Chapter 7 ENGINE STARTING AND CONTROL

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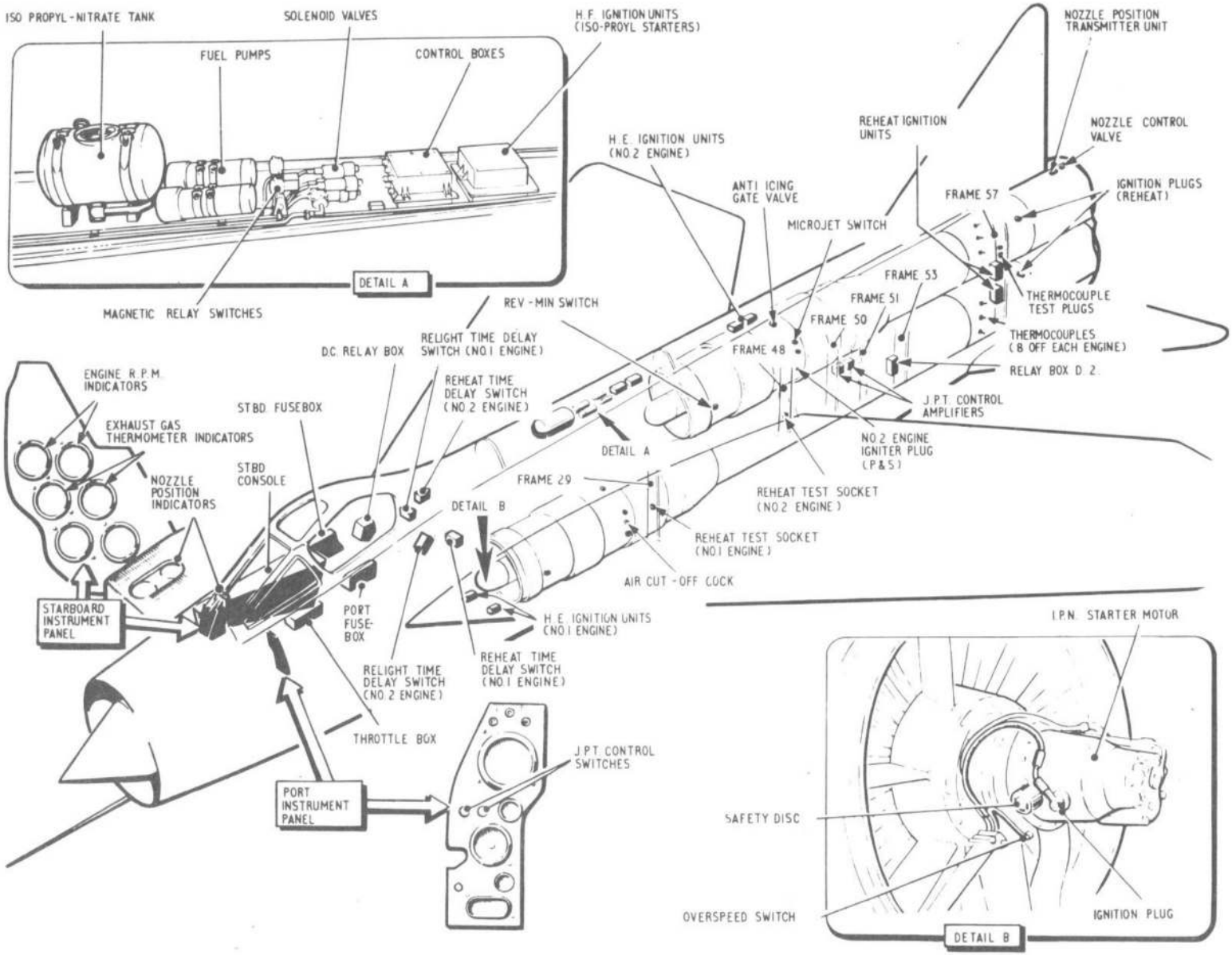

FIG.1. ENGINE SERVICES EQUIPMENT

DESCRIPTION

Modifications

◀ 1. This chapter now includes the following modification:-

Mod.4539 To introduce control unit, Pt.No.700/1/12170 in lieu of Mk.8 control unit, Pt.No. 7CZ106201

The effect of the above modification on this chapter is described in Appendix 1.

The text and diagrams have been changed to delete the pre Mod.1887 state.

STARTING

General

2. The engines are rotated up to starting speed by turbo-starter motors driven by hot gases resulting from the combustion of I.P.N. fuel. Engine light-up is effected by high-energy ignition equipment, and the ignition control circuit provides facilities for relighting the engines in flight. The Type LTSA70 starter system, comprising the turbo-starter motor and its ancillary equipment, is described in A.P.103D-0208-1GA. ▶

Control switches

3. The control switches for the engine starting circuits are fitted on the starboard console. Both circuits are supplied via an ENGINE START MASTER switch, and each circuit includes an IGNITION switch and an ENGINE START push-switch. Two RELIGHT switches, labelled NO.1 ENG. and NO.2 ENG. respectively, are mounted on the port console.

Control units

4. Two Mk.8 control units, one for each engine, are fitted in the rear fuselage spine. They control the timed sequence of operations during the engine starting period.

Pumping units

5. Two motor-driven pumping units, each incorporating a fuel pump and an air blower, are installed in the rear fuselage spine. Their d.c.-operated motors are supplied from the spine busbar via Type T2 magnetic relays which operate in conjunction with the respective control units.

Solenoid valve/H.P. switch units

6. Two of these composite items are situated adjacent to the pumping units.

H.F. ignition units

7. The high-frequency ignition units which initiate combustion of the I.P.N. fuel in their respective turbo-starter motors are located adjacent to the Mk.8 control units.

Low-pressure switches

8. The fuel delivery line to each turbo-starter motor includes a low-pressure switch, the primary function of which is to complete the ignition circuit when the pressure in the fuel line has attained a certain value. The L.P. switch for the No.1 engine starter is located on the port side of the main equipment compartment, whilst that for the No.2 engine starter is situated between frames 42 and 43 on the port side of the rear fuselage.

H.E. ignition units

9. The engines are lit by igniter plugs energized by high-energy ignition units. There are two igniter plugs and two ignition units per engine. The d.c. supplies to the respective circuits are fed from the port and starboard fuseboxes and controlled by Type S3 relays. During engine starting each relay receives an energizing supply from the relevant control unit. The ignition units for the No.1 engine are installed below the engine at frame 23; those for the No.2 engine are fitted in the rear fuselage spine.

RELIGHT

General

10. Each engine relight circuit includes a Teddington time switch, Type FHM/A/24, which controls the respective ignition relay. Depression of the relight push-switch on the port console connects a supply to the time switch, starting up its integral motor. Cam-operated contacts, within the time switch unit, extend the supply to the solenoid of the Type S3 ignition relay which, on closing, connects energizing supplies to the relevant H.E. ignition units. After 35 seconds, the ignition relay is tripped by the opening of the time switch contacts, and H.E. ignition is cut off. Additional cam-operated contacts then interrupt the supply to the motor and completely de-energize the control circuit. The relight time switches are installed on the starboard side of the main equipment compartment.

◀ The relight circuit incorporates a Type A24NR/1 relay, fitted in the d.c. relay ▶

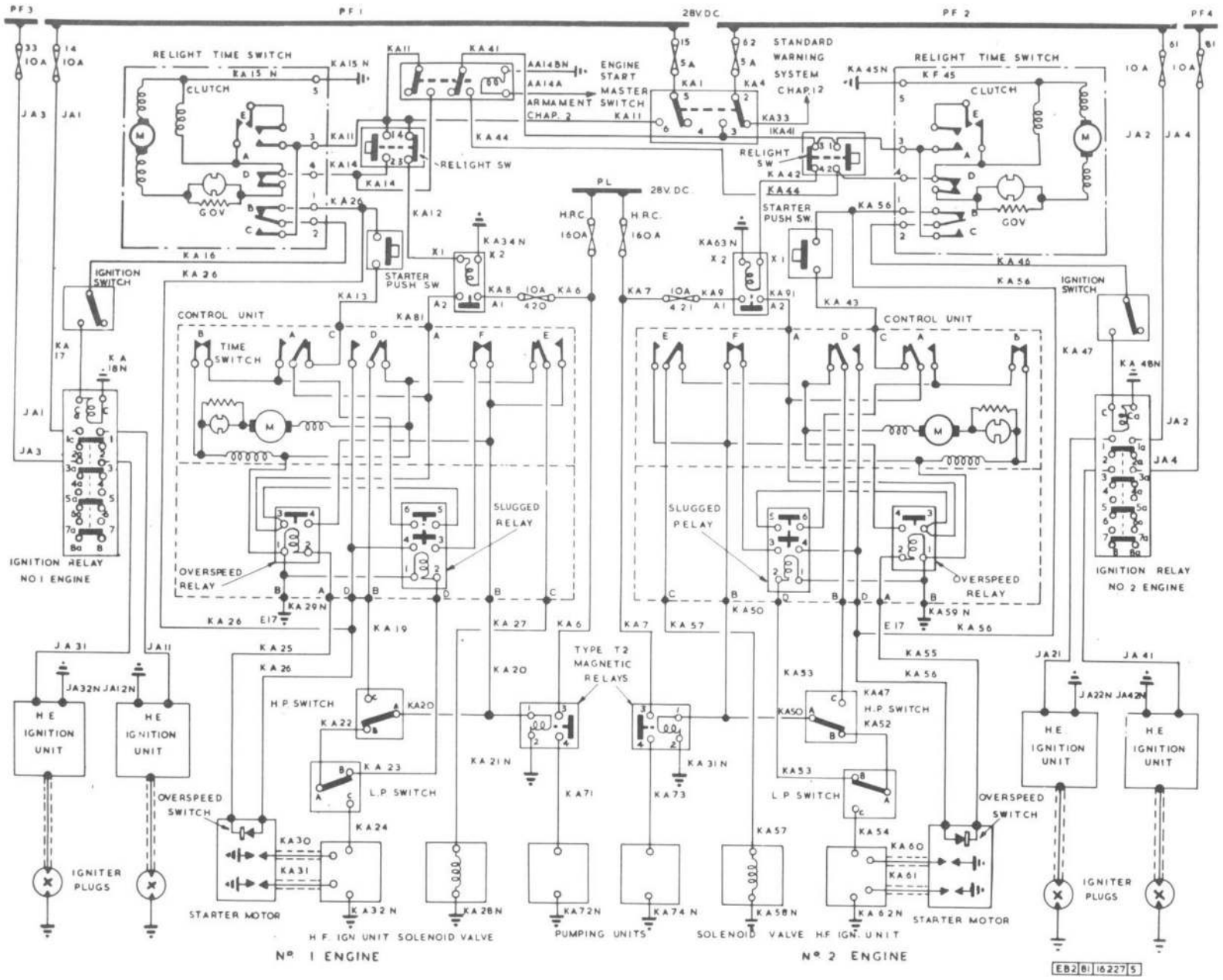

FIG.2. ENGINE STARTING AND RELIGHT SYSTEM

◀ MINOR AMENDMENTS ▶

box, which is provided to obviate engine flame-out during gun or rocket firing. When firing takes place the relay becomes energized and closes, automatically completing the relight circuit to both engines.

REHEAT

General

11. Each reheat circuit is controlled by a number of microswitches, actuated by cams on the throttle lever carriage, in conjunction with a pressure-operated microjet switch and several relays. As the throttle lever is moved into the reheat sector, the microswitches operate in a definite sequence and thus control reheat in progressive stages. Fuel from the low-pressure system is delivered to the reheat burner by a centrifugal pump driven by an air turbine, and combustion is initiated by an electrical ignition system which is energized for a limited period following the selection of reheat. Solenoid-operated valves control the supplies of air from the engine compressor to the fuel pump turbine and to a group of air rams which vary the setting of the jet pipe nozzle according to the degree of reheat. The nozzle position is shown by an indicator at the forward end of the starboard console. The control circuit provides for the automatic cancellation of reheat in the event of certain abnormal occurrences. A detailed description of the reheat equipment is included in A.P.4481J and K, Vol.1.

Throttle microswitches

12. Each reheat circuit includes four microswitches which are operated by movement of the throttle lever. They are termed the gate microswitch, the reheat microswitches, and the part reheat microswitch, and their respective functions are (a) to initially energize the circuit when the throttle lever is moved through the reheat gate, (b) to control the solenoids of the air valve which directs movement of the nozzle rams, and (c) to maintain minimum (or 1st stage) reheat until the throttle lever, having been returned through the reheat gate, reaches a certain point in the cold-running range.

Control relays

13. In addition to the igniter control relay, each reheat circuit includes a microjet relay, a reheat trip relay and a rev/min switch relay. The type of relay employed for each particular function, and its location, are shown on the relevant circuit and routeing diagrams. The rev/min switch relay, controlled by a pressure-operated rev/min switch, provides for an additional nozzle setting associated with cold running. ▶◀

Nozzle control valves

14. A nozzle control valve is mounted on the outer casing of each jet pipe. Each unit incorporates three control solenoids which are energized in a definite sequence to vary the nozzle area in accordance with the progressive stages of reheat.

Nozzle position indicator

15. This instrument and the associated transmitters are described in Sect.7, Chap.4.

Air shut-off cocks

16. The air supply to each fuel pump turbine is fed via an air shut-off cock fitted on the respective engine.

Servo-bleed valves

17. A solenoid-operated valve fitted on each pump unit is associated with the servo-pressure system which controls delivery of fuel to the relevant reheat burners.

Microjet switches

18. Each reheat circuit includes a microjet switch which senses the pressure ratio of the engine compressor and is mounted on the compressor casing. It operates in conjunction with the microjet relay to establish first stage reheat.

Microjet test plugs

19. These are connected in parallel with the microjet switches so that the latter may be short-circuited when carrying out functioning and continuity tests. They are located on the port side of the fuselage at frames 29 and 48 respectively.

Reheat ignition

20. An igniter plug fitted on each jet pipe is energized during the light-up cycle by an igniter unit located at frame 57 on the port side of the rear fuselage. The input supplies to the igniter units are controlled by Type AD/IM/28/30 relays installed in the generator equipment compartment between

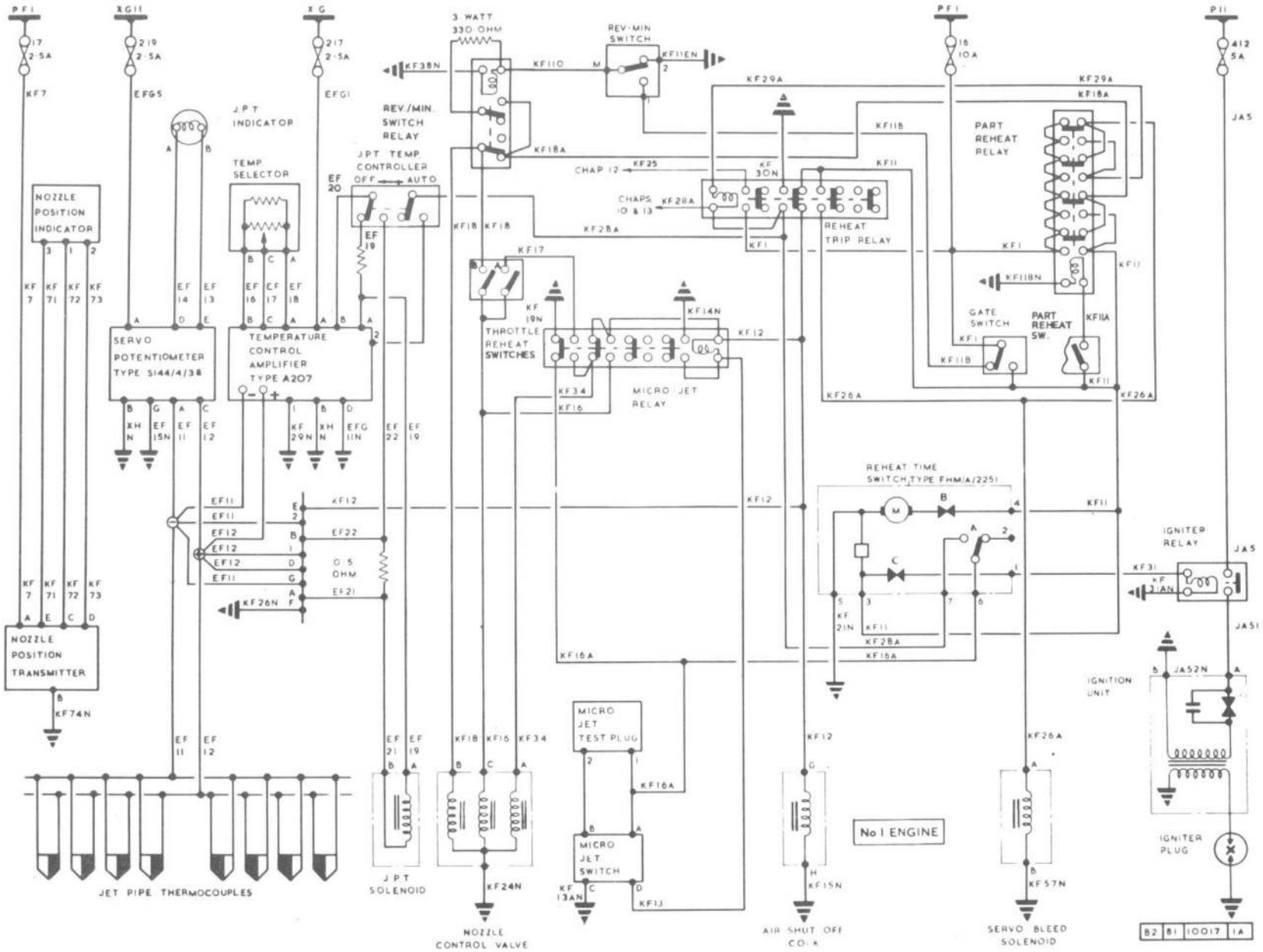

FIG. 3. ENGINE REHEAT SYSTEM

◀ MINOR AMENDMENTS ▶

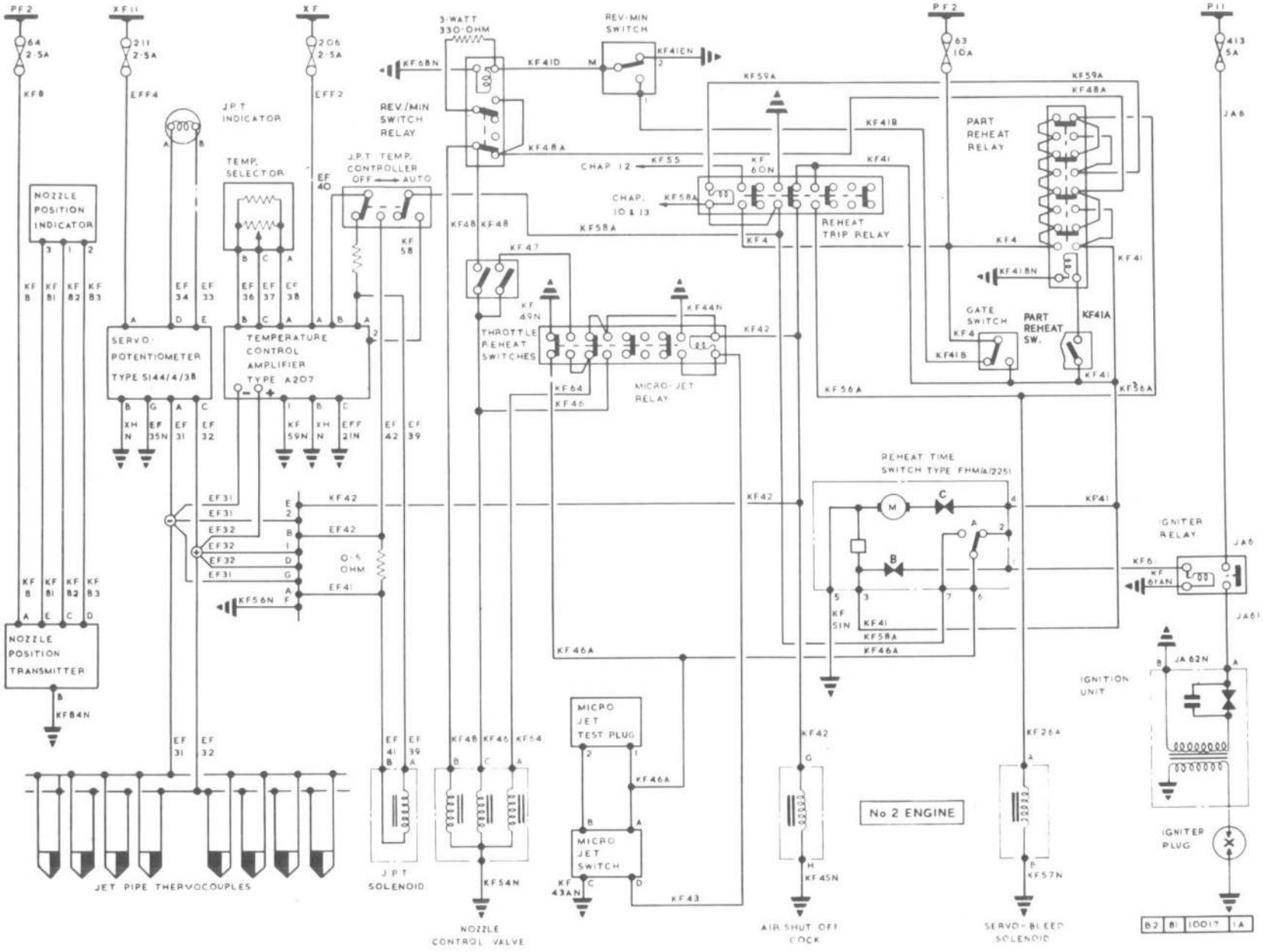

FIG. 3A. ENGINE REHEAT SYSTEM

◀ MINOR AMENDMENTS ▶

frames 52 and 53. Each relay operates in conjunction with a Type FHM/A/2251 time switch situated in the main equipment compartment. The time switch motor, energized by operation of the microjet relay, limits the duration of reheat ignition to a period of 15 seconds.

Reheat selection

21. Prior to the selection of reheat, the servo-bleed solenoid is energized through the contacts of the part reheat relay and the L.P. fuel supply to the reheat pump unit is cut off. Moving the throttle into the reheat section closes the part reheat and gate switches to complete the circuits to the time switch motor, part reheat relay solenoid, contacts on the reheat trip relay, nozzle solenoid A, and the ignition unit. When energized, the part reheat relay is held in by a supply through its contacts 1–1A and 3–3A whilst its contacts 6–6A and 8–8A open and de-energize the servo-bleed solenoid. Contacts 5–5A and 7–7A supply a positive feed to the reheat trip relay solenoid, making the relay potentially live as contacts A of the time switch will close after 10 seconds and complete the circuit to earth, unless the microjet switch moves to the rich position and opens contacts 8–8A of the microjet relay.

22. A supply through the reheat trip relay contacts 4–4A energizes the air shut-off cock solenoid and also connects to contacts D on the microjet switch through the microjet relay solenoid. The microjet relay will not be energized until the microjet switch moves to the rich light-up position and provides an earth for the relay through contacts D and C. When the microjet relay is energized, its contacts 6–6A close to energize nozzle solenoid A and the nozzle moves to the light-up position. The igniter relay is energized through contacts B in the time switch (these contacts open after 15 seconds), and upon light-up pressure in the jet pipe starts to rise.

23. The rise in jet pipe pressure is sensed by the microjet switch which moves to the rich position and energizes the microjet relay which is held in by a supply through its contacts 1–1A. The relay contacts 8–8A open to break the circuit to terminal 6 of the time switch, contacts 5–5A close to energize nozzle solenoid C, whilst contacts 6–6A open to de-energize nozzle solenoid A. The nozzle then moves to the quarter reheat position (solenoid C energized).

Reheat progression

24. Progressive increases in the degrees of reheat are made by moving the throttle forward through the reheat gate to operate the integral microswitches. Closing of microswitch A energizes nozzle solenoid A through the microjet relay contacts 7–7A and the nozzle moves to the half reheat position (nozzle solenoid A and C energized). When microswitch B closes, microswitch A opens and the nozzle opens to the three quarter reheat position (nozzle solenoids B and C energized). Moving the throttle to the maximum reheat position closes microswitch A which energizes nozzle solenoid A, and the nozzle moves to the maximum area position (solenoids A, B and C energized).

Normal cancellation

25. As the throttle is returned to the normal cruising section, the gate switch opens but the part reheat relay is held in by a supply through its contacts and the part reheat switch. This part of the circuit also maintains an energizing supply to the air shut-off cock, time switch clutch, microjet relay, and nozzle solenoid C. When the throttle setting is reduced sufficiently to open the part reheat switch, the relays are tripped and all components except the servo-bleed solenoid are de-energized. Reheat is then cancelled and the time switch is reset.

Automatic cancellation

26. Reheat is automatically cancelled if the jet pipe temperature exceeds a certain limit value, or if both a.c.-operated fuel pumps in either wing tank fail. Cancellation is effected by the reheat trip relays which, on closing, render their associated circuits inoperative and energize their respective warning circuits *(Chap.12)*. Since a double pump failure would be caused by loss of a.c. power or failure of the d.c. control supply, both reheat trip circuits can be completed via the alternator failure warning relay *(Chap.13)* or via the pump control relays *(Chap.10)*. Subject to the cause of failure, the relevant relay will connect an earth to the solenoids of the reheat trip relays, resulting in the cancellation of reheat on both engines.

Cold running nozzle position

27. To improve handling below a certain speed in the non-reheat range, the nozzle is partially opened by energizing nozzle solenoid B. The energizing supply is fed via the part reheat relay and the rev/min relay. At a predetermined engine speed, closing of the rev/min switch causes the rev/min switch relay to interrupt the circuit and de-energize solenoid B. When reheat is selected, the rev/min switch and rev/min relay are made ineffective by operation of the rev/min switch and the gate microswitch. As the rev/min switch is pressure-operated, its contacts may touch intermittently under certain conditions. To obviate chattering of the rev/min switch relay, its solenoid receives a hold-in supply via the relay contacts and a 330-ohm resistor which maintains the relay in the closed position until the rev/min switch opens fully and applies an earth to the positive side of the solenoid.

JET PIPE TEMPERATURE CONTROL

General

28. During cold running or reheat, the temperature of each jet pipe is automatically controlled by a solenoid-operated valve which restricts the fuel flow to the engine by an amount proportional to the magnitude of a temperature signal relayed to the valve by a magnetic amplifier. The input circuit of the amplifier comprises a number of series-connected thermocouple units which are fitted in the respective jet pipe. Output signals from the thermocouple chains are also utilized to operate the jet pipe temperature indicators described in Sect.7, Chap.4. The ◄ Type A207 magnetic amplifiers, one for each engine circuit, are installed between frames 49 and 50 on the port side of the rear fuselage, and are supplied from the 115-volt a.c. system. The solenoid valves, mounted on the engines, are capable of effecting a maximum fuel reduction of about 50 per cent. Temperature limitation, i.e. the amount of fuel reduction relative to jet pipe temperature, is varied by means of a temperature selector fitted on the engine. The selectors are set to limit the temperature to 775 deg C. A general description of the J.P.T. control system is contained in A.P.113F-0400 series. ►

Excess temperature tripping

29. If the jet pipe temperature rises above the limit setting, a relay incorporated in the amplifier unit automatically initiates cancellation of reheat at an excess temperature of approximately 50 deg. Closing of this relay completes the earth-return circuit from the solenoid of the reheat trip relay in the reheat circuit. Since the solenoid is already receiving a positive supply through the part reheat relay, the reheat trip relay closes and cancels reheat by shutting down the reheat fuel pump, de-energizing all solenoids of the nozzle control valve, and energizing the servo-bleed solenoid. Operation of the reheat trip relay also provides a hold-in connection to the negative side of the relay solenoid; and when, due to a drop in jet pipe temperature, the amplifier relay opens, the reheat trip relay remains energized, and reheat cannot be reselected until the throttle lever has been removed from the reheat section to trip the part reheat relay. This de-energizes the reheat trip relay, restoring the system to the normal condition. An additional function of the reheat trip relay is to control the supply to an associated warning lamp fitted on the auxiliary warnings panel. Details of the panel wiring and identification labelling are given in Chap.12.

Temperature control switches

30. Two J.P.T. CONTROL switches, No.1 and No.2 respectively, are mounted on the port instrument panel. Each of these double-pole switches has two settings, AUTO and OFF. One pole of the switch controls the output circuit of the magnetic amplifier, whilst the other is associated with the reheat trip circuit. With the switches set to AUTO, the solenoids of the temperature control valves are connected to their respective amplifiers, and the reheat trip circuits are operative. When either switch is set to OFF, the earth-return circuit between the associated reheat trip relay and the amplifier relay is interrupted, and the amplifier output circuit is isolated from the temperature control valve and connected to a 30-ohm resistor which simulates the normal loading condition of the amplifier. The resistors (5905-Z113360), one for each circuit, are fitted at the rear of the port instrument panel, adjacent to the switch terminals.

Note...

The above switches are wire-locked to the AUTO setting.

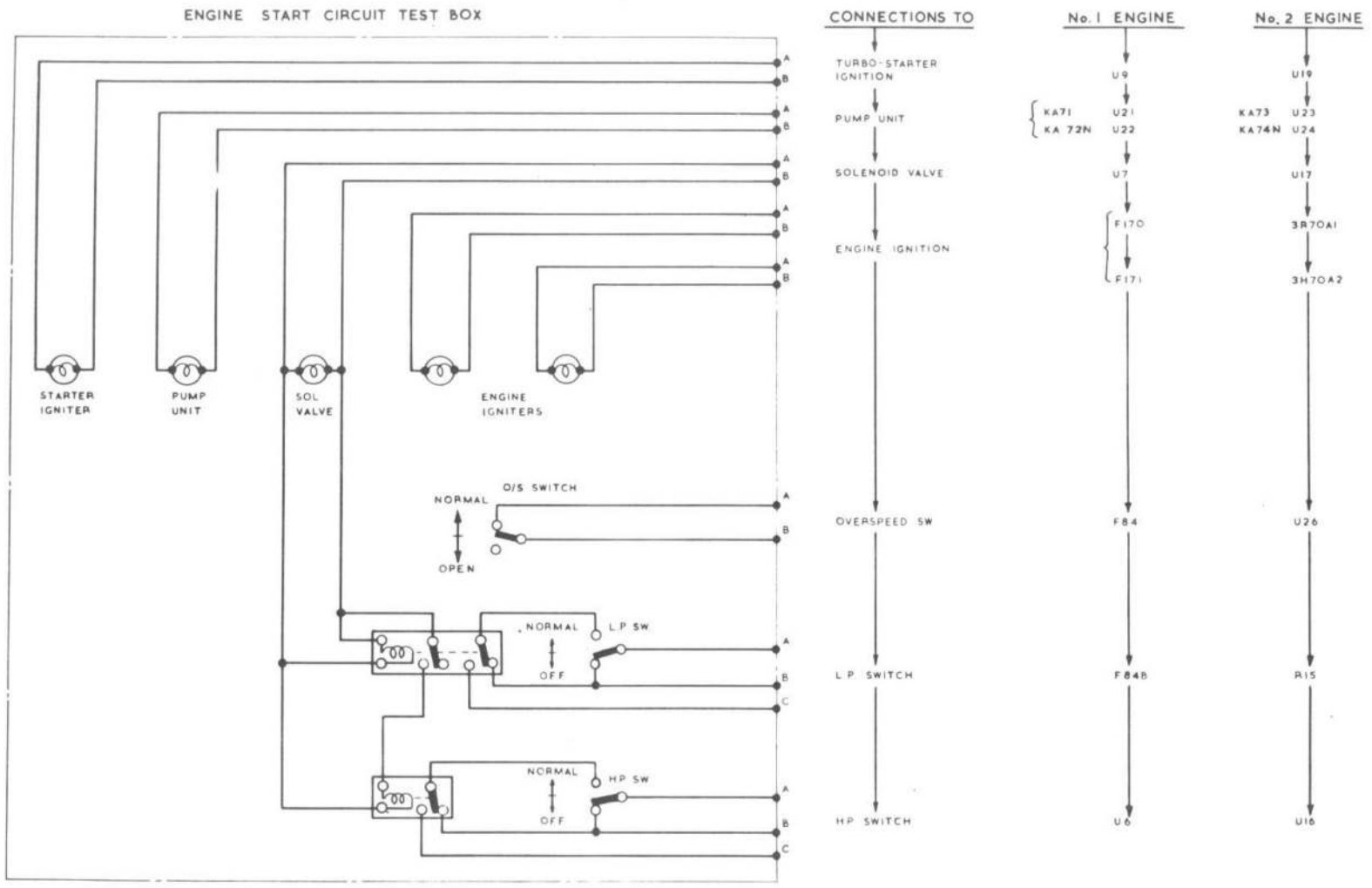

FIG. 4. ENGINE STARTING SYSTEM TEST BOX

◀ MINOR AMENDMENTS ▶

ADDITIONAL SERVICES

Engine anti-icing

31. Details of the engine anti-icing circuits are given in Chap.6.

Tachometers

32. These instruments and the associated engine-speed generators are described in Sect.7, Chap.4.

SERVICING

WARNING

The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cockpit or performing any operations upon the aircraft.

STARTER SYSTEM

Functioning tests

General

33. Descriptive and servicing information relating to the LTSA 70 starter system is contained in A.P.103D-0208-16A. In addition to the servicing described in the publication, further functioning tests are required to check the aircraft installation and these are detailed in the following para. using the test box shown in fig.4.

Test equipment required

34. Engine starting test box

Stop watch

28-volt d.c. ground supply

Preparation

35. Connect the engine test box to the aircraft wiring as shown in fig.4 according to the engine system it is desired to check. Connect the d.c. ground supply and switch ON the ENGINE START MASTER switch.

Procedure

36.

(1) Select all switches on the test box to NORMAL and the required engine ignition switch in the cockpit to ON. Press the associated START push-switch and at the same time operate the stop watch. The IGNITION and PUMP unit lamps should light and the STARTER IGNITER lamps flash momentarily.

(2) After 5 seconds operate the OVERSPEED switch on the test box. All lamps should go out.

(3) Press the START push-switch. The ENGINE IGNITER and PUMP unit lamps should light immediately and the SOL VALVE lamp and the STARTER IGNITER lamps light 3 seconds later. After 9 seconds all lamps should go out.

(4) Select the H.P. switch to OFF. Press the START push-switch, and operate the stop watch. The ENGINE IGNITER and PUMP unit lamps should light and 3.2 seconds later the system should shut down. Note that the STARTER IGNITER lamp flashed momentarily at 0.2 second.

(5) Select the L.P. switch OFF. Press the START push-switch and operate the stop watch. The ENGINE IGNITER and PUMP unit lamps should light immediately and the SOL VALVE lamp should light 3 seconds later. At 3.2 seconds the system should shut down.

(6) Operate the associated RELIGHT switch. The ENGINE IGNITER lamps should light for 28 seconds.

(7) Check that the ARM SAFETY BREAK and GROUND ARM links are in position and that fuse 133 is fitted in the d.c. feeder fusebox. Select the ARM MASTER and CAMERA switches OFF and operate the weapon firing trigger on the control column handle. The ENGINE IGNITER lamps should light for 28 seconds.

(8) Operate the START and RELIGHT push-switches simultaneously then release the switches. The ENGINE IGNITER lamps should light for 28 seconds.

(9) Remove all test equipment and restore circuits to normal.

Note...

When making the checks allow at least 18 seconds between pressing the START push-switch for successive tests. The times specified are not precise and must be regarded as approximate for the purpose of the tests.

REHEAT SYSTEM

General

37. Servicing information relating to the reheat system is contained in A.P. 4481J and K, Vol.1. Functioning and continuity tests of the installation are detailed in the following paragraphs.

Functioning and continuity tests

No.1 engine

38. *Preparation for tests.*- Disconnect cable R76B from the nozzle control

valve, cable R1B from the servo-bleed solenoid, cable F74B from the air shut-off cock, and cable R215 at the ignition unit. To these cables connect six test lamps as follows:-

LAMP	CABLE	CONNECTION	CIRCUIT
No.1	2R76B	Pins A and D	Solenoid A
No.2	2R76B	Pins B and D	Solenoid B
No.3	2R76B	Pins C and D	Solenoid C
No.4	F74B	Pins G and H	Air S.O.C.
No.5	R1B	Pins A and B	Servo-bleed solenoid
No.6	R215	Pins A and B	Ignition unit

Connect a single-pole change-over switch (spring-loaded to the OFF position) to pins, A, C and D of cable F74B as follows:-

Cable		Test switch
Pin A	to	Terminal 1
Pin C	to	Terminal 2 (centre common)
Pin D	to	Terminal 3

◀ **Note...**

A test box, described in A.P.4343V, Vol.1, Book 1, Sect.8, Chap.3, can be used in place of the change-over switch referred to above.

No.1 engine

39. *Test procedure.-* ▶

(1) Disconnect cable F162 at the a.c. fuse and relay box and remove fuse 54 from the starboard fusebox.

(2) Connect and switch on 28-volt d.c. ground supply. Lamps 2 and 5 should light.

(3) Move No.1 throttle forward until it is just through the gate into the reheat section. As the throttle passes through the gate, lamps 2 and 5 should go out and lamps 1, 4 and 6 should light. After 10 seconds, lamps 1 and 4 should go out, lamp 5 should light, and lamp 6 should go out after 15 seconds.

(4) Move the throttle back to engine idling. Lamps 2 and 5 should light and all others be out.

(5) Select the throttle to reheat. Lamps 1, 4 and 6 should light. Momentarily operate the test switch to short pins C and D of cable F74B (note; the switch must be operated quickly or the system will shut down). Lamp 1 should go out, lamp C should light, lamp D should remain on, whilst lamp 6 should go out 15 seconds after the switch is operated.

(6) Move the throttle slowly forward to full reheat. The different stages of reheat will be indicated by lamps 1, 2 and 3. Lamp 4 should remain lit throughout whilst the other indications should be:-

Stage	Lamp No.1	Lamp No.2	Lamp No.3
1	OFF	OFF	ON
2	ON	OFF	ON
3	OFF	ON	ON

(7) Select No.1 J.P.T. control switch to OFF. Disconnect cable R86A from control amplifier and short pins 1 and 2 of cable connector. Lamps 1, 2 and 3 should remain lit.

(8) Select No.1 J.P.T. control switch to AUTO. Lamps 1, 2, 3 and 4 should go out. Lamp 5 and the TTC1 warning should light. Remove short from cable R86A and reconnect the cable. There should be no affect on the indications given.

(9) Move the throttle back to the gate. Lamps 1, 2, 3 and 4 should remain out whilst lamp 5 remains lit. Move the throttle to engine idling. Lamp 5 should remain lit, lamp 2 should light, and the TTC1 warning should go out.

(10) Move the throttle into reheat. Lamps 1, 4 and 6 should light. Momentarily operate the test switch to short pins C and D of cable F74B. *(Refer to note in para.(5).)* Lamp 4 should remain on, lamp 3 should light, lamp 1 should go out, and lamp 6 should go out 15 seconds after the test switch is operated.

(11) Bring the throttle back to engine idling. Lamps 2 and 5 should be lit and all other lamps should be out.

(12) Again select reheat. Lamps 1, 4 and 6 should light. Momentarily close the test switch to short pins C and D of cable F74B. *(Refer to note para.(5).)* Lamp 4 should remain lit, lamp 1 should go out, lamp 3 should light, and lamp 6 should go out 15 seconds after the test switch is operated.

(13) Momentarily operate the test switch to short pins C and A. Lamps 3 and 4 should go out, lamp 5 should light, and the TTC1 warning should come on.

(14) Move the throttle to engine idling.

Lamps 2 and 5 should be lit and all others be out.

(15) Disconnect cable F74A at the engine junction box and short pins 1 and M of the connector. Lamp 2 should go out.

(16) Remove the short from pins 1 and M of cable F74A. This should not affect the indications given. Reconnect cable F74A to the engine junction box. Lamp 2 should light.

(17) Select reheat. Lamps 1, 4 and 6 should light. Momentarily operate the test switch to short pins C and D of cable F74B. *(Refer to note in para.(5).)* Lamp 4 should remain lit, lamp 3 should light, lamp 1 should go out, and lamp 6 should go out 15 seconds after the switch is operated.

(18) Replace fuse 54 in the starboard fusebox. Lamps 3 and 4 should go out, and lamp 5 and the TTC1 warning should light. Remove fuse 54. This should not affect the indications given.

(19) Select the throttle to engine idling. Lamp 5 should remain on, the TTC1 warning should go out, and lamp 2 should light.

(20) Select reheat, Lamps 1, 4 and 6 should light. Operate the test switch to short pins C and D of cable F74B. *(Refer to note para.(5).)* Lamp 4 should remain on, lamp 1 should go out, lamp 3 should light, and lamp 6 should go out 15 seconds after operating the switch.

(21) Reconnect cable F162. Lamp 5 and the TTC1 warning should light and lamps 3 and 4 should go out.

(22) Move the throttle back to engine idling. Lamp 5 should remain lit, the TTC1 warning should go out, and lamp 2 should light.

(23) Remove the d.c. ground supply, replace fuse 54, and reconnect all cables broken down for purpose of the tests.

◄ **No.2 engine**

40. *Preparation for tests.*- Connect the six test lamps and the test switch in accordance with the instructions in para.38, substituting R76D for R76B, 2R70B for R1B, 2R77A for F74B, and R216 for R215.

No.2 engine

41. *Test procedure.*- For cable R86A referred to in para.39 substitute R87A and for warning TTC1 substitute TTC2. Repeat tests (1) to (23) in para.39 changing all references to No.1 engine to No.2 engine. ►

J.P.T. CONTROL SYSTEM

General

42. Instructions for testing and calibrating the J.P.T. control equipment are included in A.P.4343K, Vol.1.

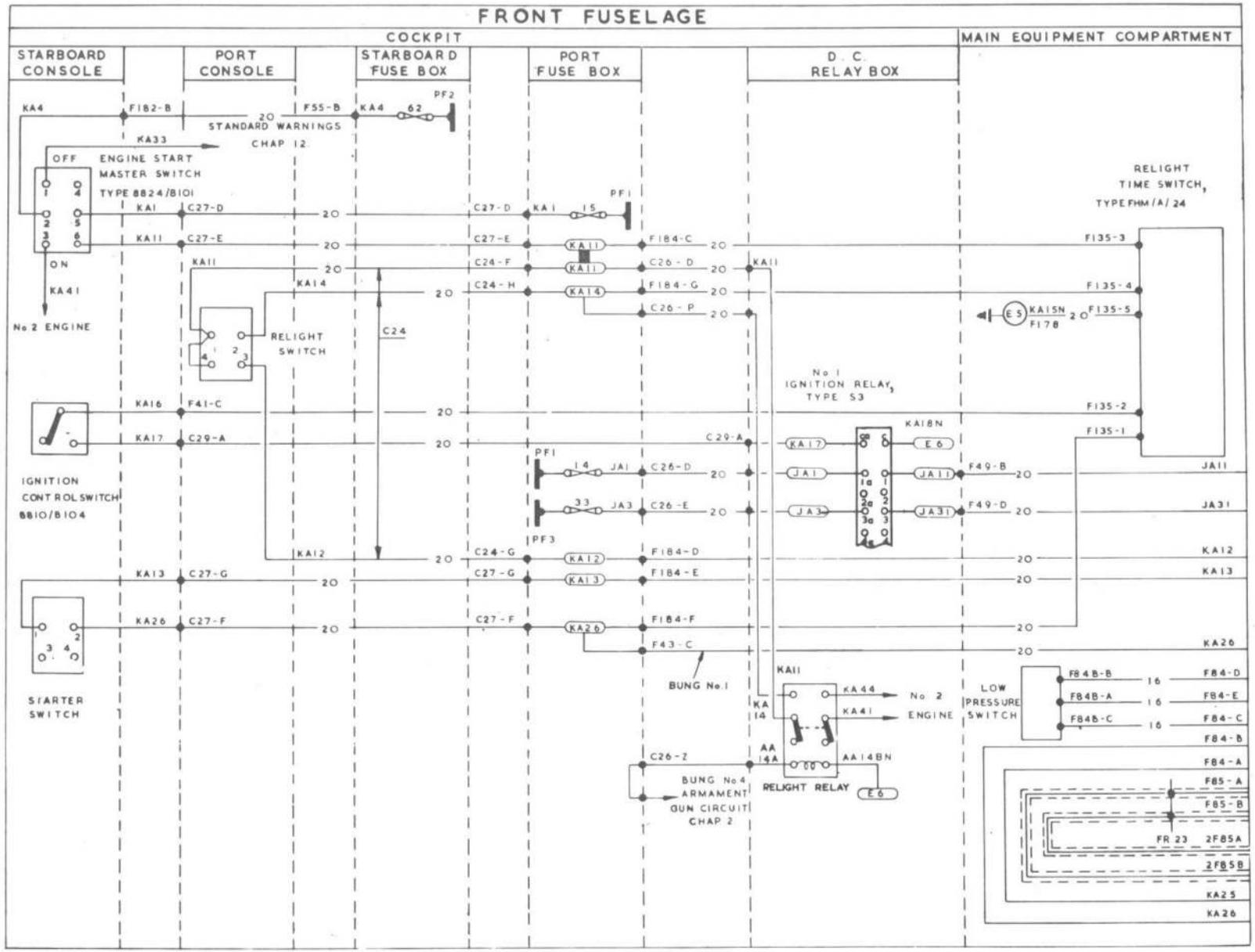

FIG. 5. No.1 ENGINE STARTING AND RELIGHT SYSTEM

◀ MINOR AMENDMENTS ▶

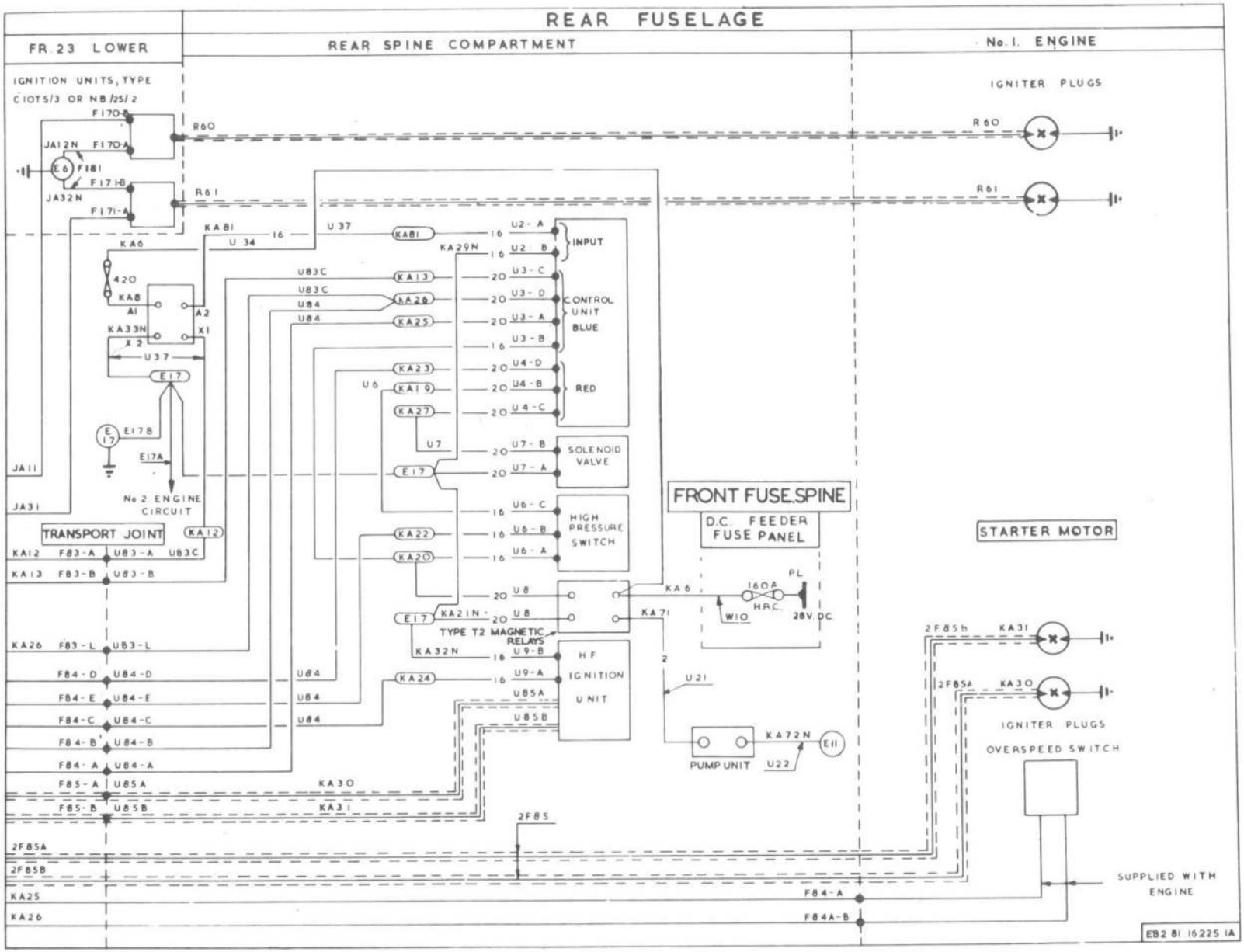

FIG. 5A No. 1 ENGINE STARTING AND RELIGHT SYSTEM

◀ MINOR AMENDMENTS ▶

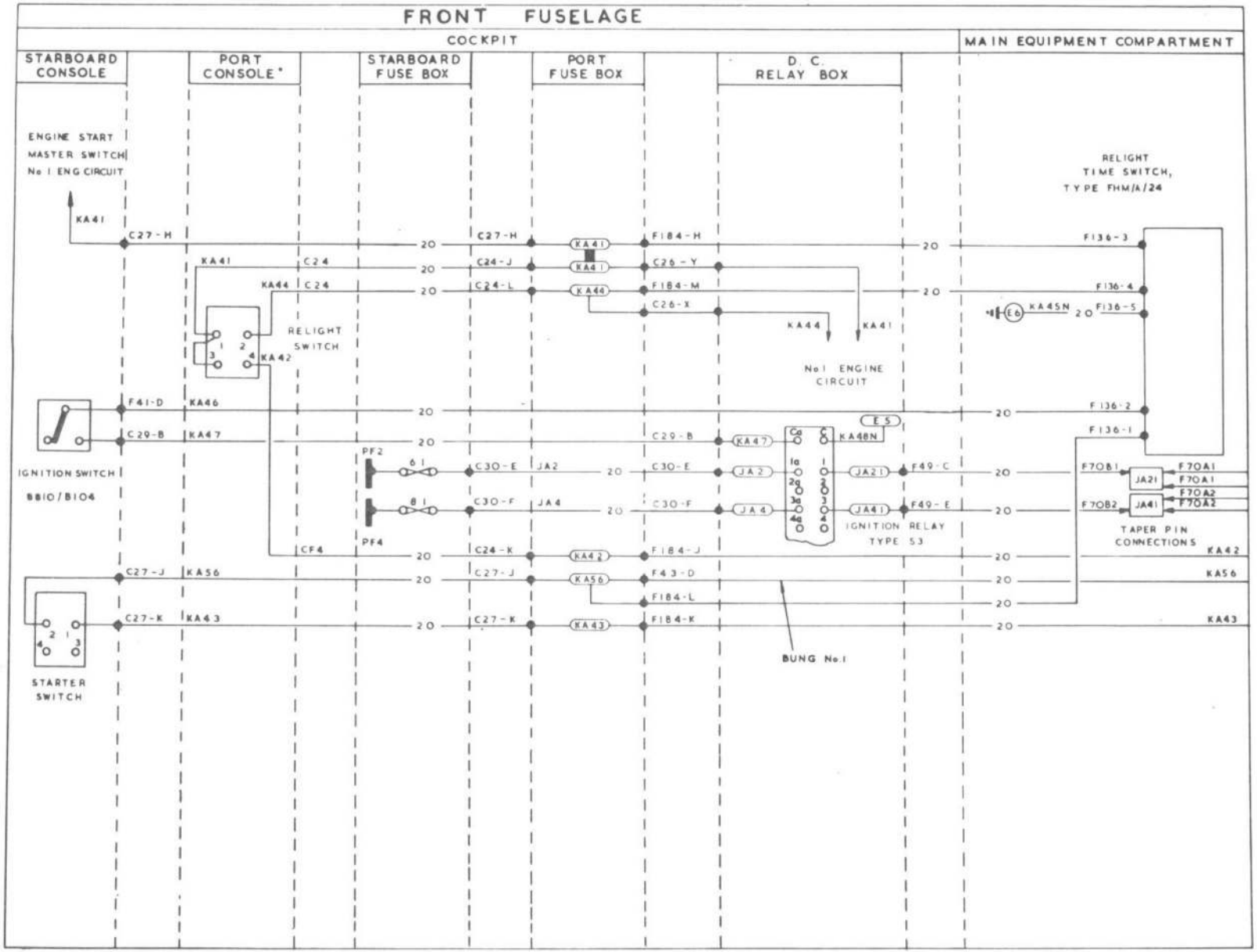

FIG. 6. No. 2 ENGINE STARTING AND RELIGHT SYSTEM

◂MINOR AMENDMENTS▸

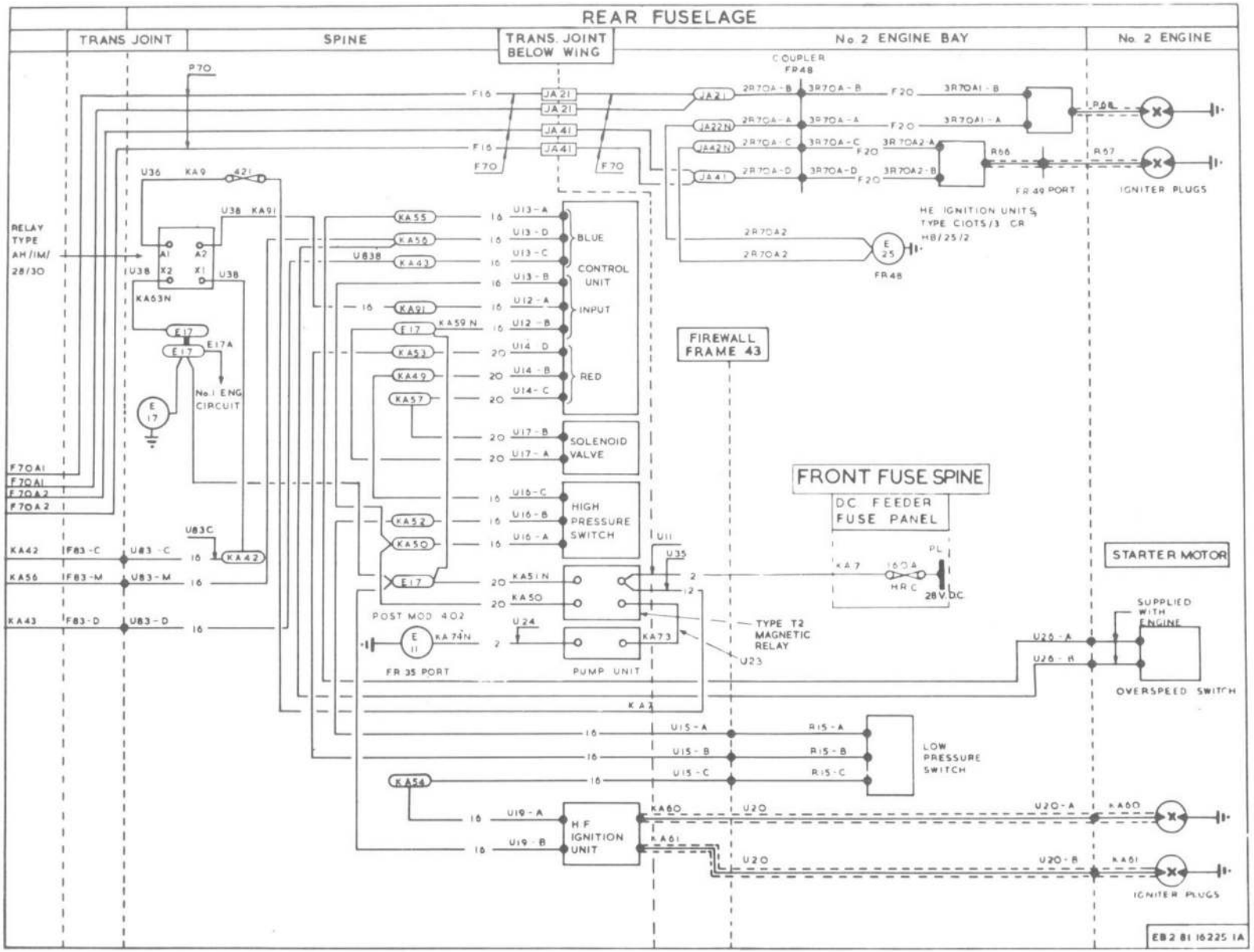

FIG. 6A. No. 2 ENGINE STARTING AND RELIGHT SYSTEM

◀MINOR AMENDMENTS▶

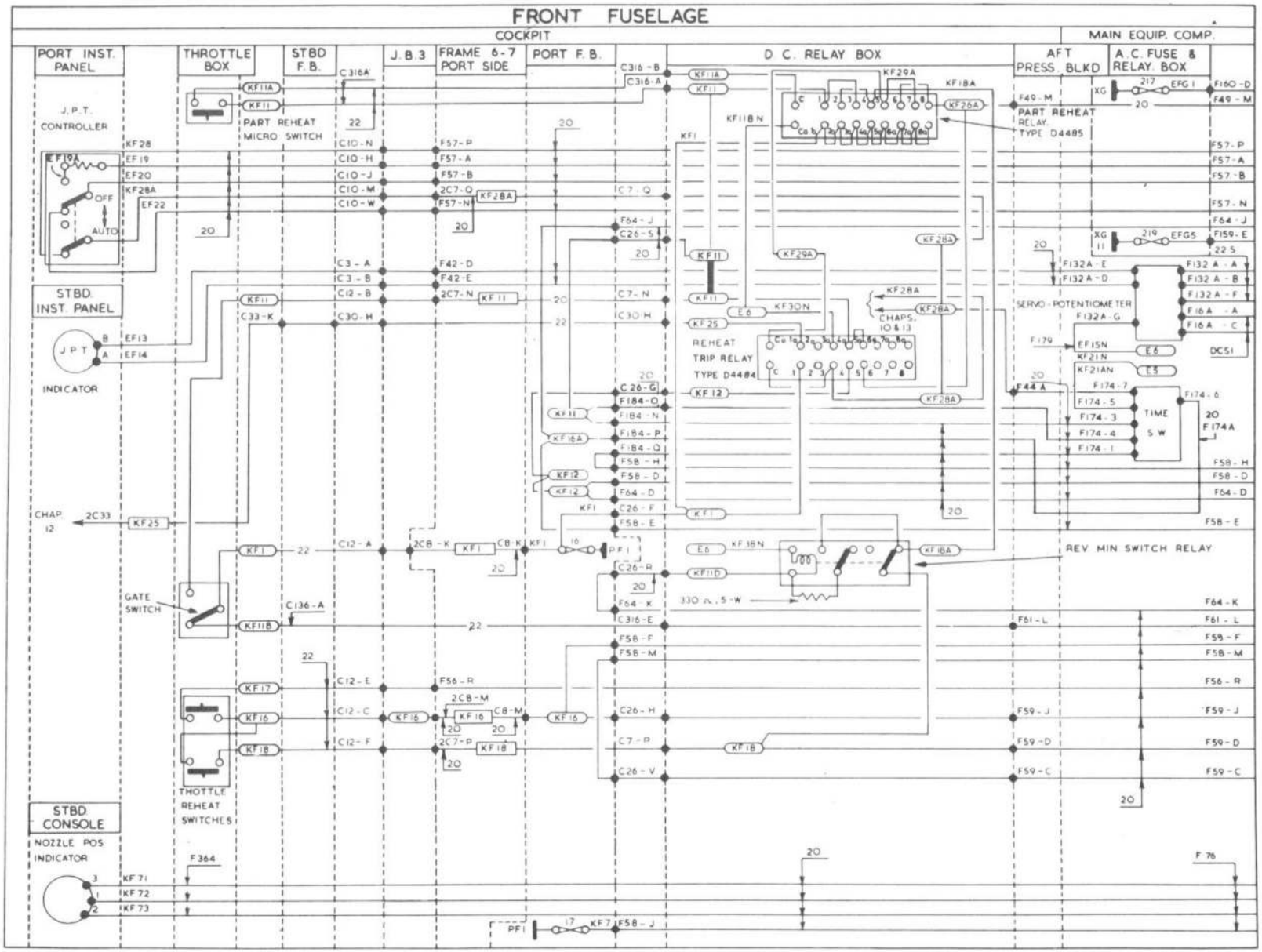

FIG. 7. No.1 ENGINE REHEAT SYSTEM

◀ MINOR AMENDMENTS ▶

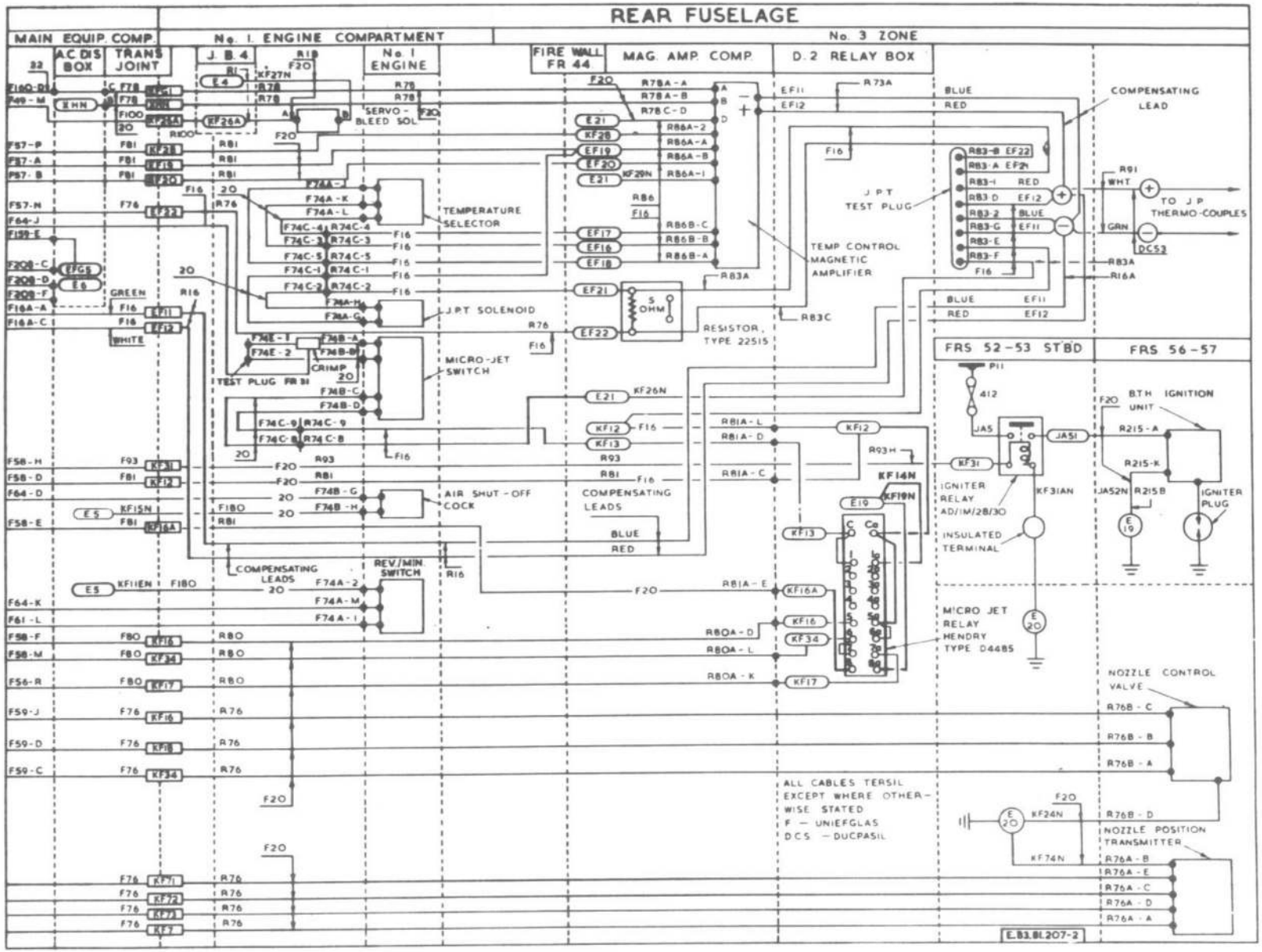

FIG. 7A . No.1 ENGINE REHEAT SYSTEM

◀ MINOR AMENDMENTS ▶

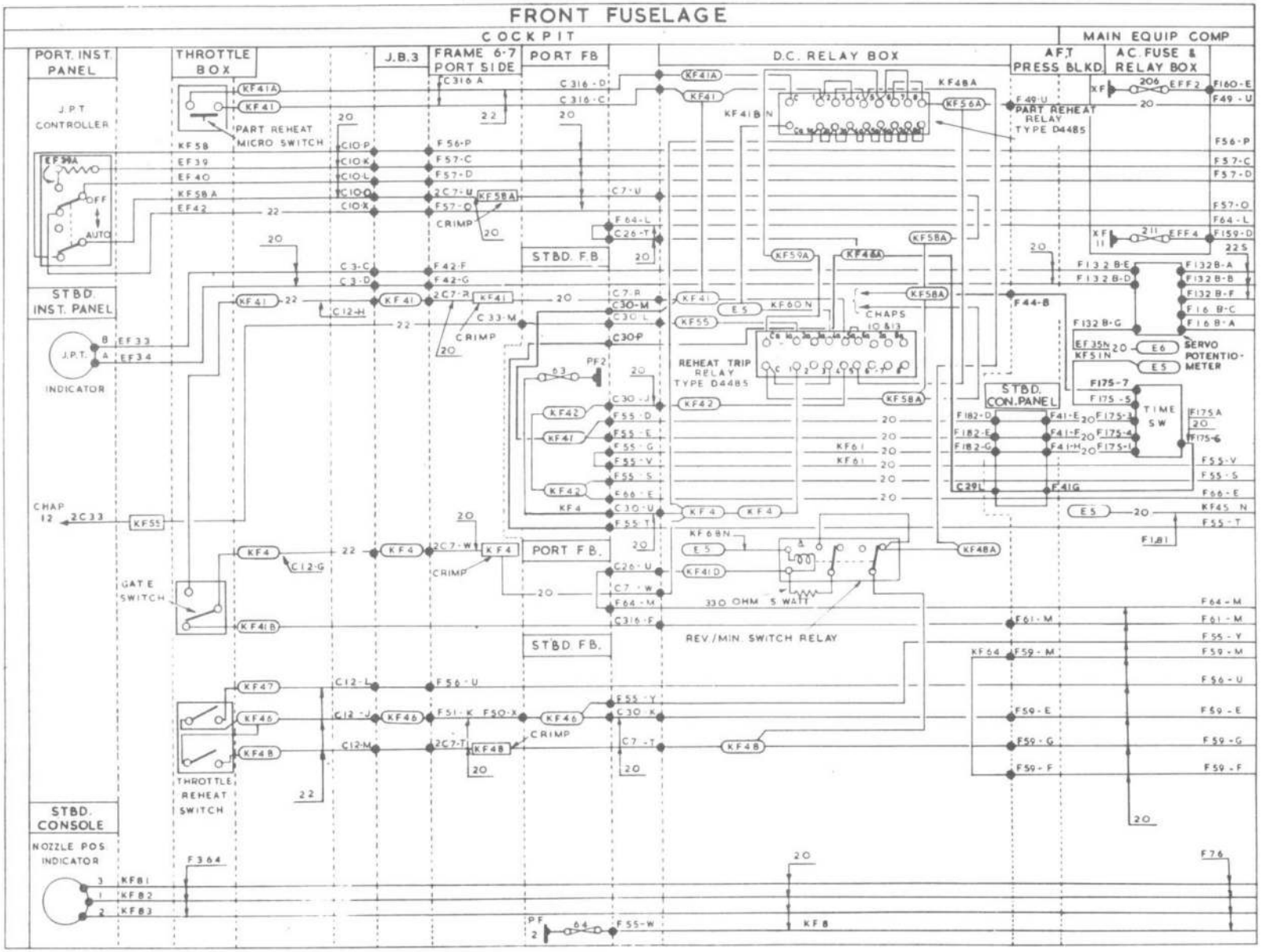

FIG. 8. No.2 ENGINE REHEAT SYSTEM

◀MINOR AMENDMENTS▶

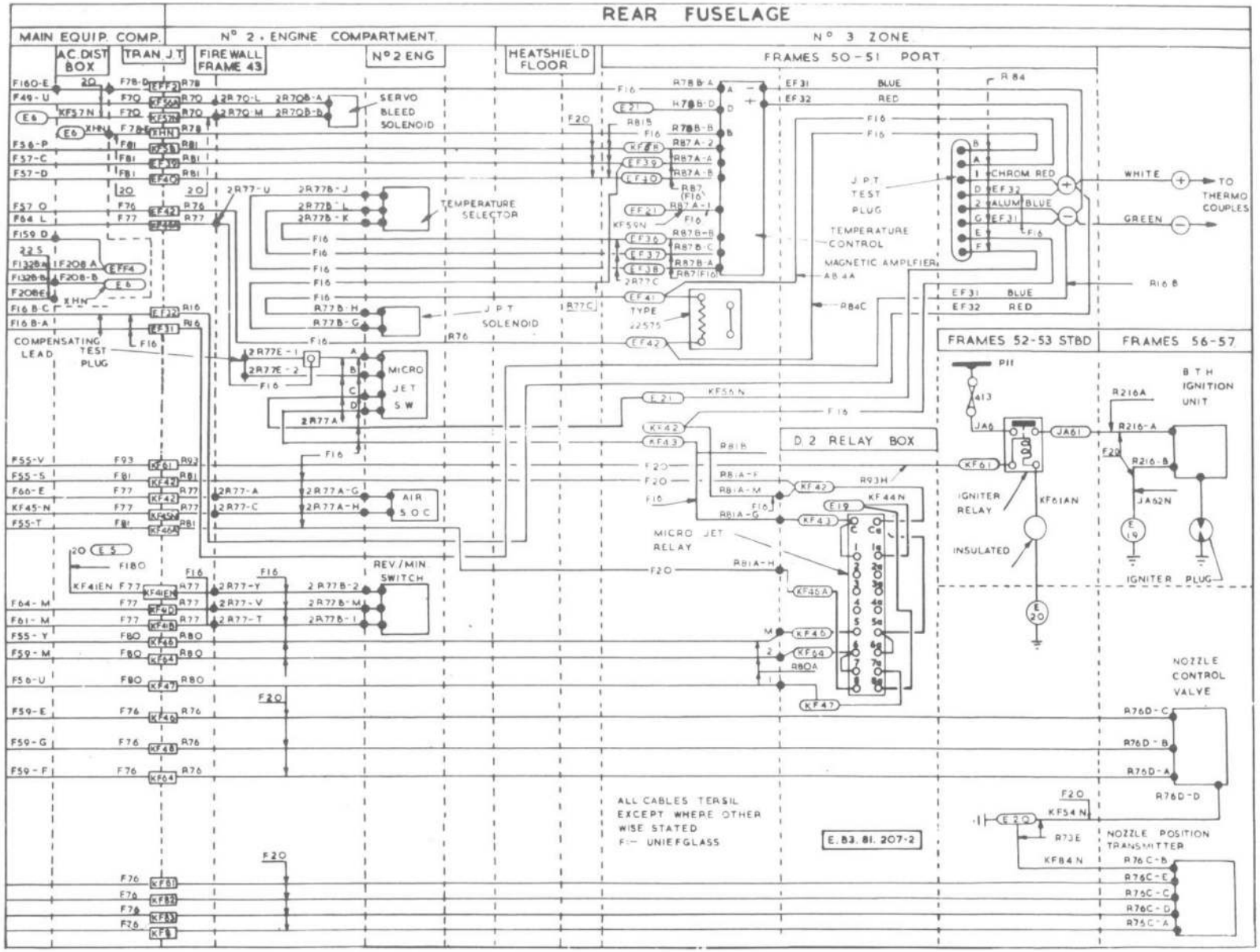

FIG. 8A. NO. 2 ENGINE REHEAT SYSTEM

◀ MINOR AMENDMENTS ▶

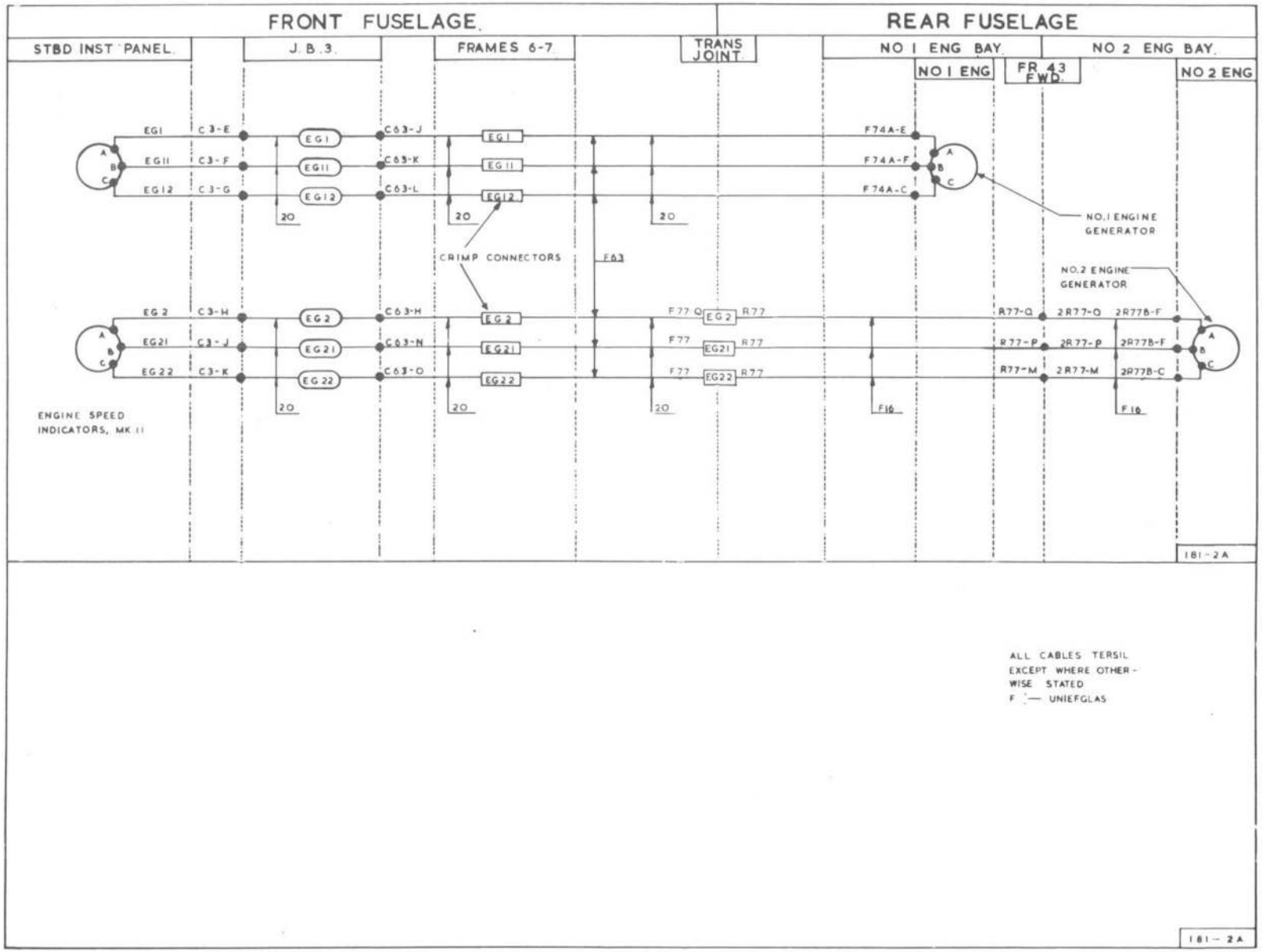

FIG. 9. TACHOMETERS

◀ MINOR AMENDMENTS ▶

Appendix I MOD.4539

To improve the reliability of the engine starting system and also to increase the overhaul life of the control units, this modification introduces Type 700/1/12170 units in lieu of the existing Mk.8, Type 7CZ/106201 units.

No wiring changes are required, the new units simply plugging into the existing aircraft wiring. Test procedure is identical to that laid down in the main chapter. For further information regarding the Type 700/1/12170 units refer to A.P.103D-0208-16A.