

GROUP D - TAIL UNIT

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REPAIR TO FIN BOTTOM SKINS

General

1. This repair leaflet is applicable to Vulcan B.Mk.1, Mk.1A and Mk.2 aircraft, and is issued to cover the partial replacement of the fin bottom skin panels 63,64,67 and 68H.2230 when found to be in a cracked or corroded condition. This usually occurs at the top edges of the panels between the front and rear fin posts.

B.B.H. 1807

H.2230
H.2230
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Sht. 1
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Typical insertion repair to fin bottom bottom skins.

G.A. of fin.
Fin assembly details.
Fin assembly details.
Fin assembly details.
Fin assembly details.
Fin assembly details.
Fin assembly details.
Fin assembly details.

2. The repair drawing is typical for a repair which entails the partial replacement of both port and starboard skins at the same time. When a repair is required on the port side only, solid rivets cannot be used due to inaccessibility. The hollow rivets normally used on the starboard side may be fitted in this case.

3. The position of the bottom edge

of the new skin panel is determined when all the damage has been removed. This edge must be equidistant between ribs. If a complete skin panel is to be renewed the operation must be carried out in accordance with production drawings H.2230, sheets 1 to 8.

Drawings required

4. The following Avro Whitworth drawings are required:

Repair procedure

5. For a repair to the forward skins on both port and starboard sides proceed as follows:

- (1) Mark out the sections of un-serviceable skin panels so that the skin joints of the new panel sections will be equidistant between ribs.
- (2) Drill out all rivets attaching the damaged portions of the panels and sufficient rivets beyond the joint lines on the serviceable panel portions to enable the skin cuts to be made and the butt straps fitted. Remove the damaged panels.
- (3) Remove all swarf and foreign matter from the fin structure.

- (4) From 14 s.w.g., magnesium alloy material, specification D.T.D.626, manufacture replacement panels to fit accurately in position. The damaged portions may be used as templates.
- (5) Manufacture butt straps, packings and aluminium foil strips in conformity with detail 'A' on B.B.H. 1807 to fit accurately between stringers. Shape these items to skin contour.
- (6) Mark out and drill the skin panels for the four rows of rivets each side of the skin joint. See Detail 'A', B.B.H.1807.
- (7) Place items manufactured in operation (5) in position on the existing skin panel and drill the required

rivet holes in these items. Repeat this operation with the replacement panel in position. Countersink all holes on the skin face to suit 120 deg. csk/head rivets.

- (8) Dismantle all items, deburr holes and edges. See Repair Leaflet A.1/3 para.5 for the protective treatment of the skin panel edges in situ. Refer to Part 1, Chap.1 for the protective treatment of all other items. Pay special attention to the rivet holes and all edges of magnesium alloy items.
- (9) Pin or service bolt butt straps, packings and foil in position and rivet up the portions attached to skin panels 63, 64H.2230 using rivets quoted on B.B.H.1807.

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(10) Pin the new panel in position on the port side and rivet up. For all riveting not shown on B.B.H.1807 see production drawings H.2230 sheets 1 to 8.

starboard side using the pop rivets quoted on B.B.H.1807 and H. 2230, sheets 1 to 8.

NOTE . . .

New skin joints on adjacent skin panels must be staggered a minimum of one rib bay.

(11) Remove all foreign matter from the internal structure and rivet the new panel in position on the

(12) When the aft skins are cracked or corroded repeat operations (1) to (11) in conformity with detail 'B' on B.B.H. 1807.

Material required

6. Table 1 gives the material required to carry out the repair.

TABLE 1

List of material

Item	Ref.No.	Part No.	Description	Quantity Required	Spec.	S.W.G. or Section	Remarks
1		3 B.B.H.1807	Packing	1+1	D. T. D. 626	20	
2		4 B.B.H.1807	Packing	1+1	D. T. D. 626	18	
3		5 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
4		6 B.B.H.1807	Packing	1+1	D. T. D. 626	20	
5		7 B.B.H.1807	Packing	1+1	D. T. D. 626	20	
6		8 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
7		9 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
8		10 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
9		11,12 B.B.H.1807	Skin	1+1	D. T. D. 626	14	
10		13 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
11		14 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
12		15 B.B.H.1807	Packing	1+1	D. T. D. 626	14	
13		16 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
14		17 B.B.H.1807	Packing	1+1	D. T. D. 626	20	
15		18 B.B.H.1807	Packing	1+1	D. T. D. 626	20	
16		19 B.B.H.1807	Butt strap	1+1	D. T. D. 626	12	
17		20 B.B.H.1807	Packing	1+1	D. T. D. 626	20	
18		21,22 B.B.H.1807	Skin	1+1	D. T. D. 626	14	
19		23 B.B.H.1807	Aluminium foil	10+10	L. 16	30	
20	28Q/9417179	A.G.S.2049/537 B.S.	Rivet, pop, 120 deg.csk/hd., 5/32in.dia.	As req.	L. 58	-	
21		A.G.S.2049/545 B.S.	Rivet, pop, 120 deg.csk/hd., 5/32in.dia.	As req.	L. 58	-	
22	28Q/16697	A.G.S.2073/640 B.S.	Rivet, pop, 120 deg.csk/hd., 3/16in.dia.	As req.	L. 58	-	
23	28Q/16698	A.G.S.2073/649 B.S.	Rivet, pop, 120 deg.csk/hd., 3/16 in.dia.	As req.	L. 58	-	
24		SS.4208/506	Rivet, 120 deg.csk/hd., 5/32in.dia.	As req.	L. 58	-	
25		SS.4208/507	Rivet, 120 deg.csk/hd., 5/32in.dia.	As req.	L. 58	-	
26		SS.4208/508	Rivet, 120 deg.csk/hd., 5/32in.dia.	As req.	L. 58	-	
27		SS.4208/607	Rivet, 120 deg.csk/hd., 3/16in.dia.	As req.	L. 58	-	
28		SS.4208/608	Rivet, 120 deg.csk/hd., 3/16in.dia.	As req.	L. 58	-	

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REPAIR TO FIN TOP SKINS

General

1. This repair leaflet is applicable to Vulcan B.Mk.1, Mk.1A and Mk.2 aircraft covering the partial replacement of the fin top skins, 65,66,69 and 70H.2230, when found to be in a cracked or corroded condition. This usually occurs at the top skin joints between the front and rear fin posts.

2. The repair drawing is typical for a repair which entails the partial replacement of both port and starboard skin panels at the same time. When a repair is required on the port side only the solid rivets called up on the drawing cannot be used due to inaccessibility. The pop rivets normally used on the starboard side may be fitted in this case.

3. The position of the bottom edge of

the new skin panel is determined when all the damage has been removed and must be equidistant between ribs. When a complete skin panel is to be renewed the operation must be carried out in accordance with production drawings H.2230, sheets 1 to 8.

Drawings required

4. The following Avro Whitworth drawings are required.

B.B.H.1806 Typical insertion repair to fin top skins.

The production drawings listed on Repair Leaflet D.1/1 are also required for this repair.

Repair procedure

5. The method of repair is identical to that given on Repair Leaflet D.1/1, repair drawing B.B.H.1806 being used instead of B.B.H.1807.

6. If, after the removal of the damaged

skin, cracking or corrosion is discovered on ribs 12 to 17, repairs must be carried out in accordance with Repair Leaflet D.1/3 before the new skin sections are fitted. A repair to ribs below the proposed new skin joint will necessitate the removal of the entire skin panel, and

either the replacement of the serviceable section or a complete panel renewal when rib repairs have been completed

Material required

7. Table 1 gives the material required to carry out the repair.

TABLE 1
List of material

Item	Ref.No.	Part No.	Description	Quantity Required	Spec.	S. W. G. or Section	Remarks
1		3 B.B.H. 1806	Packing	1+1	D. T. D. 626	20	
2		4 B.B.H. 1806	Packing	1+1	D. T. D. 626	18	
3		5 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
4		6 B.B.H. 1806	Packing	1+1	D. T. D. 626	20	
5		7 B.B.H. 1806	Packing	1+1	D. T. D. 626	20	
6		8 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
7		9 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
8		10 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
9		11, 12 B.B.H. 1806	Skin	1+1	D. T. D. 626	14	
10		13 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
11		14 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
12		15 B.B.H. 1806	Packing	1+1	D. T. D. 626	14	
13		16 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
14		17 B.B.H. 1806	Packing	1+1	D. T. D. 626	20	
15		18 B.B.H. 1806	Packing	1+1	D. T. D. 626	20	
16		19 B.B.H. 1806	Butt strap	1+1	D. T. D. 626	12	
17		20 B.B.H. 1806	Packing	1+1	D. T. D. 626	20	
18		21, 22 B.B.H. 1806	Skin	1+1	D. T. D. 626	14	
19		23 B.B.H. 1806	Aluminium foil seal	10+10	L. 16	30	
20	28Q/9417179	A. G. S. 2049/537 B.S.	Rivet, pop, 120 deg. csk/hd., 5/32in. dia.	As req.	L. 58	-	
21		A. G. S. 2049/545 B.S.	Rivet, pop, 120 deg. csk/hd., 5/32in. dia.	As req.	L. 58	-	
22	28Q/9417255	A. G. S. 2051/545 B.S.	Rivet, pop, 120 deg. csk/hd., 5/32in. dia.	As req.	D. T. D. 10B	-	
23	28Q/16697	A. G. S. 2073/640 B.S.	Rivet, pop, 120 deg. csk/hd., 3/16in. dia.	As req.	L. 58	-	
24	28Q/16698	A. G. S. 2073/649 B.S.	Rivet, pop, 120 deg. csk/hd., 3/16in. dia.	As req.	L. 58	-	
25		SS. 4208/507	Rivet, 120 deg. csk/hd., 5/32in. dia.	As req.	L. 58	-	
26		SS. 4208/508	Rivet, 120 deg. csk/hd., 5/32in. dia.	As req.	L. 58	-	
27		SS. 4208/607	Rivet, 120 deg. csk/hd., 3/16in. dia.	As req.	L. 58	-	
28		SS. 4208/608	Rivet, 120 deg. csk/hd., 3/16in. dia.	As req.	L. 58	-	

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INSERTION REPAIRS TO FIN RIBS 12 TO 17

General

1. This leaflet is applicable to Vulcan B.Mk.1, Mk.1A and Mk.2 aircraft and covers a repair to the aft end of the magnesium alloy webs, ribs 12 to 17 inclusive, when made unserviceable due to

cracks or corrosion. When the damaged web portion has been removed a replacement portion manufactured from L.72 material must be fitted. As these ribs are identical in materials and construction, one typical repair suitable for all ribs is shown on B.B.H.1896. This repair can be carried out at the same time as the skin

renewal given on Repair Leaflet D.1/2, the removal of the skins giving access to the ribs.

Drawings required

2. The following Avro Whitworth drawings are required.

B.B.H.1896

Typical rib insert repair to fin ribs 12, 13, 14, 15, 16 and 17.

H.2251

Fin centre rib No.12

H.2252

Fin centre rib No.13

H.2253

Fin centre rib No.14

H.2254

Fin centre rib No.15

H.2255

Fin centre rib No.16

H.2256

Fin centre rib No.17

Repair procedure

3. When the skin panels have been removed and damage found, proceed as follows:-

- (1) Mark out the cut-line on the damaged portion of the web at the position given on B.B.H.1896. Drill out all rivets attaching this portion to the fin structure and sufficient rivets forward of the cut-line position to enable the web to be pulled downwards from the adjacent structure. Remove the stringer brackets from the underside of the web and the transverse lipped angle from the web upper surface at the cut-line position. The transverse angle attached to the rear fin post can remain in position.
- (2) Remove the damaged portion of the web. Blend out the drain hole, radius the corners and remove the sharp edges of the web portion remaining in situ. To the cut edge of this item apply the following protective treatment.

(a) Thoroughly clean and dry the exposed edge and apply one coat of etch primer comprising Accelerator (Ref.No.33B/9429195) and Base (Ref.No.33B/9429196).

(b) Apply one coat of zinc based primer (Ref.No.33B/9429197).

(c) Finally apply one or two coats of lacquer (Ref.No.33B/9432474).

- (3) Manufacture the replacement web, butt strap and packings in accordance with the repair drawing and the respective assembly drawing. The damaged web portion may be used as a template.
- (4) Deburr and apply protective treatment to all repair items in accordance with Part 1, Chap.1.
- (5) Place the butt strap in position and rivet up the two rows attaching it to the serviceable web using type SP.79/504 rivets.

NOTE...

All remaining items to be assembled are of L.72 material. The rivets to use must be of L.86 material and not magnesium alloy as called up on the assembly drawings.

- (6) Pin or service bolt the web insert in position on the attachment angles and butt strap. Pin the transverse angle and packings in position on the upper face of the butt strap. Rivet up all items except at those positions where the stringer brackets are attached.
- (7) Position and rivet up the stringer brackets to the web and stringers.
- (8) Reposition drain holes in accordance with B.B.H.1896.

Material required

4. Table 1 gives the material required for this repair.

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TABLE 1
List of material

Item	Ref.No.	Part No.	Description	Quantity Required	Spec.	S.W.G. or Section	Remarks
1		5 B.B.H.1896	Butt strap, rib 14	1	L.72	18	
2		6 B.B.H.1896	Butt strap, rib 15	1	L.72	18	
3		7 B.B.H.1896	Butt strap, rib 16	1	L.72	18	
4		8 B.B.H.1896	Butt strap, rib 17	1	L.72	18	
5		9 B.B.H.1896	Web insert, rib 14	1	L.72	20	
6		10 B.B.H.1896	Web insert, rib 15	1	L.72	20	
7		11 B.B.H.1896	Web insert, rib 16	1	L.72	20	
8		12 B.B.H.1896	Web insert, rib 17	1	L.72	20	
9		13 B.B.H.1896	Packing, ribs 12 to 17	12	L.72	20	
10		14 B.B.H.1896	Butt strap, rib 12	1	L.72	18	
11		15 B.B.H.1896	Butt strap, rib 13	1	L.72	18	
12		16 B.B.H.1896	Web insert, rib 12	1	L.72	20	
13		17 B.B.H.1896	Web insert, rib 13	1	L.72	20	
14	28Q/19110	SP.79/504	Rivet, snap head	As req.	L.58	-	
15	28Q/17108	SP.80/504	Rivet, snap head	As req.	L.86	-	
16	28Q/19346	SP.80/505	Rivet, snap head	As req.	L.86	-	
17	28Q/18796	SP.80/605	Rivet, snap head	As req.	L.86	-	
18		SP.80/606	Rivet, snap head	As req.	L.86	-	

REPAIR TO WEBS, HINGE RIB NO.11

General

1. This leaflet is applicable to Vulcan B.Mk.1, Mk.1A and Mk.2 aircraft.
2. When the aft webs of hinge rib 11

are found to be cracked or corroded the damage is to be removed and an insertion web portion fitted in accordance with repair drawing B.B.H.1809.

3. Prior to commencing the repair remove the rudder in accordance with

Vol.1, Book 1, Sect.3, Chap.3 of A.P.4505 A and C for Mk.1 and Mk.1A or A.P.4505 B for Mk.2 aircraft.

Drawings required

4. The Avro Whitworth drawings required are:

B.B.H.1809
H.2577
H.2555

Sht. 2

Typical repair to hinge rib webs.
Hinge rib No.11 (Aft)
Details of fin balance chamber.

Repair procedure

5. Open the port hinged fairing to gain access to rib 11 and proceed as follows:

- (1) Remove the six A.25/2J bolts securing hinge bracket H.2257. Remove bracket.
- (2) Remove fairings 17,22H.2555 and brackets 14,15H.2555.

NOTE . . .

The items removed in operations (1) and (2) must be retained for refitment.

- (3) Mark out the web joint line on the upper and lower damaged webs at the position shown on B.B.H.1809. Drill out all rivets attaching the webs to the structure and remove the damaged portions of the webs. Remove and retain channel 14H.2577.

- (4) Manufacture web inserts and butt straps from material quoted on the repair drawing. The damaged web may be used as a pattern.
- (5) Place each web insert in position in turn and drill all existing holes from the internal structure.
- (6) Mark out and drill all holes in the butt straps. Drill where applicable in conjunction with those already drilled in the web inserts.
- (7) Pin the top web insert and butt strap in position and drill all remaining holes through the butt strap, web and structure. Remove web and butt strap and repeat this operation on the bottom items.
- (8) Dismantle, remove swarf, deburr all holes and edges and apply protective treatment in accordance with Repair Leaflet A.1/3 para.5,

- (9) Fit repair items and channel 14 H.2577 using rivets specified on B.B.H.1809 and H.2577. Do not rivet the four holes on each web where fairings 17,22H.2555 will be fitted.

- (10) Manufacture packings 9,10 B.B.H.1809 and steel flanges 7a,8a B.B.H.1809.

- (11) Remove flange from items 14, 15H.2555 and weld new flange in position as shown on Detail 'A', B.B.H.1809.

- (12) Refit brackets 14,15H.2555 and packings in position and rivet up. Refit fairings 17,22H.2555.

- (13) Refit hinge bracket and rudder.

Material required

6. Table 1 gives the material required.

TABLE I
List of material

Item	Ref.No.	Part No.	Description	Quantity Required	Spec.	S.W.G. or Section	Remarks
1		3 B.B.H.1809	Top web insert	1	D. T. D. 626	20	
2		4 B.B.H.1809	Bottom web insert	1	D. T. D. 626	20	
3		5 B.B.H.1809	Butt strap	1	D. T. D. 626	18	
4		6 B.B.H.1809	Butt strap	1	D. T. D. 626	18	
5		7 B.B.H.1809	Bracket, bottom	1	S. 510	24	
6		8 B.B.H.1809	Bracket, top	1	S. 510	24	
7		9 B.B.H.1809	Packing, top	1	D. T. D. 626	18	
8		10 B.B.H.1809	Packing, bottom	1	D. T. D. 626	18	
9	28Q/9417188	A. G. S. 2048/423 B.S.	Rivet, pop, 120 deg. csk/hd.	As req.	L. 58	-	
10	28Q/9417191	A. G. S. 2048/523 B.S.	Rivet, pop, 120 deg. csk/hd.	As req.	L. 58	-	
11	28Q/9417192	A. G. S. 2048/529 B.S.	Rivet, pop, 120 deg. csk/hd.	As req.	L. 58	-	
12	28Q/9417173	A. G. S. 2049/420 B.S.	Rivet, pop, 120 deg. csk/hd.	As req.	L. 58	-	
13	28Q/9417177	A. G. S. 2049/523 B.S.	Rivet, pop, 120 deg. csk/hd.	As req.	L. 58	-	
14		SS.4208/404	Rivet, 120 deg. csk/hd.	As req.	L. 58	-	
15		SS.4208/505	Rivet, 120 deg. csk/hd.	As req.	L. 58	-	

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