

Chapter 3 TAIL UNIT

(Completely Revised)

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DESCRIPTION AND OPERATION

General

1. The tail unit comprises two tail booms, twin fins and rudders, and a single tail plane and elevator. The tail booms are cantilevered from the main plane stub booms, while the rudders and interposed tail plane are attached to the fins, which are built integrally with the rear of the tail booms. The A. S. I. pressure head is mounted at the top of the port fin assembly and the tail navigation lamp is fitted in the port bullet fairing. Three aeriels are mounted on the booms, one on the port and two on the starboard boom. A hard rubber stop

is fitted to the under-surface of each boom rear end to prevent damage should the tail touch the ground. The components of the tail unit are shown in fig. 1. Attachment brackets are fitted in the forward portion of each boom for the installation of R. A. T. O. equipment

Tail boom and fin

2. Each tail boom is an oval-section light-alloy structure, consisting of a series of diaphragms to which the light-alloy skin covering is riveted (fig. 2), the skin being reinforced longitudinally with extruded stringers. An

L-section casting is riveted to the forward end of the boom to form the attachment face to the stub boom. The fin structure, comprising front and rear spars with nose and centre ribs, is an integral part of the tail boom (fig. 2).

Rudder

3. Each rudder consists of pressed light-alloy ribs attached to a spar, to which the tubular rudder post is mounted. The skin covering is riveted to the spar and ribs, and encloses a mass-balance weight secured in the

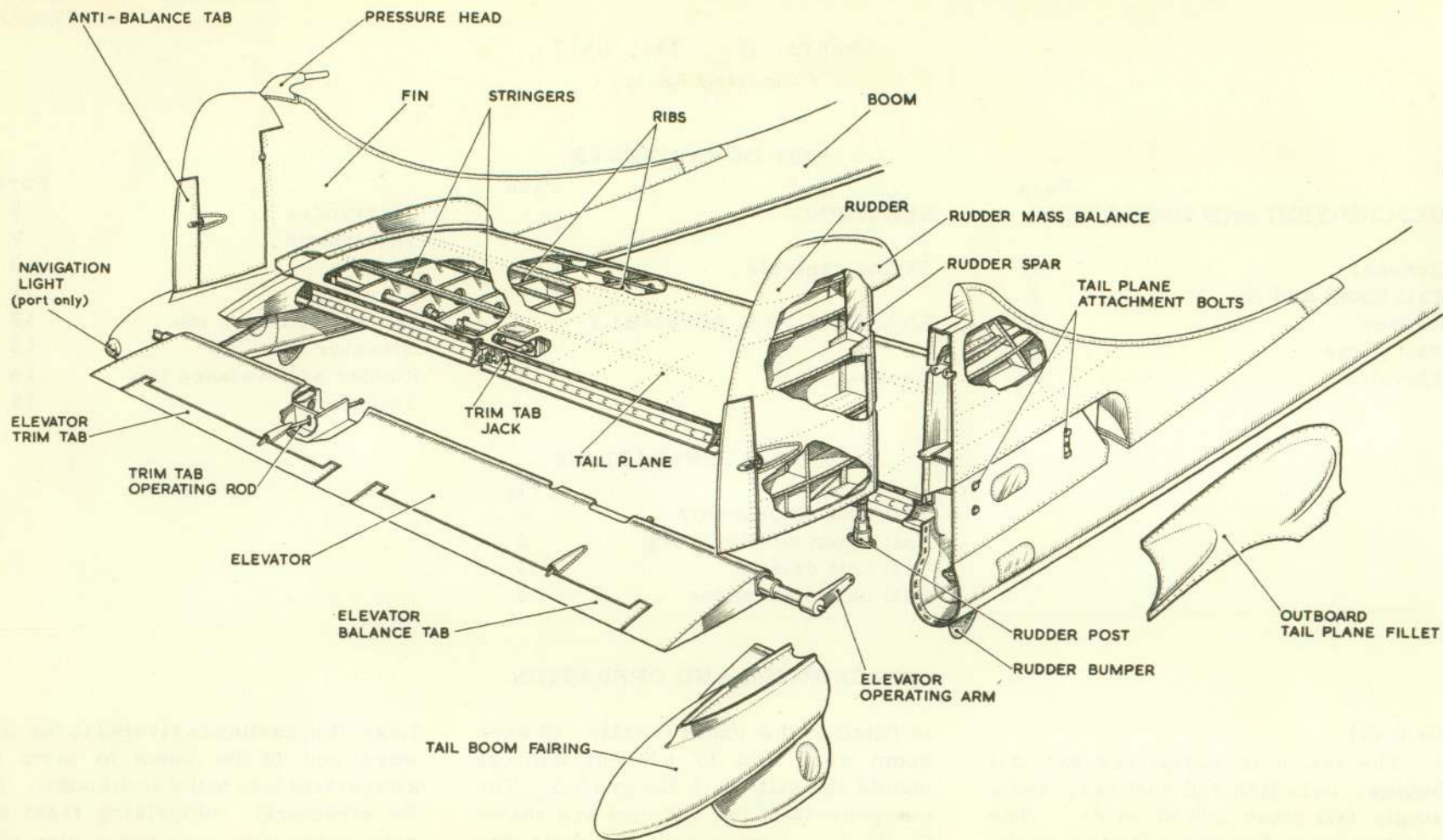


Fig.1 Tail unit components

horn of each rudder. An anti-balance tab is inset in each rudder trailing edge. The construction of the rudders is shown in fig. 1 and details of the attachment to the fin in fig. 3. The setting of the rudder controls and adjustment of the tabs are described in Chap. 4 of this Section.

Tail plane

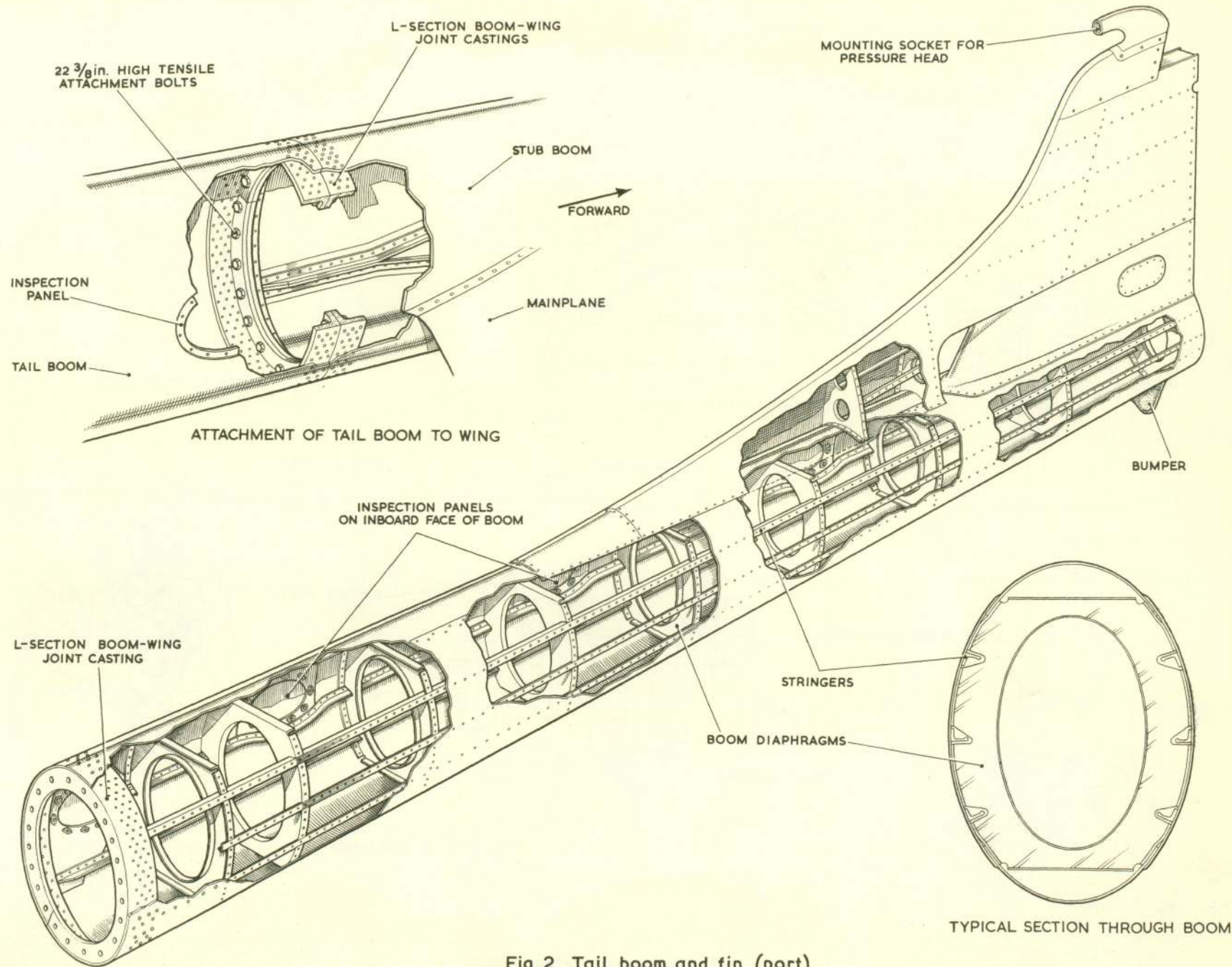
4. The tail plane comprises two channel-section spars to which the nose and main ribs are riveted. A light-alloy skin, reinforced with transverse stiffeners (fig. 1), is riveted to the spars and ribs, and the tail plane is attached to the fins by bolts passing through bushes in the spars (fig. 3).

The incidence of the tail plane is adjusted as described in para. 16. The attachment brackets for the elevator centre hinges are secured to the tail plane rear spar, and the bearing blocks for the outer hinges are attached to the rear spar of each fin (fig. 3).

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Fig. 2 Tail boom and fin (port)

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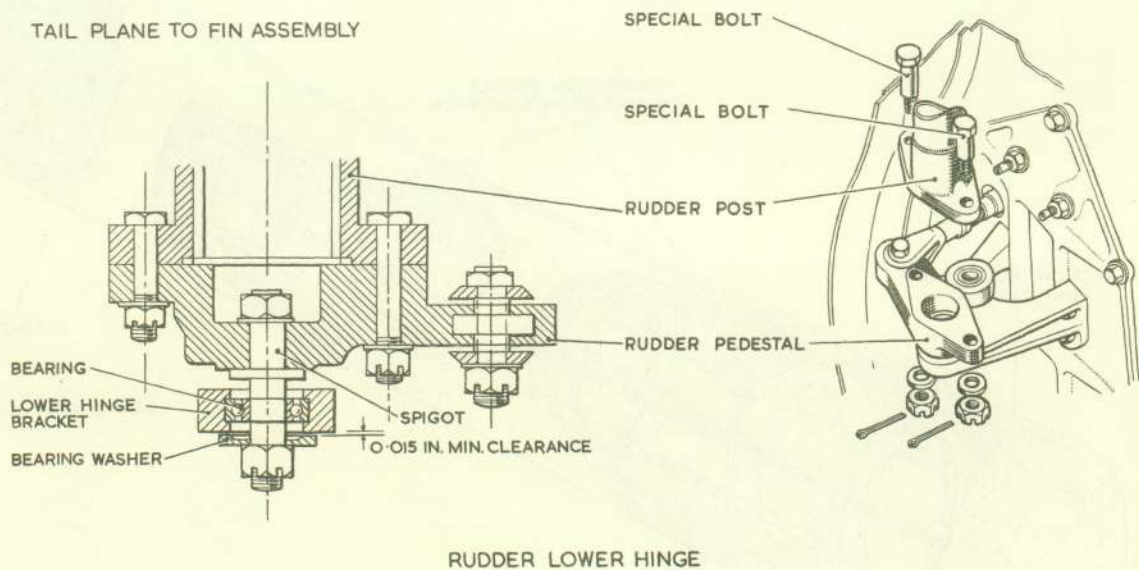
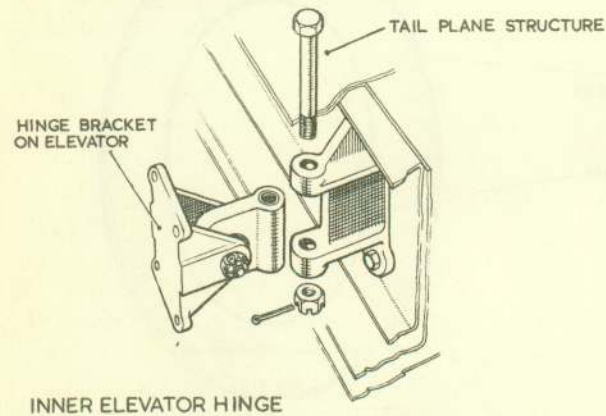
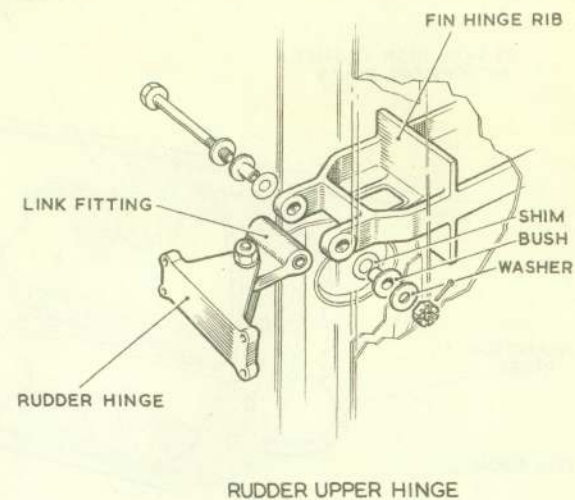
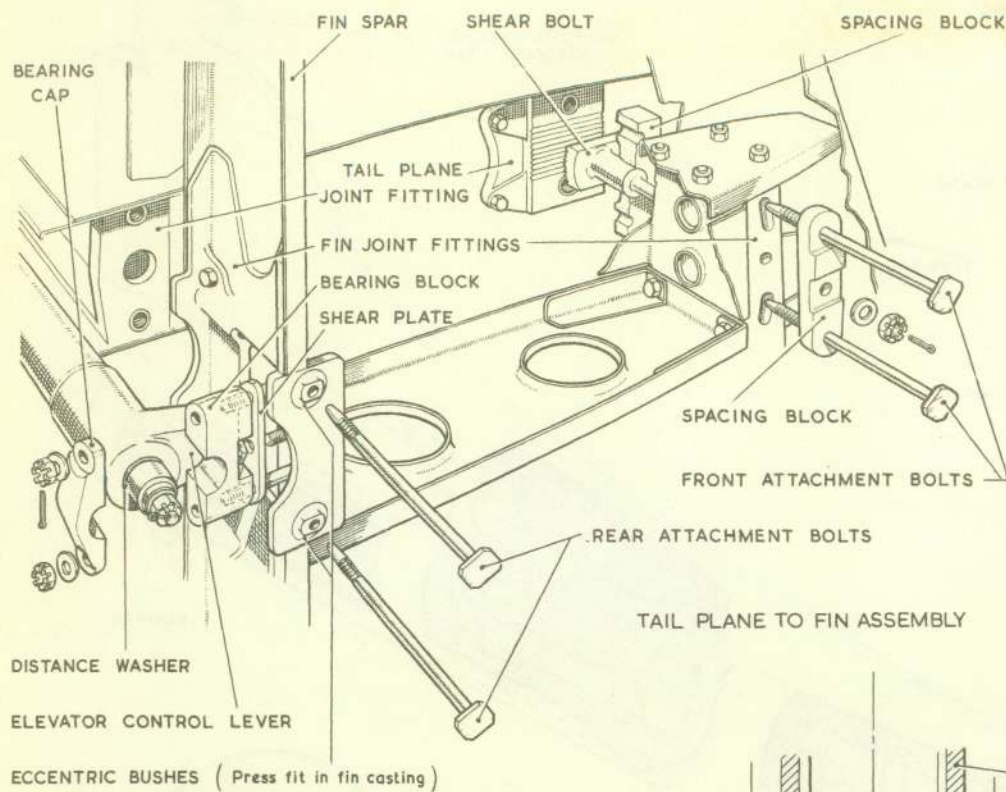


Fig.3 Tail unit details

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Elevator

5. The elevator comprises a single channel-section spar, to which the light-alloy pressed ribs are attached, the whole being covered with a light-alloy skin. Forward projecting horns, which incorporate the mass-balance weights, are mounted on the upper and under-surfaces at the two centre-hinge ribs. The elevator actuating levers are linked to torque tubes, at the ends of which spigots are mounted to locate the elevator in the bearing blocks on the rear spar of each fin. Two tabs are fitted to the elevator, the port being a trim tab operated from the engine control box in the cabin and the starboard one a balance tab. Details of the tabs together with instructions for rigging the elevator, are given in Chapter 4 of this Section.

SERVICING

Flying controls

6. The servicing requirements of the flying control mechanism are given in Chapter 4 of this Section. The procedure for checking the rigging of the tail unit, and the location of drain holes and access panels is given in Section 2, Chapter 4. The lubrication requirements are given in the same chapter.

REMOVAL AND ASSEMBLY

General

7. The following paragraphs give the sequence of operations for the removal

of the complete tail unit and its component parts. Unless otherwise stated, the order for assembly in each case is the reverse of that given for removal. The procedure for rigging the flying control mechanisms on re-assembly is given in Sect. 3, Chapter 4.

Clearances

8. The clearances which must be obtained on assembly are shown in fig. 4.

Tail booms

9. The tail booms should be dismounted as follows :-

(1) Remove the inboard and outboard inspection panels from both booms.

(2) Lock the flying controls at the forward and aft ends of each boom as detailed in Sect. 3, Chap. 4, and disconnect the control cables at their turnbuckles. Disconnect the radio and radar cables and the R. A. T. O. pneumatic lines (For radio and radar details refer to Section 6).

(3) Port boom only. Disconnect the elevator trim tab control cables at their turnbuckles, the A. S. I. pipes, and the electrical cables for the pressure head heater and the tail navigation light (For electrical details refer to Section 5).

(4) Adequately trestle the tail unit (Sect. 2, Chap. 4), then, using the

special tools listed in Section 2, Chap. 4, remove the twenty-two special bolts securing each tail boom to the main plane stub boom.

Note...

When dismantling one boom only, it is essential that the remaining parts of the tail unit be adequately supported and weighted against 'spring'.

Rudder

10. The procedure for the removal of either rudder is as follows :-

(1) Remove the tail boom rear end fairing.

Note...

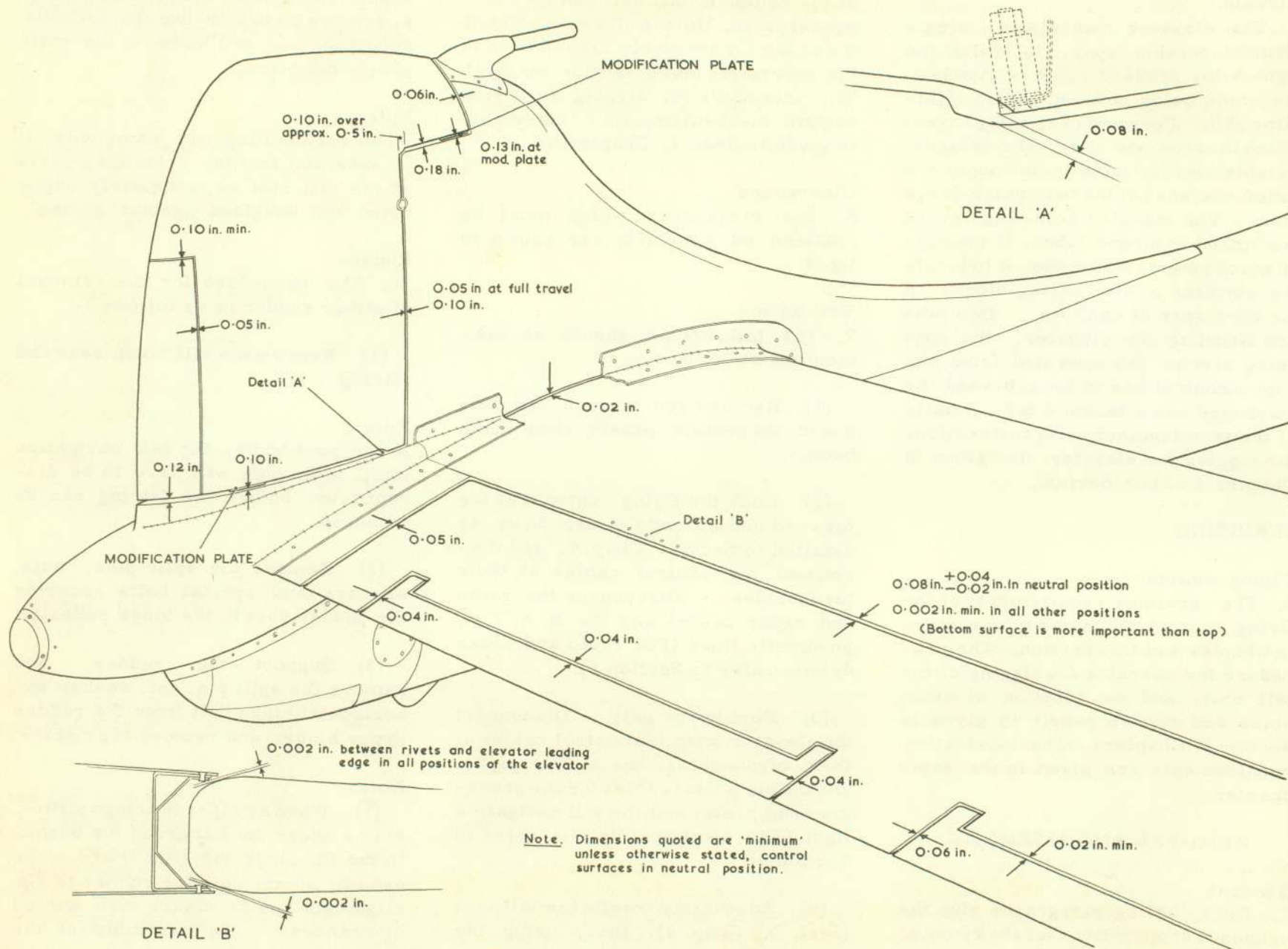
In the port boom, the tail navigation lamp cable plug will have to be disconnected before the fairing can be removed.

(2) Remove the split pins, nuts, washers and special bolts securing the rudder post to the hinge pedestal.

(3) Support the rudder, and remove the split pin, nut, washer and horizontal hinge bolt from the rudder upper hinge, and remove the rudder.

Note...

(1) When a rudder is being refitted, shims under the flanges of the bushes in the fin hinge rib (fig. 3) are to be used to obtain correct rudder to fin alignment and to ensure even shroud clearances. On assembly of the



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Fig. 4 Tail unit clearances

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upper rudder hinge, a check must be made to ensure that 0.002 to 0.005 in. end float exists between the link fitting (Part No. JOO. 756) and the bushes in the fin hinge rib, and that the bushes and shims seat correctly on the outside faces of the rib casting. Under no circumstances must the horizontal pivot bolt anchoring the link fitting to the hinge rib be overtightened; the nut must be screwed on sufficiently only to prevent end play in the bolt.

(2) On assembly of the rudder lower hinge (fig. 3, the respective nut must be screwed onto the lower end of the spigot only sufficiently to allow a clearance of 0.015 in. (min.) to exist between the hinge bracket and the bearing washer (Mod. N. 948). The bearing washer must be fitted with its recessed face uppermost.

Elevator

11. To dismantle the elevator, proceed as follows :-

(1) Remove the tail boom rear end fairings and rudders (para. 10).

(2) Remove the outboard tail plane fillets of each fin, and disconnect the control rods from the elevator operating arms.

(3) At the port inner hinge, remove the top and bottom cover plates in the elevator leading edges and disconnect the trim tab operating rod. On the starboard side remove the cover

plates and disconnect the balance tab operating-rod.

(4) Remove the split pins, nuts and bearing cups from the bearing block on each fin rear spar, to release the outboard elevator hinges.

(5) Support the elevator in the UP position and remove the split pins and nuts from the two vertical inner hinge bolts.

(6) Support the elevator in the DOWN position and withdraw the two vertical inner hinge bolts, and remove the elevator.

Note...

(1) On re-assembly, the elevator mass balance and fairing must swing easily in the front fairing without rubbing or scraping. It is important that the clearances on the tail plane and boom fairings conform to those given on fig. 4.

(2) On re-assembly of an elevator, the shear plate (fig. 3), fitted under the bearing block at each outer hinge position, is used to obtain vertical adjustment between tail plane and elevator. A series of shear plates (Part No. JOO. 984) is available with varying positions of the centre hole, Mark Numbers 2 to 8 being used to identify the centre hole off-set. Laminated shims (Attwell L. A. 3 shim, 0.05 in. max.) may also be

fitted under the bearing blocks for horizontal adjustment.

(3) Laminated shims, 0.06 in. max., may be used under each inner hinge bracket on the tail plane and elevator for horizontal adjustment.

Elevator balance tab

12. The elevator balance tab should be removed as follows :-

(1) Remove the cover plate over the connecting-rod eye end on the upper surface of the elevator leading edge.

(2) Remove the split pin, nut and bolt from the connecting-rod eye end.

(3) Remove the split pin, nut and washer from each hinge pin and withdraw the hinge pins and remove the tab.

Elevator trim tab

13. The elevator trim tab should be removed in the following manner :-

(1) Remove the cover plate over the connecting-rod eye end on the upper surface of the elevator leading edge.

(2) Remove the split pin, nut and bolt from the connecting-rod eye end.

(3) Remove the split pin, nut and washer from each hinge pin and withdraw the hinge pins and remove the tab.

Rudder anti-balance tab

14, The following procedure should be adopted to remove the rudder anti-balance tab :-

(1) Remove the fairing over the connecting-rod on the inboard side of the rudder and remove the split pin, nut, washer and bolt from the connecting-rod eye end.

(2) Remove the seventeen nuts on the tab hinge and remove the tab.

Tail plane

15. Before the tail plane can be removed, the rudders and elevator must be removed as detailed in para. 10 and 11 and the inboard and outboard tail plane fairings and fillets removed from both booms and fins, the procedure is then as follows :-

(1) Disconnect the trim tab cable from the sprocket chain and withdraw the cables from the tail plane.

Note...

To simplify the assembly of the tail plane, the cables should be secured to the chain ends by a suitable length of cord so that, when the cables are clear, a loop of cord will protrude from the end of the tail plane. The pulley guard on the fin structure prevents the cables from being pulled back through the port tail boom.

(2) Remove the four tail plane attachment bolts from outboard of each fin.

(3) Support the tail plane, spring the fins slightly apart and lower the tail plane clear.

Note...

Before removing the tail plane, it is advisable to pencil mark the shear bolts and the front tail plane spar end fittings to ensure correct mating of the serrations on re-assembly.

16. If, on assembling a new tail plane, the correct angle of incidence cannot be obtained, the following procedure should be adopted:-

(1) Remove the existing shear bolt bushes from each front attachment fitting.

(2) Insert a slave bush with sliding fit, port and starboard, to determine the shear bolt position which will give the correct angle of incidence (Sect. 2, Chap. 4).

(3) Fit either an eccentric bush (Part No. 12. TB. 243) or a concentric bush (Part No. 12. TB. 255), as appropriate. If the bush stands proud of its hole, mark it with a scribe, drive it out, and remove the excess material

(4) On final fitment, lock the bush by centre-punching lightly.

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