CHAPTER 2

FUSELAGE

Chapter 2
FUSELAGE
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Introduction

201. The fuselage structure as covered in this chapter is divided into three main sections:- nose section, front fuselage, and rear fuselage. A detachable radome of composite construction is fitted to the nose. It should be noted that formers are identified by their distance in inches fore or aft of the aircraft front spar datum. The main sections are illustrated in a sequence from front to rear, each section being broken down into its various sub-assemblies.

NOSE RADOME REPAIRS

General

202. Information given in the following paragraphs is designed to cover minor repairs to Vulcan radomes in service. For standard repairs to radome structures, reference should be made to A.P.2662B, Schemes 7.1.5, 7.4.2, and 7.4.3. The procedure to be adopted in radome repairs is covered in considerable detail in A.P.2662B and, where non-standard, in this publication due to the radome being highly stressed structurally, and critical electrically. It is emphasised that, in order to achieve acceptable standards and satisfactory final results, considerable skill and care are necessary when effecting these repairs. In order that the importance of careful repair be fully understood, a brief outline of the design features of the radome is now given.

203. The radome is of 'half wave double sandwich' design. It consists of an outer glass fabric reinforced plastic skin, and behind this a layer of low density core material with a middle skin of reinforced plastic, then a second layer of core material, and finally the inner skin. In effect there are two normal sandwiches of skin-core-skin placed back to back, so that the middle skin is double the thickness of the outer skin. This build up is necessary because the structure must fulfil severe requirements in respect of mechanical strength and stiffness, as well as possessing the required dielectric characteristics. In this dielectric sense the sandwich can be regarded as a lens system, the physical dimensions of which (skin thickness, core spacing, etc.) are related to the frequency band of the incident rays. For the sandwich to have low reflection properties over the wide range of the electrical incidence angles inherent in its shape, the thickness of the skins and the spacing of the skins, i.e., the core thickness, are critical dimensions. The importance of accurately maintaining the design thickness during repair cannot be over-emphasized. No electrical tests are necessary on the radome after carrying out repairs as quoted in the following paragraphs unless the functioning of the radar in flight is unsatisfactory.

LIMITATIONS OF REPAIR

204. Repairs to the outer skin and the inner skin are permitted within the limits laid down in the next paragraph. Penetrating punctures causing damage to the middle skin together with damage to both cores where the area of core involved is sufficient to show noticeable double curvature, must not be repaired without specialist advice.

◀ 205. The extent of repair is limited to an area of 150 sq.in. for any one patch. Where numerous small repairs are required in an area, which could be covered with one patch without exceeding the limits, use this method. The distance between two adjacent patches must not be less than the shortest side of either of the two patches. Repairs to the above limitations may be made to either the internal or external skins, but no edge of a patch on the external surface should be in the same cross-section as any edge of an internal patch. ▶

REPAIRS TO OUTER OR INNER SKIN

206. For repairs to outer or inner skins, reference should be made to A.P.2662B and the Repair Schemes quoted in para.202.

CONSTITUENTS OF RADOME

207. As the resin/glass fabric patch must have the same build-up as the original skin and a particular lay-up for a repair depends on its position on the radome, the constituents of the radome are now given. In that portion aft of the Neoprene coated area the lay-up is the same for both inner and outer skins, consisting of three layers of Y.227 satin weave fabric each with a nominal thickness of 0·012 in., and an outer layer of Y.93 plain weave 0·007 in. thick. The forward portion of the radome (the area coated with Neoprene, refer to fig.204) has a thinner skin on the outside than on the inside, i.e., one layer of Y.227 and two layers of Y.93 making up the outer skin, and three layers of Y.227 comprising the inner. This difference is to make allowance for the build up of Neoprene applied to the outer skin as a protection against rain erosion. It should be noted that:- Y.227 is a 0·012 in. nom. thickness satin weave fabric, and Y.93 is a 0·007 in. nom. thickness square weave fabric.

MINOR SCRATCHES AND DENTS

208. Surface scratches, where no appreciable tearing of glass fabric has taken place, and small dents no more than half-an-inch across, are to be repaired simply by filling in with a thixotropic resin mix S.R.17449 cured by the addition of catalyst and accelerator (Refer to A.P.2662B, Scheme 7.1.5.). As the S.R.17449 is a stiff gel, proper care must be taken to ensure that the catalyst and accelerator are thoroughly dissolved before use. Before applying the filling, the surfaces of the damaged laminate must be roughened with sandpaper to provide a mechanical key for adhesion. For areas of this order (approx. one quarter inch) the electrical discontinuity is negligible compared with the total area considered by the scanner, and electrical performance is not noticeably affected.

RADOME MATERIALS

209. Materials used in the construction of the radome are as follows:-

Glass fabric Y.227, Type S.2/225/E, D.T.D.5518, Ref.No. 32B/1229.

Glass fabric Y.93, Type P.6/225/E, D.T.D.5518, Ref.No. 32B/1225.

Radome core material, Expanded Hycar, D.T.D.764 (0.22 in. thick).

References for resins and accelerators, etc., are contained in A.P.2662B, Scheme 7.1.5. For instructions regarding application of Neoprene top coat cement, refer to para. 125 to 130 in Chap.1 and to A.P.2662B, Scheme 9.4.1.

PRESSURE CABIN SEALING

General

210. Special schemes are provided for repair to pressurised parts of the structure. In addition to the riveting technique required for external finishing, it is necessary when any repairs or replacements are done, that the instructions given in the following paragraphs are adhered to. Considerable information on sealing compounds, and their use is also given in A.P.1464B, Vol.1, Part 2, Sect.4, Chap. 6 and 7. It is emphasized that thorough cleanliness is necessary, and that surfaces must be free of grease, moisture, metal burrs, and any other contaminant which could prevent good adhesion of the sealant to the metal, or prevent complete contact of the surfaces when assembled.

MATERIALS USED

211. The materials used for sealing pressure cabin joints, etc., are Bostik Primer 1752 and Bostik Sealing Compound 1790. Bostik 1752 is of a low viscosity, and coloured blue for identification; it is used chiefly as a foundation coating. Bostik 1790 is of a higher viscosity, and having lower adhesive properties than Bostik 1752 is usually applied over it in the nature of a fillet.

Bostik Primer 1752 (Ref.No.33H/9450627)

Bostik 1790 (Ref.No.33H/2202125)

PREPARATION OF SURFACES

212. If the surfaces are bare metal they should be degreased with trichlorethylene, but if they are coated with primer, trichlorethylene must on no account be used, and the surfaces left untouched. If the primer is too thick it should be rubbed down, because if Bostik is applied to a thick layer of primer, the latter will break or shear when load is applied to the Bostik. Pressure cabin components, which are treated with primer before assembly, should therefore receive one coat, which should be kept as thin as possible.

APPLICATION

213. As an interfacial jointing compound on mating surfaces, apply by painting one coat of a mixture of equal parts of Bostik 1752 and 1790 to extend 3/8 in. beyond the edges of the contacting area. The assembly may be service bolted before finally tightening up if required, but for a riveted joint, all riveting should be completed within 36 hours of mating.

214. For the sealing of angular joints or crevices between butt strap and skin, or stringer and skin, etc., on the pressure side of the structure, apply a brush coat of Bostik 1752 over a width extending at least 3/8 in. each side of the joint, and leave to dry for two hours. Then brush paint along the joint a mixture of 1752 and 1790, allow 4 to 6 hours drying time, then apply a further coat of the same mixture.

215. All rivets and bolt heads should be brush coated with the mixture of 1752 and 1790 to form a continuous smooth band over the entire joint. In addition it is essential that all bolts at pressure joints, be dipped in Bostik 1752 immediately before use.

216. Regarding the mixture of 1752 and 1790 this will vary according to the prevailing weather conditions. The ideal mixture is that which is of a sufficiently low viscosity as to be brushable, yet not low enough to get blown through any joints. The above Bostik compounds must not be used for glass or Perspex window sealing. In cases where sealing is required near to, or in contact with glass or Perspex, Bostik Sealing Compound 1222 is to be used.

CANOPY AND CABIN WINDOWS

217. Should it be necessary to change a window in the pressurised part of the canopy or the crews' cabin, it is important that all the old glazing compound, and Bostik sealing, is removed after the defective panel has been taken out of the frame. It cannot be too strongly emphasized, that great care must be taken when removing the glazing compound, etc., to avoid damage to the frame structure.

GLAZING COMPOUND

218. The compound to be used for glazing when fitting a new panel is made up of 100 parts by weight of Araldite A.V.121 (Ref.No.33H/39) and 5 parts by weight of Hardener H.Y.951 (Ref.No.33H/2202078) These constituents should be mixed thoroughly, and used as soon as possible, as the pot life of the mix does not exceed 1.1/2 hours.

INSTALLATION PROCEDURE

219. The procedure for application of the

glazing compound and fitment of a window panel is as follows:-

(1) Thoroughly clean and degrease the mounting frame surface.

(2) Protect anchor nuts if any are fitted in the frames with small pieces of transparent adhesive tape, to prevent the compound entering the threads.

(3) Cover with a thin film of thin grease the vinyl face and edges, also the edge of the outer glass facing.

(4) Offer the window into the frame, and note where the discrepancies are, if any, regarding the alignment of the two faces, so that allowance can be made when applying the compound.

(5) Apply the Araldite compound to the mounting frame, so that a layer is formed all the way round, thicker than that eventually required.

(6) Run a fillet of Araldite compound into the areas between the toughened glass and the vinyl, making sure that the fillet does not extend so far on the vinyl edge to interfere with the fitment of the panel retaining ring.

(7) Press the panel gently yet firmly into the frame until the Araldite is exuded all round the edges, both internally and externally. Bolt in panel using retaining ring, tightening bolts to finger tightness only. Excessive tightening must be avoided. Service bolts can be used at this stage if desired.

(8) Remove all exuded compound from the edges, and the retaining ring, until they are quite clean.

(9) Allow compound to harden, by leaving it for at least 6 hours.

(10) Remove window carefully and ensure that the Araldite has a smooth surface. If there are any indentations in the surface, fill them flush with compound, and allow the filling to harden.

(11) Clean off the panel any grease adhering to it, and fit into the frame, taking care to tighten up all bolts to finger tightness first, finally tightening up with a box spanner *Excessive tightening must be avoided,* the nuts needing little more than nipping up. Correct bolts to be fitted.

◀ (12) For a final seal Bostik No.1222 (Ref.No.33H/101) or Boscoprene 2100 (Ref.No.33H/50) must be used. No other sealing compound must come in contact with the panel. Where necessary, Bostik No.1222 or Boscoprene 2100 is to be used for filling round the outside glass ply to give aero-dynamic smoothness. ▶ On no account must solvent or thinners be used for cleaning near the panel edge.

PRESSURE CABIN TESTS

220. Instructions for carrying out the necessary pressure tests after completion of any repairs to the pressurised parts of the structure are given in A.P.4505A, Vol.1, Book 1, Sect.3, Chap.8.

CANOPY FAIRINGS REPLACEMENT

General

221. The fairings are attached at the forward end of the canopy, and should it become necessary to replace one or more of the panels, the following procedure must be strictly adhered to.

PREPARATION OF SURFACES

222. In all metal bonding, surface cleanliness is very important. The bottom and forward members of the canopy are magnesium alloy castings, and the chromate protective treatment on them, should be protected against the various solvents used for cleaning the bonding surface.

(1) Remove paint, etc., in the area to be bonded by applying paint remover ◀ (Ref.No.33B/9429260) taking care ▶ that the treated area is slightly larger than that required for fitment of the fairing. After removal of the paint, great care must be taken to wash off, with water, all traces of the spent paint remover. Thoroughly dry the surface with a clean rag.

(2) The clean alloy skin surface is now etched for bonding, by treating ◀ with Deoxidine 202 (Ref.No.33C/884) applied with a brush. The ▶ surface must be kept wet for a period of 5-10 mins. after which all traces of Deoxidine must be removed by washing with cotton wool swabs soaked in water. Thoroughly dry the surface which should now show a "whitish" appearance after the above treatment. If the skin under the fairings has been etched previously, there is no need to carry out sub-para.(2). The following treatment is all that is required. A cleansing and light-etching operation with ◀ Deoxidine 202 (Ref.No.33C/884) ▶ should be carried out, and the surface afterwards washed down with water to remove any traces of the etching liquid. Dry the surface with a clean cloth.

(3) Offer the replacement fairing to the canopy, which should be in position on the aircraft, and check for alignment of the faces, noting if there are any slight discrepancies, so

that allowance can be made when applying the Araldite compound (Ref.No.33H/39).

(4) Before fitment the bonding face of the fairing should be roughened by means of coarse sandpaper or a hacksaw blade.

(5) When carrying out operations, sub-para. 1-2, it would be advisable to remove the canopy from the aircraft, protect the hinge arms etc., before standing it upright, in order that the solvents used will tend to run away from the magnesium alloy members, and not affect the chromate treatment. For treatment of magnesium alloy members inadvertently affected by the solvent, refer to A.P.2656A, Vol.1, Sect.3, Chap.6, Para. 3-7 inclusive.

BONDING COMPOUND

223. The compound to be used for attaching the fairing to the canopy is made up of 100 parts by weight of Araldite A.V.121 (Ref.No.33H/39) and 4 to 5 parts by weight of standard cold setting Hardener H.Y.951 (Ref.No.33H/2202078). These constituents should be mixed thoroughly, adding the hardener to the resin, and taking care that the resin around the sides of the container is scraped off to dislodge the adherent resin. In order to extend the pot life of the resin, when mixed, it should be transferred from the mixing container and spread out on to a clean sheet of thick gauge aluminium in a layer of about 1/4 in. thick or less. The pot life of the resin mix is approximately 1.1/2 hours depending on the prevailing temperatures. When the resin has thickened up to a point where it can no longer be easily spread, the pot life of the resin mix is considered to have expired.

INSTALLATION

224. Using a spatula or a blunt knife blade, a film of the resin compound should be well worked into the bonding surfaces of the canopy and fairing. After the initial film has been smeared on, a quantity of the compound, sufficient to fill up any discrepancies between the mating faces, is applied to squeeze out any trapped air at the joint. Surplus resin should be wiped away to leave a neat fillet around the joint.

225. The adhesive itself, or the quality of the bond, does not benefit from the application of pressure during the setting, but some light pressure will almost certainly be required to ensure that the fairing is held down and in proper contact all round the rim. Adhesive tape and plasticine may be useful in maintaining the mating position of the parts whilst curing is in process. At this stage, the rivets and Parker-Kalon screws which are fitted at the forward end of the fairings only, should now be assembled. Using the existing holes in the canopy skin, and forward mag. alloy member as location points, drill through the fairing so that all the holes are in perfect alignment. All rivets and Parker-Kalon screws should be dipped in Celloseal D.T.D.900/4301 (Ref.No.33H/113) before assembly. As the rivets are not the normal type a description is appended as follows:-

Rivets type SS.4398/508 Avdel self-sealing csk. head 120 deg. Hole dia. Morse No.20 (0·161 in. dia.)

Parker-Kalon type 'Z', S.970 No.2 x 3/16 in. long (Self-tapping screw c/sk.)

Hole dia. Morse No.47, 0·0785 in. x 3/16 in. deep. C/sk. hole 82 deg. x 0·048 in. deep.

Alternative Parker-Kalon screws which may be used:-

Parker-Kalon, type 'Z', S.970 No.4 x 3/16 in. long (Self-tapping screw c/sk.)

Hole dia., Morse No.37, 0·104 in. x 3/16 in. deep. C/sk. hole 82 deg. x 0·064 in. deep.

NOTE...
Great care should be taken if, for any reason, the holes for the Parker-Kalon screws have to be re-drilled, that the depth stated is not exceeded.

Special tools required are:-

	Manufacturer
(1) Avdel Riveting Gun	Aviation Developments Ltd.
(2) Backmarker	

CURING TIME

226. Despite the term "cold setting", curing is still dependent on the actual temperature prevailing. If the temperature is below 60 deg.F. localised heating should be used to bring the temperature up to at least 60 deg.F. as this figure should be regarded as the absolute minimum for serious bonding work.

227. With an ambient temperature of 65 deg.F. the curing to the initial hard state, takes approximately 12 hours, and a minimum of 48 hours to attain full strength curing. If the temperature should vary during the curing time, a check regarding the state of the resin can be obtained by retaining a sample of the squeezed out resin, and keeping it under the same conditions. At normal temperature of 60 deg.F. the resin compound should be quite hard after 24 hours have elapsed, and a mix that has not hardened after this time must be suspect.

FINAL FINISH

228. Any irregularities in contours, and

surface blemishes around the joints, or in the actual fairings can be filled and smoothed over with an additional quantity of Araldite A.V.121 adhesive.

BLEED HOLES

229. A small 1/16 in. bleed hole is provided in each fairing to bleed off any leaks that may occur in the canopy skinning under the fairing. Care must be taken that this hole is not blocked up during the bonding operation.

FINAL SPRAY

230. Spraying should not be done until the resin compound has reached full strength curing. This may take several days, depending upon the prevailing temperature. Cellulose and synthetic thinners will dissolve the resin if applied prior to full strength curing.

CARE IN HANDLING

231. Frequent handling of cold setting Hardener H.Y.951 can cause dermatitis. Avoid unnecessary contact, and keep all containers, weighing equipment, spatulas, etc., in a clean and non-sticky state. Clean all equipment immediately after use with the aid of cellulose or synthetic thinners, then wash down with water and finally wipe dry.

GLASS SANDWICH PANELS

General

232. Detailed in this chapter are standards of acceptance for all panels on receipt from the manufacturer, also additional damage allowances appertaining to panels in situ prior to the first flight after repair. Further permissible allowances for aircrew and servicing personnel are also described in detail.

233. Briefly all crew compartment transparencies are laminated glass ply panels. Each panel has been illustrated and annotated, to describe, in full, the build-up and condition at manufacture of all glass and Perspex panel laminations.

Definitions of terms used on all panels

234. Described in the following paragraphs, are the meanings of the 'terms' used throughout the contents of the text when referring to permissible damage and details of items.

Vision area

(1) The vision area is defined as the area of high optical quality and its position is normally shown on the relevant illustration. If the position is not shown, then the vision area may be taken as the area bounded by an imaginary line 1.0 in. from the inner edge of the metal insert in the Vinyl interlayer.

Shattering

(2) This is defined as a breakage of a glass ply resulting in loss of visual properties due to small dicing of the glass.

Ream

(3) This is internal folding, the effect of which is to produce lines of distortion which may be straight or curved. The test for this defect is accomplished by direct comparison with one of the Ministry of Aviation Standard Reference Panels and is undertaken by the manufacturers before delivery.

Seed and Inclusions

(4) Minute bubbles in the structure of the glass are called seed and may be coarse or fine. Inclusions are dirt, dust particles or other foreign bodies trapped between the glass plies. Standard reference panels held by the Ministry of Aviation must be used by the manufacturer if any doubt exists about the maximum allowable amount of these defects. Inclusions are regarded as seed when a comparison check is being undertaken.

Peel splintering

(5) This is the detachment of a thin layer of glass parallel and adjacent to the Vinyl interlayer. It can be identified as shallow 'tide' marks with very fine scribe lines running approximately at right angles to them. This defect creates a grid like appearance.

Delamination

(6) Delamination is defined as a physical breakdown of the bond between the Vinyl interlayer and glass ply. The area of delamination can be identified by the reason that a slightly different shade exists in comparison with the unaffected part.

Vinyl interlayer rupture

(7) Vinyl rupture consists of a failure or flaw in the Vinyl usually in an area between the line of mounting bolts and the inner edge of the metal insert. It will be seen as a

line approximately parallel to the edge of the glass.

Open bubbles

(8) The open bubbles give the appearance of gouge marks along the edge of the glass plies and are of a shiny green tinted appearance.

Toughened glass

(9) This is plate glass which has been increased in strength, by a tempering process involving multiple cooling air jets blowing on the heated plate to produce compressive stress on the outer glass.

Sweep toughened glass

(10) In this case the increase in strength is produced by an improved tempering process whereby a fishtail jet of air is swept along the plate giving a more uniform degree of temper and eliminating the circular stress patterns of the former process.

Strengthened glass

(11) This is produced by a similar tempering process to those described in sub-para.(9) and (10), but this is not carried as far and results in a strength which is intermediate between toughened and annealed.

Annealed glass

(12) No tempering is given in this case and the glass is as received from the manufacturers.

Parting medium

(13) This is a rubbery transparent material which is painted around the perimeter of the glass and inhibits the mechanical bond between the glass and Vinyl locally over the area of application.

Sorbo rubber

(14) A sponge rubber manufactured to specification C.S.2440.

Hard and soft Vinyl

(15) Vinyl, a trade name for polyvinyl butyral, is plasticised with triethylene glycol di-hexoate to promote strength and hardness. The addition of 20 per cent and/or 30 per cent of this ingredient has the effect of producing hard and soft Vinyl respectively.

Additional definitions

235. The definitions described in the following sub-paragraphs apply only to Dry Air Panels.

Dry air sandwich

(1) This consists of a layer of dry air, held to the basic panel inner face to act as a thermal insulation and to keep the panel face above the 'dew point' of the cabin.

Innermost ply

(2) This is annealed or toughened glass, or Perspex ply and is used to form the innermost face of the sandwich panel.

Spacer

(3) The spacer is a ring of glass or 'Sorbo' rubber 0.375 in. thick and 0.5 in. wide which separates the inner face of the basic panel from the innermost ply.

ACCEPTANCE AND REJECTION DEFECTS ON INITIAL RECEIPT FROM MANUFACTURER

Glass sandwich panel defects

236. Included in the following statements is a detailed list of defects which may be found on initial receipt from the manufacturer, some of which can be classed as negligible damage allowances. It is important that the panel must be inspected before fitting, to ensure that no further damage above the limits stated has occurred in transit.

Seed and inclusions

(1) Seed and inclusions 0.013 in. to 0.025 in. dia., five only are permitted within the vision area.

Ream

(2) If it is possible to see this defect under normal conditions, the panel must be rejected.

Edge chipping and splintering

(3) These defects are not allowed on the edges of a toughened glass pressure bearing laminate. On annealed and strengthened facing laminates, vee shaped chips not more than 0.25 in. long, 0.06 in. wide and 0.06 in. deep will be permitted. 'U' shaped chips and splinters will be a matter of concession action after viewing and agreement. All chipping and splintering must be recorded.

Scratching

(4) Scratches in the vision area are not acceptable. Outside the vision area, shallow scratches 0.002 in. deep or less and a maximum of 1.0 in. long are acceptable. Scratches outside these limits are not acceptable. Scratches in the main load bearing ply are not acceptable. When a scratched panel is accepted the degree of all scratching must be recorded.

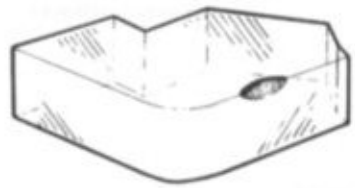
Indentations

(5) On heat treated glass two support marks will be visible. These are two pin point depressions about 1.0 in. apart; within 0.75 in. from the edge. These are acceptable. Other indentations in the critical area are not.

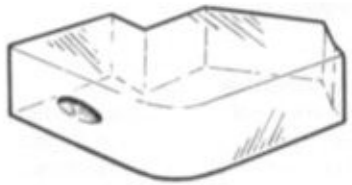
Cracks or shattering
(6) No cracks or shattering can be accepted in any glass ply.

Peel splintering
(7) Peel splintering cannot be accepted.

Open bubble
(8) No bubble must break into the edge of the glass. One open bubble in the edge of each side is allowed provided the limits stated are not exceeded. Bubbles up to 0.25 in. long and 0.125 in. wide by 0.03 in. deep are acceptable.



Unacceptable



Acceptable

OPEN BUBBLE

Vinyl interlayer defects
237. Permissible and rejection defects which may be found on initial receipt from the manufacturers are listed as follows:-

Cuts and grooves
(1) The Vinyl interlayer must have no cuts or blisters. Grooves around the edge, radial to the glass edge, which are caused by the polythene vacuum bag during panel assembly will be permitted provided inspection is satisfied that these are not cuts.

Rupture
(2) Vinyl rupture, defined as a cut or flaw, approximately parallel to the edge of the glass and situated anywhere inside the periphery of the edge mounting bolt holes, is not acceptable.

Inclusions
(3) A total of five seed and inclusions, 0.013 in. to 0.025 in. dia. including those allowed for in para.236, sub-para.(1) are permitted within the vision area.

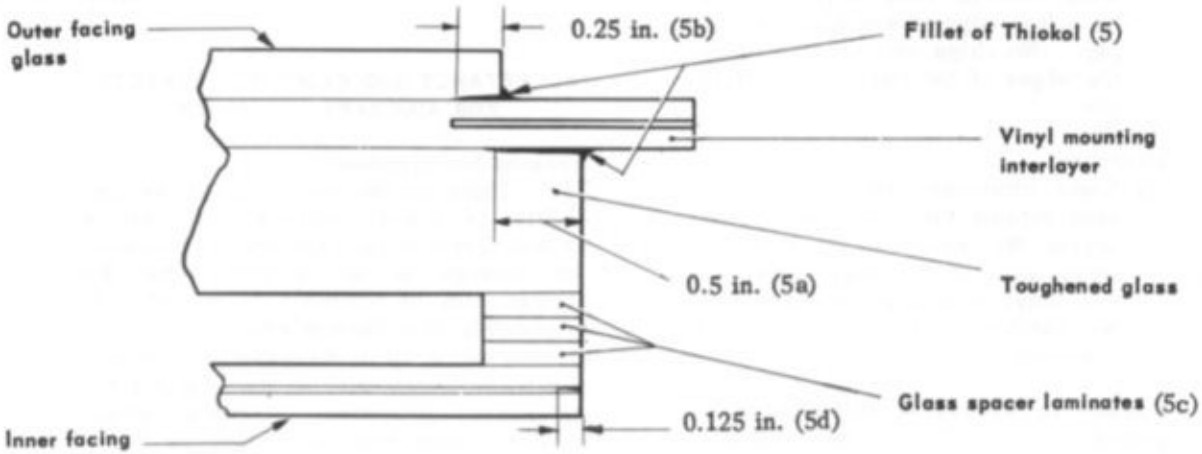
Thiokol intrusion
(4) This is defined as intrusion of Thiokol into the unbonded area around the edge of the panel left by the parting agent. It is caused when the edge seal is applied, Thiokol being forced into the gap under pressure. Intrusion is permitted up to the maximum depth of the parting agent.

Delamination - mounting interlayer
(5) Provided that a fillet of Thiokol or other approved sealant is applied around the edge of the glass/Vinyl interface, delamination is allowed as follows:-

(a) Between the toughened pressure bearing glass and the Vinyl up to 0.5 in. deep from the edge of the glass.

(b) Between the outer facing glass and the Vinyl up to 0.25 in. in depth.

(c) No delamination is allowed between the glass spacer laminates comprising the dry air sandwich.



DELAMINATION ALLOWANCES

All panels, non-mounting interlayer

(d) Delamination on non-mounting interlayers is acceptable up to a depth of 0.125 in.

NOTE...

There is no limit to the length of delamination, which would be acceptable around the complete perimeter of the panel provided the limits quoted in sub-para.(a), (b) and (d) are not exceeded.

ADDITIONAL DAMAGE DURING TRANSIT AND ASSEMBLY

Defects

238. Panels which have been cleared by Bond Inspection, may, while in transit or fitting in the aircraft acquire additional damage beyond that originally accepted. The following statements describe the defects which are permissible on concession action only.

Chipping

(1) A chip 0.25 in. long, 0.125 in. wide, 0.06 in. deep is permissible on a free edge of any glass facing ply. No chips will be allowed on the edges of the main load bearing ply.

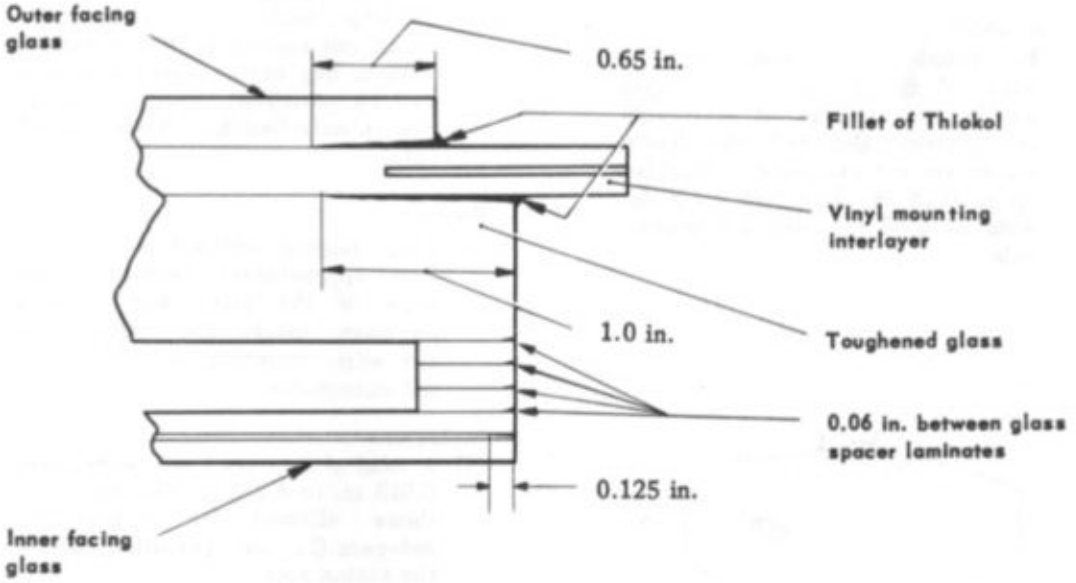
Scratches

(2) Light scratches 0.002 in. deep or less outside the vision area, i.e., within the area 1.0 in. from the inner edge of the metal insert in the Vinyl mounting interlayer, are permissible provided vision is not impaired.

Damage in excess of that quoted in sub-para.(1) and (2) must be submitted for specialist advice by the firms Technical Dept.

Delamination

(3) This must not exceed the amounts shown in the illustration below which applies to depth only, there being no limit to the length of delamination.



DELAMINATION ALLOWANCES

ACCEPTANCE AND REJECTION DEFECTS FOR AIRCRAFT IN SERVICE

Reasons for rejection

239. There are two reasons for unserviceability of glass transparencies, either because vision is impaired, or because the damage is to an extent that the strength may be seriously decreased. It is possible that damage which is not considered seriously to decrease the strength of a transparency will be unacceptable for its optical properties. Damage which impairs vision must be judged by those responsible for servicing and flying the aircraft. Lower standard of vision will be acceptable on panels which are not used frequently.

Repair information

240. There are no repair schemes for all-glass panels, and it is not permissible to polish out surface scratches. The Perspex innermost ply and rubber spacers are, however, replaceable in the field, or at base. Descriptive defect information is contained in Tables 1, 2 and 3. Illustrations defining the types of damage, also detailed sections of all the panels are included in this chapter.

TABLE 1
Glass dry air sandwich panels

Windscreen centre and side panels

Item	Defect	Remarks
(1)	Delamination on the Vinyl interlayers.	Acceptable in all areas provided that:- (a) Vision is satisfactory. (b) The area of delamination does not exceed 10 per cent of the visible area within the metal insert in the Vinyl mounting interlayer. (c) Careful examination must be made for evidence of peel splintering.
	Delamination	Delamination between the glass and the Vinyl may occur due to excessive moisture over long periods, extremes of temperatures, or handling before fitting panels to the aircraft. *NOTE . . .* *If the delaminated area contains powdered glass or glass chips it indicates a glass failure that may lead rapidly to shattering. The panel must be renewed before further pressurised flying.*
(2)	Peel splintering glass failure	Not acceptable. This can lead to failure of the load bearing ply. The panel must be changed immediately.
(3)	Toughened glass failure	Not acceptable. Failure of this type of glass is recognisable by the formation of small dice, completely obscuring vision. Such a failure greatly reduces the strength of the panel so that further pressurised flying is not permissible and the panel must be renewed at least on reaching main base.
(4)	Chipping and cracking. Outer ply-annealed glass.	Failure in this type of glass is recognisable by the formation of long cracks, few in number, without greatly impairing vision. Such a failure does not affect the strength of the panel so that if the visual quality is acceptable, normal pressurised flying can be continued, and the panel replaced when convenient.
(5)	Chipping and cracking. Centre panel only, outer ply strengthened glass.	Failure in this type of glass is recognisable by the formation of large dice, reducing, yet not obscuring vision. Such a failure does not affect the strength of the panel, so that if the visual quality is acceptable, normal pressurised flying can be continued, and the panel replaced when convenient.
(6)	Chipping and cracking of dry air sandwich spacers.	Acceptable subject to a satisfactory interspace leak check in accordance with the instructions as laid down in A.P.4505A and C, Vol.1, Book 1, Sect.3, Chap.8A. If leakage is evident, renew panel.
(7)	Chipping and cracking of innermost ply, annealed or strengthened.	Acceptable provided the vision area is satisfactory, and an interspace leak check, refer to item (6) has been completed successfully. For information, the glass ply is supplied either made from two layers of annealed glass, 2 to 2·6 mm. thick, with a Vinyl interlayer of 0·02 in. thick, or, one layer of strengthened glass 0·1875 in. thick.

TABLE 2

Pressure cabin, D.V. and canopy windows

Item	Defect	Remarks
(1)	Delamination on the Vinyl interlayers.	Acceptable in all areas provided that:- (a) Vision is satisfactory. (b) The area of delamination does not exceed 20 per cent of the visible area within the Vinyl metal insert. (c) Careful examination must be made for evidence of peel splintering. *NOTE . . .* *If the delaminated area contains powdered glass or glass chips it indicates a glass failure that may lead rapidly to shattering. The panel must be renewed before further pressurised flying.*
(2)	Peel splintering glass failure.	Not acceptable. This can lead to failure of the load bearing ply. The panel must be changed immediately.
(3)	Toughened glass failure.	Not acceptable. Failure of this type of glass is recognisable by the formation of small dice, completely obscuring vision. Such a failure greatly reduces the strength of the panel so that further pressurised flying is not permissible and the panel must be renewed at least on reaching main base.
(4)	Chipping and cracking. Outer ply-strengthened glass.	Failure in this type of glass is recognisable by the formation of large dice, reducing yet not obscuring vision. Such a failure does not affect the strength of the panel, so that if the visual quality is acceptable, normal pressurised flying can be continued and the panel replaced when convenient.
(5)	Cracking of the inner Perspex lamination.	Failure of this, is recognisable by formation of long cracks and causes a breakdown of the dry air sandwich system. Does not reduce the strength of the panel and is acceptable provided:- (a) Vision is satisfactory. (b) Misting of the panel has not occurred. *NOTE...* *If the panel is not acceptable due to this defect, a new Perspex panel can be fitted in situ as instructed.*

TABLE 3

Bomb aimer's window

Item	Defect	Remarks
(1)	Chipping and cracking, outer and inner facing glass.	Failure in this type of glass is recognisable by the formation of long cracks, few in number, without greatly impairing vision. Such a failure does not affect the strength of the panel so that if the visual quality is acceptable, normal pressurised flying may be continued, and the panel replaced when convenient.
(2)	Peel splintering glass failure.	Not acceptable. This can lead to failure of the load bearing ply. The panel must be changed immediately.
(3)	Toughened glass failure.	Not acceptable. Failure of this type of glass is recognisable by the formation of small dice, completely obscuring vision. Such a failure greatly reduces the strength of the panel so that further pressurised flying is not permissible and the panel must be renewed at least on reaching main base.

Perspex inner panel repair

241. Proceed as follows when renewing or refitting an undamaged inner Perspex ply and sorbo rubber spacer ring.

(1) Remove the cracked Perspex ply and rubber spacer ring.

(2) Thoroughly clean the toughened glass inner face by using a clean cloth damped with trichlorethylene to remove all remaining deposits of rubber adhesive. Take great care when using trichlorethylene to avoid spillage.

(2a) If Araldite has been used for bonding the damaged rubber spacer ring to the glass face, the resin will have to be scraped off, taking great care not to scratch the glass. Finally clean the bonding area with trichlorethylene.

(3) Abrade one face of the rubber ring with abrasive paper and clean down with trichlorethylene in readiness for attachment to the glass ply.

(4) Assemble the rubber ring to the Perspex ply using Evo-Stik 524. Ensure both faces are scrupulously clean before applying adhesive, then leave for 15 minutes until a tacky state is reached before joining the faces together.

(5) Ensure that the glass and Perspex ply faces are thoroughly clean, before applying glazing compound Araldite A.V.121 on to the area of glass required for bonding to the rubber spacer ring. The compound should be applied as a thin film, approximately 0·005 in. to 0·01 in. thick.

(6) Bed the Perspex/rubber spacer assembly on to the glass ply, ensure that the assembly will not be disturbed, leave to harden for at least six hours if the conditions prevailing are at normal room temperature. At this temperature a complete cure will take 24 hours.

(7) When satisfied that the joint is cured, pressure test the interspace in accordance with the instructions in A.P.4505A and C, Vol.1, Book 1, Sect.3, Chap.8A.

MATERIALS REQUIRED

Araldite A.V.121 (Ref.No.33H/39), 100 parts by weight mixed with 5 parts by weight of Hardener H.Y.951 (Ref.No.33H/2202078).

Evo-Stik 524 (Ref.No.33H/45)

180 Grit 'Wet or Dry' abrasive paper.

CAUTION...

Great care must be exercised to ensure that no trichlorethylene comes in contact with the Perspex ply, or the rubber adhesive Evo-Stik 524.

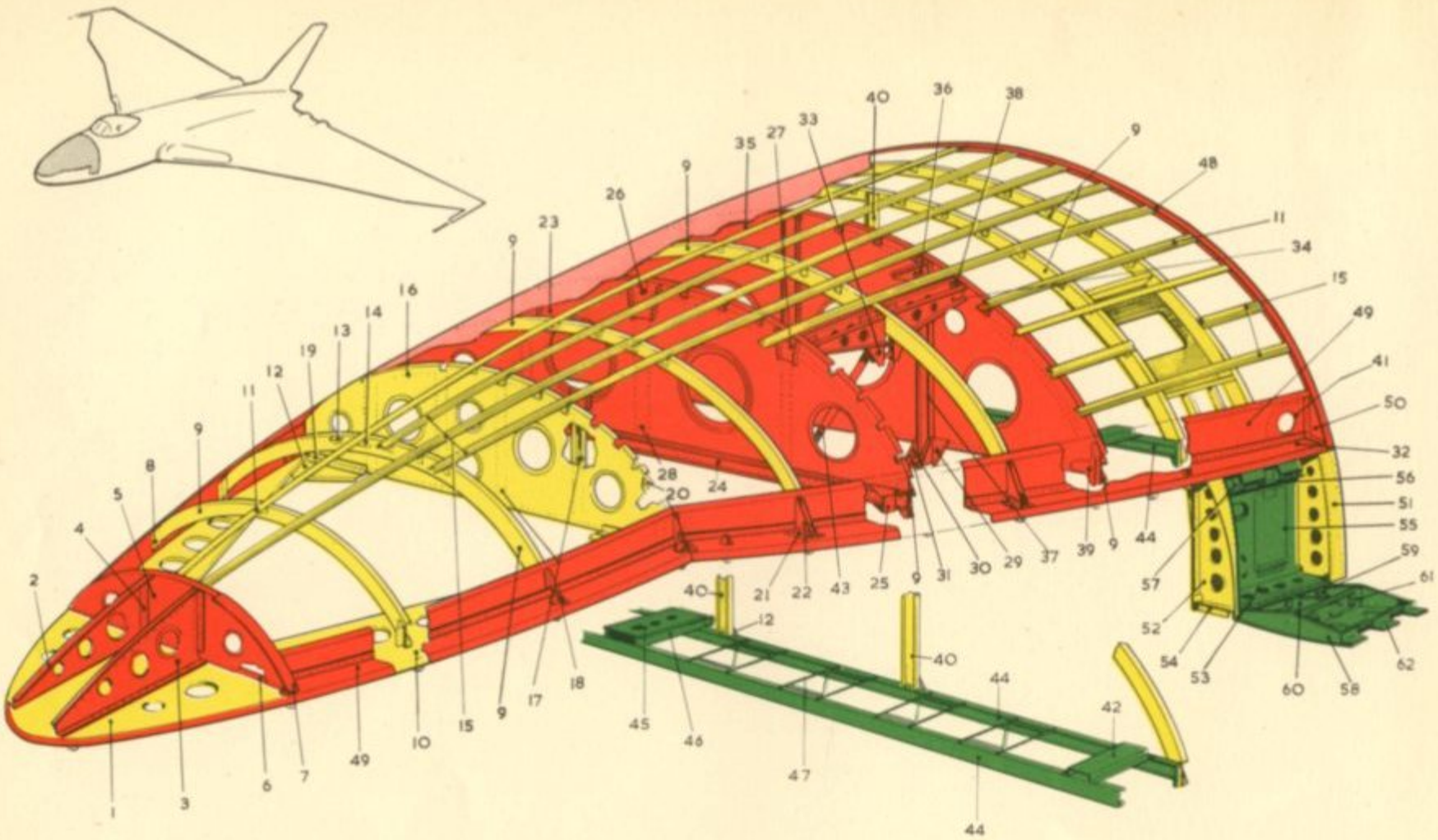


FIG. 202. METAL NOSE. (PRE MOD 38)

RESTRICTED

KEY TO FIG. 202

Item	Material: Spec.	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diam.	Negligible Damage: Holes: Pitch Ratio	Rep. Fig.
1	L72	18	Nose diaphragm		0·050	6	0·5	4 : 1	—
2	L72	20	Angle	†	—	—	—	—	—
3	L72	22	Diaphragm		0·020	6	0·5	8 : 1	—
4	L72	12b/SS.1793	Angle	†	—	—	—	—	—
5	L72	22	Diaphragm Former 510 F		0·020	6	0·5	8 : 1	—
6	L72	836/SS.1793	Angle		—	—	—	—	—
7	L72	18	Butt Strap	*	—	—	—	—	—
8	L72	18	Attachment angle	†	—	—	—	—	—
9	L72	748/SS.1793	Former channel		0·050	6	0·25	6 : 1	107, 108
10	L72	18	Horizontal plate		0·10	6	0·5	8 : 1	108
11	L65	419/SS.3075	Stringer " T "		0·050	6	—	—	109
12	L72	16	Gusset plate		0·1	6	0·5	8 : 1	—
13	L72	18	Stringer bracket	†	—	—	—	—	—
14	L72	16	Stringer bracket	†	—	—	—	—	—
15	L72	367/SS.1793	Stringer top hat		0·050	6	—	—	—
16	L72	22	Diaphragm Former 470 F		0·1	6	0·5	8 : 1	103, 106
17	L72	507/SS.1793	Stiffener		0·050	6	—	—	—
18	L72	16	Toggle bracket	*	—	—	—	—	—
19	L72	133/SS.1793	Angle	†	—	—	—	—	—
20	L72	60/SS.1793	Stiffening angle		0·050	6	—	—	—
21	L72	183/SS.1793	Attachment angle	†	—	—	—	—	—
22	L72	18	Longeron diaphragm	†	—	—	—	—	—
23	L72	22	Web former 442 F		—	—	0·25	8 : 1	103, 106
24	L72	163/SS.1793	Channel cross member		—	—	—	—	107, 108
25	L72	18	Channel bracket	†	—	—	—	—	—
26	L72	20	Gusset plate	†	—	—	—	—	—
27	L72	20	Gusset plate	†	—	—	—	—	—
28	L72	100/SS.1793	Channel stiffener		—	—	0·25	6 : 1	107, 108
29	L72	14	Corner bracket	†	—	—	—	—	—
30	L72	14	Gusset plate	†	—	—	—	—	—
31	L72	238/SS.1793	Channel beam		—	—	0·25	6 : 1	107–108
32	L72	18	Horizontal plate		0·1	6	0·5	8 : 1	220, 220A, 220B, 220C
33	L72	14	Channel		0·050	6	—	—	—
34	L72	20	Intercostal		—	—	0·25	8 : 1	105–107
35	L72	22	Web former 414 F		—	—	0·25	8 : 1	—
36	L72	18	Attachment plate	†	—	—	—	—	—
37	L72	100/SS.1793	Channel stiffener		—	—	0·25	6 : 1	107–108

All measurements are given in inches.

* No repairs permitted.

† More expedient to renew than repair.

Item	Material: Spec.	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diam.	Negligible Damage: Holes: Pitch Ratio	Rep. Fig.
38	L72	16	Channel	†	—	—	—	—	—
39	L72	18	Attachment angle	†	—	—	—	—	—
40	L72	613/SS.1793	Vertical member		0·050	6	0·25	6 : 1	107–108
41	L72	18	Doubling plate	*	—	—	—	—	—
42	L72	16	Support channel		0·1	4	1·0	4 : 1	108
43	L63	1" dia. × 22G	Strut	*	—	—	—	—	—
44	L72	613/SS.1793	Channel Cross member		0·050	4	0·25	4 : 1	107–108
45	L72	22	Mounting Tray	†	0·1	4	1·0	4 : 1	—
46	L72	348/SS.1793	Support channel	†	0·050	4	0·25	6 : 1	—
47	T.54	$\frac{5}{16}$ dia. × 20G	Stowage frame		0·030	4	—	—	—
48	L72	840/SS.1793	Transport joint angle		—	—	—	—	—
49	L72	18	Vertical member		—	—	0·5	8 : 1	—
50	D.T.D. 683	—	Longeron attachment bracket	*	—	—	—	—	—
51	L72	18	Skin panel	†	0·050	6	—	—	—
52	L72	18	Side stiffening member		0·050	6	0·5	4 : 1	105–108
53	L72	18	Bottom member		0·050	6	0·5	8 : 1	105–108
54	L72	18	Mounting channel	†	—	—	—	—	—
55	L72	20	Inboard web		0·1	4	—	—	—
56	L72	314/SS.1793	Stiffening angle	†	—	—	—	—	—
57	L72	18	Stud bracket	†	—	—	—	—	—
58	L72	20	Side member		0·1	4	0·5	6 : 1	108
59	L72	18	Bottom angle		0·050	4	0·5	6 : 1	108
60	L72	20	Stiffening member		0·050	4	0·5	6 : 1	108
61	L72	20	Cross member		0·050	4	0·5	6 : 1	108
62	L72	18	Top angle	†	—	—	—	—	—

All measurements are given in inches.

* No repairs permitted.

† More expedient to renew than repair.

KEY TO FIG. 202A

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	L72	20	Angle	†	—	—	—	—	—
2	L72	20	Channel	†	—	—	—	—	—
3	L72	20	Angle	†	—	—	—	—	—
4	L72	20	Angle	†	—	—	—	—	—
5	L72	20	Channel	†	—	—	—	—	—
6	L72	20	Angle	†	—	—	—	—	—
7	L72	20	Main channel		0·05	4	—	—	105, 108
8	L72	20	Centre bracket	†	—	—	—	—	—
9	L72	20	End bracket	†	—	—	—	—	—
10	L72	20	Angle	†	—	—	—	—	—
11	L72	20	Angle	†	—	—	—	—	—
12	L72	20	Top plate		0·10	4	0·5	4 : 1	—
13	L72	16	Back plate	†	—	—	—	—	—
14	L72	18	Side member	*	—	—	—	—	—
15	L72	20	Reinforcing plate	†	—	—	—	—	—
16	L72	18	Spinning	†	—	—	—	—	—
17	L72	18	Packing	†	—	—	—	—	—
18	L72	16	Packing	†	—	—	—	—	—
19	L72	18	Side member	*	—	—	—	—	—
20	L72	18	Web former 470 F		0·10	6	—	—	103
21	L72	16	Angle	†	—	—	—	—	—
22	L72	20	Angle	†	—	—	—	—	—
23	L72	455/SS.1793	Stiffener		0·05	6	—	—	—
24	L72	507/SS.1793	Stiffener		0·05	6	—	—	—
25	L72	455/SS.1793	Stiffener		0·05	6	—	—	—
26	L72	18	Web former 510 F	*	—	—	—	—	—
27	L72	511/SS.1793	Stiffener	*	—	—	—	—	—
28	L72	511/SS.1793	Stiffener	*	—	—	—	—	—
29	L72 or L65	—	Base Ring	†	—	—	—	—	—
30	L72	10	Plate	†	—	—	—	—	—
31	L65	—	Centre segments	†	—	—	—	—	—
32	L65	—	Bottom segments	†	—	—	—	—	—
33	L72	16	Bottom angle	*	—	—	—	—	—
34	L72	22	Web former 442 F		0·10	6	0·5	8 : 1	103, 106
35	L72	18	Gusset plate	†	—	—	—	—	—
36	L72	22	Web former 414 F		—	—	0·25	8 : 1	103, 106
37	L72	613/SS.1793	Vertical member		0·05	4	0·50	6 : 1	107–108
38	L72	613/SS.1793	Cross member		0·10	4	1·00	4 : 1	107–108
39	L72	18	Butt Strap	*	—	—	—	—	—

All dimensions are quoted in inches. † More expedient to renew than repair. * No repair permitted.

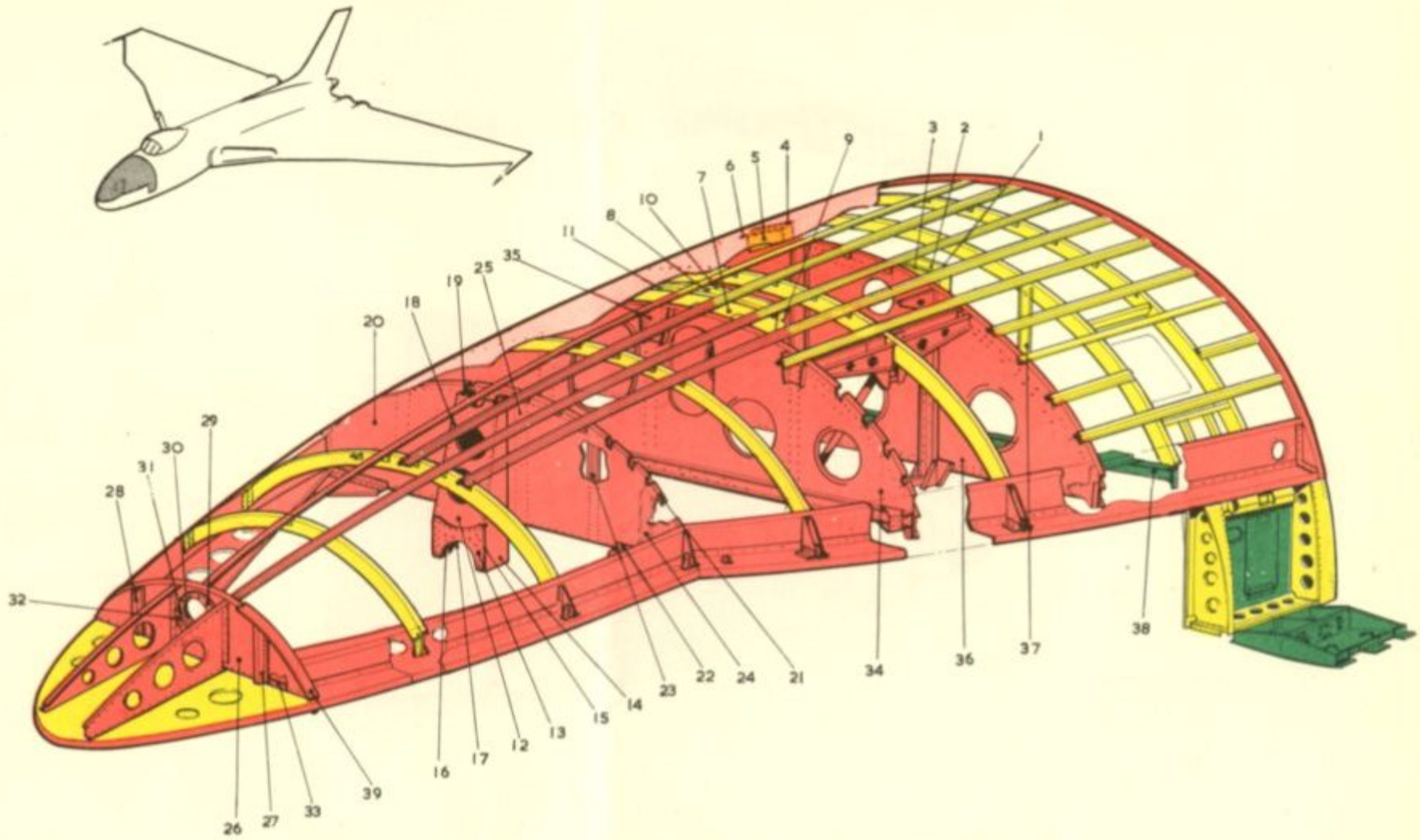


FIG. 202.A. METAL NOSE (POST MOD. 38)

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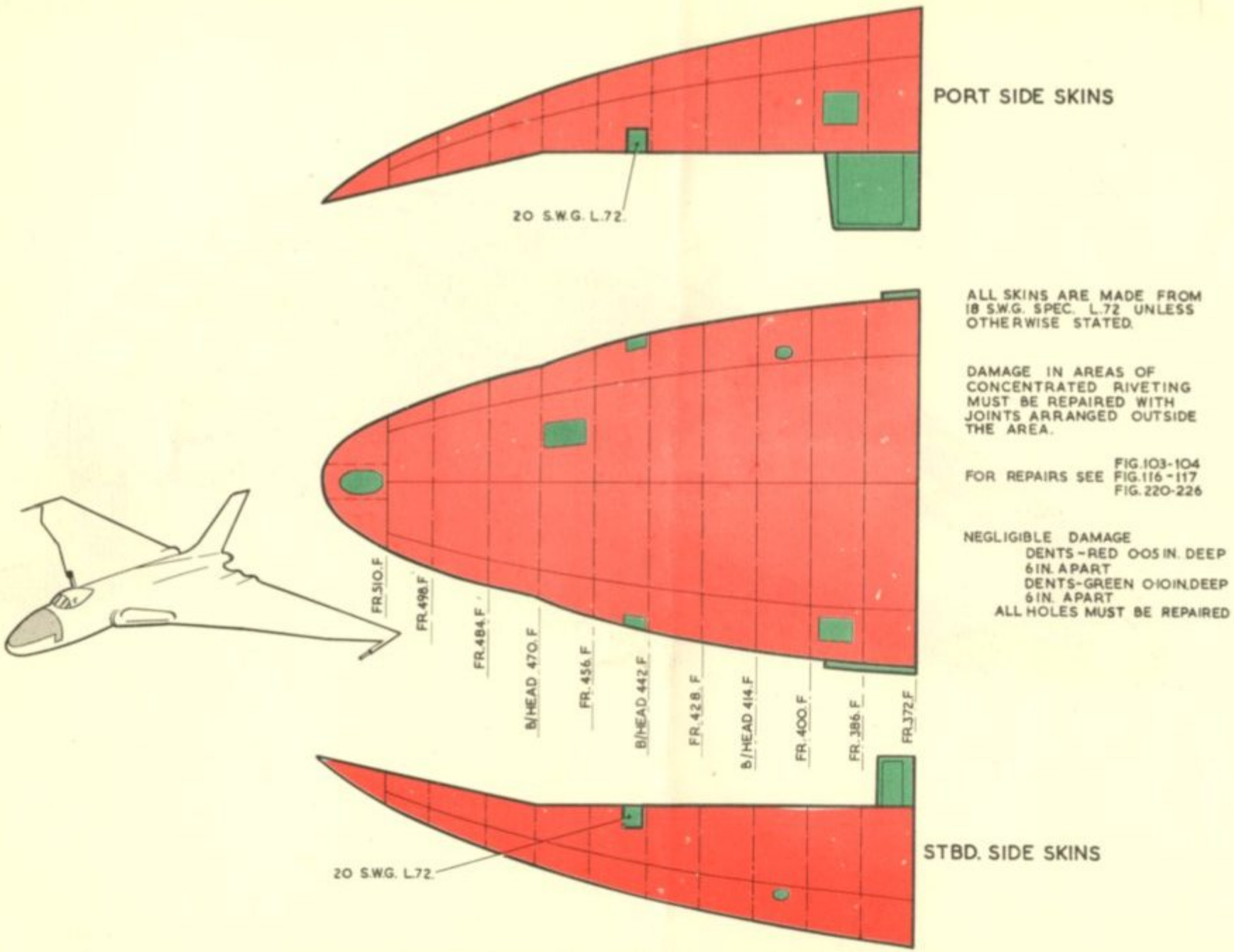

FIG. 203. METAL NOSE SKINS

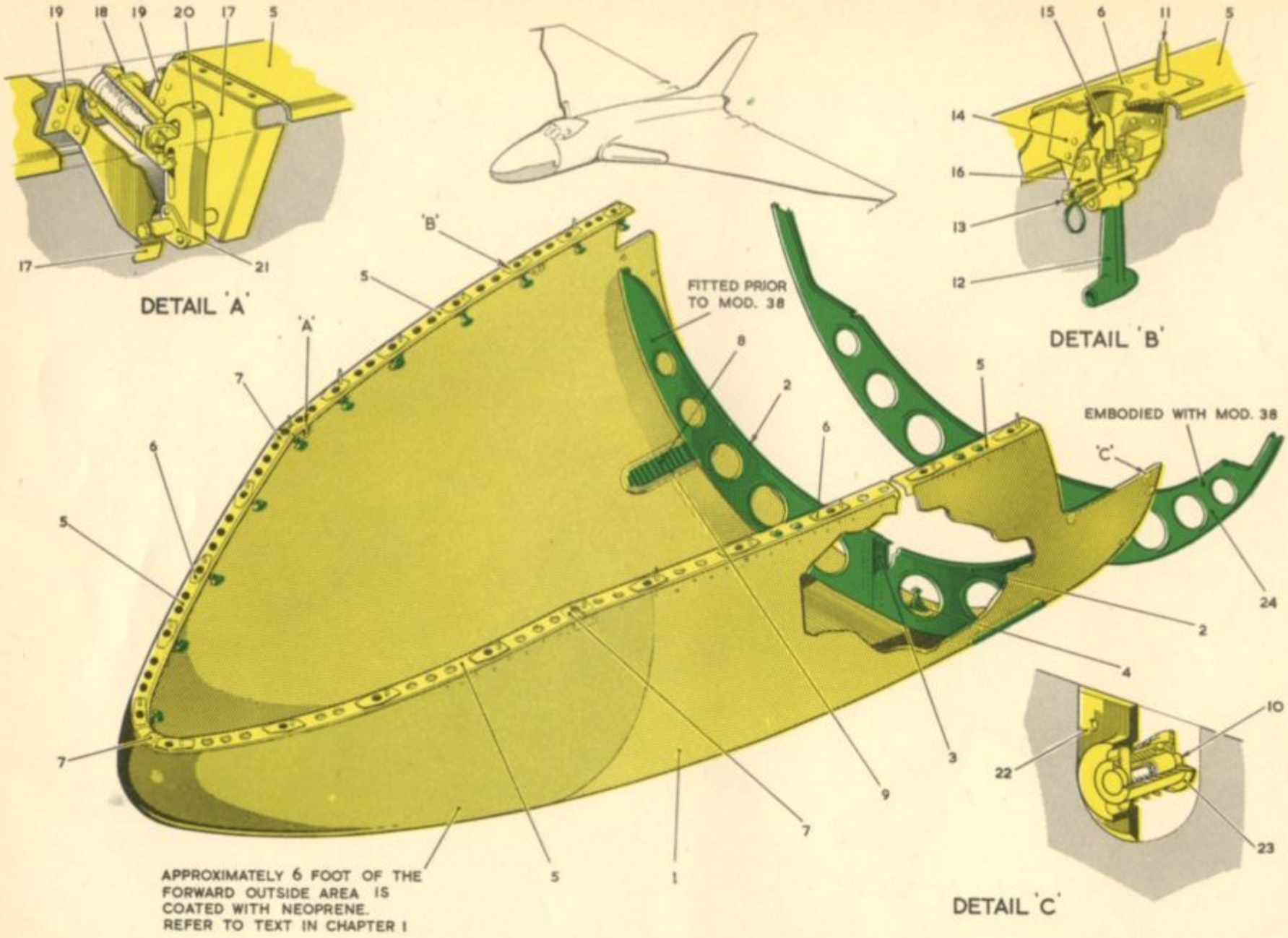

FIG. 204. NOSE RADOME - MOD 38 EMBODIED

KEY TO FIG. 204

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	—	—	Radome Moulding		—	—	—	—	219–219A
2	L72	16	Radome Former		0·10	2·5	0·25	4 : 1	106–107–108
3	L72	16	Joint plate		0·10	2·5	0·25	4 : 1	108
4	—	—	Drain plug assembly	*	—	—	—	—	—
5	L72	14	Radome longeron		0·05	3·0	—	—	—
6	L72	16	Packing plate	†	0·05	3·0	—	—	—
7	L72	14	Joint plate	†	0·05	3·0	—	—	—
8	L59	18	Louvre	†	0·10	2·5	—	—	—
9	L59	20	Angle	†	0·10	2·5	—	—	—
10	S.80	—	Button	*	—	—	—	—	—
11	S.110	—	Dowel	*	—	—	—	—	—
12	D.T.D. 130.A	—	Lever	*	0·05	2·5	—	—	—
13	—	—	Pip-pin	*	—	—	—	—	—
14	L72	18	Attachment bracket	†	0·10	3·0	—	—	—
15	S.96	—	Hook	*	—	—	—	—	—
16	L65	—	Toggle mounting	†	—	—	—	—	—
17	L72	18	Attachment bracket	†	0·10	3·0	0·25	6 : 1	—
18	L65	—	Housing	*	—	—	—	—	—
19	L72	18	Attachment angle	†	0·10	2·5	—	—	—
20	L65	—	Hook	*	—	—	—	—	—
21	L65	—	Bearing	†	0·50	3·0	—	—	—
22	B.S.S. 249	—	Housing	*	0·50	2·5	—	—	—
23	S.80	—	Pin	*	—	—	—	—	—
24	L72	16	Radome Former Mod. 38		0·10	2·5	0·25	4 : 1	106–107–108

All dimensions are quoted in inches.

† More expedient to replace than repair.

* No repairs permitted.

KEY TO FIG. 205

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	L72	6	Support-Ring Sector	†	—	—	—	—	—
2	L72	12	Attachment Ring Sector	†	—	—	—	—	—
3	L72	20	Dome Sector		—	—	—	—	223.A
4	L72	20	Jointing Strap		—	—	—	—	223.B
5	L72	20	Sealing plate	†	—	—	—	—	—
6	L73	6	Aft angle		—	—	—	—	—
7	D.T.D. 410	—	Pressure dome Reinforcing	†	—	—	—	—	—
8	L72	20	Patch plate		—	—	—	—	—
9	L72	16	Packing		0·050	3·0	—	—	—
10	L72	20	Strap plate		—	—	—	—	—
11	L72	16	Top horizontal angle		0·10	3·0	—	—	—
12	L72	16	Top plate		0·10	3·0	0·25	4 : 1	—
13	L72	16	Vertical panel		0·10	3·0	0·25	4 : 1	—
14	D.T.D. 130.A	139/SS.3075	Upper " T " section		0·10	3·0	—	—	—
15	L72	18	Inner skin angle		—	—	—	—	—
16	L72	16	Diaphragm		0·05	3·0	0·4	4 : 1	115
17	L73	14	Bracket		0·05	3·0	0·4	4 : 1	—
18	S.510	16	Bracket	*	—	—	—	—	—
19	D.T.D. 304.B	361/SS.3075	Forward angle		—	—	—	—	—
20	L72	10	Reinforcing plate outer	*	—	—	—	—	—
21	D.T.D. 687.A	20	Diaphragm		0·10	3·0	0·25	4 : 1	—
22	D.T.D. 304.B	361/SS.3075	Forward angle centre		—	—	—	—	—
23	L65	—	Strap bracket	*	—	—	—	—	—
24	L72	18	Attachment bracket	*	—	—	—	—	—
25	L72	10	Mounting ring	*	—	—	—	—	—
26	L72	10	Support ring	*	—	—	—	—	—
27	L72	20	Dish		—	—	—	—	—
28	D.T.D. 88.C	—	Access door reinforcing ring	*	—	—	—	—	—
29	L65	—	Clamp bracket	*	—	—	—	—	—

All dimensions are quoted in inches.

† More expedient to renew than repair.

* No repair permitted.

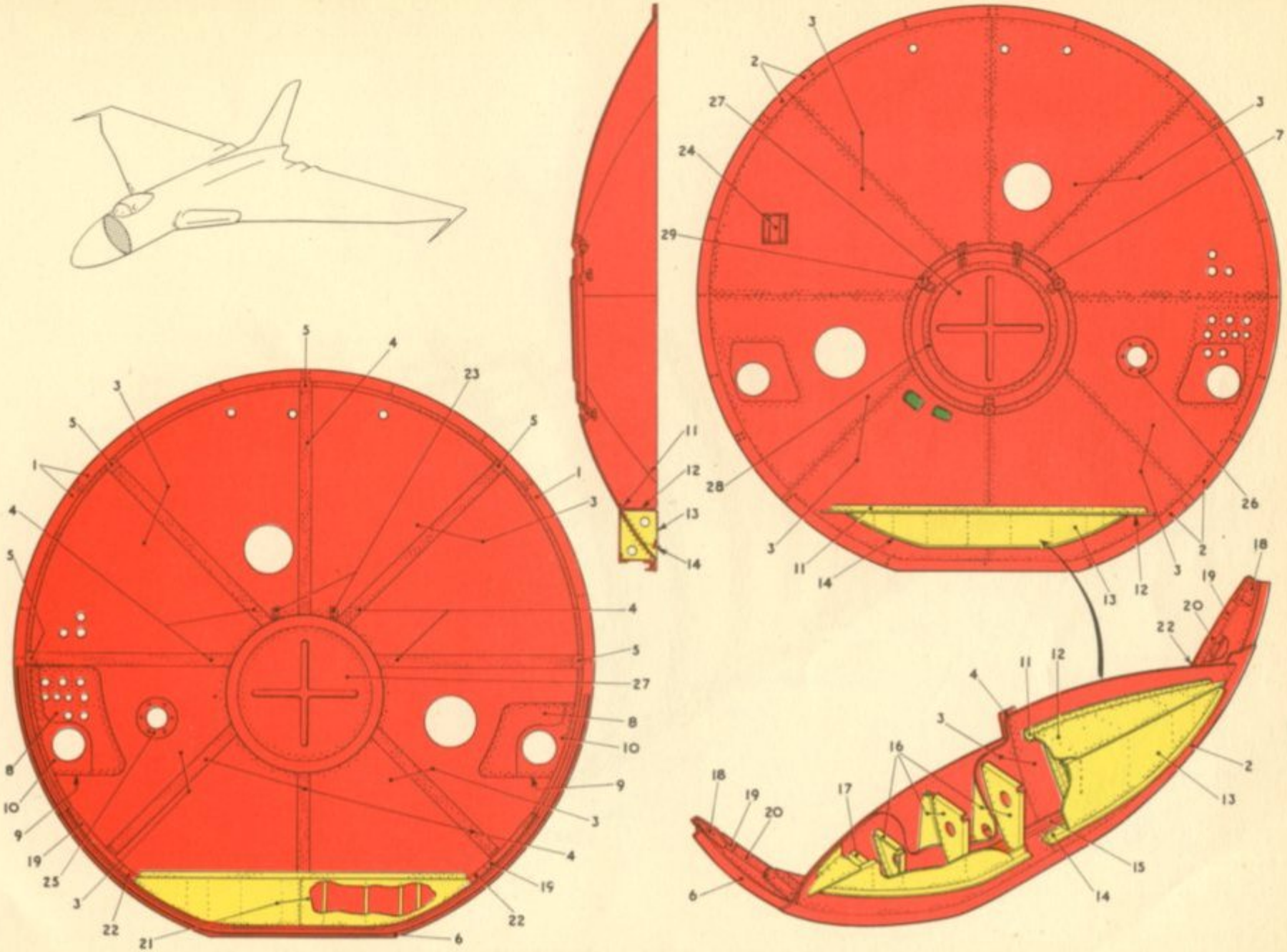

FIG. 205. FRONT PRESSURE BULKHEAD

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RESTRICTED

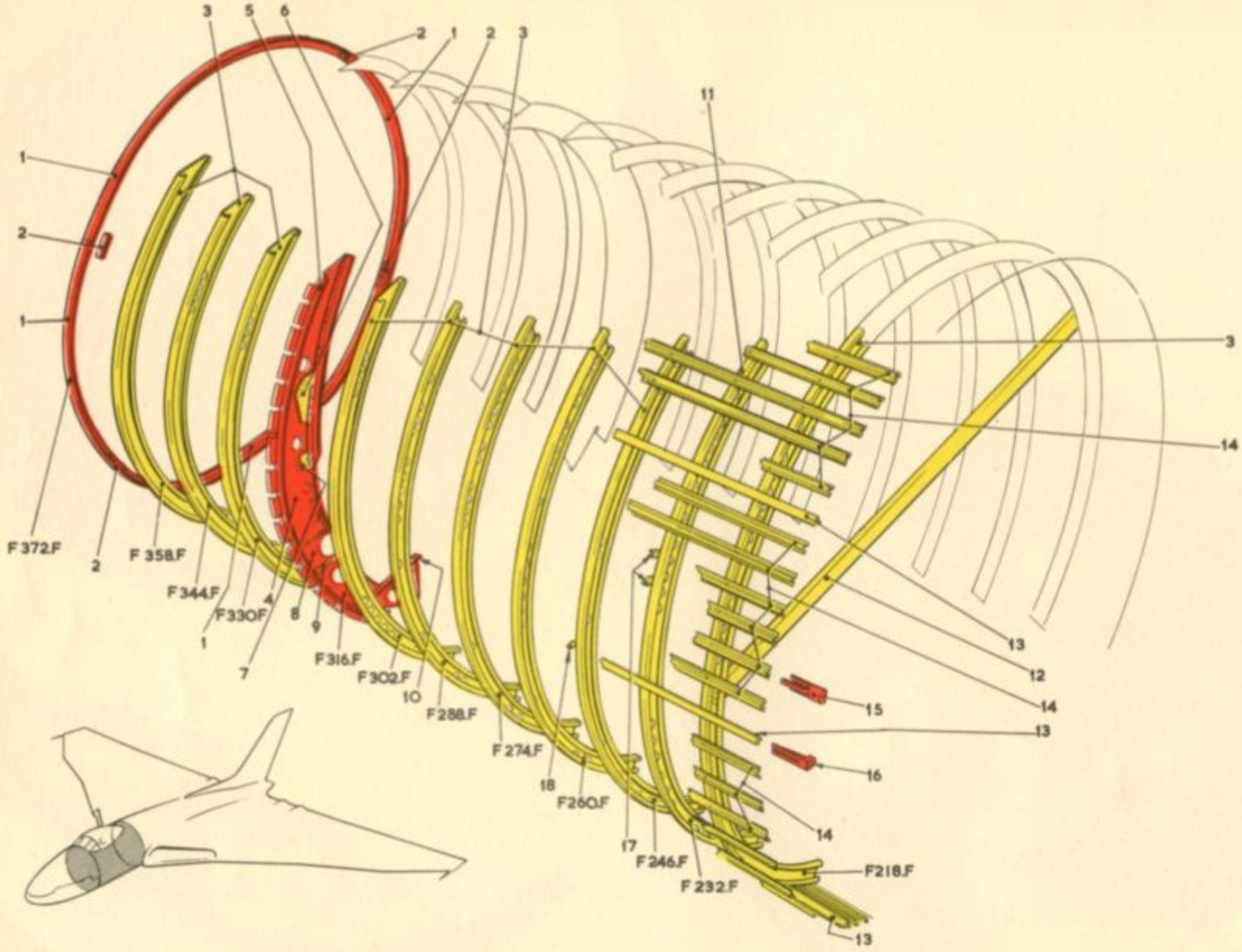


FIG. 206. FORMERS - FRONT FUSELAGE

RESTRICTED

KEY TO FIG. 206

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	L65	299/SS.3075	Former Sector		—	—	—	—	—
2	S.3	14	Joint plate	†	—	—	—	—	—
3	L72	420/SS.1793	Half former		0·10	2·5	0·25	6 : 1	105–107–108
4	L73	18	Web plate		0·10	2·0	0·5	4 : 1	—
5	L72	525/SS.1793	Outer angle		0·10	2·0	—	—	—
6	D.T.D. 687.A	18	Gusset plate	†	0·10	2·0	0·25	4 : 1	—
7	L72	16	Doubling plate	†	0·15	2·5	0·25	3 : 1	—
8	L72	16	Reinforcing plate	†	0·15	2·5	0·25	3 : 1	—
9	L72	16	Strap	†	0·10	2·0	—	—	—
10	L72	525/SS.1793	Bottom inner angle		0·10	2·0	—	—	114
11	L72	224/SS.1793	Half former		0·10	2·5	0·25	6 : 1	105–107–108
12	L72	766/SS.1793	Cross member		0·10	2·5	0·25	6 : 1	107–108
13	L65	325/SS.3075	Stringers " T " section		—	—	—	—	110
14	L72	211/SS.1793	Stringers " top hat " section		0·50	3·0	—	—	112
15	D.T.D. 88.C	—	Stringer bracket " top hat "	*	—	—	—	—	—
16	D.T.D. 88.C	—	Stringer bracket " T "	*	—	—	—	—	—
17	L72	18	Stringer bracket	†	—	—	—	—	—
18	L72	16	Angle	†	0·10	2·5	—	—	—

All dimensions quoted are in inches.

† More expedient to renew than repair.

* No repair permitted.

KEY TO FIG. 206A

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	L73	18	Rib Web		0·10	2·0	0·5	4 : 1	—
2	L72	525/SS.1793	Rib Angle		0·10	2·0	—	—	—
3	L72	16	Reinforcing Strap		0·10	2·0	—	—	—
4	L72	16	Doubling plate		0·15	2·5	0·25	3 : 1	—
5	L72	16	Stringer Bracket	*	0·10	2·0	—	—	—
6	L72	18	Stringer Bracket	*	0·10	2·0	—	—	—
7	D.T.D. 687	18	Gusset plate	†	0·10	2·0	0·25	4 : 1	—
8	L72	16	Reinforcing Ring	†	0·15	2·0	—	—	—

All dimensions are quoted in inches.

† More expedient to renew than repair.

* No repair permitted.

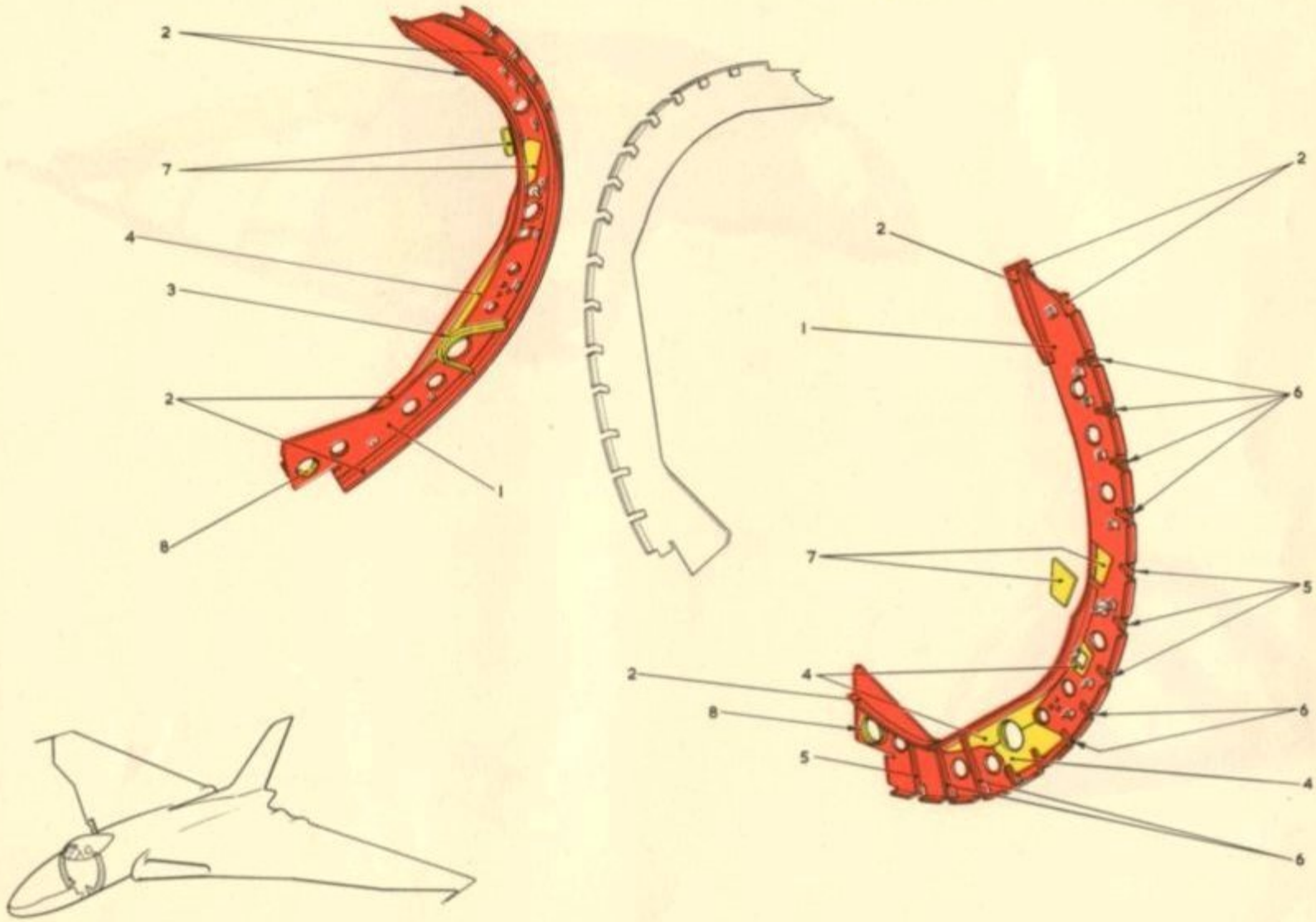
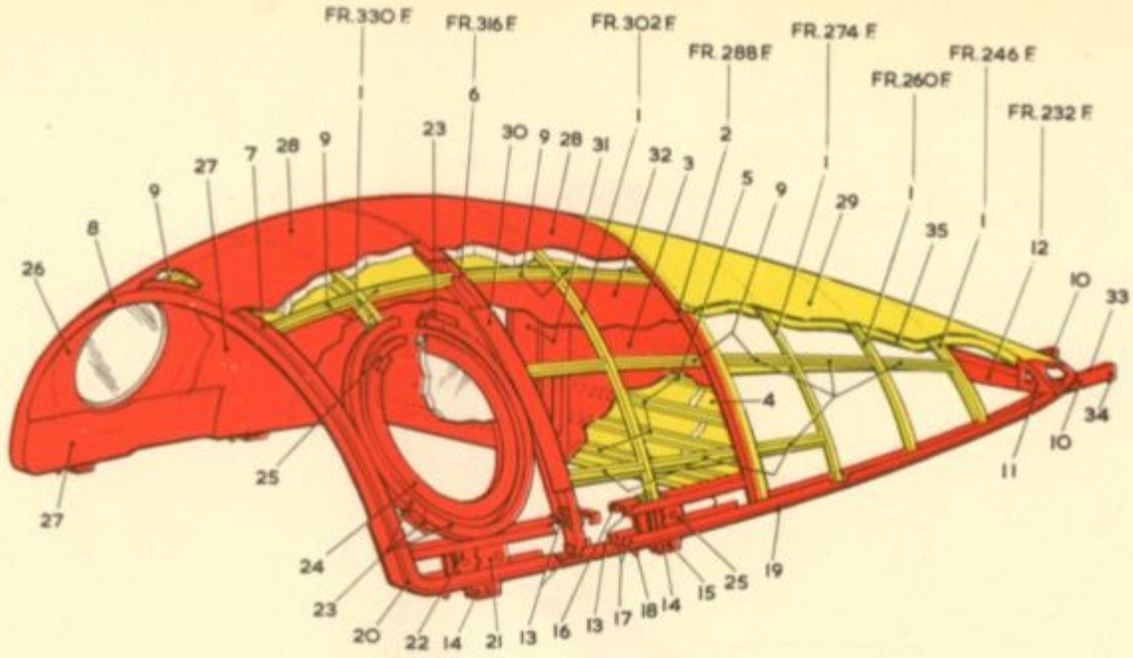


FIG. 206A. FORMER 316F. FRONT FUSELAGE

248581 / 7013 375 12'57 B.B.Ltd. Gp. 979



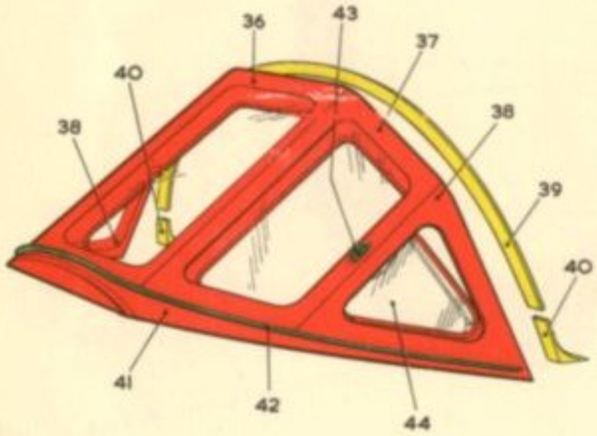


FIG. 207 CANOPY AND WINDSCREEN

RESTRICTED

Key to fig. 207

Item	Material Spec.	Material S.W.G or Section	Description	Negligible Damage Dents Depth	Dents Dist. Apart	Dents Dia.	Holes Pitch Ratio	Repair Fig. No.
1	L.72	16	Former	—	—	—	—	—
2	DTD.687	16	Front and rear channel	—	—	—	—	—
3	L.72	14	Forward bulkhead skin	—	—	—	—	—
4	L.72	16	Rear bulkhead skin	—	—	—	—	—
5	L.73	20	Stiffeners	—	—	—	—	—
6	L.72	16	Former 316. F	—	—	—	—	—
7	L.72	16	Front outer angle	—	—	—	—	—
8	DTD.259 DTD.88C	—	Front frame	—	—	—	—	—
9	L.72	219/SS.1793	Stringer	0·05	2·5	—	—	—
10	L.72	16	Hinge side members	†—	—	—	—	—
11	DTD.88C	—	Fairing block	†—	—	—	—	—
12	L.72	20	Diaphragm	0·05	3·0	0·25	8 : 1	—
13	L.72	16	Attachment angles	†0·05	3·0	—	—	—
14	S.96	—	Fork	*—	—	—	—	—
15	S.99	—	Pin	*—	—	—	—	—
16	L.65	328/SS.3075	Channel member	0·05	3·0	—	—	—
17	L.72	16	Centre angles	—	—	—	—	—
18	S.96	—	Dowel	*—	—	—	—	—
19	DTD.259 or DTD.88C	—	Base plate	—	—	—	—	—
20	DTD.259 or DTD.88C	—	Corner base plate	†—	—	—	—	—
21	L.72	16	Packing	†0·05	3·0	—	—	—
22	L.72	18	Stiffener bracket	† 0.05	3·0	—	—	—
23	L.72	16	Channel	†0·05	3·0	—	—	—
24	DTD.166B	18	Reinforcing plate	†0·05	3·0	—	—	—
25	L.72	16	Angle	†0·05	3·0	—	—	—
26	L.72	18	Skin	0·05	3·0	—	—	—
27	L.72	20	Inner skins	0·10	2·5	—	—	—
28	L.72	18	Forward outer skins	—	—	—	—	—
29	L.72	18	Aft outer skin	0·05	3·0	—	—	—
30	L.72	18	Butt strap	—	—	—	—	—
31	DTD.687	14	Channel	0·05	3·0	—	—	—
32	L.72	20	Centre inner skin	0·10	2·5	—	—	—
33	DTD.124A	14	Channels	†—	—	—	—	—
34	S.3	10	Cam plates	*—	—	—	—	—
35	L.72	20	Aft inner skin	0·10	2·5	—	—	—
36	DTD.410	—	Centre window frame	*—	—	—	—	—
37	DTD.410	—	Side window frame	*—	—	—	—	—
38	DTD.410	—	D. V. window frame	*—	—	—	—	—
39	L.72	3	Sealing strip	*—	—	—	—	—
40	DTD.118A or DTD.142A	—	Sealing strip end	*—	—	—	—	—
41	DTD.88C	—	Windscreen base forging	*—	—	—	—	—
42	L.59	18	Rain deflector	0·10	2·5	0·25	6 : 1	—
43	L.65	—	Wiper stop body	*—	—	—	—	—
44	—	—	D.V. window assembly	*—	—	—	—	—

All dimensions are stated in inches. † More expedient to replace than repair. * No repair permitted.

Key to fig. 208

Item	Material Spec.	Material S.W.G or Section	Description	Negligible Damage: Dents Depth	Dents Dist. Apart	Holes Dia.	Holes Pitch Ratio	Repair Fig. No.
1	S.510 or S.514	16	Hinge cover	†0·05	3·0	—	—	—
2	L.72	18	Intercostals	0·05	3·0	0·25	4 : 1	115
3	L.72	20	Intercostal	0·05	3·0	0·25	4 : 1	115
4	DTD.687	18	Web	0·05	3·0	0·25	4 : 1	108
5	L.73	16	Web	0·05	3·0	0·25	4 : 1	108
6	L.73	12	Bottom boom angle	0·05	3·0	—	—	—
7	L.72	16	Intercostal	0·05	3·0	0·25	4 : 1	115
8	DTD.687	14	Web plate	0·025	3·0	0·25	4 : 1	—
9	L.65	338/SS.3075	Top boom	0·025	3·0	0.25	6 : 1	—
10	DTD.687	16	Web plate	0·05	3·0	0·25	4 : 1	—
11	L.65	—	Plumb line attach. block	†0·025	3·0	—	—	—
12	DTD.687	10	Cockpit rail—rear	0·025	3·0	—	—	—
13	DTD.687	10	Web plate	0·025	3·0	—	—	—
14	L.72	16	Brackets	†0·025	3·0	—	—	—
15	L.72	18	Top skin	—	—	—	—	—
16	DTD.683	350/SS.3075	Angle bracket	0·025	3·0	—	—	—
17	L.72	16	Channel stiffener	0·025	3·0	0·20	6 : 1	—
18	L.72	18	Butt strap	†0·05	3·0	0.25	6 : 1	—
19	L.72	16	Intercostal	0·05	3·0	0·25	6 : 1	—
20	S.514	16	Intercostal	0·05	3·0	0·25	4 : 1	—
21	L.72	18	Intercostal	0·05	3·0	0·25	4 : 1	115
22	DTD.687	10	Joint plate	†0·025	3·0	—	—	—
23	L.72	16	Support bracket	†0·05	3·0	0·25	4 : 1	—
24	DTD.130	—	Attachment angle	*—	—	—	—	—
25	L.73	10	Rail	0·025	3·0	—	—	—
26	S.510	16	Cover	0·025	3·0	—	—	—
27	L.72	16	Attachment bracket	0·05	3·0	0·25	4 : 1	—
28	DTD.683 or L.65	—	Bracket	0·025	3·0	—	—	—
29	L.73	14	Reinforcing channel	0·025	3·0	0·25	8 : 1	—
30	L.73	10	Reinforcing plate	0·025	3·0	—	—	—
31	L.73	10	Packing	†0·025	3·0	—	—	—
32	L.73	12	Reinforcing plate	0·025	3·0	0·25	8 : 1	—
33	L.73	12	Attachment angle	0·025	3·0	0·25	6 : 1	—
34	L.73	14	Cross member	0·025	3·0	0·25	8 : 1	—
35	L.73	12	Bracing strip	0·025	3·0	—	—	—
36	DTD.687	10	Angle	0·025	3·0	—	—	—
37	DTD.687	12	Skin	0·025	3·0	—	—	—
38	DTD.687	10	Web	0·025	3·0	—	—	—
39	L.72	10	Gusset plate	†0·025	3·0	—	—	—
40	L.65	—	Ejection jack foot	*—	—	—	—	—
41	L.72	16	Bracket	0·05	3·0	0·25	6 : 1	—
42	L.73	12	Web	0·025	3·0	—	—	—
43	L.72	10	Attachment plate	0·025	3·0	0·25	8 : 1	—
44	L.65	—	Block	0·025	3·0	—	—	—
45	L.73	10	Reinforcing plate	0·025	3·0	—	—	—
46	L.72	18	Skin panel	0·05	3·0	0·25	8 : 1	—
47	L.72	20	Diaphragm	†0·05	3·0	—	—	—

All dimensions are stated in inches. † More expedient to replace than repair. * No repair permitted.

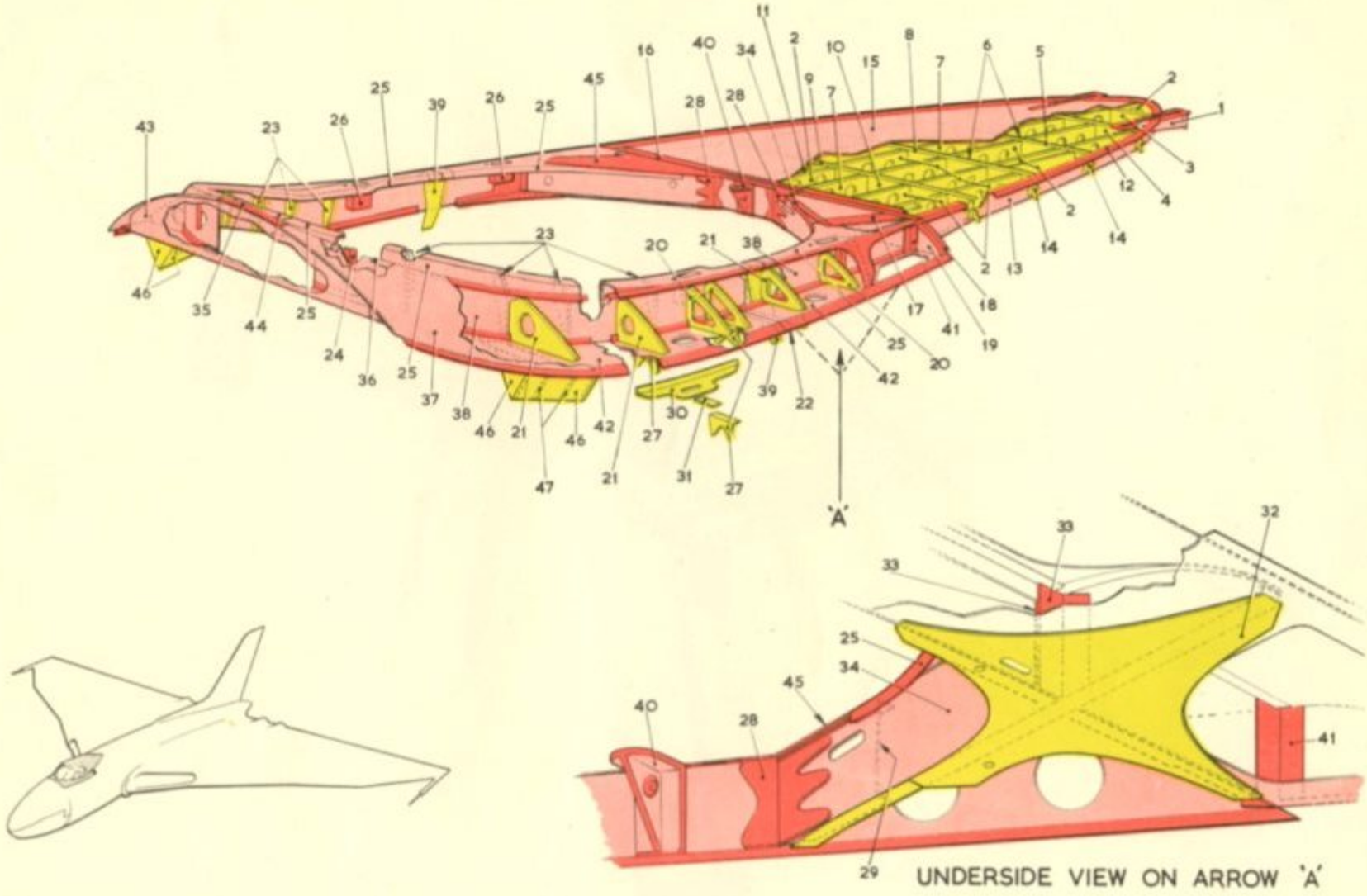


Fig.208 Cockpit rail structure
Mod.275, 367, 368 and 405 embodied
RESTRICTED

26/151/6432 376 5/58 88Ltd Gp. 979

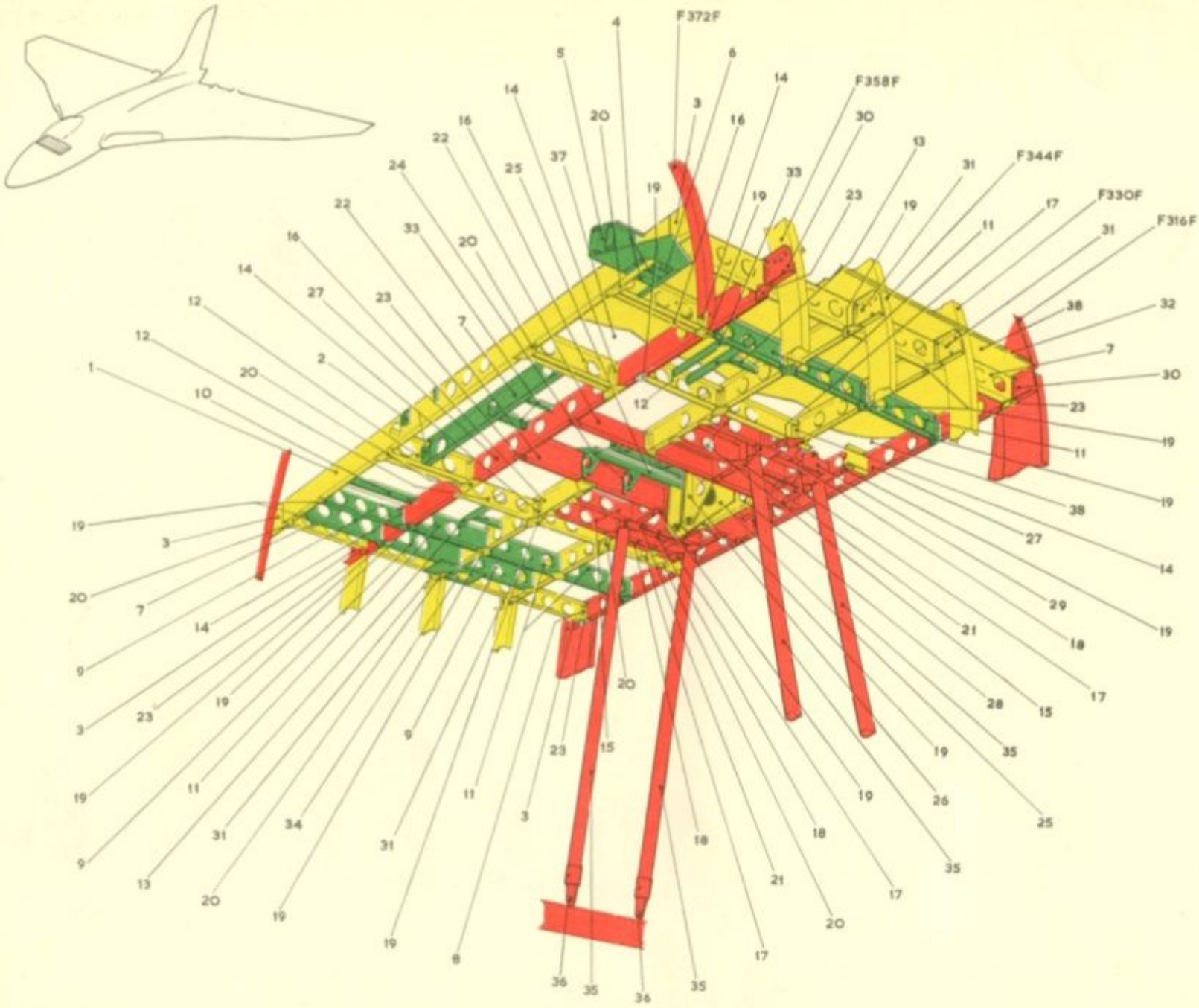


FIG. 209. PILOTS' FLOOR

KEY TO FIG. 209

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	L72	589/SS.1793	Cross member		0·05	3·0	0·25	6 : 1	107–108
2	L72	20	Angle	†	0·10	2·5	—	—	—
3	L72	589/SS.1793	Attachment bracket		0·05	3·0	—	—	115
4	L72	590/SS.1793	Intercostal		0·05	3·0	0·25	4 : 1	115
5	L72	20	Gusset plate		0·10	2·5	0·25	4 : 1	—
6	L72	183/SS.1793	Angle	†	0·05	3·0	—	—	—
7	L72	590/SS.1793	Side member		0·10	2·5	0·25	6 : 1	105–108
8	L72	18	Angle	†	0·10	2·5	—	—	—
9	L72	591/SS.1793	Intercostal		0·10	2·5	0·25	4 : 1	105–108
10	L72	18	Member		0·10	2·5	0·25	4 : 1	108
11	L72	22	Intercostal		0·10	2·5	0·25	4 : 1	105–108
12	L72	590/SS.1793	Intercostal		0·10	2·5	0·25	6 : 1	105–108
13	L72	20	Support angle		0·10	2·5	0·25	4 : 1	—
14	L72	183/SS.1793	Angle	†	0·10	2·5	—	—	—
15	L72	589/SS.1793	Intercostal		0·05	3·0	0·25	6 : 1	105–108
16	L72	590/SS.1793	Intercostal		0·10	2·5	0·25	6 : 1	105–108
17	L72	18	Lamp mounting and Gusset plate	†	0·05	3·0	—	—	—
18	L72	16	Channel		0·05	3·0	—	—	—
19	L72	20	Gusset plate	†	0·10	2·0	—	—	—
20	L72	18	Gusset plate	†	0·10	2·0	—	—	—
21	L72	18	Gusset plate	†	0·05	3·0	—	—	—
22	L72	16	Floor member		0·05	3·0	0·25	8 : 1	108
23	L72	20	Gusset plate	†	0·05	3·0	—	—	—
24	L72	20	Intercostal		0·10	2·5	0·25	4 : 1	115
25	L72	20	Lipped angle		0·10	2·5	0·25	6 : 1	—
26	L72	20	Intercostal		0·10	2·5	0·25	6 : 1	—
27	L72	589/SS.1793	Cross member		0·05	3·0	0·25	8 : 1	105–108
28	L72	589/SS.1793	Intercostal		0·10	2·5	0·25	6 : 1	105–108
29	L72	8	Bearing plate	†	—	—	—	—	—
30	L72	16	Attachment bracket		0·05	3·0	—	—	115
31	L72	590/SS.1793	Attachment bracket		0·10	2·5	0·25	6 : 1	115
32	L72	696/SS.1793	Shear angle		0·10	2·5	—	—	—
33	L72	18	Member		0·10	2·5	0·25	4 : 1	—
34	L72	20	Reinforcing skin		0·15	2·5	0·25	4 : 1	—
35	L63	14	Tube for support strut	*	—	—	—	—	—
36	D.T.D. 683 or L65	—	End socket	*	—	—	—	—	—
37	L72	22	Forward floor skin		0·10	2·5	0·25	4 : 1	225
38	L72	20	Aft floor skin		0·10	3·0	0·25	6 : 1	225

All dimensions are quoted in inches. † More expedient to replace than repair. * No repairs permitted

KEY TO FIG. 210

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	L72	589/SS.1793	Cross member		0·10	2·5	0·25	6 : 1	108
2	L72	16	Joint bracket		0·10	2·5	0·25	6 : 1	115
3	L72	18	Gusset plate	†	0·10	2·5	—	—	—
4	L72	20	Gusset plate	†	0·10	2·5	—	—	—
5	L72	18	Intercostal		0·10	2·5	0·25	4 : 1	105, 108
6	L72	20	Gusset plate	†	0·10	2·5	—	—	—
7	L72	16	Gusset plate	†	0·10	2·5	—	—	—
8	L72	16	Cross member		0·10	2·5	0·25	6 : 1	108
9	L72	18	Angle	†	0·10	2·5	—	—	—
10	L65	—	Jack attachment bracket	*	—	—	—	—	—
11	L72	18	Joint plate	†	0·10	2·5	—	—	—
12	L72	224/SS.1793	Cross member		0·10	2·5	0·25	6 : 1	108
13	L72	20	Gusset plate	†	0·10	2·5	—	—	—
14	L72	461/SS.1793	Step support		0·10	2·5	0·25	6 : 1	108
15	L72	413/SS.1793	Cross member		0·15	2·0	0·25	4 : 1	108
16	L72	413/SS.1793	Intercostal		0·15	2·0	0·25	4 : 1	108
17	L72	20	Gusset plate	†	0·10	2·5	—	—	—
18	L72	413/SS.1793	Cross member		0·10	2·5	0·25	6 : 1	108
19	L72	18	Angle		0·10	2·5	0·25	6 : 1	—
20	L72	14	Attachment bracket	*	—	—	—	—	—
21	L72	18	Support bracket	†	0·10	2·5	—	—	—
22	L72	413/SS.1793	Intercostal		0·15	2·0	0·25	4 : 1	108
23	L72	413/SS.1793	Intercostal		0·10	2·5	0·25	6 : 1	108
24	L72	18	Angle bracket	*	0·10	2·5	0·25	6 : 1	—
25	L72	18	Foot guard		0·20	2·0	0·5	4 : 1	—
26	L72	22	Shelf cross member		0·15	2·0	0·25	4 : 1	—
27	L72	20	Floor skin		0·15	3·0	0·5	5 : 1	225
28	L72	18	Floor support		0·10	2·5	0·25	6 : 1	108
29	L72	22	Channel member		0·15	2·0	0·25	4 : 1	—
30	L72	253/SS.1793	Angle		0·10	2·0	—	—	—
31	L72	772/SS.1793	Channel member		0·15	2·0	0·25	4 : 1	—
32	L72	18	Angle bracket	*	0·10	2·5	—	—	—
33	L72	20	Gusset plate	†	0·10	2·5	—	—	—
34	L72	18	Channel stiffener		0·10	2·5	0·25	6 : 1	—
35	L72	244/SS.1793	Floor support		0·10	2·5	0·25	6 : 1	108
36	L72	16	Centre frame member		0·10	2·5	0·25	6 : 1	108
37	L72	16	Channel		0·10	2·5	0·25	6 : 1	108
38	L72	6	Seat attachment plate	*	—	—	—	—	—
39	D.T.D. 423	248/SS.3075	Angle		0·10	2·0	—	—	—
40	L72	20	Angle		0·10	2·0	—	—	—

All dimensions are quoted in inches.

† More expedient to replace than repair.

* No repairs permitted.

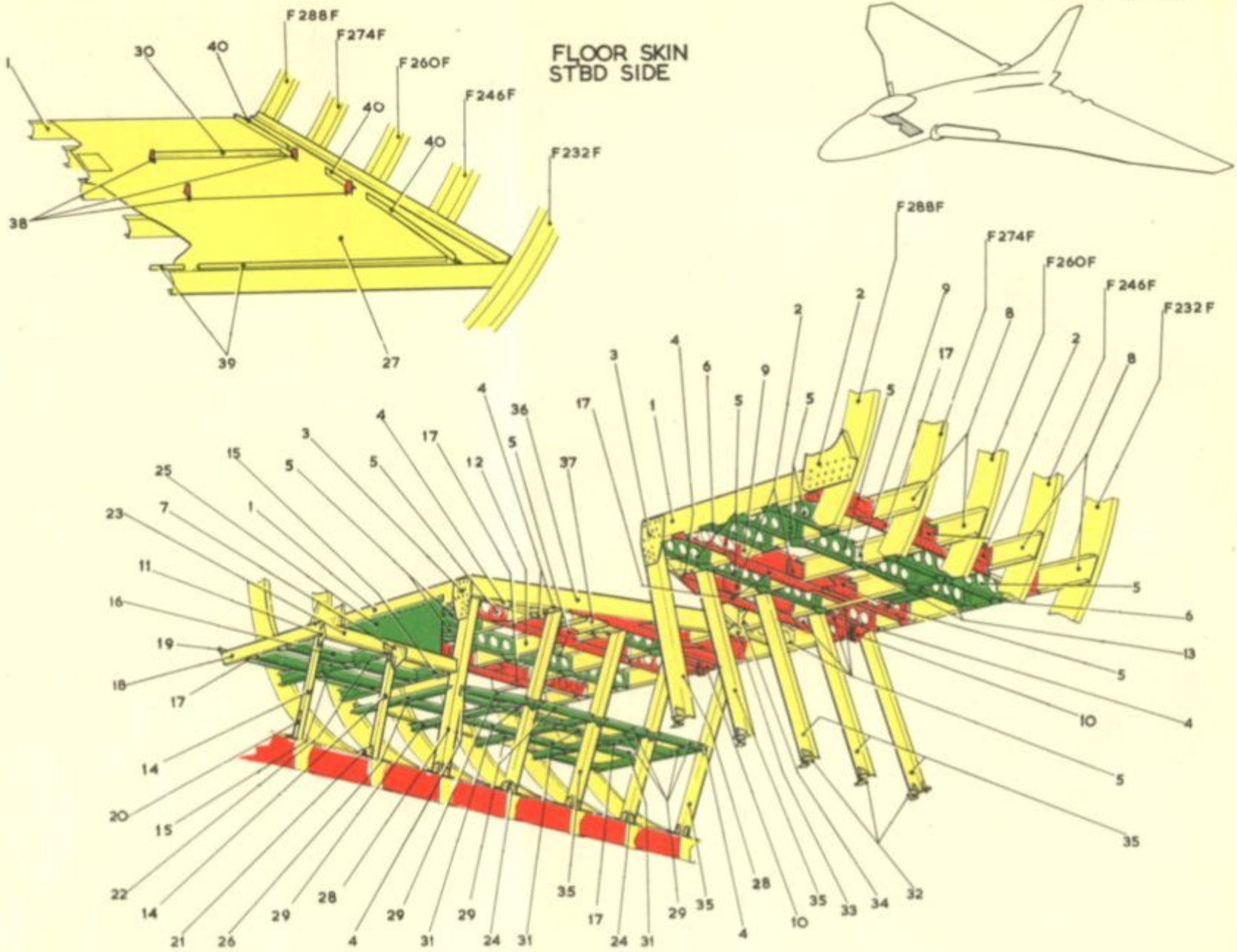
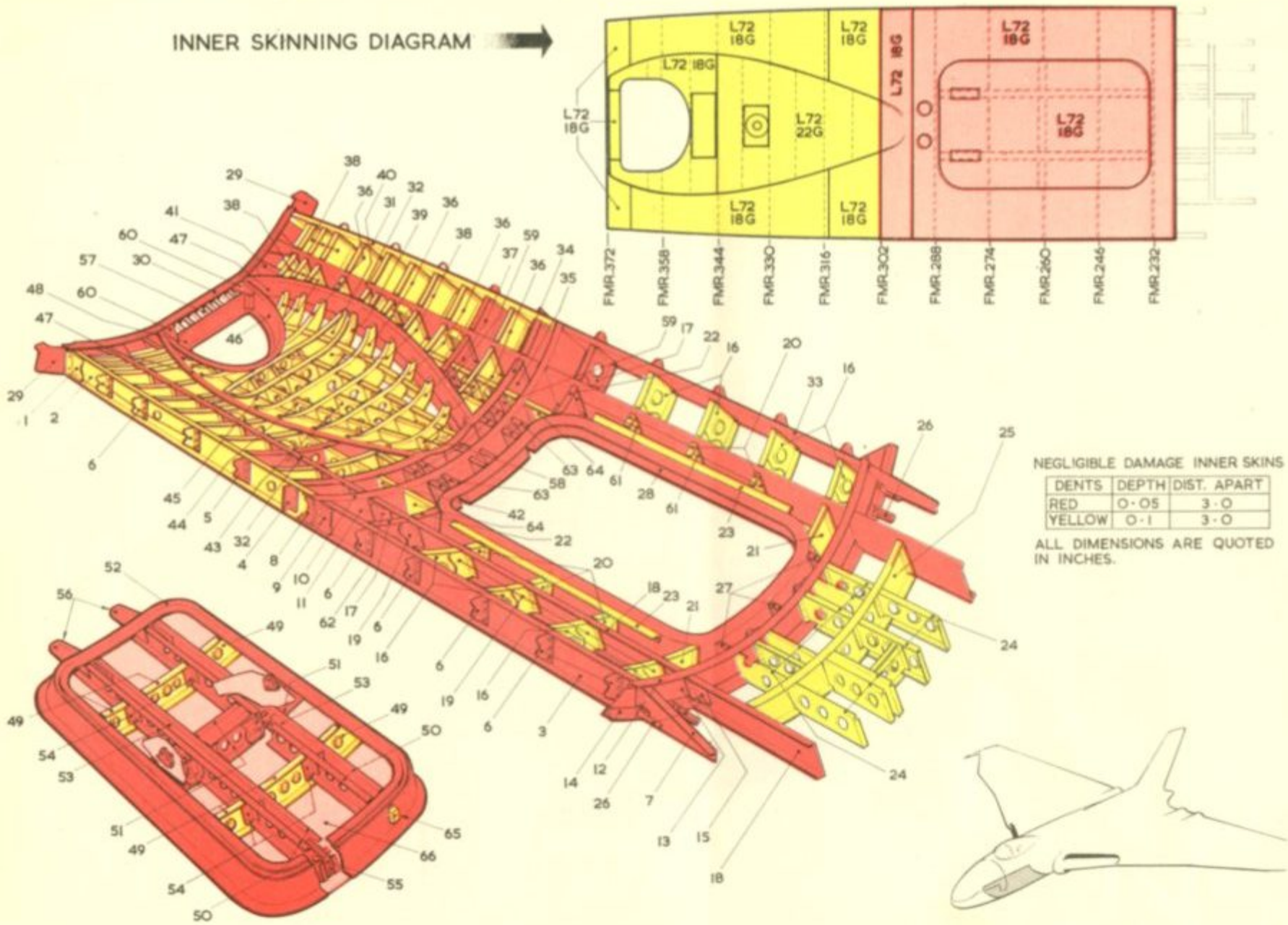


FIG. 210. CREW'S FLOOR

RESTRICTED



NEGLIGIBLE DAMAGE INNER SKINS

DENTS	DEPTH	DIST. APART
RED	0·05	3·0
YELLOW	0·1	3·0

ALL DIMENSIONS ARE QUOTED IN INCHES.

FIG.211. KEEL & ENTRANCE DOOR - STRUCTURE

Key to fig. 211

Item	Material Spec.	Material S.W.G or Section	Description	Negligible Damage Dents Depth	Dents Dist. Apart	Holes Dia.	Holes Pitch Ratio	Repair Fig. No.
1	DTD.633	—	Front O/B bracket	†—	—	—	—	—
2	L.72	14	Channel member	0·030	6·0	—	—	—
3	L.72	14	Channel member	0·030	6·0	—	—	—
4	L.65	261/SS.3075	Angle	†—	—	—	—	—
5	L.72	16	Angle bracket	†—	—	—	—	—
6	L.72	16	Angle bracket	†—	—	—	—	—
7	L.72	16	Pressing	0·030	6·0	—	—	108
8	DTD.683	—	Attachment bracket	†—	—	—	—	—
9	DTD.683	—	Attachment bracket	†—	—	—	—	—
10	L.65	314/SS.3075	Inner angle	0·030	6·0	—	—	—
11	L.72	16	Web	0·030	6·0	0·5	8 : 1	—
12	L.65	314/SS.3075	Inner angle	0·030	6·0	—	—	—
13	L.72	16	Web	0·030	6·0	0·5	8 : 1	—
14	L.65	299/SS.3075	Outer angle	0·030	6·0	—	—	—
15	L.65	—	Bracket	†—	—	—	—	—
16	L.72	18	Outer diaphragms	0·050	6·0	0·5	8 : 1	108
17	L.72	18	Outer diaphragms	0·030	6·0	—	—	108
18	L.72	10	Intermediate longeron	0·030	6·0	0·25	16 : 1	—
19	L.72	16	Angle bracket	0·030	6·0	—	—	—
20	L.72	14	Side diaphragms	0·050	6·0	0·5	8 : 1	108
21	L.72	14	Rear diaphragms	0·050	6·0	0·5	8 : 1	108
22	L.72	14	Front diaphragms	0·030	6·0	—	—	108
23	L.72	10	Reinforcing angles	0·050	6·0	—	—	—
24	L.72	18	Intercostals	0·050	6·0	0·5	8 : 1	105, 108
25	L.72	18	Cross member 218" F	0·050	6·0	0·5	8 : 1	108
26	DTD.88C	—	Stringer attachment bracket	*—	—	—	—	—
27	L.72	18	Door frame attachment brackets	0·030	6·0	—	—	—
28	L.72	10	Door frame pressing	0·030	6·0	—	—	—
29	L.72	14	Web	0·030	6·0	—	—	—
30	DTD.130A	139/SS.3075	Upper "T" section	—	—	—	—	—
31	L.72	14	Channel member	0·050	6·0	0·5	8 : 1	—
32	L.72	10	Forward longerons	0·030	6·0	—	—	—
33	L.72	14	Channel member	0·030	6·0	—	—	—
34	L.72	12	Inner skin member (Former 302" F)	0·030	6·0	—	—	—
35	L.72	16	Web (Former 302" F)	0·030	6·0	—	—	—
36	L.72	18	Blister intermediate formers	0·050	6·0	0·5	8 : 1	108
37	L.72	16	Blister former 316" F	0·030	6·0	0·5	16 : 1	108

All dimensions are stated in inches.

† More expedient to replace than repair.

* No repair permitted.

Key to fig. 211 (continued)

Item	Material Spec.	Material S.W.G or Section	Description	Negligible Damage: Dents Depth	Dents Dist. Apart	Dents Dia.	Holes Pitch Ratio	Repair Fig. No.
38	L.72	16	Blister formers	0·050	6·0	0·5	8 : 1	108
39	DTD.443	159/SS.3075	Former flange "T" section (344" F)	0·050	6·0	—	—	—
40	L.72	16	Inclined former	0·050	6·0	0·5	8 : 1	108
41	L.72	16	Intercostal	0·030	6·0	—	—	—
42	L.72	16	Intercostal	0·050	6·0	0·5	8 : 1	108
43	L.72	18	Intercostals on C/L of blister	0·050	6·0	0·5	8 : 1	108
44	L.72	18	Intercostals (25°)	0·050	6·0	0·5	8 : 1	108
45	L.72	18	Intercostals (45°)	0·050	6·0	0·5	8 : 1	108
46	L.73	12	Window frame	0·030	6·0	—	—	—
47	L.72	10	Curved frame members	0·030	6·0	—	—	—
48	L.72	16	Window channel	0·030	6·0	—	—	—
49	L.72	16	Door stiffening members	0·050	6·0	0·5	8 : 1	108
50	DTD.687	6	Longitudinal members	0·030	6·0	0·5	16 : 1	—
51	L.72	14	Door stiffening members	0·030	6·0	0·5	16 : 1	—
52	L.72	10	Door pressing	0·030	6·0	—	—	—
53	L.73	10	Reinforcing channels	0·030	6·0	0·5	16 : 1	—
54	L.72	16	Attachment brackets	† —	—	—	—	—
55	L.65	—	Locking pin brackets	† —	—	—	—	—
56	L.65	—	Hinge fittings	—	—	—	—	—
57	L.72	—	Window channel diaphragms	0·050	6·0	0·25	8 · 1	—
58	L.72	16	Intercostals	0·030	6·0	—	—	115
59	L.72	16	Attachment angles	† —	—	—	—	—
60	DTD.683	—	Window frames corner brackets	* —	—	—	—	—
61	L.72	14	Angle brackets	† —	—	—	—	—
62	DTD.683	—	Bracket	* —	—	—	—	—
63	L.72	16	Hinge diaphragms	* —	—	—	—	—
64	L.72	16	Intercostals	0·050	6·0	—	—	115
65	DTD.166 or 171	16 and 18	Striker bracket	† —	—	—	—	—
66	◀L.72▶	18	Outer skin	—	—	—	—	—

All dimensions are stated in inches.

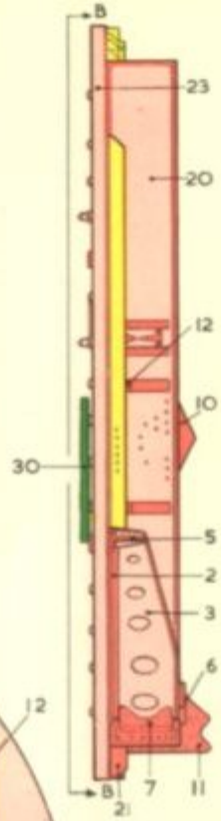
† More expedient to replace than repair.

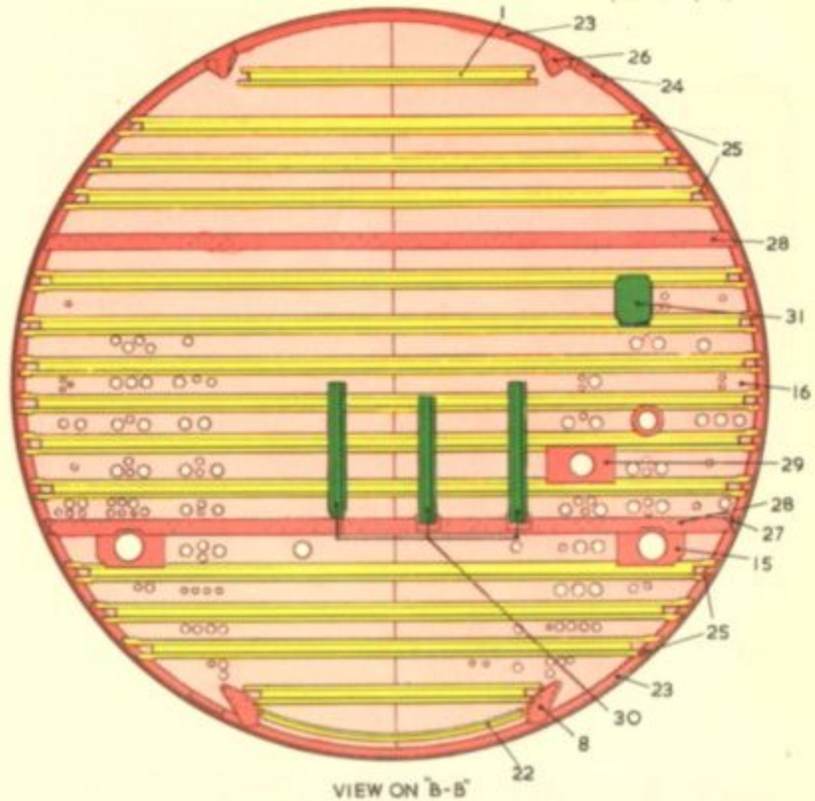
* No repair permitted.

KEY TO FIG.212

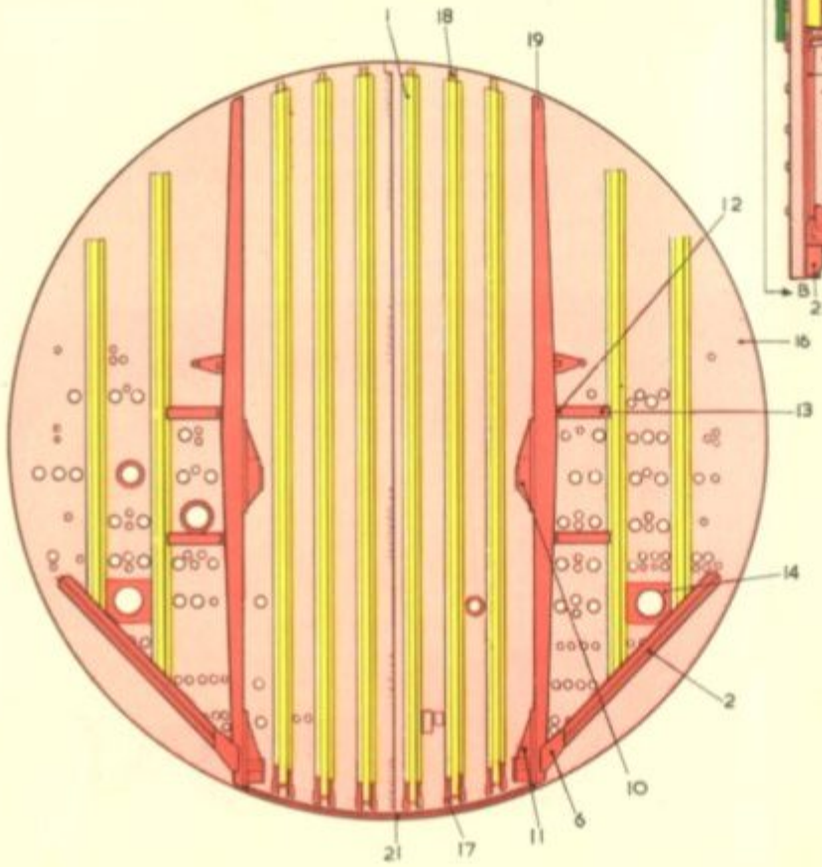
Item	Material Spec.	Material S.W.G. or Section	Description	Negligible Damage Dents Depth	Dents Dist. Apart	Holes Dia.	Holes Pitch Ratio	Repair Fig.
1	L.72	581/SS.1793	Top hat stiffeners	0.05	6.0	-	-	224A, 224C, 224D
2	L.65	294/SS.3075	Angle	x -	-	-	-	-
3	L.72	16	Web	0.05	6.0	-	-	-
4	L.72	12b/SS.1793	Angle	x -	-	-	-	-
5	D.T.D.5054	-	Bracket	* -	-	-	-	-
6	L.65	-	Bracket	* -	-	-	-	-
7	L.72	14	Joint plate	* -	-	-	-	-
8	L.72	1	Gusset plate	x 0.05	6.0	-	-	-
9	L.72	18	Bracket	x -	-	-	-	-
10	D.T.D.5054	-	Nosewheel attachment bracket	* -	-	-	-	-
11	D.T.D.5054	-	Nosewheel attachment bracket	* -	-	-	-	-
12	L.72	20	Stabilising bracket	x 0.05	6.0	0.5	12:1	-
13	L.72	16	Plate	x -	-	-	-	-
14	L.72	22	Packing strip	x 0.05	6.0	-	-	-
15	L.72	18	Stiffening plate forward	x -	-	-	-	-
16	L.72	14	Web	-	-	-	-	224A, 224B, 224D, 224E
17	L.72	16	Angle stiffeners	* -	-	-	-	-
18	L.72	14	Channel bracket	x -	-	-	-	-
19	D.T.D.5064	-	Beam	-	-	-	-	-
20	D.T.D.5064	-	Reinforcing piece	-	-	0.5	16:1	-
21	L.65	300/SS.3075	Aft bottom angle	-	-	-	-	-
22	L.72	12/SS.1793	Landing angle	0.05	6.0	-	-	-
23	L.65	300/SS.3075	Half ring	-	-	-	-	-
24	L.65	300/SS.3075	Joint angle	x -	-	-	-	-
25	L.72	16	Reinforcing channel	0.05	6.0	-	-	-
26	L.65	-	Slinging bracket	* -	-	-	-	-
27	L.72	486/SS.1793	Channel stiffener	-	-	-	-	-
28	L.72	14	Strap plate	0.05	6.0	-	-	-
29	L.72	10	Reinforcing plate	x 0.05	6.0	-	-	-
30	L.72	511/SS.1793	Panel mounting member	x 0.1	6.0	0.25	8:1	-
31	L.72	20	Suppressor mounting bracket	x 0.05	6.0	0.5	8:1	-

* No repairs permitted
x More expedient to renew than repair
All dimensions are quoted in inches





VIEW ON "B-B"



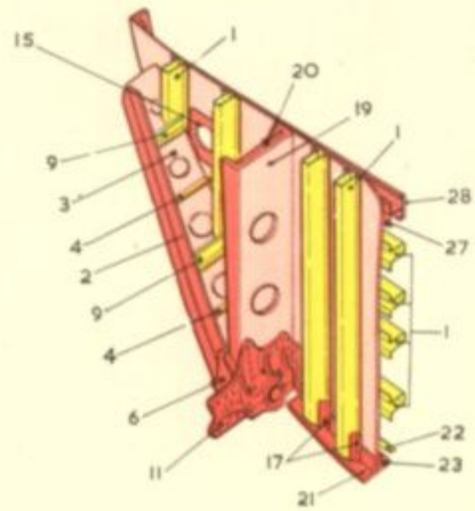


FIG. 212. REAR PRESSURE BULKHEAD
MOD. 38 EMBODIED
RESTRICTED

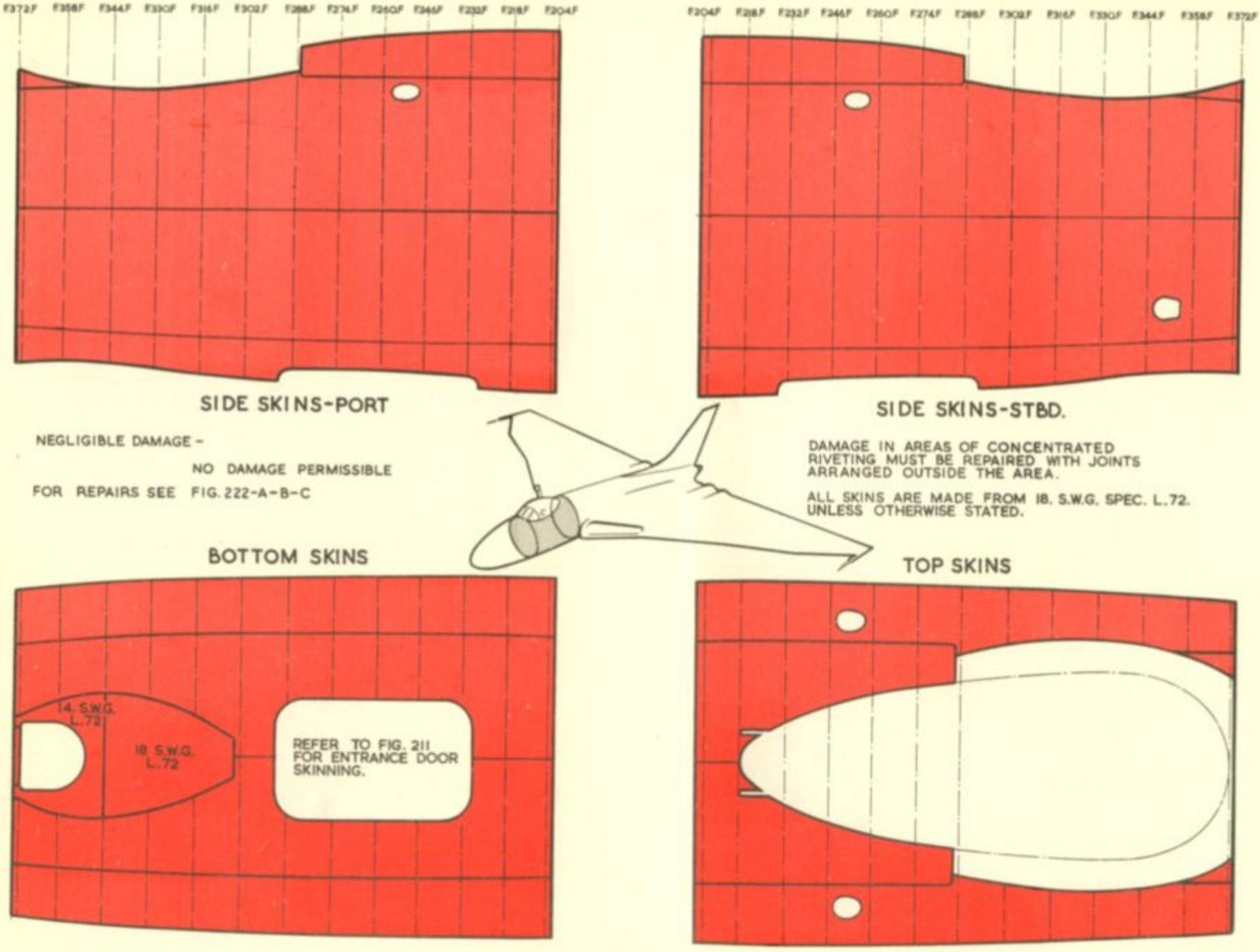
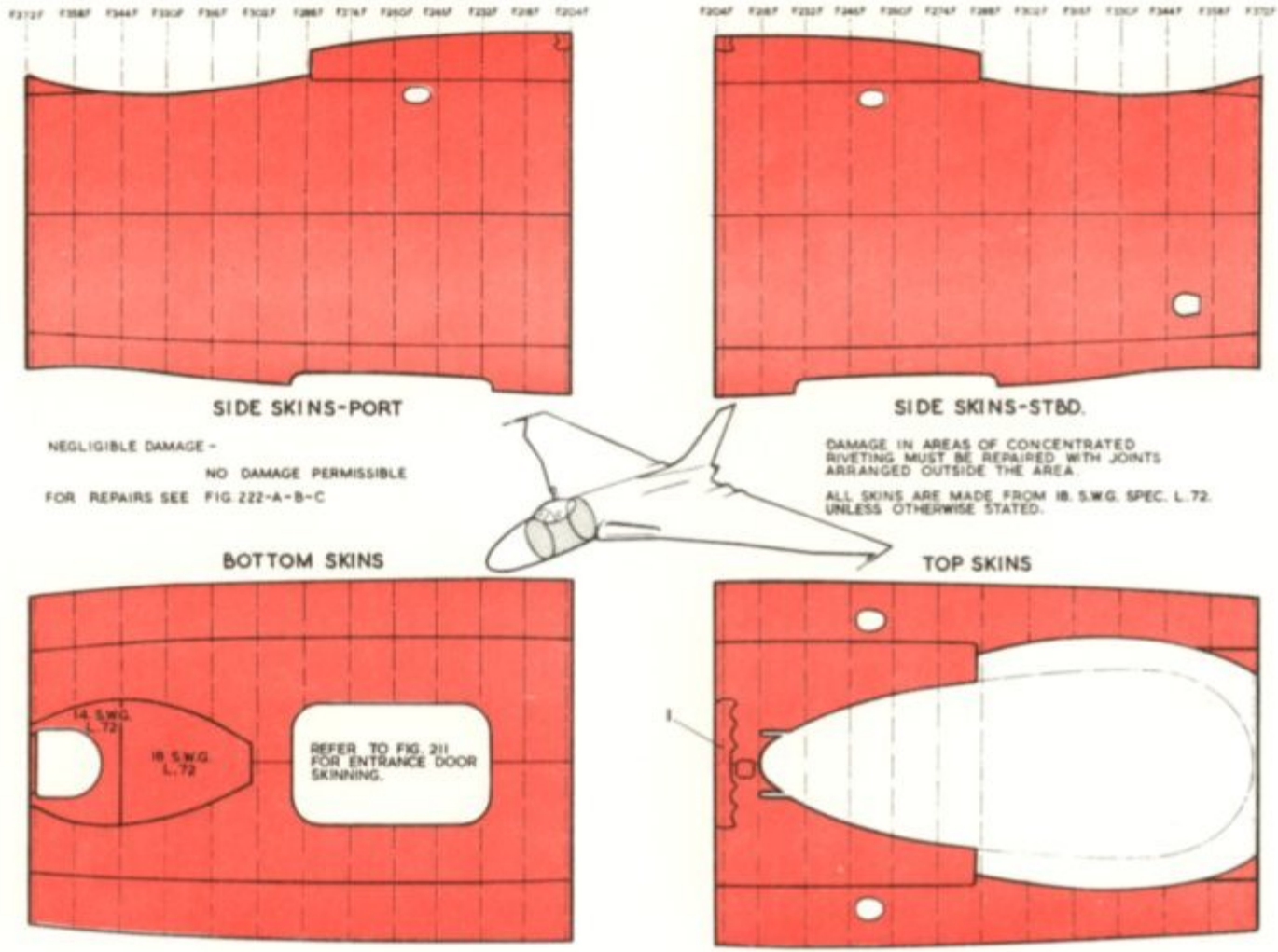


Fig.213 Front fuselage skins



ITEM	SPEC.	S.W.G.	DESCRIPTION	NEGLIGIBLE DAMAGE			
				DENTS		HOLES	
				DEPTH	DIST. APART	DIA.	PITCH RATIO
1	L.72	16	REINFORCING PLATE	0·025	3·0	–	–

ALL DIMENSIONS ARE QUOTED IN INCHES

Fig. 213A Front fuselage skins (Post Mod.1787)

Key to fig. 214

Item	Material Spec.	Material S.W.G. or Section	Description	Negligible Damage Dents Depth	Dents Dist. Apart	Holes Dia.	Holes Pitch Ratio	Repair Fig.
1	L.65	316/SS.3075	Wing angles	* —	—	—	—	—
2	L.65	317/SS.3075	Wing angles	* —	—	—	—	—
3	L.72	8	Joint plates	* —	—	—	—	—
4	L.65	316/SS.3075	Joint angles	* —	—	—	—	—
5	L.72	18	Bottom member	0·10	2·5	0·25	6 : 1	107-108
6	L.72	18	Former side ring	0·10	2·5	0·25	6 : 1	108
7	L.72	20	Side and top members	0·15	2·5	0·25	4 : 1	—
8	L.72	18	Joint plate	† 0·10	2·5	—	—	—
9	L.72	20	Bottom member	0·10	3·0	—	—	—
10	L.72	20	Jointing channel	† 0·10	3·0	—	—	—
11	L.72	455/SS.1793	Intercostal	0·10	2·5	0·25	8 : 1	108-115
12	L.72	14	Frame top	0·10	2·5	0·25	8 : 1	108
13	L.72	446/SS.1793	Angle bottom member	0·10	3·0	—	—	108
14	L.72	16	Top member	0·10	2·5	0·25	8 : 1	108
15	L.72	12a/SS.1793	Angle	0·10	2·5	—	—	113
16	L.72	16	Jointing channel	† 0·10	2·5	—	—	—
17	L.72	455/SS.1793	Former top	0·05	3·0	—	—	108
18	L.72	18	Jointing channel	† 0·05	3·0	—	—	—
19	L.72	18	Channel	0·05	3·0	—	—	108
20	L.72	211/SS.1793	Vertical stiffeners	0·05	3·0	—	—	112
21	DTD.626	18	Web (side)	0·10	2·5	0·25	6 : 1	108
22	DTD.626	17	Web	0·10	2·5	0·25	6 : 1	108
23	L.72	875/SS.1793	Angle	0·10	2·5	—	—	—
24	L.72	20	Angle	0·10	2·5	—	—	—
25	L.72	359/SS.1793	Angle	0·10	2·5	—	—	—
26	L.72	20	Web	0·15	3·0	0·25	6 : 1	—
27	L.72	854/SS.1793	Web top centre	0·15	3·0	0·25	6 : 1	—
28	L.72	237/SS.1793	Former section	0·05	3·0	—	—	—
29	L.72	18	Former top	0·05	3·0	—	—	108
30	L.72	24	Former extension	0·20	2·0	0·25	4 : 1	108
31	L.72	24	Ribs	0·20	2·0	0·25	4 : 1	108
32	L.65	343/SS.3075	Angle	0·05	3·0	—	—	—
33	L.72	18	Angle	0·05	3·0	—	—	—
34	L.72	18	Web	0·05	3·0	—	—	—
35	L.65	313/SS.3075	Half former	—	—	—	—	—
36	L.72	12	Joint angle	* —	—	—	—	—
37	L.72	22	Web	0·15	3·0	0·25	6 : 1	—
38	L.65	356/SS.3075	Angle	0·10	3·0	—	—	—
39	L.72	20	Web	0·15	3·0	0·25	6 : 1	—
40	L.65	293/SS.3075	Angle	0·10	3·0	—	—	—
41	L.65	318/SS.3075	Stringer	0·10	2·5	—	—	—
42	L.72	14	Beam and channel	—	—	—	—	108
43	L.72	18	Beam	—	—	—	—	108
44	L.72	18	Attachment bracket	† —	—	—	—	—
45	L.72	582/SS.1793	Stringer (Z-section)	0·10	2·5	—	—	221
46	L.72	211/SS.1793	Stringer (top-hat)	0·10	2·5	—	—	112
47	L.65	337/SS.3075	Stringer (T-section)	0·05	3·0	—	—	—
48	L.65	309/SS.3075	Stringer (T-section)	0·10	2·5	—	—	—
49	L.72	20	Diaphragm	0·15	3·0	0·25	6 : 1	108
50	L.72	20	Cross member	0·15	3·0	0·25	6 : 1	108
51	L.72	16	Angle	0·05	3·0	—	—	—
52	L.72	20	Pressing	0·15	3·0	0·25	6 : 1	108
53	L.72	20	Aft hinge members	0·10	2·5	—	—	—
54	L.72	18	Web	0·10	2·5	0·25	8 : 1	—
55	L.72	18	Web	0·10	2·5	0·25	4 : 1	—
56	L.72	18	Attachment angle	* —	—	—	—	—
57	L.72	14	Beam	—	—	—	—	—
58	L.72	20	Angles	† 0·10	2·5	—	—	—
59	L.72	18	Joint bracket	0·10	2·5	0·25	6 : 1	115
60	L.72	14	Forward beam	—	—	—	—	—
61	S.3	981/SS.1793	Stiffener	0·05	3·0	—	—	—
62	S.3	24	Skins	0·05	3·0	—	—	—
63	L.72	20	Rib	† 0·05	3·0	—	—	—
64	L.65	358/SS.3075	Jet pipe formers	0·05	3·0	—	—	—
65	L.72	20	Former skin	0·05	3·0	—	—	—
66	L.72	16	Packing	* 0·05	3·0	—	—	—
67	L.72	854/SS.1793	Web bottom angle	0·05	3·0	—	—	—

All dimensions are quoted in inches.

† More expedient to replace than repair.

* No repairs permitted.

367319/33570/6600/375/8.1959/C.T.Ltd.

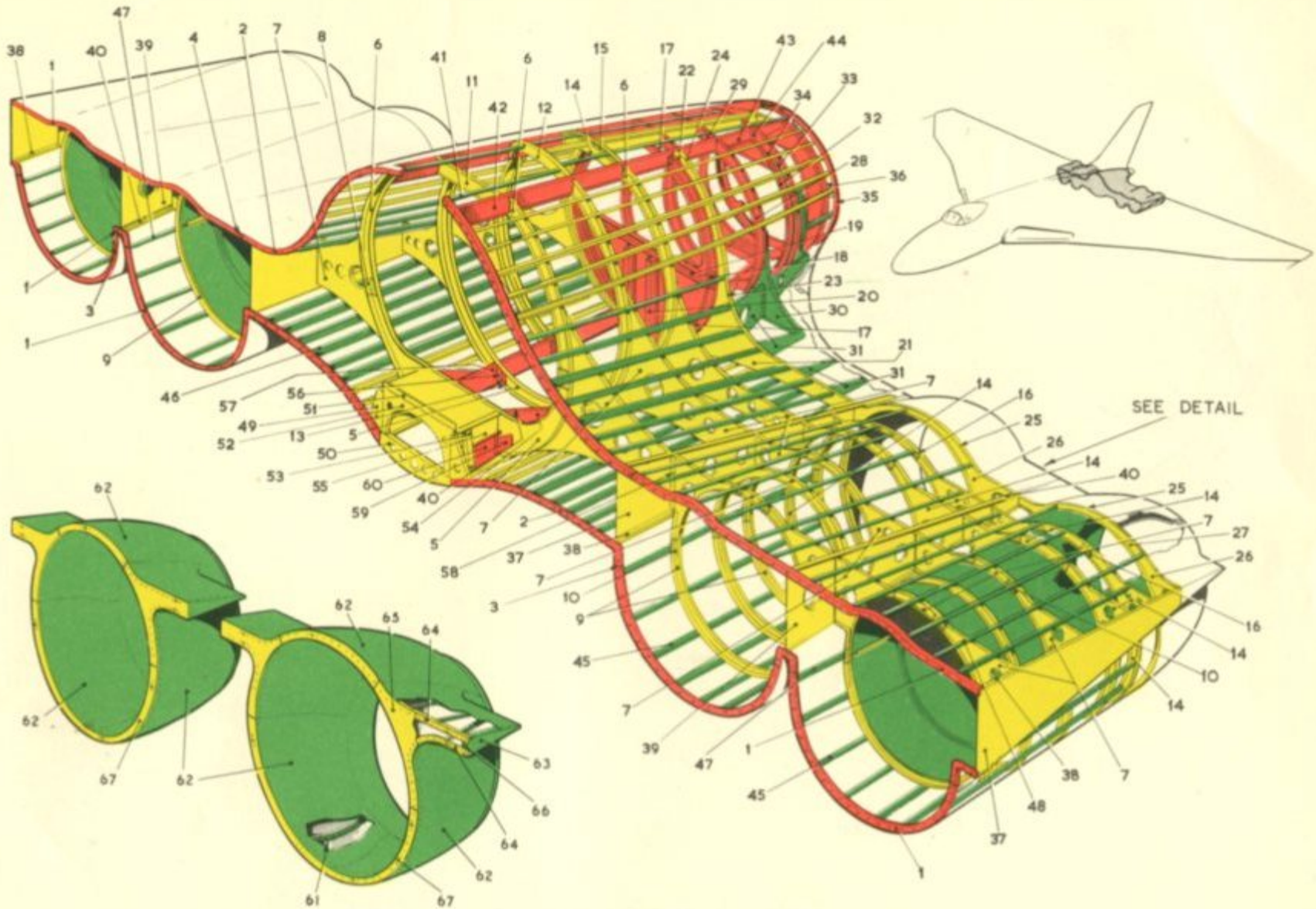


FIG. 214. REAR FUSELAGE STRUCTURE

RESTRICTED

(A.L. 9, Mar. 58)

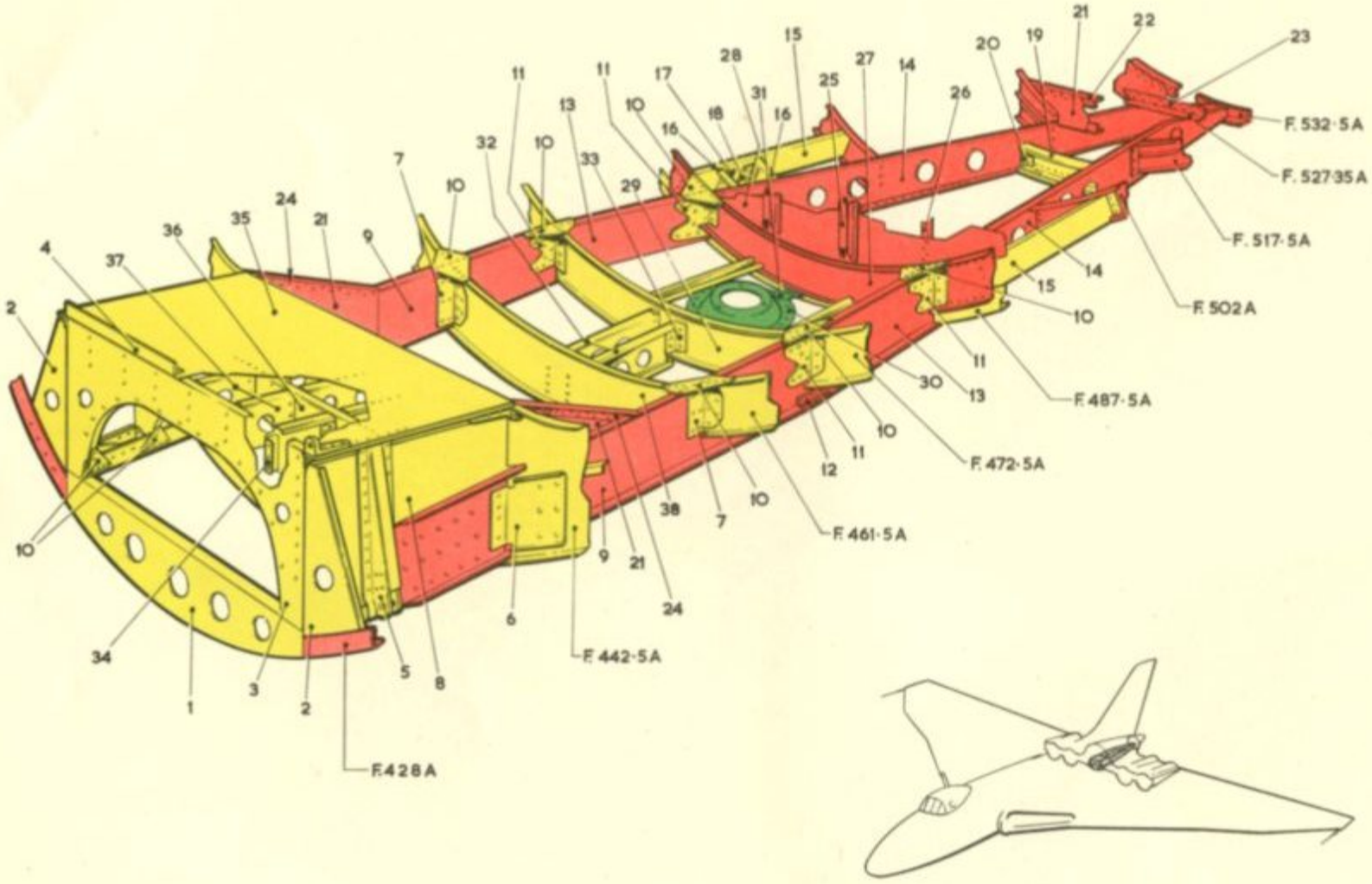


FIG. 215. REAR FUSELAGE - BOTTOM STRUCTURE

RESTRICTED

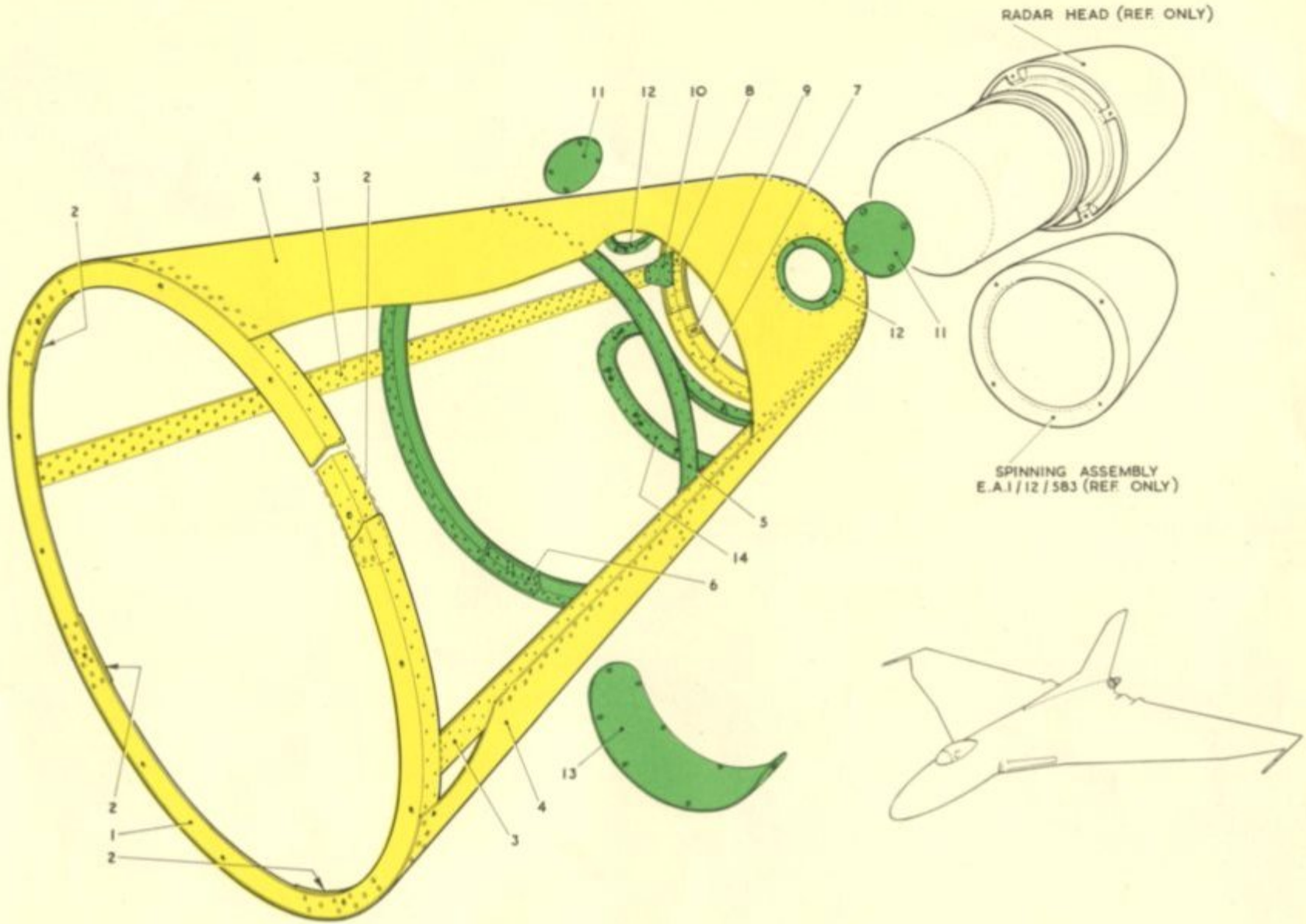


FIG. 218. TAIL CONE

(A.L. 9, Mar. 58)

269151/6432 376 5/58 BBLtd Gp. 979

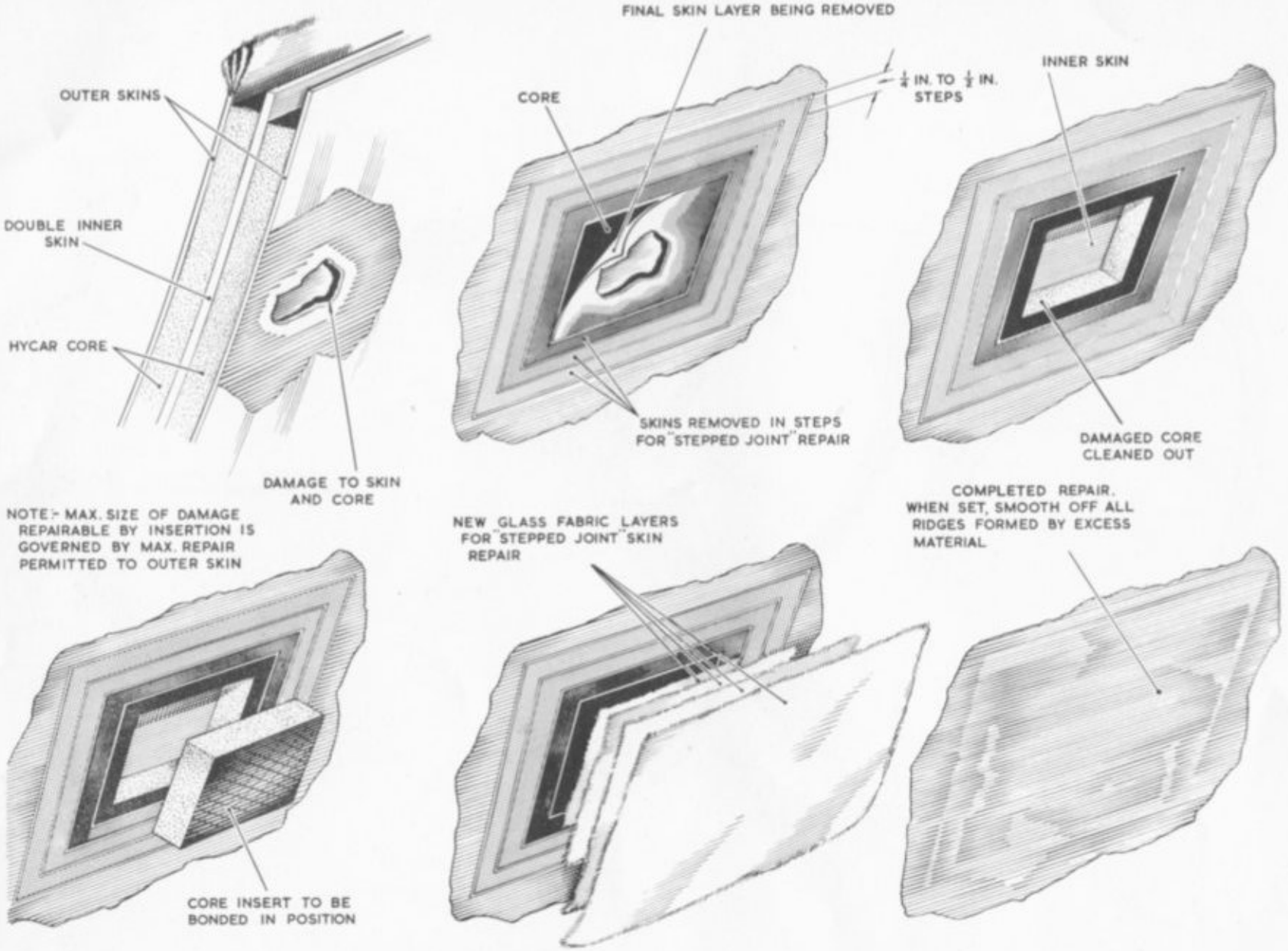


FIG. 219. TYPICAL RADOME REPAIR

RESTRICTED

KEY TO FIG. 218

Item	Material: Specification	Material: S.W.G. or Section	Description		Negligible Damage: Dents: Depth	Negligible Damage: Dents: Distance Apart	Negligible Damage: Holes: Diameter	Negligible Damage: Holes: Pitch Ratio	Repair Figure
1	L72	14	Former 532·5		0·05	4·0	—	—	114
2	L72	14	Reinforcing angle	†	0·05	4·0	—	—	—
3	L72	16	Strap plate		0·05	4·0	—	—	—
4	L72	16	Skin		0·1	4·0	—	—	103
5	L72	20	Former		0·05	4·0	—	—	114
6	L72	20	Joint angle	†	0·05	4·0	—	—	—
7	L72	16	Former		0·05	4·0	—	—	114
8	L72	16	Joint angle	†	0·05	4·0	—	—	—
9	L72	10	Packing	†	—	—	—	—	—
10	L72	20	Gusset	†	0·05	4·0	—	—	—
11	L72	16	Door	†	0·1	4·0	—	—	—
12	L72	20	Reinforcing ring		0·05	4·0	—	—	—
13	L72	16	Door		0·1	4·0	—	—	103
14	L72	22	Reinforcing ring		0·05	4·0	—	—	—

All dimensions are quoted in inches.

† More expedient to replace than repair.

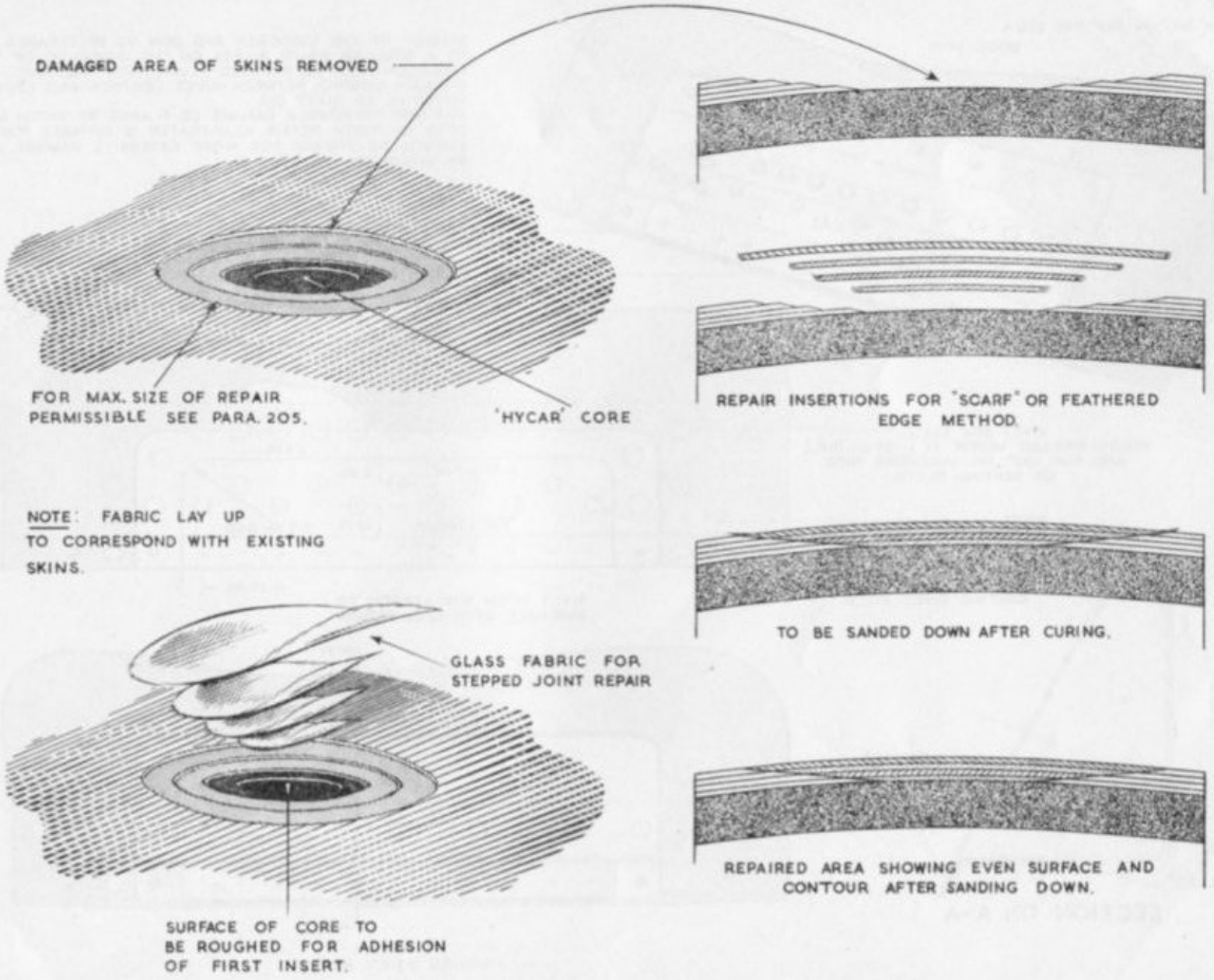


Fig. 219A. Radome repair—inner and outer skins

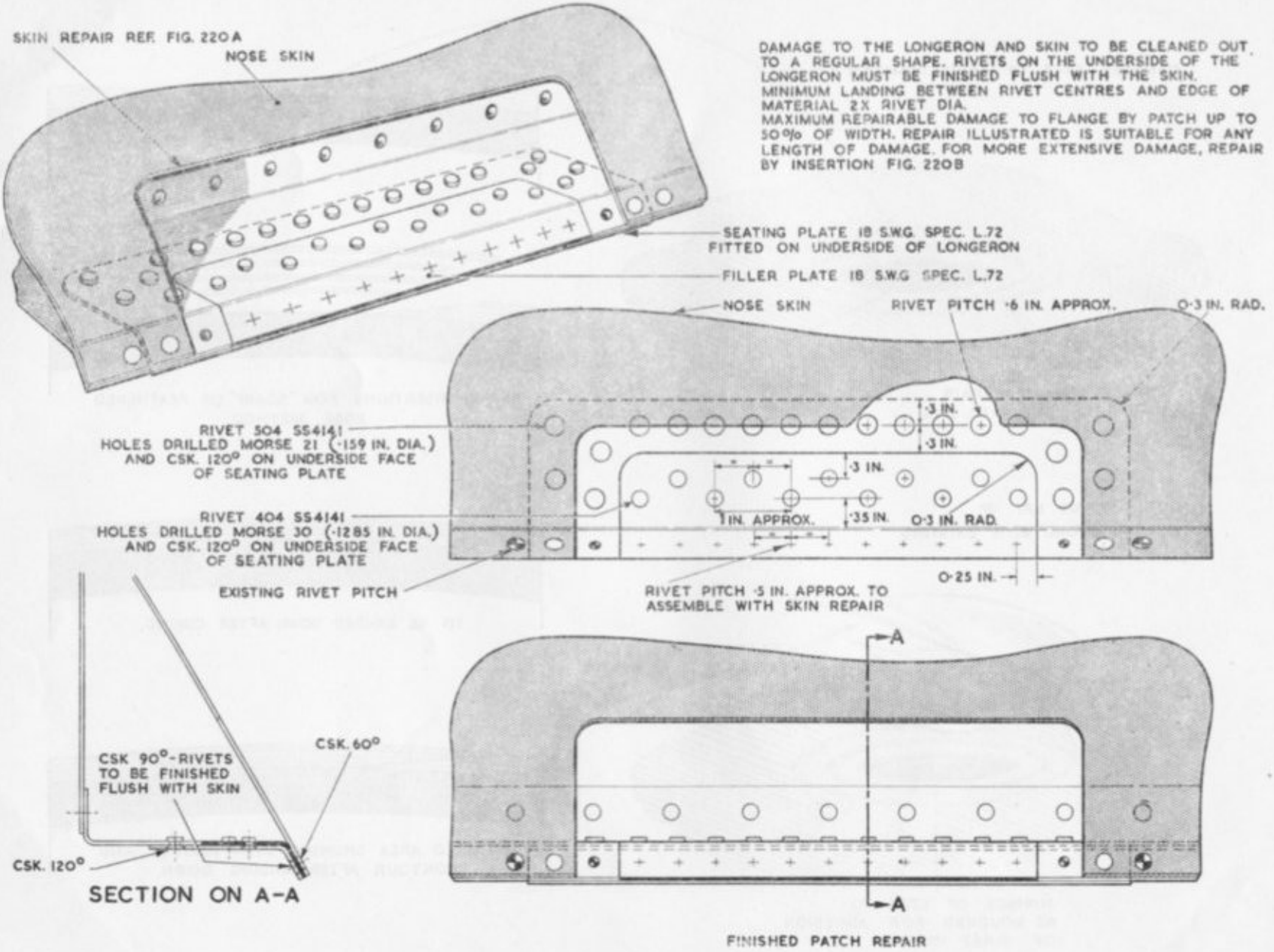


Fig. 220. Repair to nose longeron flange

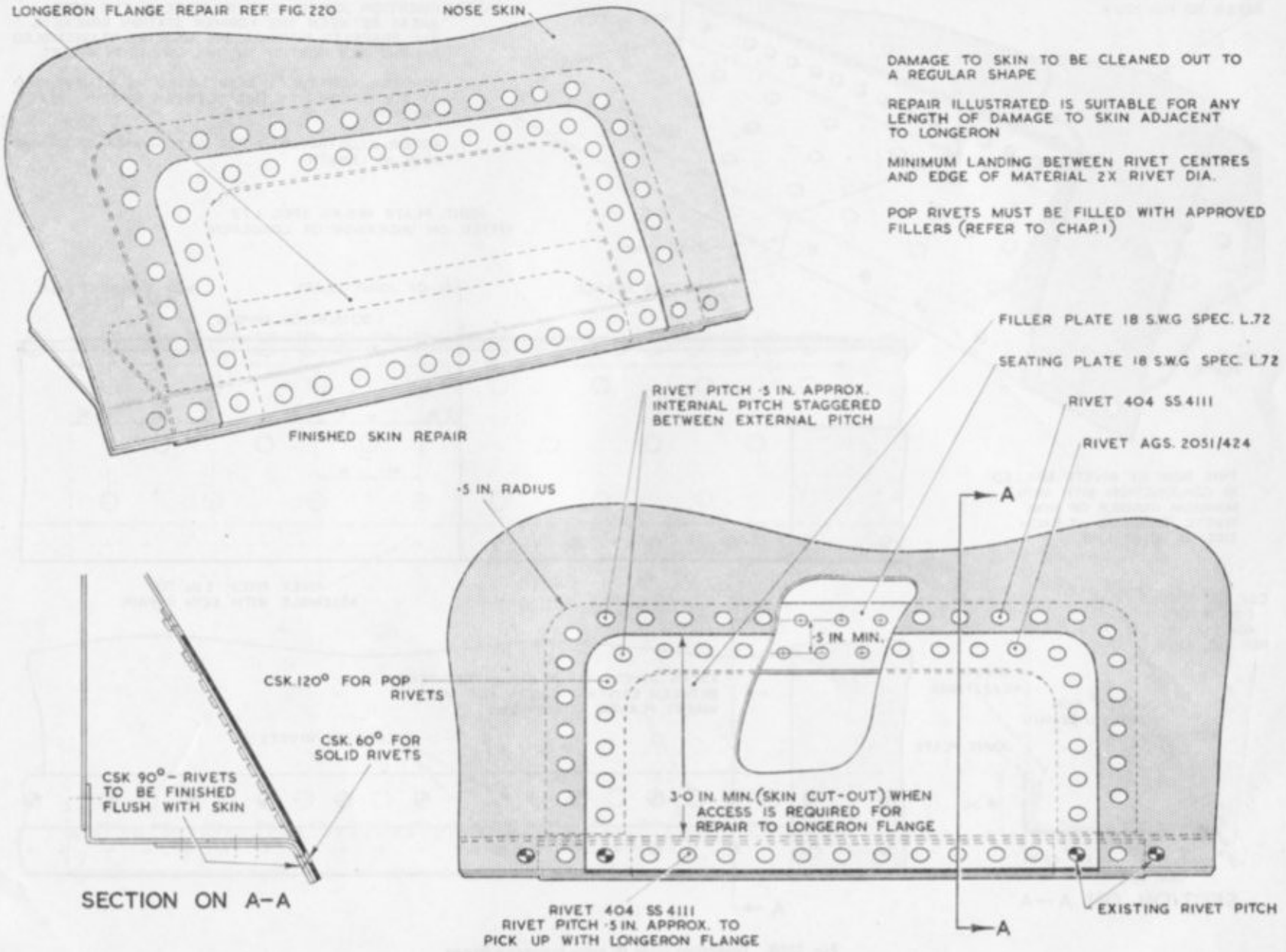


Fig. 220A. Repair to nose longeron skin

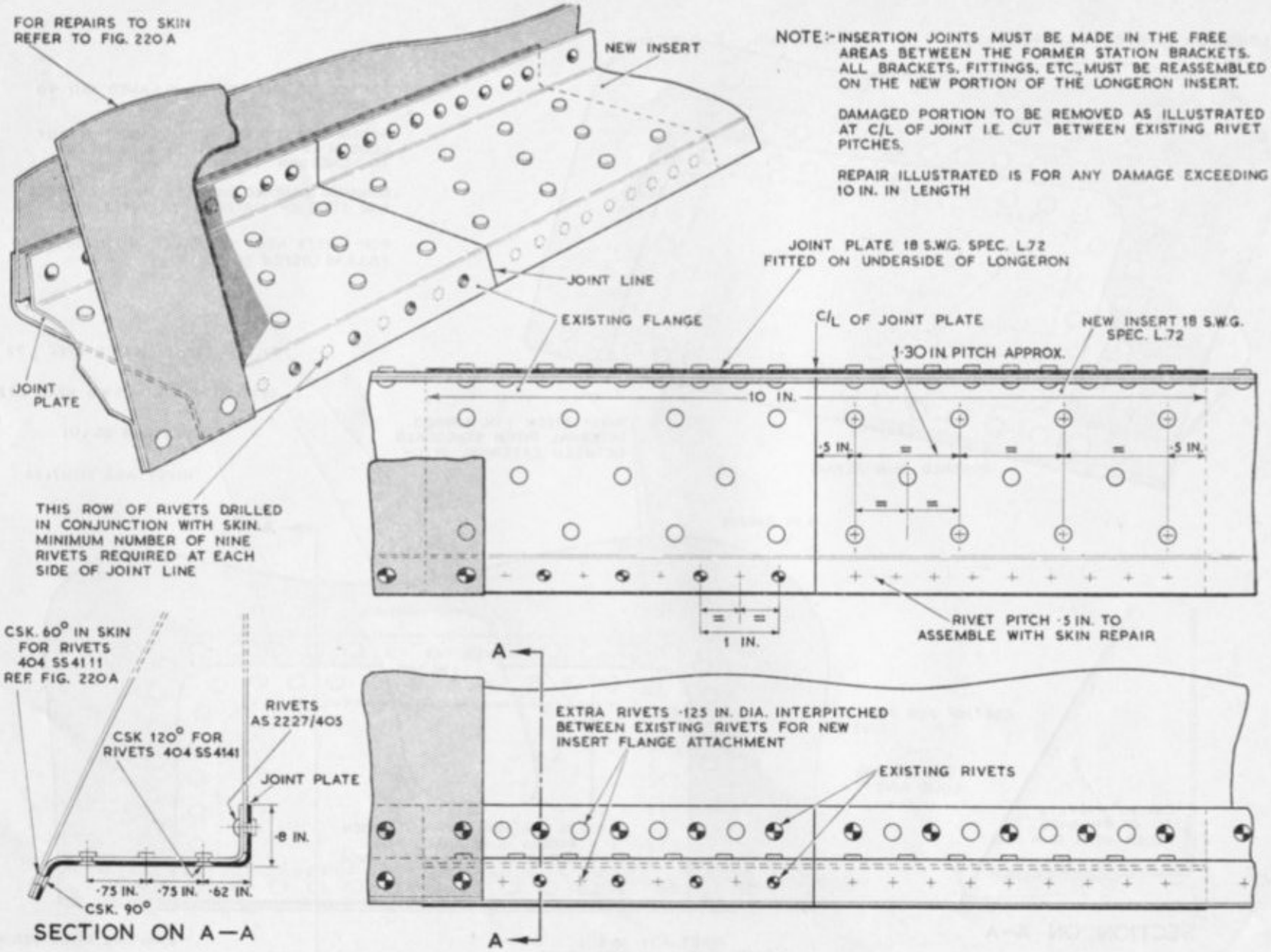


Fig. 220B. Insertion joint to nose longeron flange

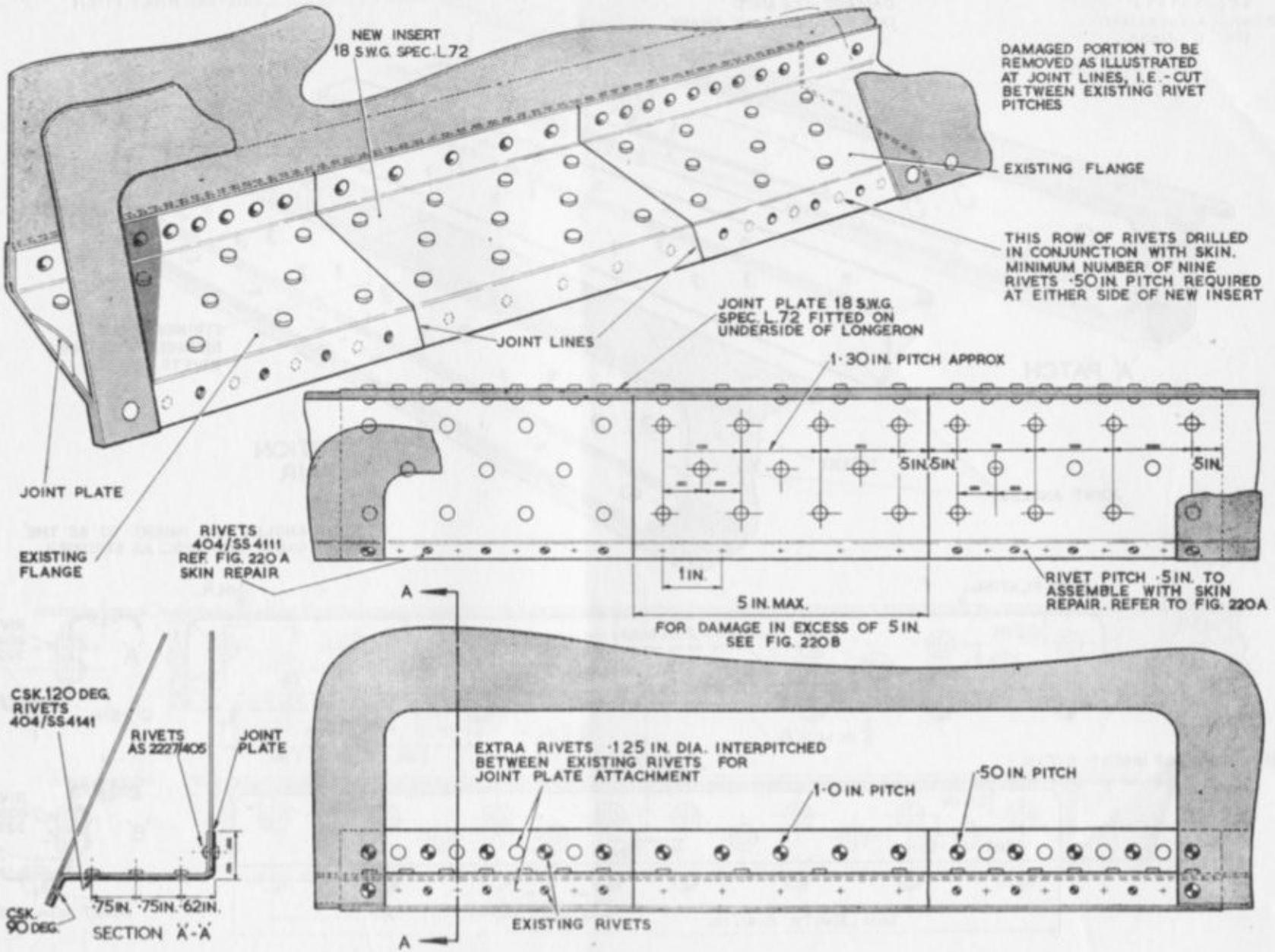


Fig. 220C. Patch insertion repair — nose longeron

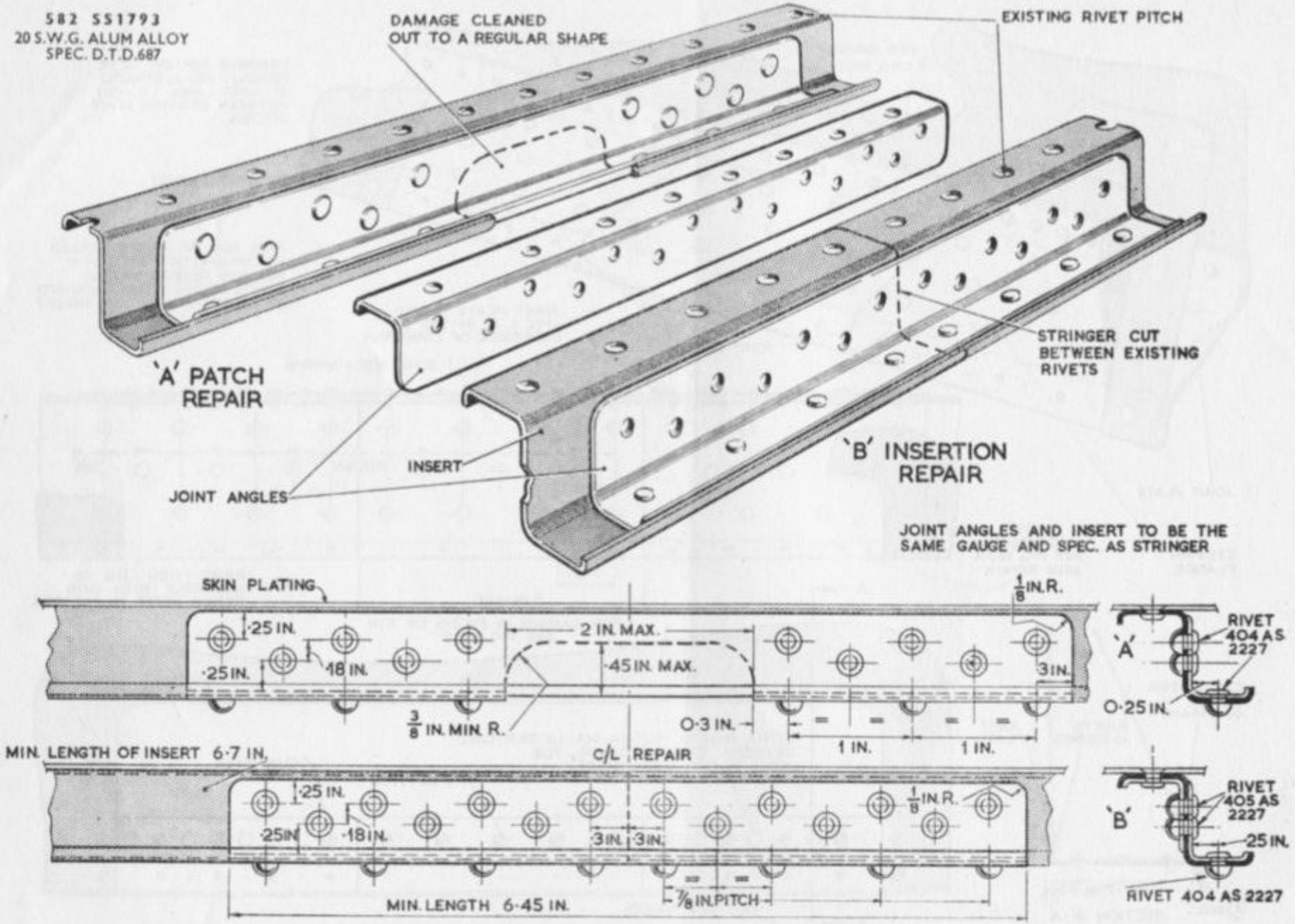
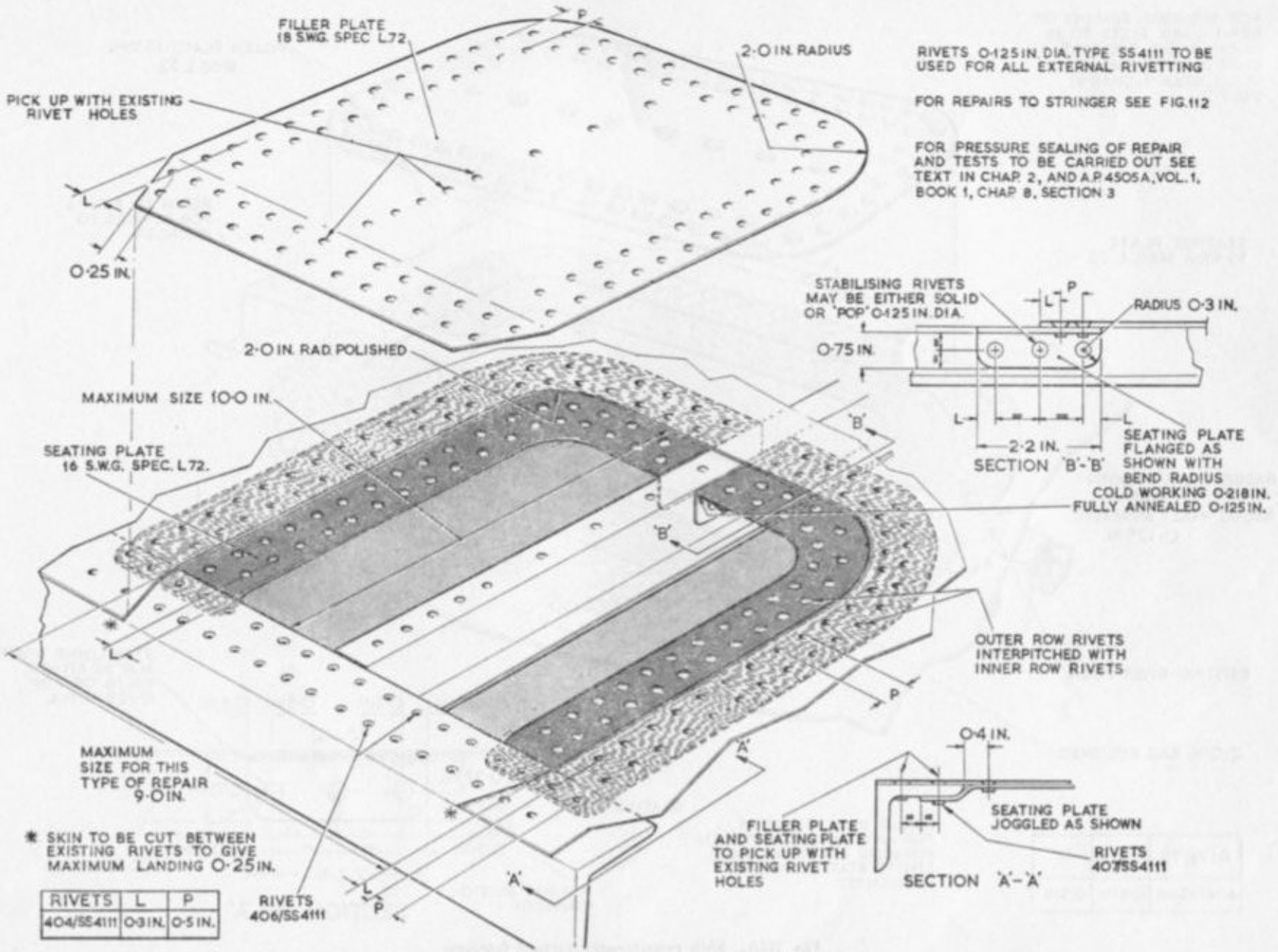
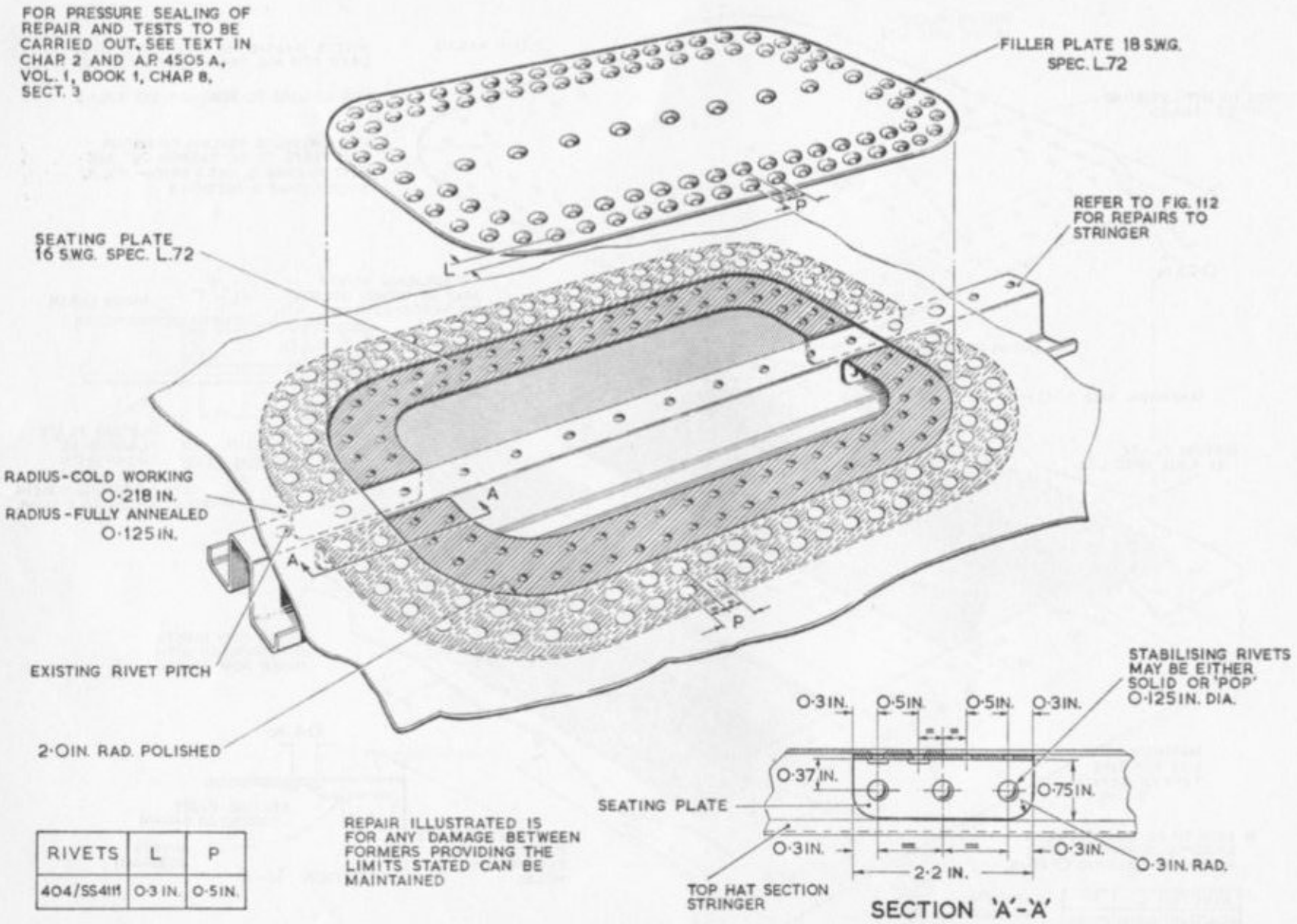


Fig. 221. Patch and insertion repairs to 'Z' section stringers



RIVETS	L	P
404/SS4111	0·3 IN.	0·5 IN.

Fig. 222. Skin repair—pressurised fuselage—transport joint



RIVETS	L	P
404/SS4111	0·3 IN.	0·5 IN.

Fig. 222A. Skin repairs—pressurised fuselage

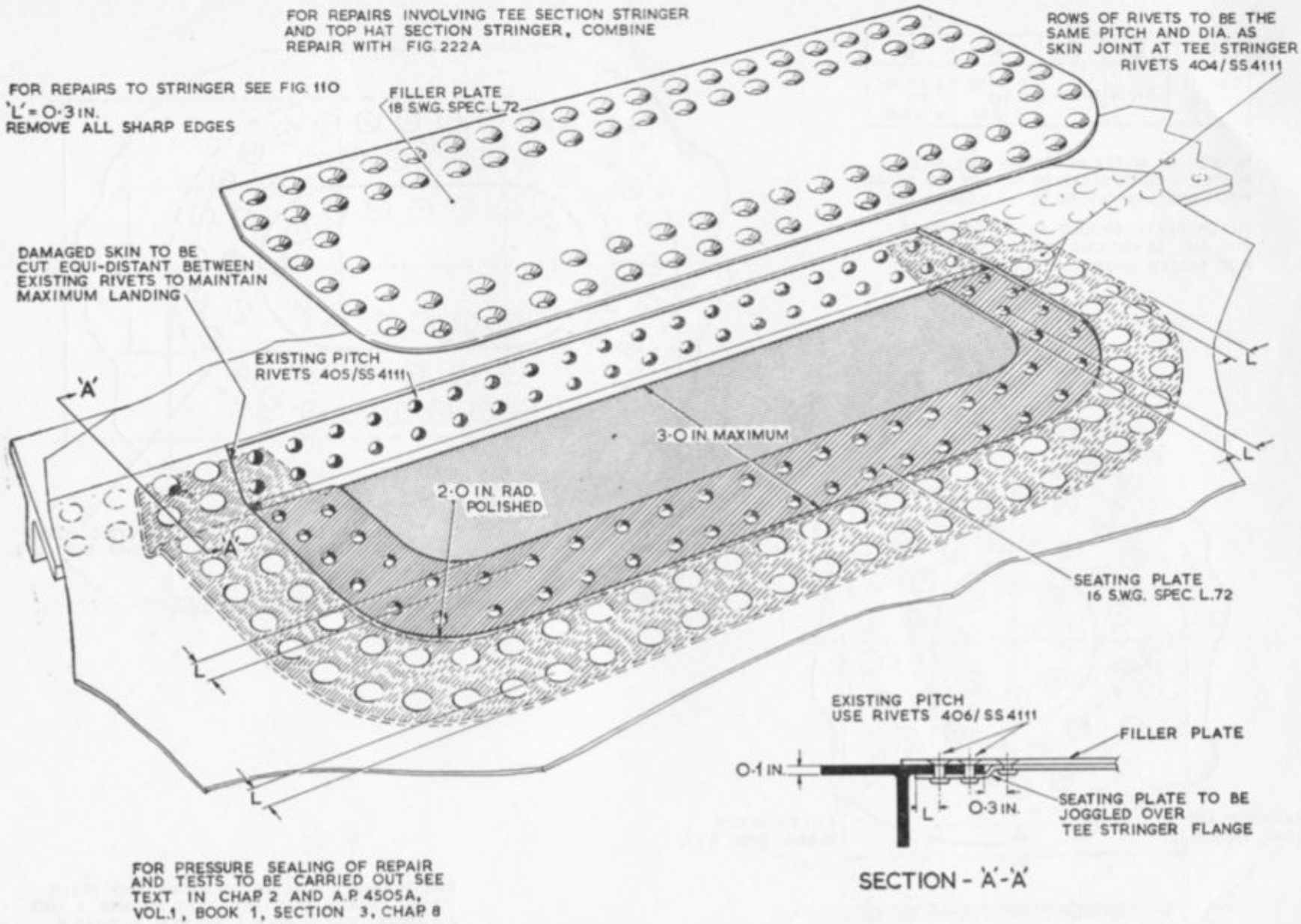
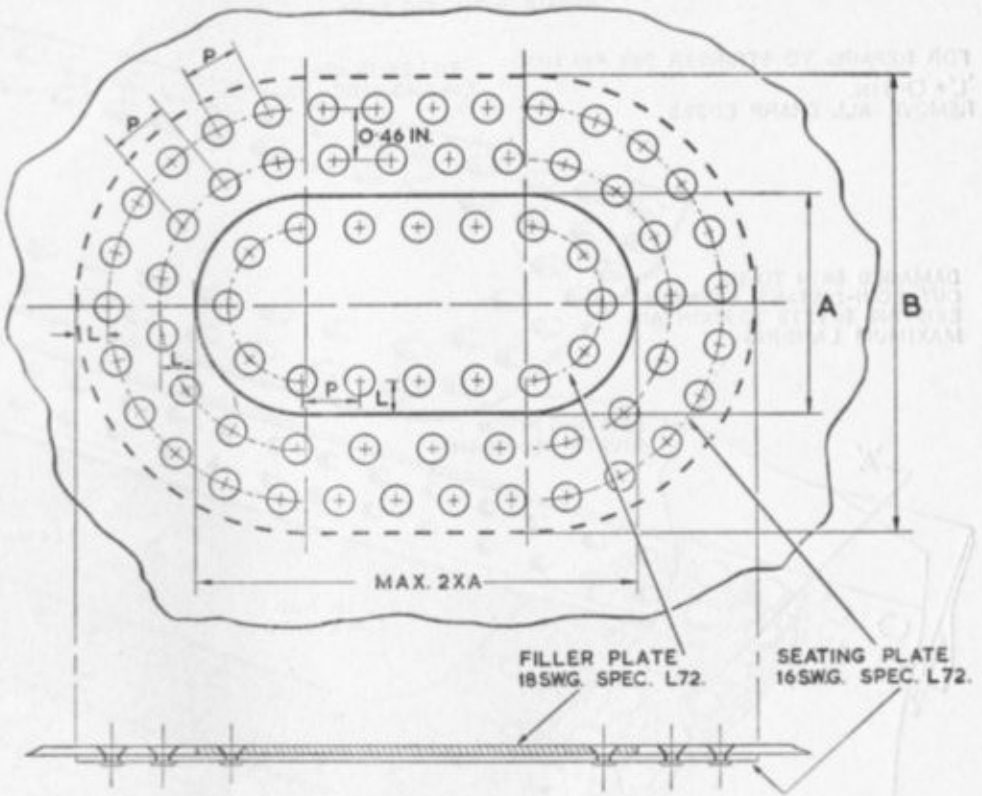


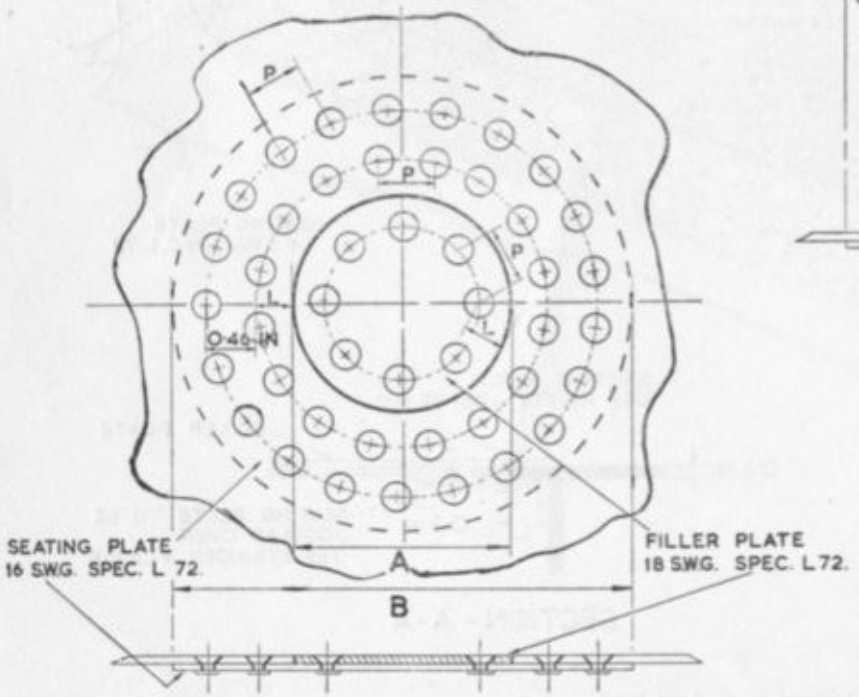
Fig. 222B. Skin repair at 'T' stringer—pressurised fuselage

RIVET	L	P	A	B
SS4111 404	0·3 IN.	0·5 IN.	1·125 IN. TO 2·0 IN.	3·25 IN. TO 4·125 IN.

NUMBER OF RIVETS IN SEATING AND FILLER PLATES IS CONTROLLED BY THE SIZE OF REPAIR PITCH AND LANDING TO BE AS ILLUSTRATED.

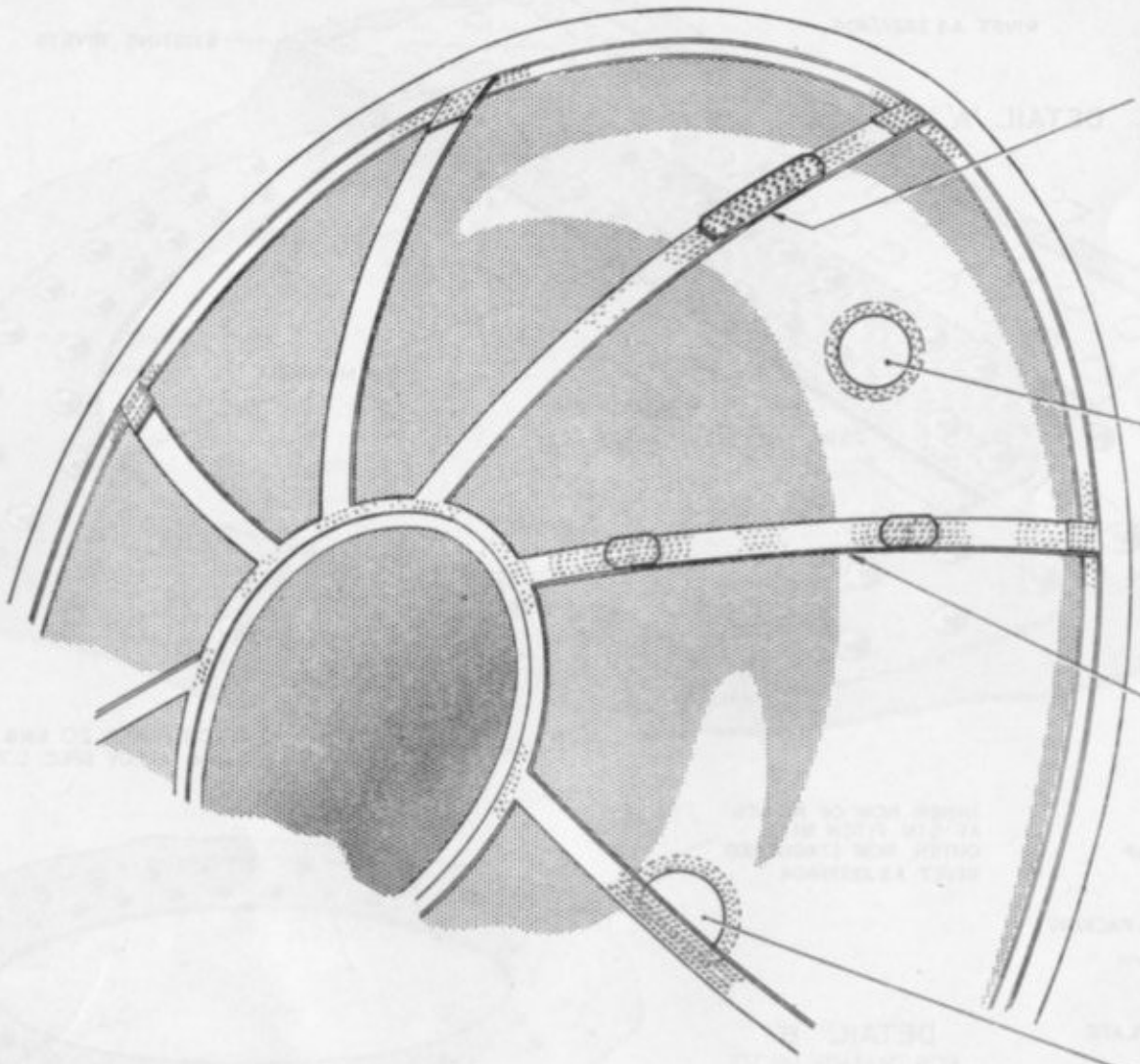
FILLER PLATE SHOULD BE AN ACCURATE FIT. ANY DEVIATIONS IN CONTOUR SHOULD NOT EXCEED 0·03 IN. AT ANY ONE POINT.





FOR PRESSURE SEALING OF REPAIR AND TESTS TO BE CARRIED OUT SEE TEXT IN CHAP. 2. AND A.P. 4505A, VOL. I, BOOK I, SECTION 3, CHAP 8.

Fig. 222C. Skin repairs—pressurised fuselage—free areas



PATCH REPAIR OR SMALL INSERTION TO JOINTING STRAP NECESSITATING REMOVAL OF NOT MORE THAN 3 IN. OF DAMAGE

DETAIL 'D'
SEE FIG. 223B

REPAIR FOR HOLE IN FREE AREA

DETAIL 'B'
SEE FIG. 223A

INSERTION REPAIR TO JOINTING STRAP

DETAIL 'C'
SEE FIG. 223B

REPAIR TO SKIN AT JOINTING STRAP

DETAIL 'A'
SEE FIG. 223A

NOTE:- FOR PRESSURE SEALING OF ALL REPAIRS, AND TESTS TO BE CARRIED OUT, REFER TO TEXT IN CHAP. 2, AND A.P. 4505 A, VOL. 1, BOOK 1, SECT. 3, CHAP. 8

Fig. 223. Repairs to forward pressure bulkhead

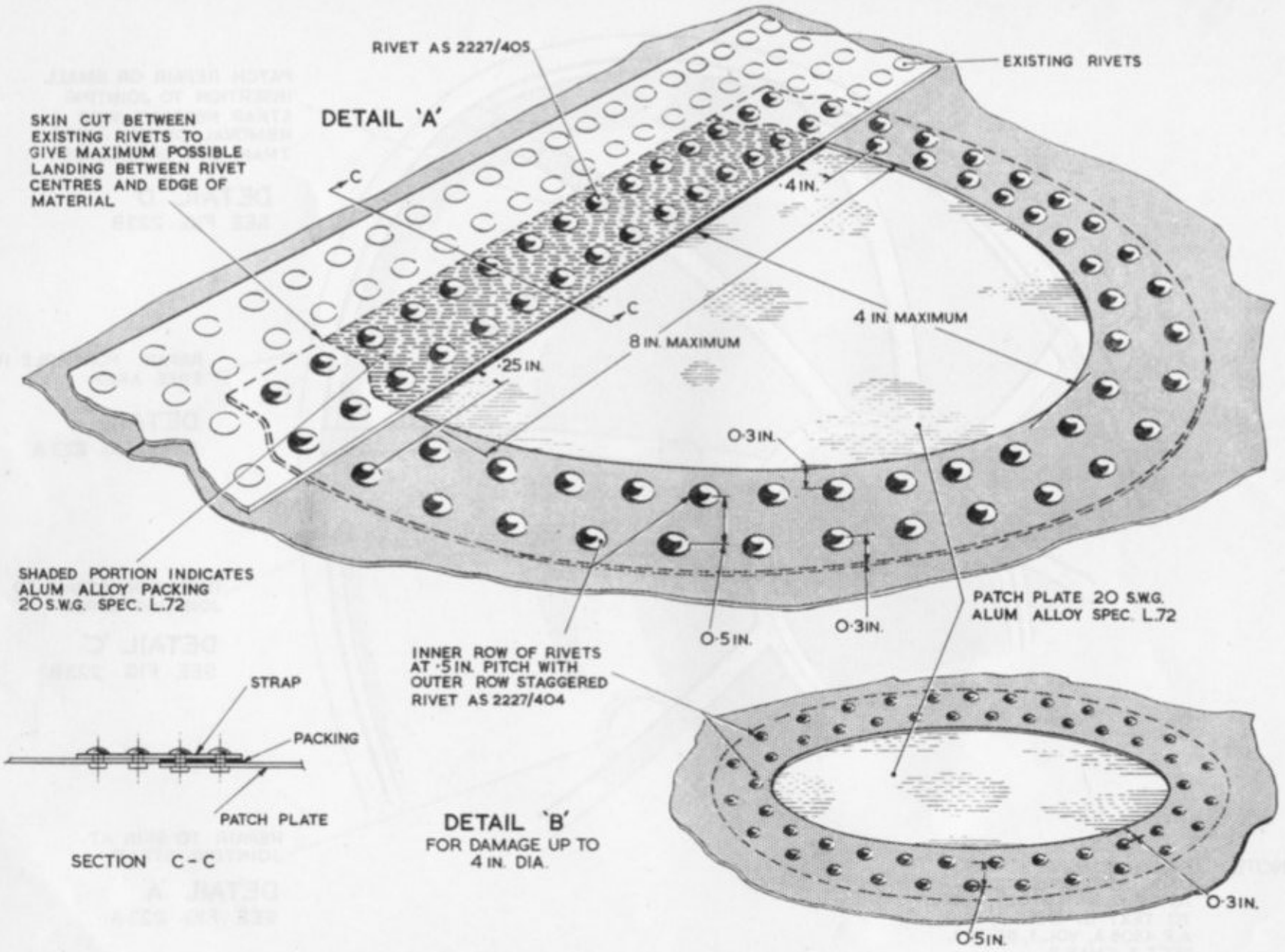


Fig. 223A. Repairs to forward pressure bulkhead

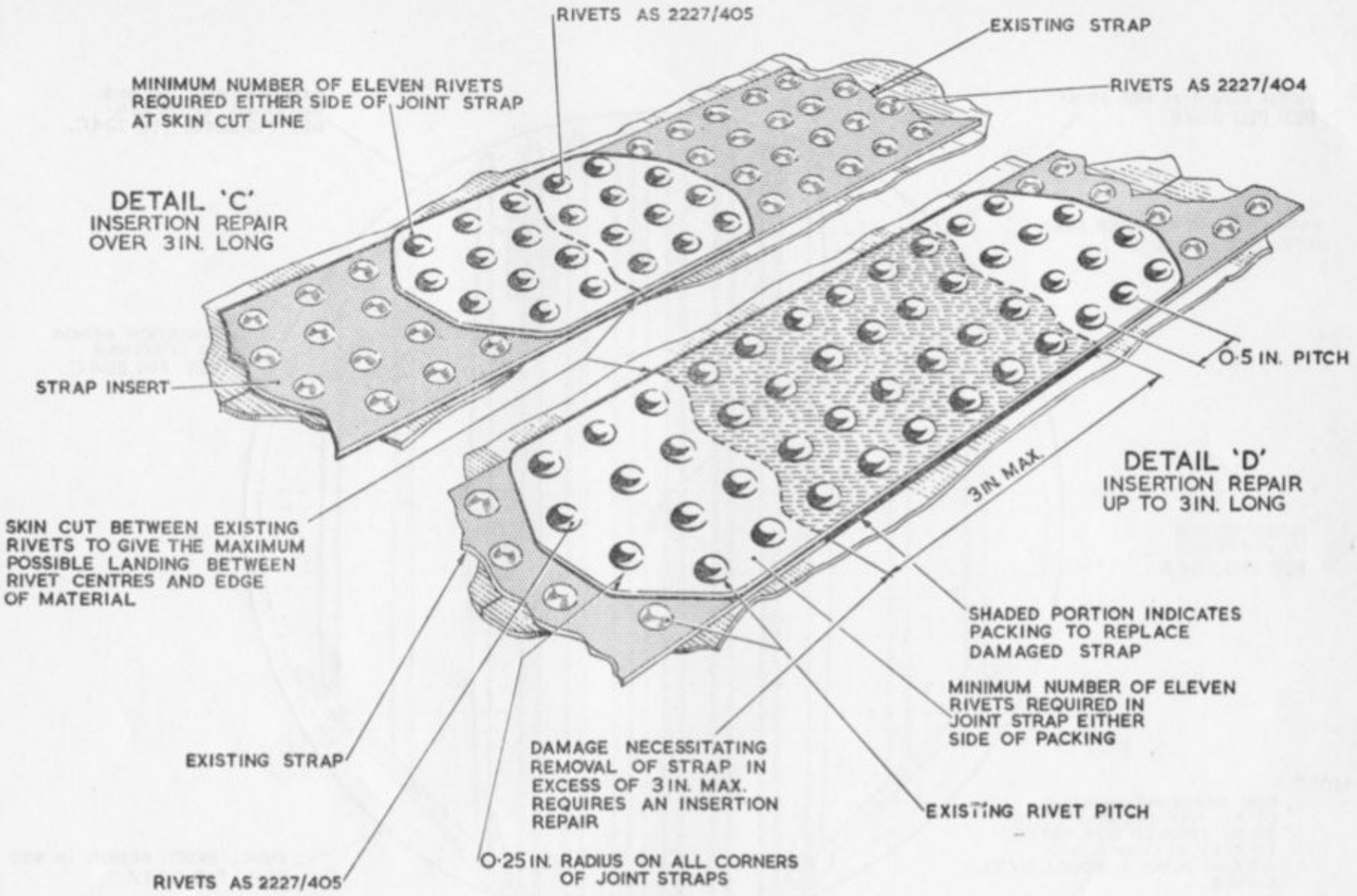


Fig. 223B. Repairs to forward pressure bulkhead

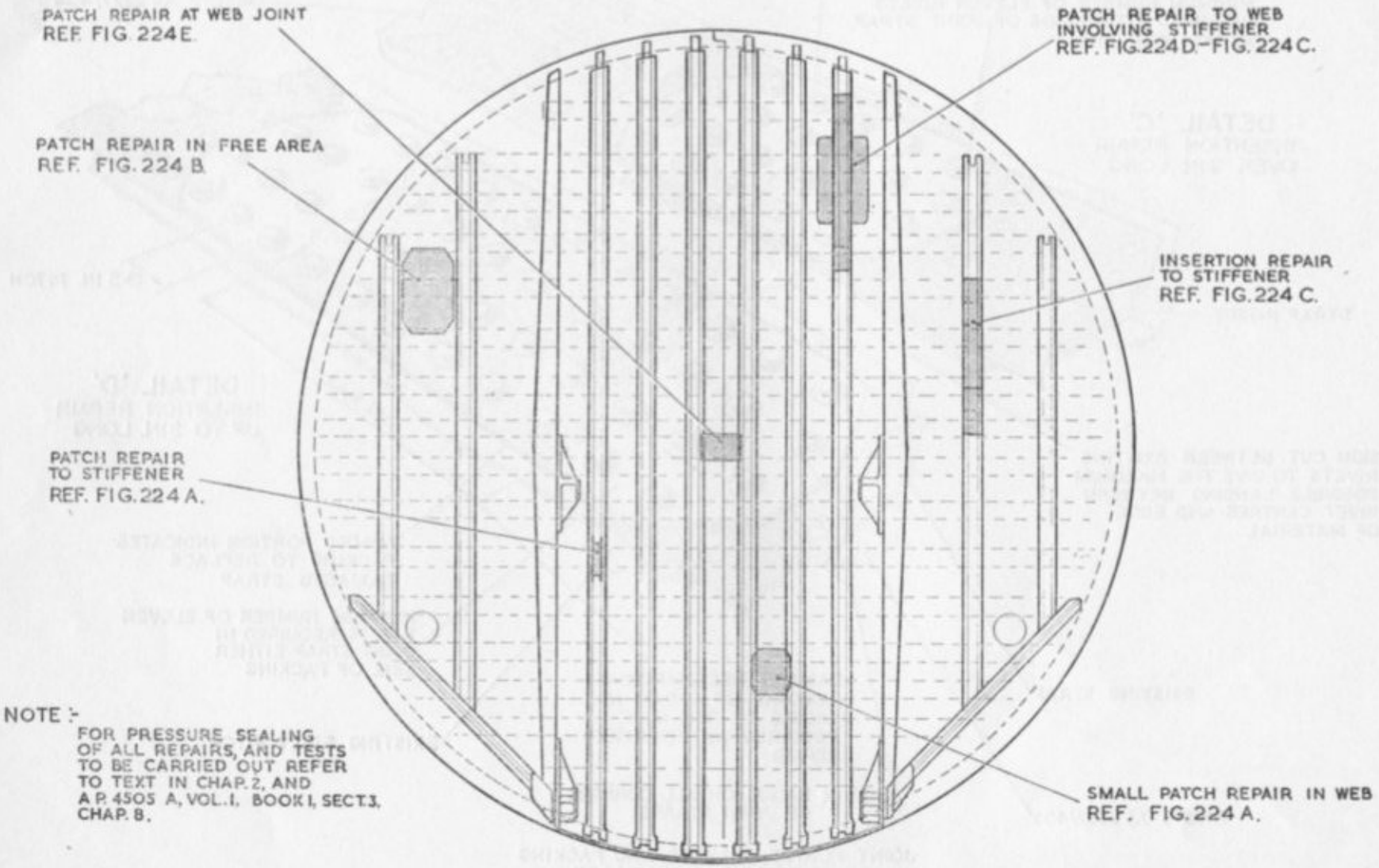


Fig. 224. Repairs to rear pressure bulkhead

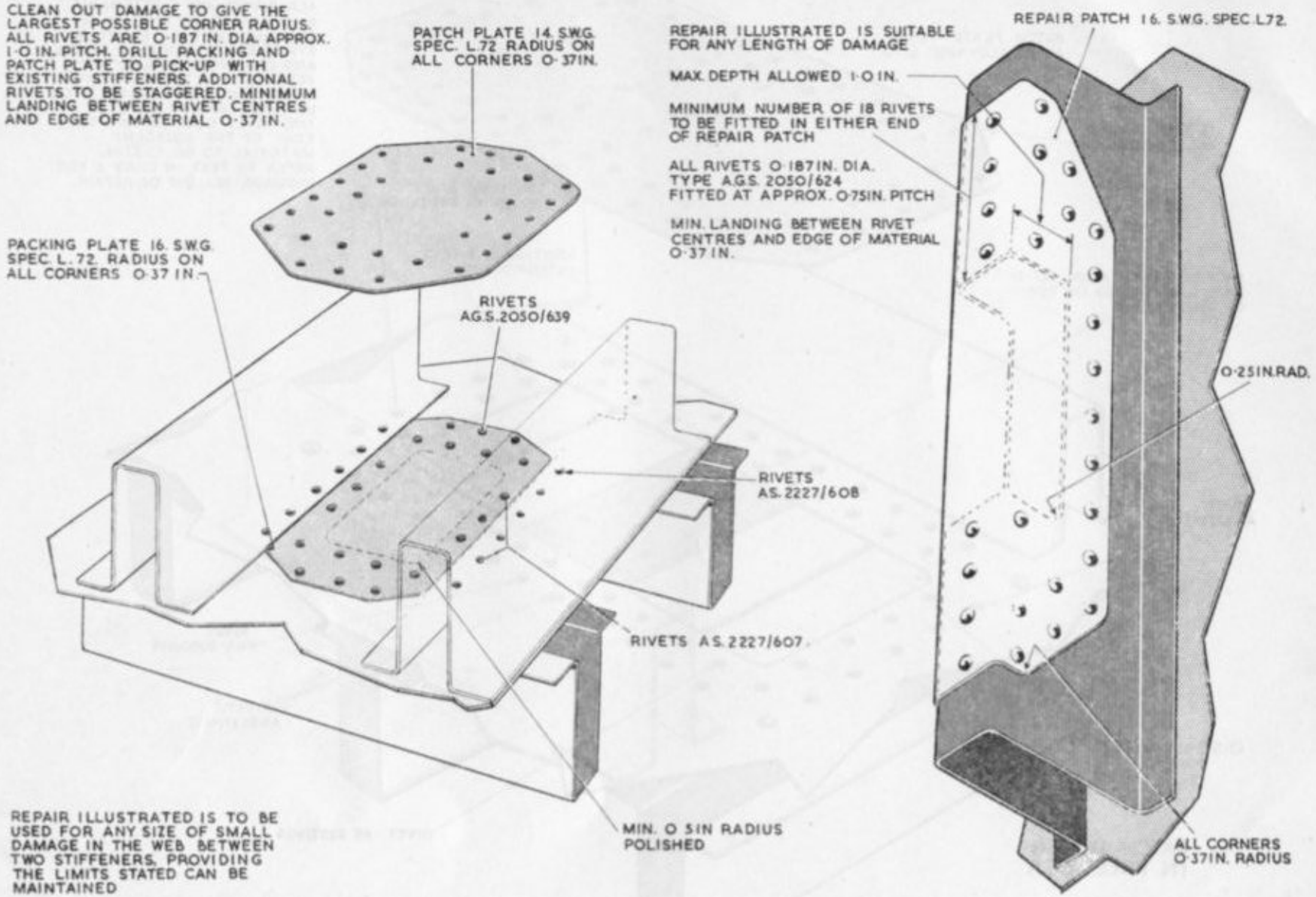


Fig. 224A. Rear pressure bulkhead repairs

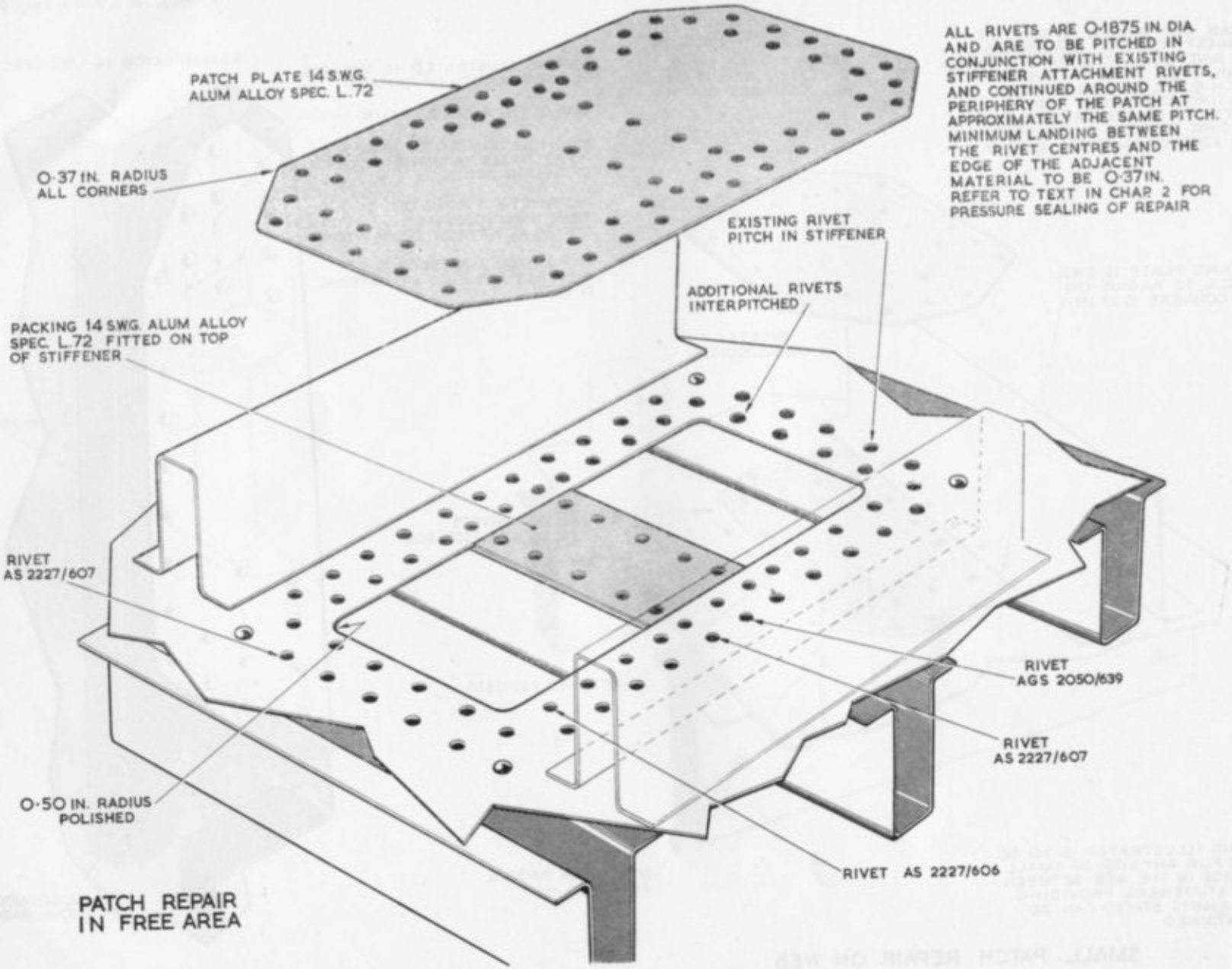


Fig. 224B. Repairs to rear pressure bulkhead

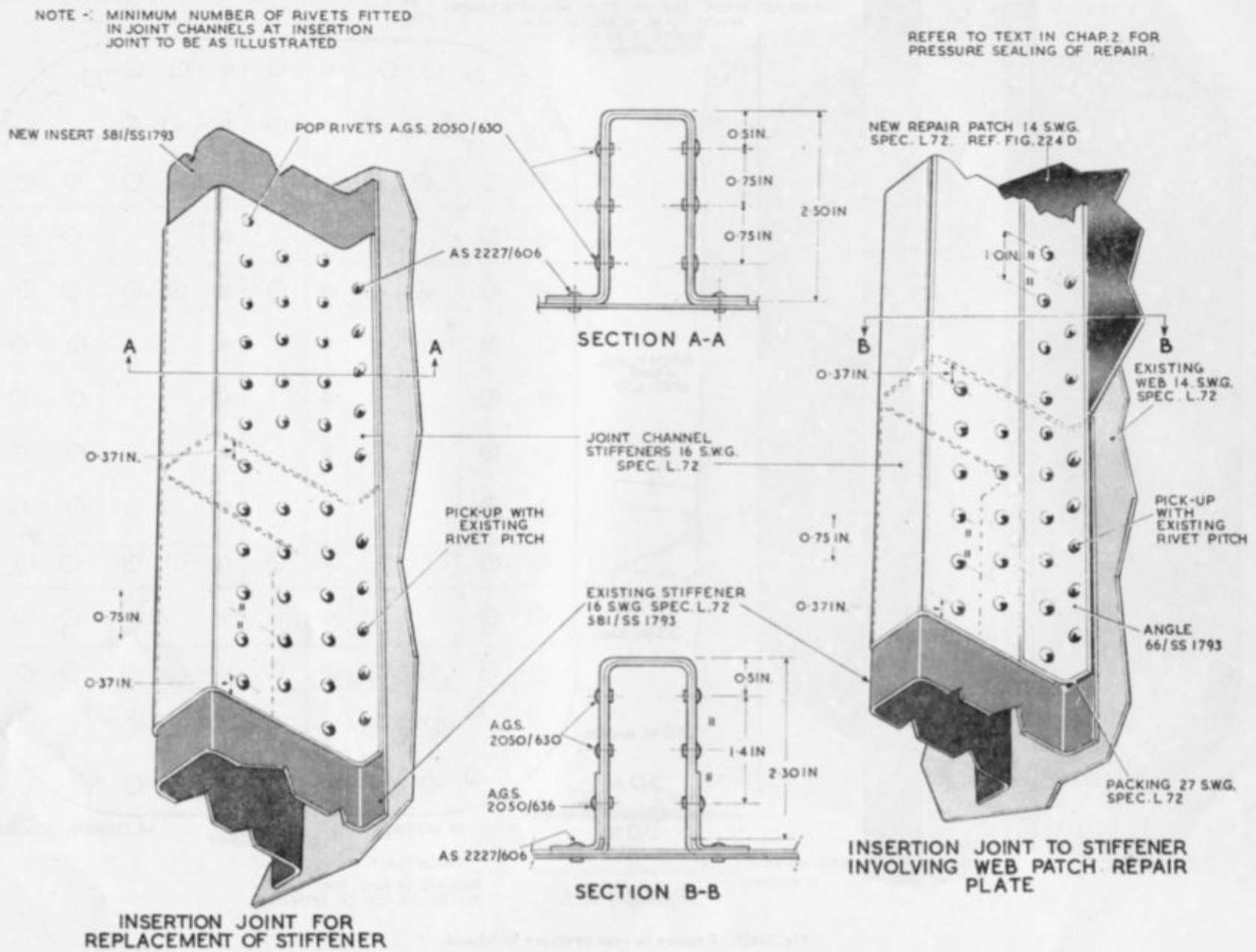


Fig. 224C. Repairs to rear pressure bulkhead

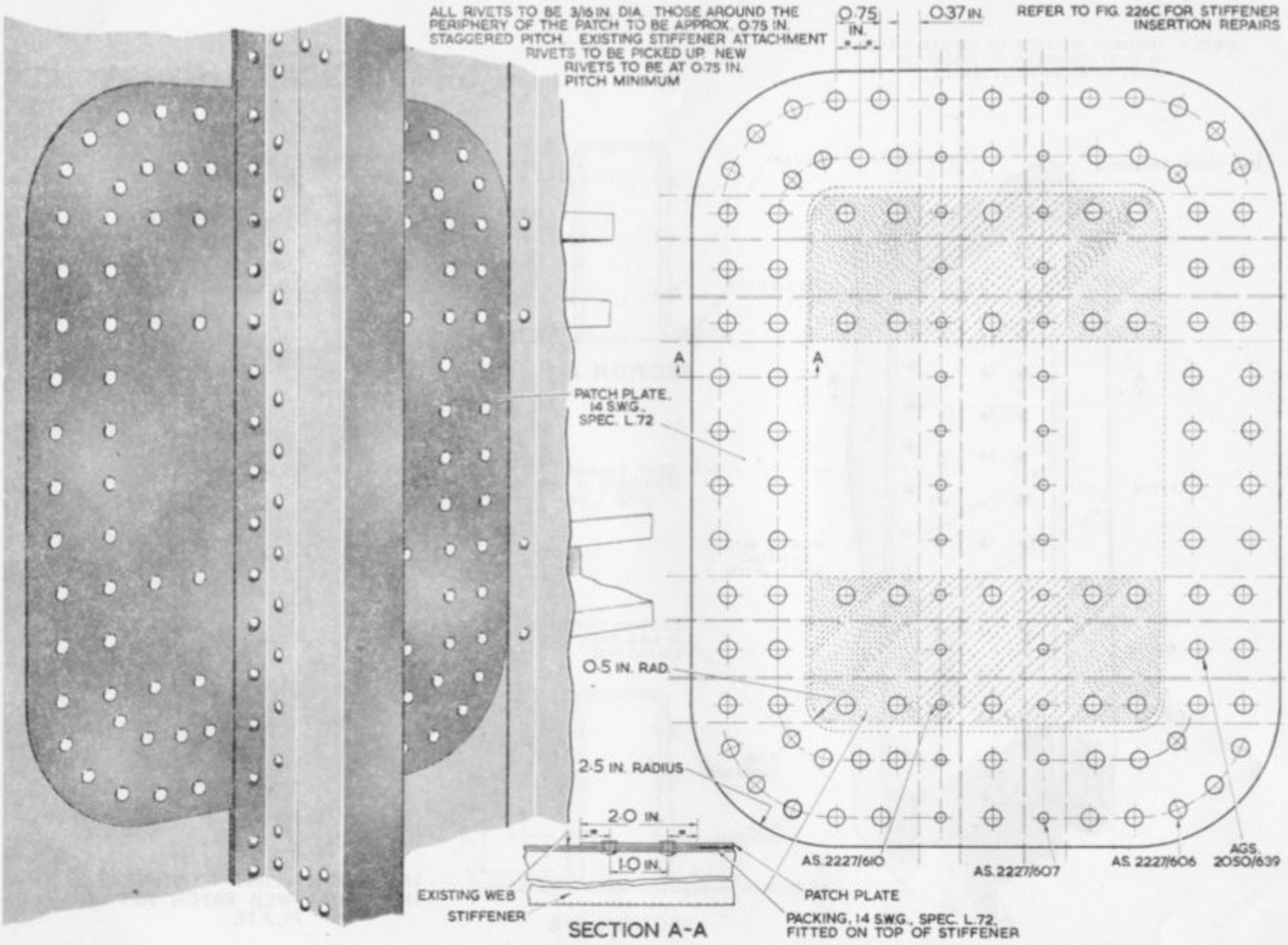


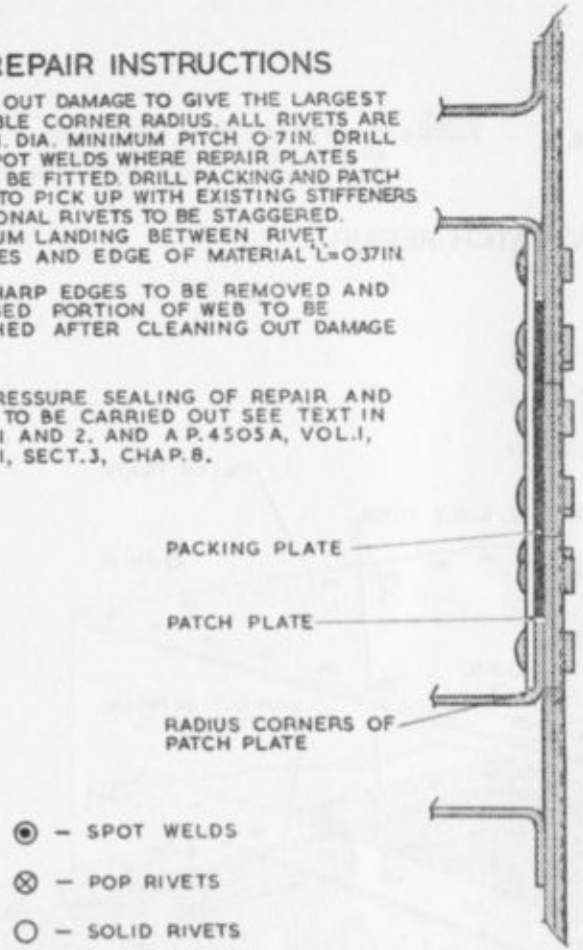
Fig. 224D. Repairs to rear pressure bulkhead

REPAIR INSTRUCTIONS

CLEAN OUT DAMAGE TO GIVE THE LARGEST POSSIBLE CORNER RADIUS. ALL RIVETS ARE 0·187 IN. DIA. MINIMUM PITCH 0·7 IN. DRILL OUT SPOT WELDS WHERE REPAIR PLATES ARE TO BE FITTED. DRILL PACKING AND PATCH PLATE TO PICK UP WITH EXISTING STIFFENERS ADDITIONAL RIVETS TO BE STAGGERED. MINIMUM LANDING BETWEEN RIVET CENTRES AND EDGE OF MATERIAL 'L' = 0·37 IN.

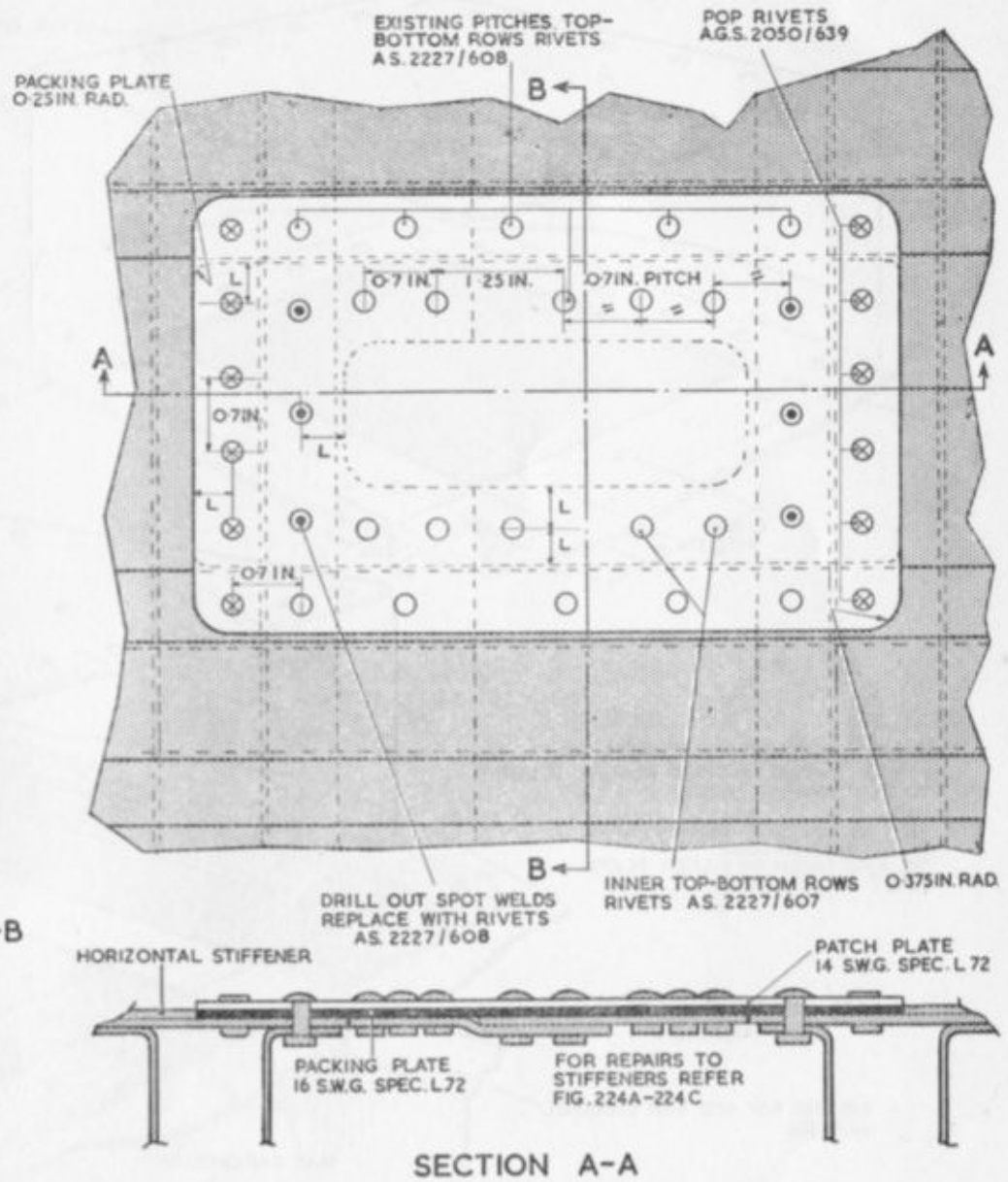
ALL SHARP EDGES TO BE REMOVED AND DAMAGED PORTION OF WEB TO BE POLISHED AFTER CLEANING OUT DAMAGE

FOR PRESSURE SEALING OF REPAIR AND TESTS TO BE CARRIED OUT SEE TEXT IN CHAP. 1 AND 2. AND A.P.4505A, VOL.1, BOOK 1, SECT.3, CHAP.8.



SECTION B-B

REPAIR ILLUSTRATED IS TO BE USED FOR ANY SIZE OF SMALL DAMAGE THROUGH THE WEB BETWEEN TWO STIFFENERS, PROVIDING THE LIMITS STATED CAN BE MAINTAINED



SECTION A-A

Fig. 224E. Repairs to rear pressure bulkhead—web joint

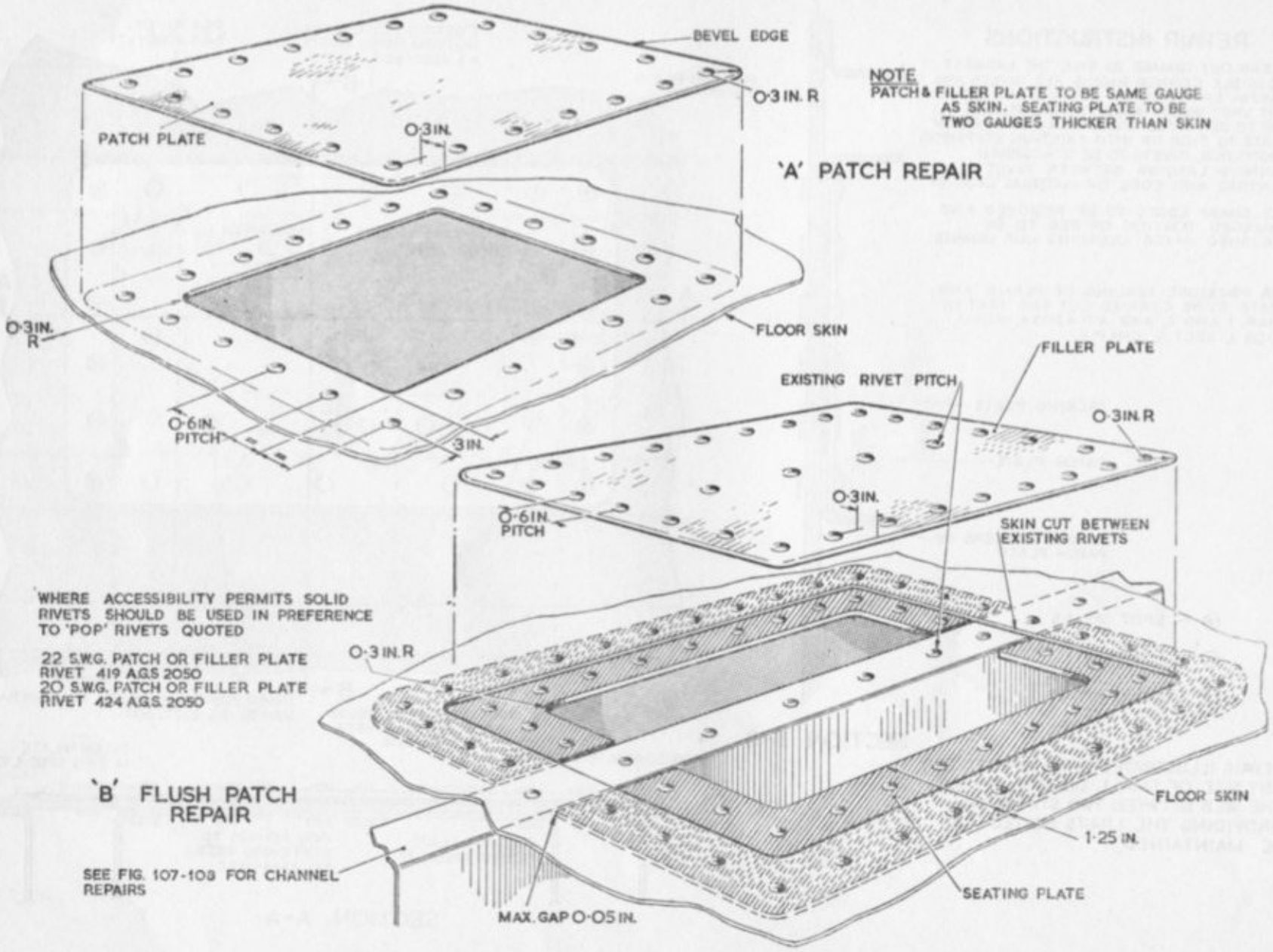
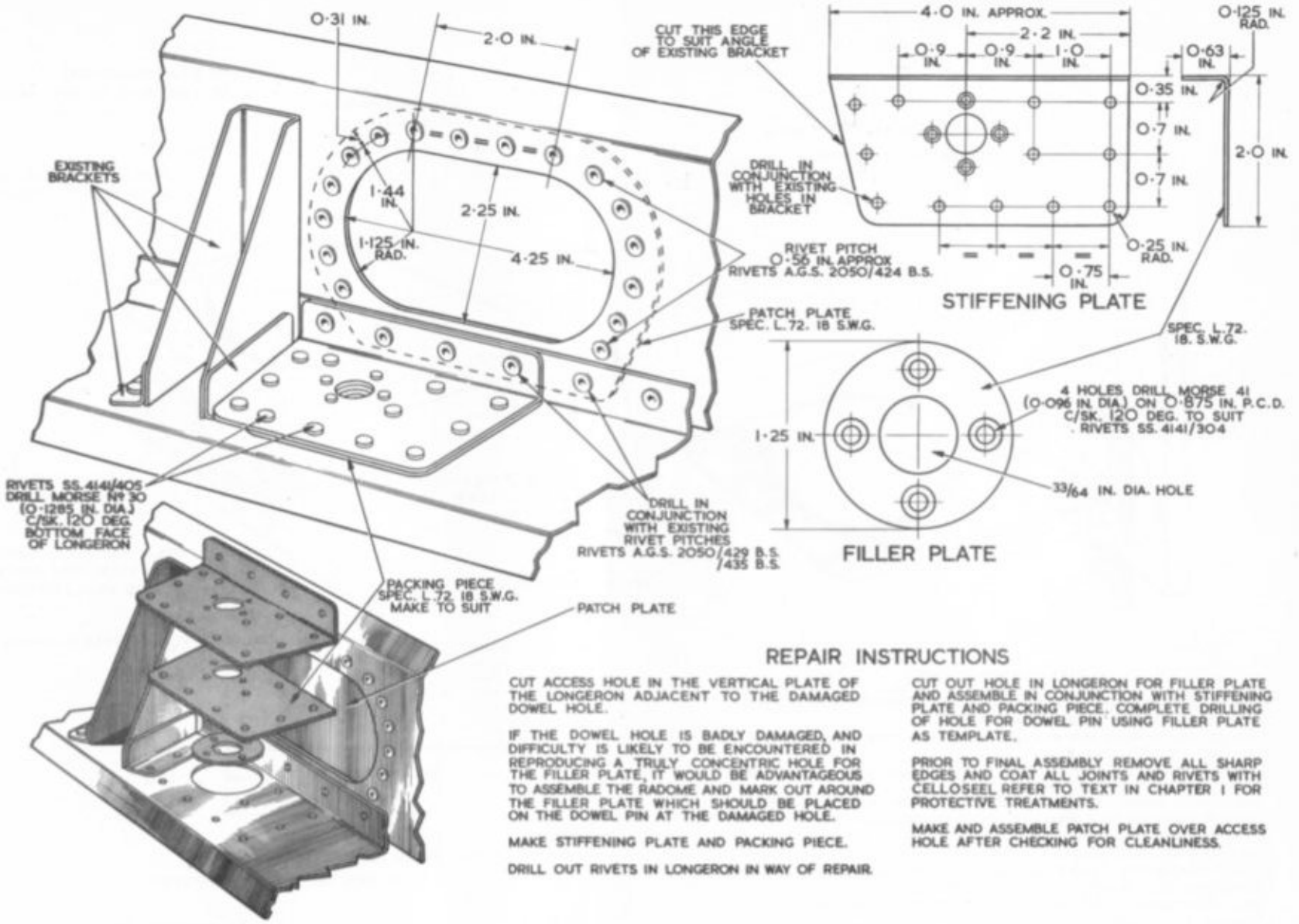


Fig. 225. Floor skin repairs

269150 375 5.9.58 324 We. & S. A507



REPAIR INSTRUCTIONS

CUT ACCESS HOLE IN THE VERTICAL PLATE OF THE LONGERON ADJACENT TO THE DAMAGED DOWEL HOLE.

IF THE DOWEL HOLE IS BADLY DAMAGED, AND DIFFICULTY IS LIKELY TO BE ENCOUNTERED IN REPRODUCING A TRULY CONCENTRIC HOLE FOR THE FILLER PLATE, IT WOULD BE ADVANTAGEOUS TO ASSEMBLE THE RADOME AND MARK OUT AROUND THE FILLER PLATE WHICH SHOULD BE PLACED ON THE DOWEL PIN AT THE DAMAGED HOLE.

MAKE STIFFENING PLATE AND PACKING PIECE.

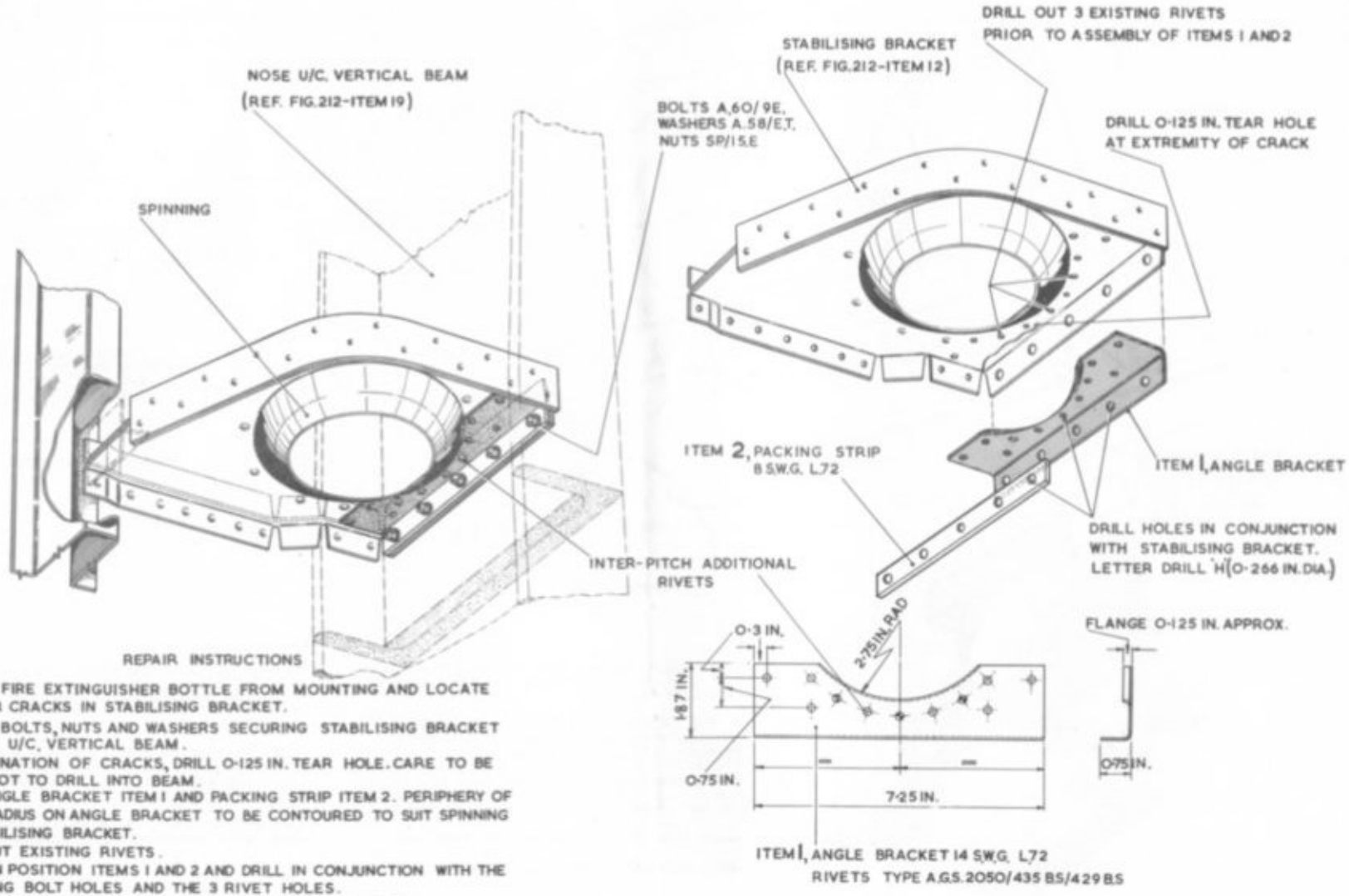
DRILL OUT RIVETS IN LONGERON IN WAY OF REPAIR.

CUT OUT HOLE IN LONGERON FOR FILLER PLATE AND ASSEMBLE IN CONJUNCTION WITH STIFFENING PLATE AND PACKING PIECE. COMPLETE DRILLING OF HOLE FOR DOWEL PIN USING FILLER PLATE AS TEMPLATE.

PRIOR TO FINAL ASSEMBLY REMOVE ALL SHARP EDGES AND COAT ALL JOINTS AND RIVETS WITH CELLOSEEL. REFER TO TEXT IN CHAPTER 1 FOR PROTECTIVE TREATMENTS.

MAKE AND ASSEMBLE PATCH PLATE OVER ACCESS HOLE AFTER CHECKING FOR CLEANLINESS.

Fig.226. Repair to damaged dowel holes in nose longeron



REPAIR INSTRUCTIONS

REMOVE FIRE EXTINGUISHER BOTTLE FROM MOUNTING AND LOCATE CRACK OR CRACKS IN STABILISING BRACKET.

REMOVE BOLTS, NUTS AND WASHERS SECURING STABILISING BRACKET TO NOSE U/C. VERTICAL BEAM.

AT TERMINATION OF CRACKS, DRILL 0·125 IN. TEAR HOLE. CARE TO BE TAKEN NOT TO DRILL INTO BEAM.

MAKE ANGLE BRACKET ITEM 1 AND PACKING STRIP ITEM 2. PERIPHERY OF 2·75 IN. RADIUS ON ANGLE BRACKET TO BE CONTOURED TO SUIT SPINNING ON STABILISING BRACKET.

DRILL OUT EXISTING RIVETS.

CLAMP IN POSITION ITEMS 1 AND 2 AND DRILL IN CONJUNCTION WITH THE 5 EXISTING BOLT HOLES AND THE 3 RIVET HOLES.

DRILL ADDITIONAL RIVET HOLES AS ILLUSTRATED ON ITEM 1.

REMOVE ALL SHARP EDGES, AND SWARF.

APPLY CELLOSEEL REF. NO. 33H/113 TO ALL MATING SURFACES BEFORE FINAL ASSEMBLY OF ITEMS 1 AND 2.

REFIT FIRE EXTINGUISHER BOTTLE.

Fig. 227. Fire extinguisher bottle mountings–rear pressure bulkhead.
Repair for cracks in stabiliser bracket.

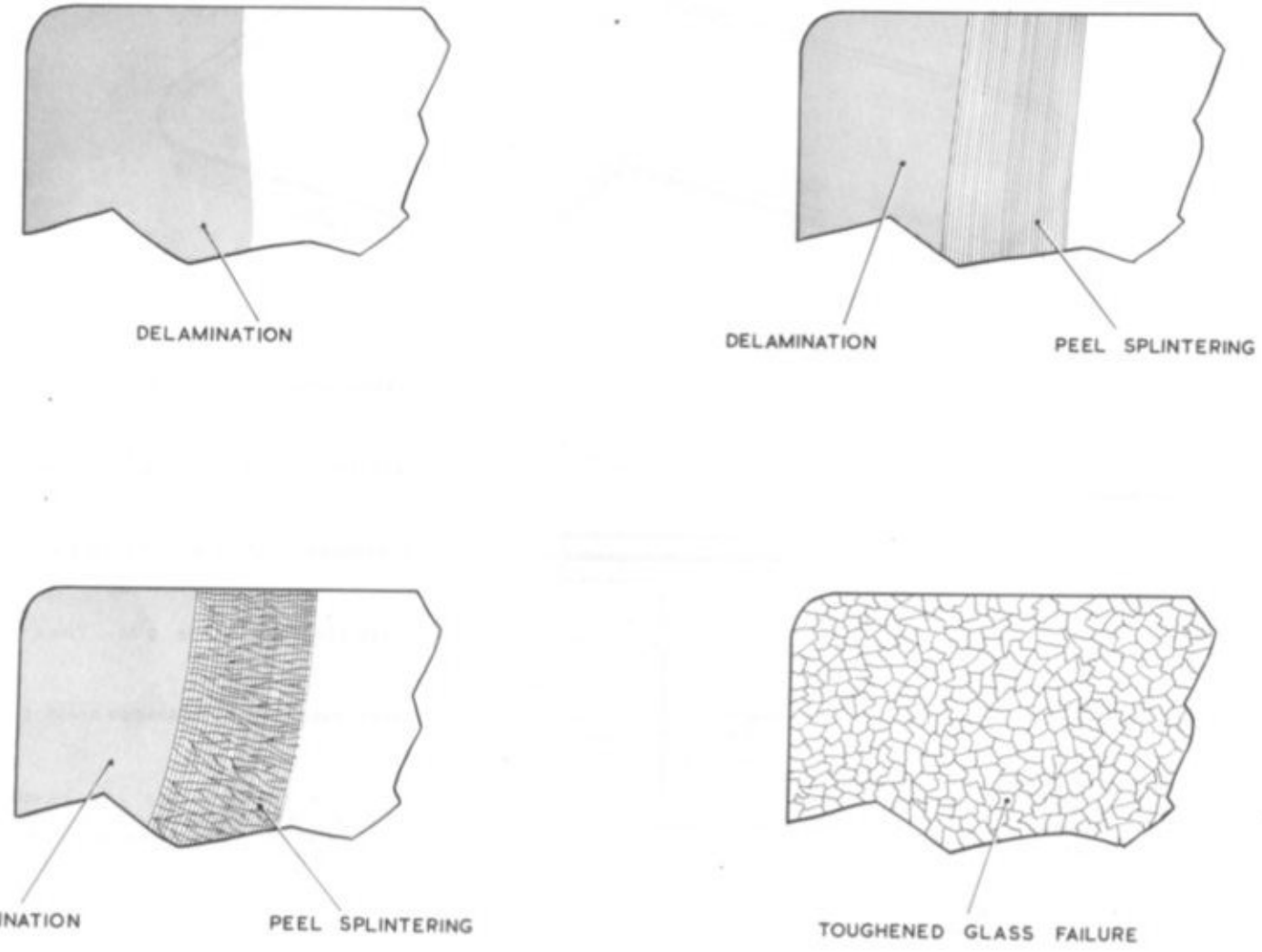
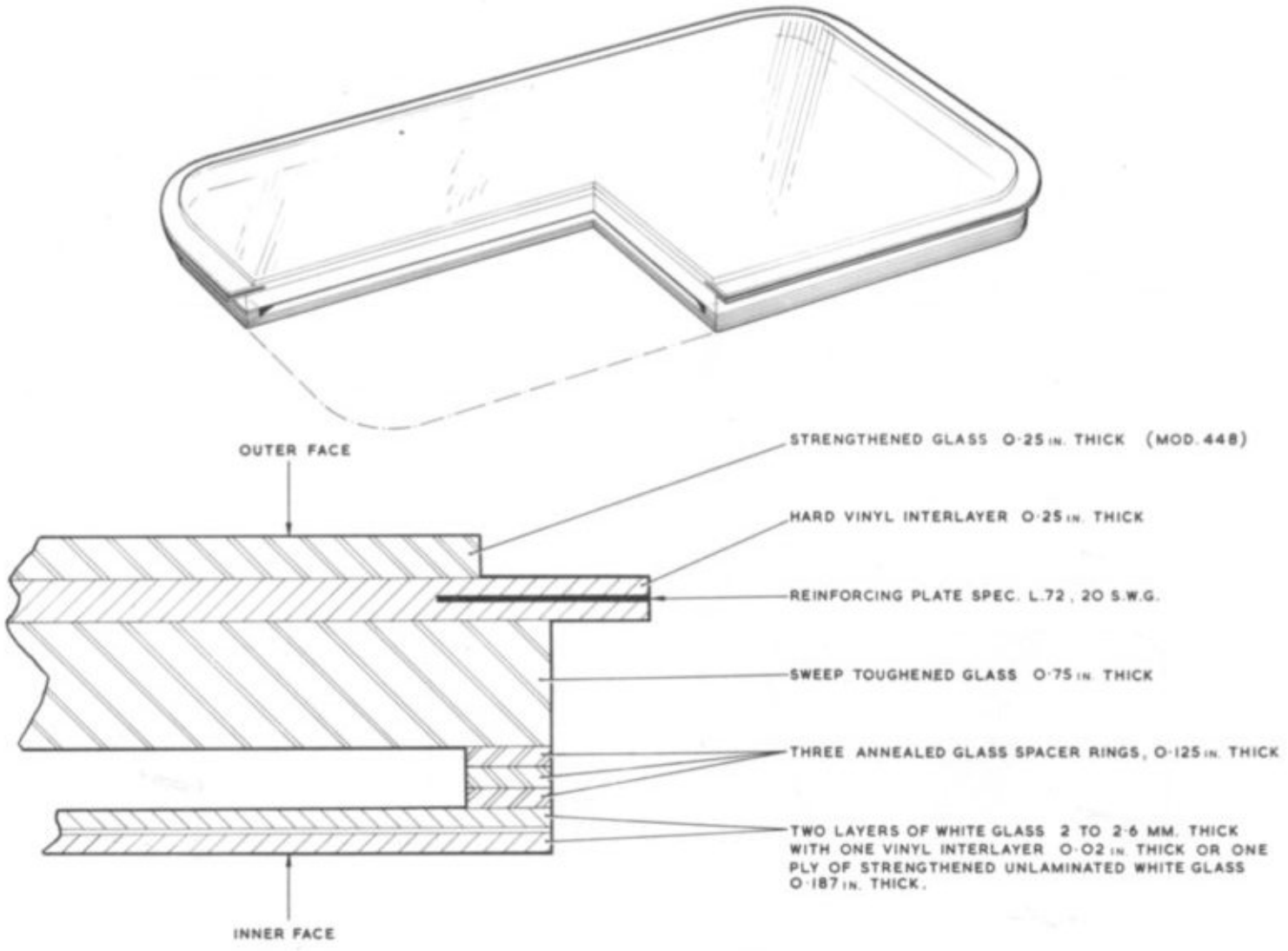
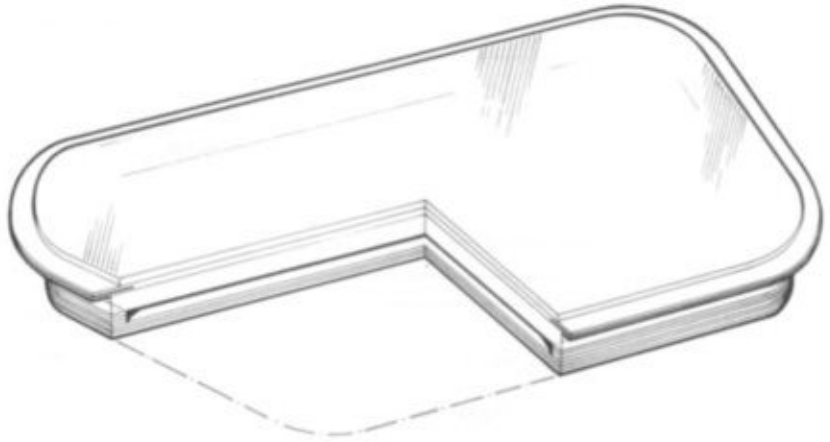


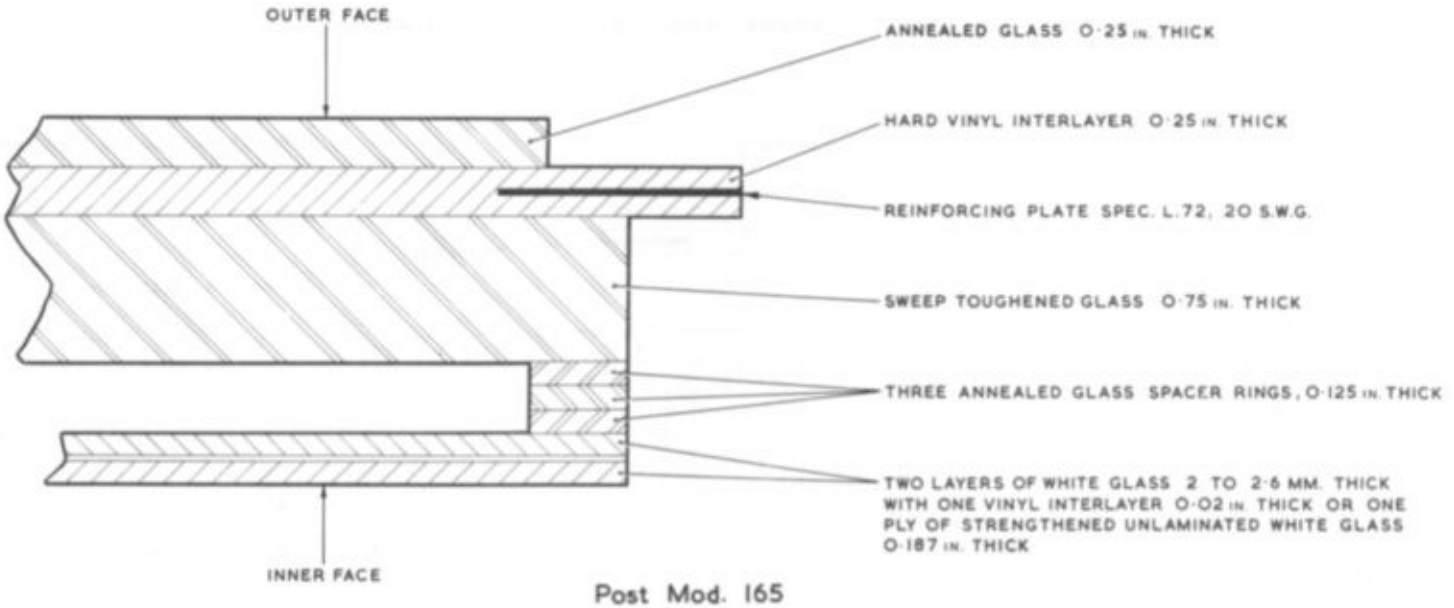
Fig. 228. Damage definitions



Post Mod. 448

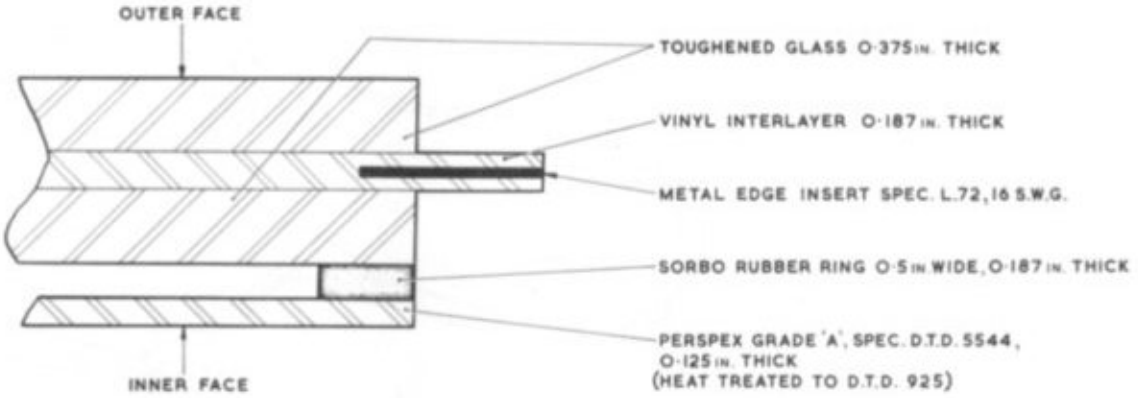
Fig. 229. Centre window, windscreen – dry air sandwich





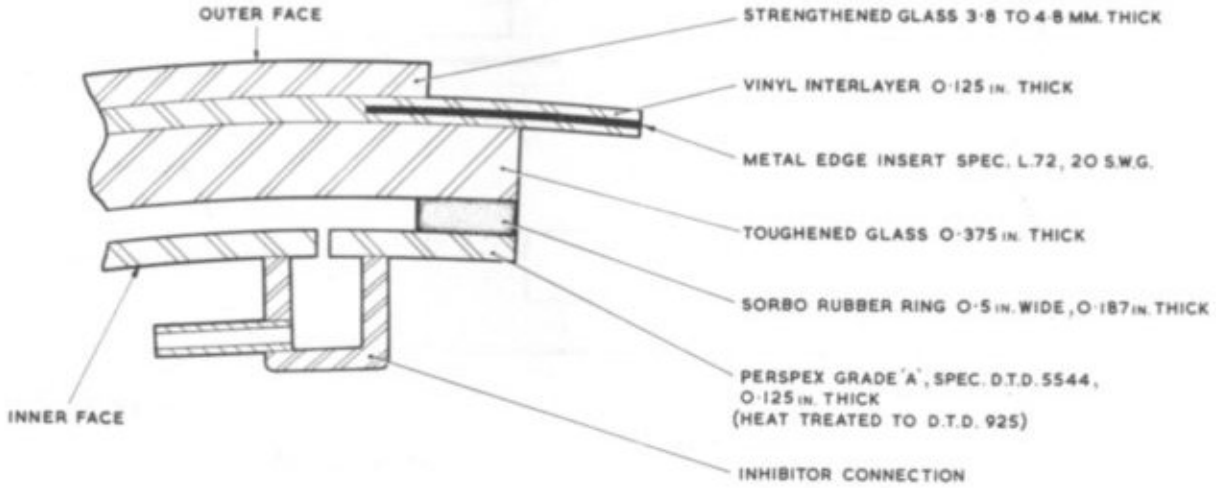
Post Mod. 165

Fig. 230. Side window, windscreen – dry air sandwich



Post Mod. 165

Fig. 231. D.V. window, windscreen – dry air sandwich



Post Mod. 271

Fig. 232. Canopy window – dry air sandwich

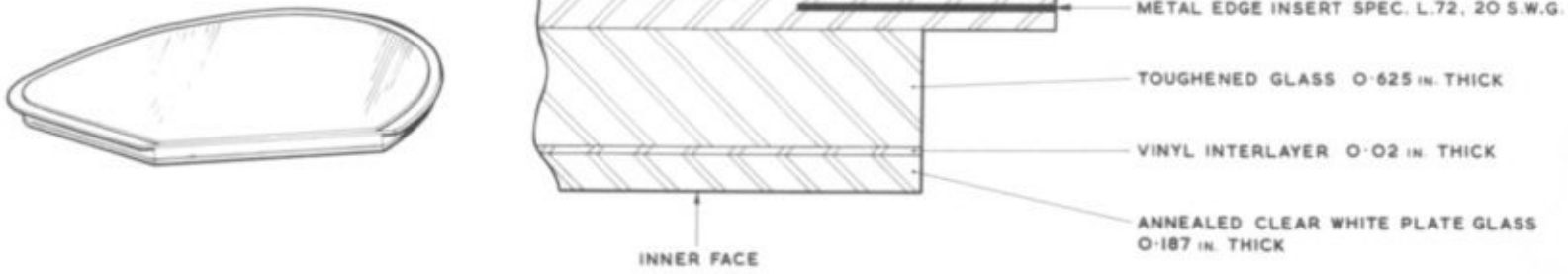
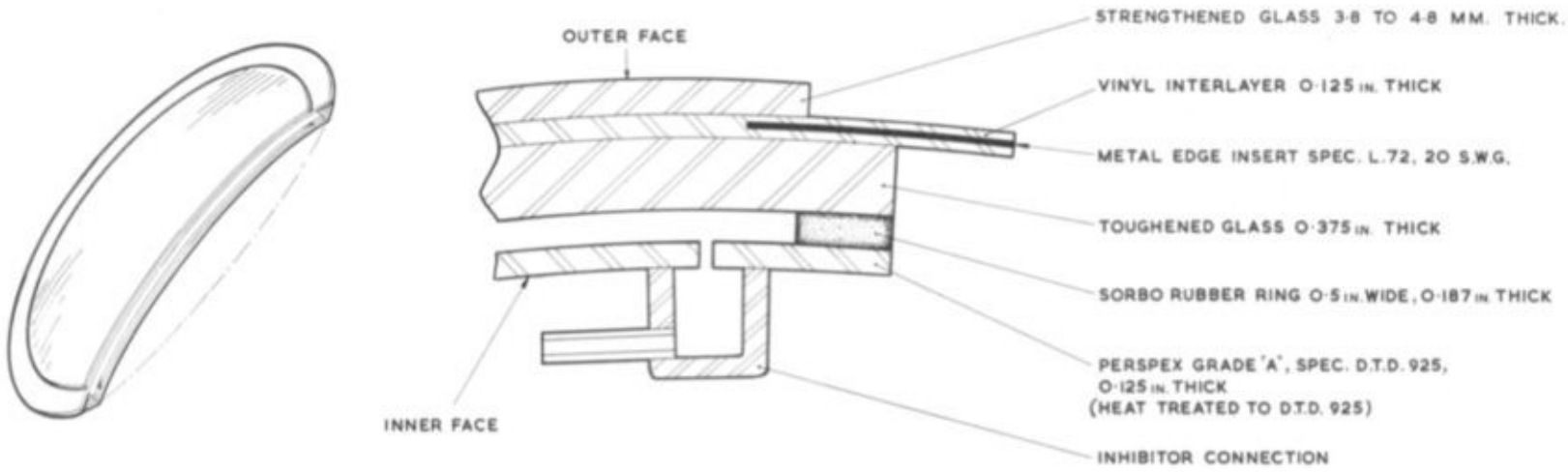


Fig. 233. Bomb aimers window



Post Mod. 271

Fig. 234. Window in pressure cabin, F.246F. — F.260F.