GROUP D2 ELEVATOR AND AILERON POWER CONTROLS AND HYDRAULIC PRESSURE INDICATOR (CODE PE, PA AND HP)

LIST OF CONTENTS

ILLUSTRATION

Introduction

1. The electrical circuit of the elevator and aileron power controls, including that for the hydraulic pressure indicator, are described in this group, together with the method of operation and the necessary servicing information required to maintain the equipment in an efficient condition. A routing and theoretical diagram of the circuits is also included. For detailed information on the standard components used, reference should be made to the appropriate volumes of the A.P.4343 series, while a description of the electrical system of the aircraft as a whole, including system wiring details, referencing of components and general servicing, will be found in Group A1 of this chapter. The removal of the major electrical equipment is given in Group A2, and the location, including the means of access, in Group A3 also of this chapter.

DESCRIPTION

ELEVATOR AND AILERON POWER CONTROLS

2. The electrical circuits for the elevator and aileron power-operated controls include two ON/OFF control switches, which are located on the centre instrument panel in the cockpit. One of these switches controls the elevator electro-hydraulic selector valve, which is located between frames 54 and 55 in the rear fuselage lower fin structure. The other switch controls the aileron electro-hydraulic selector valve mounted on the front spar in the starboard wheel bay. These selector valves control the supply of hydraulic power to the elevator booster jack, located between frames 52 and 55 in the rear fuselage lower fin structure, and to the aileron booster jacks, located one in each outer wing. Two Type C.1838Y, Mk. 2 magnetic indicators, located on the port instrument panel in the cockpit, are provided to indicate when the booster jacks are disengaged, due either to operation of the control switches or to a hydraulic failure. These indicators, which are separately fused, are de-energized when a micro switch is operated by the release units on each booster jack. For a full description of the elevator and aileron power controls, reference should be made to Sect. 3, Chap. 4 of this volume.

Operation

3. As the operation of the elevator and aileron power control electrical circuits is similar, only the function of the elevator circuit will be described. With the elevator control switch set to the ON position, current will be conducted through the switch and

energize solenoid B of the elevator electro-hydraulic selector valve. When solenoid B is energized, it allows the hydraulic supply pressure to move the slide valve within the selector in such a direction as to supply hydraulic pressure to the elevator booster jack servo valve and release unit. The release unit will engage with the booster jack ram and, when the control column is moved, one of two orifices in the servo valve is opened. The orifice which is opened depends upon the direction in which the control column is moved. Hydraulic pressure will then be directed to one side of the booster jack ram. This pressure will move the booster jack body, which, being in connection with the elevators, will move them, resulting in power operation.

4. When the elevator control switch is set to the OFF position, current will be conducted through the switch and energize solenoid A of the elevator electro-hydraulic selector valve. When solenoid A is energized, it allows the hydraulic supply pressure to move the slide valve within the selector in such a direction as to cut off the hydraulic pressure to the booster jack servo valve and release unit. The slide valve movement also allows the pressure in these units to flow back into the return line. As the pressure in the release unit discharges into the return line, the release unit disengages from the booster jack ram. In disengaging, the release unit operates a micro switch, which de-energizes the elevator magnetic indicator, thus indicating that the power is disengaged and manual effort alone must be used to move the elevators.

5. In the event of electrical failure, the selector valve will remain in the selected position and power operation of the control surface will still be available, but in the event of a hydraulic failure the hydraulic pressure indicator lamp (*para.* 6) will illuminate to indicate that only a limited number of power operations of the controls are available from a hydraulic accumulator in the system. When the accumulator is exhausted, the booster jack will be automatically disengaged and the release unit will operate the micro switch to de-energize the magnetic indicator in a similar manner to that described in para. 4.

Note . . .
The micro switches controlling the aileron power assistance indicator are connected in series, thus both must make circuit to energize the indicator. In the case of electrical failure, the magnetic indicator will be de-energized independently of the micro switches and indicate power off although power operation will still be available.

HYDRAULIC PRESSURE INDICATOR

6. A lamp, situated on the port instrument panel, and an aural warning inter-connection with the V.H.F. installation, are provided to indicate failure of the hydraulic system. The lamp is controlled by a Type TP.5207 hydraulic pressure switch incorporated in the hydraulic system pipe-lines on the port side of the gun package bay. The aural warning is also controlled by the hydraulic pressure switch, via the contacts of a Type Q, No. 3 audio warning relay situated on the under-surface of the cabin port shelf, which may be energized to break circuit and cut-out the audio signal by operation of a Type D.5405 audio warning cut-out switch situated on the cabin starboard shelf. The contacts of the pressure switch close, to complete the circuit to the indicator lamp and aural warning, when the hydraulic system pressure drops to below 600 lb. per sq. in.

Operation

7. The operation of the hydraulic pressure indicator lamp circuit should be evident, once reference is made to the routing and theoretical diagram of the circuit (*fig.* 1). For a full description of the hydraulic system as a whole, reference should be made to Sect. 3, Chap. 6.

SERVICING

8. For servicing of the electrical system as a whole, reference should be made to Group A1 of this chapter. Apart from keeping all the components clean and carrying out the normal routine tests of security and serviceability, the only other servicing necessary is the electrical tests of the electro-hydraulic selector valves as described in A.P.1803D, Vol. 1.

REMOVAL AND ASSEMBLY

9. Once access has been obtained, the removal of the electrical components forming the elevator and aileron power controls and hydraulic pressure indicator circuits should present no unusual difficulties. The location of, and access to, all the components is indicated in Group A3 of this chapter.

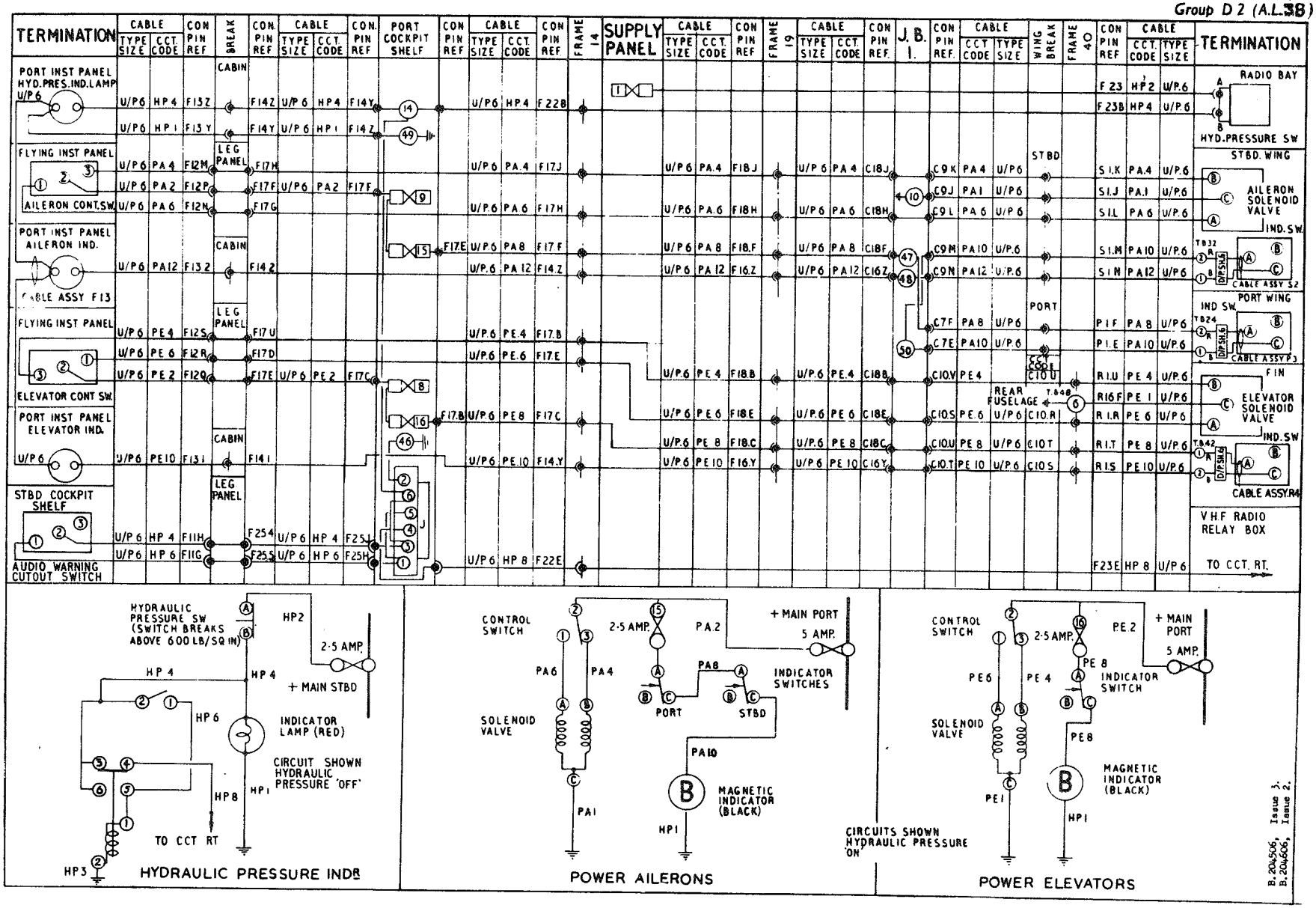

FIG. 1. ELEVATOR AND AILERON POWER CONTROLS AND HYDRAULIC PRESSURE INDICATOR (A.L.38, Nov.56)

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