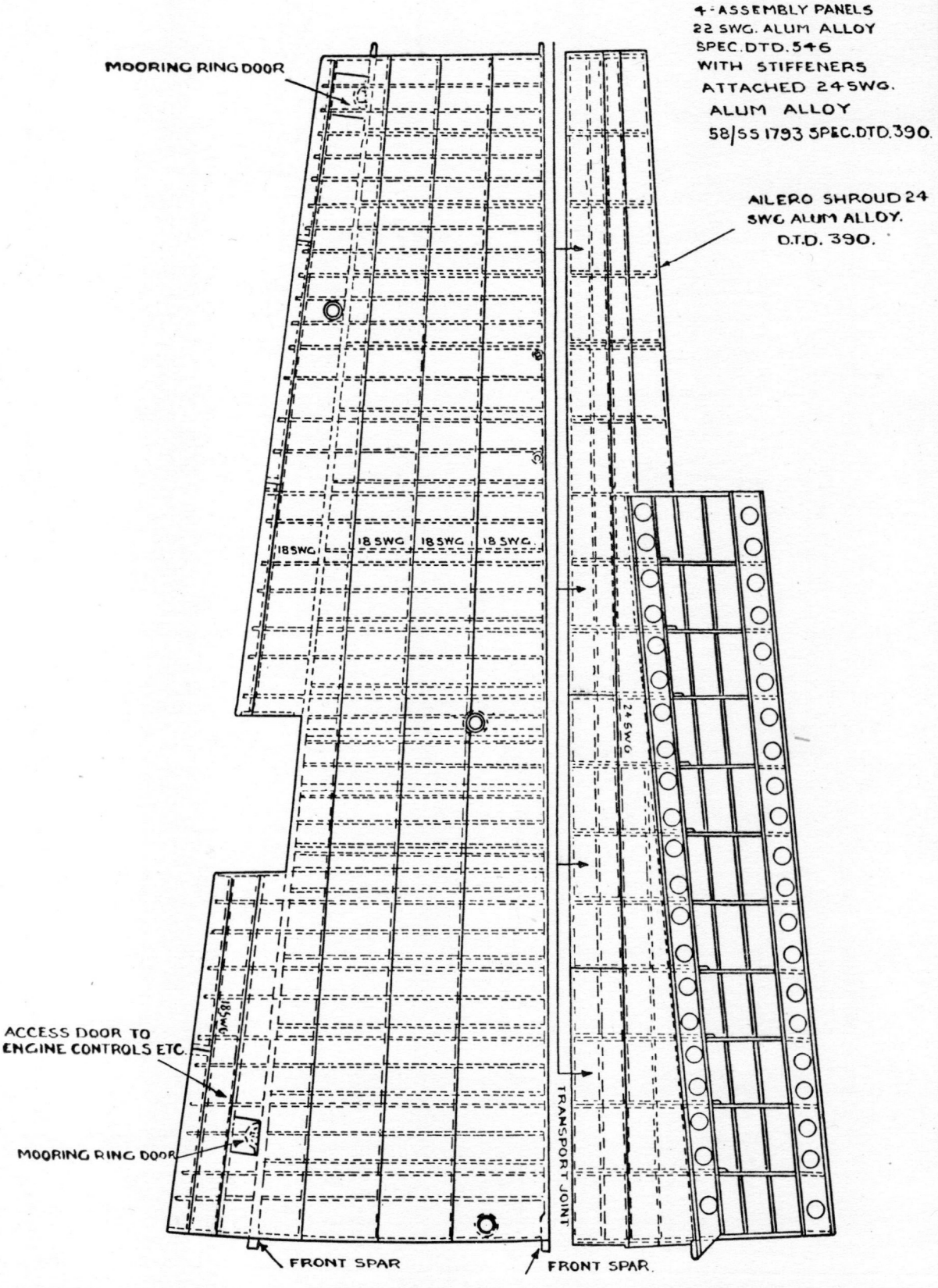

# 18 PLATING & RIVETING - MAIN PLANE CENTRE PORTION TOP SKIN 18



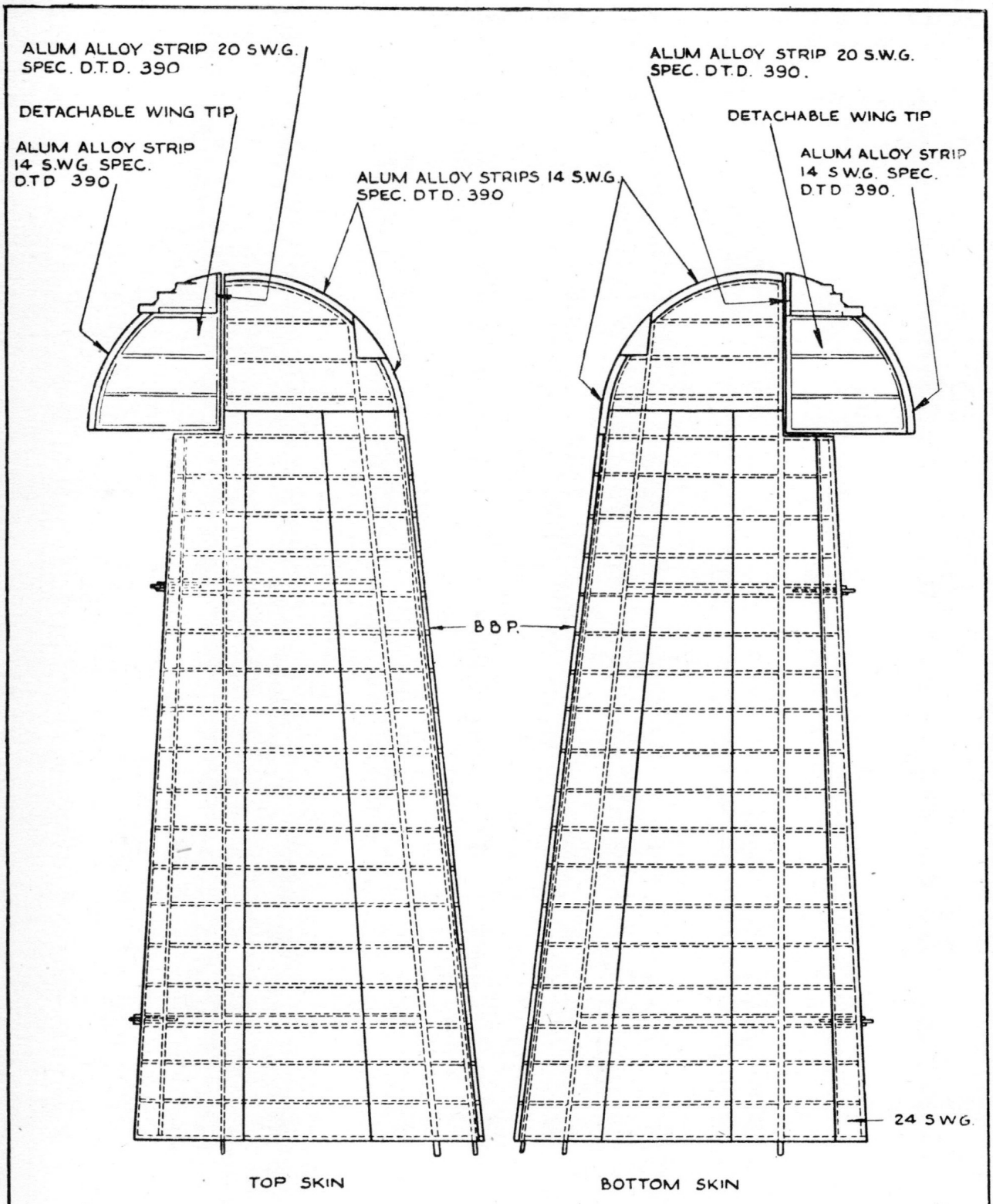

# 19 PLATING-BOTTOM SURFACE-MAINPLANE-CENTRE PORTION 19




20 | PLATING & RIVETING – MAINPLANE – INNER PORTION – OUTER PLANE – TOP SURFACE | 20



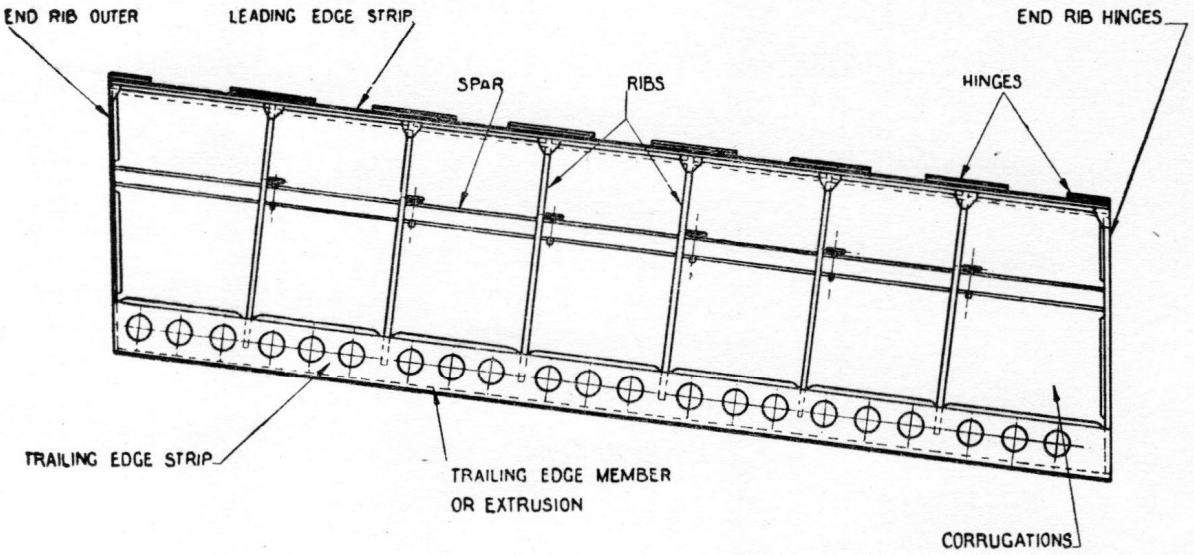

# 21 PLATING & RIVETING-MAIN PLANE-INNER PORTION -OUTER PLANE-BOTTOM SURFACE 21



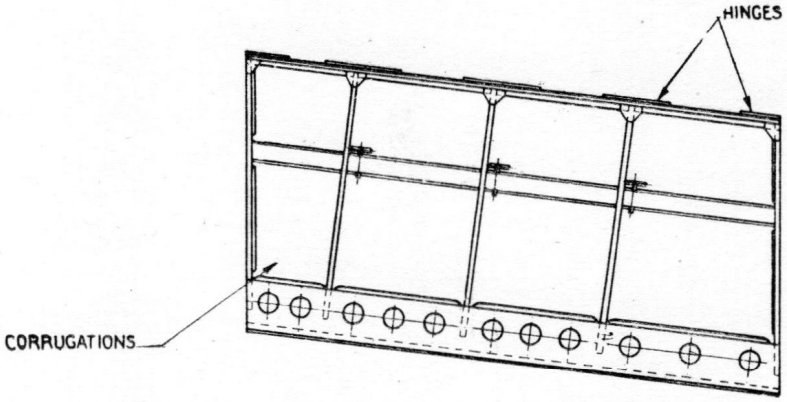

ALL PLATING ALUM ALLOY 20 S.W.G
UNLESS SHOWN OTHERWISE SPEC. D.T.D 390
B.B.P PLATES ALUM ALLOY 14 S.W.G. SPEC D.T.D 390.

FOR DETAILS OF SKINNING AND RIVETING SEE
DRG Nos F.5171 AND F.5172

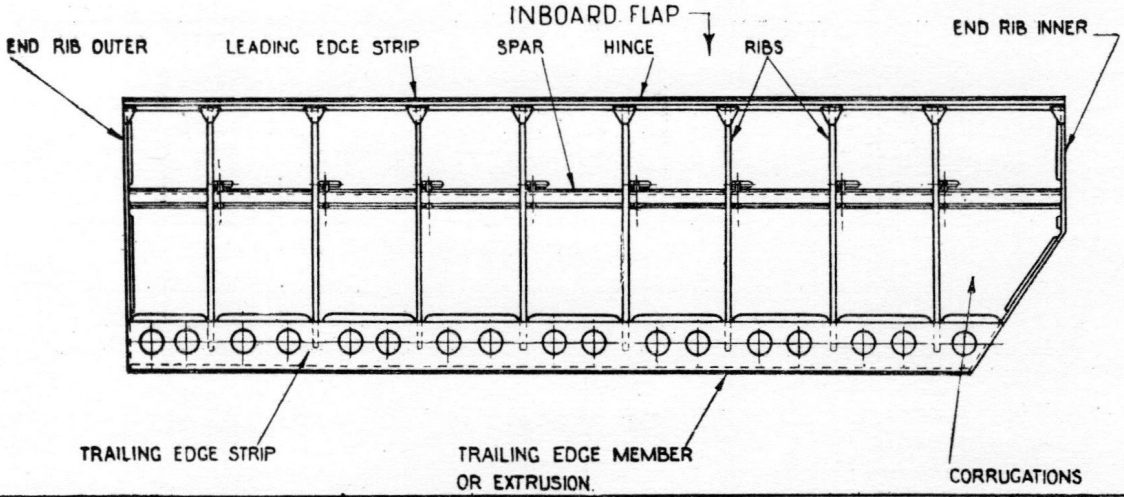
| 22 | PLATING & RIVETING – OUTER PORTION – OUTER PLANE | 22 |
|---|---|---|

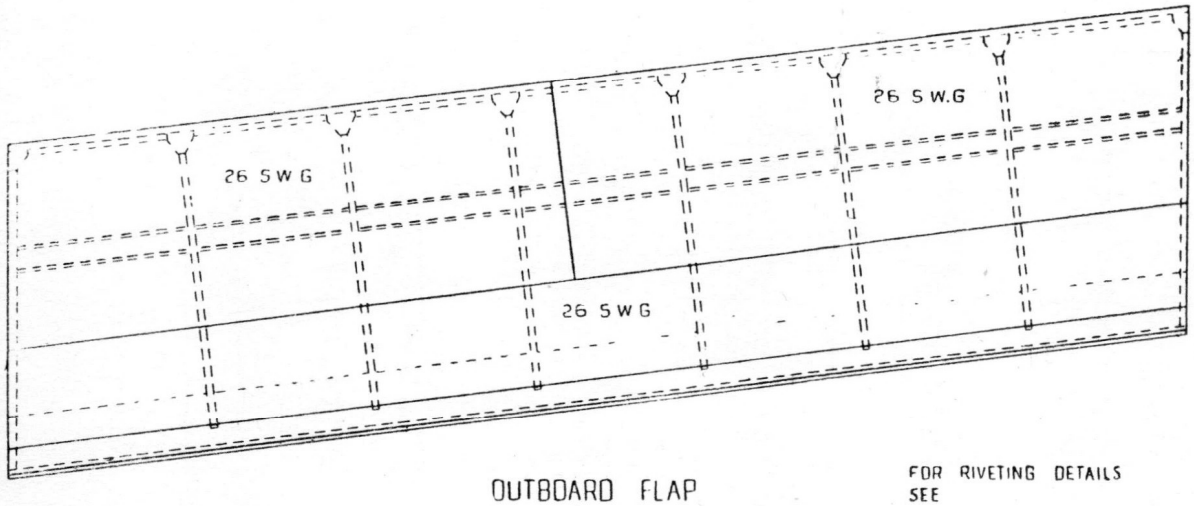



OUTBOARD FLAP




OUTBOARD FLAP EXTENSION

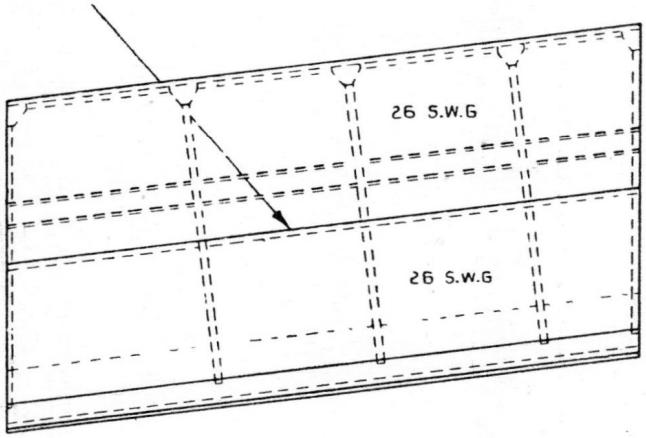





OUTBOARD FLAP

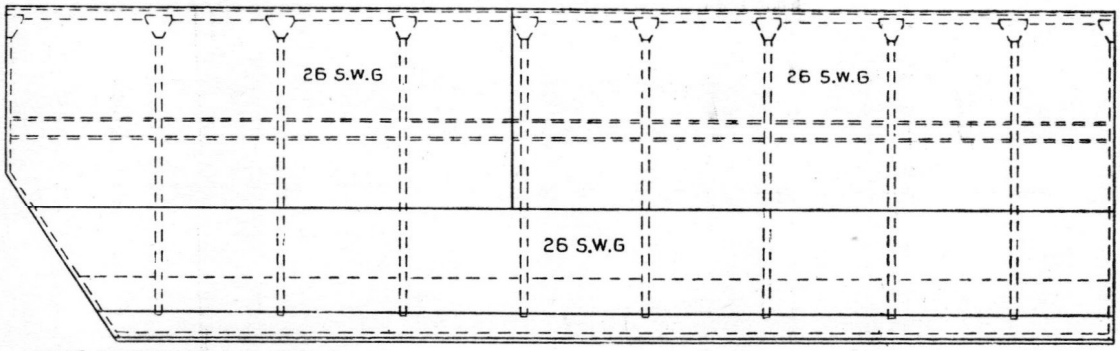
FOR RIVETING DETAILS SEE

SKIN JOINT IF SKIN CANNOT BE OBTAINED IN ONE PIECE




OUTBOARD FLAP EXTENSION

FOR RIVETING DETAILS SEE



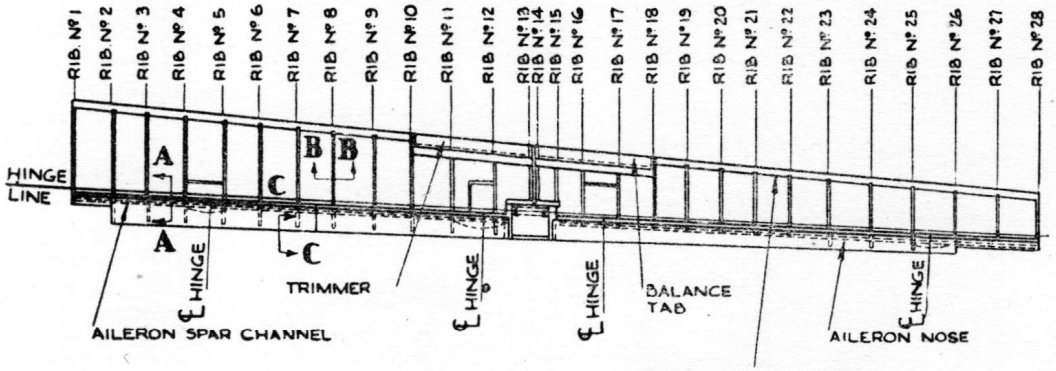

INNER CORRUGATED SKIN 26 S.W.G

ALL SKIN ALUM ALLOY

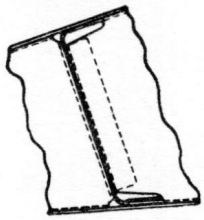
SPEC. :- D.T.D. 275, 390 OR 546

INBOARD FLAP

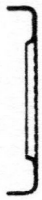
FOR RIVETING DETAILS SEE



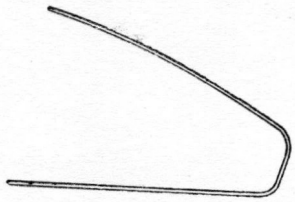

FOR PLATING AND RIVETTING OF AILERON SEE FIG.



TYPICAL SECTION AT **A-A**
SPAR CHANNEL
ALUM ALLOY 14G.
SPEC DTD 390

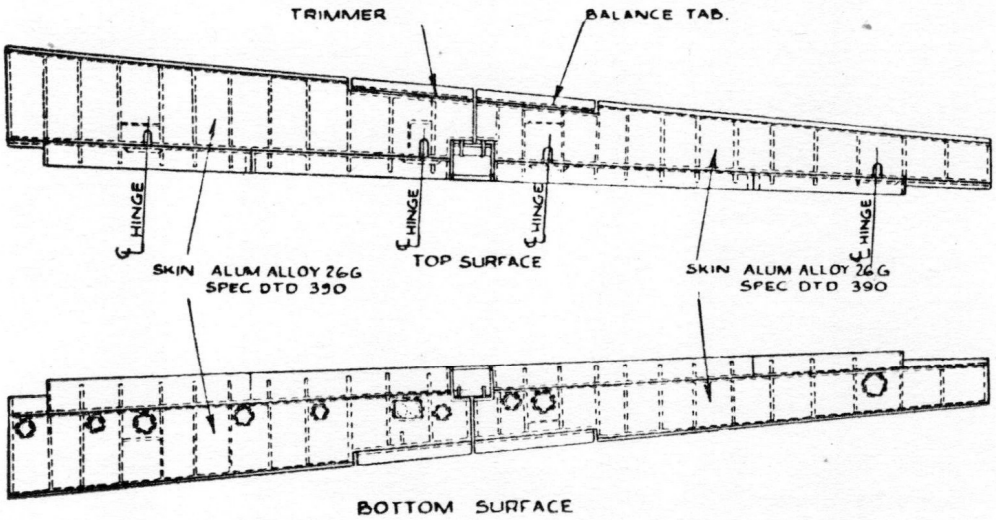


TYPICAL SECTION **B-B**
RIB WEB
ALUM ALLOY 24G
SPEC DTD 390



TYPICAL SECTION AT **C-C**
ALUM ALLOY 14G
SPEC DTD 213

25 AILERONS 25




FOR RIVETING DETAILS SEE ORG Nº F 5628 SHT 4.

FOR AILERON STRUCTURE SEE FIG. 25.

26 PLATING AND RIVETING – AILERON 26

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART I — CHAPTER 7

## Tail Plane and Elevator

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## TAIL PLANE AND ELEVATORS

### General

1. The tail plane structure comprises spars built up of light alloy extruded booms and sheet webs, nose and centre portion ribs, and a light alloy skin.

2. Great care must be taken to prevent the accumulation of moisture within the tail planes as this will cause corrosion. All repair patches on the outer skin must therefore be rendered watertight in accordance with the appropriate instruction given in Chapter 1. For details of the tail plane see figs. 5 and 6.

## TAIL PLANE

## SPARS

### Boom

### Negligible Damage

3. In the free edges of the boom between ribs 3 and 7, nicks and abrasions which, when cleaned out, are not deeper than 1/8 in. and not longer than 1½ in. may be neglected. In-board of rib 3 and outboard of rib 7 negligible damage in the free edges of the boom is confined to nicks and abrasions which, when cleaned out, are not deeper than 1/16 in. and not longer than 1 in.

### WEB

### Negligible Damage

4. Between ribs Nos. 3 and 7 damage which occurs in the middle third of the web between the spar boom and which, when cleaned out, does not exceed 1¼ in. in diameter may be neglected. Negligible damage to the spar web outside the middle third between these two rib stations is restricted to damage which, when cleaned out, does not exceed ½ in. in diameter.

5. Inboard of rib 3 and outboard of rib 7 damage which occurs in the middle third of the web between the spar booms and which, when cleaned out, does not exceed 5/8 in. diameter may be neglected. Negligible damage to the spar web outside the middle third at these two positions is restricted to damage which, when cleaned out, does not exceed ¼ in. diameter.

## RIBS

### General

6. The tail plane ribs are similar in construction to those of the main plane and comprise nose and centre portions.

### Negligible Damage

7. Smooth isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided that they do not cause distortion of the nose skin. If the nose skin is distorted as a result of damage it should be dressed back into position after the attachment rivets have been removed. Damage to the skin as the result of this operation should be repaired as described in para. 11.

### CENTRE PORTION

### Negligible Damage

8. Damage to the rib web which, when cleaned out, does not exceed 1 in. diameter, may be neglected provided that it is not closer than 1 in. to any lightening hole or fitting. Smooth isolated dents in a rib flange may be neglected provided that they are free from cracks, abrasions and sharp corners, and not deeper than 1/16 in.

### Damage Repairable by Patching

9. Damage in the form of perforations or cracks should be repaired in a manner similar to that employed for the repair of the main plane ribs, and described in Chapter 6. Cracks which occur at the inner extremity of a stringer cut out should be repaired as shown in Chapter 4, fig. 6.

## SKIN

## TOP AND BOTTOM

### Negligible Damage

10. Damage to the nose skin which, when trimmed to a regular shape, is not larger than ½ in. diameter, may be neglected. Perforations in the skin which occur anywhere between the spars may be neglected provided that, when cleaned out, they are not larger than 1 in. diameter and not closer than 1 in. to any rib or stringer. Such a hole should be covered with a doped-on fabric patch.

### Damage Repairable by Patching

11. Damage greater than negligible should be repaired by patching as shown in fig. 1. Patch repairs to the skin between the spars should be made in a manner similar to those for the main plane skin. (See Chapter 6.)

## STRINGERS

### General

12. The tail plane stringers are similar to the lipped angle-section stringers employed in the main planes, and should be dealt with in accordance with the relevant definitions and procedure given in Chapter 6.

## ELEVATORS

### General

13. The elevators comprise steel tubular spars, with ribs, stringers and skin of light alloy.

## SPAR

### Negligible Damage

14. Small surface abrasions which, when smoothed out with fine emery cloth, are not deeper than 0.02 in., may be neglected. Smooth isolated dents free from cracks, abrasions and sharp corners, may be neglected provided that they are not deeper than 1/8 in. and can be encompassed in a 1 in. diameter circle.

## RIBS

### Negligible Damage

15. Damage to the rib web which, when

cleaned out, does not exceed ½ in. diameter, may be neglected provided that it is not closer than 1 in. to any lightening hole or fitting. Smooth isolated dents in the rib flange may be neglected provided that they are free from cracks, abrasions and sharp corners and not deeper than 1/16 in.

## STRINGERS

### Negligible Damage

16. Smooth isolated dents free from cracks, abrasions and sharp corners, may be neglected, provided that they are not deeper than 3/32 in. and have not caused loosening of adjacent attachments. Damage to an edge of a stringer which, when cleaned out, is not deeper than 1/16 in. and not longer than ½ in. may also be neglected. Where damage to a stringer involves distortion of the adjacent skin, the attachment rivets must be removed and the skin and stringer carefully restored to shape.

### Damage Repairable by Patching

17. Damage to the flanges of the stringers not exceeding 1¼ in. long by 5/16 in. wide should be repaired by patching or insertion as shown in fig. 2 and fig. 3.

## TRAILING EDGE STRINGER

### Negligible Damage

18. Smooth isolated dents free from cracks, abrasions and sharp corners may be neglected provided that they are not deeper than 0.03 in. and can be encompassed by a ¾ in. diameter circle.

## SKIN

## TOP AND BOTTOM

### Negligible Damage

19. Damage to the skin which, when trimmed to a regular shape, is not larger than ½ in. diameter, may be neglected. Such a hole should be covered with a doped-on fabric patch.

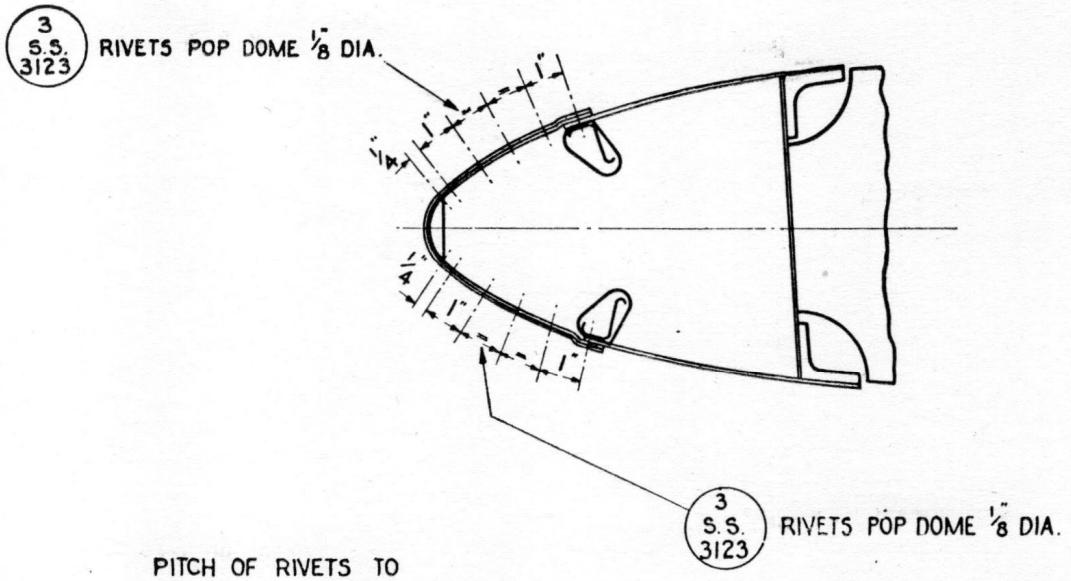
### Damage Repairable by Patching

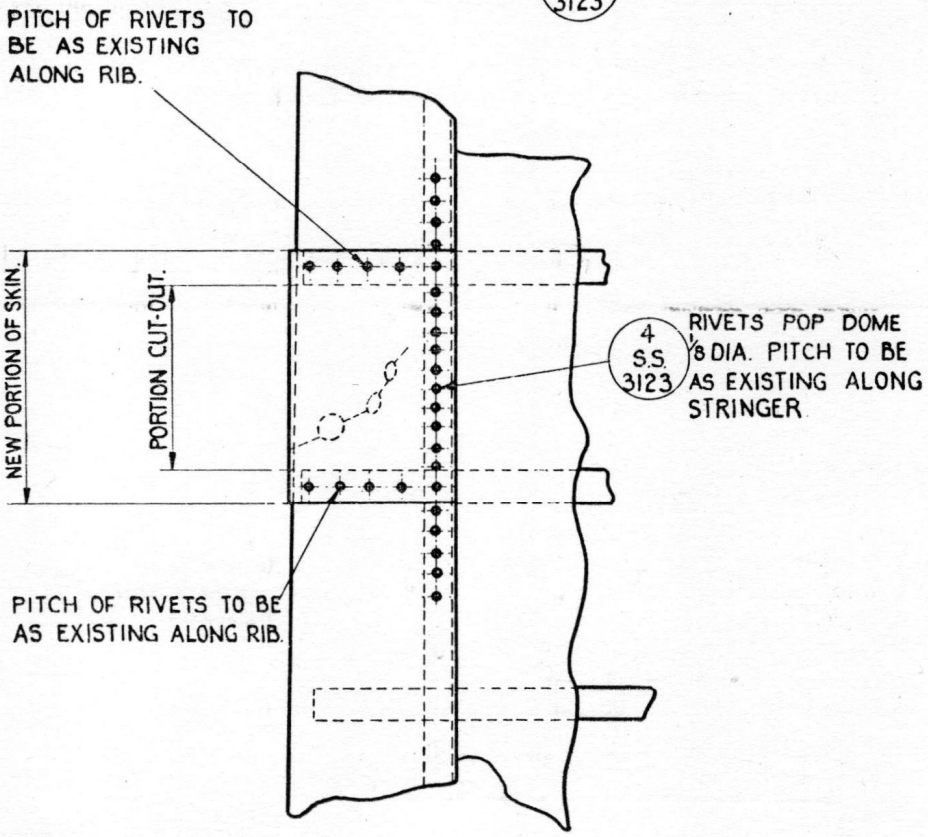
20. Damage greater than negligible should be repaired by patching as shown in fig. 4, providing that the cleaned out damage is not greater than that stated and that no more than two patches occur in each elevator.

## MASS BALANCE

### General

21. As the repairs to the tail plane are restricted to the application of minor patches, which must not exceed a total of ¼ lb. per elevator at the trailing edge, the mass balance will not be affected.

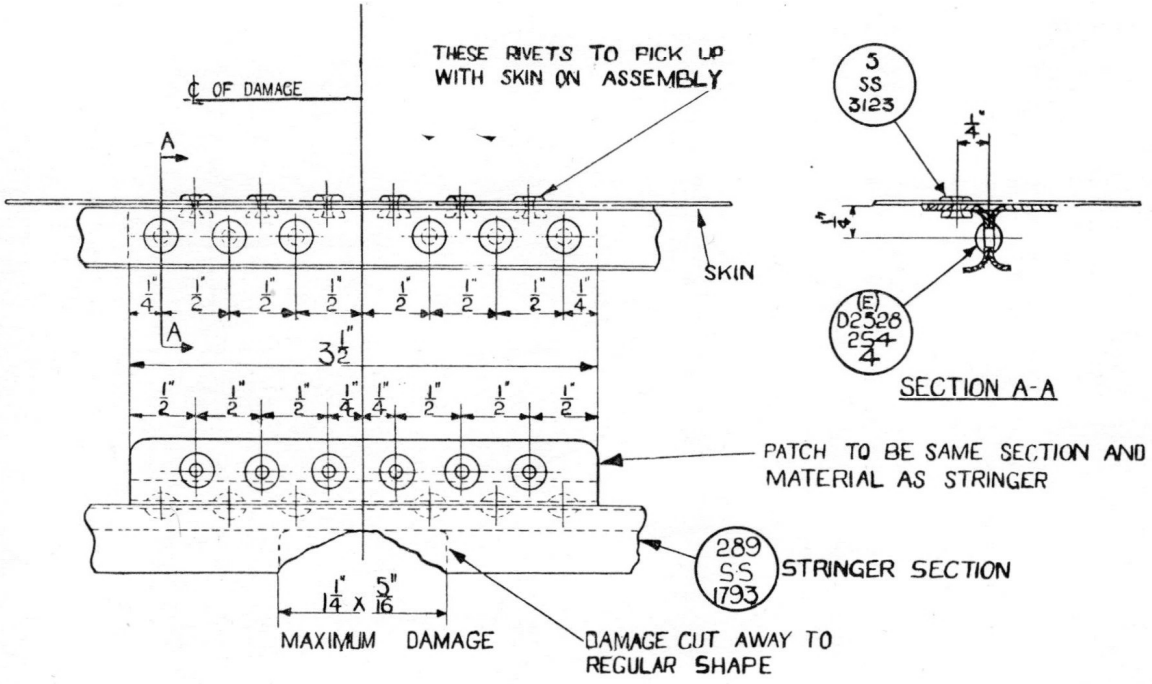


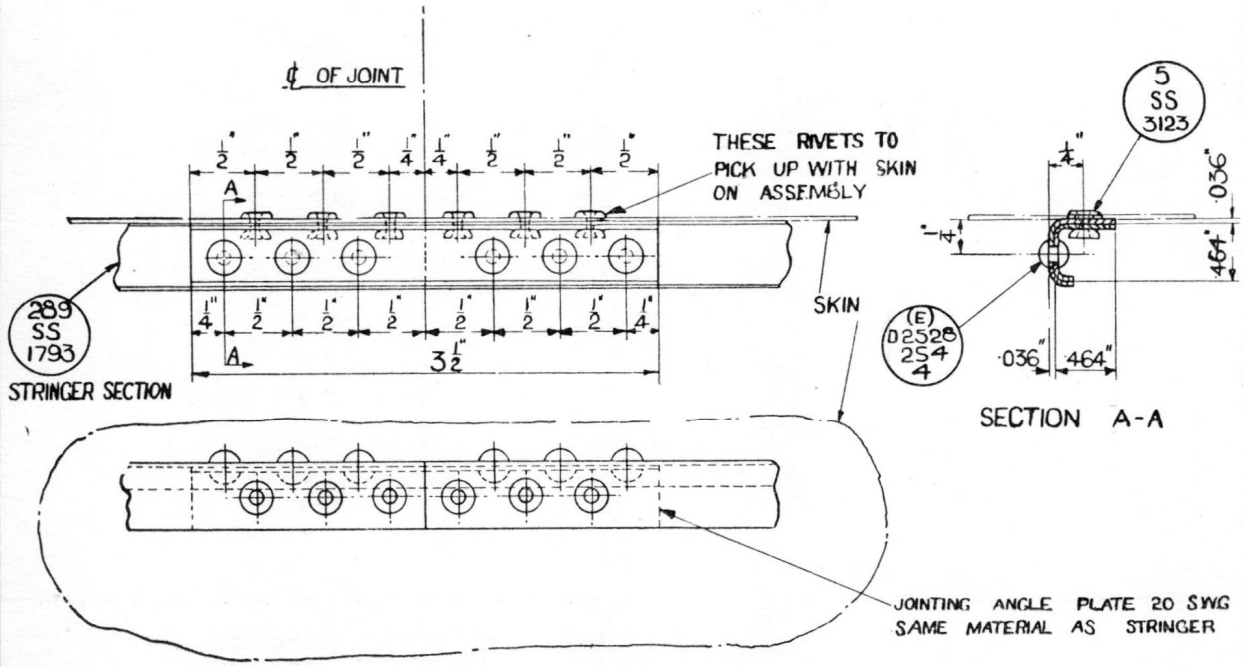

MATERIAL :- ALUM. ALLOY 24 S.W.G.
SPEC :- D.T.D. 390.

JOINTING COMPOUND TO BE APPLIED BETWEEN SURFACES.

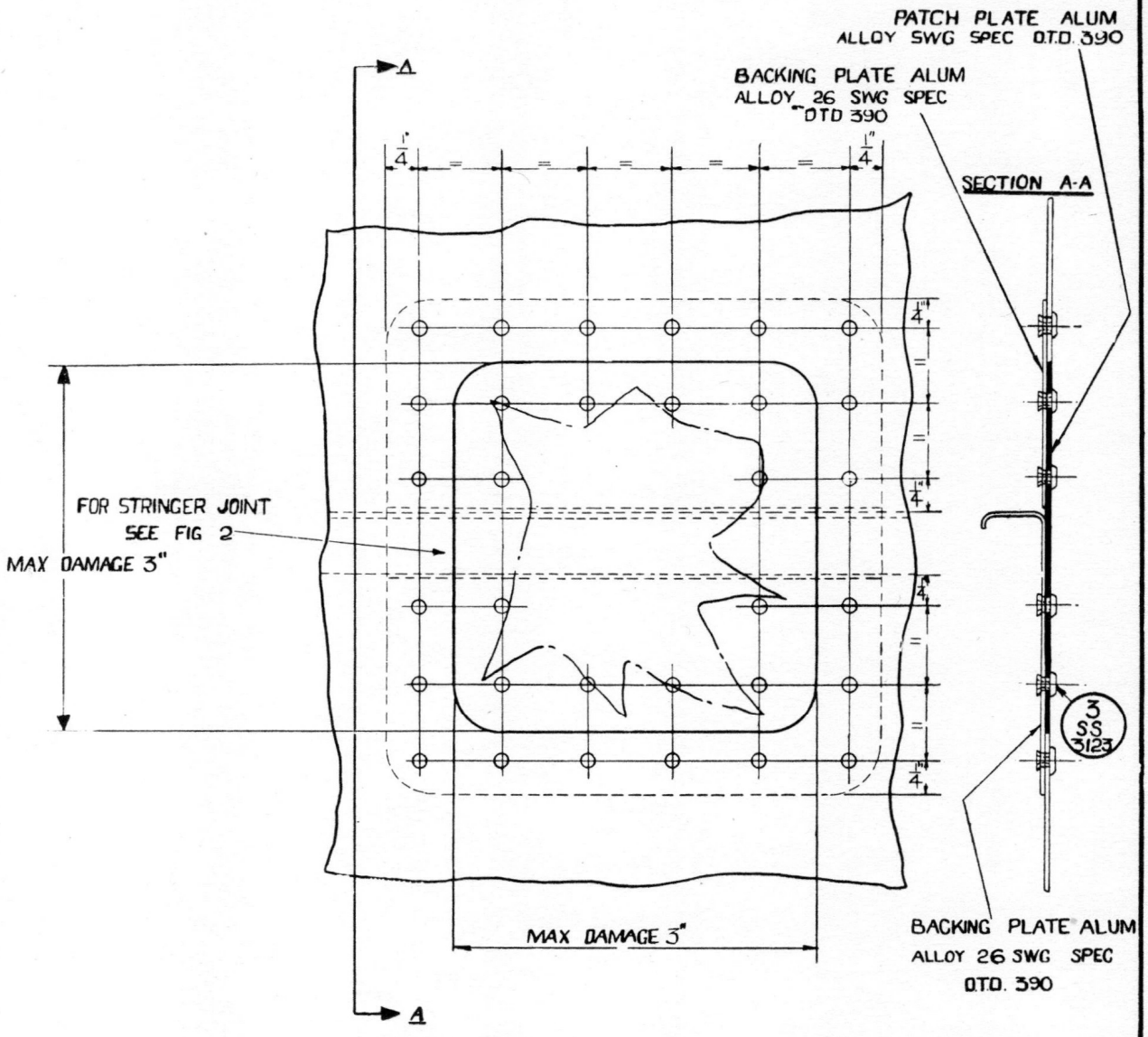
| 1 | REPAIR TO TAIL PLANE LEADING EDGE. | 1 |
|---|---|---|



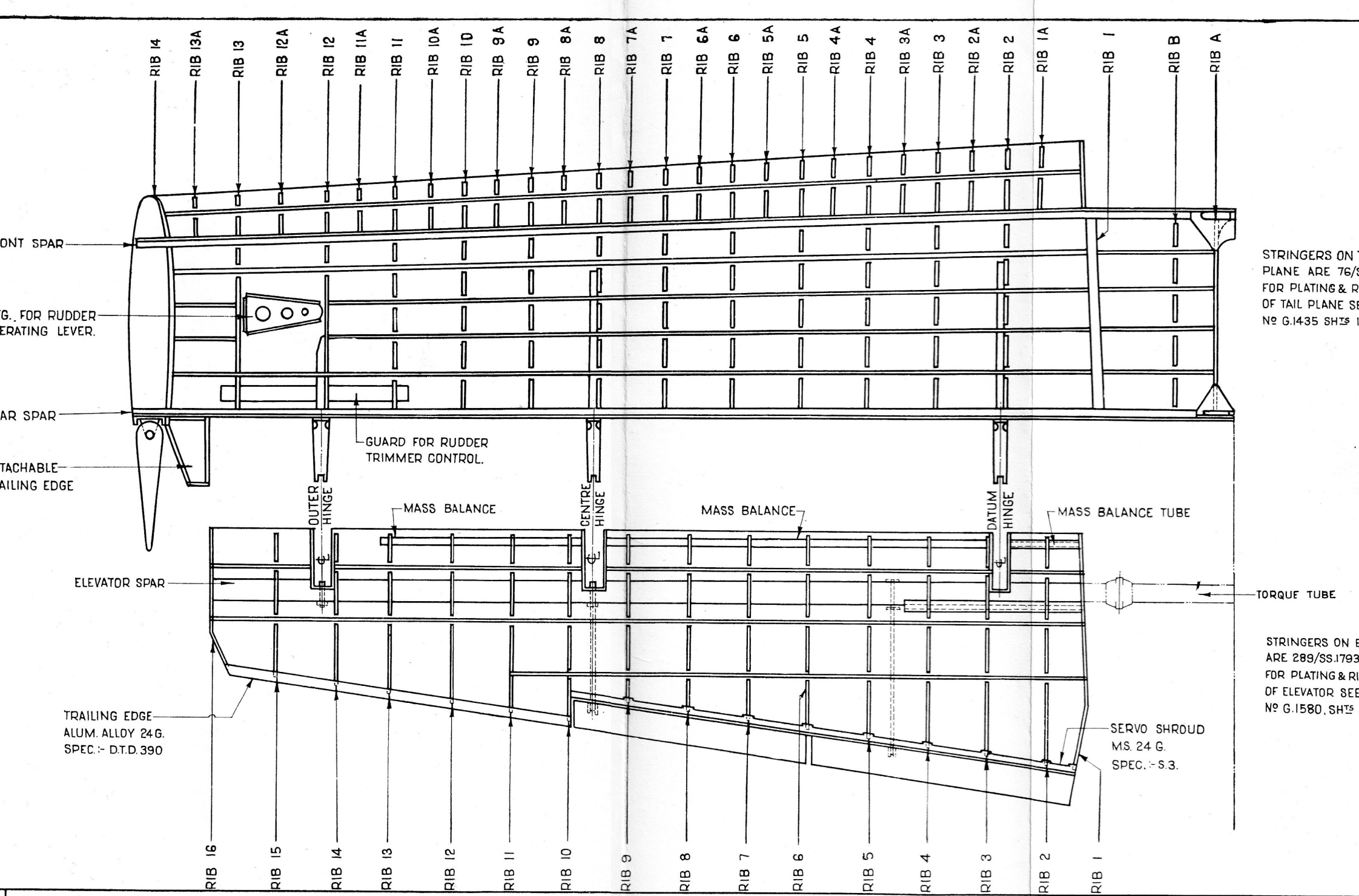

| 2 | PATCH REPAIRS TO ELEVATOR STRINGERS | 2 |
|---|---|---|




| 3 | JOINTING OF ELEVATOR STRINGER | 3 |
|---|---|---|



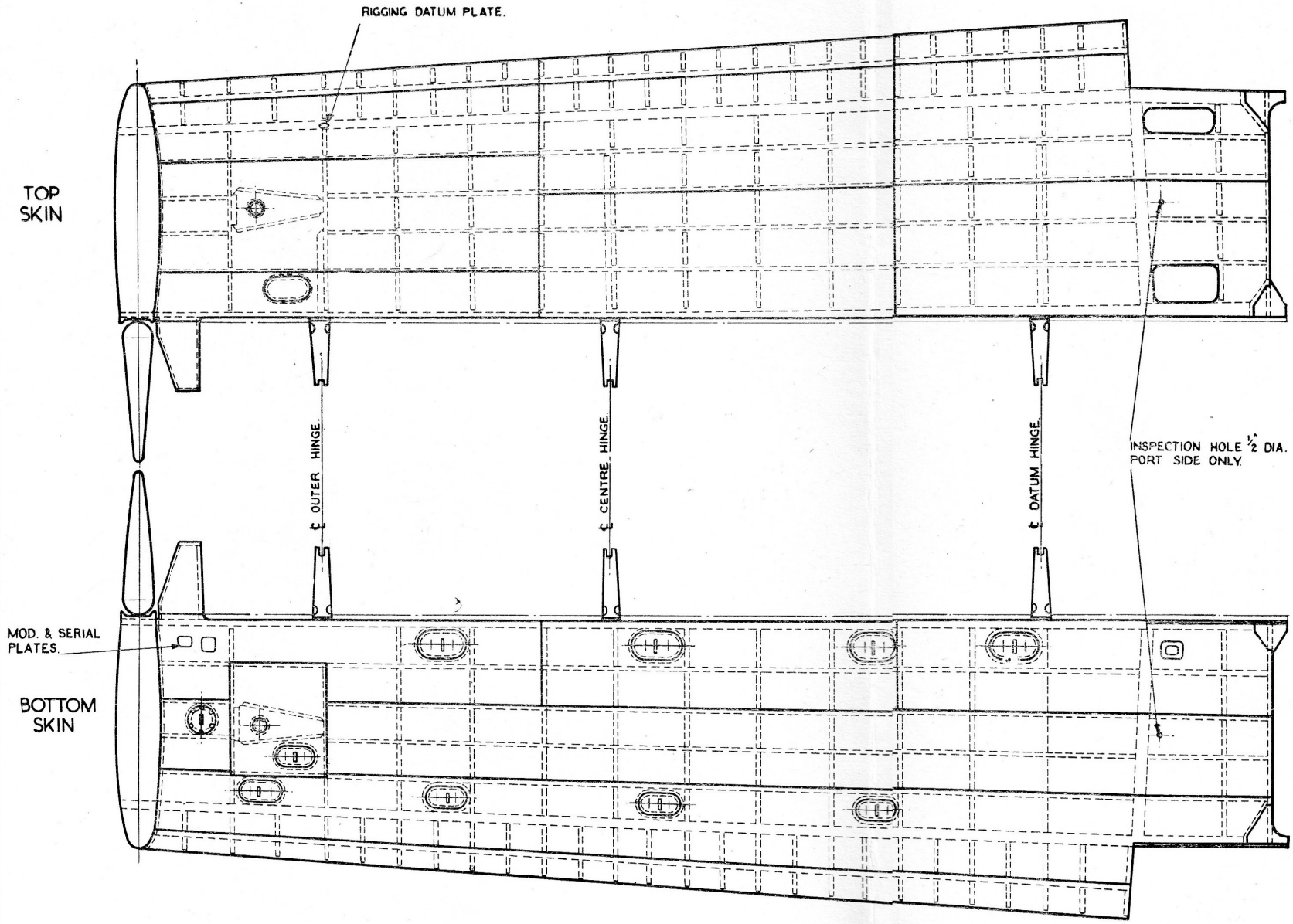

| 4 | PATCH FOR ELEVATOR SKIN-AT STRINGER POSITION | 4 |
|---|---|---|

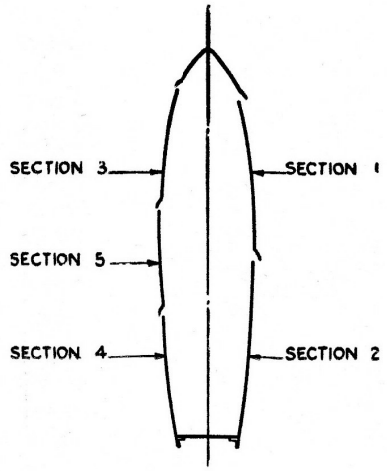



STRINGERS ON T
PLANE ARE 76/S
FOR PLATING & R
OF TAIL PLANE SE
Nº G.1435 SHTS 1

STRINGERS ON E
ARE 289/SS.1793
FOR PLATING & RI
OF ELEVATOR SEE
Nº G.1580, SHTS

# TAIL PLANE AND ELEVATOR



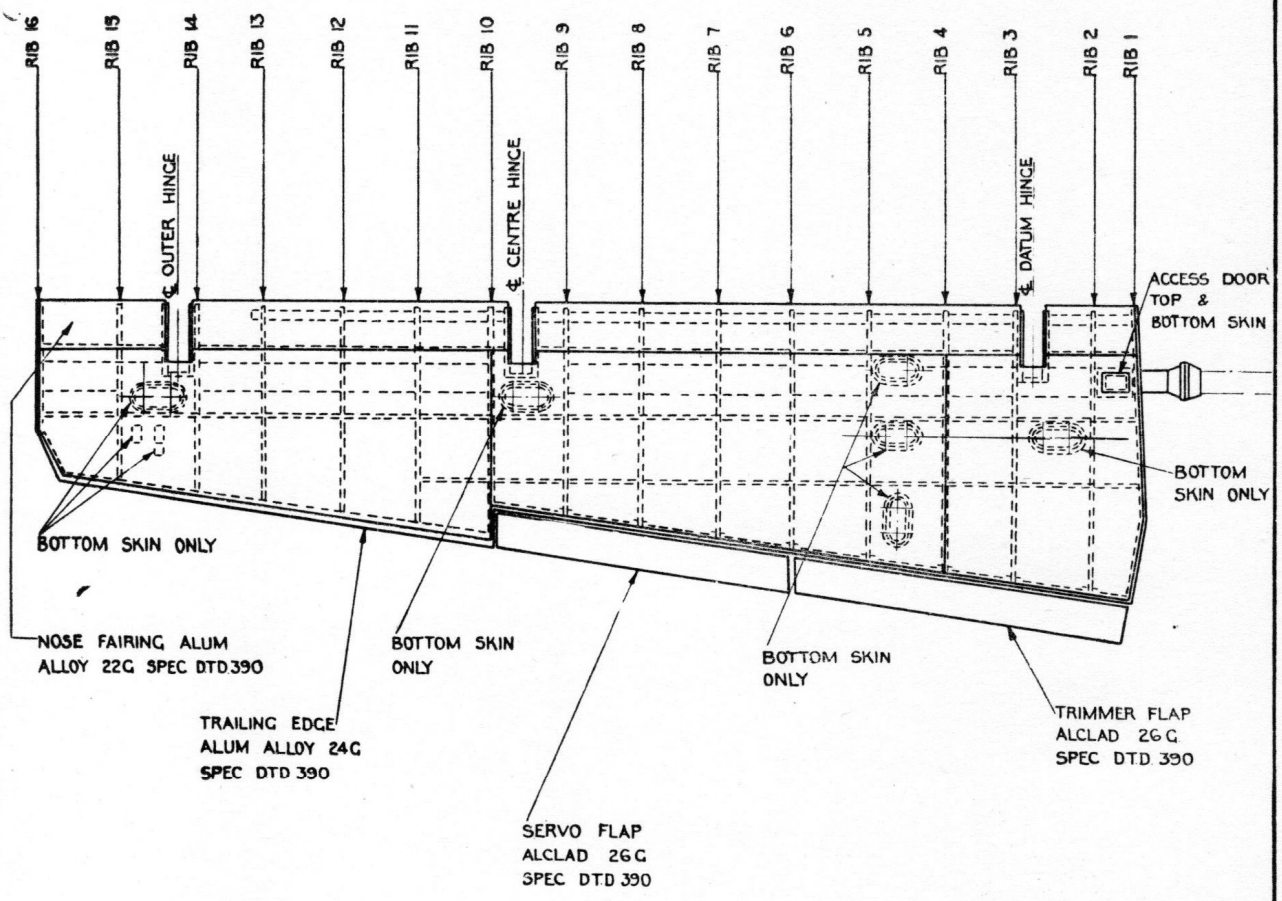

## SKIN ASSEMBLY

| | |
|---|---|
| SECTION 1<br>SECTION 2 | TOP SKIN. |
| SECTION 3<br>SECTION 4<br>SECTION 5 | BOTTOM SKIN. |

NOTE:-

ALL SKIN COVERING IS ALUM. ALLOY 20 S.W.G. - SPEC. D.T.D. 390

FOR DETAILS OF RIVETING SEE G.1435 SHEETS 1, 2, 4 & 5.




| 7 | PLATING & RIVETING - ELEVATOR | 7 |
|---|---|---|

R.A.A.F. Publication No.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART I — CHAPTER 8

## Fins and Rudders

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## FINS AND RUDDERS

### General

1. A fin and a rudder are situated at each extremity of the tail plane. The fins are constructed of light-alloy and each comprises ribs and stringers, finposts, and a metal covering. The rudders are similar in construction and also have a metal skin. For details of the fins and rudders, see figs. 2 and 3.

### FIN

### FINPOSTS

### General

2. The finposts, front and rear, are constructed of aluminium alloy extruded section flanges with an aluminium alloy web.

### Negligible Damage

3. In the free edges of the flanges, between ribs Nos. 6 and 8 on the front and rear finposts and in the vicinity of the hinges on the rear finpost, nicks and abrasions which when cleaned out are not deeper than 1/32 in. and not longer than 1 in. in any plane may be neglected.

4. Damage to the free edges of the flanges outside the positions mentioned, and which when cleaned out does not exceed 1/16 in. deep by 1½ in. long in any plane may be neglected.

5. In the web of a finpost smooth isolated dents which are not deeper than 1/16 in. may be neglected provided that they can be encompassed by a 1½ in. diameter circle. The surrounding structure should be carefully checked, particularly in the vicinity of the hinges and tail plane attachment plates.

### RIBS AND INTERCOSTALS

### Negligible Damage

6. Perforations which, when cleaned out, are not larger than 1 in. dia., may be neglected provided that they are not closer than 1 in. to any fitting, rivet or existing hole.

### Damage Repairable by Patching

7. Damage to the flanges and webs should be repaired in a manner similar to that employed for the fuselage floor intercostals (see Chapter 4). It is necessary, however, to use pop rivets when the rivets holding the patch pass through the outside skin.

### SKIN

### Negligible Damage

8. Smooth isolated dents which do not exceed 1/8 in. deep and show no signs of cracks, abrasions or sharp corners, may be regarded as negligible damage provided that they do not hold any part of the structure out of position.

### Damage Repairable by Patching

9. Damage to the skin greater than that stated in para. 8 may be repaired in a manner similar to the main plane skin (see Chapter 6).

### STRINGERS

### General

10. The stringers in the fin are similar to the lipped angle-section stringers employed in the main plane. For repairs, therefore, reference should be made to Chapter 6.

### LEADING EDGE

### Negligible Damage

11. Where cleaned-out damage does not affect more than 40 per cent. of the area of the cross-section, it may be neglected provided that it does not occur in way of the attachment screws and is covered with a doped-on fabric patch. Damage which causes loosening of the attachment screws must be repaired.

### RUDDERS

### RUDDERPOST

### General

12. The rudderpost is constructed of a rolled section aluminium alloy channel.

### Negligible Damage

13. Smooth, isolated dents which are not deeper than 1/16 in., which can be encompassed in a 1½ in. dia. circle, may be neglected.

### Damage Repairable by Patching

14. Damage to the flange of the rudderpost should first be cut to a regular shape and then patched as shown in fig. 1. Repair of damage to the web of the finpost can be made in a manner similar to the fuselage floor intercostals (see Chapter 4).

### RIBS

### Negligible Damage

15. Damage which, when trimmed to a regular shape does not exceed 1 in. dia., and is not within 1 in. of any fitting, rivet or existing hole, may be neglected.

### Damage Repairable by Patching

16. Damage to the flanges and webs should be repaired in a manner similar to that employed for the fuselage floor inter-costals (see Chapter 4). It is necessary, however, to use pop rivets to secure the patch where they pass through the outer skin.

### SKIN

### General

17. For negligible damage and repairs to the rudder skin, reference should be made to Chapter 6.

### TRAILING EDGE

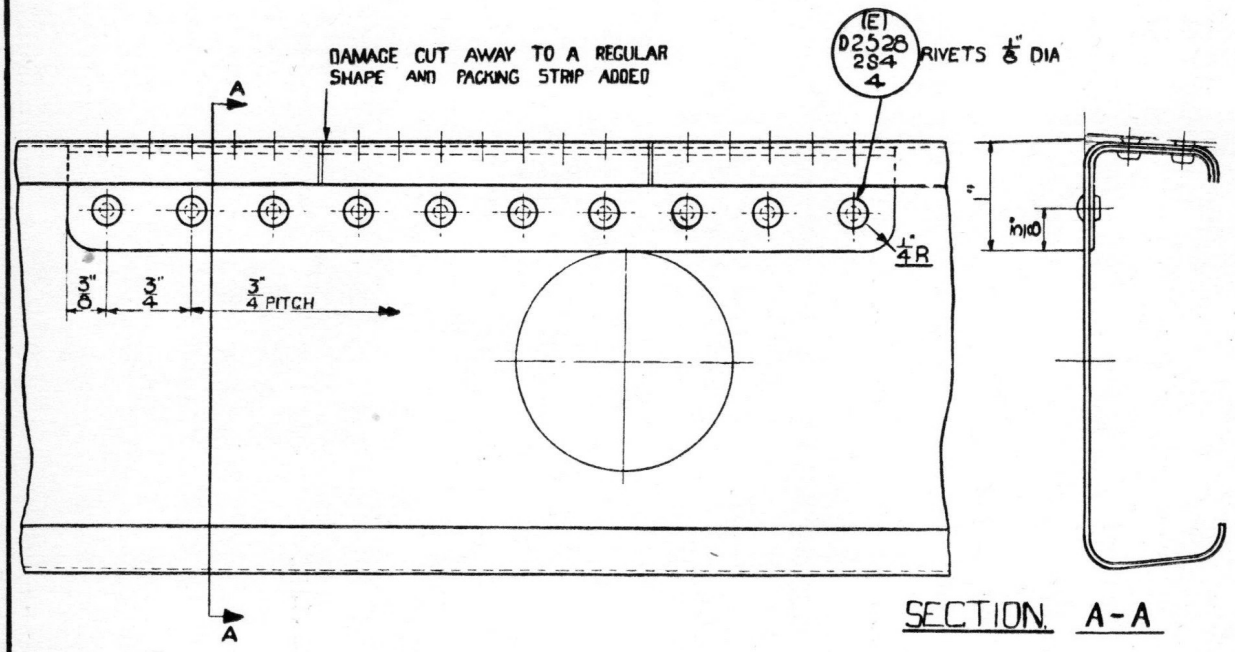
### General

18. The trailing edge member is of similar section to the flap trailing edge member and repairs can therefore be made in a similar manner (see Chapter 6).

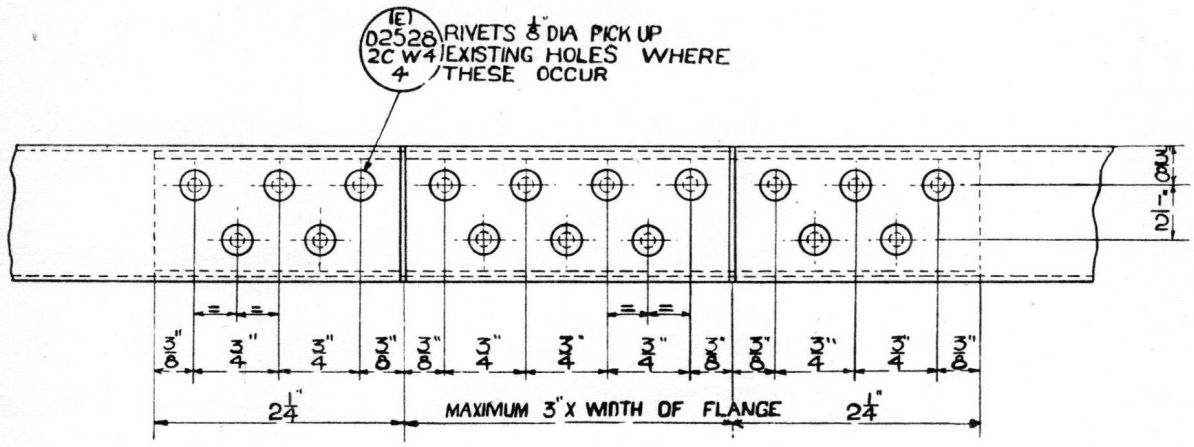
### MASS-BALANCE

### General

19. As the damage to the rudders which may be repaired in accordance with this Part is of a minor nature only, the mass-balance will not be affected.



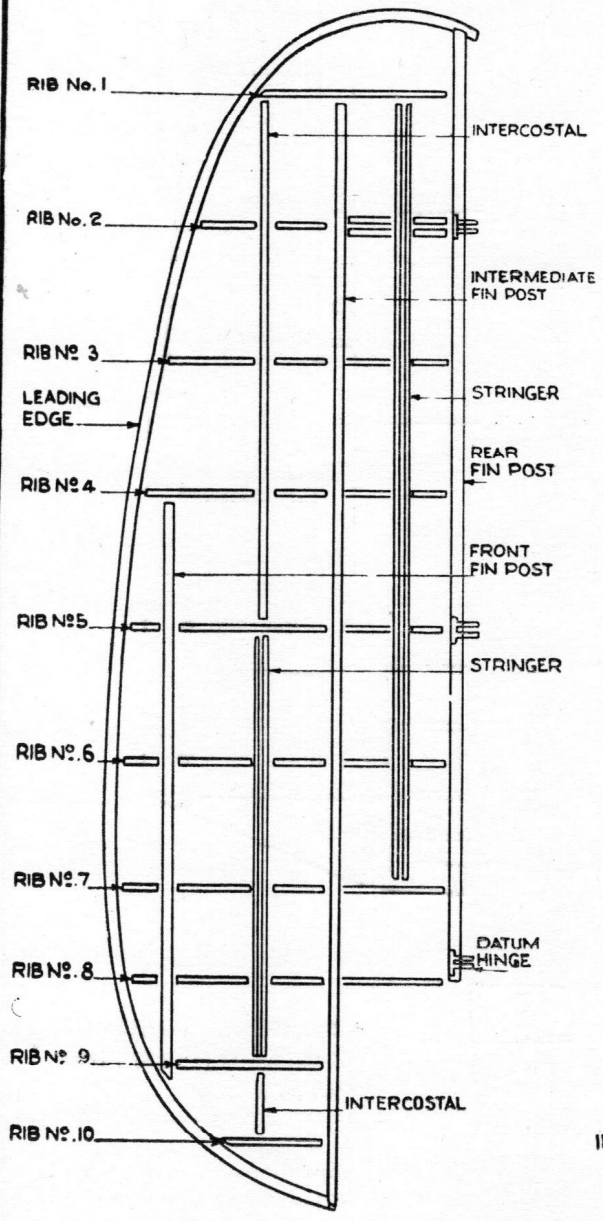

SECTION A-A

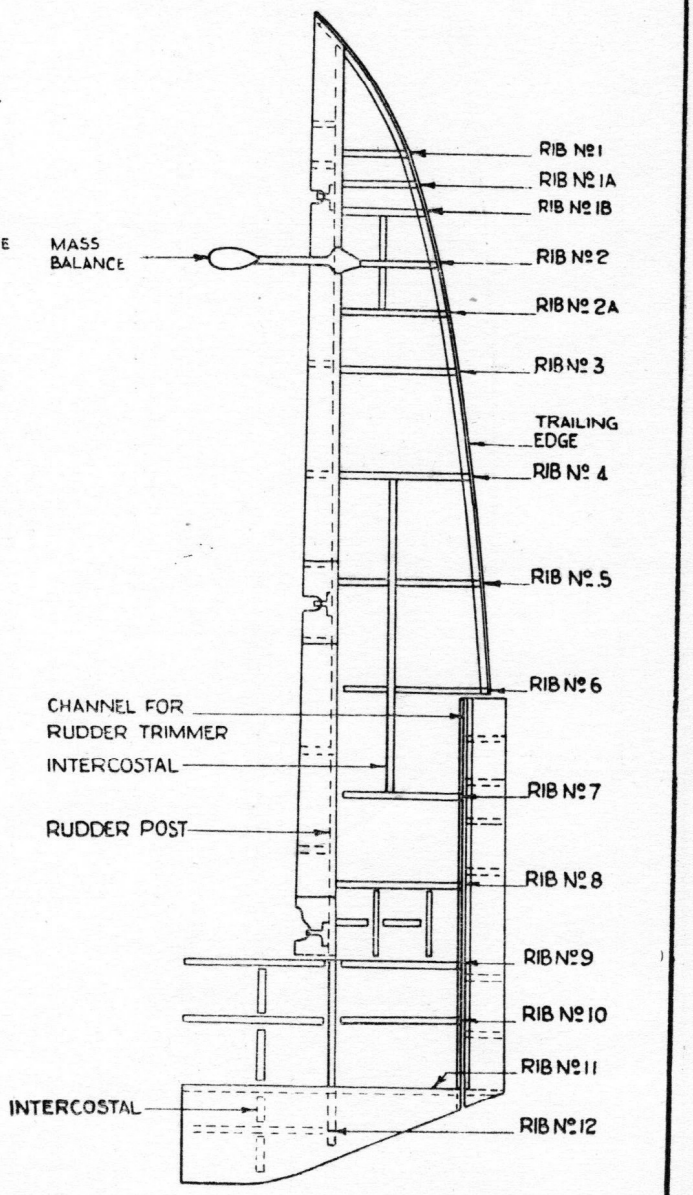



REPAIR ANGLE TO BE ALUM ALLOY 20 SWG
SPEC:- DTD 275 OR 390.

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

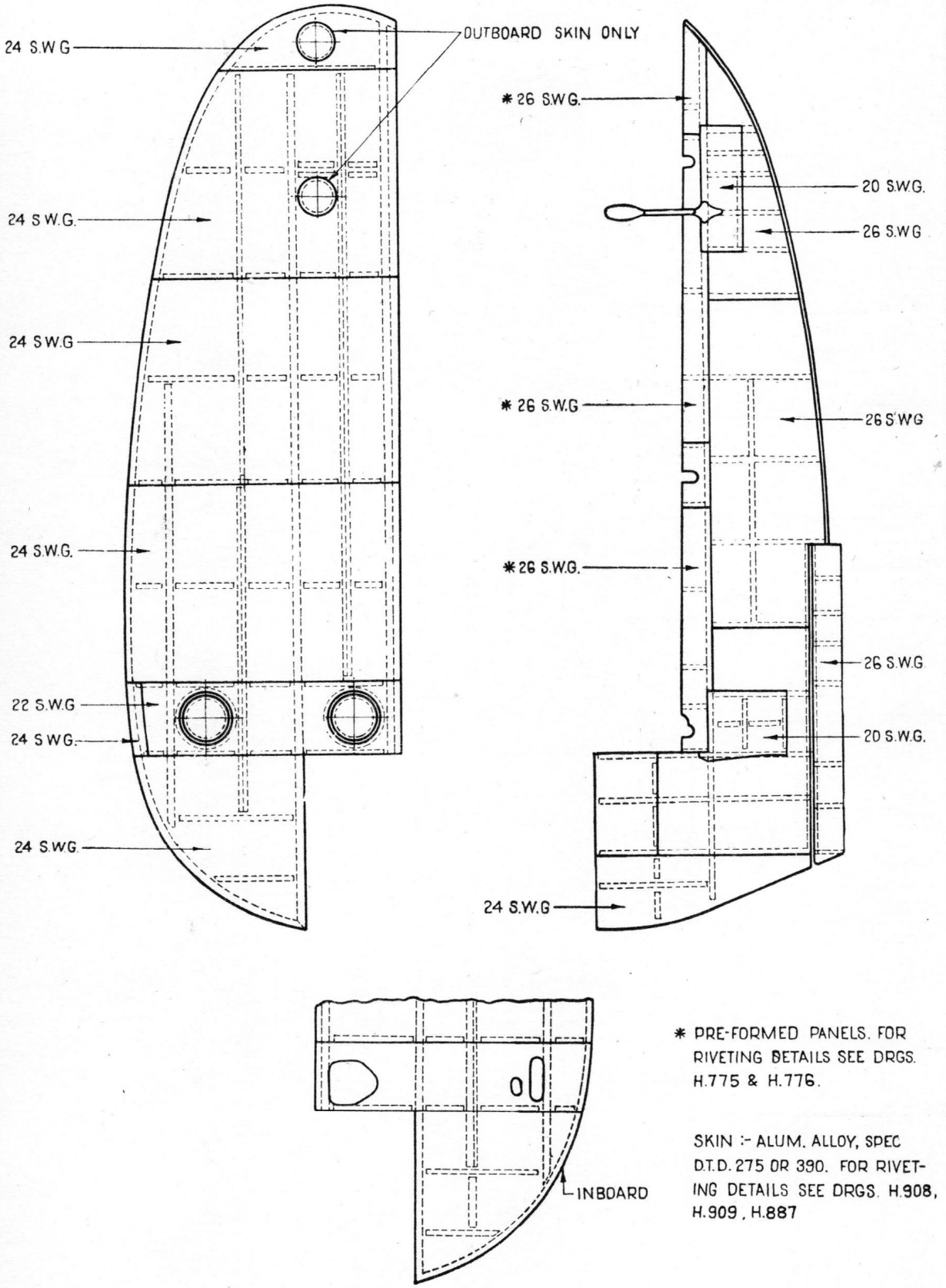
| 1 | PATCH REPAIR TO RUDDER POST | 1 |
|---|---|---|




FOR PLATING & RIVETING
SEE FIG. 3.

| 2 | FIN & RUDDER | 2 |
|---|---|---|




* PRE-FORMED PANELS. FOR RIVETING DETAILS SEE DRGS. H.775 & H.776.

SKIN :- ALUM. ALLOY, SPEC D.T.D. 275 OR 390. FOR RIVETING DETAILS SEE DRGS. H.908, H.909, H.887

| 3 | PLATING & RIVETING - FIN & RUDDER | 3 |
|---|---|---|

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART I — CHAPTER 9

## Miscellaneous Repairs

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## MISCELLANEOUS REPAIRS

### NACELLE FAIRINGS—INBOARD AND OUTBOARD

**General**

1. The nacelle fairings are constructed of light-alloy channel-section formers braced with angle-section stringers and covered with a light-alloy skin.

### FORMERS

**Negligible Damage**

2. Damage to the edge of a former which, when cleaned out, does not exceed 1/8 in. deep and 1½ in. long, may be neglected. In the web of the former, cleaned out, damage not exceeding a hole greater than ¾ in. dia. may be neglected provided that it is not within 1 in. of any rivet or fitting, etc.

**Damage Repairable by Patching**

3. Patch repairs should be carried out in a manner similar to that employed for the fuselage light formers (see Chap. 4, para. 9).

### SKIN

4. Skin patch repairs should be effected in a manner similar to that employed for the main plane skin (see Chap. 6, paras. 3 and 4).

### STRINGERS

5. Patch and insertion repairs to the stringers should be made in a manner similar to that employed for the fuselage small section stringers (see Chap. 4, paras. 17 and 19).

### UNDERCARRIAGE DOORS

**Skin**

**Negligible Damage**

6. Dents in either the inner or outer skin, which show no signs of cracks, abrasions, and sharp corners, may be neglected provided that they are not deeper than 3/32 in. Holes or cracks in the inner skin which do not exceed 1 in. dia. when trimmed to a regular shape may also be neglected. Such holes must, however, be covered with a doped-on fabric patch.

**Damage Repairable by Patching**

7. Patch repairs to the Undercarriage door skin may be made in a similar manner to that employed for the main plane skin (see Chap. 6, para. 4).

### FORMERS

**Negligible Damage**

8. Negligible damage to the undercarriage door formers is similar to that defined in para. 2.

**Damage Repairable by Patching**

9. Patch repairs to the formers may be made in a manner similar to that employed for the fuselage light formers (see Chap. 4, para. 9).

**Stringers**

10. The negligible damage definition and the method of repair of these stringers are similar to those described for the main plane lipped angle-section stringers (see Chap. 6, paras. 7 and 8).

### UNDERCARRIAGE DOOR HINGE BEAM

**Negligible Damage**

11. Damage to the edges of the channel which, when smoothed out, does not exceed 3/16 in. deep and 1 in. long, may be neglected. Smooth isolated dents in any other part of the channel, which are free from cracks, abrasions and sharp corners, may also be neglected.

### FLYING CONTROLS

**General**

12. No part of the flying control system, except the control tubes, is repairable. Damaged parts must therefore be replaced by standard spares.

### CONTROL TUBES

**Negligible Damage**

13. Smooth isolated dents not deeper than 1/30th of the diameter of the tube may be neglected, provided that they show no signs of cracks, abrasions and sharp corners.

### TANK STRAPS

**Negligible Damage**

14. Negligible damage in any shape or form is not allowed on the tank straps; any damage therefore must be repaired either by patching or replacement.

### TRANSPARENT PANELS

**General**

15. Minor damage to the transparent panels in the canopy, such as cracks or small holes, may be repaired by patching with a small piece of the same material after both the surfaces of the patch and the damaged portion of the panel have been brushed with Diakon cement. Holes 1/16 in. dia. should be drilled at the end of all cracks to prevent them from spreading. The patch should then be held in position until the cement sets. If the damage is extensive the panel must be replaced. When drilling holes in the new panels for fixing bolts, it is important to ensure that they are of the same diameter as the holes in the damaged portion.

16. Damage, however slight, to the "Triplex" glass panelling in the bomb-aimer's "glasshouse" necessitates replacement of the panels affected.

## SPECIAL TOOLS REQUIRED TO EFFECT REPAIRS DESCRIBED THROUGHOUT THIS PUBLICATION.

| Ident. No. | Part No. | Description | Size | Remarks |
|---|---|---|---|---|
| | A.G.S. 880/2 | Snap riveting | 3/32 in. | For solid snap head rivets |
| | A.G.S. 880/3 | Snap riveting | 1/8 in. | |
| | A.G.S. 880/5 | Snap riveting | 3/16 in. | |
| A73/6003 | 2.Z.1770 | Snap for snaphead rivets | 3/32 in. | For use with Aero No. 3 riveter |
| A73/6004 | 3.Z.1770 | Snap for snaphead rivets | 1/8 in. | |
| A73/6005 | 4.Z.1770 | Snap for snaphead rivets | 3/16 in. | |
| A73/6006 | 5.Z.1770 | Snap for snaphead rivets | 1/4 in. | For use with Keller riveter |
| A73/6007 | 6.Z.1770 | Snap for snaphead rivets | 5/16 in. | |
| A73/6008 | 7.Z.1770 | Snap for mushroom hd. rivets | 3/32 in. | |
| A73/6009 | 8.Z.1770 | Snap for mushroom hd. rivets | 1/8 in. | For use with Aero No. 3 riveter |
| A73/6010 | 9.Z.1770 | Snap for mushroom hd. rivets | 3/16 in. | |
| A73/6013 | 10.Z.1770 | Snap riveting mushroom head | 3/32 in. | |
| A73/6014 | 11.Z.1770 | Snap riveting mushroom head | 1/8 in. | For hand riveting |
| A73/6015 | 12.Z.1770 | Snap riveting mushroom head | 3/16 in. | |
| A73/7009 | 2.Z.1983 | Snap | 1/8 in. | |
| A73/7010 | 3.Z.1983 | Snap | 3/16 in. | |
| A73/7011 | 4.Z.1983 | Dolly | 1/8 in. | For predimpling skin |
| A73/7012 | 5.Z.1983 | Dolly | 3/32 in. | |
| A73/6018 | 2.Z.1774 | Dolly, press countersink | 3/32 in. | |
| A73/6019 | 3.Z.1774 | Dolly, press countersink | 1/8 in. | |
| A73/6020 | 4.Z.1774 | Holder, dolly | | |
| A73/3881 | 1.Z.1474 | Riveter, pop and foot pump | | |
| | 1.Z.1775 | Intensifier | | For use with pop riveter when air line is used |
| A73/3880 | 1.Z.1473 | Pop rivet drill | | |
| | | Riveter, pneumatic Keller | | |
| | No. 3 | Riveter, pneumatic | | |
| | No. 1 | Oil gun, Tecalemit | | For priming intensifier |
| | No. 4662 | Adaptor, Tecalemit | | Body screwed for special adaptor |
| | | Desoutter pistol type pneumatic drill | | |
| A73/6017 | 1.Z.1773 | Cutter for drill countersinking | For 3/16 in. to 5/16 in. rivets | For use with Desoutter pistol drill |
| A73/3880 | 1.Z.1473 | Pop rivet drill | | For use with Desoutter mighty atom drill |
| A73/16932 | 2.Z.2392 | Setting gauges for plug rivet drill | For 1/8 in. dia. 1/8 in. rivets | |
| A73/16933 | 3.Z.2392 | | For 5/32 in. dia. rivets | |
| A73/16934 | 4.Z.2392 | | For 3/16 in. dia. rivets | |
| A73/6016 | 1.Z.1772 | Cutter for drill countersinking | For 3/32 in. to 5/32 in. dia. rivets | |

| Ident. No. | Part No. | Description | Size | Remarks |
|---|---|---|---|---|
| A73/6011 | 1.Z.1771 | Hammer head | | For use with Aero. No. 3 riveter |
| A73/6012 | 2.Z.1771 | Hammer head | | For use with Keller riveter |
| | 1/Z.3148 | Reaming fixture | | For spar shackles set of 25 reamers in a wooden box. Z.3151 |
| | 1/Z.3149 | Reaming fixture | | |
| | Z.3113 | Reamers, for main and secondary holes in spar booms comprising:— | | |
| | 2/Z.3113 | Reamer | 1.78 in. dia. for 0.03 in. oversize hole | |
| | 3/Z.3113 | Reamer | 1.8125 in. dia. for 0.0625 in. oversize hole | |
| | 4/Z.3113 | Reamer | 1.84 in. dia. for 0.09 in. oversize hole | |
| | 5/Z.3113 | Reamer | 1.875 in. dia. for 0.125 in. oversize hole | |
| | 6/Z.3113 | Reamer | 1.76 in. dia. for 0.010 in. oversize hole | |
| | 7/Z.3113 | Reamer | 1.28 in. dia. for 0.03 in. oversize hole | |
| | 8/Z.3113 | Reamer | 1.3125 in. dia. for 0.0625 in. oversize hole | |
| | 9/Z.3113 | Reamer | 1.34 in. dia. for 0.09 min. oversize hole | Reamers are requisitioned in their appropriate chapters and tables. |
| | 10/Z.3113 | Reamer | 1.375 in. dia. for 0.125 in. oversize hole | |
| | 11/Z.3113 | Reamer | 0.655 in. dia. for 0.03 in. oversize hole | |
| | 12/Z.3133 | Reamer | 0.6875 in. dia. for 0.0625 in. oversize hole | |
| | 13/Z.3113 | Reamer | 0.715 in. dia. for 0.09 in. oversize hole | |
| | 14/Z.3113 | Reamer | 0.75 in. dia. for 0.125 in. oversize hole | |
| | 15/Z.3113 | Reamer | 0.8425 in. dia. for 0.03 in. oversize hole | |
| | 16/Z.3113 | Reamer | 0.875 in. dia. for 0.0625 in. oversize hole | |
| | 17/Z.3113 | Reamer | 0.9025 in. dia. for 0.090 in. oversize hole | |
| | 18/Z.3113 | Reamer | 0.9375 in. dia. for 0.125 in. oversize hole | |

| Ident. No. | Part No. | Description | Size | Remarks |
|---|---|---|---|---|
| | 19/Z.3113 | Reamer | 0.78 in. dia. for 0.03 in. oversize hole | |
| | 20/Z.3113 | Reamer | 0.8125 in. dia. for 0.0625 in. oversize hole | |
| | 21/Z.3113 | Reamer | 1.03 in. dia. for 0.03 in. oversize hole | |
| | 22/Z.3113 | Reamer | 1.0625 in. dia. for 0.0625 in. oversize hole | Reamers are requisitioned in their appropriate chapters and tables |
| | 23/Z.3113 | Reamer | 1.0925 in. dia. for 0.090 in. oversize hole | |
| | 24/Z.3113 | Reamer | 1.125 in. dia. for 0.125 in. oversize hole | |
| | 25/Z.3113 | Reamer | 1.1525 in. dia. for 0.09 in. oversize hole | |
| | 26/Z.3113 | Reamer | 1.1875 in. dia. for 0.125 in. oversize hole | |
| | Z.3137 | Pilot bushes for main and secondary holes in spar booms and engine sub-frames, comprising:— | | Set of 31 reamers in a wooden box. Z.3152 |
| | 2/Z.3137 | Bush, pilot | 1.75 in. dia | |
| | 3/Z.3137 | Bush, pilot | 1.76 in. dia. for 0.01 in. oversize hole | |
| | 4/Z.3137 | Bush, pilot | 1.78 in. dia. for 0.03 in. oversize hole | |
| | 5/Z.3137 | Bush, pilot | 1.8125 in. dia. for 0.0625 in. oversize hole | |
| | 6/Z.3137 | Bush, pilot | 1.84 in. dia. for 0.09 in. oversize hole | |
| | 7/Z.3137 | Bush, pilot | 1.25 in. dia. | Pilot bushes are requisitioned in their appropriate chapters and tables |
| | 8/Z.3137 | Bush, pilot | 1.28 in. dia. for 0.03 in. oversize hole | |
| | 9/Z.3137 | Bush, pilot | 1.3125 in. dia. for 0.0625 in. oversize hole | |
| | 10/Z.3137 | Bush, pilot | 1.34 in. dia. for 0.09 in. oversize hole | |
| | 11/Z.3137 | Bush, pilot | 0.625 in. dia. | |
| | 12/Z.3137 | Bush, pilot | 0.655 in. dia. for 0.03 in. oversize hole | |
| | 13/Z.3137 | Bush, pilot | 0.6875 in. dia. for 0.0625 in. oversize hole | |
| | 14/Z.3137 | Bush, pilot | 0.715 in. dia. for 0.09 in. oversize hole | |
| | 15/Z.3137 | Bush, pilot | 0.8125 in. dia. | |
| | 16/Z.3137 | Bush, pilot | 0.8425 in. dia. for 0.03 in oversize hole | |

| Ident. No. | Part No. | Description | Size | Remarks |
|---|---|---|---|---|
| | 17/Z.3137 | Bush, pilot | 0.875 in. dia. for 0.0625 in. oversize hole | |
| | 18/Z.3137 | Bush, pilot | 0.9025 in. dia. for 0.09 in. oversize hole | |
| | 19/Z.3137 | Bush, pilot | 0.75 in. dia. | |
| | 20/Z.3137 | Bush, pilot | 0.78 in. dia. for 0.03 in. oversize hole | |
| | 21/Z.3137 | Bush, Pilot | 1.0 in. dia. | |
| | 22/Z.3137 | Bush, Pilot | 1.03 in. dia. for 0.03 in. oversize hole | |
| | 23/Z.3137 | Bush, Pilot | 1.0625 in. dia. for 0.0625 in. oversize hole | |
| | 24/Z.3137 | Bush, Pilot | 1.0925 in. dia. for 0.0925 in. oversize hole | |
| | 25/Z.3137 | Bush, Pilot | 1.125 in. dia. for 0.0625 in. oversize hole | Pilot bushes are requisitioned in their appropriate chapters and tables |
| | 26/Z.3137 | Bush, Pilot | 1.1525 in. dia. for 0.090 in. oversize hole | |
| | 27/Z.3137 | Bush, Pilot | 1.00 in. dia. | |
| | 28/Z.3137 | Bush, Pilot | 1.03 in. dia. for 0.03 in. oversize hole | |
| | 29/Z.3137 | Bush, Pilot | 1.0625 in. dia. for 0.0625 in. oversize hole | |
| | 30/Z.3137 | Bush, pilot | 1.0925 in. dia. for 0.09 in. and 0.03 in. oversize holes | |
| | 31/Z.3137 | Bush, pilot | 1.125 in. dia. for 0.0625 in. oversize hole | |
| | 32/Z.3137 | Bush, pilot | 1.1525 in. dia. for 0.09 in. oversize hole | |
| | Z.3139 | Reamers, for engine attachment holes, engine subframes comprising:— | | Set of 4 reamers in a wooden box. Z.3270 |
| | 2/z.3139 | Reamer | 1.0925 in. dia. for 0.03 in. oversize hole | |
| | 3/z.3139 | Reamer | 1.125 in. dia. for 0.0625 in. oversize hole | |
| | 4/z.3139 | Reamer | 1.1525 in. dia. for 0.09 in. oversize hole | |
| | 5/z.3139 | Reamer | 1.1875 in. dia. for 0.125in. oversize hole | Reamers are requisitioned in their appropriate chapters and tables |
| D1B/3068 | | Standard hand Reamer | 21/32 in. dia | |
| D1B/3070 | | Standard hand Reamer | 11/16 in. dia. | |
| D1B/3072 | | Standard hand Reamer | 23/32 in. dia | |
| D1B/3073 | | Standard hand Reamer | 3/4 in. dia. | |
| D1B/3074 | | Standard hand Reamer | 25/32 in. dia. | |
| D1B/3075 | | Standard hand Reamer | 13/16 in. dia. | |

| Ident. No. | Part No. | Description | Size | Remarks |
|---|---|---|---|---|
| D1B/3076 | | Standard hand Reamer | 27/32 in. dia. | |
| D1B/3077 | | Standard hand Reamer | 7/8 in. dia. | |
| D1B/3078 | | Standard hand Reamer | 29/32 in. dia. | |
| D1B/3079 | | Standard hand Reamer | 15/16 in. dia. | Standard hand reamers are requisitioned, in their appropriate chapters and tables |
| D1B/3080 | | Standard hand Reamer | 31/32 in. dia. | |
| D1B/3081 | | Standard hand Reamer | 1 in. dia. | |
| D1B/3082 | | Standard hand Reamer | 1-1/32 in. dia. | |
| D1B/3083 | | Standard hand Reamer | 1-1/16 in. dia. | |
| D1B/3084 | | Standard hand Reamer | 1-3/32 in. dia. | |
| D1B/3085 | | Standard hand Reamer | 1-1/8 in. dia. | |
| Z.2187 | | Jig, setting | | |
| Z.1725 | | Jig, setting | | |
| Z.2458 | | Reamer, taper | | |

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# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

## PART 2 — MAJOR REPAIR SCHEMES

The purpose of this part is to provide in a compact form all details relative to major repairs to the Lincoln Mk. 30 Aircraft.

### KEY TO INFORMATION

So that information contained in this part may be readily found, data has been set out in nine Chapters, each Chapter dealing with a specific part of the aircraft. To facilitate quick reference, detailed lists of contents and illustrations are provided at the front of each Chapter. A list of special tools required to effect repairs to this part, and also Part 1, is given after Chapter Nine of Part 1.


CHAPTER 1 — General Information.
CHAPTER 2 — Engine Sub-Frames.
CHAPTER 3 — Fuel Tanks.
CHAPTER 4 — Fuselage.
CHAPTER 5 — Alighting Gear.
CHAPTER 6 — Main Planes.
CHAPTER 7 — Tail Plane and Elevators.
CHAPTER 8 — Fins and Rudders.
CHAPTER 9 — Miscellaneous Repairs.
Alphabetical Index for Parts 1 and 2.

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# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

PART 2 — CHAPTER 1

## General Information

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*To be issued later.

## GENERAL INFORMATION

**Special Tools**

1. A list of special tools which are required to effect repairs described in this Part is given at the end of Part 1, and the following points should be observed in connection with their use.

**Aero. No. 3 Riveter (See Fig. 6, Part 1, Chap 1)**

2. The Aero. No. 3 riveter can be used for all types of reaction riveting where the diameter of the rivet does not exceed 3/16 in.

**Keller Riveter**

3. The Keller riveter is a similar tool to the Aero. No. 3 riveter, and may be used for $\frac{1}{4}$ in. dia. and 5/16 in. dia. rivets.

**Desoutter "Mighty Atom" and Pistol Type Drill**

4. Using the special cutters, the Desoutter "Mighty Atom" drill can be used for countersinking holes for 3/32 in. dia. to 5/32 in. dia. rivets, and the pistol type drill for countersinking holes 3/16 in. dia. to 5/16 in. dia. rivets.

**Pre-Dimpling Tools**

5. The pre-dimpling tools should be used in conjunction with the Aero No. 3 riveter for countersinking holes in the skin, but when it is desired to countersink and rivet in one operation it is necessary to use the press countersink dolly and holder in conjunction with a hammer head fitted to either an Aero. No. 3 or a Keller riveter, according to the size of the rivet.

**Pop Riveter**

6. The pop riveter and foot pump may be used for pop riveting, but when the air line exists, the special pop riveter and intensifier should be used. In order to obtain accurate and reliable riveting when using the intensifier and air line, it is essential that the intensifier functions to give maximum efficiency and this can only be obtained if it is correctly primed as indicated in Fig. 4, Chapter 1, Part 1. Details of the intensifier and riveter are given in Fig. 6, Chap. 1, in order that replacement parts can be identified and fitted.

**Special Reaming Fixtures**

7. Special reaming fixtures, oversize reamers and pilot bushes are available for use with spar shackles when the holes are slightly elongated, and the method of use is shown in Figs. 1 and 2.

**Plating and Riveting**

8. To enable the gauge and specification of the plate to be identified reference should be made to Part 1, Chapter 1.

**Fuselage Skin**

9. If the damage to the fuselage skin is in excess of that described in the relevant Chapter of Part 1, the panel should be cut out completely, and the replacement panel be made with joggled edges if it is necessary to obtain a flush finish as illustrated in the relevant drawings in Chapter 4.

**Main Plane Skin, Excessive Damage**

10. If the damage to the main plane skin is in excess of that described in the relevant Chapter of Part 1, the panel should be cut out to the nearest rib or stringer, and the replacement panel be made with joggled edges to obtain a flush finish as illustrated in the relevant drawings in Chapter 6.

**Enlarged Bolt Holes**

11. Before refitting any bolts which it has been necessary to remove as a result of damage, a careful examination should be made to ensure that the holes are not elongated. If provision has not been made to fit 1/16 in. wall bushes, it will be necessary to replace the part concerned, unless, as in certain cases, special arrangements have been made to repair the member by fitting oversize bolts.

**Enlarged Rivet Holes**

12. Rivet holes which sustain damage during the removal of rivets should be enlarged 1/32 in. oversize.

13. For the method of fitting oversize washers to deeply countersunk rivet holes, reference should be made to Chapter 1, para. 17, Part 1.

**TABLE A.**
**Plating and Riveting Details**

| Description | Part | Chapter | Figure |
|---|---|---|---|
| Fuselage Nose Portion | 1 | 4 | 27 |
| Front Centre Portion | 1 | 4 | 28 |
| Intermediate Centre Portion | 1 | 4 | 29 |
| Fuselage Rear Centre Portion | 1 | 4 | 30 |
| Fuselage Rear Portion | 1 | 4 | 31 |
| Bomb Doors, 4,000 lb. Type | 1 | 4 | 32 |
| Main Plane Centre Portion Top Skin | 1 | 6 | 18 |
| Main Plane Centre Portion Bottom Skin | 1 | 6 | 19 |
| Outer Plane Inner Portion Top Skin | 1 | 6 | 20 |
| Outer Plane Inner Portion Bottom Skin | 1 | 6 | 21 |
| Outer Plane Outer Portion | 1 | 6 | 22 |
| Inboard and Outboard Flaps | 1 | 6 | 24 |
| Aileron | 1 | 6 | 26 |
| Tail Plane | 1 | 7 | 6 |
| Elevator | 1 | 7 | 7 |
| Fin and Rudder | 1 | 8 | 3 |

**Heat Treatment of Light Alloys**

14. Where it is necessary to use aluminium alloy sheet, for the fabrication of an angle or any bent over section, reference should be made to Chapter 1, paras. 8 to 11 of Part 1, in which details of heat treatment of light alloy sheet and allowable bend radii without heat treatment are given.

**Heat Treatment of Steel Plate Specification D.T.D. 124A and S. 3.**

15. After cold working, parts made of steel plate to specification D.T.D. 124A, should be heat treated to a temperature of approximately 860 deg. C. and quenched in oil or water.

16. Parts made of steel plate to specification S.3, and which have been bent, should be heated to a temperature of between 450 deg. C. and allowed to cool naturally in the air.

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## REPAIR MANUAL

PART 2 — CHAPTER 2

## Engine Sub-Frames

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## ENGINE SUB-FRAMES

### General

1. For information on the structure, assembly and removal of the engine sub-frames, reference should be made to Section 5, of R.A.A.F. Publication —.

### Bushing of Holes, Inboard Sub-frames

2. Holes in the inboard sub-frame which have become slightly elongated or scored on the inside should be repaired by bushing, using 1/16 in. wall bushes; for details of these bushes, reference should be made to Fig. 2.

### Bushing of Engine Mounting Attachment Holes at "A", Fig. 1.

3. To repair the attachment holes at "A" a sequence of reamers and pilot bushes as listed in Table 1 will be required. The holes should be reamed out to the dimensions given, the appropriate repair bush inserted, and finally reamed through to the correct dimensions as shown.

4. Fig. 3 shows the method of reaming out attachment holes when using the oversize reamers and pilot bushes listed in the Tables throughout the text of this Chapter, and reference should be made to this Drawing before commencing repairs.

5. Details of the pilot bushes are given in Chapter 6, Fig. 5. This drawing has been included for reference purposes only, and should be referred to for manufacturing purposes, when the pilot bushes are unobtainable as standard tools.

**TABLE 1.**

| Socket | Ident. No. | Pilot Bushes | Ident. No. | Reamers |
|---|---|---|---|---|
| Engine Mounting Attachment Sockets "A" | | 23/Z.3137 | | 2/Z.3139 |
| | | 24/Z.3137 | | 3/Z.3139 |
| | | 25/Z.3137 | | 4/Z.3139 |
| | | 26/Z.3137 | | 4/Z.3139 |

### Bushing of Engine Mounting Holes B to G, Fig. 1.

6. To repair the holes B to G, Standard hand reamers only are required and these will be found listed in the Appendix on special tools at the end of Part 1. The holes should be drilled and reamed out to the dimensions given, the appropriate bush inserted, and finally reamed through to the correct dimensions as shown.

**TABLE 2.**
**Material for Repair of Engine Sub-frame Attachment Holes**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 6/O.3006 | Bush | 1-3/16 in. dia. + .0015 + .0010 in. | S.1 | For engine mounting attachment sockets at "A" |
| | 7/O.3006 | Bush | 3/4 in. dia. + .0010 + .00075 in. | S.1 | Joint at U/c Beam at "B" |
| | 3/O.3006 | Bush | 1 in. dia. + .0010 + .00075 in. | HTS S.2 | For sockets at inboard and outboard top rear joint at C and G. |
| | 12/O.3006 | Bush | 5/8 in. dia. + .0010 + .00075 in. | HTS S.2 | For sockets top rear joint inboard at C. |
| | 8/O.3006 | Bush | 5/8 in. dia. + .0010 + .00075 in. | S.1 | For socket at top rear joint at D. |
| | 2/O.3006 | Bush | 1 in. dia. + .0010 + .00075 in. | S.1 | For socket bottom rear joint at E. |
| | 4/O.3006 | Bush | 3/4 in. dia. + .0010 + .00075 in. | S.1 | For lug bracket on U/c beam at "F". |

### Bushing of Holes—Outboard Sub-frames

7. Elongation or scoring of the Attachment Holes in the outboard sub-frame will necessitate the bushing of the holes concerned, using 1/16 in. wall bushes.

8. To repair the engine mounting attachment

sockets A, B and C, referenced in Fig. 4, by the above method, will necessitate a sequence of reamers and pilot bushes as listed in Table 3, see also paras. 4 and 5. The holes should be reamed out to the dimension given, the appropriate bush inserted, and finally reamed through to the correct dimensions as shown.

**TABLE 3.**

| Sockets | Ident. No. | Pilot Bushes | Ident. No. | Reamers |
|---|---|---|---|---|
| A, B, C | | 23/Z.3137 | | 2/Z.3139 |
| See | | 24/Z.3137 | | 3/Z.3139 |
| Fig. 4 | | 25/Z.3137 | | 4/Z.3139 |
| | | 26/Z.3137 | | 5/Z.3139 |

9. For repairs to the holes at Details D, E, H and J, shown in Fig. 4A (for repairs at detail F and G, see para. 10), standard hand reamers will be required, and these are referenced in the appendix at the end of Part 1.

**Bushing of Joint at Front and Rear Spars Details F and G, Fig. 4B.**

10. (i) If on examination the tube over area A is damaged less than .100 in. thick, the complete tube should be drilled out and a new tube, Part No. 50/0.2916 (see Fig. 5), welded into position. After welding, the bore diameter of the tube should be reamed out to .875 in. dia. $+ .0005$ $— .00025$ in.

(ii) If the thickness of the tube over area A is .100 in. or more, the tube should be reamed out to 15/16 in. dia. $+ .0005$ $— .00025$ in. and the bush Item No. 9/0.3006 inserted. Finally ream through the bush to the dimensions shown.

**TABLE 4.**
**Material for Repair of Attachment Holes, Outboard Sub-frames**

| Indent. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 6/0.3006 | Bush | 1-3/16 in. dia. | | For bottom and rear bottom joint at A. For top sockets inboard and outboard Frame at B and C. |
| | 5/0.3006 | Bush | 7/8 in. dia. | | Socket for outboard sub-frame at D. |
| | 7/0.3006 | Bush | 3/4 in. dia. | | Socket for detachable strut at J. |
| | 8/0.3006 | Bush | 5/8 in. dia. | | Socket for detachable and diagonal struts at E and H. |
| | 9/0.3006 | Bush | 15/16 in. dia. | | Joint at front and rear spars at F and G. |

**Engine Mounting Channels—Outboard Sub-frame**

**General**

11. Elongation or scoring of the attachment holes in the engine mounting channels will necessitate the bushing of the holes concerned using 1/16 in. wall bushes, as listed in Table 5.

**Bushing of Holes, Rear Engine Mounting Channel**

12. The existing holes in the engine mounting channel should be reamed out to the dimensions shown in Fig. 6, and the Bush, Item No. 10/0.3006 (see Fig. 2) insterted. To hold the bush firmly into position a 1/16 in. dia. hole should be drilled in the bush and plate as shown, and the hole countersunk at each end to accommodate a 1/16 in. dia. x 120° countersunk head steel rivet. After insertion, the rivet should be peened over to secure the bush, and filed flush with the sides of the plate. Finally ream through the bush to the dimensions given.

**Bushing of Holes—Front Engine Mounting Channel**

13. The existing attachment hole in the front engine mounting channel should be reamed out to the dimensions shown in Fig. 6A, the bush

Item No. 11/0.3006 inserted and finally reamed through to 7/8 in. dia.

+ .0005 in.

— .00025 in. in conjunction with the engine sub-frame.

NOTE:—

It is important that the dimension from the edge of the bush to the bottom of the engine mounting channel is not less than 23/32 in. when the bush is fitted and the repair completed.

**TABLE 5.**
**Material for Repair of Holes—Engine Mounting Channels**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 10/0.3006 | Bush | 7/8 in. dia. | S.1 | For rear engine mounting channel |
| | 11/0.3006 | Bush | 1 in. dia. | S.1 | For front engine mounting channel |
| | | Standard reamer | 7/8 in. dia. | | For rear engine mounting |
| | | Standard reamer | 3/4 in. dia. | | |
| | | Standard reamer | 1/16 in. dia. | | |
| | (E) D2528/3CW2/7 | Rivet | 1/16 in. dia. | | Key for holding bush 10/0.3006 |
| | | Standard reamer | 1 in. dia. | | For front engine mounting channel |
| | | Standard reamer | 7/8 in. dia. | | |

**Repair by Insertion and Welding**

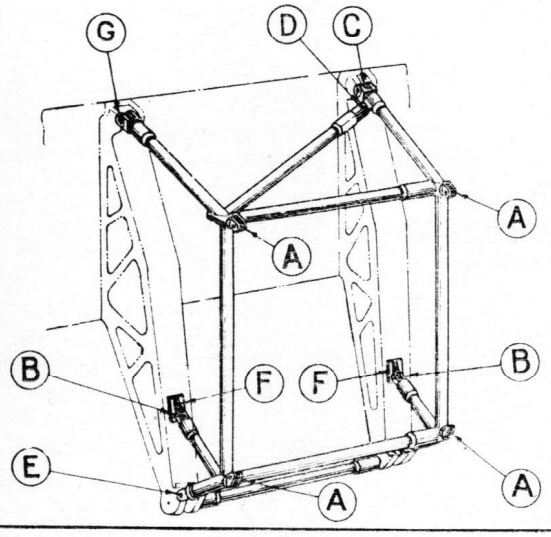
14. Damage to a tubular member greater than that defined in Chapter 2, para. 4 of Part 1, and provided that the damage does not occur within the middle third of any tube, a repair can be effected by cutting away the damaged portion of tube, and inserting a new portion using an internal liner, as shown in Fig. 7.

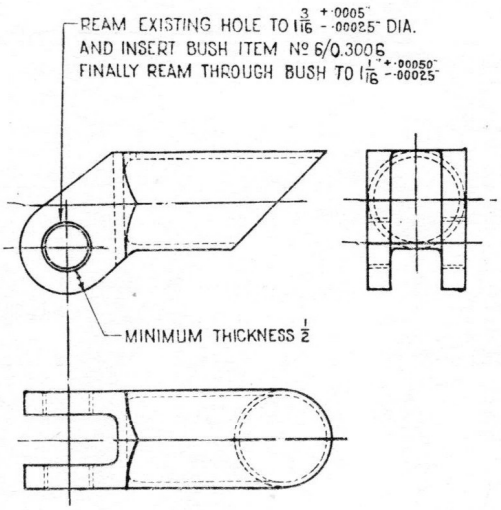
15. After cutting away the damaged portion, measure the inside diameter of the tube, and from Table 6, ascertain the correct liner for the insertion.

16. Details for the fabrication of the liners, together with the method of insertion, are shown in Fig. 7.

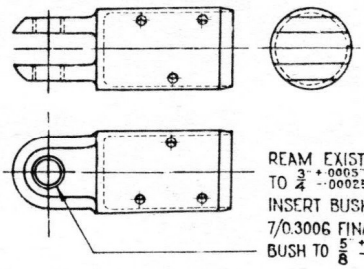
NOTE:—

The two lower members of the inboard sub-frame attached to the lug brackets on the undercarriage beam, are not repairable, and must be replaced.

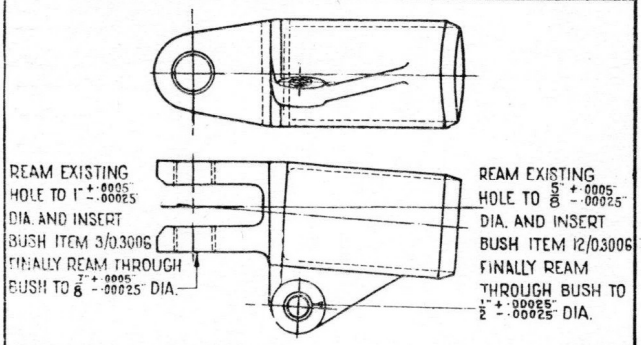


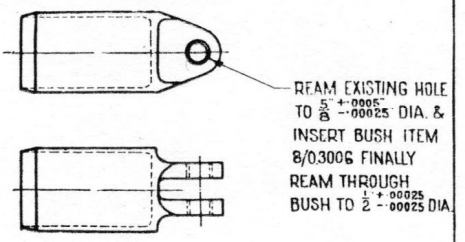

BUSHING OF ENGINE MOUNTING ATTACHMENT SOCKETS. A



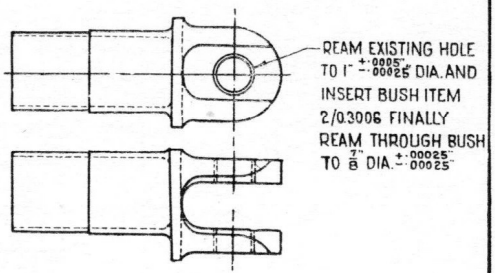

BUSHING OF SOCKET FOR JOINT ON UNDERCARRIAGE BEAM B



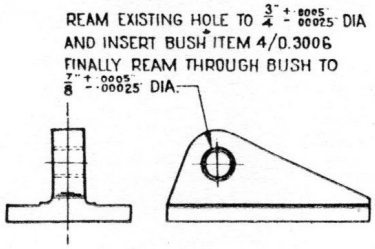

BUSHING OF SOCKET TOP REAR JOINT - INBOARD C




BUSHING OF SOCKET AT TOP REAR JOINT - INBOARD D

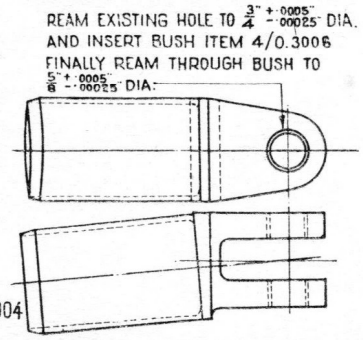



BUSHING OF SOCKET AT BOTTOM REAR JOINT E



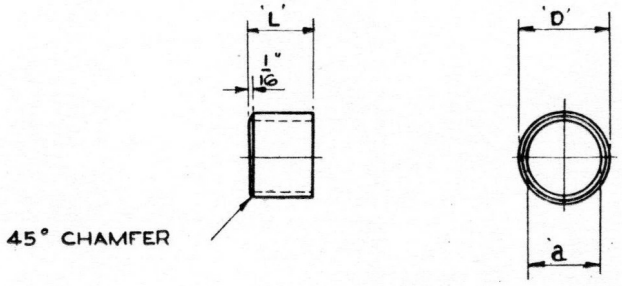

THIS WAS LINCOLN REPAIR 0.3004

BUSHING OF SOCKET FOR TOP REAR JOINT-OUTBOARD F

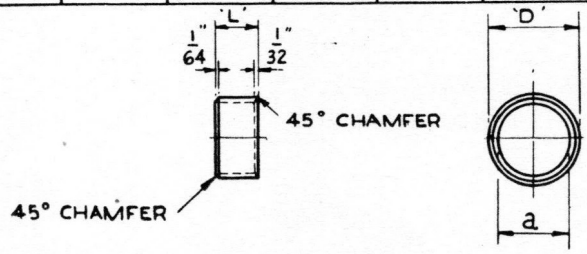



BUSHING OF LUG BRACKET ON UNDERCARRIAGE BEAM G

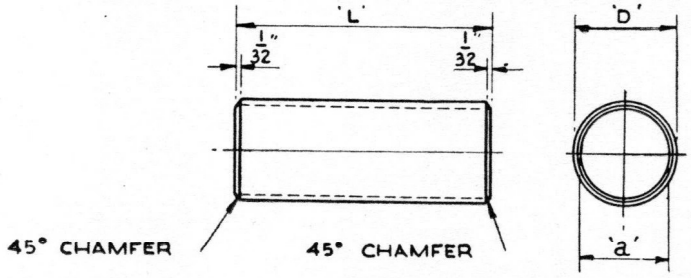
# 1 BUSHING OF HOLES-ENGINE SUB FRAME-INBOARD 1



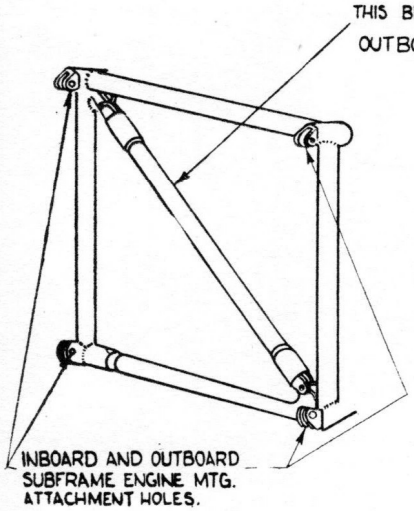

| PART Nº | DIA 'D' | DIA 'a' | LENGTH 'L' | MATERIAL | IDENTICAL WITH BUSH ITEM Nº | USED ON |
|---|---|---|---|---|---|---|
| 0/3006/12 | 5/8" +.0010" +.00075" | 1/2" +.00025" -.00025" | 1/2" -.001" -.002" | H.T.S. S2. | | 16/02874 |
| 0/3006/ 2 | 1" +.0010" +.00075" | 7/8" +.0005" -.00025" | 9/16" -.001" -.002" | M.S. S.I. | | 43/02874 |
| 0/3006/ 3 | 1" +.0010" +.00075" | 7/8" +.0005" -.00025" | 5/8" -.001" -.002" | H.T.S. S2. | | 16/02874 17/02874 |
| 0/3006/ 4 | 3/4" +.0010" +.00075" | 5/8" +.0005" -.00025" | 3/4" -.001" -.002" | M.S. S.I. | | 46/02874 |
| 0/3006/ 5 | 7/8" +.0010" +.00075" | 3/4" +.0005" -.00025" | 7/16" -.001" -.002" | M.S. S.I. | | 71/02916 |
| 0/3006/10 | 7/8" +.0010" +.00075" | 3/4" +.0005" -.00025" | .36" -.001" -.002" | M.S. S.I. | | |
| 0/3006/ 11 | 1" +.0010" +.00075" | 7/8" +.0005" -.00025" | .32" -.001" -.002" | M.S S.I. | | |

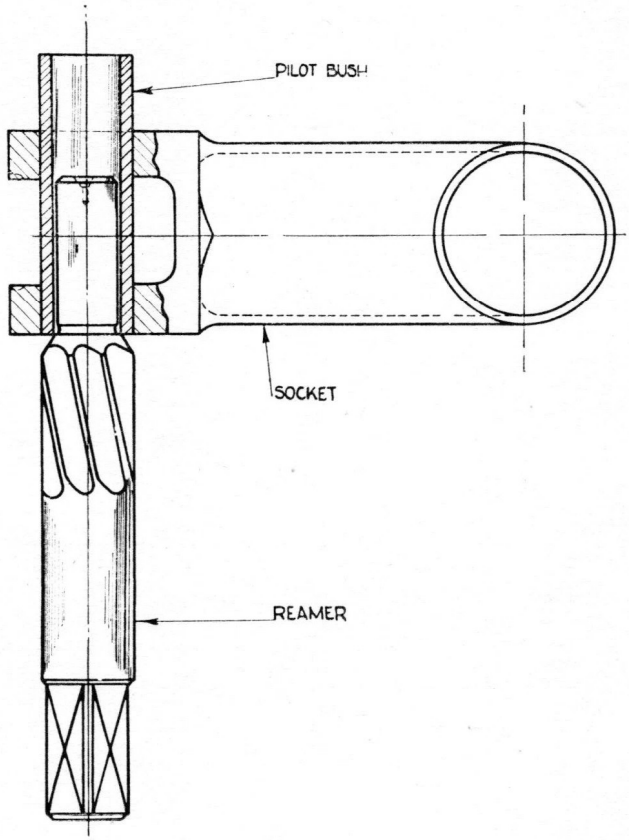



| PART Nº | DIA 'D' | DIA 'a' | LENGTH 'L' | MATERIAL | IDENTICAL WITH BUSH ITEM Nº | USED ON | | |
|---|---|---|---|---|---|---|---|---|
| 0/3006/ 6 | 1 3/16" +.0015" +.0010" | 1 1/16" +.00050" -.00025" | 9/16" -.001" -.002" | M.S S.I | | 40/0.2874 | 74/02873 89/02873 | 70/02916 72/02873 |
| 0/3006/ 7 | 3/4" +.0010" +.00075" | 5/8" +.0005" -.00025" | 3/8" -.001" -.002" | M.S. S.I. | | 44/0.2874 2/0.2875 | | |
| 0/3006/ 8 | 5/8" +.0010" +.00075" | 1/2" +.00025" -.00025" | 3/8" -.001" -.002" | M.S. S.I. | | 2/02541 3/02875 18/02874 | | |




| PART Nº | DIA 'D' | DIA 'a' | LENGTH 'L' | MATERIAL | IDENTICAL WITH BUSH ITEM Nº | USED ON |
|---|---|---|---|---|---|---|
| 0/3006/9 | 15/16" +.0010" +.00075" | 13/16" +.002" +.004" | 3.357" -.002" -.004" | M.S. S.I. | | 02916 SH.9 02916 SH.5 |

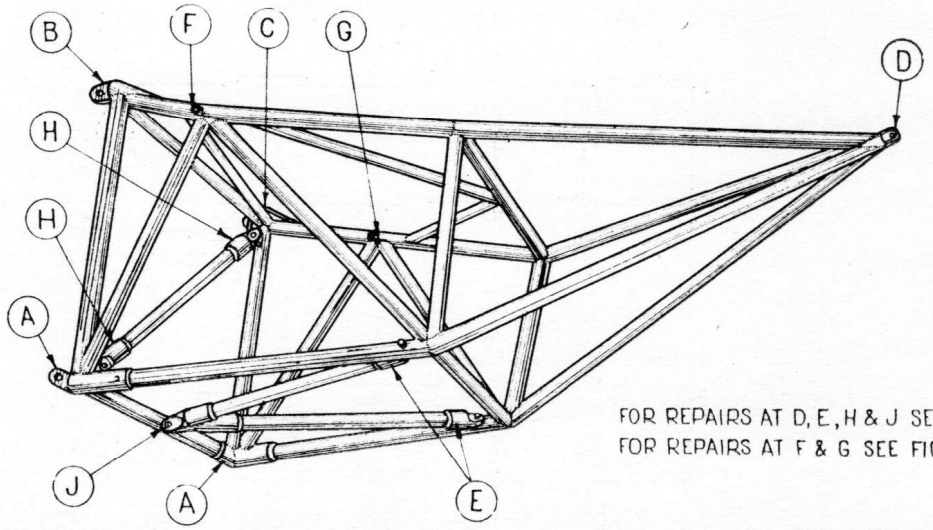


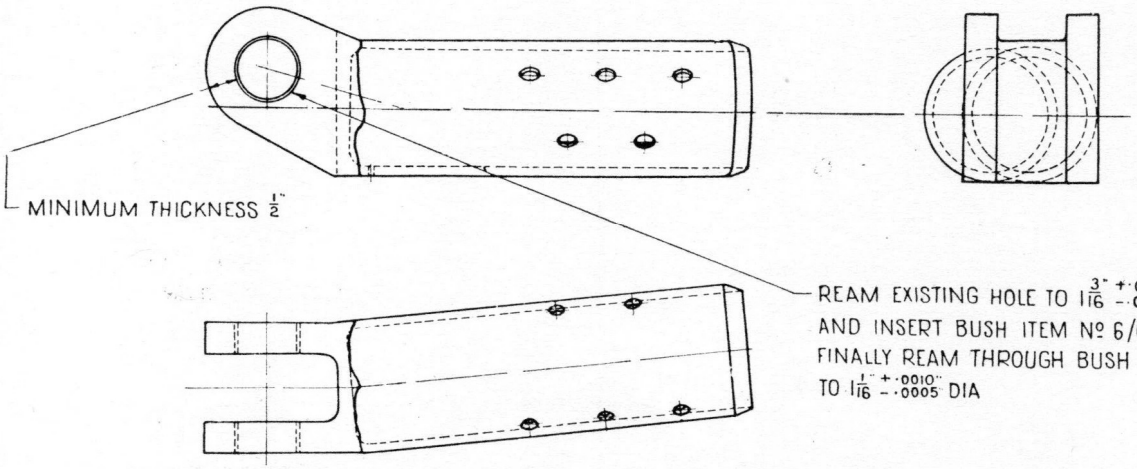

| OVERSIZE HOLE | REAMER Nº | PILOT BUSH Nº |
|---|---|---|
| – | Z/Z. 3139 | Z3/Z. 3137 |
| ·03" | 3/Z. 3139 | Z4/Z. 3137 |
| ·0625" | 4/Z. 3139 | Z5/Z. 3137 |
| ·09" | 5/Z. 3139 | Z6/Z. 3137 |

THIS WAS LINCOLN REPAIR Z.3140

| 3 | METHOD OF REAMING OVERSIZE ENGINE ATTACHMENT HOLES | 3 |
|---|---|---|




FOR REPAIRS AT D, E, H & J SEE FIG 4A
FOR REPAIRS AT F & G SEE FIG. 4B

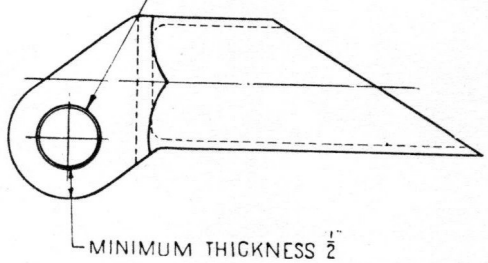


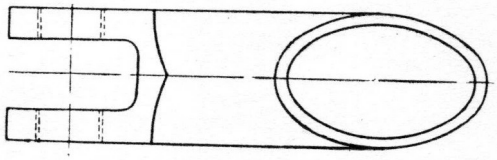

BUSHING OF FRONT & REAR BOTTOM JOINT SOCKETS

A
C

B

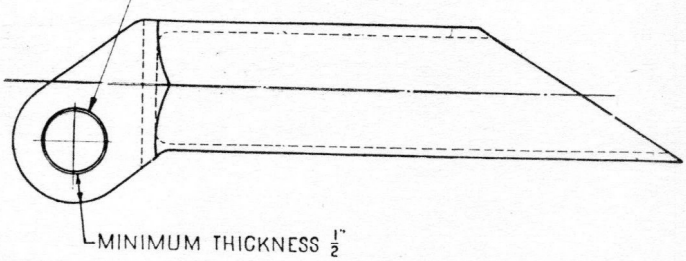
REAM EXISTING HOLE TO 1 3/16" +.00075" -.00025" DIA
AND INSERT BUSH ITEM Nº 6/0.3006
FINALLY REAM THROUGH BUSH TO
1 3/16" +.0010" -.0005" DIA.

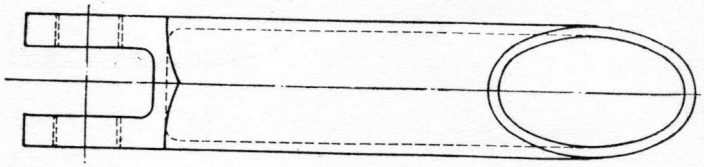


BUSHING OF TOP SOCKET (INBOARD FRAME)

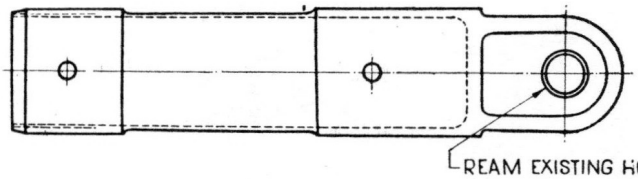
REAM EXISTING HOLE TO 1 3/16" +.00075" -.00025" DIA.
AND INSERT BUSH ITEM Nº 6/0.3006
FINALLY REAM THROUGH BUSH TO
1 1/16" +.0010" -.0005" DIA.



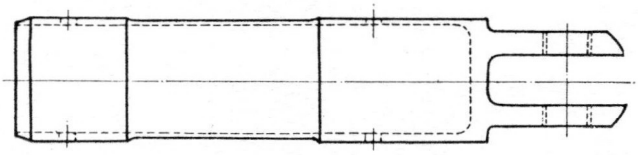



BUSHING OF TOP SOCKET (OUTBOARD FRAME)
THIS WAS LINCOLN REPAIR 0.3005

| 4 | BUSHING OF HOLES - ENGINE SUBFRAME - OUTBOARD | 4 |
|---|---|---|

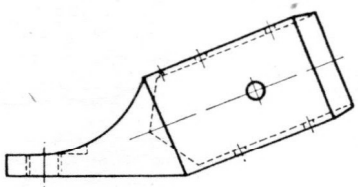


REAM EXISTING HOLE TO $\frac{7}{8}$" $^{+\cdot0005"}_{-\cdot00025"}$ DIA.
AND INSERT BUSH ITEM Nº 5/0.3006
FINALLY REAM THROUGH BUSH
TO $\frac{3}{4}$" $^{+\cdot0005"}_{-\cdot00025"}$ DIA.

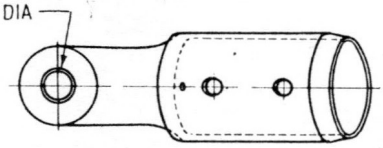


BUSHING OF SOCKET FOR 9/B SUB FRAME

D

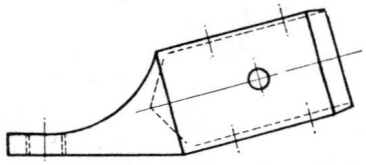


REAM EXISTING HOLE TO $\frac{5}{8}$" $^{+\cdot0005"}_{-\cdot00025"}$ DIA
AND INSERT BUSH ITEM Nº 8/0.2865
FINALLY REAM THROUGH BUSH TO
$\frac{1}{2}$" $^{+\cdot0005"}_{-\cdot00025"}$ DIA

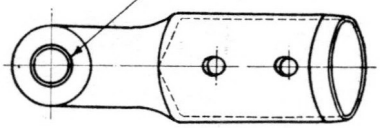


BUSHING OF SOCKET FOR DETACHABLE STRUT

E

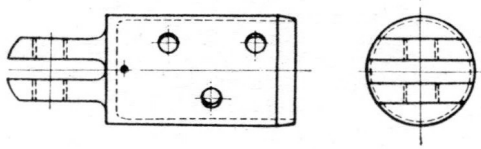


REAM EXISTING HOLE TO $\frac{3}{4}$" $^{+\cdot0005"}_{-\cdot00025"}$
AND INSERT BUSH ITEM Nº 7/0.2865
FINALLY REAM THROUGH BUSH TO
$\frac{5}{8}$" $^{+\cdot0005"}_{-\cdot00025"}$ DIA.



BUSHING OF SOCKET FOR DETACHABLE STRUTS

J



REAM EXISTING HOLE TO $\frac{5}{8}$" $^{+\cdot0005"}_{-\cdot00025"}$ DIA.
AND INSERT BUSH ITEM Nº 8/0.2865.
FINALLY REAM THROUGH BUSH TO
$\frac{1}{2}$" $^{+\cdot0005"}_{-\cdot00025"}$ DIA.

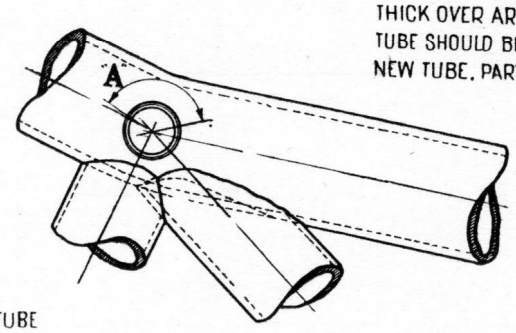
BUSHING OF SOCKET FOR DIAGONAL STRUT.

THIS WAS LINCOLN REPAIR 0.3005

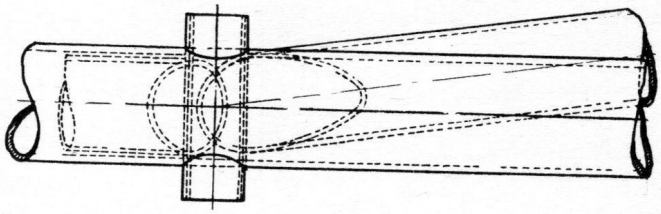
H

# 4 A BUSHING OF HOLES-ENGINE SUBFRAME-OUTBOARD 4A

IF DAMAGED TUBE IS LESS THAN 100 THICK OVER AREA "A", THE COMPLETE TUBE SHOULD BE DRILLED OUT, AND A NEW TUBE, PART Nº 50/0.2916 FITTED



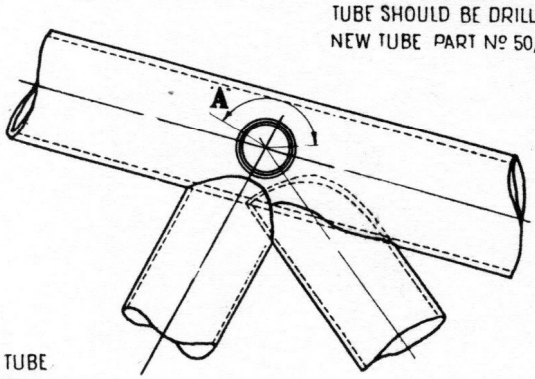

IF THICKNESS OF DAMAGED TUBE OVER AREA "A" IS 100 OR MORE, DRILL AND REAM TO $\frac{15}{16}$ DIA $^{+.0005}_{-.00025}$ AND INSERT BUSH ITEM Nº 9/0 3006 FINALLY REAM THROUGH BUSH TO $\frac{7}{8}$ DIA $^{+.0005}_{-.00025}$



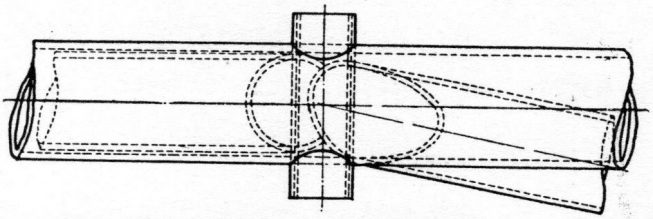
BUSHING OF JOINT AT FRONT SPAR

F

IF DAMAGED TUBE IS LESS THAN 100 THICK OVER AREA "A", THE COMPLETE TUBE SHOULD BE DRILLED OUT AND A NEW TUBE PART Nº 50/0 2916 FITTED.




IF THICKNESS OF DAMAGED TUBE OVER AREA "A" IS .100" OR MORE, DRILL AND REAM TO $\frac{15}{16}$" DIA $^{+.0005"}_{-.00025"}$, AND INSERT BUSH, ITEM Nº 9/0.3006, FINALLY REAM THROUGH BUSH TO $\frac{7}{8}$" DIA $^{+.0005"}_{-.00025"}$

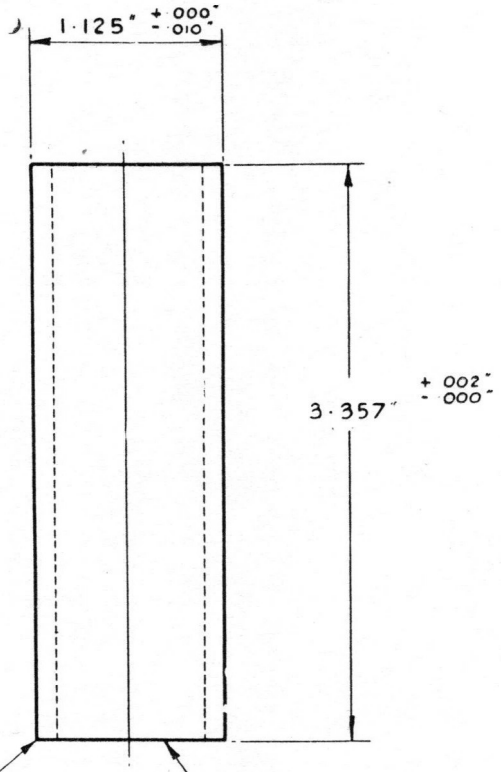


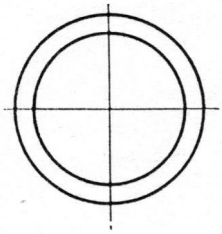
BUSHING OF JOINT AT REAR SPAR

THIS WAS LINCOLN REPAIR 0.3005

G

# 4B BUSHING OF HOLES - ENGINE SUBFRAME - OUTBOARD 4B

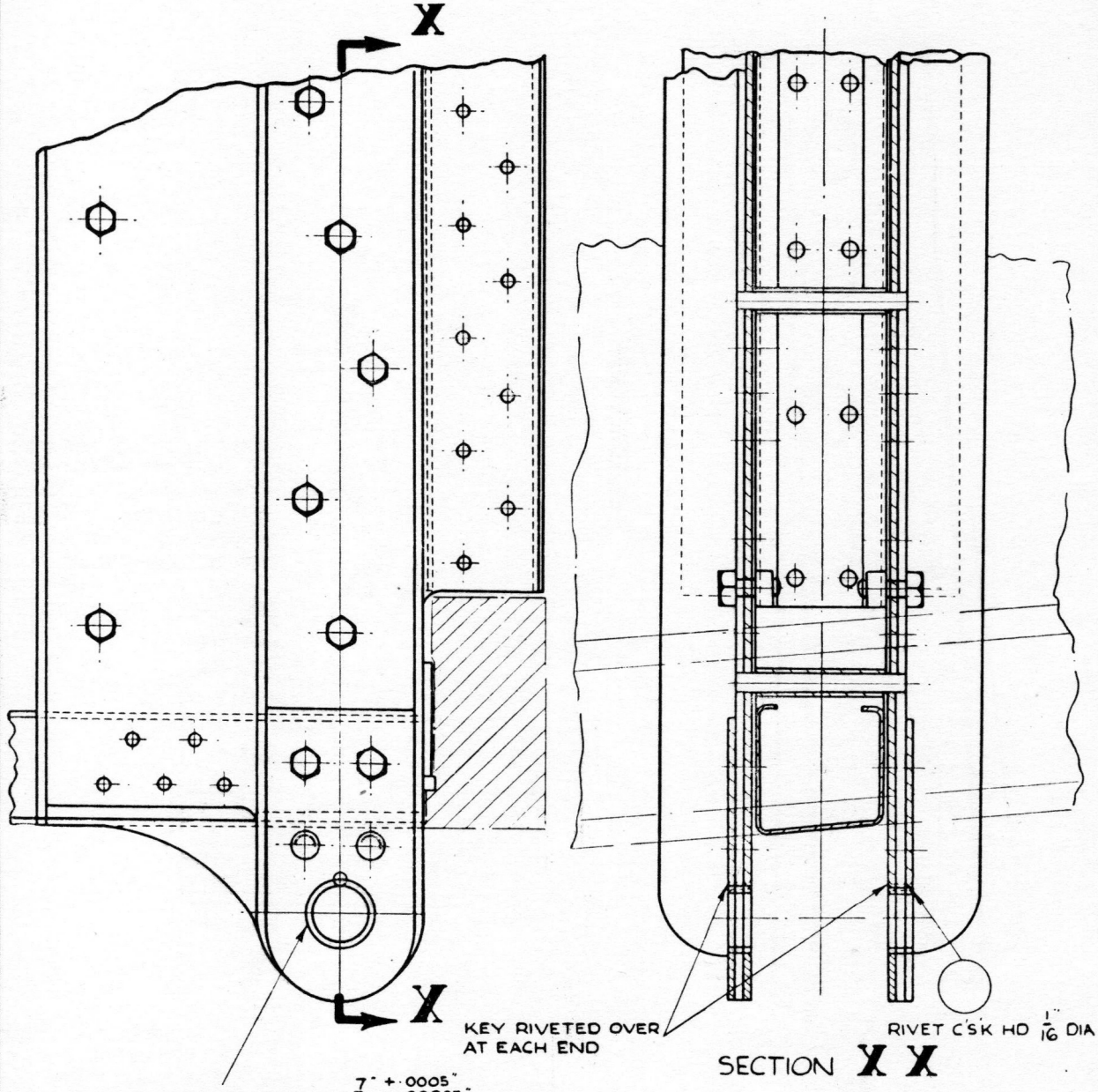


NOTE -
BORE DIA OPENED UP TO 875" +·0005 -·00025 AFTER WELDING INTO SUB-FRAME

MATL - STEEL BAR $1\frac{1}{8}$" DIA SPEC - DTD 126A

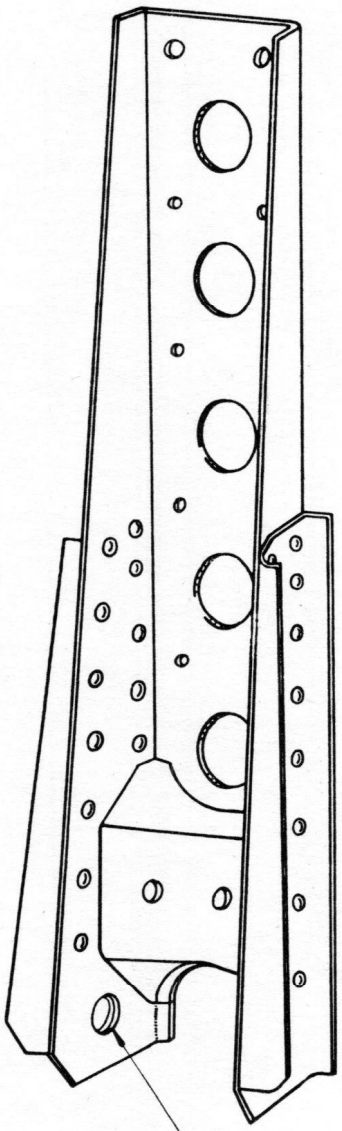
| 5 | BEARING TUBE (50/0.2916) | 5 |
|---|---|---|



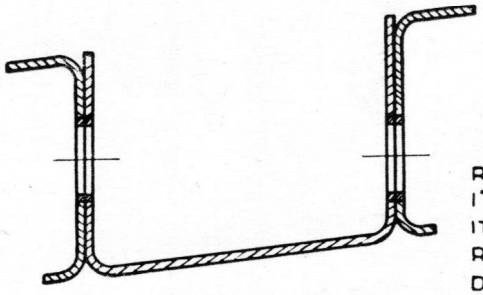

REAM EXISTING HOLE TO $\frac{7}{8}$" $^{+.0005"}_{-.00025"}$ DIA AND INSERT BUSH PART Nº 10/0 3006 DRILL $\frac{1}{16}$" DIA HOLE IN BUSH AND PLATE FOR KEY AS SHOWN AND COUNTERSINK FIT $\frac{1}{16}$" DIA KEY AND RIVET OVER TO SECURE BUSH. FILE KEY FLUSH WITH SIDES OF PLATE. FINALLY REAM THROUGH IN CONJUNCTION WITH ENGINE SUB-FRAME TO $\frac{3}{4}$" $^{+.0005"}_{-.00025"}$ DIA.

THIS WAS LINCOLN REPAIR 0.3011

| 6 | BUSHING OF HOLE - REAR ENGINE MOUNTING CHANNEL - OUTBOARD SUBFRAME | 6 |
|---|---|---|

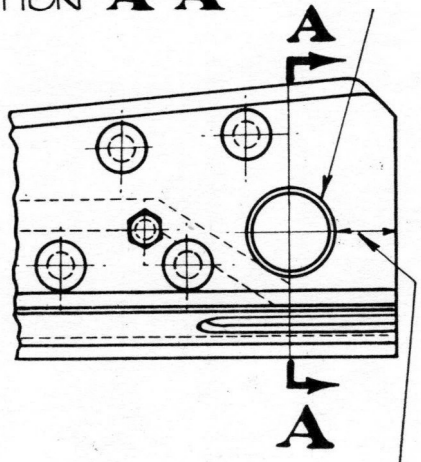


SEE DETAIL **B**



SECTION **A~A**

REAM EXISTING HOLE TO 1" $^{+.0005"}_{-.00025"}$ DIA INSERT BUSH ITEM Nº 11/0.3006 FINALLY REAM OUT TO $^{7}/_{8}$" $^{+.0005"}_{-.00025"}$ DIA IN CONJ$^{N}$ WITH ENGINE SUB-FRAME

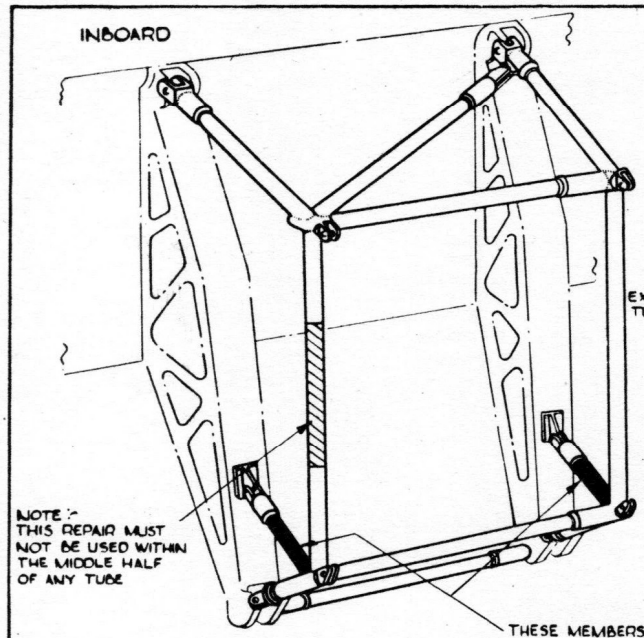


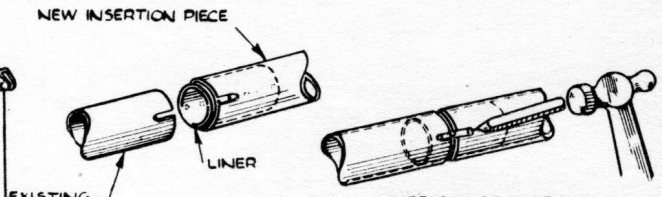

IT IS IMPORTANT THAT DIMENSION BE NOT LESS THAN $^{23}/_{32}$" WHEN BUSH IS FITTED & REPAIR IS COMPLETE

FRONT ENGINE MOUNTING CHANNEL OUTBOARD SUB-FRAME

THIS WAS LINCOLN REPAIR 0.3011

| 6A | BUSHING OF HOLE – FRONT ENGINE MOUNTING CHANNEL - OUTBOARD SUBFRAME | 6A |
|---|---|---|



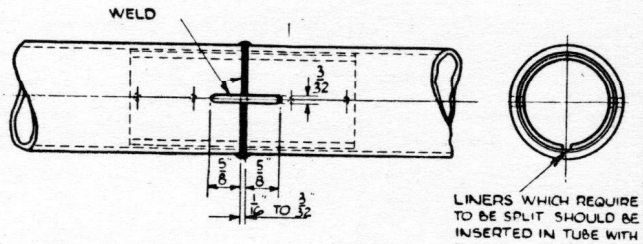
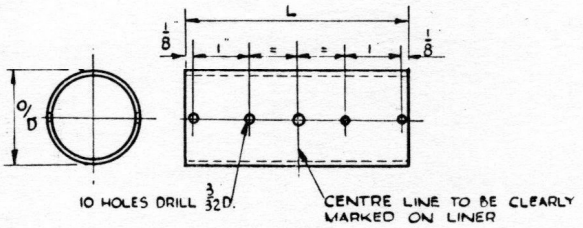



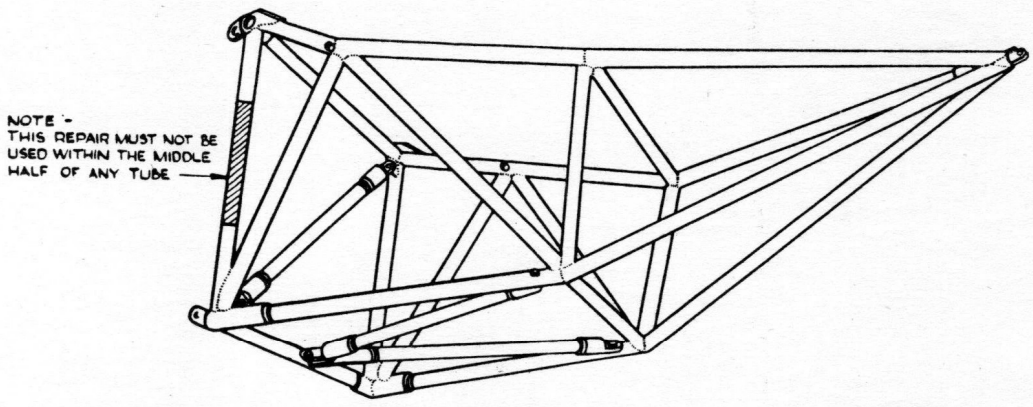

TABLE OF LINERS

| PART Nº | TO FIT INSIDE TUBE | LINER | | | REMARKS |
|---|---|---|---|---|---|
| | | OUTSIDE DIA | LENGTH | GAUGE | |
| 0.3007/2 | 1 3/4" O/D x 14 SWG | 1 5/8" | 3 1/2" | 14 | SPLIT |
| 0.3007/3 | 1 3/4" O/D x 10 SWG | 1 1/2" | 3 1/2" | 10 | SPLIT |
| 0.3007/4 | 2 1/8" O/D x 10 SWG | 1 7/8" | 4" | 10 | SPLIT |
| 0.3007/5 | 1 3/4" O/D x 17 SWG | 1 5/8" | 3 1/2" | 17 | |
| 0.3007/6 | 2 1/4" O/D x 10 SWG | 2" | 4" | 10 | SPLIT |
| 0.3007/7 | 1 7/8" O/D x 10 SWG | 1 5/8" | 3 3/4" | 10 | SPLIT |
| 0.3007/8 | 1 7/8" O/D x 14 SWG | 1 3/4" | 3 3/4" | 14 | SPLIT |




DETAILS OF LINER
MATERIAL - STEEL TUBE
SPEC - T45 OR DTD 563

OUTBOARD




THIS WAS DRAWING 0.3007 ISSUE 1

| 7 | INSERTION JOINT - USING INTERNAL LINER | 7 |
|---|---|---|

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

PART 2 — CHAPTER 3

## Fuel Tanks

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| Patch repair to stiffener and welded patch to skin | 5 |

## FUEL TANKS

### No. 1 Fuel Tank

### General Information

1. The general principles to be worked to in the repairing of No. 1 fuel tanks are described in A.P. 1464A, Vol. 1, Part 3, Section 14.

2. Spot welds which are cracked or porous should be drilled out and the hole filled with a soft aluminium rivet, to specification L. 36, which has been dipped in sealing compound, the head of the rivet being inside the tank. This repair may be carried out to holes drilled out up to 1/4 in. dia.

NOTE:—If during pressure testing, leakage occurs, the external reaction head of the rivet should be welded over. (See A.G.I. 3 (D) 45.)

3. For damage greater than that defined in para. 2, for example, blowholes, etc., up to approximately 1/2 in. dia., reference should be made to para. 12.

### Bolted Patch Repair

4. Damage to the fuel tank skin which can be encompassed by a 4 in. dia. circle may be repaired by cleaning out the damage to a regular shape and patching as shown in Fig. 1.

5. For repair to the protective covering of the tank, reference should be made to A.P. 1464A, Vol. 1, Part 3, Section 14.

**TABLE 7.**

**Repair Material for Bolted Patch Repair Fuel Tank**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 275 or D.T.D. 390 | For patch plate |
| A73/7158 | 8/P.1888 | Inner ring | | | |
| A73/90313 | 010/P.1888 | Washer | | | |
| A73/4073 | 27/P.1888 | Bolt | | | |
| | 1/SS.3074 | Strip locking | | | |
| H128F/31627 | (E) D2528/2S3/3 | Rivet snap head | 3/32 in. dia. x 3/16 in. long | D.T.D. 327 | For securing |

### Patch Repair to Tank Rib

6. Damage to a tank which involves a tank rib, and is in the vicinity of a flanged lightening hole, should be repaired by patching. The damage should be cleaned out to a regular shape and the distorted stiffener lightly hammered back as near as possible to its original shape.

A patch to suit the contour of the flanged lightening hole should be made up, and riveted into position as shown in Fig. 2.

7. On completion of the repair, the tank skin should be replaced.

**TABLE 8.**

**Repair Material for Patch-Tank Rib**

| Ident No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 18 s.w.g. | D.T.D. 275 or 390 | For patch plate |
| H128F/61176 | 5/SS.3123 | Rivet | 1/8 in. dia. | D.T.D. 327 | |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/4 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |

### Repair to Tank Rib and Skin Stiffener

8. Damage to a tank which involves a tank rib flange and also a vertical stiffener, should be repaired by patching as shown in Fig. 3. The damage should be cleaned out to a regular shape, and a repair angle and plate made to extend at least 2-1/4 inches either side of the cleaned out damage and riveted to the rib as shown at detail "C".

9. The damaged section of skin stiffener

should be cut away, a new section inserted and riveted together with an oversize section, made to conform to the outside contour of the original former section, as shown at detail "A".

10. On completion of the repair the damaged tank skin should be replaced with a new skin patch welded into position as shown at B.

**TABLE 9.**

**Material for Repair of Tank Rib and Skin Stiffener**

| Ident No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. long | D.T.D. 327 | |
| H128F/30280 | (E) D2528/2S5/5 | Rivet, snap head | 5/32 in. dia. x 5/16 in. long | D.T.D. 327 | |
| H128F/30281 | (E) D2528/2S5/6 | Rivet, snap head | 5/32 in. dia. x 3/8 in long | D.T.D. 327 | |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, counter sunk head | 1/8 in. dia. x 1/4 in. long | D.T.D. 327 | |
| H128F/61182 | 12/SS/3123 | Rivet, pop dome head. | 3/16 in. dia. | D.T.D. 327 | |
| | | Sheet, aluminium alloy | 18 S.W.G. | D.T.D. 275 or 390 | For angle plate and stiffener. |
| | | Sheet, aluminium | Same gauge as existing skin | D.T.D. 213 | For repair patch. Tank skin. |

**Insertion Repair to Stiffener and Welded Patch to Skin**

11. Damage to the fuel tank greater than that defined in para. 12 may be repaired by insertion and welding.

The damaged skin and stiffener should be cut away to a regular shape and a patch of 18 S.W.G. Aluminium alloy D.T.D. 213 welded to the skin. Insert a new portion of stiffener section 182/SS.1793 to the size of the cleaned out damage and spot weld to the skin. The joints should then be made as indicated in Fig. 4.

NOTE.—

On completion of the repair the tank should be pressure tested in accordance with instructions laid down in AGI.3 (D) 33, para. 14. If leaks do occur, the reaction heads of the rivets should be welded over, as stated in AGI.3 (D) 45.

**TABLE 10.**

**Material for Repair of Tank Stiffener and Skin Patch**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Repair Section | | D.T.D. 213 | For oversize stiffener and skin patch |
| | 182/SS.1793 | Insertion section | | | |
| H128F/61182 | 12/SS.3123 | Pop rivets | 3/16 in. dia. | | |
| H128F/30745 | (E) D2528/1S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. long | L.36 | |
| | | **Alternative Material** | | | |
| | | Repair section Insertion section | | | |
| H128F/61182 | 12/SS.3123 | Pop rivet | 3/16 in. dia. | | |
| H128F/61184 | 14/SS.3123 | Pop rivet | 3/16 in. dia. | | |
| H128F/30745 | (E) D2528/1S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. long | L.36 | |

**Patch Repair to Stiffener and Welded Patch to Skin**

12. Damage greater than that described in Chapter 3, para. 1 of Part 1, should be repaired as illustrated in Fig. 5, provided that the damage is within the following limits:

(i) Damage to the flange of a stiffener does not exceed $\frac{3}{4}$ in. long and does not extend into the flange for more than $\frac{1}{2}$ in.

(ii) Damage in the vertical portion of the stiffener does not exceed 3/8 inch wide nor 3/4 in. high.

13. In both cases the damage should be cleaned out and a patch riveted to the stiffener as shown at details B and C, the reaction head of the rivets to be on the outside of the tank.

14. On completion of the repair to the stiffener the skin should be repaired with a welded patch as shown.

15. If, during pressure testing, leakage occurs, the reaction head of the rivet should be welded over, see NOTE, para. 11.

16. For repairs to damage greater than that described above, reference should be made to para. 11.

**TABLE 11.**
**Repair Material for Stiffener and Tank Skin Patch**

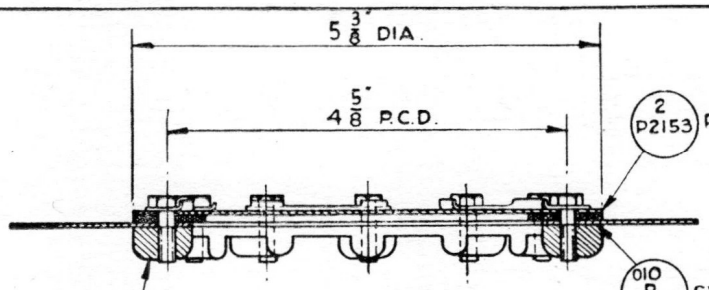
| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | For stiffener angle |
| H128F/61176 | 5/SS.3123 | Pop, Rivet | 1/8 in. dia. | | |
| H128F/30745 | (E) D2528/1S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | L. 36 | |
| | | Aluminium sheet | 18 s.w.g. | D.T.D. 213 | For skin patch |

**Nos. 2 and 3 Fuel Tanks**

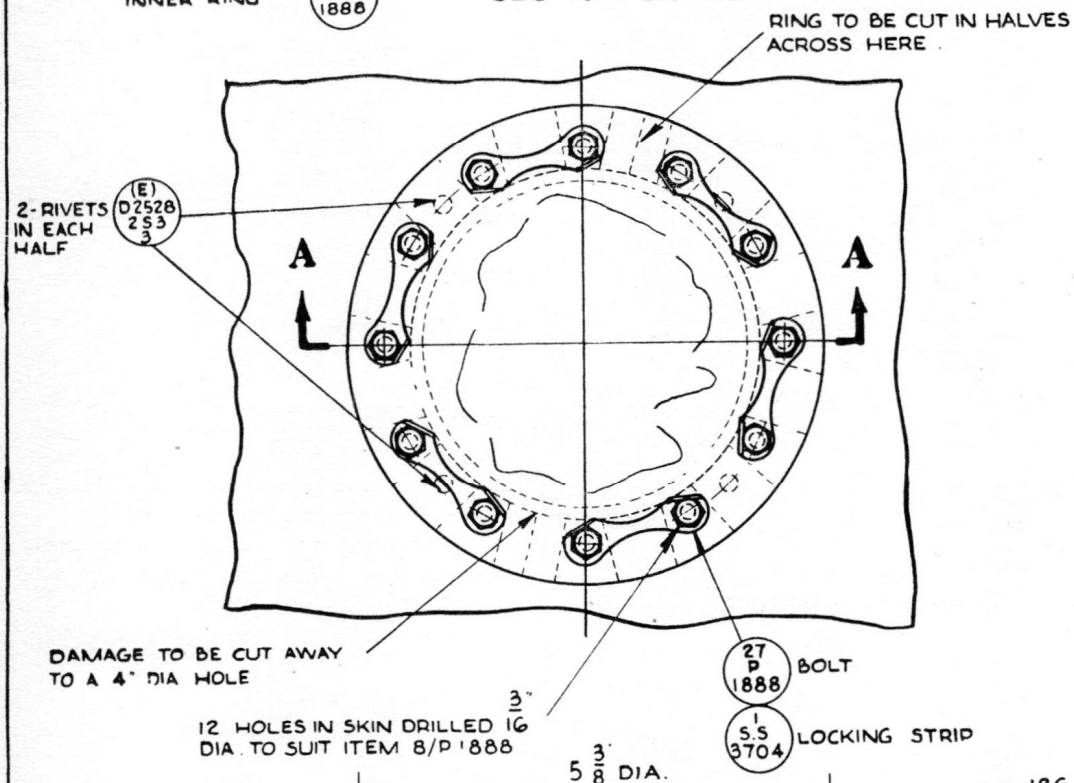
**General Information**

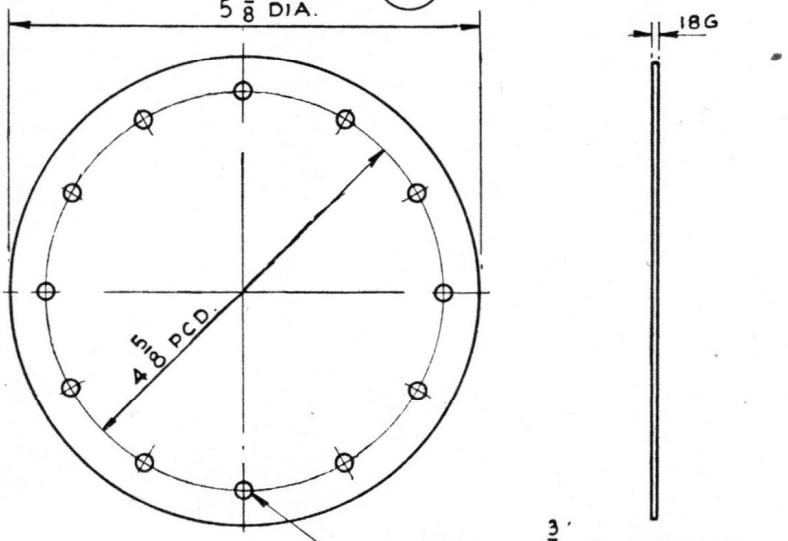
17. The Nos. 2 and 3 fuel tanks are flexible and of a self-sealing type, made to specification D.T.D. 1073. They are manufactured under the trade name of Marflex.

18. For repairs to this type of tank, reference should be made to A.P. 1464D, Vol. 1, Part 2, Section 5, Chapter 20.




SECTION **A-A**



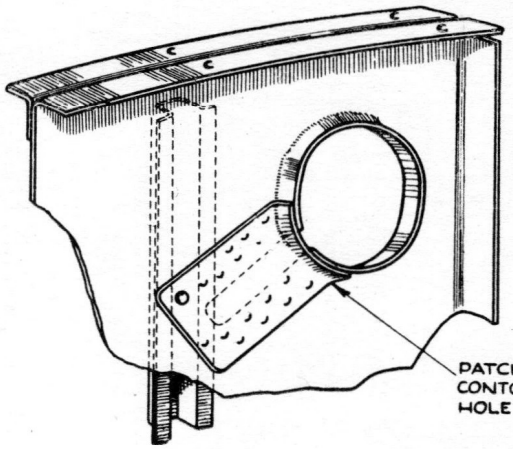




MATERIAL - ALUM ALLOY 18 S.W.G DTD 275 OR 390

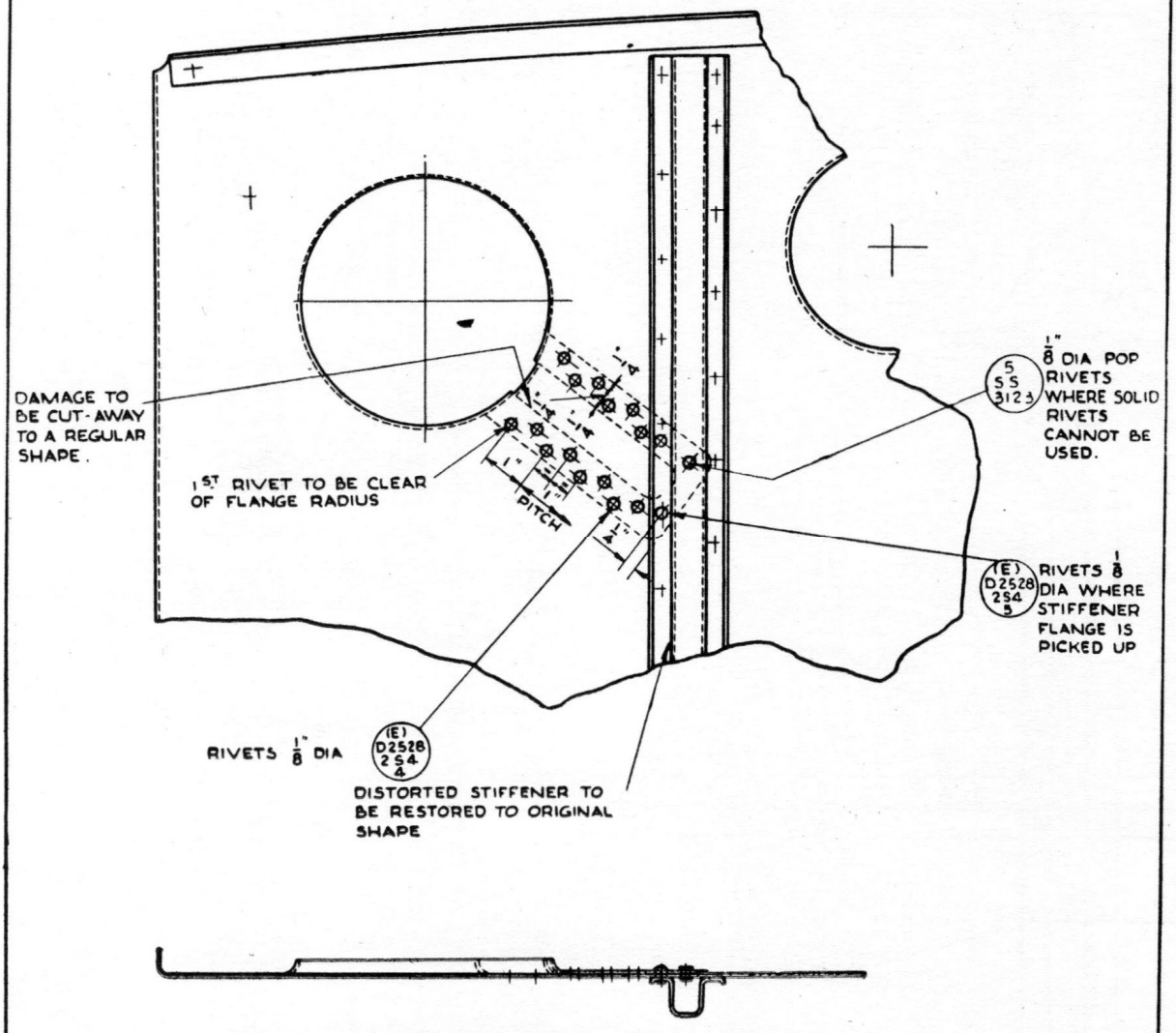
DETAIL OF PATCH PLATE
2/P2153

THIS WAS LINCOLN REPAIR P.2153

| | | |
|---|---|---|
| 1 | BOLTED PATCH REPAIR - FUEL TANK | 1 |




VIEW SHOWING REPAIR






PATCH TO BE ALUM ALLOY 18G
SPEC :- D.T.D. 275 OR 390

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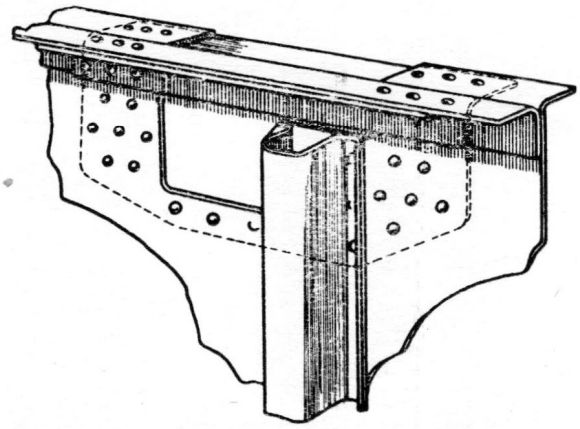
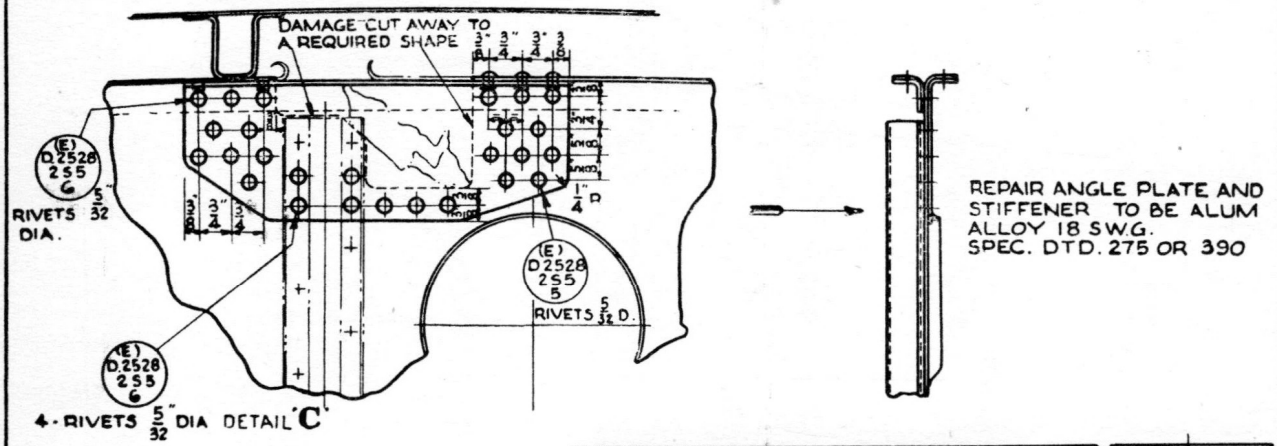
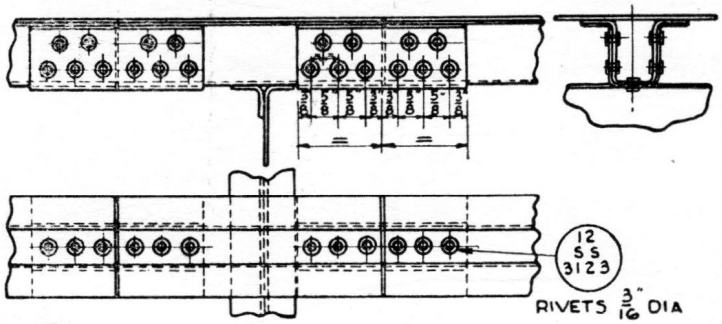
| 2 | PATCH REPAIR TO TANK RIB | 2 |
|---|---|---|

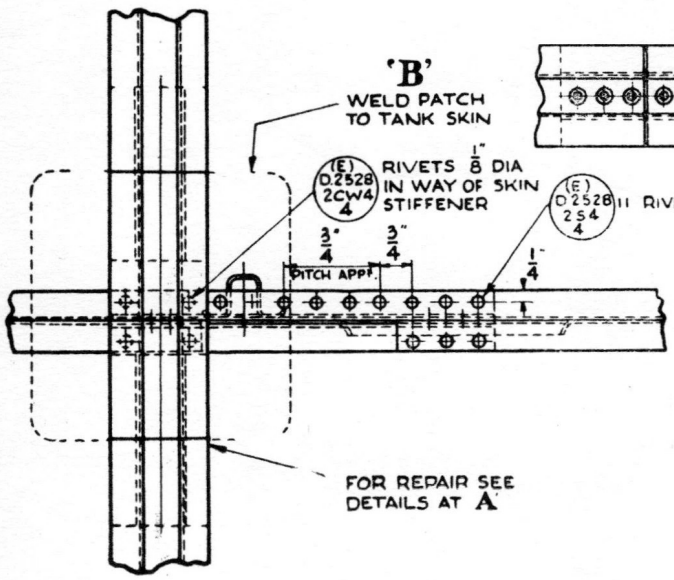


VIEW IN DIRECTION OF ARROW SHOWING REPAIR




DETAIL 'A'
REPAIR TO SKIN STIFFENER

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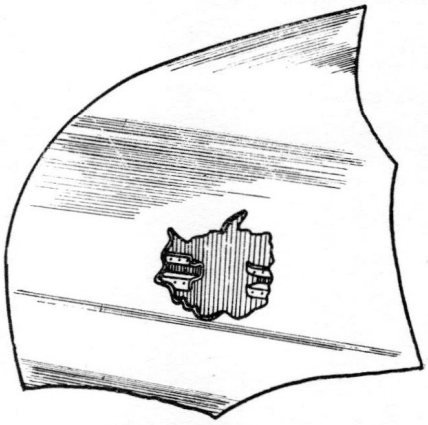
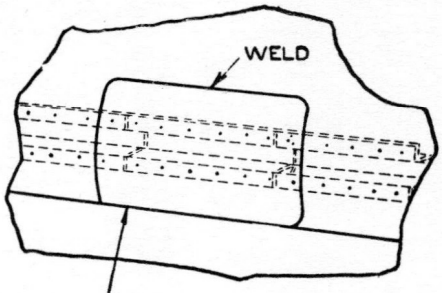
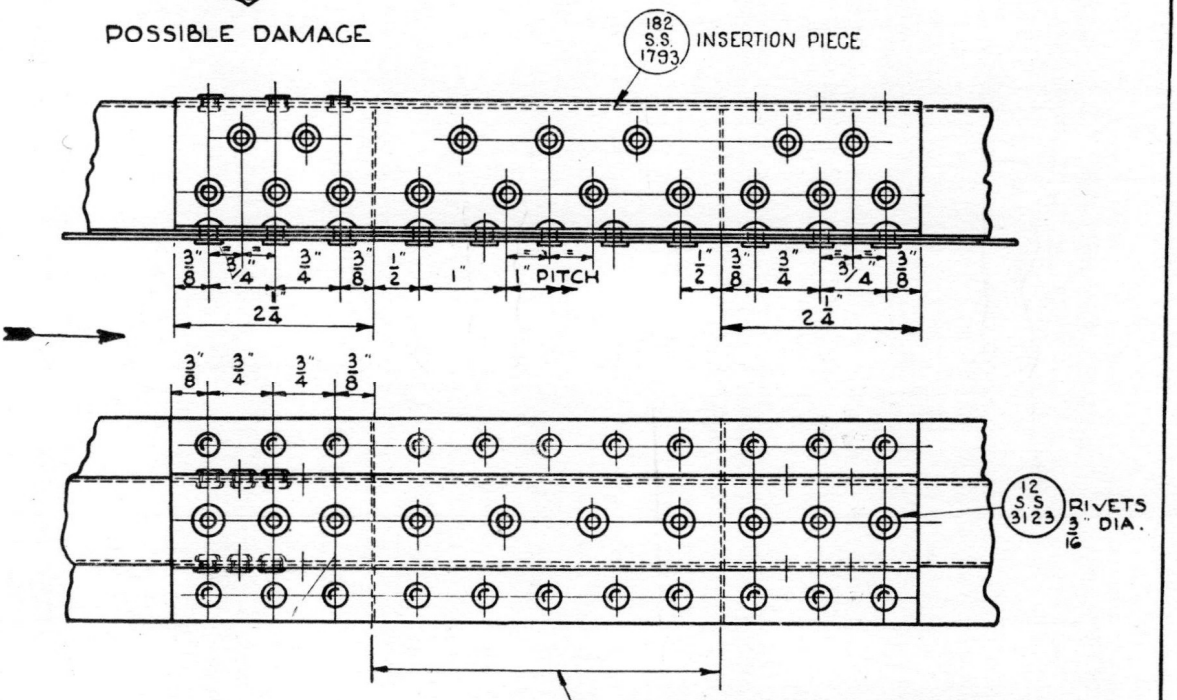
| 3 | PATCH REPAIR TO FUEL TANK RIB & SKIN STIFFENER | 3 |
|---|---|---|



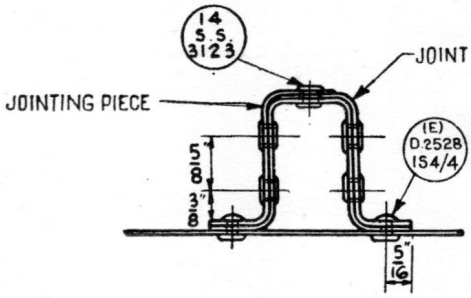
POSSIBLE DAMAGE



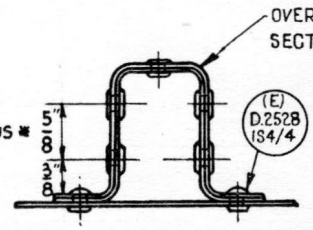

PATCH WELDED TO SKIN, AND SPOT WELDED TO STIFFENER




INSERT NEW LENGTH OF STIFFENER AND SPOT WELD TO SKIN BEFORE FIXING PATCH RIVETS TO BE INTERMEDIATE WITH SPOT-WELDING




ALTERNATIVE METHOD OF REPAIR



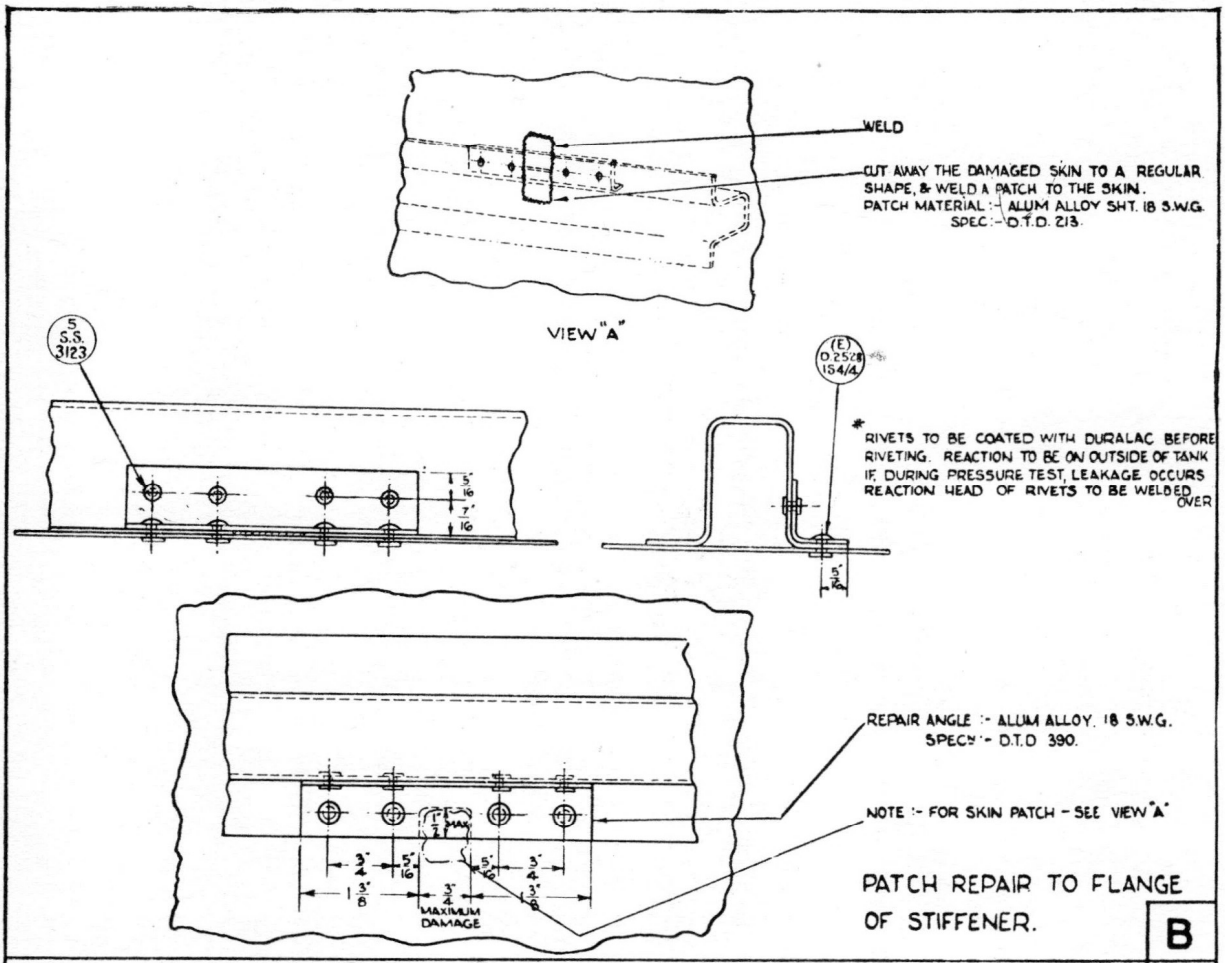

VIEW IN DIRECTION -OF ARROW

* NOTE - RIVETS TO BE COATED WITH DURALAC BEFORE RIVETING. REACTION TO BE ON OUTSIDE OF TANK. IF DURING PRESSURE TEST LEAKAGE OCCURS, REACTION HEAD OF RIVETS TO BE WELDED OVER

CUT AWAY THE DAMAGED SKIN AND STIFFENER TO A REGULAR SHAPE AND WELD A PATCH TO THE SKIN USING ALUM ALLOY SHEET 18 S.W.G. SPEC.:- D.T.D 213 INSERT A NEW PORTION OF STIFFENER SECTION 182/S.S 1793 TO SIZE OF DAMAGE AND SPOT WELD TO SKIN. MAKE JOINT AS INDICATED USING ALUM ALLOY SHEET 18 S.W.G. SPEC. D.T.D. 213

THIS WAS LINCOLN REPAIR P.2159

| 4 | INSERTION REPAIR TO STIFFENER & WELDED PATCH TO SKIN-FUEL TANK | 4 |
|---|---|---|




# 5 PATCH REPAIR TO STIFFENER & WELDED PATCH TO SKIN - FUEL TANK 5

R.A.A.F. Publication No.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART 2 — CHAPTER 4

## Fuselage

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| Patch Repair to Web and Top or Bottom Flange of Longeron, Fuselage Front and Rear Centre Portions | 34 |
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## FUSELAGE

### Skin

**Repair to Fuselage Skin—Extensive Damage**

1. Damage greater than that described in Chapter 4, para. 3 to 5 of part 1 should be repaired by replacing part of a skin panel or panels.

2. This repair does not apply to that portion of the skin between formers Nos. 16 to 19 bounded by stringers 4 to 7, port and starboard. For repairs to this section of skin, reference should be made to para. 7.

3. The repair should be effected by cutting away the damaged skin to the inside of the formers and stringers and replacing with a skin patch of the same gauge and material as the existing skin; the edges of the patch should be chamfered and joggled where necessary as shown in fig. 1.

4. The patch should bed down on jointing compound whilst still wet, and should be riveted into position, picking up existing rivet holes in the stringers and formers.

5. Where a lap joint occurs, it will be necessary to drill holes for additional rivets, the rivet pitch not to exceed 1/2 inch; at this pitch the rivets may be in a straight line, but where the rivet pitch is 3/8 in. only, the rivets should be staggered.

**TABLE 12.**
**Repair Material for Skin Patch—Fuselage**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 14 s.w.g. | D.T.D. 390 | |
| | | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 390 | |
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | |
| | | Sheet, aluminium alloy | 20 s.w.g. | D.T.D. 390 | |
| | | Sheet, aluminium alloy | 22 s.w.g. | D.T.D. 390 | |
| | | Sheet, aluminium alloy | 24 s.w.g. | D.T.D. 390 | |
| H128F/30250 | (E) D2528/2S3/3 | Rivet, snap head | 3/32 in. dia. x 3/16 in. | D.T.D. 327 | |
| H128F/30251 | (E) D2528/2S3/4 | Rivet, snap head | 3/32 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/31627 | (E) D2528/2S4/3 | Rivet, snap head | 1/8 in. dia. x 3/16 in. | D.T.D. 327 | |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/30269 | (E) D2528/2S4/6 | Rivet, snap head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |

**Repair to Fuselage Skin at Forward End of Upper Turret Longeron**

6. Damage greater than that defined in Chapter 4, paras. 3 to 5 of Part 1, should be repaired by replacing part of a skin panel or panels.

This repair applies only to that portion of skin between formers No. 16 to 19, bounded by stringers No. 4 to 7 port and starboard. For repairs to any other portions of skin, reference should be made to Para. 1, and the appropriate drawing listed therein.

7. Where that portion of skin as described above is damaged, it should be repaired as follows:—

(i) The 22 s.w.g. reinforcing skin and the 18 s.w.g. skin should be removed between formers No. 15 to 21 and replaced by a new 18 s.w.g. and 22 s.w.g. reinforcing skin.

(ii) This necessitates a new skin lap joint at former No. 15, as shown in Fig. 2, but at former No. 21 the existing skin lap joint must be used, as shown in Fig. 3.

(iii) All other skin joints and attachments should be effected by reference to the relevant drawing listed in Table "A" at the end of Chapter 1, or to the G.A. of Fuselage Plating and Riveting for Rear Centre Section, Drawing No. D4573.

**TABLE 13.**
**Repair Material for Fuselage Skin, Fwd. End of Upper Turret Longeron**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 28/D.4288 | Reinforcing skin (port) | 22 s.w.g. | D.T.D. 390 | |
| | 29/D.4288 | Reinforcing skin (stbd.) | 22 s.w.g. | D.T.D. 390 | |
| | — | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | |
| H128F/30311 | (E) D2528/2B4/4 | Rivet, brazier head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/30312 | (E) D2528/2B4/5 | Rivet, Brazier head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/30313 | (E) D2528/2B4/6 | Rivet, Brazier head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/30314 | (E) D2528/2B4/7 | Rivet, Brazier head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/30744 | (E) D2528/2B4/10 | Rivet, Brazier head | 1/8 in. dia. x 5/8 in. | D.T.D. 327 | |

**Formers**

**Patch Repair to Buckled Light Former at Junction with Stringer**

8. Buckling of a light type former at its junction with a stringer and which is greater than that described in Chapter 4, paras. 9 to 11 of Part 1, may be repaired by patching, provided that:—

(a) The former can be restored to its approximate original shape by light hammering.

(b) The former is not severed by cracks which radiate from lightening holes.

9. The repair should be carried out as follows:—

(i) The damaged former should be cleaned out to a regular shape and 3/32 in. dia. holes drilled at the extremities of any small cracks radiating from the lightening holes.

(ii) The buckled former lightly hammered back to its original shape and the patch plate and angles riveted over the damage as shown in Fig. 4. (See Table 14 for material gauge.)

(iii) The damaged section of stringer should then be cut away and a new section inserted, the angle and packing piece being riveted to the stringer and former as shown.

(iv) For repairs to stringers, reference should be made to Part 1, Chapter 4, Figs. 12 and 13.

(v) On completion of the repair, the damaged skin should be repaired as described in Chapter 4 of Part 1.

**TABLE 14.**
**Repair Material for Buckled Light Former at Junction With Stringer**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 275 or 390 | For patch plate and angles |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, c'sunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| | | Stringer section | | | For stringer insert |

**Insertion Repair to Light Former**

10. Damage to a light former, greater than that defined in para. 8, will necessitate the insertion of a new length of section.

11. The light formers are made in halves, and if the damage affects more than 50 per cent. of either of them, the damaged half should be replaced by a complete new half-former as illustrated in Fig. 5 and described below.

(i) The damaged portion of former should be cut out between lightening holes.

(ii) A new section of former fabricated. This can be done by cutting a section from a spare former, if available, or making up a new portion by reference to the relevant drawing in the main D.I.S.

(iii) Joint patches of 16 S.W.G. aluminium alloy should be made up, and riveted to the existing former and insertion piece, the outer flange of the joint plates to pick up the existing skin riveting.

(iv) Where cables or control rods pass through lightening holes, these should be reproduced in the plate when being made up.

(v) On completion of this repair, the skin should be repaired as described in Chapter 4 of Part 1.

**TABLE 15.**
**Material for Insertion Repair to Light Former**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 16 S.W.G. | D.T.D. 275 or 390 | For joint plate |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | For attaching joint plate to former |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | For attaching stringer bracket |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, c'sunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | For attaching skin to former |

**Patch Repair to Inner Flange of Heavy Former**

12. Damage to a heavy former in excess of that defined in Chapter 4, para. 13 of Part 1, and which necessitates removal of part of the inner flange and web, should be repaired by patching. The damaged portion should be cut away to a regular shape and a 10 S.W.G. aluminium alloy angle secured to the inside of the flange as shown in Fig. 6.

NOTE:—

If the lightening hole in way of the repair is not required for the passage of controls, etc., the repair angle need not be cut to clear the lightening hole.

**TABLE 16.**
**Material for Repair of Inner Flange of Heavy Former**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 10 S.W.G. | D.T.D. 390 | For repair angle |
| H128F/6063 | (E) D2528/2S6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |

**Patch Repair to Outer Flange of Heavy Former**

13. Damage to a heavy former in excess of that defined in Chapter 4, para. 13 of Part 1, and which may necessitate removal of part of the outer flange and web, should be repaired as shown in Fig. 7, provided that the damage does not exceed 6 in. in length nor extend for more than 2 in. into the section.

14. The repair should be effected by cutting away the stringer in way of the damage and cleaning out the damaged flange to a regular shape. A packing piece, the same gauge and specification as the original, should be inserted and secured with an internal angle of 10 S.W.G. aluminium alloy, riveted with a minimum of four equally spaced rivets in the flange of the former, either side of the insertion piece. To complete the repair, rivet the angle to the web as shown; the rivet holes in the insertion piece and angle should be drilled in conjunction with the skin, and they should be staggered.

15. For repairs to the skin, refer to Chapter 1, paras. 8 to 10, and the appropriate Drawings listed in Table "A".

**TABLE 17.**
**Material for Repair to Outer Flange of Heavy Former**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 10 S.W.G. | D.T.D. 275 or 390 | For repair angle |
| | | Sheet, aluminium alloy | As reqd. | D.T.D. 275 or 390 | For packing piece |
| H128F/30289 | (E) D2528/2S6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/5821 | (E) D2528/2CW4/7 | Rivet, c'sunk head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/6335 | (E) D2528/2CW8/8 | Rivet, c'sunk head | 1/4 in. dia. x 1/2 in. | 327 | |

**Insertion Repair to Web of Former 35**

16. Damage to the web of former 35 in excess of that defined in Chapter 4, para. 16, of Part 1, should be repaired by cutting away the damaged portion of web through the centre line of the nearest lightening holes and inserting a new length of web, secured with 14 S.W.G. aluminium alloy joint plates as illustrated in Fig. 8.

17. The lightening hole must not be reproduced in the jointing plates unless required for the passage of conduits or controls, etc.

**TABLE 18.**
**Material for Repair to Web of Former 35**

| Ident. No. | Part No. | Description | Size | Specification |
|---|---|---|---|---|
| | | Sheet, aluminium alloy | 14 s.w.g. | D.T.D. 390 |
| H128F/30288 | (E) D2528/2S6/6 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 |

**Insertion Repair to Web of Former 38**

18. Damage to the web of former 38 in excess of that defined in Chapter 4, para. 16, of Part 1, should be repaired by insertion. The damaged portion of web should be cut away through the centre line of the nearest lightening holes, a new length of web inserted, and secured with 14 S.W.G. aluminium alloy joint plates as shown in Fig. 9.

19. The lightening holes need not be reproduced in the joint plate unless required for the passage of cables or conduits.

**TABLE 19.**
**Material for Repair to Web of Former 38**

| Ident. No. | Part No. | Description | Size | Specification |
|---|---|---|---|---|
| | | Sheet, Aluminium alloy | 14 s.w.g. | D.T.D. 390 |
| H128F/30288 | (E) D2528/2S6/6 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 |
| H128F/30290 | (E) D2528/2S6/8 | Rivet, snap head | 3/16 in. dia. x 1/2 in. | D.T.D. 327 |

**Patch Repair to Flanges of Built Up Formers 35 and 38**

20. Damage to the flanges of formers 35 and 38 in excess of that defined in Chapter 4, para. 16, of Part 1, should be repaired by one of the methods described below, provided that the damage does not exceed 2 in. in length nor extend more than 3/4 in. into the section.

**Patch Repair to Inner and Outer Flanges**

(i) Damage to the inner and outer flanges of the above formers may be repaired by inserting a packing piece to the size of the cleaned out damage, and riveting a 12 s.w.g. aluminium alloy angle section to the existing flange and packing piece. The angle should be made to extend at least 2½ in. either side of the cleaned out damage as shown in Fig. 10.

**Patch Repair Outer Flanges**

(ii) Damage to the outer flanges may be repaired by backing up the damaged flanges with a 12 s.w.g. aluminium alloy angle section, riveted to the original and made to extend at least 2 in. either side of the damage as shown in Fig. 11.

21. On completion of the repairs, the damaged skin should be replaced as defined in Chapter 4, part 1.

22. For repairs to damage greater than that described above, reference should be made to para. 23.

**TABLE 20.**
**Material for Repair of Flanges, Formers 35 and 38**

| Ident. No. | Part No. | Description | Size | Specification |
|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 12 s.w.g. | D.T.D. 390 |
| H128F/31012 | (E) D2528/2S8/8 | Rivet, snap head | 1/4 in. dia. x 1/2 in. | D.T.D. 327 |
| H128F/6063 | (E) D2528/2CW6/7 | Rivet, countersunk head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 |
| H128F/5823 | (E) D2528/2CW6/8 | Rivet, countersunk head | 3/16 in. dia. x 1/2 in. | D.T.D. 327 |
| H128F/5725 | (E) D2528/2CW4/5 | Rivet, countersunk head | 1/8 in. dia. x 5/16 in. | |

**Insertion Repair to Flanges of Built Up Formers 35 and 38**

23. Damage to the flanges of formers 35 or 38 in excess of that defined in para. 20, should be repaired by inserting a new length of extrusion, the same gauge and specification as the original, secured with internal angles of 10 S.W.G. aluminium alloy riveted as shown in Fig. 12.

24. On completion of repairs to the outer flanges, a new panel of skin should be fitted as described in Chapter 1, paras. 8 to 10, and the appropriate Drawings listed in Table "A".

**TABLE 21.**
**Material for Repair to Flanges of Built Up Formers 35 and 38**

| Ident. No. | Part No. | Description | Size | Specification |
|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 10 s.w.g. | D.T.D. 390 |
| H128F/30289 | (E) D2528/2S6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 |
| H128F/5823 | (E) D2528/2CW6/8 | Rivet, countersunk head | 3/16 in. dia. x 1/2 in. | D.T.D. 327 |
| H128F/31013 | (E) D2528/2S8/10 | Rivet, snap head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 |

**Insertion Repair to Upper Half of Former 35 and 38**

25. Damage to a flange and web of former 35 or 38 in that position of the member above the tail plane attachment bolts, greater than that defined in Chapter 4, para. 16, of Part 1, should be repaired by inserting a new section of former as shown in Fig. 13.

26. The damaged portion should be cut away through the centre line of rivets on the outer flange as near the centre line of the lightening holes as possible, the new portion of former inserted and jointed with joint plates of 16 S.W.G. aluminium alloy and 12 S.W.G. steel angle sections, riveted to the inside of the inner and outer flanges as shown.

27. On completion of the repair, the skin should be repaired as described in para. 24.

**TABLE 22.**
**Material for Repair of Upper Half of Formers, 35 or 38**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 16 S.W.G. | D.T.D. 390 | For joint plates |
| | — | Sheet, carbon-steel | 12 S.W.G. | D.T.D. 124A | To be hardened and tempered. |
| H128F/59217 | (E) D2528/2S8/6 | Rivet, snap head | 1/4 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/31013 | (E) D2528/2S8/10 | Rivet, snap head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 | |
| H128F/30289 | (E) D2528/2S6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |

**Replacement of Lower Portion of Former 35 between Stringers 12 Port and Starboard**

28. Extensive damage to the lower portion of former 35, may be repaired by partial replacement, provided that the damage does not extend beyond a point 9.25 in. below the centre line of the tail plane attachment bolts.

29. The tail plane should first be removed as

described in R.A.A.F. Publication . . . Section 5. Before the damaged portion is cut away, the jig, Part No. Z2187 (see Fig. 16) should be fitted into position, as shown in Fig. 14, to prevent distortion of the sound portion of the former and to locate the tail wheel beam in its correct position.

30. A new portion of former, either cut from a spare former 35, or made up as shown in Fig. 15, should be butted up to the existing former and held into position with the jig as shown in Fig. 14 . The joint plates should then be riveted to the two sections as shown in Figs. 14 and 15.

31. On completion of the repair, new lengths of stringers should be fitted, the joints being made as described in Chapter 4, para. 19 of Part 1, and they should be staggered in alternate bays.

32. Replace the intercostals and walkaway skin; the cutaway fuselage skin should be replaced as described in paras. 8 to 10 and the appropriate Drawings listed in Table "A".

**TABLE 23.**
**Repair Material for Lower Portion of Former 35**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Insertion | — | — | Spare part |
| | 5/D.3503 | Inner joint angle | — | — | Spare part |
| | 6/D.3503 | Outer joint angle | — | — | Spare part |
| | 8/D.3503 | Web joint plate | — | — | Spare part |
| | 9/D3503 | Web joint plate | — | — | Spare part |
| H128F/32444 | (E) D2528/2S8/7 | Rivet, snap head | 1/4 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/31015 | (E) D2528/2S8/12 | Rivet, snap head | 1/4 in. dia. x 3/4 in. | D.T.D. 327 | |
| H128F/5735 | (E) D2528/2CW4/6 | Rivet, countersunk head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/5822 | (E) D2528/2CW6/7 | Rivet, countersunk head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |
| | Z.2187 | Jig, former 35 | | | |

**Patch Repair to Inner Angle Former 27**

33. Damage to the inner angle of Former 27 in excess of that defined in Chapter 4, para. 15 of Part 1, should be repaired as illustrated in Fig. 17, provided that the damage does not extend for more than 3/4 in. into the section and is not longer than 6 in. in length.

34. The damaged flange of the angle should be trimmed out to a regular shape, a packing piece of 10 S.W.G. aluminium alloy inserted and secured with an internal reinforcing angle riveted in conjunction with the packing piece and original angle.

35. If the web is also damaged, a repair should be made as described in para. 36, after the inner angle has been repaired.

**TABLE 24.**
**Material for Repair of Inner Angle, Former 27**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 390 | |
| | — | Sheet, aluminium alloy | 10 s.w.g. | D.T.D. 390 | Packing piece |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/30289 | (E) D2528/2S4/7 | Rivet, snap head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/30288 | (E) D2528/2S6/6 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/31009 | (E) D2528/2S6/4 | Rivet, snap head | 3/16 in. dia. x 1/4 in. | D.T.D. 327 | |

**Patch Repair to Outer Angle of Former 27, with Insertion Repair to Web**

36. Damage to the outer angle and adjacent web of former 27 in excess of that defined in Chapter 4, para. 15 of Part 1, may be repaired as shown in Fig. 18, provided that the damage

to the flange does not exceed 6 in. in length, nor extend more than 1-1/8 in. into the section.

37. The damaged portion of web should be cut away and the damaged flange cleaned out to a regular shape. A new portion of web and packing should be inserted and secured with an internal angle bolted in conjunction with the packing piece, web and angle, using the same bolts and nuts as originally. Complete the repair by inserting (E) D2528/2CW4/7 and 2CW4/6 rivets, utilising the existing rivet holes in the skin.

38. On completion of the repair, the skin should be repaired as described in Chapter 1, paras 8 to 10, and the appropriate drawings listed in Table "A".

**TABLE 25.**
**Material for Repair of Outer Angle and Web of Former 27**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, carbon-steel | 18 s.w.g. | D.T.D. 124A | Hardened and tempered |
| | — | Sheet, aluminium alloy | 12 s.w.g. | D.T.D. 390 | For new portion of web |
| | — | Sheet, aluminium alloy | 8 s.w.g. | D.T.D. 390 | Packing piece |
| H128F/5735 | (E) D2528/2CW4/6 | Rivet, countersunk head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/5821 | (E) D2528/2CW4/7 | Rivet, countersunk head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |

**Patch Repair to Flange of Former E**

39. Damage to either of the flanges of former E in excess of that defined in Chapter 4, para. 14 of Part 1, may be repaired as shown in Fig. 19, provided that the damage does not exceed 6 in. in length nor extend more than 7/8 in. into the section after it has been cleaned out.

**TABLE 26.**
**Material for Repair to Flange of Former E**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, carbon-steel | 14 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | — | Sheet, aluminium alloy | 6 s.w.g. | D.T.D. 390 | For packing piece |
| H128F/5823 | (E) D2528/2CW6/8 | Rivet, countersunk head | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |

**Replacement of Lower Portion of Former E**

40. Damage to the lower portion of Former E, in excess of that defined in para. 39, necessitates a replacement.

(i) Before commencing repairs, the front portion of the fuselage should be removed (see R.A.A.F. Publication —, Section 5).

(ii) The jig, Part No. Z.1725 (see Fig. 20) should be positioned on Former E, to ensure that the holes for the attachment of the nose portion are correctly located.

(iii) The repair to the damaged former should then be carried out as defined in Fig. 22.

(iv) For details of joint, drilling of front and rear flanges, and former contour, refer to Fig. 21.

**TABLE 27.**
**Material for Repair of Lower Portion of Former E**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | Z.1725 | Setting jig | — | — | |
| | | Lower portion, former E | — | — | Spare part or made from 51/SS.3075 |
| | — | Sheet, steel | 14 s.w.g. | D.T.D. 124A | Hardened and tempered |
| H128F/30290 | (E) D2528/2S6/8 | Rivet, snap head | 3/16 in. x 1/2 in. | D.T.D. 327 | |
| H128F/5823 | (E) D2528/2CW6/8 | Rivet, countersunk head | 3/16 in. x 1/2 in. | D.T.D. 327 | |

**Insertion Repair to 6 in. Heavy Former**

41. Damage to a heavy former in excess of that defined in Chapter 4, para. 13 of Part 1, necessitates the insertion of a new length of section. The damaged section should be cut away as near as possible on the centre line of the nearest lightening holes. Insert the new section of former and secure the butt joints with 12 S.W.G. aluminium alloy reinforcing angles and plates, as illustrated in Fig. 23.

42. If the skin is damaged, a new panel should be fitted as described in paras. 8 to 10 and the appropriate drawings listed in Table "A" before the outer reinforcing plate is fitted.

**TABLE 28.**
**Material for Repair of 6 in. Heavy Former**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 12 s.w.g. | D.T.D. 275 or D.T.D. 390 | |
| H128F/31012 | (E) D2528/2S8/8 | Rivet, snap head | 1/4 in. dia. | D.T.D. 327 | |
| H128F/31013 | (E) D2528/2S8/10 | Rivet, snap head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2CW8/10 | Rivet, countersunk head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2CW8/12 | Rivet, countersunk head | 1/4 in. dia. x 3/4 in. | D.T.D. 327 | |

**Insertion Repair to 4 in. Heavy Former**

43. Damage to a 4 in. Heavy Former in excess of that defined in Chapter 4, para. 13 of Part 1, necessitates the insertion of a new length of Former as shown in Fig. 24. The damaged portion should be cut away through the centre line of the two nearest lightening holes, the new section of former inserted, and secured with 12 S.W.G. Aluminium alloy angles. The outer angle should be riveted in conjunction with the Fuselage skin as shown.

44. On completion of the repair, the skin should be renewed as described in para. 42.

**TABLE 29.**
**Material for Repair of 4 in. Heavy Former**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | — | Sheet, aluminium alloy | 12 s.w.g. | D.T.D. 390 | For jointing angles |
| H128F/31012 | (E) D2528/2S8/8 | Rivet, snap head | 1/4 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2CW8/10 | Rivet, countersunk head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 | |

**Repair to Outer Angle Former 12 on Centre Section and Rear Centre Section**

45. Damage to the outer angle in excess of that defined in Chapter 4, para. 15 of Part 1, and which, when cleaned out, does not exceed 4 ins. in length nor extend for more than 1-1/8 ins. into the section, may be repaired by inserting a packing piece of 8 S.W.G. Aluminium alloy, secured with an internal angle riveted to the packing piece and original angle as shown in Fig. 25. If the adjacent web is also damaged it should be repaired as described in para. 36 and the appropriate drawing listed therein.

46. On completion of the repair the skin should be repaired as described in para. 42.

**TABLE 30.**
**Material for Repair of Outer Angle-Former 12 C/S and Rear C/S**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet carbon steel | 14 s.w.g. | D.T.D. 124A | Hardened and tempered |
| | | Packing piece | 8 s.w.g. | D.T.D. 390 | |
| H128F/30314 | (E) D2528/2B4/7 | Mushroom head rivet | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/30325 | (E) D2528/2B5/7 | Mushroom head rivet | 5/32 in. dia. x 7/16 in. | D.T.D. 327 | |

**Insertion Repair to Inner Angle Former 12**

47. Damage to the inner angle of former 12 in excess of that defined in para. 33 should be repaired by insertion as described below.

48. The damaged portion of extruded angle should be removed, a new length of similar section inserted and jointed with internal and external angles as shown in Fig. 26. The web and extrusion should be radiused to allow the external angle to fit snugly; the length of the angles should be made sufficiently long to pick up eight 1/4 in. rivets on either side of the butt joint at existing pitches.

**TABLE 31.**
**Material for Insertion Repair to Inner Angle Former 12**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2/D.4918 | Repair Angle | 14 s.w.g. | D.T.D. 124A | Hardened and tempered |
| | 3/D.4918 | Repair Angle | 18 s.w.g. | D.T.D. 124A | Hardened and tempered |
| H128F/31013 | (E) D2528/2S8/10 | Rivet, snap head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 | |
| H128F/32693 | (E) D2528/2S6/9 | Rivet, snap head | 3/16 in. dia. x 9/16 in. | D.T.D. 327 | |

**Insertion Repair to Former "E" on Nose Section**

49. Damage to the forward flange of Former "E" in excess of that defined in para. 39 necessitates the insertion of a new portion of flange. The insertion should be of the same gauge and specification as the original and should be secured with joint angles of 14 S.W.G. D.T.D. 166B., riveted to the insertion piece and original former as illustrated in Fig. 27.

**TABLE 32.**
**Material for Insertion Repair, Former E (Port) of Nose Section**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2/D.5045 | Angle | 14 s.w.g. | D.T.D. 166B | |
| | (E) D2528/2CW5/6 | Rivet, c'sunk head | 5/32 in. dia. x 3/8 in. | D.T.D. 327 | |

**Insertion Repair to Former "E" on Front Centre Section at Top Production Joint**

50. Damage in excess of that defined in para. 39 should be repaired by the insertion of a Channel Stiffener as shown on Fig. 28.

**TABLE 33.**
**Material for Insertion Repair to Former E, Front C/S—Top Production Joint**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2/D.5046 | Channel | 14 s.w.g. | D.T.D. 166B | Repair portion |
| H128F/5822 | (E) D2528/2CW6/7 | Rivet, c'sunk head | | D.T.D. 327 | |
| H28C/2138 | 15/AGS.248 | Screw, c'sunk head | | | |
| H128F/5821 | (E) D2528/2CW4/7 | Rivet | | D.T.D. 327 | |

**Insertion Repair to Former 27 on Rear Section (D4)**

51. Damage to the forward flange of former 27 in excess of that defined in para. 36, will necessitate the insertion of a new length of section. The damaged flange should be removed and a new length of section, the same as the original, inserted; the butt joints should be secured with internal angles of 14 S.W.G. steel, picking up the existing bolt and rivet holes either side of the joint as shown in Fig. 29. The stringer bracket should be repositioned; if necessary, the back base of the bracket may be radiused so as to clear the repair angle. Duralac should be applied between mating faces, and assemble using the existing bolts,

nuts and washers, where available.

52. On completion of the repair the skin should be repaired as described in Chapter 1, paras. 8 to 10, and the appropriate drawings listed in Table "A".

**TABLE 34.**
**Material for Insertion Repair, Former 27 on Rear Section (D.4)**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Reinforcing angle | 14 s.w.g. | D.T.D. 124A | Hardened and tempered |
| H128F/5823 | (E) D2528/2CW6/8 | 120° c'sunk head rivet | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |
| | 36/D.1629 | Bolt | | | Existing |
| H28/5852 | EPI/SS.2664 | Nut | | | Existing |
| A73/343 | 4/SS.3110 | Washer | | | Existing |
| H28/6009 | AGS.749/E2 | Bolt | | | Existing |
| H128F/6336 | (E) D2528/2CW4/8 | 120° c'sunk head rivet | 1/8 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/5823 | (E) D2528/2CW6/8 | 120° c'sunk head rivet | | D.T.D. 327 | |
| | 2/SS.3237 | Screw 120° c'sunk head Stringer bracket | | | Existing |

**Insertion Repair to Inner Angles, Former 27**

53. Damage to the inner angle of former 27 in excess of that defined in para. 33 necessitates the insertion of a new portion of angle. The insertion should be the same section and specification as the original and should be secured with joint angles of 12 S.W.G. Aluminium alloy riveted to the insertion section and original angle as illustrated in Fig. 30.

54. If the web also is damaged, a repair should be made as described in para. 36 after the inner angle has been repaired:

**TABLE 35.**
**Material for Insertion Repair to Inner Angles, Former 27**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2/D.5087 | Repair angle | 12 s.w.g. | D.T.D. 390 | |
| H128F/30290 | (E) D2528/2S6/8 | Snap head rivet | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/30271 | (E) D2528/2S4/8 | Snap head rivet | 1/8 in. dia. x 1/2 in. | D.T.D. 327 | |

**Fuselage Longerons**

**Patch Repair to Skin and Top or Bottom Edge of Longeron**

55. Damage to the top or bottom edge of a longeron in excess of that defined in Chapter 4, paras. 21 and 22 of Part 1, may be repaired by inserting a packing piece, to the size of the cleaned out damage (see note below for permissible damage), secured with a patch plate of 16 S.W.G. Steel, riveted to the longeron, packing piece and skin as illustrated in Fig. 31.

56. Damage to the adjacent skin should be repaired with a 16 S.W.G. reinforcing plate and flush skin patch of the same gauge and specification as the original.

NOTE:—

The above repair can only be carried out if the damage is within the following limits:

(i) Damage to the longeron edge, when cleaned out to a regular shape, must not exceed 8 in. in length nor extend more than 1 in. into the section.

(ii) Damage to the adjacent fuselage skin, when cleaned out, must not exceed 8 ins. in length, and 6 in. in width.

(iii) If the damage to the longeron occurs in that portion between formers Nos. 10 to 12, or 12 to 14, then the longeron must be cut between formers Nos. 9 to 10 or 14 to 15, and the damaged portion removed. A new portion should then be fitted and an insertion joint effected between formers Nos. 9 to 10 (see para. 67) or between formers Nos. 14 to 15 (see para. 61).

**TABLE 36.**

**Material for Repair of Top and Bottom Longeron and Skin**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon steel | 16 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | | Sheet, alum. alloy | 6 s.w.g. | D.T.D. 390 | For packing piece |
| | | Sheet, alum. alloy | 16 s.w.g. | D.T.D. 390 | For reinforcing plate |
| | | Sheet, alum. alloy | 20 s.w.g. | D.T.D. 390 | For skin repair |
| | | Sheet, alum. alloy | 22 s.w.g. | D.T.D. 390 | |
| H128F/5725 | (E) D2528/2CW4/5 | Rivet, countersunk head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/5823 | (E) D2528/2CW6/8 | Rivet, countersunk head | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/5825 | (E) D2528/2CW6/10 | Rivet, countersunk head | 3/16 in. dia. x 5/8 in. | D.T.D. 327 | |

**Patch Repair to Top or Bottom Edges and Flanges of Longeron, Fuselage Front and Rear Centre Portions**

57. Damage to a longeron in excess of that defined in Chapter 4, para. 21 of Part 1, may be repaired by patching as illustrated in Fig. 32. The damaged flange or edge should be cleaned out (see NOTE below), a packing piece inserted, and riveted together with a 12 s.w.g. steel reinforcing angle and outside patch plate as shown.

58. Where damage occurs to the skin adjacent to the damage in the longeron, the skin should be repaired as defined in para. 55.

NOTE:—

The above repairs can only be carried out if the damage is within the following limits:

(i) Damage to the longeron edge, when cleaned out, must not exceed 4 ins. in length nor extend more than 3 ins. into the section.

(ii) Damage to the longeron flange, when cleaned out, must not exceed 4 in. in length nor extend for more than 1½ in. from the inner face of the longeron web.

(iii) If the damage to the longeron occurs in that position between formers Nos. 12 to 14, then the longeron must be cut between formers Nos. 14 and 15 and the damaged portion removed. A new portion should then be fitted and an insertion joint (see para. 61) effected between formers No. 14 and 15.

**TABLE 37.**

**Material for Repair of Longeron, Top and Bottom Edges and Flanges**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon steel | 12 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | | Sheet, alum. alloy | 6 s.w.g. | D.T.D. 390 | For packing piece |
| H128F/ | (E) D2528/2CW8/9 | Rivet, c'sunk head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2CW8/11 | Rivet, c'sunk head | 1/4 in. dia. x 11/16 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2S8/9 | Rivet, snap head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |

**Patch Repair to Top or Bottom Edge of Web and Adjacent Flange of Longeron, Fuselage Front and Rear Centre Portion**

59. Damage to a longeron in excess of that defined in para. 57 may be repaired by patching as illustrated in Fig. 33. The damaged flange or edge should first be trimmed out to a regular shape (see note below for permissible damage) a packing piece inserted and riveted together with a 12 s.w.g. steel reinforcing angle and outside patch plate made to extend for a minimum of six inches either side of the cleaned

out damage. The outside patch plate should be chamfered all around the outside edge before assembly to the longeron.

NOTE:—

The above repair can only be carried out if the damage is within the following limits:

(i) Damage to the longeron edge, when cleaned out, must not exceed 5-1/2 in. in length nor extend more than 1/4 in. into the section.

(ii) Damage to the longeron flange, when cleaned out, must not exceed 5-1/2 in. in length nor extend more than 2-1/4 in. from the inner face of the longeron web.

(iii) If the damage to the longeron occurs in that portion between formers No. 12 to 14, then the longeron must be cut between formers No. 14 and 15 and the damaged portion removed. A new portion should then be fitted and an insertion joint (see para. 61 and 62) effected between formers Nos. 14 and 15.

Where damage occurs to the skin adjacent to the damage in the longeron, the skin should be repaired as described in para. 55.

**TABLE 38.**
**Repair Material for Top and Bottom Edge of Web, and Adjacent Flange of Longeron**

| Ident. No. | Part No. | Description | Size | | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon-steel | 12 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | | Sheet, aluminium alloy | 6 s.w.g. | D.T.D. 390 | For packing piece |
| H128F/5821 | (E) D2528/2CW4/7 | Rivet, countersunk head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/30290 | (E) D2528/2S6/8 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | |
| | (E) D2528/2S8/9 | Rivet, snap head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |
| | (E) D2528/2CW8/9 | Rivet, countersunk head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |
| | (E) D2528/2CW8/11 | Rivet, countersunk head | 1/4 in. dia. x 11/16 in. | D.T.D. 327 | |

**Patch Repair to Web and Top or Bottom of Longeron, Fuselage Front and Rear Centre Portions**

60. Damage to the approximate centre of a longeron web and to the lip of a flange in excess of that defined in Chapter 4, para. 21 of Part 1, may be repaired as illustrated in Fig. 34. The damaged flange and web should be cleaned out (see NOTE below), a packing piece of 6 S.W.G. aluminium alloy inserted and riveted in conjunction with the 10 s.w.g. steel reinforcing angle and outside patch plate as shown.

NOTE:—

The above repair to the longeron can only be carried out provided that the damage does not exceed the following limits.

(i) Damage to the longeron web, when cleaned out, must not exceed 4 in. in

**TABLE 39.**
**Repair Material for Longeron Web and Top or Bottom Flange**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, steel | 10 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | | Sheet, aluminium alloy | 6 s.w.g. | D.T.D. 390 | For packing pieces |
| H128F/30270 | (E) D2528/2S4/7 | Rivet, snap head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| | (E) D2528/2S8/9 | Rivet, snap head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |
| | (E) D2528/2CW8/11 | Rivet, countersunk head | 1/4 in. dia. x 11/16 in. | D.T.D. 327 | |
| | (E) D2528/2CW8/9 | Rivet, countersunk head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |

length and 2½ in. in width.

(ii) Damage to the lip of the flange, when cleaned out, must not exceed 4 in. in length nor extend more than 3 in. into the section.

(iii) If the damage to the longeron occurs in that portion between formers No. 12 to 14, then the longeron must be cut between formers No. 14 and 15 and the damaged portion removed. A new portion should then be fitted and an insertion joint (see para. 61 and 62) effected between formers No. 14 and 15.

**Insertion Repair to Longeron, Fuselage Front and Rear Centre Portions**

61. Damage greater than that defined in paras. 59 and 60 will necessitate the insertion of a new portion of longeron.

62. The damaged portion of longeron should be cut away, and a new portion, the same as the original, inserted and jointed with two 14 s.w.g. steel patch plates, made to extend at least 5½ inches either side of the butt joints, and riveted in conjunction with four 12 s.w.g. steel reinforcing angles, attached to the inside and outside flanges of the longeron as illustrated in Fig. 35.

63. On completion of the repair the skin should be renewed as described in paras. 8 to 10 and the appropriate drawings listed in Table "A".

**TABLE 40.**
**Material for Insertion Repair to Longeron**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon-steel | 12 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | | Sheet, carbon-steel | 14 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| H128F/ | (E) D2528/2S8/9 | Rivet, snap head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |
| H128F/31014 | (E) D2528/2S8/11 | Rivet, snap head | 1/4 in. dia. x 11/16 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2CW8/10 | Rivet, countersunk head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 | |
| H128F/6333 | (E) D2528/2CW8/12 | Rivet, countersunk head | 1/4 in. dia. x 3/4 in. | D.T.D. 327 | |

**Insertion Repair to End of Longeron, Fuselage Front Centre Portion**

64. Damage to the rear end of a longeron i.e., at its point of attachment to the longeron of the fuselage centre portion, which exceeds that defined in paras. 59 and 60, necessitates the insertion of a new portion of longeron.

65. The damaged end should be trimmed up to a regular shape, and a patch plate of 12 S.W.G. steel, riveted to the end of the longeron, as shown in Fig. 36. The overhanging portion of the patch plate should be drilled in conjunction with the 6 S.W.G. aluminium alloy packing piece and the longeron attachment bracket, Part Nos. 3 and 4/D 1738, using the same size rivets as originally.

66. Where damage occurs to the skin adjacent to the damage in the longeron, the skin should be repaired as described in para. 55.

**TABLE 41.**
**Material for Repair of Longeron End**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon-steel | 12 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | | Sheet, aluminium alloy | 6 s.w.g. | D.T.D. 390 | For packing piece |
| H128F/ | (E) D2528/2CW8/9 | Rivet, countersunk head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |

**Insertion Repair to Longeron, Centre Portion of Fuselage**

67. Damage to the longeron in excess of that defined in para. 55 necessitates the insertion of a new portion of longeron.

68. The damaged longeron should be cut out and a new portion of longeron, the same size and specification as the original, inserted, and jointed with an inner and outer steel patch plate riveted in conjunction with the longeron and skin, as illustrated in Fig. 37.

69. On completion of the repair, the skin should be repaired as described in Chapter 1, and the appropriate drawings listed in Table "A".

**TABLE 42.**
**Material for Insertion Repair to Longeron**

| Ident. No. | Part No. | Description | Size | Specifications | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon steel | 16 s.w.g. | D.T.D. 124A | Hardened and tempered |
| | | Sheet, carbon steel | 14 s.w.g. | D.T.D. 124A | Hardened and tempered |
| H128F/5825 | (E) D2528/2CW/6/10 | Rivet, countersunk head | 3/16 in. dia. x 5/8 in. | D.T.D. 327 | |
| | (E) D2528/2CW8/10 | Rivet, countersunk head | 1/4 in. dia. x 5/8 in. | D.T.D. 327 | |
| H128F/6333 | (E) D2528/2CW8/12 | Rivet, countersunk head | 1/4 in. dia. x 3/4 in. | D.T.D. 327 | |

## Bomb Doors

### Patch Repair to Flanges of Spar Boom, 4,000 lb. Type Bomb Door

70. Damage to the free edges of the flanges in excess of that defined in Chapter 4, para. 38 of Part 1, may be repaired by patching provided that, when cleaned out, the damage to the flange does not exceed 3 in. in length nor extend more than 3/4 in. into the section. Where the damage occurs in the spar boom top flanges the capping strip should be repaired by inserting a new length of section butt jointed with the original as shown in Fig. 38.

71. On completion of the repair, the skin, if damaged, should be repaired as described in Chapter 1, and the appropriate drawings listed in Table "A".

**TABLE 43.**
**Material for Repair to Flanges of Spar Booms, Bomb Doors**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon steel | 18 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | | Sheet, alum. alloy | 6 s.w.g. | D.T.D. 390 | For packing piece |
| | | Sheet, alum. alloy | 20 s.w.g. | D.T.D. 390 | For capping piece |
| H128F/30271 | (E) D2528/2S4/8 | Rivet, snap head | 1/8 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/30283 | (E) D2528/2S5/8 | Rivet, snap head | 5/32 in. dia. x 1/2 in. | D.T.D. 327 | |

### Insertion Joint in Spar of 4,000 lb. Type Bomb Doors

72. Damage to a spar boom in excess of that defined in para. 70, and damage to the web greater than that defined in Chapter 4, para. 40 of Part 1, necessitates an insertion.

73. The damaged portion should be cut out midway between lightening holes; a new section, either fabricated or cut from a spare should be inserted, and secured with joint plates of 20 s.w.g. Aluminium alloy, and reinforcing angles, Part Nos. 2, 3, 4 and 5/D.3753 (see Fig. 40) riveted to the inside and outside of the top and bottom flanges of the spar, as shown in Fig. 39.

74. On completion of the repairs, the skin should be repaired as described in Chapter 1, paras. 8 to 10 and the appropriate drawings listed in Table "A".

**TABLE 44.**

**Material for Insertion Joint in Spar, Bomb Doors**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 20 s.w.g. | D.T.D. 390 | If not available as spares to be made up. |
| | 2.D.3753 | Angle | — | — | |
| | 3.D.3753 | Angle | — | — | |
| | 4.D.3753 | Angle | — | — | |
| | 5.D.3753 | Angle | — | — | |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/2752 | (E) D2528/2S4/11 | Rivet, snap head | 1/8 in. dia. x 11/16 in. | D.T.D. 327 | |
| H128F/30290 | (E) D2528/2S6/8 | Rivet, snap head | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/32693 | (E) D2528/2S6/9 | Rivet, snap head | 3/16 in. dia. x 9/16 in. | D.T.D. 327 | |
| H128F/6063 | (E) D2528/2CW6/7 | Rivet, countersunk head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |

**Patch Repair to Bomb Door Hinge Channel, with Skin Replacement (4,000 lb. type Bomb Door).**

75. Damage to the free edge of a bomb door hinge channel in excess of that defined in Chapter 4, para. 41 of Part 1, may be repaired provided that the damage does not exceed 4-1/2 in. into the section. The repair should be effected by cleaning out the damage to a regular shape, and inserting a 1/8 in. thick aluminium alloy packing piece, secured with a 16 S.W.G. steel angle riveted to the inside of the hinge extrusion, as shown in Fig. 41.

76. The damaged skin should be replaced by a new panel of skin, over the length of one bay between door formers (see note Fig. 41).

**TABLE 45.**

**Material for Repair of 4,000 lb. Type Bomb Door Hinge Channel and Skin**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, carbon steel | 16 s.w.g. | D.T.D. 124A | Hardened and tempered |
| | | Sheet, aluminium alloy | 10 s.w.g. | D.T.D. 390 | For packing piece |
| | | Sheet, aluminium alloy | 24 s.w.g. | D.T.D. 390 | For skin panel |
| H128F/30281 | (E) D2528/2S5/6 | Rivet, round head | 5/32 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/5725 | (E) D2528/2CW4/5 | Rivet, countersunk head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/61175 | 4/SS.3123 | Rivet, pop dome head | 1/8 in. dia. x 0.19 in. | D.T.D. 10B | |
| H128F/61178 | 7/SS.3123 | Rivet, pop dome head | 1/8 in. dia. x 0.29 in. | D.T.D. 10B | |
| H128F/61189 | 20/SS.3123 | Rivet, pop dome head | 5/32 in. dia. x 0.37 in. | D.T.D. 10B | |

**Insertion Repair to Bomb Door Hinge Channel (4,000 lb. Type Bomb Doors)**

77. Damage to a hinge channel in excess of that defined in para. 75 necessitates the insertion of a new length of section, held into position with 14 s.w.g. steel jointing channels (see Fig. 43) riveted to the inside of the hinge channel, and extending at least 5-5/16 in. either side of the butt joints, as shown in Fig. 42.

78. On completion of the repair, the skin panel should be renewed as described in para. 74.

**TABLE 46.**
**Material for Repair of Bomb Door Hinge Channel (4,000 lb. Type)**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 153/D.3436 | Joint channel | 14 s.w.g. | D.T.D. 124A | Spare part |
| H128F/61184 | 14/SS.3123 | Rivet, pop, dome head | 3/16 in. dia. | D.T.D. 10B | |
| H128F/5735 | (E) D2528/2CW4/6 | Rivet, snap head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/30289 | (E) D2528/2S6/7 | Rivet, countersunk head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/31080 | (E) D2528/2B6/7 | Rivet, mushroom head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |

**Patch Repair to Edge Channel of 4,000 lb. Type Bomb Doors**

79. Damage to an edge channel in excess of that defined in Chapter 4, para. 41 of Part 1, and which does not exceed 4 ins. in length nor 1-1/8 in. width, should be repaired by patching.

80. The retaining strip (see Fig. 44) should be cut back leaving sufficient space either side of the damaged channel edge to allow the new retaining strip to pick up two existing rivet holes either side of the damage.

81. The damaged edge channel should be cleaned out to a regular shape, and a 14 S.W.G. aluminium alloy packing piece inserted. The new retaining strip, patch plate (see Item 2/D.3908, Fig. 44) and packing piece should then be assembled, picking up existing rivet holes, as shown.

82. If the skin is damaged it should be repaired as described in para. 74.

**TABLE 47.**
**Material for Patch Repair to Edge Channel, 4,000 lb. Type Bomb Door**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2/D.3908 | Sheet, carbon-steel | 20 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| | — | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 390 | For retaining strip |
| | — | Sheet, aluminium alloy | 14 s.w.g. | D.T.D. 390 | For packing piece |
| H128F/61178 | 7/SS.3123 | Rivet, pop-dome head | 1/8 in. dia. | D.T.D. 10B | |

**Insertion Repair to Edge Channel, 4,000 lb. Type Bomb Doors**

83. Damage to the hinge channel in excess of that defined in para. 79 necessitates an insertion. The damaged edge channel should be cut out as near as possible, central between two ribs, a new length of edge channel inserted and butt jointed with the original, using 18 S.W.G. steel jointing strips as shown in Fig. 45. The skin, if damaged, should be renewed as described in para. 74.

**TABLE 48.**
**Material for Insertion Repair to Bomb Door Edge Channel**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Jointing strip | 18 s.w.g. | D.T.D. 124A | To be hardened and tempered |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, countersunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/5725 | (E) D2528/2CW4/5 | Rivet, countersunk head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/61178 | 7/SS.3123 | Rivet, pop, dome-head | 1/8 in. dia. | D.T.D. 10B | |

**Insertion Repair to Bomb Door Curtain, Hinge Control**

84. Damage to a hinge channel in excess of that defined in para. 75 necessitates the insertion of a new length of section, as illustrated in Fig. 46. The damaged section should be cleaned out and a new section, cut from Part No. 48/SS.3075 inserted, and jointed, with jointing channel secured to the inside of the extrusion. The skin attachment holes in the insertion and angle should be drilled from the skin. The skin panel should be repaired as described in appropriate drawing listed in Table A, Chapter 1.

**TABLE 49.**
**Material for Insertion Repair to Bomb Door Curtain, Hinge Control**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Channel | 14 s.w.g. | D.T.D. 124A | Hardened and tempered |
| H128F/30289 | (E) D2528/2S6/7 | Snap head rivets | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/6062 | (E) D2528/2CW6/6 | 120° countersunk head rivets | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/30290 | (E) D2528/2S6/8 | Snap head rivets | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |

**Floors**

**Patch Repair to Floor Beam 22**

85. Damage in excess of that defined in Chapter 4, para. 29 of Part 1, and which, when cleaned out to a regular shape, is not closer than 1/2 in. to any edge and does not exceed $2\frac{3}{4}$ in. width nor more than 2-3/8 in. across the section, should be repaired with an internal angle patch of 10 S.W.G. aluminium alloy riveted to the floor beam as shown in Fig. 47.

86. If the repair is in way of an intercostal the intercostal should be cut to fit inside the channel patch, new angles should be fitted to the intercostal and riveted to the patch plate and floor beam, utilising the existing holes in the beam as shown.

**TABLE 50.**
**Material for Repair to Floor Beam 22**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| H128F/30271 | (E) D2528/2S4/8 | Snap head rivet | 1/8 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/32693 | (E) D2528/2S6/9 | Snap head rivet | 3/16 in. dia. x 9/16 in. | D.T.D. 327 | |
| H128F/30766 | (E) D2528/2S4/9 | Snap head rivet | 1/8 in. dia. x 9/16 in. | D.T.D. 327 | |
| | | Channel patch | 10 S.W.G. | D.T.D. 390 | |

**Insertion Repair to 4 in. Light Floor Beam**

87. Extensive damage to a 4 in. light floor beam will necessitate the insertion of a new portion of beam. The damaged section should be cut away, a new section of the same gauge and material inserted, and secured, with internal joint patches of 14 S.W.G. aluminium alloy, made to extend for a minimum of 4-1/2 inches either side of the butt joints, and riveted to the insertion and original section as shown in Fig. 48.

**TABLE 51.**
**Material for Insertion Repair to 4 in. Light Floor Beam**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Jointing angle | 14 s.w.g. | D.T.D. 390 | |
| H128F/30288 | (E) D2528/2S6/6 | Snap head rivet | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | |

**Insertion Joint in 10 S.W.G. Rolled Section Floor Beam**

88. Extensive damage to 10 S.W.G. Rolled Section Foor Beam will necessitate the insertion of a new portion of beam. The damaged section of beam should be cut away, a new section, cut

from a spare, Part No. 1/D.1906, inserted and secured with internal Channel patches of 10 S.W.G. Aluminium Alloy. The joint channels should be made to extend for a minimum of 5-1/2 inches either side of the butt joint and should be riveted to the insertion and original section as shown in Fig. 49.

89. On completion of the insertion repair fit new flanges to the intercostals to accommodate the joint channel and rivet to the beam as shown.

**TABLE 52.**
**Material for Insertion Repair of Rolled Section Floor Beam**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Joint channel | 10 s.w.g. | D.T.D. 390 | |
| H128F/30289 | (E) D2528/2S6/7 | Snap head rivet | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/30270 | (E) D2528/2S4/7 | Snap head rivet | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |

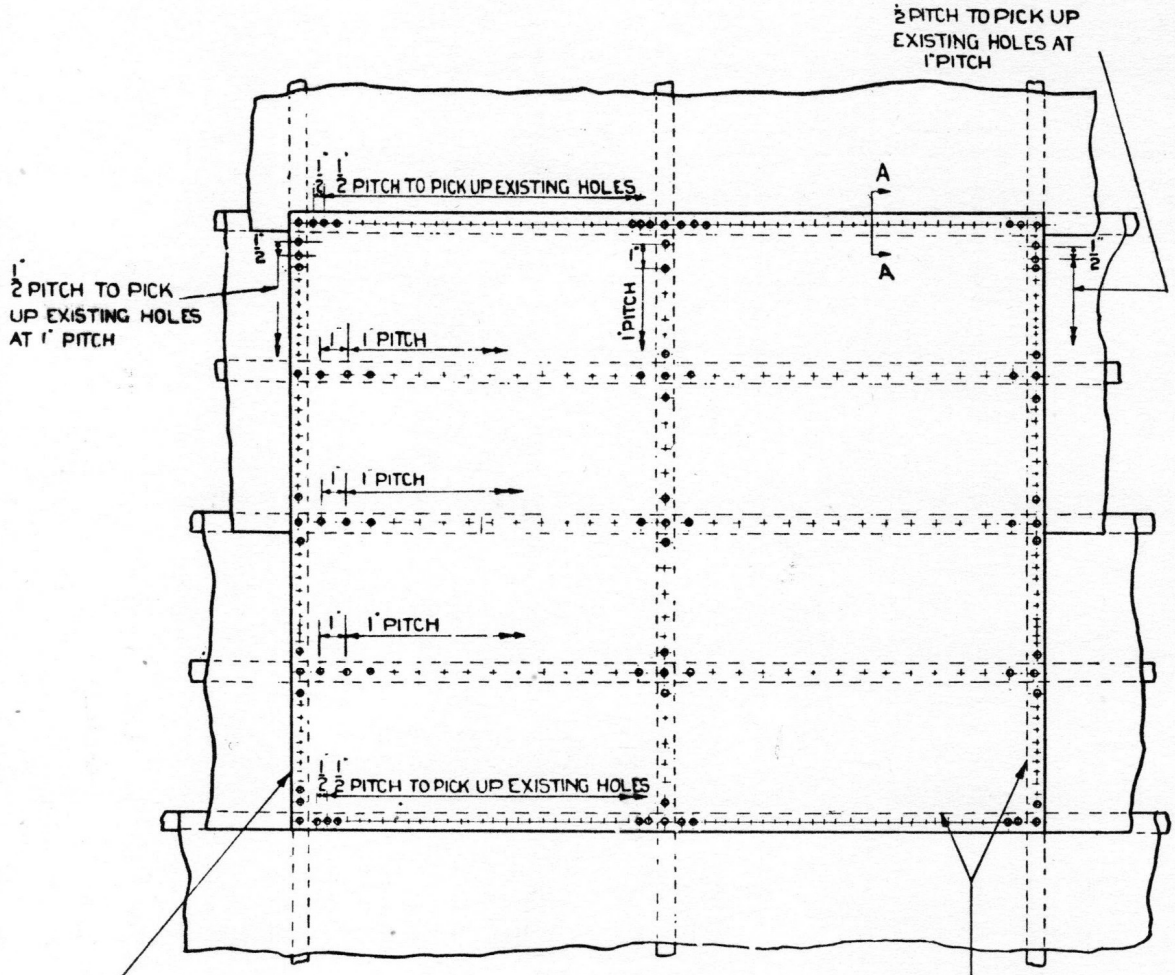
**Insertion to Floor Beam 10**

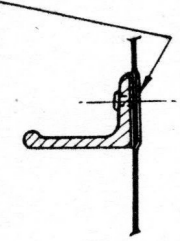
90. Extensive damage to Floor Beam No. 10 will necessitate the insertion of a new portion of beam. The damaged portion should be cut away, a new portion, the same size and specification as the original inserted, and jointed with internal Channel patches of 10 S.W.G. Aluminium Alloy. The joint channels should be made to extend for a minimum of 5 inches either side of the butt joints, and should be riveted to the insertion and original section as shown in Fig. 50.

91. On completion of the insertion repair, fit new flanges to the intercostals to accommodate the joint channel, and rivet to the floor beam as shown.

**TABLE 53.**
**Material for Repair of Floor Beam 10**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Jointing channel | 10 S.W.G. | D.T.D. 390 | |
| H128F/30290 | (E) D2528/2S6/8 | Snap head rivets | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/30270 | (E) D2528/2S4/7 | Snap head rivets | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |



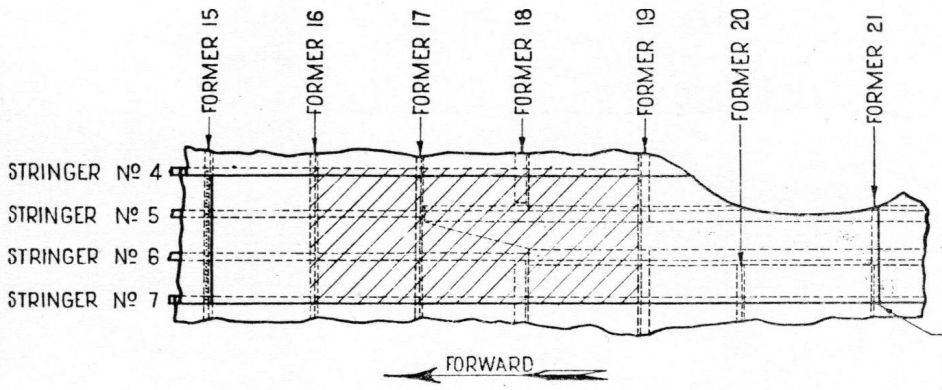
SECTION A-A

NOTE - WHERE LAP JOINTS OCCUR THE RIVET PITCHING MUST NOT EXCEED $\frac{1}{2}$" PITCH AT THIS, THE RIVETS MAY BE IN A STRAIGHT LINE
WHEN PITCHING IS $\frac{3}{8}$" ONLY, THE RIVETS SHOULD BE STAGGERED

NOTE - PATCH TO BE SAME MATERIAL & GAUGE AS EXISTING SKIN. SEE DRG. Nº D.2061. ALL SHEETS.
JOGGLE PATCH AS NECESSARY.
PATCH MUST BED DOWN ON JOINTING COMPOUND WHILST STILL WET

THIS WAS LINCOLN REPAIR D.3744

| 1 | REPAIR TO FUSELAGE SKIN EXTENSIVE DAMAGE | 1 |
|---|---|---|



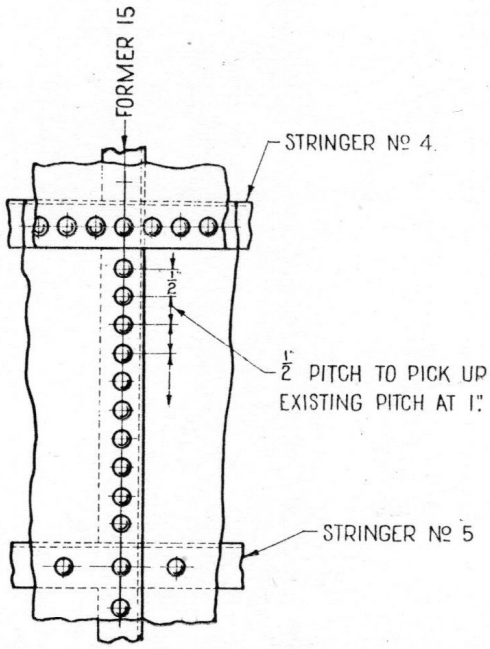

FOR DETAILS OF SKIN LAP JOINT AT FORMER Nº 21 SEE FIG. 3.

FOR ALL OTHER SKIN JOINTS SEE DRG. Nº D.4573.

NOTES :-

SHADED AREA DENOTES 22 S.W.G. REINFORCING SKIN.

DAMAGE TO THE SKIN WHICH ACCURS WITHIN THE SHADED AREA NECESSITATES THE REMOVAL OF THE 22 S.W.G REINFORCING SKIN & THE 18 S.W.G. SKIN BETWEEN FORMERS Nº 15 TO 21.



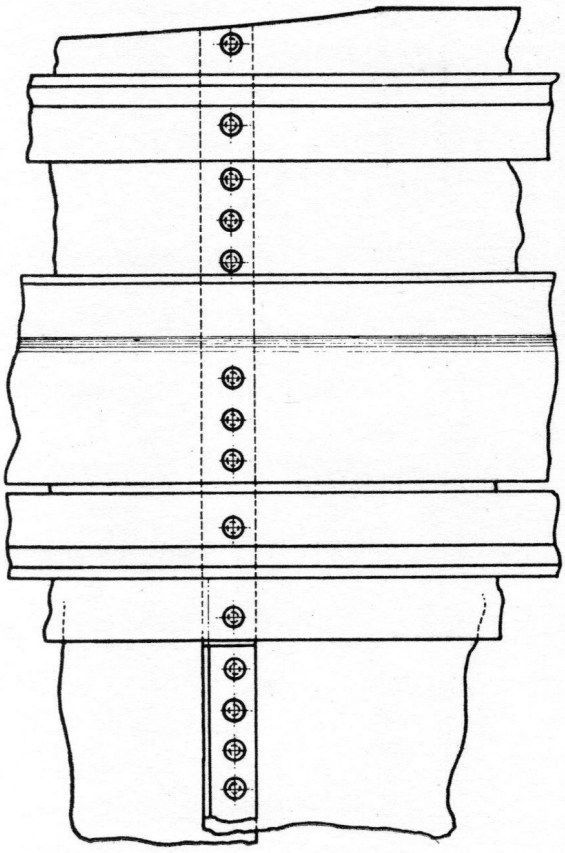

VIEW SHOWING NEW SKIN LAP JOINT AT FORMER Nº 15

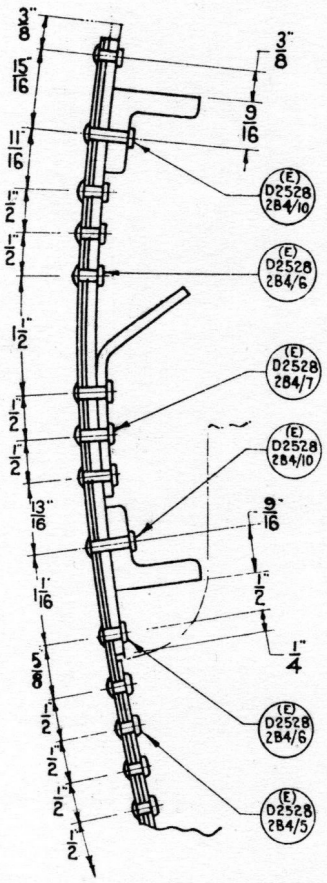
NOTE :-

PATCH TO BE OF SAME MATERIAL & GUAGE AS EXISTING SKIN JOGGLE PATCH AS NECESSARY. PATCH MUST BED DOWN ON JOINTING COMPOUND WHILST STILL WET.

THIS WAS LINCOLN REPAIR D.5305

| 2 | REPAIR TO FUSELAGE SKIN AT FORWARD END OF UPPER TURRET LONGERON | 2 |
|---|---|---|



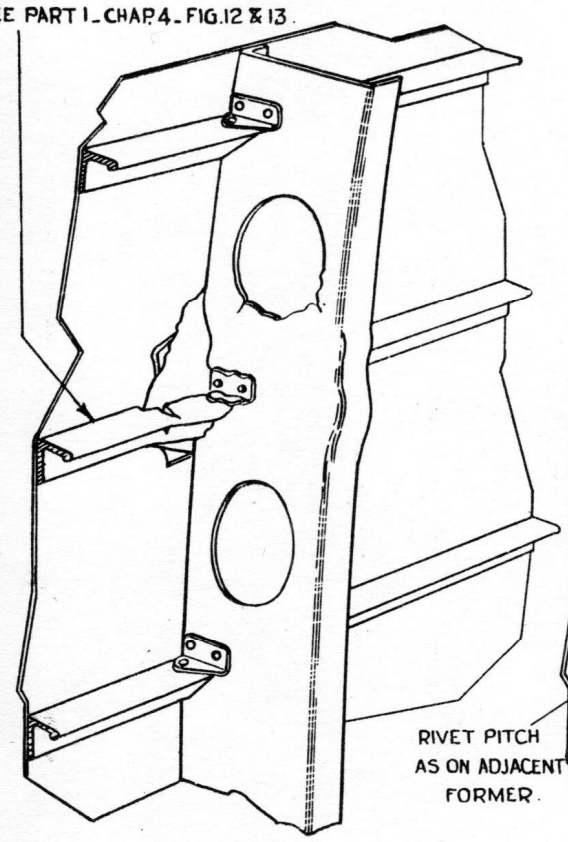



REFERENCE DRAWINGS
D.4173 LONGERON
D.4288 G.A. FUSELAGE PLATING & RIVETING - REAR CENTRE SECTION.

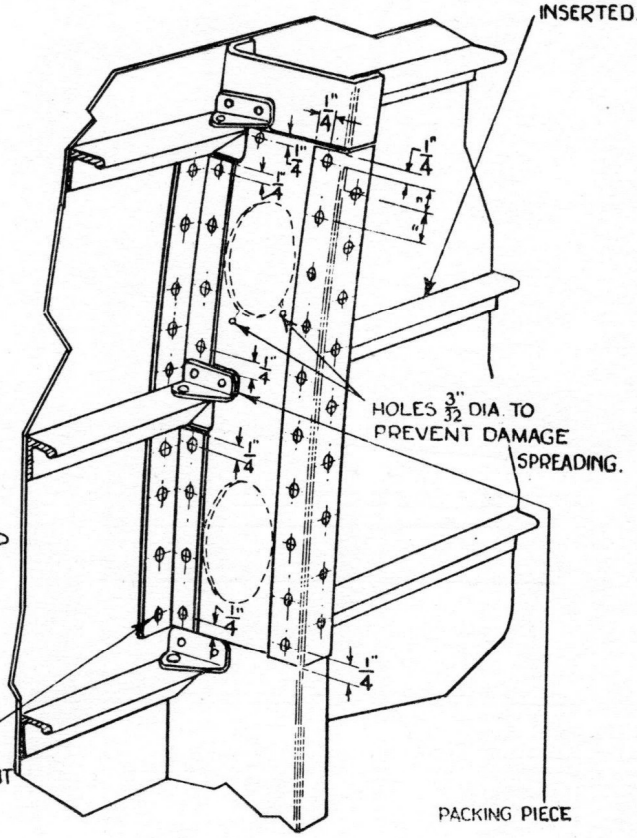
THIS WAS LINCOLN REPAIR DRAWING, D.4448.

| 3 | RIVETING OF SKIN LAP AT FORMER 21 | 3 |
|---|---|---|

FOR REPAIR TO STRINGER
SEE PART 1_CHAP.4_FIG.12 & 13.



TYPICAL DAMAGE TO FORMER



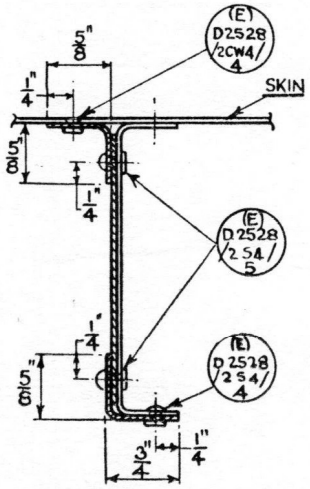

REPAIRED FORMER

**NOTES:**

APPLY JOINTING COMPOUND BETWEEN METAL FACES.

PATCH PLATE & ANGLES RIVETED AT APPROX. 1" PITCH.

WHERE CABLES ETC PASS THROUGH LIGHTENING HOLES. THESE MUST BE REPRODUCED IN STIFFENING PLATE.




SECTION THRO' REPAIR.

**MATERIAL.**

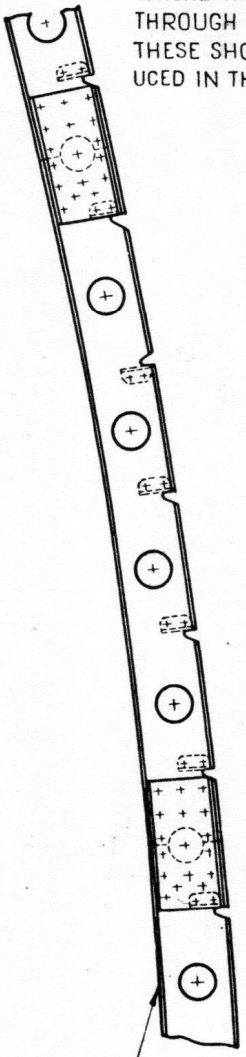
PATCH PLATE & ANGLES : ALUM. ALLOY_16G.

**SPEC:**

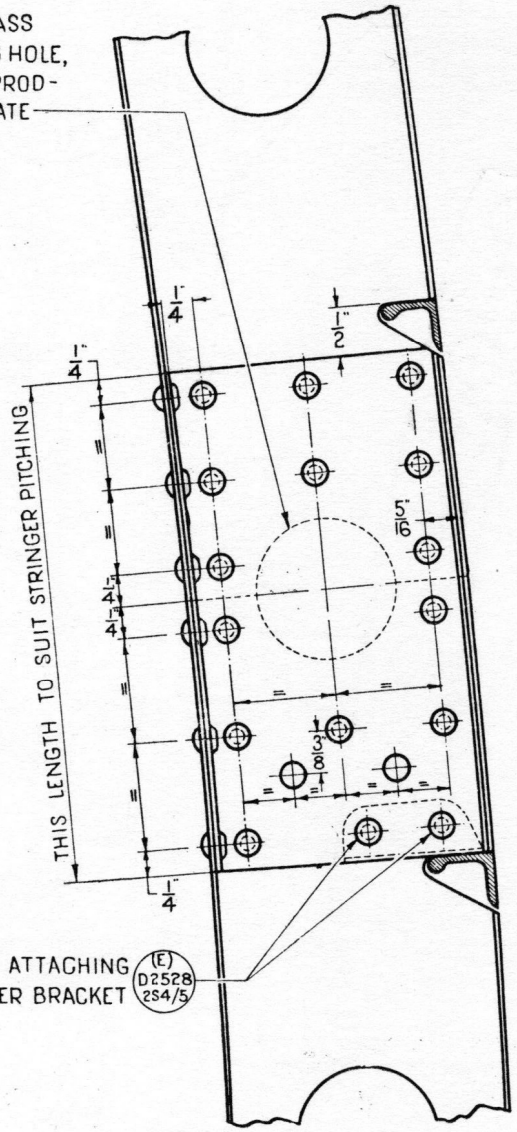
D.T.D. 275 OR 390

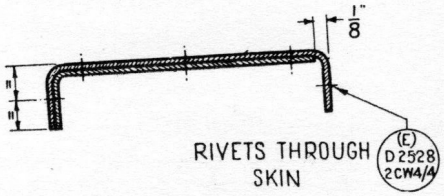
THIS WAS LINCOLN REPAIR D.3748

| 4 | PATCH REPAIR TO BUCKLED LIGHT FORMER AT JUNCTION WITH STRINGER | 4 |
|---|---|---|



NOTE :-
NEW PIECE OF FORMER CUT FROM A SPARE, IF AVAILABLE, OR BY REFERENCE TO THE RELEVANT DRAWING IN THE MAIN D.I.S.



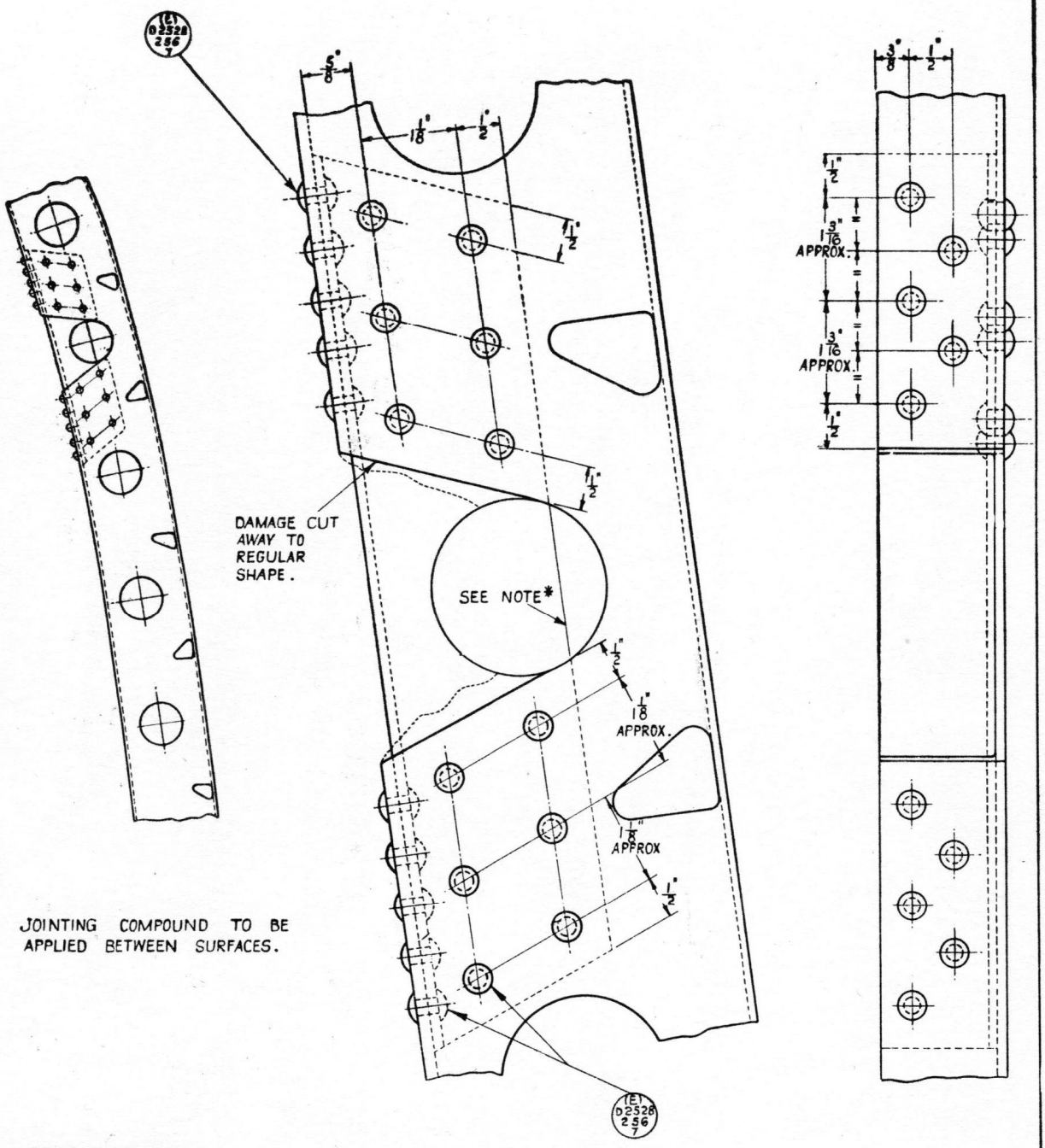




SECTION THROUGH JOINT.

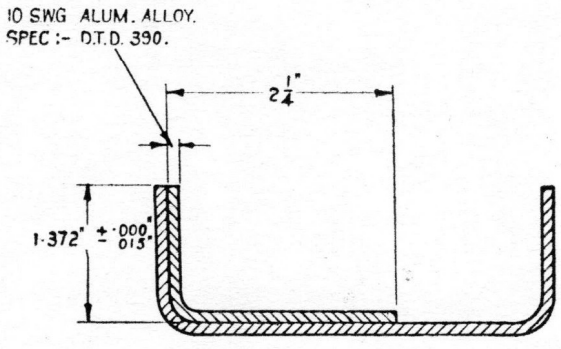
NOTE :-
CUT OUT DAMAGED PORTION BETWEEN LIGHTENING HOLES
APPLY JOINTING COMPOUND BETWEEN METAL FACES.
OUTER FLANGE OF JOINT PLATE SHOULD PICK UP SKIN RIVETING

THIS WAS LINCOLN REPAIR D.3745

| 5 | INSERTION REPAIR TO LIGHT FORMER | 5 |
|---|---|---|



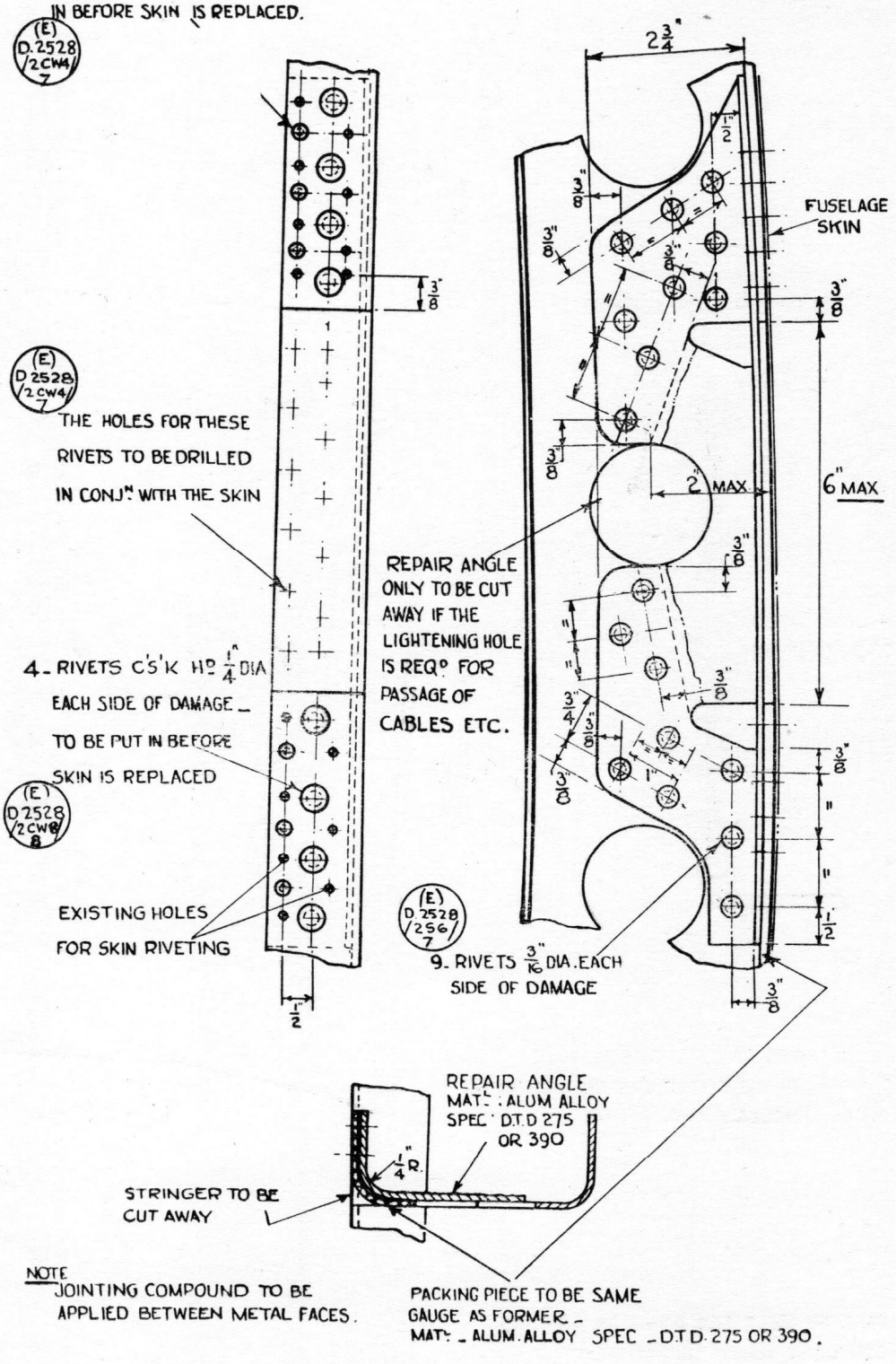

JOINTING COMPOUND TO BE APPLIED BETWEEN SURFACES.




* NOTE :- IF THE LIGHTENING HOLE IN WAY OF REPAIR IS NOT REQUIRED FOR PASSAGE OF CONTROLS, CONDUITS E^C., THE REPAIR ANGLE NEED NOT BE CUT TO CLEAR LIGHTENING HOLE.

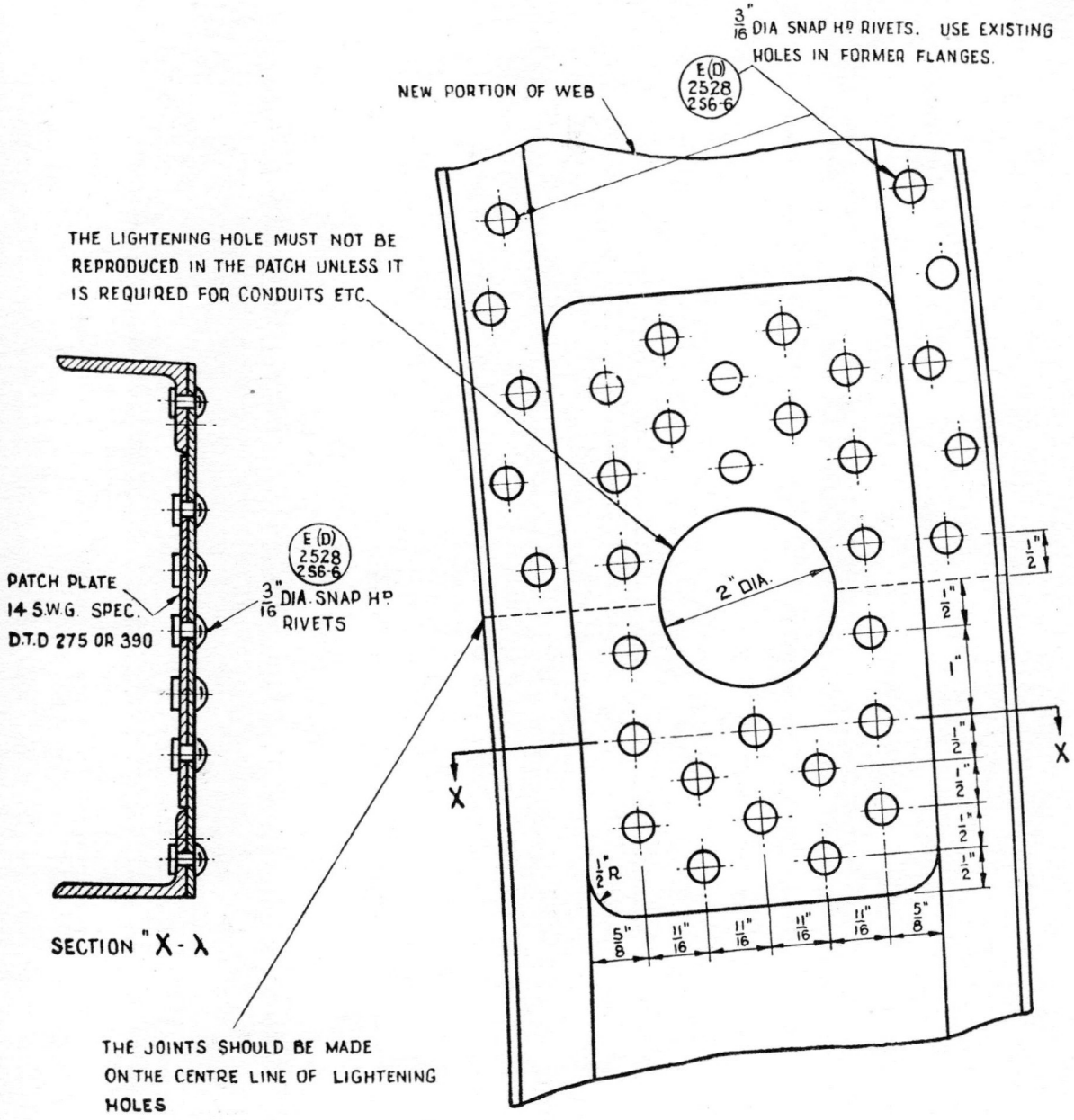
THIS WAS LINCOLN REPAIR D.3752

| 6 | PATCH REPAIR TO INNER FLANGE OF HEAVY FORMER | 6 |
|---|---|---|




THIS WAS LINCOLN REPAIR D3751

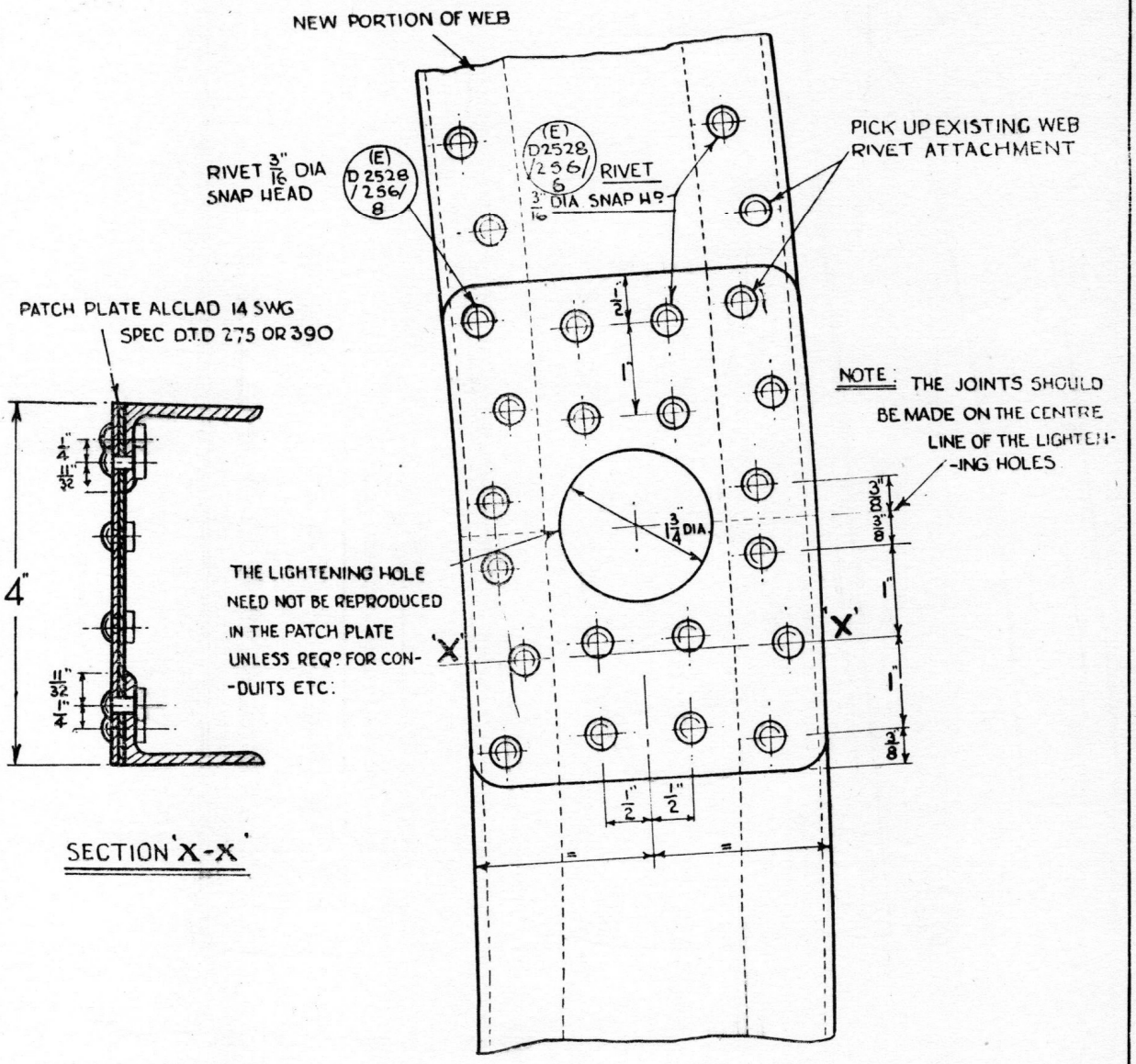
| 7 | PATCH REPAIR TO OUTER FLANGE OF HEAVY FORMER | 7 |
|---|---|---|




PATCHES MUST BED DOWN ON JOINTING COMPOUND, WHILST THIS IS STILL WET

THIS WAS LINCOLN REPAIR D.3757

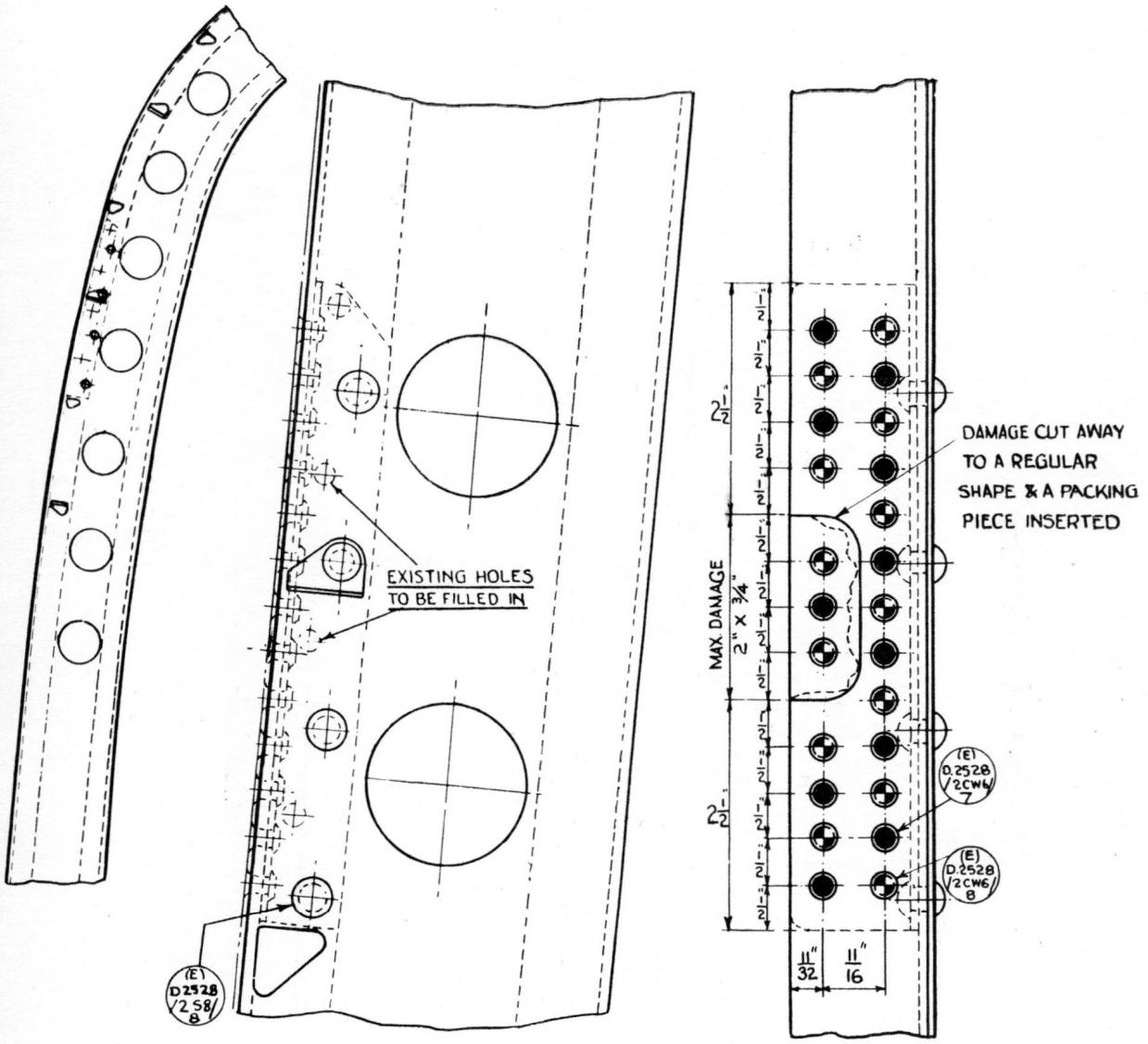
| 8 | INSERTION REPAIR TO WEB OF FORMER 35 | 8 |
|---|---|---|

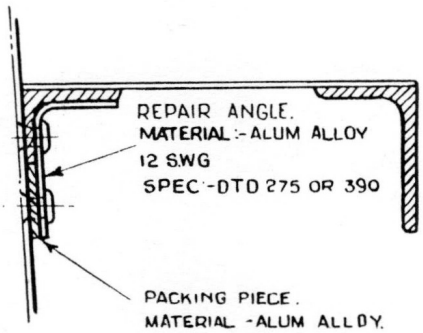



PATCHES MUST BED DOWN ON JOINTING COMPOUND WHILST STILL WET.

THIS WAS LINCOLN REPAIR 3758

| 9 | INSERTION REPAIR TO WEB OF FORMER 38 | 9 |
|---|---|---|



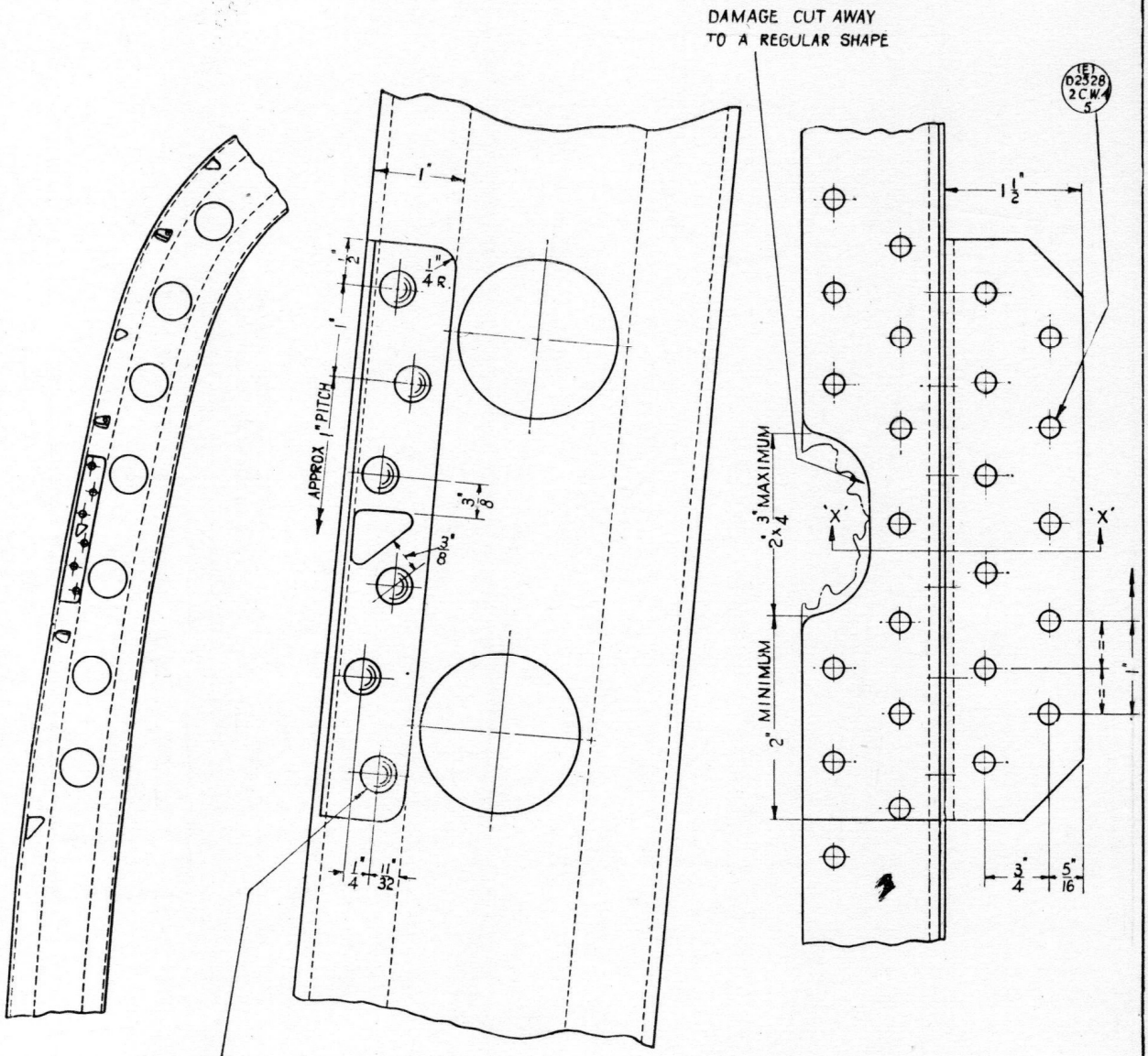

● ADDITIONAL HOLES TO BE DRILLED FOR 3/16" DIA. RIVETS WHERE SHOWN. RIVETS TO BE INSERTED THRO FORMER ANGLE & REPAIR ANGLE ONLY

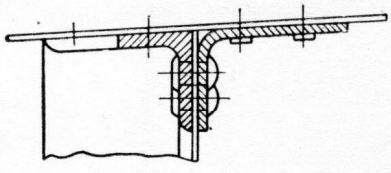
⊕ EXISTING RIVET HOLES TO BE DRILLED OUT FOR 3/16 DIA RIVETS RIVETS TO BE INSERTED WHEN SKIN PLATING HAS BEEN REPLACED, JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

FOR ALTERNATIVE METHOD OF REPAIR SEE FIG 11

THIS WAS LINCOLN REPAIR D.3781.

| 10 | PATCH REPAIRS TO INNER & OUTER FLANGES OF BUILT UP FORMERS 35 & 38 (INTERNAL ANGLE) | 10 |
|---|---|---|



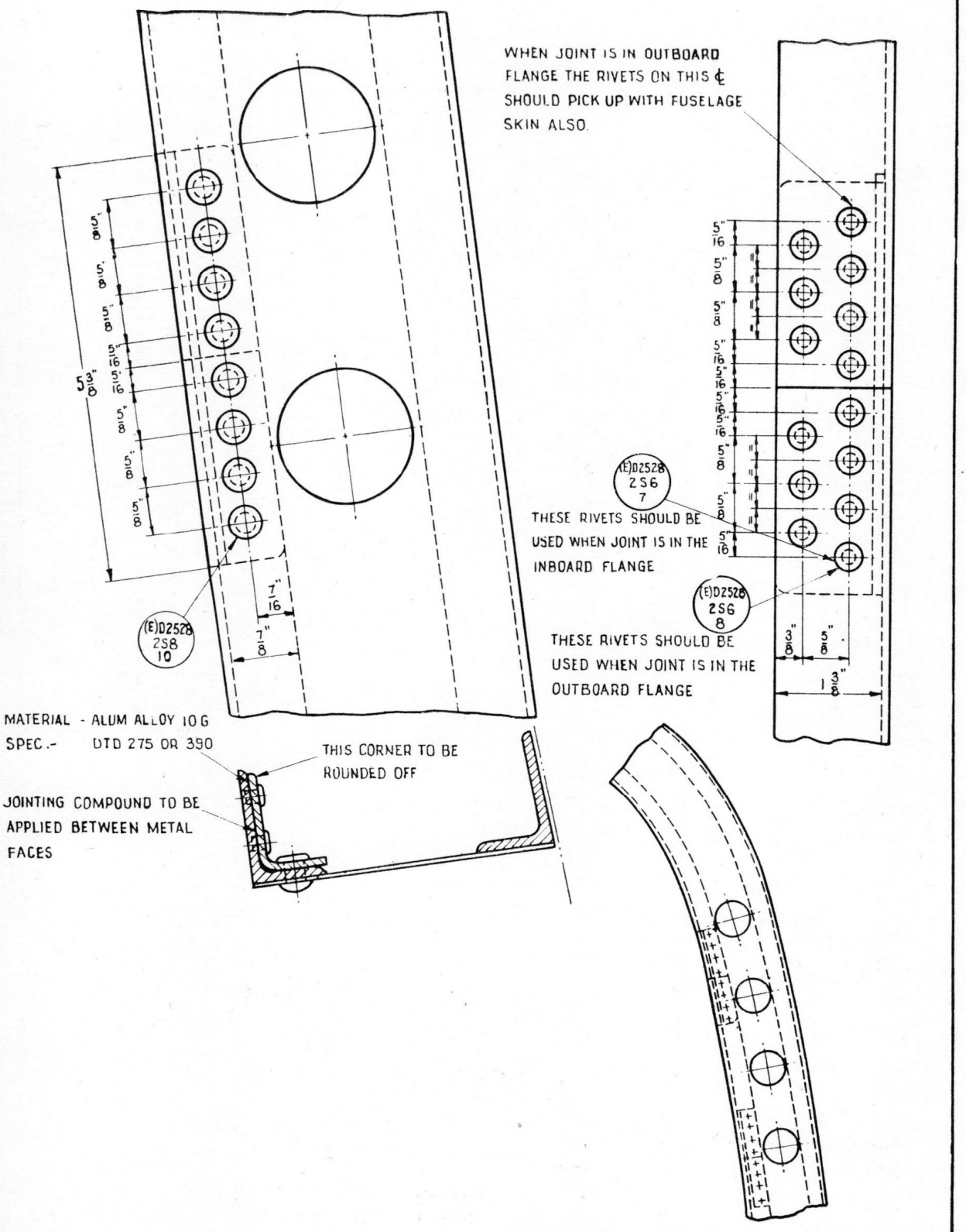
SECTION 'X–X'

FOR ALTERNATIVE METHOD OF REPAIR SEE FIG. 10

MATERIAL :– ALUM. ALLOY. 12 G.
SPEC :– D.T.D. 275 OR 390.
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

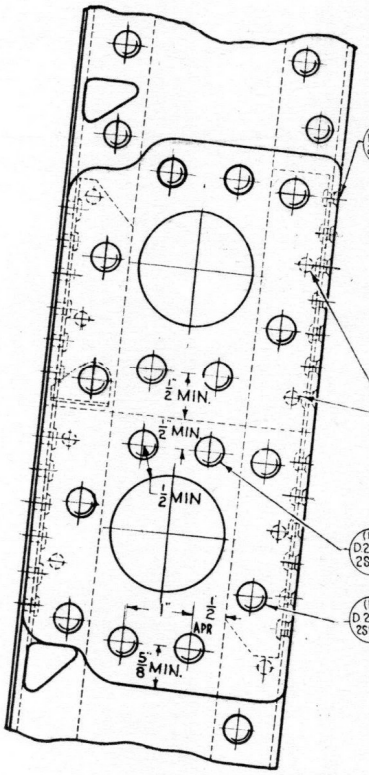
THIS WAS LINCOLN REPAIR D.3782

# 11 PATCH REPAIR TO OUTER FLANGES OF BUILT UP FORMERS 35 AND 38 (EXTERNAL ANGLES) 11




THIS WAS LINCOLN REPAIR D.3837

| 12 | INSERTION REPAIR TO FLANGES OF BUILT UP FORMERS 35 AND 38 | 12 |
|---|---|---|

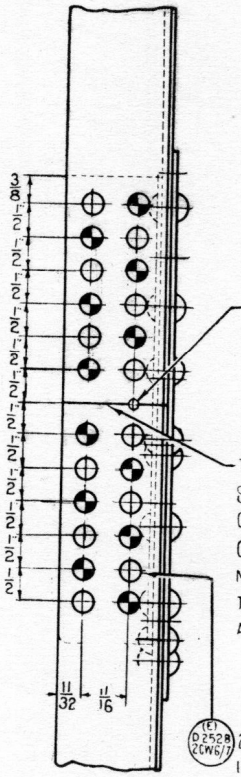



(E) D.2528 2CW6/7 RIVETS ON INNER FLANGE SPACED AS SHOWN FOR OUTER FLANGE.

EXISTING RIVET HOLES FILLED IN USING C'S'K HD RIVETS

(E) D.2528 258/6

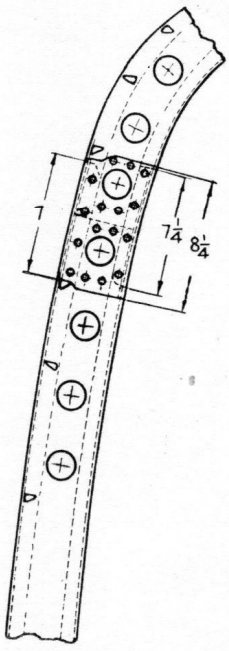
(E) D.2528 258/10 EXISTING RIVET HOLES DRILLED OUT FOR ¼ DIA RIVETS




EXISTING HOLE AT JOINT IGNORED.

THE DAMAGED PORTION SHOULD BE CUT AWAY ON THE ℄ OF RIVET ON OUTER FLANGE & AS NEAR THE CENTRE OF THE LIGHTENING HOLES AS POSSIBLE

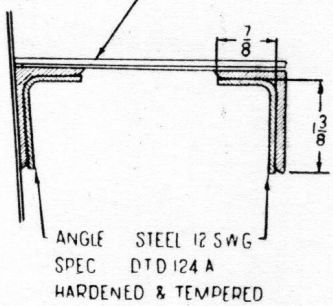
(E) D.2528 2CW6/7 24 RIVETS TO BE INSERTED AFTER SKIN HAS BEEN REPLACED




VIEW OF REPAIR

EXISTING RIVET HOLES IN OUTER FLANGE TO BE DRILLED OUT FOR 3/16 DIA RIVETS

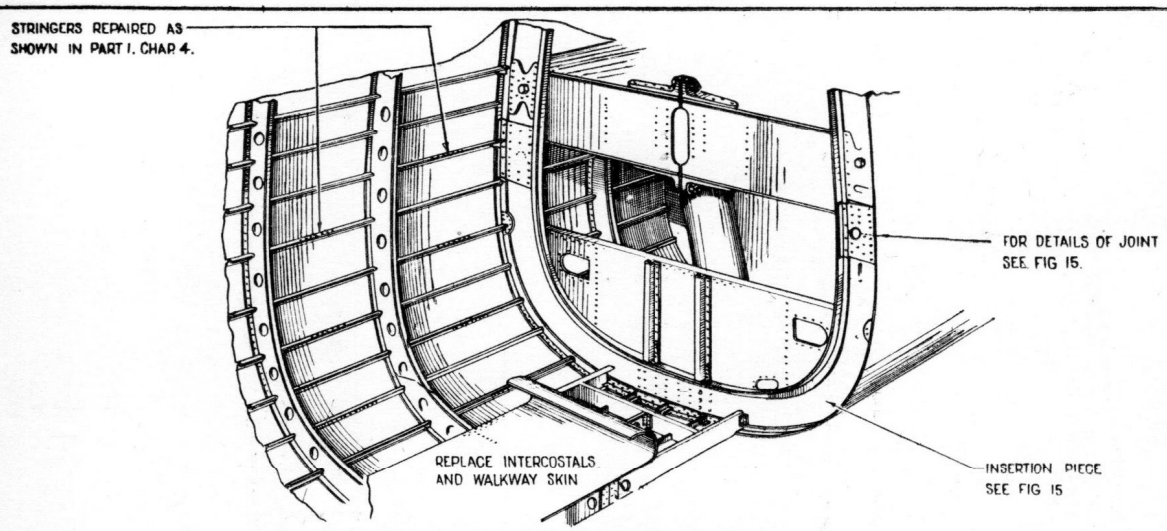
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES



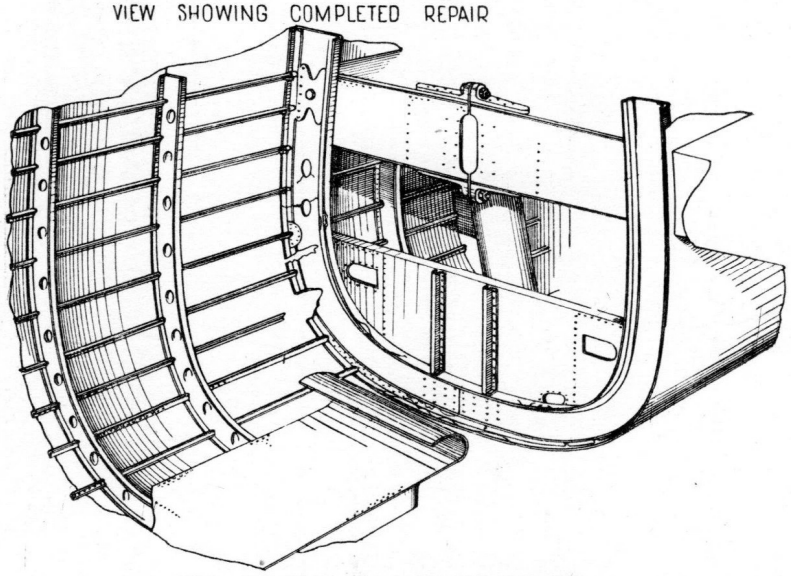

SECTION THROUGH REPAIR

THIS WAS LINCOLN REPAIR D 3872

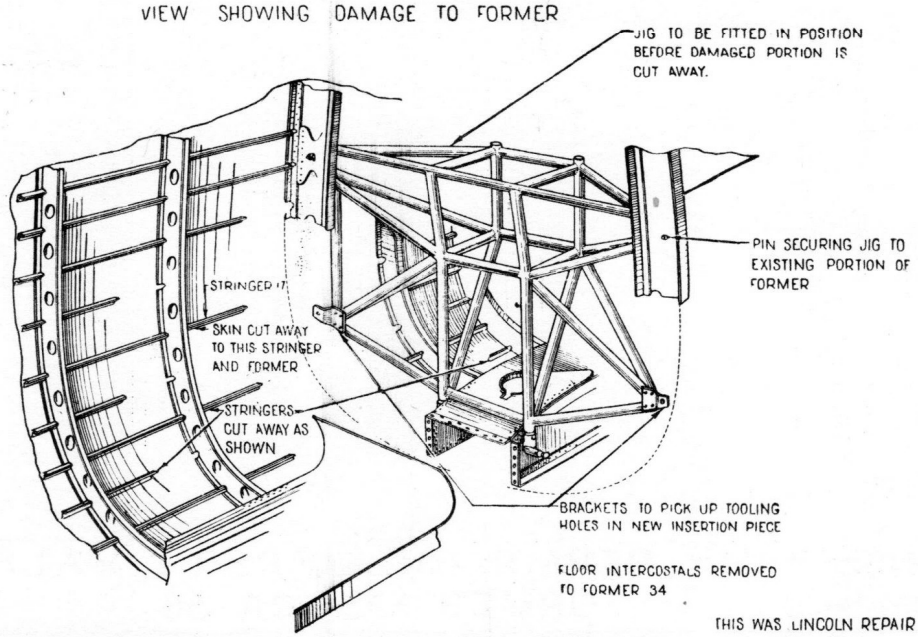
| 13 | INSERTION REPAIR IN UPPER HALF OF FORMER 35 OR 38 | 13 |
|---|---|---|




VIEW SHOWING COMPLETED REPAIR



VIEW SHOWING DAMAGE TO FORMER

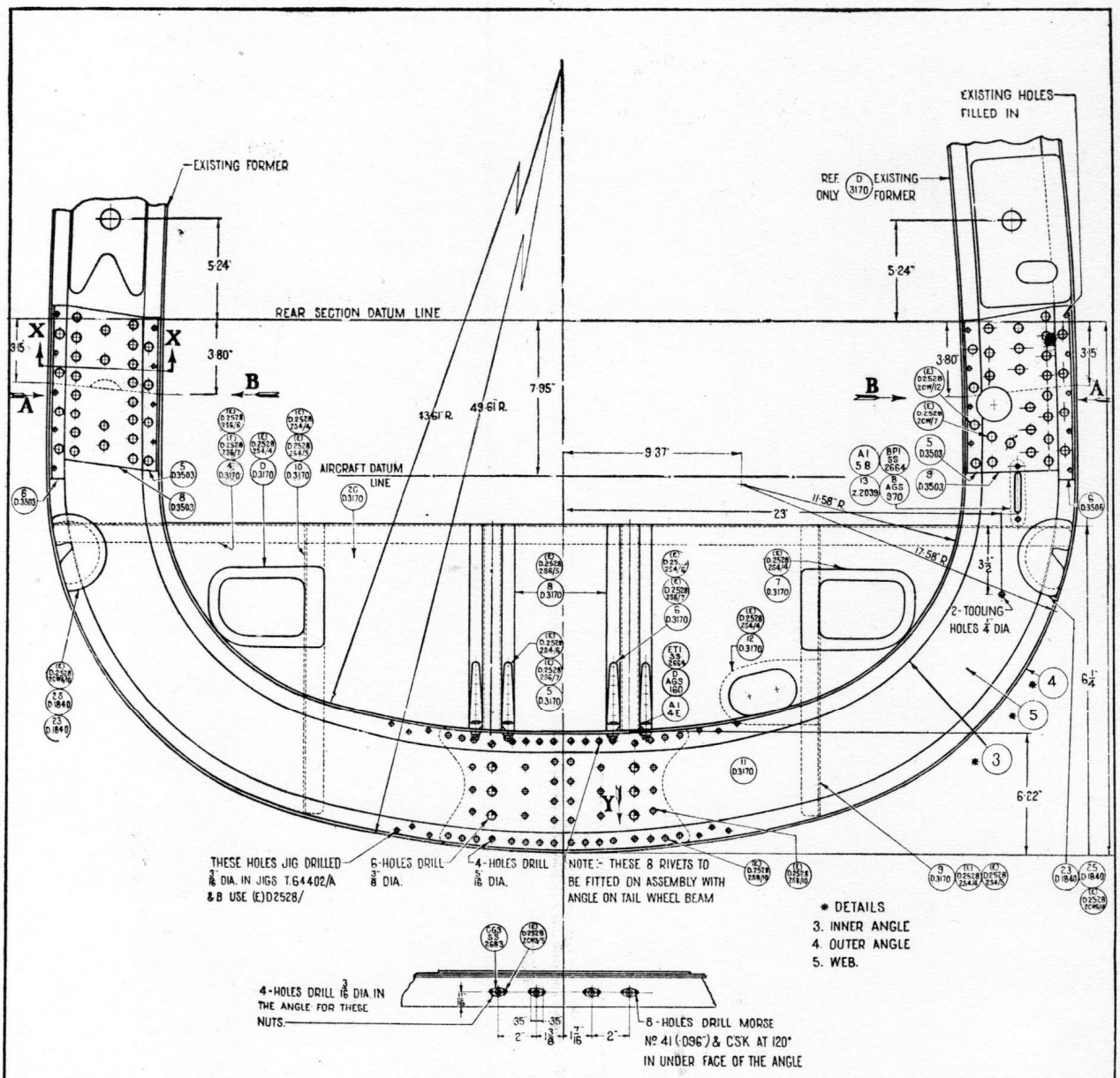



THIS WAS LINCOLN REPAIR D3894

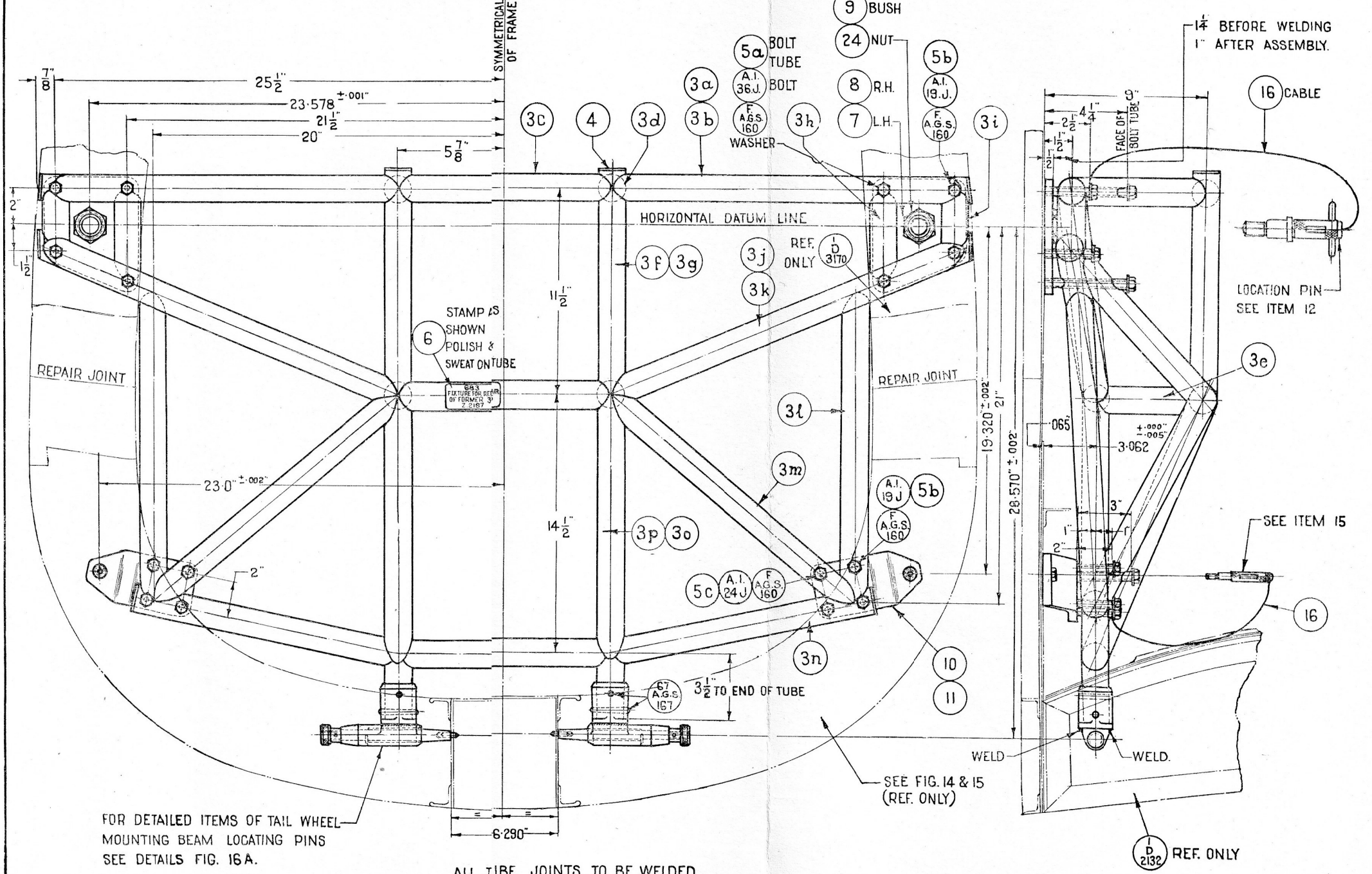
VIEW SHOWING DAMAGED FORMER CUT AWAY & JIG PART Nº Z.2187 (SEE FIG.16) FITTED IN POSITION



# REPLACEMENT OF LOWER PORTION OF FORMER 35




| 15 | INSERTION PIECE & JOINT PLATES TO LOWER PORTION OF FORMER 35 | 15 |
|---|---|---|




FOR DETAILED ITEMS OF TAIL WHEEL MOUNTING BEAM LOCATING PINS SEE DETAILS FIG. 16A.

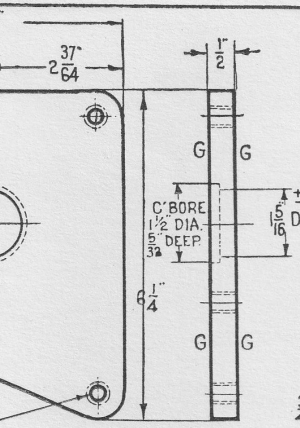
ALL TUBE JOINTS TO BE WELDED REAM BOLT TUBES $\frac{3}{8}$" DIA. AFTER WELDNG SHANK OF BOLTS MUST NOT EXCEED $\frac{3"\ -.002"}{8\ +.002"}$ DIA.

NOTE :- FOR B.O.M. & DETAILED ITEMS SEE FIG. 16A.

THIS WAS LINCOLN REPAIR Z.2187

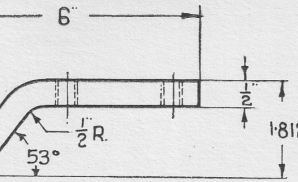


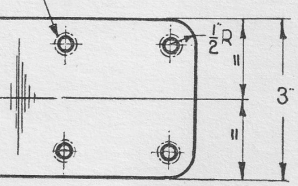
# SETTING FIXTURE FOR REPAIR TO FORMER 35




E

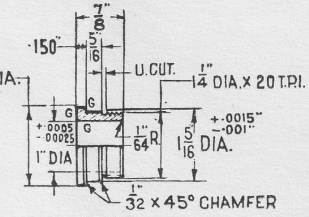
H.-AS DRAWN
.H.- OPP. HAND
S TO BE SURFACE
ND AT 'G'



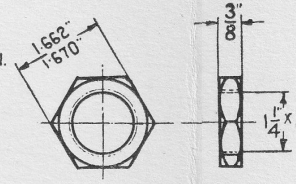




ITEM 10

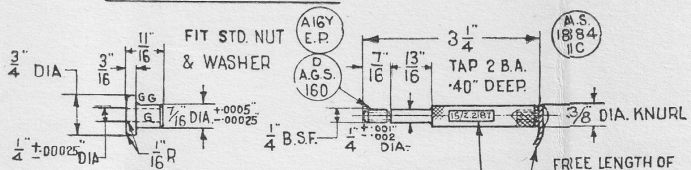
PEC. SEE




ITEM 9
CASE HARDEN & GRIND AT 'G'

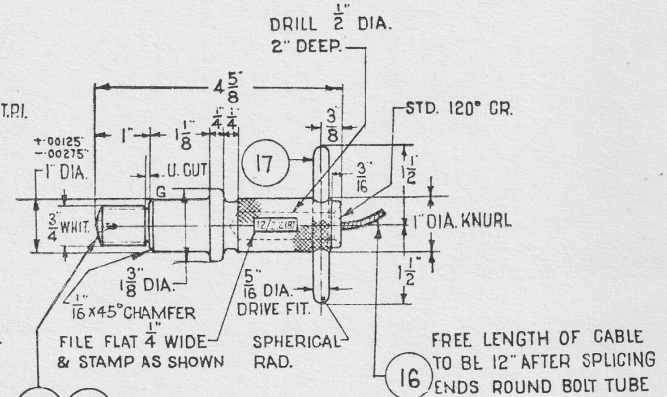



ITEM 24



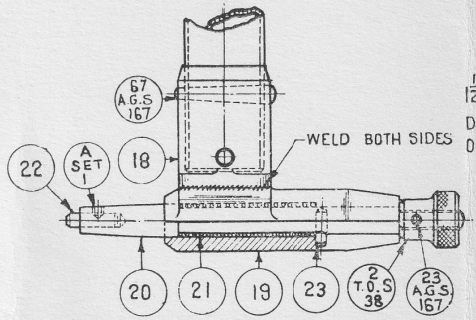

ITEM 11
CASE HARDEN & GRIND AT 'G'.

ITEM 15
CASE HARDEN & GRIND AT 'G'. LEAVE THREADS SOFT

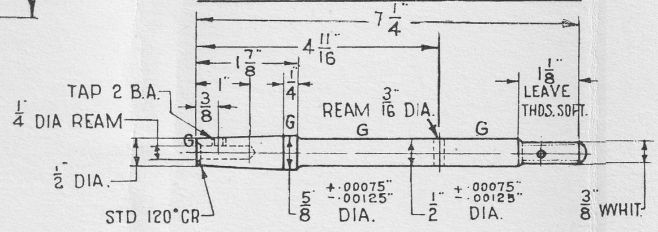



ITEM 12
CASE HARDEN & GRIND AT 'G'. LEAVE THREADS SOFT

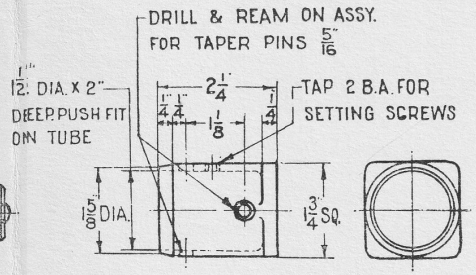
MATERIAL :- CASE HARDENING STEEL
UNLESS OTHERWISE STATED.



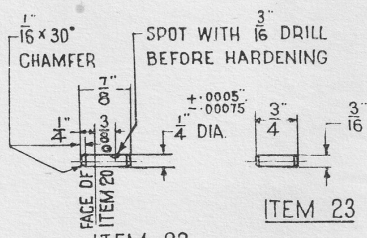

ARRANGEMENT OF LOCATION
FOR TAIL WHEEL MOUNTING BEAM




ITEM 20
CASE HARDEN & GRIND AT 'G'.

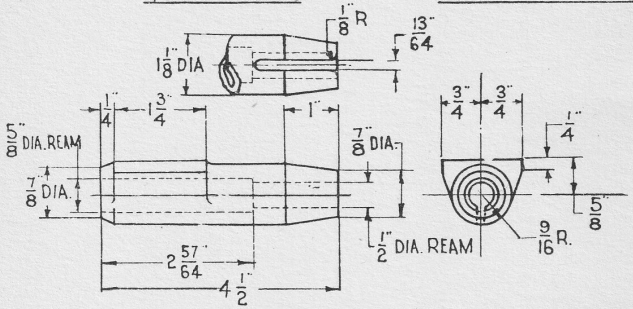



ITEM 18
WELD TO ITEM 19




ITEM 22
HARDEN & GRIND AT 'G'

ITEM 23




ITEM 19
WELD TO ITEM 18

MATERIAL :- CASE HARDENING STEEL
UNLESS OTHERWISE STATED

THIS WAS LINCOLN REPAIR Z.2187 SHT 2

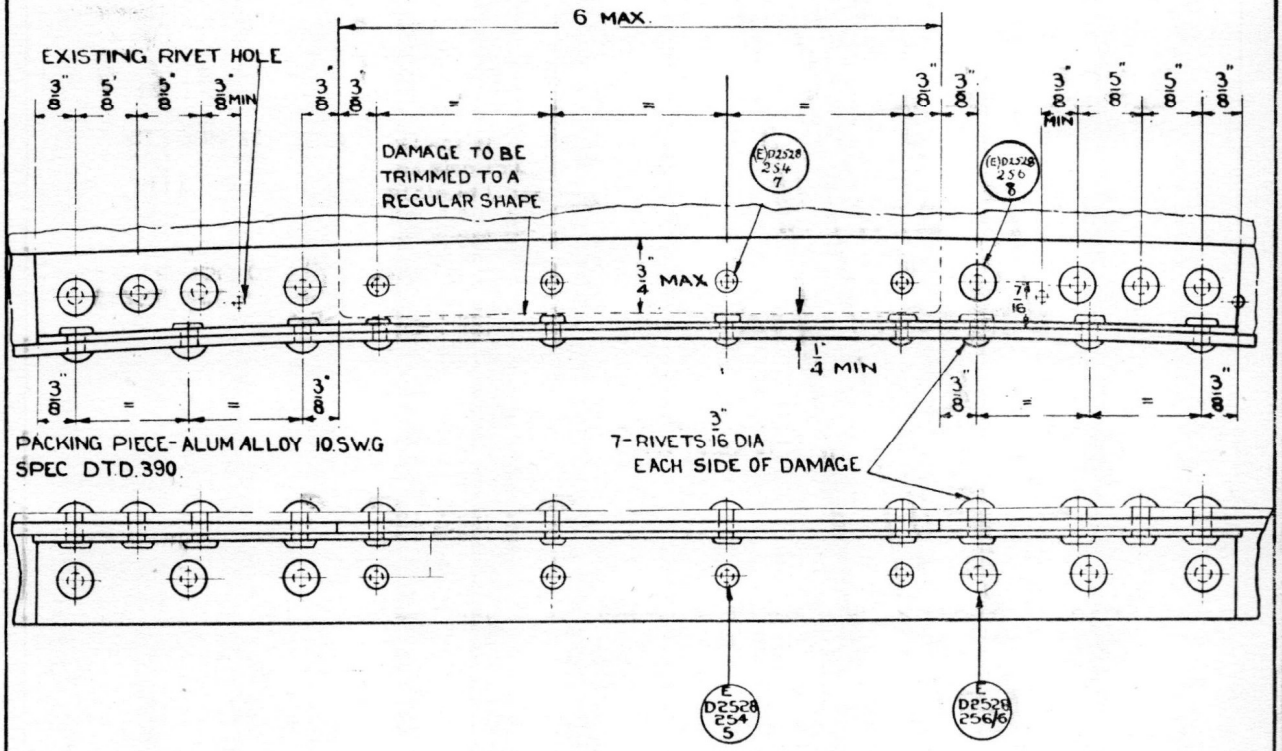
## BILL OF MATERIAL FOR

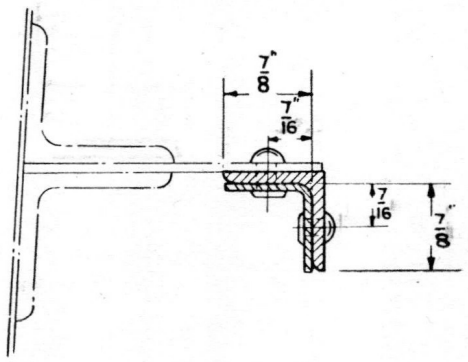
| ITEM Nº | DESCRIPTION | Nº OFF | |
|---|---|---|---|
| A1/36J | BOLT - 3/8" B.S.F. | 4 | |
| F/AGS 160 | WASHER - 3/8" B.S.F. | 16 | |
| A1/19J | BOLT - 3/8" B.S.F. | 10 | |
| A1/24J | BOLT - 3/8" B.S.F. | 2 | |
| 6 | IDENTIFICATION PLATE | 1 | BR |
| 7 | TOP PLATFORM - L.H. | 1 | ST |
| 8 | TOP PLATFORM - R.H. | 1 | ST |
| 9 | BUSH | 2 | 13/ |
| 10 | BOTTOM PLATFORM | 2 | ST |
| 11 | BUSH | 2 | 1" |
| 12 | LOCATION PIN | 2 | 1½ |
| 13 | NUT - STD. - 3/4" WHIT." | 2 | |
| 14 | WASHER - STD. FOR 3/4" WHIT. BOLT." | 2 | |
| 15 | LOCATION PIN | 2 | 3/8 |
| AS1884/1C | SCREW - 2 B.A. | 2 | |
| A16Y/EP | NUT - 1/4" B.S.F. | 2 | |
| D/AGS160 | WASHER - 1/4" B.S.F. | 2 | |
| 16 | CABLE | 4 | FLE |
| 17 | SHAFT | 2 | ST |
| 18 | SOCKET | 2 | ST |
| 67/AGS167 | TAPER PIN | 4 | |
| 19 | BEARING | 2 | ST |
| 20 | PLUNGER | 2 | 3/4 |
| 21 | SPRING - ½" I/D. 16 TURNS 2 5/8" FREE LG. | 2 | 20 |
| 22 | END PIN. | 2 | SIL |
| 23 | STOP PIN. | 2 | SIL |
| 2/TDS38 | KNURLED NUT - STD. JIG UNIT | 2 | |
| 23/AGS167 | TAPER PIN | 2 | |
| A/SET. 1 | SET SCREW - "UNBRAKO" - 2 B.A. x 3/16" | 2 | |
| 24 | NUT - 1¼" DIA. x 20 T.P.I. | 2 | ST |

## WELDED FRAME C

| ITEM Nº | DESCRIPTION | Nº OFF | MA |
|---|---|---|---|
| 3a | UPPER HOZINTAL TUBE | 1 | STEEL TU |
| 3b | UPPER DIAGONAL STRUT | 2 | STEEL TU |
| 3c | CENTRE BRACING TUBE | 4 | STEEL TU |
| 3d | UPPER DISTANCE TUBE | 2 | STEEL TU |
| 3e | LOWER DISTANCE TUBE | 2 | STEEL TU |
| 3f | BOTTOM CENTRE TUBE | 2 | STEEL TU |
| 3g | TOP CENTRE TUBE | 2 | STEEL TU |
| 3h | SIDE SPACING TUBE | 2 | STEEL TU |
| 3i | OUTER SPACING TUBE. | 2 | STEEL TU |
| 3j | BOTTOM SIDE TUBE | 2 | STEEL TU |
| 3k | TOP DIAGONAL STRUT | 2 | STEEL TU |
| 3l | SIDE VERTICAL STRUT | 2 | STEEL T |
| 3m | SIDE DIAGONAL STRUT | 2 | STEEL T |
| 3n | LOWER SIDE TUBE | 2 | STEEL T |
| 3o | LOWER CENTRE TUBE | 2 | STEEL T |
| 3P | LOWER DIAGONAL STRUT | 2 | STEEL T |
| 4 | END SEALING PLATE | 8 | 16G PLA |
| 5a | BOLT TUBE | 4 | STEEL T |
| 5b | BOLT TUBE | 10 | STEEL T |
| 5c | BOLT TUBE | 2 | STEEL TU |

L FOR THE ASSEMBLY OF SETTING FIXTURE FOR REPAIR TO FORMER 35 (SEE




SECTION THROUGH REPAIR

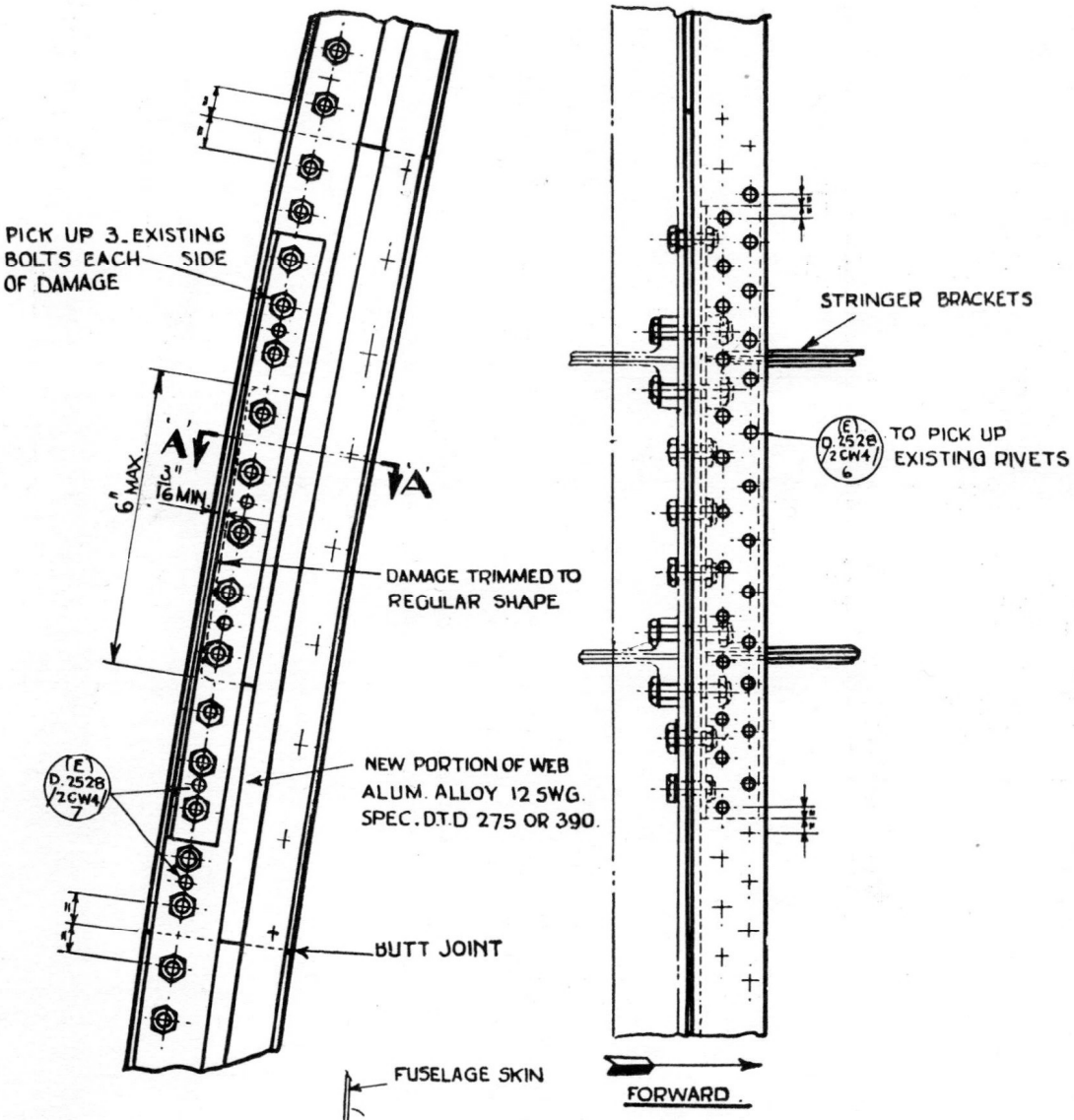
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

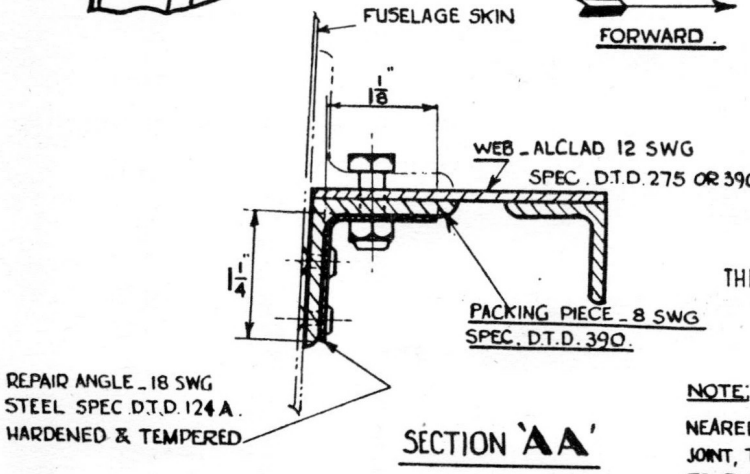
MATERIAL - REPAIR ANGLE ALUM. ALLOY. 16G.

SPEC - D.T.D. 390.

THIS WAS LINCOLN REPAIR D.3900.

| 17 | PATCH REPAIR TO INNER ANGLE OF FORMER 27 | 17 |
|---|---|---|



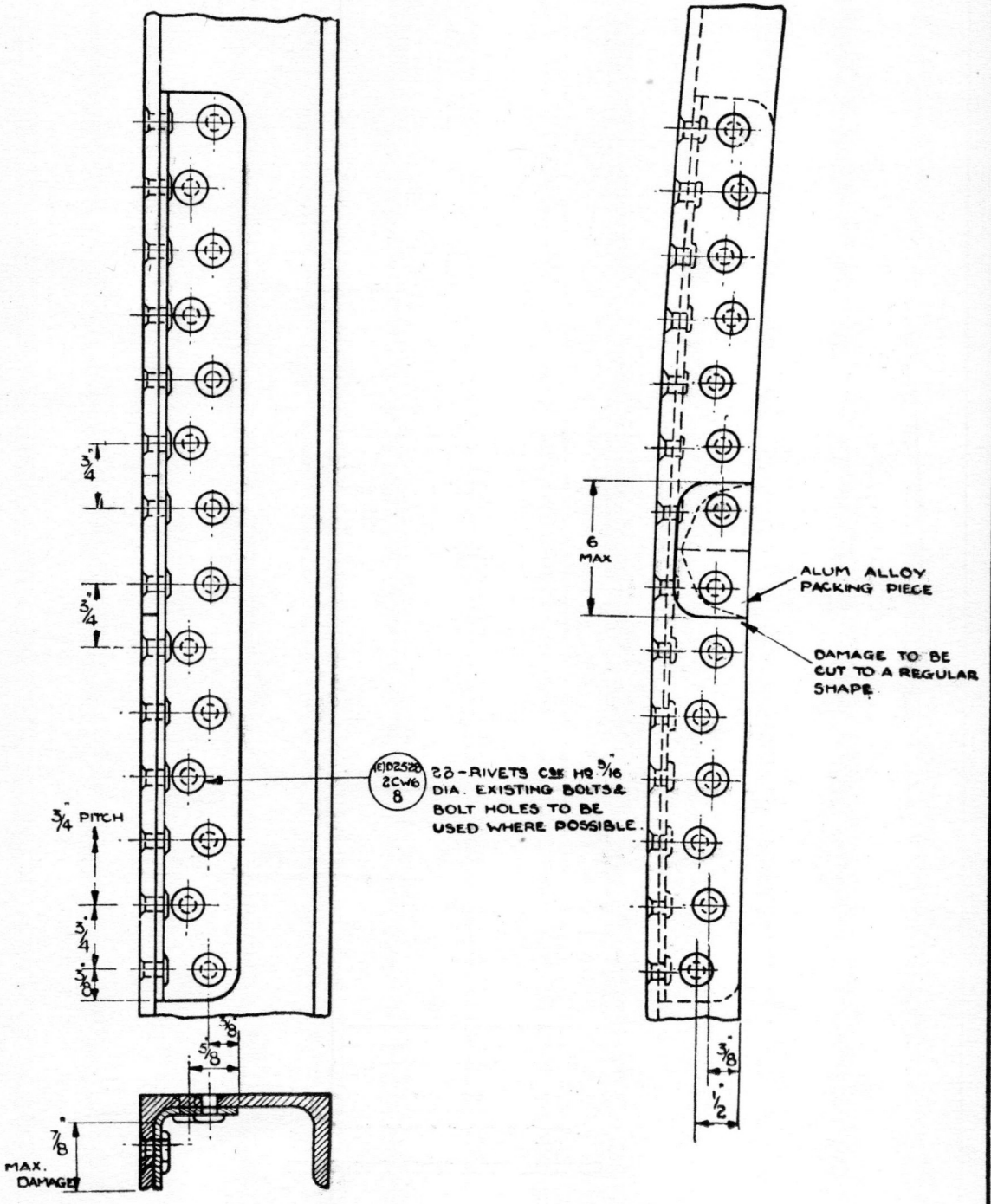




SECTION 'AA'

THIS WAS LINCOLN REPAIR D.3901

NOTE: IF THE EDGE OF THE DAMAGE IS NEARER THAN 6" TO THE EXISTING WEB JOINT, THE NEW PIECE OF WEB SHOULD EXTEND TO THIS EXISTING JOINT.

| 18 | PATCH REPAIR TO OUTER ANGLE OF FORMER Nº 27 WITH INSERTION WEB | 18 |
|---|---|---|



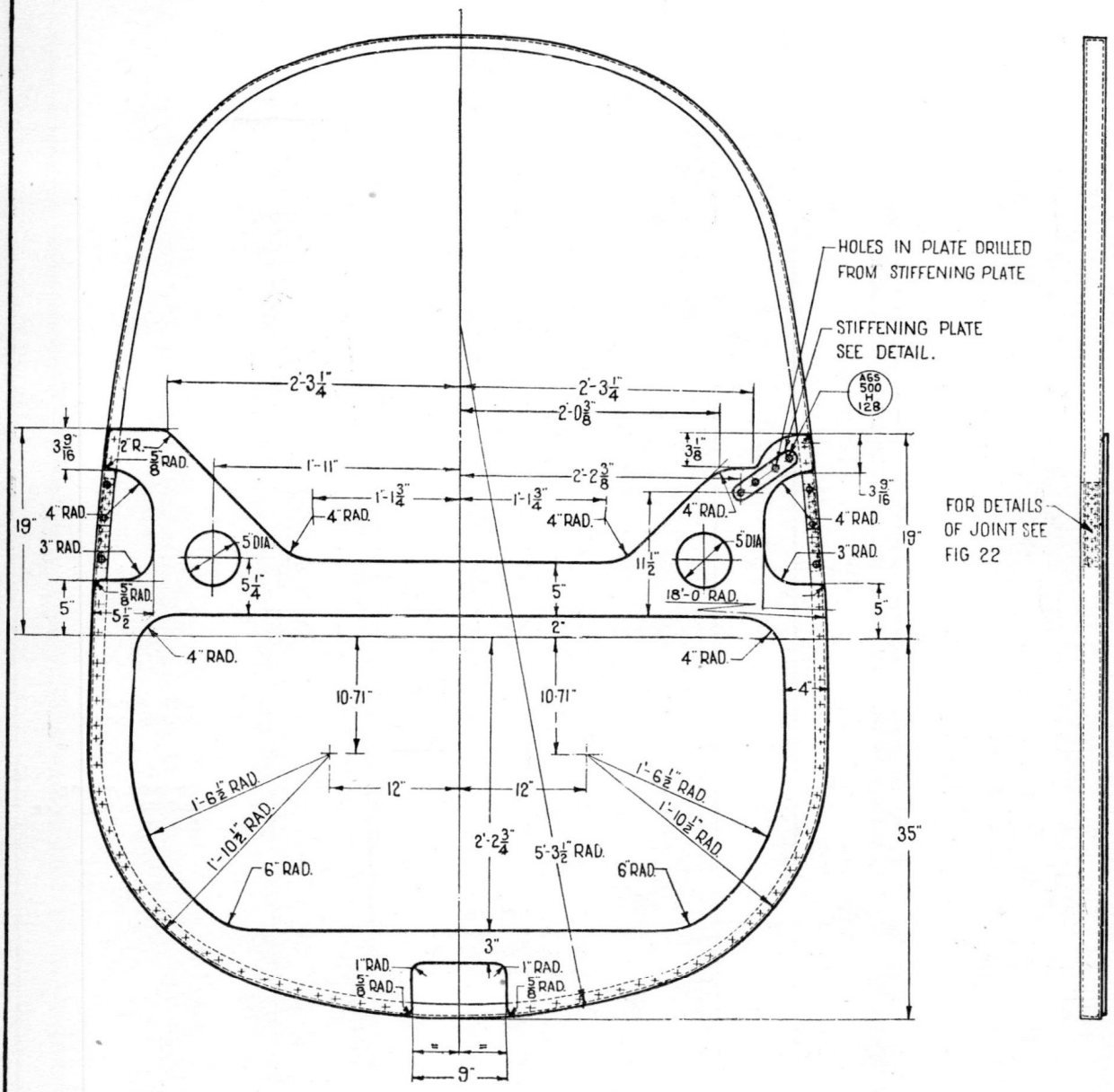

REPAIR ANGLE :- STEEL 1"x1"x14 S.W.G.

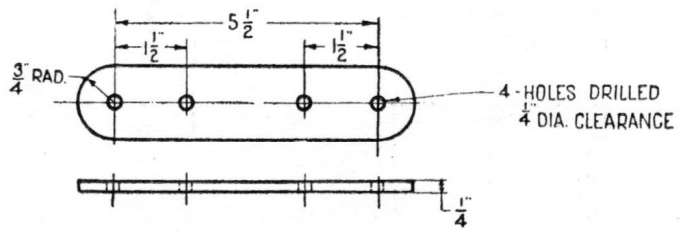
SPEC :- D.T.D. 124.A HARDENED & TEMPERED.

JOINTING COMPOUND SHOULD BE APPLIED BETWEEN FACES.

THIS WAS LINCOLN REPAIR D 3850

| 19 | PATCH REPAIR TO FLANGES OF FORMER "E" | 19 |
|---|---|---|




## DETAILS OF STIFFENING PLATE

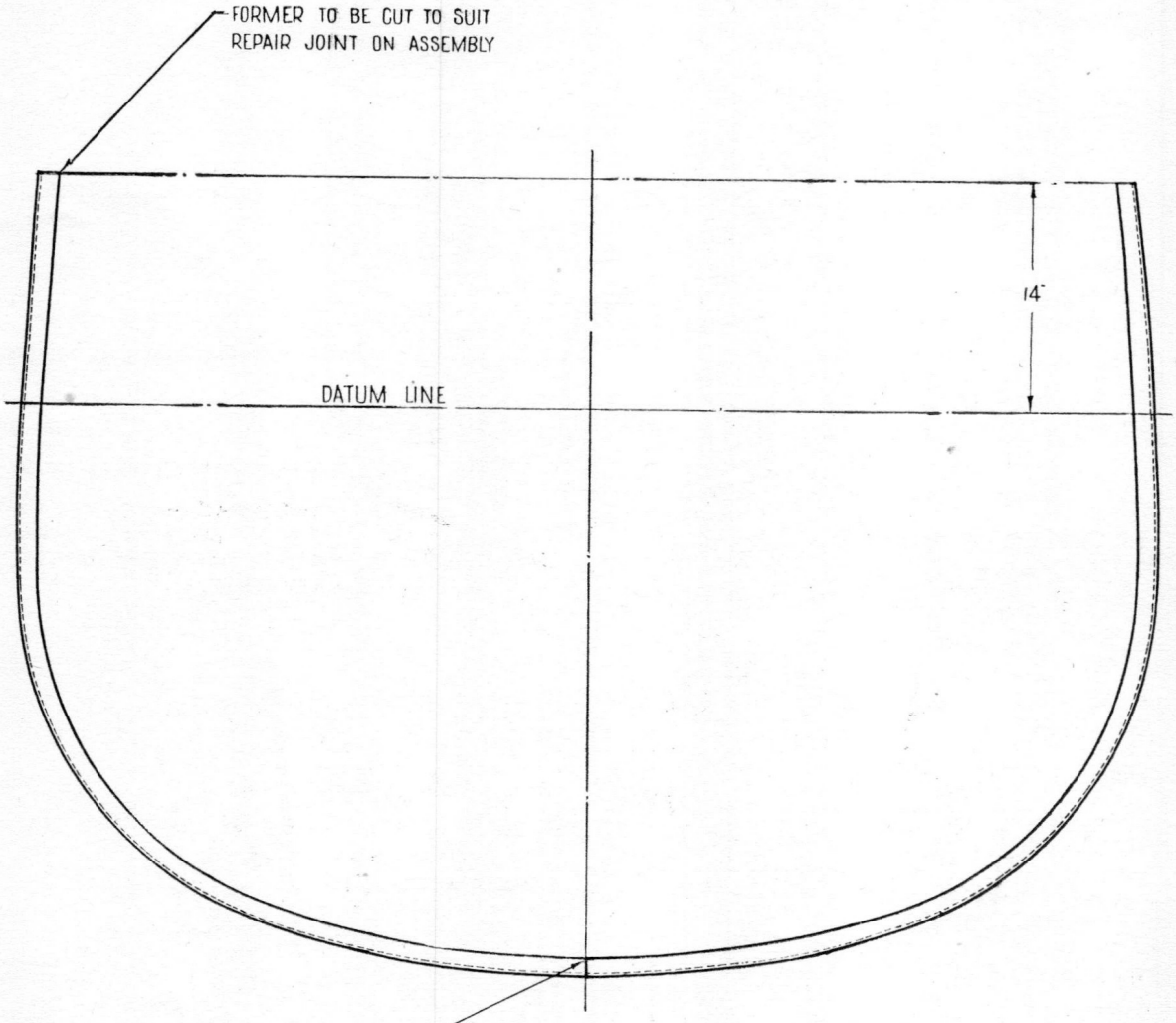
MATERIAL STEEL 1/4" THICK

NOTE :- HOLES TO BE JIG DRILLED FROM PRODUCTION JIG & CHECKED WITH INTERCHANGEABILITY JIG V 15353

THIS WAS LINCOLN REPAIR Z.1725.



# SETTING JIG FOR FORMER "E" - FRONT CENTRE SECTION

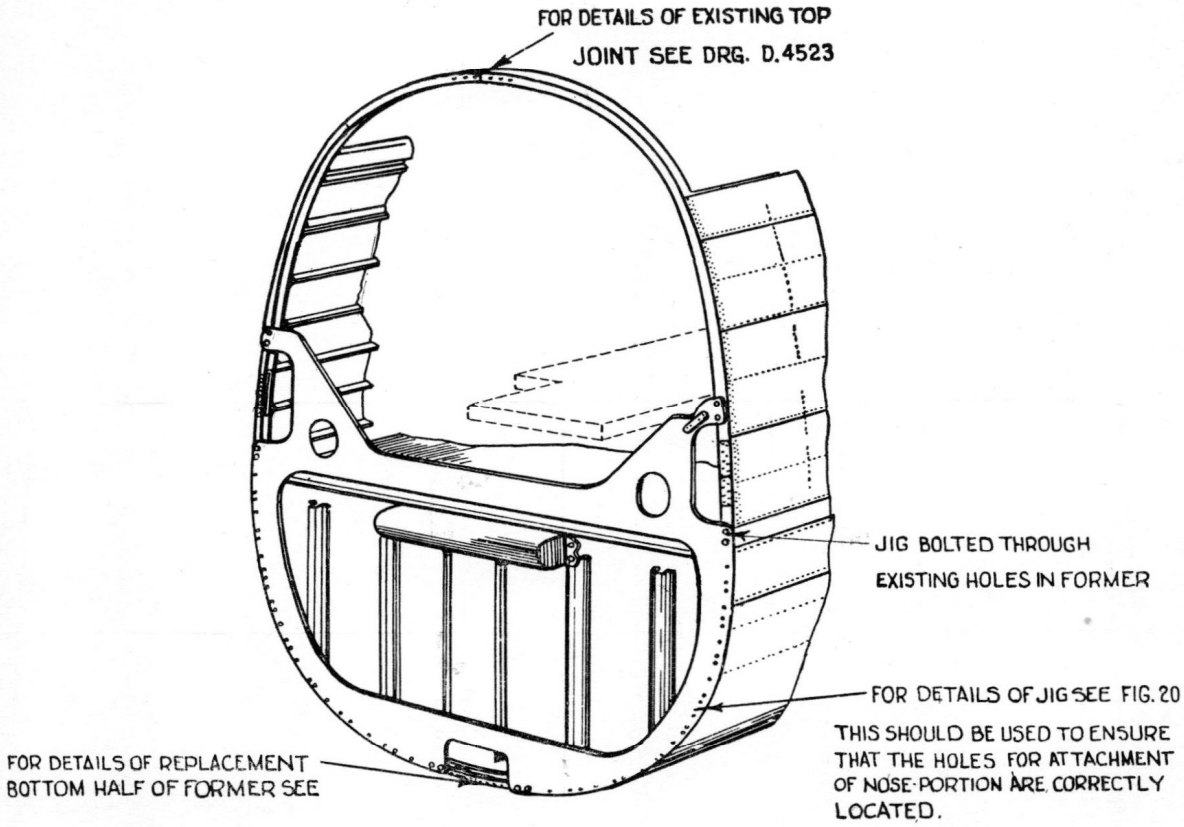


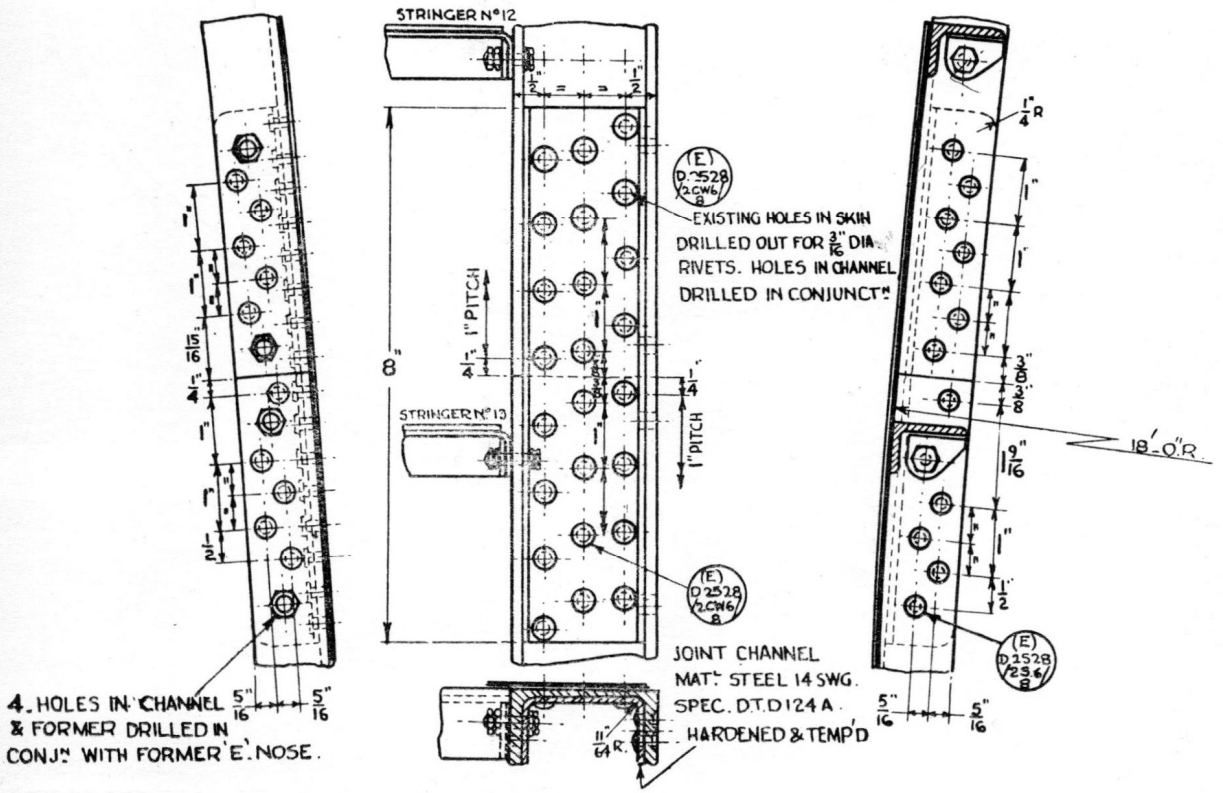

REPAIR FORMER MADE FROM EXTRUSION
SECTION Nº 51/SS 3075

FOR FORMER CONTOUR SEE DRG. Nº D1657

THIS WAS LINCOLN REPAIR D 3851

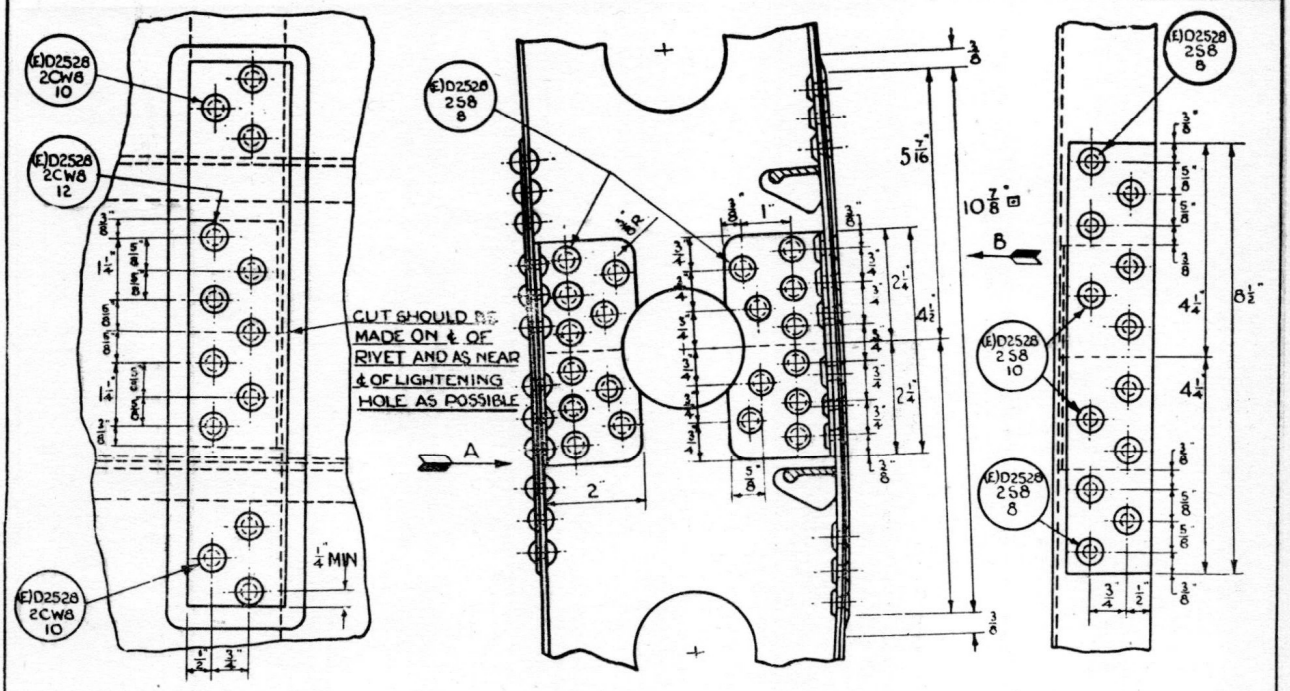
| 21 | REPLACEMENT LOWER PORTION FOR FORMER "E" REPAIR MATERIAL | 21 |
|---|---|---|



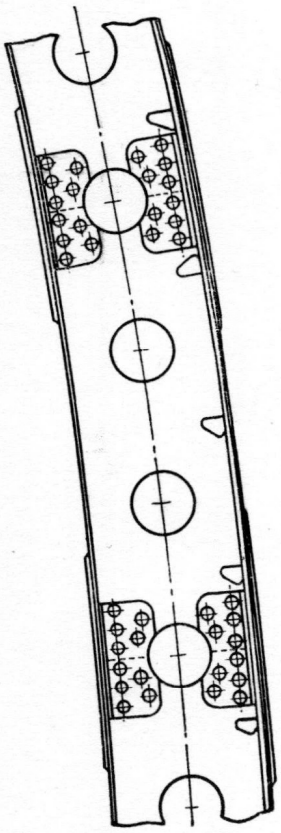

NOTE: TRANSPORT JOINT BOLTS & STRINGER BRACKET BOLT INCREASED IN LENGTH AS REQUIRED.

THIS WAS LINCOLN REPAIR D.3129

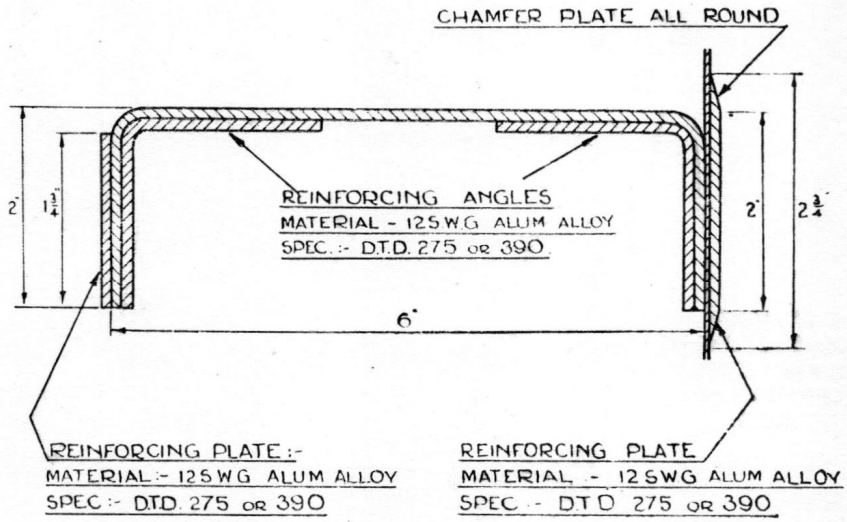



VIEW IN DIRECTION OF ARROW 'B'

VIEW IN DIRECTION OF ARROW 'A'



VIEW SHOWING NEW PIECE IN POSITION.



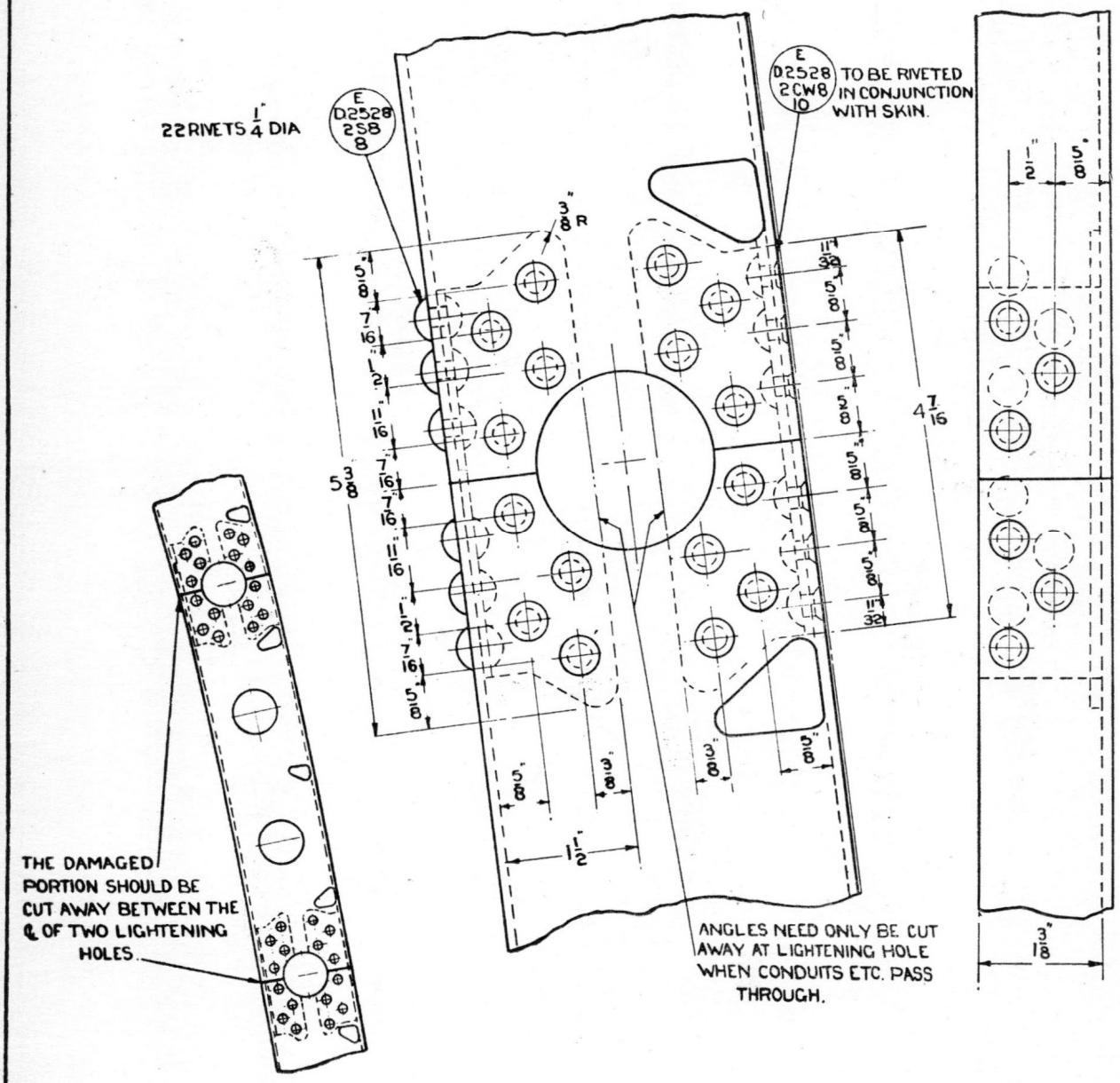

REINFORCING PLATE:-
MATERIAL:- 12 S.W.G. ALUM ALLOY
SPEC:- D.T.D. 275 OR 390

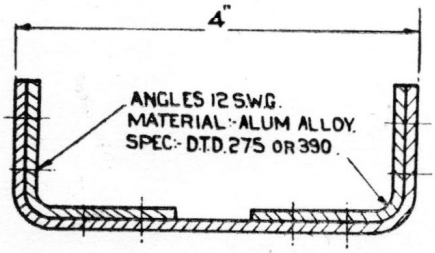
REINFORCING PLATE
MATERIAL - 12 S.W.G. ALUM ALLOY
SPEC.- D.T.D. 275 OR 390

□ THE OVERALL LENGTH OF THE REINFORCING PLATE MAY VARY TO ENABLE THREE EXISTING RIVET HOLES EACH SIDE OF STRINGER TO BE USED.

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR D.3838.

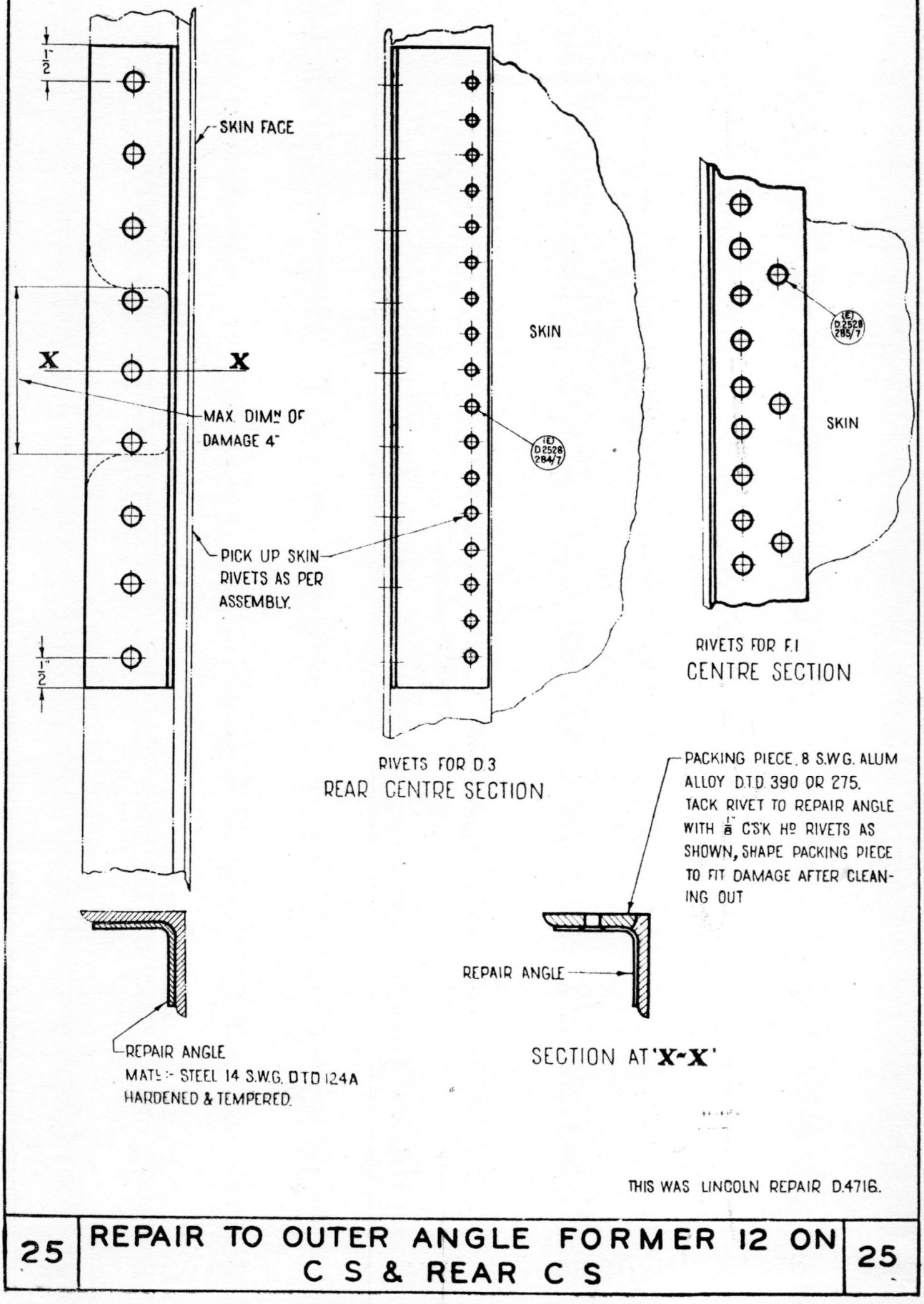



JOINTING COMPOUND SHOULD BE APPLIED BETWEEN METAL FACES.

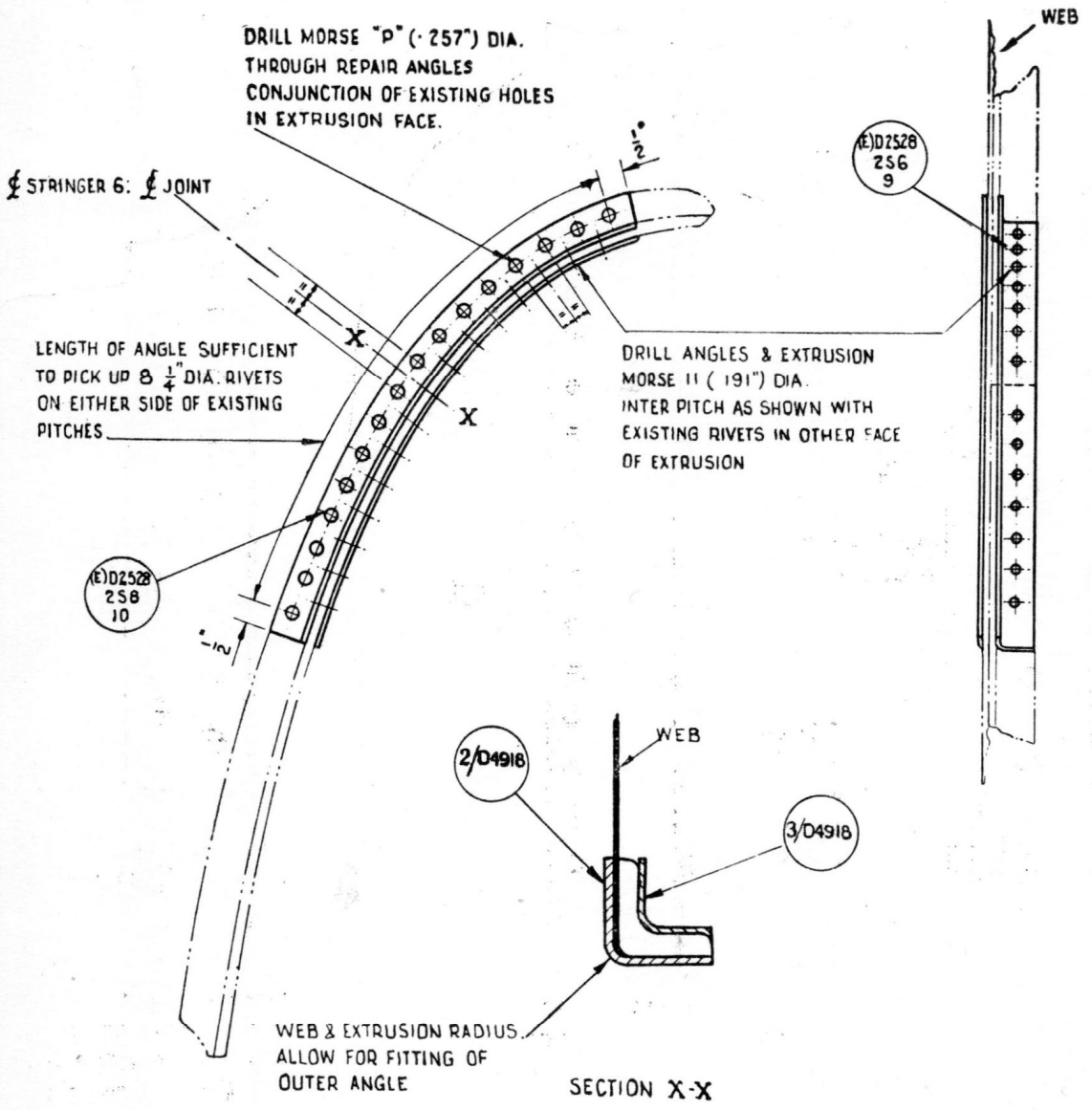
THIS WAS LINCOLN REPAIR D.3846.

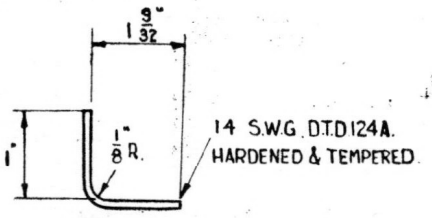
| 24 | INSERTION REPAIR TO 4" HEAVY FORMER | 24 |
|---|---|---|



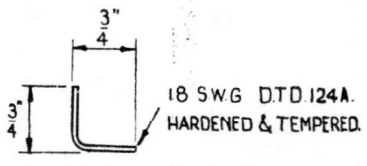

THIS WAS LINCOLN REPAIR D.4716.

| 25 | REPAIR TO OUTER ANGLE FORMER 12 ON C S & REAR C S | 25 |
|---|---|---|



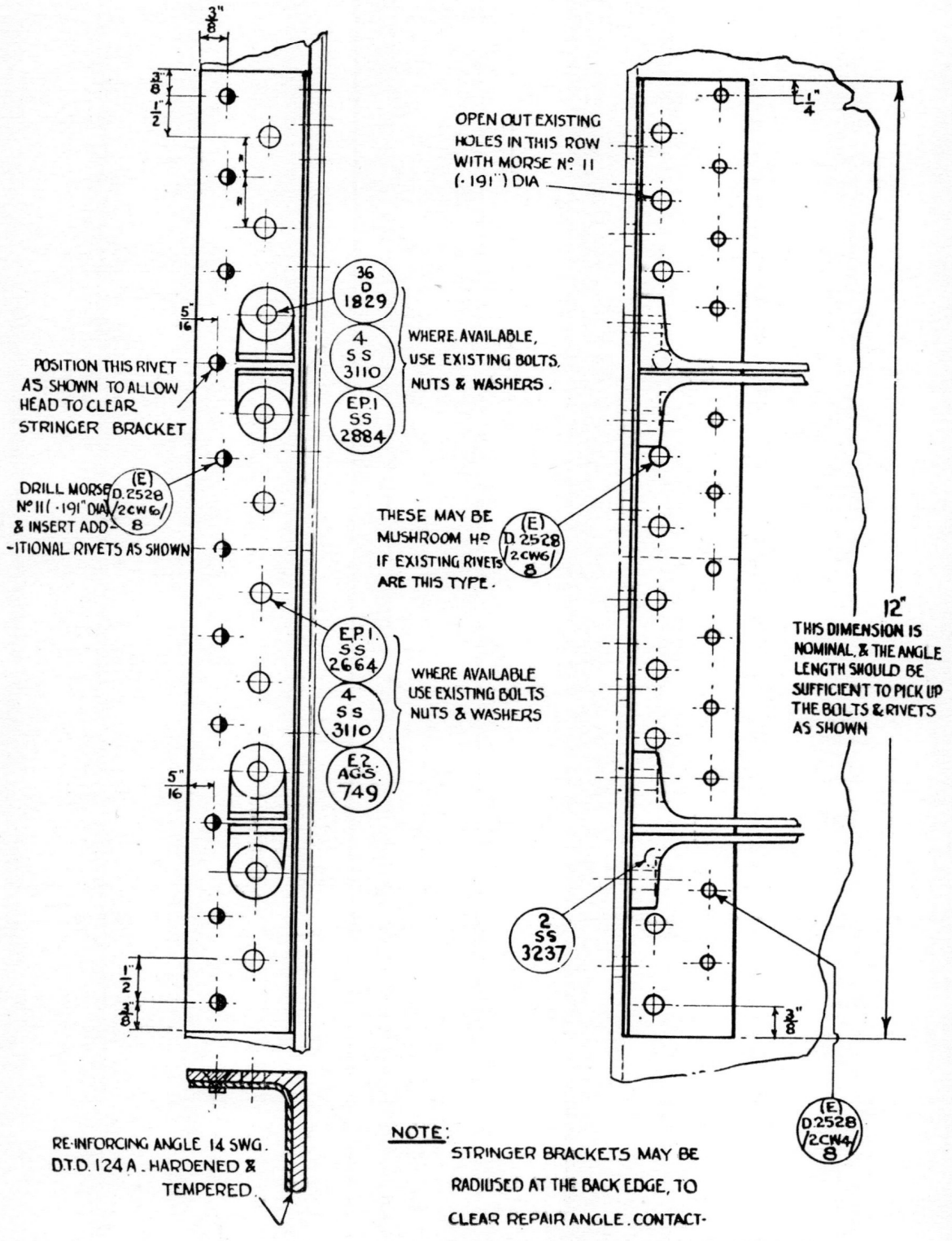

DETAIL OF ITEM 2/D4918




DETAIL OF ITEM 3/D4918

THIS WAS LINCOLN REPAIR D.4918

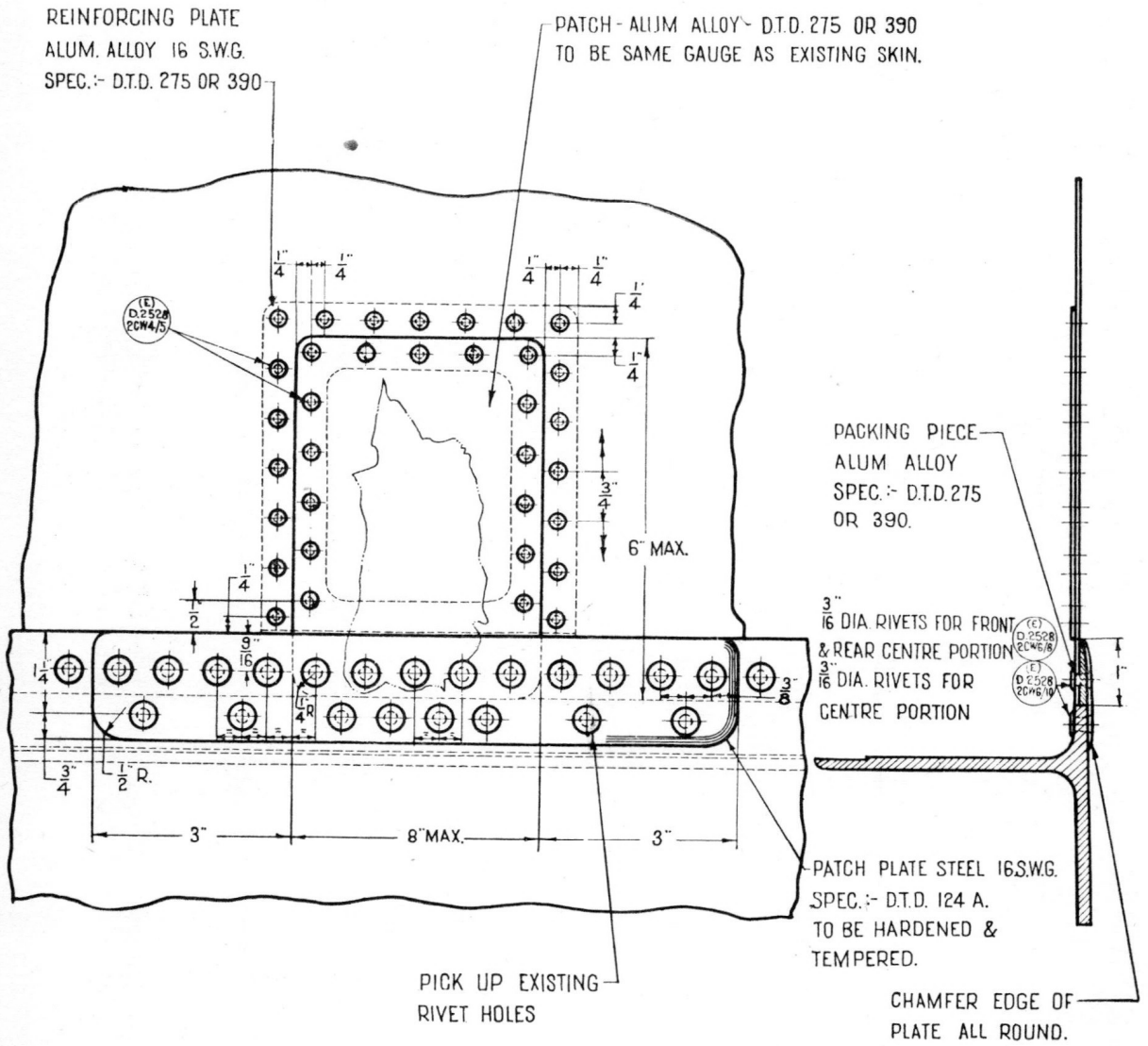
| 26 | INSERTION REPAIR TO INNER ANGLE FORMER 12 | 26 |
|---|---|---|




NOTE: STRINGER BRACKETS MAY BE RADIUSED AT THE BACK EDGE, TO CLEAR REPAIR ANGLE. CONTACT-ING SURFACES TO BE COATED WITH DURALAC.

THIS WAS LINCOLN REPAIR D.4711

| 29 | INSERTION REPAIR TO FORMER 27 ON REAR SECTION (D. 4.) | 29 |
|---|---|---|

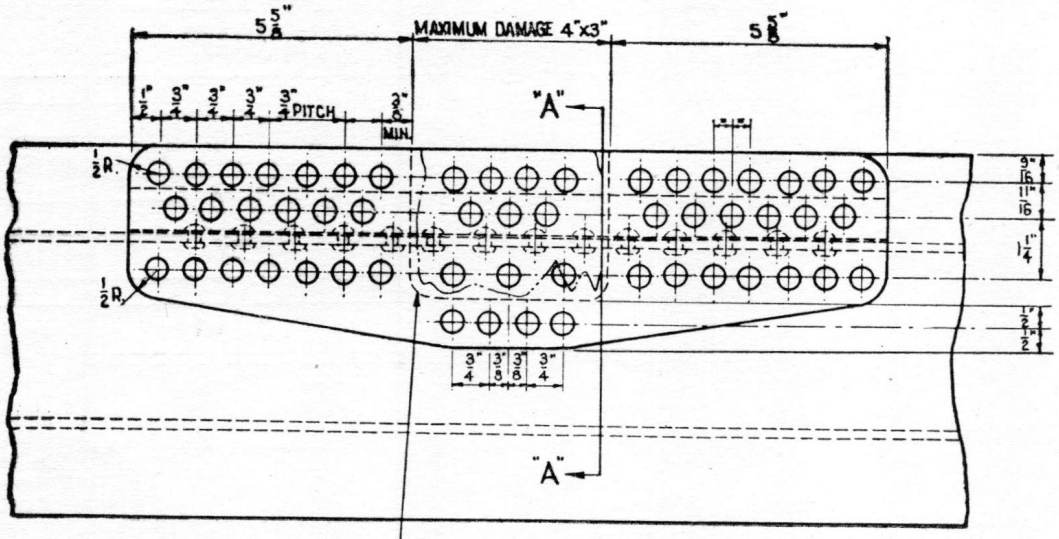



DAMAGE TO BE CUT AWAY TO A REGULAR SHAPE AND PACKING PIECE SAME GAUGE AS LONGERON TO BE INSERTED.

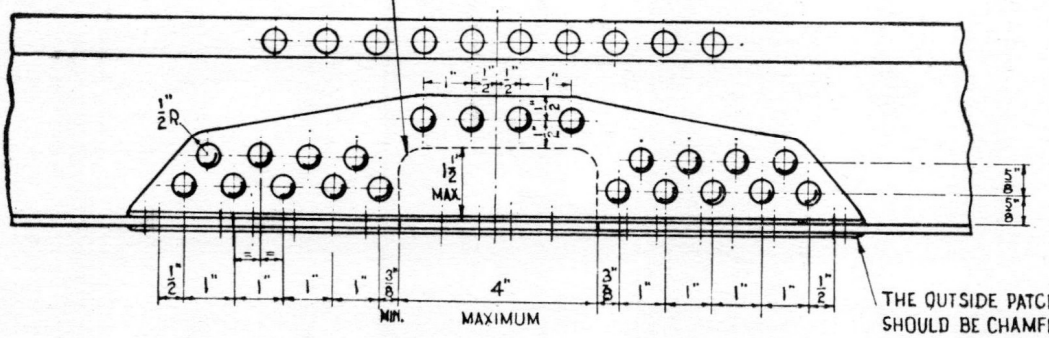
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR D.3834

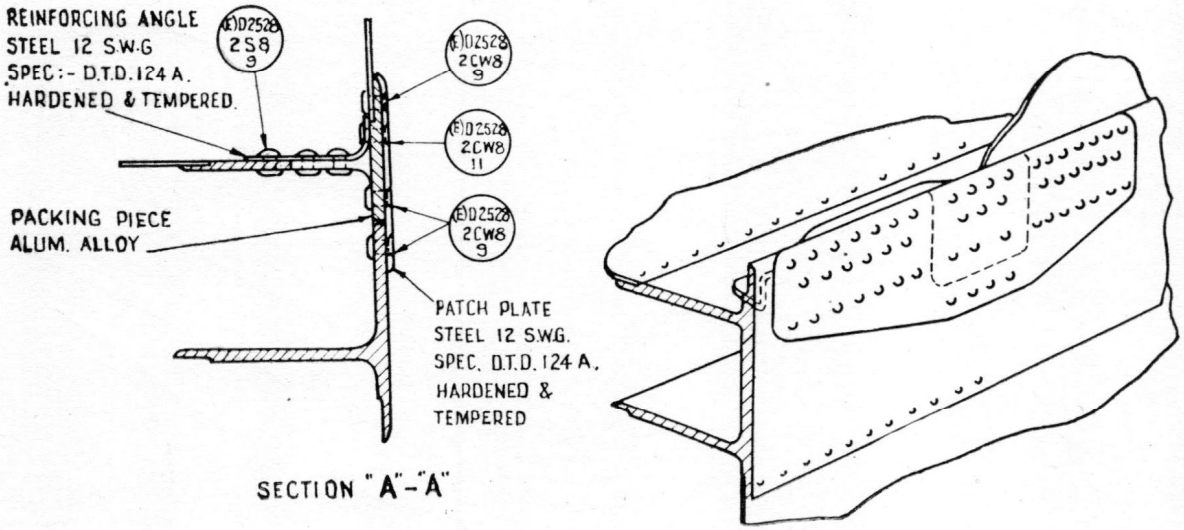
| 31 | PATCH REPAIR TO SKIN AND TOP OR BOTTOM EDGE OF LONGERON | 31 |
|---|---|---|




DAMAGE TO BE CUT TO A REGULAR SHAPE




THE OUTSIDE PATCH PLATE SHOULD BE CHAMFERED ALL ROUND THE EDGE.

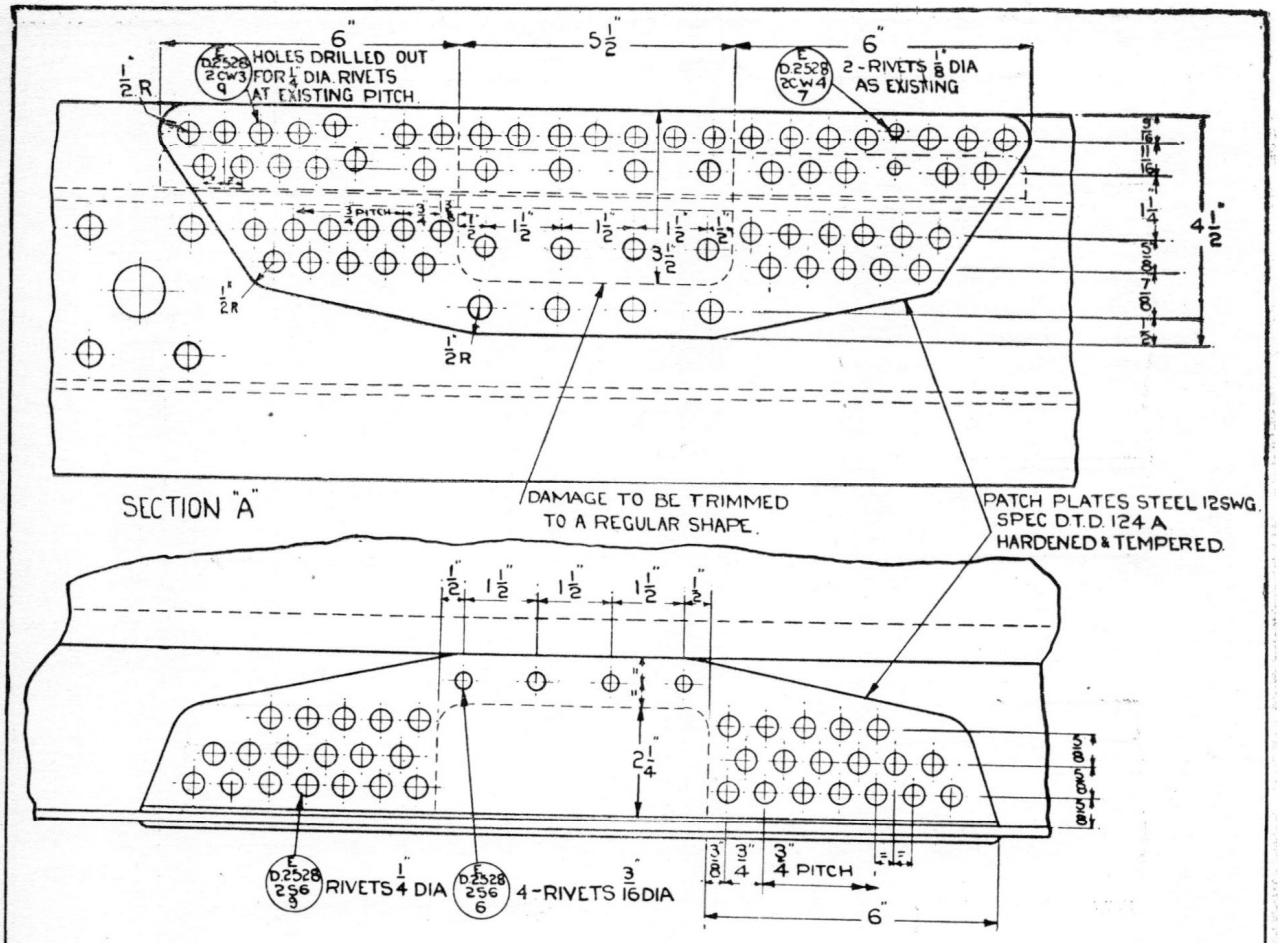


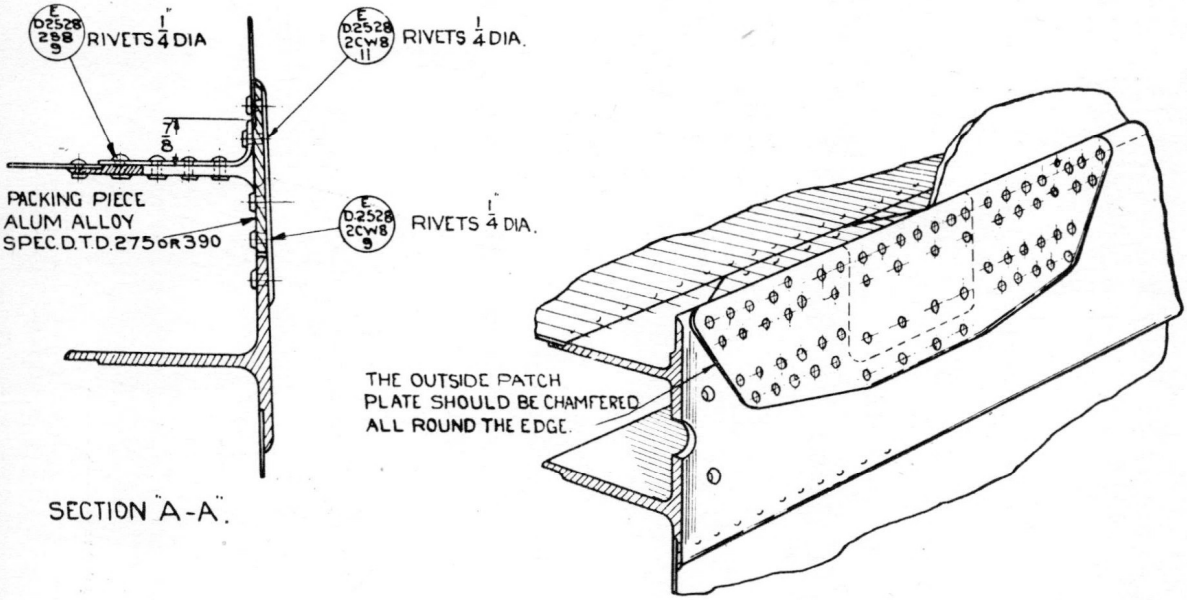

SECTION "A"-"A"

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

THIS WAS LINCOLN REPAIR D.3897

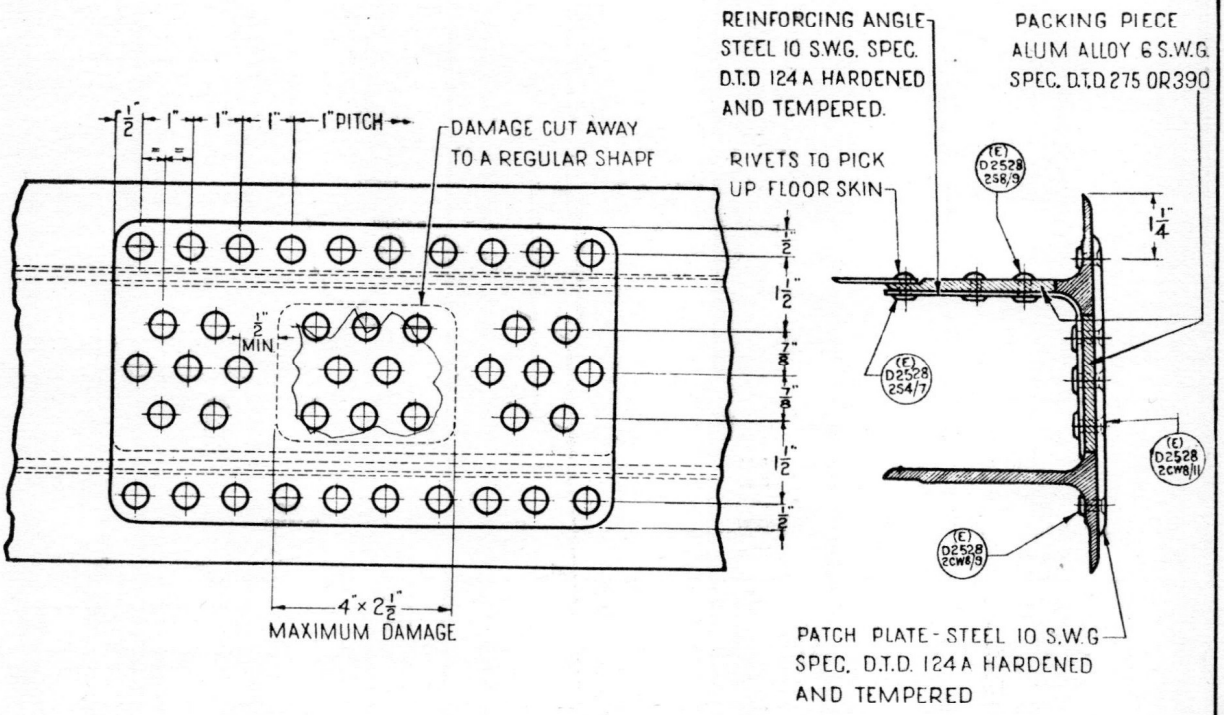
| 32 | PATCH REPAIRS TO TOP OR BOTTOM EDGES AND FLANGES OF LONGERONS - FUSELAGE FRONT AND REAR CENTRE PORTIONS | 32 |
|---|---|---|

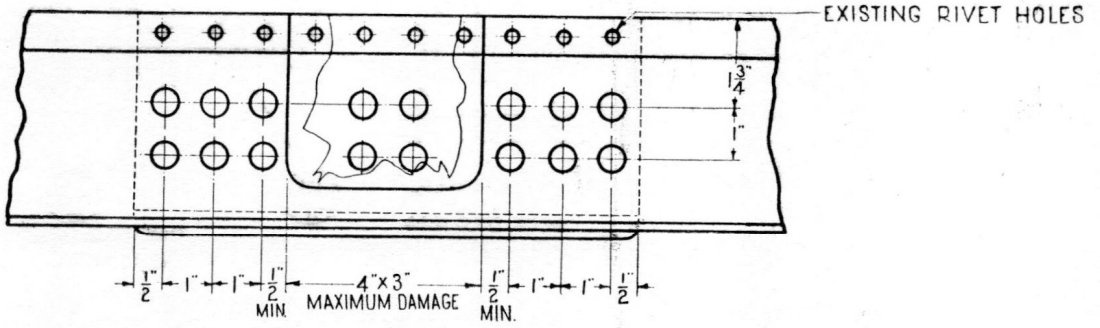


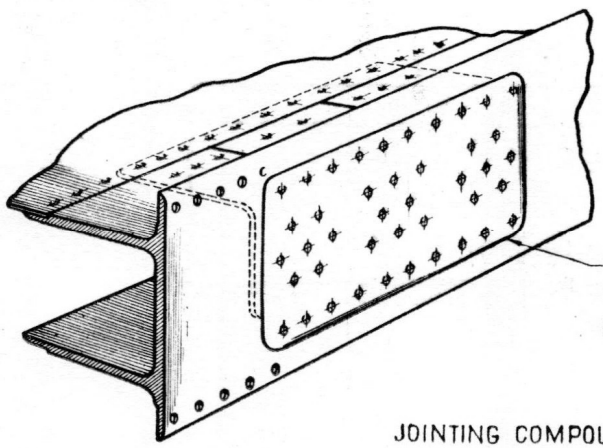




THIS WAS LINCOLN REPAIR D.3880

| 33 | PATCH REPAIR TOP OR BOTTOM EDGE AND ADJACENT FLANGE OF LONGERON - FUSELAGE FRONT AND REAR CENTRE PORTIONS | 33 |
|---|---|---|



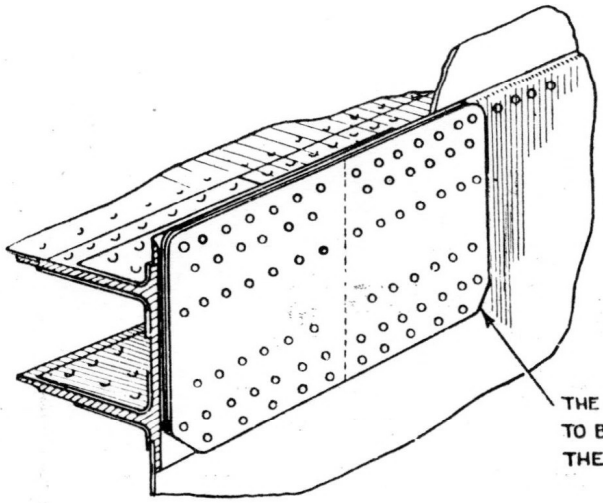



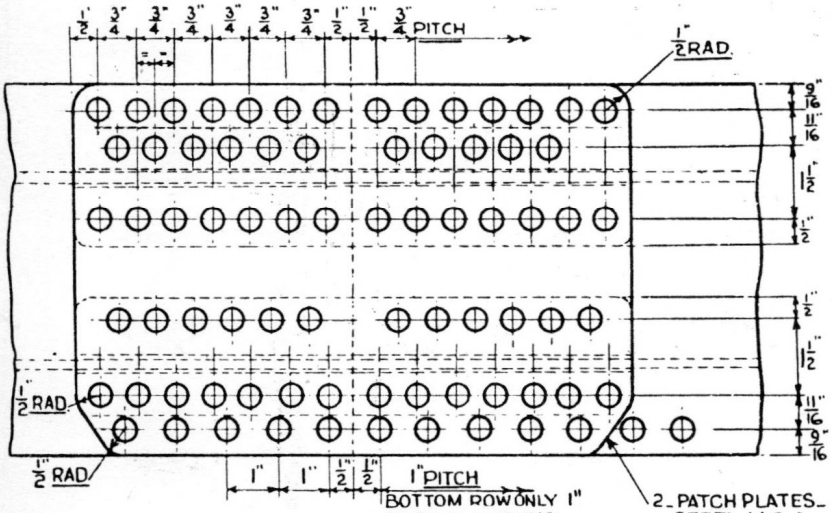

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

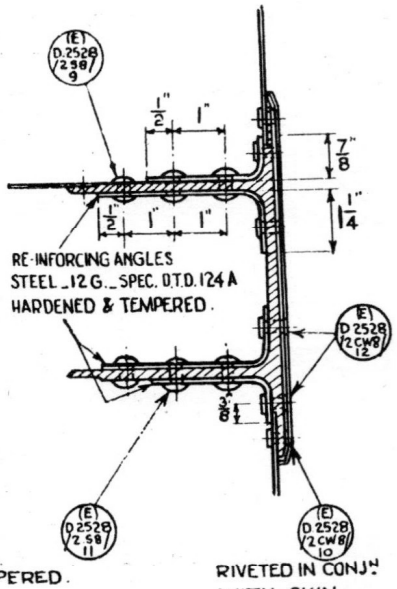
THIS WAS LINCOLN REPAIR D.3880

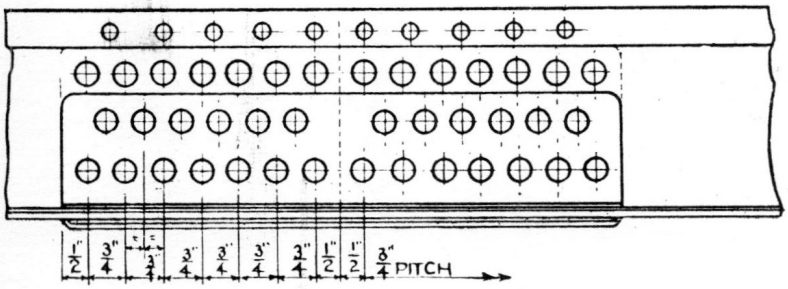
| 34 | PATCH REPAIR - WEB & LONGERON FLANGES FRONT & REAR CENTRE PORTION | 34 |
|---|---|---|



THE OUTSIDE PATCH PLATE TO BE CHAMFERED ALL ROUND THE EDGE.



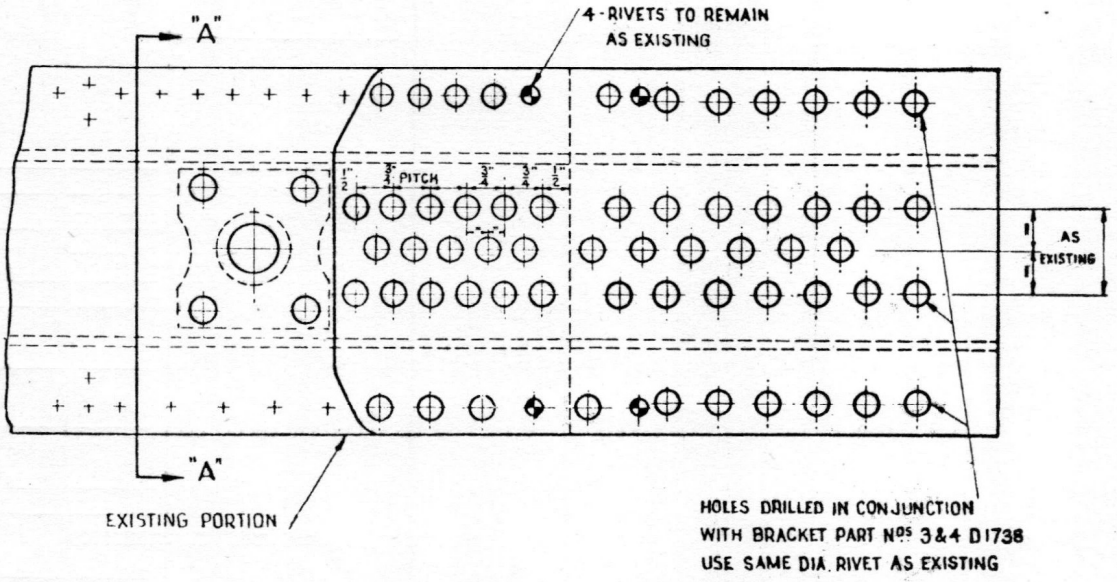



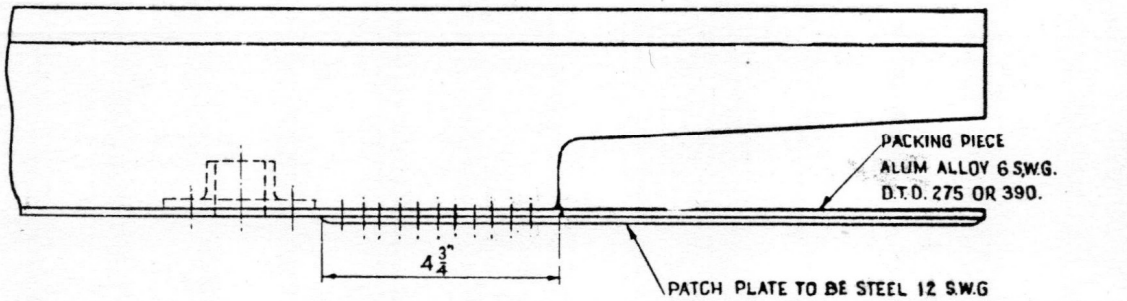



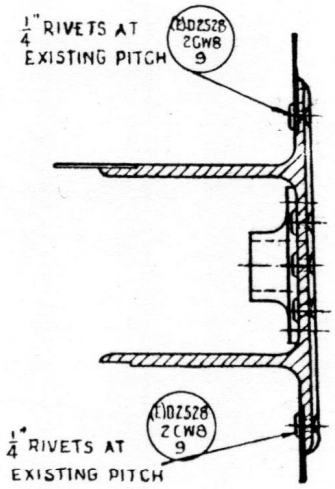

NOTE: JOINT COMPOUND TO BE APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR D.3883

| 35 | INSERTION REPAIR TO LONGERON FUSELAGE FRONT & REAR CENTRE PORTION | 35 |
|---|---|---|



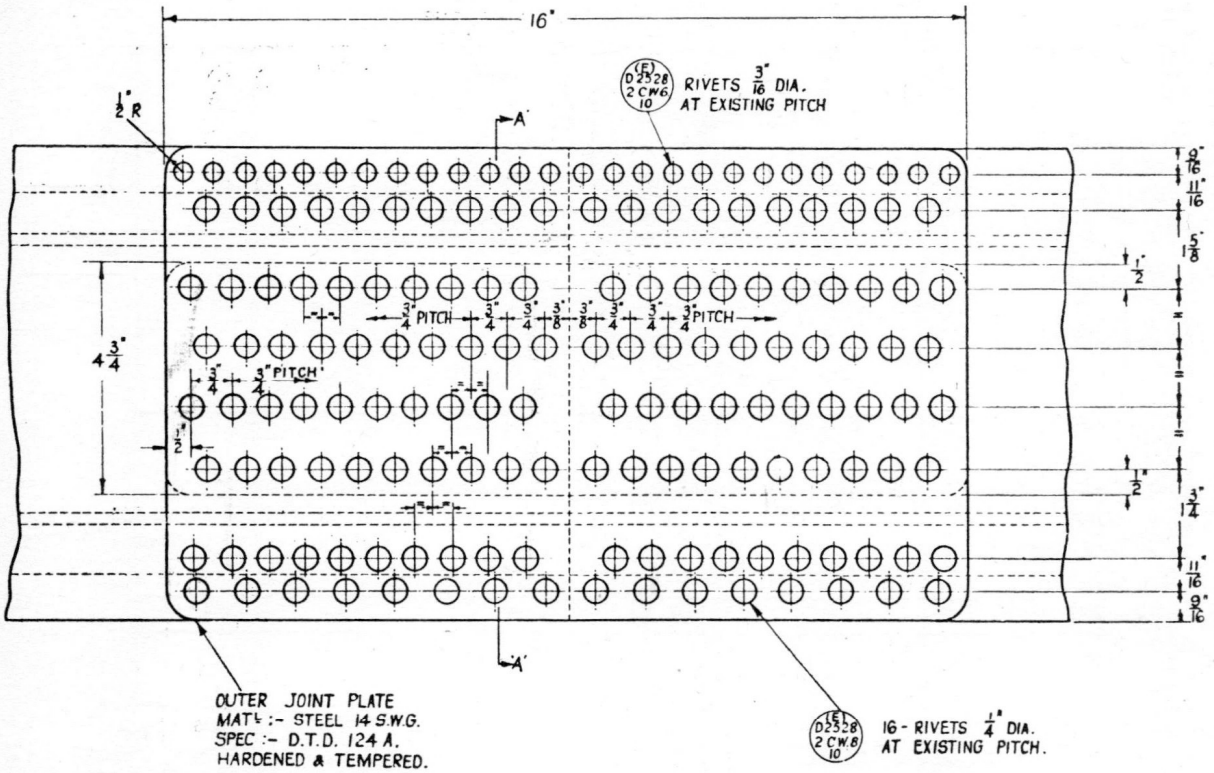



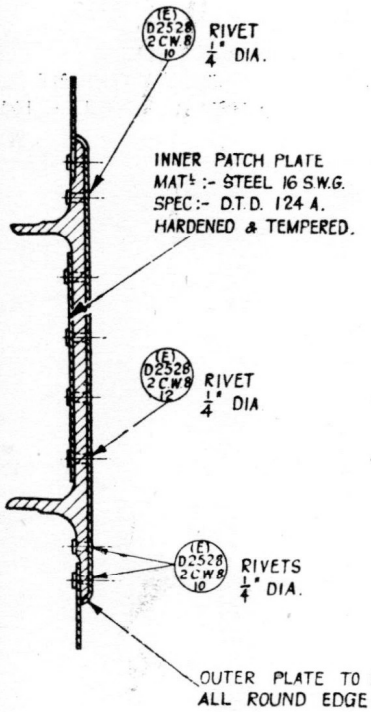

SECTION "A"-"A"

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

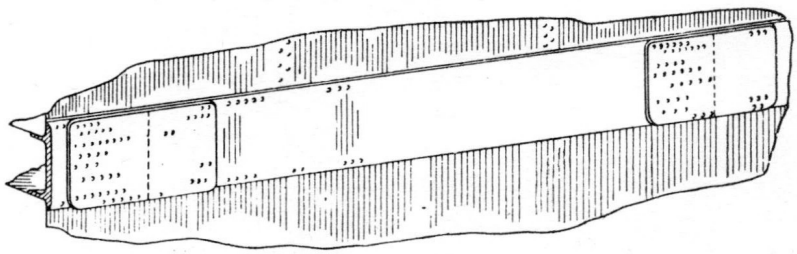
THIS WAS LINCOLN REPAIR D.3885

| 36 | INSERTION REPAIR TO END OF LONGERON FRONT CENTRE PORTION | 36 |
|---|---|---|




SECTION — 'A-A'

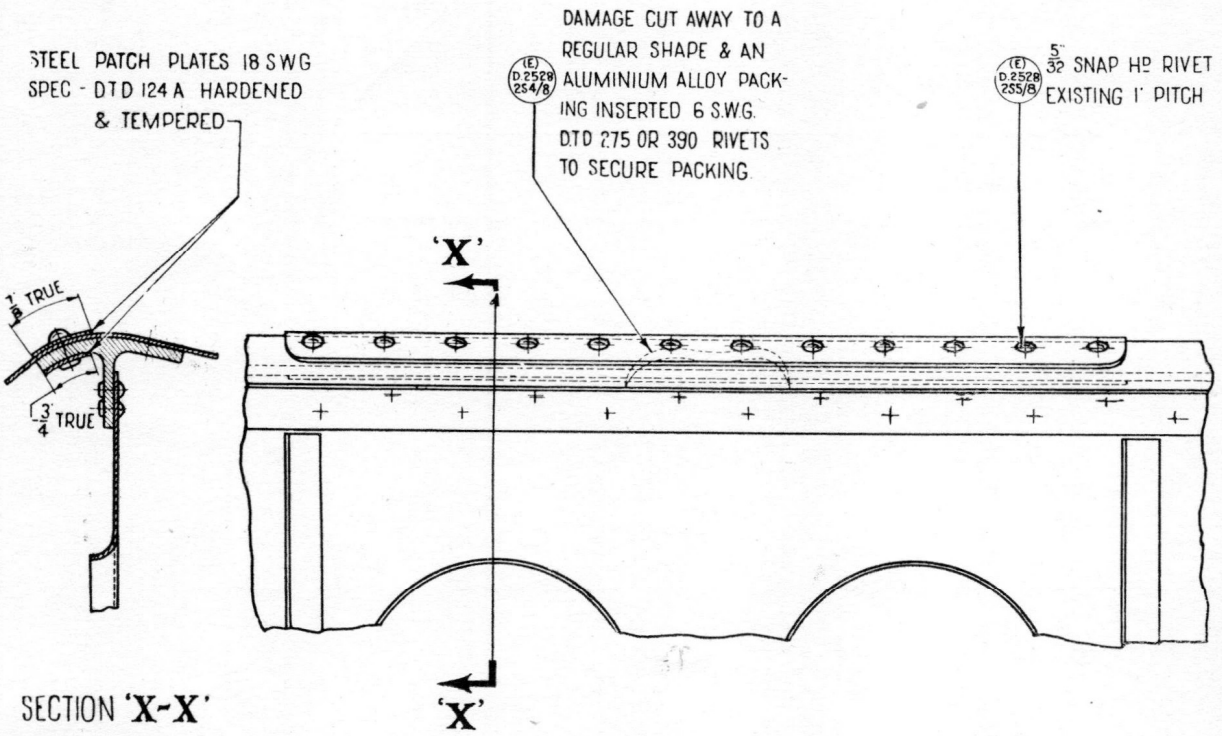


VIEW OF INSERTION.

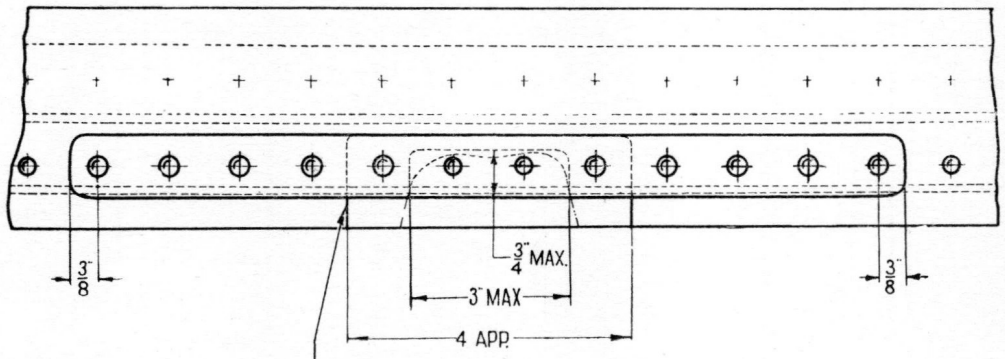
PATCHES MUST BED DOWN ON JOINTING COMPOUND WHILST THIS IS STILL WET.

THIS WAS LINCOLN REPAIR D.3756

| 37 | INSERTION REPAIR TO LONGERON - CENTRE PORTION FUSELAGE | 37 |
|---|---|---|



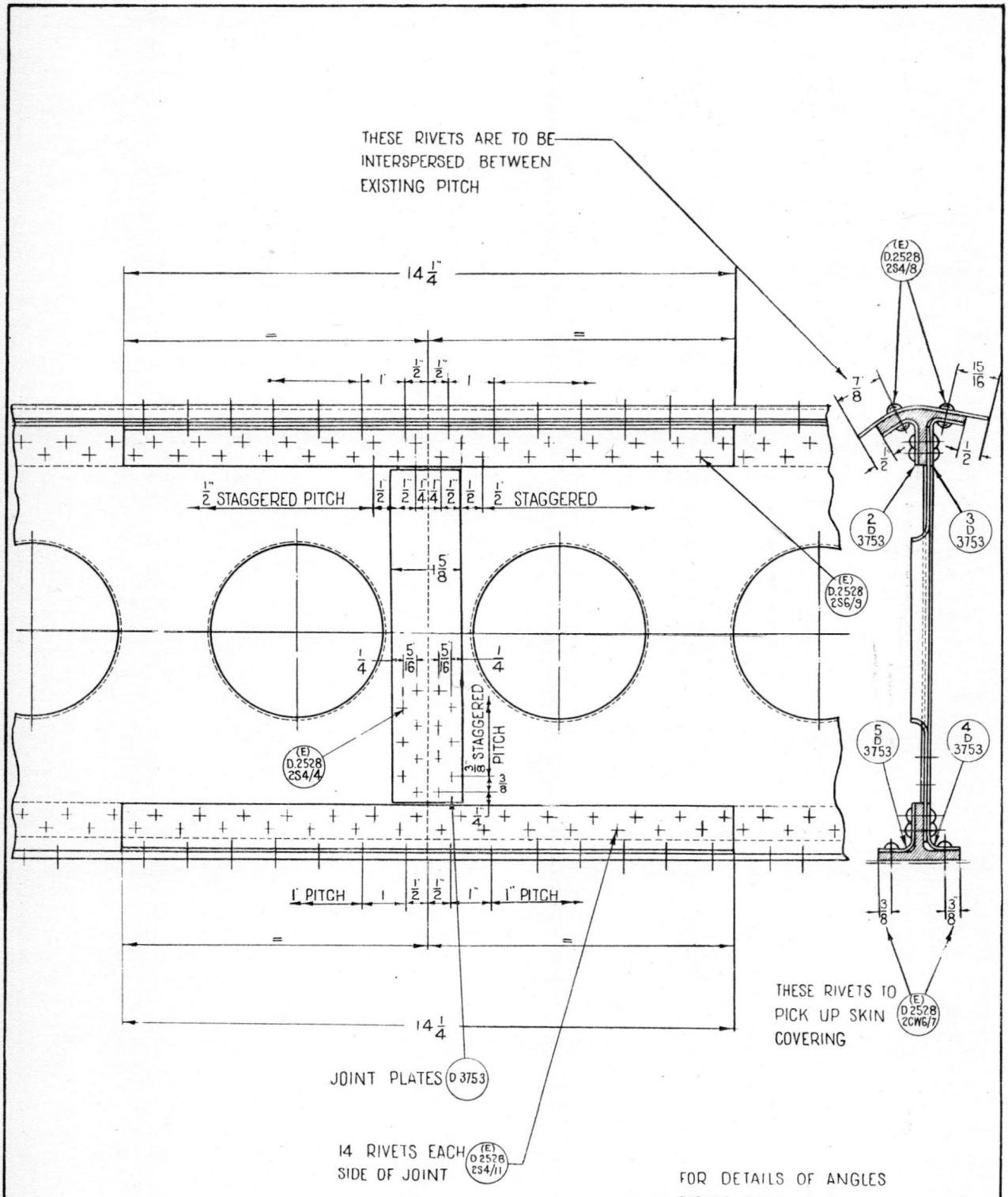

SECTION 'X-X'




PORTION OF CAPPING PIECE REMOVED & A NEW PIECE INSERTED
MATL :- ALUM ALLOY 20 S.W.G.
SPEC :- D.T.D 275 OR 390

THIS WAS LINCOLN REPAIR D3847

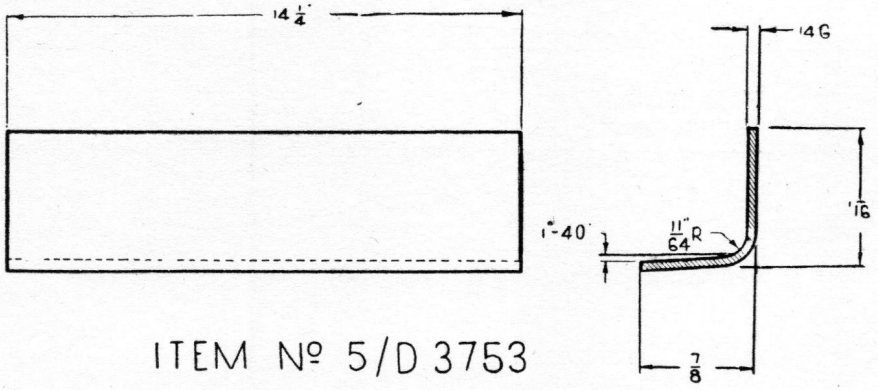
| 38 | PATCH REPAIR TO FLANGES OF BOMB DOOR SPAR BOOMS — 4000 LBS TYPE | 38 |
|---|---|---|



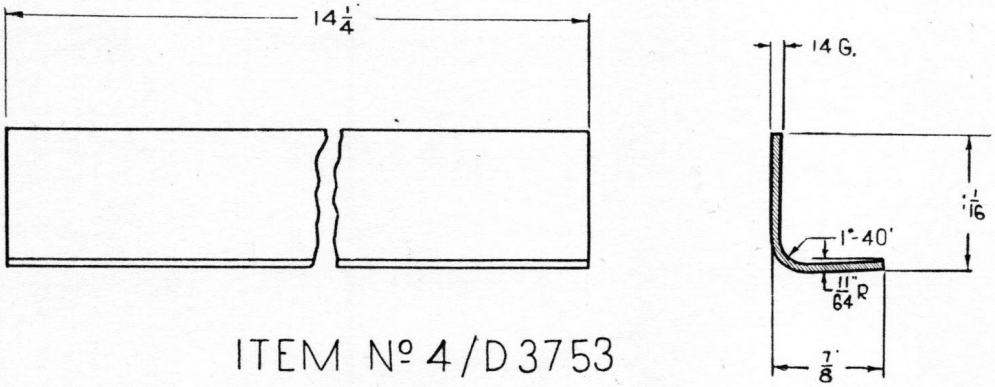

FOR DETAILS OF ANGLES D3753 SEE FIG 40.

THIS WAS LINCOLN REPAIR D 3753.

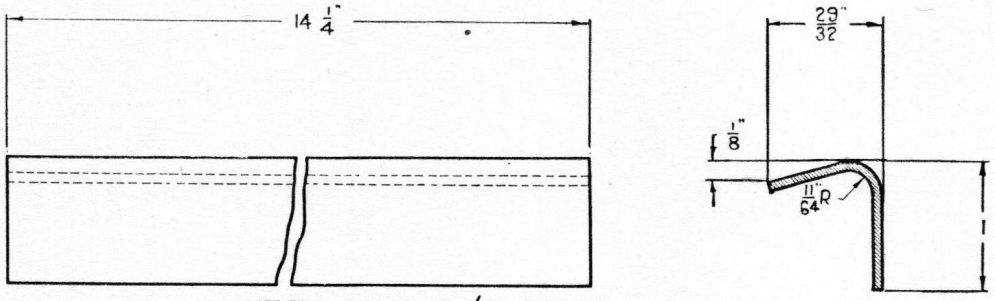
| 39 | INSERTION JOINT IN BOMB DOOR SPAR 4000 LBS TYPE | 39 |
|---|---|---|



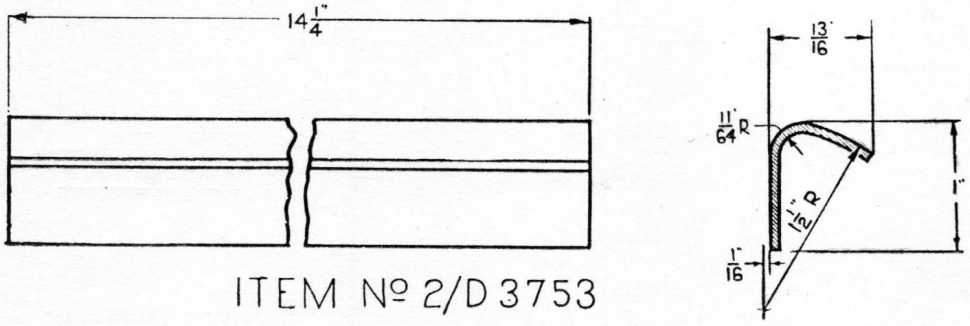

ITEM Nº 5/D 3753




ITEM Nº 4/D 3753



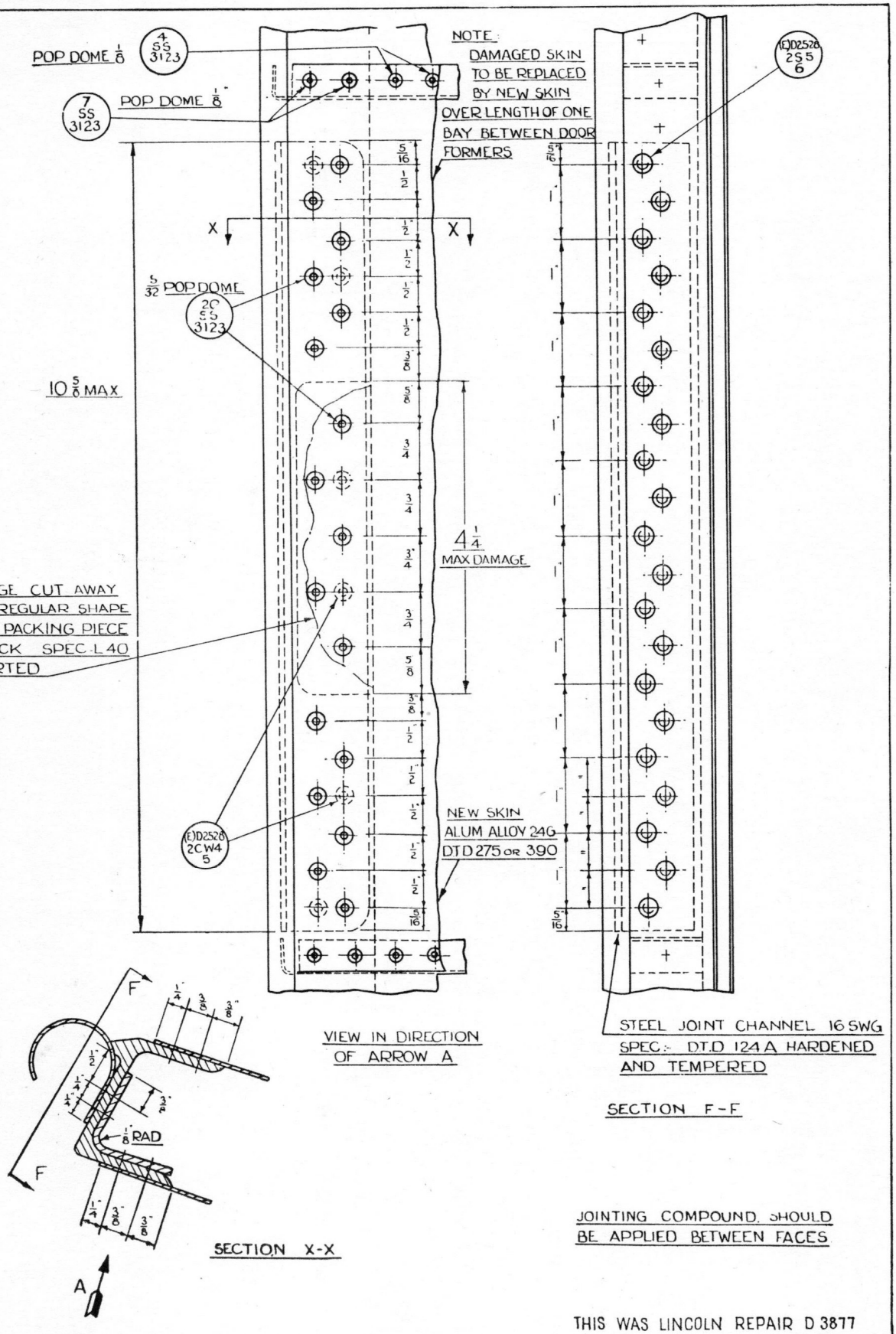

ITEM Nº 3/D.3753




ITEM Nº 2/D 3753

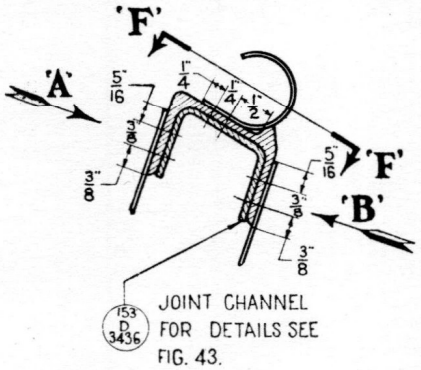
MATERIAL SPECIFICATION :-
.STEEL 14 SW.G D.T.D. 124A OR (E)D536B.

| 40 | JOINTING ANGLES, BOMB DOOR SPAR, INSERTION SEE FIG. 39 | 40 |
|---|---|---|

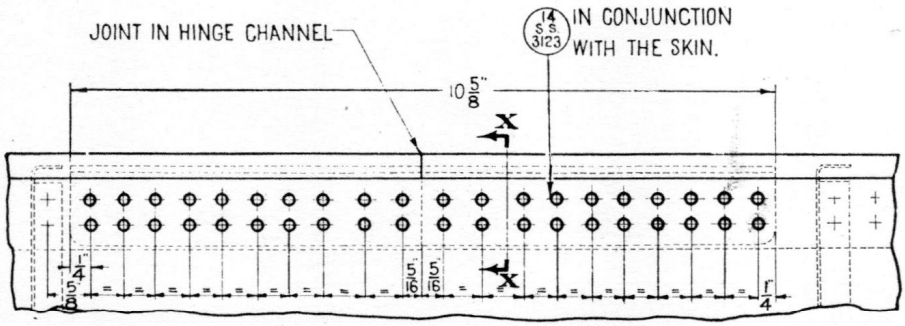



THIS WAS LINCOLN REPAIR D 3877

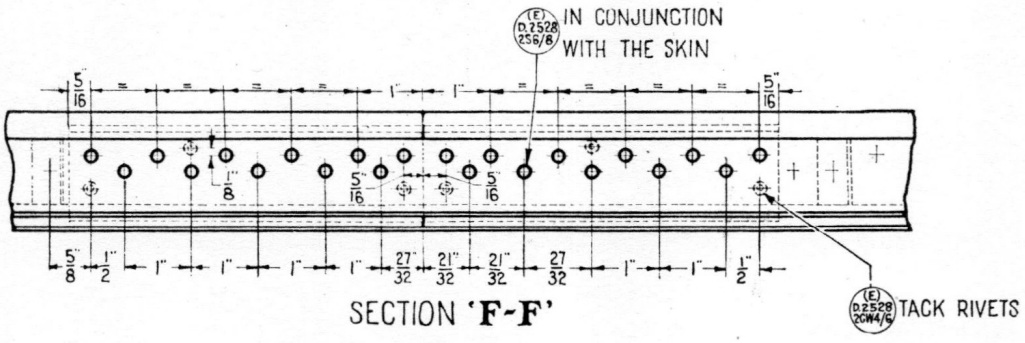
| 41 | PATCH REPAIR TO BOMB DOOR HINGE CHANNEL 4,000 LB. AND 8,000 LB. TYPE | 41 |
|---|---|---|



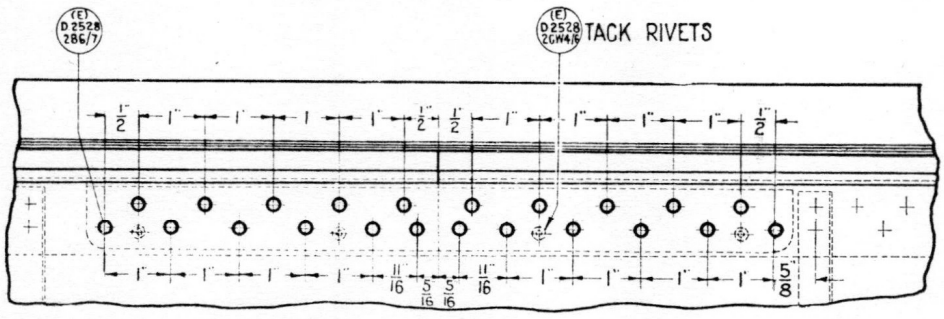

SECTION 'X-X'




VIEW IN DIRECTION OF ARROW 'A'



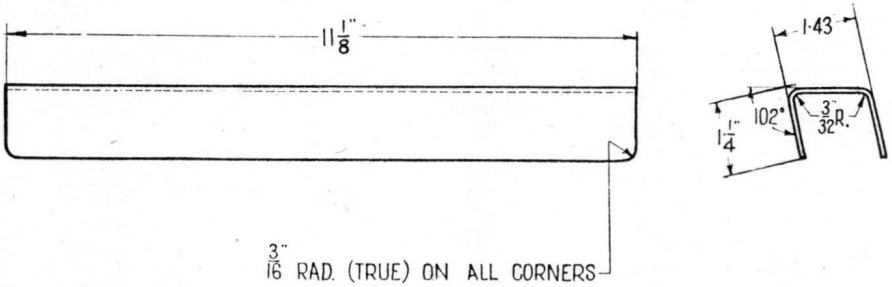

SECTION 'F-F'




VIEW IN DIRECTION OF ARROW 'B'

THIS WAS LINCOLN REPAIR D.3767

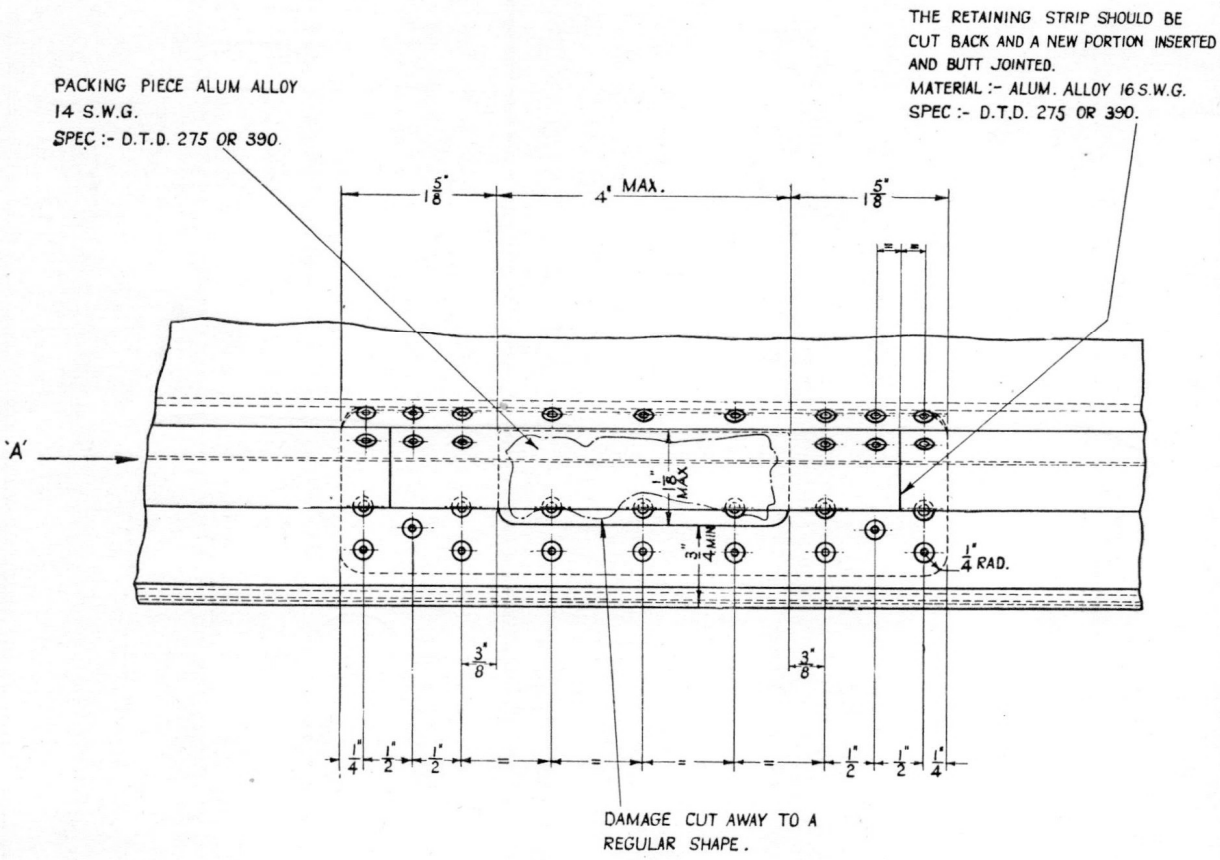
| 42 | INSERTION REPAIR TO BOMB DOOR HINGE CHANNEL 4000 LB & 8000 LB BOMB DOORS | 42 |
|---|---|---|



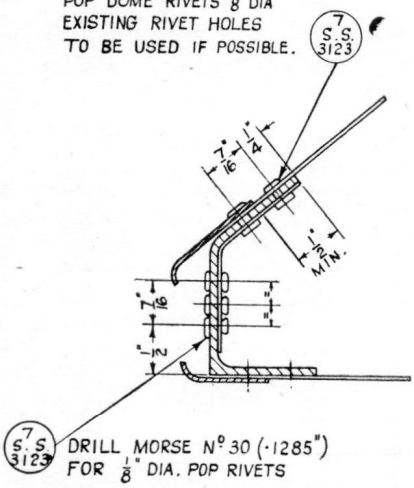

MATERIAL :- STEEL 14 G.
SPEC. :- D.T.D. 124 A HARDENED
& TEMPERED.

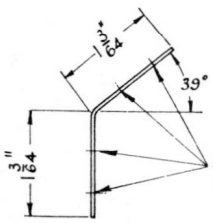
THIS WAS LINCOLN REPAIR 153/D.3436

| 43 | JOINT CHANNEL | 43 |
|---|---|---|




PATCHES TO BED DOWN ON JOINTING COMPOUND.



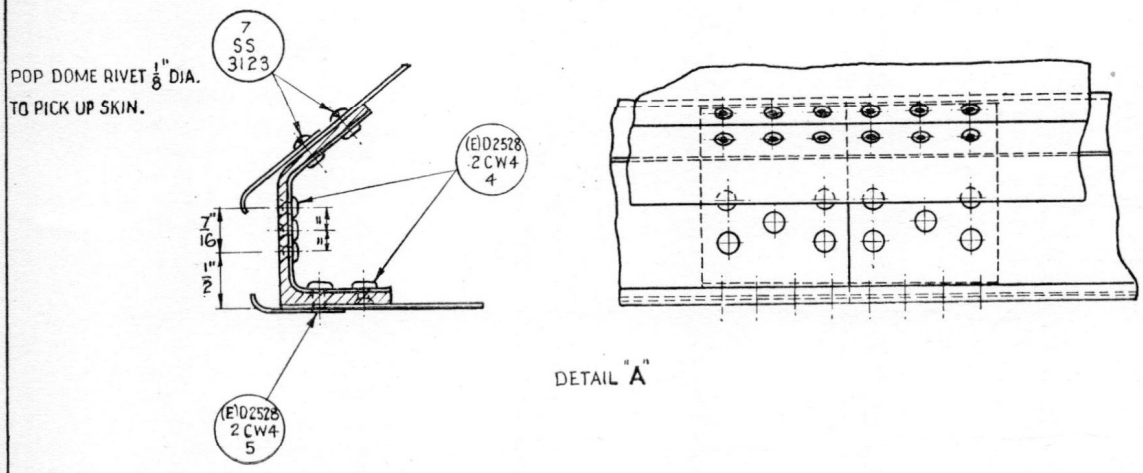

SECTION ON PATCH PLATE. ITEM 2/D.3908

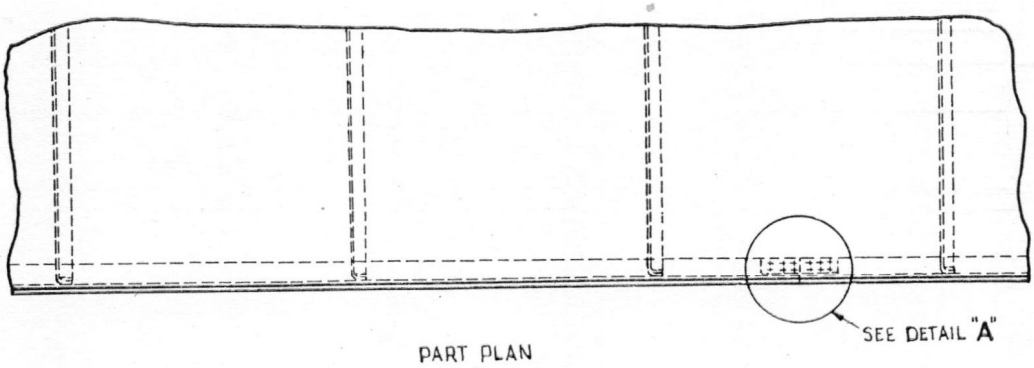
MATERIAL :- STEEL 20 G.
SPEC :- D.T.D. 124. A.
HARDENED & TEMPERED.

VIEW IN DIRECTION OF ARROW 'A'.

THIS DRAWING WAS LINCOLN REPAIR D3908.

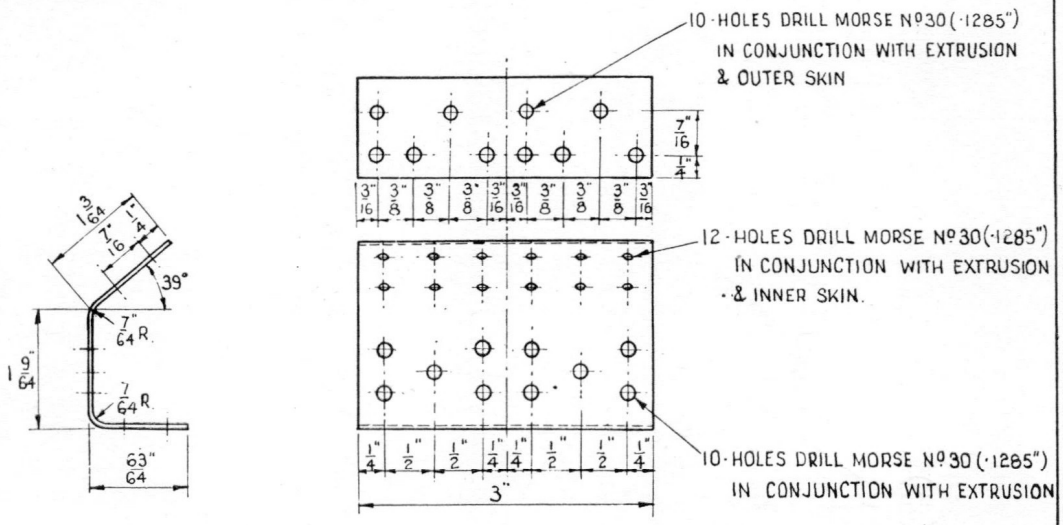
| 44 | PATCH REPAIR TO BOMB DOOR EDGE CHANNEL | 44 |
|---|---|---|




PART PLAN

NOTE.- CENTRE LINE OF JOINT MUST BE AS NEAR AS POSSIBLE CENTRAL BETWEEN TWO RIBS



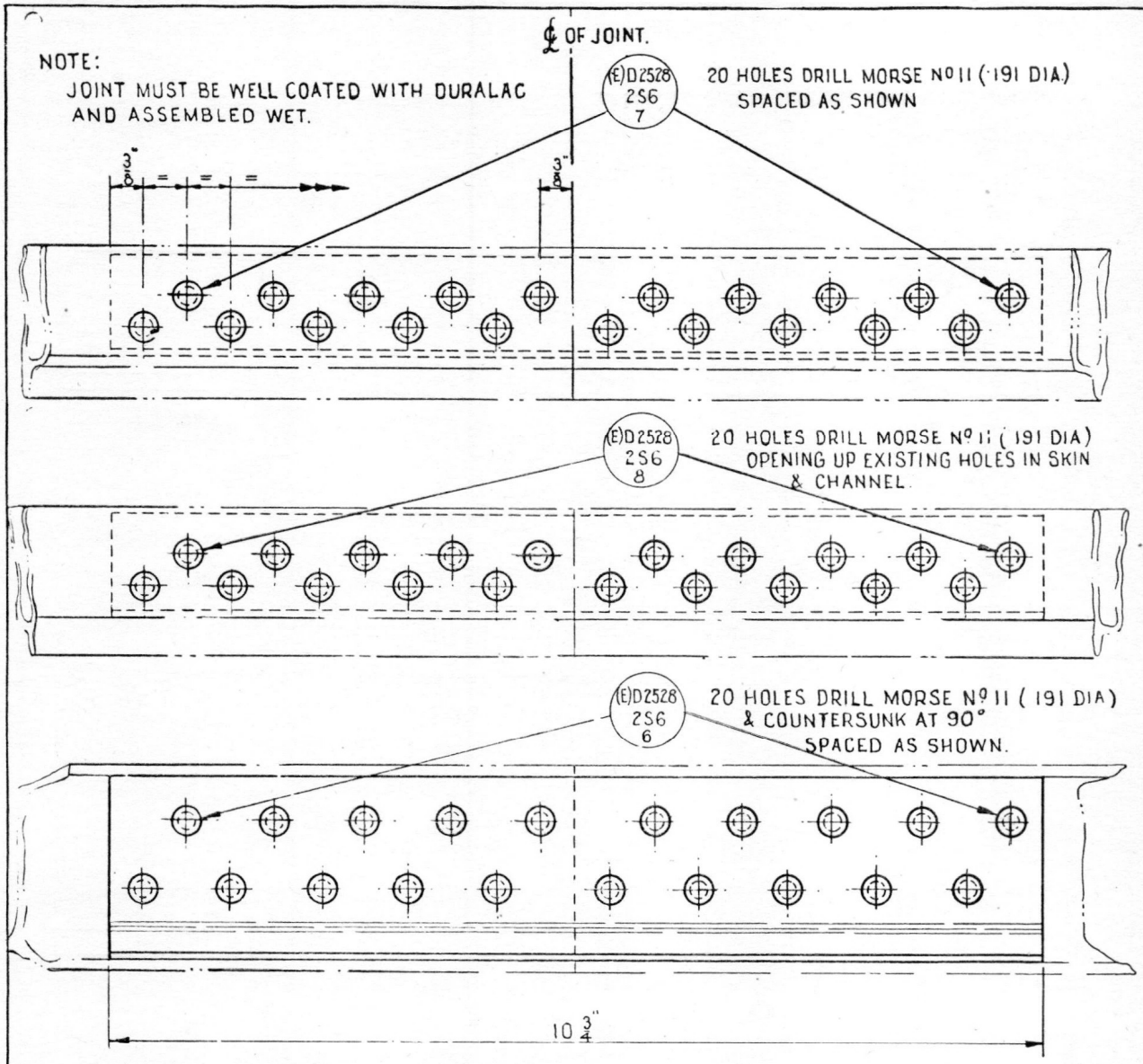

DETAILS OF JOINTING STRIP

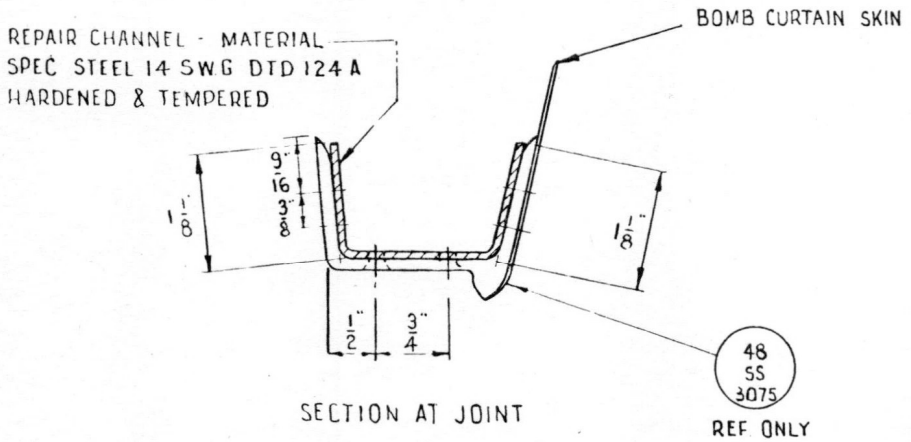
MATERIAL - STEEL PLATE 18 SWG.
SPEC - D.T.D 124A HARDENED & TEMPERED

THIS WAS LINCOLN REPAIR D.3842

| 45 | INSERTION REPAIR, BOMB DOOR HINGE CHANNEL 4000 LB TYPE | 45 |
|---|---|---|

NOTE:
JOINT MUST BE WELL COATED WITH DURALAC AND ASSEMBLED WET.

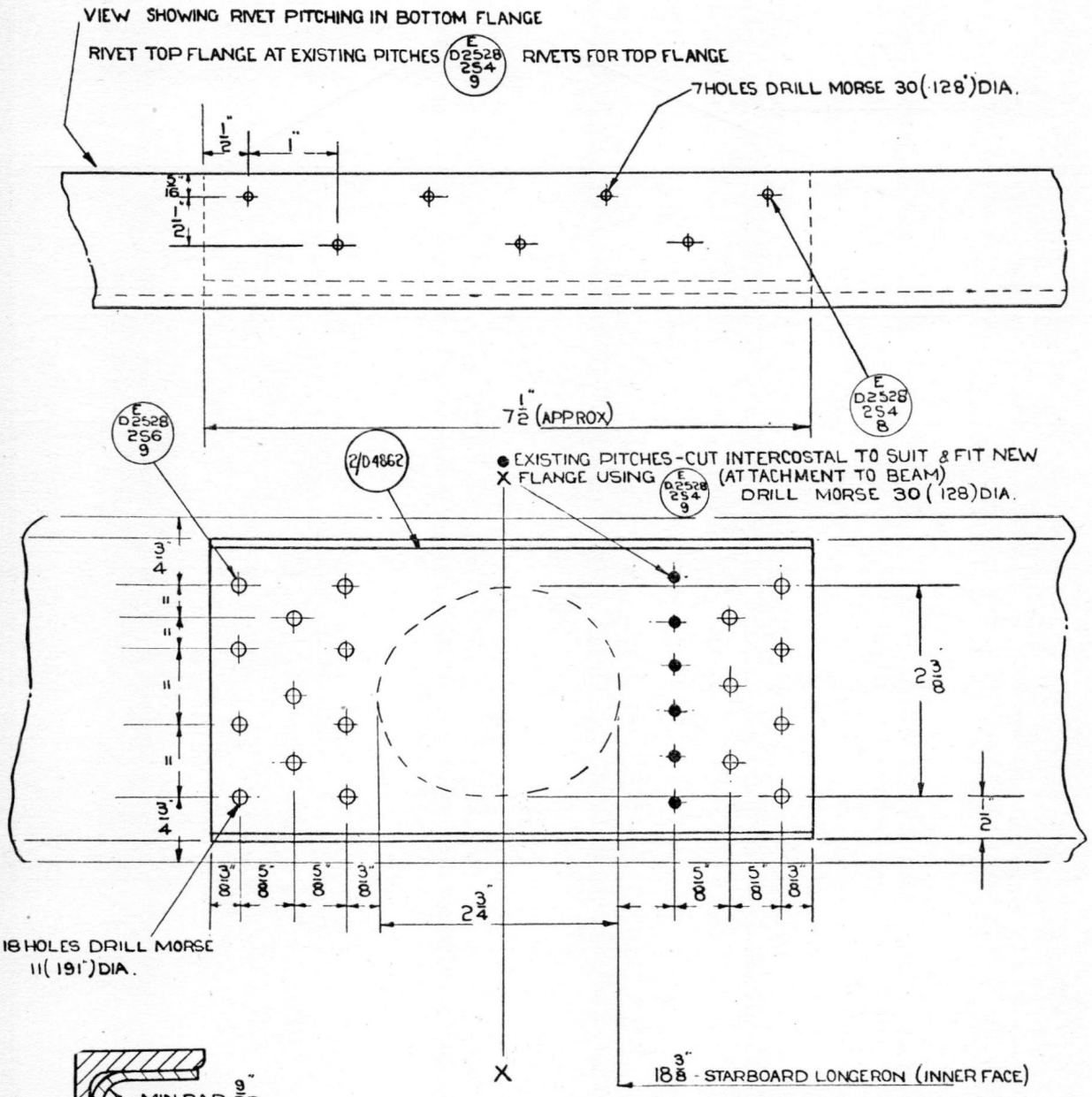


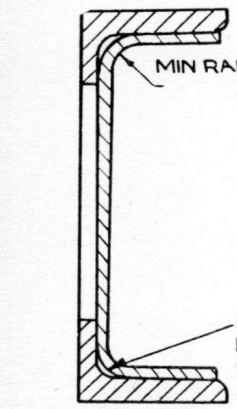




SECTION AT JOINT

THIS WAS LINCOLN REPAIR D.5089

| 46 | INSERTION REPAIR TO BOMB DOOR CURTAIN HINGE CHANNEL | 46 |
|---|---|---|



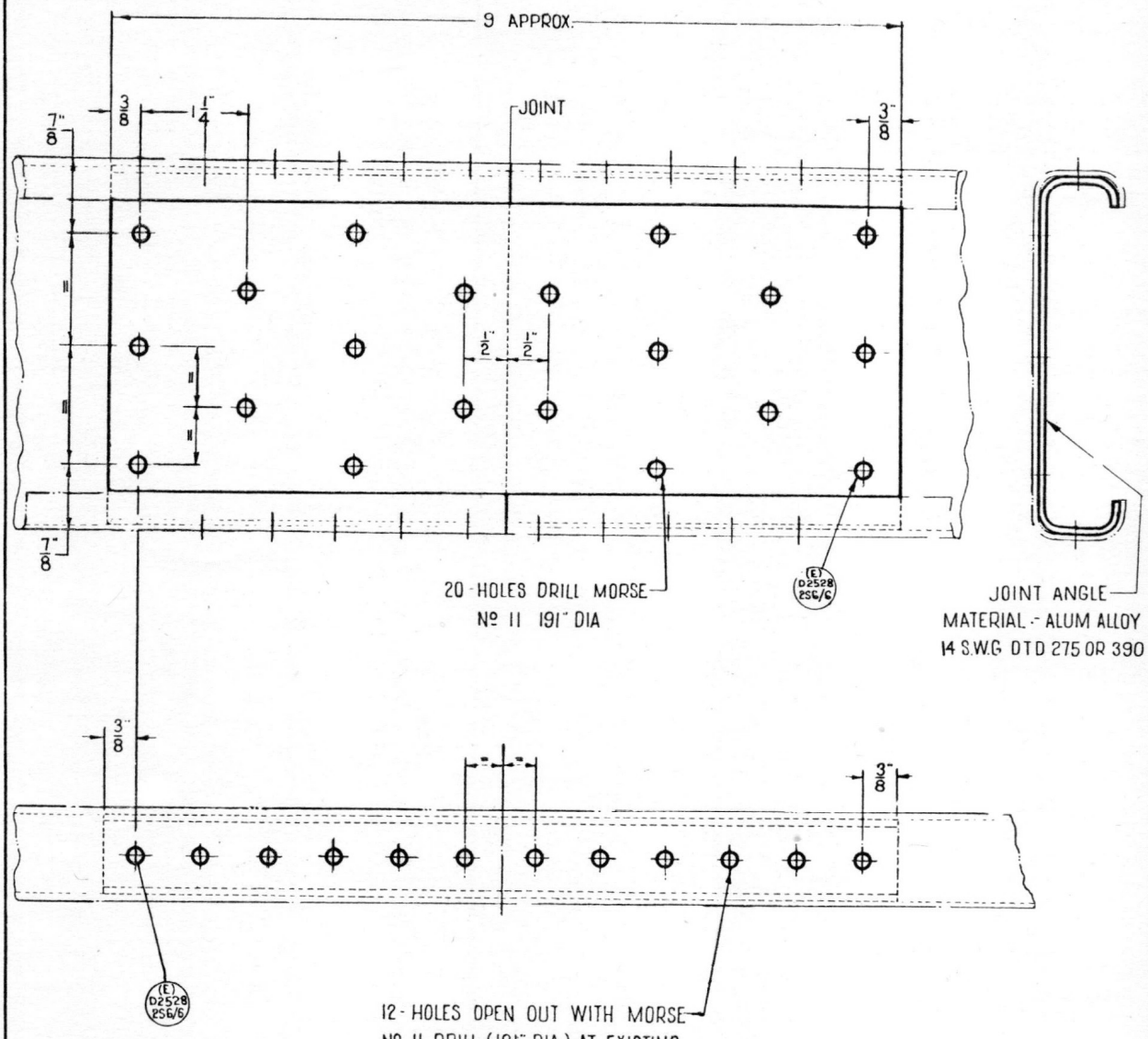

SECTION AT "X X"

NOTE - DAMAGE TO BE CLEANED OUT TO SMOOTH SHAPE & DIMENSIONS SHOWN & TO BE FREE FROM CRACKS & ABRASIONS

ALL CONTACTING SURFACES TO BE COATED WITH DURALAC BEFORE ASSEMBLY

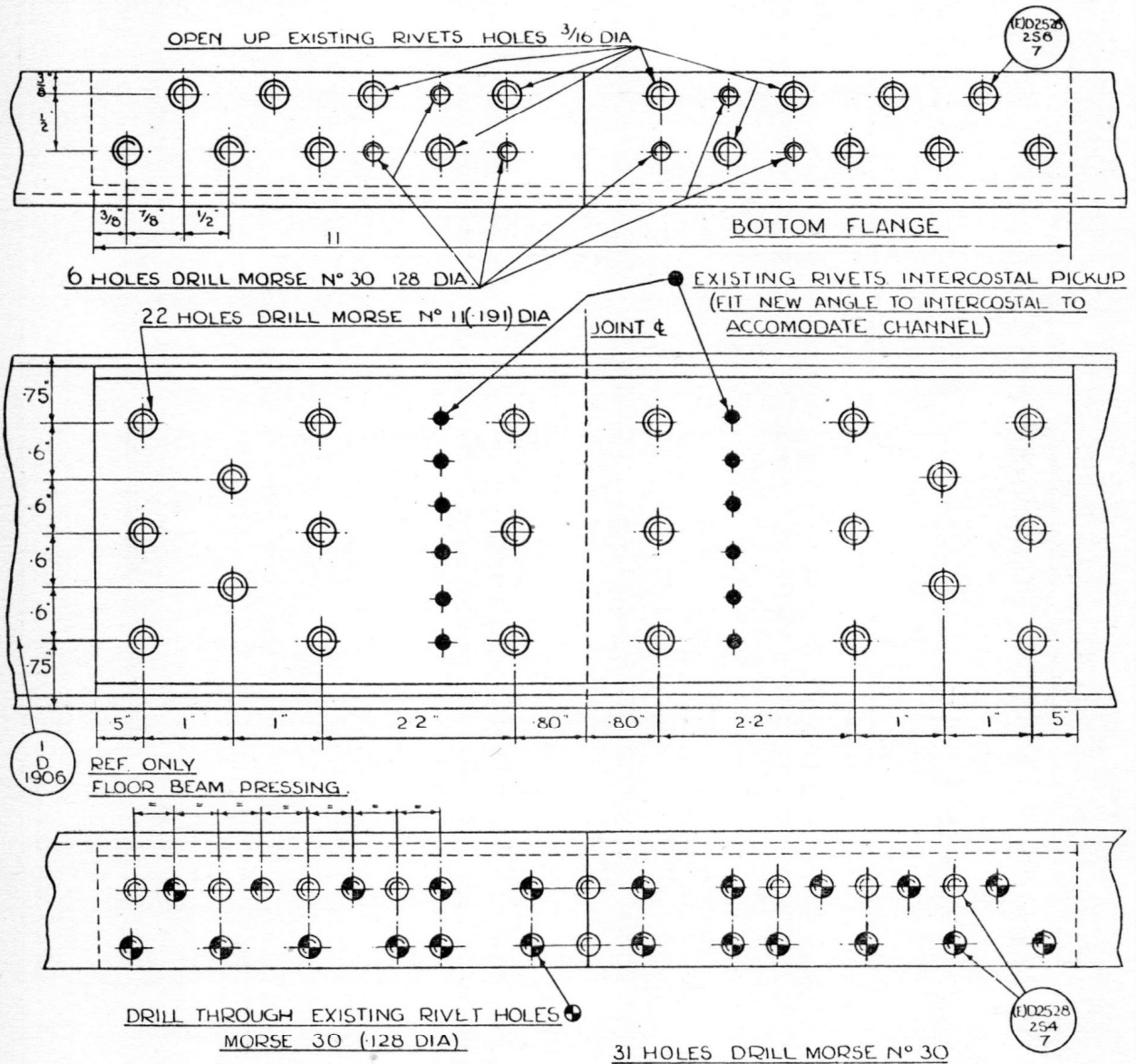
THIS WAS LINCOLN REPAIR D4862

| 47 | PATCH REPAIR TO FLOOR BEAM 22 | 47 |
|---|---|---|



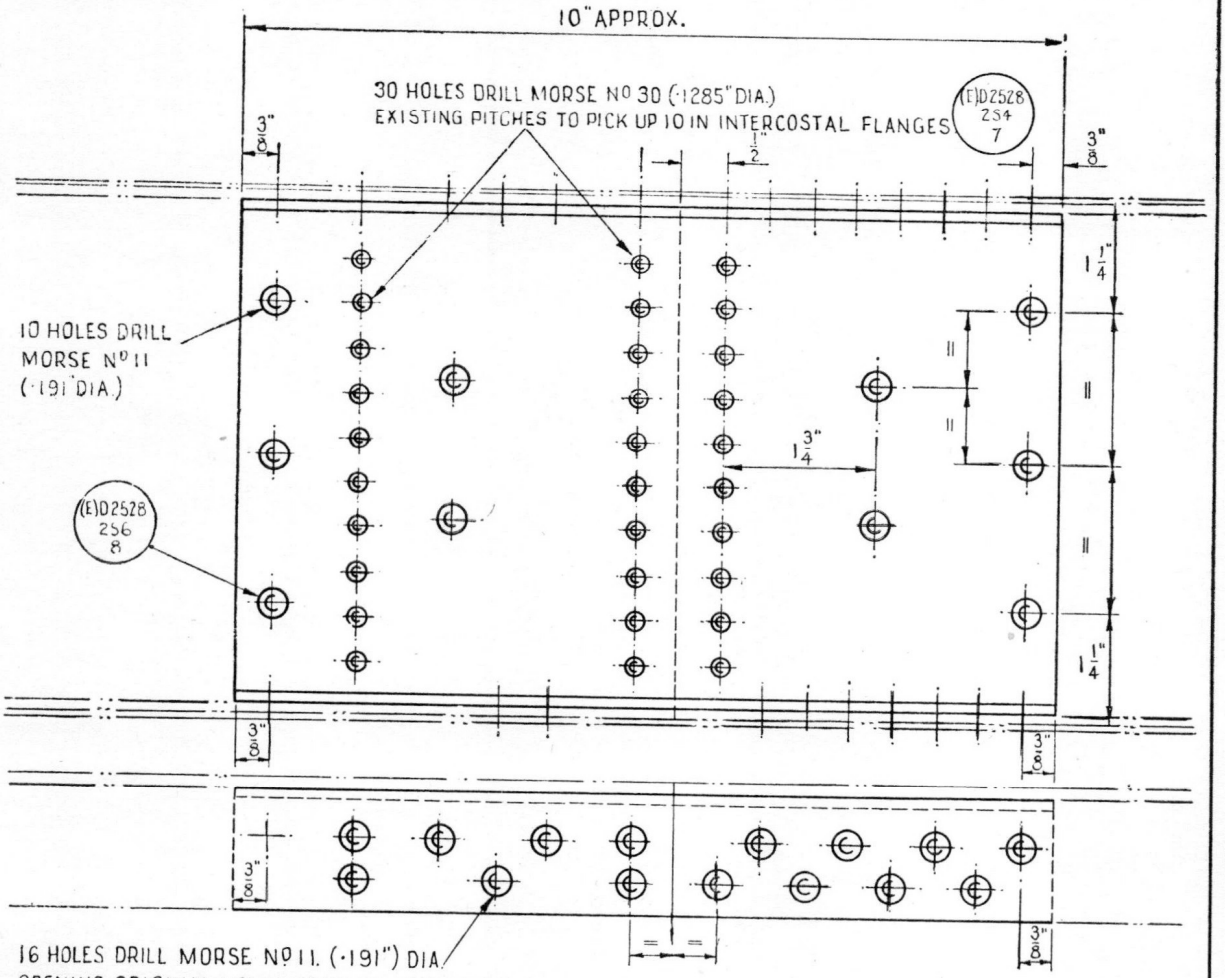

THIS WAS LINCOLN REPAIR D.4863

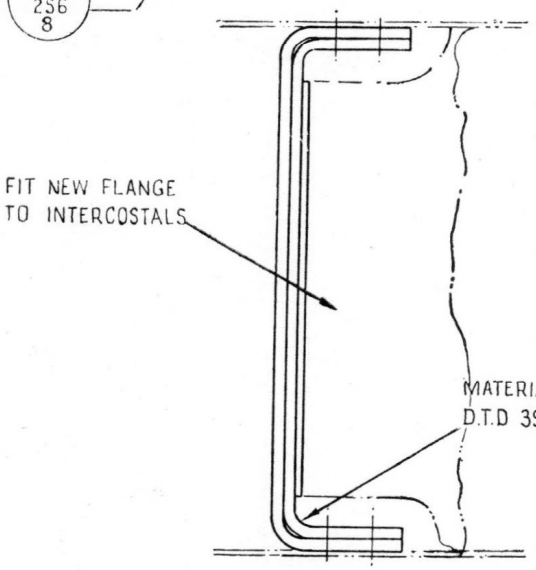
| 48 | INSERTION TO 4" LIGHT FLOOR BEAM | 48 |
|---|---|---|




THIS WAS LINCOLN REPAIR D4724

| 49 | INSERTION JOINT IN 10 SWG ROLLED SECTION FLOOR BEAM | 49 |
|---|---|---|




SECTION FIT ℄ OF JOINT

THIS WAS LINCOLN REPAIR D4861.

| 50 | INSERTION TO FLOOR BEAM 10 | 50 |
|---|---|---|

R.A.A.F. Publication No.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

PART 2 — CHAPTER 5

## Alighting Gear

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## ALIGHTING GEAR

### General Information

1. Figures 1 and 2 are key diagrams of the main undercarriage and tail wheel strut, and provide the means of identifying the methods necessary for the repair of the various parts of the alighting gear.

2. The standard hand reamers required to effect repairs in this Chapter are contained in the list of special tools at the end of Part 1.

3. Dismantling of an undercarriage or tail wheel unit, other than a support beam, should be carried out as described in R.A.A.F. Publication No. —, Section 4, Chapter 3. When making or completing a repair to a unit other than a support beam, the following instructions should be adhered to:

(i) If a nut has been locked by forming a burr on the thread of the bolt this should be ascertained before unscrewing the nut in order that the burr may be removed, otherwise both parts will be damaged.

(ii) On the re-assembly of parts which have been locked as described in the above para. (1), the locking should be completed in a similar manner . Where other methods of locking have been employed, they should be reproduced on the new assembly. It is most essential that all parts should be adequately locked.

(iii) Where jointing compound is to be applied in the case of dissimilar materials, pigmented varnish jointing compound, D.T.D. 369, should be used.

(iv) Where special fits are mentioned in these notes, e.g., 1/2 in. dia., Class B, these refer to standard "Newall" tolerances.

(v) Before dismantling any two mating parts which may be used again, they should be clearly marked to ensure that they are re-assembled in the correct position. Special attention should be given to this marking to indicate the position and extend of any oversize holes.

(vi) Abrasions which can be classified as negligible should be cleaned up to remove all sharp corners, and if they occur on an external surface, other than a bearing surface, they should be coated with Zinc chromate primer (Yellow), R.A.A.F. Specification K7, and Nitro-Cellulose, R.A.A.F. Specification K5 or D.T.D. 63.

(vii) Components which have been completely overhauled should have all external surfaces, other than bearing surfaces, coated with K7 as described in above sub-para (vi).

NOTE:—

The damage and repairs described in this Chapter may only be carried out on parts that are correct to drawing.

### Undercarriage Support Beams

#### General

4. Before commencing repairs to the undercarriage support beam, it should be removed in accordance with instructions given in R.A.A.F. Publication No. —, Section 5.

#### Bushing of Holes

#### Unbushed Holes

5. Damage which results in the scoring or elongation of the unbushed holes in the undercarriage support beam will necessitate bushing.

6. The only holes affected by this repair are the spar attachment hole top, and the spar attachment hole bottom, on items 10, 11, 12 and 13/O.2923. The position of these holes together with the reaming and bushing details are illustrated at details A and B on Fig. 3.

7. For the standard hand reamers required to carry out the above repairs, and the repairs given in paras. 8 and 9, reference should be made to para. 2. Details of the various bushes required will be found listed in Fig. 4.

**TABLE 54.**
**Repair Material for Bushing Holes in U/C Support Beams**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 1/O.3055 | Bush | 1-3/16 in. dia. + 0.0015 in. + 0.0010 in. | S.1 | For spar attachment hole —top at "A" |
| | 2/O.3055 | Bush | 1-3/16 in. dia. + 0.0015 in. + 0.0010 in. | | |
| | 3/O.3055 | Bush | 1-3/16 in. dia. + 0.0015 in. + 0.0010 in. | S.1 | For spar attachment hole top at "B" |
| | 4/O.3055 | Bush | 1-3/16 in. dia. + 0.0015 in. + 0.0010 in. | S.1 | |

**Fitting of Oversize Bushes**

8. If the holes for the existing bushes in an undercarriage support beam are elongated or scored it will be necessary to fit new bushes which are .010 in. oversize.

9. The existing bush should be reamed out to the dimensions given in details C, D, E and F in Fig. 3 and a new bush substituted; finally ream through the bush to the dimensions given.

**TABLE 54A.**
**Material for Repair of Oversize Holes**
**Undercarriage Support Beam**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 5/0.3055 | Bush .010" oversize | 1 in. dia. + .0110 in. + .01075 in. | S.1 | For holes in top socket "C" |
| | 6/0.3055 | Bush .010" oversize | 1-11/16 in. dia. + .0115 in. + .0111 in. | S.1 | For holes in attachment for oleo leg at "D" |
| | 7/0.3055 | Bush .010" oversize | 1-7/16 in. dia. + .0115 in. + .0111 in. | S.1. | |
| | 8/0.3055 | Bush .010" oversize | 1 in. dia. + .0110 in. + .01075 in. | S.1 | For hole in bottom socket at "E" |
| | 9/0.3055 | Bush .010" oversize | 1 in. dia. + .0110 in. + .01075 in. | S.1 | For hole in bracing strut lug at "F" |

**Undercarriage**

**Undercarriage Axle**

10. Before commencing repairs to the axle, reference should be made to para. 3 on General Information.

11. Figure 5 is a key diagram to which this Repair refers.

**Reference A.1**

12. Scores which cover an area greater than that defined in Chapter 5, para. 11 of Part 1, may be removed by machining to a minimum diameter of 5.990 in., building up with hard chromium plate and grinding to the original diameter of +5.995 in. —5.9985 in.

**Reference A.2**

13. (i) Provided that the holes in the axle have not been enlarged to more than 0.635 in. diameter, they may be nickel plated and reamed to 5/8" diameter + .002 in. — .005 in.

(ii) Damage which cannot be rectified in this way should be repaired by opening out the holes in both the axle and the torque adaptor plate to 41/64 in. or 21/32 in. diameter and fitting oversize bolts, Part Nos. R197-1X or R197-1Z.

**Reference A.3**

14. Provided that the holes have not been enlarged more than 2.010 in. diameter, they should be nickel plated and reamed to 2 in. diameter, Class B, + 0.001 in. — 0.0005 in.

**Reference A.4**

15. With the distance pad fixed into position, the holes may be opened out to 2-3/16 in. diameter, Class "B", through both axle and distance pad, the bush, Part No. R197-2 may then be fitted flush with the inner face of the pad and the outer surface of the axle.

16. For the standard hand reamers required to carry out these repairs refer to Para. 2.

**TABLE 55.**
**Material for Repair of Undercarriage Axle**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R197-1X | Bolt, oversize | | S.2 or S.11 | |
| | R197-1Z | Bolt, oversize | | S.2 or S.11 | |
| | R197-2 | Bush | | D.T.D. 254 | |

**Bottom Sliding Tube**

17. Before commencing repairs to the bottom sliding tube, reference should be made to General Information, Para. 1.

18. Figure 6 is a key diagram to which this repair refers.

**Reference A.1**

19. Damage greater than that described in Chapter 5, para. 18 of Part 3 of this publication, may be removed by machining to a minimum diameter of 3.98 ins., building up with hard chromium plate and grinding to the original

diameter of 3.9975 in., 3.9945 in. This can only be done if the bore of the cylinder is less than 13.19 in. diameter. As a temporary measure, where plating facilities are not available, the tube may be turned through 180° to present the least worn surface to the point of maximum friction.

**Reference A.2**

20. (i) If this hole is not enlarged beyond 2.01 in. diameter, the inside of the hole should be hard nickel plated and reamed to 2.0 in. diameter, Class "B" + .001 in. — .0005 in.

(ii) If the hole is enlarged beyond 2.01 in. diameter, it should be opened out to 2-3/16 in. dia., Class "B", and a bush, Part No. SP696-11 driven in as shown in Figure 6. Both ends of the bush should be flush finished.

**Reference A.3**

21. (i) If this hole is damaged, drill out the hole to 3/16 in. diam., and drill and tap a new 2 B.A. hole 0.5 in. from the end of the tube and at least 3.0 in. from the old hole. This repair can be repeated as required.

(ii) An alternative method of repair is to open out the damaged hole to 1/4 in. B.S.F. and assemble with a new grub screw, Part No. SP228-92.

22. Refer to para 2 for the standard hand reamers required to effect these repairs.

**TABLE 55A.**
**Material for Repair of Bottom Sliding Tube**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | SP. 228-92 | Grubscrew | 1/4 in. B.S.F. | | |
| | SP. 696-11 | Bush | | | |

**Radius Rod Attachment Fitting**

23. Before commencing repairs to the radius rods attachment fitting, reference should be made to General Information, para. 1.

24. Figure 7 is a key diagram to which this repair refers.

**Reference A.1**

25. Damage to this slotted hole may be repaired by opening out the hole to one of the following widths + .001 in. — .0005 in.

33/64 in., 17/32 in., 35/64 in., or 9/16 in. and increasing the length of the hole by the same amount. Substitute a new stud, Part No. 699542 and concentric bush Part No. R192-18X, R192-18Z, R192-18B or R192-18A for the original stud. If the slots are off centre after opening out the hole, an eccentric bush, Part No. R124-13X, R124-13Z, R124-13B or R124-13A, should be used in place of the above concentric bushes.

**Reference A.2**

26. Damage to this slotted hole should be repaired by opening out as described in para. 25, and substituting a greaser extension Part No. 699544 or R192-18A for the original greaser extension. If the slots are off centre after opening out the hole, then an eccentric bush, Part No. R124-13X, R124-13Z, R124-13B or R124-13A should be used in place of the above concentric bushes.

**Reference A.3**

27. Scores inside the bearing sleeve, Part No. L/1508 may be removed or reduced provided that they are not more than 0.015 in. deep, and that the total width of all scores in any 2 in. arc of the circumference does not exceed 0.25 in. The diameter of the bearing sleeve where the scores have been removed or reduced, must not be less than 4.007 in. diameter.

**Reference A.4**

28. Damage to the 3/8 in. B.S.F. holes should be repaired by opening out the holes to 7/16 in.

**TABLE 56.**
**Material for Repair of the Radius Rod Attachment Fitting**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 69954 | Stud | | | |
| | R192-18X | Bush, concentric | | | |
| | R192-18Z | Bush, concentric | | | |
| | R192-18B | Bush, concentric | | | |
| | R192-18A | Bush, concentric | | | |
| | R124-13X | Bush, eccentric | | | |
| | R124-13Z | Bush, eccentric | | | |
| | R124-13B | Bush, eccentric | | | |
| | R124-13A | Bush, eccentric | | | |
| | 699544 | Greaser extension | | | |
| | R124-12 | Stud | 7/16 in. B.S.F. | | |
| | R124-11 | Greaser extension | | | |

B.S.F. and re-assembling, using a new stud, Part No. R124-12, or a new greaser extension Part No. R124-11.

NOTE:—

This repair cannot coincide with the repairs described in paras. 26 and 27 above.

**Radius Rod**

29. Before commencing repairs to the radius rod, reference should be made to General Information, Para. 1.

Figure 8 is a key diagram to which this repair refers.

**Reference A.1**

30. Damage to the holes in the fittings and tubes for the ferrule should be repaired by opening out the holes to 33/64 in. or 17/32 in. dia., Class "B". Substitute new oversize ferrules Part Nos. S.P. 680-14X or S.P. 680-14Z for the original ferrule. The original screwed rods may be used again if they have not been stretched and if the thread formation is correct. To lock, file flush and equally space centre punch three times.

**Reference A.2**

31. The holes used for attaching the foot bracket may be repaired as described in para. 2, using oversize ferrules Part Nos. S.P. 680-15X or S.P. 680-15Z in place of the original ferrules.

**TABLE 56A.**
**Repair Material for Oversize Holes—Radius Rods**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | S.P.680-14X | Ferrule, oversize | | | Oversize for S.P.121-0 |
| | S.P.680-14Z | Ferrule, oversize | | | S.P.121-0 |
| | S.P.680-15X | Ferrule, oversize | | | S.P.121-P |
| | S.P.680-15Z | Ferrule, oversize | | | S.P.121-P |

**Strut Bracing Fitting**

**General**

32. Before commencing repairs to the strut bracing fitting, reference should be made to General Information, para. 1.

33. Figure 9 is a key diagram to which this repair refers.

**Reference A.1**

34. Damage to this slotted hole may be repaired by opening out the hole to one of the following widths + .001 in. — .0005 in. 33/64 in., 17/32 in., 35/64 in., or 9/16 in. and increasing the length of the hole by the same amount. Substitute a new stud, part No. R192-3 and a concentric bush Part No. R192-19X, R192-19Z, R192-19B or R192-19A for the original stud. If the slots are off centre after opening out the hole, an eccentric bush, Part No. R192-4X, R192-4B or R192-4A, should be used in place of the above concentric bushes.

**Reference A.2**

35. Damage to this slotted hole may be repaired by opening out the hole as described in para. 34, and substituting a greaser extension Part No. R192-5 and a concentric bush as described in para. 39. If the slots are off centre after opening out the hole, an eccentric bush should be fitted as described in para. 34.

**Reference A.3**

36. Damage to these holes should be repaired by opening out the holes to 1/4 in. B.S.F. and fitting special screws, Part No. R192-2; the screws should be fitted flush and locked by centre-punching (see para. 3, sub-paras. i to vii).

**TABLE 57.**
**Material for Repair of Strut Bracing Fitting**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 192/3 | Stud | | | |
| | 192/19X | Bush, concentric | | | |
| | 192/19Z | Bush, concentric | | | |
| | 192/19B | Bush, concentric | | | |
| | 192/19A | Bush, concentric | | | |
| | 192/4X | Bush, eccentric | | | |
| | 192/4Z | Bush, eccentric | | | |
| | 192/4B | Bush, eccentric | | | |
| | 192/4A | Bush, eccentric | | | |
| | 192/5 | Greaser extension | | | |
| | 192/2 | Screw | 1/4 in. B.S.F. | | |

**Internal Cylinder**

37. Before commencing repairs to the internal cylinder, reference should be made to para. 1.

38. Figure 10 is a key diagram to which this repair refers.

**Reference A.1**

39. Scores of this cylinder may be ground or polished out, provided that the diameter is not reduced below 3.238 in. The cylinder should then be hard chrome plated, and ground to its original diameter of 3.250 in./3.245 in.

**Reference A.2**

40. Scores in the bore of a cylinder may be polished out, but the internal diameter must not exceed 2.935 in.

**Reference A.3**

41. Damage to this hole may be repaired by making a new hole at the same distance from the centre of the cylinder, in a position where it will not be in line with the inflation part, the balance pipe part, or either of the stud holes.

**Reference A.4**

42. Damage to this hole may be repaired by opening out to a 1/4 in. B.S.F. and counter-boring 1/4 in. dia. by 0.35 in. deep, and fitting a new locking screw, Part No. R192-20. An alternative method of repair is to make a new 2 B.A. hole in any suitable position at least 30° from the old hole. The damaged hole should be drilled out 3/16 in. dia. to prevent subsequent use.

**Reference A.5**

43. Damage to this hole may be repaired by producing a similar local flat in any suitable position and making a new 2 B.A. hole.

**Reference A.6**

44. Damage to this hole may be repaired by making a new 4 B.A. hole in the opposite slot, or by making a new slot and a hole in any suitable position.

**Reference A.7**

45. If the faces of the valves are damaged, they should be repaired by reducing the recoil valve, Part No. 699537 to 0.77 in. minimum length, and the damping valve, Part No. 699559, should be spot-faced 1-5/8 in. dia. by 0.015 in. maximum depth.

**Reference A.8**

46. If this hole is damaged, it should be repaired by making a new 4 B.A. hole in the opposite slot, or by making a new slot and hole in any suitable position.

**TABLE 58.**
**Material for the Repair of the Internal Cylinder**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R192-20 | Locking screw | 1/4 in. B.S.F. | | |

**Top End Fitting**

47. Before commencing repairs to the top end fitting, reference should be made to para. 1 on General Information.

48. Figure 11 is a key diagram to which this repair refers.

**Reference A.1**

49. Damage to this hole should be repaired by opening out the hole to 1-53/64 in. diameter, Class "B" and fitting an oversize bush, Part No. R124/15. The wall thickness must not be less than 0.59 in. in the centre after opening out the hole.

**Reference A.2**

50 Damage to this hole should be repaired by opening out the hole to 7/8 in. diameter, Class "B", and fitting an oversize bush, Part No. S.P. 693/4. The wall thickness must not be less than 0.38 in. after opening out the hole.

**Reference A.3**

51. Damage to these holes in the top end fitting and top outer cylinder should be repaired by opening out the holes to 57/64 in. dia. or 29/32 in. dia. Class "B" and fitting oversize ferrules, Part No. S.P.680/16X or S.P. 680/16Z. The holes in the filler block should be opened out to a maximum of 15/16 in. dia. to clear the ferrules.

**Reference A.4**

52. Damage to this hole should be repaired by drilling out the hole 3/16 in. dia. to prevent subsequent use, and making a new 2 B.A. hole on the opposite side of the balance pipe union. The new hole should be made through the wall of the top end fitting only. This repair applies also to the set screw at the inflation valve.

**Reference A.5**

53. Damage to the holes in the top fitting and outer tube may be repaired by opening out the holes to 33/64 in. dia. or 17/32 in. dia., Class "B". Spot-face the holes in the filler block with a 9/16 in. dia. cutter to a depth of 0.015 in./0.020 in. measured on the centre line and re-assemble using new set screws, Part No. 192/21X or R192-21Z.

**Reference A.6**

54. If the holes in the filler block are damaged, they should be opened out together with the holes in the top fitting and the outer tube to 33/64 in. dia. or 17/32 in. dia., Class "B". Re-assemble using new set screws, R192-6X or R192-6Z.

**Reference A.7**

55. Damage to the tapped holes in the filler block should be repaired by redrilling and tapping 5/8 in. B.S.F., also opening out the holes in the top fitting and outer tube and counter-boring 0.3 in. deep in the filler block to: 5/8 in., 41/64 in., or 21/32 in. dia. Class "B". Re-assemble using new set screws, Part No. R192-17A, R192-17X or R192-17Z.

**TABLE 59.**
**Material for Repair of Top End Fitting**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R124/15 | Bush, oversize | | | |
| | SP693/4 | Bush, oversize | | | |
| | SP680/16X | Ferrule, oversize | | | |
| | SP680/16Z | Ferrule, oversize | | | |
| | R192/21X | Set screw | | | |
| | R192/21Z | Set screw | | | |
| | R192/6X | Set screw | | | |
| | R192/6Z | Set screw | | | |
| | R192/17A | Set screw | | | |
| | R192/17X | Set screw | | | |
| | R192/17Z | Set screw | | | |

**Tail Wheel**

**Tail Wheel Fork and Axle**

56. Before commencing repairs to the tail wheel fork and axle, reference should be made to para. 1.

57. Figure 12 is a key diagram to which this repair refers.

**Reference A.1**

58. Scores on the axle not deeper than 0.005 in. should be dressed to remove the sharp edges. The axle should then be hard chrome plated, and ground to its original diameter of 1.499 in./1.500 in.

**Reference A.2**

59. Damage to this hole in the fork may be repaired by opening out the mating holes to 37/64 in. dia. or 19/32 in. dia., Class "B", and re-assembling, using a new bolt Part No. R135-3X or R135-3Z.

**Reference A.3**

60. Damage to the towing lugs should be repaired as described in para. 65.

**Reference A.4**

61. Damage to this hole should be repaired by opening out to 1/4 in. B.S.F. and re-assembling, using a new grub screw, Part No. S.P. 228/104.

**Reference A.5**

62. Damage to these holes should be repaired by opening out the mating holes to 33/64 in. dia. or 17/32 in., Class "B", re-assemble using oversize ferrule, Part No. R113/2X or R113/2Z.

**TABLE 60.**
**Material for Repair of Tail Wheel Fork and Axle**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R135/3X | Bolt | | | |
| | R135/3Z | Bolt | | | |
| | SP228/104 | Grub screw | | | |
| | R113/2X | Ferrule, oversize | | | |
| | R113/2Z | Ferrule, oversize | | | |

**Towing Lugs**

63. Before commencing repairs to the towing lugs, reference should be made to para. 1.

64. Figure 13 is a diagram to which this repair refers.

65. Damage to the towing lugs in excess of that defined in Chapter 5, para. 19, Part 1, should be repaired by cutting off the towing lugs at the root and finishing flush. Drill and ream a new hole 3/8 in. dia $+.0015$ in. $-.0005$ in. —9/16 in. from the flush finish and 7/8 in. down from the top of the lug. Spot-face 1-7/8 in. dia. on both sides and file away the shaded portion to permit the fitting of the lugs as shown in Fig. 13.

66. Refer to the appendix at the end of Part 1 for the hand reamers required to carry out this repair.

**TABLE 60A.**
**Material for Repair of Towing Lugs—Tail Wheel**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R135/4 | Towing lug | | | |
| | R135/5 | Bolt | | | |
| H28/262 | AGS.191/J | Washer | | | |
| | 8/SS3782 | Nut | | | |

**Centre Fitting**

67. Before commencing repairs to the centre fitting, reference should be made to para. 1.

68. Figure 14 is a diagram to which this repair refers.

**Reference A.1**

69. Damage to any of the 1/4 in. B.S.F. holes should be repaired by turning the bearing, Part No. 483616 through 15° (0.7 in. measured around the circumference) and drilling and tapping new 1/4 in. B.S.F. holes, using the existing holes in the centre fitting as a means of location. Re-assemble using the original bolts.

Old holes should be drilled out to prevent their subsequent use.

70. An alternative method of repair is to open out the damaged hole in the bearing to 5/16 in. B.S.F. and the corresponding hole in the centre fitting to 5/16 in. dia., Class "B". Re-assemble using new bolt, Part No. R135/2.

**Reference A.2**

71. Damage to the holes for the countersunk rivets should be repaired by opening out the holes in the mating parts together to 11/32 in. dia. Re-assemble using new rivets, Part No. (E) D2528/3CN., 11/32 in. dia., x 3/4 in. The rivets must be flush finished both inside and out.

**Reference A.3**

72. Damage to this hole should be repaired by opening out to 1-7/8 in. dia., Class "B" and driving in a bush, Part No. SP693/23, check-reaming to 1-3/4 in. dia., Class "B" and filing flush.

**Reference A.4**

73. Scores in the bore in the outer tube may be polished out, provided that the diameter of the bore does not exceed 4.518 in.

**Reference A.5**

74. Local scores and abrasions on the sliding tube, not deeper than 0.005 in. should be dressed to remove sharp edges, and the tube then re-chrome plated and ground to its original diameter of 4.4945 in./4.4985 in.

**TABLE 61.**
**Material for Repair of Centre Fitting Tail Wheel**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R135/2 | Bolt | 5/16 in. B.S.F. | | |
| | (E) D2528/3CN | Rivet | 11/32 in. dia. x 3/4 inch | D.T.D. 327 | |
| | SP693/23 | Bush | | | |

75. Before commencing repairs to the internal cylinder, reference should be made to para. 1 of this chapter.

76. Figure 15 is the key diagram to which this repair refers.

**Reference A.1**

77. Local scores or abrasions not deeper than 0.010 in. should be dressed to remove the sharp edges, and the cylinder re-chromium plated and ground to its original diameter of 2.9976 in./2.9915 in.

**Reference A.2**

78. In use, the lower end of the internal cylinder becomes distorted by the appearance of four bulges below the grub screws (see Fig. 15).

The self-centring bushes need not be dismantled from the cylinder if these bulges are less than 1/16 in. high, and no repair or adjustment is necessary.

**Reference A.3**

79. If the self-centring bush has been removed, slight elongation of the holes in the internal cylinder should be repaired by opening them out, together with the holes in the self-centring bush to 37/64 in. dia. or 19/32 in. dia. and fitting oversize grub screws, Part No. R135/1X or R135/1Z.

**Reference A.4**

80. If any of the bulges on the end of the internal cylinder are more than 1/16 in. high, or if the self-centring bush has been removed and the holes are elongated more than is repairable (see para. 79) even though the bulges are less than 1/16 in. high, the cylinder may be salvaged as follows:—

(i) Using jig No. J645 (see Fig. 17) make a new set of holes spaced at 135° to the original holes, for the 1/4 in. B.S.P. inflation valve, the three 1/2 in. dia. studs, and the four 9/16 in. grub screws.

(ii) Care must be taken not to damage the stack pipe by allowing the 1/4 in. dia. drill for the new inflation valve hole to go too deep, and to remove all swarf from around the stack pipe after drilling this hole.

(iii) A 1/4 in. B.S.P. plug should be screwed into the old inflation valve hole and well sealed with soft solder when re-assembling.

**Reference A.5**

81. Scores, free from cracks and sharp corners, which occur on the cylindrical sides of the self-centring bushes, and do not extend over an

area of more than 3/4 sq. in. may be neglected, provided that they are at least 1/4 in. from the inclined faces of each bush, and not less than 0.02 in. from the keyway and shoulder of the moving bush.

82. Damage to the inclined faces of the bushes should be repaired as described in para. 85 and Fig. 16.

**Reference A.6**

83. Damage to the spanner holes should be repaired by drilling new holes at 90° to the existing holes.

**Reference A.7**

84. Damage to the hole for the grub screw is repairable by opening out the hole to 1/4 in. B.S.F. and assemble using new grub screw, Part No. SP338/88.

**TABLE 62**
**Material for Repair of Internal Cylinder**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R135/1X | Grub screw | | | |
| | R135/1Z | Grub screw | | | |
| | J.645 | Jig | | | |
| | SP.228/88 | Grub screw | 1/4 in. | B.S.F. | |

**Self-Centring Bushes, 48367 and 683911**

85. Before commencing repairs to the self-centring bushes refer to para. 1 on General Information.

86. Damage to the inclined faces of the self-centring bushes should be repaired as follows:—

(i) When correcting self-centring bush Part No. 48367 the face must be turned back to retain the $.50^{.60}$ dimension after filing the working face as shown at "B" in Fig. 16.

(ii) The part in the direction of arrow "A", each profile of both bushes to be of helical form, or, alternatively, may be machined to $2\frac{3}{4}$ in. rad. as shown at scrap view "A", and blended in smoothly with the 50° slope by hand filing.

**End Plug**

87. Before commencing repairs to the end plug, reference should be made to Part 1, Chapter 5, para. 25.

88. Figure 17 is the repair diagram to which these repairs refer.

**Reference A.1**

89. Damage to the holes for the grub screws in the outer tube should be repaired by:—

(i) Opening out the holes to 49/64 in. dia. or 25/32 in. dia. Class "B", together with 0.18 in. deep counterbore in the end plug, and re-assembling, using new grub screws, Part No. R113-3X or R113-3Z.

(ii) If the tapped hole is damaged, open out to 7/8 in. B.S.F. and open out the hole in the outer tube and the 0.18 in deep counterbore in the end plug to 7/8 in. dia. Class "B". Re-assemble using a new grub screw, Part No. R174-8A.

(iii) A further repair may be effected by opening out the hole in the outer tube and the 0.18 in. counterbore to 57/64 in. dia. or 29/32 in. dia. Class "B", and assembling using a new grub screw, Part No. R174/8X or R174/8Z.

**Reference A.2**

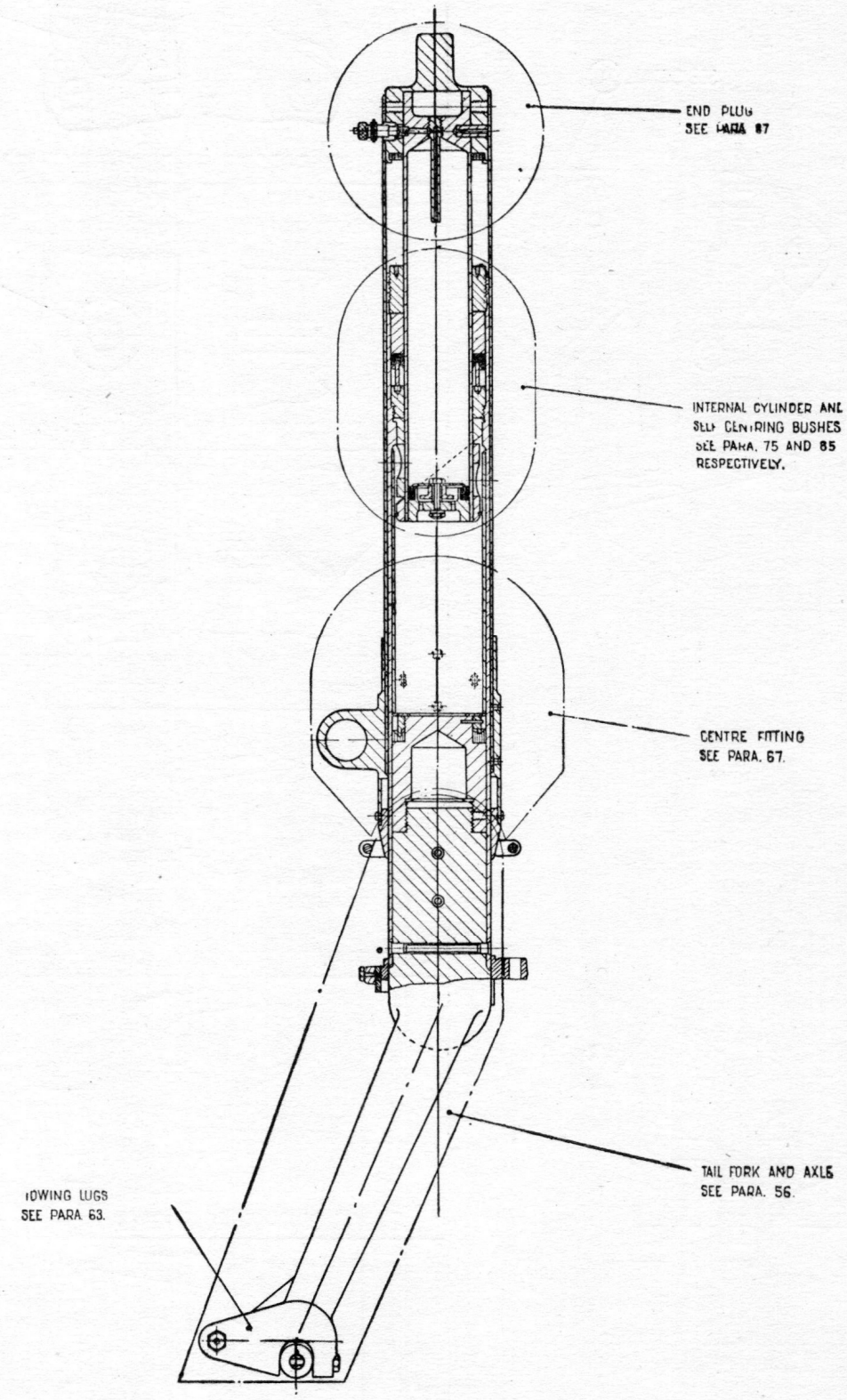
90. Damage to this stud hole should be repaired by opening out the mating holes together to 23/64 in. dia. or 17/32 in dia. Class "B" and re-assembling using new studs, Part No. R113-1X or R113-1Z.

**Reference A.3**

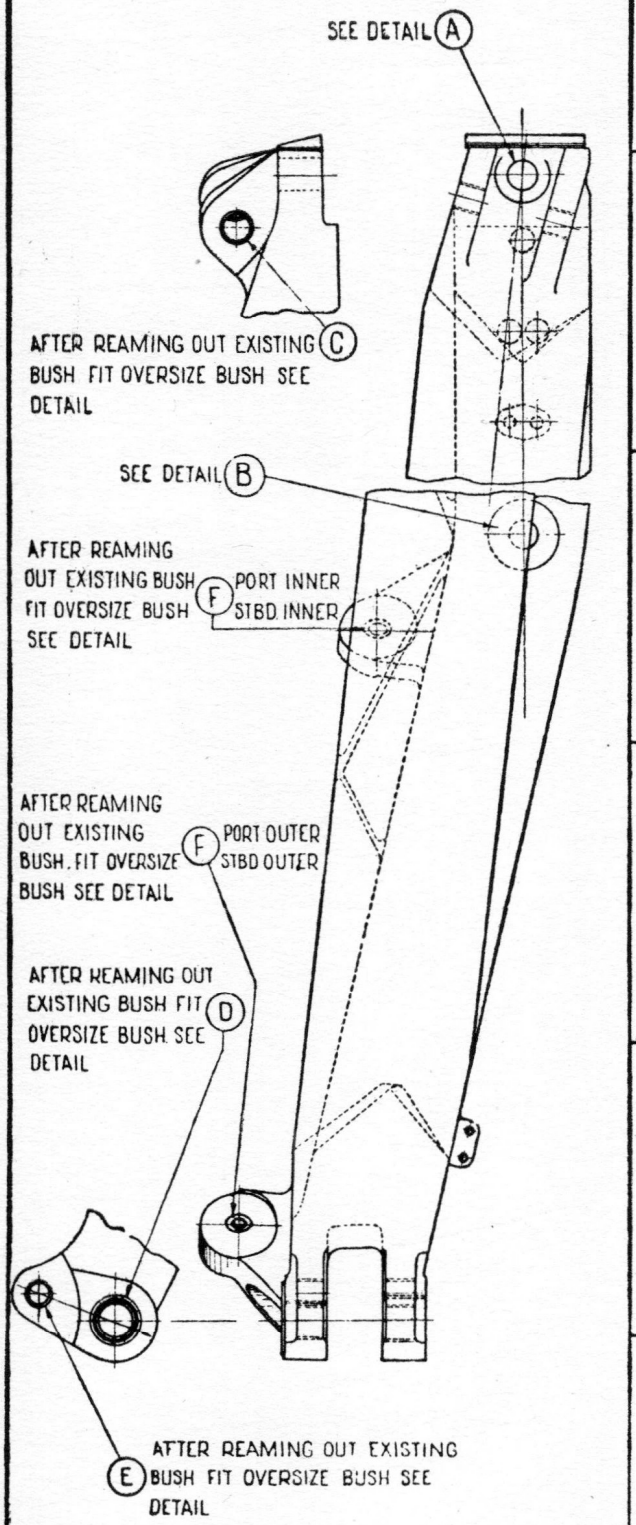
91. Damage to this bolt hole should be repaired by opening out the tapped hole to 1/4 in. B.S.F., opening out the hole in the locking plate, Part No. 466163, and distance piece to 7/64 in. dia. and the slot in the locking plate Part No. 483653 to a width of 17/64 in., and re-assembling, using a new bolt Part No. A15Y.2E and washer, Part No. AGS.162/D.

**TABLE 63.**
**Material for Repair of End Plug**

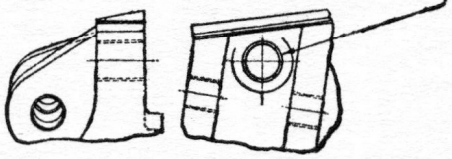
| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | R113/3X | Grub screw | | | |
| | R113/3Z | Grub screw | | | |
| | R174/8A | Grub screw | | | |
| | R174/8X | Grub screw | | | |
| | R174/8Z | Grub screw | | | |
| | R113/1X | Stud | | | |
| | R113/1Z | Stud | | | |
| | A15Y/2E | Bolt | | | |
| | AGS162/D | Washer | | | |




2 KEY DIAGRAM - TAIL WHEEL STRUT 2

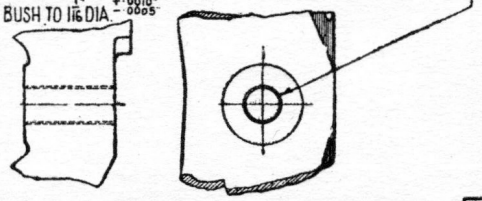



HOLE DRILL AND REAM TO $1\frac{3}{16}$" DIA. $^{+.00075}_{-.00025}$" AND FIT BUSH 1/0.3055 FOR 10 & 11/0.2923 AND 2/0.3055 FOR 12 & 13/0.2923 FINALLY REAM THROUGH BUSH TO $1\frac{1}{16}$" DIA $^{+.0010}_{-.0005}$"



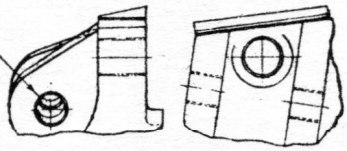
BUSHING OF SPAR ATTACHMENT HOLE-TOP **A**

HOLE DRILL AND REAM TO $1\frac{3}{16}$" DIA. $^{+.00075}_{-.00025}$" AND FIT BUSH Nº 3/0.3055 FOR 10 & 11/0.2923 AND 4/0.3055 FOR 12 & 13/0.2923 FINALLY THROUGH BUSH TO $1\frac{1}{16}$" DIA $^{+.0010}_{-.0005}$"



BUSHING OF SPAR ATTACHMENT HOLE-BOTTOM **B**

HOLE DRILL AND REAM TO 1" $^{+.0105}_{+.00975}$" DIA. AND FIT BUSHES Nº 5/0.3055 FINALLY REAM THROUGH BUSHES TO $\frac{7}{8}$" DIA. $^{+.0005}_{-.00025}$"



REPAIR BY FITTING NEW BUSH .010" OVERSIZE

FITTING OF OVERSIZE BUSHES **C**

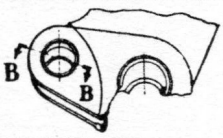



HOLE DRILL & REAM TO $1\frac{7}{16}$" DIA $^{+.01075}_{+.00975}$" & FIT BUSH Nº 7/0.3055 FINALLY REAM THROUGH BUSH TO $1\frac{1}{2}$" DIA. $^{+.001}_{+.0005}$"

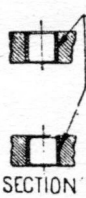
REPAIR BY FITTING NEW BUSH .010" OVERSIZE

HOLE DRILL & REAM TO $1\frac{11}{16}$" DIA. $^{+.01075}_{+.00975}$" & FIT BUSH Nº 6/0.3055. FINALLY REAM THROUGH BUSH TO $1\frac{1}{2}$" DIA $^{+.005}_{+.0025}$"

FITTING OF OVERSIZE BUSHES SECTION **A-A** **D**



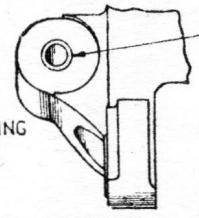

REPAIR BY FITTING NEW BUSH .010" OVERSIZE



BOLE DRILL & REAM TO 1" DIA $^{+.0105}_{+.00975}$" & FIT BUSH Nº 8/0.3055 FINALLY REAM THROUGH BUSH TO $\frac{1}{8}$" DIA. $^{+.005}_{+.00025}$"

SECTION **B-B**

FITTING OF OVERSIZE BUSHES **E**

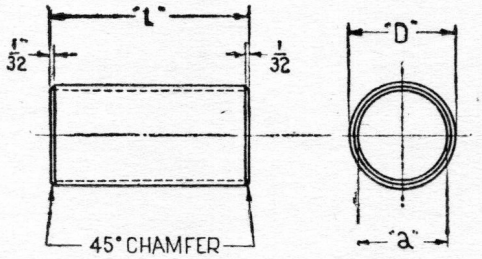


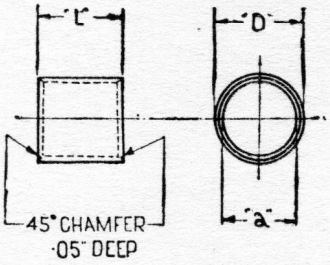
REPAIR BY FITTING NEW BUSH .010" OVERSIZE.

HOLE DRILL REAM TO 1" DIA $^{+.0105}_{+.00975}$" AND FIT BUSH Nº 9/0.3055 FINALLY REAM THROUGH BUSH TO $\frac{3}{4}$" DIA $^{+.0005}_{-.00025}$"

FITTING OF OVERSIZE BUSHES **F**

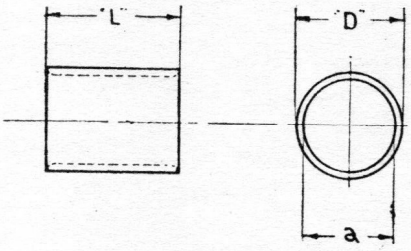
# 3 BUSHING OF HOLES & FITTING OF OVERSIZE BUSHES – UNDERCARRIAGE SUPPORT BEAMS 3

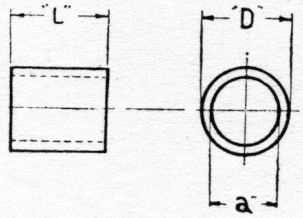



| PART Nº | DIA. "D" | DIA "a" | LENGTH "L" | MATERIAL | USED ON |
|---|---|---|---|---|---|
| 0.3055/1 | 1 3/16" +·0015" +·0010" | 1/16" +·0010" −·0005" | 17/32" −·001" −·002" | M.S. S.I. | 10&11/0.2923 |
| 0.3055/2 | 1 3/16" +·0015" +·0010" | 1/16" +·0010" −·0005" | 1 49/64" −·001" −·002" | M.S. S.I. | 12&13/0.2923 |
| 0.3055/3 | 1 3/16" +·0015" +·0010" | 1/16" +·0010" −·0005" | 2 25/32" −·001" −·002" | M.S. S.I. | 10&11/0.2923 |
| 0.3055/4 | 1 3/16" +·0015" +·0010" | 1/16" +·0010" −·0005" | 3 1/64" −·001" −·002" | M.S. S.I. | 12&13/0.2923 |

| PART Nº | DIA. "D" | DIA. "a" | LENGTH "L" | MATERIAL | USED ON |
|---|---|---|---|---|---|
| * 0.3055/5 | 1" +·0110" +·01075" | 7/8" +·0005" −·00025" | 1" −·001" −·002" | M.S. S.I. | 0.2923 |
| * 0.3055/6 | 1 1/16" +·0110" +·01075" | 1/2" +·0005" −·00025" | 1 15/32" −·001" −·002" | M.S. S.I. | 0.2923 |
| * 0.3055/8 | 1" +·0110" +·01075" | 7/8" +·0005" −·00025" | 1" −·001" −·002" | M.S. S.I. | 0.2923 |
| | | | | | |



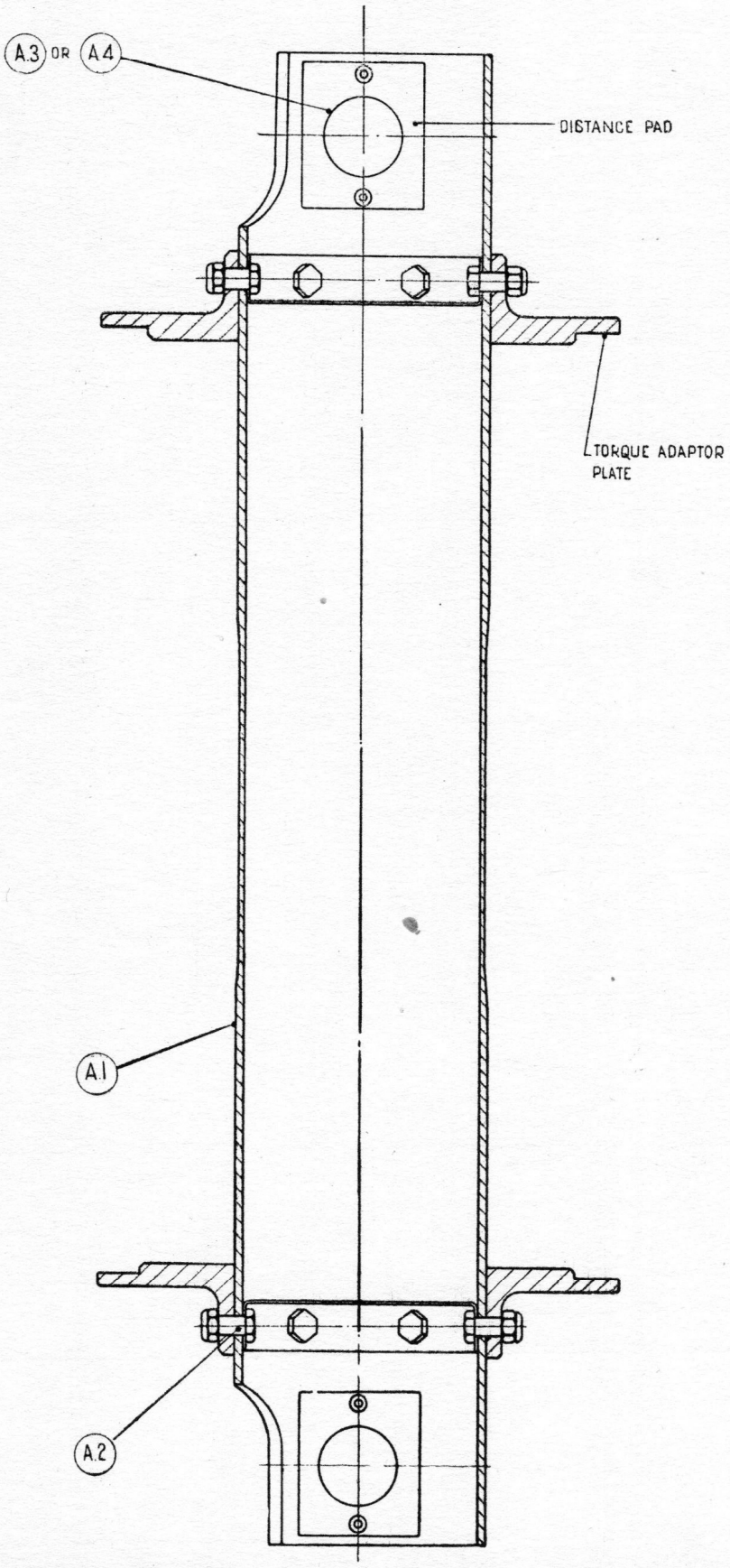

| PART Nº | DIA "D" | DIA "a" | LENGTH "L" | MATERIAL | USED ON |
|---|---|---|---|---|---|
| * 0.3055/7 | 7/16" +·0115" +·0110" | 1/4" +·001" −·0005" | 1 9/16" −·001" −·002" | M.S. S.I. | 0.2923 |
| | | | | | |
| | | | | | |
| | | | | | |

| PART Nº | DIA "D" | DIA "a" | LENGTH Nº | MATERIAL | USED ON |
|---|---|---|---|---|---|
| * 0.3055/9 | 1" +·0110" +·01075" | 3/4" +·0005" −·00025" | 1 1/8" −·001" −·002" | M.S. S.I. | 0.2923 |
| | | | | | |
| | | | | | |
| | | | | | |

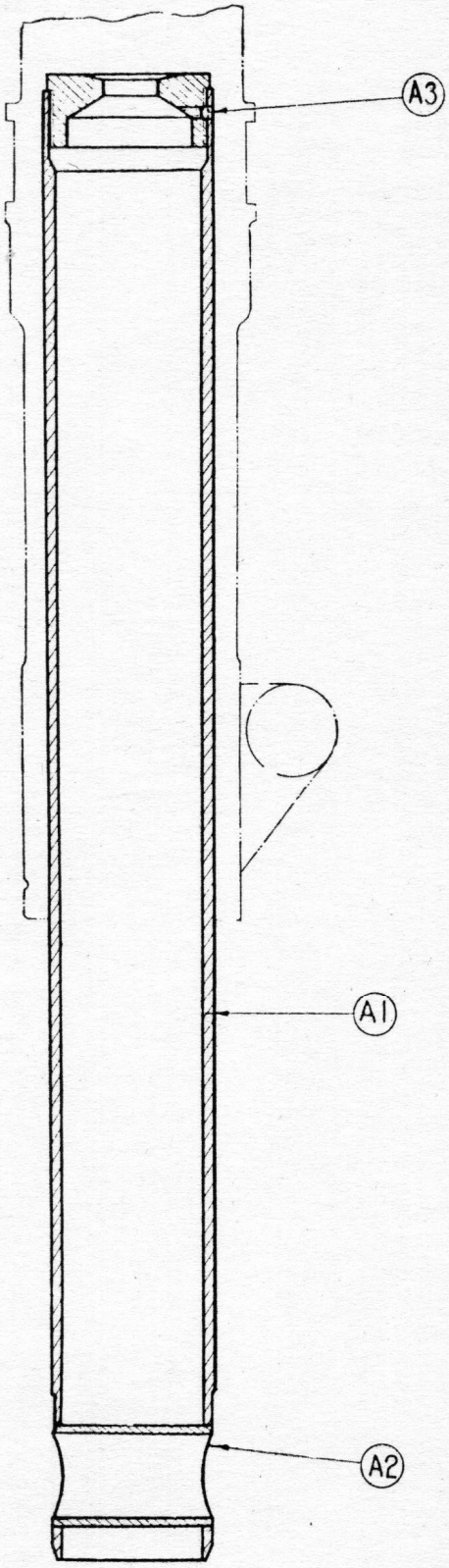
* DENOTES 010" OVERSIZE



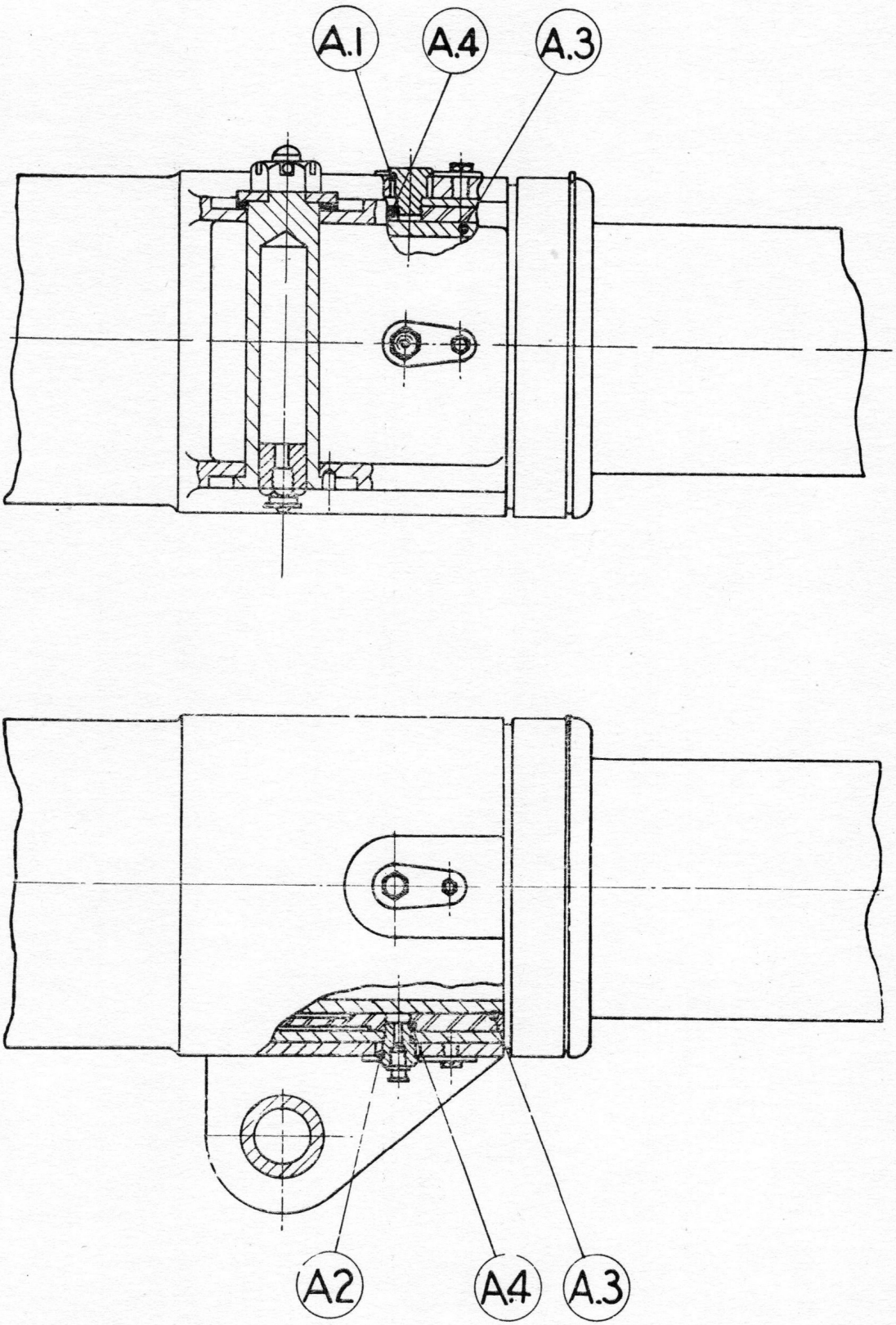
# REPAIR BUSHES–UNDERCARRIAGE SUPPORT BEAMS



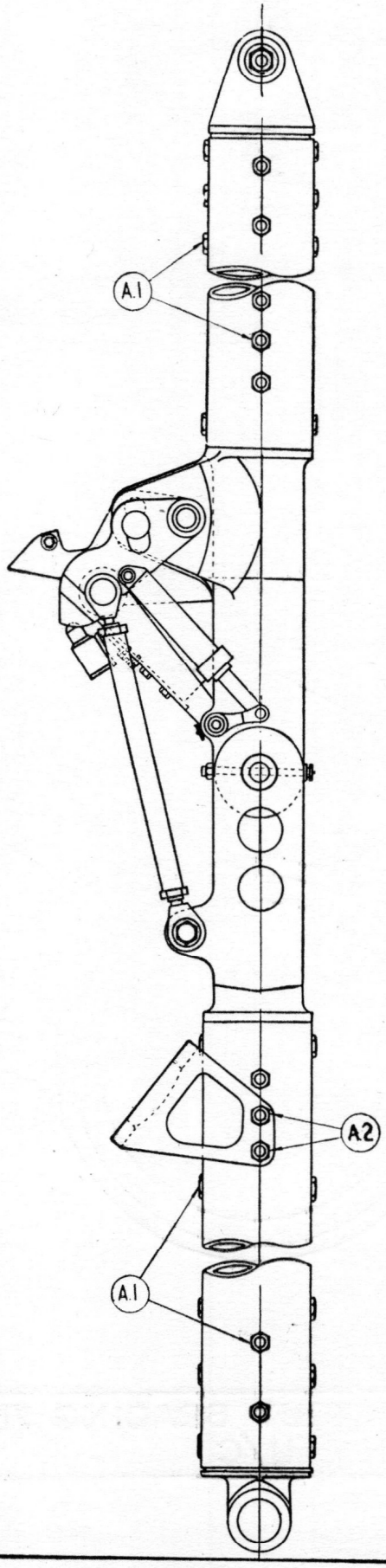

5 UNDERCARRIAGE AXLE 5



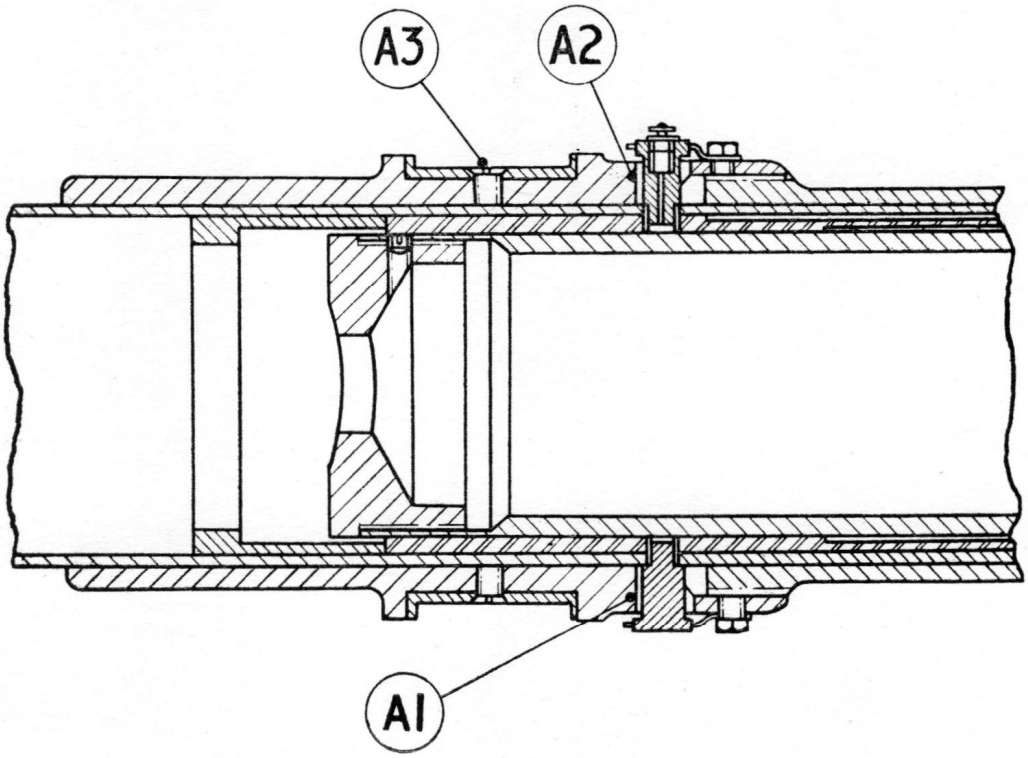

| 6 | BOTTOM SLIDING TUBE U/C | 6 |
|---|---|---|

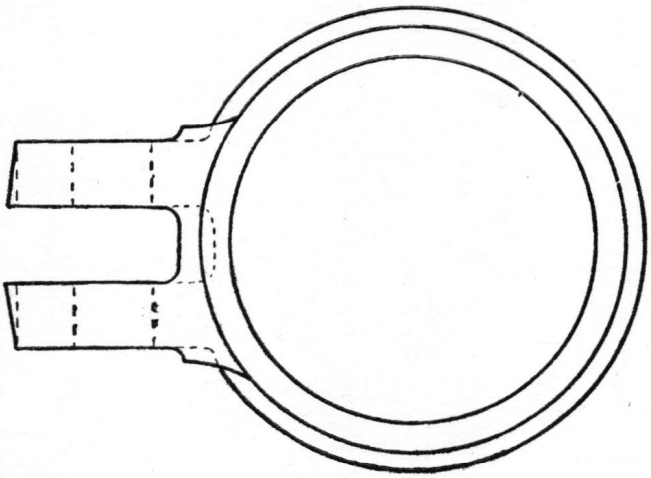



| 7 | RADIUS ROD ATTACHMENT FITTING | 7 |
|---|---|---|

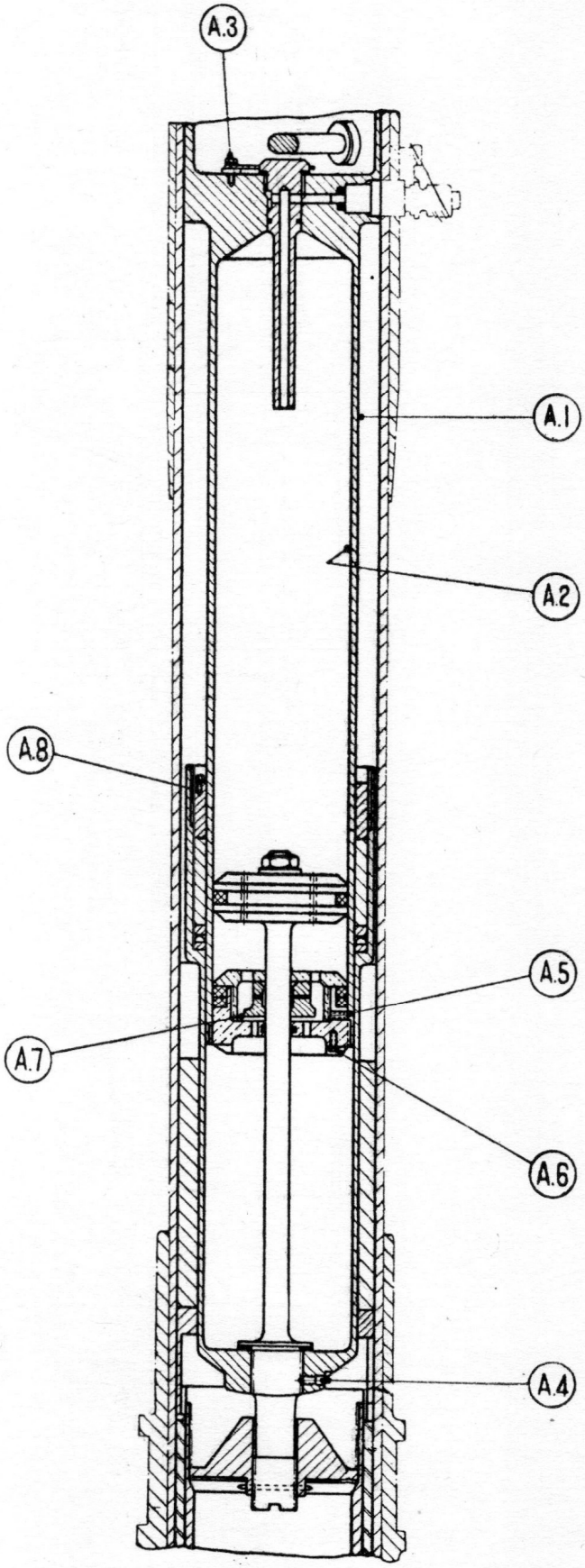



| 8 | RADIUS ROD | 8 |
|---|---|---|

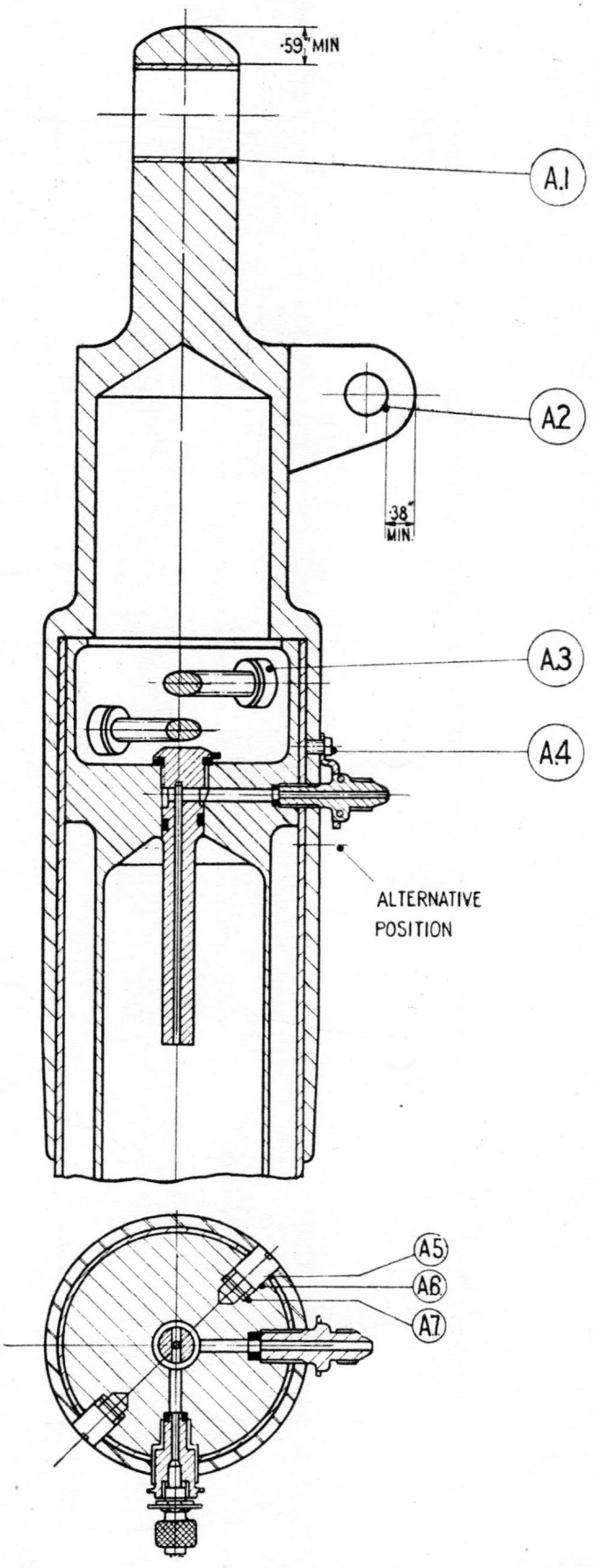


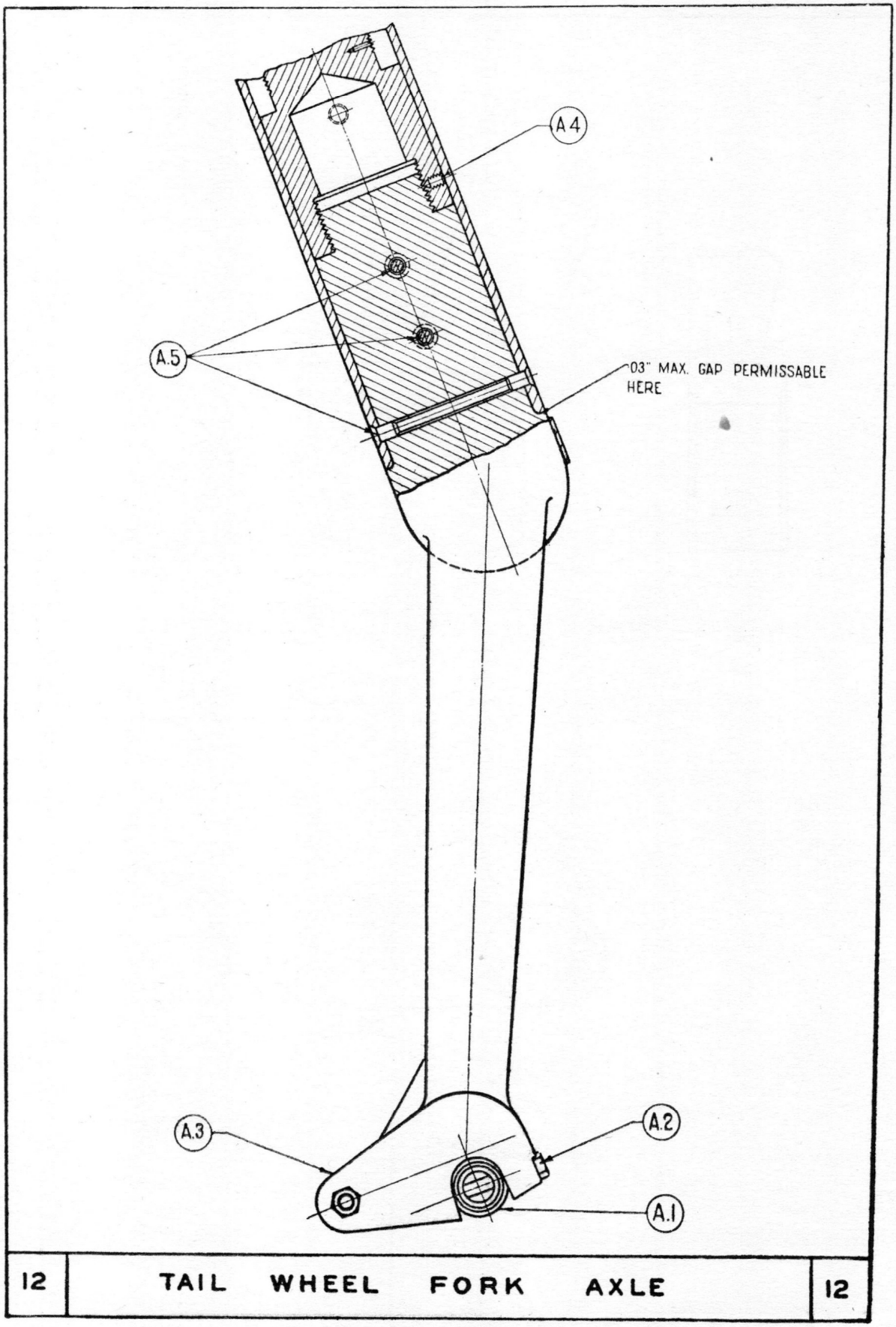
| 9 | REPAIR TO HOLES - STRUT BRACING FITTING MAIN U/C | 9 |
|---|---|---|



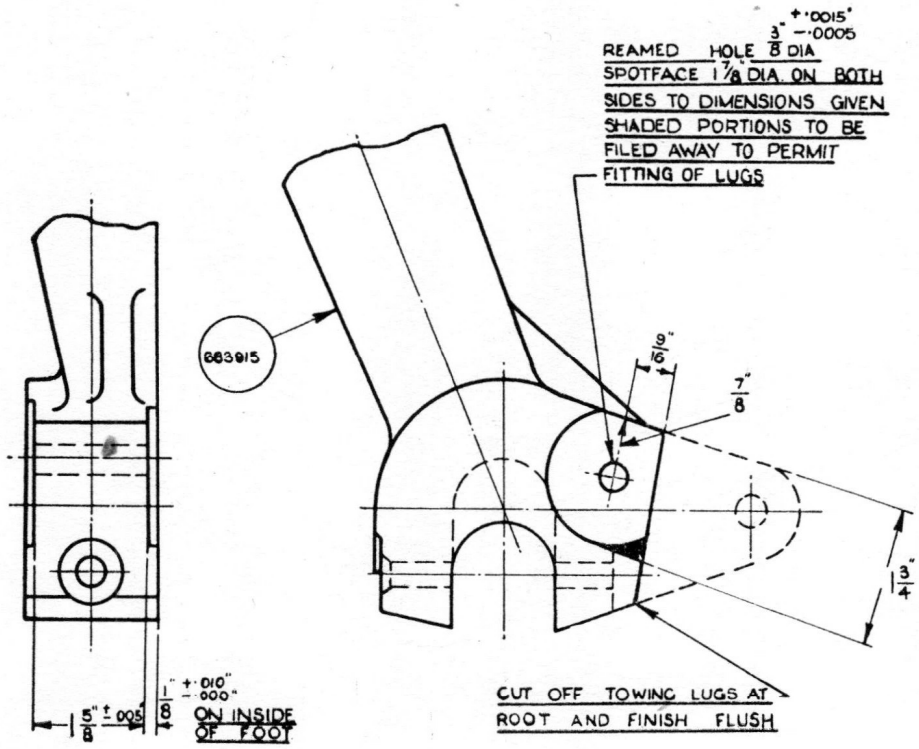

| 10 | INTERNAL CYLINDER | 10 |
|---|---|---|

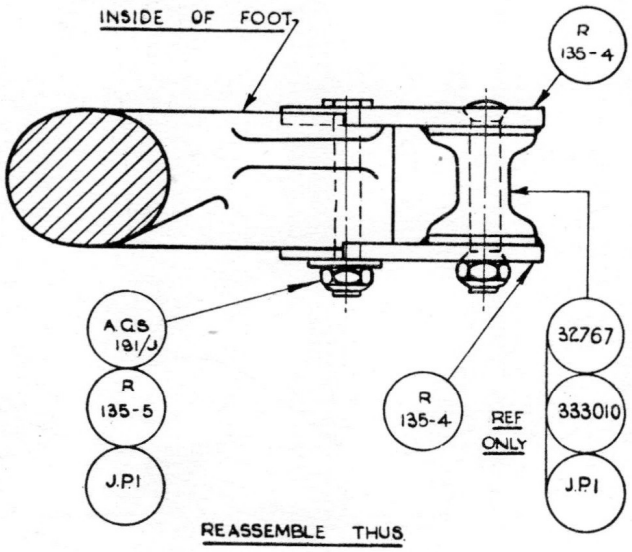



| 11 | TOP END FITTING | 11 |
|---|---|---|

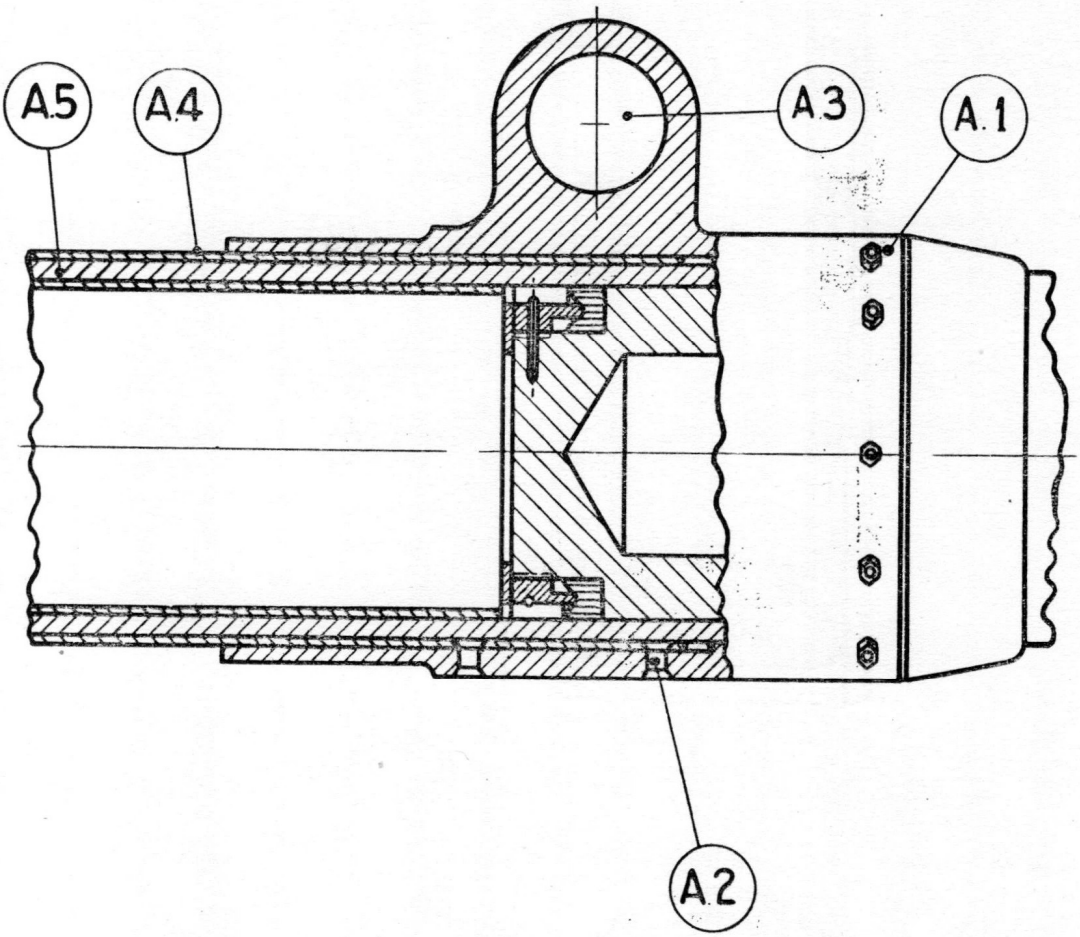



| 12 | TAIL WHEEL FORK AXLE | 12 |
|---|---|---|

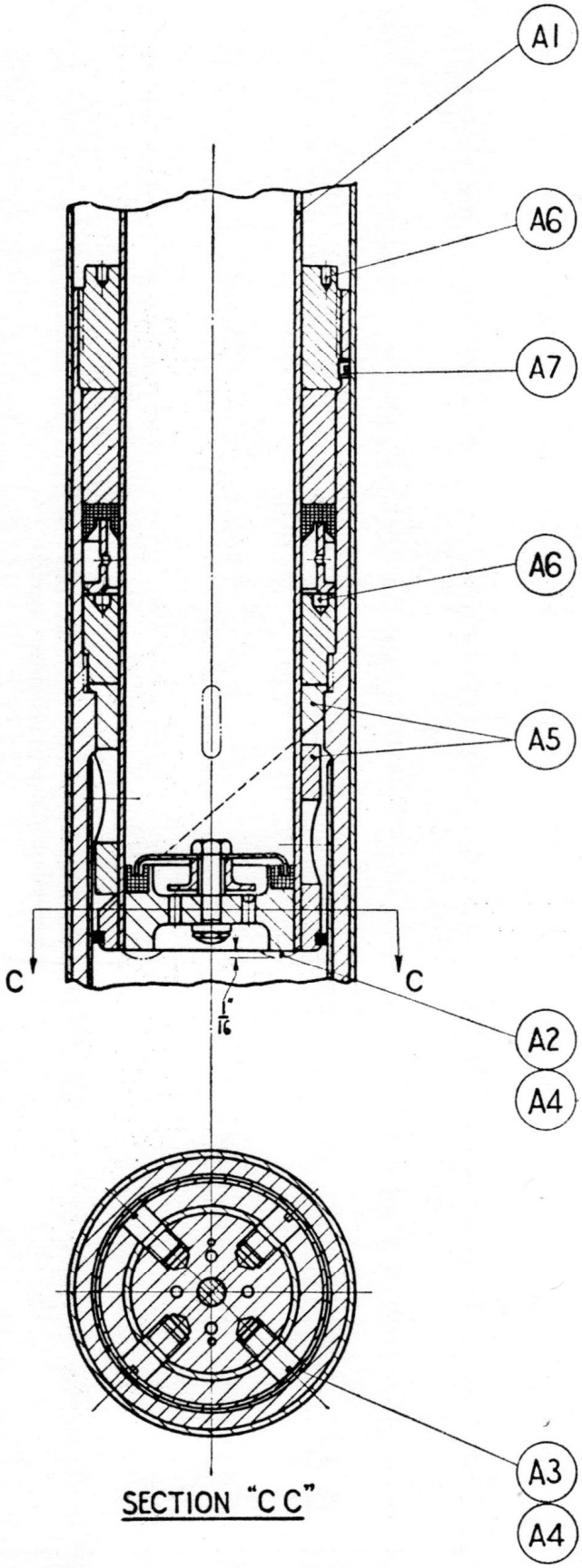


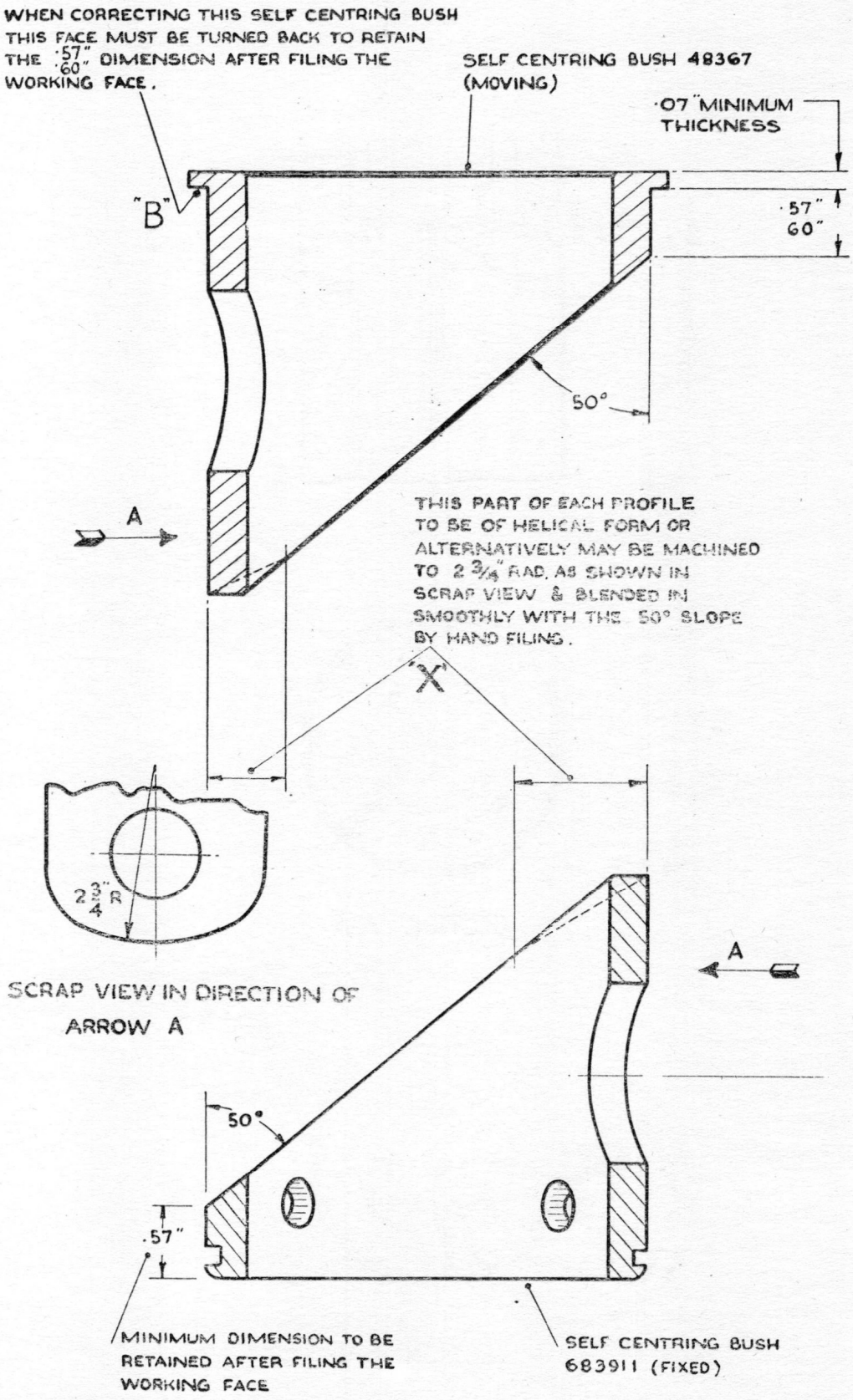

| 13 | REPAIR TO TOWING LUGS – ON TAIL WHEEL FORK | 13 |
|---|---|---|

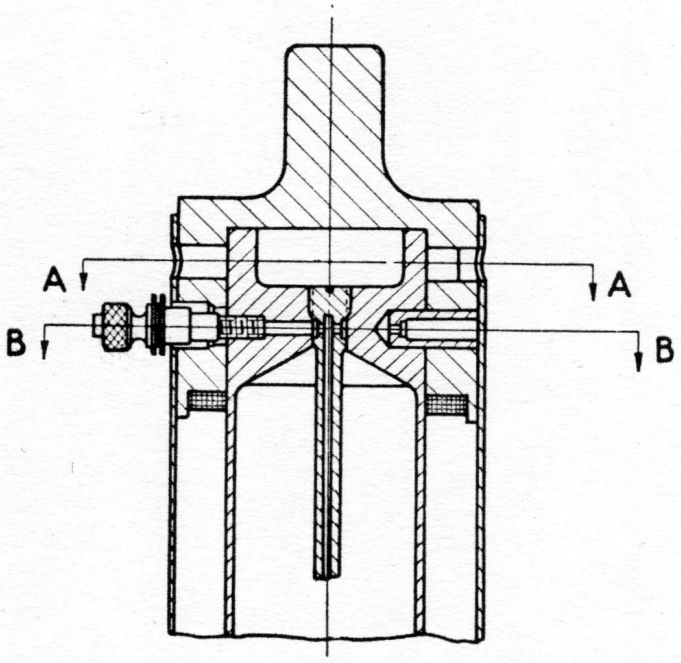


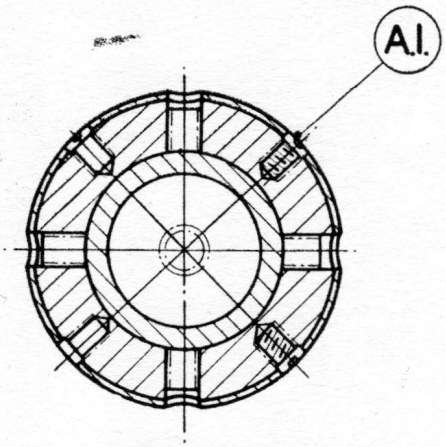

| 14 | CENTRE FITTING | 14 |
|---|---|---|



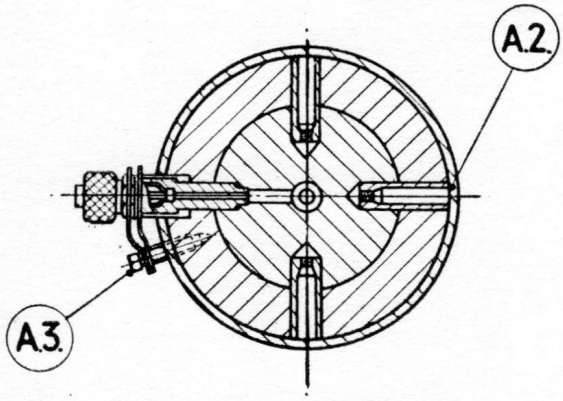

| 15 | INTERNAL CYLINDER | 15 |
|---|---|---|


WHEN CORRECTING THIS SELF CENTRING BUSH THIS FACE MUST BE TURNED BACK TO RETAIN THE .57" .60" DIMENSION AFTER FILING THE WORKING FACE.
SELF CENTRING BUSH 48367 (MOVING)
.07" MINIMUM THICKNESS
"B"
.57" .60"
50°
A
THIS PART OF EACH PROFILE TO BE OF HELICAL FORM OR ALTERNATIVELY MAY BE MACHINED TO 2 3/4" RAD. AS SHOWN IN SCRAP VIEW & BLENDED IN SMOOTHLY WITH THE 50° SLOPE BY HAND FILING.
2 3/4" R
SCRAP VIEW IN DIRECTION OF ARROW A
A
50°
.57"
MINIMUM DIMENSION TO BE RETAINED AFTER FILING THE WORKING FACE
SELF CENTRING BUSH 683911 (FIXED)




SECTION A-A

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# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART 2. CHAPTER 6

## Main Plane

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## MAIN PLANES

### General

1. For general information appertaining to the main planes, refer to para. 1, Chapter 6 of Part 1. For assembly and removal operations, reference should be made to the appropriate drawings in Section 5 of R.A.A.F. Publication No. —.

### Oversize Holes

### Bushing of Holes for Main and Secondary Attachment Bolts in Front and Rear Spars—Top and Bottom Booms—Intermediate Portion of Wing

2. Holes which have become slightly elongated or badly scored on the inside, should be repaired by bushing, i.e., fitting a 1/16 in. wall bush.

3. To repair the holes by this method necessitates a sequence of reamers and pilot bushes as listed in Table 64. Reference should also be made to the appendix on special tools at the end of Part 1, and to Fig. 4A and 5, which give details of the pilot bushes and reamers mentioned throughout the text, for manufac-

**TABLE 64.**
**Pilot Bushes and Reamers for Attachment Holes —Intermediate Portion of Wing**

| Bush Part No. | Ident. No. | Pilot Bushes Required | Ident. No. | Reamers Required | Remarks |
|---|---|---|---|---|---|
| 2.F.5916 | | 2.Z.3137 | | 2.Z.3113 | For Front Spar Top and Bottom Booms |
| | | 3.Z.3137 | | 3.Z.3113 | |
| 2.F.6202 | | 4.Z.3137 | | 4.Z.3113 | |
| | | 5.Z.3137 | | 5.Z.3113 | |
| 3.F.5916 | | 21.Z.3137 | | 21.Z.3113 | |
| | | 22.Z.3137 | | 22.Z.3113 | |
| | | 23.Z.3137 | | 23.Z.3113 | |
| | | 24.Z.3137 | | 24.Z.3113 | |
| 4.F.5916 | | 15.Z.3137 | | 15.Z.3113 | |
| | | 16.Z.3137 | | 16.Z.3113 | |
| | | 17.Z.3137 | | 17.Z.3113 | |
| | | 18.Z.3137 | | 18.Z.3113 | |
| 5.F.5916 | | 11.Z.3137 | | 11.Z.3113 | |
| | | 12.Z.3137 | | 12.Z.3113 | |
| | | 13.Z.3137 | | 13.Z.3113 | |
| | | 14.Z.3137 | | 14.Z.3113 | |
| 6.F.5916 | | 7.Z.3137 | | 7.Z.3113 | For Rear Spar Top and Bottom Booms |
| | | 8.Z.3137 | | 8.Z.3113 | |
| | | 9.Z.3137 | | 9.Z.3113 | |
| | | 10.Z.3137 | | 10.Z.3113 | |
| 7.F.5916 | | 19.Z.3137 | | 19.Z.3113 | |
| | | 20.Z.3137 | | 20.Z.3113 | |
| | | 15.Z.3137 | | 15.Z.3113 | |
| | | 16.Z.3137 | | 16.Z.3113 | |

**TABLE 65.**
**Material for Repair of Holes for Main and Secondary Attachment Bolts—Spars**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2.F.5916 | Bush | 1-7/8 in. o/d. | S1 or T45 | Front spar main holes |
| | 3.F.5916 | Bush | 1-1/8 in. o/d. | S1 or T45 | Front spar secondary holes |
| | 4.F.5916 | Bush | 15/16 in. o/d. | S1 or T45 | Front spar secondary hole |
| | 5.F.5916 | Bush | 3/4 in. o/d. | S1 or T45 | Front spar secondary hole |
| | 6.F.5916 | Bush | 1-3/8 in. o/d. | S1 or T45 | Rear spar main holes |
| | 7.F.5916 | Bush | 7/8 in. o/d. | S1 or T45 | Rear spar secondary holes |

turing purposes, when the pilot bushes and reamers are unobtainable as standard tools.

4. Before commencing repairs to the attachment holes, the steel reinforcing plates should be removed. The holes should then be reamed and bushed in accordance with instructions given in Fig. 1, which also gives details of the various sized bushes required. Reference should also be made to Fig. 4, which shows the method of reaming the wing attachment holes using the reamers and pilot bushes mentioned. After insertion, the bushes should be filed flush with the faces of the boom, and finally reamed through to the dimensions given.

5. If the holes in reinforcing plates are damaged (see para. 2 above), they should be reamed and bushed as illustrated in Fig. 1A. The bushes should be filed flush with the faces of the plate, and any burrs removed with a fine scraper or file. Assemble the reinforcing plate as originally.

**Bushing of Holes for Main Attachment Bolts, Intermediate and Outer Main Plane Booms General**

6. Main Attachment Holes at the outer wing joints which have become slightly elongated or badly scored in the inside should be repaired by bushing, using 1/16 in. wall bushes. The reamers and pilot bushes listed in Table 66 will be required to complete the repairs to these holes. Reference should also be made to the appendix on special tools at the end of Part 1.

7. The damaged main attachment holes in the front or rear spar should be drilled and reamed to the dimensions shown in Fig. 2. The bushes, Item No. 2/F5915 for the rear, and Item No. 3/F5915 for the front spar attachment holes, should be inserted and filed flush with the faces of the boom. Finally ream through the bushes to the dimensions given in Fig. 2, details Item 2 or 3, whichever is required.

**TABLE 66.**

**Pilot Bushes and Reamers for Main Attachment Holes—Outer Wing Joints**

| Bush Part No. | Ident. No. | Pilot Bushes Required | Ident. No. | Reamers Required |
|---|---|---|---|---|
| 2.F.5915 | | 27.Z.3137 | | 21.Z.3113 |
| | | 28.Z.3137 | | 22.Z.3113 |
| | | 29.Z.3137 | | 23.Z.3113 |
| | | 30.Z.3137 | | 24.Z.3113 |
| 3.F.5915 | | 29.Z.3137 | | 23.Z.3113 |
| | | 30.Z.3137 | | 24.Z.3113 |
| | | 31.Z.3137 | | 25.Z.3113 |
| | | 32.Z.3137 | | 26.Z.3113 |

**TABLE 67.**

**Material for Repair of Holes for Main Attachment Bolts—Outer Wing Joints**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2.F.5915 | Bush | 1-1/8 in. o/d. | S1 or T45 | Rear spar bushes |
| | 3.F.5915 | Bush | 1-3/16 in. o/d. | S1 or T45 | Front spar bushes |

**Bushing of Holes for Main and Secondary Attachment Bolts and Engine Rib Bolts in Front and Rear Spar Boom—Centre Portion of Wing**

8. Holes which have become slightly elongated or badly scored on the inside should be repaired by bushing—using 1/16 inch wall bushes.

9. Fig. 4 shows the method of reaming the wing attachment holes when using the pilot bushes and reamers listed in the text, and reference should be made to this drawing before commencing repairs.

10. Fig. 4A and 5 give details of the pilot bushes and reamers listed in the Table throughout the text of this Chapter, and have been included for reference purposes only.

11. Before commencing repairs to the holes in the front or rear spar booms, the steel reinforcing side plates should be removed. The holes concerned should then be reamed and bushed in accordance with instructions given in Fig. 3, which also gives details of the bushes required. After insertion, the bushes should be filed flush with the boom faces and finally reamed through to the dimensions given. Reassemble the reinforcing plates as originally.

12. If the holes in the reinforcing plates are damaged (see para. 8) they should be reamed and bushed in accordance with instructions given in Fig. 1A. The bushes should be filed flush with the faces of the plates, and any burrs removed. On completion of the repair, re-assemble the plates as previously.

**TABLE 68.**

**Pilot Bushes and Reamers for Attachment Holes —Centre Portion of Wing**

| Bush Part No. | Ident No. | Pilot Bushes Required | Ident. No. | Reamers Required | Remarks |
|---|---|---|---|---|---|
| 2.F.5917 | | 11.Z.3137 | | 11.Z.3113 | For front Spar Booms |
| | | 12.Z.3137 | | 12.Z.3113 | |
| | | 13.Z.3137 | | 13.Z.3113 | |
| | | 14.Z.3137 | | 14.Z.3113 | |
| 3.F.5917 | | 15.Z.3137 | | 15.Z.3113 | |
| | | 16.Z.3137 | | 16.Z.3113 | |
| | | 17.Z.3137 | | 17.Z.3113 | |
| | | 18.Z.3137 | | 18.Z.3113 | |
| 4.F.5917 | | 23.Z.3137 | | 23.Z.3113 | |
| | | 24.Z.3137 | | 24.Z.3113 | |
| | | 25.Z.3137 | | 25.Z.3113 | |
| | | 26.Z.3137 | | 26.Z.3113 | |
| 5.F.5917 | | 2.Z.3137 | | 2.Z.3113 | |
| | | 3.Z.3137 | | 3.Z.3113 | |
| | | 4.Z.3137 | | 4.Z.3113 | |
| | | 5.Z.3137 | | 5.Z.3113 | |
| | | 6.Z.3137 | | 6.Z.3113 | |
| 6.F.5917 | | 15.Z.3137 | | 15.Z.3113 | For Rear Spar Booms |
| | | 16.Z.3137 | | 16.Z.3113 | |
| | | 17.Z.3137 | | 17.Z.3113 | |
| | | 18.Z.3137 | | 18.Z.3113 | |
| 7.F.5917 | | 7.Z.3137 | | 7.Z.3113 | |
| | | 8.Z.3137 | | 8.Z.3113 | |
| | | 9.Z.3137 | | 9.Z.3113 | |
| | | 10.Z.3137 | | 10.Z.3113 | |

**TABLE 69.**

**Material for Repair of Holes for Main and Secondary Attachment Bolts and Engine Rib Bolts in Front and Rear Spar—Centre Portion Wing**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2.F.5917 | Bush | 3/4 in. o/d. | S1 or T45 | Front spar secondary hole |
| | 3.F.5917 | Bush | 15/16 in. o/d. | S1 or T45 | Front spar secondary hole |
| | 4.F.5917 | Bush | 1-3/16 in. o/d. | S1 or T45 | Front spar secondary hole and engine rib. |
| | 5.F.5917 | Bush | 1-7/8 in o/d. | S1 or T45 | Front spar main hole |
| | 6.F.5917 | Bush | 15/16 in. o/d. | S1 or T45 | Rear spar secondary hole and engine rib holes |
| | 7.F.5917 | Bush | 1-3/8 in. o/d. | S1 or T45 | Rear spar main hole |

**Skin**

**Skin Repair—Intermediate Portion of Outer Wing**

13. Extensive damage to the skin in the form of a large hole or a series of small holes in close proximity should be repaired by patching. The damaged skin panel should be cut back to the nearest ribs and existing skin lap joints, and a new skin panel positioned and riveted as shown in Fig. 6.

**TABLE 70.**
**Material for Repair of Main Plane Top or Bottom Skin**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Patch, aluminium alloy | 18 s.w.g. | D.T.D. 546 | For top and bottom skin |
| H128F/61177 | 6/SS.3123 | Rivet, pop dome head | 1/8″ dia. | D.T.D. 10B | For bottom skin repair only |
| H128F/61178 | 7/SS.3123 | Rivet, pop dome head | 1/8″ dia. | D.T.D. 10B | |
| H128F/61189 | 20/SS.3123 | Rivet, pop dome head | 5/32 in. dia. | D.T.D. 10B | |
| H128F/30311 | (E) D2528/2B4/4 | Rivet, mushroom head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | For top skin repair only |
| H128F/30312 | (E) D2528/2B4/5 | Rivet, mushroom head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |

**Skin Repair—Outer Portion Outer Wing**

14. Extensive damage to the skin in the form of a large hole or a series of small holes in close proximity should be repaired by patching. The damaged skin panel should be cut back to the nearest ribs and existing skin lap joints, and a new panel of skin positioned and riveted as shown in Fig. 7.

**TABLE 71.**
**Material for Repair of Main Plane Top and Bottom Skin, Outer Portion—Outer Wing**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Patch, aluminium alloy | 20 s.w.g. | D.T.D. 390 | For top or bottom skin |
| H128F/61175 | 4/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | For bottom skin repair only |
| H128F/61176 | 5/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | |
| H128F/61178 | 7/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | |
| | (E) D2528/2B4/7 | Rivet, mushroom head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | For top skin repair only |
| H128F/30311 | (E) D2528/2B4/4 | Rivet, mushroom head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/30312 | (E) D2528/2B4/5 | Rivet, mushroom head | 1/8 in. dia. x 5/16 in, | D.T.D. 327 | |

**Skin Repair at Rear Spar, Intermediate Portion**

15. Extensive damage to the skin in the vicinity of the rear spar, should be repaired with a flush patch as described below, after the spar has been repaired.

16. The damaged portion of skin should be cut away midway between existing screws. When removing the grub screws, care should be taken not to damage the holes in any way, see NOTE —.

17. A new panel of skin the same gauge as the original should be inserted and secured, with a backing strip riveted to the existing skin and insertion; two jointing strips should be positioned on the boom to pick up at least six screw holes each side of the skin panel joint, as illustrated in Fig. 8.

NOTE:—

(i) If the Parker Kalon screws or the existing holes are damaged, either in removal or insertion, the holes must be drilled and tapped 2 B.A. and screws SS/3830 used in place of Parker Kalon screws.

(ii) If the countersink 2 B.A. screw is oversize or damaged, screw SS/3934 should be used.

(iii) If the hole for a 2 B.A. screw is defective it should be drilled and tapped $\frac{1}{4}$ in. B.S.F. and screw SS/3957 used.

(iv) To lock the above screws, jointing compound must be applied under the head before finally screwing down.

IMPORTANT:—

The method of extraction and renewal of broken Parker Kalon screws is given in Chapter 9, paras. 16 to 19, and it is most important that the instructions given be strictly adhered to.

**TABLE 72.**
**Material for Skin Repair at Rear Spar, Intermediate Portion**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 546 | For 18 S.W.G. skin patch and backing strip |
| H128F/61176 | 5/SS.3123 | Rivet, pop dome head Parker Kalon self-tapping screw No. 7 | 1/8 in. dia. | D.T.D. 10B | |

**Stringers and Stiffeners**

**Insertion Repair to Main Plane Stringers, Top Hat and Lipped Angle Section**

18. Damage to a stringer or stiffener in excess of that defined in Chapter 6, paras. 8 and 10, of Part 1, necessitates the insertion of a new section of stringer as described below:—

**Top Hat Section Stringer**

(i) The damaged top hat section should be cut away between rivet holes, see detail A, Fig. 9, a new section of stringer Part No. 219/SS1793 inserted, and secured, with an oversize top hat section riveted in conjunction with the insertion piece and original section, using 10/SS.3123 rivets, pitched as shown. The oversize top hat section should be made to extend at least 2-5/8 in. either side of the butt joint.

**Lipped Angle Section Stringer**

(ii) The damaged section of stringer should be cut away as shown at detail B, Fig. 9. A new section of stringer cut from Part No. 76/SS.1793 should be inserted and secured with a jointing angle section made from 22 S.W.G. Aluminium Alloy, or alternatively, the jointing angles may be made by increasing the radii of the lip of section Part No. 76/SS.1793 (see Note on Fig. 9). The jointing angles should be made to extend at least 2-1/2 in. either side of the butt joint and should be riveted as shown.

NOTE:—

The skin in both cases should be riveted in conjunction with the insertion utilising the existing holes in the skin.

19. For repairs to the skin reference should be made to Chapter 6, paras. 4 or 6 of Part 1.

**TABLE 73.**
**Material for Repair of Main Plane Stringers Top Hat and Lipped Angles**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Angle section, lipped | 22 s.w.g. | D.T.D. 390 | For repair of lipped angle section stringers |
| | 76/SS.1793 | Insertion section | 22 s.w.g. | | For lipped angle section stringers |
| H128F/31627 | (E) D2528/2S4/3 | Rivet, snap head | 1/8 in. dia. x 3/16 in. | D.T.D. 327 | |
| H128F/61175 | 4/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | For lipped angle section stringers |
| | | Top hat section | 18 s.w.g. | D.T.D. 390 | For repair of top hat section stringers |
| | 219/SS.1793 | Insertion section | 18 s.w.g. | | |
| H128F/61178 | 7/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | For top hat section stringers |
| H128F/61180 | 10/SS.3123 | Rivet, pop dome head | 3/16 in. dia. | D.T.D. 10B | For top hat section stringers |

**Patch and Insertion Repair to "T"—Section Stringer, Nose Portion, Intermediate and Outer Wings**

20. Providing that the damage to a "T" section stringer is confined to one flange only, and does not exceed 2 in. in length nor extend more than 1/2 in. into the section, it may be repaired by patching as shown in Fig. 10.

21. Damage greater than that described above will necessitate an insertion. The damaged portion of stringer should be cut away and a new portion, cut from Section 165/SS.3075, inserted and secured with internal angles, riveted to the insertion section and original with a minimum of 6 rivets either side of the joint in the centre flange; tack rivet the angles to the two top flanges. To complete the repair, rivet the angles and T-section in conjunction with the skin, utilising the standard rivet holes in the skin. The skin should be repaired as defined in Chapter 6, paras. 4 to 6 of Part 1.

22. A similar repair to a larger T-section stringer is shown in Fig. 11, and reference should be made to this drawing for information on the positioning of the above angles to the section.

**TABLE 74.**
**Material for Insertion and Patch Repair—T-Section Stringer**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Patch plate | 16 s.w.g. | D.T.D. 390 | For patch repair |
| | | Packing | 16 s.w.g. | D.T.D. 390 | |
| H128F/5719 | (E) D2528/2CW4-4 | Rivet, countersunk head | 1/8 dia. | D.T.D. 327 | |
| | 8/SS.3790 | Rivet, pop dome head | 1/8 dia. | S1 | |
| | | Joint Angle | 16 s.w.g. | D.T.D. 390 | For insertion repair |
| | 165/SS.3075 | Insertion section | | L.40 | |
| H128F/30269 | (E) D2528/2S4/6 | Rivet, snap head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, countersunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| | 8/SS.3790 | Rivet, pop dome | | S.1 | |

**Insertion Repair to "T" Section Stiffener Centre and Intermediate Portions**

22. Damage to a "T" section stiffener in excess of that defined in Chapter 6, para. 12 of Part 1, for a trailing edge "T" Section stiffener, necessitates an insertion.

23. The damaged section should be cut away and a new section of stiffener, cut from 58/SS/3075, inserted, and secured, with joint angles of 16 S.W.G. Aluminium Alloy, as shown in Fig. 11. The joint angles should extend at least 2-1/2 ins. either side of the damage and should be tack riveted to the original and insertion section, using (E) D2528/2CW4/4 rivets. Finally rivet the angles to the T-section utilising the existing skin rivet holes as shown.

24. On completion of the repair the skin should be repaired as defined in Chapter 6, para. 4 or 6 of Part 1.

**TABLE 75.**
**Material for Insertion Repair "T" Section Stiffener**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 16 s.w.g. | D.T.D. 390 | For repair angles |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, countersunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/30269 | (E) D2528/2S4/6 | Rivet, snap head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |
| | 58/SS.3075 | Extrusion | | | For insertion section |

**Insertion Repair to Main Plane Trailing Edge, Section 11/SS./3075**

25. Damage to the extruded section of the trailing edge in excess of that defined in Chapter 6, para. 45 of Part 1, necessitates the insertion of a new section.

26. The damaged trailing edge section should be cut away so as to form a half flap joint as shown at B in Fig. 12. Fit a new portion of trailing edge section, cut from a spare, to the size of the cleaned out damage, rivet together using (E) D2528/2CW3/10 and 2CW3/8 Rivets respectively, as shown at Section A.A.

**TABLE 76.**
**Material for Insertion Repair, Main Plane Trailing Edge Section**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 10/SS.3075 | Trailing edge section | — | — | For insertion |
| H128F/30316 | (E) D2528/2B4/10 | Rivet, mushroom head | 1/8 in. dia. | D.T.D. 327 | |
| H128F/5830 | (E) D2528/2CW3/10 | Rivet, countersunk head | 3/32 in. dia. | D.T.D. 327 | |
| H128F/58085 | (E) D2528/2CW3/8 | Rivet, countersunk head | 3/32 in. dia. | D.T.D. 327 | |

**Insertion Repair to Trailing Edge Section 9/SS./3075 Outer Portion Wing**

27. Damage greater than that defined in Chapter 6, para. 45 of Part 1, necessitates an insertion.

28. The damaged section of trailing edge should be cut away so as to form a half-lap joint, as shown at A, Fig. 13. From a spare trailing edge section, Part No. 9/SS./3075, cut a portion to fit into the size of the cleaned out damage as shown at B. Rivet together using (E) D2528/2CW3/4 and 2CW3/5 rivets, positioned so as to avoid the existing skin riveting as shown.

**TABLE 77.**
**Material for Insertion Repair, Trailing Edge Section 9/SS.3075**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 9/SS.3075 | Extrusion, magnesium alloy | — | D.T.D. 259 | For insertion |
| H128F/5720 | (E) D2528/2CW3/4 | Rivet, 120° countersunk head | 3/32 in. dia. | D.T.D. 327 | |
| H128F/5730 | (E) D2528/2CW3/5 | Rivet, 120° countersunk head | 3/32 in. dia. | D.T.D. 327 | |

**Patch and Insertion Repairs to Wing Tip Trailing Edge Stringer**

29. Damage to the trailing edge stringers in excess of that defined in Chap. 6, para. 14 of Part 1, should be repaired by patching (see sub-para. (i) below); provided that the damage does not exceed 1½ ins. in length and does not extend more than 3/4 in. into the section.

30. Damage greater than that described above will necessitate an insertion as described in sub-para. (ii).

**Patch Repair**

(i) The damage should be cleaned out and the stringer hammered back as near as possible to its original shape. The repair sleeve of 24 S.W.G. aluminium alloy should be made to wrap snugly around the existing stringer, and should extend at least 1-1/2 in. either side of the cleaned out damage, as shown in Fig. 14, Detail A. The sleeve patch should be secured to the stringer using 4/SS.3123 and (E) D2528/2S3/4 rivets.

**Insertion Repair**

(ii) The damaged portion of stringer should be cut out, the cuts being made midway between rivet holes; a new section, cut from a spare stringer if available, should be inserted and secured with a joint sleeve of 24 S.W.G. aluminium alloy. The sleeve should be made to fit snugly around the existing stringer, as shown at "B" in Fig. 14, and should extend at least 1-3/4 in. either side of the butt joint. Rivet together as shown.

**TABLE 78.**
**Material for Patch and Insertion Repair, Wing Tip Trailing Edge**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 24 s.w.g. | D.T.D. 390 | For patch and insertion wrapper plates |
| H128F/61175 | 4/SS.3123 | Rivet, pop dome head | 1/8 in. dia. x 0.19 | D.T.D. 10B | |
| H128F/30251 | (E) D2528/2S3/4 | Rivet, snap head | 3/32 in. dia. x 1/4 in. | D.T.D. 327 | |

**Insertion Repair to Aileron Shroud Attachment Angle**

31. Damage to the aileron shroud attachment angle in excess of that defined in Chapter 6, para. 12 of Part 1, for the trailing edge "T" section stiffeners, necessitates an insertion.

32. The damaged section should be cut out midway between rivet pitches. A new angle section of the same size and material as the original inserted, and secured with internal joint angles of 18 S.W.G. Aluminium alloy, extending at least 4-3/4 in. either side of the butt joints. Rivet together using (E) D2528/2CW4/4 rivets, the rivets being staggered as shown in Fig. 15.

33. On completion of this repair the skin should be renewed as described in Chapter 1, para. 8 to 10, and the appropriate drawings listed in Table "A".

NOTE:—
When the angle is fitted to the trailing edge, the insertion joints should be centrally placed between two ribs.

**TABLE 79.**
**Material for Insertion Repair, Aileron Shroud Attachment Angle**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | Joint angle |
| H128F/5719 | (E) D2528/2CW4-4 | Rivet, countersunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**TABLE 80.**
**Material for Patch Repairs to Main Plane Spar Webs**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 9 s.w.g. | D.T.D. 546 | For patch plates |
| | | Sheet, alum. alloy | 12 s.w.g. | D.T.D. 546 | |
| | | Sheet, alum. alloy | 14 s.w.g. | D.T.D. 546 | |
| | | Sheet, alum. alloy | 16 s.w.g. | D.T.D. 546 | |
| | | Sheet, alum. alloy | 18 s.w.g. | D.T.D. 546 | |
| | | Sheet, alum. alloy | 20 s.w.g. | D.T.D. 546 | |
| | (E) D2528/2CW8/9 | Rivet, countersunk head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | For 9 s.w.g. patches |
| | (E) D2528/2CW7/8 | Rivet, countersunk head | 7/32 in. dia. x 1/2 in. | D.T.D. 327 | For 12 s.w.g. patches |
| H128F/30288 | (E) D2528/2S6/6 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | For 14 s.w.g. patches |
| H128F/30280 | (E) D2528/2S5/5 | Rivet, snap head | 5/32 in. dia. x 5/16 in. | D.T.D. 327 | For 16 s.w.g. patches |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | For 18 s.w g. patches |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | For 20 s.w.g. patches |

## Spars

### Patch Repairs to Main Plane Spar Webs

34. Damage to the webs of the centre or outer main plane spars, in excess of that defined in Chapter 6, paras. 17 and 18 of Part 1, should be repaired by a circular or rectangular patch as shown in Fig. 16, provided that the damage after being cleaned out does not exceed the following limits:—

(i) A rectangle 6 ins. by 4 ins.

(ii) A circle 6 ins. in diameter.

35. For repairs to damage greater than that described above, refer to para. 36.

### Insertion Repair to Main Plane Spar Webs

36. Damage to the main plane spar webs in excess of that defined in para. 34, necessitates the insertion of a new section of web as described below.

37. (i) The damaged section of web should be cut away. When removing the bolts or rivets through the spar web, care should be taken not to damage the holes in any way.

(ii) A new portion of web of the same gauge and material as the original should be inserted, leaving a 1/16 in. gap, at the joints.

(iii) Utilising the existing bolt holes in the spar boom, carefully drill holes of the same size through the web insertion. Insert bolts the same size as the original and lock the nuts in accordance with instructions given in Chapter 1, para. 25 of Part 1.

(iv) Table 81 sets out the specification and gauge sizes of the joint plates for various sections of the spars, and before making up these plates, reference should be made to this Table and also Fig. 17, which gives details of the plates together with the distance that the plates should extend either side of the damage. The joint plates should be positioned and riveted as annotated at dimension A, B, C and D.

**TABLE 81.**
**Material for Insertion Repair to Main Plane Spar Webs**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 9 s.w.g. | D.T.D. 546 | For patch plates |
| | | Sheet, alum. alloy | 12 s.w.g. | | |
| | | Sheet, alum. alloy | 14 s.w.g. | | |
| | | Sheet, alum. alloy | 16 s.w.g. | | |
| | | Sheet, alum. alloy | 18 s.w.g. | | |
| | | Sheet, alum. alloy | 20 s.w.g. | | |
| H128F/ | (E) D2528/2CW8/9 | Rivet, countersunk head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | For 9 s.w.g. patch |
| H128F/ | (E) D2528/2CW7/8 | Rivet, countersunk head | 7/32 in. dia. x 1/2 in. | D.T.D. 327 | For 12 s.w.g. patch |
| H128F/30288 | (E) D2528/2S6/6 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | For 14 s.w.g. patch |
| H128F/30280 | (E) D2528/2S5/5 | Rivet, snap head | 5/32 in. dia. x 5/16 in. | D.T.D. 327 | For 16 s.w.g. patch |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | For 18 s.w.g. patch |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | For 20 s.w.g. patch |

### Patch Repair to Top Boom Flanges of Trailing Edge Spar

38. Damage greater than that defined in Chapter 6, para. 21 of Part 1, should be repaired by patching as described in para. 39 and 40, provided that the damage does not exceed the following limits.

(i) On the vertical flange, the damage must not be longer that 3 inches and must not extend more than 3/8 inch into the section.

(ii) On the horizontal flange, the damage must not be longer than 4 inches and must not extend more than 7/16 in. into the section.

39. In both cases, the damage must be cleaned out to the dimensions given in subparas. (i) and (ii). A packing piece of the same gauge and material as the existing flange inserted, and secured, with internal angle

patches made up of 18 S.W.G. steel, D.T.D. 124A, as shown in Fig. 18.

40. In the case of the vertical flange where it is necessary to use bolts instead of rivets, the bolts should be locked with a centre punch. (See Part 1, Chapter 1, para. 25.)

**TABLE 82.**
**Material for Patch Repair to Top and Bottom Flanges T/E Spar**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, steel | 18 s.w.g. | D.T.D. 124A | Reinforcing angle |
| | | Sheet, aluminium alloy | 10 s.w.g. | D.T.D. 390 | Packing piece |
| | | Sheet, aluminium alloy | 12 s.w.g. | D.T.D. 390 | Packing piece |
| H28/7291 | A15Y/3E | Bolt | 1/4 in. B.S.F. | | |
| H28/756 | A16Y/EP | Nut | 1/4 in. B.S.F. | | |
| A73/951 | 4/SS.3115 | Washer | 1/4 in. B.S.F. | | |
| H128F/5720 | (E) D2528/2CW3/4 | Rivet, countersunk head | 3/32 in. dia. | D.T.D. 327 | |
| H128F/6041 | (E) D2528/2CW5/6 | Rivet, countersunk head | 5/32 in. dia. | | |
| H128F/5822 | (E) D2528/2CW6/7 | Rivet, countersunk head | 3/16 in dia. x 7/16 in. | | |
| H128F/6335 | (E) D2528/2CW8/8 | Rivet, countersunk head | 1/4 in. dia. x 1/2 in. | | |

**Patch Repairs to Bottom Boom Flanges of Trailing Edge Spars**

41. Damage greater than that defined in Chapter 6, para. 21 of Part 1, should be repaired by patching as described in paras. 42 and 43 provided that the damage, when cleaned out, does not exceed the following limits.

(i) In the vertical portion, damage must not exceed more than 4 in. in length nor extend more than 1-3/8 in. into the section.

(ii) In the horizontal portion, damage must not exceed more than 4 ins. in length nor extend more than 5/16 in. into the section.

42. In both cases the damage should be cleaned out to a regular shape, a packing piece the same gauge and specification as the original inserted and secured with 18 S.W.G., D.T.D. 124A steel angles, riveted to the inside of the boom, as shown in Fig. 19.

43. The bolts, Part No. A15Y.EP, in the vertical portion of the flange, should be cut to the required length and locked in accordance with instructions given in Part 1, Chapter 1, para. 25.

**TABLE 83.**
**Material for Patch Repair to Bottom Boom Flanges T/E Spar**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, steel | 18 s.w.g. | D.T.D. 124A | |
| | | Sheet, aluminium alloy | 10 s.w.g. | D.T.D. 390 | For packing |
| | | Sheet, aluminium alloy | 12 s.w.g. | D.T.D. 390 | |
| H28/7291 | A15Y/3E | Bolt | 1/4" B.S.F. | | |
| H28/756 | A16Y/EP | Nut | 1/4" B.S.F. | | |
| A73/951 | 4/SS.3115 | Washer | 1/4" B.S.F. | | |
| H128F/5720 | (E) D2528/2CW3-4 | Rivet, countersunk head | 3/32 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/6041 | (E) D2528/2CW5-6 | Rivet, countersunk head | 5/32 in. dia. x 3/8 in. | | |
| H128F/6335 | (E) D2528/2CW8-8 | Rivet, countersunk head | 1/4 in. dia. x 1/2 in. | | |
| H128F/5822 | (E) D2528/2CW6-7 | Rivet, countersunk head | 3/16 in. dia. x 7/16 in. | | |

**Insertion Repairs to Top and Bottom Booms of Trailing Edge Spar, Outer Wings**

44. Damage greater than that defined in paras. 38 and 41 necessitates the insertion of a new section of spar boom, as follows:—

(i) The damaged portion of spar boom should be cut away, the cuts being made through the centre line of a spar attachment hole.

(ii) A new section of spar, cut from a spare, Part Nos. 96/SS.3075 or 97/SS.3075, whichever is required, should be inserted and secured with joint angles of 18 S.W.G. Steel, and reinforcing plates of 14 S.W.G. Steel affixed to the inside of the spar booms using A15Y/3E bolts, as illustrated in Fig. 20.

NOTE:—

The bolts should be cut to the required length, and should be locked in accordance with instructions given in Part 1, Chapter 1, para. 25.

45. On completion of the repair, the skin should be repaired as described in Chapter 1, paras 8 to 10 and the appropriate drawings listed in Table A.

**TABLE 84.**
**Material for Insertion Repairs to Booms T/E Spar**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet steel | 18 s.w.g. | D.T.D. 124A | |
| | | Sheet steel | 14 s.w.g. | D.T.D. 124A | |
| H27/7291 | A15Y/3E | Bolt | 1/4 in. B.S.F. | D.T.D. 327 | |
| H28/756 | A16Y/EP | Nut | 1/4 in. B.S.F. | D.T.D. 327 | |
| A73/951 | 4/SS.3115 | Washer | | | |
| H128F/6041 | (E) D2528/2CW5/6 | Rivet, countersunk head | 5/32 in. dia. x 3/8 in. | | |
| | (E) D2528/2CW8/10 | Rivet, countersunk head | 1/4 in. dia. x 5/8 in. | | |

**Insertion Repair to Top and Bottom Spar Boom—Trailing Edge—Centre Portion Wing**

46. Extensive damage to the top or bottom trailing edge spar boom necessitates an insertion.

47. The damaged portion should be cut away midway between spar attachment holes; a new section of spar, cut from a spare, Part No. 18/SS.3075 for the top boom or Part. No. 19/SS.3075 for the bottom boom, should be inserted and secured with 14 S.W.G. Steel reinforcing plates and 18 S.W.G. Steel joint angles bolted to the inside of the booms as shown in Fig. 21. The joint angles and plates should be made to extend for a minimum of 5-3/8 in. either side of the joint, and the bolts should be cut to length and locked with a centre punch. (See NOTE, para. 44.)

**TABLE 85.**
**Material for Insertion Repair, Spar Booms T/E, Centre Portion Wing**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 3.F.5141 | Reinforcing angle (top boom) | Steel 14 S.W.G. | D.T.D. 124A | Hardened and tempered |
| | 4.F.5141 | Joint angle (top boom) | Steel 18 S.W.G. | D.T.D. 124A | |
| | 5.F.5141 | Reinforcing angle (bottom boom) | Steel 14 S.WG. | D.T.D. 124A | |
| | 6.F.5141 | Joint angle (bottom boom) | Steel 18 S.W.G. | D.T.D. 124A | |
| H28/7291 | A15Y/3E | Bolt | 1/4 in. B.S.F. | | |
| H28/756 | A16Y/EP | Nut | 1/4 in. B.S.F. | | |
| A73/951 | 4.SS.3115 | Washer | | | |

**Insertion Repair to Bottom Boom—False Spar—Centre Portion Wing**

48. Extensive damage to the false spar will necessitate the insertion of a new portion of spar. The damaged portion should be cut out midway between nut plates, a new section of the same gauge and specification inserted and jointed with internal angles of 12 S.W.G. Aluminium alloy, riveted to the insertion and original section, as shown in Fig. 22. The nut plates should be assembled to the insertion piece as originally.

**TABLE 86.**
**Material for Insertion Repair, False Spar Boom, Centre Section**

| Ident No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Repair angle, alum. alloy | 12 s.w.g. | D.T.D. 390 | |
| H128F/5821 | (E) D2528/2CW4/7 | Rivet, countersunk head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| H28/6058 | CJI/SS.3148 | Simmonds single anchor nut | | | |
| H128F/58085 | (E) D2528/2CW3/8 | Rivet, countersunk head | 3/32 in. dia. | D.T.D. 327 | |
| H128F/5735 | (E) D2528/2CW4/6 | Rivet, countersunk head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/30314 | (E) D2528/2B4/7 | Rivet, mushroom head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |

**Insertion Repair to Bottom Boom Outboard False Spar**

49. Extensive damage to false spar boom will necessitate the insertion of a new portion of spar. The damaged portion should be cut out midway between hinged packings, a new portion, the same as the original inserted, and jointed, with a jointing piece and reinforcing strips. The reinforcing strips should be riveted to both sides of the flange utilising the existing rivet holes in the flange and web. The inside edge of the jointing piece should be radiused to fit snugly and should be tack riveted to the skin flange. The skin should then be renewed, and drilled in conjunction with the flange and jointing piece as shown in Fig. 23. For repairs to the skin refer to Chapter 1, Table "A".

**TABLE 87.**
**Material for Insertion Repair, Bottom Boom, Outboard False Spar**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Bar, dural | 1/4 in. x 1-3/8 in. | L.1 | Jointing piece |
| | | Sheet, alum. alloy | 14 s.w.g. | D.T.D. 390 | Reinforcing strips |
| H128F/5824 | (E) D2528/2CW6/9 | Rivet, countersunk head | 3/16 in. dia. | D.T.D. 327 | |
| H128F/31082 | (E) D2528/2B6/10 | Rivet, mushroom head | 3/16 in. dia. | D.T.D. 327 | |
| H128F/30291 | (E) D2528/2S6/10 | Rivet, snap head | 3/16 in. dia. | D.T.D. 327 | |

**Main Ribs**

**Patch Repair to Engine Mounting Rolled Section Rib Boom and Bracing Struts (Section 170/SS.1793).**

50. Damage to a rib boom or bracing strut, section 170/SS.1793, in excess of that defined in Chapter 6, para. 29 of Part 1, and providing that, when cleaned out, the damage to the free edge of a boom or strut does not extend more than 2½ inches into the section and is not wider than 3 inches, it may be repaired with a 12 s.w.g. Aluminium alloy patch positioned centrally over the damage and riveted to the section, as illustrated in Fig. 24.

51. More extensive damage than that defined above necessitates an insertion and should be repaired as defined in para. 63.

**TABLE 88.**
**Material for Patch Repair, Engine Mounting Rolled Section Booms and Bracing Struts**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 12 s.w.g. | D.T.D. 390 | |
| H128F/6063 | (E) D2528/2S6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |

**Patch Repairs to Crack in Rolled Section Rib Boom (Section 93/SS.1793).**

52. Damage to a rib boom in excess of that defined in Chapter 6, para. 29 of Part 1, involving a crack in the boom, should be repaired by patching, provided that the crack does not extend for more than 3/4 inch of the width of each of the two flanges. A 3/32 in. dia. hole should first be drilled at the extremities of the crack and the 20 S.W.G. patch positioned centrally over the damage and, riveted to the rib boom, as illustrated in Fig. 25.

**TABLE 88A.**
**Material for Patch Repair to Rolled Section Rib Boom**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 20 s.w.g. | D.T.D. 390 | For patch plate |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**Patch Repair to Extruded and Rolled Section Rib Booms (Section 93/SS.1793)**

53. Damage greater than that defined in para. 52, may be repaired by patching as described in sub-paras. (i) and (ii) provided that the damage does not exceed the limits defined therein.

**Extruded Section**

(i) Provided that after cleaning out, the damage to an extruded section does not exceed the width of one flange and is not longer than 1½ inches, it may be repaired with patch plates of 18 S.W.G. Steel, made to extend for 1¾ inches either side of the cleaned out damage, and riveted to the flange and cross section of the extrusion as shown at A in Fig. 26.

**Rolled Section**

(ii) Provided that after cleaning out, the damage to a rolled section does not exceed half the cross sectional area, and is not longer than 1½ ins., it may be repaired by riveting an 18 S.W.G. Aluminium alloy wrapper patch to the outside of the boom with a minimum of three rivets either side of the damage as shown at B, Fig. 26.

54. On completion of the repair, the skin should be repaired as described in Chapter 1, and the appropriate drawings listed in Table "A".

**TABLE 89.**
**Material for Repair to Extruded and Rolled Section Booms, 93/SS.1793**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, steel | 18 s.w.g. | D.T.D. 124A | Patch plate for extruded section |
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | Repair angle for rolled section |
| H128F/30267 | (E) D2528/2S4-4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**Patch and Insertion Repairs to Bottom Boom of Rib 1 (Section 105/SS.1793).**

55. Damage to the bottom boom of rib 1 in excess of that defined as negligible in Chapter 6, para. 29 of Part 1, and providing that the damage to a rib boom flange does not extend more than 1½ inches into the section and is not longer than 2 inches, it may be repaired by riveting a 16 S.W.G. aluminium alloy patch to both sides of the damaged flange as illustrated in Fig. 27.

56. Damage greater than that defined above

will necessitate the insertion of a new length of rib boom. The nut strip should first be removed. The damaged length of boom should then be cut away and a new length of boom section 105/SS.1793 should be cut to the required length. Clearance holes should be drilled in the new length to suit the holes in the nut strip. Insert the new section of boom and secure with internal joint channels and external joint plates riveted to the insertion piece and original boom, as shown in Fig. 28.

57. The length of nut strip which fouls the internal joint channel should be cut away and should be riveted to the jointing piece as shown.

**TABLE 90.**
**Material for Patch and Insertion Repair, Bottom Boom Rib 1.**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 390 | For patch repair |
| H128F/30289 | (E) D2528/2S6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/31012 | (E) D2528/2S8/8 | Rivet, snap head | 1/4 in. dia. x 1/2 in. | D.T.D. 327 | |
| | 105/SS.1793 | Boom rolled section | 14 s.w.g. | D.T.D. 390 | For insertion repair |
| | | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 390 | |
| H128F/31082 | (E) D2528/2S8/8 | Rivet, snap head | 1/4 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/31079 | (E) D2528/2B6/6 | Rivet, mushroom head | 3/16 in. dia. | D.T.D. 327 | |

**Patch and Insertion Repair to Rolled Section Rib (Section 169/SS.1793) Bracing Struts Inboard Engine Ribs**

**Patch Repair**

58. Providing that the damage in one flange of a member only does not extend more than 2½ inches into the section and is not wider than 3 inches, the repair may be effected by cleaning out the damage to a regular shape and patching. The patch should be made to extend for a minimum of 3 inches either side of the damage, and should be riveted to the damaged flange and opposite flange as shown in Fig. 29, Detail B.

**Insertion Repair**

59. More extensive damage than that defined above should be repaired by insertion. The damaged length of rib should be cut away and a new section, cut from Part No. 169/SS.1793, inserted. The butt joints should be secured with 12 S.W.G. Steel joint plates riveted to both flanges of the insertion and original section as shown in Fig. 29, Detail A.

**TABLE 91.**
**Material for Patch and Insertion Repair Rolled Section Rib 169/SS.1793**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Patch plate alum. alloy | 8 s.w.g. | D.T.D. 390 | For patch repairs |
| | (E) D2528/2S8-9 | Rivet, snap head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |
| | | Joint plate, steel | 12 s.w.g. | D.T.D. 124A | For insertion repair |
| | | Insertion section 169/SS.1793 | 8 s.w.g. | D.T.D. 390 | |
| | (E) D2528/2S8-9 | Rivet, snap head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |

**Insertion Repair to Rolled Section Rib Booms (Section 93/SS.1793).**

60. Damage to the rolled section rib booms in excess of that defined in para. 53 necessitates the insertion of a new length of boom. The damaged portion should be cut out between rivet pitches and a new length, cut from 93/SS.1793, inserted. The joint should be secured with a joint angle and reinforcing plate riveted to the new section and original, as shown in Fig. 30. On completion of the repair to the boom, the skin should be repaired as described in Chapter 1, paras. 8 to 10 and the appropriate drawings listed in Table "A".

**TABLE 92.**
**Material for Insertion Repair to Rolled Section Rib Boom 93/SS.1793**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | For all joint plates |
| | 93/SS.1793 | Rib Boom section | — | — | For insertion piece |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**Insertion Repair to Top Boom of Rib 1 Section 292/SS.1793)**

61. Damage to the top boom of rib 1 in excess of that defined in para. 55, necessitates the insertion of a new length of boom, cut from Section 292/SS.1793. The nut strip must first be removed, and clearance holes drilled in the new portion of boom to suit the holes in the nut strip. The butt joints should be secured with internal angles and reinforcing side plates riveted to the new and original section as shown in Fig. 31.

62. On completion of the insertion repair, the nut strip should be replaced, and the skin repaired as defined in Chapter 1, and the appropriate drawings listed in Table "A".

**TABLE 93.**
**Material for Insertion Repair to Top Boom of Rib 1, Section 292/SS.1793**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 292/SS.1793 | Boom section | 14 s.w.g. | | For replacement portion and repair plates |
| | | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 390 | |
| H128F/31079 | (E) D2528/2B6-6 | Rivet, mushroom head | 3/16 in. dia. | D.T.D. 327 | |
| H128F/31012 | (E) D2528/2S8-8 | Rivet, snap head | 1/4 in. dia. x 1/2 in. | D.T.D. 327 | |

**Insertion Repair to Engine Mounting Rolled Section Rib Booms and Bracing Struts (Sections 170, 171, 171A/SS.1793).**

63. Damage to an engine mounting rib boom or bracing struts which is in excess of that defined in para. 50, will necessitate the insertion of a new length of boom the same gauge and specification as the original. The butt joints should be secured with joint plates riveted on the outside of the boom flanges. The gauge and specification of the joint plates, together with riveting details are given at A, B and C in Fig. 32.

64. On completion of the repair to the top or bottom booms, the skin should be repaired as illustrated in the relevant drawings listed in Table A, Chapter 1.

**TABLE 94.**
**Material for Repair of Rolled Section Rib Booms and Bracing Struts**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, steel | 14 s.w.g. | D.T.D. 124A | For 10 s.w.g. booms and struts |
| | | Sheet, steel | 16 s.w.g. | D.T.D. 124A | For 12 and 14 s.w.g. booms and struts |
| H128F/ | (E) D2528/2S8/9 | Rivet, snap head | 1/4 in. dia. x 9/16 in. | D.T.D. 327 | |
| H128F/31012 | (E) D2528/2S8/8 | Rivet, snap head | 1/4 in. dia. x 1/2 in. | D.T.D. 327 | |

**Insertion Repair to Rolled and Extruded Section Rib Booms**

65. Damage to a rolled or extruded rib boom in excess of that defined in para. 53, necessitates an insertion as described below.

**Rolled Section B40/SS.3075**

66. The damaged portion of boom should be cut away midway between rivet pitches, a new

portion of boom, cut from B40/SS.3075, inserted and secured with an outer angle and two reinforcing plates riveted to the new and original section, as shown in Fig. 33.

**Extruded Sections 40/SS.3075 and 38/SS.3075**

67. In both cases the damaged portion of Rib should be cut away midway between rivet pitches and the new portion of boom inserted. The butt joints should be secured with three joint plates positioned and riveted to the two sections as shown at details A and B in Fig. 34.

NOTE:—

The insertion repair at "A" (Section 40/SS.3075) applies only to ribs 8, 11 and 16, and the insertion repair at "B" (section 38/SS. 3075) applies to Ribs 14, 15 and 17 only.

68. On completion of these repairs, the web and skin should be repaired as described in para. 64.

**TABLE 95.**
**Material for Insertion Repair, Rolled and Extruded Rib Booms**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet steel | 18 s.w.g. | D.T.D. 124A | |
| | 38.SS.3075 | Rib boom section | | | |
| | 40.SS.3075 | Rib boom section | | | |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. long | D.T.D. 327 | For insertion repairs to extruded sections |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| | | Angle, alum. alloy | 16 S.W.G. | D.T.D. 390 | For insertion repair to rolled section |
| | | Plate, alum. alloy | 16 S.W.G. | D.T.D. 390 | |
| | | Plate, alum. alloy | 16 S.W.G. | D.T.D. 390 | |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/30269 | (E) D2528/2S4/6 | Rivet, snap head | 1/8 in. dia. x 3/8 in. | D.T.D. 327 | |

**Tank Access Doors**

**Insertion Repair to Door Stiffener, Centre Portion Wing**

69. Damage to a tank access door stiffener in excess of that defined in Chapter 6, para. 33 of Part 1, necessitates an insertion. The damaged portion of stiffener should be cut away midway between rivet pitches and a new length of section the same as the original inserted. The butt joints should be secured with an oversize top hat section riveted to the insertion piece and the original as shown in Fig. 33.

70. The skin should be repaired as described in para. 64.

**TABLE 96.**
**Material for Insertion Repair to Door Stiffener, Centre Portion Wing**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| H128F/61178 | 7/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | |
| H128F/61181 | 11/SS.3123 | Rivet, pop dome head | 3/16 in. dia. | D.T.D. 10B | |
| | | Sheet, alum. alloy | 14 s.w.g. | D.T.D. 390 | |

**Flaps**

**Patch Repair to Outer Skin**

71. Damage greater than that defined in Chapter 6, para. 40 of Part 1, and which, when cleaned out, does not exceed an area 9 in. x 6 in. should be repaired by inserting a packing piece to the size of the cleaned out damage, and fitting a patch. The patch should extend for two corrugations either side of the damage, and the rivet pitch should be arranged to pick up the existing skin riveting in alternate corrugations, as shown in Fig. 36.

72. If the reinforcing corrugations are also damaged, a repair should be made as described in para. 79, in conjunction with the repair to the outer skins.

**TABLE 97.**
**Material for Patch Repair, Outer Skin, Flap**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 26 s.w.g. | D.T.D. 390 | |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, countersunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**Patch Repair to Outer Skin at Trailing Edge**

73. Damage to the outer skin at the trailing edge in excess of that defined in Chapter 6, para. 45 of Part 1, should be repaired by cutting away the damage to a regular shape and fitting a seating strip and flush patch. The seating strip and patch should be riveted to the trailing edge utilising the existing rivet holes, as illustrated in Fig. 37.

**TABLE 98.**
**Material for Patch Repair, Outer Skin Trailing Edge**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 24 s.w.g. | D.T.D. 390 or D.T.D. 546 | |
| | | Sheet, aluminium alloy | 26 s.w.g. | D.T.D. 390 or D.T.D. 546 | |
| H128F/61174 | 3/SS.3123 | Rivet, pop | 1/8 in. dia | D.T.D. 10B | |
| H128F/6041 | (E) D2528/2CW3/7 | Rivet, countersunk head | 3/32 in dia. x 7/16 in. | D.T.D. 327 | |

**Insertion Repair to Flap Spar**

74. Damage greater than that defined in Chapter 6, para. 37 of Part 1, should be repaired by cutting away the damaged portion of the spar between the existing rivets in the flange, and inserting a new length of the same gauge and specification as the original. The butt joints should be secured with wrap plates made to conform to the outside contour of the section, and should be riveted to the two sections, utilising the existing rivet holes in the flange. A typical repair is shown in Fig. 38.

75. On completion of the repair to the spar, the corrugations and skin, if damaged, should be repaired as described in paras. 71 and 79.

**TABLE 99.**
**Material for Insertion Repair, Flap Spar**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 16 s.w.g. | D.T.D. 390 | |
| H128F/61179 | 10/SS.3123 | Rivet, pop dome head | 3/16 in. dia. | D.T.D. 10B | |

**TABLE 100.**
**Material for Insertion Repair, Flap Rib**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 20 s.w.g. | D.T.D. 390 | |
| H128F/30267 | (E) D2528/2S4-4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2CW4/4 | Rivet, 120° countersunk head | 1/8 in. dia x 1/4 in. | D.T.D. 327 | |
| H128F/61176 | 5/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | Required only when outer skin is not removed |
| | F.4657 | Angle, reinforcing | — | | |

**Insertion Repair to Flap Rib**

76. Damage greater than that defined in Chapter 6, para. 39 of Part 1, should be repaired by cutting away the damaged portion of the rib and inserting a new portion, cut from a spare rib if available. The butt joints should be secured with a joint plate and reinforcing angle, riveted to the insertion piece and original, as shown in Fig. 40. Details of the joint plate and angle are shown in Fig. 40 and 39 respectively.

77. Damage to either end of the rib may be repaired in a similar manner, but using one only of the joints shown.

78. On completion of the repair to the rib, the corrugations and skin, if damaged, should be repaired as described in paras. 79 and 71 respectively.

**Patch Repair to Corrugations**

79. Damage greater than that defined in Chapter 6, para. 41 of Part 1, and which, when cleaned out, does not exceed 9 in. by 6 in. should be repaired by patching as shown in Fig. 41. The patch should be made to conform to the outside shape of the corrugations and the rivet pitch should be arranged to pick up the existing skin riveting in alternate corrugations as shown.

If the outer skin is also damaged, a repair of the type described in para. 71 should be made in conjunction with the repair to the corrugations.

**TABLE 101.**
**Material for Patch Repair to Corrugations, Flaps**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 26 s.w.g. | D.T.D. 390 | |
| H128F/61359 | 2/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | |
| H128F/5719 | (E) D2528/2CW4/4 | Rivet, countersunk head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**Insertion Repair to Trailing Edge Strip**

80. Damage to the trailing edge strip in excess of that defined in Chap. 6, para. 43 of Part 1, should be repaired by cutting away the damaged portion between two ribs, and inserting a new length of strip. The insert should overlap the existing section and should be riveted to the rib utilising the existing rivet holes, as illustrated in Fig. 42.

**TABLE 102.**
**Material for Insertion Repair, Trailing Edge Strip Flaps**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 24 s.w.g. | D.T.D. 390 | |
| H128F/61176 | 5/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | |
| H128F/6047 | (E) D2528/2CW3/6 | Rivet, countersunk head | 3/32 in. dia. x 3/8 in. | D.T.D. 327 | |
| H128F/ | (E) D2528/2CW3/7 | Rivet, countersunk head | 3/32 in. dia. x 7/16 in. | D.T.D. 327 | |

**TABLE 103.**
**Material for Insertion Repair, Trailing Edge Section 9/SS.3075**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 9/SS.3075 | Extrusion, magnesium alloy | | D.T.D. 259 | |
| H128F/5720 | (E) D2528/2CW3/4 | Rivet, countersunk head | 3/32 in. dia. x 1/4 in. | D.T.D. 327 | |
| H128F/5730 | (E) D2528/2CW3/5 | Rivet, countersunk head | 3/32 in. dia. x 5/16 in. | D.T.D. 327 | |

**Insertion Repair to Trailing Edge Section, 9/SS.3075**

81. Damage to the trailing edge member in excess of that defined in Chapter 6, para. 45 of Part 1, necessitates the insertion of a new length of section. This repair is the same as that described in para. 28, and reference should be made to that paragraph and the relevant drawing listed therein.

82. On completion of the repair to the trailing edge member, it may be found necessary to repair the trailing edge strip and the outer skin, and these repairs should be made in accordance with instructions described in Chapter 6, para. 43 of Part 1.

**Ailerons**

**Patch Repair to Aileron Spar Channel**

83. Damage greater than that defined in Chapter 6, para. 49 of Part 1, and which, when cleaned out, does not exceed 5 in. in length, nor extend beyond a point 7/8 in. from the undamaged flange, may be repaired by cutting away the damaged portion of spar channel to a regular shape and riveting a patch plate and packing plate to cover the damage as shown in Fig. 43.

84. More extensive damage than that defined above necessitates replacement of the damaged portion, the repair being effected as described in para. 85.

NOTE:—

The above repair should be made in conjunction with any repairs necessary to the aileron nose.

**TABLE 104.**
**Material for Patch Repair, Aileron Spar Channel**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Patch plate | 14 s.w.g. | D.T.D. 390 | |
| | | Packing plate | 14 s.w.g. | D.T.D. 390 | |
| H128F/61182 | 12/SS.3123 | Rivet, pop dome head | 3/16 in. dia. | D.T.D. 10B | |
| H128F/61183 | 13/SS.3124 | Rivet, pop countersunk head | 3/16 in. dia. | D.T.D. 10B | |

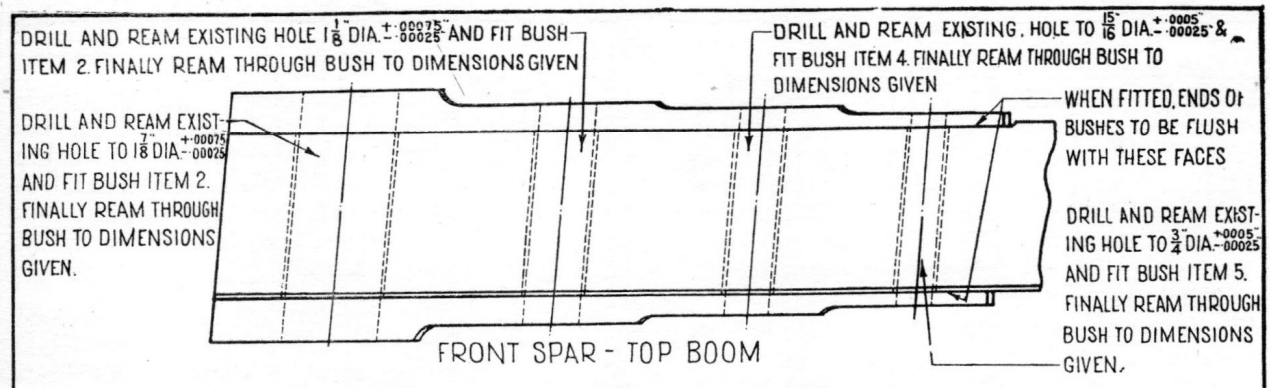
**Insertion Repair to Aileron Spar Channel**

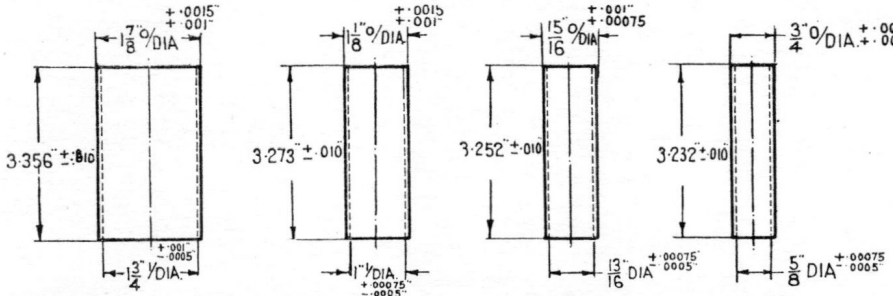
85. Damage to a spar channel in excess of that defined in para. 83, necessitates an insertion. The damaged length of spar should be cut out, the cuts being made conveniently between two ribs. The butt joints should be secured with Joint plates riveted to the inside of the spar channel utilising the existing rivet holes where shown in Fig. 44.

86. This repair should be made in conjunction with any repairs which are necessary to the aileron nose.

**TABLE 105.**
**Material for Insertion Repair, Aileron Spar Channel**

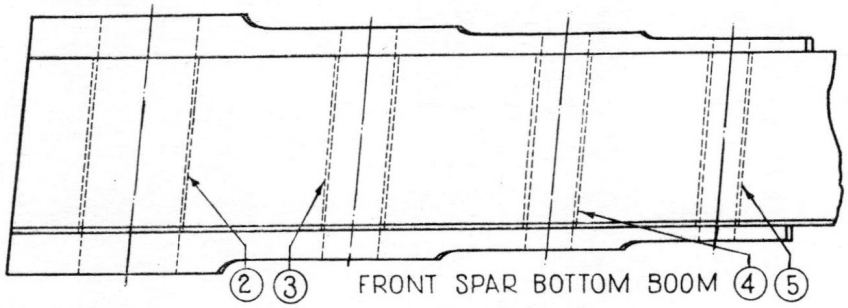
| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Joint plate | 14 s.w.g. | D.T.D. 390 | To suit spar channel |
| H128F/61182 | 12/SS.3123 | Rivet, pop dome head | 3/16 in. dia. | D.T.D. 10B | |
| H128F/61183 | 13/SS.3124 | Rivet, pop, countersunk head | 3/16 in. dia. | D.T.D. 10B | |
| | | Rivet, 90° countersunk head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | |



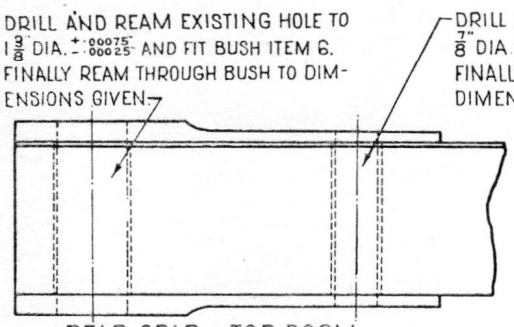



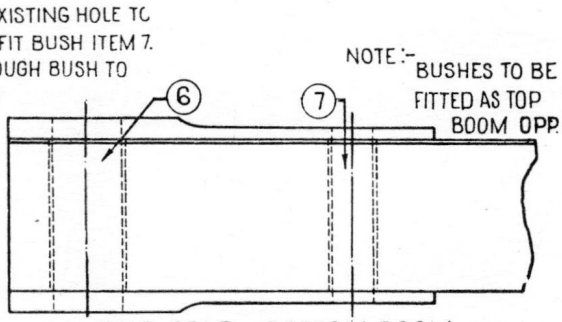

DETAIL OF ITEM 2. DETAIL OF ITEM 3. DETAIL OF ITEM 4. DETAIL OF ITEM 5.

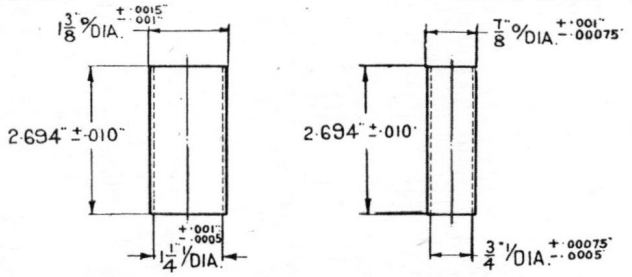
MATERIAL FOR BUSHES :- MILD STEEL BAR OR TUBE. SPEC.:- S.I. OR T.45.




NOTE:- BUSHES TO BE FITTED AS TOP BOOM ABOVE.




DETAIL OF ITEM 6. DETAIL OF ITEM 7.

MATERIAL FOR BUSHES :- MILD STEEL BAR OR TUBE SPEC.:- S.I. OR T.45.

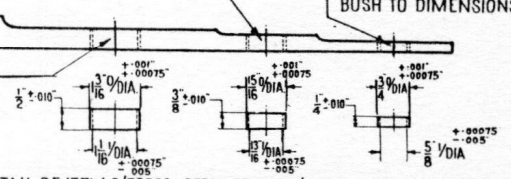
THIS WAS LINCOLN REPAIR F 5916

| | | |
|---|---|---|
| 1 | **BUSHING OF MAIN & SECONDARY ATTACHMENT HOLES**<br>INTERMEDIATE PORTION OF WING AT JOINT TO CENTRE PORTION | 1 |

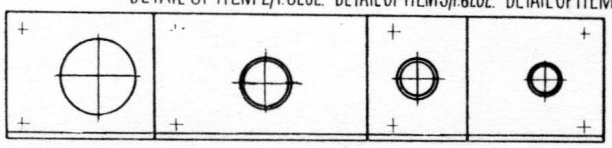
DRILL AND REAM EXISTING HOLE TO $\frac{15}{16}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 3 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN.

DRILL AND REAM EXISTING HOLE TO $\frac{3}{4}$ DIA. $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 4 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

DRILL AND REAM EXISTING HOLE TO $1\frac{3}{16}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 2 FINALLY REAM THROUG BUSH TO DIMENSIONS GIVEN




DETAIL OF ITEM 2/F6202. DETAIL OF ITEM 3/F6202. DETAIL OF ITEM 4/F6202

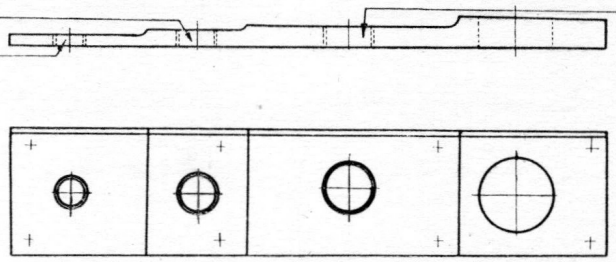


REINFORCING PLATE - BOTTOM BOOM - FRONT SPAR - CENTRE SECTION

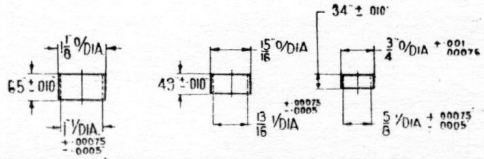
DRILL AND REAM EXISTING HOLE TO $\frac{15}{16}$ DIA $^{+.0005}_{-.00075}$ AND FIT BUSH ITEM 3 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

DRILL AND REAM EXISTING HOLE TO $\frac{3}{4}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 4 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

DRILL AND REAM EXISTING HOLE TO $1\frac{3}{16}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 2 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN



REINFORCING PLATE - TOP BOOM - FRONT SPAR CENTRE SECTION



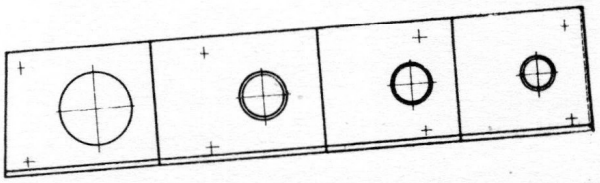

DETAIL OF ITEM 5/F6202 DETAIL OF ITEM 6/F6202 DETAIL OF ITEM 7/F6202

DRILL AND REAM EXISTING HOLE TO $1\frac{1}{8}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 5 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

DRILL AND REAM EXISTING HOLE TO $\frac{15}{16}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 6 FINALLY REAM THROUGH BUSH TO DIMENSION GIVEN

DRILL AND REAM EXISTING HOLE TO $\frac{3}{4}$ DIA $^{+.0005}_{-.00075}$ AND FIT BUSH ITEM 7 FINALLY REAM THROUGH BUSH TO DIMENSION GIVEN

WHEN FITTED ENDS OF BUSHES TO BE FLUSH WITH THESE FACES



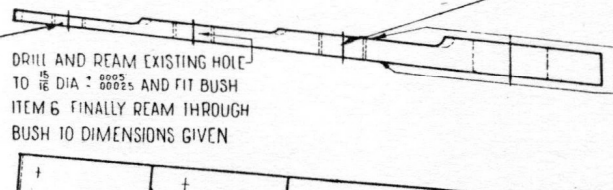
FRONT REINFORCING PLATE TOP & BOTTOM BOOMS FRONT SPAR JOINT-OUTER SECTION

DRILL AND REAM EXISTING HOLE TO $1\frac{1}{8}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 5 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

DRILL AND REAM EXISTING HOLE TO $\frac{3}{4}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 7 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

DRILL AND REAM EXISTING HOLE TO $\frac{15}{16}$ DIA $^{+.0005}_{-.00025}$ AND FIT BUSH ITEM 6 FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

WHEN FITTED ENDS OF BUSHES TO BE FLUSH WITH THESE FACES

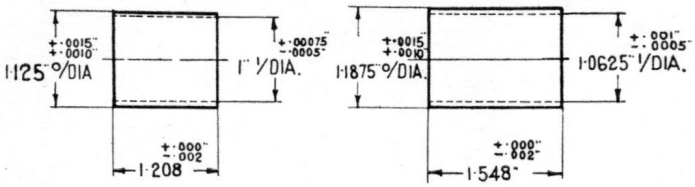


MATERIAL FOR BUSHES
STEEL BAR
SPEC DTD 331

REAR REINFORCING PLATE TOP & BOTTOM BOOMS FRONT SPAR JOINT OUTER SECTION

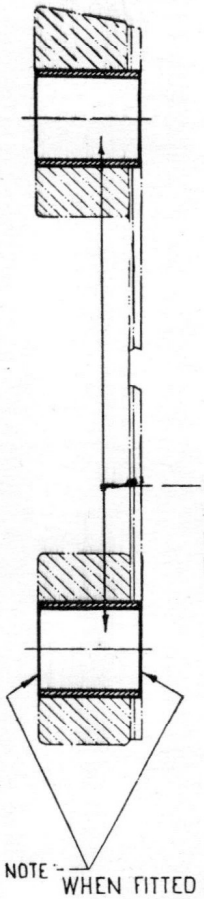
THIS WAS LINCOLN REPAIR F.6202

# 1A BUSHING OF SECONDARY ATTACHMENT HOLES - FRONT SPAR - INBOARD JOINT 1A



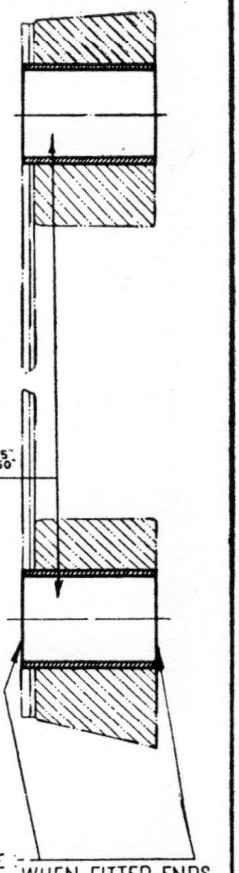

DETAIL OF ITEM 2/F.5915

DETAIL OF ITEM 3/F.5915.



DRILL AND REAM HOLE TO 1·125" DIA. AND FIT BUSH ITEM 2. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN.

NOTE :- WHEN FITTED ENDS OF BUSH MUST NOT PROTRUDE BEYOND THESE FACES



DRILL AND REAM HOLE TO 1·1875" AND FIT BUSH ITEM 3. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

NOTE :- WHEN FITTED ENDS OF BUSH MUST NOT PROTRUDE BEYOND THESE FACES.

REAR SPAR
INTERMEDIATE PORTION - WING - (OUTER ATTACHMENT HOLE) OUTER PORTION - WING

FRONT SPAR
INTERMEDIATE PORTION - WING - (OUTER ATTACHMENT HOLE) OUTER PORTION - WING.

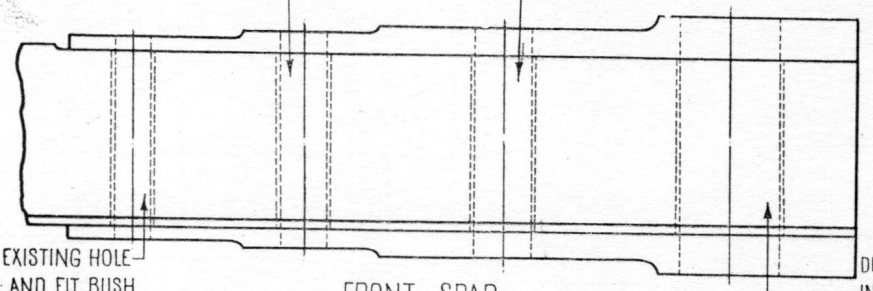
MATL :- MILD STEEL BAR OR TUBE
SPEC :- S.I. OR T.45.

THIS WAS LINCOLN REPAIR F.5915

| 2 | BUSHING OF MAIN ATTACHMENT HOLES INTER— MEDIATE PORTION WING TO OUTER PORTION WING | 2 |
|---|---|---|

DRILL AND REAM EXISTING HOLE TO $\frac{15}{16}$" DIA. $^{+\cdot0005}_{-\cdot00025}$" AND FIT BUSH ITEM 3. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN.

DRILL AND REAM EXISTING HOLES TO $1\frac{3}{16}$" DIA $^{+\cdot00075}_{-\cdot00050}$" AND FIT BUSH ITEM 4. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN.

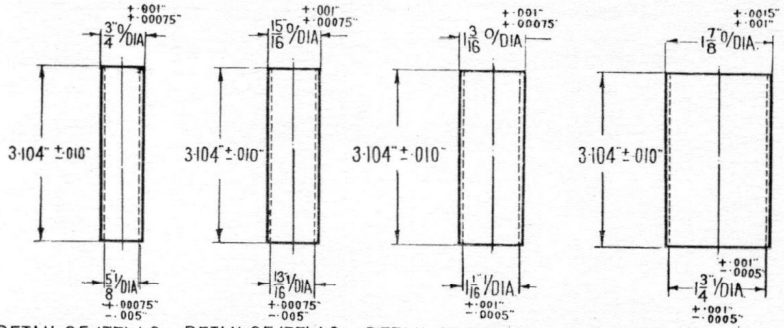


DRILL AND REAM EXISTING HOLE TO $\frac{3}{4}$" DIA. $^{+\cdot0005}_{-\cdot00025}$" AND FIT BUSH ITEM 2. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN

FRONT SPAR

TOP AND BOTTOM SPAR

DRILL AND REAM EXISTING HOLE TO $1\frac{7}{8}$" $^{+\cdot00075}_{-\cdot00025}$" AND FIT BUSH ITEM 5. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN.

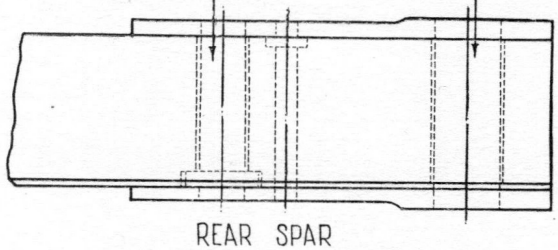



DETAIL OF ITEM 2. DETAIL OF ITEM 3 DETAIL OF ITEM 4. DETAIL OF ITEM 5

MATERIAL FOR BUSHES :- MILD STEEL BAR OR TUBE SPEC. S1 OR T.45.

DRILL AND REAM EXISTING HOLE $\frac{15}{16}$" DIA. $^{+\cdot0005}_{-\cdot00025}$" AND FIT BUSH ITEM 6. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN.

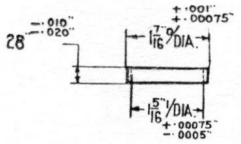
DRILL AND REAM EXISTING HOLE TO $1\frac{3}{8}$" DIA. $^{+\cdot00075}_{-\cdot00025}$" AND FIT BUSH ITEM 7. FINALLY REAM THROUGH BUSH TO DIMENSIONS GIVEN.



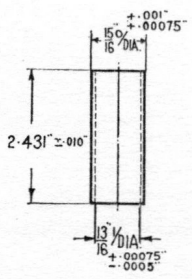
REAR SPAR

TOP AND BOTTOM BOOMS.

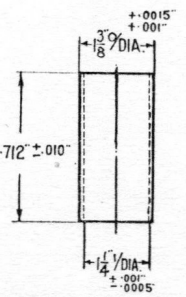
SEE TABLE 68 FOR PART Nº OF BUSHES




DETAIL OF ITEM 8.




DETAIL OF ITEM 6.

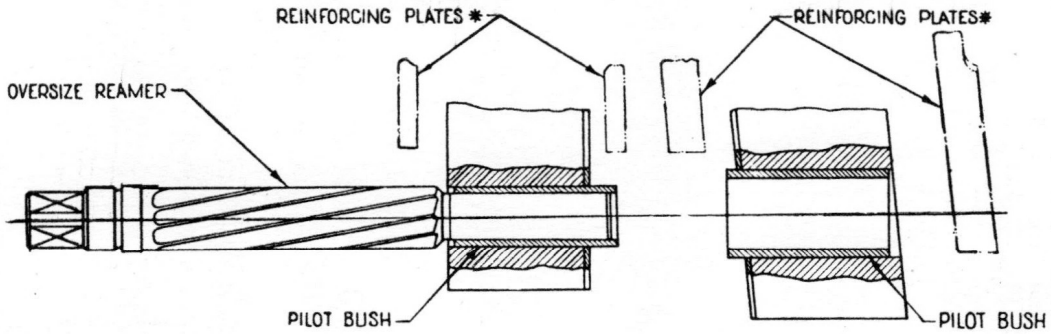



DETAIL OF ITEM 7

MATERIAL FOR BUSHES :- MILD STEEL BAR OR TUBE SPEC. S.I. OR T.45

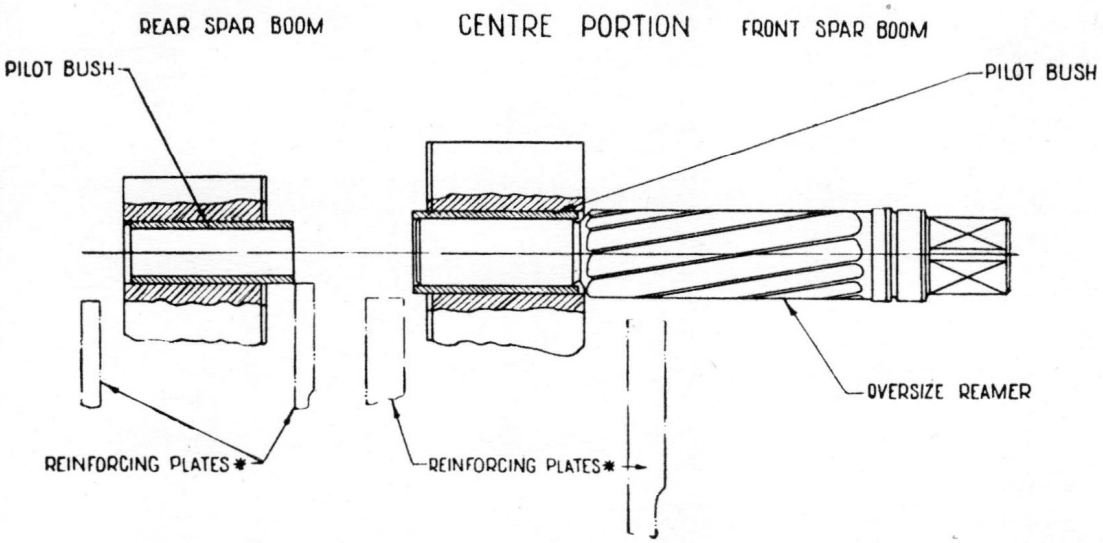
THIS DRAWING WAS F 5917

| 3 | BUSHING OF MAIN & SECONDARY ATTACHMENT HOLES IN CENTRE PORTION OF WING | 3 |
|---|---|---|




INTERMEDIATE PORTION

* NOTE - STEEL REINFORCING PLATES TO BE REMOVED PRIOR TO REAMING

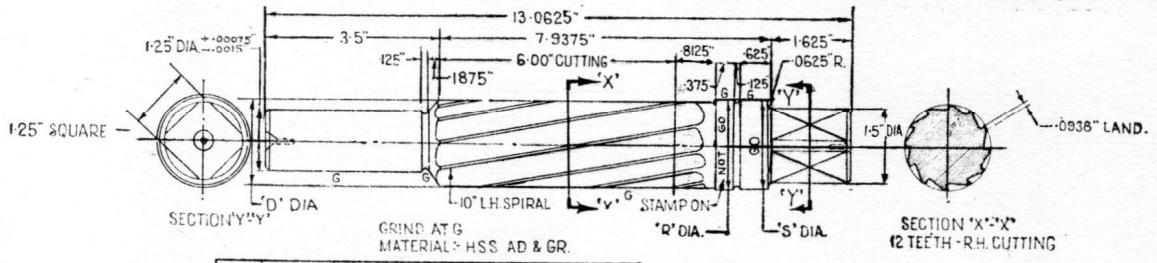



THE MAIN AND SECONDARY ATTACHMENT HOLES IN THE FRONT & REAR SPAR BOOMS ARE REAMED OUT FOR BUSHING USING A SEQUENCE OF PILOT BUSHES AND REAMERS INCREASING 030" SIZES

FOR REAMERS AND PILOT BUSHES CONCERNED REFERENCE SHOULD BE MADE TO THE TABLES THROUGHOUT THE TEXT OF THIS CHAPTER.

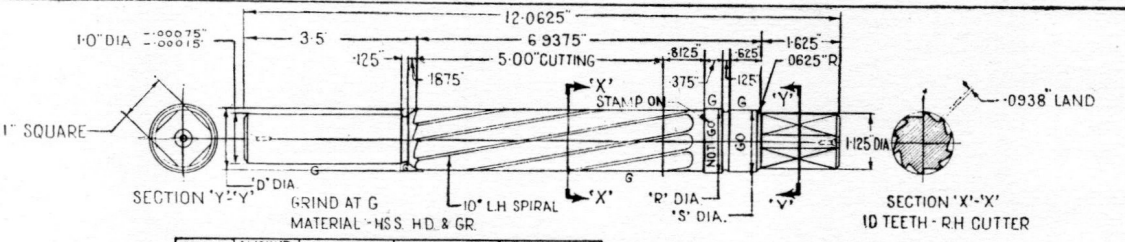
THIS DRG. WAS Z 3141

| 4 | METHOD OF REAMING ATTACHMENT HOLES | 4 |
|---|---|---|



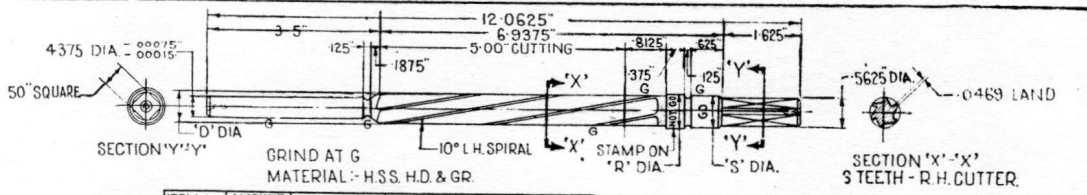

| ITEM Nº | AMOUNT OVERSIZE | 'D' DIA. | 'R' DIA. | 'S' DIA. |
|---|---|---|---|---|
| Z3113/2 | ·03" | 1·78" +·00075 −·00025 | 1·78" +·00075 +·00100 | 1·78" −·00025 −·00050 |
| Z3113/3 | ·0625" | 1·8125" +·00075 −·00025 | 1·8125" +·00075 +·00100 | 1·8125" −·00025 −·00050 |
| Z3113/4 | ·09" | 1·84" +·00075 −·00025 | 1·84" +·00075 +·00100 | 1·84" −·00025 −·00050 |
| Z3113/5 | ·125" | 1·875" +·00075 −·00025 | 1·875" +·00075 +·00100 | 1·875" −·00025 −·00050 |
| Z3113/6 | ·010" | 1·76" +·00075 −·00025 | 1·76" +·00075 +·00100 | 1·76" −·00025 −·00050 |

REAMERS FOR BUSHING MAIN ATTACHMENT HOLES IN FRONT BOOM SPAR



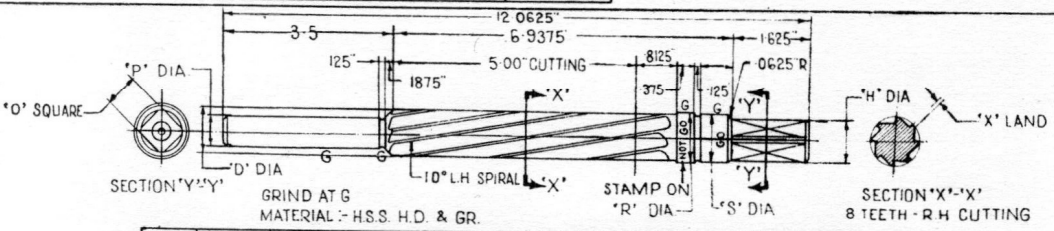

| ITEM Nº | AMOUNT OVERSIZE | 'D' DIA. | 'R' DIA. | 'S' DIA. |
|---|---|---|---|---|
| Z3113/7 | ·03" | 1·28" +·00075 −·00025 | 1·28" +·00075 +·00100 | 1·28" −·00025 −·00050 |
| Z3113/8 | ·0625" | 1·3125" +·00075 −·00025 | 1·3125" +·00075 +·00100 | 1·3125" −·00025 −·00050 |
| Z3113/9 | ·09" | 1·34" +·00075 −·00025 | 1·34" +·00075 +·00100 | 1·34" −·00025 −·00050 |
| Z3113/10 | ·125" | 1·375" +·00075 −·00025 | 1·375" +·00075 +·00100 | 1·375" −·00025 −·00050 |

REAMERS FOR BUSHING MAIN ATTACHMENT HOLES IN FRONT SPAR BOOMS



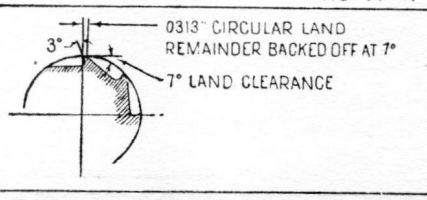

| ITEM Nº | AMOUNT OVERSIZE | 'D' DIA. | 'R' DIA. | 'S' DIA. |
|---|---|---|---|---|
| Z3113/11 | ·03" | ·655" +·005 −·00025 | ·655" +·005 +·00525 | ·655" −·00025 −·00050 |
| Z3113/12 | ·0625" | ·6875" +·005 −·00025 | ·6875" +·005 +·00525 | ·6875" −·00025 −·00050 |
| Z3113/13 | ·09" | ·715" +·005 −·00025 | ·715" +·005 +·00525 | ·715" −·00025 −·00050 |
| Z3113/14 | ·125" | ·75" +·005 −·00025 | ·75" +·005 +·00525 | ·75" −·00025 −·00050 |

REAMERS FOR BUSHING MAIN ATTACHMENT HOLES IN FRONT SPAR BOOMS



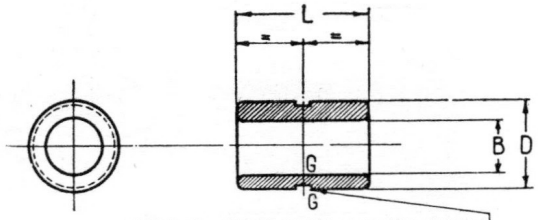

| ITEM Nº | AMOUNT OVERSIZE | 'D' DIA. | 'R' DIA. | 'S' DIA. | 'P' DIA | 'O' SQUARE | 'H' DIA | 'X' LAND |
|---|---|---|---|---|---|---|---|---|
| Z3113/15 | ·03" | ·8425" +·005 −·00025 | ·8425" +·005 +·00525 | ·8425" −·00025 −·00050 | ·50" −·00075 −·00150 | ·6250" | ·7813" | ·0469" |
| Z3113/16 | ·0625" | ·875" +·005 −·00025 | ·875" +·005 +·00525 | ·875" −·00025 −·00050 | ·50" −·00075 −·00150 | ·6250" | ·7813" | ·0469" |
| Z3113/17 | ·090" | ·9025" +·005 −·00025 | ·9025" +·005 +·00525 | ·9025" −·00025 −·00050 | ·50" −·00075 −·00150 | ·6250" | ·7813" | ·0469" |
| Z3113/18 | ·125" | ·9375" +·005 −·00025 | ·9375" +·005 +·00525 | ·9375" −·00025 −·00050 | ·50" −·00075 −·00150 | ·6250" | ·7813" | ·0469" |
| Z3113/19 | ·03" | ·78" +·005 −·00025 | ·78" +·005 +·00525 | ·78" −·00025 −·00050 | ·50" −·00075 −·00150 | ·6250" | ·7813" | ·0469" |
| Z3113/20 | ·0625" | ·8125" +·005 −·00025 | ·8125" +·005 +·00525 | ·8125" −·00025 −·00050 | ·50" −·00075 −·00150 | ·6250" | ·7813" | ·0469" |
| Z3113/21 | ·03" | 1·03" +·00075 −·00050 | 1·03" +·00075 +·00100 | 1·03" −·00050 −·00025 | ·6875" −·00075 −·00150 | ·6250" | ·875" | ·0625" |
| Z3113/22 | ·0625" | 1·0625" +·00075 −·00050 | 1·0625" +·00075 +·00100 | 1·0625" −·00050 −·00025 | ·6875" −·00075 −·00150 | ·6250" | ·875" | ·0625" |
| Z3113/23 | — | 1·0925" +·00075 −·00050 | 1·0925" +·00075 +·00100 | 1·125" −·00050 −·00025 | ·6875" −·00075 −·00150 | ·6250" | ·875" | ·0625" |
| Z3113/24 | — | 1·125" +·00075 −·00050 | 1·125" +·00075 +·00100 | 1·125" −·00050 −·00025 | ·6875" −·00075 −·00150 | ·6250" | ·875" | ·0625" |
| Z3113/25 | ·09" | 1·1525" +·00075 −·00050 | 1·1525" +·00075 +·00100 | 1·1525" −·00050 −·00025 | ·6875" −·00075 −·00150 | ·6250" | ·875" | ·0625" |
| Z3113/26 | ·125" | 1·1875" +·00075 −·00050 | 1·1875" +·00075 +·00100 | 1·1875" −·00050 −·00025 | ·6875" −·00075 −·00150 | ·6250" | ·875" | ·0625" |

REAMERS FOR BUSHING MAIN ATTACHMENT HOLES IN FRONT & REAR SPAR BOOMS



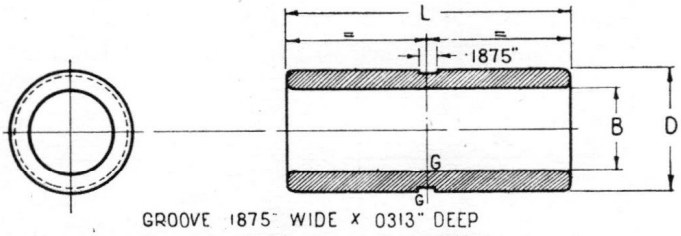

ITEM 1 - ONE SET OF REAMERS COMPLETE
REAMERS TO BE SUPPLIED IN BOX Nº Z3151

| 4A | REAMERS - BUSHING FRONT & REAR SPAR BOOMS MAIN & SECONDARY HOLES | 4A |
|---|---|---|




GROOVE 1875" WIDE X 0313" DEEP
FOR STAMPING ITEM Nº ON BUSH

| | ITEM | AMOUNT OVERSIZE | L | B | D |
|---|---|---|---|---|---|
| | 3137 / 27 | – | 1¾" | ·6875" | 1·00" |
| | 3137 / 28 | ·03" | 1¾" | ·6875" | 1·03" |
| | 3137 / 29 | – | 1¾" | ·6875" | 1·0625" |
| | 3137 / 30 | – | 1¾" | ·6875" | 1·0925" |
| | 3137 / 31 | ·0625" | 1¾" | ·6875" | 1·125" |
| | 3137 / 32 | 09" | 1¾" | ·6875" | 1·1525" |
| * | 3137 / 36 | 010" | 1¾" | ·6875" | 1·0725" |
| * | 3137 / 37 | ·010" | 1¾" | ·6875" | 1·01" |




GROOVE 1875" WIDE X 0313" DEEP
FOR STAMPING ITEM Nº ON BUSH

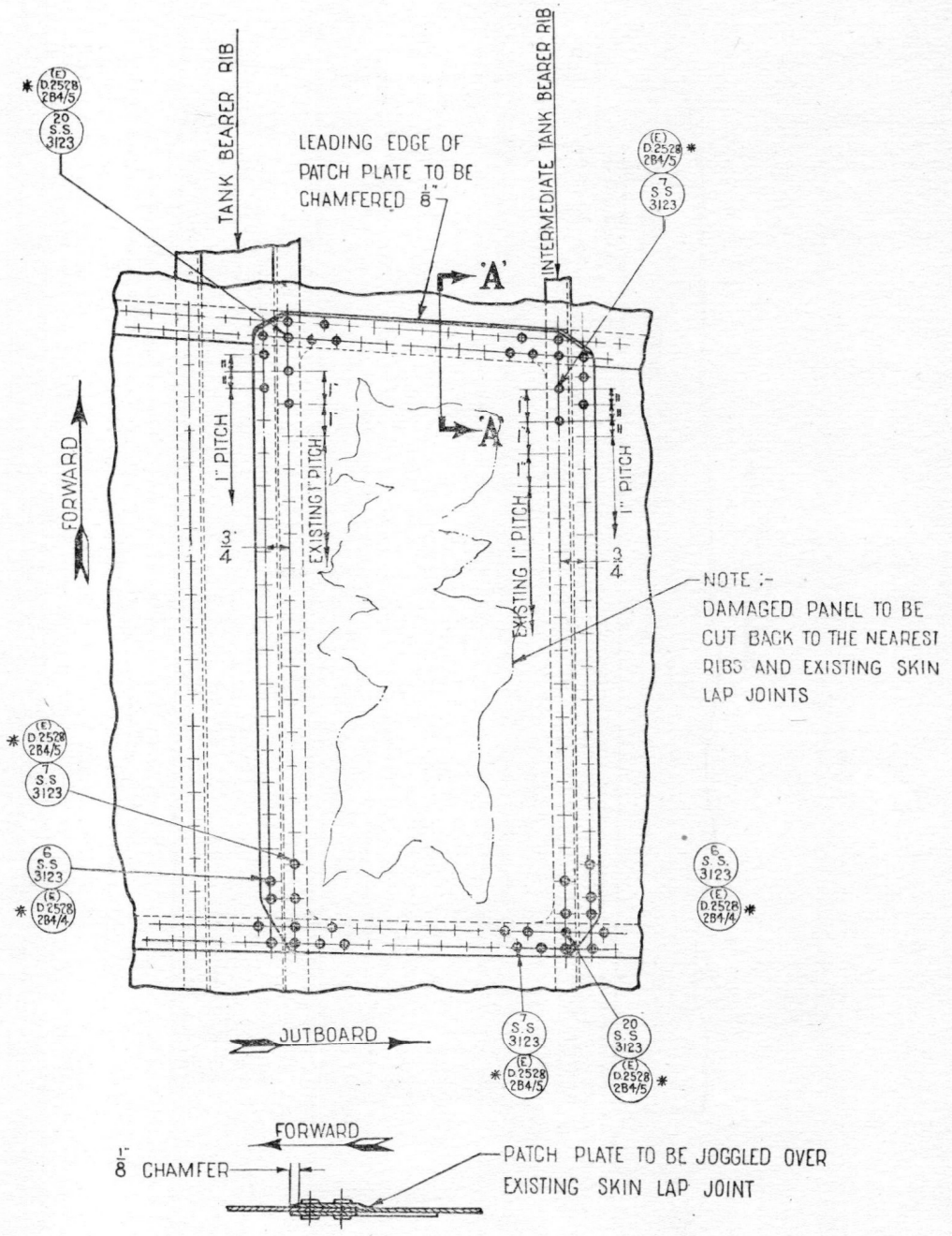
| | ITEM | AMOUNT OVERSIZE | L | B | D |
|---|---|---|---|---|---|
| | 3137 / 2 | – | 3½" | 1·25" | 1·75" |
| | 3137 / 3 | 01" | 3½" | 1·25" | 1·76" |
| | 3137 / 4 | 03" | 3½" | 1 25" | 1·78" |
| | 3137 / 5 | 0625" | 3½" | 1·25" | 1·8125" |
| | 3137 / 6 | 09" | 3½" | 1·25" | 1·84" |
| | 3137 / 7 | – | 3¼" | 1·00" | 1·25" |
| | 3137 / 8 | 03" | 3¼" | 1·00" | 1·28" |
| | 3137 / 9 | 0625" | 3¼" | 1·00" | 1·3125" |
| | 3137 / 10 | 09" | 3¼" | 1·00" | 1 34" |
| | 3137 / 11 | – | 3¼" | 4375" | 625" |
| | 3137 / 12 | 03 | 3¼" | 4375" | 655" |
| | 3137 / 13 | 0625" | 3¼" | 4375" | 6875" |
| | 3137 / 14 | ·09" | 3¼" | 4375" | 715" |
| | 3137 / 15 | – | 3¼" | ·5" | 8125" |
| | 3137 / 16 | ·03" | 3¼" | ·5" | ·8425" |
| | 3137 / 17 | ·0625" | 3¼" | ·5" | ·875" |
| | 3137 / 18 | 09" | 3¼" | ·5" | 9025" |
| | 3137 / 19 | – | 3¼" | 5" | 75" |
| | 3137 / 20 | ·03" | 3¼" | 5" | 78" |
| | 3137 / 21 | – | 3¼" | 6875" | 1 0" |
| | 3137 / 22 | 03 | 3¼" | 6875" | 1·03" |
| | 3137 / 23 | 0625" | 3¼" | 6875" | 1 0625 |
| | 3137 / 24 | 0925" | 3¼" | 6875" | 1·0925" |
| | 3137 / 25 | 0625" | 3¼" | 6875" | 1·125" |
| | 3137 / 26 | 090" | 3¼" | 6875" | 1·1525" |
| * | 3137 / 33 | – | 4½" | 1·25" | 1·75 |
| * | 3137 / 34 | 010" | 4½" | 1 25" | 1 76" |
| * | 3137 / 35 | ·010" | 3¼" | 1·00" | 1·26" |
| | | | | | |
| | | | | | |

PILOT BUSHES FOR MAIN & SECONDARY HOLES IN SPAR BOOMS, & ENGINE SUB-FRAMES ARE NORMALLY SUPPLIED IN A WOODEN BOX PART Nº Z 3152 THOSE MARKED THUS * ARE SEPERATE, & IF UN-OBTAINABLE, SHOULD BE MADE UP

NOTE - TOLERANCES TO COLUMN 'B' DIA = $^{\cdot 00050}_{\cdot 00025}$
TOLERANCES TO COLUMN 'D' DIA = $^{\cdot 00125}_{\cdot 00125}$

MATL - SPEC S 14, S 90, S 15, OR S82. CASE HARDENED OR S.28 HEAT TREATED

| 5 | PILOT BUSHES FOR REAMERS BUSHING FRONT & REAR SPAR BOOM HOLES | 5 |
|---|---|---|

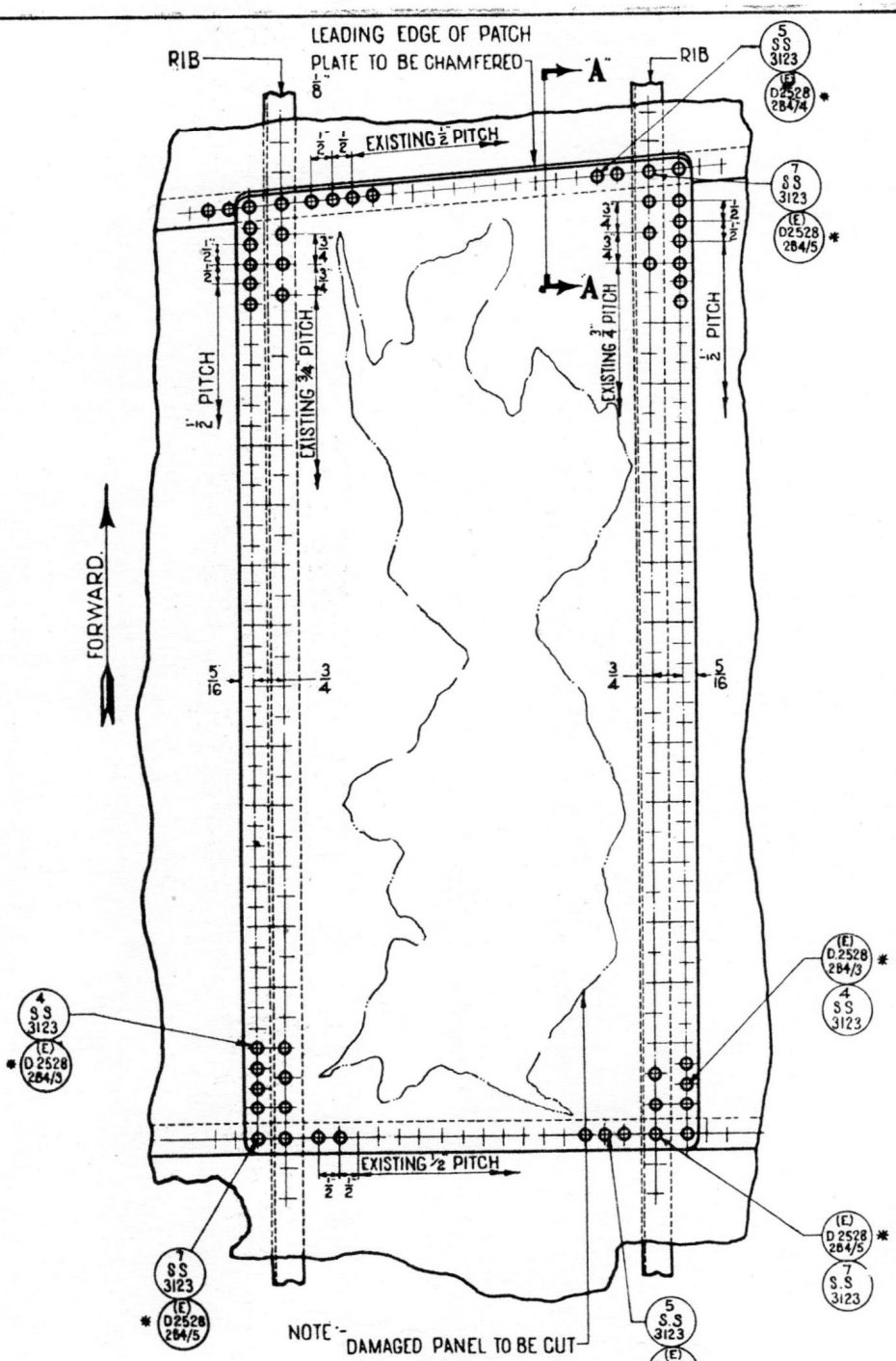



SECTION 'A-A'

NOTE :-
RIVETS MARKED THUS * ARE FOR TOP SKIN REPAIR ONLY

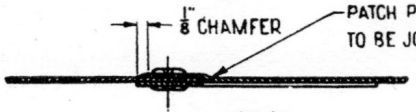
MATERIAL :- ALUM ALLOY 18 S.W.G
SPECIFICATION :- D.T.D. 546

THIS WAS LINCOLN REPAIR F.6168




NOTE:- DAMAGED PANEL TO BE CUT BACK TO THE NEAREST RIBS AND EXISTING SKIN LAP JOINTS.

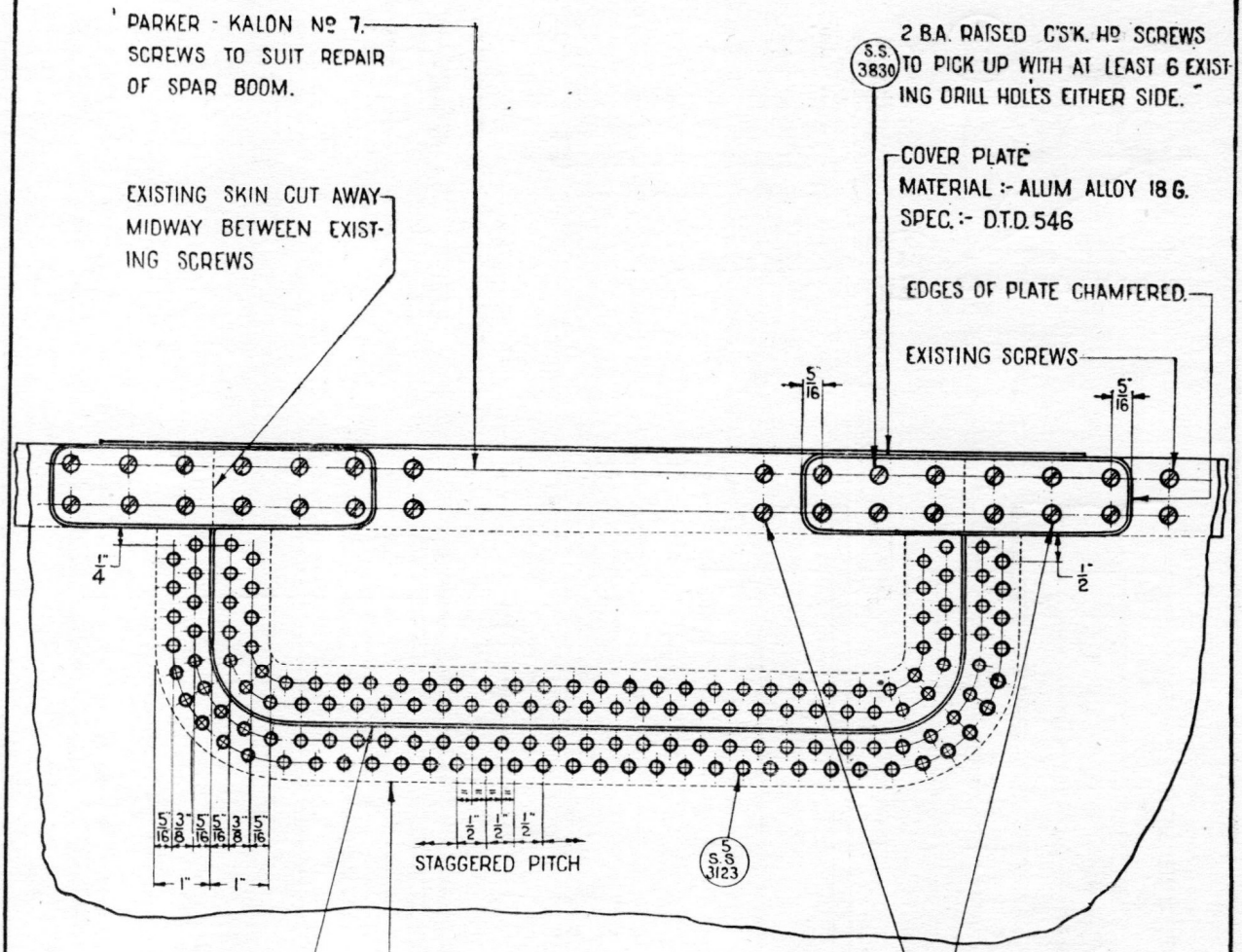
NOTE:- RIVETS MARKED THUS * ARE FOR TOP SKIN REPAIR ONLY.




SECTION A-A

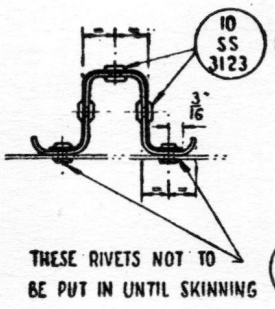
THIS WAS LINCOLN REPAIR F.6169

# 7 REPAIR TO MAINPLANE SKIN - OUTER PORTION - OUTER WING 7




THIS WAS LINCOLN REPAIR F.6150.

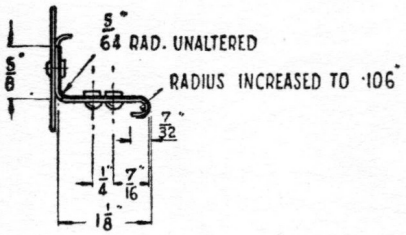
| 8 | METHOD OF REPAIRING SKIN ADJOINING REAR SPAR BOOM | 8 |
|---|---|---|

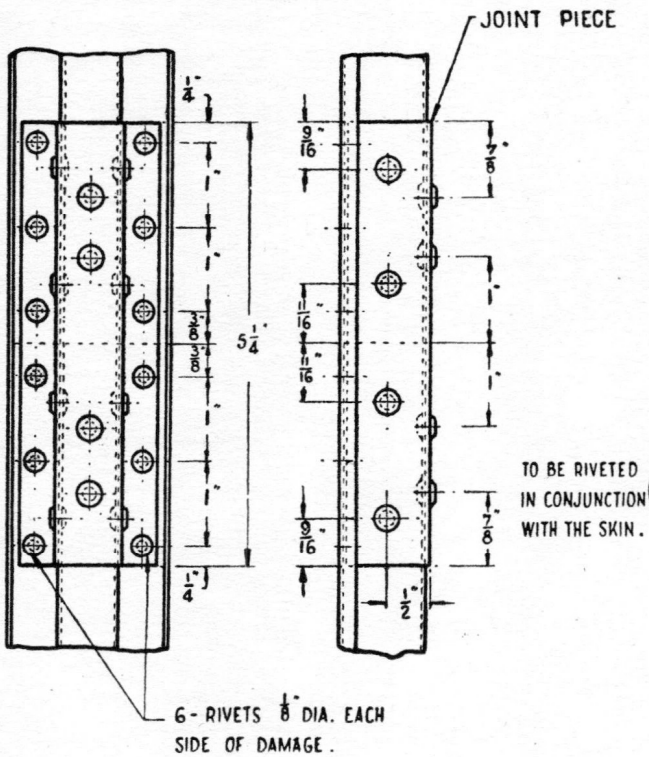



POP RIVETS $\frac{3}{16}$" DIA.

NOTE :- THE NOTES ON THE RADII REFER TO THE ALTERATIONS NECESSARY WHEN THE JOINTING PIECE IS MADE FROM STRINGER SECTION 76/SS 1793.

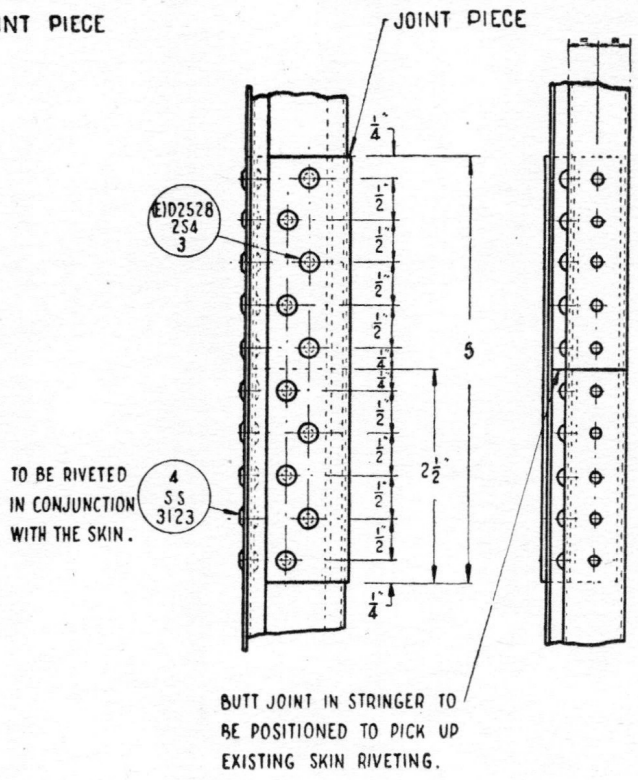
POP DOME RIVETS $\frac{1}{8}$" DIA.




MATERIAL :- ALUM. ALLOY. SHEET 18 G.
SPEC. :- D.T.D. 275 OR 390.
STRINGER SECTION PT. Nº 219/SS. 1793.

DETAIL 'A'

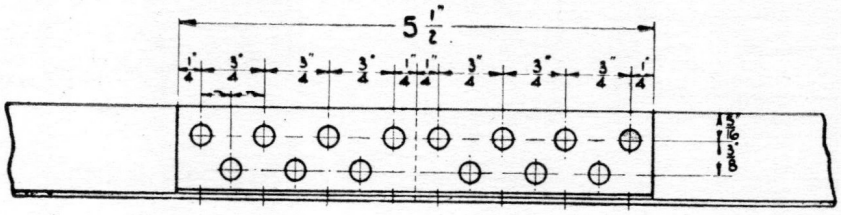


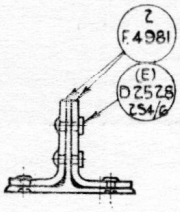

MATERIAL :- STRINGER SECTION 76/SS 1793 OR ALUM ALLOY. SHEET 22 G.
SPEC :- D.T.D. 275 OR 390.

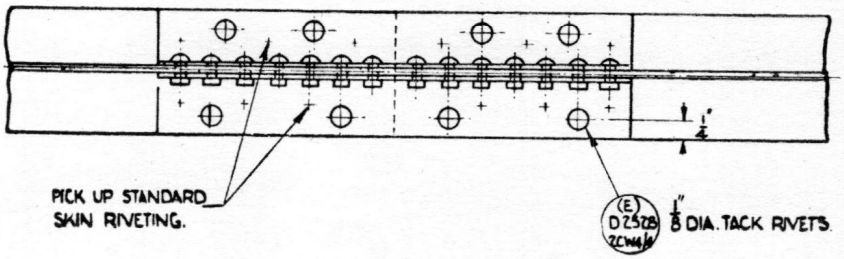
DETAIL 'B'

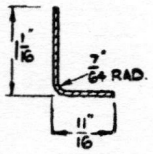
THIS WAS LINCOLN REPAIR F.4848

| 9 | INSERTION REPAIRS TO UPPER AND LOWER SURFACE MAINPLANE STRINGERS | 9 |
|---|---|---|



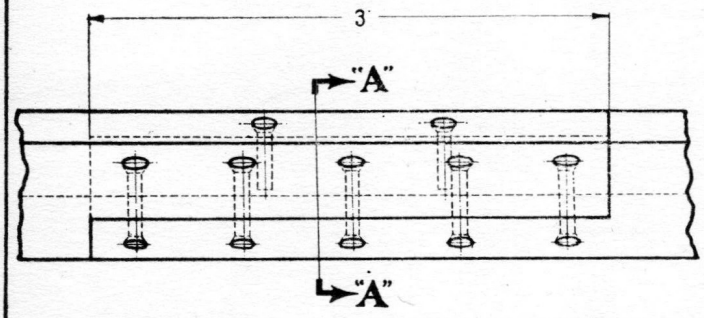



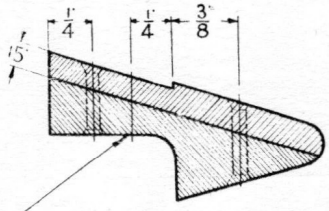




DETAIL OF JOINT ANGLE
ITEM 2/F.4981
MATERIAL :- ALUM ALLOY.
SPEC. :- 16 S.W.G. D.T.D. 275 OR 390.

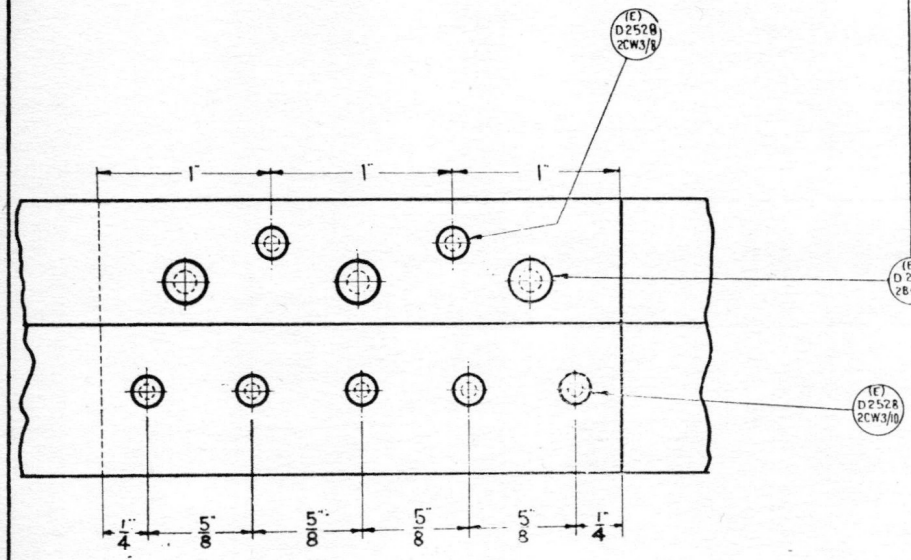
THIS WAS LINCOLN REPAIR F.4981

| 11 | INSERTION REPAIR TO MAIN PLANE STIFFENER | 11 |
|---|---|---|

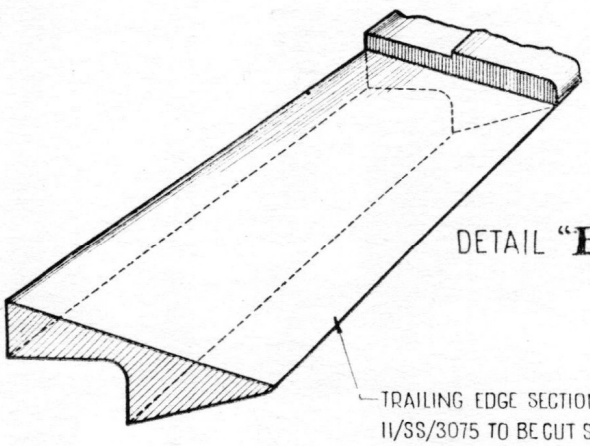



SECTION "A"-"A"




FOR ATTACHMENT OF SKIN TO TRAILING EDGE

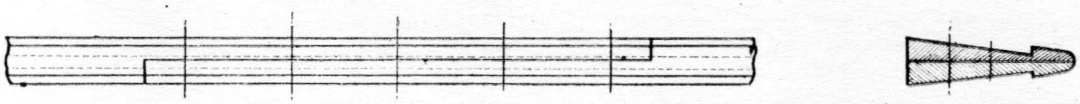


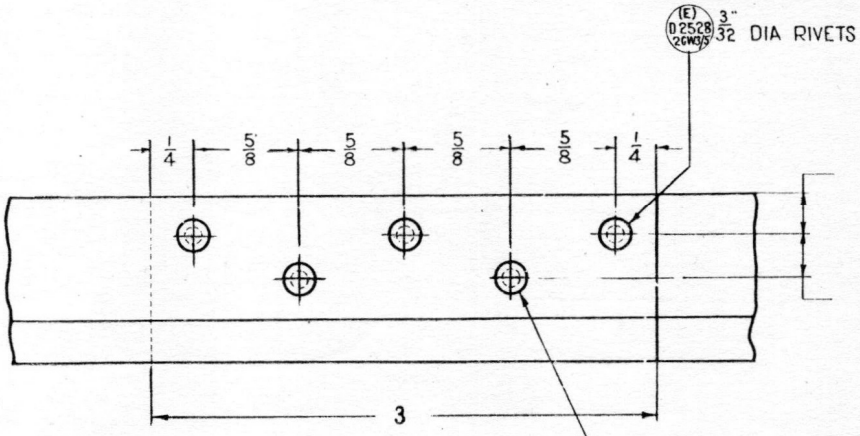
DETAIL "B"

TRAILING EDGE SECTION Nº 11/SS/3075 TO BE CUT SO AS TO FORM A HALF LAP JOINT

THIS WAS LINCOLN REPAIR E4980

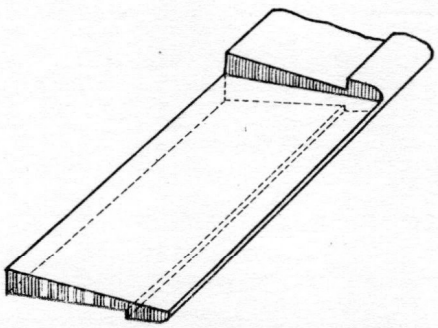
| 12 | INSERTION JOINT IN MAINPLANE TRAILING EDGE SECTION 11/SS3075 | 12 |
|---|---|---|






"B" RIVETS POSITIONED SO AS TO AVOID EXISTING SKIN RIVETING

TRAILING EDGE SECTION 9/SS 3075 TO BE CUT SO AS TO FORM A HALF-LAP JOINT

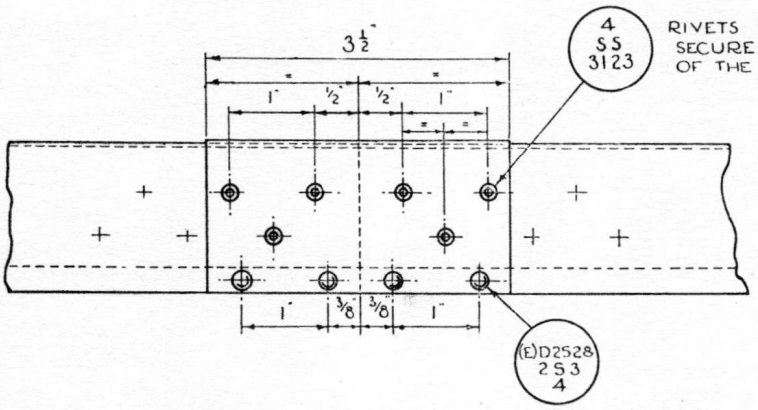


"A" VIEW SHOWING PORTION OF TRAILING EDGE PREPARED FOR JOINT

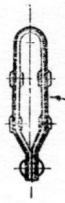
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR E.5001

| 13 | INSERTION JOINT TO FLAP TRAILING EDGE SECTION Nº 9/SS3075 | 13 |
|---|---|---|



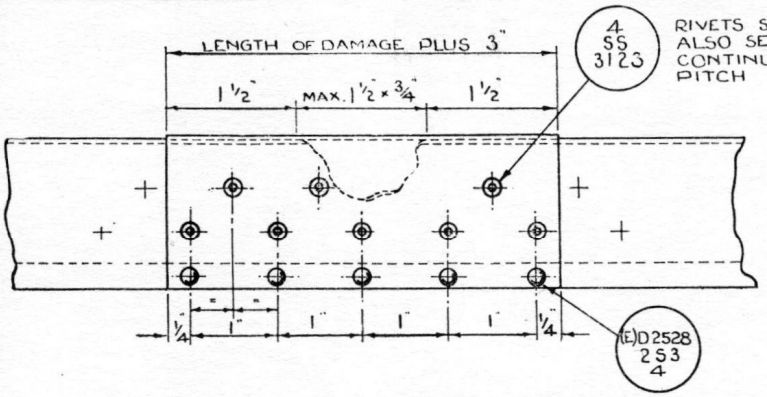

RIVETS SECURING REPAIR SLEEVE ALSO SECURE SKIN AND ARE A CONTINUATION OF THE EXISTING PITCHING



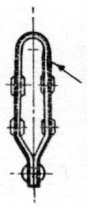
REPAIR SLEEVE BENT ROUND EXISTING SECTION
MAT ALUM ALLOY 24 SWG
SPEC DTD 275 OR 390

## INSERTION REPAIR

B




RIVETS SECURING REPAIR SLEEVE ALSO SECURE SKIN AND ARE A CONTINUATION OF THE EXISTING PITCH



REPAIR SLEEVE BENT ROUND EXISTING SECTION
MAT: ALUMN ALLOY 24SWG
SPEC· DTD 275 OR 390.

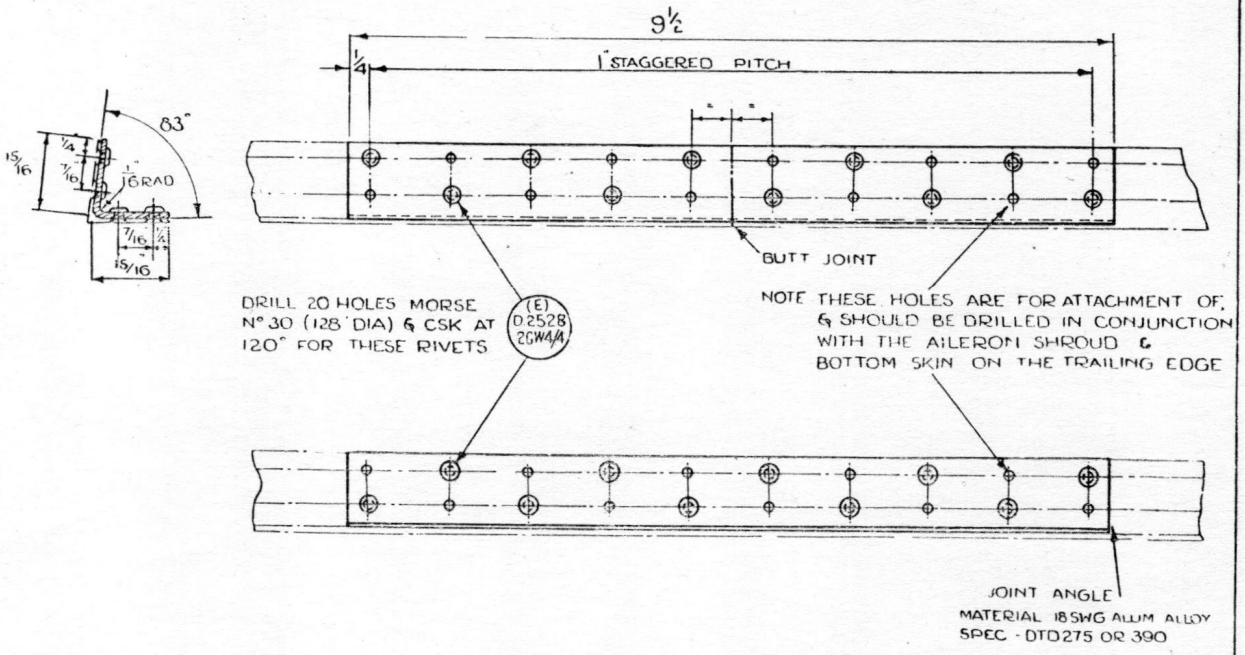
DAMAGE TO BE HAMMERED BACK TO AS NEAR AS POSSIBLE THE ORIGINAL SHAPE BEFORE FITTING PATCH

## PATCH REPAIR

A

THIS WAS LINCOLN REPAIR F.5005.

| 14 | PATCH & INSERTION REPAIRS TO WING TIP TRAILING EDGE STRINGER | 14 |
|---|---|---|

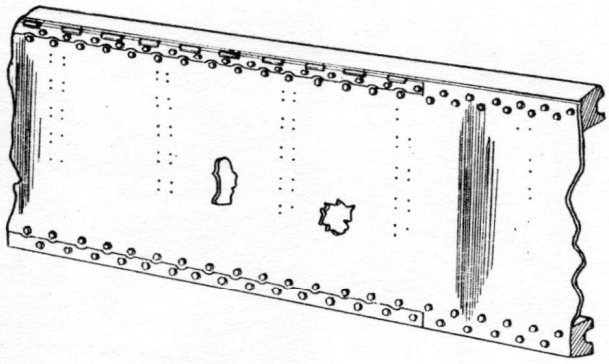



NOTE THIS JOINT SHOULD BE CENTRALLY PLACED BETWEEN TWO RIBS, WHEN THE ANGLE IS FITTED TO THE TRAILING EDGE

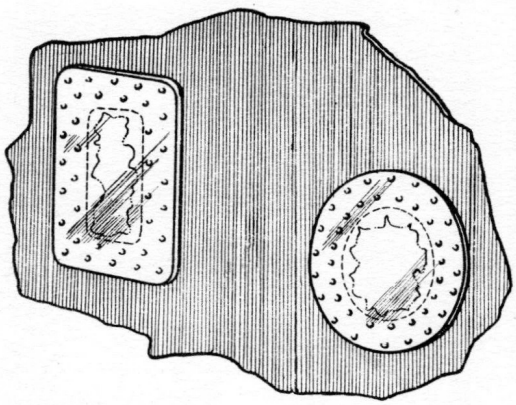
JOINTING COMPOUND SHOULD BE APPLIED BETWEEN FACES

THIS WAS LINCOLN REPAIR F.4968.

| 15 | INSERTION JOINT - IN AILERON SHROUD ATTACHMENT ANGLE | 15 |
|---|---|---|



POSSIBLE DAMAGE TO SPAR WEB



REPAIR PATCHES IN POSITION

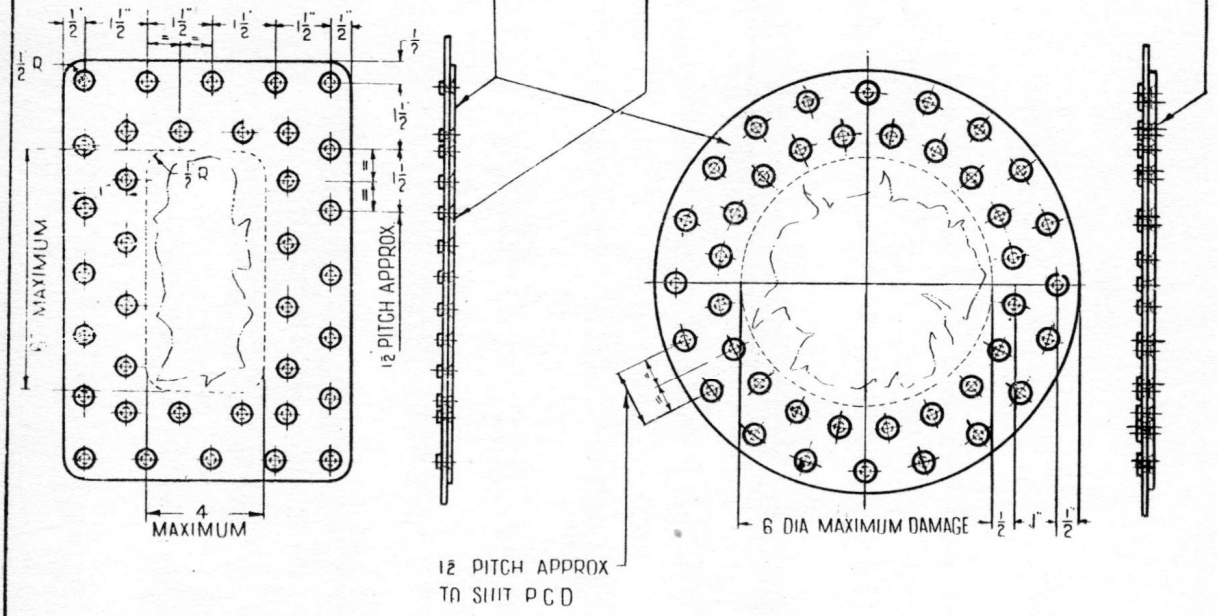
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

PATCH MATERIAL - ALUM ALLOY
SPEC :- DTD 546

| THICKNESS OF PATCH | FRONT SPAR |
|---|---|
| CENTRE SECTION F/S | 9G |
| CENTRE SECTION R/S | 12G |
| INTERMEDIATE PORTION F/S | 14G |
| INTERMEDIATE PORTION R/S | 14G |
| OUTER PORTION F/S (INBOARD) | 16G |
| OUTER PORTION F/S (OUTBOARD) | 18G |
| OUTER PORTION R/S (INBOARD) | 18G |
| OUTER PORTION R/S (OUTBOARD) | 20G |

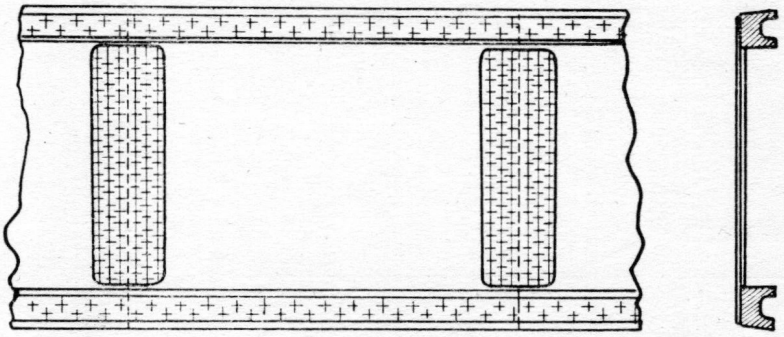
(E) D.2528 2GW7/8 FOR 9G WEB
(E) D.2528 2GW7/8 FOR 12G WEB
(E) D.2528 256/6 FOR 14G WEB
(E) D.2528 255/5 FOR 16G WEB
(E) D.2528 254/4 FOR 18G WEB
(E) D.2528 254/4 FOR 20G WEB

(E) D.2528 2GW9/8 FOR 9G WEB
(E) D.2528 2GW7/8 FOR 12G WEB
(E) D.2528 256/6 FOR 14G WEB
(E) D.2528 255/5 FOR 16G WEB
(E) D.2528 254/4 FOR 18G WEB
(E) D.2528 254/4 FOR 20G WEB

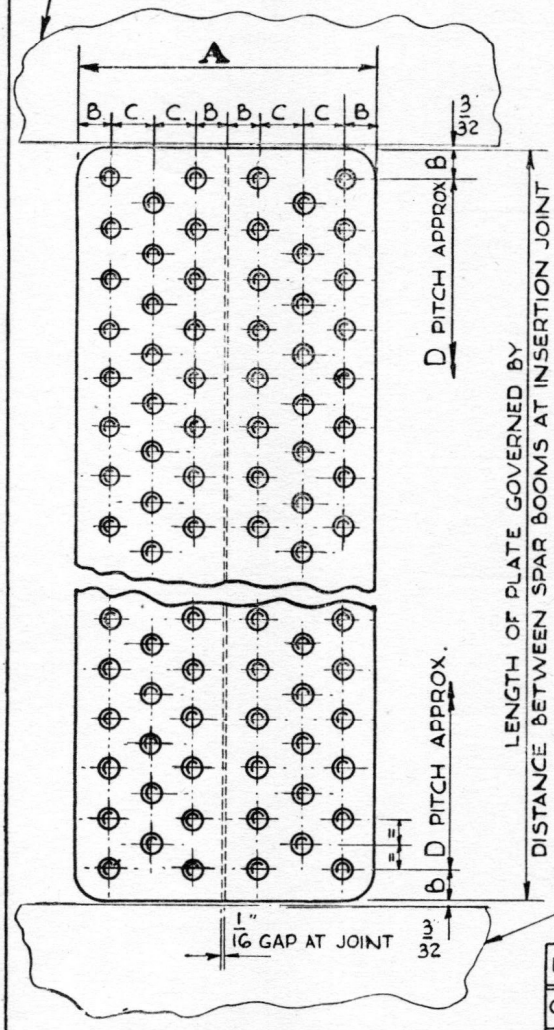



THIS WAS LINCOLN REPAIR F.617?

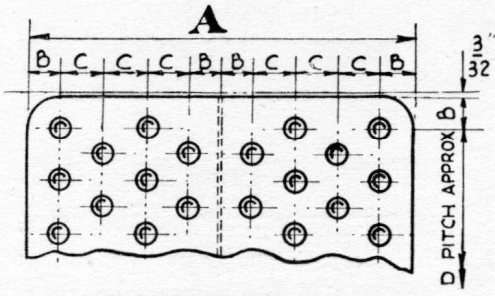
# 16 PATCH REPAIRS TO MAINPLANE SPAR WEB - CENTRE & OUTER PORTION 16




ELEVATION SHOWING INSERTION




DETAILS OF RIVETING.



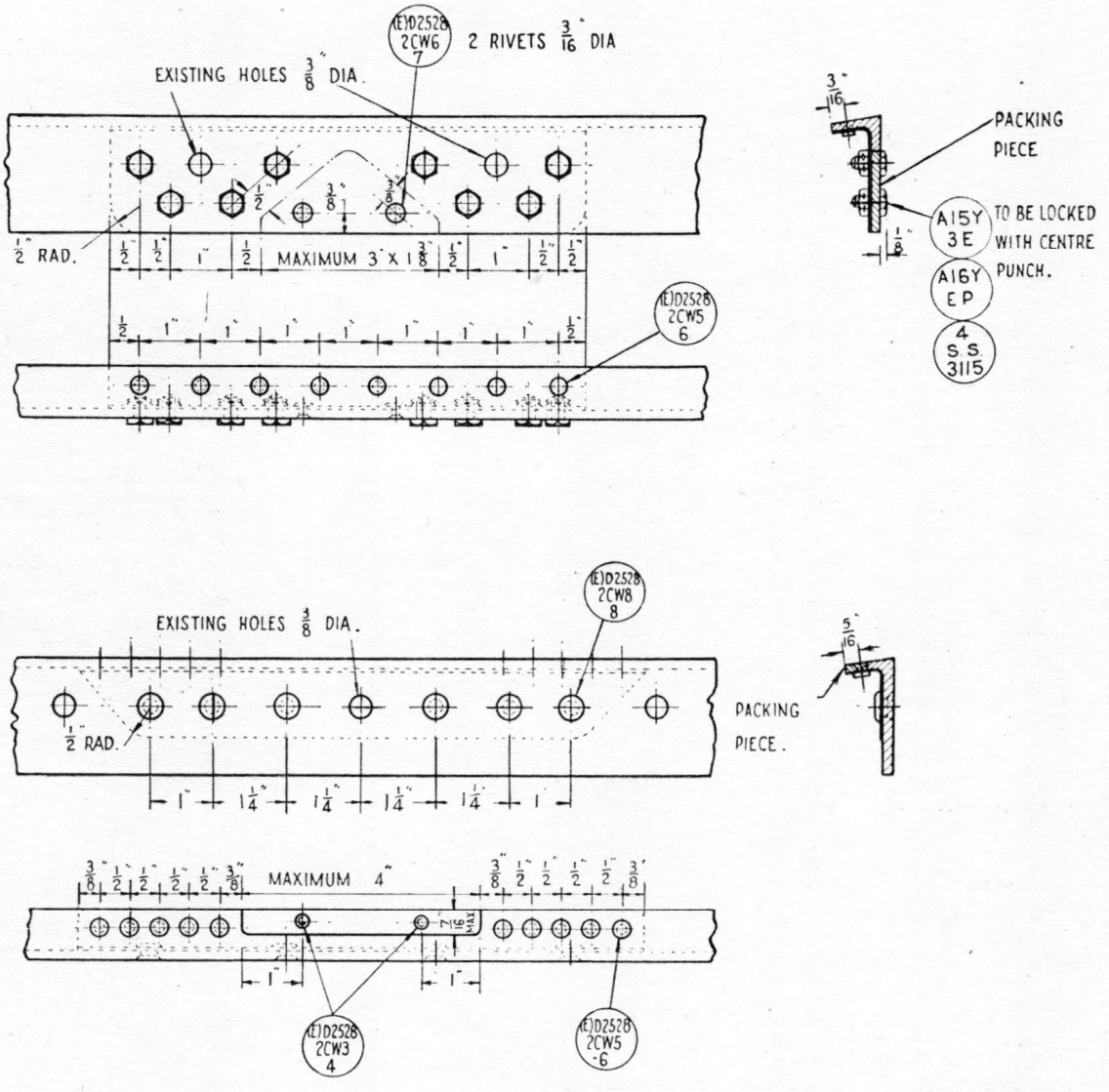

VIEW SHOWING INSERTION JOINT AT INTERMEDIATE PORTION USING 8 PITCHES OF RIVETS

| LOCATION OF JOINT | JOINT PLATE | SPEC | DIM A | DIM B | DIM C | DIM D | RIVET |
|---|---|---|---|---|---|---|---|
| CENTRE/SEC/F/S | 9G | D.T.D 546 | 7" | 3/4" | 1" | 1 3/16" APP. | E)D2528/2CW8/5 |
| CENTRE/SEC/R/S | 12G | D.T.D 546 | 5 13/16" | 15/32" | 1" | 1·25" APP. | E)D2528/2CW7/8 |
| INTERMEDIATE PORTN F/S | 14G | D.T.D 546 | 4·50" | ·37" | ·38" | 1" APP. | E)D2528/2S6/6 |
| INTERMEDIATE PORTN R/S | 14G | D.T.D 546 | 3·75" | 5/16" | 3/8" | 1" APP. | E)D2528/2S6/6 |
| OUTER PORTION F/S OUTBD RIB 27 | 16G | D.T.D 546 | 3·25" | ·34" | ·46" | ·90" APP. | E)D2528/2S5/5 |
| OUTER PORTION F/S INBOARD RIB 27 | 18G | D.T.D 546 | 3·25" | ·34" | ·46" | ·90" APP. | E)D2528/2S4/4 |
| OUTER PORTION R/S INBD RIB 26 | 18G | D.T.D 546 | 3·25" | ·3125" | ·50" | 1·25" APP. | E)D2528/2S4/4 |
| OUTER PORTION R/S OUTBOARD RIB 26 | 20G | D.T.D 546 | 3·25" | ·3125" | ·50" | 1·25" APP. | E)D2528/2S4/4 |

THIS WAS LINCOLN REPAIR F.6167.



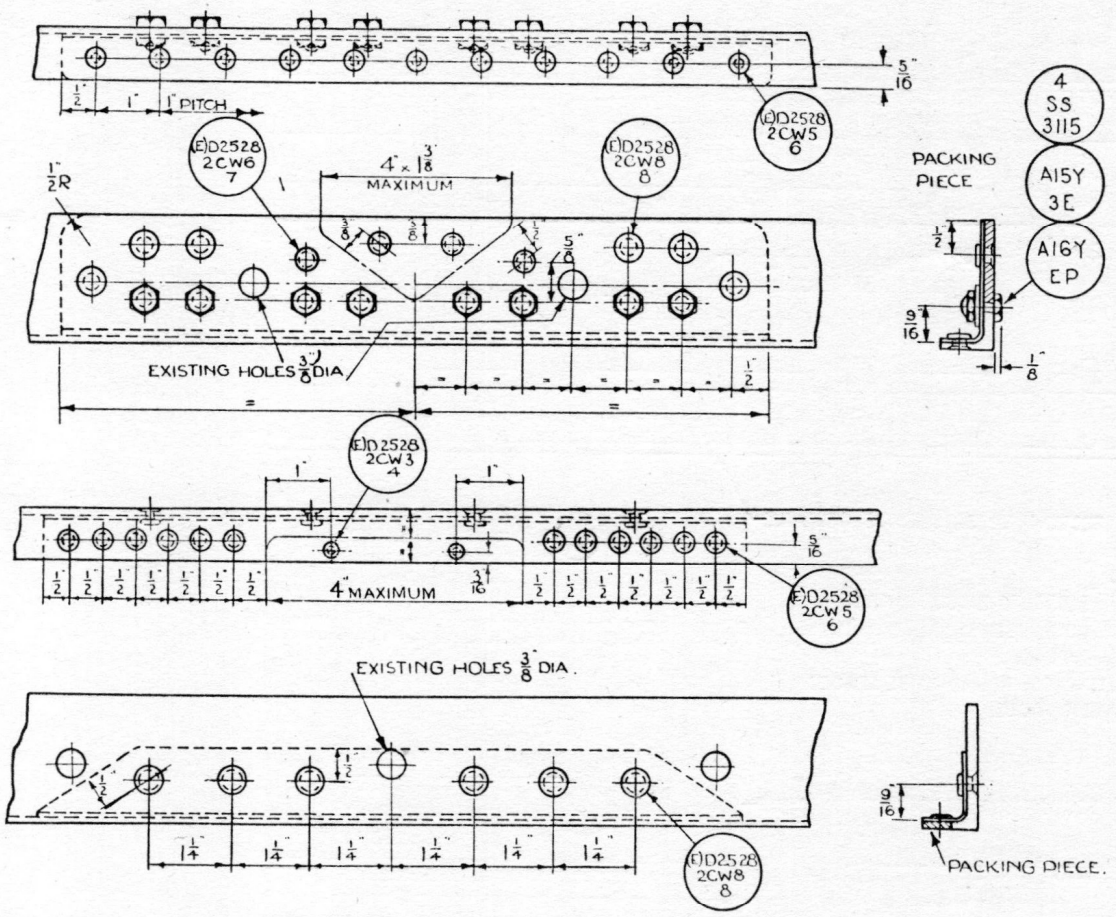
# INSERTION REPAIR TO MAIN PLANE SPAR WEB




REINFORCING ANGLES STEEL - 18 S W G
SPEC. D.T.D. 124 A.
HARDENED & TEMPERED

THIS WAS LINCOLN REPAIR F4979

| 18 | PATCH REPAIRS TO TOP BOOM FLANGES TRAILING EDGE SPAR | 18 |
|---|---|---|




REINFORCING ANGLES TO BE STEEL 18G, SPEC :- D.T.D. 124A HARDENED & TEMPERED AFTER BENDING & DRILLING

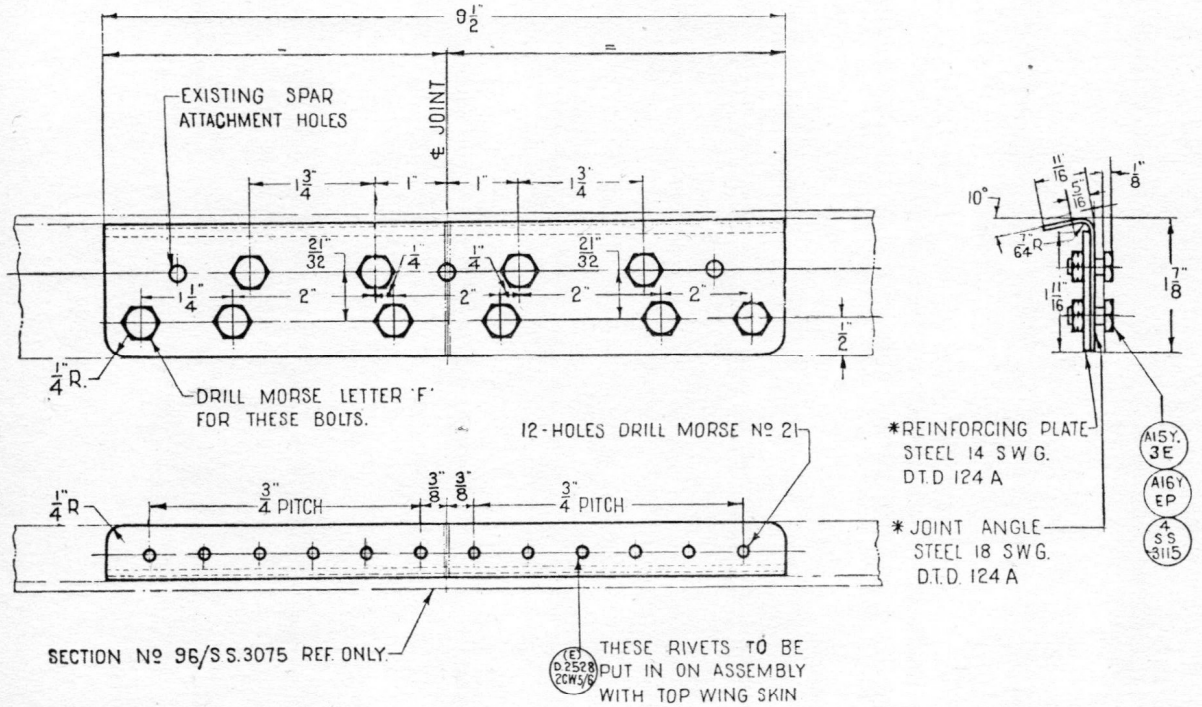
BOLTS TO BE CUT OFF TO REQUIRED LENGTH & LOCKED WITH CENTRE PUNCH.

JOINTING COMPOUND TO BE APPLIED BETWEEN FACES

DAMAGE TO BE CUT OUT TO A REGULAR SHAPE

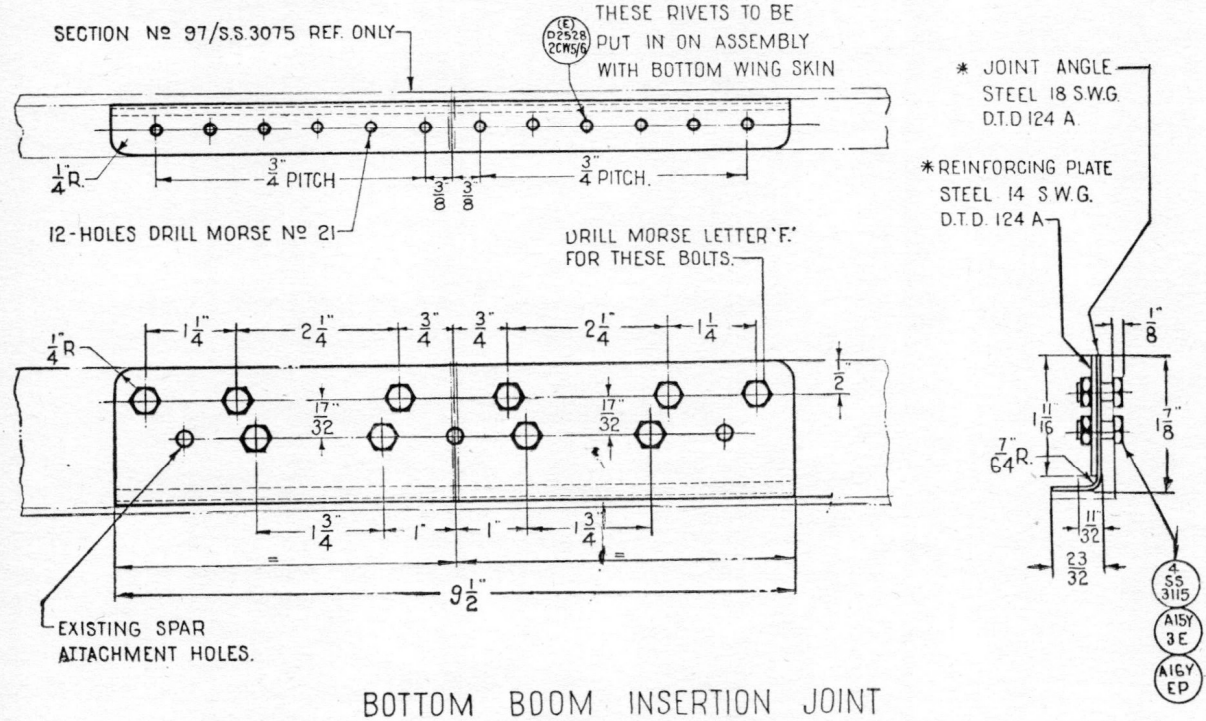
THIS WAS LINCOLN REPAIR F4989

| 19 | PATCH REPAIRS TO BOTTOM BOOM FLANGES ON TRAILING EDGE SPAR | 19 |
|---|---|---|




NOTE :- BOLTS TO BE CUT OFF TO REQUIRED LENGTH & LOCKED WITH CENTRE PUNCH.
JOINTING COMPOUND TO BE APPLIED BETWEEN FACES.

## TOP BOOM INSERTION JOINT

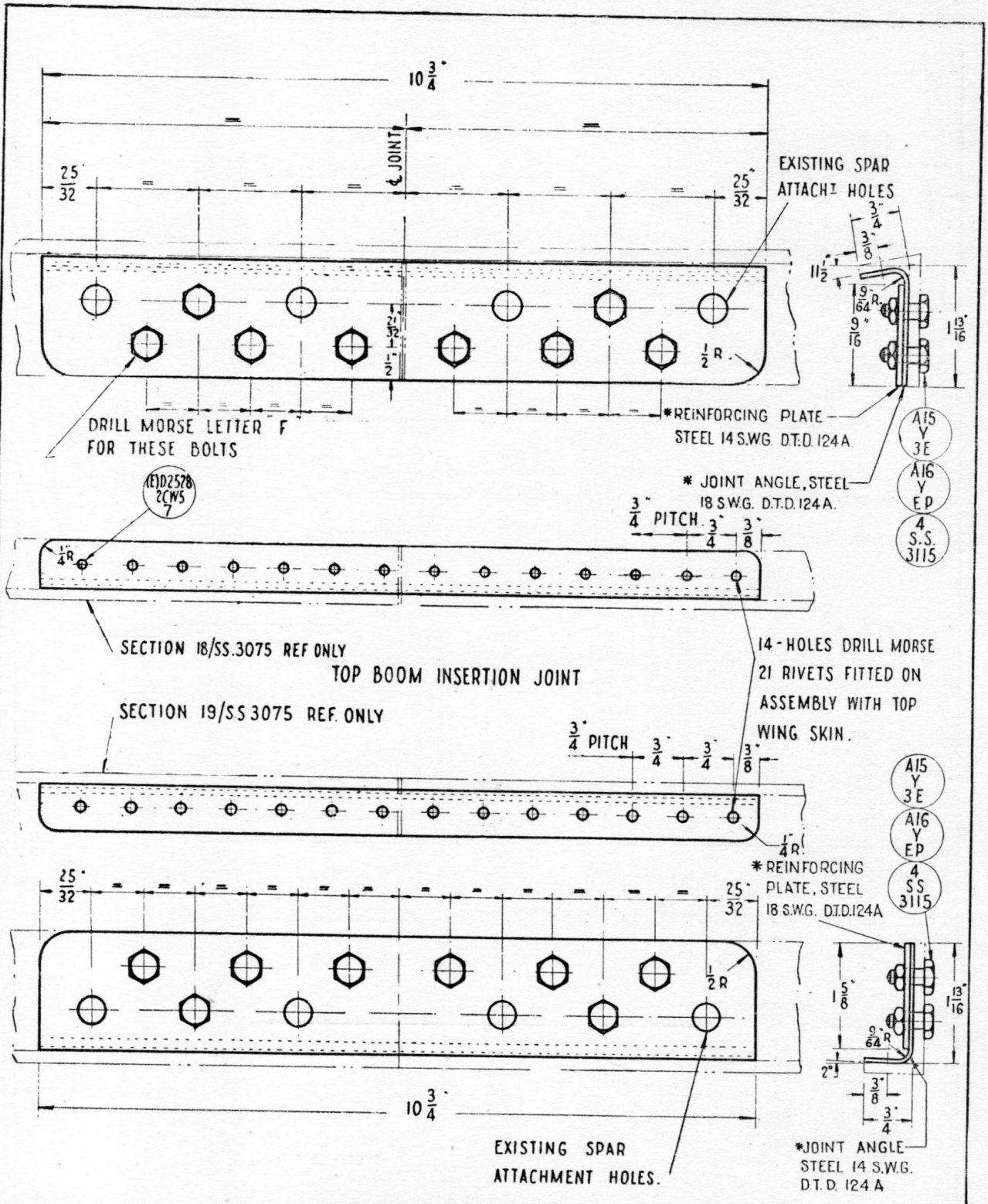



## BOTTOM BOOM INSERTION JOINT

* THESE ITEMS TO BE HARDENED & TEMPERED.

THIS WAS LINCOLN REPAIR F.4986

| 20 | INSERTION REPAIRS TO TRAILING EDGE SPAR BOOMS - OUTER WING | 20 |
|---|---|---|

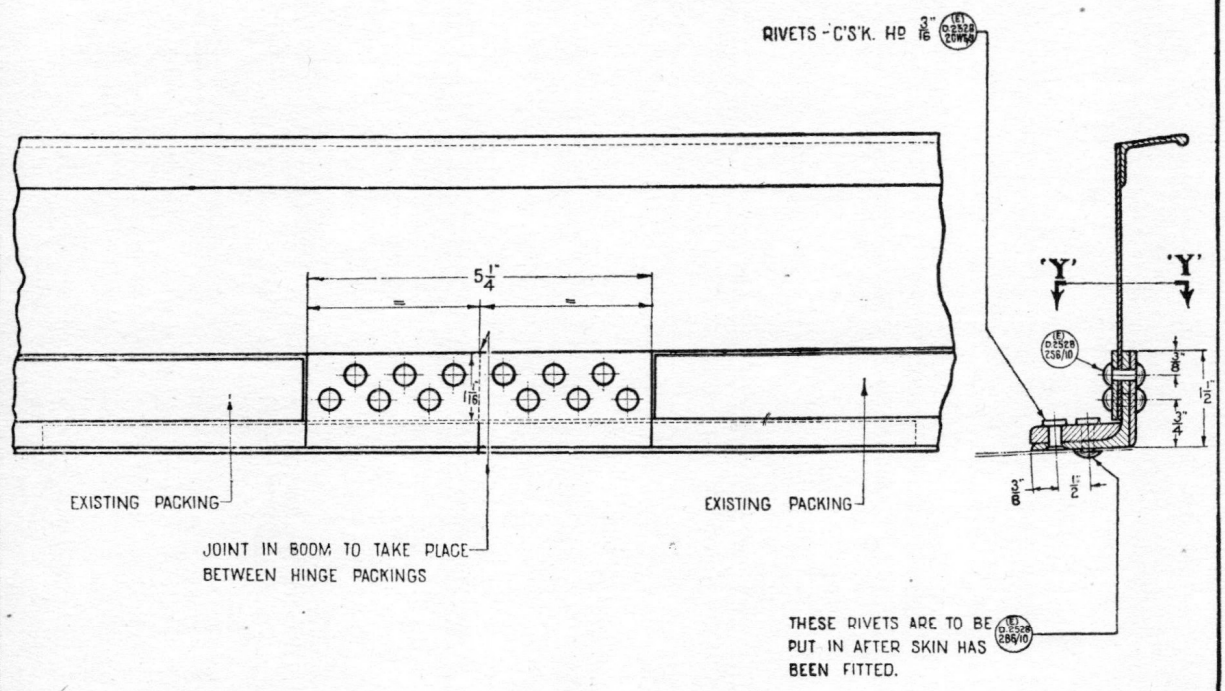


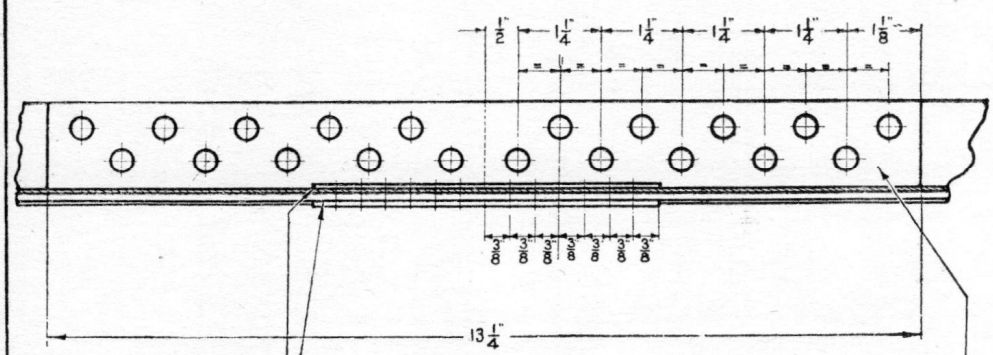

NOTE:- BOLTS TO BE CUT OFF TO REQUIRED LENGTH & LOCKED WITH CENTRE PUNCH.

* THESE ITEMS TO BE HARDENED & TEMPERED.

THIS WAS LINCOLN REPAIR F.5141.

| 21 | INSERTION REPAIRS TO TRAILING EDGE SPAR BOOMS - CENTRE SECTION | 21 |
|---|---|---|



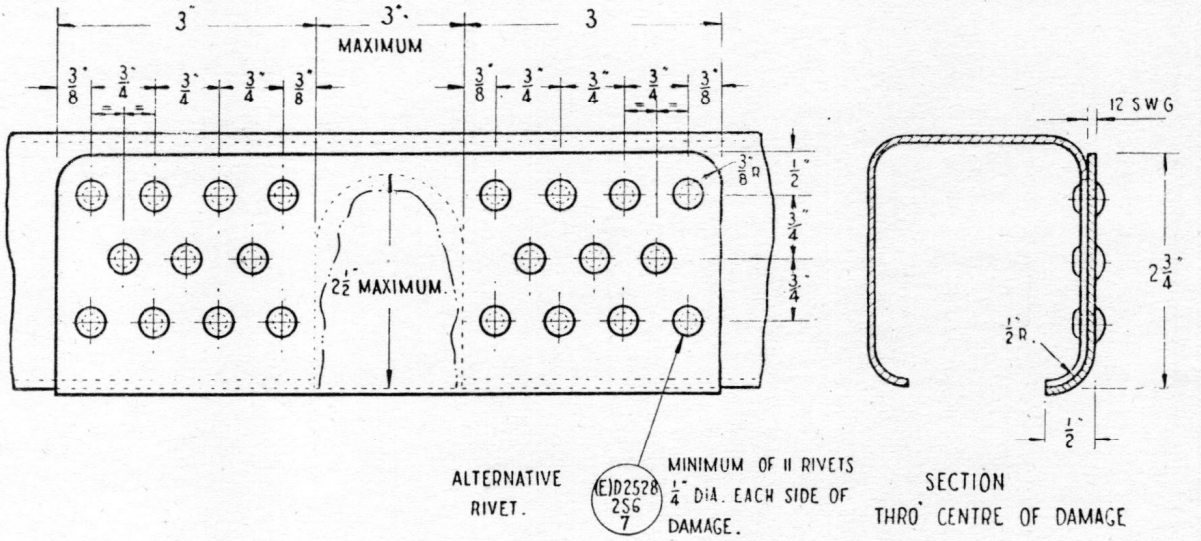




REINFORCING STRIPS:-
MATL :- ALUM. ALLOY 14 S.W.G
SPEC :- D.T.D. 275 OR 390.

JOINTING PIECE - 1 OFF
MATL - DURAL BAR 1/4" X 1 3/8"
SPEC :- L.I.

THIS WAS LINCOLN REPAIR F.5035.

| 23 | INSERTION TO BOTTOM BOOM - OUTBOARD FALSE SPAR | 23 |
|---|---|---|



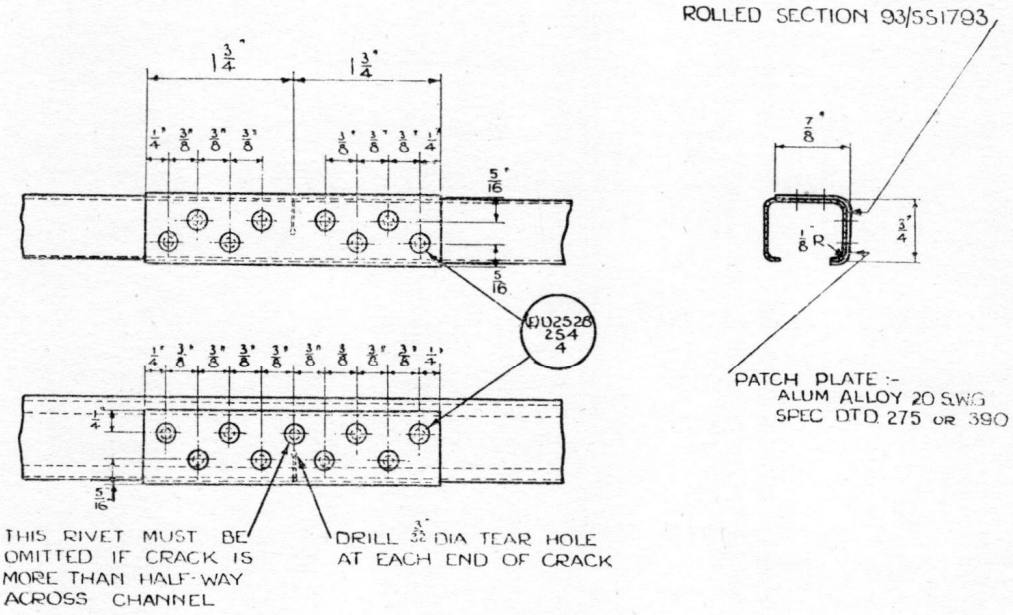

MAXIMUM DAMAGE AFTER CUTTING AWAY TO A REGULAR SHAPE 3" x 2½" IN ONE SIDE OF MEMBER ONLY.
MORE EXTENSIVE DAMAGE NECESSITATES AN INSERTION

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

PATCH PLATE :- MATL ALUM. ALLOY 12 S.W.G
SPEC.:- D.T.D. 275 OR 390.

THIS WAS LINCOLN REPAIR F.4992

| 24 | PATCH REPAIR TO ROLLED SECTION ENGINE MOUNTING RIB BOOMS AND BRACING STRUTS | 24 |
|---|---|---|

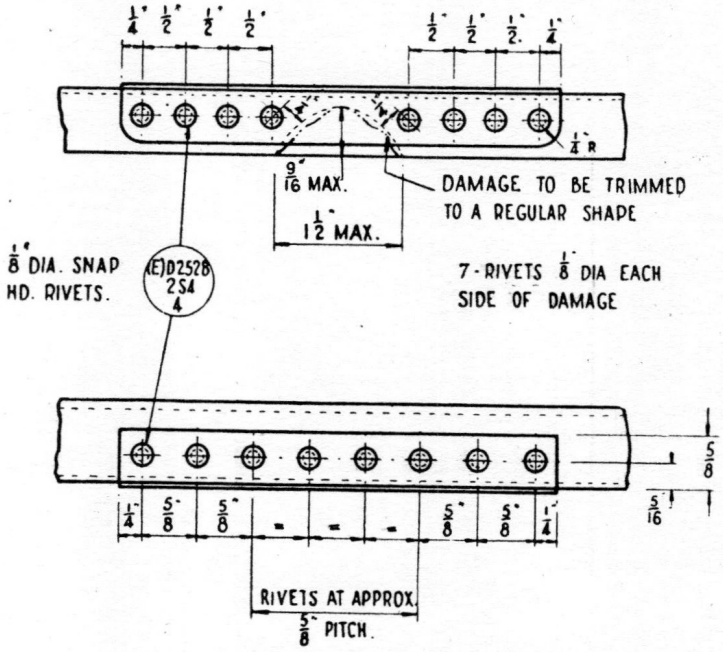


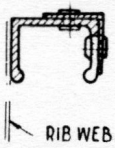

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

NOTE. THE CRACK MUST NOT EXTEND FOR MORE THAN $\frac{3}{4}$" OF THE WIDTH OF EACH OF THE TWO FLANGES

THIS WAS LINCOLN REPAIR F.4990

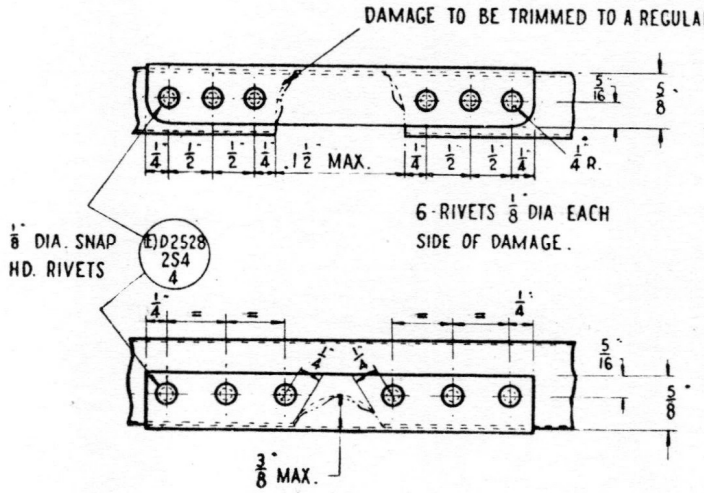
| 25 | REPAIR TO CRACK IN MAIN PLANE RIB BOOM (ROLLED SECTION) | 25 |
|---|---|---|

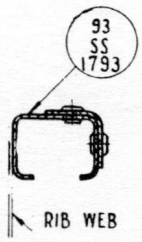



JOINT PLATES STEEL 18 S.W.G.
SPEC:- D T D. 124 A

**'A'** EXTRUDED SECTION



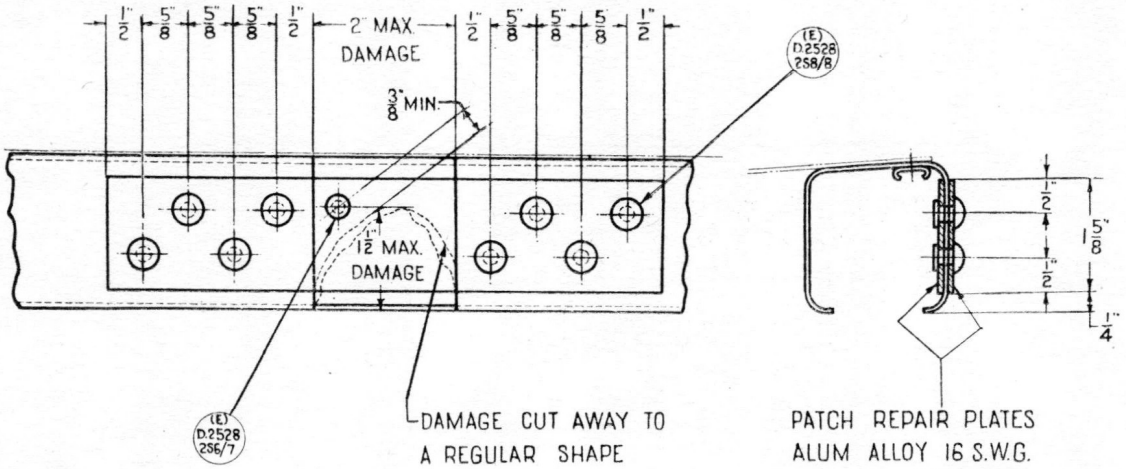

REPAIR ANGLE ALUM. ALLOY 18 S.W.G
SPEC. DTD 275 OR 390

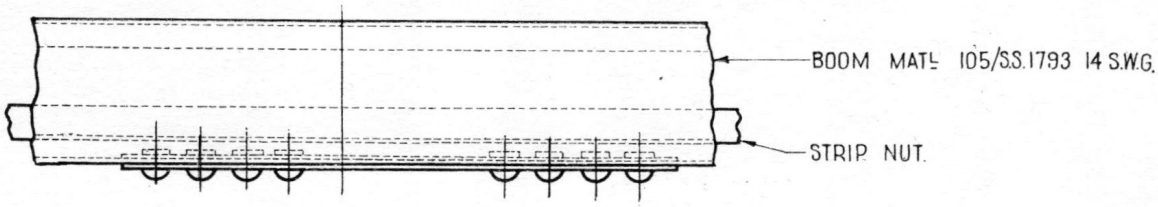
**'B'** ROLLED SECTION

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR F.5019

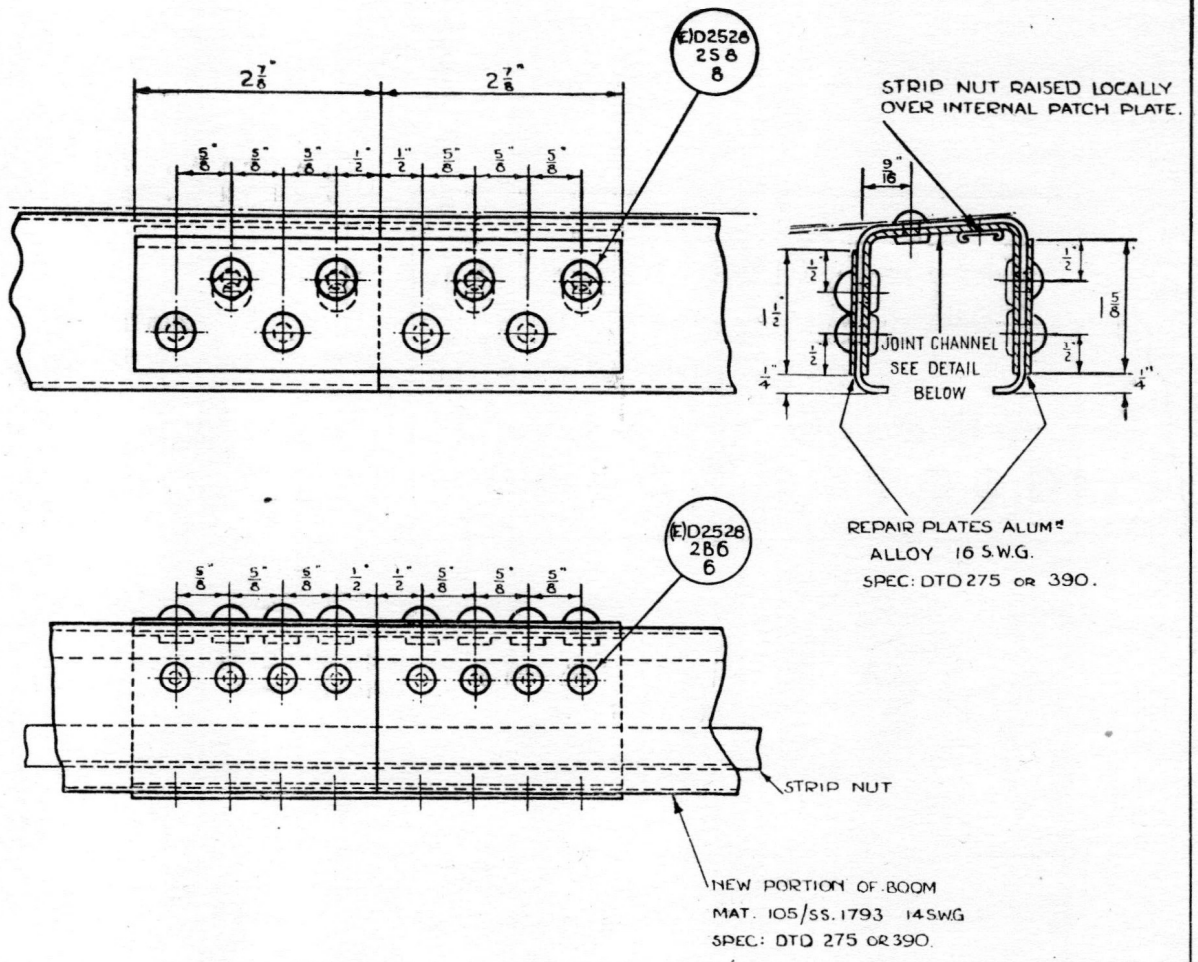
| 26 | PATCH REPAIR TO MAIN PLANE RIB BOOMS (ROLLED AND EXTRUDED SECTIONS) | 26 |
|---|---|---|

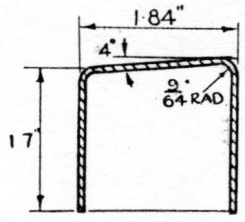



THIS WAS LINCOLN REPAIR F. 5919

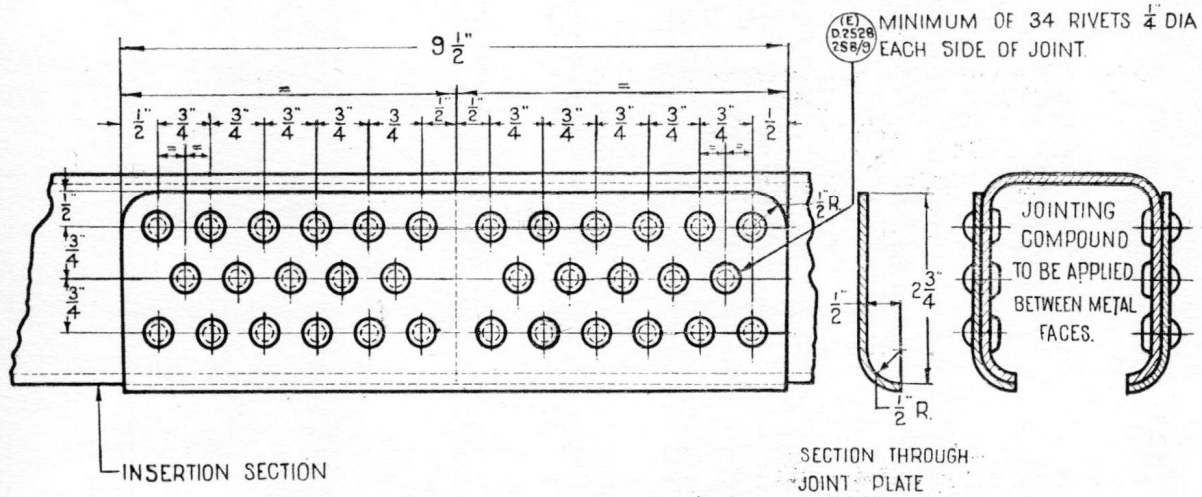
| 27 | PATCH REPAIR TO TOP BOOM OF RIB 22 | 27 |
|---|---|---|



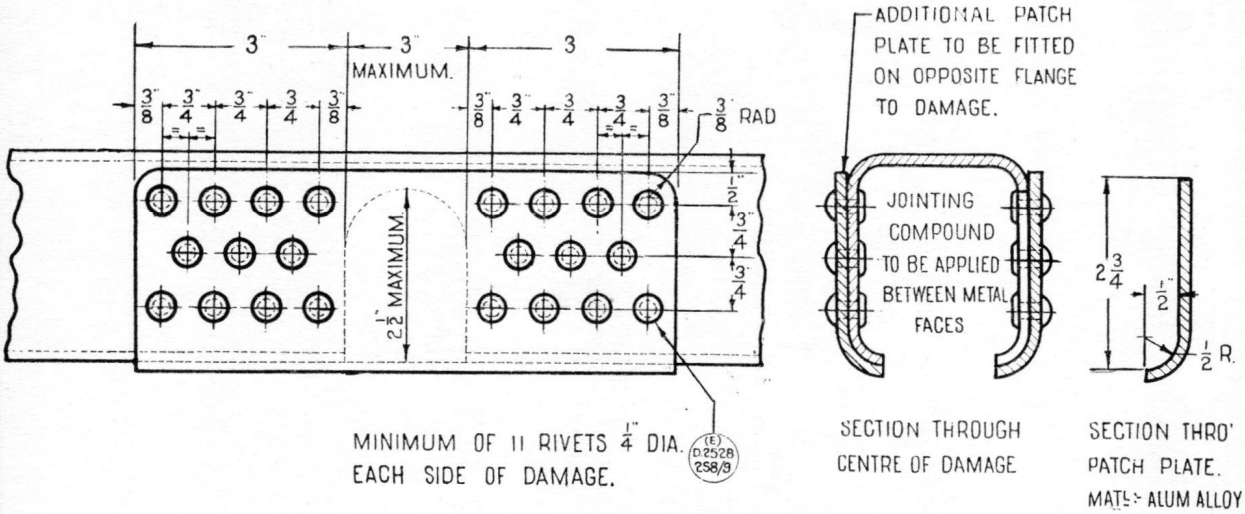




INTERNAL PATCH PLATE
MAT. ALUMs ALLOY 16 S.W.G.
SPEC: DTD. 275 OR 390

THIS WAS LINCOLN REPAIR F.4982




## "A" INSERTION REPAIR
TO 169/S.S. 1793

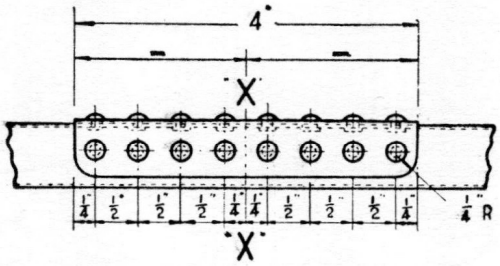


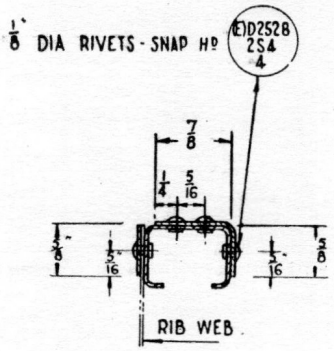

## "B" PATCH REPAIR
TO 169/S.S. 1793

NOTE :- MAXIMUM DAMAGE AFTER CUTTING AWAY TO A REGULAR SHAPE 3" × 2 1/2" IN ONE SIDE OF MEMBER ONLY MORE EXTENSIVE DAMAGE NECESSITATES AN INSERTION.

THIS WAS LINCOLN REPAIR F.6176

| 29 | PATCH & INSERTION REPAIRS TO ENGINE RIBS CENTRE SECTION-MAIN PLANE | 29 |
|---|---|---|




SECTION "X-X"

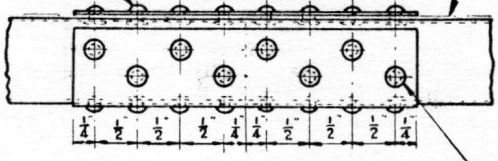
SECTION 93/S.S. 1793

JOINT PLATES :- ALUM. ALLOY 18 S.W.G.

SPEC. D.T.D. 275 OR 390.

PICK-UP EXISTING HOLES WITH
RIVETS EQUALLY SPACED BETWEEN

INSERTION PIECE



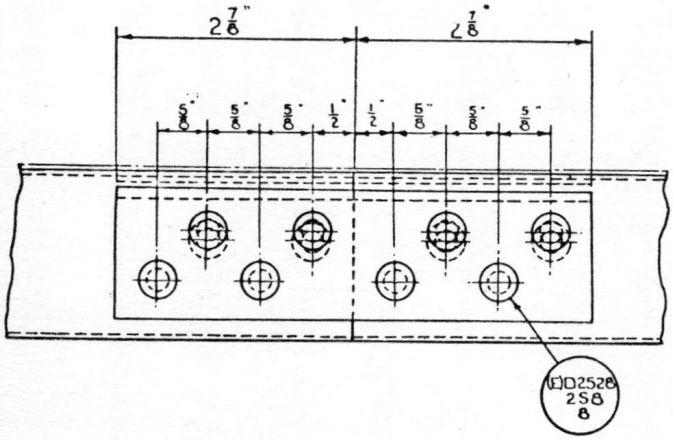
12 ⅛ DIA RIVETS EACH SIDE OF JOINT.

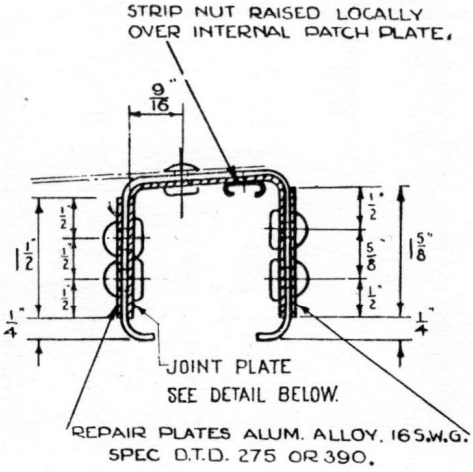
THIS JOINT APPLIES TO RIBS 6,7,9,10.

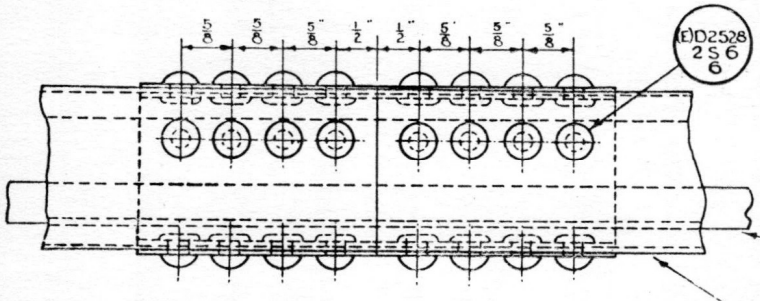
JOINTING COMPOUND TO BE
APPLIED BETWEEN METAL FACES.

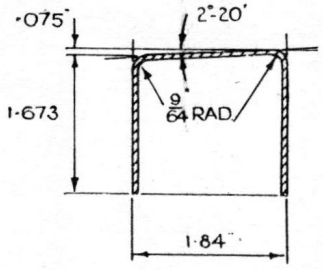
THIS WAS LINCOLN REPAIR F.5010

| 30 | INSERTION JOINT IN ROLLED SECTION MAIN PLANE RIB BOOMS | 30 |
|---|---|---|



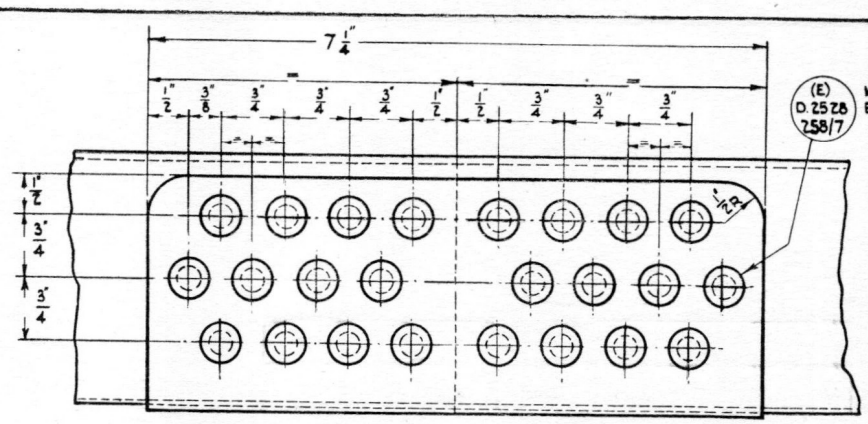



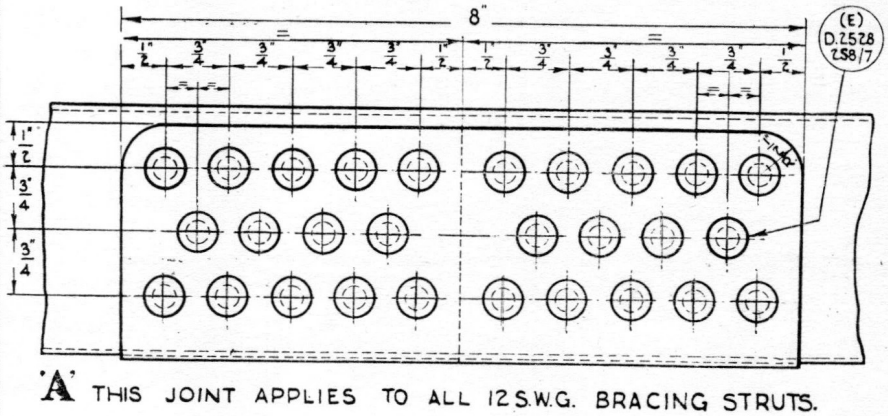

DETAIL OF ITEM 4/F6173
INTERNAL PATCH PLATE
MAT. ALUM ALLOY 16 SWG.
SPEC: D.T.D. 275 OR 390.

THIS WAS LINCOLN REPAIR F.6173

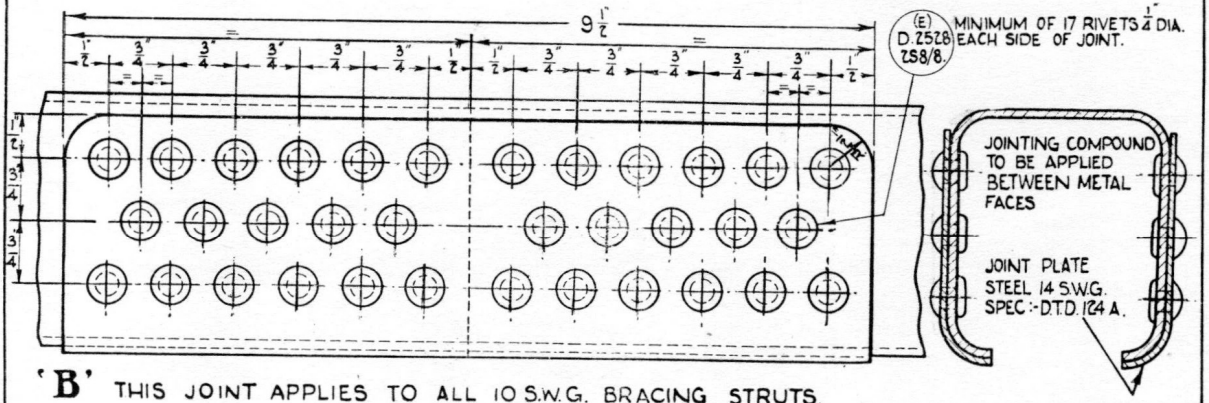
| 31 | INSERTION REPAIR TO TOP BOOM OF RIB NO. 1 | 31 |
|---|---|---|



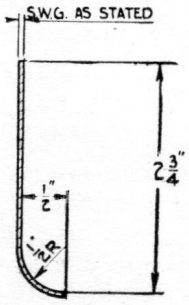

THIS JOINT APPLIES TO ALL 14 S.W.G. BRACING STRUTS.




**'A'** THIS JOINT APPLIES TO ALL 12 S.W.G. BRACING STRUTS.



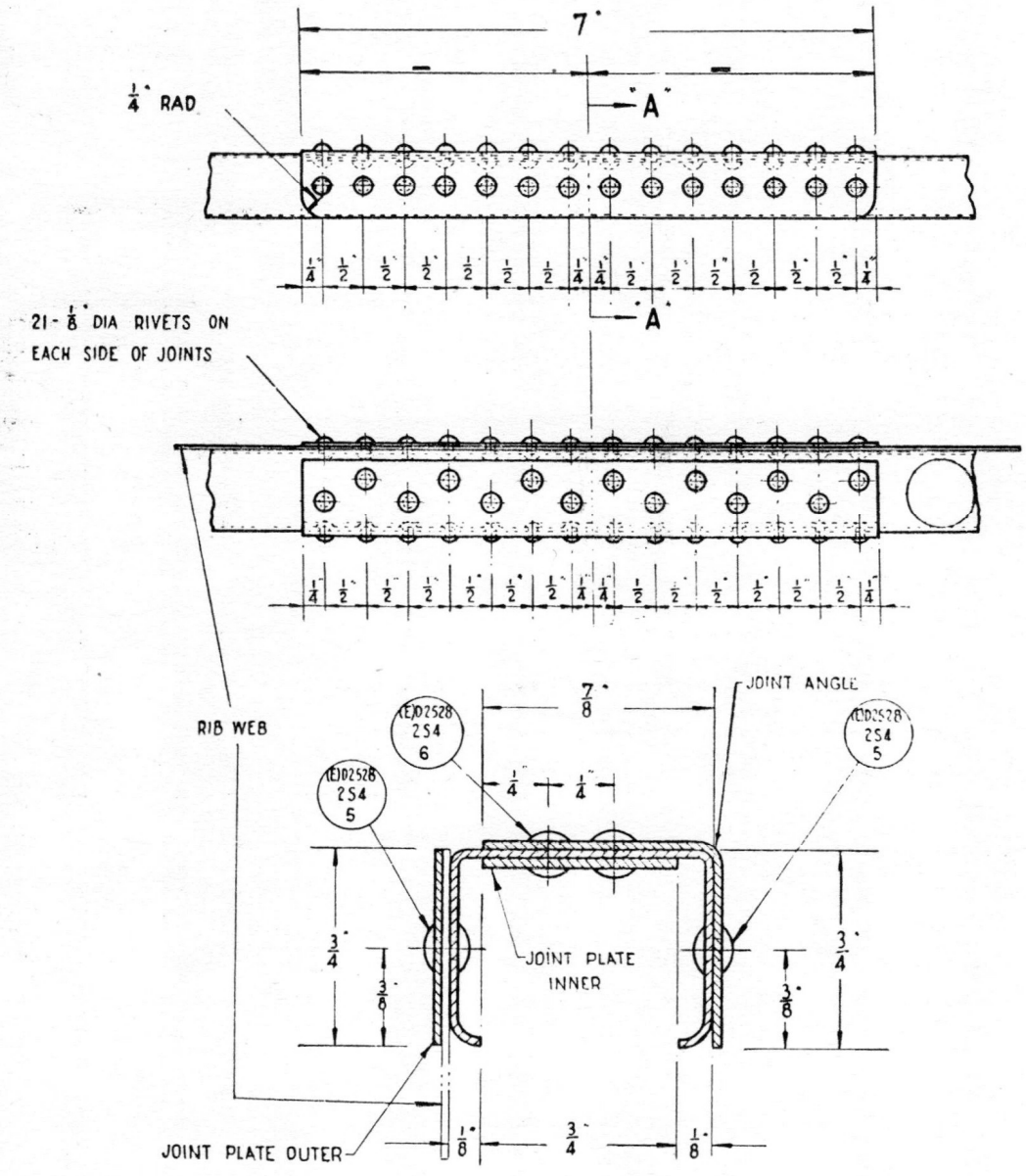

**'B'** THIS JOINT APPLIES TO ALL 10 S.W.G. BRACING STRUTS.




SECTION THRO' JOINT PLATE.

THIS WAS LINCOLN REPAIR F 4988

| 32 | INSERTION JOINT - ROLLED SECTION - ENGINE MOUNTING RIB BOOMS & BRACING STRUTS | 32 |
|---|---|---|




SECTION A-A

BOOM SECTION - B40/SS 3075.

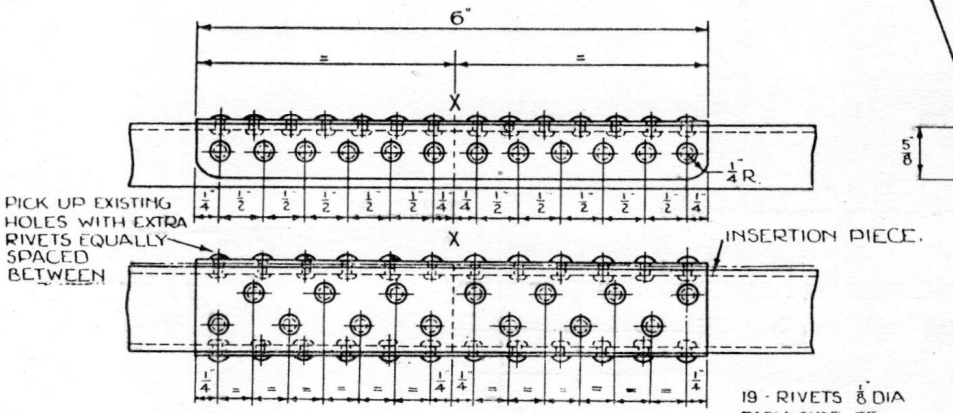
TWICE FULL SIZE.

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

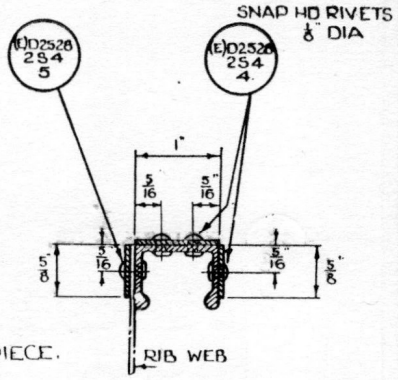
MATERIAL :- ALUM. ALLOY. 16 S.W.G. D.T.D. 390 OR 275.

THIS WAS LINCOLN REPAIR F.5802.

| 33 | INSERTION JOINT IN ROLLED SECTION RIB Nº 8 BOOM - MAINPLANE | 33 |
|---|---|---|

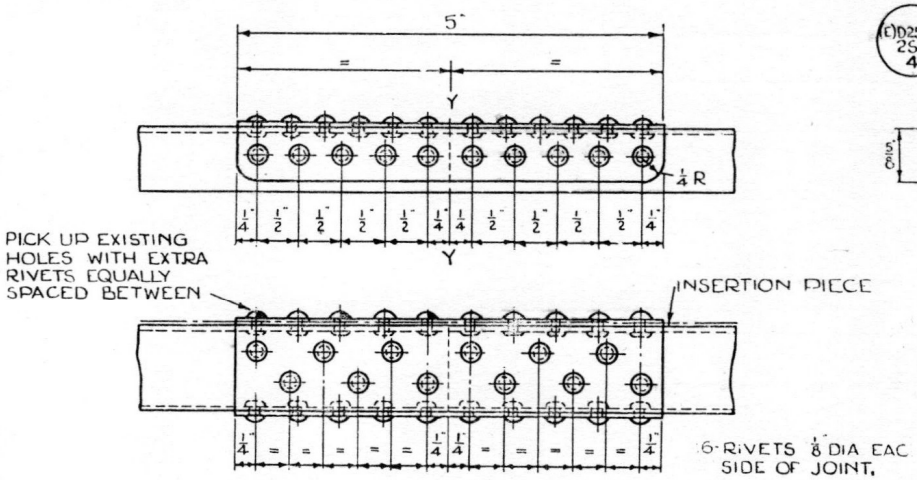



THIS JOINT APPLIES TO RIBS 8, 11 & 16

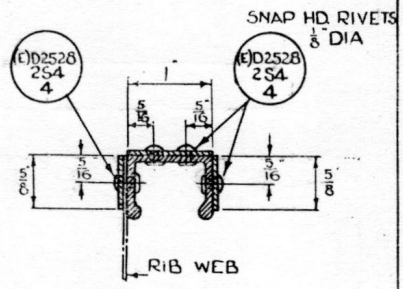



SECTION X-X
EXTRUDED SECTION
40/SS 3075
JOINT PLATES STEEL 18G
SPEC; DTD 124 A.

## REPAIR 'A'




THIS JOINT APPLIES TO RIBS 14 15 & 17



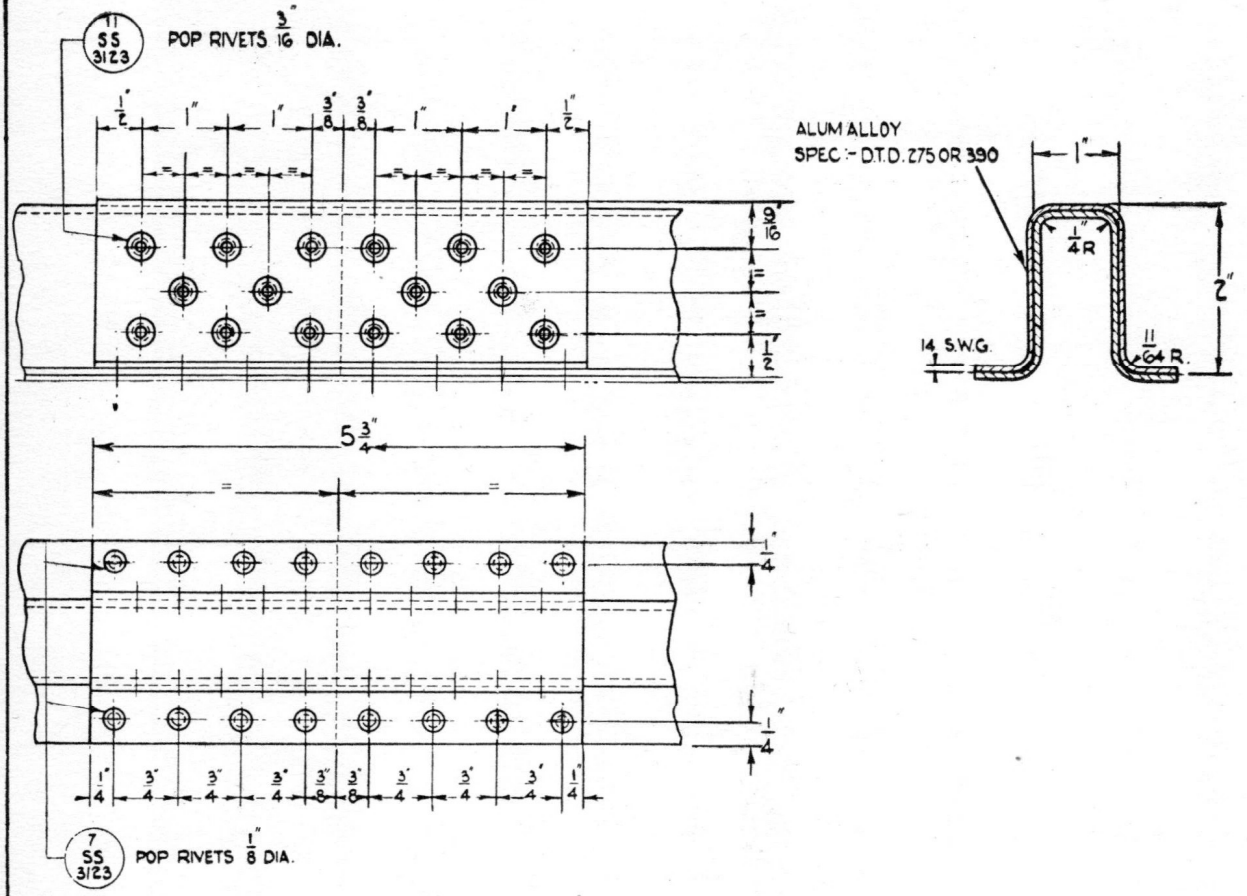

SECTION Y-Y
EXTRUDED SECTION
38/SS 3075.
JOINT PLATES STEEL 18G
SPEC DTD 124A

## REPAIR 'B'

JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR F.5003

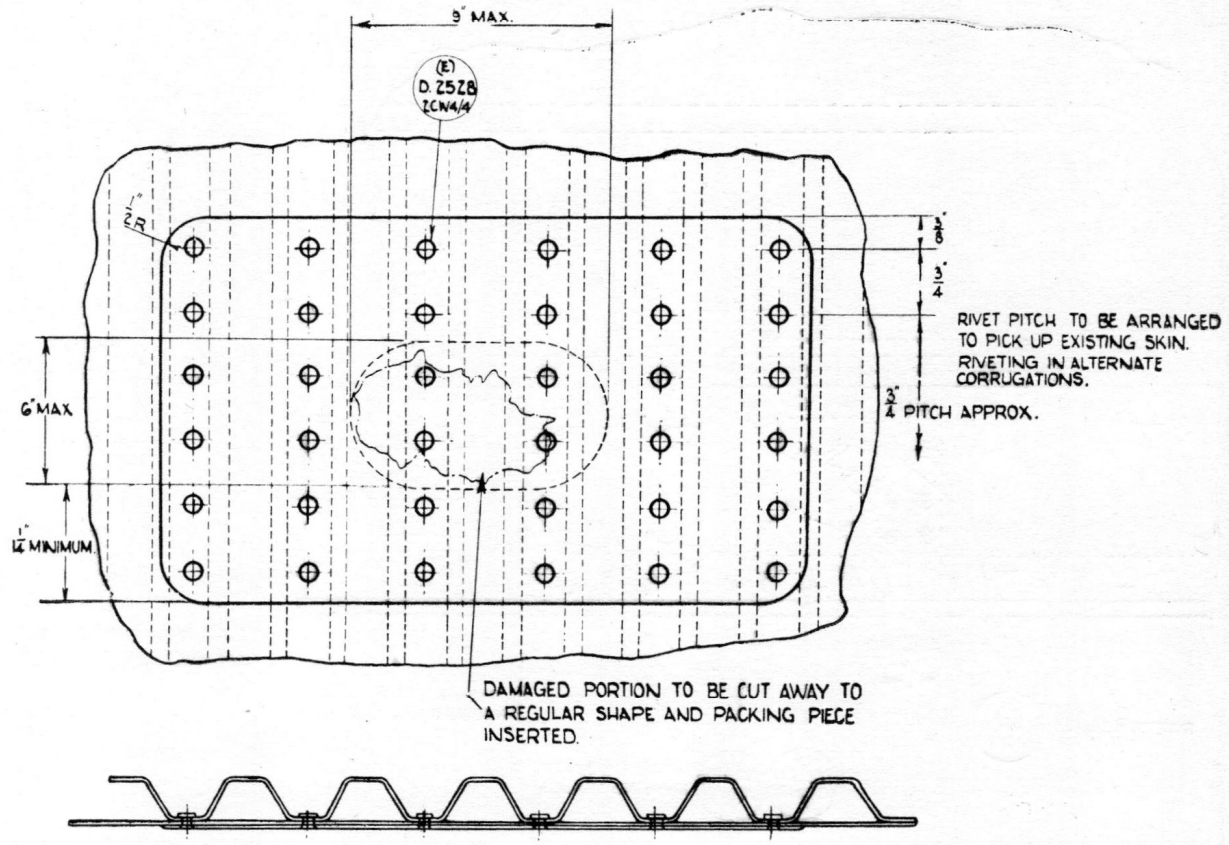
| 34 | INSERTION JOINT – MAIN PLANE RIB BOOMS EXTRUDED SECTION | 34 |
|---|---|---|




JOINTING COMPOUND TO BE
APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR F.4991.

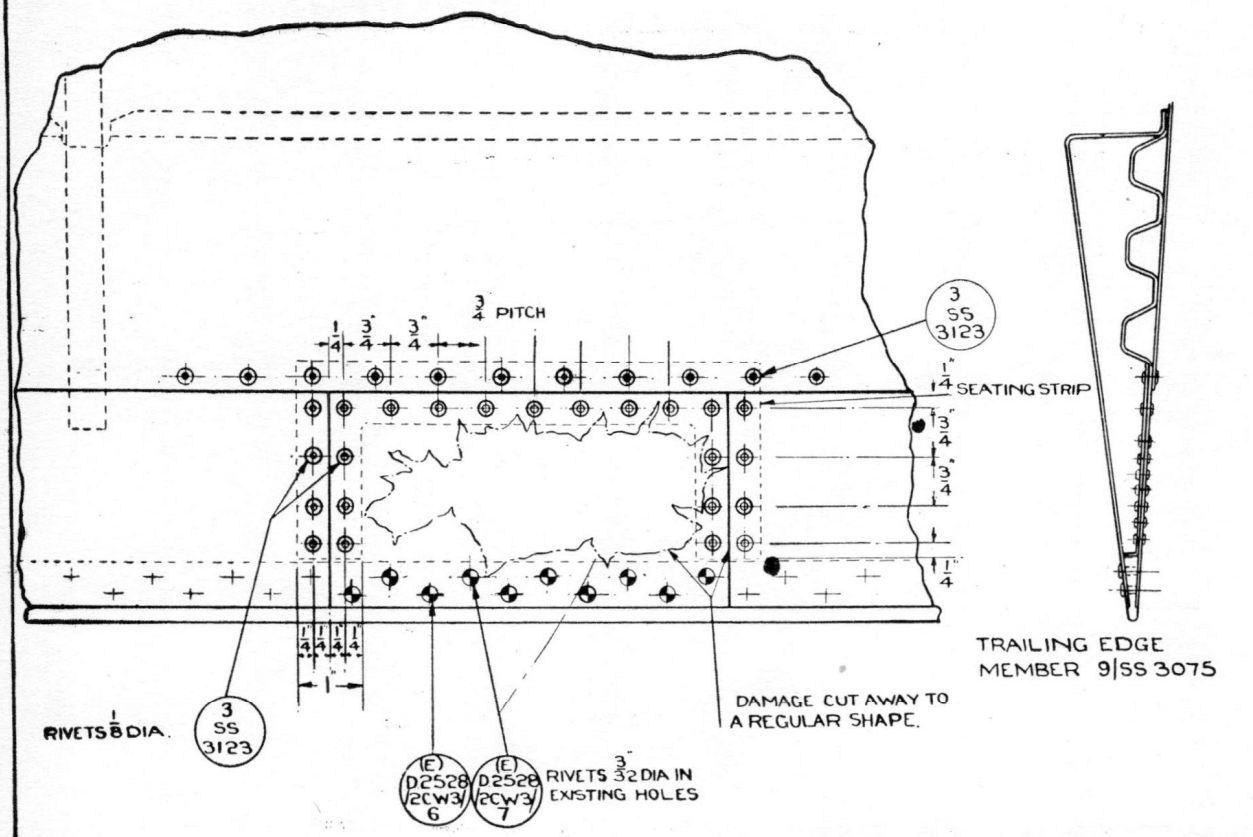
# 35 INSERTION REPAIR-TANK ACCESS DOOR STIFFENER 35




PATCH PLATE & PACKING PIECE.
MAT :- LIGHT ALLOY. 26 S.W.G.
SPEC:- D.T.D. 275 OR 390.

THIS WAS LINCOLN REPAIR F.4996

| 36 | PATCH REPAIR TO FLAP OUTER SKIN | 36 |
|---|---|---|

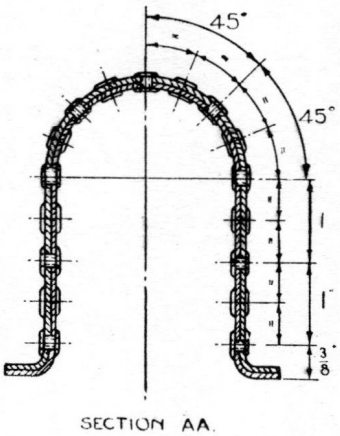



RIVETS IN EXISTING HOLES SHOWN THUS ⊙ ⊕
PATCH TO BE ALUM. ALLOY 26 S.W.G.
SPEC:- D.T.D. 275 OR 390.
SEATING STRIP TO BE ALUM. ALLOY 24 S.W.G.
SPEC:- D.T.D. 275 OR 390.

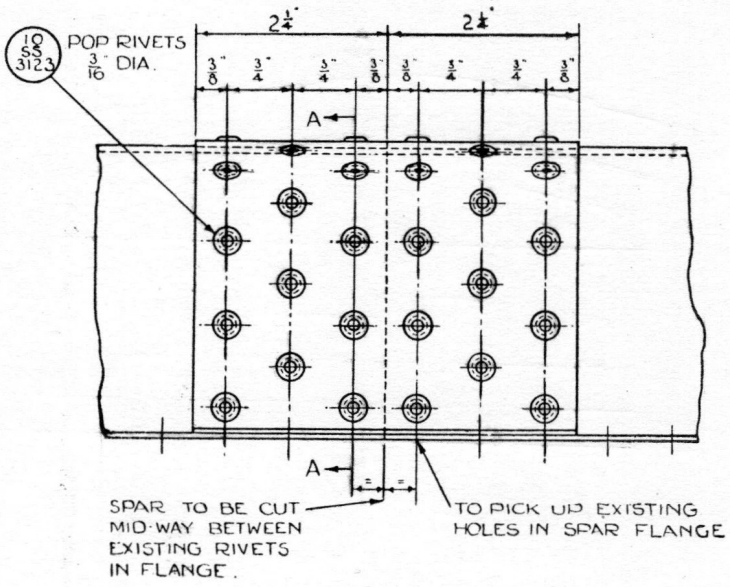
JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES.

THIS WAS LINCOLN REPAIR F.5002.

| 37 | PATCH REPAIR TO FLAP OUTER SKIN AT TRAILING EDGE | 37 |
|---|---|---|




SECTION AA.

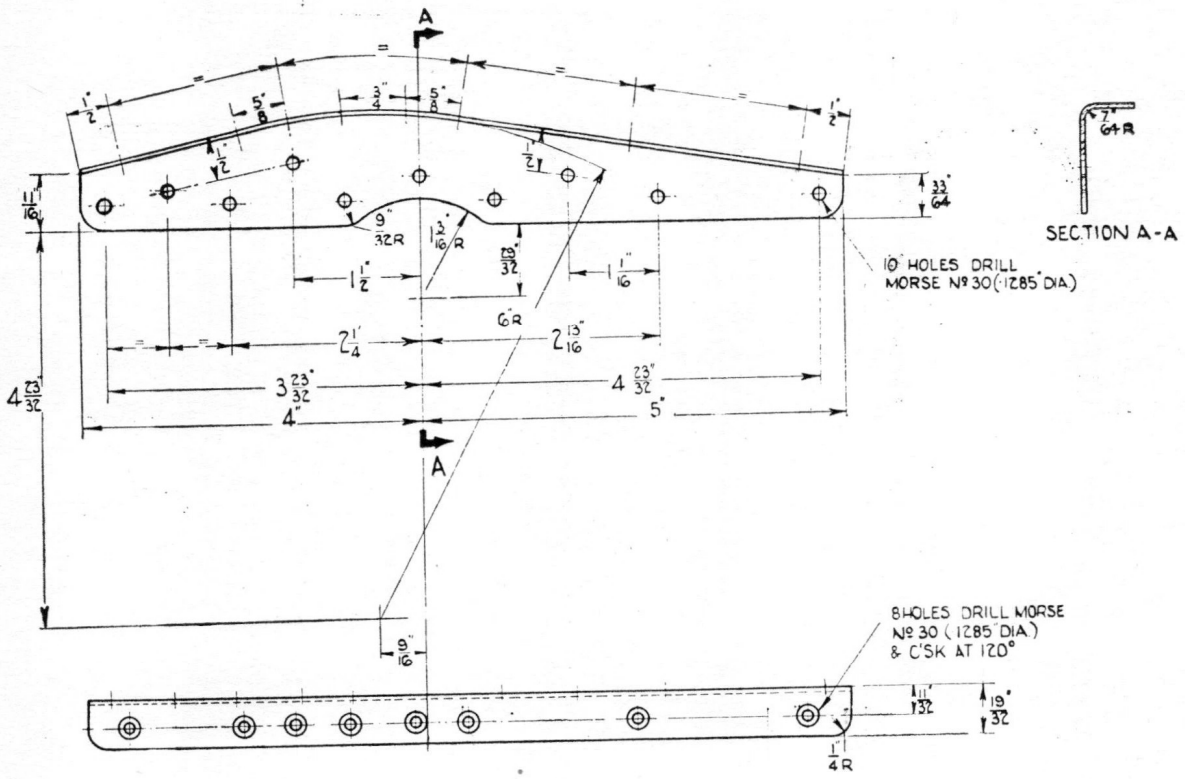



JOINT PLATE ALUM ALLOY 16 S.W.G.
SPEC:- D.T.D. 275 OR 390.

JOINTING COMPOUND TO BE APPLIED.
BETWEEN OVERLAPPING FACES.

THIS WAS LINCOLN REPAIR F.4997.

| 38 | JOINTING FOR INSERTION REPAIR FLAP SPAR | 38 |
|---|---|---|

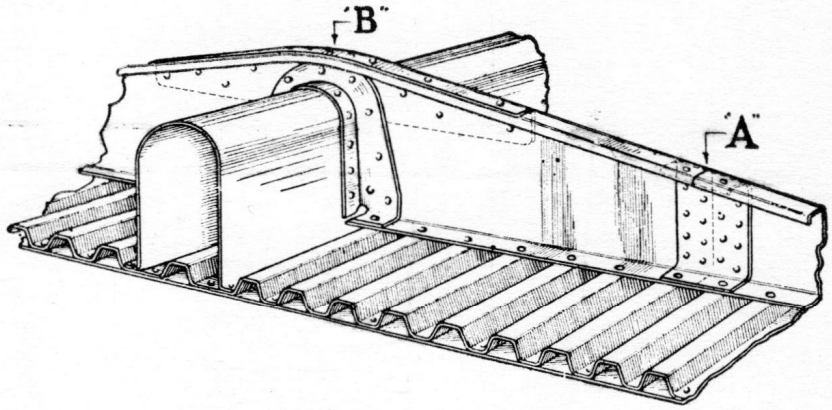


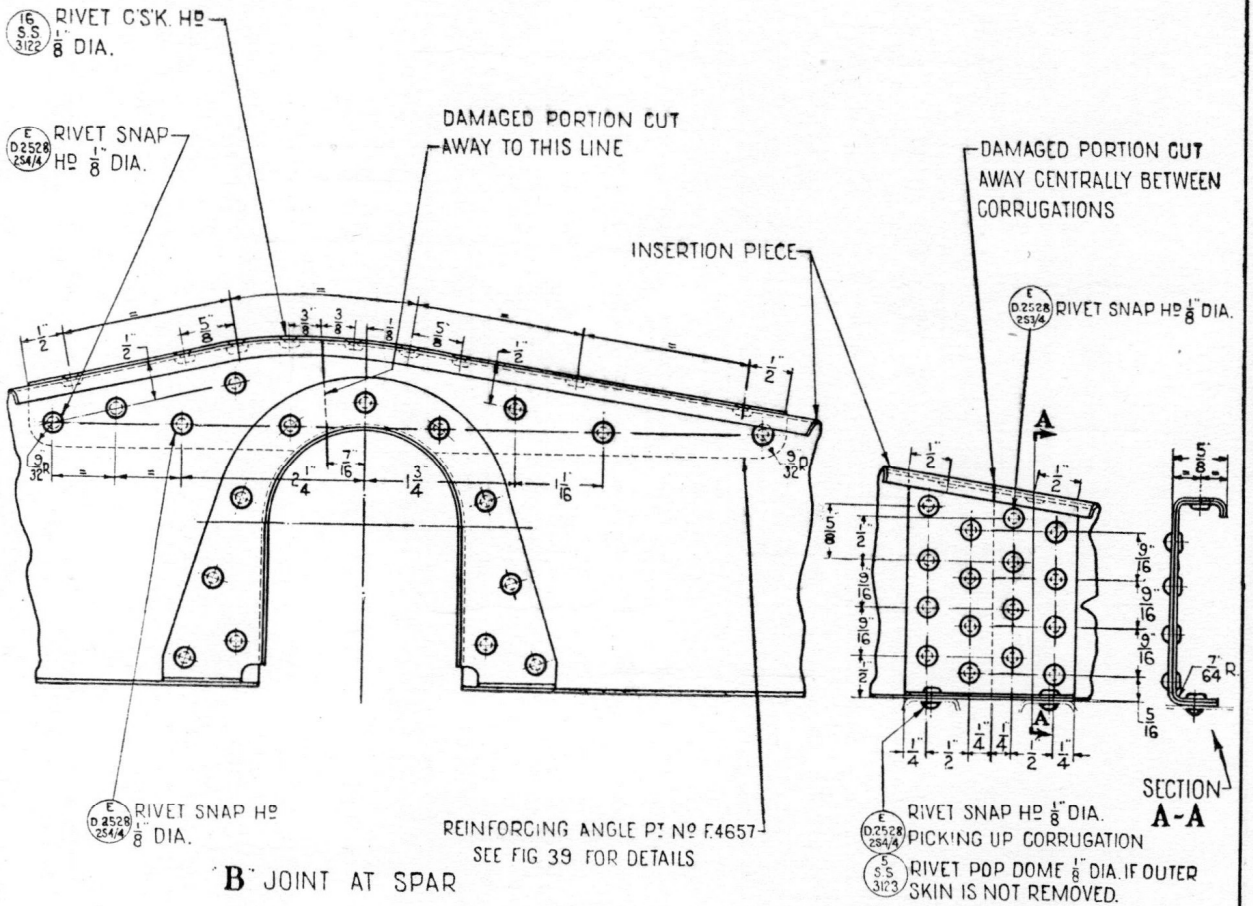

MATERIAL :- ALUM ALLOY 20 S.W.G.
SPEC .- D.T.D 275 OR 390.

THIS ITEM IS IDENTICAL WITH
ITEM Nº Z/F.4358 EXCEPT FOR
THE DRILLING DETAILS.

THIS WAS LINCOLN REPAIR F.4657

| 39 | REINFORCING ANGLE FOR REPAIR TO FLAP RIB | 39 |
|---|---|---|




"B" JOINT AT SPAR

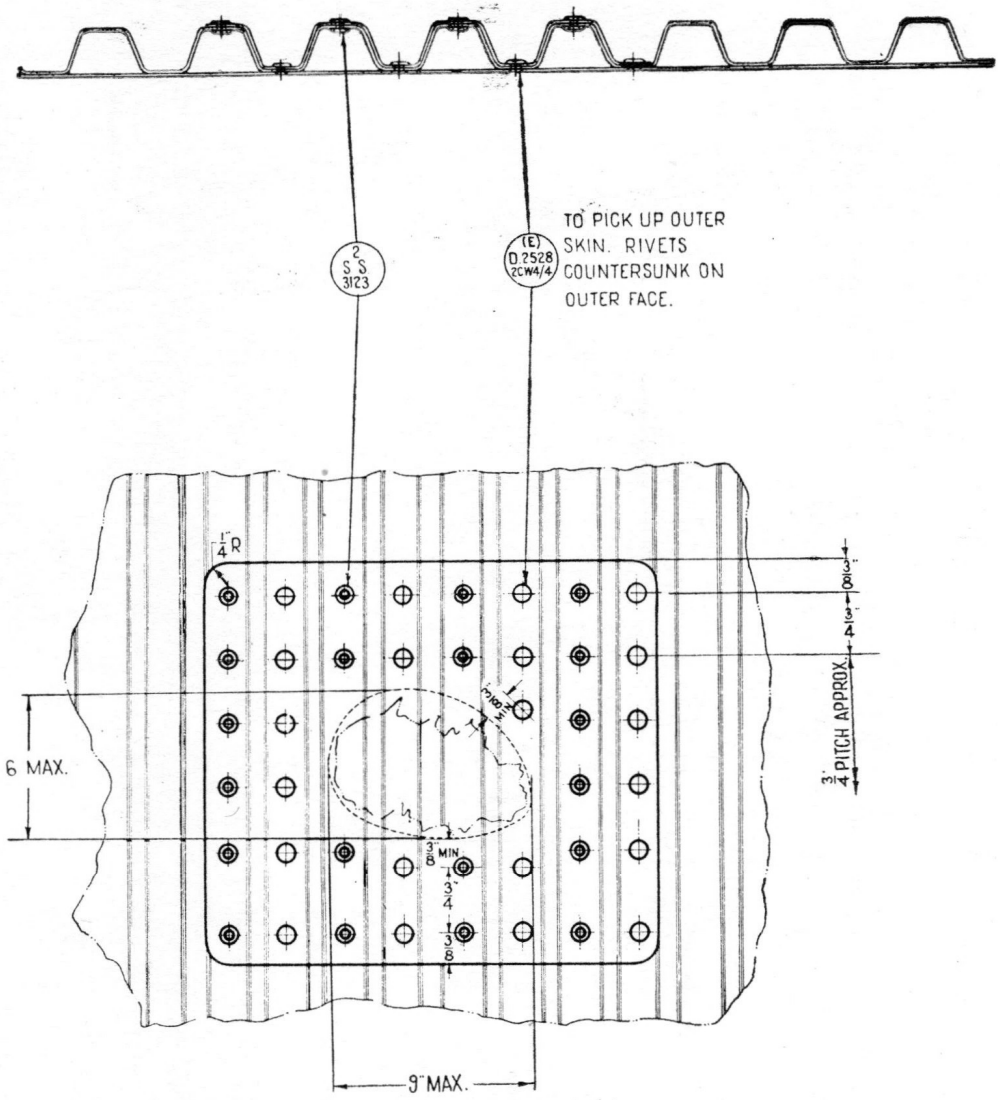
"A" JOINT 11" APPROX. FROM ℄ OF SPAR

JOINT PLATE & INSERTION PIECE TO BE ALUM ALLOY 20 S.W.G. SPEC.- D.T.D. 275 OR 390.

JOINTING COMPOUND TO BE APPLIED BETWEEN ALL OVERLAPPING SURFACES.

THIS WAS LINCOLN REPAIR F. 5008

| 40 | INSERTION REPAIR TO FLAP RIB | 40 |
|---|---|---|

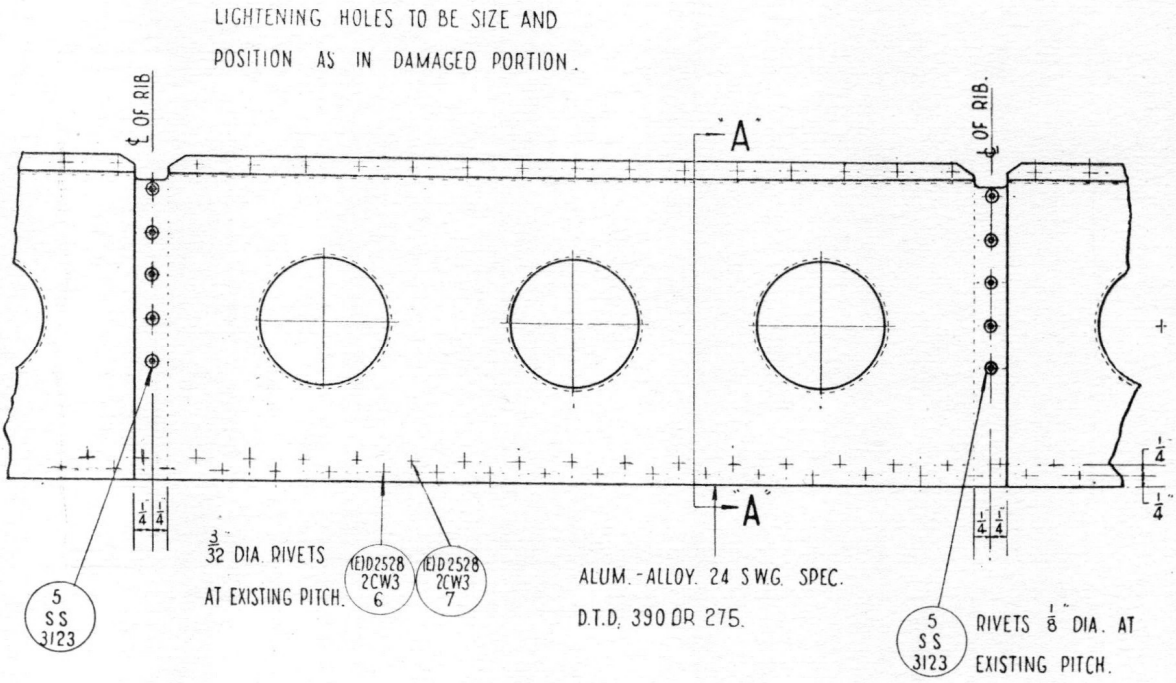


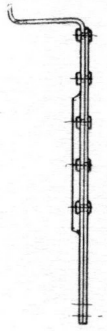

RIVET PITCH TO BE ARRANGED TO PICK UP EXISTING SKIN RIVETING IN ALTERNATE CORRUGATIONS

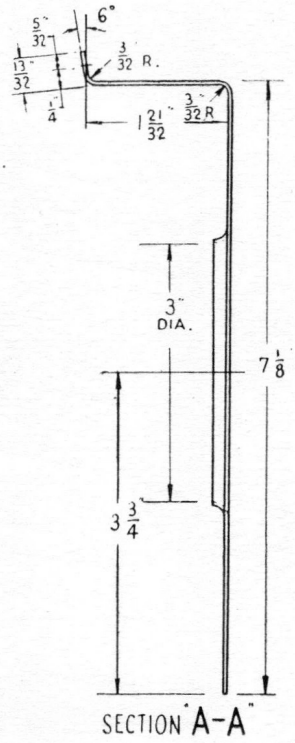
REPAIR PLATE LIGHT ALLOY 26 S.W.G.
SPEC :- DTD 275 OR 390.

THIS WAS LINCOLN REPAIR F.4984.

| 41 | PATCH REPAIR TO FLAP CORRUGATIONS | 41 |
|---|---|---|



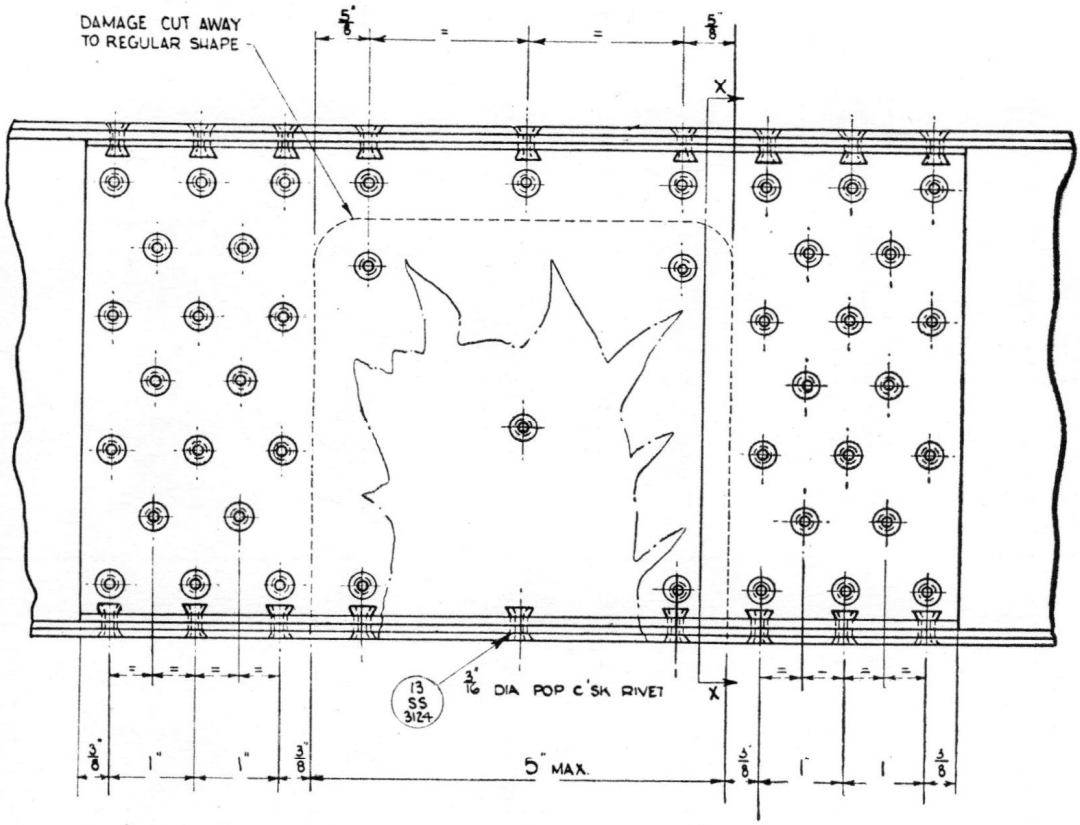


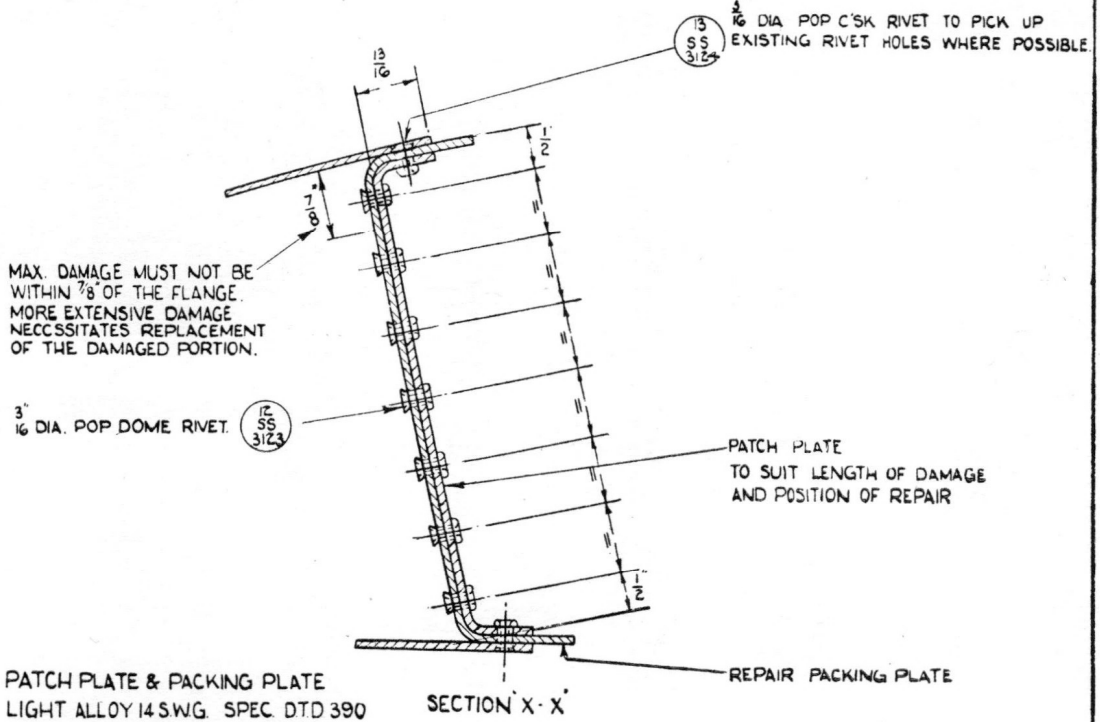

JOINTING COMPOUND TO BE
APPLIED BETWEEN METAL FACES

SECTION A-A

THIS WAS LINCOLN REPAIR F. 5007.

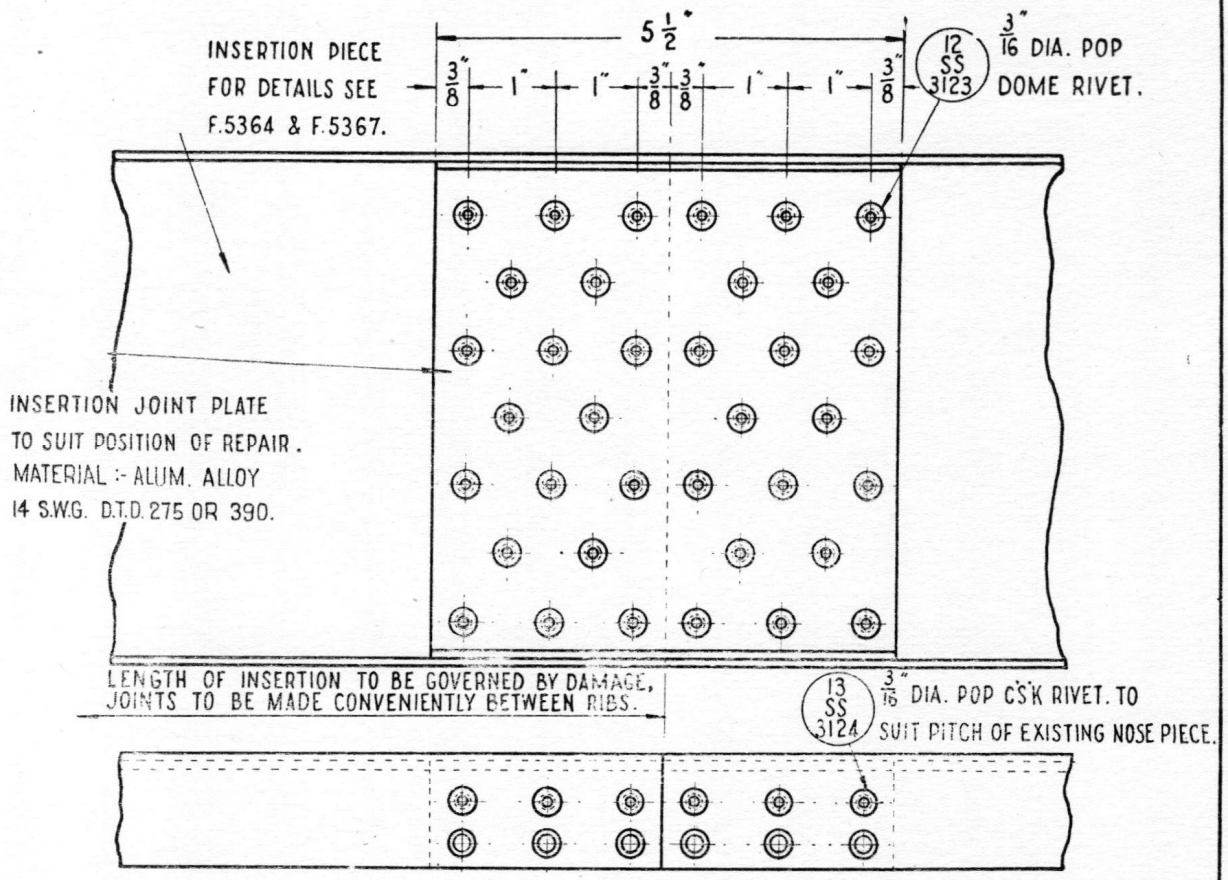
| 42 | INSERTION JOINT TO FLAP TRAILING EDGE STRIP | 42 |
|---|---|---|



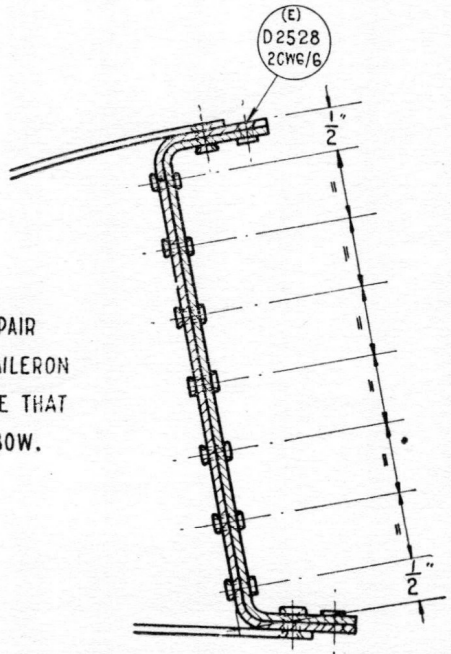




PATCH PLATE & PACKING PLATE
LIGHT ALLOY 14 S.W.G. SPEC. DTD 390
JOINTING COMPOUND TO BE APPLIED BETWEEN OVERLAPPING FACES.

THIS WAS LINCOLN REPAIR F.6157.




VIEW ON A




SECTION THROUGH REPAIR

IMPORTANT- AFTER THIS REPAIR HAS BEEN CARRIED OUT THE AILERON MUST BE CHECKED TO ENSURE THAT IT IS FREE FROM TWIST OR BOW.

THIS WAS LINCOLN REPAIR F.6156.

R.A.A.F. Publication No.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART 2 — CHAPTER 7

## Tail Plane and Elevator

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* To be issued later.

**Tail Plane Spars**

**Patch Repair to Tail Plane Spar Web**

1. Damage to the free areas of the spar web in excess of that defined in Chapter 7, paras. 4 and 5 of Part 1, and which, when cleaned out, does not exceed a hole 4 ins. dia. may be repaired with a circular patch. The patch should be the same gauge as the web and should be riveted to the web as shown in Fig. 1.

**TABLE 106.**
**Material for Patch Repair to Tail Plane Spar Web**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | For patch plate |
| | | Sheet, aluminium | 16 s.w.g. | D.T.D. 390 | For patch plate |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**Patch Repair to Hole in Tail Plane Spar Boom and Adjacent Web**

2. Damage greater than that defined in Chapter 7, para. 3 of Part 1, should be repaired with an 18 S.W.G. Aluminium Alloy patch riveted to the web and boom as illustrated in Fig. 2, provided that, when cleaned out, the damage does not exceed the following limits.

(i) Damage to the free edge of the boom does not extend more than 5/8 in. into the section.

(ii) Damage to both boom and adjacent web does not exceed $\frac{3}{4}$ in. dia.

For repairs to damage in excess of that defined in sub-para. (i) above, refer to para. 3.

**TABLE 107.**
**Material for Patch Repair, Tail Plane Spar Boom and Adjacent Web**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, aluminium alloy | 18 s.w.g. | D.T.D. 390 | |
| H128F/30271 | (E) D2528/2S4/8 | Rivet, snap head | 1/8 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/30291 | (E) D2528/2S6/10 | Rivet, snap head | 3/16 in. dia. x 5/8 in. | D.T.D. 327 | |

**Patch Repair to Web Attachment Flange of Tail Plane Spar Boom**

3. Damage to the boom in excess of that defined in para. 2 sub-para. (i) and which, when cleaned out, does not exceed 4 in. in length, nor extend more than 1 in. into the free edge of the boom, may be repaired by inserting a packing piece and packing as shown in Fig. 3. The patch should be made sufficiently long to pick up a minimum of 6 rivets at the existing pitch, either side of the damage.

4. On completion of the repair to the spar the skin should be repaired as described in Chapter 1 and the appropriate drawings listed in Table "A".

**TABLE 108.**
**Material for Patch Repair, Web Attachment Flange Tail Plane Spar Boom**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet carbon steel | 14 s.w.g. | D.T.D. 124A | Hardened and tempered |
| | | Sheet alum. alloy | 10 s.w.g. | D.T.D. 390 | For packing piece |
| H128F/30261 | (E) D2528/2S3/6 | Rivet, snap head | 3/32 in. dia. x 3/8 in. long | D.T.D. 327 | |
| H128F/30290 | (E) D2528/2S6/8 | Rivet, snap head | 3/16 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/6335 | (E) D2528/2CW8/8 | Rivet, countersunk head | 1/4 in. dia. x 1/2 in. | D.T.D. 327 | |

**Insertion Repair to Tail Plane Spar Boom and Web**

5. Damage to the spar boom in excess of that defined in para. 3, and to the spar web greater than that defined in para. 1, necessitates cutting out the damaged portion and

inserting a new length of boom or web. The butt joints should be secured with joint plates secured to the webs, and reinforcing blocks, Item Nos. 2 and 3/G.1524 (details of which are given in Fig. 5), bolted to the spar booms; before positioning the blocks, the existing rivets in the undamaged spar boom should be drilled out where shown in Fig. 4.

6. To ascertain to correct location of the holes to be drilled in the blocks, clamp them firmly to the spar boom and using a drill the same size as the holes in the booms give a few turns of the drill, remove the block and drill the holes. Care must be taken to make sure that the holes are drilled at the correct angle to allow the bolt heads and nuts to tighten flush with mating faces.

7. On completion of the repair, new skin panels should be fitted as illustrated in the relevant drawings listed in Table "A", Chapter 1.

NOTE:—

It is important to note that the above repair may be carried out between ribs No. 3 and 13 only.

**TABLE 109.**
**Material for Insertion Repair, Tail Plane Spar Booms and Webs**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 2/G.1524 | Repair block top boom | | L.40 | Spare part |
| | 3/G.1524 | Repair block bottom boom | | L.40 | Spare part |
| | | Sheet alum. alloy | 10 s.w.g. | D.T.D. 390 | |
| | 66/SS.3620 | Bolt, round head | 5/16 in. dia. | | |
| H28/758 | A16Y/GP | Nut, high tensile steel | | | |
| H28/7292 | A15Y/14E | Bolt, hexagon | 1/4 in. dia. | | |
| H28/756 | A16Y/EP | Nut, high tensile steel | | | |
| H128F/30288 | (E) D2528/2S6/6 | Rivet, snap head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | |
| | | Rivet, 90° countersunk head | 3/16 in. dia. x 3/8 in. | D.T.D. 327 | |

**Repair to Tail Plane Centre Joint Straps**

8. Damage to the joint straps, such as elongation of holes for bolts attaching joint straps to spar booms, may be repaired by re-drilling holes a larger size and using larger diameter bolts, as shown in Fig. 6. Details for the fabrication of these bolts is illustrated in Fig. 7.

**TABLE 110.**
**Material for Repair of Joint Straps, Tail Plane Centre Joint**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 6.G.1551 | Special bolt, countersunk head | 3/8 in. B.S.F. | S.2 | |
| | 7.G.1551 | Special bolt, countersunk head | 3/8 in. B.S.F. | S.2 | |
| | 8.G.1551 | Special bolt, countersunk head | 5/16 in. B.S.F. | S.2 | |
| | 9.G.1551 | Special bolt, countersunk head | 5/16 in. B.S.F. | S.2 | |
| | 10.G.1551 | Special bolt, countersunk head | 5/16 in. B.S.F. | S.2 | |
| | 11.G.1551 | Special bolt, countersunk head | 5/16 in. B.S.F. | S.2 | |
| | | Simmonds nuts | 3/8 in. B.S.F. | S.2 | |
| | | Simmonds nuts | 5/16 in. B.S.F. | S.2 | |

## Tail Plane Ribs

### Partial Replacement of Tail Plane Nose Ribs

9. Damage to a nose rib in excess of that defined in Chapter 7, para. 7 of Part 1, should be repaired by partial replacement, provided that the damage is confined to the front half of the rib only. Damage in excess of this necessitates the replacement of the nose rib concerned (see Part 1).

10. The new portion of nose rib should be made up from 24 S.W.G. alum. alloy sheet, to dimensions obtained from adjacent ribs, or a new portion cut from a spare nose rib and riveted to the undamaged portion as illustrated in Fig. 8.

11. On completion of the repair to the rib the skin should be repaired as described in para. 7.

**TABLE 111.**
**Material for Partial Replacement of Tail Plane Nose Rib**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet alum. alloy | 24 s.w.g. | D.T.D. 390 | |
| H128F/31627 | (E) D2528/2S4/3 | Rivet, snap head | 1/8 in. dia. x 3/16 in. long | D.T.D. 327 | |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. long | D.T.D. 327 | |

## Elevator Spar

### Patch Repair to Dents in Elevator Spar Tubes

12. Damage in the form of a dent which is in excess of that defined in Chapter 7, para. 14 of Part 1, should be repaired with a patch welded over the damage as illustrated in Fig. 9, provided that the dent does not exceed a maximum length of 3ins. and a width of 1 in.

**TABLE 112.**
**Material for Patch Repair, Elevator Spar Tubes**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet steel | 18 s.w.g. | S.3 | For patch |
| | | Welding wire | | | |

### Welded Repair to Bush in Elevator Spar Hinge Box

13. Damage to the elevator spar hinge box in the form of cracks which radiate from the bush may be repaired by re-welding all round the ends of the bush and welding up the cracks as illustrated in Fig. 10.

14. No other material other than welding wire is required to complete this repair.

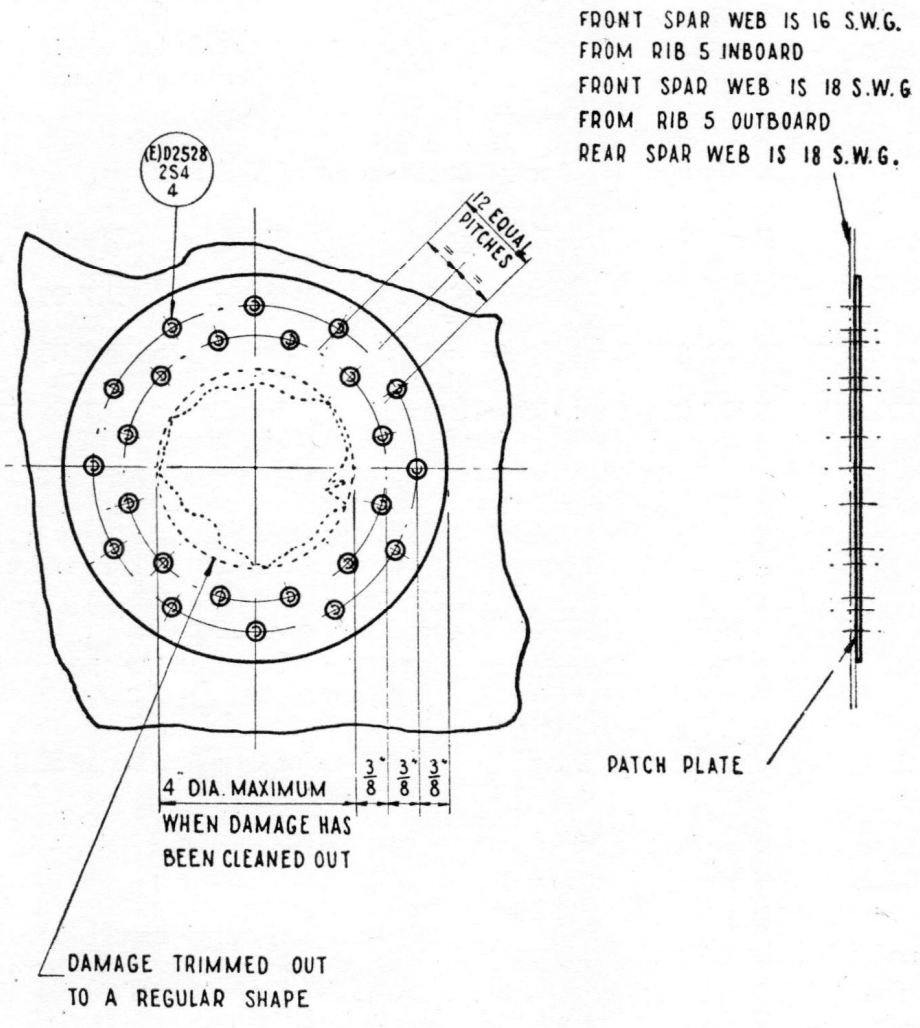
### Fitting of Oversize Taper Bolts in Elevator Spars

15. After the elevators have been dismantled for repair or other purposes, inspection may reveal that the holes for the main taper bolts are slightly elongated. If these holes are elongated, they should be reamed oversize, using taper reamer Part No. Z.2458, and special oversize taper bolts Part No. G.1544 fitted.

16. Details of the oversize reamers and taper bolts are illustrated in Figs. 11 and 12 respectively.

**TABLE 113.**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | 1/G.1544 | Taper bolt | | S.2 | |
| | 2/G.1544 | Taper bolt | | S.2 | |
| | 3/G.1544 | Taper bolt | | S.2 | |
| | 4/G.1544 | Taper bolt | | S.2 | |
| | Z.2458 | Taper reamer | | | |

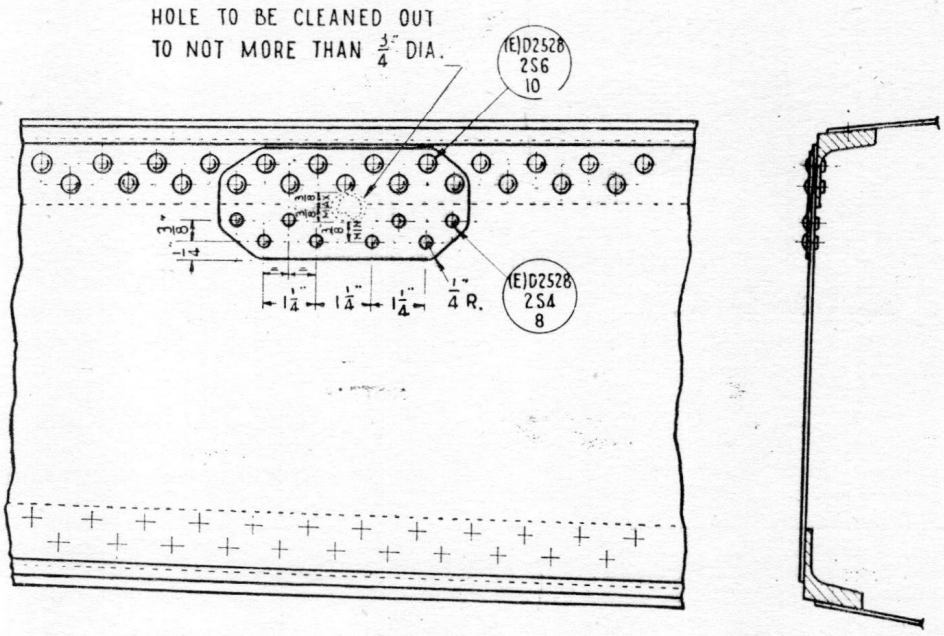



PATCH PLATE MATERIAL :- ALUM. ALLOY. SAME GAUGE AS WEB.
SPEC :- D.T.D. 275 OR 390.

NOTE :- JOINTING COMPOUND TO BE
APPLIED BETWEEN FACES

THIS WAS LINCOLN REPAIR G.1535

| 1 | PATCH REPAIR TO TAIL-PLANE SPAR WEBS | 1 |
|---|---|---|

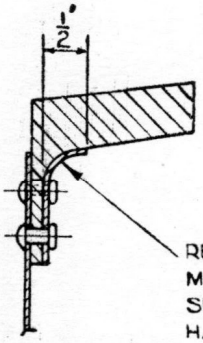



PATCH :- MATL :- ALUM. ALLOY. 18 S.W.G.
SPEC :- D.T.D. 275 OR 390.

NOTE :- JOINTING COMPOUND SHOULD BE APPLIED BETWEEN FACES.

THIS WAS LINCOLN REPAIR G1534.

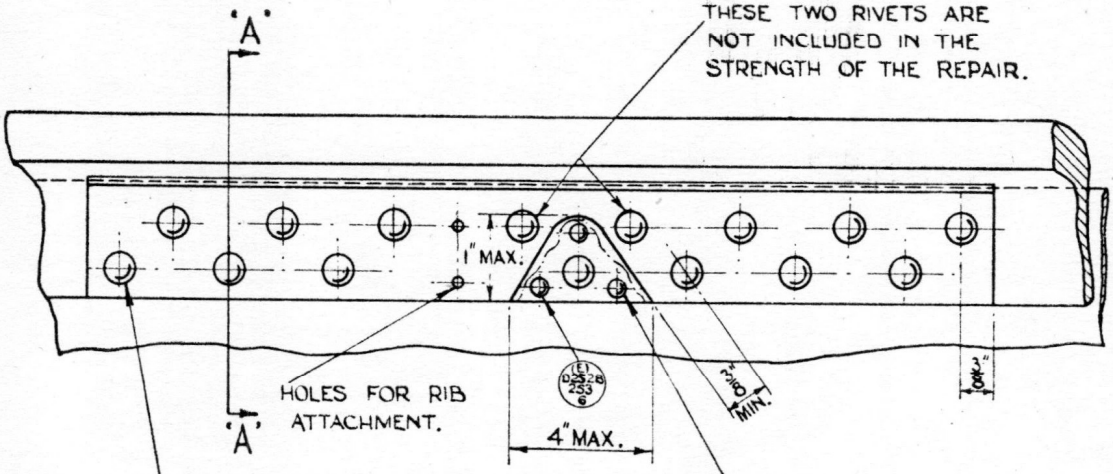
| 2 | PATCH REPAIR TO TAIL PLANE SPAR BOOM & ADJACENT WEB | 2 |
|---|---|---|




REPAIR ANGLE
MATERIAL :- STEEL 14 S.W.G.
SPEC :- D.T.D. 124 A.
HARDENED & TEMPERED.

SECTION 'A-A'.

NOTE :-
THESE TWO RIVETS ARE NOT INCLUDED IN THE STRENGTH OF THE REPAIR.



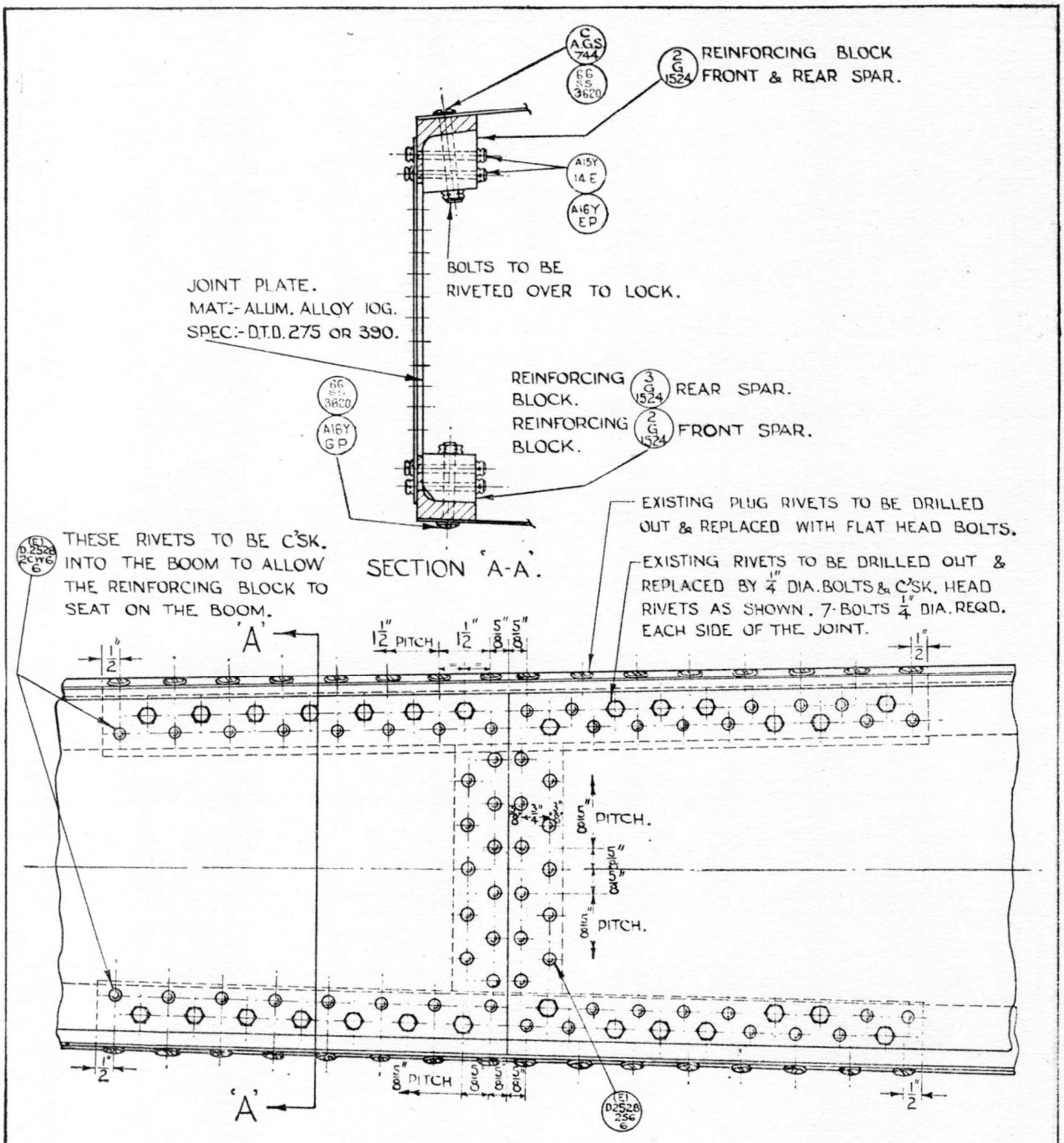

OUTBOARD OF FUSELAGE JOINT. (E) D2528 256 8
INBOARD OF FUSELAGE JOINT. (E) D2528 2C 8 9
} MINIMUM OF 6 - RIVETS EACH SIDE OF DAMAGE IN EXISTING HOLES.

PACKING PIECE
MATERIAL :- ALUM. ALLOY 10 S.W.G.
SPEC :- D.T.D. 275 OR 390.

NOTE :-
JOINTING COMPOUND TO BE APPLIED BETWEEN FACES.

THIS DRAWING WAS G.1536.

| 3 | PATCH REPAIR TO WEB ATTACHMENT FLANGE - TAIL PLANE SPAR BOOM | 3 |
|---|---|---|

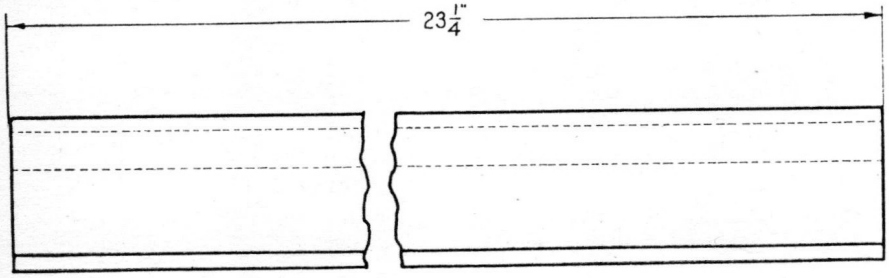


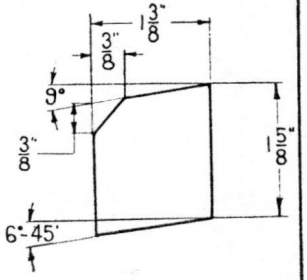

IMPORTANT :- THIS REPAIR MAY BE CARRIED OUT ONLY BETWEEN RIBS Nº 3 & 13.

NOTE :- JOINTING COMPOUND SHOULD BE APPLIED BETWEEN FACES.

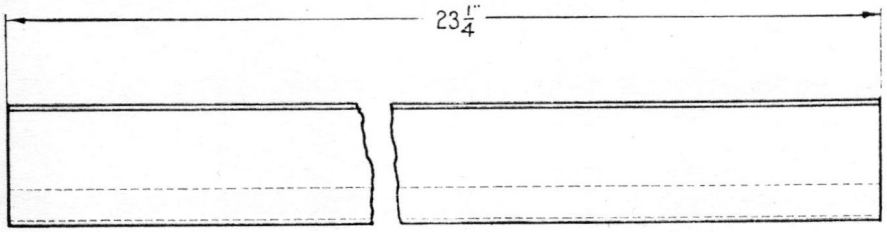
THIS DRAWING WAS G.1541.

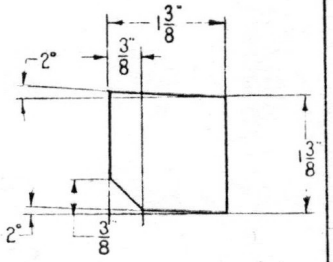
| 4 | INSERTION REPAIR TO TAIL PLANE SPAR BOOMS AND WEB | 4 |
|---|---|---|




2/G 1524



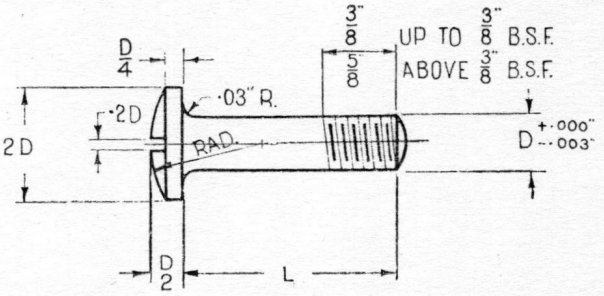




3/G.1524

MATERIAL :- ALUM ALLOY
SPEC :- D.T.D. 364

THIS WAS LINCOLN REPAIR G.1524

| 5 | REPAIR BLOCKS - TAIL PLANE SPAR BOOMS | 5 |
|---|---|---|



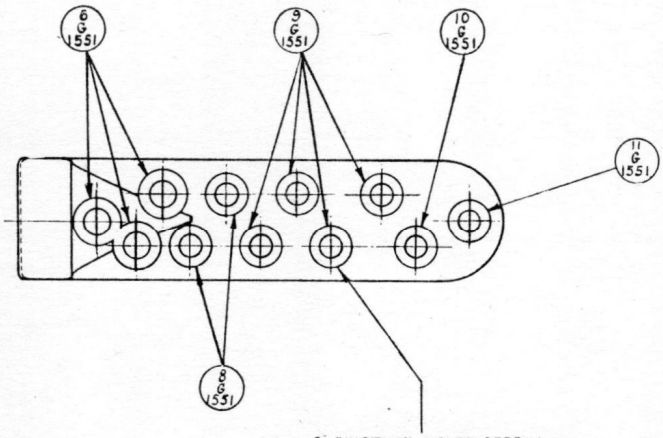

BOLTS TO BE CADMIUM PLATED

MATERIAL :- H.T.S. BAR
SPEC. :- S.2.

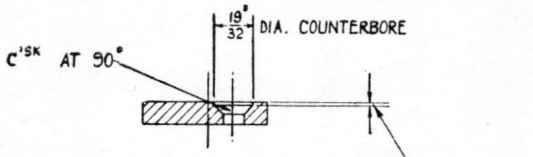
| LENGTH L | DIAMETER D | | | | |
|---|---|---|---|---|---|
| | 2 B.A. | 1/4" B.S.F. | 5/16" B.S.F. | 3/8" B.S.F. | 7/16" B.S.F. |
| ·5" | | | | | |
| ·6" | | | | | |
| ·7" | | | | | |
| ·8" | | | | | |
| ·9" | | | | | |
| 1·0" | | | | | |
| 1·1" | | | | | |
| 1·2" | | | | | |
| 1·3" | | | | | |
| 1·4" | | | | | |
| 1·5" | | | | | |
| 1·6" | | | | | |
| 1·7" | | | | | |
| 1·8" | | | | | |
| 1·9" | | | | | |
| 2·0" | | | | | |
| 2·2" | | | | | |
| 2·4" | | | 66 | | |
| 2·6" | | | | | |
| 2·8" | | | | | |
| 3·0" | | | | | |
| 3·2" | | | | | |
| 3·4" | | | | | |
| 3·6" | | | | | |

REFERENCE NUMBERS TO BE ADDED FOR BOLT LENGTHS AS REQUIRED.

| 6A | SPECIAL BOLT SS.3620 | 6A |
|---|---|---|

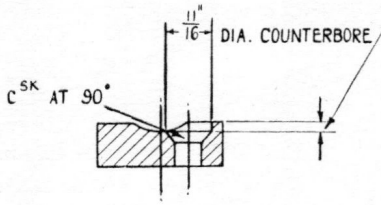



REPAIR TO FRONT JOINT STRAP
ITEMS 32, 35 OR 36/G1220.



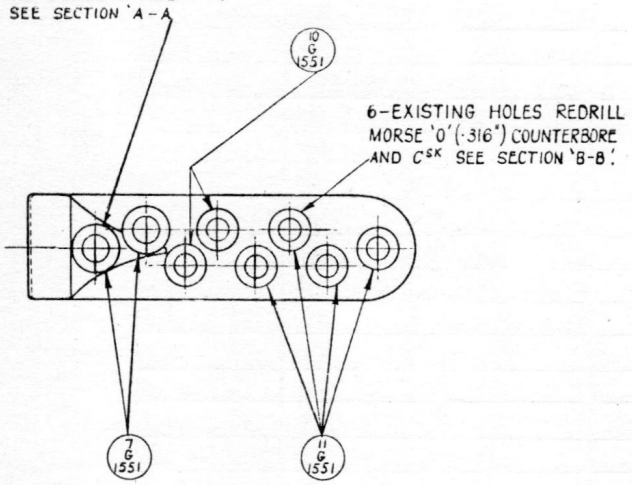

SECTION B-B.

THIS DEPTH TO BE KEPT TO A MINIMUM.

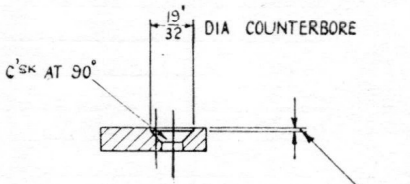



SECTION 'A-A'.

2-EXISTING HOLES REDRILL LETTER 'W' (·386") COUNTERBORE AND C'SK. SEE SECTION 'A-A'.

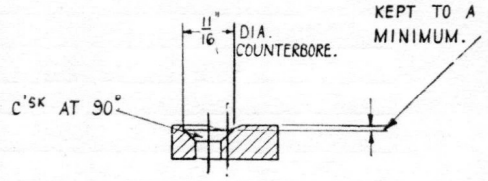



REPAIR TO REAR JOINT STRAP
ITEM 31/G 1220.




SECTION 'B-B'.

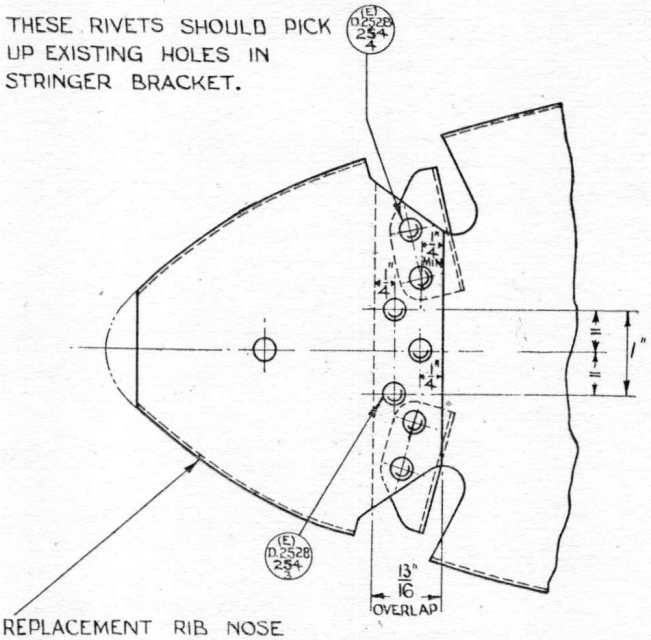
THIS DEPTH TO BE KEPT TO A MINIMUM.




SECTION 'A-A'.

THIS DRAWING WAS G1551.

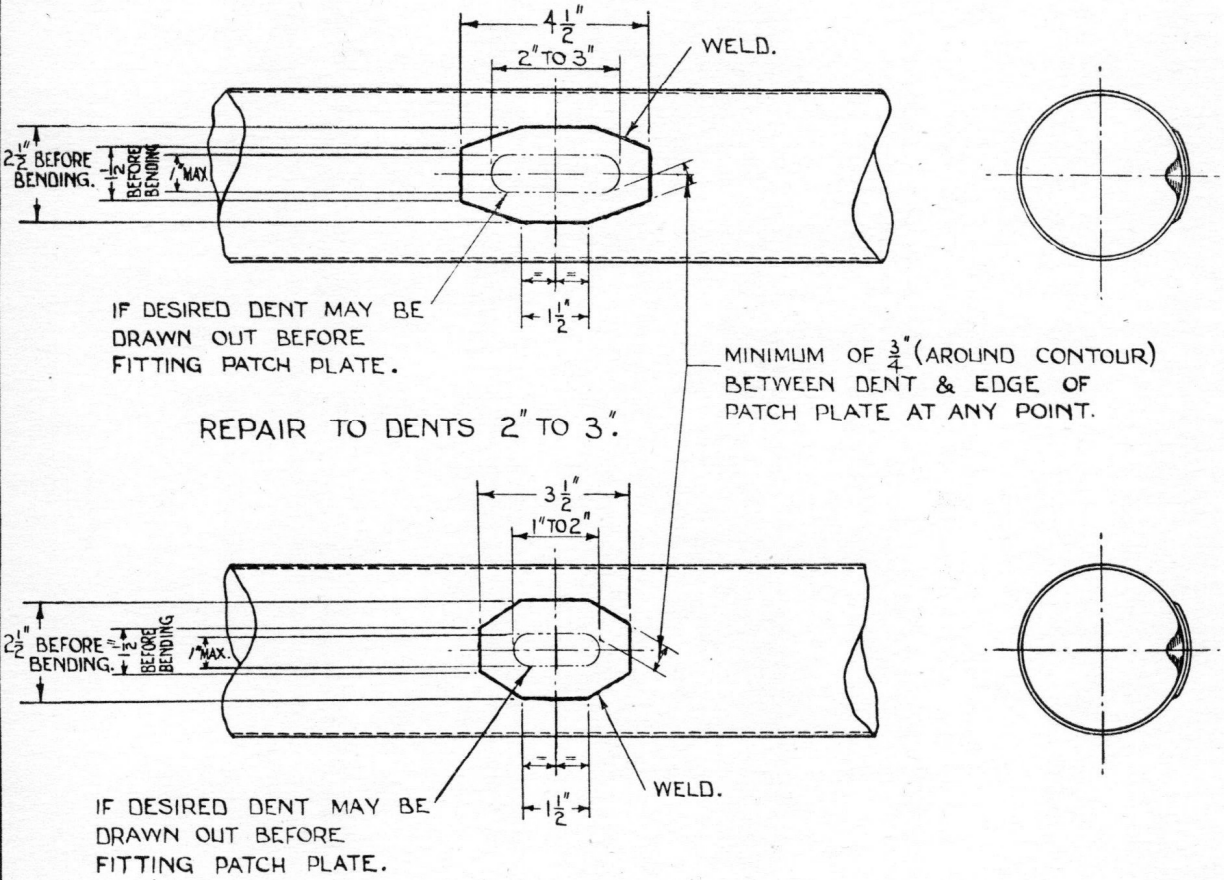
| 7 | DETAILS OF REPAIRS TO JOINT STRAPS AT TAILPLANE CENTRE JOINT | 7 |
|---|---|---|




NOTE :- JOINTING COMPOUND SHOULD BE APPLIED BETWEEN FACES OF THE OVERLAP.

THIS DRAWING WAS G.1542.

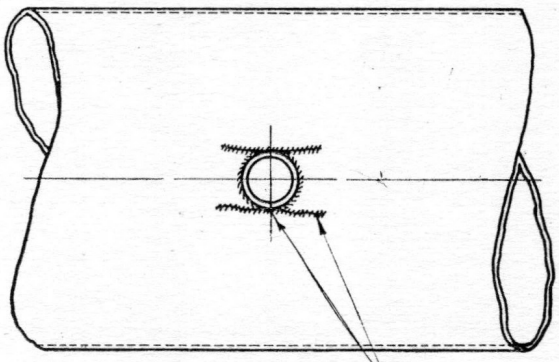
| 8 | PARTIAL REPLACEMENT TO NOSE RIB-TAIL PLANE | 8 |
|---|---|---|



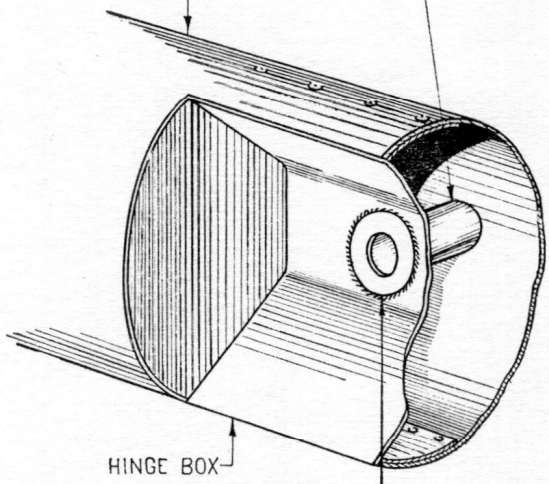

PATCH PLATES MATERIAL :- M.S. 18 S.W.G.
SPEC :- S.3.

THIS DRAWING WAS G.1539.

| 9 | PATCH REPAIR TO DENT-ELEVATOR SPAR | 9 |
|---|---|---|



BUSH TO BE RE-WELDED TO SPAR, ANY CRACKS WELDED UP.



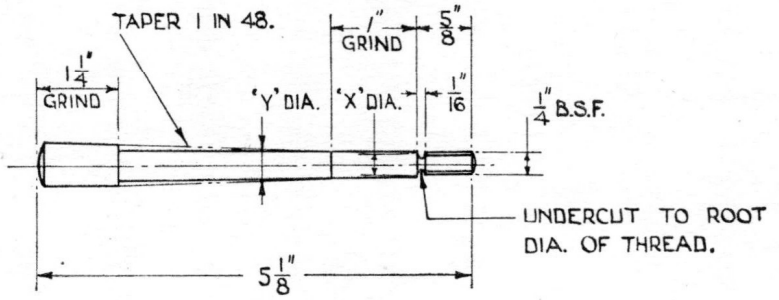

FLANGE OF BUSH WHICH HAS BROKEN AWAY AT SMALL WELDS TO BE RE-WELDED ALL ROUND TO BOX.

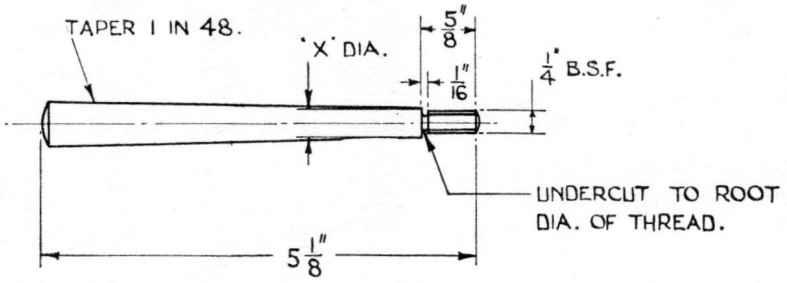
NOTE:- AFTER THIS REPAIR HAS BEEN CARRIED OUT, THE ELEVATOR SHOULD BE CHECKED FOR TWIST FROM END TO END, AND IF NECESSARY SQUARED UP.

WHEN THIS REPAIR HAS BEEN CARRIED OUT, THE MOD. PLATE SHOULD BE STAMPED UP TO STATE THAT MOD. 814 HAS BEEN CARRIED OUT.

THIS WAS LINCOLN REPAIR G1534

| 10 | WELDED REPAIR TO BUSH IN ELEVATOR SPAR HINGE BOX | 10 |
|---|---|---|



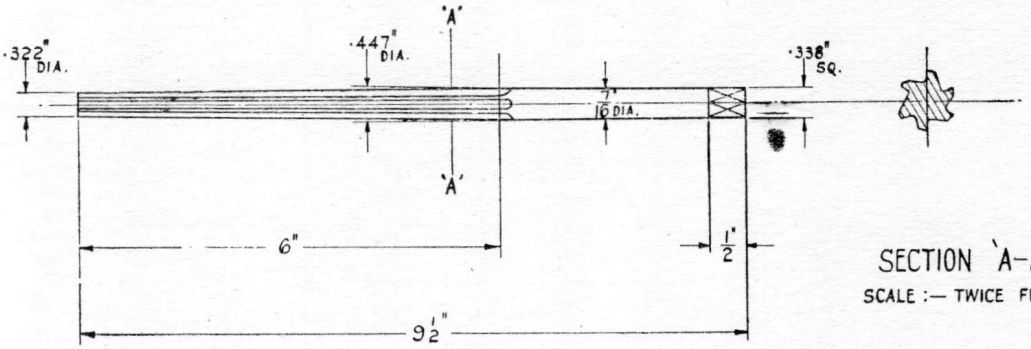

ALTERNATIVE METHOD OF MANUFACTURE.

MATERIAL:- STEEL BAR.
SPEC:- S.2. OR S.11 OR (E)D533

| ITEM No. | 'X' DIA. | 'Y' DIA. |
|---|---|---|
| 1/G.1544 | ·332" +·002 −·000 | ·353" ±·005" |
| 2/G.1544 | ·342" +·002 −·000 | ·363" ±·005" |
| 3/G.1544 | ·352" +·002 −·000 | ·373" ±·005" |
| 4/G.1544 | ·382" +·002 −·000 | ·403" ±·005" |

FOR SPECIAL TAPER REAMERS SEE FIG. 12

THIS DRAWING WAS G.1544.



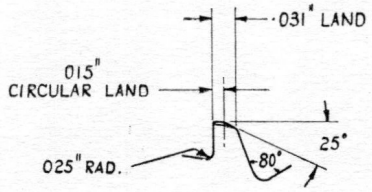

SECTION 'A-A.

SCALE :— TWICE FULL SIZE.

TAPER REAMER (TAPER 1 IN 48)

6 TEETH. RIGHT HAND CUTTING.

MAT :- H.S.S. HRD & GRD.




ENLARGED VIEW OF TOOTH.

NOTE :-

THIS TAPER REAMER ENABLES THE HOLES IN THE ELEVATOR SPAR TO BE OPENED OUT ·010" ·020" ·030" & ·060" OVERSIZE.

THIS DRAWING WAS Z2458.

| 12 | SPECIAL OVERSIZE TAPER REAMERS FOR ELEVATOR SPAR BOLT HOLES | 12 |
|---|---|---|

R.A.A.F. Publication No.

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

PART 2 — CHAPTER 8

## Fins and Rudders

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## FINS AND RUDDERS

### Fins

**Patch and Insertion Repair to Stiffening Channel—Fin Metal Leading Edge**

1. Damage to the flange of a stiffening channel which when cleaned out does not exceed 4 ins. in length, nor extend more than 1-1/4 in. into the section, should be repaired with an angle patch riveted to the flange and cross section, as illustrated in Fig. 1.

2. Damage greater than that defined above necessitates the insertion of a new portion of stiffening channel. The butt joints should be secured with joining angles riveted to the inside of the two sections, as illustrated in Fig. 2.

**TABLE 114.**
**Material for Patch and Insertion Repairs to Stiffener Channel, Fin**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet, alum. alloy | 20 s.w.g. | D.T.D. 390 | For patch and insertion repairs |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. | D.T.D. 327 | |
| H128F/61176 | 5/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | |

**Patch and Minor Insertion Repairs to Intermediate Fin Post**

3. Damage to the lower tip of the intermediate fin post, or to any individual flange of this member in excess of that defined in Chap. 8, para. 3 of Part 1, may be repaired, provided that the damage is within the limits defined in paras. 4 and 5.

**Patch Repair**

4. Damage to a flange which when cleaned out does not exceed 2 in. in length and 1 in. in width, may be repaired by patching. The damaged flange should be lightly hammered back to its original shape and the angle patch riveted over the damage as shown in Fig. 3, Detail "A".

**Insertion Repair**

5. Provided that damage to the lower tip of the intermediate fin post does not extend for more than 6 ins. from the bottom, a partial replacement may be effected. The new portion should be butted to the original and the joint secured with a joint channel riveted to the inside of the sections as illustrated in Fig. 3, Detail "B".

6. Damage more extensive than that described above necessitates the insertion of a new portion of fin post as described in para. 8.

7. On completion of the repair to the fin post, the skin should be repaired as described in Chapter 6, para. 4 of Part 1.

**TABLE 115.**
**Material for Patch and Insertion Repair, Intermediate Fin Post**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet alum. alloy | 22 s.w.g. | D.T.D. 390 | For patch repair |
| | | Sheet, alum. alloy | 20 s.w.g. | D.T.D. 390 | For insertion repair |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. long | D.T.D. 327 | |
| H128F/61175 | 4/SS.3123 | Rivet, pop dome | 1/8 in. dia. | D.T.D. 10B | |

**TABLE 116.**
**Material for Insertion Repair, Intermediate Fin Post**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet alum. alloy | 20 s.w.g. | D.T.D. 390 | For repair angle |
| H128F/30267 | (E) D2528/2S4/4 | Rivet, snap head | 1/8 in. dia. x 1/4 in. long | D.T.D. 327 | |
| H128F/61178 | 7/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | D.T.D. 10B | |

### Insertion Repair to Intermediate Fin Post

8. Damage to the intermediate fin post in excess of that defined in paras. 3 to 5, necessitates the insertion of a new portion of the member. The butt joints should be secured with angle plates of 20 S.W.G. alum. alloy riveted to the insertion piece and original section as illustrated in Fig. 4.

9. On completion of the repair to the fin post, the skin should be repaired as illustrated in the appropriate Drawings listed in Table "A" Chapter 1.

## Rudders

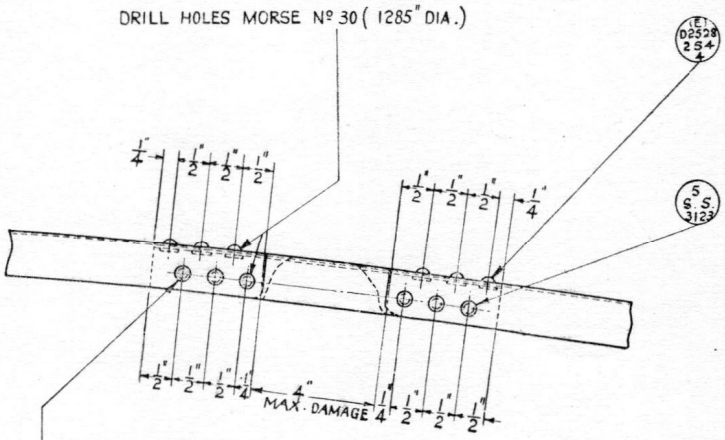
### Insertion Repair to Rudder Post

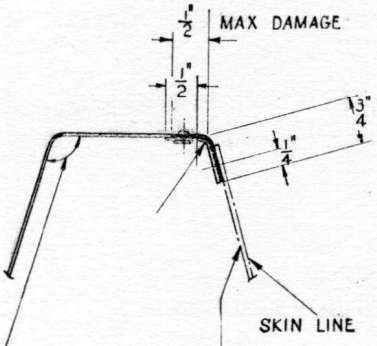
10. Damage to the rudder post in excess of that defined in Chapter 8, para. 14 of Part 1, necessitates the insertion of a new portion of the member. The butt joints should be secured with internal angles and a reinforcing plate riveted to the insertion piece and original, as shown in Fig. 5.

11. On completion of the repair, the skin should be repaired as described in Chapter 1, and the appropriate drawings listed in Table "A".

**TABLE 117.**
**Material for Insertion Repair to Rudder Post**

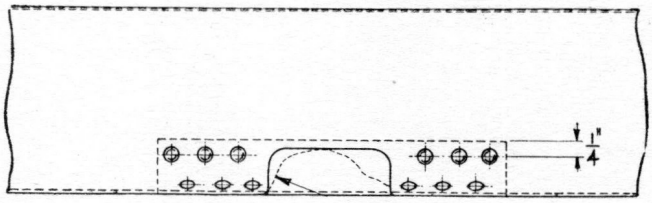
| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet carbon steel | 20 s.w.g. | D.T.D. 124A | Repair plate hardened and tempered |
| | | Sheet carbon steel | 20 s.w.g. | D.T.D. 124A | Repair angle hardened and tempered |
| H128F/31594 | (E) D2528/2S5/4 | Rivet, snap head | 5/32 in. dia. x 1/4 in. long | D.T.D. 327 | |
| H128F/30268 | (E) D2528/2S4/5 | Rivet, snap head | 1/8 in. dia. x 5/16 in. long | D.T.D. 327 | |
| H128F/61178 | 7.SS.3123 | Rivet, pop dome | 1/8 in. dia. | D.T.D. 10B | |




ANGLE TO SUIT THAT OF THE STIFFENING CHANNEL.

PATCH PLATE OF ALUM. ALLOY. 20's S.W.G. SPEC:- D.T.D. 390.



DAMAGE TO BE CLEANED OUT TO A REGULAR SHAPE.

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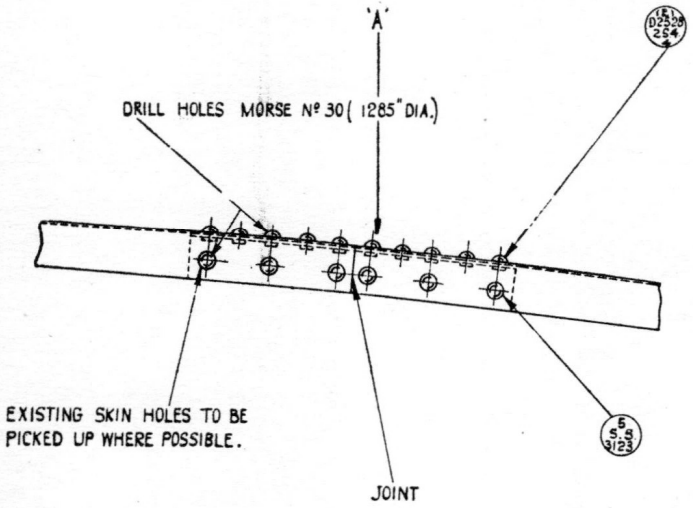
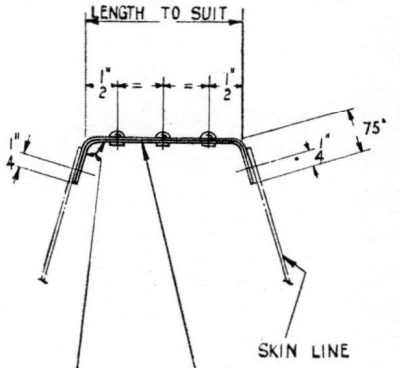
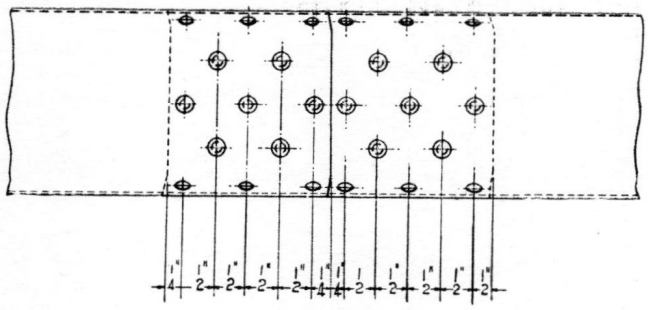
# PATCH REPAIRS TO STIFFENING CHANNEL METAL LEADING EDGE TO FIN




ANGLE TO SUIT THAT OF THE STIFFENING CHANNEL.

INSERTION PLATE :-
ALUM ALLOY 20's S.W.G.
SPEC :- D.T.D. 390.

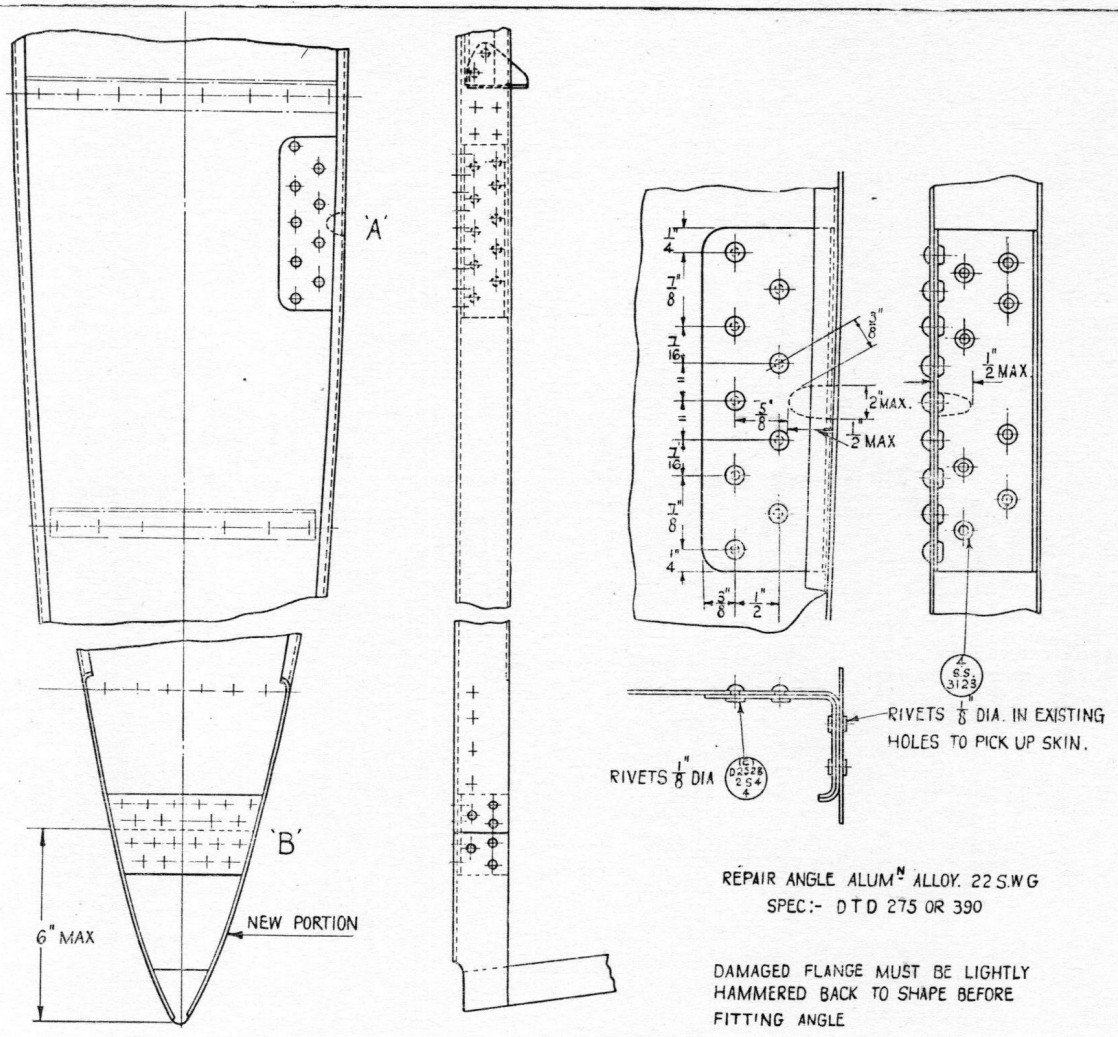


TRUE DIMENSIONS

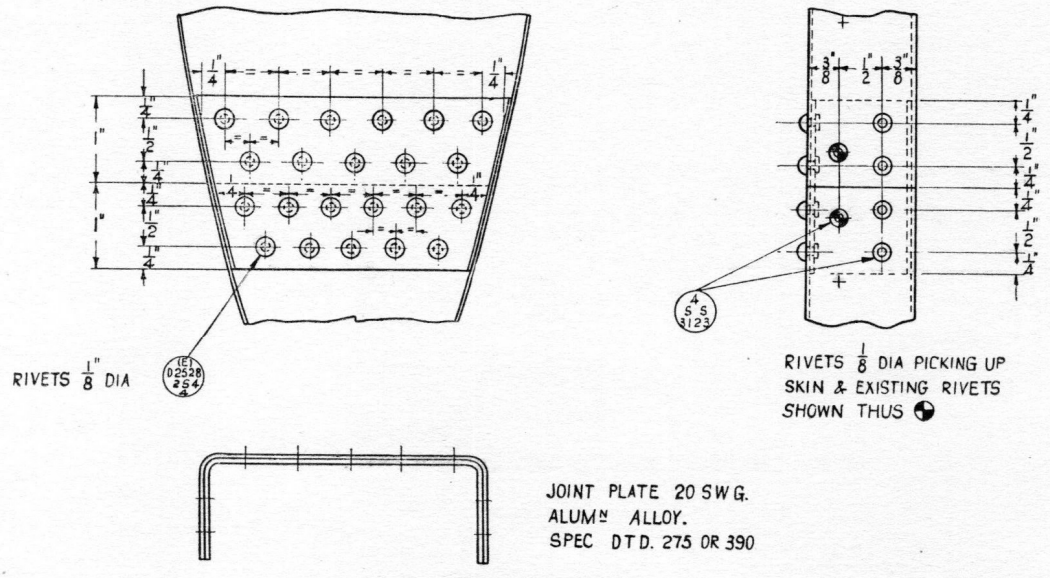
VIEW IN DIRECTION OF ARROW 'A'.

THIS DRAWING WAS H934.

| 2 | INSERTION REPAIR TO STIFFENING CHANNEL FOR METAL LEADING EDGE TO FIN | 2 |
|---|---|---|



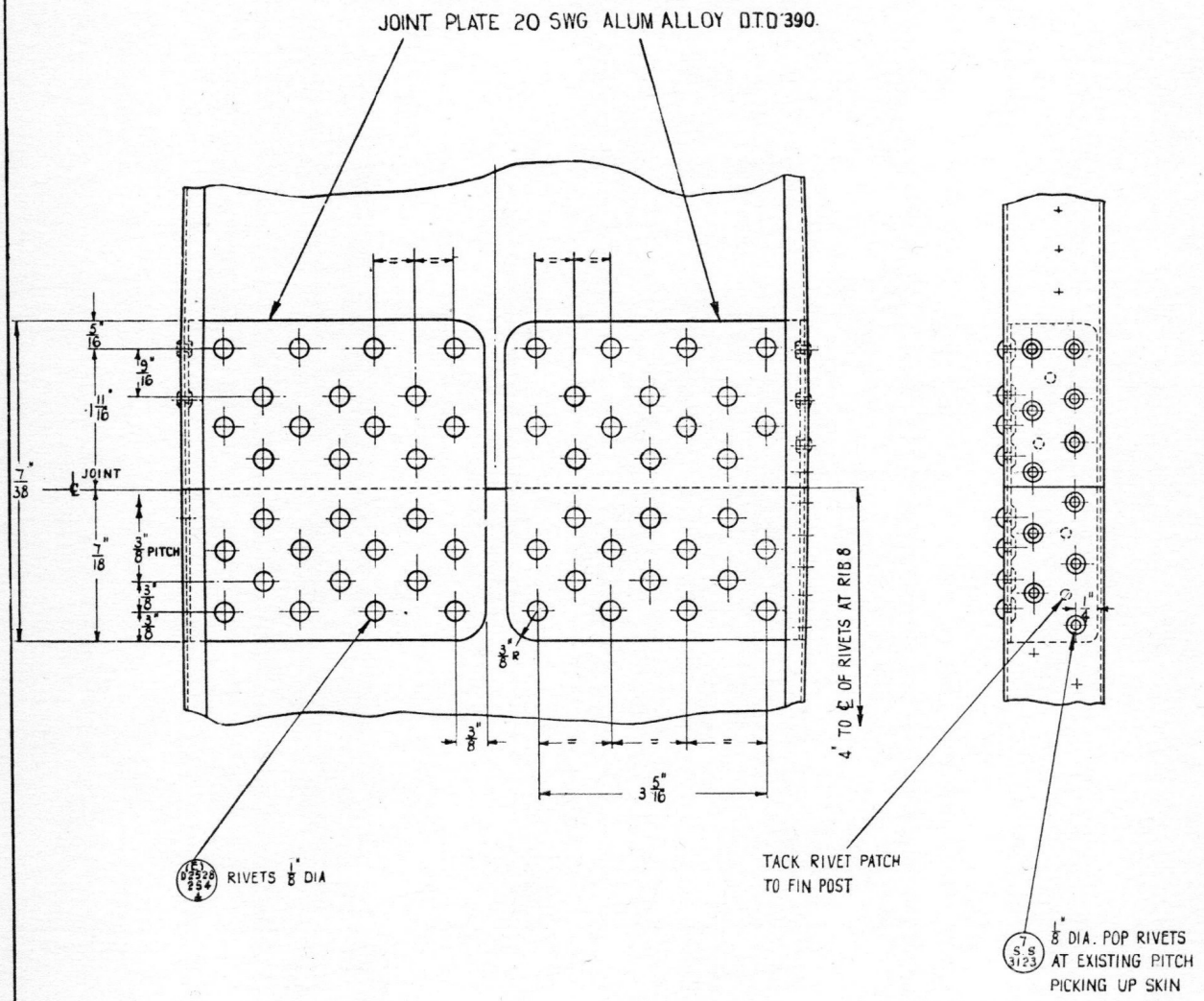

DETAIL OF REPAIR AT 'A'.

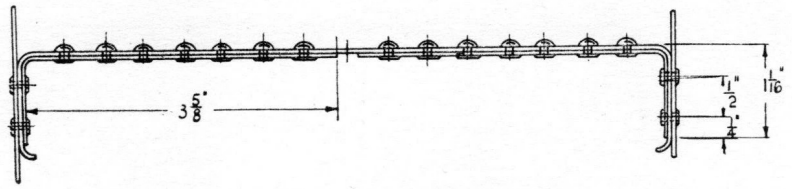



DETAIL OF JOINT AT 'B'

THIS DRAWING WAS H.855.

| 3 | PATCH & MINOR INSERTION REPAIRS -INTERMEDIATE FIN POST | 3 |
|---|---|---|




JOINTING COMPOUND TO BE APPLIED BETWEEN METAL FACES

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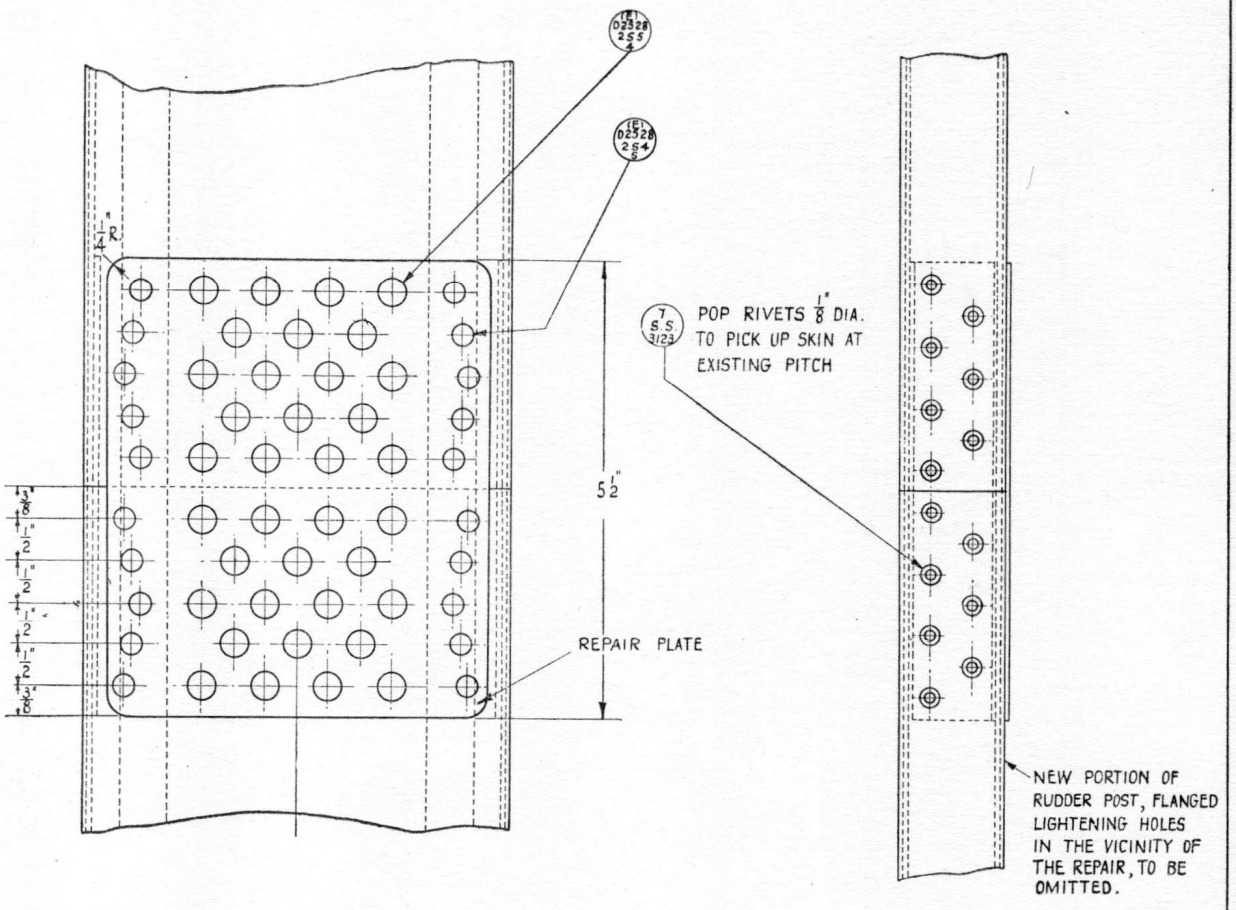
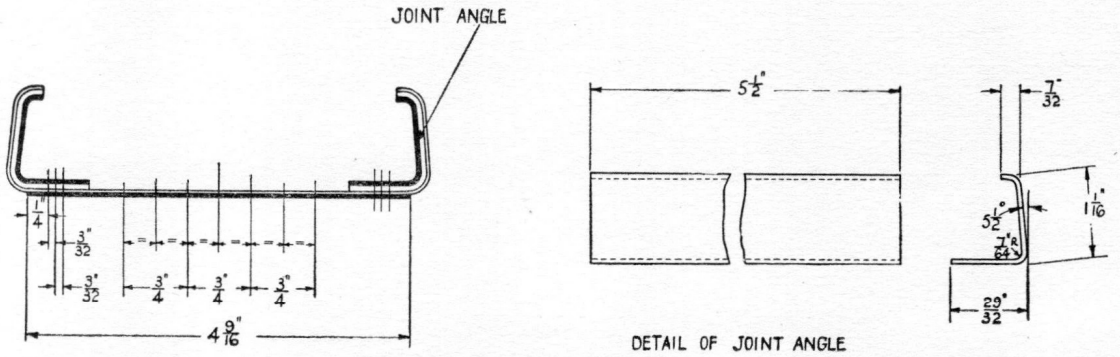
| 4 | INSERTION REPAIR TO INTERMEDIATE FIN POST | 4 |
|---|---|---|




DETAIL OF JOINT ANGLE

THIS DRAWING WAS H841.

MATERIAL :- ALUM. ALLOY. 20 S.W.G. D.T.D. 390.

| 5 | INSERTION REPAIR TO RUDDER POST | 5 |
|---|---|---|

# AUSTRALIAN LINCOLN MK. 30

## REPAIR MANUAL

### PART 2 — CHAPTER 9

## Miscellaneous Repairs

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* To be issued later.

## MISCELLANEOUS

### Undercarriage Door Hinge Beam

### Insertion Repair to Undercarriage Door Hinge Beam

1. Damage to the undercarriage door hinge beam in excess of that defined in Chapter 9, para. 11 of Part 1, should be repaired by cutting away the damaged portion midway between formers and inserting a new length of channel section. The butt joints should be secured with 16 S.W.G. steel joint channels riveted to the inside of the insertion and original section as illustrated in Fig. 1.

**TABLE 118.**
**Material for Insertion Repair, U/C Door Hinge Beam**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Sheet steel | 16 s.w.g. | D.T.D. 124A | Hardened and tempered |
| H128F/ | 8/SS.3123 | Rivet, pop dome | 3/16 in. dia. | D.T.D. 10B | |
| H128F/ | (E) D2528/2CW6/3 | Rivet, countersunk head | 3/16 in. dia. x 3/16 in. | D.T.D. 327 | |

### Twin Cell Flare Launching Chute MK. III.

### General

2. Before commencing repairs to the flare chutes, attention should first be given to the general instructions for repair in A.P. 1644, Vol. 11, Part 3, Sect. 3, Chap. 1.

### Chute Body, Major Repair

3. If the chute body is badly distorted or damaged it must be exchanged, all serviceable parts being removed and salvaged for use in the repair of other chutes.

### Minor Damage

4. Slight distortion may be rectified by resetting.

5. Dents must be removed by supporting the dented part against a piece of hardwood and tapping with a hide-faced hammer.

### Rivets, Loose or Damaged

6. Loose or damaged rivets must be tightened or exchanged as appropriate, attention being given to the instructions in A.P. 1464A, Vol. 1, Part 3, Sect. 3, Chap. 2, paras. 39 and 41.

### E.M. Release Brackets

7. The brackets to which the E.M. Release Units are bolted must be reset to the correct shape, if distorted, or exchanged if damaged or badly distorted.

### Armour Plate

8. The protective coating on the armour plate must be maintained intact.

9. The armour plate brackets, if slightly distorted, must be reset to the correct shape; or replaced if damaged or badly distorted.

### Doors

10. The doors, if slightly distorted, must be reset to the correct shape. Dents must be removed as stated in para. 3. If badly distorted the doors must be exchanged.

11. The door springs must be exchanged if rusted, fractured or weak.

12. Door catches and door catch springs must be exchanged if rusted, fractured or weak.

13. The cover, if distorted or damaged, must be exchanged or rectified.

### Lanyards

14. Lanyards, if damaged or corroded, must be exchanged.

### Camera Delay Mechanism

15. The camera delay mechanism must be exchanged if damaged.

### Repair Scheme for the Removal of Parker Kalon Screws

### General

16. The tools required for the extraction of broken P.K. Screws are listed in Fig. 2, and reference should be made to this drawing before commencing repairs.

### Method of Extraction

17. It is important that the following sequence of operations should be strictly adhered to when removing the damaged screws.

(i) Very gently centre pop the broken Parker Kalon screw (see detail A) for drill centreing; there is no necessity to attempt to make a deep punch mark in the screw, as heavy blows tend to drive the hard screw into the comparatively soft boom and damage the threads.

(ii) With the Mighty Atom gun fitted with the shortened 1/16 in. dia. drill, carefully drill down the centre of the broken screw (see detail B), using the recommended lubricant.

(iii) With the Comet screw extractor fitted in the top wrench, push the end of the extractor firmly into the 1/16 in. dia. hole in the drilled screw; press down firmly whilst turning the wrench in an anti-clockwise direction (see detail C), so as to extract the shank of the broken P.K. Screw in one piece.

### Inspection of Holes

18. On removal of the broken P.K. Screws, inspection must be made to ascertain possible damage sustained to the hole and countersink during extraction and the appropriate repair scheme tabulated below adopted.

(i) If the hole and countersink are un-

damaged, then a new P.K. Screw No. SS.3827, may be fitted, taking care to start the screw by hand to engage existing threads (see Fig. 4, Detail C).

(ii) If the damage is confined to the hole, then the hole may be tapped out to receive a 2 B.A. Screw No. SS.3830.

(iii) If the damage is confined to the countersink then a special large head 2 B.A. Screw No. SS.3934 must be fitted using the special countersink tool No. T.D.E.82 as shown at Detail B.

(iv) If the damage is beyond the scope of a 2 B.A. Screw, then the hole must be tapped and countersunk, using special countersink tool No. T.D.E.82 to receive a special 1/4 in. B.S.F. Screw No. SS.3957.

**Method of Fitting Parker Kalon No. 7 Raised Countersink Head Screws No. SS.3827, for use on skins under 20 S.W.G.**

19. (i) Drill skin and under structure using a No. 28 ($.1405 \begin{matrix} + .005'' \\ - .000'' \end{matrix}$) dia. drill and a Desoutter drill equipped with a special adaptor carrying drill bush, set in accordance with the instructions in para. 20 sub-paras. (i) to (iv) and shown in Fig. 4, Detail A.

(ii) Remove skin, and using a Desoutter drill and prototype adjustable countersink attachment No. T257660, complete with cutter No. T.D.S.L./T532/17 (see Fig. 3, Detail A), set to suit plug gauge No. T263399, countersink understructure, using radius cutter No. T.S.D.L./T532/20 (see Fig. 3, Detail B).

(iii) Inspect depth, lineability of countersink and diameter of hole, using taper plug gauge N263399. Replace the skins into position, lining up the holes in the skins with the holes in the under structure; dimple holes in the skin, using tool No. T.D.E.84/5 in conjunction with tool No. T.D.E.84, as illustrated in Fig. 3, Detail C.

(iv) Inspect dimpling of the skin.

(v) Fit the news screws as described in para. 20, sub-para. V.1 and Fig. 4.

**Method of Fitting Parker Kalon No. 7 Raised Countersunk head screws, No. SS.3827. For use on skin thickness 20 S.W.G. or over.**

20. The following sequence of operations should be adhered to when P.K. Screws are being fitted to skins of 20 S.W.G. or more.

(i) The drill size required will be No. 28. This size MUST be gauged; check drill that the hole drilled is correct to size, viz., $.1405 \begin{matrix} + .005'' \\ - .000'' \end{matrix}$. It is not sufficient to assume that a number 28 drill is automatically drilling a correct size hole.

(ii) Drilling MUST be carried out through bushed drill jigs whenever possible, using a disoutter drill with special adaptor carrying drill bush (see detail A, Fig. 4), which requires to be set to the depth called up on drawings.

(iii) Countersinking MUST be carried out using special countersinking tool No. T.D.E. 82 (see detail B, Fig. 4) which should be set to depth using a Parker Kalon screw as a gauge (see detail E).

(iv) Inspect the depth, lineability of countersink and diameter of hole.

(v) Screw ends must be dipped in duralac before fitting. Screw must be started square by hand (see detail C for right and wrong method). Then use power screwdriver and complete the last turn by hand.

**Repair Scheme for Damaged Dzus Fasteners**

21. Dzus fastener springs which are badly corroded, damaged or broken must be removed and replaced with a new spring, as described below.

**Removal**

22. The rivets holding the spring in position should be removed in accordance with instructions described in Chapter 1, para. 35.

**Replacement**

23. At inaccessible parts of the aircraft, where it is not possible to use the standard riveting tools for the assembly of fasteners, the method illustrated in Fig. 5, and described below should be used:

(i) The existing rivet holes should be opened out to accommodate a 4 B.A. bolt SS.1882/1C using a No. 26 (.1470) drill and the holes countersunk 90° to allow the bolt head to be flush with the skin.

(ii) A 4 B.A. Simmonds nut should be soft soldered to the top side at each end of the spring as shown at Detail A.

(iii) Insert the spring assembly through the existing centre hole, using a pair of long nose pliers and line up with the existing fastener holes, as shown at Detail B.

(iv) Apply Duralac on the underside of the bolt head.

(v) Insert the bolts and tighten down.

**Patch Repair to Crack in Mooring Ring Door Cut-Out**

22. Cracks which occur at the corners of the mooring ring door cut-out should be repaired by patching as illustrated in Fig. 6, and described below.

(i) A 1/8 in. dia. hole should be drilled at the extremity of the crack to prevent spreading.

(ii) Remove the existing Parker Kalon screws in the area of the patch plate.
(iii) Position the patch plate over the damage. Drill and tap the existing Parker Kalon screw holes to 1/4 in. B.S.F. in conjunction with the plate and countersink the holes in the plate 120° to accommodate the head of the special screw, details of which are illustrated in Fig. 7.

**TABLE 120.**
**Material for Patch Repair—Mooring Ring Door Cut-Out**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Alum. Alloy | 16 s.w.g. | D.T.D. 390 | For patch plate |
| | SS.3957 | Special screw | 1/4 in. B.S.F. | S.1 | |
| H128F/61177 | 6/SS.3123 | Rivet, pop dome | | | |
| H128F/30312 | (E) D2528/2B4/5 | Rivet, mushroom head | 1/8 in. dia. x 5/16 in. | D.T.D. 327 | |
| H128F/30311 | (E) D2528/2B4/4 | Rivet, mushroom head | 1/8 in. dia. x 1/4 in. | D.T.D. 327 | |

**Patch Repair to Outboard Engine Cut-Outs, Top and Bottom Skin**

23. Cracks which occur in the top or bottom skin at the corners of the engine cut-outs should be repaired by patching as illustrated in Fig. 8 and described below.
(i) A 1/8 in. dia. hole must be drilled at the end of the crack to prevent spreading.
(ii) Parker Kalon screws which are in way of the patch plate should be removed, and the holes in the skin and boom should be drilled and tapped 1/4 in. B.S.F. in conjunction with the patch plate.
(iii) The patch plate should be positioned over the damage and secured with pop rivets and special 120° countersunk head screws as illustrated at Details A and B.

24. For details of the special screws, reference should be made to Fig. 7.

**TABLE 121.**
**Material for Patch Repair to Engine Cut-Outs**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Alum. Alloy | 16 s.w.g. | D.T.D. 390 | For patch plate |
| H128F/61176 | 5/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | | |
| H128F/61177 | 6/SS.3123 | Rivet, pop dome head | 1/8 in. dia. | | |
| H128F/31080 | (E) D2528/2B6/7 | Rivet, snap head | 3/16 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/30751 | (E) D2528/2B4/3 | Rivet, snap head | 1/8 in. dia. x 3/16 in. | D.T.D. 327 | |
| | SS.3957 | Special screw | 1/4 in. B.S.F. | S.1 | |

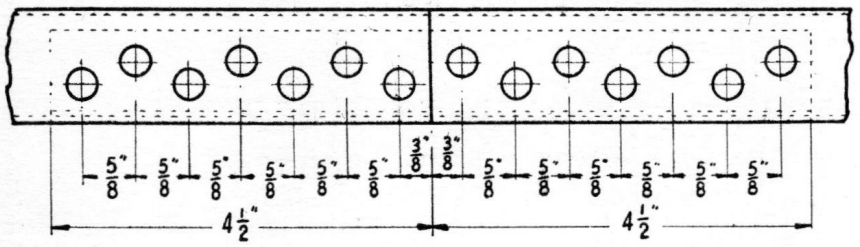
**Patch Repair to Crack in Skin at Rear of Bomb Bay**

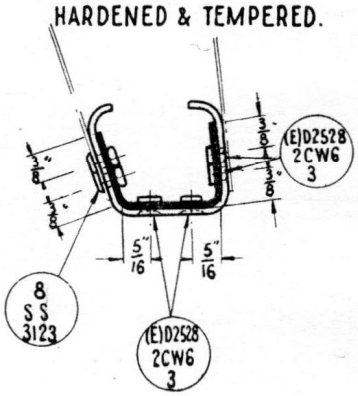
25. Damage in the form of a crack in the skin at the rear of the bomb bay at Former 22 must be repaired by patching. A 1/8 in. dia. hole must first be drilled at the end of the crack to prevent spreading and a patch plate positioned and riveted as illustrated in Fig. 9.

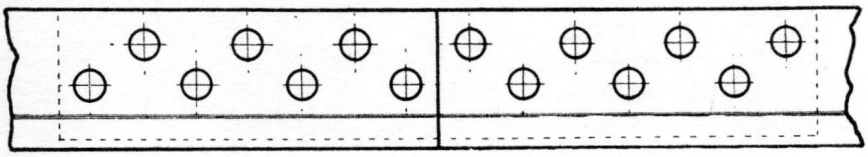
**TABLE 122.**
**Material for Patch Repair—Rear of Bomb Bay**

| Ident. No. | Part No. | Description | Size | Specification | Remarks |
|---|---|---|---|---|---|
| | | Alum. Alloy | 16 s.w.g. | D.T.D. 390 | For patch plate |
| H128F/5801 | (E) D2528/2CW5/8 | Rivet, c'sunk head | 5/32 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/30326 | (E) D2528/2B5/8 | Rivet, mush. head | 5/32 in. dia. x 1/2 in. | D.T.D. 327 | |
| H128F/30744 | (E) D2528/2B4/9 | Rivet, mush. head | 1/8 in. dia. x 9/16 in. | D.T.D. 327 | |
| H128F/30314 | (E) D2528/2B4/7 | Rivet, mush. head | 1/8 in. dia. x 7/16 in. | D.T.D. 327 | |
| H128F/30306 | (E) D2528/2B3/3 | Rivet, mush. head | 3/32 in. dia. x 3/16 in. | D.T.D. 327 | |

REPAIR CHANNEL
MATL :STEEL PLATE 16 G
SPEC :- D.T.D. 124.A.
HARDENED & TEMPERED.



VIEW IN DIRECTION OF ARROW 'A'

JOINT SHOULD BE POSITIONED
BETWEEN FORMERS.

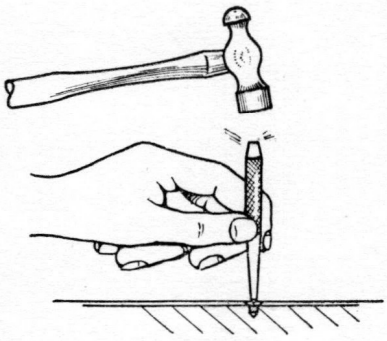
THIS WAS LINCOLN REPAIR E.1159

| | | |
|---|---|---|
| 1 | INSERTION JOINT IN U/C DOOR HINGE BEAM | 1 |

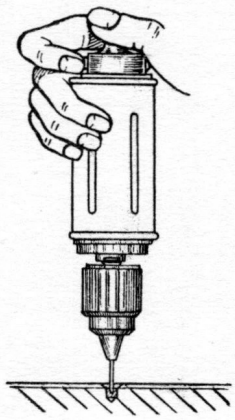
## TOOLS REQUIRED TO REMOVE BROKEN P.K. SCREWS

1. MIGHTY ATOM PNEUMATIC GUN.
2. SPECIAL TOUGHENED $\frac{1}{16}$" DIA. TWIST DRILL.
3. A CENTRE PUNCH.
4. A HAMMER.
5. A LUBRICANT CONTAINING EQUAL PARTS OF ENGINE OIL AND PARAFFIN.
6. A SMALL TAP WRENCH.
7. Nº 1 "COMET" SCREW EXTRACTOR.

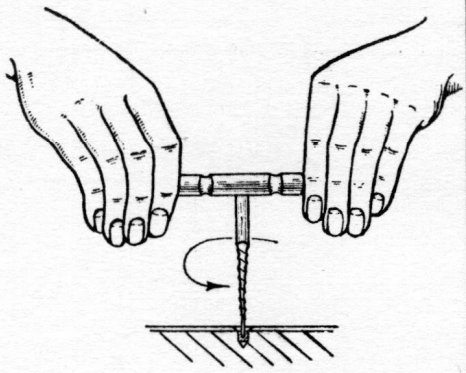
NOTE :- SEE TEXT OF CHAPTER 9 FOR REMOVAL PROCEDURE OF P.K. SCREWS.



DETAIL 'A'



DETAIL 'B'



DETAIL 'C'

THIS WAS LINCOLN REPAIR B.1446 SHT 1.

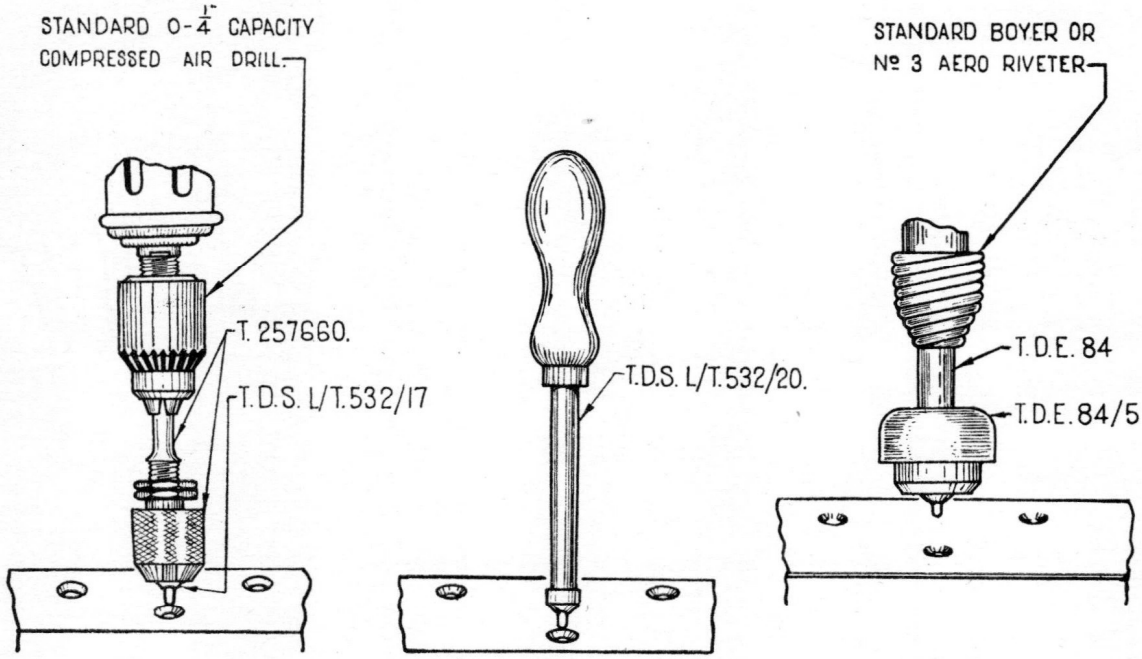
| 2 | REPAIR METHOD FOR REMOVAL OF BROKEN PARKER KALON SCREWS | 2 |
|---|---|---|

THIS METHOD IS ONLY FOR USE ON SKINS UNDER 20 S.W.G. - FOR THICKER GAUGES SEE FIG. 4.

THE FOLLOWING SEQUENCE OF OPERATION SHOULD BE ADHERED TO.

1. DRILL SKIN AND UNDER-STRUCTURE USING A Nº 28 DRILL.
2. REMOVE SKIN AND COUNTERSINK UNDER-STRUCTURE.
3. RADIUS COUNTERSINK.
4. REMOVE DRILLING SWARF USING COMPRESSED AIR LINE TO DO SO.
5. INSPECT HOLES.
6. REPLACE SKINS IN POSITION.
7. DIMPLE SKINS (DO NOT BURR SKINS ON UNDERSIDE)
8. INSPECT DIMPLING OF SKINS.
9. DIP SCREWS IN DURALAC AND FIT.
10. FIT SCREWS IN ACCORDANCE WITH INSTRUCTIONS GIVEN IN FIG 4

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMPLIFIED NOTES ON FITMENT OF P.K. SCREWS IN PARA'S OF CHAP. 9.




**A**
COUNTERSINKING OF UNDERSTRUCTURE

**B**
INTRODUCTION OF RADII TO COUNTERSUNK HOLES IN UNDER-STRUCTURE

**C**
DIMPLING OF SKIN COVERING.

THIS WAS LINCOLN REPAIR B.1445 SHT 2

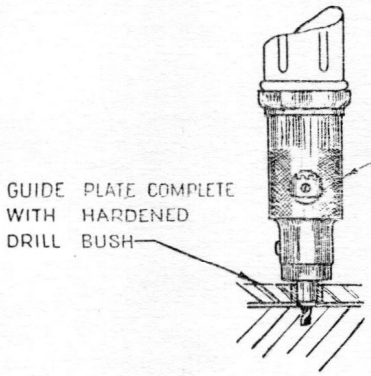
| 3 | METHOD FOR FITTING PARKER KALON Nº 7 RAISED - C'SUNK Hº SCREWS S.S.3827 | 3 |
|---|---|---|

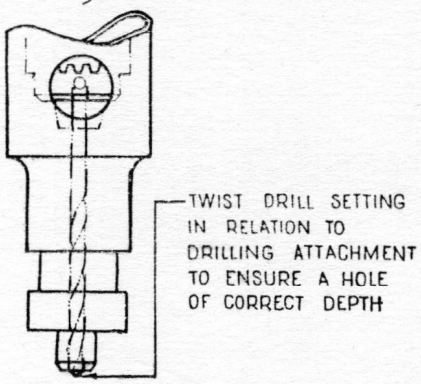
THIS METHOD IS ONLY FOR USE ON SKIN THICKNESS 20G. OR OVER FOR THINNER GAUGES SEE FIG. 3.

FOR FOLLOWING SEQUENCE OPERATIONS SHOULD BE ADHERED TO.

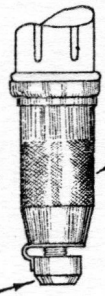
1. DRILL SKIN AND UNDER-STRUCTURE USING A Nº 28 DRILL
2. COUNTERSINK FOR PARKER KALON RAISED COUNTERSUNK HEAD SCREW
3. REMOVE DRILLING SWARF USING COMPRESSED AIR.
4. INSPECT HOLES
5. DO NOT BURR SKINS ON UNDERSTAND
6. DIP SCREWS IN DURALAC AND FIT.

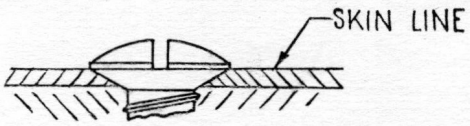
IMPORTANT
THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMPLIFIED NOTES ON FITMENT OF P.K. SCREWS IN PARAS. OF CHAPTER 9.



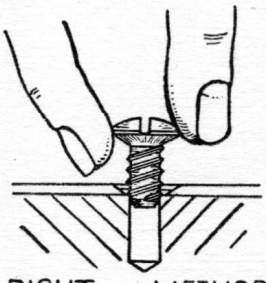

DETAIL 'A'



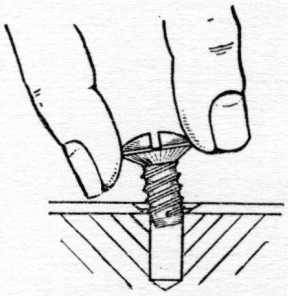




COUNTERSINK CUTTER TO BE ADJUSTED TO OBTAIN THE ABOVE CONDITION WHEN SCREW IS FITTED.

DETAIL 'B'



RIGHT METHOD



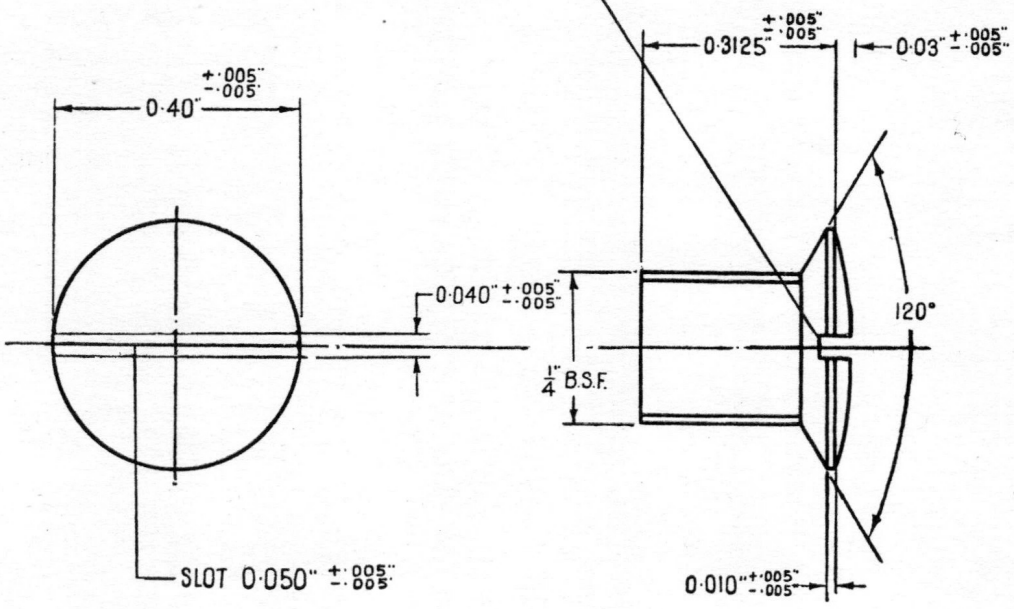
WRONG METHOD

DETAIL 'C'

THIS WAS LINCOLN REPAIR B.1445 SHT 1.

| 4 | METHOD FOR FITTING PARKER KALON Nº 7 RAISED C S K Hº - SCREWS S.S.3827 | 4 |
|---|---|---|

NOTE :-
ALL BURRS ON THE EDGES OF THE SLOT ON THE COUNTERSUNK FACE MUST BE REMOVED.




MATERIAL :- MILD STEEL
SPEC :- S.I.

| 7 | SPECIAL ¼" RAISED 120 C'S'K. HD SCREW | 7 |
|---|---|---|

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