

**Chapter 3  
TAIL UNIT**

**LIST OF CONTENTS**

DESCRIPTION	Para.
<i>Introduction</i> . . . . .	1
<b>Fin</b>	
<i>General</i> . . . . .	3
<i>Fin posts</i> . . . . .	4
<i>Ribs</i> . . . . .	6
<i>Shroud</i> . . . . .	9
<i>Leading edge</i> . . . . .	10

	Para.
<i>Skin covering</i> . . . . .	11
<i>Fin tip</i> . . . . .	12
<b>Rudder pre Mod.2060</b>	
<i>General</i> . . . . .	13
<i>Spars</i> . . . . .	14
<i>Ribs</i> . . . . .	15
<b>Rudder post Mod.2060</b>	
<i>General</i> . . . . .	19

	Para.
<b>SERVICING</b>	
<i>General</i> . . . . .	20

**REMOVAL AND ASSEMBLY**

<i>General</i> . . . . .	21
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**LIST OF ILLUSTRATIONS**

	Fig.
<i>Rib positions - fin and rudder</i> . . . . .	1
<i>Fin and rudder structure pre Mod.2060</i> . . . . .	2
<i>Rudder top hinge</i> . . . . .	3
<i>Rudder lower hinge</i> . . . . .	4
<i>Removal of fin tip</i> . . . . .	5
<i>Removal of rudder</i> . . . . .	6
<i>Rudder post Mod.2060</i> . . . . .	7

**DESCRIPTION**

**FIN**

**General**

3 With the exception of a detachable tip of composite construction and the magnesium alloy webs of the ribs, the fin internal structure consists of aluminium alloy front and rear fin posts joined by plate ribs.

**Fin posts**

4 The front fin post comprises of a port

**Introduction**

1. Descriptions of the fin and rudder are given in this chapter, with illustrations of their general structure and of the disposition of spars and ribs within the structure.

2. As no conventional tail plane is fitted to this aircraft, the elevators are mounted on the trailing edge of the main plane, and descriptive and other details of them will be found in Sect.3, Chap.2.

and starboard machined extruded T-section boom joined by doubling plates to a plate web. Top-hat and lipped-channel section stiffeners are riveted at intervals along the web. A circular aperture, reinforced with doubling plates and angle-section stiffeners, in the lower end of the web provides access to the fuselage attachment bolts.



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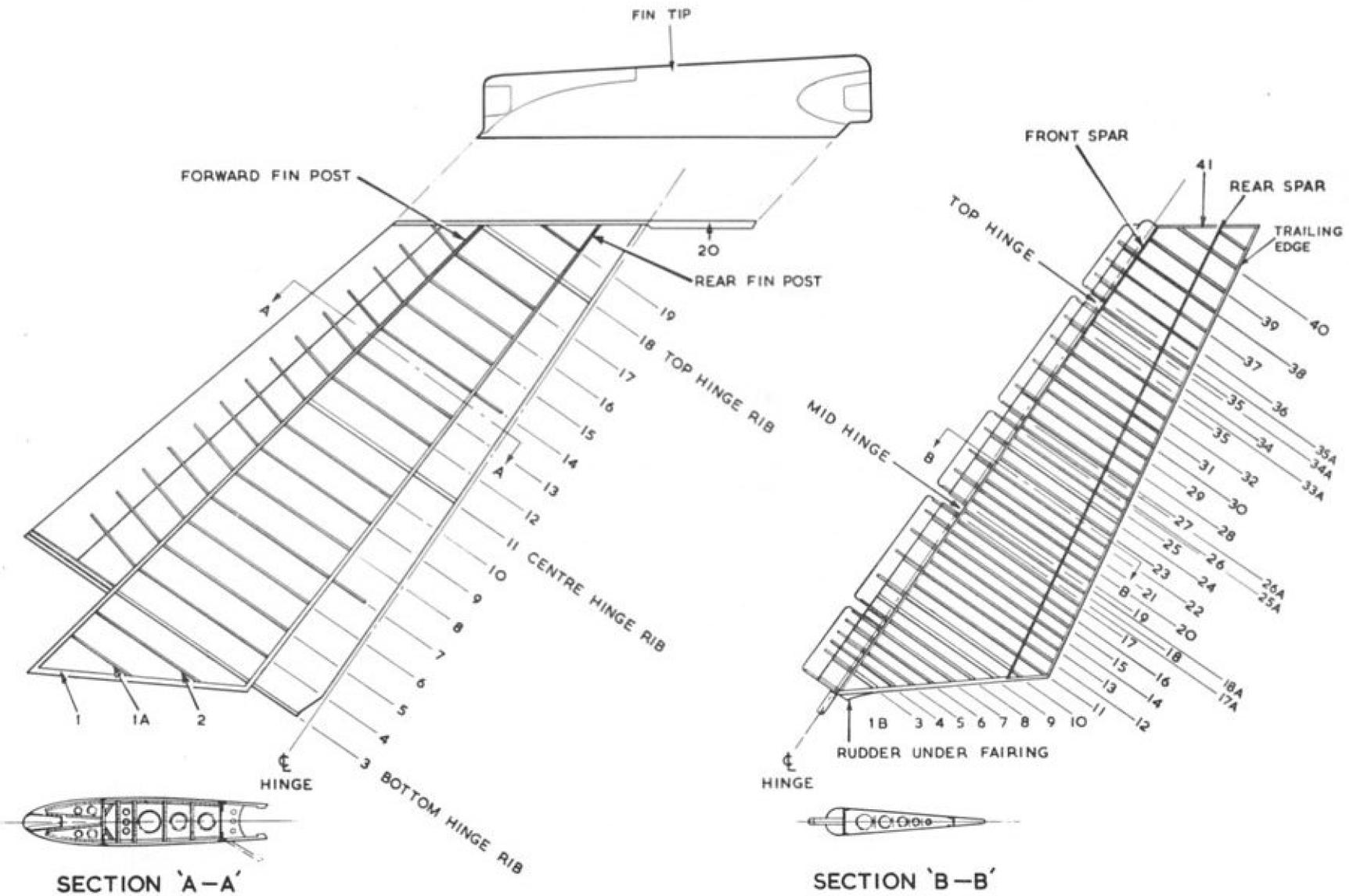


Fig.1 Rib positions - fin and rudder

Mod. 2304P

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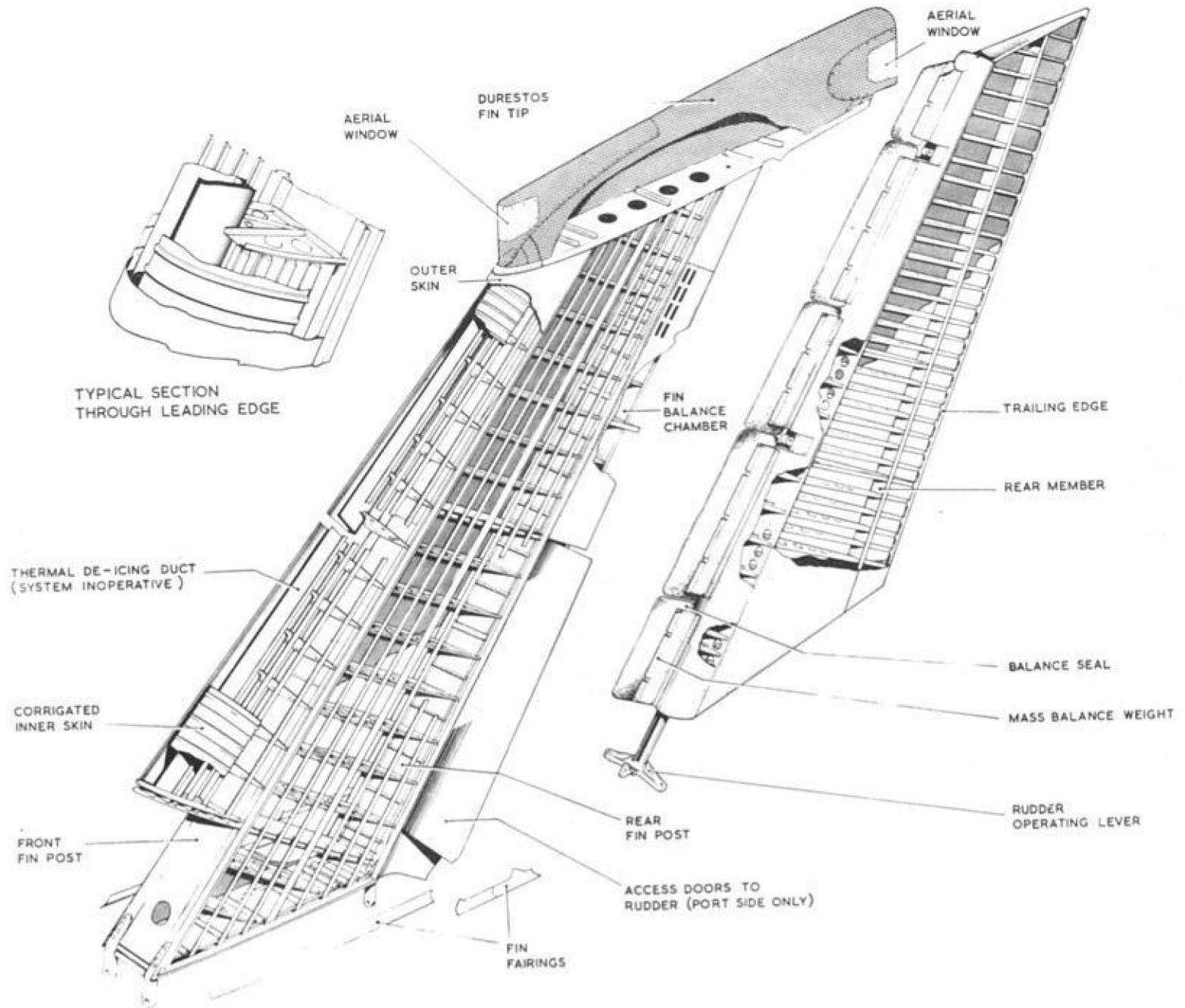


Fig. 2 Fin and rudder - pre. Mod. 2060

5. The rear fin post is similar in construction to the front post, with the exception of the web plate stiffeners which are of angle section.



**Ribs**

6. Between the fin posts three main ribs (3, 11 and 18) carry the rudder hinge loads, each being constructed from two lipped-channel section booms joined by two web plates and reinforced with angle-section stiffeners.

7. Flanking the hinge ribs are secondary ribs, which consist of a plate web containing flanged lightening holes, edged with angle-section members and carrying plate type skin attachment brackets.

8. The final rib at the top of the fin (rib 20) is constructed to carry the fin tip, and consists of a plate web with angle-section stiffeners. Anchor nuts in the edge members accommodate the securing screws for the fin tip.

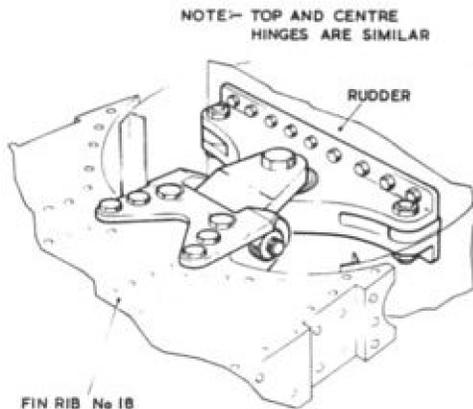


Fig. 3 Rudder top hinge (43)

**Shroud**

9. Behind the rear spar are diaphragm members to which the curved portion of the shroud is riveted. The trailing edge is completed by port and starboard fairings which together with the curved shroud form the fin balance chamber. To facilitate servicing of rudder hinge attachments and the rudder sealing fabric, the port fairing is mounted on hinges.

**Leading edge**

10. The leading edge assembly, forward of the fin front post consists of nose ribs with plate webs and angle-section stiffeners suitably cut away and flanged to accommodate vertical skin plating. An inner corrugated skin, open at its forward end is fitted in the leading edge assembly, and together with the vertical skin skin plating forms ducts through which the now inoperative thermal de-icing system warm air was distributed.

**Skin covering**

11. The fin is covered by sub-assembled magnesium-alloy skin panels, having their stringers riveted to the skin plating in the detail production stage. The stringers are then riveted to the attachment brackets. Z-section stringers are employed except at the skin butt joints, when T-section is used.

**Fin tip**

12. The fin tip is a moulding constructed of five layers of Durestos, a Phenolic impregnated asbestos felt, with reinforcing layers on the inside of the crown of the moulding. Fibreglass fairings, each housing an R.F. head behind a fibreglass aerial window, are mounted at the forward and rear edges of the tip, the rear edge of the tip behind suitably cut away to accommodate the installation. The fairings are secured to the tip by 2B.A. bolts, washers and stiffnuts. To avoid erosion, or moisture loading

due to capillary action, the tip with the exception of the aerial windows is treated with Neoprene both inside and outside, in accordance with D.T.D. 926. Inner and outer plate members fitted to the lower edge are secured by 2B.A. screws to anchor nuts on fin rib 20. Bonding straps connect the R.F. head attachment brackets to the fin plate members.

**RUDDER PRE MOD.2060**

**General**

13. The all-metal rudder consists of a main spar and a channel section rear spar joined by plate ribs, and is constructed in magnesium alloy with the exception of the main spar, which is of aluminium alloy.

**Spars**

14. The main spar is built up from two extruded booms, with a plate web which has flanged lightening holes and angle-section stiffeners to form the attachment for the ribs. The rear spar is a straight-forward channel section.

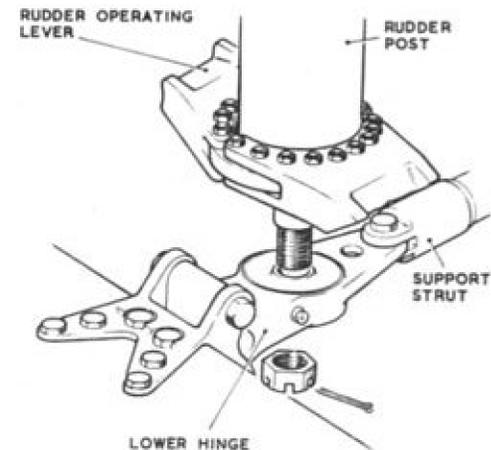
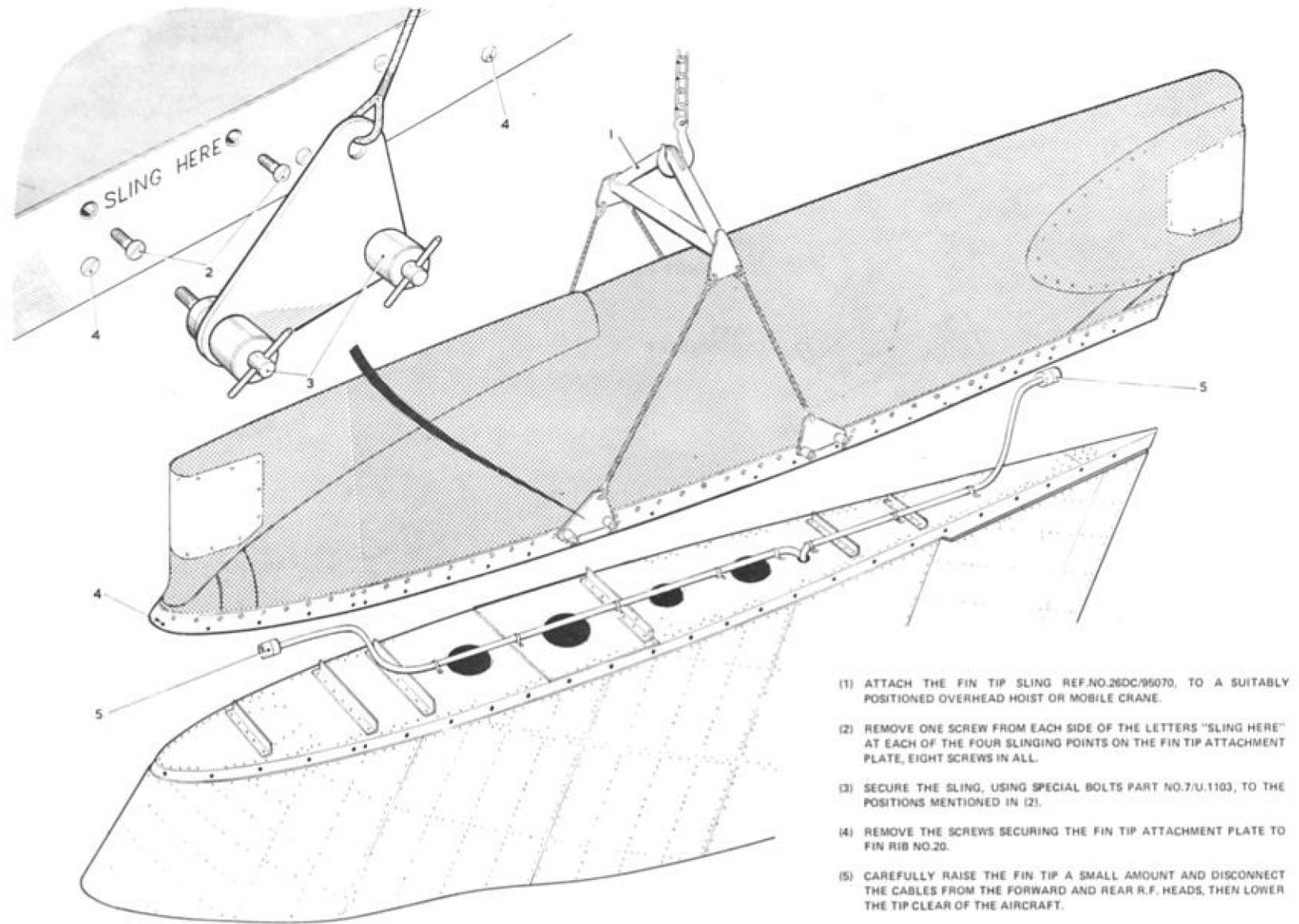


Fig. 4 Rudder lower hinge (7423)

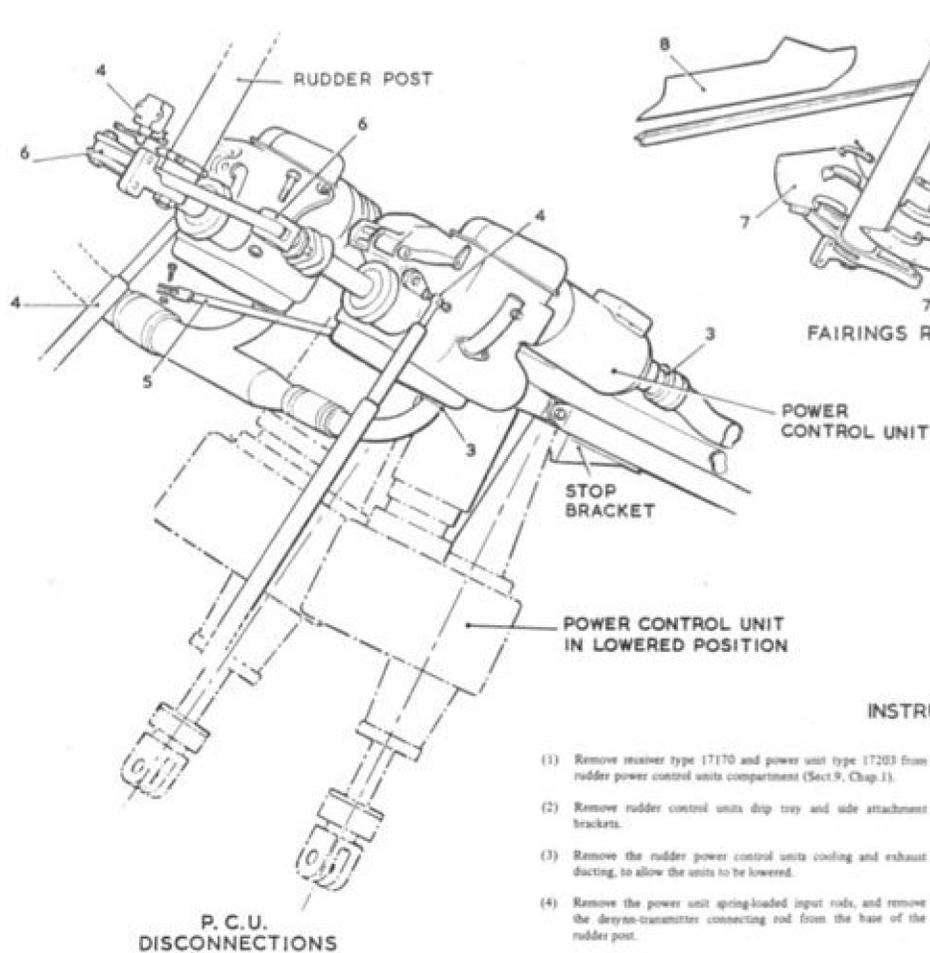


- (1) ATTACH THE FIN TIP SLING REF.NO.26DC/95070, TO A SUITABLY POSITIONED OVERHEAD HOIST OR MOBILE CRANE.
- (2) REMOVE ONE SCREW FROM EACH SIDE OF THE LETTERS "SLING HERE" AT EACH OF THE FOUR SLINGING POINTS ON THE FIN TIP ATTACHMENT PLATE, EIGHT SCREWS IN ALL.
- (3) SECURE THE SLING, USING SPECIAL BOLTS PART NO.7/U.1103, TO THE POSITIONS MENTIONED IN (2).
- (4) REMOVE THE SCREWS SECURING THE FIN TIP ATTACHMENT PLATE TO FIN RIB NO.20.
- (5) CAREFULLY RAISE THE FIN TIP A SMALL AMOUNT AND DISCONNECT THE CABLES FROM THE FORWARD AND REAR R.F. HEADS, THEN LOWER THE TIP CLEAR OF THE AIRCRAFT.

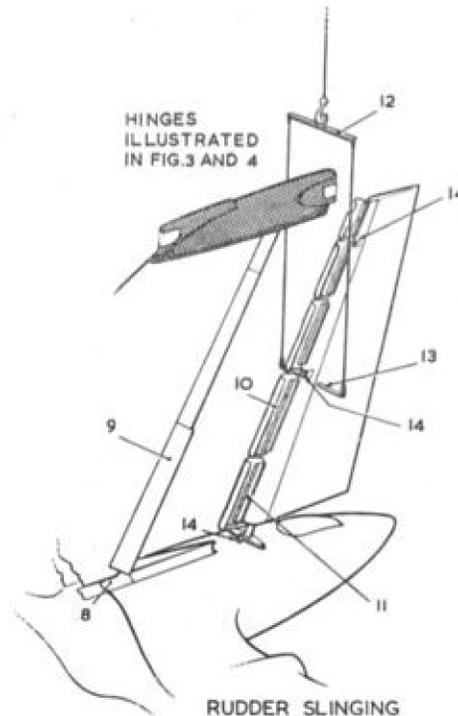
Fig.5. Removal of fin tip  
 (Mod. 2304)

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FAIRINGS REMOVAL



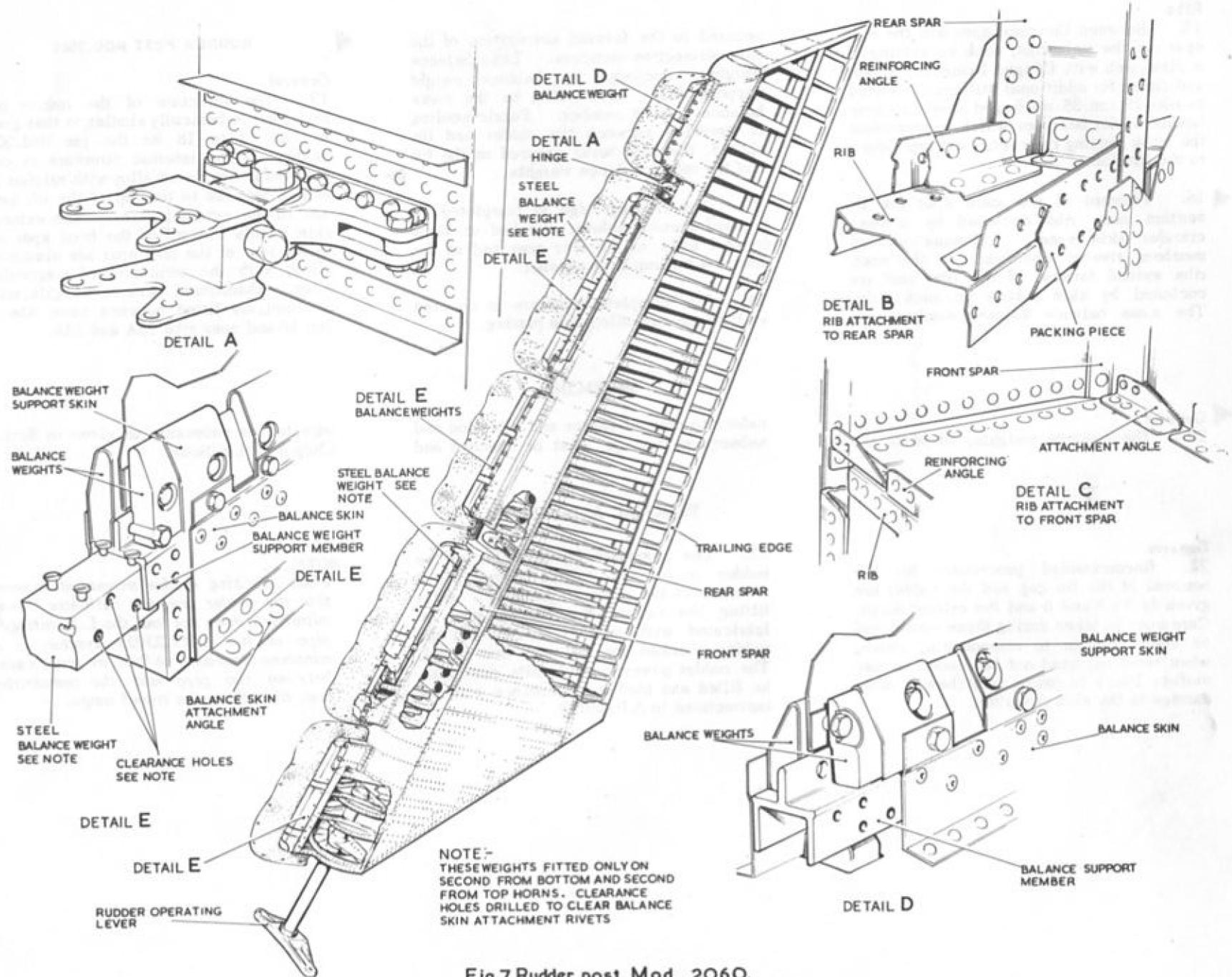
HINGES ILLUSTRATED IN FIG.3 AND 4

RUDDER SLINGING

INSTRUCTIONS

- (1) Remove motor type 17170 and power unit type 17203 from rudder power control units compartment (Sect.9, Chap.1).
- (2) Remove rudder control units dip tray and side attachment brackets.
- (3) Remove the rudder power control units cooling and exhaust ducting, to allow the units to be lowered.
- (4) Remove the power unit spring-loaded input rods, and remove the dryno-transmitter connecting rod from the base of the rudder post.
- (5) Remove the power units centre support strut.
- (6) Disconnect the power control units at the ram end and lower gently on to the stop brackets, having first ensured that electric leads to the motor are free enough to prevent them being pulled.
- (7) Remove the internal split detachable fairing at the base of the rudder post.
- (8) Remove the external detachable fairing at the base of the fin balance chamber.
- (9) Open the fin balance chamber hinged port fairings and remove the doors at the rudder hinge points.
- (10) Disconnect the fabric shroud from the fin.
- (11) Remove the lowest balance weight from the rudder leading edge, to assist manoeuvring of rudder when removing.
- (12) Attach rudder sling Part No.1/U.1069, Ref.No. 26DC/95012 (aircraft with rudder, post Mod.2060) or Part No.1/U.2232, Ref. No.26DC/1510098 (aircraft with heavier rudder, post Mod. 2060) to a suitably positioned overhead hoist or crane. To prevent snatch loading on the sling when taking the load of the rudder, it is recommended that a block and tackle be interposed between the sling and the crane.  
**WARNING . . .**  
**Pre mod sling, Part No.1/U.1069 must not be used with the heavier rudder introduced by Vulcan Mod.2060.**
- (13) Fit the sling lifting bar in the rudder lifting point just below the mid hinge position; fit the distance pieces on the bar and attach the sling cables.
- (14) Take the weight on the sling cables and remove the horizontal attachment bolts from the lower, centre and upper hinge positions.
- (15) The rudder may now be manoeuvred clear of the aircraft. Considerable care is required during this operation, to avoid damage to rudder or fin.  
**WARNING . . .**  
Due to the removal of the mass balance weight, the rudder will swing to a horizontal position when it is removed. Personnel should be prepared for this movement so that it does not injure them or knock them off the steps or platform on which they will be working.

Fig.6 Removal of rudder  
(Mod. 2304)  
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NOTE:-  
THESE WEIGHTS FITTED ONLY ON  
SECOND FROM BOTTOM AND SECOND  
FROM TOP HORNS. CLEARANCE  
HOLES DRILLED TO CLEAR BALANCE  
SKIN ATTACHMENT RIVETS

Fig.7.Rudder post Mod. 2060.

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### Ribs

15. Between the main spar and the rear spar are the main ribs, each consisting of a plate web with flanged lightening holes, and fluted for additional stiffness. Fitted to ribs 18 and 35 are forged steel brackets housing roller bearings, which accommodate the bolts forming the centre and top hinges to the fin ribs.

16. Forward of the main spar are D-section nose ribs enclosed by a semi-circular skin panel. Channel-section members riveted chordwise to the nose ribs extend forward of the ribs and are enclosed by skin panels on each side. The mass balance support members are

### General

20. The balance weights, fitted to the

### General

21. Recommended procedures for the removal of the fin cap and the rudder are given in fig.5 and 6 and the related Keys. Care must be taken during these operations to avoid damage to components, which, when removed, must not be placed on any surface likely to cause scratches or other damage to the skin covering.

secured to the forward extremities of the channel-section members. Lead balance weights, enclosed by balance weight support skins, are bolted to the mass balance support member. Fabric sealing is provided between the rudder and fin shroud, the seal being secured to the fin and the rudder balance weights.

17. The trailing edge is completed by channel section riblets, attached at their forward ends to the rear spar and at the rear to a trailing edge member.

18. The complete structure is covered with magnesium alloy skin plating.

## SERVICING

rudder to prevent flutter and vibration and subsequent damage, must be checked and

## REMOVAL AND ASSEMBLY

22. The procedure for assembly of the rudder or fin cap to the aircraft is a reversal of the removal process. After fitting the rudder, the hinges must be lubricated with grease XG-295 and the rudder checked for full and free travel. The rudder power control units must also be filled and bled in accordance with the instructions in A.P.4603B.

## RUDDER POST MOD.2060

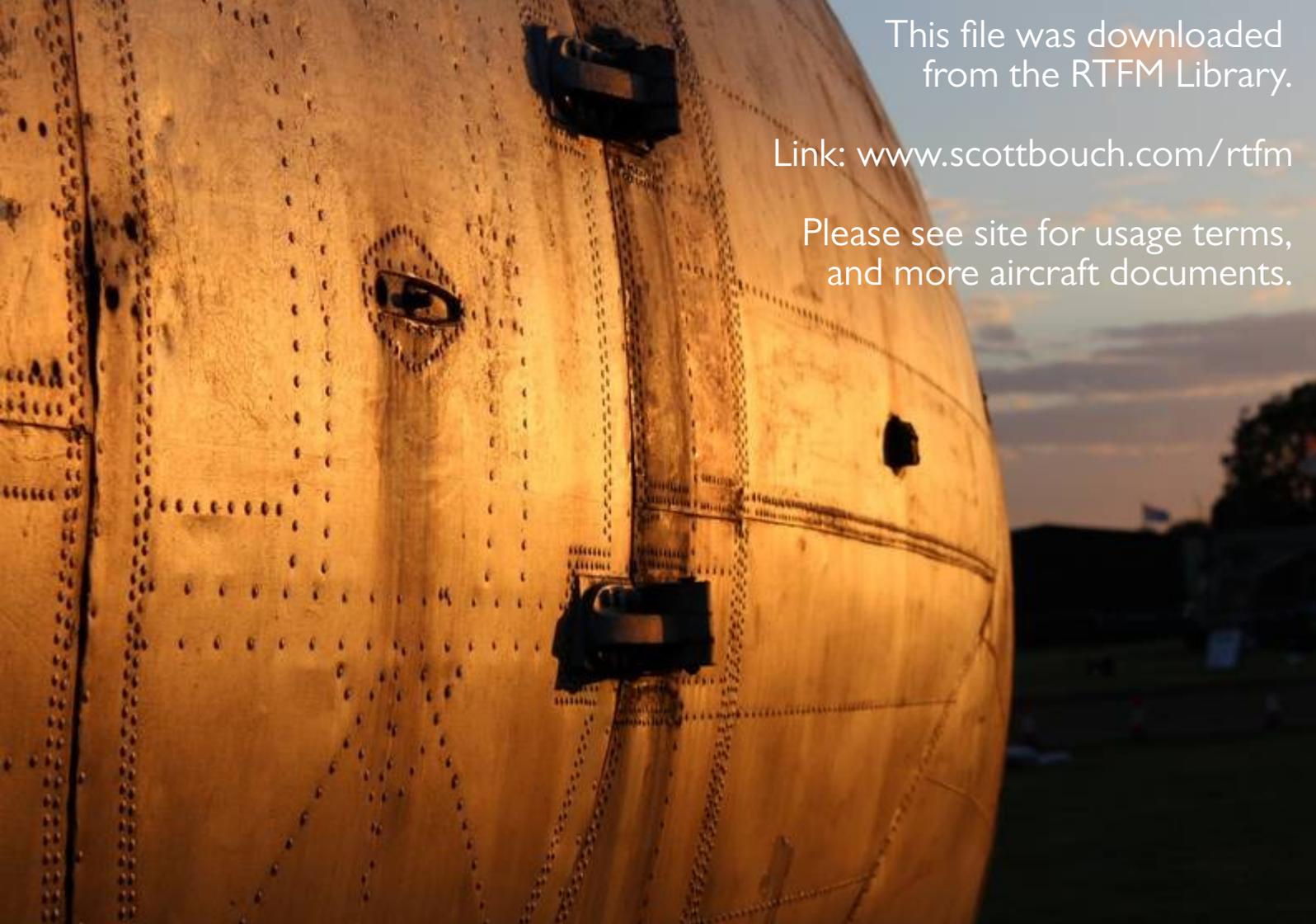
### General

19. The structure of the rudder post Mod.2060 is basically similar to that given in para.13 to 18 for the pre Mod.2060 rudder. The internal structure is constructed in aluminium alloy with reinforcing angles secured to the top of the rib webs and to the external skin. The external skin panels forward of the front spar and to the rear of the rear spar are aluminium alloy, with the remainder of magnesium alloy. Additional balance weights, made of steel, are fitted between nose ribs 10 and 18 and nose ribs 25A and 33A.

adjusted as necessary as given in Sect.3, Chap.4 of this Book.

### NOTE . . .

*When checking rudder movement, ensure that the rudder position indicator transmitter arm does not foul the L.F. nitrogen pipe of the A.R.I.23023 system. A minimum clearance of 0.50 in. must exist between the pipe and the transmitter arm, throughout the travel range.*



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