

CHAPTER I

CHAP.

1

INTRODUCTORY REPAIR INFORMATION

RESTRICTED

CHAPTER 1 INTRODUCTORY REPAIR INFORMATION

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Dimpling and riveting process for

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Construction

1. The single-seat version of the Hunter is a mid wing aircraft of all-metal construction, powered by one gas turbine-engine. It has swept-back main planes, a variable-incidence swept-back tail-plane, power-assisted aileron and elevator controls and provision for cabin pressurisation. The engine, which is mounted centrally in the fuselage, has a straight-through jet pipe. Twin-air intakes are positioned in the leading edges of the stub wings. On all single-seat aircraft except the GA Mk.11 the guns and ammunition are carried in a detachable armament package in the front fuselage. The aircraft consists of the following main components:-

- (1) Front fuselage, incorporating detachable nosing, cockpit canopy and windscreens.
- (2) Centre fuselage, with short stub wing.
- (3) Rear fuselage, of which the bottom portion of the fin forms an integral part.
- (4) Detachable tail cone.
- (5) Upper portion of fin.

(6) Rudder.

(7) Tail plane complete with elevators.

(8) Main plane complete with ailerons.

(9) Flaps.

(10) Engine mounting.

2. The engine is totally enclosed in the fuselage and access is obtained through the rear transport joint.

3. The tricycle alighting gear is operated hydraulically, the nose wheel retracting forward into the nose portion of the front fuselage, and the main wheels retracting inward into the wings.

Structure classification

4. The structure diagrams which appear in subsequent chapters are coloured to indicate the relative importance of each part of the structure.

LIST OF ILLUSTRATIONS

RED denotes

PRIMARY STRUCTURE

YELLOW denotes

SECONDARY STRUCTURE

The two types of structure are defined as follows:-

- (1) Primary structure: All portions of the structure in which a single failure, whether in flight, landing or take-off might cause structural collapse, loss of control, failure of motive power, unintentional release of bombs, pyrotechnics or any other items of jettisonable equipment, or serious injury to the pilot.
- (2) Secondary structure: (a) Those portions of the structure which would normally be regarded as primary structure but which unavoidably have such a reserve of strength over design requirements that weakening may be permitted without

risk of failure, and (b) structure which, if damaged, would not impair the safety of the aircraft in any manner specified above for primary structure.

Location diagrams

5. Location diagrams in the main chapters show the locations of individual repairs and refer to the appropriate repair illustrations.

Heat treatment of repair materials

6. The only heat treatment necessary when effecting repairs to this aircraft is the normalising of duralumin (L.37) rivets before use, and of light alloy sheet (L.72) prior to forming operations. For further instructions on heat treatment of light alloys, reference should be made to A.P.1464B/3.

Protective coatings

7. Care must be taken to avoid un-necessary damage to protective coatings. If the protective coating is damaged the instructions given in A.P.1464D, Part 2, Sect.1, Chap.1 must be strictly observed.

Support of structure during repair

8. The structure must be adequately supported during repair, unless the repair is a very minor one, so as to relieve the affected and adjacent parts from excessive loads and to prevent further damage. The importance of correct support during the cutting out of damage cannot be over-emphasised, as it is essential to keep the structure in correct alignment during this operation. Trestles for this aircraft will be found listed in Vol.1, whilst details of standard trestles will be found in A.P.1464G, Vol.1, Part 2, Sect.2, Chap.9. When operating on soft ground, support the trestle legs on wood planks.

Removal of Hi-Shear pins

9. Hi-Shear pins should be removed as follows:-

- (1) Carefully chisel off the dural collar taking care not to damage the surrounding structure.
- (2) Lightly tap out the pin, which may be used again if undamaged.

Riveting

10. Details of riveting used on this aircraft are shown in fig.2. Flush riveting must be used for all repairs to external skin surfaces exposed to the airstream. Where semi-tubing (bif) rivets have been removed leaving a dimple in the skin, one of the dimpling tools shown in fig.1 should be used to dimple new parts and to form the existing dimple to suit normal 120 deg. countersunk head rivets. For details of riveting in pressurised areas, reference should be made to Chapter 2 of this volume.

11. Where blind riveting is authorised for repairs to the aircraft, monel Tucker or Avdel rivets should be used. Where the Tucker type of rivets are used break-head type mandrels are normally preferred but the break-stem type may be utilised bearing in mind that the maximum thickness riveted, for rivets of similar length, is 0.02 in. less in the case of the break-stem type. When Tucker rivets are used it is especially important to ensure that the mandrels are removed from the aircraft, particularly where they might short electrical circuits or foul operating mechanisms. In permanently enclosed areas and air intake skins it is advisable to use Avdel rivets, but if the Tucker type is used it should be the break-stem type where the heads are retained in the rivets after clinching. Blind riveting should always be sealed after assembly. Sizes of rivets

available with their part numbers may be found in fig.2.

Distance tubes

12. Distance tubes of the solid drawn type should be used where possible, if these are not available, or where accessibility does not permit the use of the solid drawn type, split-type distance tubes may be used. Drifts for expanding distance tubes are listed in Table 1 and may be used for tubes made from T.1, T.26 or S.510.

Prevention of corrosion

13. Class 1 treatment, as described in A.P.1464D, Vol.1, Part 2, Sect.1, Chap.1, is applicable to this aircraft. When effecting repairs particular care must be exercised to ensure that the original coatings are undamaged and that renewal parts are protected by this treatment. Where lack of facilities prevents Class 1 treatment being given, the best possible substitute must be used; the area so treated must be suitably marked. Corrosion will usually be shown up by cracking of the finish or the finish will flake off when pressed by the finger. When corrosion is detected the area must be carefully examined to determine its full extent.

Drainage holes

14. To ensure adequate drainage of components, it is essential that drainage holes should be provided in any new or repaired part. If these have been "lost" during repair, suitable new holes must be made. It may also be necessary to provide new drainage holes where a repair forms a trap for moisture.

Detection of cracks

15. Particular care is necessary to ensure

that no cracks in a member go undetected. If a crack is suspected the procedure laid down in A.P.880C, Vol.1, should be followed. Where possible, as a temporary measure, small holes should be drilled in the extremities of the cracks to prevent them from spreading.

Dressing of damage

16. Before attempting repairs, damage in the form of holes must be carefully cleaned out to leave a smooth edge and must be free from cracks. Where a hole is not circular or elliptical each corner should be provided with a pronounced radius. Any distortion interfering with a repair patch should be dressed out to provide a good seating for the patch.

Marking out repairs

17. Except for outlines, which may be marked with scribes, all marking out on all alloys used for the repair of airframes is done with a graphite pencil. However, since graphite can cause galvanic corrosion, all traces of pencil line are to be removed when the repair is completed. If it is necessary to delineate a defect such as a crack, where the marking has to remain for more than a few hours, a grease pencil of any colour except black (as this might contain carbon) is to be used.

Repair of plate members

18. Unless otherwise stated, plate members such as flanged ribs may be repaired by riveting a patch over the damaged portion. The patch should be of the same gauge and specification as the part to be repaired, and when applied at, or near, the flanged holes, flanges, or flanged edges it should itself be flanged to restore the original stiffness of the part. In the absence of specific instructions, the rivet pitch should not exceed 1·0 in. and should not be less than 0·7 in., a minimum landing of 2D (where D = dia. of rivet) must be allowed. These instructions only apply to light alloy plate members not exceeding 20 s.w.g.

Modification of parts

19. When fitting a repair patch under an existing bracket or angle, it may be necessary to modify the part to suit the thickness

of the patch; a small bracket may be more easily replaced by a new bracket which incorporates the new allowances. Machined parts must not be modified, and where it is impossible to fit a patch on the opposite side of a damaged panel to that on which the machined part was mounted, the panel should be replaced by a new part extending to the edges of adjacent structural members.

Patch repairs to skins

20. Only flush patches may be used on the external surfaces of this aircraft; all other types are prohibited. All patches must be shaped to conform to the exact contour of the skin, and when dealing with the heavier gauges it is recommended that the patches are cut from pre-formed sheet. On the main plane skin no patch repairs may be carried out within an area of one-third of the chord, measured from the leading edge.

Standard sections

21. Standard sections together with applicable repair sections are shown in fig.3.

Terms of reference

22. The terms of reference for various sections are shown in fig.4.

Limiting conditions

23. The repairs illustrated in this Part are typical repairs and their application may be limited by:-

- (1) Accessibility and position of adjacent structure.
- (2) The amount of sound material left after the damaged portion has been removed; sufficient must be left to allow for adequate fixing of the repair material.

TABLE 1 Standard and Special Tools

Ref.No.	Part No.	Description	Remarks
—	ST.1657/1	Dimpler, 3/32 in. dia. rivets	
—	ST.1657/2	Dimpler, 1/8 in. dia. rivets	
1C/6456	—	Tool, countersinking	
1C/6553	—	Head, riveting, pop, offset c/w C and D type jaws and nose pieces	
1C/6661	—	Head, riveting, pop, midget, c/w C and D type jaws and nose pieces	
—	ST.1312	Head, riveting, c/w retaining spring	
—	ST.1306	Snap, riveting, for csk/hd. rivets below 1/4 in. dia.	
—	ST.1307	Snap, riveting, for csk/hd. rivets 1/4 in. dia. and over	
—	R.526A	Drift, 3/16 in. i/d tube	
—	R.526B	Drift, 1/4 in. i/d tube	
—	R.526C	Drift, 5/16 in. i/d tube	
—	R.526D	Drift, 3/8 in. i/d tube	
—	G.18/1A	Hand ratchet tool, for use with FH.190 Jo-Bolts, standard type AHJO	
1C/7094	—	Adaptor	
1C/7095	—	Nose piece	
			Use with 1C/7088

TABLE 2
Repair Materials

Ref. No.	Part No.	Description	Size	Specn.	Remarks
30B/1738	—	Sheet, aluminium alloy	26 s.w.g.	L.72	
30B/1736	—	Sheet, aluminium alloy	24 s.w.g.	L.72	
30B/1734	—	Sheet, aluminium alloy	22 s.w.g.	L.72	
30B/1732	—	Sheet, aluminium alloy	20 s.w.g.	L.72	
30B/1730	—	Sheet, aluminium alloy	18 s.w.g.	L.72	
30B/1728	—	Sheet, aluminium alloy	16 s.w.g.	L.72	
30B/1726	—	Sheet, aluminium alloy	14 s.w.g.	L.72	
30B/1723	—	Sheet, aluminium alloy	10 s.w.g.	L.72	
30B/1756	—	Sheet, aluminium alloy	14 s.w.g.	L.73	
30B/1754	—	Sheet, aluminium alloy	10 s.w.g.	L.73	
30A/542	—	Sheet, mild steel	14 s.w.g.	S.510	
30A/544	—	Sheet, mild steel	16 s.w.g.	S.510	
30A/2219	—	Sheet, stainless steel	24 s.w.g.	S.520	
30B/NIV	—	Sheet, tungum	20 s.w.g.	D.T.D.283	
30B/887	—	Sheet, tungum	22 s.w.g.	D.T.D.283	
30A/NIV	—	Strip, 0.60 in. wide	14 s.w.g.	S.520	To repair stringer Std.1679
30A/NIV	—	Strip, 0.90 in. wide	12 s.w.g.	S.520	To repair stringer Std.1612/2
—	R.622	Stringer repair section	18 s.w.g.	L.72	To repair stringer Std.1679
—	R.623/1	Stringer repair section	16 s.w.g.	S.520	
—	R.623/2	Stringer repair section	14 s.w.g.	S.520	
—	Std.1679/1	Stringer section	—	—	
—	Std.1612/2	Stringer section	—	—	
—	Std.1612/15	Stringer section	—	—	
—	R.626	Balance weight, rudder	14 s.w.g.	S.510	
—	R.628/12	Balance weight, rudder	12 s.w.g.	S.510	
—	R.628/14	Balance weight, rudder	14 s.w.g.	S.510	
—	R.629/12	Balance weight, rudder	12 s.w.g.	S.510	
—	R.629/14	Balance weight, rudder	14 s.w.g.	S.510	
—	R.630/12	Balance weight, rudder	12 s.w.g.	S.510	
—	R.630/14	Balance weight, rudder	14 s.w.g.	S.510	
—	A.S.164/308	Rivet, csk/hd.	3/32 in.dia.	L.37	
—	A.S.164/404	Rivet, csk/hd.	1/8 in.dia.	L.37	
—	A.S.164/405	Rivet, csk/hd.	1/8 in.dia.	L.37	
—	A.S.164/406	Rivet, csk/hd.	1/8 in.dia.	L.37	
—	A.S.164/505	Rivet, csk/hd.	5/32 in.dia.	L.37	
—	A.S.164/506	Rivet, csk/hd.	5/32 in.dia.	L.37	
—	A.S.161/406	Rivet, csk/hd.	1/8 in.dia.	L.37	
—	A.S.161/506	Rivet, csk/hd.	5/32 in.dia.	L.37	
—	A.S.161/507	Rivet, csk/hd.	5/32 in.dia.	L.37	
—	A.S.161/508	Rivet, csk/hd.	5/32 in.dia.	L.37	

TABLE 2 (continued)

Ref.No.	Part No.	Description	Size	Specification	Remarks
28Q/6134	A.S.161/505	Rivet, csk/hd.	5/32 in.dia.	L.37	
28Q/5994	A.S.161/607	Rivet, csk/hd.	3/16 in.dia.	L.37	
28Q/14500	A.S.161/609	Rivet, csk/hd.	3/16 in.dia.	L.37	
28Q/1660	A.S.156/405	Rivet, sn/hd.	1/8 in.dia.	L.37	
28Q/1661	A.S.156/505	Rivet, sn/hd.	5/32 in.dia.	L.37	
28Q/1671	A.S.156/506	Rivet, sn/hd.	5/32 in.dia.	L.37	
28Q/9701	A.S.156/509	Rivet, sn/hd.	5/32 in.dia.	L.37	
28Q/9417224	A.G.S. 2050/419/BH	Rivet, pop, dm/hd.	1/8 in.dia.	D.T.D.10	
28Q/9417225	A.G.S. 2050/424/BH	Rivet, pop, dm/hd.	1/8 in.dia.	D.T.D.10	
28Q/9417230	A.G.S. 2050/524/BH	Rivet, pop, dm/hd.	5/32 in.dia.	D.T.D.10	
28Q/9417238	A.G.S. 2050/639/BH	Rivet, pop, dm/hd.	3/16 in.dia.	D.T.D.10	
28Q/9417203	A.G.S. 2051/419/BH	Rivet, pop, csk/hd.	1/8 in.dia.	D.T.D.10	
28Q/9417209	A.G.S. 2051/524/BH	Rivet, pop, csk/hd.	5/32 in.dia.	D.T.D.10	
28Q/9417202	A.G.S. 2051/413/BH	Rivet, pop, csk/hd.	1/8 in.dia.	D.T.D.10	
28Q/9417208	A.G.S. 2051/519/BH	Rivet, pop, csk/hd.	5/32 in.dia.	D.T.D.10	
28Q/9417214	A.G.S. 2051/624/BH	Rivet, pop, csk/hd.	3/16 in.dia.	D.T.D.10	
28Q/9417217	A.G.S. 2051/639/BH	Rivet, pop, csk/hd.	3/16 in.dia.	D.T.D.10	
26FX/4428	R.625	Bolt, special	1/4 in.dia.	S.95.B.	
28M/9435068	A.G.S. 2008/E/1	Nut, anchor	1/4 in.B.S.F.		
30B/NIV	—	Tube, tungum	20 s.w.g. × 1/4 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	20 s.w.g. × 1.3/4 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	20 s.w.g. × 2 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 3/16 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 1/4 in. o/d.	D.T.D.253	
30B/796	—	Tube, tungum	22 s.w.g. × 5/16 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 3/8 in. o/d.	D.T.D.253	

Fuel system
pipe lines

TABLE 2 (continued)

Ref.No.	Part No.	Description	Size	Specification	Remarks
30B/NIV	—	Tube, tungum	22 s.w.g. × 5/8 in. o/d.	D.T.D.253	
30B/802	—	Tube, tungum	22 s.w.g. × 3/4 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 7/8 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 1.0 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 1.1/4 in.o/d.	D.T.D.253	Fuel system pipe lines
30B/822	—	Tube, tungum	22 s.w.g. × 1.1/2 in.o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 1.3/4 in.o/d.	D.T.D.253	
30B/1633	—	Tube, aluminium	20 s.w.g. × 1/4 in. o/d.	L.54	
30B/NIV	—	Tube, aluminium	17 s.w.g. × 1.3/4 in.o/d.	L.54	
30B/2187	—	Tube, tungum	20 s.w.g. × 1/2 in. o/d.	D.T.D.323	
30B/2191	—	Tube, tungum	20 s.w.g. × 3/4 in. o/d.	D.T.D.323	
30B/2176	—	Tube, tungum	22 s.w.g. × 3/16 in.o/d.	D.T.D.323	
30B/2179	—	Tube, tungum	22 s.w.g. × 1/4 in. o/d.	D.T.D.323	Hydraulic and
30B/2184	—	Tube, tungum	22 s.w.g. × 3/8 in. o/d.	D.T.D.323	pneumatic system
30B/2188	—	Tube, tungum	22 s.w.g. × 1/2 in. o/d.	D.T.D.323	pipe lines
30B/1615	—	Tube, monel	20 s.w.g. × 1/2 in. o/d.	D.T.D.477	
30B/NIV	—	Tube, monel	20 s.w.g. × 3/4 in. o/d.	D.T.D.477	
30B/1327	—	Tube, monel	22 s.w.g. × 3/16 in.o/d.	D.T.D.477	
30B/1614	—	Tube, monel	22 s.w.g. × 1/4 in. o/d.	D.T.D.477	
30B/1400	—	Tube, monel	22 s.w.g. × 3/8 in. o/d.	D.T.D.477	

Note . . .

When ordering tube for use in hydraulic and pneumatic systems, a test pressure of 4,500 lb. per sq.in. must be quoted for pressure pipes.

TABLE 2 (continued)

Ref.No.	Part No.	Description	Size	Specification	Remarks
30B/NIV	—	Tube, tungum	20 s.w.g. × 1 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 3/16 in.o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 1/4 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 3/8 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 1 in. o/d.	D.T.D.253	
30B/NIV	—	Tube, tungum	22 s.w.g. × 1 1/4 in.o/d.	D.T.D.253	Cabin pressurising and air conditioning system pipe lines
30B/822	—	Tube, tungum	22 s.w.g. × 1 1/2 in.o/d.	D.T.D.253	
30B/1659	—	Tube, aluminium	20 s.w.g. × 1 in. o/d.	L.54	
30B/1662	—	Tube, aluminium	20 s.w.g. × 1 1/2 in.o/d.	L.54	
30B/1663	—	Tube, aluminium	22 s.w.g. × 1 1/2 in.o/d.	L.54	
30B/NIV or /2176	—	Tube, tungum	22 s.w.g. × 3/16 in.o/d.	D.T.D.253 or D.T.D.323	
30B/NIV or /2179	—	Tube, tungum	22 s.w.g. × 1/4 in. o/d.	D.T.D.253 or D.T.D.323	De-icing system pipe lines
30B/NIV or /2188	—	Tube, tungum	22 s.w.g. × 1/2 in. o/d.	D.T.D.253 or D.T.D.323	
30B/522	—	Tube, copper or		T.51	
30B/NIV	—	Tube, tungum or	16 s.w.g. × 3/16 in.o/d.	D.T.D.323	
30B/NIV	—	Tube, monel		D.T.D.477	
30B/1122	—	Tube, copper or		T.51	
30B/2176	—	Tube, tungum or	22 s.w.g. × 3/16 in.o/d.	D.T.D.323	Oxygen system pipe lines
30B/1327	—	Tube, monel		D.T.D.477	
30B/1637	—	Tube, aluminium	22 s.w.g. × 5/16 in.o/d.	L.54	

TABLE 2 (continued)

Ref. No.	Part No.	Description	Size	Specification	Remarks
30B/1195	—	Tube, aluminium	22 s.w.g. × 5/16 in.o/d.	L.56	Oxygen system pipe lines
30B/838	—	Tube, tungum	22 s.w.g. × 3/16 in.o/d.	D.T.D.323	
30B/839	—	Tube, tungum	22 s.w.g. × 1/4 in. o/d.	D.T.D.323	Anti-G system pipe lines
◀ 30B/1649	—	Tube, aluminium	20 s.w.g. × 5/8 in. o/d.	L.54	
30A/NIV	—	Tube, stainless steel	20 s.w.g. × 3/4 in. o/d.	T.55	
30A/NIV	—	Tube, stainless steel	22 s.w.g. × 3/4 in. o/d.	T.55	Fire extinguishing system pipe lines
30A/NIV	—	Tube, stainless steel	22 s.w.g. × 1 in. o/d.	T.58	
30A/NIV	—	Tube, stainless steel	22 s.w.g. × 3/16 in.o/d.	T.58	
30A/NIV	—	Tube, stainless steel	22 s.w.g. × 1/4 in. o/d.	T.58	Fuel filter de-icing system pipe lines
30A/NIV	—	Tube, stainless steel	22 s.w.g. × 3/8 in. o/d.	T.58	
30A/NIV	—	Tube, stainless steel	22 s.w.g. × 5/8 in. o/d.	D.T.D.207 or T.55	
30A/NIV	—	Tube, stainless steel	22 s.w.g. × 3/4 in. o/d.	D.T.D.207 or T.55	
30B/1633	—	Tube, aluminium	20 s.w.g. × 1/4 in. o/d.	L.54	Liquid fuel starter system pipe lines
30B/1649	—	Tube, aluminium	20 s.w.g. × 5/8 in. o/d.	L.54	
30B/1631	—	Tube, aluminium	22 s.w.g. × 3/16 in.o/d.	L.54	

TABLE 3

Alternative materials

This table gives alternative specifications or part numbers of fully interchangeable materials or parts which it may be found necessary to use when repairing or reconditioning this aircraft. In some cases the alternatives may be obsolescent but may be utilised if stocks are available. Reference numbers may be found in the appropriate section of A.P.1086.

Part No. or Specification	Description	Alternative
Aluminium alloy		
D.T.D.546	Sheet, aluminium alloy	L.73
D.T.D.610	Sheet, aluminium alloy	L.72, D.T.D.390
D.T.D.364	Bar, aluminium alloy	L.65C
Sect.3		
Steel		
S.92B	Bar, steel, 40 ton	D.T.D.126, Sect.3
S.93B	Bar, steel, 35 ton	S.6B
S.94B	Bar, steel, 55 ton	S.11B, S.69B D.T.D.188, Sect.3 D.T.D.600
S.95B	Bar, steel, 55 ton	S.11B, S.69B D.T.D.188, Sect.3 D.T.D.600,
S.96B	Bar, steel, 55 ton	S.11B, S.69B D.T.D.188, Sect.3 D.T.D.600
S.80B	Bar, steel, 55 ton, corrosion resisting	D.T.D.463, Sect.3
S.97B	Bar, steel, 65 ton	S.65B, S.81B
S.98B	Bar, steel, 75 ton	D.T.D.473, Sect.3
S.99B	Bar, steel, 80 ton	D.T.D.331, Sect.3
S.510	Sheet, mild steel	S.3
S.520	Sheet, stainless steel	D.T.D.166
S.521	Sheet, stainless steel	D.T.D.171
Bolts		
A.25	Bolts, H.T.S., hex/hd.	A.15Y
A.28	Bolts, light alloy, hex/hd.	A.17
A.57	Bolts, H.T.S., shear	A.G.S.571
A.26	Bolts, H.T. stainless, hex/hd.	A.15.Z

TABLE 3 — *continued*

Part No. or Specification	Description	Alternative
Nuts		
A.27	Nuts, medium tensile steel	A.16.Y
A.24	Nuts, H.T. stainless	A.16.Z
A.29	Nuts, light alloy	A.18
A.58	Nuts, medium tensile steel, shear	A.G.S.572
Screws		
A.31	Screws, steel, ch/hd.	A.G.S.247, B.S.57/42
A.32	Screws, steel, rd/hd.	A.G.S.245, B.S.57/32
A.33	Screws, steel, csk/hd.	A.G.S.249, B.S.57/22
A.35	Screws, stainless steel, ch/hd.	A.G.S.896
A.36	Screws, stainless steel, rd/hd.	A.G.S.967
A.37	Screws, stainless steel, csk/hd.	A.G.S.968
A.40	Screws, aluminium alloy, rd/hd.	A.G.S.564
A.43	Screws, brass, ch/hd.	A.G.S.246, B.S.57/41
A.44	Screws, brass, rd/hd.	A.G.S.244, B.S.57/31
A.45	Screws, brass, csk/hd.	A.G.S.248, B.S.57/21
Washers		
S.P.13	Washers, steel	A.G.S.160
S.P.14	Washers, stainless steel	A.G.S.946
S.P.15	Washers, aluminium alloy	A.G.S.970, A.S.470
S.P.16	Washers, aluminium alloy	A.S.471
S.P.18	Washers, steel	A.G.S.157, A.G.S.161
S.P.19	Washers, stainless steel	A.G.S.947
S.P.42	Washers, tab	A.G.S.518
S.P.47	Washers, single spring, steel	A.G.S.162, A.G.S.585
Rivets		
A.G.S.2050	Rivets, pop, monel, dm/hd.	TLP/D, A.G.S.2040
A.G.S.2051	Rivets, pop, monel, csk/hd.	TLP/K, A.G.S.2041
Split pins		
S.P.9	Split pins, nickel alloy	A.G.S.166, A.G.S.784
Hose clips		
A.G.S.605	Hose clips (Jubilee type)	A.G.S.1000

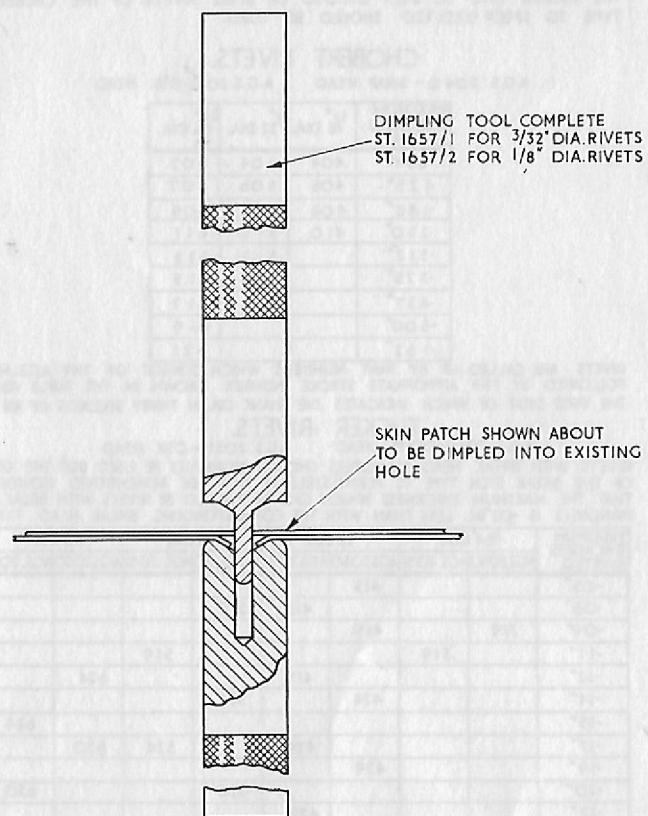
TABLE 4. LIMITS FOR HOLES

Size	Clearance hole inclusive of clearance	Drill size for blind rivets	Drill size for solid rivets	Standard hole (Hawker limit)	Fit C hole (Hawker limit)	Fit B hole (Newall limit)	Fit A hole (Newall limit)
1/16 in.	Morse No. 51			1/16 in.	+0.003 in. -0.000 in.		
3/32 in.	Morse No. 40	Morse No. 41	Morse No. 40	3/32 in.	+0.003 in. -0.000 in.		
7/64 in.	Morse No. 33	Morse No. 33		7/64 in.	+0.003 in. -0.000 in.		
6 B.A. = 0.1102 in.	Morse No. 32				Morse No. 33		
					+0.003 in. =0.113 in. -0.000 in.		
1/8 in.	Morse No. 30	Morse No. 30	Morse No. 30	1/8 in.	+0.003 in. -0.000 in.		
4 B.A. = 0.1417 in.	Morse No. 25				Morse No. 27		
					=0.144 in. -0.000 in.		
5/32 in.	Morse No. 21	Morse No. 20	Morse No. 21	5/32 in.	+0.003 in. -0.000 in.	5/32 in.	+0.0015 in. -0.0000 in.
2 B.A. = 0.185 in.	Morse No. 10			3/16 in.	+0.003 in. -0.000 in.	Morse No. 13	+0.0015 in. =0.185 in. -0.0000 in.
3/16 in.	Morse No. 10	Morse No. 11	Morse No. 10	3/16 in.	+0.003 in. -0.000 in.	3/16 in.	+0.0015 in. -0.0000 in.
7/32 in.	1/64 in. over nominal size			Morse No. 1			
7/32 in. to 1/4 in.							
1/4 in.		1/4 in.	Letter F		+0.005 in. -0.000 in.	+0.002 in. -0.000 in.	
1/4 in. to 5/16 in.							
5/16 in.	Letter O	Letter O					

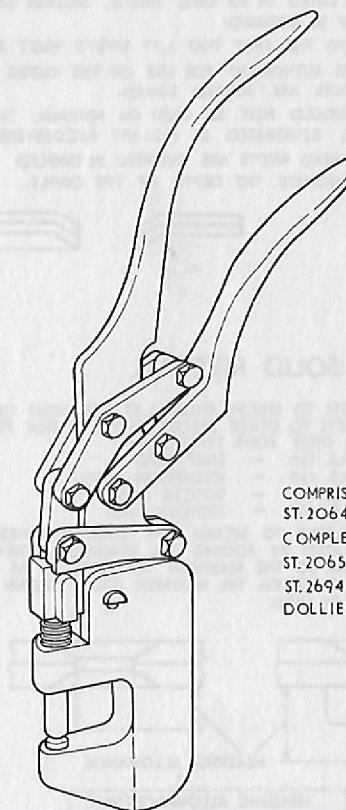
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Table 4 (continued)

Size	Clearance hole inclusive of clearance	Drill size for blind rivets	Drill size for solid rivets	Standard hole (Hawker limit)	Fit C hole (Hawker limit)	Fit B hole (Newall limit)	Fit A hole (Newall limit)
5/16 in. to 3/8 in.							
3/8 in.	1/64 in. over nominal size	Letter V	Letter W	+0.005 in. -0.000 in.	+0.002 in. -0.000 in.	±0.0005 in.	±0.00025 in.
13/32 in. to 1/2 in.				+0.007 in. -0.000 in.	+0.003 in. -0.000 in.		
17/32 in. to 1 in.				+0.010 in. -0.000 in.	+0.004 in. -0.000 in.	+0.00075 in. -0.0005 in.	+0.00050 in. -0.00025 in.
1,1/16 in. to 2 in.	1/32 in. over nominal size			+0.010 in. -0.000 in.	+0.004 in. -0.000 in.	+0.0010 in. -0.0005 in.	+0.00075 in. -0.00025 in.
2,1/16 in. to 3 in.				+0.015 in. -0.000 in.	+0.005 in. -0.000 in.	+0.00125 in. -0.00075 in.	
3,1/16 in. to 4 in.				+0.020 in. -0.000 in.	+0.006 in. -0.000 in.	+0.00150 in. -0.00075 in.	+0.0010 in. -0.0005 in.
4,1/16 in. to 5 in.	1/16 in. over nominal size			+0.020 in. -0.000 in.	+0.007 in. -0.000 in.	+0.00175 in. -0.00075 in.	
5,1/16 in. to 6 in.				+0.020 in. -0.000 in.	+0.008 in. -0.000 in.	+0.0020 in. -0.0010 in.	+0.0015 in. -0.0005 in.



HAND DIMPLER



HAND TOGGLE DIMPLING TOOL

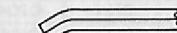
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1 DRILL HOLE MORSE N^o 40 FOR $\frac{1}{8}$ " DIA.
RIVETS OR MORSE N^o 50 FOR $\frac{3}{32}$ " DIA.
RIVETS



2 DIMPLE HOLE WITH APPROPRIATE TOOL
SHOWN ABOVE



3 CLEAN OUT HOLE WITH MORSE N^o 30
DRILL FOR $\frac{1}{8}$ " DIA. RIVETS AND MORSE
N^o 40 DRILL FOR $\frac{3}{32}$ " DIA. RIVETS.
INSERT 120° C SK. HEAD RIVETS IN THE
NORMAL MANNER

NOTES

THIS DIMPLING PROCESS SHOULD BE USED WHERE THE SKIN IS TOO THIN TO PERMIT
THE USE OF CUT-COUNTERSINKING. CUT-COUNTERSINKING SHOULD NOT BE EMPLOYED
ON MATERIAL THINNER THAN 20 SW.G. FOR $\frac{1}{8}$ " DIA. RIVETS OR 22 SW.G. FOR $\frac{3}{32}$ " DIA.
RIVETS

WHERE SEMI-TUBULAR RIVETS HAVE BEEN REMOVED HOLES SHOULD BE DIMPLED IN
A SIMILAR MANNER TO THAT SHOWN ABOVE AND SUITABLE 120° C SK. HEAD RIVETS INSERTED

FIG. I. DIMPLING AND RIVETING PROCESS FOR SKIN PATCH REPAIRS

GENERAL NOTES ON RIVETING.

1. RIVETS WILL BE FOUND LISTED IN A.P.1086, PART 12, SECTION 28Q FROM WHICH THE APPROPRIATE REFERENCE NUMBERS MAY BE OBTAINED.
2. ATTENTION IS DRAWN TO THE FACT THAT L.37 RIVETS MUST BE NORMALISED.
3. WHERE BLIND RIVETS ARE AUTHORISED FOR USE ON THE OUTER SURFACE CARE MUST BE TAKEN TO ENSURE THAT THE RIVETS ARE SUITABLY SEALED.
4. CUT-COUNTERSINKING SHOULD NOT BE USED ON MATERIAL THINNER THAN 20 SWG. DIMPLED HOLES FORMED BY THE TOOLS ILLUSTRATED IN FIG.1 ARE RECOMMENDED FOR THESE THIN GAUGE SKINS.
5. WHERE COUNTERSUNK HEAD RIVETS ARE INSERTED IN DIMPLED HOLES THE MAXIMUM THICKNESS TO BE RIVETED MUST INCLUDE THE DEPTH OF THE DIMPLE.



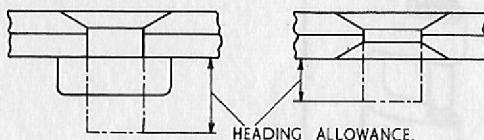
THICKNESS TO BE RIVETED.

SOLID RIVETING.

FOUR MAIN TYPES OF RIVETS TO SPECIFICATION L.37 ARE USED ON THIS AIRCRAFT. THE USE OF RIVETS TO OTHER SPECIFICATIONS IS NOT PERMITTED UNLESS OTHERWISE STATED. THESE FOUR TYPES ARE:-

- A.S. 156 — SNAP HEAD.
- A.S. 158 — MUSHROOM HEAD.
- A.S. 161 — 90°CSK HEAD.
- A.S. 164 — 120°CSK HEAD.

THE LENGTH OF RIVET REQUIRED TO SECURE ANY GIVEN THICKNESS OF MATERIAL MAY BE CALCULATED BY ADDING THE HEADING ALLOWANCE GIVEN IN THE TABLE BELOW TO THE MAXIMUM THICKNESS TO BE RIVETED. WHEN CALCULATING THIS THICKNESS THE MAXIMUM GAUGE SHOWN IN THE ADJACENT TABLE SHOULD BE USED.



RIVET DIA.	HEADING ALLOWANCE (INS.)	
	SNAP HEAD.	CSK. HEAD.
1/16"	.08	.05
3/32"	.12	.07
1/8"	.16	.09
5/32"	.20	.12
7/32"	.24	.14
1/4"	.28	.16
5/16"	.32	.19
3/8"	.40	.23
	.49	.28

RIVETS ARE CALLED UP BY PART NUMBERS WHICH CONSIST OF THE A.S. TYPE NUMBER FOLLOWED BY A STROKE NUMBER THE FIRST DIGIT OF WHICH IS THE SHANK DIA. IN THIRTY-SECONDS OF AN INCH AND THE NEXT TWO DIGITS THE LENGTH IN SIXTEENTHS OF AN INCH.
E.G. A.S. 156/405 IS A 1/8 IN. DIA. SNAP HEAD L.37 RIVET 5/16 IN. LONG.

BLIND RIVETING.

WHERE THE USE OF BLIND RIVETING IS AUTHORISED MONEL RIVETS OF THE TUCKER TYPE TO SPEC^H D.T.D.10 OR STEEL RIVETS OF THE CHOBERT TYPE TO SPEC^H D.T.D.720 SHOULD BE USED.

CHOBERT RIVETS.

A.G.S. 2040 - SNAP HEAD A.G.S 2041 - C'SK HEAD

MAXIMUM THICKNESS RIVETED	1/8 DIA.	5/32 DIA.	3/16 DIA.
.064"	404	504	605
.125"	406	506	607
.188"	408	508	609
.250"	410	510	611
.312"		512	613
.375"		514	615
.437"			617
.500"			619
.562"			621

RIVETS ARE CALLED UP BY PART NUMBERS WHICH CONSIST OF THE A.G.S. NUMBER FOLLOWED BY THE APPROPRIATE STROKE NUMBER SHOWN IN THE TABLE ABOVE, THE FIRST DIGIT OF WHICH INDICATES THE SHANK DIA. IN THIRTY SECONDS OF AN INCH.

TUCKER RIVETS.

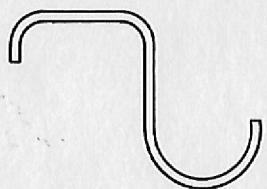
A.G.S. 2050 - DOME HEAD A.G.S. 2051 - C'SK HEAD

RIVETS WITH BREAK HEAD MANDRELS SHOULD NORMALLY BE USED BUT THE USE OF THE BREAK STEM TYPE IS PERMISSIBLE. IT MUST BE REMEMBERED HOWEVER THAT THE MAXIMUM THICKNESS WHICH CAN BE RIVETED BY RIVETS WITH BREAK STEM MANDRELS IS .02" IN. LESS THAN WITH THE CORRESPONDING BREAK HEAD TYPE.

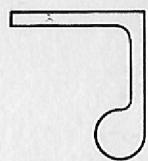
MAXIMUM THICKNESS RIVETED	7/64 DIA.	1/8 DIA.	5/32 DIA.	3/16 DIA.
A.G.S 2050	A.G.S 2051	A.G.S 2050	A.G.S 2051	A.G.S 2050
.05"		413		
.08"			413	519
.09"	319	419		
.11"	319			519
.12"		419		
.14"		424	524	
.15"				624
.17"		424	524	630
.19"		429		
.20"			530	
.22"		429		
.23"			530	636
.25"		435	537	639
.26"				636
.28"		435	537	639
.29"			540	
.30"		440		
.32"			540	
.33"		440		
.34"			545	
.36"				650
.37"				545
.39"				650
.51"				665
.54"				665

RIVETS ARE CALLED UP BY PART NUMBERS WHICH CONSIST OF THE A.G.S. NUMBER FOLLOWED BY THE APPROPRIATE STROKE NUMBER SHOWN IN THE TABLE ABOVE, THE FIRST DIGIT OF WHICH INDICATES THE SHANK DIA. IN THIRTY-SECONDS OF AN INCH. THE MAX THICKNESSES RIVETED SHOWN ABOVE ARE WITH BREAK HEAD MANDRELS.

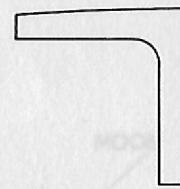
FIG. 2. RIVETING.



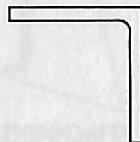
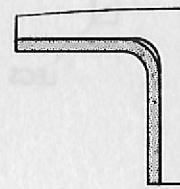
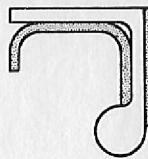
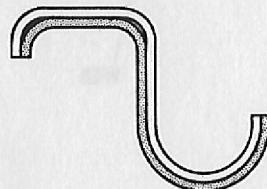
STD. 1224



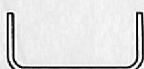
STD. 1679/1



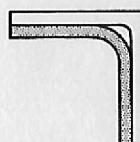
STD. 1612/2



STD. 953 AND
PT. N° D.179955-8 ITEMS I

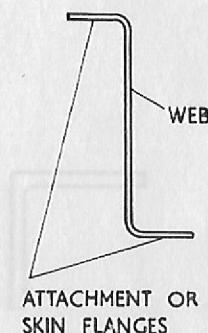
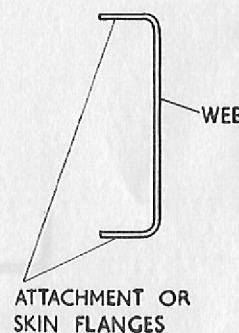
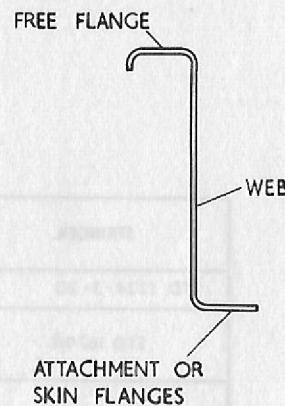
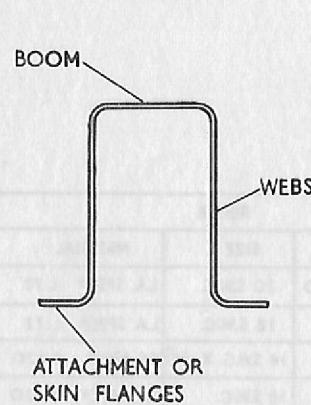
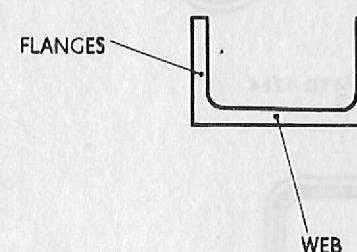
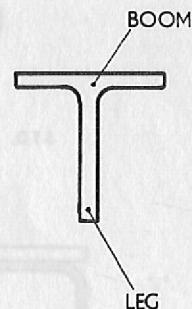
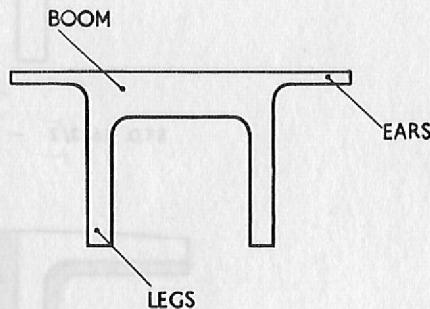


PT N° C.183884-5 B.184991-2
C.188397-9 C.188401-3 & C.217236-42



STRINGER.	REPAIR		
	SECTION	SIZE	MATERIAL
STD. 1224-3-2O	R.612-2O	2O S.W.G.	L.A. SPEC ^N L.72
STD. 1679/1	R.622.	18 S.W.G.	L.A. SPEC ^N L.72
	S.S. STRIP.	14 S.W.G. X 60"	S.S. SPEC ^N S.52O
STD. 1612/2	R.623-1	16 S.W.G.	S.S. SPEC ^N S.52O
	S.S. STRIP	12 S.W.G. X 90"	S.S. SPEC ^N S.52O
STD. 953	R.623-3	16 S.W.G.	S.S. SPEC ^N S.52O
PT. N° D.179955-8 ITEMS I	R.623-2	14 S.W.G.	S.S. SPEC ^N S.52O
PT N° C.183884-5 C.188397-9 C.188401-3 & C.217236-42.	R.624-1	2O S.W.G.	L.A. SPEC ^N L.72
PT N° B.184991-2 & B.227183-4.	R.624-2	2O S.W.G.	L.A. SPEC ^N L.72

FIG. 3. REPAIR STRINGER SECTIONS



THESE DIAGRAMS ARE DEVISED TO STANDARDISE THE TERMS OF REFERENCE
USED THROUGHOUT THE REPAIR OF THE AIRCRAFT THUS MINIMISING THE
RISK OF ANY MISUNDERSTANDING DUE TO THE USE OF VAGUE OR UNFAMILIAR
TERMS.

FIG. 4. TERMS OF REFERENCE

RESTRICTED

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