Chapter 5 FLYING CONTROL AIDS

(Completely revised)

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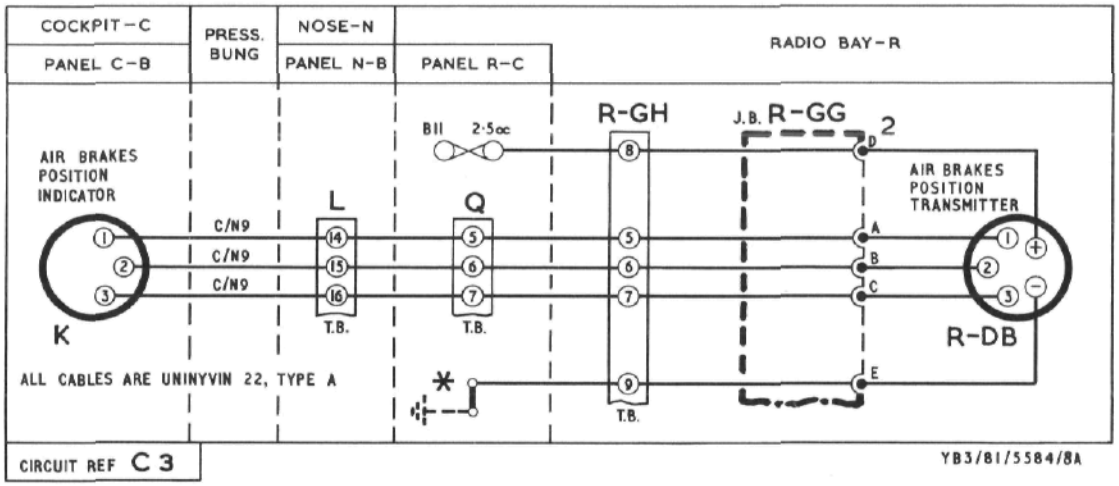

Fig. 1. Air brakes position indicator

FLYING CONTROL INSTRUMENTS

Introduction

1. This Chapter describes the control aids which are provided to assist the pilot during flight. These include the various instruments which indicate the position of the flying control surfaces, the autopilot/autostabilizer system, and a yaw damper system. Information regarding the location of components, together with a list of associated Air Publications, is in Chapter 1 of this Section.

Modification standard

2. This Chapter includes the following modifications:- 108, 150, 196, 340, 366, 441, 471 and 967.

General

3. The flying control surfaces position indicator circuits utilize the Desynn indicating system, the components and operation of which are described in detail in A.P. 1275A, Vol. 1, Sect. 16. Each circuit comprises an indicator located at the pilot's station and an actuating transmitter which is mechanically coupled to the associated control. As the control moves, a slider on the transmitter is correspondingly also moved. This movement is electrically communicated to the indicator, causing a display on the dial to correspond to the position of the mechanism to which the transmitter is connected. The dial displays differ and are described in the following paragraphs. The setting of each position indicator is described as appropriate in Book 1, Cover 2, Sect. 3, Chap. 4.

Air brakes position indicator *(fig 1)*

4. The position of the air brakes is shown on an indicator which is identified K and mounted on the port side of the pilot's instrument panel (C-B). It shows the angle at which the air brakes are opened by the display of an orange-coloured sector of an equivalent angle. When the air brakes are closed a black disc is displayed on the indicator. The d.c. supply for the operation of the indicator is fed from fuse B11 (panel R-C) via the junction box R-GG and is controlled by transmitter R-DB.

Aileron trim position indicator *(fig 2)*

5. The amount of trim applied to the aileron controls is shown by a pictorial representation of the horizon on the dial of an indicator which is identified K and located on the engine control box (panel C-E). The d.c. supply for the operation of the indicator is fed from fuse E9 (panel C-Q) and controlled by transmitter C-BE.

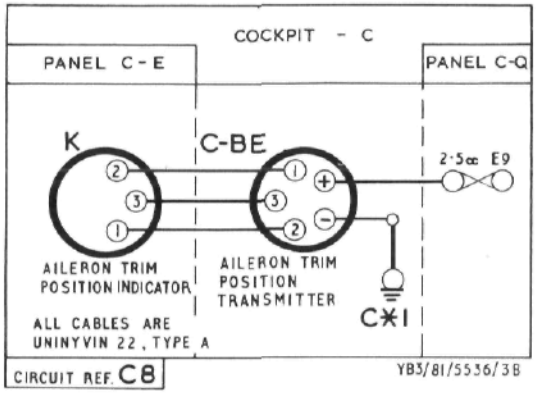

Fig. 2. Aileron trim position indicator

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Appendix 1 AUTOPILOT (Mod 438, 445, 670, 671, 802, 839 and 988)

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LIST OF ILLUSTRATIONS

Mod 438

1. Mod 438 introduces an improved circuit for limiting aileron runaway when the autopilot authority is employed in the navigational mode. The limit microswitch on the aileron torque shaft is disconnected and two microswitches are fitted, as limit switches, one on the lever group before each aileron powered control unit. As shown in fig 1 the two switches (P-AR, port and S-AR, stbd) are connected in series with the limit microswitches on the aileron spring struts of the respective wings. The circuit is however, rendered inoperative by a shorting link connected across terminals 4, 5 and 6 of terminal block R-CF.

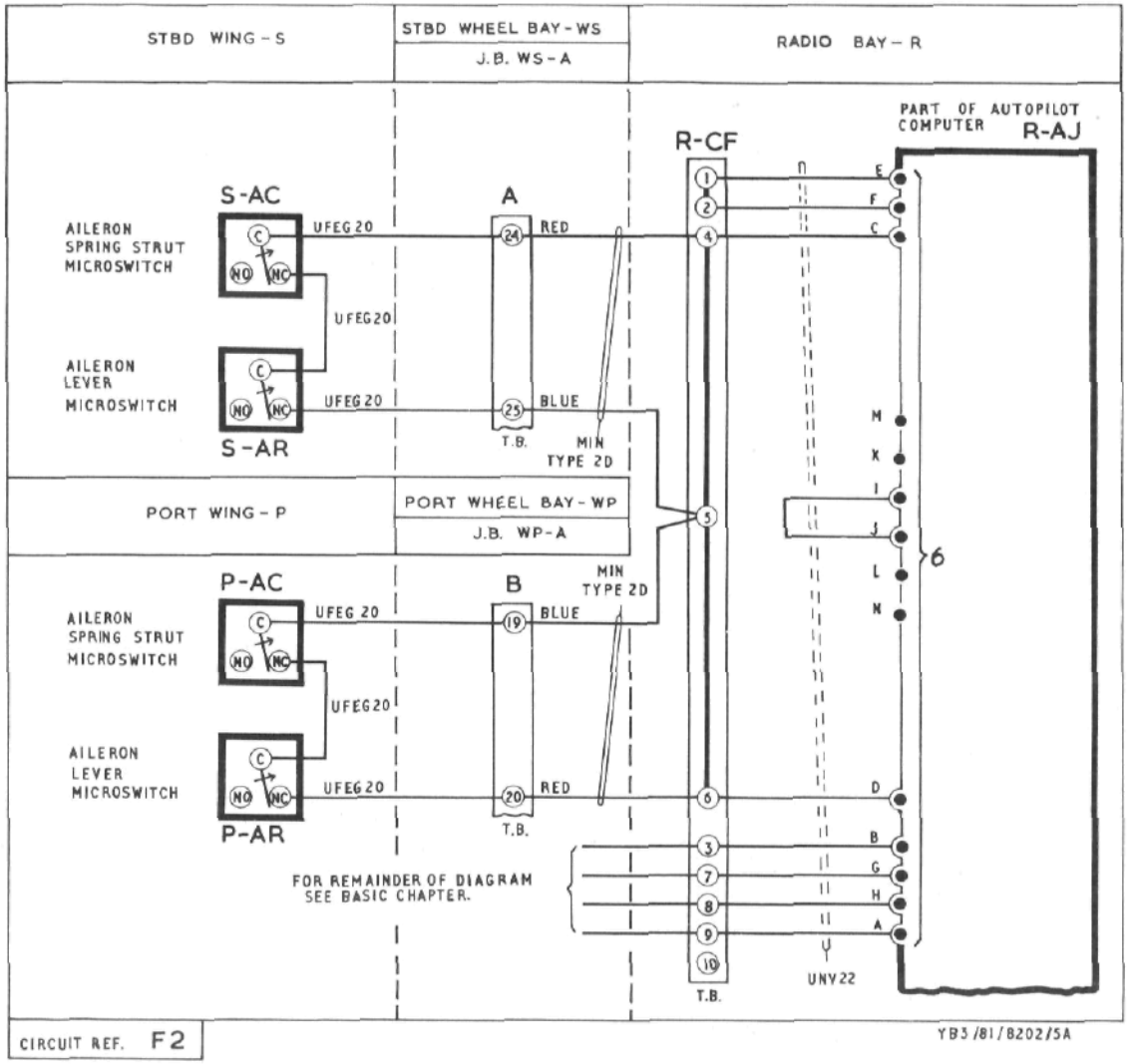

Fig. 1. Autopilot (post-Mod 438)

Mod 445

2. Mod 445 introduces an autopilot computer Type 3D5708-A4 in lieu of the autopilot computer Type 3D5708-A3. The replacement computer incorporates Mach No. lock, heading lock and barometric height lock modes and is integrated with the IFIS, as shown in fig 2, by modification of the wiring in the IFIS junction box R-AW and the substitution of the socket R-AW/11 for the blanking socket (Mod 150) on plug R-AW/11.

Note...

Pending CA authority all autopilot modes are rendered inoperative by the provision of a blanking plate fitted on the autopilot control unit, located on panel C-F/4 on the pilot's starboard console. The blanking plate secures the autopilot master switch in the OFF *position.*

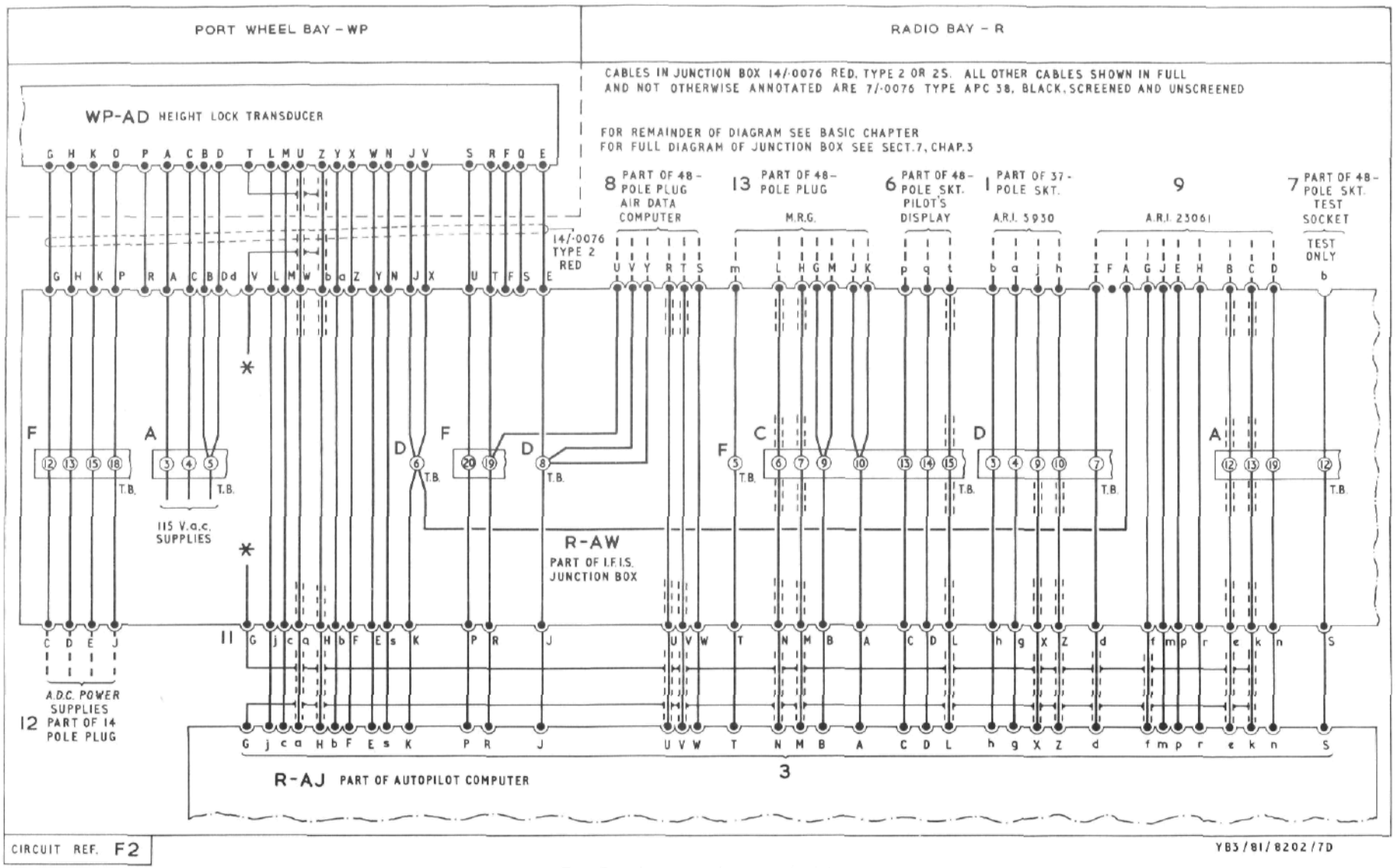

Fig. 2. Autopilot (post-Mod 445)

Mod 670

3. On aircraft with Mod 670 incorporated the circuit for limiting aileron runaway when using autopilot authority in the navigational mode is rendered operative. The circuit is also modified for use in the autopilot programmed manoeuvre mode. This additional facility is, however, rendered inoperative by a shorting link connected across terminals 15 and 16 of terminal block R-CF. As shown in fig 3 the link short circuits the aileron spring strut microswitches P-AC and S-AC while retaining the series connection between the aileron lever microswitches P-AR and S-AR; this maintains the aileron runaway limiting circuit for use with the autopilot authority in the navigational mode only.

4. Mod 670 also reduces the limits at which the aileron runaway limiting circuit cuts off the autopilot authority in the navigational mode. The new limits and the manner in which the microswitches are adjusted to them are contained in Book 1, Cover 2, Sect. 3, Chap. 4B.

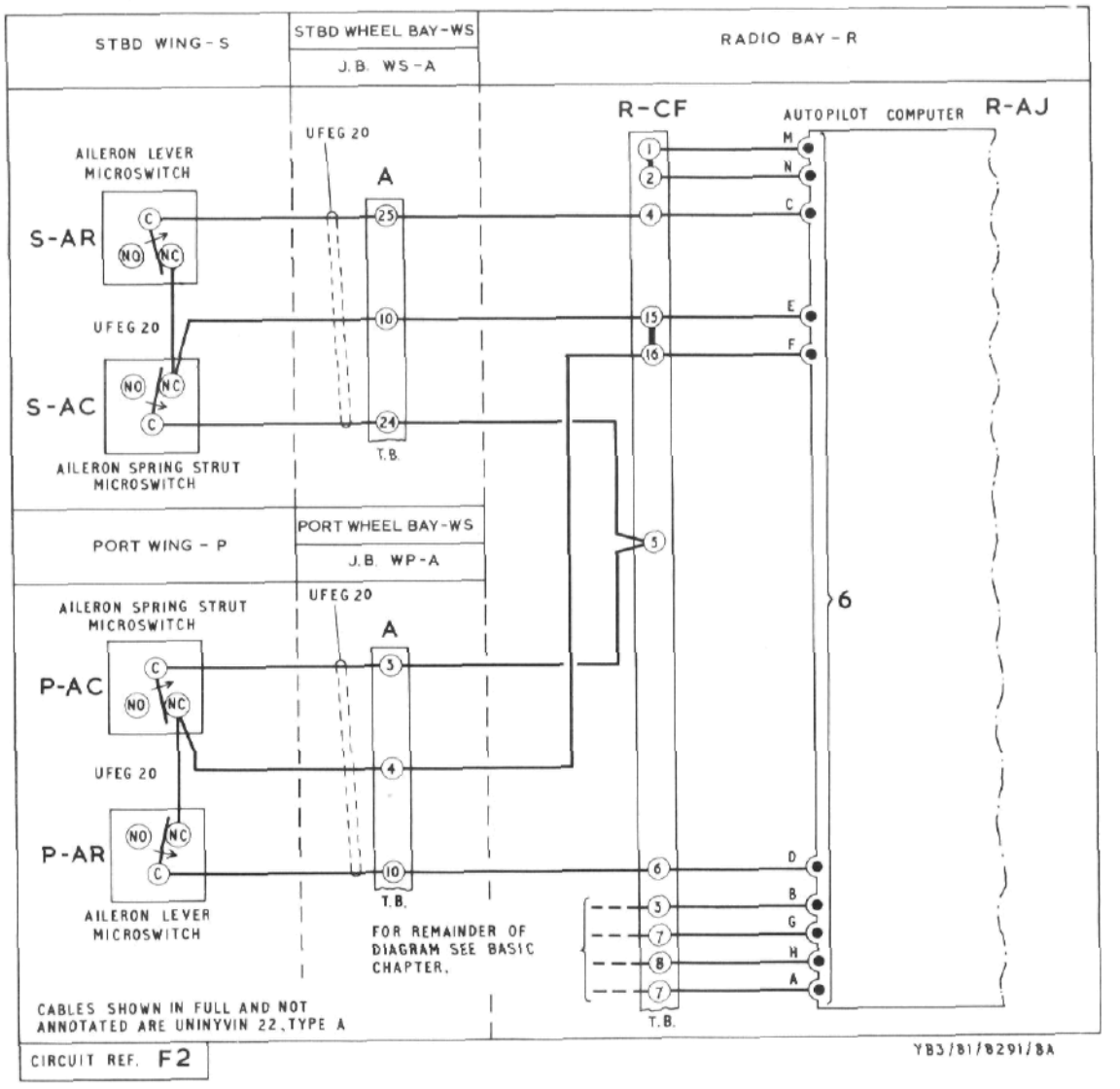

Fig. 3. Autopilot (post-Mod 670)

Mod 671

5. On aircraft with Mod 671 incorporated the single autopilot authority cut-off microswitch, operated by the tail plane powered control unit, is replaced by four microswitches. The microswitches are connected in pairs as shown in fig 4, the autopilot authority being cut-off by one pair (R-SJ and R-SK) in the navigational mode and by the second pair (R-SG and R-SH) in the programmed manoeuvre mode.

6. Mod 671 also introduces new limits at which the tail plane runaway circuit cuts-off the autopilot authority in the respective operational modes. These limits and the manner in which they are adjusted is contained in Book 1, Cover 2, Sect. 3, Chap. 4D.

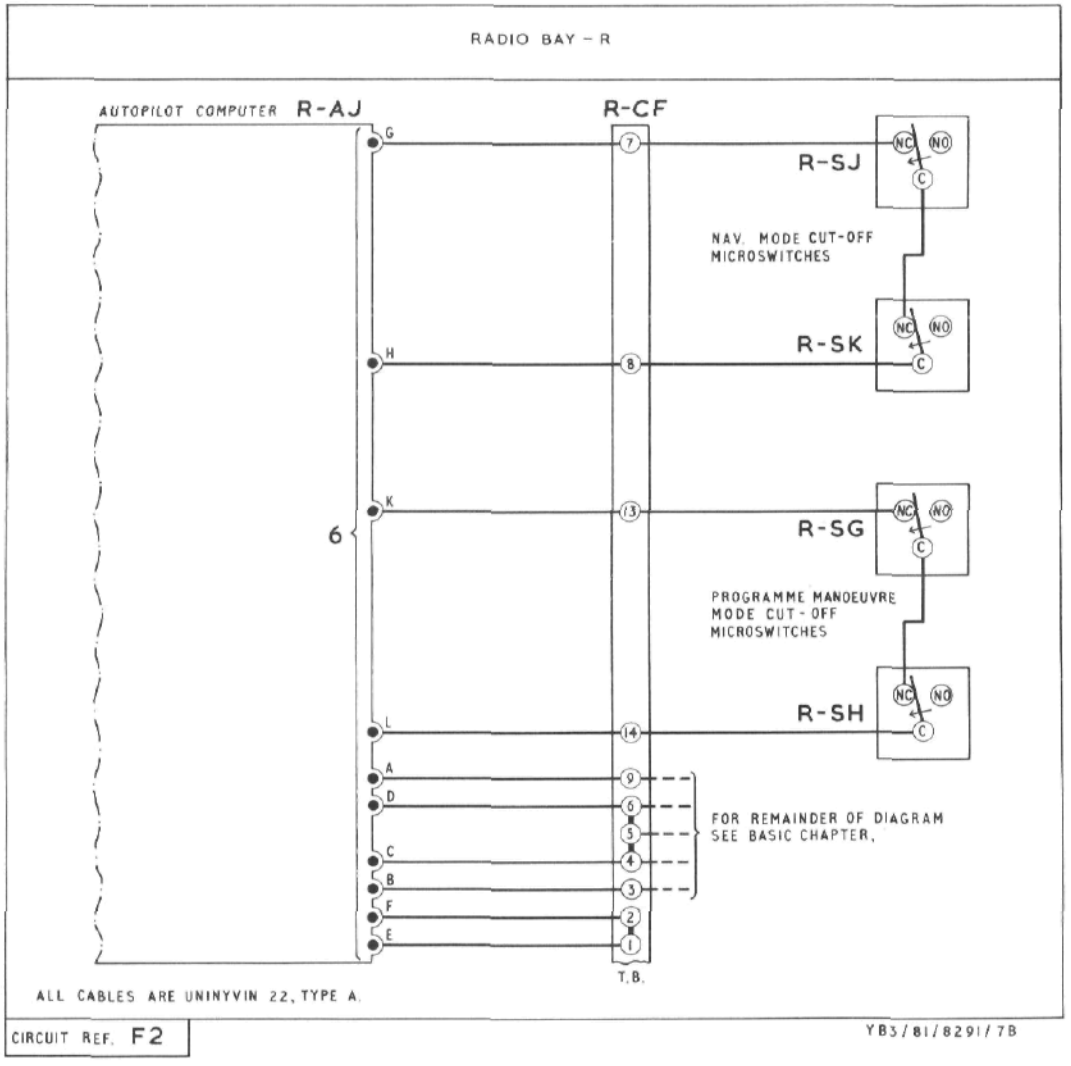

Fig. 4. Autopilot (post-Mod 671)

Mod 802

7. On embodiment of Mod 802, the existing blanking plate (Mod 445) is removed from the autopilot control unit (panel C-F/4), and a revised blanking plate fitted in lieu. The revised blanking plate renders the Mach and heading lock modes operative, while maintaining the height lock mode inoperative by locking the height/Mach switch in the Mach position.

Mod 839

8. Mod 839 introduces an autopilot computer Type 3D 5708-A5 in lieu of the Type 3D 5708-A4 (Mod 445). A facility is incorporated in the replacement computer to ensure automatic disconnection of the autopilot on disengagement and obviate autopilot runaway. Also, three shorting links, introduced by STI/BUCC/45, are removed on terminal blocks A respectively, at panel R-J, junction boxes WP-A and WS-A.

Mod 988

9. On embodiment of Mod 988, the blanking plate (Mod 802) is removed from the autopilot control unit (panel C-F/4), and the three autopilot modes, Mach, heading and height lock are rendered operative.

Appendix 2 AILERON TRIM AND TAIL PLANE POSITION INDICATORS

(Mod 452, Parts C and A)

LIST OF ILLUSTRATIONS

1. The installation of Mod 452, Parts C and A involves minor changes in the routeing of the aileron trim position indicator circuit and the tail plane position indicator circuit. The modified circuits are shown in fig 1 and 2 respectively.

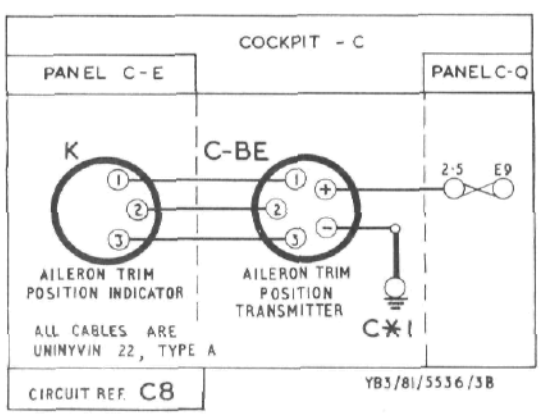

Fig. 1. Aileron trim position indicator

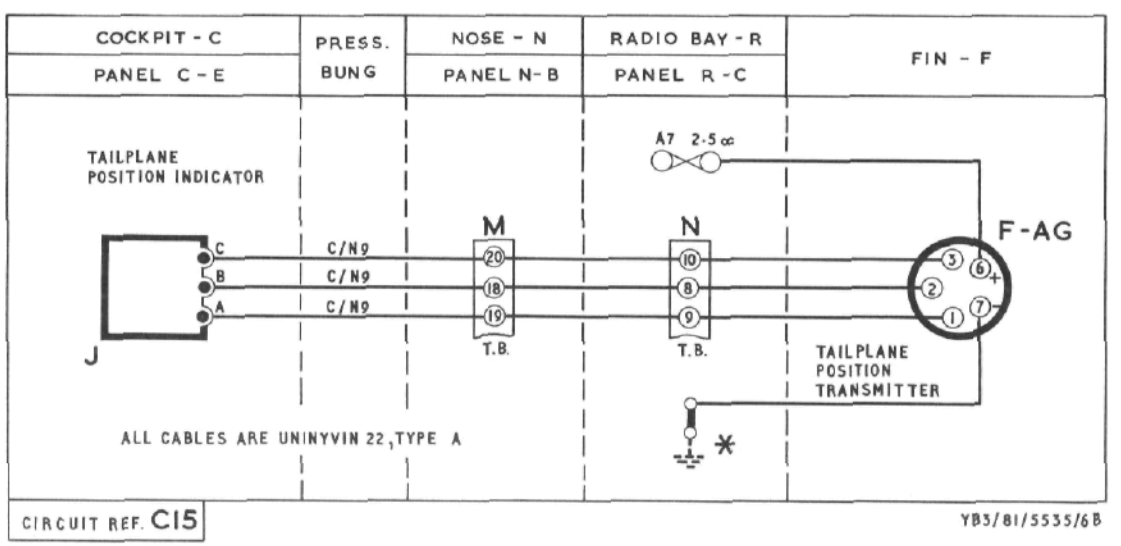

Fig. 2. Tail plane position indicator

Mod 670

3. On aircraft with Mod 670 incorporated, ◀ the improved circuit for limiting aileron runaway when using autopilot authority in the navigational mode, which was introduced by Mod 438, is rendered operative. The circuit is also modified as shown in fig 3 in order that it may be readily adapted in the event of the introduction of the programme manoeuvre facility. ▶

4. Mod 670 also reduces the limits at which the aileron runaway limiting circuit cuts off the autopilot authority in the navigational mode. The new limits and the manner in which the microswitches are ◀ adjusted to them are contained in A.P. 101B-1201-1A, Cover 2, Sect. 3, Chap. 4B. ▶

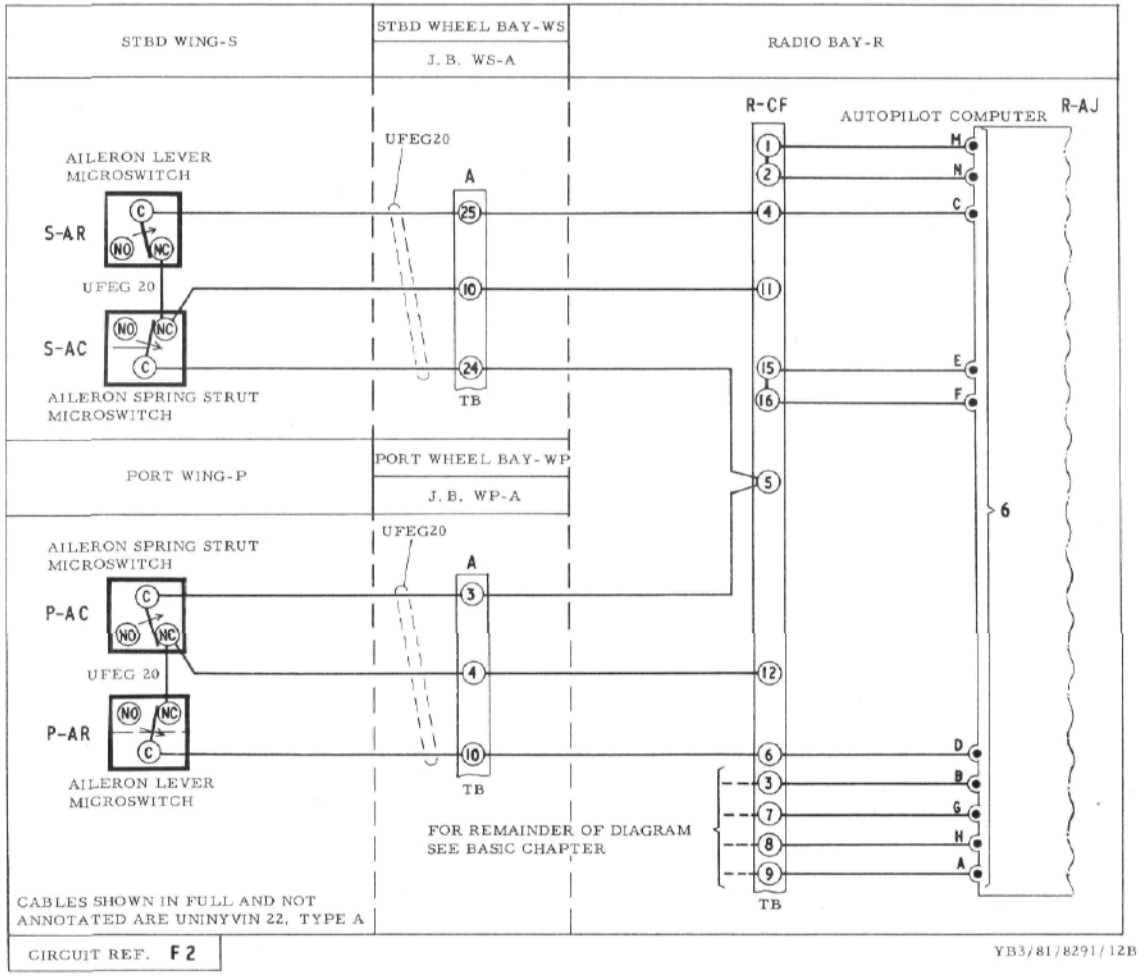

Fig. 3. Autopilot (post-Mod 670)

◀ Wiring of T.B. R-CF amended ▶

Mod 671

5. On aircraft with Mod 671 incorporated the single autopilot authority cut-off microswitch, operated by the tail plane powered control unit, is replaced by four microswitches. The microswitches are connected in pairs as shown in fig 4, the autopilot authority being cut-off by one pair (R-SJ and R-SK) in the navigational mode and by the second pair (R-SG and R-SH) in the programmed manoeuvre mode.

6. Mod 671 also introduces new limits at which the tail plane runaway circuit cuts-off the autopilot authority in the respective operational modes. These limits and the manner in which they are adjusted is contained in A.P. 101B-1201-1A, Cover 2, Sect. 3, Chap. 4D. ▶

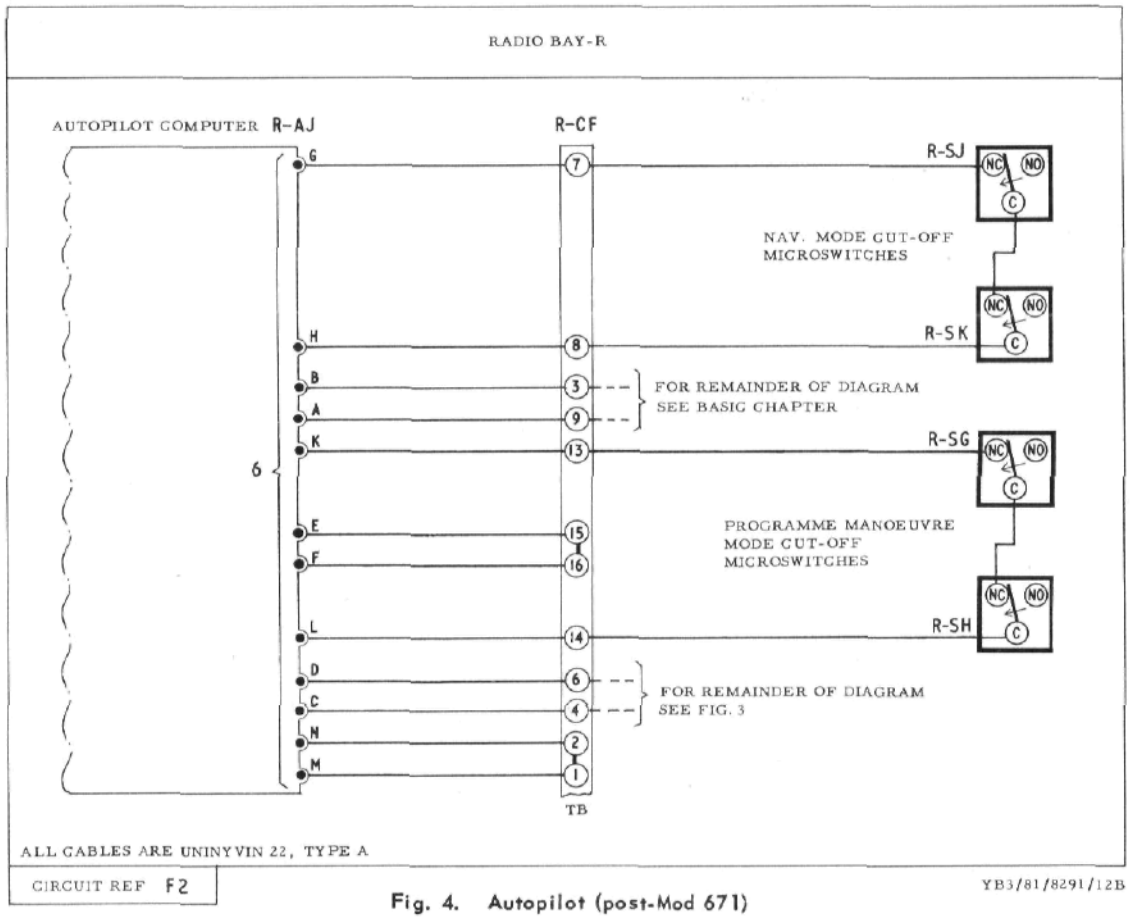

Fig. 4. Autopilot (post-Mod 671)

◀ Wiring corrections; cross references amended ▶

Mod 802

7. On embodiment of Mod 802, the existing blanking plate (Mod 445) is removed from the autopilot control unit (panel C-F/4), and a revised blanking plate fitted in lieu. The revised blanking plate renders the Mach and heading lock modes operative, while maintaining the height lock mode inoperative by locking the height/Mach switch in the Mach position.

Mod 839

8. Mod 839 introduces an autopilot computer Type 3D 5708-A5 in lieu of the Type 3D 5708-A4 (Mod 445). A facility is incorporated in the replacement computer to ensure automatic disconnection of the autopilot on disengagement and obviate autopilot runaway. Also, three shorting links, introduced by STI/BUCC/45, are removed on terminal blocks A respectively, at panel R-J, junction boxes WP-A and WS-A.

Mod 988

9. On embodiment of Mod 988, the blanking plate (Mod 802) is removed from the autopilot control unit (panel C-F/4), and the three autopilot modes, Mach, heading and height lock are rendered operative.

Appendix 3 AUTOPILOT (Mod 659)

ILLUSTRATION

1. On aircraft with Mod 659 incorporated the tail plane automatic stabilization facility of the autopilot is extended to cover the landing approach attitude. The extension is effected by linking contacts 3 and 1 of the pitch control switch A on the stabilization switch panel C-X as shown in fig 1.

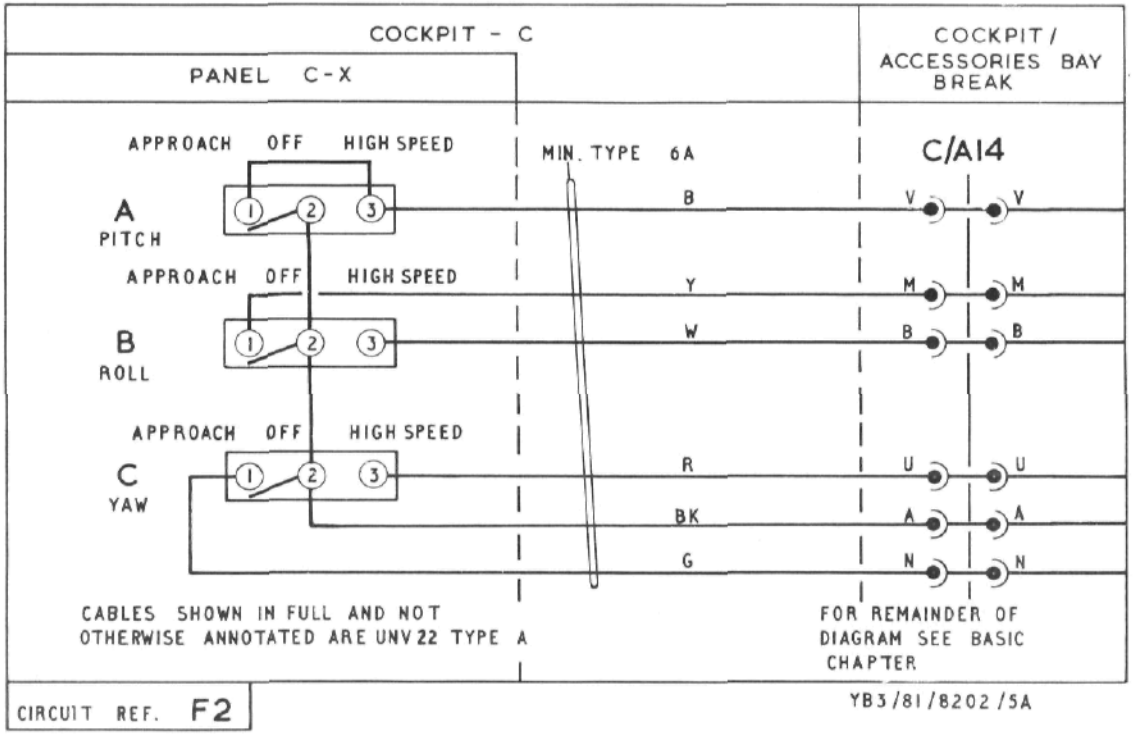

Fig. 1. Autopilot

Appendix 4 AUTOPILOT (Mod 707)

ILLUSTRATION

1. On aircraft with Mod 707 incorporated, the height lock transducer, previously fitted in the port wheel bay, is repositioned in the radio bay. The transducer is now mounted on the forward face of the frame at station 531·5 and is identified R-SN. The repositioning of the transducer does not affect its operation but the wiring diagram is altered as shown in fig 1 to re-locate the unit in the radio bay.

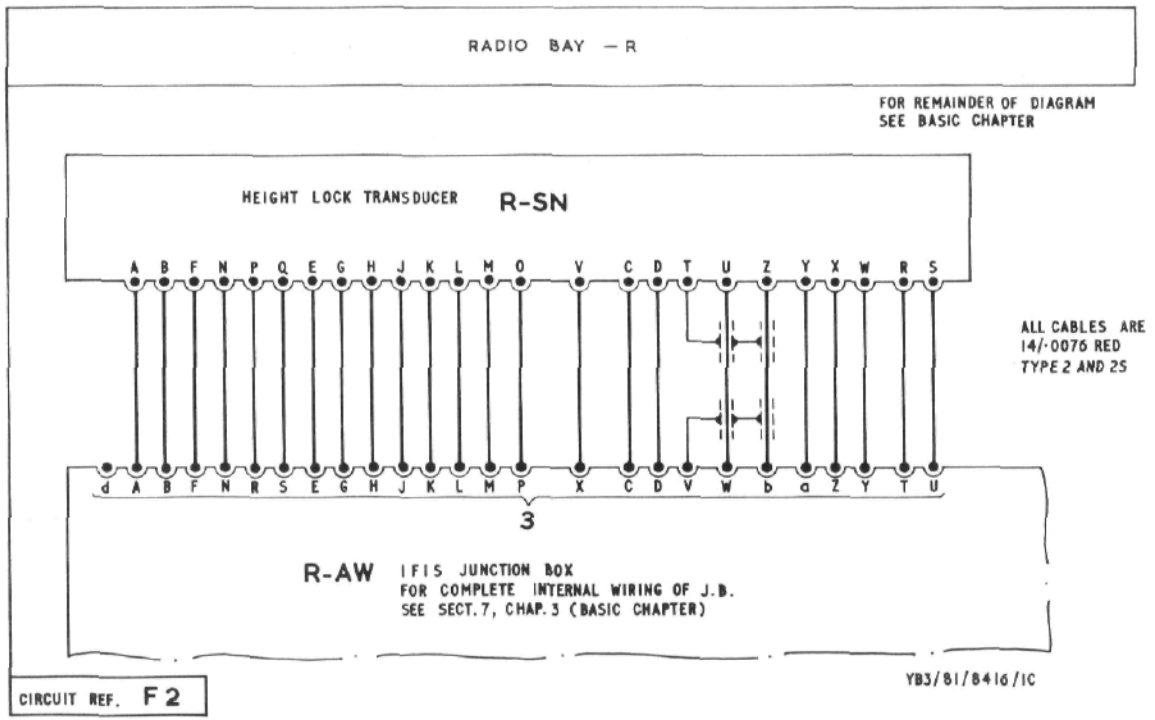

Fig. 1. Autopilot

Appendix 5 AUTOPILOT (Mod 1152)

1. Mod 1152 introduces a Type B height lock transducer in lieu of the Type A. It provides the additional facility of accepting a correcting radio height signal from the radio altimeter, at heights below 5,000 feet, to correct the barometric height signal. The adjusted height error signal is then passed to the autopilot computer.

2. The radio height lock mode remains inoperative until a modified computer is fitted capable of accepting the corrected height signal.

103/2/2/83 89970 500 10/66 HSAL 1423