

Chapter 3 TAIL UNIT

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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. A whip-type aerial is mounted on the top surface of the port boom, and a hard rubber stop is fitted to the under-surface of each boom rear end to prevent damage should the tail of the boom touch the ground. The components of the tail unit are shown in fig. 1.

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 and 4*).

Rudder

3. Pressed light-alloy trailing edge ribs are attached to a single channel section spar, which has the tubular rudder post mounted at its base. The skin covering is riveted to

the spar and ribs and encloses a mass-balance weight secured in the horn of each rudder. A small trim tab is inset in the base of each rudder trailing edge. The construction of each rudder is shown in *fig. 4* and details of its attachment to the fin in *fig. 3*. The setting of the rudder controls and adjustment of the trim tab are described in Chap. 4 of this Section.

Tail plane

4. The tail plane comprises two channel section spars to which the nose and centre ribs are riveted. A light-alloy skin, reinforced with transverse stiffeners (*fig. 4*), 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

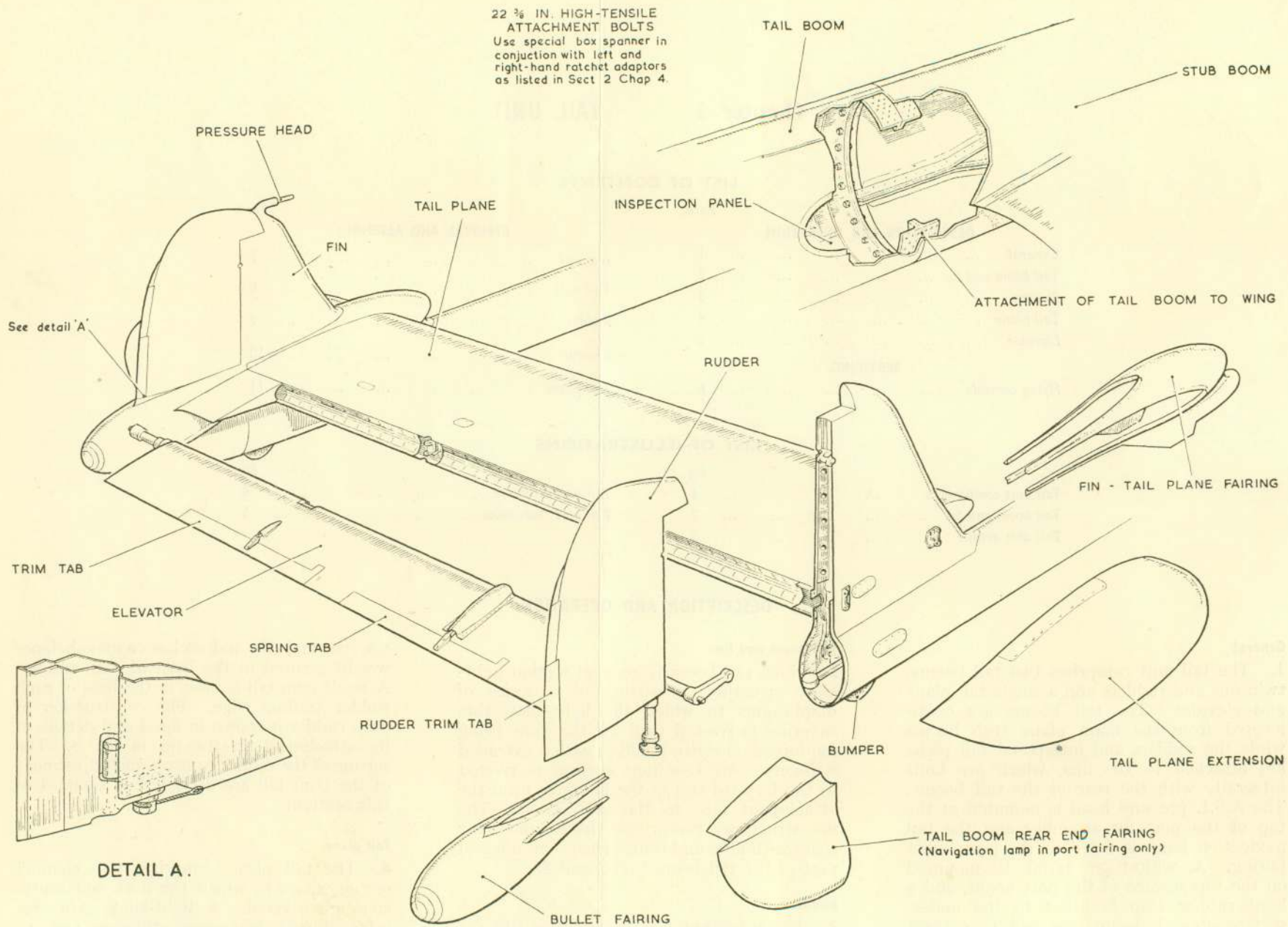


Fig. 1. Tail unit components

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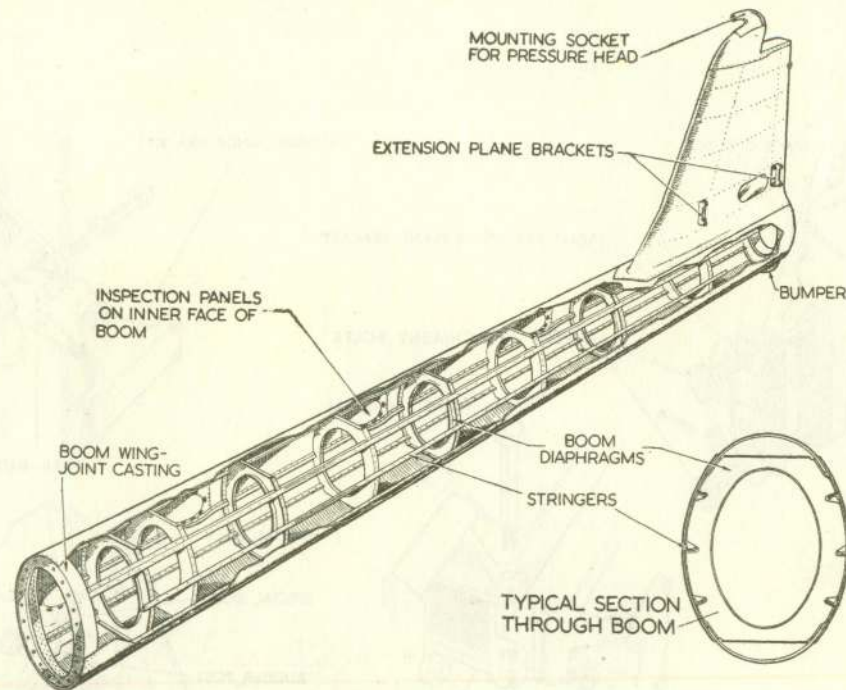


Fig. 2. Tail boom and fin

incidence of the tail plane is adjusted ◀ as described in para. 12. ▶ The attachment brackets for the elevator centre hinges are secured to the rear spar, and the bearing blocks for the outer hinges are attached to the rear spar of each fin (fig. 3).

Elevator

5. The elevator, which is covered with a light-alloy skin, comprises a single channel-section spar to which the nose and trailing edge ribs are attached. To the undersurface, at the two centre hinge ribs, are attached forwardly projecting horns carrying the mass-balance weights. Torque tubes project from each end of the elevator, to the starboard of which is attached the elevator control lever. At the end of each torque tube is a spigot which locates in the bearing block on the rear spar of each fin. The

trailing edge of the elevator is recessed to accommodate two tabs; the starboard tab is spring-operated, and the port trim tab is adjustable from the cabin. Details of their mechanisms, together with instructions for rigging, are given in Chap. 4.

SERVICING

Flying controls

6. The tail unit structure requires little servicing beyond lubrication of the control surface hinges at the periods laid down in Vol. 4. The main servicing operations are concerned with the mechanism of the flying controls which are fully described in Chap. 4 of this Section. The procedure for checking the rigging of the tail unit and the location of the drain holes and access panels are given in Sect. 2, Chap. 4. The elevator, rudder, trim and spring tab hinges are pre-

packed and do not require lubrication during the normal life of the aircraft; other lubrication requirements are given in Sect. 3, Chap. 4.

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. Fig. 5 indicates the clearances which must be obtained during assembly.

Tail unit

8. (1) Remove the inboard and outboard inspection panels from the forward and aft ends of each boom, and the second panel from the inboard of the port boom only.
- (2) Lock the flying controls at the forward and aft ends of each boom as detailed in Chap. 4, and disconnect the control cables at their turnbuckles.
- (3) *Port boom only.* Disconnect the elevator trim control cables at the turnbuckles, the A.S.I. pipes and the electrical cables for the pressure head heater, tail navigation lamp, telebrief and aerial. Refer to Sect. 5 for electrical details.
- (4) Trestle the tail unit (Sect. 2, Chap. 4) and, using the special box spanner in conjunction with the left and right-hand ratchet adapters, detach the tail booms from the main planes by withdrawing the twenty-two $\frac{3}{8}$ in. dia. attachment bolts (fig. 1).

Note . . .

If one boom only is to be dismantled, it is essential that the remaining components of the tail unit should be adequately supported and weighted against spring.

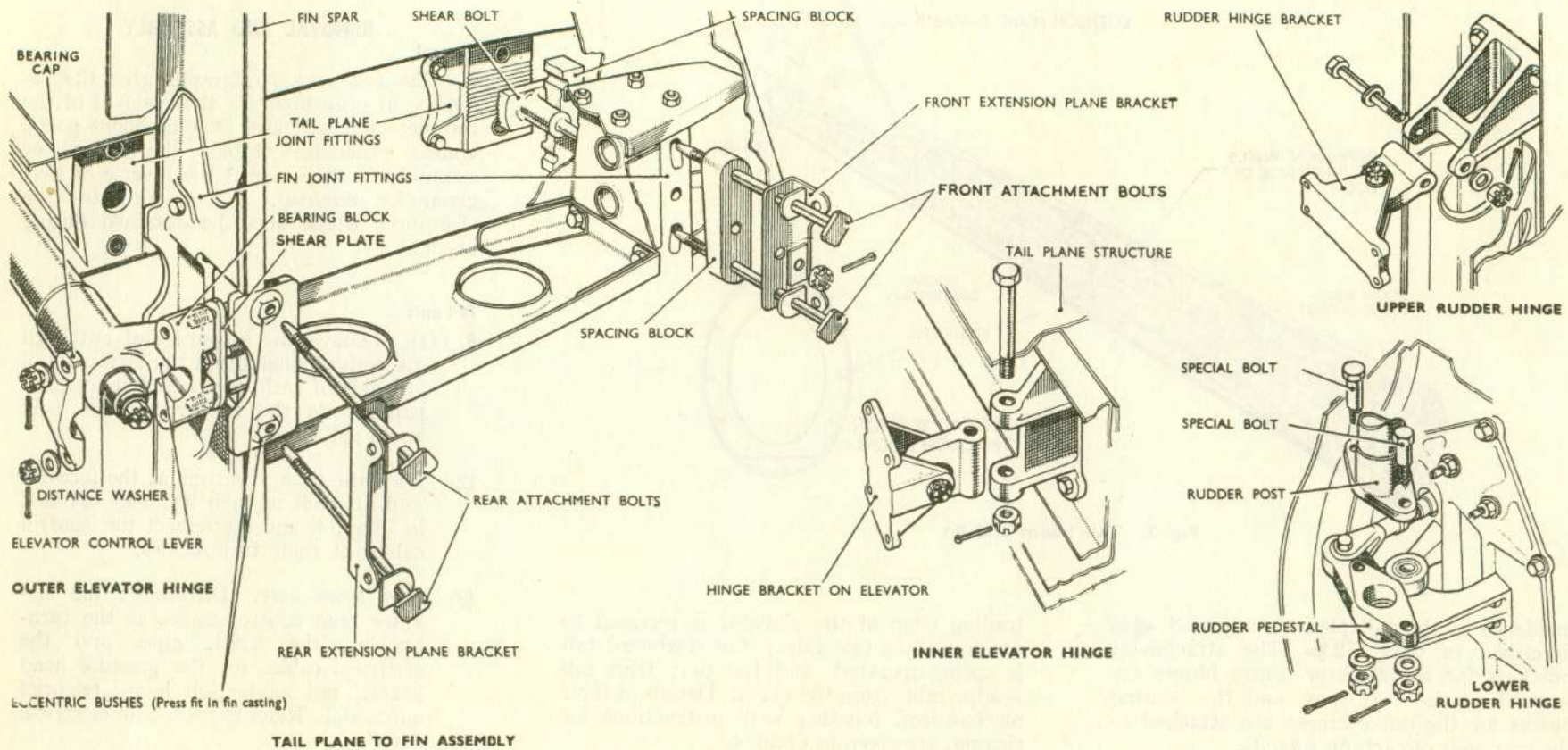


Fig. 3. Tail unit details

Rudder

9. Remove each rudder as follows :—

- (1) Remove the tail boom end and bullet fairings from each tail boom (fig. 1).

Note . . .

The tail navigation lamp and telebrief cables must be uncoupled from the rear end of the port boom before the fairing can be removed.

- (2) Remove the rudder post from the pedestal (fig. 3) by withdrawing the two split pins, nuts and bolts.
- (3) Support the rudder and withdraw the horizontal attachment bolt, nut and split pin from the upper-hinge (fig. 3.)

Elevator

10. (1) Remove the bullet fairings, tail plane fillets, tail boom rear end fairings and the rudder (fig. 1).
- (2) Remove the access panel from the outboard surface of the starboard fin, and disconnect the operating-rod from the elevator actuating lever (Sect. 3, Chap. 4).
- (3) Remove the upper and lower access panels from the inner hinge on the elevator leading edge, and disconnect the trim tab operating-rod (fig. 4).
- (4) Withdraw the split pins, nuts and bearing cap from the bearing block on each fin rear spar to release the elevator outboard hinges (fig. 3).

- (5) Support the elevator in the *up* position, and withdraw the split pins and nuts from the bolts at the inner hinges (fig. 3).
- (6) Support the elevator in the *down* position, withdraw the two bolts from the inner hinges and remove the elevator.

◀Note . . .

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 No. 2 to 8 being used to identify the centre hole off-set. Laminated shims may also be fitted under the bearing blocks for horizontal adjustment. Laminated shims, 0.06 in. max., may be used under each inner hinge bracket on the tail plane and elevator for horizontal adjustment.▶

Tail plane

11. The operations outlined in para. 9 and 10 have to be completed before the tail plane may be removed as detailed below :—

- (1) Remove the trim tab controls access panel (fig. 4).
- (2) Disconnect the trim tab cables from the sprocket chain and withdraw the cables from the tail plane.

Note . . .

To simplify the re-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.

- (3) Withdraw the four square headed tail boom attachment bolts from outboard of each fin.
- (4) Support the tail plane, spring the fins apart slightly and lower the tail plane clear.

◀12. 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.▶

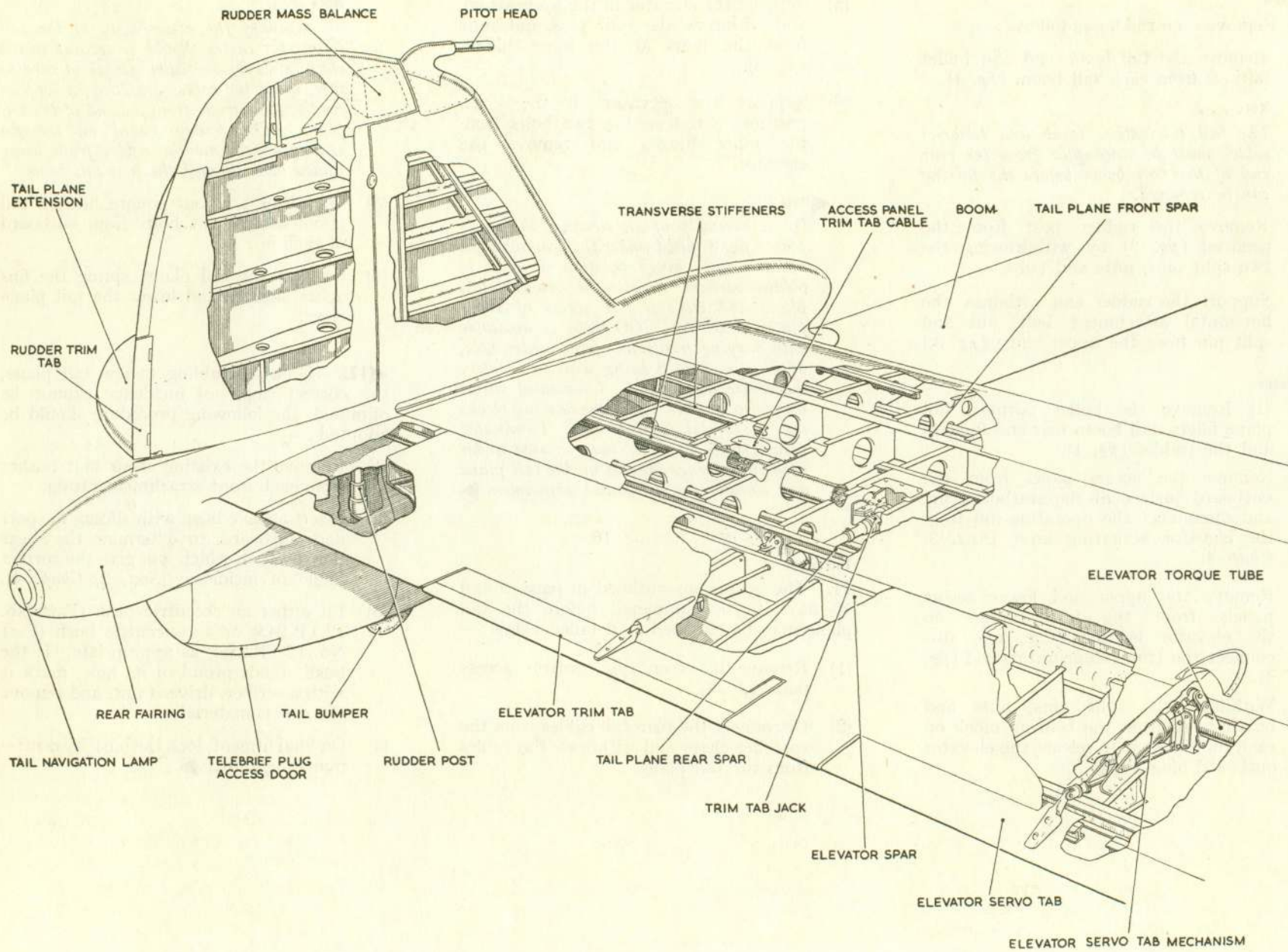


Fig. 4. Tail unit structure

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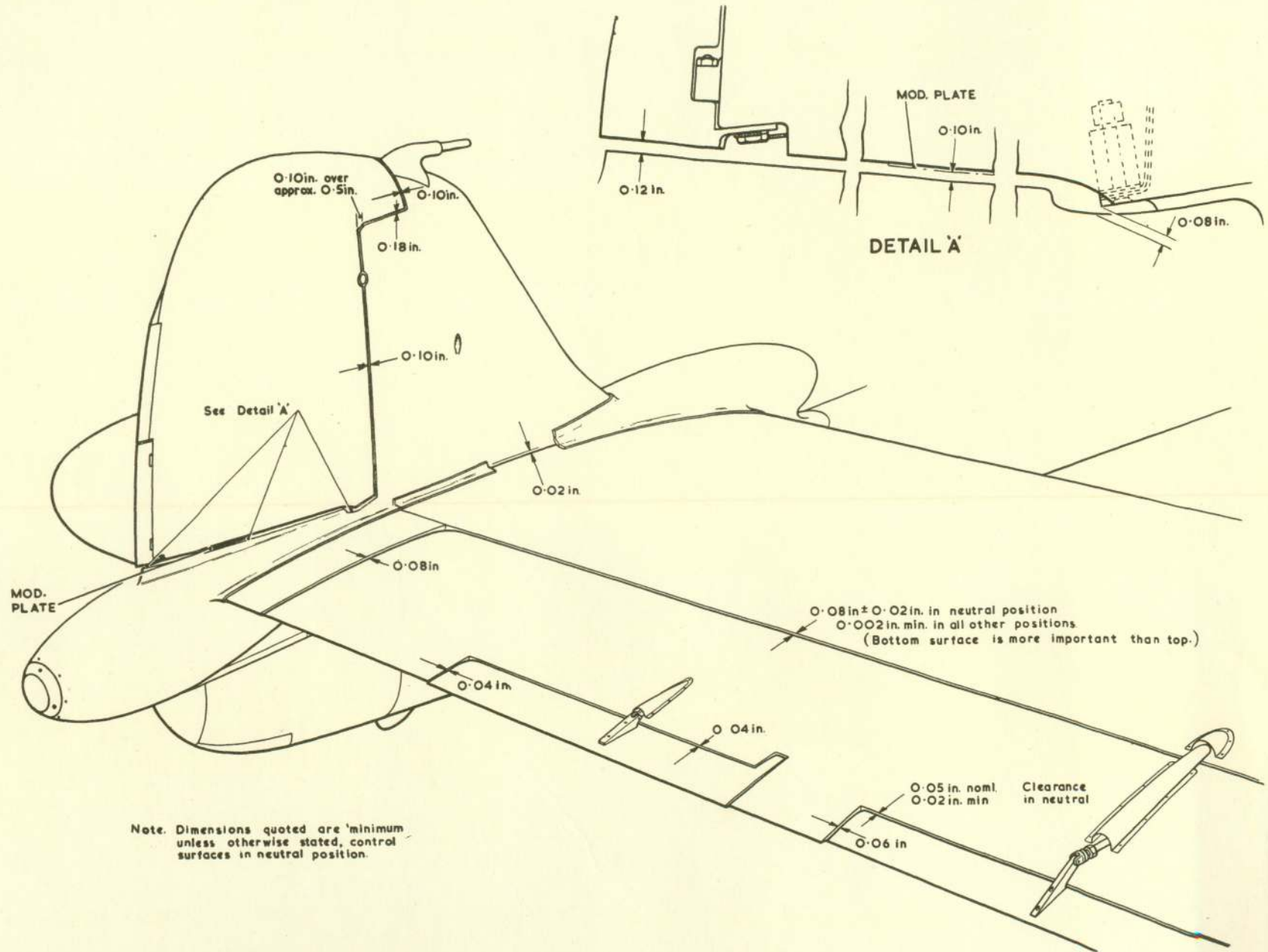


Fig. 5. Tail unit clearances

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