Chapter 4A FLYING CONTROLS - GENERAL INFORMATION

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LIST OF ILLUSTRATIONS

DESCRIPTION

Control surface operation

1. The flying controls consist of ailerons, rudder, tail plane, air brakes and flaps, all hydraulically operated *(Chap.6)*. The flaps and air brakes are moved by double-acting jacks, the ailerons and rudder by jack-type powered flying-control units (p.f.c.u.) which incorporate integral control mechanisms, and the tail plane by a twin screwjack p.f.c.u. which is driven by hydraulic motors controlled by an integral valve mechanism. The p.f.c.u. are mechanically controlled through rod-and-lever control runs from a conventional control column and rudder bar. The operating jacks of the flaps and air brakes are controlled, through electro-hydraulic selectors, by switches in the cockpit.

Effect of partial hydraulic failure

2. Hydraulic power for operation of ailerons, tail plane, and rudder is duplicated (No.1 and No.2 controls systems) so that failure of one hydraulic system does not result in loss of aircraft control. Aileron power duplication is effected by using two p.f.c.u., each powered by a separate hydraulic system, to operate each aileron; if one hydraulic system fails the affected p.f.c.u. is motored by the second unit. Failure of one hydraulic system also results in one of the two hydraulic motors in the tail-plane p.f.c.u. failing to operate, but the other motor continues to drive the screwjacks. The rudder p.f.c.u. is a tandem-piston type, with the two pistons served by different hydraulic systems. The flap and air-brake jacks are operated only by the services hydraulic system, but the availability of two pumps in this system ensures continued operation should one pump or one engine fail.

Aileron movement restriction (post Mod.2145)

3. A mechanical restrictor (post Mod.

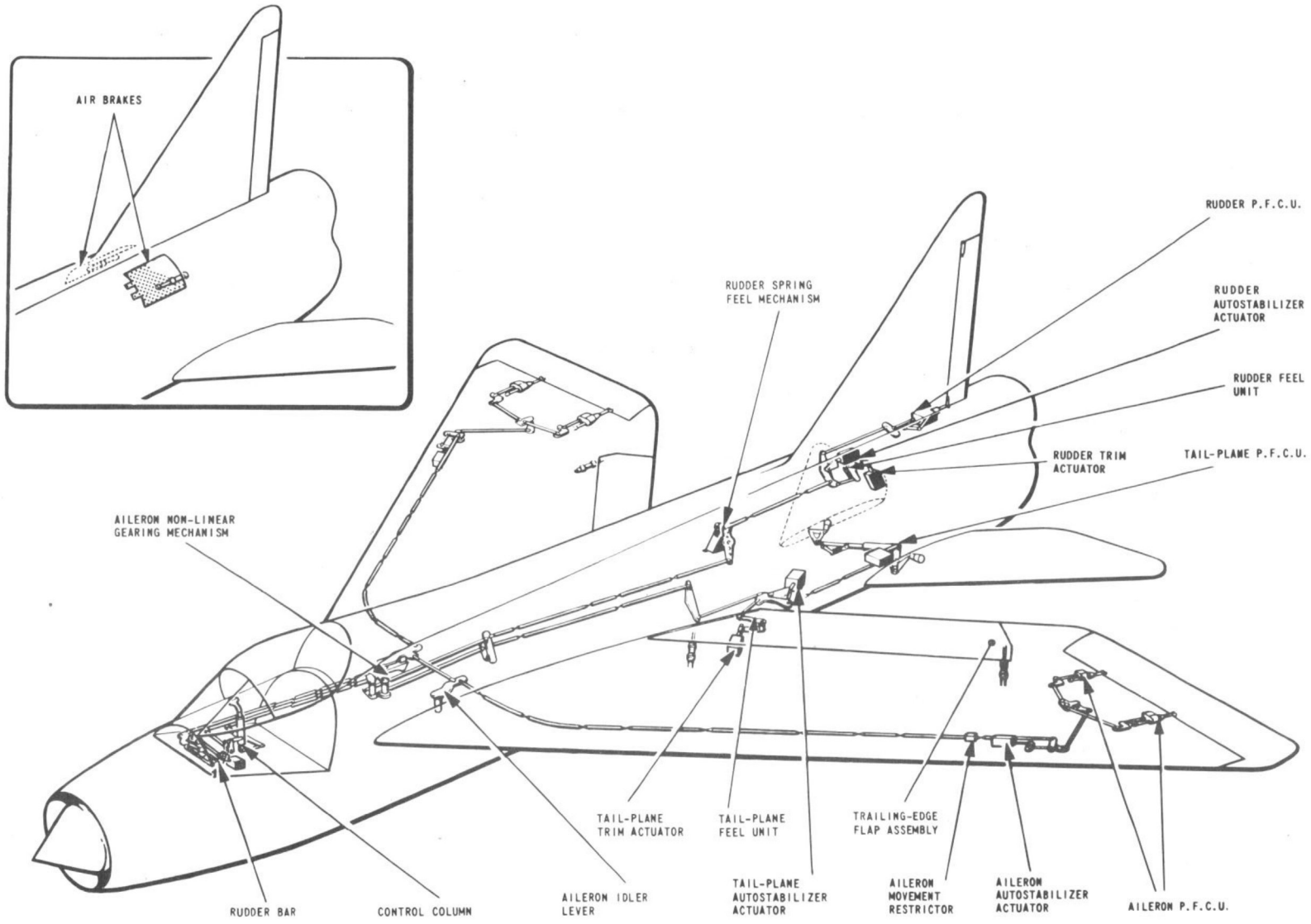

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FIG.1. GENERAL ARRANGEMENT OF FLYING CONTROLS

2145) ensures that aircraft rolling limitations are not exceeded in flight. The restrictor, operated by the port wheel well door, contacts a spacing collar in the aileron control run in the port wing *(Chap.4D)*.

Artificial feel

4. As the primary flying controls are irreversible, artificial feel is provided in each system. In the ailerons system, this is achieved by a torsion bar; in the rudder and tail-plane system, a representative loading on the pilot's controls is effected by hydraulic feel units which vary the loading with changes in air speed or altitude. A limiting device incorporated in the hydraulic pressure regulating mechanism ensures that the loading does not become excessive at supersonic speeds. Additionally, light spring centring forces are applied to the rudder and tail-plane controls, providing emergency feel should hydraulic loading be lost due to hydraulic or pitot static failure.

◀ **Trimming and flight control coupling**

5. Trim changes are effected by electrically-operated linear actuators which are linked into each control run and controlled by cockpit switches. The actuators move the control runs, displacing the p.f.c.u. and the cockpit controls to the required trim position. Electro-hydraulic autostabilizer acutators impose flight control system demands upon the control surfaces in a similar manner, but without causing movement of the cockpit controls.

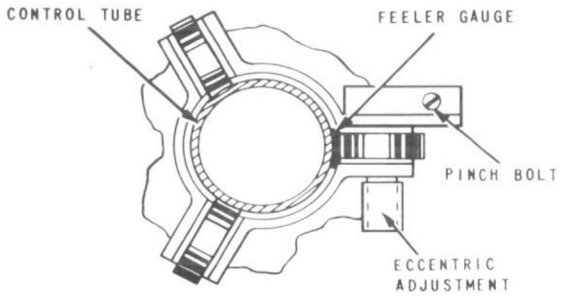

Fig.2. Control rod guide-roller adjustment

◀ NOTE AMENDED ▶

Principal hydraulic components

6. For information on the principal hydraulic components of the flying controls systems refer to Chap.6. ▶

SERVICING

Control rod guide-roller adjustment *(fig.2)*

7. The allowable tolerances and the method of measurement are shown in the illustration. If adjustment is necessary, slacken the pinch bolt and rotate the spindle of the eccentrically-mounted roller.