Chapter 3 TAIL UNIT

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DESCRIPTION

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, of this book.

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 is built in aluminium alloy of a front and rear fin post joined by plate ribs.

Fin posts

4. The front fin post comprises a port and a 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. Two 4 in. dia. flanged holes in the top of the web provide a passage rearwards for warm air from the leading edge de-icing duct.

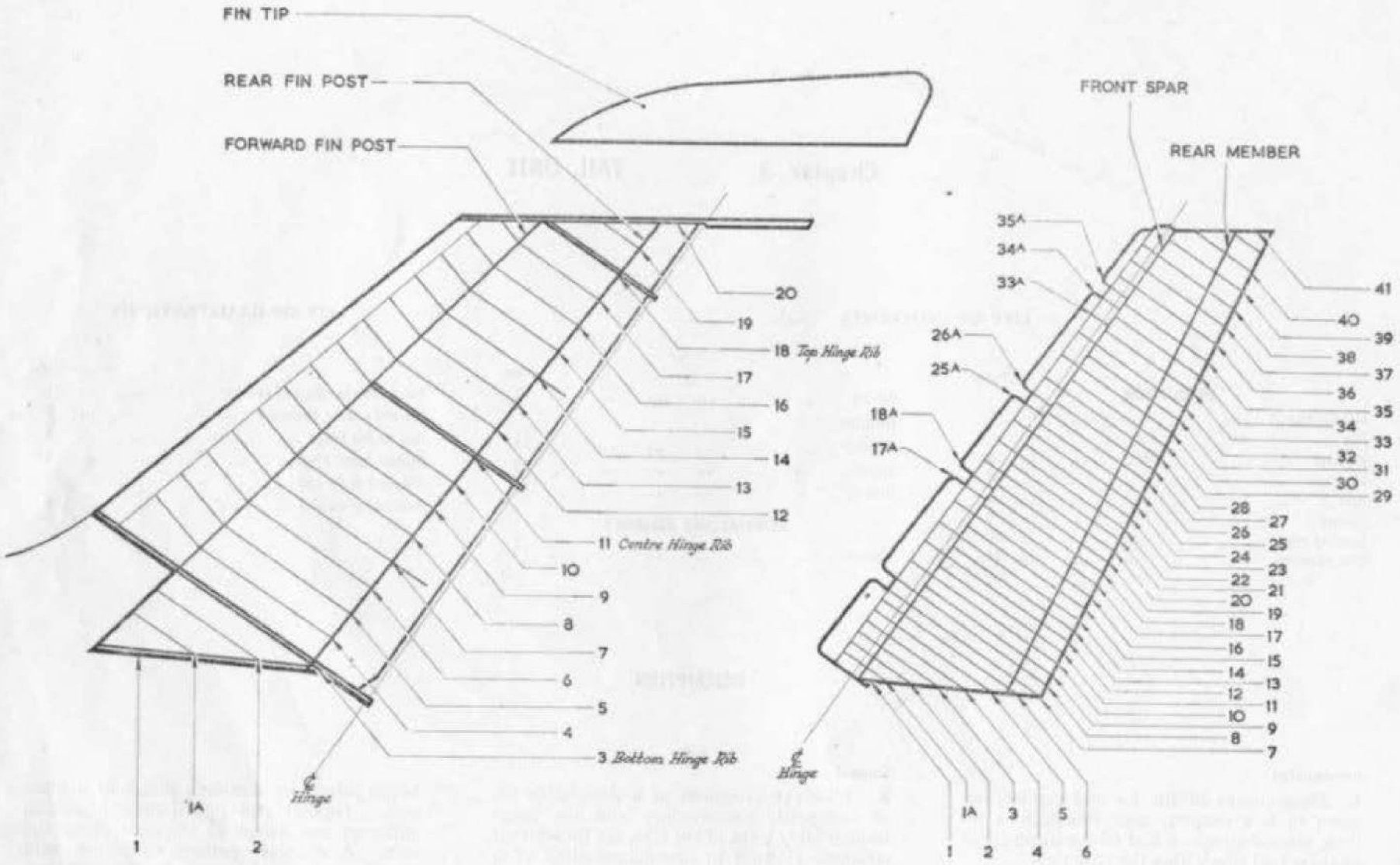


Fig. 1. Rib positions—fin and rudder

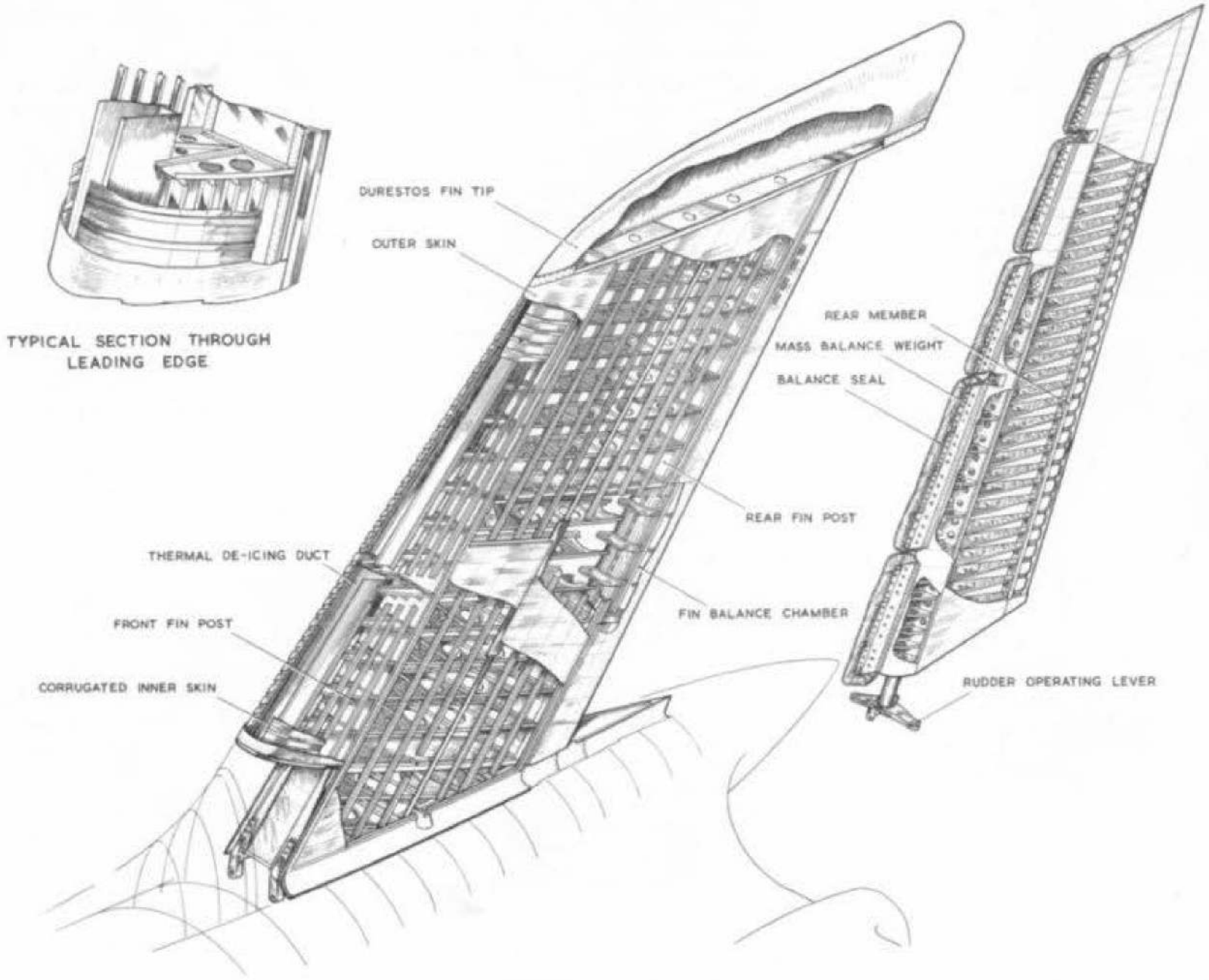


Fig.2. Fin and rudder structure

5. The rear fin post is similar in construction to the front post, but with angle-section stiffeners only utilised along the web plate. A series of holes near the top of the web provides a passage rearwards for warm air from the leading edge de-icing duct.

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 plate webs containing flanged lightening holes, edged with angle-section members and carrying plate type skin attachment brackets.

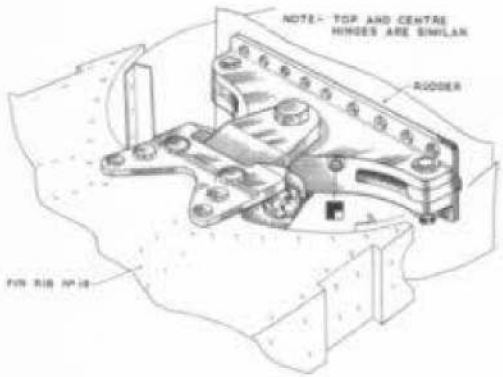


Fig.3. Rudder top hinge

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.

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 silicone coated glass cloth rudder balance seals, 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 which forms the ducting of the thermal de-icing system. An inner skin in the leading edge assembly is open at its forward end and corrugated for distribution of de-icing warm air.

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, where T-section is used.

Fin tip

12. The fin tip is a one-piece moulding constructed of five layers of Durestos, a Phenolic impregnated asbestos felt, with reinforcing layers in the inside of the crown of the moulding. To avoid erosion, or moisture loading due to capillary action the tip is treated with Neoprene, both inside and outside, in accordance with Specification, D.T.D.926. Inner and outer plate members fitted to the lower edge are secured by 2 B.A. screws to the anchor nuts on fin rib No.20.

RUDDER

General

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

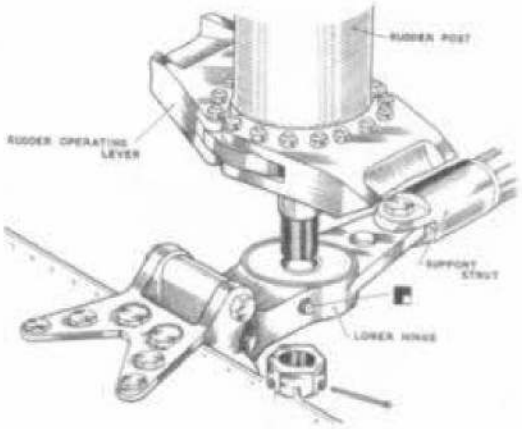
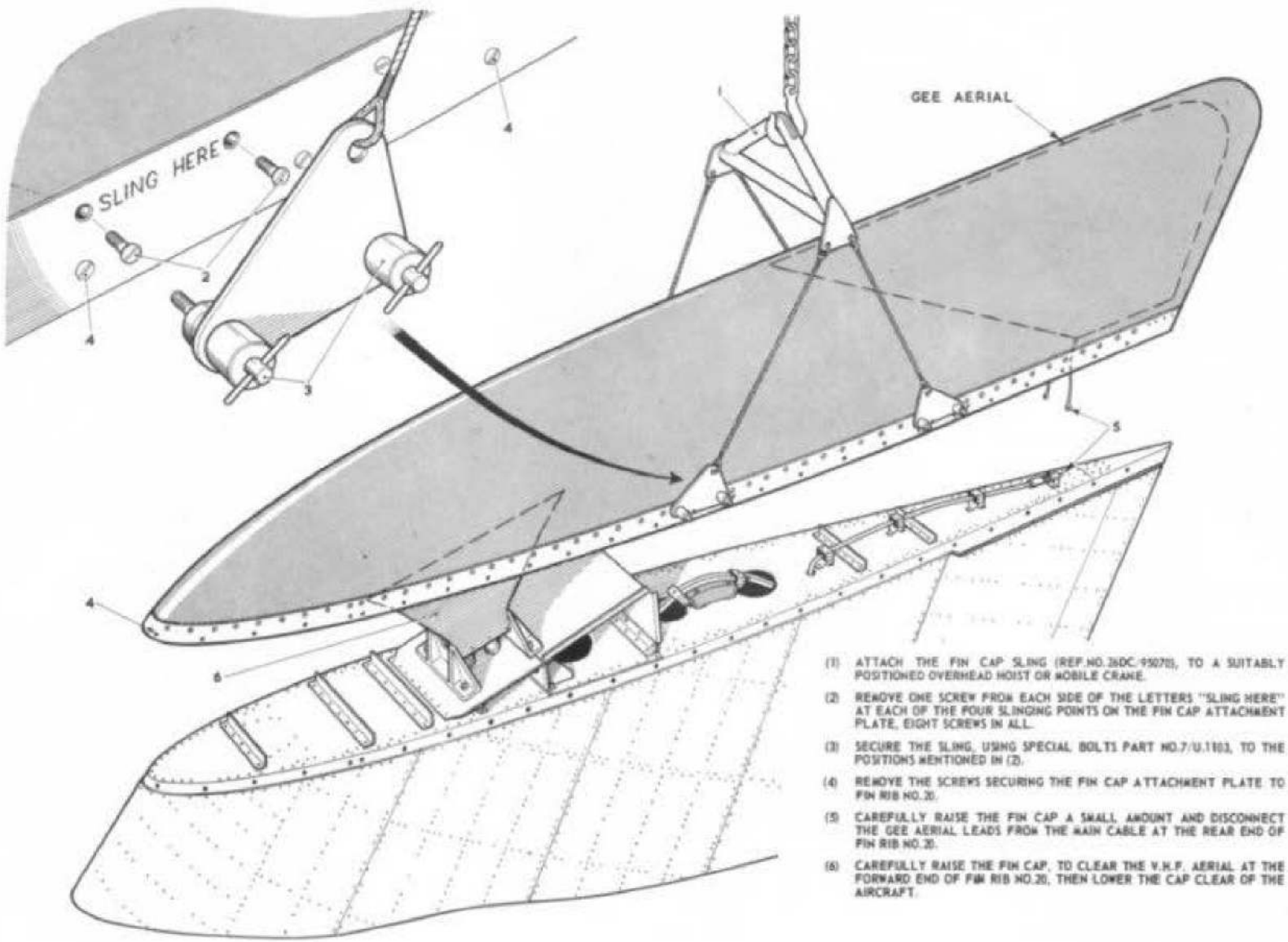


Fig.4. Rudder lower hinge



(1) ATTACH THE FIN CAP 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 CAP ATTACHMENT PLATE, EIGHT SCREWS IN ALL.

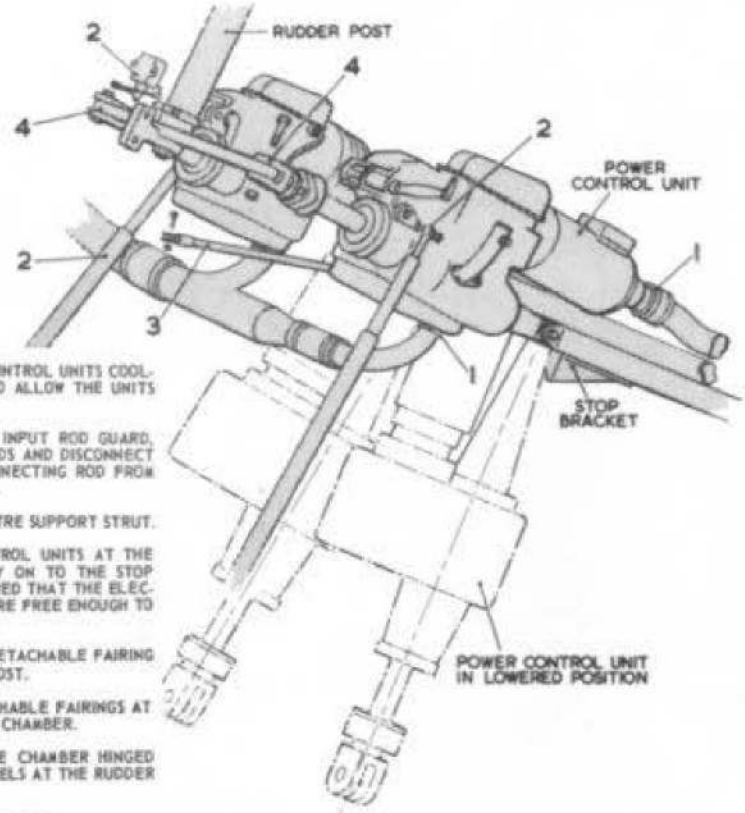
(3) SECURE THE SLING, USING SPECIAL BOLTS PART NO.7/U.1103, TO THE POSITIONS MENTIONED IN (2).

(4) REMOVE THE SCREWS SECURING THE FIN CAP ATTACHMENT PLATE TO FIN RIB NO.20.

(5) CAREFULLY RAISE THE FIN CAP A SMALL AMOUNT AND DISCONNECT THE GEE AERIAL LEADS FROM THE MAIN CABLE AT THE REAR END OF FIN RIB NO.20.

(6) CAREFULLY RAISE THE FIN CAP, TO CLEAR THE V.H.F. AERIAL AT THE FORWARD END OF FIN RIB NO.20, THEN LOWER THE CAP CLEAR OF THE AIRCRAFT.

Fig. 5 Removal of fin cap



P.C.U. DISCONNECTIONS

INSTRUCTIONS

(1) REMOVE THE RUDDER POWER CONTROL UNITS COOLING AND EXHAUST DUCTING, TO ALLOW THE UNITS TO BE LOWERED.

(2) REMOVE, THE SPRING-LOADED INPUT ROD GUARD, THE SPRING LOADED INPUT RODS AND DISCONNECT THE DESYNN-TRANSMITTER CONNECTING ROD FROM THE BASE OF THE RUDDER POST.

(3) REMOVE THE POWER UNITS CENTRE SUPPORT STRUT.

(4) DISCONNECT THE POWER CONTROL UNITS AT THE RAM END AND LOWER GENTLY ON TO THE STOP BRACKETS, HAVING FIRST ENSURED THAT THE ELECTRICAL LEADS TO THE MOTOR ARE FREE ENOUGH TO PREVENT THEM BEING PULLED.

(5) REMOVE THE INTERNAL SPLIT DETACHABLE FAIRING AT THE BASE OF THE RUDDER POST.

(6) REMOVE THE EXTERNAL DETACHABLE FAIRINGS AT THE BASE OF THE FIN BALANCE CHAMBER.

(7) OPEN THE PORT FIN BALANCE CHAMBER HINGED FAIRINGS AND REMOVE THE PANELS AT THE RUDDER HINGE POINTS.

(8) DISCONNECT THE SHROUD FROM THE FIN.

(9) TO ASSIST MANOEUVRING THE RUDDER DURING REMOVAL, REMOVE THE LOWEST BALANCE WEIGHT FROM THE RUDDER LEADING EDGE.

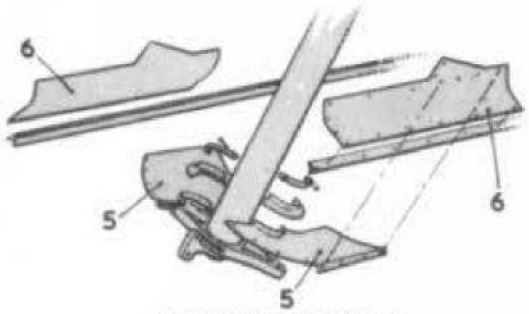
(10) ATTACH THE RUDDER SLING (REF.NO.26DC/95012) TO A SUITABLY POSITIONED OVERHEAD HOIST OR CRANE.

(11) 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.

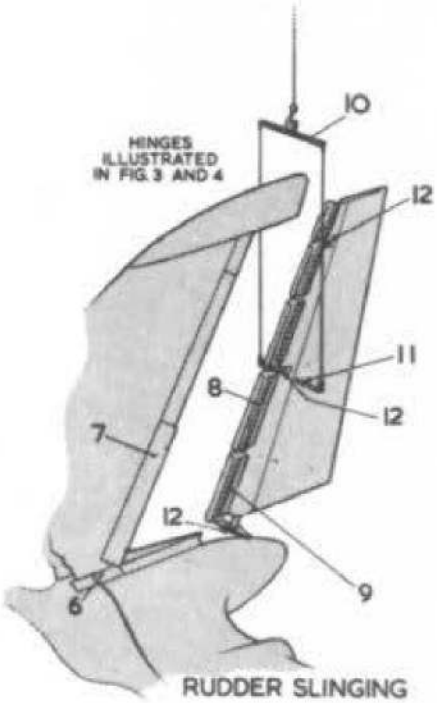
(12) TAKE THE WEIGHT ON THE SLING CABLES AND REMOVE THE HORIZONTAL ATTACHMENT BOLTS FROM THE LOWER, CENTRE AND UPPER HINGE POSITIONS.

(13) THE RUDDER CAN NOW BE MANOEUVRED CLEAR OF THE AIRCRAFT. CONSIDERABLE CARE MUST BE EXCERCISED DURING THIS OPERATION TO AVOID DAMAGE TO THE RUDDER AND FIN.

WARNING...
DUE TO THE REMOVAL OF THE MASS BALANCE WEIGHT THE RUDDER WILL SWING TO A HORIZONTAL POSITION WHEN IT IS REMOVED. PERSONNEL MUST BE PREPARED FOR THIS MOVEMENT SO AS TO AVOID INJURY OR BEING KNOCKED OFF THE STEPS OR PLATFORM ON WHICH THEY WILL BE WORKING.



FAIRINGS REMOVAL



RUDDER SLINGING

Fig. 6. Removal of rudder

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 member is a straightforward channel section.

Ribs

15. Between the main spar and the rear member 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. Channel-section members riveted chordwise to these ribs carry mass balance weights of lead strip, and also form the attachment for the silicone coated glasscloth sealing to the fin shroud.

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

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

REMOVAL AND ASSEMBLY

General

19. Recommended procedures for the removal of the fin cap and the rudder are given in fig.5 and 6, and the related Keys. Removal of the fin will be dealt with in Vol.6 of this publication. 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.

20. The procedure for assembly of 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 correct movement and for full and free travel. The rudder power control units should also be filled and bled in accordance with instructions in A.P.4603B.