CHAPTER 4

FUSELAGE

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FUSELAGE
(Completely revised)

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Description

1. The fuselage is of metal built in two main sections. The two parts are jointed near the trailing edge of the main plane, attachment being made by bolting and the use of a riveted lap strap.

Front section

2. The semi-monocoque structure of the front section has four main longerons secured to formers of pressed metal and Z-section stringers. The firewall is of stainless steel and the engine mounting is fixed to fittings mounted on the ends of the longerons. There is a keel structure extending from the firewall to the joint between the two sections which is used generally for housing control runs, etc. The cockpit is a built-in structure carrying two seats riveted to the vertical formers and skin of the fuselage. Pick-up fittings for the attachment of the upper and lower spar root fittings are included in a built-up U-shaped frame extending across the fuselage under the front seat.

Rear section

3. The rear section of the fuselage is a straight tapered semi-mono-

coque structure having pressings as formers, Z-section stringers and a stress bearing skin. There is a bulkhead at the rear reinforced by an extension of the fin spar, this structure carrying the empennage and the tail wheel fitting. Aft of this bulkhead is a tail cone which is readily detachable.

Definition of repairable and negligible damage

4. Definitions of repairable damage with a description of any damage which can be treated as negligible will be found in Table 1. References to appropriate repair illustrations are also included to supplement the definitions of repairable damage.

TABLE 1

Definitions of negligible and repairable damage

Component	Negligible damage	Repairable damage	Repair Fig. No.	Key diagram
TOP STRUCTURE				4/1
Skin	Dents 0.1 in. deep, 4.0 in. dia., 8.0 in. apart	Damage not exceeding 1.5 in. dia. Damage in excess of 1.5 in. dia.	4/13 4/11	
Deck	Dents 0.1 in. deep, 3.0 in. dia., 12.0 in. apart			
Formers	Dents 0.05 in. deep, 2.0 in. long, 12.0 in. apart	Local buckles or perforations	4/14	
Canopy rails	0.03 in. deep (blended out abrasions)			
Locker doors	Any damage which does not spoil the working of the door.			
SIDE PANELS				4/2
Skin	Dents 0.1 in. deep, 4.0 in. long, 12.0 in. apart	Damage in excess of negligible between formers 1 and 5	4/16	
		Damage in unshaded areas aft of former 5 not exceeding 4.0 in. dia.	4/13	
		Damage aft of former 5 in excess of 4.0 in. dia.	4/11	
		Limited damage, bottom front corner	4/17	
Stringers	Dents 0.1 in. deep, 4.0 in. long, 12.0 in. apart	Any damage	4/15	
Formers	Dents 0.05 in. deep, 2.0 in. long, 12.0 in. apart	Local buckles or perforations	4/14	

TABLE 1 - continued

Component	Negligible damage	Repairable damage	Repair Fig. No.	Key diagram
BOTTOM STRUCTURE				4/3
Skin	Dents 0.1 in. deep, 4.0 in. dia.	Damage in excess of negligible forward of former 5 excluding shaded area	4/16	
		Limited damage, top front corner	4/17	
		Damage aft of former 5 ;		
		Not exceeding 4.0 in. dia.	4/13	
		In excess of 4.0 in. dia.	4/11	
Stringers	As for side panel	As for side panel	4/15	
Formers	As for side panel	As for side panel	4/14	
Control box sides and cover	Dents 0.25 in. deep, 0.5 in. dia. 12.0 in. apart	Damage not exceeding 4.0 in. dia.	4/13	
False longeron	Dents 0.05 in. deep, 0.5 in. dia., 12.0 in. apart and at least 12.0 in. from front end			
Spar frames	Dents 0.5 in. deep, 1.5 in. dia., and clear of spar members			
Stringers, floor supporting	Dents 0.1 in. deep, 2.0 in. long, 8.0 in. apart			
REAR FUSELAGE				4/4
Skin	As for top structure skin (when clear of stringers)	As for top structure skin	4/13, 4/11 and 4/12	

RESTRICTED

TABLE 1 - continued

Component	Negligible damage	Repairable damage	Repair Fig. No.	Key diagram
Stringers	Dents 0.1 in. deep, 4.0 in. dia., 12.0 in. apart	Any damage	4/15	
FLOORS	Dents 0.25 in. deep, 4.0 in. dia.,	Cracks up to 1.0 in. Drill $\frac{1}{8}$ in. dia. hole at ends		4/5
		Damage in excess of 1.0 in.	4/10	
		Damage to footwell (rear cockpit)	4/9	
REAR BULKHEAD	Dents 0.05 in. deep, 2.0 in. dia. at least 1.0 in. clear of edges of members.			4/6
REAR FUSELAGE FORMERS	Dents 0.05 in. deep, 2.0 in. long, 12.0 in. apart	Any damage	4/14	4/6
FIREWALL	Dents 0.25 in. deep, 5.0 in. dia.	Damage up to 4.0 in. dia.	4/13	4/7
Channels	Dents 0.1 in. deep 3.0 in. long			
SEAT DIAPHRAGM				4/8
Diaphragm	Dents 0.25 in. deep, 5.0 in. dia., 8.0 in. apart	Small cracks up to 0.5 in. long	4/13	
		Cracks in lower corner radius	4/19	
Channels and angles	Dents 0.1 in. deep, 2.0 in. dia., 12.0 in. apart			

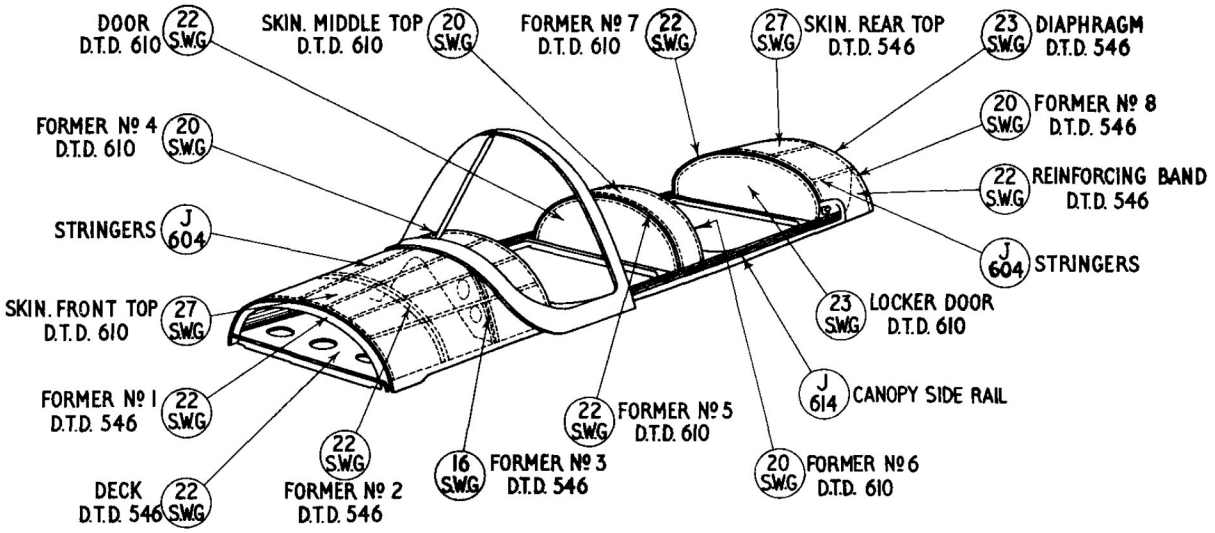


Fig. 4/1. Top structure

Top structure

5. The deck if damaged more than negligibly will need to be renewed, or application made for a suitable repair scheme.

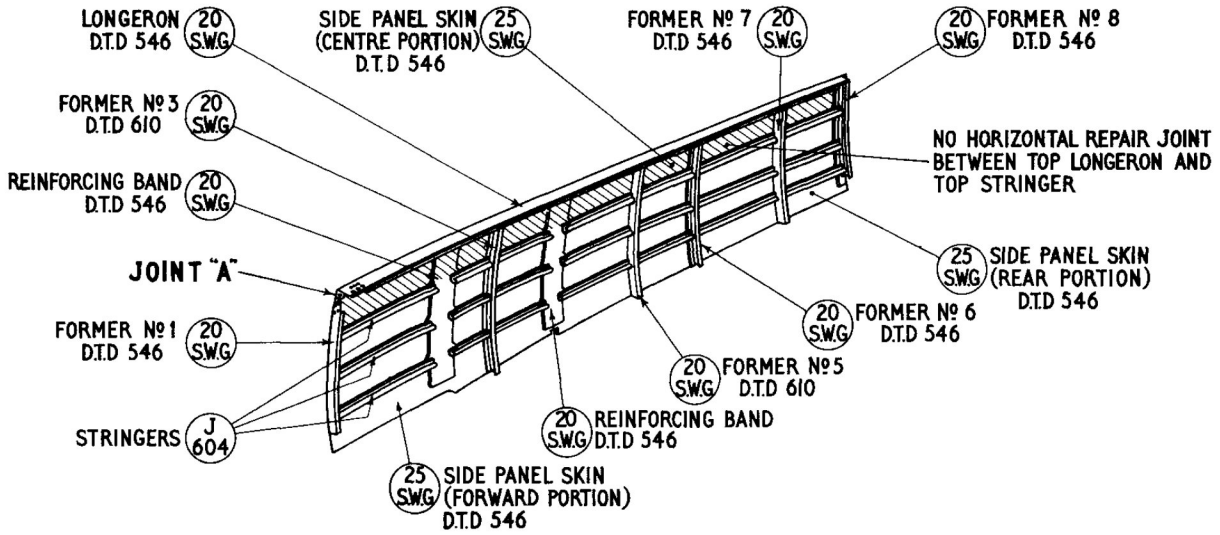


Fig. 4/2. Side panel

Side panel

6. Repair damage within the shaded area by patches extending to pick up longeron and top stringer. Refer to Table 1 for forms of repair applicable and location limitations.

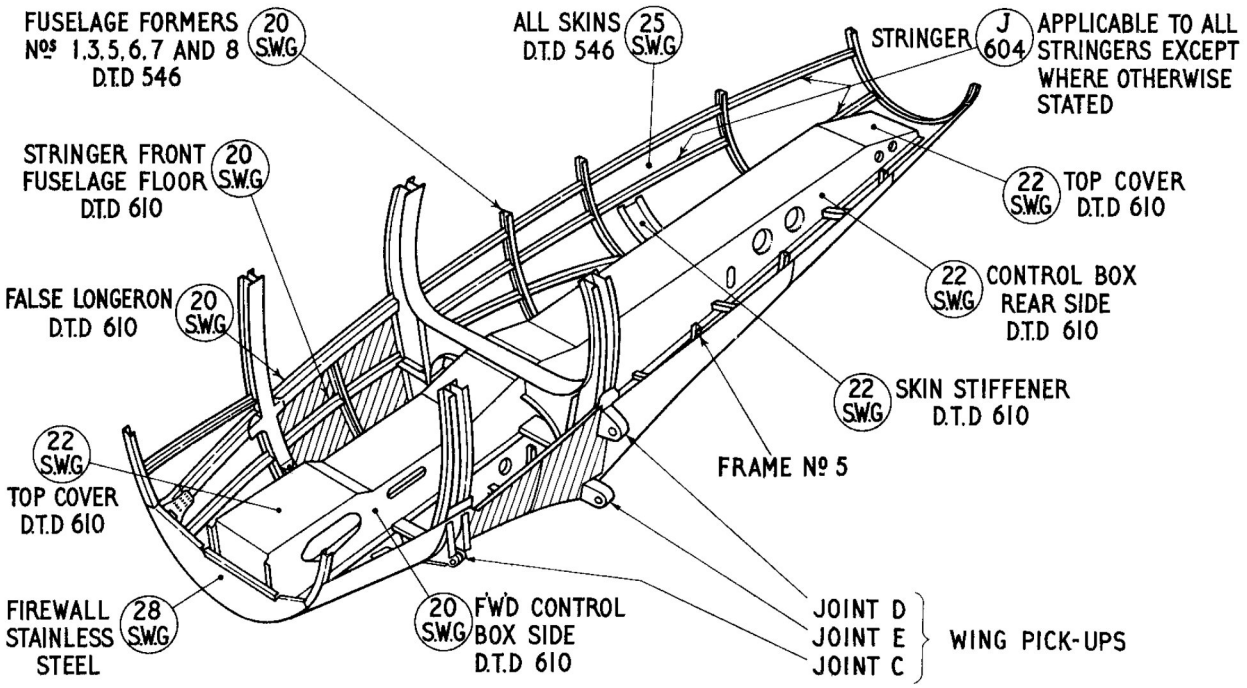


Fig.4/3. Bottom structure

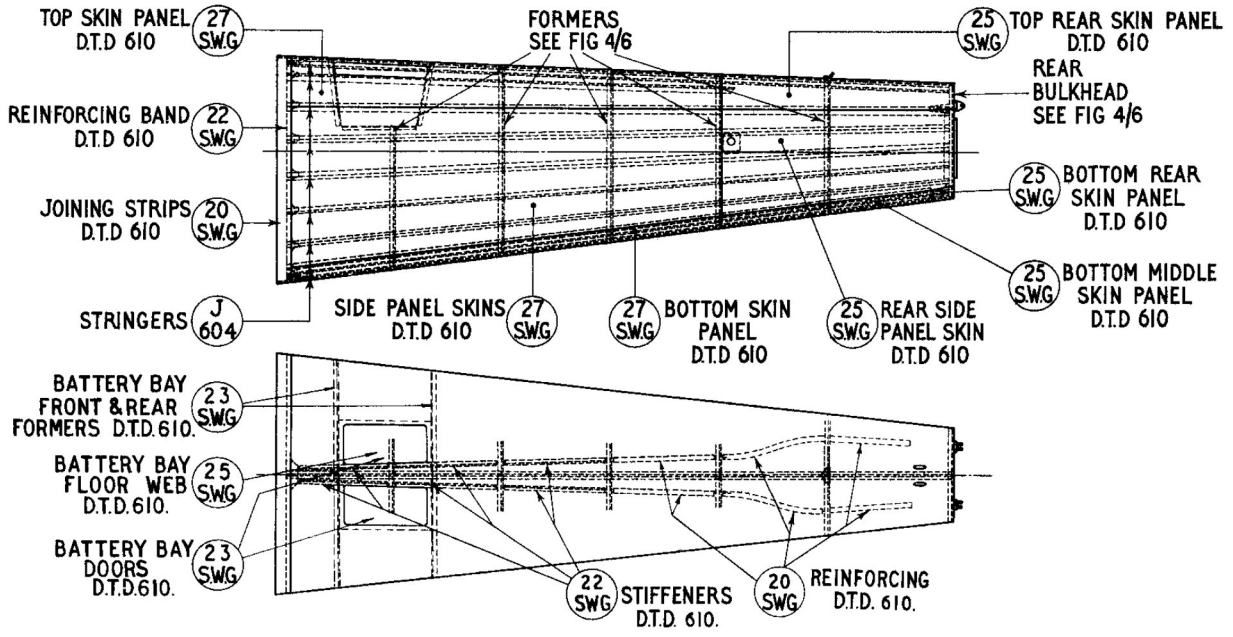


Fig. 4/4. Rear fuselage

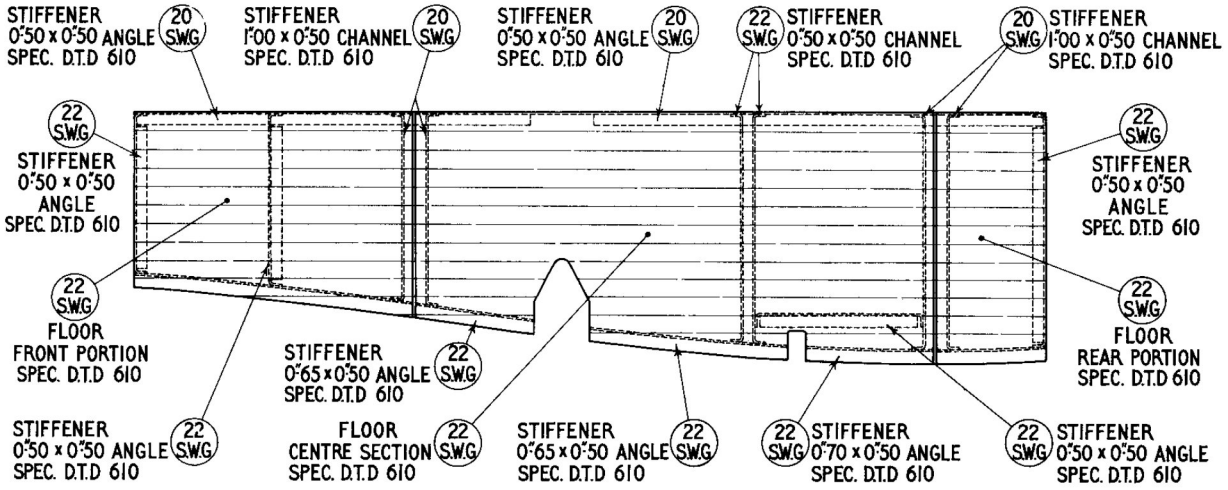


Fig. 4/5. Floor diagram

Flooring

7. The illustration shows the port half of the forward floor, the aft flooring is similar but has footwells (fig. 4/9). Whereas damage to the corrugated flooring is repairable, damage to the stiffeners will prove more easily repaired by renewal.

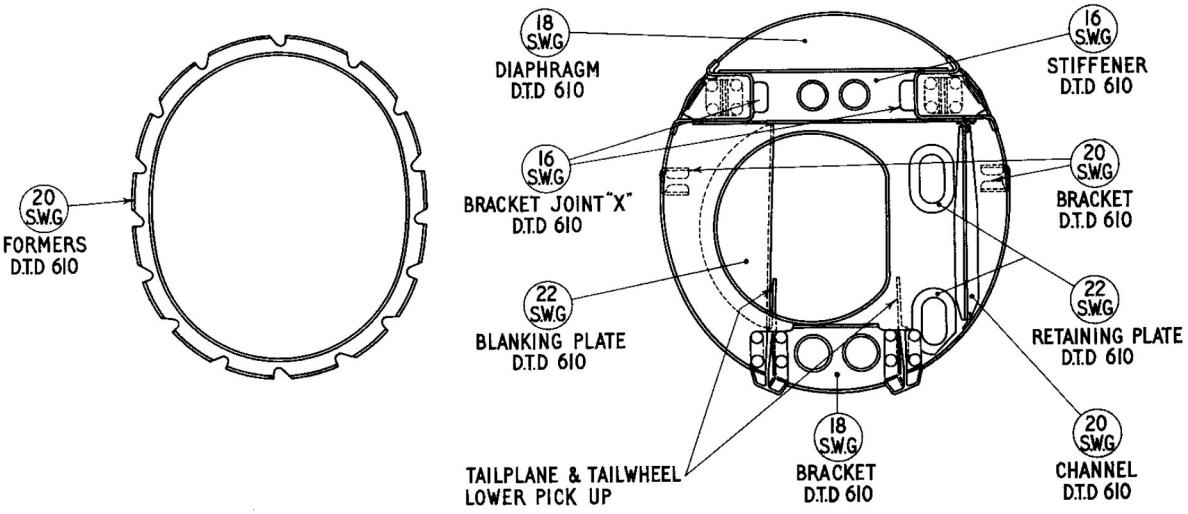


Fig. 4/6. Rear bulkhead and typical former

Rear bulkhead and formers

8. When damaged more than negligibly the rear bulkhead must be renewed.

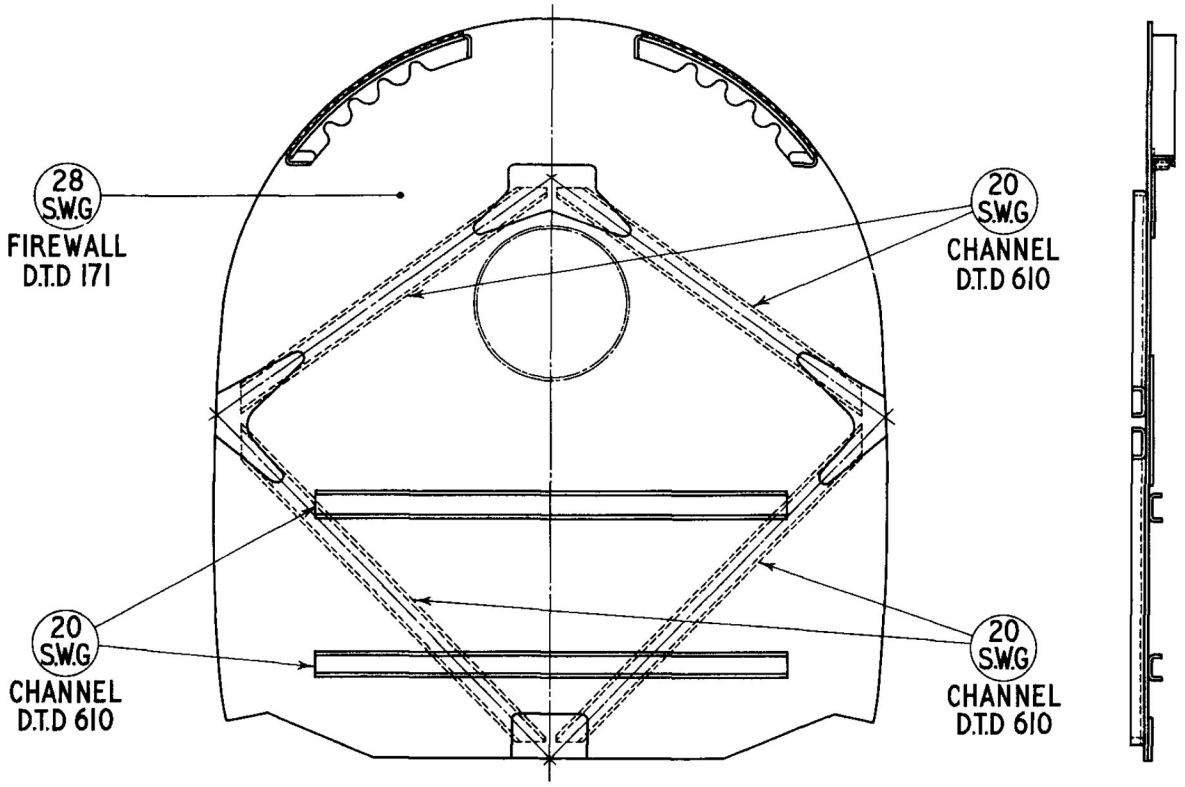
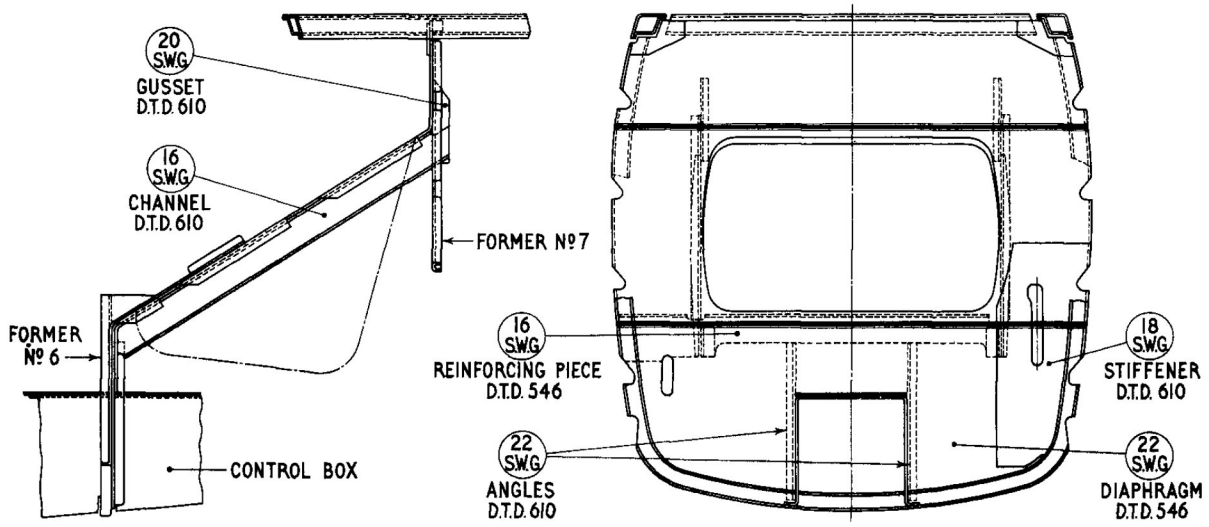


Fig.4/7.Firewall



NOTE. REAR SEAT DIAPHRAGM SHOWN
FRONT SEAT DIAPHRAGM SIMILAR BUT AT MAIN SPAR FRAME AND FORMER 5

Fig.4/8.Seat diaphragms

Firewall and seat diaphragms

9. The channels and angles of these components when damaged more than negligibly should be renewed.

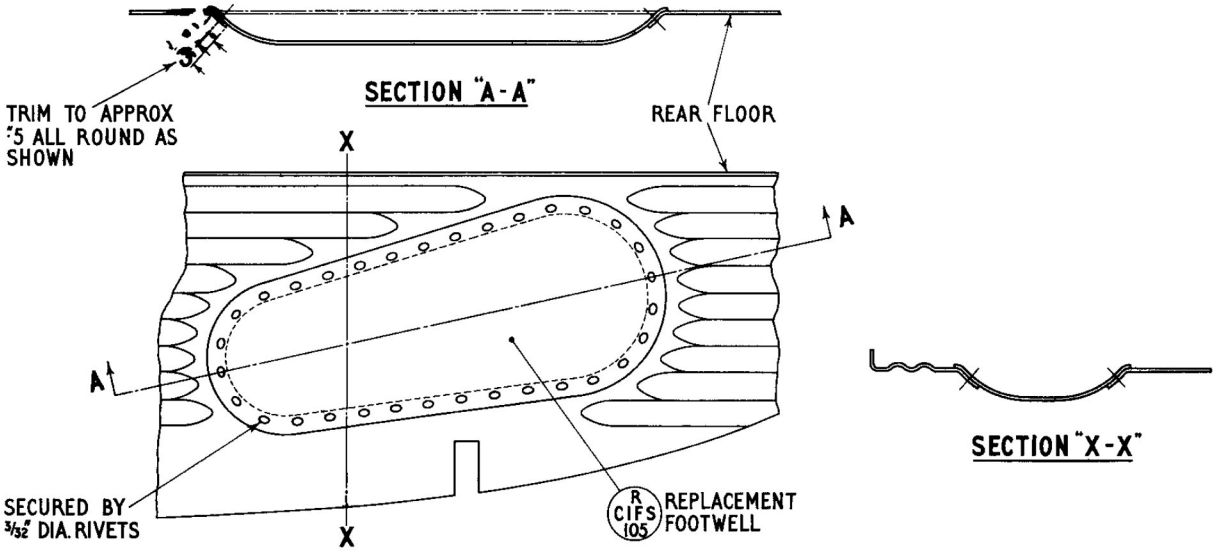


Fig. 4/9. Footwell repair

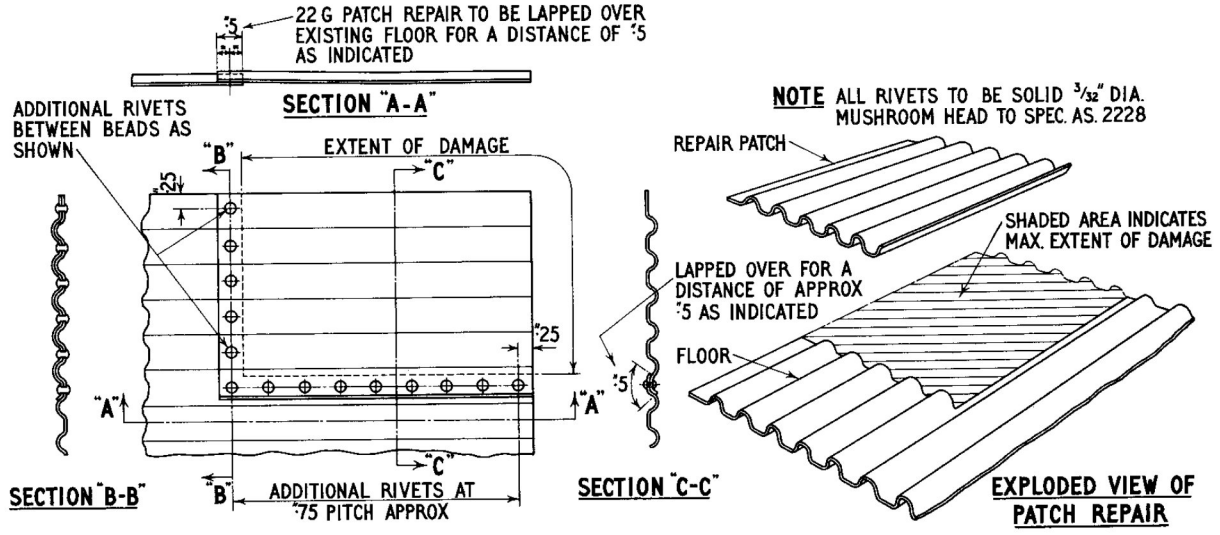


Fig. 4/10. Floor repair

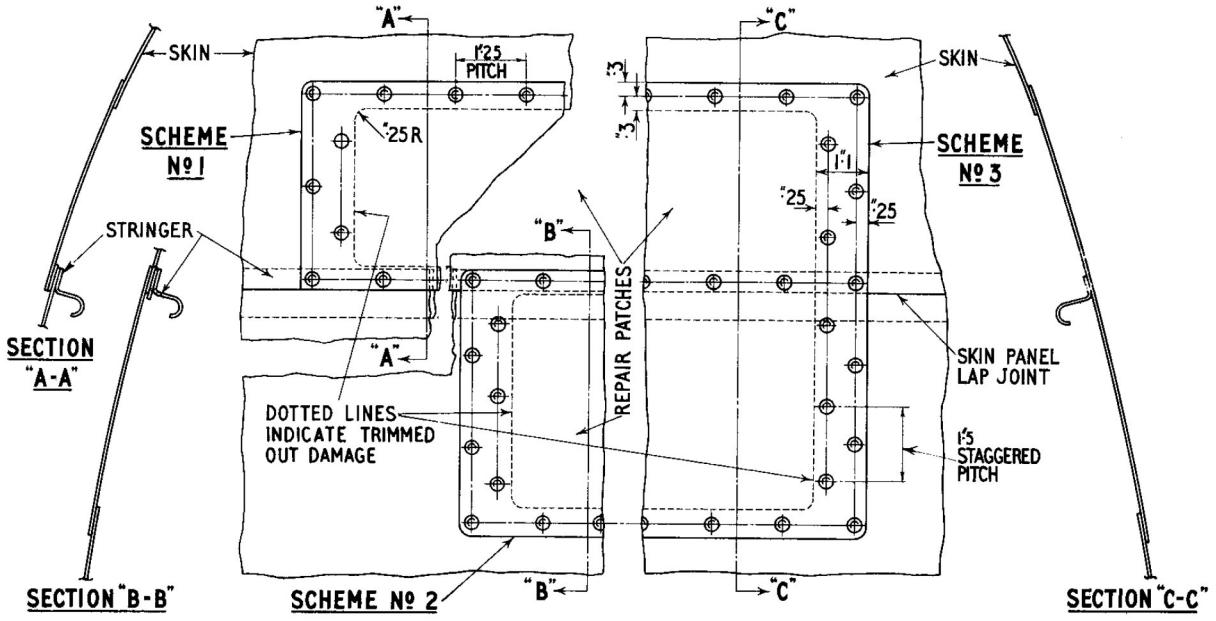


Fig.4/11.Typical skin repairs

Skin repairs

10. Scheme 1 illustrates method of repairing skins where specified in Table 1 when damage occurs above and close to longitudinal skin lap joint.

Scheme 2 illustrates method of repairing skins when damage occurs below and close to longitudinal skin lap joint.

Scheme 3 illustrates method of repairing skins when damage occurs about or clear of a longitudinal skin lap joint, as required.

Schemes 1 and 2 may be combined if areas of damage and sizes of repair material make this desirable.

Apply repair shown in fig.4/12 forward and/or aft of damage adjacent to fuselage joining strips.

These schemes may be adopted to suit other transverse joints provided riveting adheres to the pitches illustrated.

All rivets to be mushroom head to AS.2228. 3/32 in. dia. except when picking up larger existing rivet holes.

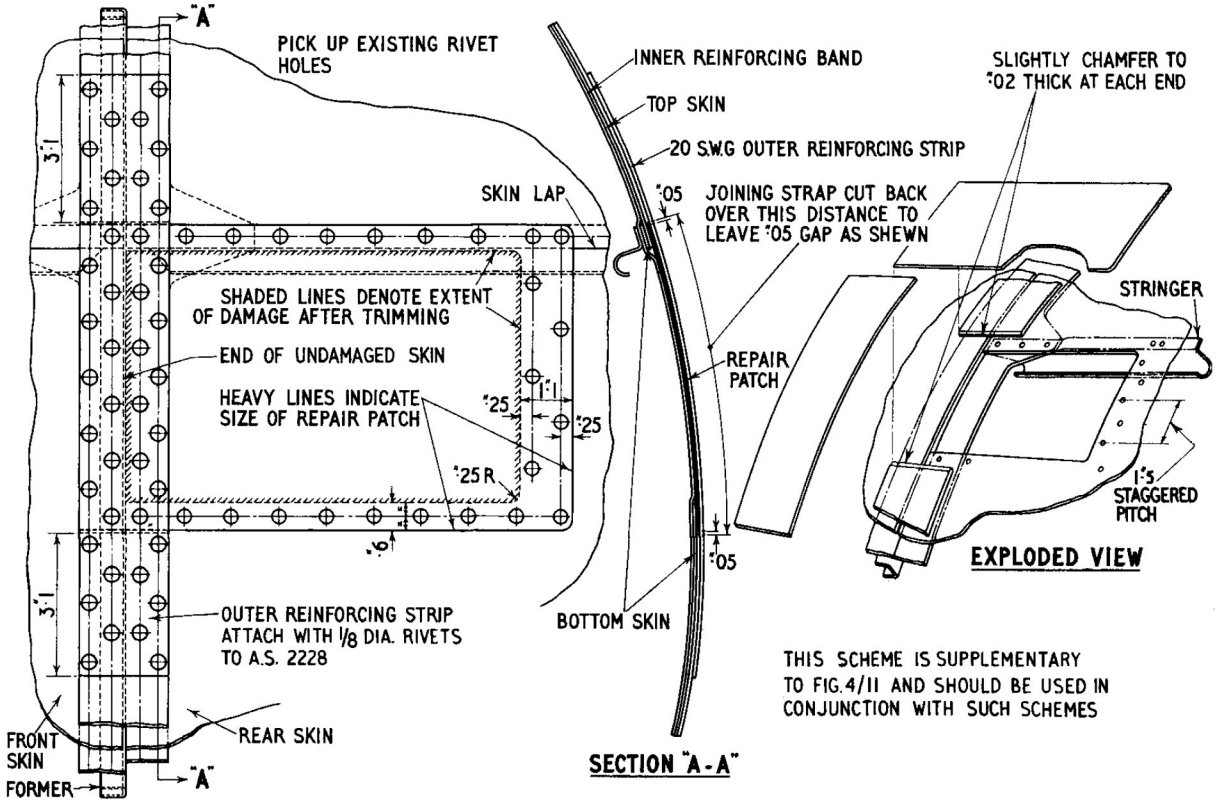
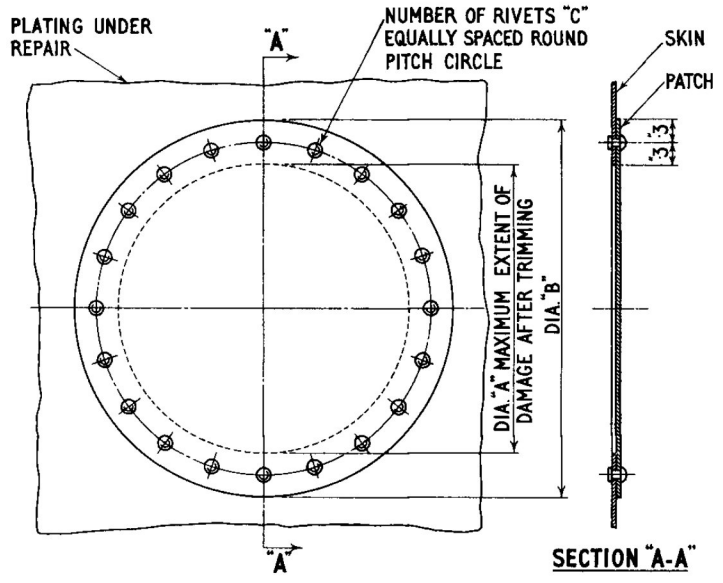


Fig. 4/12. Skin repair at fuselage joint



MAXIMUM DIAMETER OF DAMAGE "A"	DIAMETER OF PATCH "B"	NUMBER OF RIVETS IN PATCH "C"
·50	1·70	4
1·00	2·20	8
1·50	2·70	12
2·00	3·20	16
2·50	3·70	20
3·00	4·20	20
3·50	4·70	24
4·00	5·20	24
4·50	5·70	28
5·00	6·20	32

ALL RIVETS TO BE 3/32 in. DIA. MUSHROOM HEAD ALUMINIUM ALLOY OR CHOBERT DURAL SNAP HEAD 1/8 in. DIA.

Fig. 4/13. Patch repair

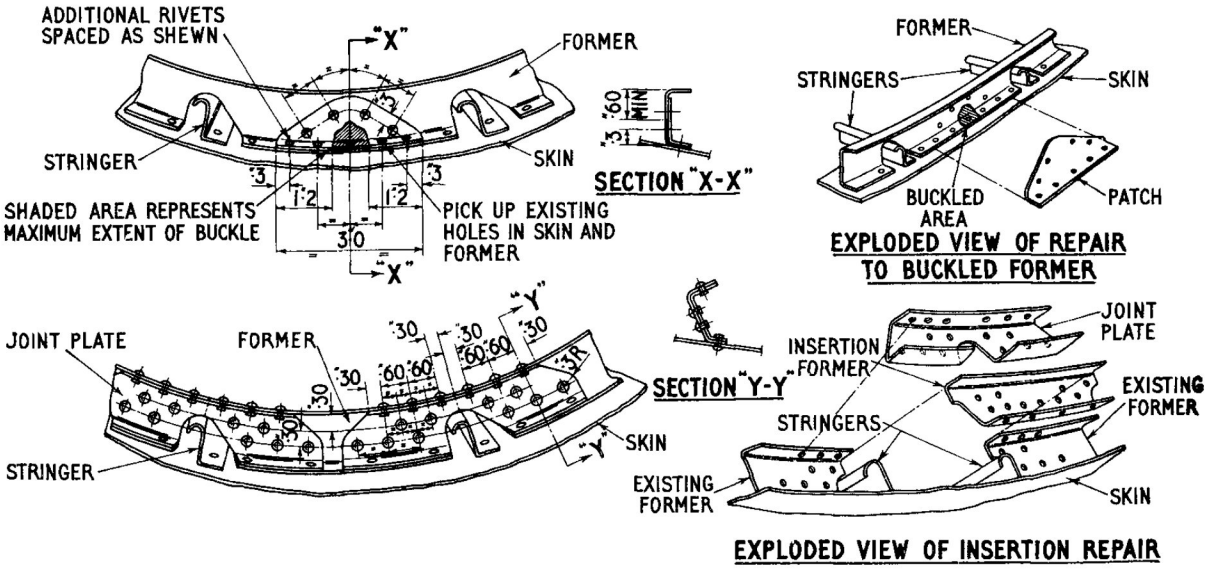


Fig.4/14.Former repair

Former repairs

11. Buckles in formers must always be carefully dressed out before a patch is riveted in position. Insertions, patches and joint plates must be made of the same gauge material and specification as the former under repair. Rivets should be 3/32 in. mushroom head aluminium alloy but, where solid rivets are not practical, use should be made of $\frac{1}{8}$ in. dia. Chobert duralumin rivets.

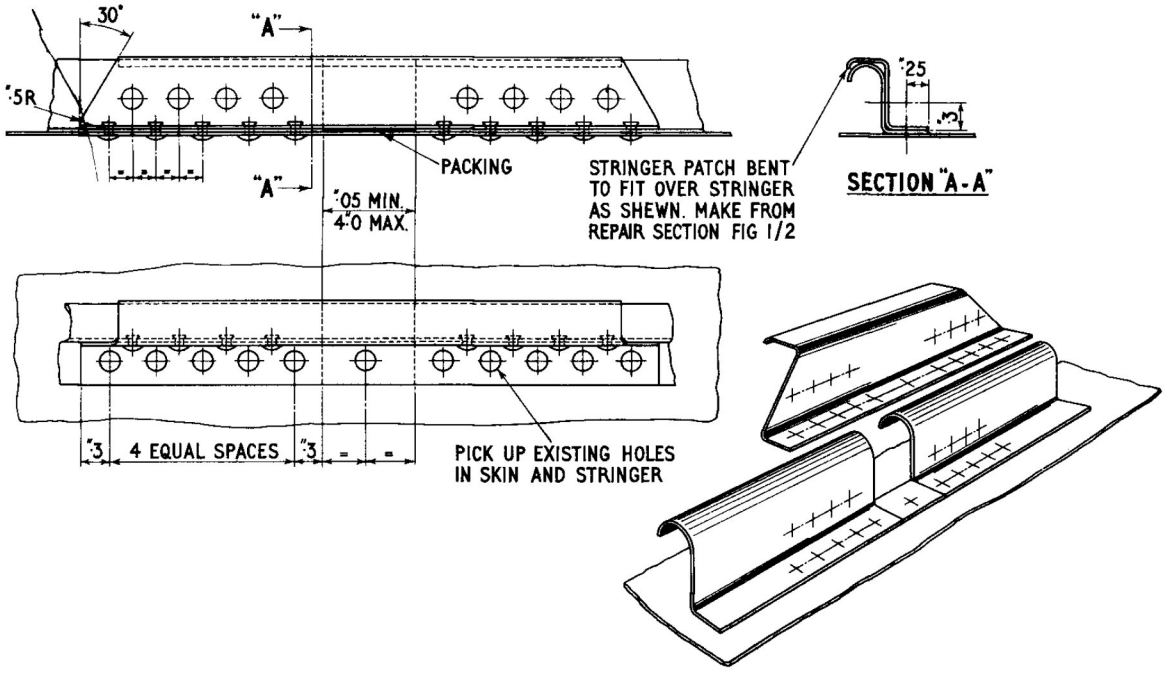


Fig. 4/15. Stringer repair

Stringers

12. Damage over 4 in. in length may be repaired by insertion of a new length of stringer joined to the existing parts with joint plates similar to patch illustrated (0.05 in. gaps).

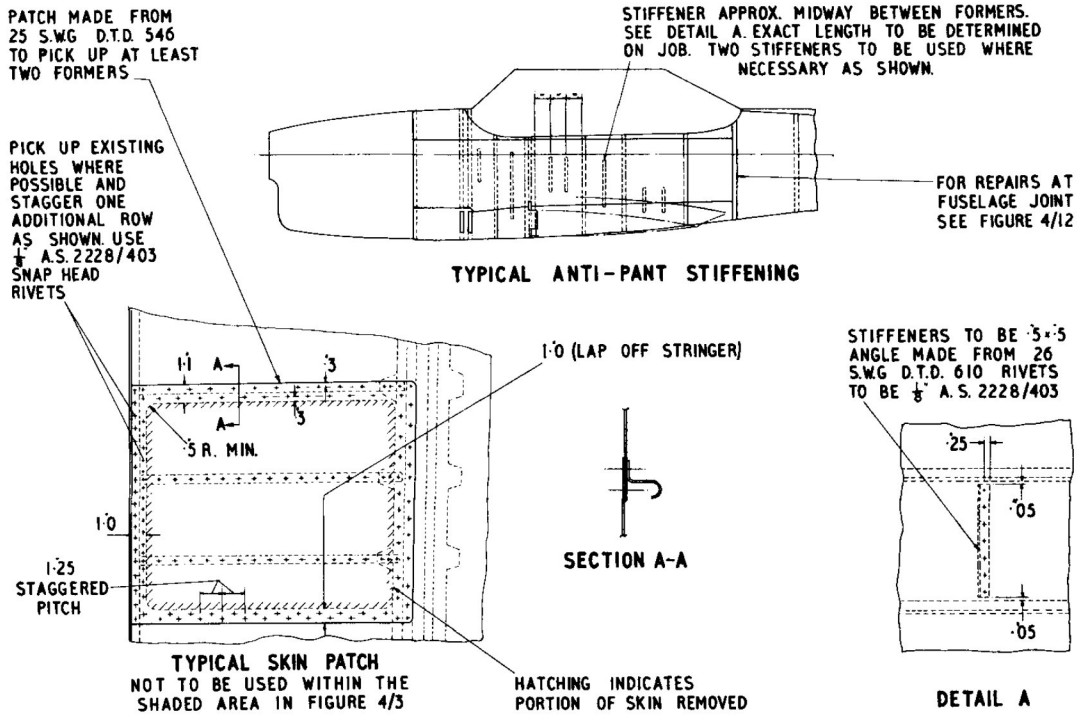


Fig. 4/16. Side and bottom skin repair, formers 1 to 5

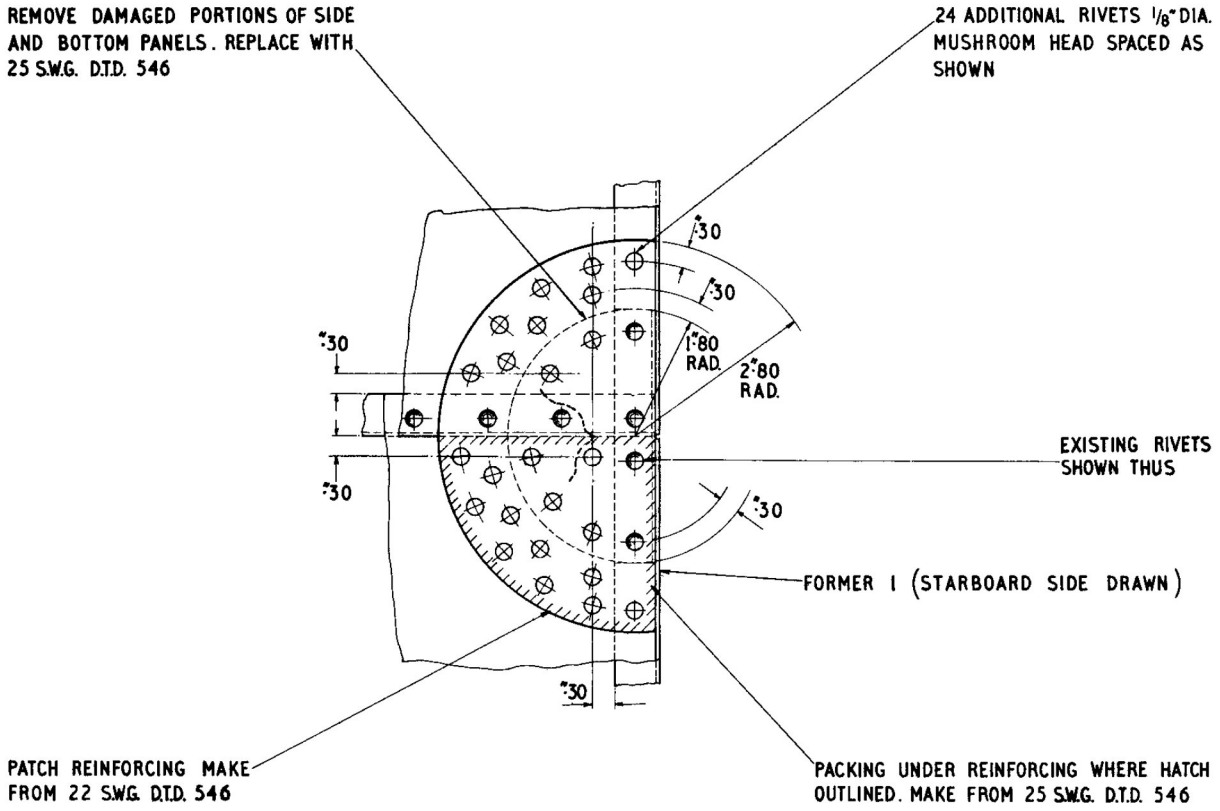


Fig. 4/17. Side to bottom lap skin repair

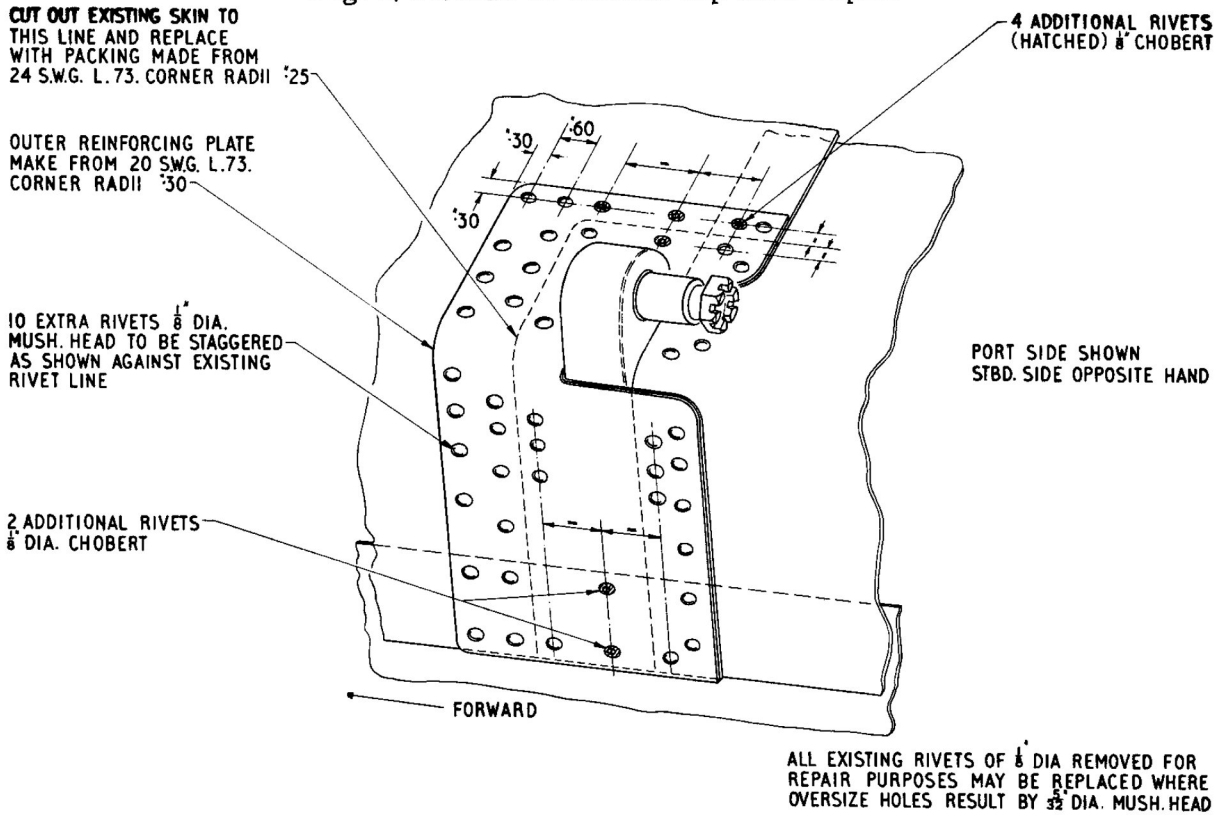


Fig. 4/18. Skin repair at joint E

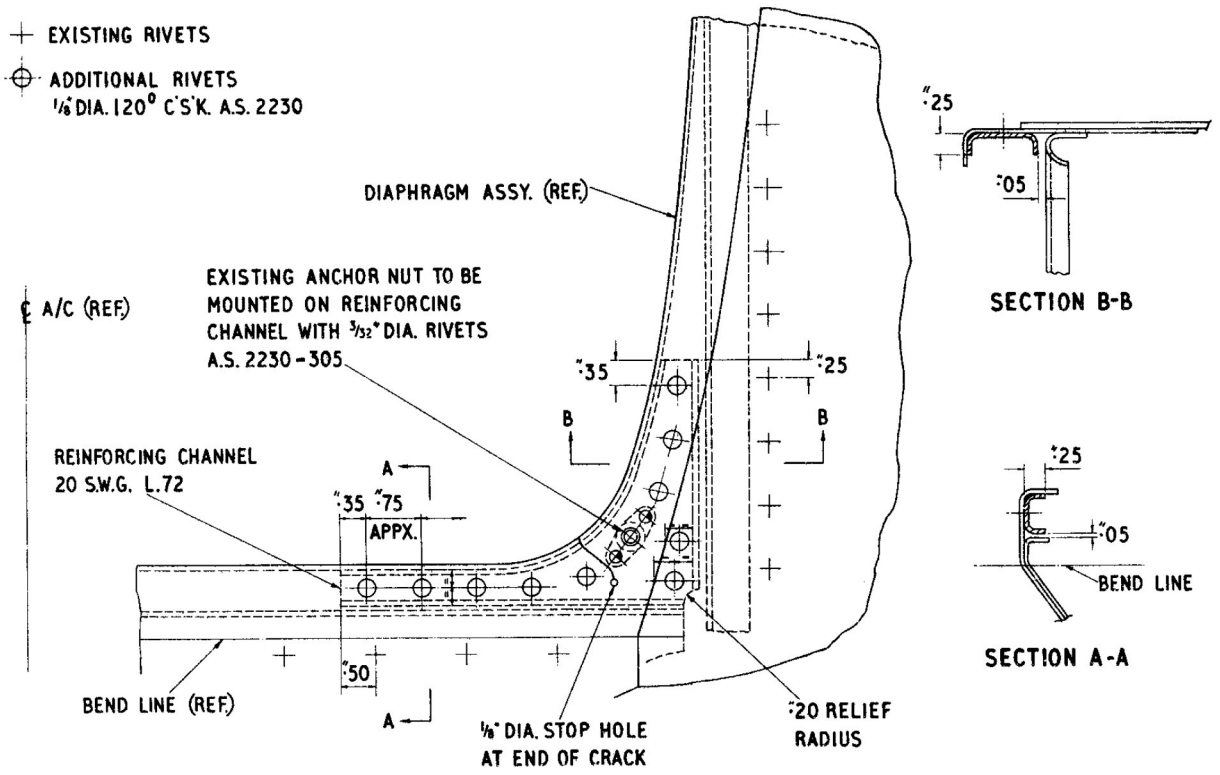


Fig. 4/19. Seat diaphragm repair