CHAPTER 2 MAIN PLANES

(Completely revised)

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LIST OF ILLUSTRATIONS

DESCRIPTION

General

1. The main planes are cantilever structures upon which the ailerons, flaps and dive brakes are hinged. Built integrally with each main plane are the stub boom, the engine air-intake duct and the undercarriage diaphragm. Four flexible bag type fuel tanks are housed in each wing, but for clarity these tanks are not illustrated in fig. 2. Details of the tank installation will be found in Sect. 4, Chap. 2.

2. The main plane consists basically of a single I-section main spar, to which a false rear spar is joined by light-alloy ribs and a light-alloy skin covering. The skin is stiffened

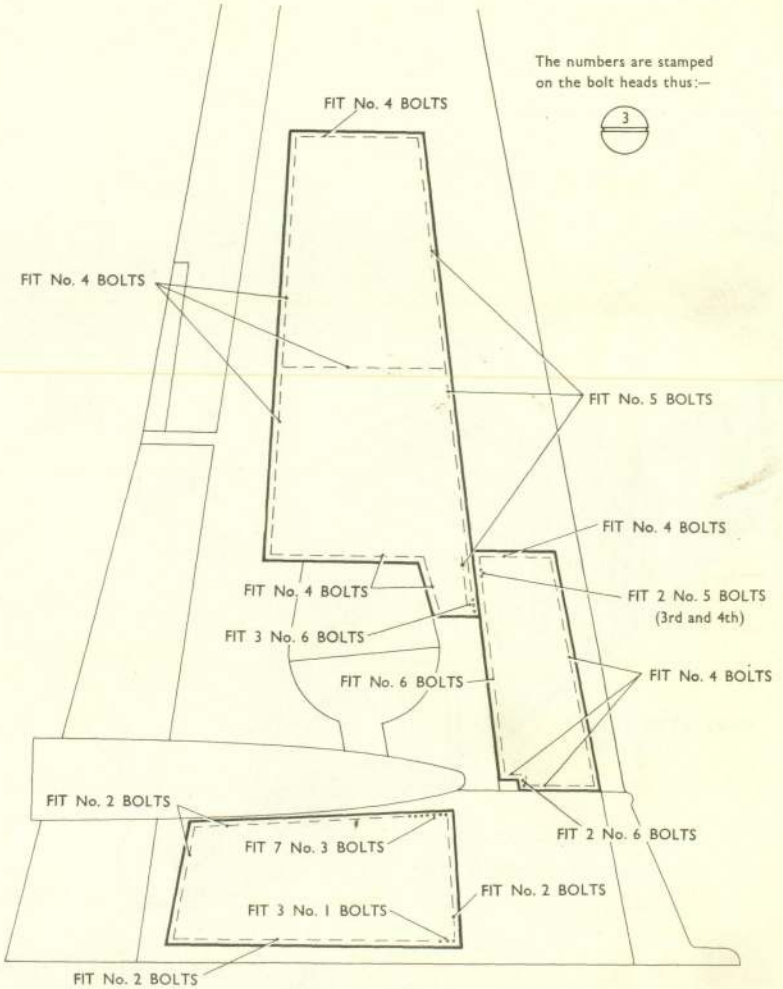

Fig. 1 Fuel tank doors

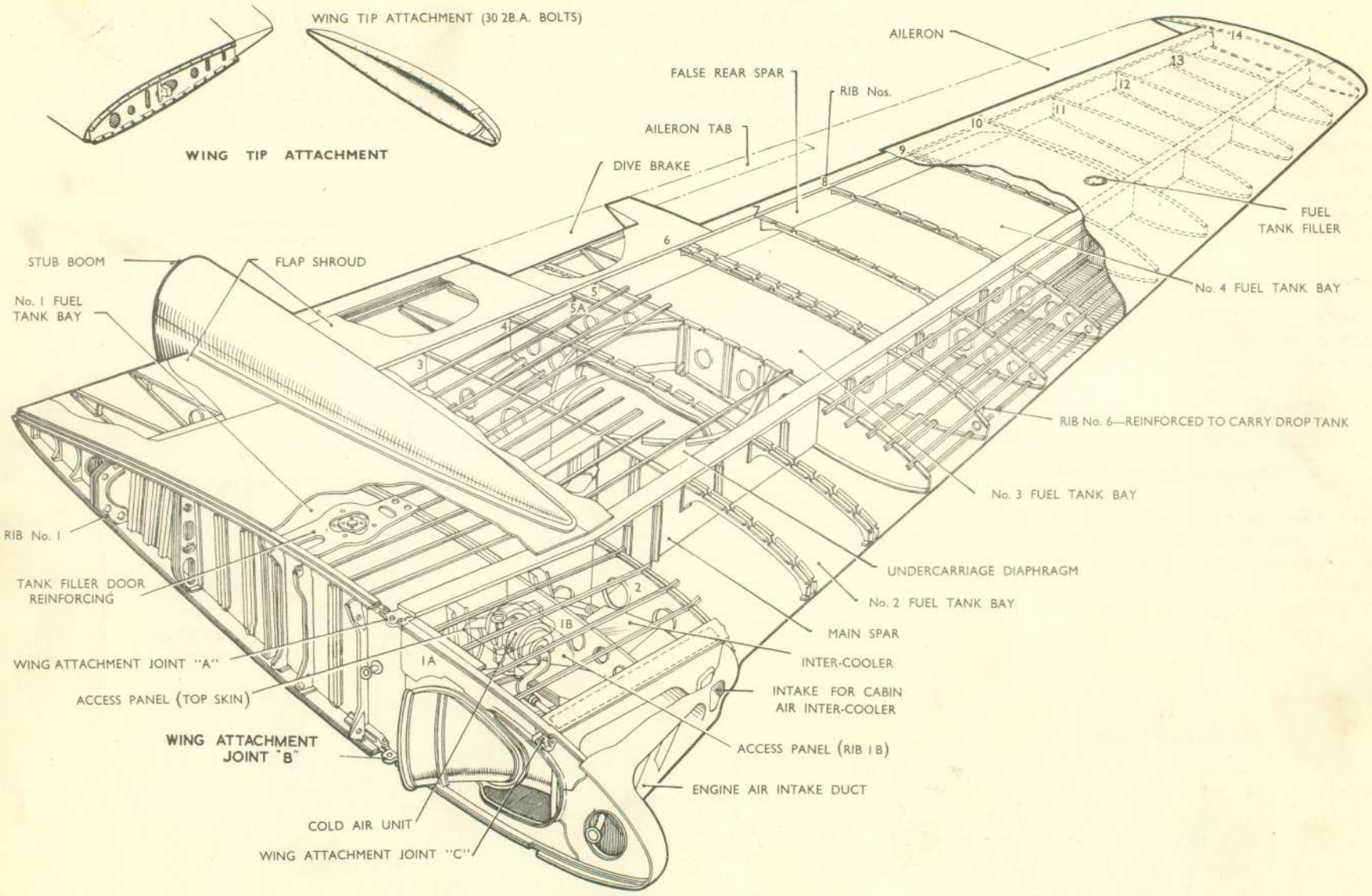

Fig. 2 Main plane structure

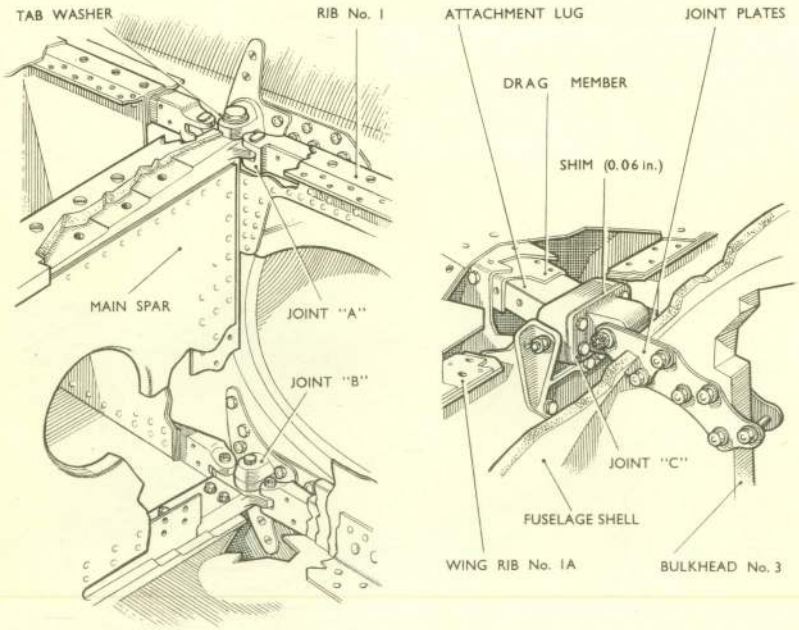

Fig. 3 Main plane joints

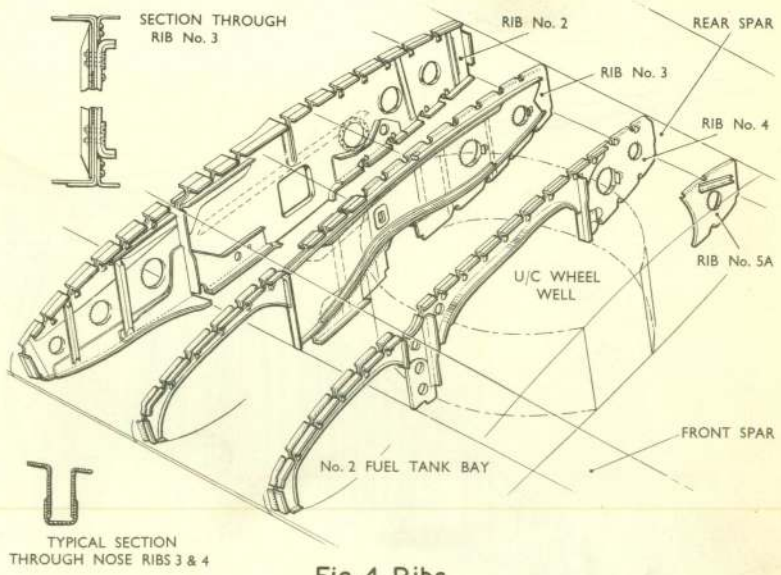

Fig. 4 Ribs

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with spanwise stringers. The fuel tank doors comprise a considerable area of the undersurface of the main plane. The bolts which secure these doors have a numeral stamped on the head of each bolt and they must be assembled in their appropriate holes according to the instructions in fig. 1. The lubricant table in Sect. 2, Chap. 4, of this volume identifies the lubricant symbols used in fig. 7, 8 and 9.

Spars

3. The main spar is a channel-section, light-alloy pressing comprising three lengths which are bolted together with butt and strap joints. The top and bottom light-alloy booms, which taper in plan form and elevation, are riveted to the spar flanges. The spar is further strengthened by extruded stiffeners riveted to the web. The false rear spar is a simple light-alloy channel-section pressing, with top and bottom booms riveted to the flanges.

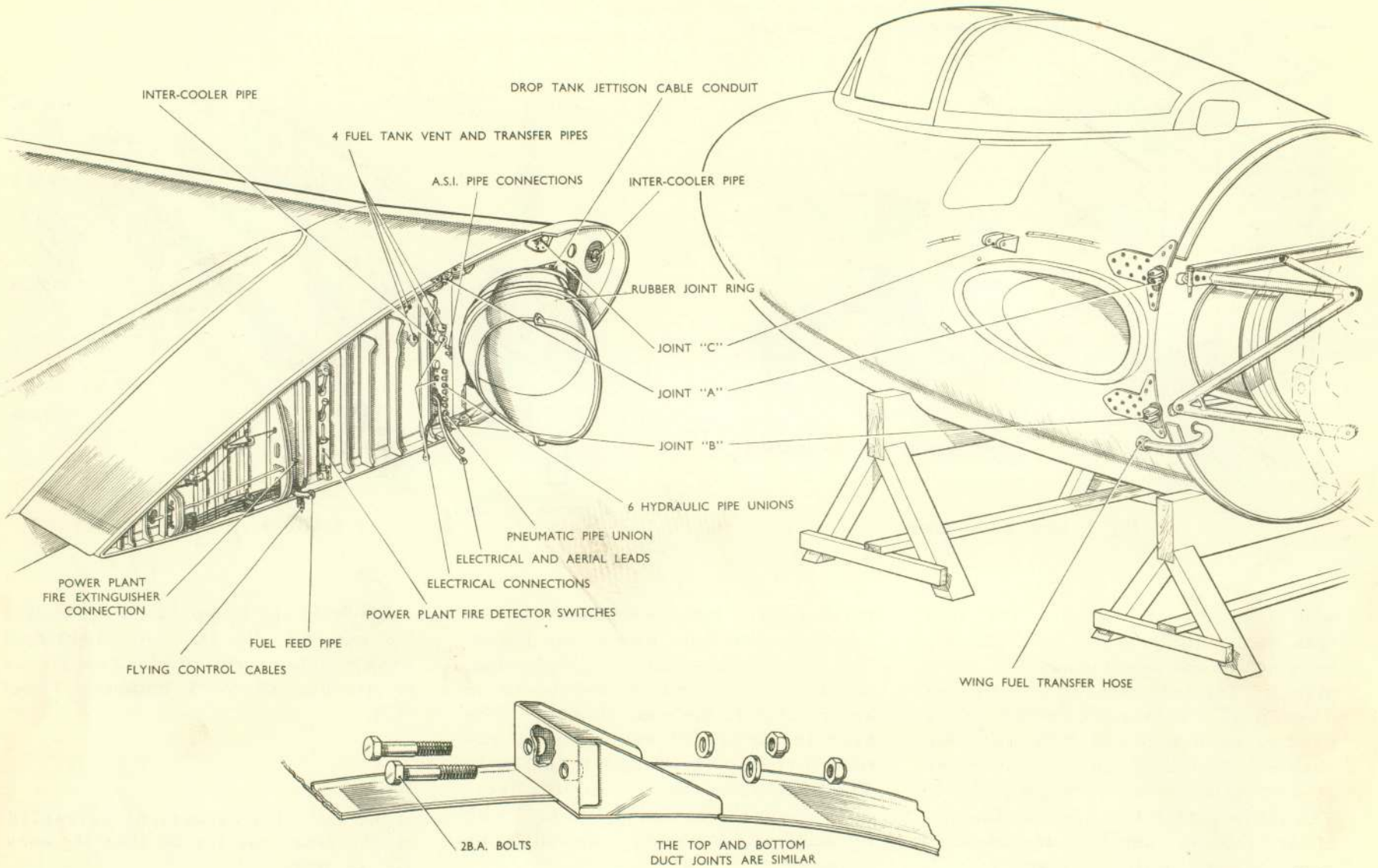
Attachment points

4. The two main spar end fittings are secured to the cross tubes on No. 4 bulkhead by special bolts (joints 'A' and 'B', fig. 3). An additional drag member forward of the main spar is attached to No. 3 bulkhead (joint 'C').

Note...

Joint 'C' (fig. 3) must be assembled to the wing root lug so that the word TOP is uppermost.

The procedure for removing the main plane from the fuselage is given in para. 10.



DETAIL OF INTERMEDIATE JOINT ON AIR INTAKE DUCT

Fig. 5 Main plane to fuselage attachment

Ribs

5. Fig. 4 illustrates the construction of some typical ribs. Ribs number 1 to 6 (fig. 2), are strengthened for such purposes as drop tank, undercarriage and tail boom attachments.

Ailerons

6. Each aileron consists of a single spar to which the trailing edge ribs are attached, the whole structure being covered with a light-alloy skin. Nose ribs which project forward of the spar support the mass-balance. The inboard end of each trailing edge is recessed to accommodate the balance tab. The operation of the tab together with the procedure for rigging the aileron, flap and dive brake is described in Chap. 4. The aileron is supported by three hinges on the rear spar of the main plane (fig. 7).

Flaps

7. Each main plane supports two interconnected split flaps which extend from the wing root to the stub boom and from the stub boom to rib No. 5A. . The attachment of the flaps together with their operating mechanism is illustrated in fig. 8.

Dive brakes

8. Immediately outboard of each flap are the dive brakes which are constructed of light-alloy ribs and a skin covering. The dive brake is hinged about its centre of pressure. The method of attachment and operation is illustrated in fig. 9.

REMOVAL AND ASSEMBLY

General

9. The following paragraphs outline the recommended procedure to be adopted for the removal of the main planes, ailerons, flaps, and dive brakes. It may be assumed that their assembly is mainly the reversal of this procedure unless otherwise stated.

Main plane (fig. 5)

10. To remove the main plane, it will first be necessary to dismantle the engine cowlings and the tail cone fairing, and to remove the fuselage fuel tank (instructions for which are given in Section 4). It is recommended that the three main plane attachment bolts are treated with penetrating oil at least one hour before extraction. After releasing the pressure from the hydraulic and pneumatic systems and after draining the fuel system, the following items must be removed or disconnected:-

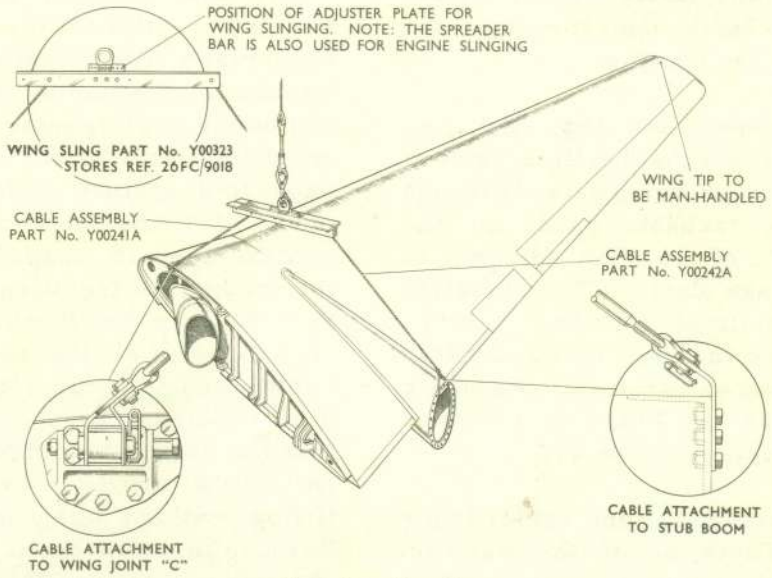


Fig. 6 Main plane sling

(1) Wing root fairings, wing fuel transfer connection, two fuel tank vents, drop tank air pressure and fuel transfer hoses. All these items are on rib No. 1.

(2) Place the three hydraulic selectors on No. 2 bulkhead in the mid position, and disconnect the one pneumatic union and six hydraulic unions on rib No. 1.

(3) Port wing only. - Two A. S. I. pipe connections on rib No. 1 and at the wing to boom joint. Total head hose connections on rib No. 1. Fire extinguisher hose from the distribution ring on the engine. Release the master switch from rib No. 1.

(4) Starboard wing only. - Electric cables from the starter panel on rib No. 1. Air-intake duct for generator cooling and gun heating.

(5) Disconnect the drop tank jettison cable from the Teleflex cable at rib No. 6, access being gained through the small detachable panel on the undersurface of the wing adjacent to the air-intake duct. The Teleflex conduit is split at the wing to fuselage joint, so that the Teleflex cable may be withdrawn from its conduit in the wing when the latter is removed from the fuselage (para. 11).

(6) All electrical and aerial leads at their sockets or at the junction blocks on the engine mounting and at the tail boom joint. Disconnect all bonding connections.

(7) All flying control cables at the turnbuckles on rib No. 1 and at the turnbuckles at the forward end of the appropriate tail boom. The elevator trim cables are on the port side only.

(8) Release the two large Jubilee clips which secure the rubber joint on the air-intake duct, and slide the rubber joint over the duct. This joint is only accessible from the fuselage tank bay when the tank is removed. Split the intermediate portion of the air-intake duct (fig. 5).

(9) The aircraft should now be suitably trestled for the removal of the main plane attachment bolts. If it is intended to dismantle only one of the tail boom attachments, the tail plane and both booms must be adequately supported against spring. The removal of the tail boom from the wing is described in Chap. 3. Details of the method of trestling are given in Sect. 2, Chap. 4 of this volume. After ensuring that all the requisite pipes, cables and electric leads have been disconnected, adjust the trestles so that the main attachment bolt at joints 'A' and 'B' are free to turn in their fittings without using any undue force. Remove the bolts from joints 'A' and 'B' using spanner, Part No. Y00390, and extractor, Part No. 12Y613A, with adapter plug, Part No. Y00181, and the bolt from joint 'C' using extractor, Part No. Y0093. The main plane may now be manhandled on to trestles or slung in the manner illustrated in fig. 6.

Note...
It is important that the same man remains on the wing to check the freedom of the bolt in joint 'A' and to remove the bolt. He should remain in the same position throughout the operation.

11. When assembling the main plane to the fuselage, it is essential that the joint fittings are accurately aligned before attempting to insert the bolts. The precautions outlined in para. 10 as regards positioning of the operator on the wing should be strictly observed. The bolts and fittings should be clean and lightly smeared with grease, ZX-13 before assembly. New attachment bolts must always be fitted when replacing the main plane. The old bolts may be reconditioned with cadmium plate in accordance with the instructions given in A. P. 4099 and 4269, Part 4. Before offering the main plane up to the fuselage, thread the Teleflex cable for the drop tank release into its conduit in the wing, as this operation cannot be carried out when the main plane is assembled. Check the rigging and symmetry in accordance with the instructions given in Sect. 2, Chap. 4.

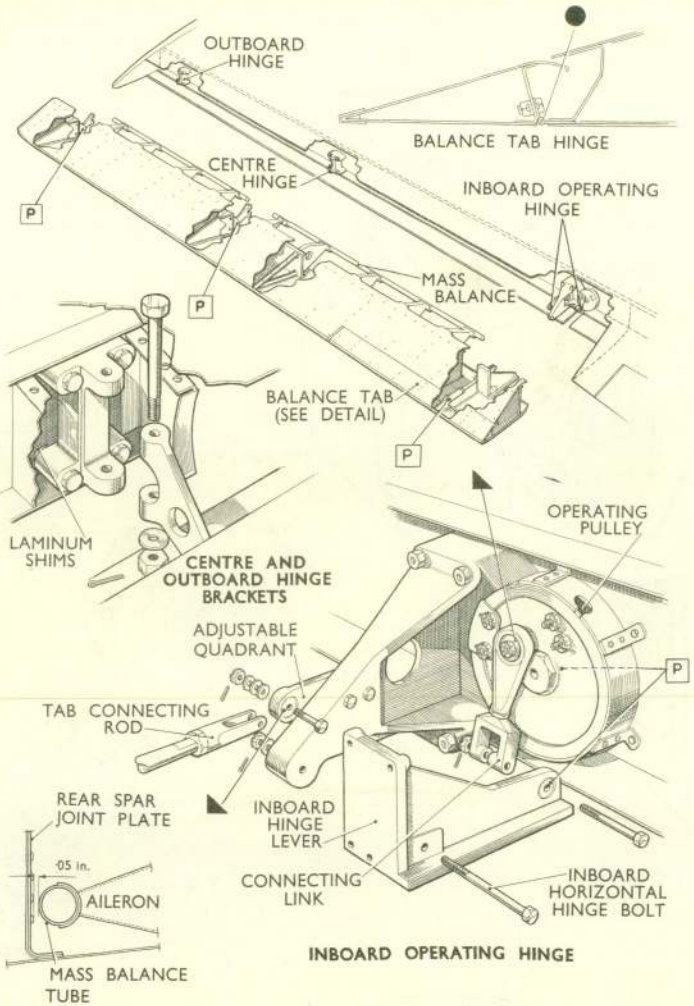


Fig. 7 Aileron

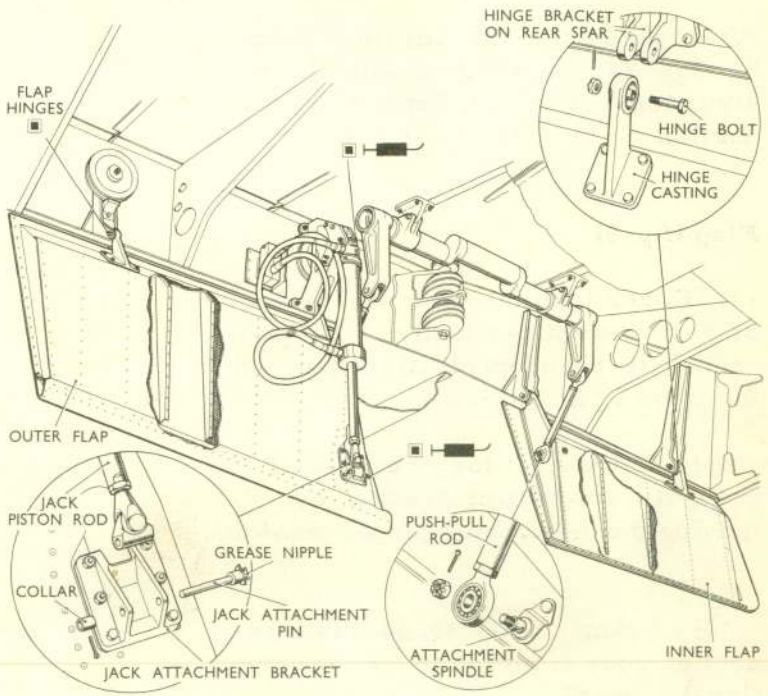


Fig. 8 Flap

Aileron (fig. 7)

12. The following instructions are for the removal of the aileron:-

(1) Release the small elliptical cover plates above and below the centre and outboard hinges.

(2) Remove the access panels from each side of the inboard hinge on the lower surface of the main plane.

(3) Remove the tab connecting-rod from the adjustable quadrant.

(4) Remove the bolt which secures the connecting link to the lever on the inboard operating hinge.

(5) Remove the horizontal inboard hinge bolt.

(6) Support the aileron and remove the vertical bolts from the centre and outboard hinges.

Note...

A minimum clearance of 0.05 in. must be obtained between the face of the rear spar joint plate and the mass balance tube. The mass balance tube may be dressed back by a maximum of 0.05 in. to maintain this clearance.

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After assembly, the ailerons should be rigged in accordance with the instructions given in Chap. 4 of this Section.

Flap (fig. 8)

13. Either the inner or outer flap may be removed independently. The procedure to be adopted after lowering the flaps is as follows:-

(1) Disconnect the jack piston-rod from its attachment bracket by removing the horizontal pin as shown.

(2) Dismantle the torque tube connecting rods from the inner and outer flaps.

(3) Support each flap in turn and remove the hinge bolts.

After assembly the flaps should be adjusted in accordance with the instructions given in Chap. 4 of this Section.

Dive brakes (fig. 9)

14. Remove the dive brakes as follows:-

(1) Select DIVE BRAKES ON, depress the manually operated non-return valve and operate the hand pump

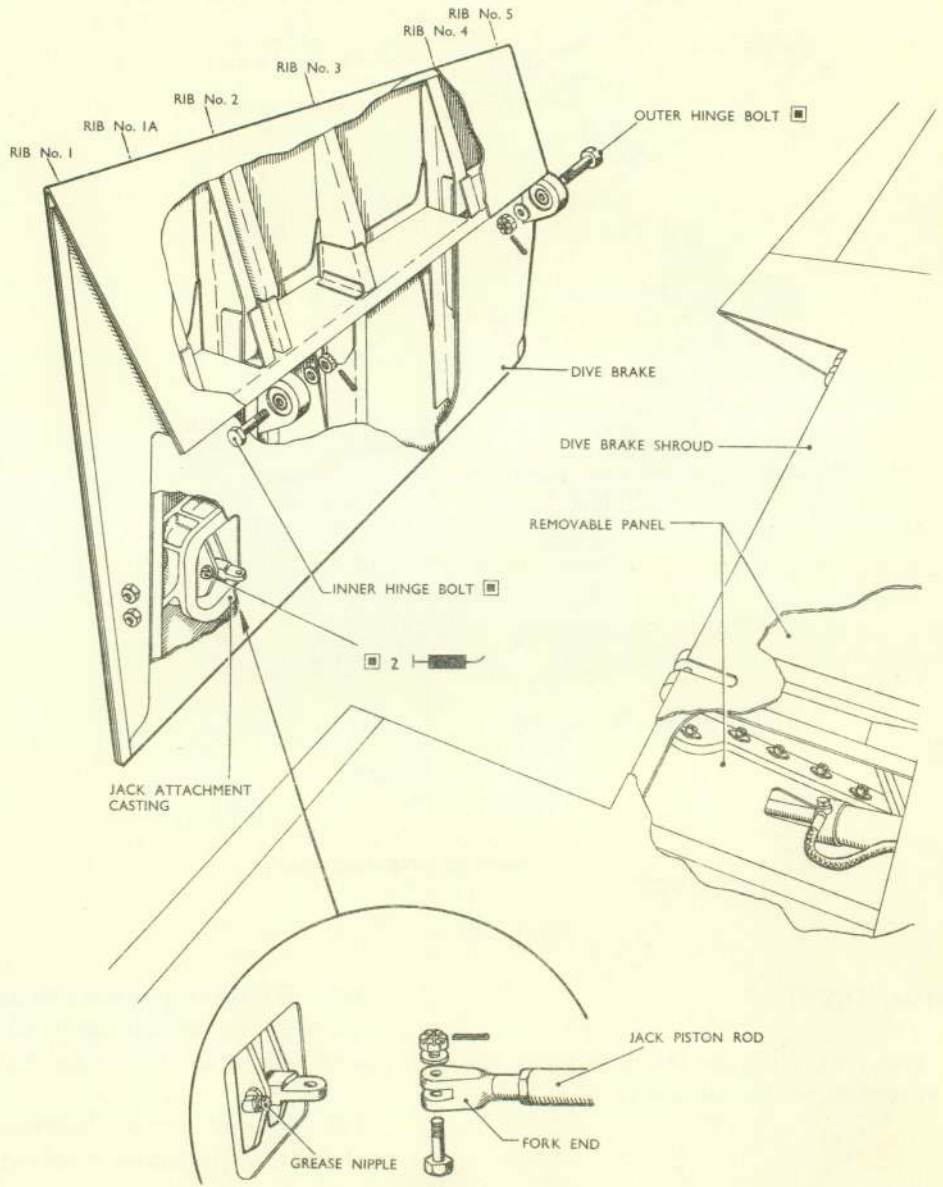

Fig. 9 Dive brake

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(2) Remove the circular access panel from the undersurface of the main plane immediately outboard of the dive brake. This will give access for the removal of the outboard bolt.

(3) Disconnect the fork end of the jack piston-rod from the dive brakes shackle by removing the vertical bolt.

(4) Support the dive brake and remove the two hinge bolts.

When assembling the dive brake, the adjustment of the jack should be carried out in accordance with the instructions given in Chap. 4 of this Section.