~~CONFIDENTIAL~~

ARROW 1 SERVICE DATA

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LIST OF ILLUSTRATIONS

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SECTION 27

FIRE PROTECTION

ELECTRICS

(This data supersedes previous issue dated 15 Feb 58)

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ARROW 1 SERVICE DATA

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DESCRIPTION

GENERAL

1 The fire protection system is comprised of fire detection and fire extinguisher actuation circuits.

2 The fire detection circuits detect and indicate overheating conditions in the LH engine compartment, the RH engine compartment and the hydraulic bay which is the section of the fuselage between the engine compartments. In addition to the hydraulic equipment, fuel system and electrical system components are located in this section.

3 In the extinguisher actuation circuits two fire extinguishers are fitted which can be discharged individually into any two of the three fire detection areas. Alternatively, both extinguishers can be discharged into any one of the three areas or both extinguishers can be discharged simultaneously by the operation of a switch, marked CRASH-FIRE, located in the front cockpit. In this case, the content of one extinguisher is discharged into both the LH and the RH engine compartments, and the content of the remaining extinguisher is discharged into the hydraulic bay.

FIRE DETECTION CIRCUITS

4 The three fire detection circuits are electrically identical. Each circuit is comprised of a number of lengths of a specially constructed heat detector conduit, a detector control unit and a fire warning indicator light which, when depressed, actuates the corresponding actuation circuit of the extinguishers.

5 The detector conduit consists of two uninsulated wires embedded in an insulating material which has a negative co-efficient of temperature, i.e. a rise in temperature results in a drop in the insulation resistance value. The wires and the insulating material are contained in a conductive sheathing of Inconel which is grounded at intervals to the aircraft structure. One of the core wires is connected to the sheathing and the other is series connected to the control unit.

6 The lengths of detector conduit can be constructed to have different operating limits by increasing or decreasing the resistance value of the insulating material for any given temperature. This permits a complete circuit to indicate overheating conditions at different temperatures along its length. The detector circuits of the engine compartments are assembled in this manner.

7 The conduit lengths fitted forward of the engine firewall are constructed to have resistance-temperature characteristics that enable an overheat warning indication to be given if the temperature exceeds 260°C (500°F), or if at least six inches of the conduit is subjected to 315°C (600°F). The conduit lengths fitted aft of the firewall are constructed to have resistance-temperature characteristics that enable an overheat warning indication to be given if the temperature exceeds 307°C (585°F), or if at least six inches of the conduit is subjected to 380°C (715°F). The detector conduits in the hydraulic bay are constructed to have resistance-temperature characteristics that enable an overheat warning indication to be given if the ambient temperature exceeds 232°C (405°F) or if at least six inches of the conduit is subjected to 288°C (550°F).

8 As the detector circuits are formed in loops, they will continue to operate normally despite a break occurring in the live core wire. To facilitate checking this core wire for continuity, a switch, located on the Refuelling and Test panel E21, is provided to interrupt the loop and ground the core wire. This simulates an overheat condition and continuity of the wire will be indicated if the relevant fire warning light illuminates. The switch is a three-pole type and grounds all three detection circuits simultaneously. To restrict the current flow when the detector circuits are grounded, a current limiting resistor for each circuit is inserted between the test contacts of the switch and ground.

9 The detector control unit is basically an electronic switch which operates a circuit relay. This relay, when energized, completes a supply circuit from the emergency DC bus to the fire warning indicator located in the cockpit. The control unit incorporates two

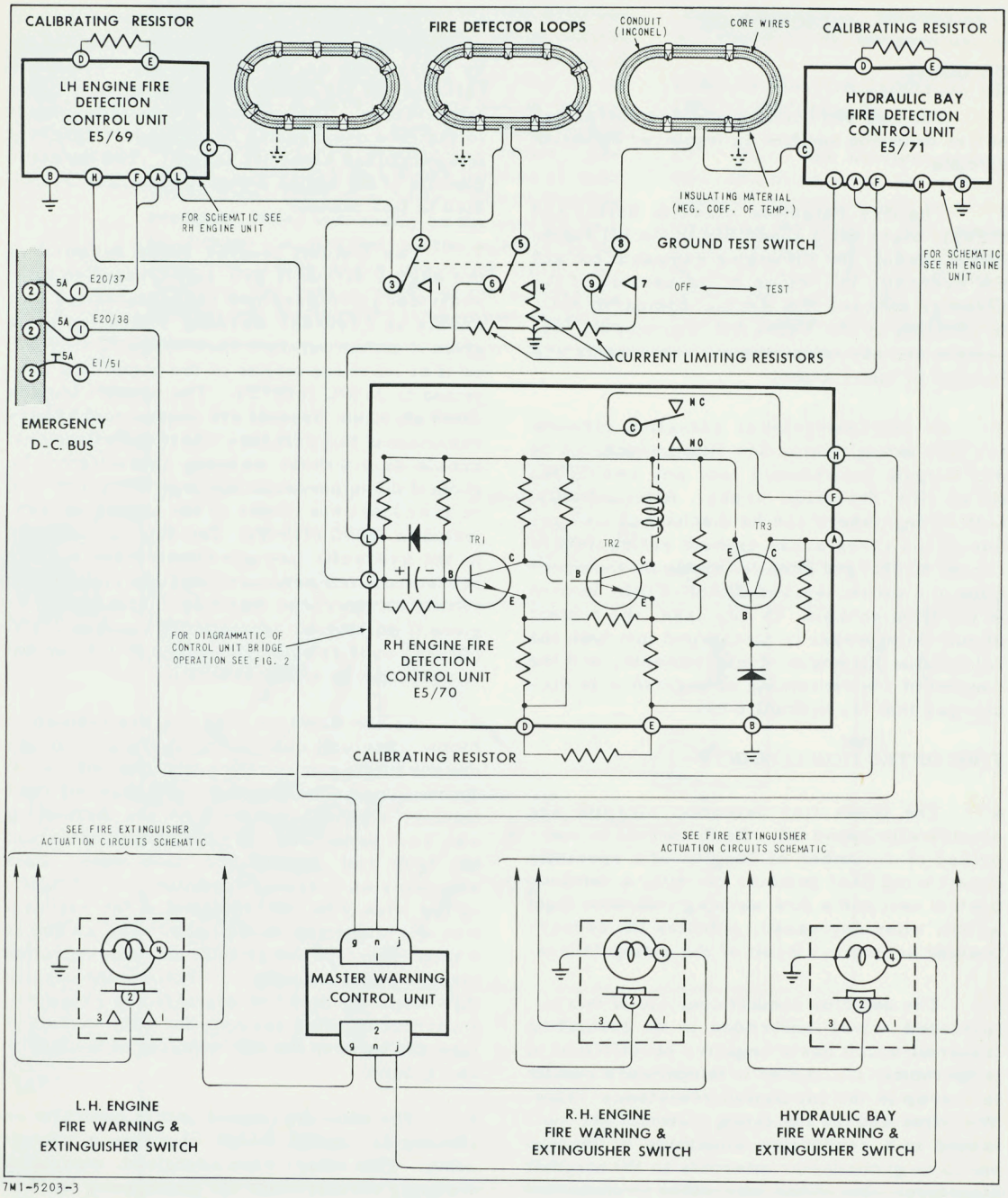

FIG. 1 FIRE DETECTION CIRCUITS SCHEMATIC

transistors which perform the switching function, the circuit relay and a resistance bridge circuit which uses the sensing element as one leg of the bridge and a calibrating resistor as its opposite leg. A third transistor and its current components maintain a constant supply voltage of 24 volts for the detection circuits. The circuit is effective to a lower limit of 17 volts and an upper limit of 31 volts. The calibrating resistor, fitted externally on the control unit, facilitates calibration of the system to the required temperature operating limit. Increasing the ohmic value of the calibrating resistor will increase the temperature operating limit. Conversely, decreasing the ohmic value will decrease the temperature operating limit.

FIRE DETECTOR CONTROL UNIT OPERATION (Fig 2)

10 When the ambient temperature in the fire detection area is normal, the sensing element resistance will be of a value that will unbalance the bridge. The unbalanced condition of the bridge causes a potential difference to develop between the base (B) and the emitter (E) of the first stage (TR1); i.e. the base becomes more positive with respect to the emitter.

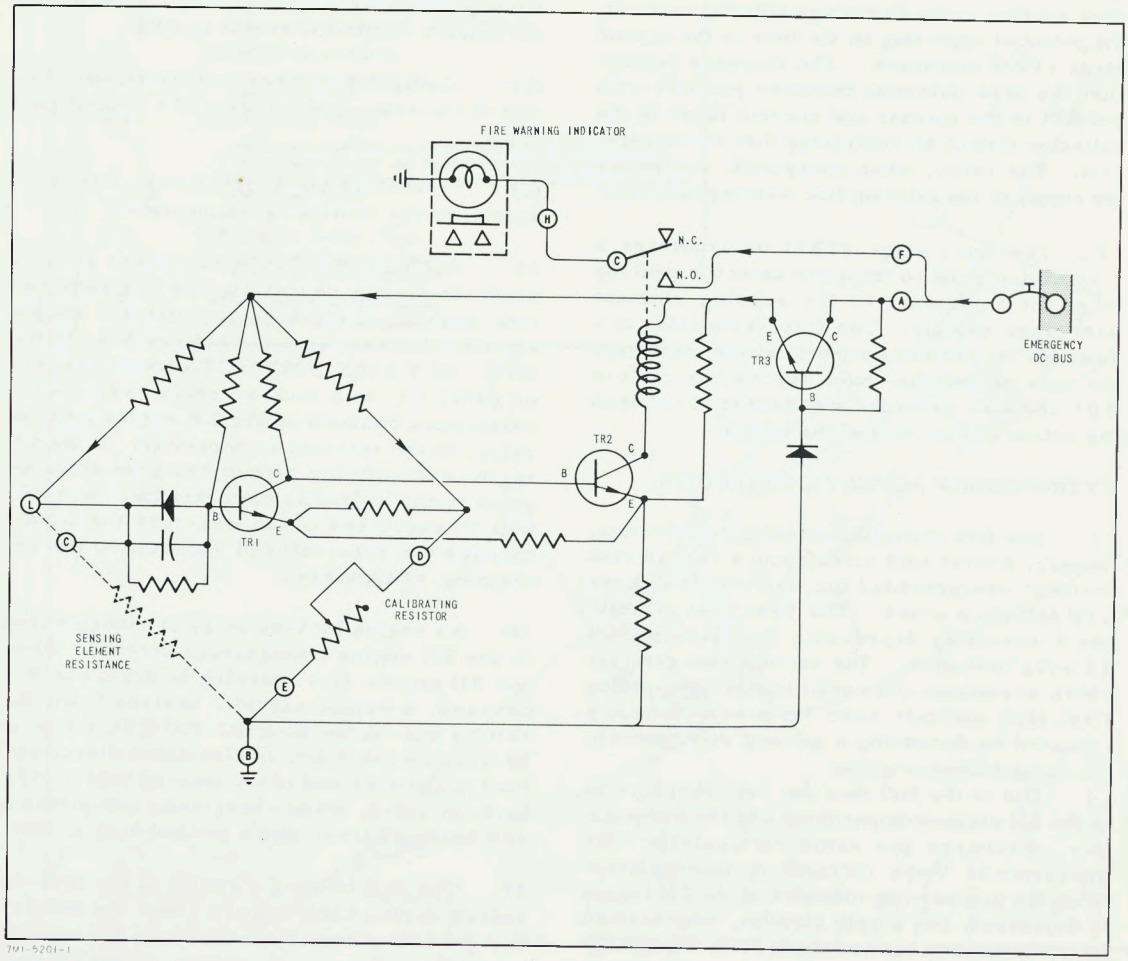

FIG. 2 DIAGRAMMATIC OPERATION OF DETECTOR CONTROL UNIT

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This condition permits current to flow in the collector (c) circuit and causes the voltage appearing on the base (B) of the second stage (TR2) to develop a negative bias. The value of this bias is such that the transistor does not conduct.

11 If an overheat condition occurs in the fire detection area, the sensing element resistance decreases in resistance to a point where the bridge is balanced and no potential difference will exist between the base and emitter of the first stage (TR1). When this condition exists, the transistor does not conduct. When current does not flow in the first stage collector circuit, the potential appearing on the base of the second stage (TR2) increases. The increase is such that the base potential becomes positive with respect to the emitter and current flows in the collector circuit so energizing the circuit relay coil. The relay, when energized, completes the supply to the relevant fire warning indicator.

12 The first stage (TR1) incorporates a circuit designed to improve detector sensing when the resistance of the sensing element decreases rapidly. The circuit consists of a resistor-capacitor network which restricts the rate of voltage drop across the input to TR1 and also provides a differential between the cut-in and cut-out of the circuit.

EXTINGUISHER ACTUATION CIRCUITS

13 Two fire extinguisher actuation circuits, namely, a first shot circuit and a second shot circuit, are provided for each of the three fire detection areas. The first shot circuits are actuated by depressing the relevant fire warning indicator. The second shot circuits which are inoperative until the corresponding first shot circuits have been selected, are actuated by operating a second shot switch.

14 Due to the fact that the first shot circuit of the LH engine compartment and the hydraulic bay, discharge the same extinguisher, the operation of these circuits is interrelated. When the fire warning indicator of the LH engine is depressed, two supply circuits, both derived from the battery bus via the L FIRE PROTECT circuit breaker on panel E1, are completed. One supply releases the appropriate extinguisher and the other supply energizes an engine lock-on relay. The supply to the extinguisher is completed via the relay open contacts of a lock-on relay in the hydraulic bay extinguisher actuation circuit. If the hydraulic bay actuation circuit was actuated prior to operating the LH engine circuit, the hydraulic bay lock-on relay will be energized which transfers the supply through the relay closed contacts to the remaining extinguisher. The lock-on relay, when energized, does the following:

(a) Completes a self-holding circuit which holds the relay in the energized position until the supply circuit is interrupted, i.e. selecting the master electrical switch to OFF.

(b) Completes a preparatory supply circuit to the relay-open contact of a second shot relay.

(c) Transfers the hydraulic bay first shot circuit to the remaining extinguisher.

15 The hydraulic bay extinguisher circuit, when actuated by depressing the hydraulic bay fire warning indicator, completes a supply circuit, derived from the battery bus via the HYD. BAY FIRE PROTECT circuit breaker on panel E1, to a lock-on relay and, via the relay-open contacts of the LH engine lock-on relay, to the relevant extinguisher. If the LH engine extinguisher circuit has been actuated prior to the hydraulic bay, this lock-on relay will be energized which transfers the supply through the relay-closed contacts to the remaining extinguisher.

16 An engine lock-on relay is incorporated in the RH engine extinguisher circuit. When the RH engine fire warning indicator is depressed, a supply circuit, derived from the battery bus via the R. FIRE PROTECT circuit breaker on panel E1, is completed directly to the extinguisher and to the lock-on relay. The lock-on relay, when energized, completes a self holding circuit and a second shot circuit.

17 The self holding circuits of the lock-on relays derive their supply from the battery bus via an automatic reset circuit breaker on panel E1 and a set of contacts of the master electrical switch.

ARROW 1 SERVICE DATA

LOCATION OF ELECTRICAL COMPONENTS - FIRE PROTECTION

ITEM NO.	DESCRIPTION
E1	FORWARD CIRCUIT BREAKER PANEL
-45	5A CB, FIRE EXTINGUISHER, LH ENGINE
-46	5A CB, FIRE EXTINGUISHER RH ENGINE
-47	5A CB, FIRE EXTINGUISHER, HYDRAULIC BAY
-49	10A CB, SECOND SHOT SUPPLY, LH ENGINE AND HYDRAULIC BAY
-50	10A CB, SECOND SHOT SUPPLY, RH ENGINE
-51	5A CB, FIRE DETECTION, HYDRAULIC BAY
E3	FORWARD ACCESSORY PANEL
-5	RELAY, LH ENGINE LOCK ON
-6	RELAY, RH ENGINE LOCK ON
E4	DISTRIBUTION PANEL
E5	MAIN ACCESSORY PANEL
-69	FIRE DETECTION CONTROL UNIT, LH ENGINE
-70	FIRE DETECTION CONTROL UNIT, RH ENGINE
-71	FIRE DETECTION CONTROL UNIT, HYDRAULIC BAY
E6	FORWARD RELAY PANEL
-9	RELAY, HYDRAULIC BAY LOCK ON
-21	RELAY, SECOND SHOT
E14	FIRE AND FUEL PANEL
-5	FIRE WARNING INDICATOR AND EXTINGUISHER PUSH SWITCH (LH ENGINE)
-6	FIRE WARNING INDICATOR AND EXTINGUISHER PUSH SWITCH (RH ENGINE)
-7	FIRE WARNING INDICATOR AND EXTINGUISHER PUSH SWITCH, HYDRAULIC BAY
-10	SECOND SHOT SWITCH
-24	CRASH SWITCH
E20	AFT CIRCUIT LIMITER PANEL
-37	5A FUSE, FIRE DETECTION, LH ENGINE
-38	5A FUSE, FIRE DETECTION, RH ENGINE
E21	REFUELLING AND TEST PANEL
-8	SWITCH, FIRE DETECTION GROUND TEST

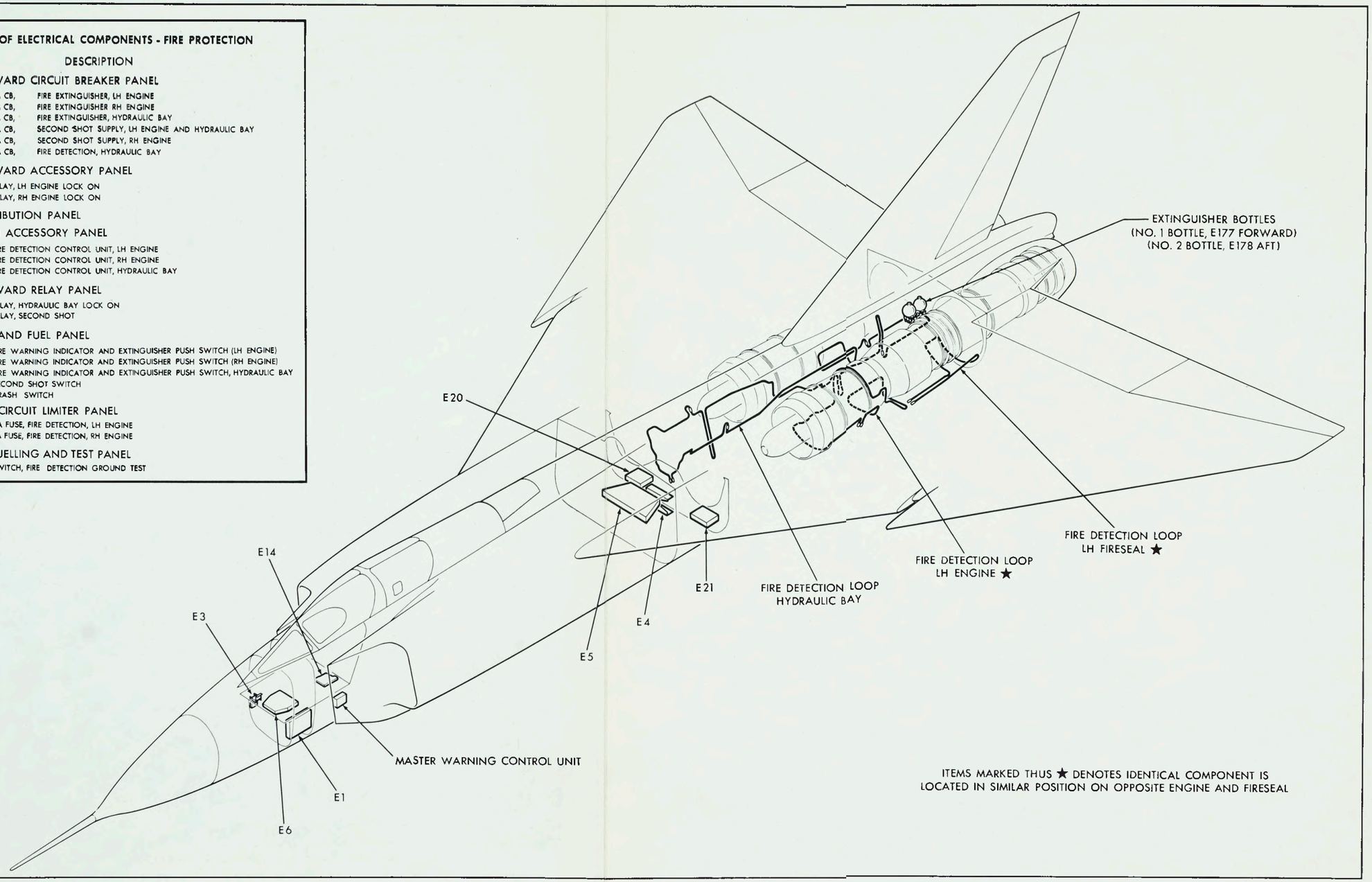

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FIG. 4 LOCATION OF ELECTRICAL COMPONENTS - FIRE PROTECTION

ARROW 1 SERVICE DATA

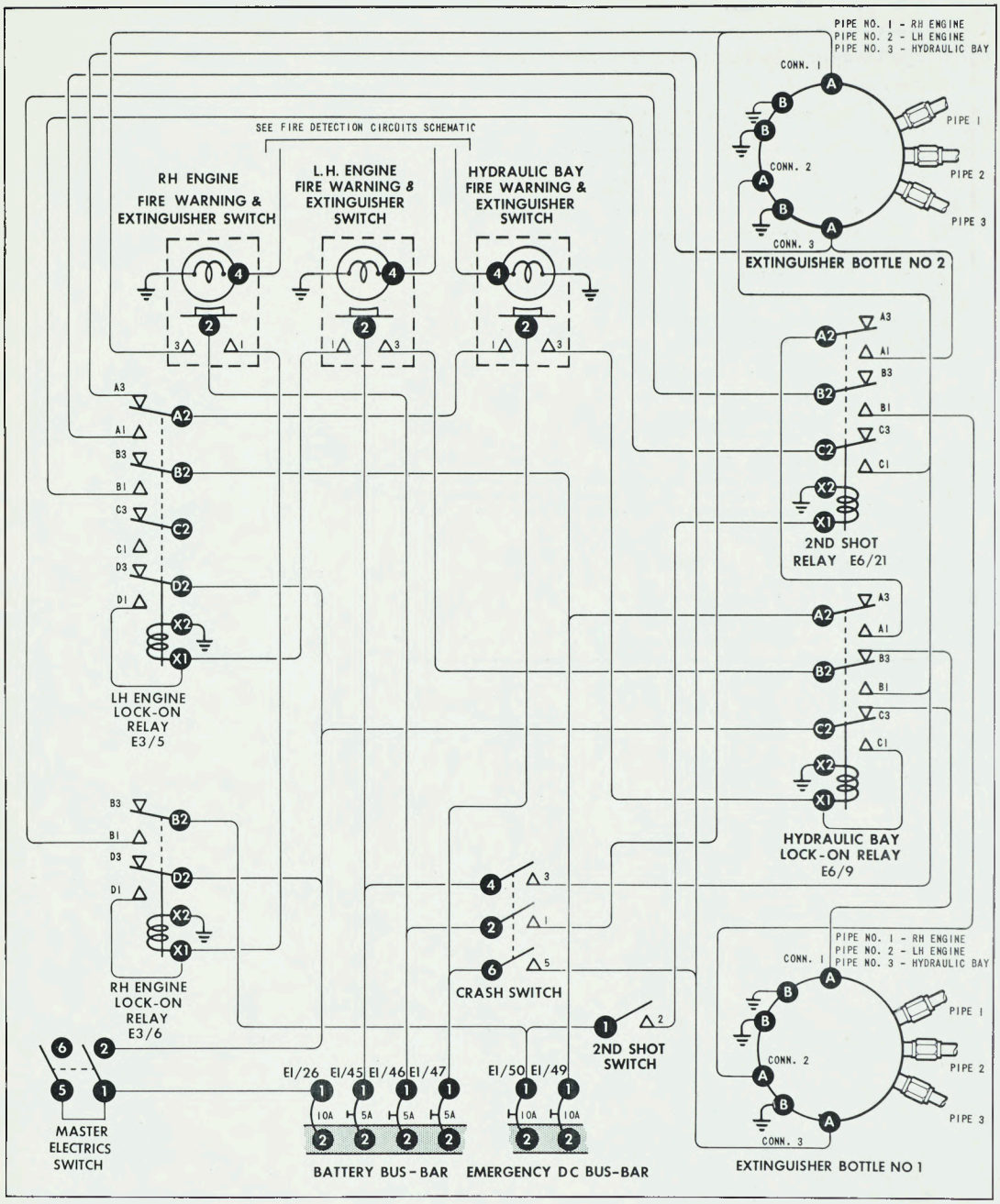

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FIG. 3 FIRE EXTINGUISHER ACTUATION CIRCUITS SCHEMATIC

18 The second shot circuits are identical in operation. Operating the SECOND SHOT switch will complete a supply circuit to the second shot relay. This relay, when energized, completes all three second shot circuits, but only one will be 'live' due to the operation of the first shot circuit. The LH engine and hydraulic bay second shot circuits, derive a supply from the emergency DC bus-bar via the L L/P COCK. FIRE CONT circuit breaker on panel E1. The RH engine second shot circuit derives its supply from the emergency DC bus-bar via the R L/P COCK. FIRE CONT circuit breaker on panel E1.

19 The pilot's CRASH-FIRE switch is parallel connected with the second shot circuit of the LH engine, the first shot circuit of the RH engine, and the first shot circuit of the hydraulic bay. When the switch is operated supply circuits are completed from the battery bus-bar to discharge both extinguishers. The second shot circuit of the LH engine and the first shot circuit of the RH engine discharge the same extinguisher into the LH and RH engine compartments. The first shot circuit of the hydraulic bay discharges the remaining extinguisher into the hydraulic bay.

FUNCTION TESTING

FIRE DETECTION CIRCUITS FUNCTION TEST

20 To check the serviceability of the fire detection system proceed as follows:

(a) Connect a source of DC power to the external DC supply receptacle and select the MASTER ELEC switch to the on position.

(b) Select and hold the FIRE DETECTION switch, located on the refuelling and test panel E21, to the TEST position. Note that the LH, HYD and RH fire warning lights, located on the LH console, and the red master warning lights, located on the main instrument panel, are illuminated. Release the FIRE DETECTION switch.

FIRE EXTINGUISHER ACTUATION CIRCUITS FUNCTION TEST

21 To check the continuity and operation of the fire extinguisher actuation circuits proceed as follows:

(a) Disconnect cables E1116/5, E1116/6 and E1116/7 from extinguisher bottle No. 1 and cables E1116/8, E1116/9 and E1116/10 from extinguisher bottle No. 2.

(b) Connect a test light between pins A and B of each of the above cable plugs.

(c) Depress the LH fire warning light and check that an indication of supply is obtained at the plug of cable E1116/5.

(d) Hold the SECOND SHOT switch to the 'on' position and check that an indication of supply is obtained at the plug of cable E1116/9.

(e) Release the SECOND SHOT switch and depress the HYD fire warning light. An indication of supply should be obtained at the plug of cable E1116/10.

(f) Momentarily, interrupt the lock-on relay supply circuit by selecting the MASTER ELECTRICS switch to OFF then ON. No indication should be obtained at the plugs.

(g) Depress the HYD fire warning light and check that an indication of supply is obtained at the plug of cable E1116/7.

(h) Hold the SECOND SHOT switch to the 'on' position and check that an indication of supply is obtained at the plug of cable E1116/10.

(j) Release the SECOND SHOT switch and depress the LH fire warning light. An indication of supply should be obtained at the plug of cable E1116/9.

(k) Repeat operation (f).

(m) Depress the RH fire warning light and check that an indication of supply is obtained at the plug of cable E1116/8.

(n) Hold the SECOND SHOT switch to the 'on' position and check that an indication of supply is obtained at the plug of cable E1116/6.

(p) Repeat operation (f).

(q) Actuate the pilots CRASH-FIRE switch and check that an indication of supply is obtained at the plug of cables E1116/8, E1116/9 and E1116/7.

(r) Prior to reconnecting the cables, check the solenoids of the extinguishers for continuity with an ohmmeter. Check that a resistance of approximately 40 ohms is indicated between pin A and pin B of the three receptacles on each extinguisher.

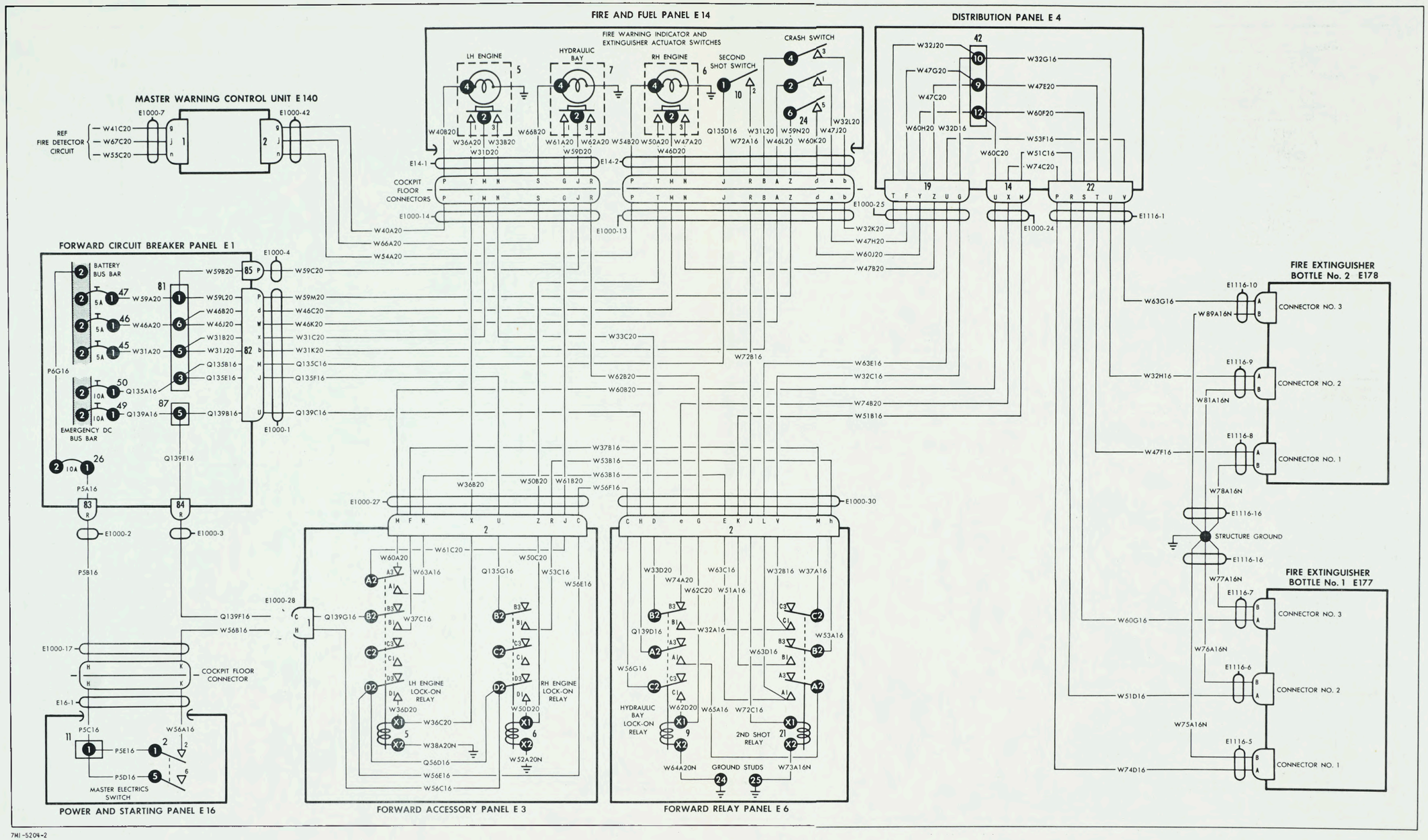

FIG. 5 FIRE EXTINGUISHER ACTUATION CIRCUITS

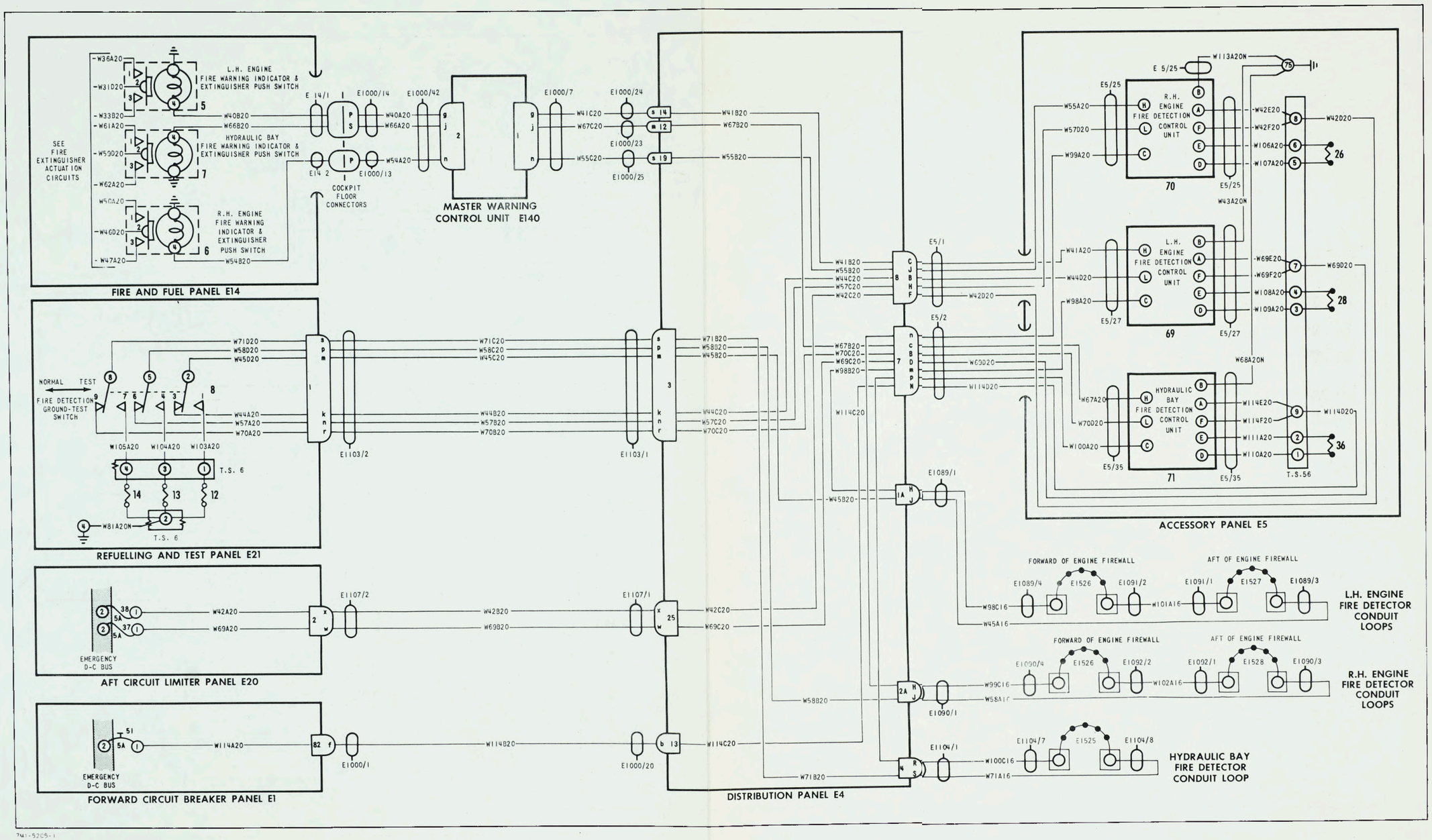

FIG. 6 FIRE DETECTION CIRCUITS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Fire Warning Light and Extinguisher Push Switches - 3	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-S-155			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 1500 hours

FUNCTION

To serve as a combined fire warning indicator and fire extinguisher actuation switch. One assembly for each of the three detection areas, viz. LH engine compartment, RH engine compartment and the Hydraulic Bay.

LOCATION

Front cockpit LH console, panel E14.

ACCESS — MEN X MINUTES

Unobstructed when panel E14 is removed from the LH console - four quick-fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure assembly to panel E14 using lock-washer and nut provided.
Solder circuit wires to lugs.
Refit panel in console - four quick-fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the indicator is securely mounted on the panel. Check that the circuit wires are securely and properly soldered. Depress the indicator light and check that the spring return action is positive.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Fire Detector Control Units - 3	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1154-18	Walter Kidde	P/N 871510	25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 350 hours

FUNCTION

To complete a supply circuit to the fire warning light when overheat conditions are detected. Three units are fitted which operate in conjunction with their corresponding LH engine compartment, RH engine compartment and Hydraulic Bay fire detection circuits.

LOCATION

Main Accessory Panel E5, located on bulkhead at station 485 in the Missile Bay.

ACCESS

MEN X MINUTES

Lower the missile pack and release E5 panel from its forward mounts by removing two pip pins.

REPLACEMENT PROCEDURE

MEN X MINUTES

Fit and secure unit to panel with four screws. Connect and secure circuit wiring to terminals. Raise and position panel, secure with the two pip pins.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is securely and properly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

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COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Fire Protection Loop (Portion forward of LH and RH engine firewall)	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1195-29 (3 off) 7-1195-27 (1 off)	Walter Kidde		25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 1500 hours

FUNCTION

To detect ambient temperatures in excess of 260°C (500°F) or localized heating in excess of 315°C (600°F).

LOCATION

Engine compartment forward of firewall (LH and RH)
Detector length 32 feet, assembled from four lengths.

ACCESS — MEN X MINUTES

When engine is removed, unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Connect and secure the electrical connectors at both ends of the length of conduit to the connectors of the adjacent lengths.
Fit and secure the length of conduit to the aircraft structure with the fixed securing clips.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the electrical connectors are securely and properly fitted throughout the length of the loop. Check that the loop is fitted securely, throughout its length, to the aircraft structure.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

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COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Fire Protection Loop (Portion aft of LH and RH engine firewall)	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1158-77 (1 off) 7-1158-71 (1 off)	Walter Kidde	805267	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 1500 hours

FUNCTION

To detect ambient temperatures in excess of 307°C (585°F) or localized heating in excess of 380°C (715°F).

LOCATION

Engine compartment aft of firewall (LH and RH)
Detector length 28 feet, assembled from 2 lengths.

ACCESS — MEN X MINUTES

When engine is removed, unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Connect and secure the electrical connectors at both ends of the length of conduit to the connectors of the adjacent lengths.
Fit and secure the length of conduit to the aircraft structure with the fixed securing clips.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the electrical connectors are securely and properly fitted throughout the length of the loop. Check that the loop is fitted securely, throughout its length, to the aircraft structure.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

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COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Fire Protection Loop (Hydraulic Bay)	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1150-5027 (8 off) 7-1150-5029 (1 off)	Walter Kidde		25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 1500 hours

FUNCTION

To detect ambient temperatures in excess of 232°C (450°F) or localized heating in excess of 288°C (550°F).

LOCATION

Hydraulic Bay.
Detector length 85 feet, assembled from nine lengths.

ACCESS — MEN X MINUTES

Hydraulic Bay access doors.

REPLACEMENT PROCEDURE — MEN X MINUTES

Connect and secure the electrical connectors at both ends of the length of conduit to the connector of the adjacent lengths.
Fit and secure the length of conduit to the aircraft structure with the fixed securing clips.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the electrical connectors are securely and properly fitted throughout the length of the conduit. Check that the loop is fitted securely, throughout its length, to the aircraft structure.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

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ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Fire Detector Test Switch	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
9CS-S-160			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 1500 hours

FUNCTION

To facilitate testing the core wire of the fire detector conduits for continuity.

LOCATION

Refuel and Ground Test panel E21, located forward of LH speed brake.

ACCESS

	MEN X MINUTES
Open hinged access panel, forward of LH speed brake. Remove panel E21 by releasing 11 camloc fasteners.	

REPLACEMENT PROCEDURE

	MEN X MINUTES
Fit and secure switch to panel using lock-washer and nut supplied. Connect and secure circuit wires to switch terminals. Refit panel - 11 camloc fasteners.	

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the switch is securely mounted. Operate the switch and check that the lever action is smooth and that the make and break is not sluggish.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Fire Protection Relays - Engine Lock-on, LH and RH	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS25024-1			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 1500 hours

FUNCTION

When energized, by depressing the corresponding LH engine or RH engine fire warning light, the relays complete a supply circuit in preparation for a second shot.

LOCATION

Panel E3, located on the RH wall of the nose wheel bay.

ACCESS — MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure relay in panel E3 using four mounting screws.
Connect and secure circuit wires to relay terminals.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the relay is securely mounted. Check that the circuit wiring is securely and properly connected to the relay terminals.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

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COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Hydraulic Bay Lock-on Relay	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS25024-1			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

When energized, by depressing the hydraulic bay fire warning light, the relay transfers the LH engine extinguisher actuation to the remaining extinguisher and completes a circuit in preparation for a second shot.

LOCATION

Panel E6, located on the roof of nose wheel bay.

ACCESS — MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure relay to panel using four mounting screws.
Connect and secure circuit wires to relay terminals.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the relay is securely mounted. Check that the circuit wiring is securely and properly connected to the relay terminals.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

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ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Second Shot Switch	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
	Cutler - Hammer	8811K15	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 1500 hours

FUNCTION

To complete the supply for the extinguisher actuation second shot circuits.

LOCATION

Front cockpit LH console, panel E14.

ACCESS

MEN X MINUTES

Unobstructed when panel E14 is removed from the console - seven quick-fasteners.

REPLACEMENT PROCEDURE

MEN X MINUTES

Fit and secure switch and guard to panel using lock-washer and nut supplied.
Connect and secure circuit wires to switch.
Fit and secure panel E14 in the console with seven quick-fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the switch and its guard are securely and properly fitted. Operate the switch and check that the lever action is smooth and that the make and break is not sluggish or rough.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

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COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	FIRE PROTECTION	Second Shot Relay	

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS25024-1			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 1500 hours

FUNCTION

When energized, by operating the second shot switch, completes the preparatory second shot actuation circuit set-up by the selected first shot actuation circuit.

LOCATION

Panel E6, located on the roof of nose wheel bay.

ACCESS — MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure relay on panel E6 using four mounting screws.
Connect and secure circuit wires to relay terminals.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the relay is securely mounted. Check that the circuit wiring is securely and properly fitted to the relay terminals.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

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ARROW 1 SERVICE DATA

SECTION 32

CANOPIES

(This data supersedes previous issue dated 17 Oct 57)

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ARROW 1 SERVICE DATA

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CANOPIES

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DESCRIPTION

GENERAL

1 The front and rear cockpits are enclosed by separate clamshell type canopies. Each canopy consists of two shells hinged to the front fuselage upper longerons.

2 Each canopy is normally opened and closed by an electrically actuated screw jack and is locked mechanically by the crew member when closed. Actuation can be selected by internal or external switches. In an emergency an explosive cartridge system in each cockpit operates the canopy opening linkage. The explosive cartridge is fired either by pulling the ejection seat firing handle or by pulling an emergency canopy opening lever. Both cartridges can be fired simultaneously from outside by pulling an emergency lanyard.

3 Pneumatic seals fitted round each half shell inflate to form a seal for cabin pressurization. A solenoid operated valve controlling the seals is energized when both canopies are locked, and is de-energized when either one of the two canopies is unlocked.

CANOPIES (Fig 1)

4 Both canopies are of similar construction, each half shell consisting of a light alloy frame covered by an inner and an outer skin with insulating material between the two skins. A clear vision panel is incorporated in the forward end of each half shell. The front panels are of larger area than the rear panels and are electrically heated for de-icing purposes. Each canopy half shell is attached to a piano type hinge which in turn is secured to the upper longerons of the front fuselage. Locking latch pins on the left half shells mate with locking latches on the right half shells to lock the canopies.

5 Each canopy is opened and closed independently from inside the cockpit by selection of an OPEN-OFF-CLOSE toggle switch located on the left-hand console. For external control two OPEN-OFF-CLOSE toggle switches are mounted under a latched door in the left side of the arch dividing the two cockpits. Interlocking relays prevent the external switches from operating in opposition to the internal switches. A micro-switch operated by the latch locking handle prevents power being fed to the screw jack before the canopy is unlocked.

6 Each clear vision panel in the front canopy consists of three layers of optically corrected glass. The inner face of the outer layer is coated with a conducting film which is electrically heated. A sensing element mounted between the layers maintains the temperature of the panel at 43°C (110°F). Power is supplied to the panels when the master electrical switch is ON.

7 Air pressure for the canopy seals is supplied by the aircraft low pressure pneumatic system and is controlled by a solenoid operated control valve. The final forward movement of the latch locking handle actuates a micro-switch located on an index plate. When both canopies are locked and both micro-switches actuated, the solenoid operated valve is energized and the seals inflated. When one canopy is unlocked, the solenoid operated valve is de-energized which deflates the seals by venting them to atmosphere. Power for operating the solenoid operated valve is available only when the master electrical switch is ON.

8 The locking handle can be selected and locked in the following two positions, as shown on fig 2:

(a) Handle fully back. In this position the canopy is unlocked and the OPEN-OFF-CLOSE switches are energized.

(b) Handle fully forward. In this position the canopy is locked, the seals inflated, and the locking handle disconnected from the latch linkage in readiness for emergency opening if necessary.

LOCKING MECHANISM (Figs 2 and 3)

9 The pilot's canopy has five trunnion type latch pins on the upper edge of the left-hand half shell and five matching latches on the

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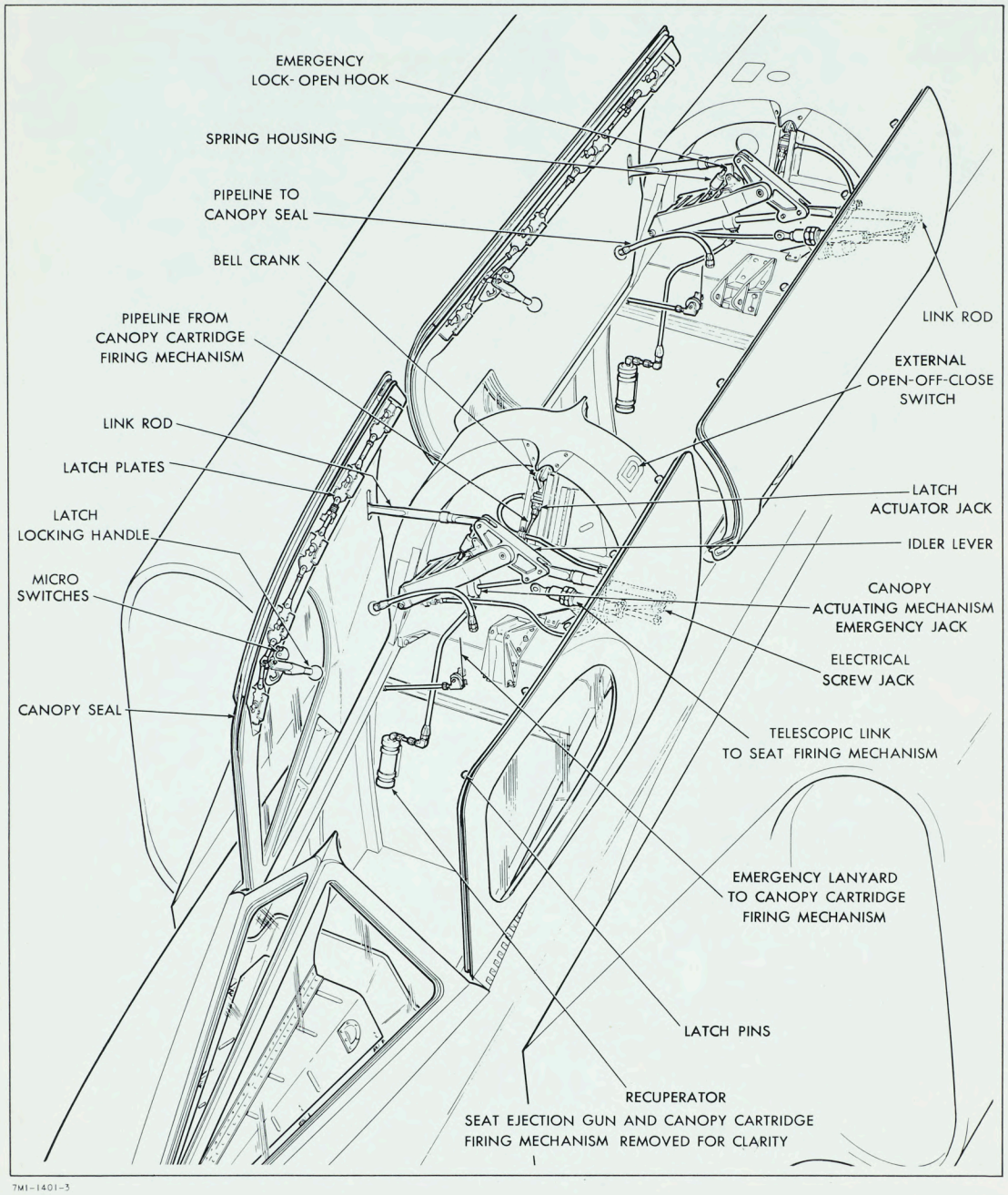

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FIG. 1 FRONT AND REAR CANOPIES

right-hand half shell. The navigator's canopy has four latch pins and four latches. The latches consist of latch plates sliding in latch plate guides and interconnected by adjustable connecting rods. Each plate has a keyhole slot, the hole being of sufficient size to permit passage of the head of the latch pin, and the slot being a clearance fit on the shank of the pin. A coil spring fitted over the centre connecting rod of the pilot's canopy and the aft connecting rod of the navigator's canopy moves the latches to the locked position when the locking handle is released from the unlocked position.

10 The forward connecting rod consists of two short rods attached to the upper end of a latch lever. The latch lever pivots on an index plate and is forked at its lower end. This fork engages a spring-loaded plunger in the locking handle. The plunger rides in a contoured slot in the index plate and engages with locking recesses at the front and rear of the slot. The two recesses locate the locking handle in the locked or the unlocked position. Pulling the knob at the end of the locking handle disengages the plunger from the recesses. Due to the shape of the contoured slot the last half of the forward movement of the locking handle disengages the plunger from the fork end of the latch lever. The locking handle is then disconnected from the latch linkage and the latches are held in the locked position by the coil spring. This leaves the linkage disengaged from the locking handle and the latches are free to be unlocked by the emergency system.

NORMAL OPERATION (Figs 2 and 6)

11 The canopy is unlocked by pulling the knob on the latch locking handle and moving the handle rearwards. This movement performs the following functions:

(a) The first part of the handle movement actuates the canopy seal micro-switch and de-energizes the solenoid operated control valve, deflating the seals. It also engages the handle with the latch lever.

(b) The last part of the handle movement unlocks the latches then actuates another micro-switch which supplies power to the OPEN-OFF-CLOSE switches.

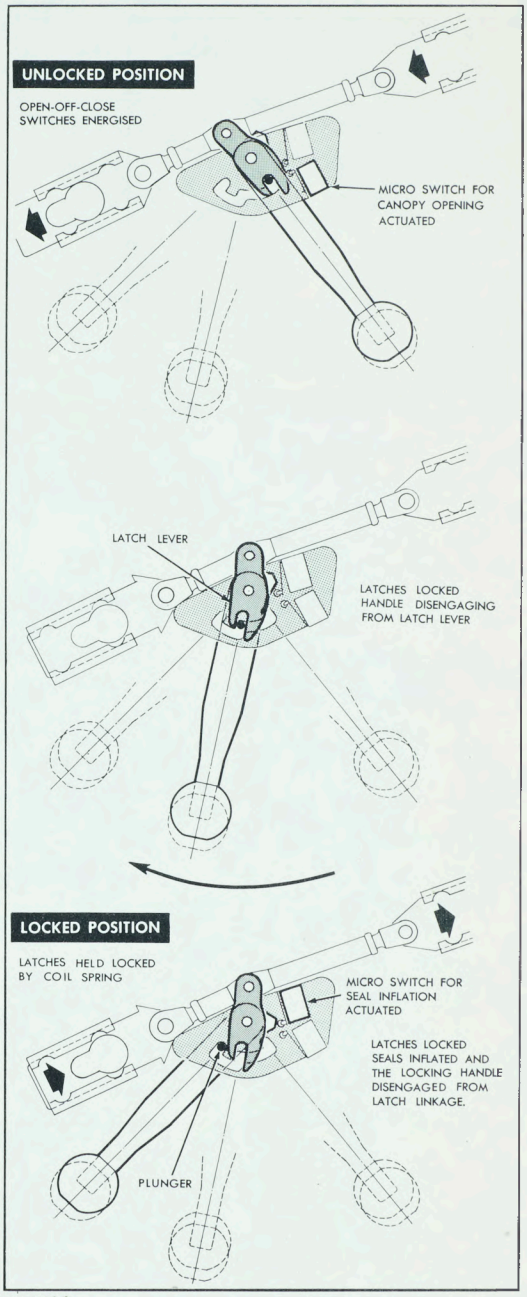

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FIG. 2 LOCKING HANDLE POSITIONS

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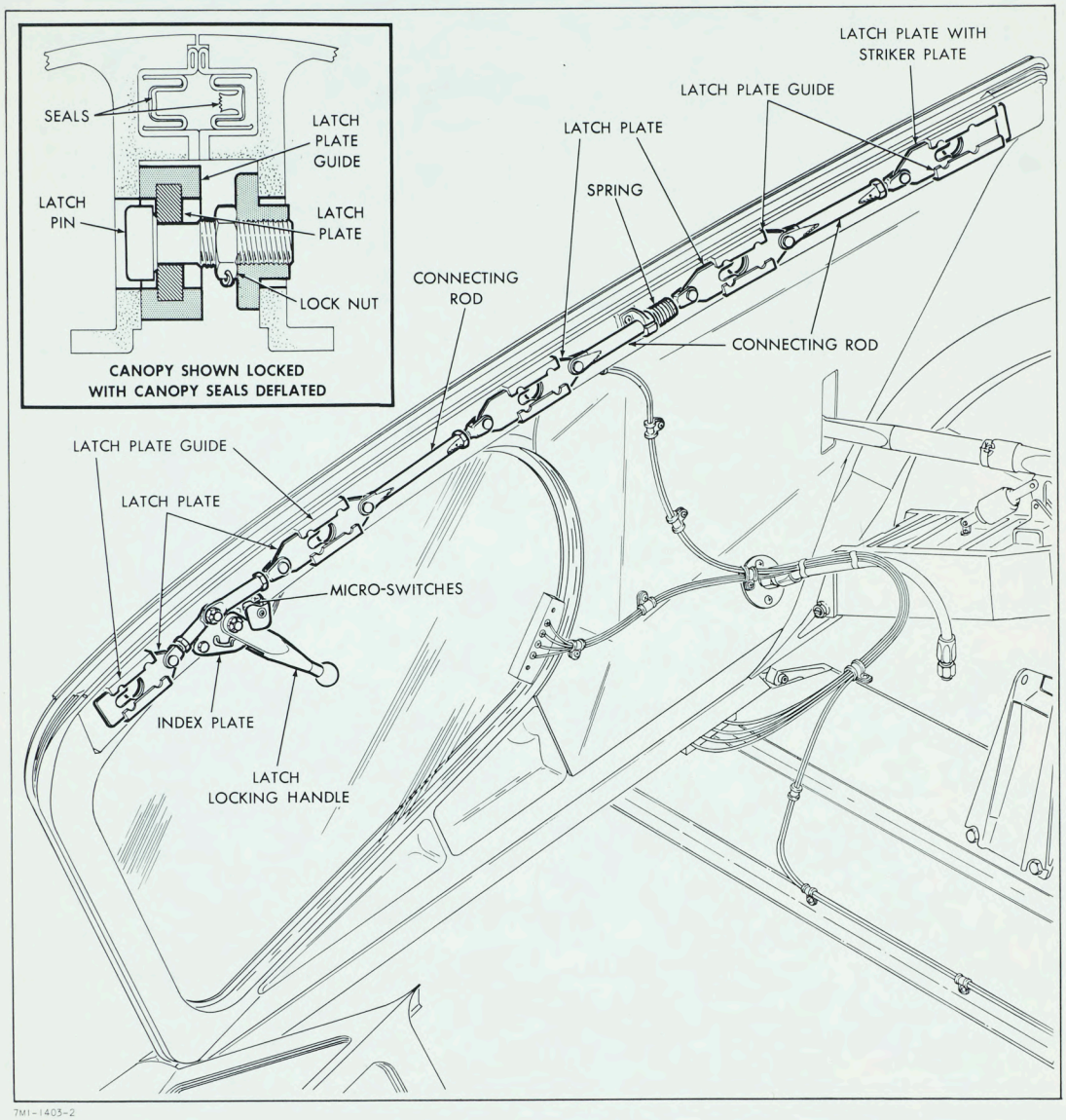

FIG. 3 CANOPY LATCH MECHANISM

12 Selection of the internal or external OPEN-OFF-CLOSE switches to OPEN operates the electrical screw jack which extends and opens the two half shells through an idler and link rods.

13 The canopy is closed by selecting either the internal or external switches to CLOSE, causing the electrical screw jack to retract and close the canopy. When the canopy is fully closed and the latches are engaged, it is locked

by pulling out the locking handle and pushing it to the forward position. This movement performs the following functions:

(a) Actuates a micro-switch which isolates the OPEN-OFF-CLOSE switch.

(b) Moves the latch plates rearwards and locks the canopy latches.

(c) Actuates a micro-switch which energizes the canopy seal control valve and inflates the canopy seals.

(d) Disconnects the locking handle from the latch lever.

EMERGENCY SYSTEM (Fig 4)

14 In an emergency, each canopy is individually opened by gas pressure which is generated when a cartridge, located on the rear upper section of the ejection gun, is fired. The gas pressure is sequenced to unlock the canopy latches and then actuate a piston rod which opens the canopy.

15 The emergency canopy opening system is fired by any one of the following methods:

(a) A crew member operates either the face blind handle or the alternative firing handle of his ejection seat. This method opens the crew member's canopy and fires his seat automatically.

(b) A crew member operates a yellow and black striped emergency lever located forward of and above his right knee. This opens the individual canopy only.

(c) After a crash landing, a lanyard stowed behind a latched door located on the right hand side of the fuselage forward of the engine air intake is pulled from outside the aircraft. This method opens both front and rear canopies. The lanyard is out of reach to persons on the ground when the landing gear is down.

WARNING

Ground personnel should stand clear of the aircraft during this operation.

16 The emergency canopy opening system comprises the following components: a Martin Baker cartridge firing mechanism and explosive cartridge; a latch actuation jack and bellcrank lever; a canopy actuating mechanism emergency jack; a spring-loaded hook; an oil filled recuperator. Any of the methods described in para 15 withdraws a wedge shaped sear from a spring-loaded firing pin in the firing mechanism and fires the cartridge. The gas generated by the explosion is piped to the base of the latch actuator jack, forcing the striker rod upwards. See fig 4. The striker rod strikes the lower arm of the bellcrank lever, causing it to rotate. The upper arm of the bellcrank lever strikes the rear face of the rearmost latch plate, forcing all the latch plates forward to the unlocked position. The canopy locking handle remains in the fully forward position during this movement.

17 Full travel of the latch actuator jack striker rod upwards uncovers internal ports and allows the gas to pass through flexible pipes to the actuating mechanism emergency jack. This jack is pivoted on a spindle attached to the cockpit rear bulkhead, and the jack piston is connected to the idler lever, rotating it and forcing the link rods outwards, opening both half shells. The initial movement of the left hand shell shears a separation device in the electrically operated screw jack, disconnecting it from the half shell.

18 In the emergency open position the canopy is opened approximately 14° more than in the normal open position. This permits a spring-loaded hook, mounted on the idler lever support, to engage behind a bushing on the idler lever and lock the canopy in the emergency open position. See fig 6.

19 When the canopy is opened in an emergency by pulling the ejection seat firing handle, a sear is also withdrawn from the seat ejection gun firing pin. At this stage, the firing pin is prevented from operating by a release rod passing through it. The release rod is connected to a spring-loaded yoke hinged on the side of the seat structure. A telescopic link joins the yoke to the left half shell of the canopy. During normal operation the telescopic link extends and retracts without withdrawing the release rod from the ejection gun firing pin.

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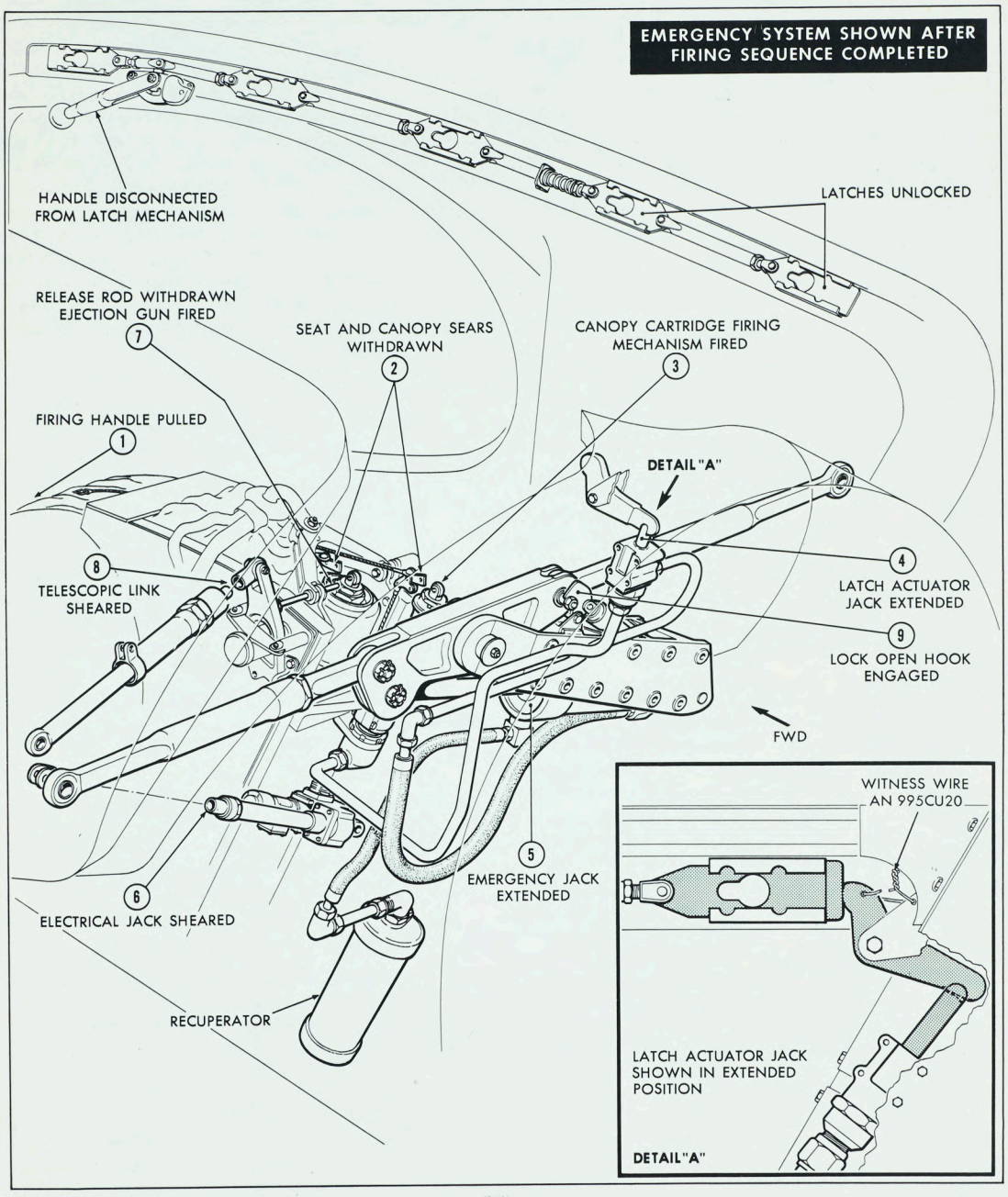

FIG. 4 CANOPY EMERGENCY MECHANISM

The additional angle of opening of the canopy in emergency operation causes the link to reach the end of its free travel and pull the yoke outwards, withdrawing the release rod. The firing pin is then free to descend and fire the ejection gun at approximately 40° of canopy opening. The additional movement to fully open (45°) severs a shear pin in the link when the seat starts to move upwards.

20 The exhaust side of the emergency jack is oil filled and is connected through a restrictor to a recuperator mounted on the right side of the cockpit bulkhead near the floor. During normal canopy operation, the piston of the emergency jack extends and retracts freely with the idler arm, but in the faster emergency operation the passage of the oil through the restrictor and into the recuperator provides a damping effect.

EMERGENCY CABLE SYSTEM (Fig 5)

21 The emergency cables run from the sear actuating levers, on the front and rear canopy cartridge firing mechanisms, to their respective emergency canopy opening levers. The cables are also connected to the outside emergency lanyard. Each cable operates through a stepped pulley on the crew member's bulkhead to increase the cable travel at the sear actuating levers. Bowden cable adjusters are provided below each canopy cartridge firing mechanism, and an adjustment is provided at the cable connector aft of the front cockpit emergency lever arm.

22 Pulling the rear cockpit emergency lever to the rear causes the outboard end of the lever arm to move forward, carrying with it the ball terminal against its front face, pulling the cables and withdrawing the sear. The cable slackens between the front and rear cockpit levers and does not effect the front cockpit emergency system.

23 Pulling the front cockpit emergency lever to the rear causes the outboard end of the lever arm to move forward pulling on the cable anchored to it and withdrawing the sear. During this movement a slot in the lever arm passes over the rear cockpit cable without pulling the cable.

24 When the outside emergency lanyard is pulled, a stop on the rear cockpit cable bears on the aft face of the front cockpit lever arm, moving it forward. This pulls on the front cockpit operating cable and withdraws the sear. At the same time the cable is pulled through the hole in the rear cockpit lever and withdraws the rear cockpit sear. During this operation only the front cockpit lever arm moves forward, the emergency lever remaining in the forward position. The rear cockpit lever also remains in the forward position. This ensures that operation of the external lanyard is not impeded by the witness wiring on the emergency levers.

TESTING AND SERVICING

GENERAL

25 The procedures for testing and servicing both front and rear canopies are similar. The front canopy is described in this section and any special instructions for the rear canopy are noted.

WARNING

Prior to working on the canopies the ejection seats must be disarmed. The canopy cartridge firing mechanisms should also be disarmed except in the circumstances noted below.

NOTE

In the event of an electrical power failure or malfunction of the electrical actuator, the canopy cannot be opened from either inside or outside of the aircraft except by the emergency operation. For this reason the canopy cartridge firing mechanism should be armed if personnel are required to be in the cockpit when the canopy is closed by the actuator.

26 Procedures for arming and disarming the ejection seats and canopy cartridge firing mechanisms are detailed in Arrow 1 Service Data - Section 31.

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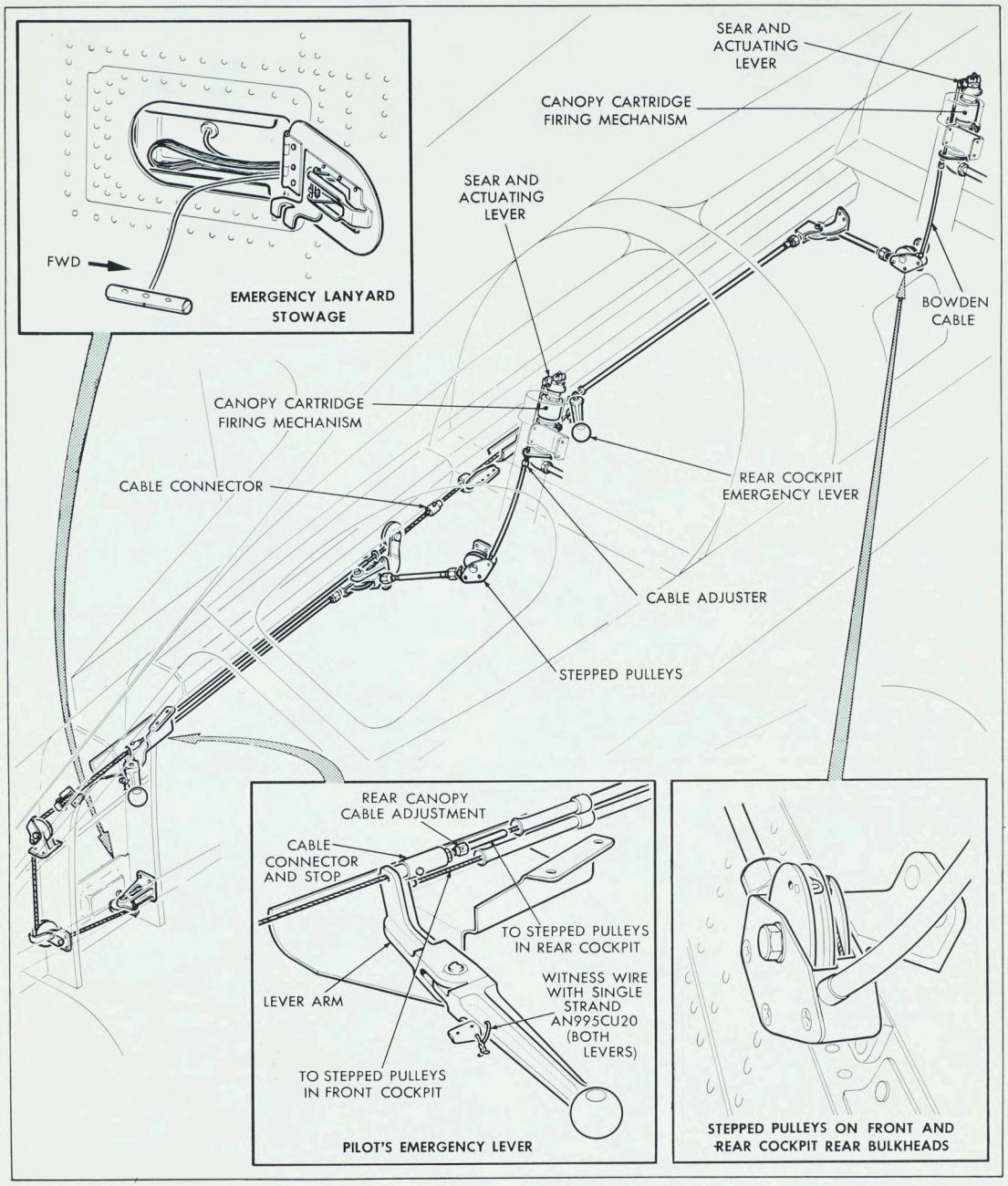

FIG. 5 EMERGENCY CABLE SYSTEM

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ADJUSTING THE LATCH LINKAGE

27 To adjust the latch linkage, proceed as follows:

(a) Place the latch locking handle in the fully back position.

(b) Starting with the front latch plate, adjust each connecting rod so that the latch plate stops are hard up against the latch plate guide. See fig 8. When adjusting the connecting rod on which the spring is mounted, do not detach the rod end from the rod, as this releases the spring.

(c) After the mechanism has been adjusted, ensure that all connecting rods are in safety and tighten the locknuts.

ADJUSTING THE LATCH PINS (Fig 7)

28 To adjust the latch pins, proceed as follows:

(a) Disconnect the electrically actuated screw jack.

(b) Place the locking handle in the fully back position and close both half shells by hand.

(c) Check that the gap between the two half shells, along the top of the canopy, is central about the aircraft centre line.

(d) Place the locking handle in the fully forward position, ensuring that each latch pin is through the hole in the corresponding latch plate.

(e) Adjust each latch pin until the face on the underside of the head bears against the outboard side of the latch plate.

(f) Slacken each latch pin one quarter turn.

(g) Tighten the locknut.

(h) Open the canopy and reconnect the electrically operated screw jack.

(j) Wirelock each latch pin locknut to the bolt head on the latch pin housing.

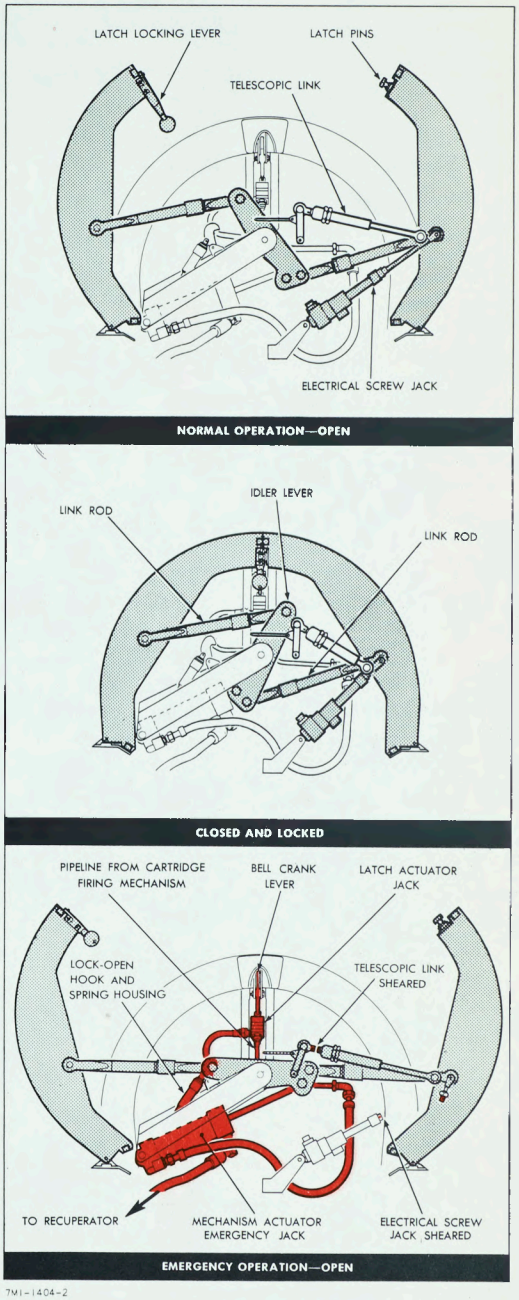

FIG. 6 CANOPY OPERATION

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(k) Close the canopy and check that the latch mechanism operates smoothly.

(m) Adjust the electrically operated screw jack if necessary.

ADJUSTING THE ELECTRICALLY ACTUATED SCREW JACK AND LINK RODS

29 To adjust the electrically actuated screw jack and link rod on the LH half shell, proceed as follows:

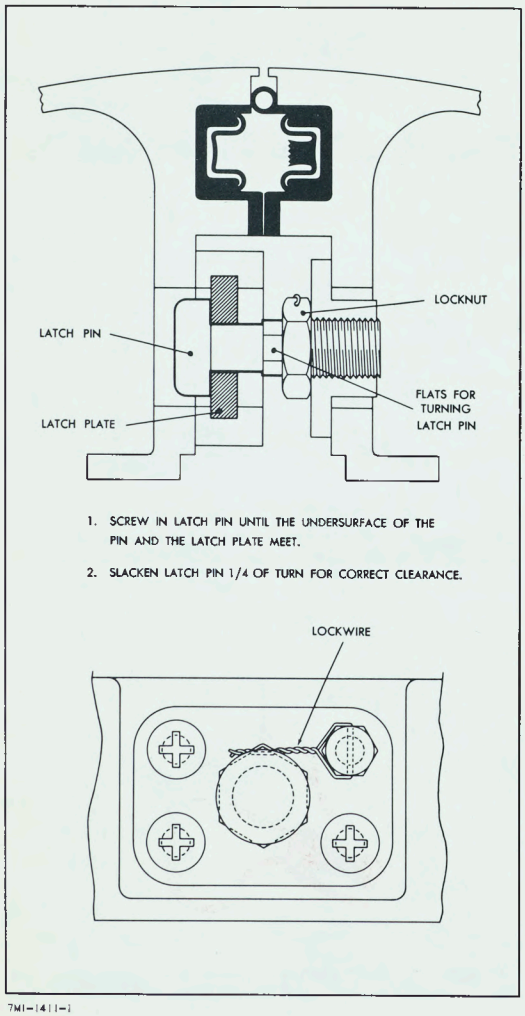

FIG. 7 LATCH PIN ADJUSTMENT

(a) Connect the external DC power supply.

(b) Disconnect the electrically operated screw jack from the half shell and operate either the internal or external OPEN-OFF-CLOSE switch to CLOSE and support the electrically operated screw jack as it retracts. See fig 10.

(c) With the jack fully retracted, disconnect the electrical connector from the receptacle on the jack.

(d) Slacken the locknut on the eye end of the jack and remove the jack from its bracket on the rear bulkhead.

(e) Remove the LH link rod from the idler lever.

(f) Connect the eye-end of the electrically actuated screw jack and the barrel end of the link rod to the LH half shell, using the special pip-pin.

(g) Close and lock both half shells.

(h) Adjust the electrically actuated screw jack, by turning the body of the jack, until the bushing is aligned with the hole in the bracket on the bulkhead.

(j) Secure the bushing to the bracket with the bolt, nut and cotter pin.

(k) Tighten the locknut on the eye-end.

(m) Push the emergency jack piston fully home, and adjust the link rod until the bushing lines up with the holes in the idler lever.

(n) Insert the bolt and secure with a nut and cotter pin.

(p) Tighten the locknut and wirelock in place.

(q) Connect the electrical connector to the receptacle on the jack and wirelock.

30 To adjust the RH link rod, proceed as follows:

(a) Open the RH half shell.

(b) Disconnect the RH link rod from the idler lever.

(c) Attach the barrel end of the link rod to the half shell, using the special pip-pin.

(d) Close and lock the canopy.

(e) Adjust the link rod until the bushing lines up with the holes in the idler lever.

(f) Insert the bolt and secure with a spacer, nut and cotter pin. The spacer is assembled to the rear of the idler lever.

(g) Tighten the link rod locknut and wire-lock in place.

(h) Function the canopy through several cycles to ensure smooth operation.

FILLING THE RECUPERATOR

31 To fill the recuperator it is necessary to remove the emergency jack, pipeline and recuperator from the cockpit. See para 52.

32 To fill the recuperator proceed as follows:

(a) Assemble the flexible pipeline to the recuperator and support the assembly over a suitable receptacle, so that the pipeline extends vertically above the recuperator.

(b) Fill the pipeline with oil MIL-O-5606.

(c) Hold the emergency jack so that the union at the piston end is uppermost and fill with oil MIL-O-5606 with the piston fully retracted.

(d) Connect the filled pipeline to the emergency jack, losing as little oil as possible.

(e) Install the three components as an assembly, see para 53.

(f) After installing the components, disconnect the electrically actuated screw jack and push the canopy to the emergency open position until the hold-open hook engages. If any difficulty is experienced in obtaining the fully open position, bleed off some oil at the bleed point at the top of the recuperator until the hook engages.

RIGGING THE EMERGENCY CABLES (Fig 5)

33 Before commencing adjustment of the canopy emergency firing cables, ensure that the cartridges have been removed from the canopy cartridge firing mechanisms in both cockpits. See Arrow 1 Service Data - Section 31.

(a) To rig the front canopy emergency cable proceed as follows:

(1) Pull up the front canopy emergency cable below the cartridge firing mechanism to take out all slack and to ensure that the front canopy emergency opening lever is pulled to its forward position.

(2) Adjust on the Bowden cable adjuster until the clevis pin can be inserted through the cable eye end and the hole in the actuating lever with no slack in the cable.

(3) Tighten the lock nut on the Bowden cable adjuster.

(4) Secure and lock the clevis pin with a washer and a cotter pin.

(b) To rig the emergency lanyard cable proceed as follows:

(1) Pull the lanyard end of the cable outboard through the grommet in the emergency lanyard cable stowage, until the cable connector and stop bears against the aft face of the front canopy emergency opening lever arm. During this operation the front canopy emergency opening lever arm must remain in the aft position, see detail of pilot's emergency lever, fig 5.

(2) Coil the spare cable carefully in the external stowage.

(3) Place the emergency lanyard handle under the bracket on the external stowage door and close the door.

(c) To rig the rear canopy emergency cable proceed as follows:

(1) Push the rear canopy emergency opening lever to the forward position.

(2) With light tension applied to the cable at the cartridge firing mechanism, adjust the cable adjuster on the upper cable situated aft of the front canopy emergency opening lever arm (see detail of pilot's emergency lever, fig 5), until the ball terminal on the cable bears against the forward face of the rear canopy emergency opening lever. Tighten the cable adjuster lock nut.

(3) Take out any slack in the cable between the rear canopy emergency opening lever and the cartridge firing mechanism by adjusting on the Bowden cable adjuster below the cartridge firing mechanism until the clevis pin can be inserted through the cable eye end and the hole in the actuating lever.

(4) Tighten the cable adjuster lock nut.

(5) Secure and lock the clevis pin with a washer and a cotter pin.

(d) To complete the rigging, witness wire both canopy emergency opening levers to their respective brackets, using a single strand of locking wire AN995CU20.

REMOVAL AND INSTALLATION

GENERAL

34 The procedures for removal and installation of both front and rear canopies are similar. In this section the removal and installation of the front canopy components are described and any special instructions for the rear canopy are noted.

REMOVING THE LATCH MECHANISM (Fig 8)

35 Removal of the latch mechanism is carried out in the following sequence:

(a) Removing the latch plates.

(b) Removing the latch locking handle and index plate assembly.

(c) Removing the latch plate guides.

36 The procedure is the same for both front and rear canopies except that the rear canopy has only four latches. The latches are numbered from front to rear in both cases.

37 To remove the latch plates proceed as follows:

(a) Place the latch locking handle in the fully forward position.

(b) Remove the cotter pin and clevis pin securing the fifth latch plate to the connecting rod and slide the latch plate rearwards out of its guide.

(c) Remove the cotter pin and clevis pin from the forward end of the connecting rod and remove the connecting rod.

(d) Repeat the procedure for the fourth, third and second latch plates. Remove the roll-pin stop from the second latch plate before removing the latch plate.

(e) Remove the first latch plate with the latch plate guide. See para 39.

38 To remove the latch locking handle, index plate and forward connecting rods, proceed as follows:

(a) Remove the cotter pin securing the nut to the latch locking handle pivot. Remove the nut.

(b) Remove the countersunk screw securing the aft end of the index plate to the canopy. Retain the spacer.

(c) Remove the screw securing the switch cover to the index plate and remove the switch cover.

(d) Remove the screws securing the micro-switches to the index plate and remove the micro-switches. Leave the micro-switches attached to their leads.

(e) Remove the bolt securing the forward end of the index plate.

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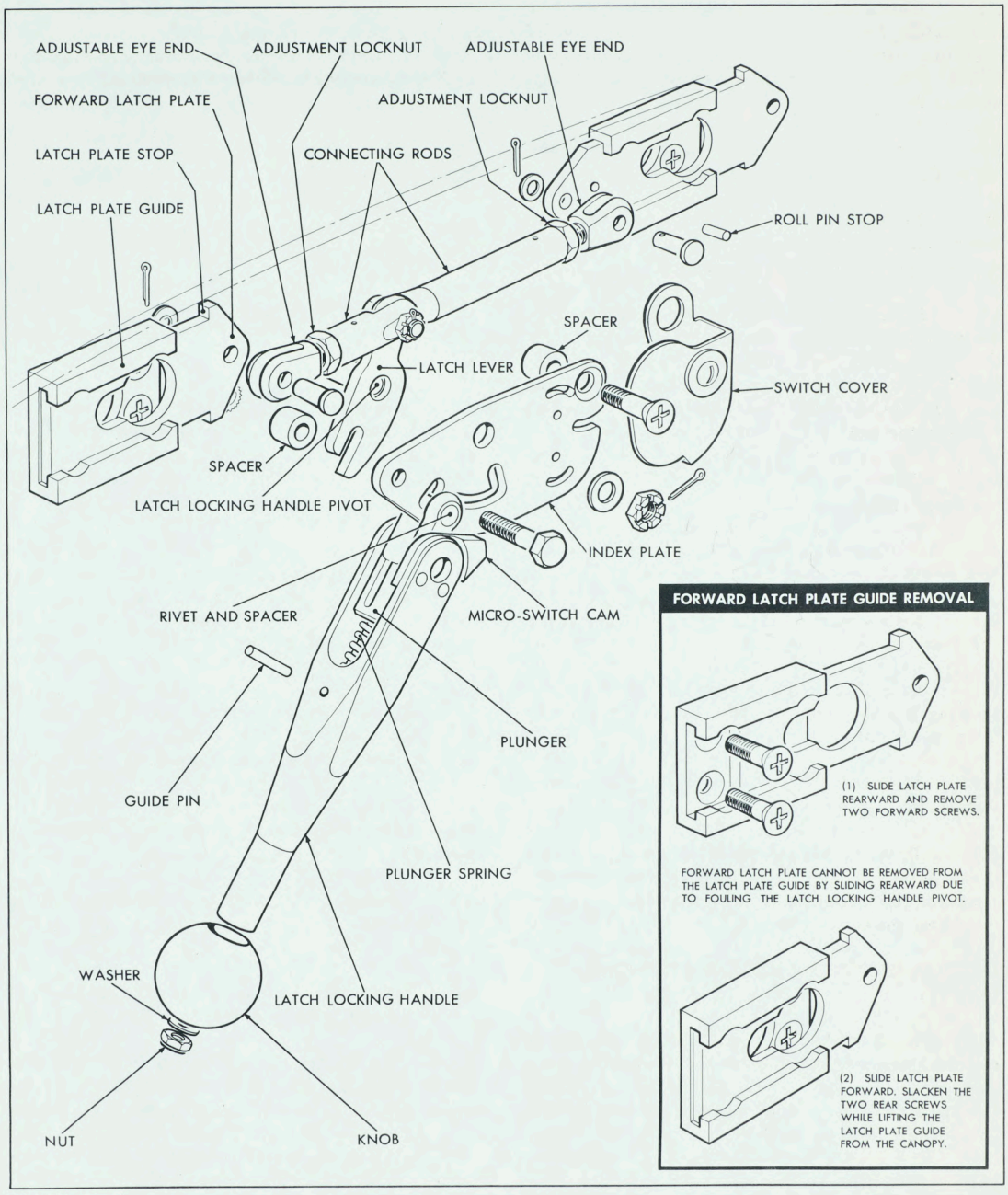

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FIG. 8 LATCH MECHANISM INSTALLATION

(f) Remove the index plate together with the latch locking handle. The latch lever together with the two forward connecting rods will separate from the locking handle assembly. See fig 8.

39 To remove the latch plate guides (see inset fig 8) proceed as follows:

(a) Remove four countersunk screws from the second, third, fourth and fifth latch plate guides and remove the guides.

(b) Slide the first latch plate aft and remove the two forward countersunk screws.

(c) Slide the latch plate forward until the two aft countersunk screws can be reached through the hole in the latch plate.

(d) Remove the two screws while lifting the latch plate guide.

40 To dismantle the latch-locking handle and index plate assembly, proceed as follows:

(a) Remove the self-locking nut securing the knob to the plunger.

(b) Drive out the guide pin from the latch locking handle. This will release the plunger from the handle.

(c) Withdraw the plunger from the handle. Retain the spring.

(d) Drill out the countersunk rivet securing the spacer in the fork end of the plunger. Remove the spacer. The index plate can now be removed from the plunger.

INSTALLING THE LATCH MECHANISM (Fig 8)

41 The sequence of installing the latch mechanism is the reverse of that given for removal. See para 35. Prior to installing the locking handle the index plate and handle are assembled as follows:

(a) Position the spacer in the cam slot in the index plate and attach it in the fork end of the plunger using a rivet, AN427-6-10.

(b) Install the spring on the shaft of the plunger and insert the plunger into the latch locking handle so that the micro-switch cam on the latch locking handle is towards the rear of the index plate.

(c) Push the plunger into the latch locking handle until the hole in the latch locking handle aligns with the slot in the plunger.

(d) Insert the guide pin and stake it in position.

(e) Install the knob on the threaded end of the plunger and secure with a self-locking nut.

42 The installation procedure for the latch plate guides is the reverse of that given for removal in para 37. A coat of barium chromate jointing compound, D.T.D. 369A is to be applied to the canopy mounting pad before installing the latch plate guide.

43 The installation procedure for the latch plates is the reverse of that given for removal in para 37. The following points should be noted:

(a) Install all clevis pins with the head inboard, and secure with cotter pins.

(b) A roll pin stop is installed in the second latch plate.

(c) For adjustment of the latch linkage see para 27.

44 To install the latch locking handle, index plate and forward connecting rods, proceed as follows:

(a) Assemble the two forward connecting rods and the latch lever as shown in fig 8.

(b) Insert the latch lever between the fork ends of the latch locking handle with the latch lever on the outboard side of the index plate.

(c) Align the pivot hole in the latch lever, index plate and latch locking handle and install the assembly on the latch locking handle pivot. Secure with a nut and cotter pin.

(d) Install the bolt and spacer securing the forward end of the index plate.

(e) Install the countersunk screw and spacer securing the rear end of the index plate. The switch cover should be installed on the spacer at this stage.

(f) Operate the latch locking handle throughout its range and check for correct operation.

(g) Install the two micro-switches and adjust as described in Arrow 1 Service Data - Section 33.

LATCH PINS AND HOUSINGS (Fig 7)

45 To remove the latch pins and latch pin housings, proceed as follows:

(a) At each latch pin, break and remove the locking wire.

(b) Slacken the locknut and remove the latch pin.

(c) Remove the three countersunk screws and one bolt securing each latch pin housing. In each case, except for the second latch pin housing in the front cockpit, the screws and bolt screw into Rosan inserts. In the case of the second latch pin housing of the front canopy the screws and bolt are secured by self-locking nuts.

46 The procedure for installing the latch pins and housings is the reverse of that given for removal in para 45. The following points should be noted:

(a) Apply barium chromate jointing compound, D.T.D. 369A to each latch pin housing pad on the canopy before assembly, and assemble while wet.

(b) At the second latch pin housing in the front cockpit install the nuts and washers with wet barium chromate, D.T.D. 369A.

(c) Do not lockwire the locknuts until the latch pins have been adjusted.

(d) For adjustment of latch pins see para 28.

CANOPY HALF SHELLS

47 Each canopy half shell weighs approximately 120 lbs and suitable arrangements for lifting should be provided. To remove the canopy half shells, proceed as follows:

(a) With the canopy open, isolate the aircraft battery and disconnect the external power supplies.

(b) Disconnect the electrical leads from the micro-switches on the RH half shell at terminal strip E32. (E43 in the rear cockpit).

(c) Disconnect the de-icing element and sensing unit leads from the terminal strip on each clear vision panel. (Front cockpit only).

(d) Disconnect the pneumatic seal flexible hoses.

(e) Remove the inside row of attachment bolts on the RH half shell.

(f) Support the RH half shell and remove the pip-pin to disconnect the link rod.

(g) Close the half shell and remove the outside row of attachment bolts.

(h) Remove the half shell.

(j) Repeat the operations in (e), (f), (g) and (h) for the LH half shell. The electrically operated screw jack is attached by the same pip-pin as the link rod.

(k) Separate the hinge by withdrawing the hinge pin.

(m) Remove the upper part of the hinge by removing the countersunk screws.

48 The procedure for installing the half shells is the reverse of that given for removal in para 47. The following points should be noted:

(a) Wet barium chromate primer D.T.D. 369A must be applied to the canopy half shell before installing the upper hinge.

(b) A coat of thinned EC 1291 sealing compound must be applied between the lower hinge and the upper surface of the cockpit edge before installation.

(c) The attachment bolts and washers must be assembled with wet barium chromate primer, D.T.D. 369A.

(d) The latch mechanism and latch pins must be adjusted as in paras 27 - 28.

(e) The electrically operated screw jack must be adjusted as in paras 29 - 30.

(f) After assembly and adjustment, a cabin pressurization test must be carried out. See Arrow 1 Service Data - Section 17.

EMERGENCY MECHANISM (Figs 9 and 10)

49 If the canopy is opened in an emergency by the cartridge operated system, all components affected by the explosion must be removed and exchanged for new parts. The parts affected are: the emergency jack, the latch actuator jack, the canopy cartridge firing mechanism and three pipelines.

50 To remove the latch actuator jack and pipelines, proceed as follows:

(a) Remove the pipeline connecting the latch actuator jack to the canopy cartridge firing mechanism and the pipeline connecting the latch actuator jack to the union on the bulkhead. See fig 4.

(b) Remove three nuts and bolts securing the doubler to the bracket. Remove the doubler.

(c) Remove the four self-locking nuts and the four bolts securing the latch actuator jack to the bracket and remove the latch actuator jack.

51 The procedure for replacing the latch actuator jack is the reverse of that given for removal in para 50. The following points should be noted:

(a) Ensure that the latch actuator jack piston is fully retracted.

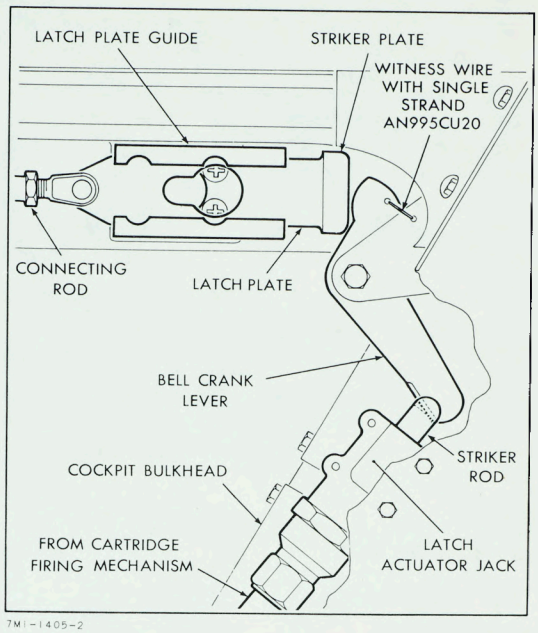

FIG. 9 LATCH ACTUATOR BELLCRANK LEVER

(b) Ensure that the groove in the latch actuator jack piston engages with the arm of the bellcrank.

(c) Witness wire the bellcrank to the bracket with a single strand of copper locking wire AN995CU20.

52 To remove the canopy mechanism emergency jack and the recuperator, proceed as follows:

(a) Remove the flexible high pressure hose connecting the emergency jack to the union on the bulkhead.

(b) Remove the recuperator from its bracket on the bulkhead.

(c) Remove the cotter pin, nut and bolt securing the emergency jack piston to the idler lever.

(d) Remove the cotter pin securing the emergency jack spindle and remove the spindle.

ARROW 1 SERVICE DATA

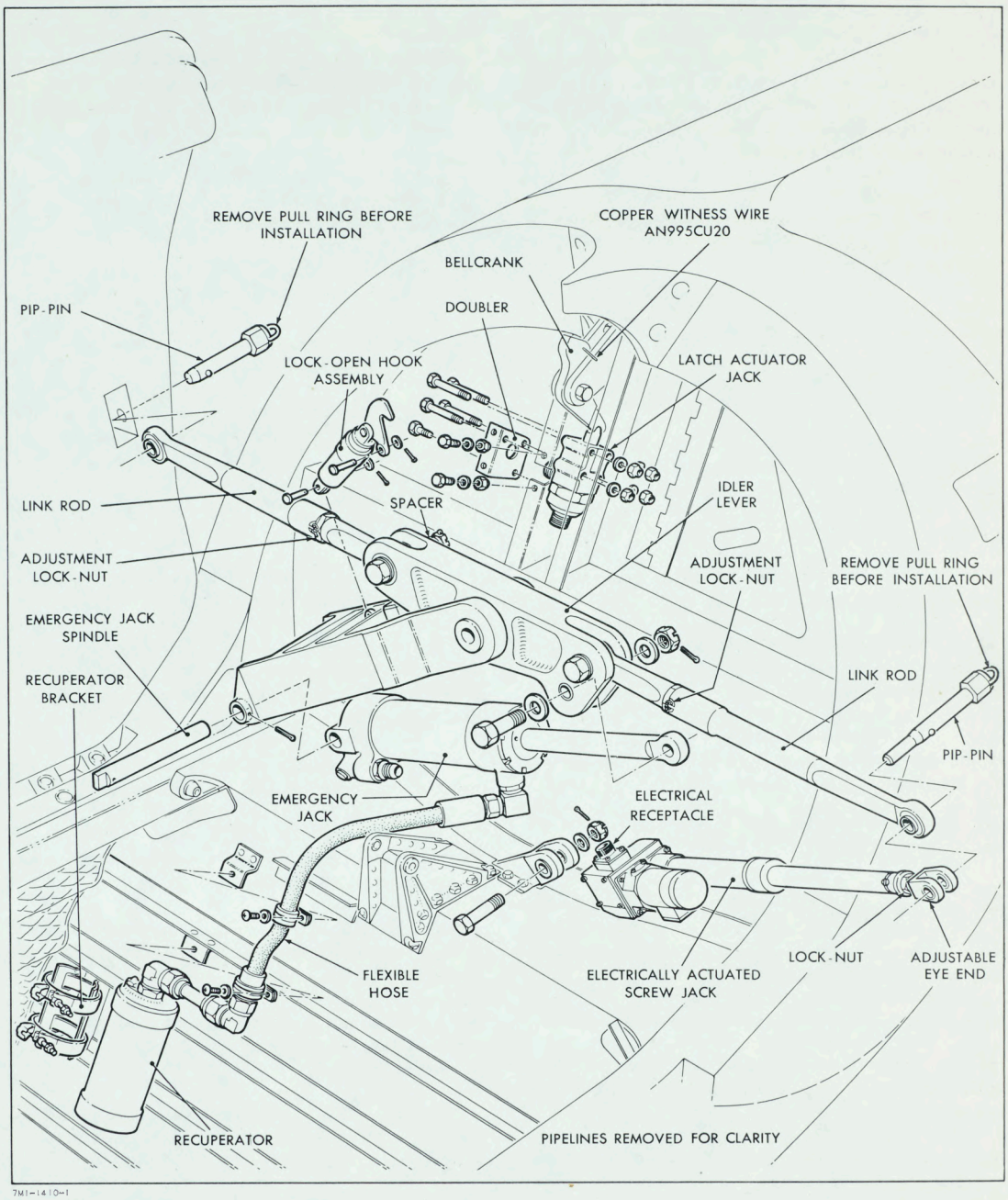

FIG. 10 EMERGENCY MECHANISM INSTALLATION

(e) Remove the emergency jack, flexible hose and recuperator as a complete assembly.

(f) Hold the assembly over a suitable receptacle, remove the flexible hose union at the emergency jack, and drain the oil from jack and recuperator.

53 The procedure for installing the emergency jack and recuperator is the reverse of that given for removal in para 52. The following points should be noted:

(a) Do not overtighten the clamps as excessive pressure on the clamps will restrict piston travel.

(b) Fill the recuperator as in para 31.

54 For details of removal and installation of the canopy cartridge firing mechanism see Arrow 1 Service Data - Section 31.

EMERGENCY CABLES (Fig 5)

55 To remove the rear cockpit rear cable, proceed as follows:

(a) Ensure that the safety pin is installed in the sear of the canopy cartridge firing mechanism.

(b) Disconnect the cable from the cartridge firing mechanism sear by removing the cotter pin and clevis pin.

(c) Unscrew the cable adjuster located below the cartridge firing mechanism.

(d) Remove the nut, bolt and cover plate from the stepped pulley.

(e) Drive out the roll-pins from the pulleys and disconnect the cables.

(f) Remove the upper cable assembly.

(g) Remove the nut and bolt securing the pulley at the RH side of the bulkhead and remove the pulley.

(h) Remove the cotter pin and nut securing the rear cockpit emergency lever. Remove three screws and remove the rear cockpit emergency lever shield.

(j) Break the witness wire and remove the emergency lever.

(k) Remove two self-locking nuts and screws securing the plate on the end of the emergency lever. Remove the plate.

(m) Remove the cotter pin and clevis pin securing the cable connector forward of the rear cockpit emergency lever.

(n) Remove the cable connectors from both cables and withdraw the rear cockpit rear cable.

56 To remove the rear cockpit forward cable proceed as follows:

(a) Slacken the locknut on the upper cable adjuster adjacent to the front canopy emergency lever.

(b) Unscrew the adjuster and withdraw the rear cockpit forward cable from the conduit.

57 To remove the external emergency lanyard, proceed as follows:

(a) Remove the cotter pin and clevis pin securing the cable connector to the external emergency lanyard, adjacent to the front cockpit emergency lever.

(b) Withdraw the cable forward through the hole in the front cockpit emergency lever arm.

(c) Remove the nuts, bolts, cable guards and pulleys from the three brackets on the front face of the frame at station 147.

(d) Pull the cable through the grommets taking care not to damage or dislodge the grommets.

(e) Remove the cable guard from the pulley bracket located inboard of the external lanyard stowage.

(f) Carefully pull the external lanyard out through the grommet in the external lanyard stowage.

58 To remove the front cockpit emergency cable proceed as follows:

(a) Ensure that the safety pin is installed in the sear of canopy cartridge firing mechanism.

(b) Disconnect the cable from the cartridge firing mechanism sear by removing the cotter pin and clevis pin.

(c) Unscrew the cable adjuster located below the cartridge firing mechanism.

(d) Remove the nut, bolt and cover plate from the stepped pulley.

(e) Drive out the roll-pins from the pulleys and disconnect the cables.

(f) Remove the upper cable assembly.

(g) Remove the nut and bolt securing the pulley to the bracket at the RH side of the bulkhead.

(h) Remove the cotter pin and nut securing the front cockpit emergency lever. Remove three screws and remove the front cockpit emergency lever shield.

(j) Break the witness wire and remove the emergency lever and lever arm.

(k) Remove the cotter pin to disconnect the cable from the lever arm.

(m) Withdraw the cable from the conduit.

59 The procedure for installing the emergency cables is the reverse of that given for removal in paras 55 - 58. The following points should be noted.

(a) When installing the stepped pulleys, ensure that the cable from the emergency lever is connected to the small pulley, and that the cable to the cartridge firing unit is connected to the large pulley.

(b) For adjustment of the cables see para 33.

ARROW 1 SERVICE DATA

EQUIPMENT LIST

AVRO PART NO.	MANUFACTURER AND PART NO.	NOMENCLATURE	QUANTITY IN SYSTEM
7-1052-1037	Martin Baker Ltd MBEU 472-AVR	Jack, Canopy Emergency	2
7-1052-1038	Martin Baker Ltd MBEU 475-AVR/B	Jack, Canopy Actuator	2
7-1052-6589	Martin Baker Ltd MBEU 565-AVR/B	Recuperator	2
7-1152-9	Airborne Accessories R5110	Electrically Actuated Screw Jack	2
7-1053-1, 2	Avro Aircraft Ltd	Pilot's Canopy LH and RH	1
7-1053-3, 4	Avro Aircraft Ltd	Navigator's Canopy LH and RH	1
7-1052-1366	Avro Aircraft Ltd	Idler Lever	2
7-1052-1852	Avro Aircraft Ltd	Support Emergency Jack	2
7-1052-7141	Avro Aircraft Ltd	Hose Assembly H.P. (Front Cockpit)	1
7-1052-7142	Avro Aircraft Ltd	Hose Assembly H.P. (Rear Cockpit)	1
7-1052-5977	Avro Aircraft Ltd	Link Rod	4
7-1052-6451	Avro Aircraft Ltd	Cable Assembly Emergency Lanyard	1
7-1052-6452	Avro Aircraft Ltd	Cable Assembly Front Cockpit Upper	1
7-1052-6453	Avro Aircraft Ltd	Cable Assembly Front Cockpit Lower	1
7-1052-7227	Avro Aircraft Ltd	Cable Assembly Front Cockpit Canopy Firing Mechanism	1
7-1052-6434	Avro Aircraft Ltd	Cable Assembly Rear Cockpit	1
7-1052-7223	Avro Aircraft Ltd	Cable Assembly Rear Cockpit Canopy Firing Mechanism	1

SECTION 33

ARROW 1 SERVICE DATA

SECTION 33

CANOPIES

ELECTRICS

(This data supersedes previous issue dated 5 Dec 1956)

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ELECTRICAL SYSTEM

CANOPIES

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DESCRIPTION

GENERAL

1 Each canopy, front and rear, is opened and closed by its respective electric actuator, both actuators deriving their power supply from the battery bus-bar. The inflation and deflation of the canopy seals is controlled by a solenoid valve operated by a power supply taken from the emergency d-c bus-bar. The canopies are mechanically locked when in the closed position.

CANOPY ACTUATION

2 Each canopy is controlled by two double-pole, double-throw switches having OPEN-OFF-CLOSE positions. One switch is mounted in each cockpit, and the other two are mounted externally on the canopy arch for ground operation. Interlocking relays are provided to prevent the external switches from acting in opposition to the internal switches.

3 The canopy actuators are of the linear type and contain load limit switches to cut off the electrical supply when the canopies are in the fully open or fully closed positions.

4 Limit switches actuated by the mechanical lock latches prevent the d-c supply being fed to the actuators before the latches are unlocked.

5 An emergency mechanical release is provided for the mechanical lock latches, as the external switches do not override the latches.

6 The canopies should only be opened and closed once after each flight using the aircraft battery. If further operation is required a ground power supply should be used.

CANOPY SEAL INFLATION

7 The canopy seal inflation valve is solenoid operated by micro-switches actuated by the canopy mechanical latch locking handles. The solenoid is energized and the canopy seals inflated when the second canopy is locked, and is de-energized to deflate the seals when the first canopy is unlocked.

FUNCTION TESTING

CANOPY ACTUATION CIRCUITS TEST

8 Check the operation of the canopy actuation circuits proceeding as follows:

(a) Check that an external source of a-c power supply is connected to the aircraft external supply receptacle and that the MASTER ELECT switch is set to the ON position.

(b) Check that the FRONT and REAR ACT., canopy CONT and SEAL circuit breakers, grouped under the heading CANOPY on circuit breaker panel E1, are switched on.

(c) Hold the front cockpit canopy actuation switch in the CLOSE position until the canopy is fully closed. Note that the operation of the canopy actuator is smooth throughout its travel.

(d) Set the canopy latch locking handle to the canopy locked position. There should be no power on the actuator when the canopy actuation switch is selected to OPEN.

(e) Set the canopy latch locking handle to the canopy unlocked position then hold the canopy actuation switch to OPEN until the canopy is fully open.

(f) With the front canopy ground service switch selected to CLOSE and the canopy in the process of closing, check that the canopy actuation switch will override the ground service switch by selecting the OPEN position.

(g) Repeat operations (c) to (f) inclusive for the rear canopy actuation switch.

CANOPY SEAL VALVE TEST

9 The operation of the canopy seal valve is tested during the canopy seal testing procedure described in Arrow I System Service Data - Low Pressure Air System.

PROCEDURE UPON COMPLETION OF TESTING

10 To conserve the capacity of the storage battery, the following procedure should be followed:

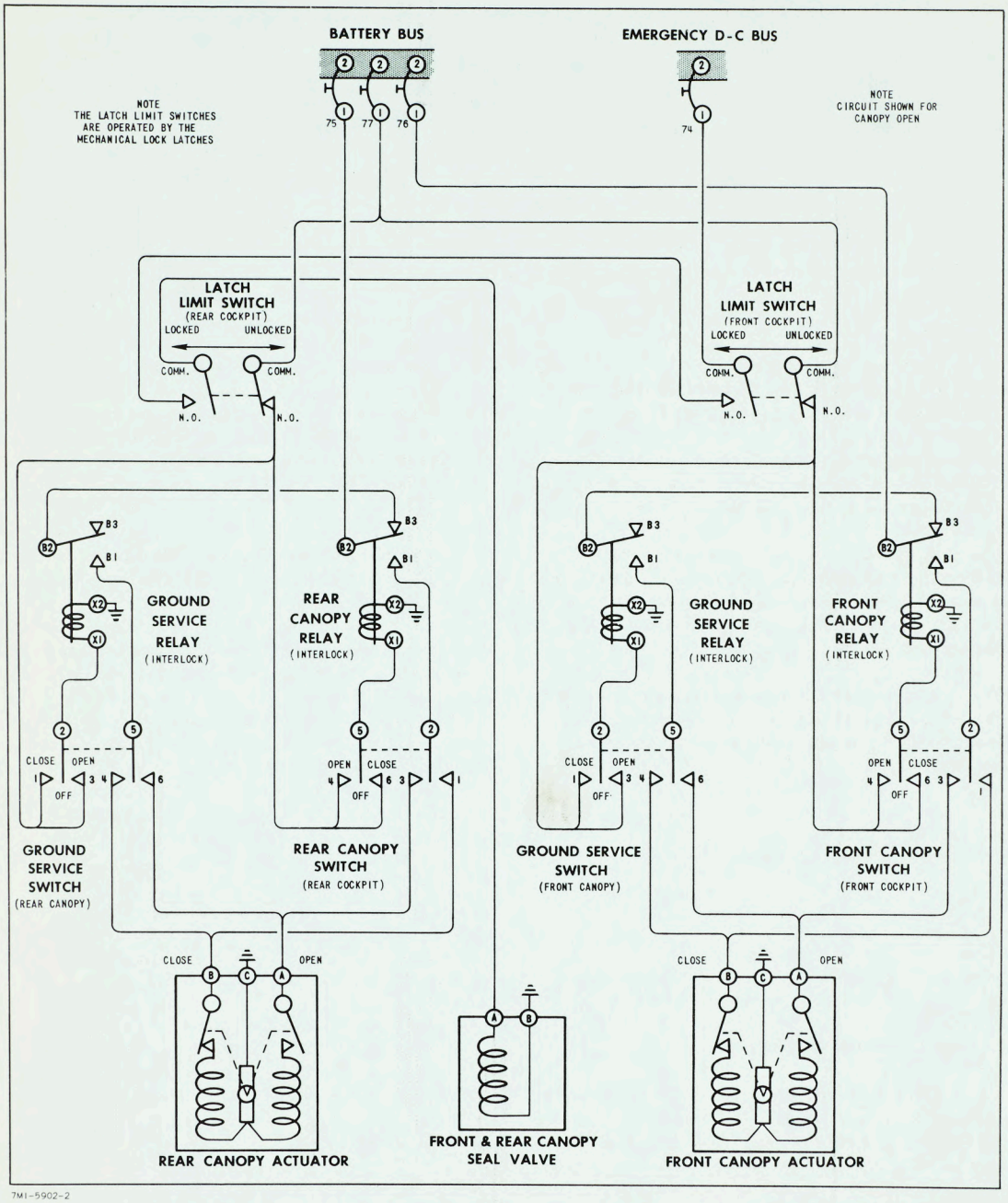


FIG. 1 CANOPY ACTUATION SCHEMATIC

(a) Hold the rear canopy ground service switch in the CLOSE position until the rear canopy is fully closed.

(b) Select the MASTER ELECT switch to the OFF position.

(c) Hold the front canopy ground service switch in the CLOSE position until the front canopy is fully closed.

(d) Disconnect the external source of power from the external supply receptacle.

LATCH LIMIT SWITCHES ADJUSTMENT

11 To adjust the latch limit switches proceed as follows:

(a) Connect a test lamp between ground and the normally-open contact of the relevant limit switch.

(b) Set the latch locking handle to its full travel in the unlocked position if the canopy actuation limit switch is to be adjusted, or to the canopy locked position if the canopy seal limit switch is to be adjusted.

(c) Loosen the limit switch mounting screws and adjust the switch until the test lamp just illuminates. To provide an operating override adjust the switch to increase the depression of the actuating arm by .025 - .075 inch. Tighten the mounting screws when the adjustment is complete. (See fig 2).

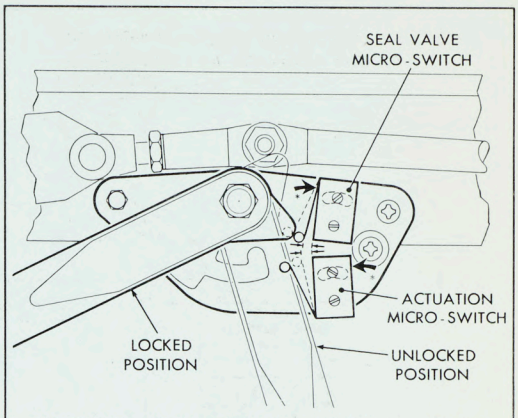
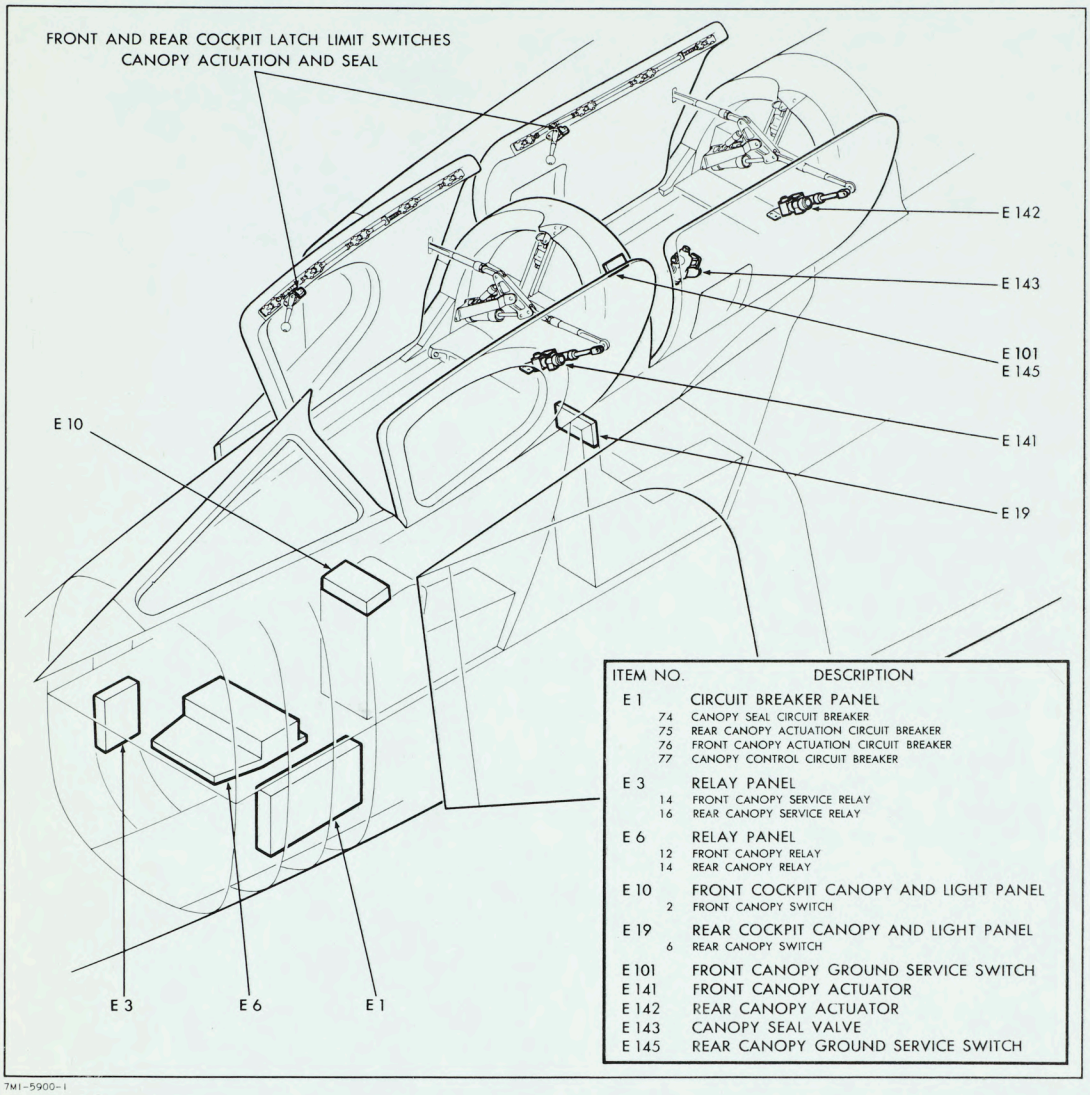


FIG. 2 CANOPY LATCH LIMIT SWITCH ADJUSTMENT

(d) Remove the test lamp and check the operation of the canopy actuation circuits as described in para 8.

ARROW 1 SERVICE DATA



ITEM NO.	DESCRIPTION
E 1	CIRCUIT BREAKER PANEL
74	CANOPY SEAL CIRCUIT BREAKER
75	REAR CANOPY ACTUATION CIRCUIT BREAKER
76	FRONT CANOPY ACTUATION CIRCUIT BREAKER
77	CANOPY CONTROL CIRCUIT BREAKER
E 3	RELAY PANEL
14	FRONT CANOPY SERVICE RELAY
16	REAR CANOPY SERVICE RELAY
E 6	RELAY PANEL
12	FRONT CANOPY RELAY
14	REAR CANOPY RELAY
E 10	FRONT COCKPIT CANOPY AND LIGHT PANEL
2	FRONT CANOPY SWITCH
E 19	REAR COCKPIT CANOPY AND LIGHT PANEL
6	REAR CANOPY SWITCH
E 101	FRONT CANOPY GROUND SERVICE SWITCH
E 141	FRONT CANOPY ACTUATOR
E 142	REAR CANOPY ACTUATOR
E 143	CANOPY SEAL VALVE
E 145	REAR CANOPY GROUND SERVICE SWITCH

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FIG. 3 LOCATION OF ELECTRICAL COMPONENTS - CANOPY CIRCUITS

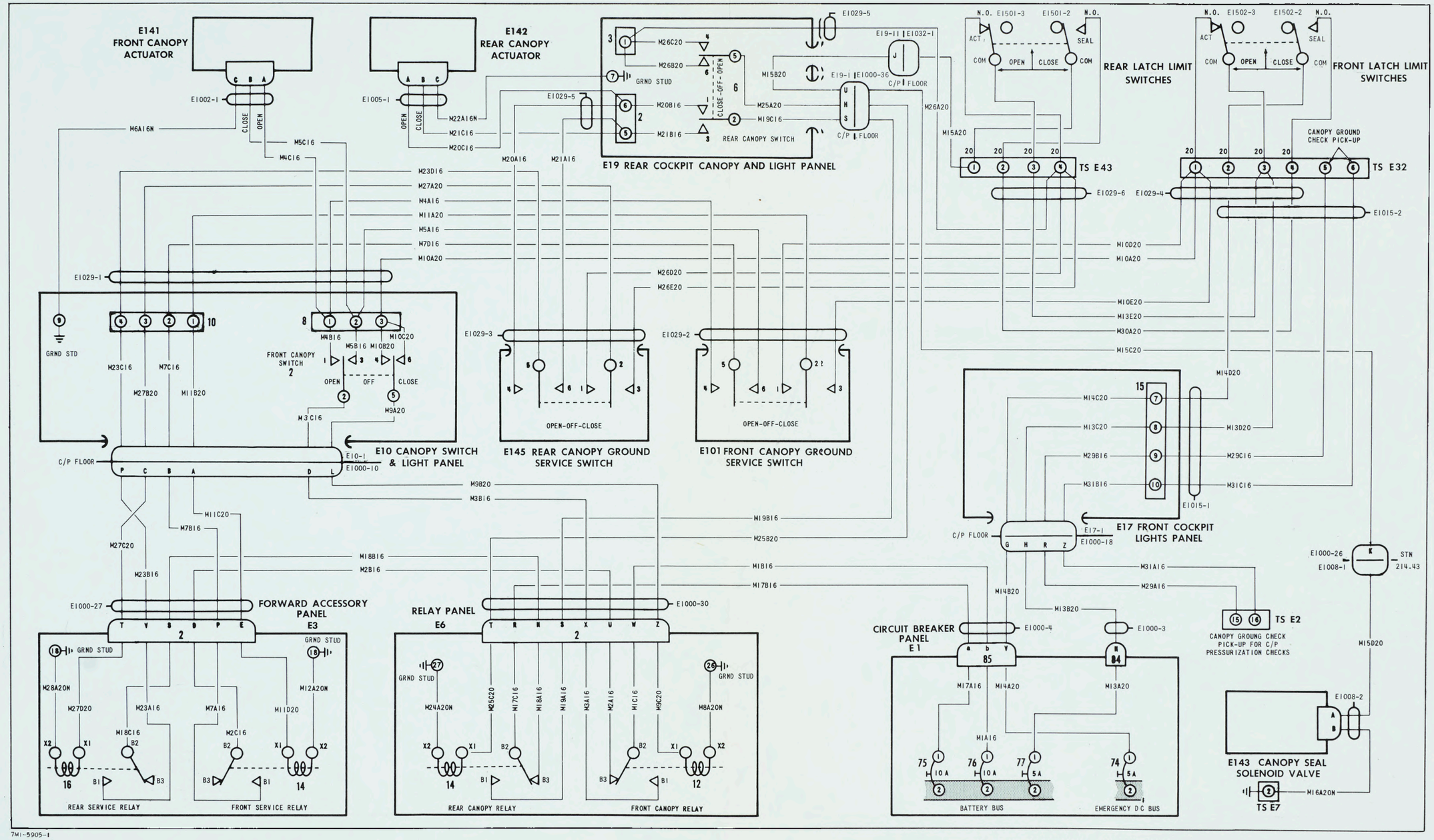

FIG. 4 CANOPY ACTUATION

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Front Canopy Actuation Switch	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
	Cutler-Hammer	8834K4	25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To complete the supply circuits for the front canopy actuator.

LOCATION

On panel E10 LH console.

ACCESS

MEN X MINUTES

Unobstructed when panel E10 is released from the console - 4 screws.

REPLACEMENT PROCEDURE

MEN X MINUTES

Mount switch on panel E10.
Fit and secure six circuit connections.
Refit panel E10 to LH console - 4 mounting screws.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Operate the switch and check that the lever action is smooth and that the make and break is not sluggish or rough.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Rear Canopy Actuation Switch	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
	Cutler-Hammer	8834K4	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To complete the power supply for the rear canopy actuator.

LOCATION

On panel E19 LH console.

ACCESS — MEN X MINUTES

Unobstructed when panel E19 is released from the console - 4 quick fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Mount switch on panel E19.
Fit and secure six circuit connections.
Refit panel E19 to LH console - 4 quick fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Operate the switch and check that the lever action is smooth and that the make and break is not sluggish.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Canopy External Actuation Switches	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-S-159-7			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To facilitate operating the front and rear canopies externally. The switches complete the supply to the canopy actuators.

LOCATION

On LH side canopy centre arch.

ACCESS — MEN X MINUTES

Via hinged access door on LH side of aircraft between the front cockpit and the rear cockpit.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure switches to mounting plate with mounting nuts supplied.
Fit and secure the circuit wires.
Fit and secure the mounting plate - six screws.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Clean externally. Operate the switch and check that the lever action is smooth and that the make and break is not sluggish.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Latch Limit Switches, (Actuation) Front and Rear	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-S-152			25201

OVERHAUL LIFE: KNOWN– ESTIMATED–

FUNCTION

To interrupt the power supply to the canopy actuators when the canopies are locked.

LOCATION

Front cockpit; on index plate aft of the front canopy latch locking handle.
Rear cockpit; on index plate aft of the rear canopy latch locking handle.

ACCESS — MEN X MINUTES

Unobstructed in the front and rear cockpits.

REPLACEMENT PROCEDURE — MEN X MINUTES

Assemble actuation latch limit switches.
Install on index plate aft of latch locking handle, and secure with two mounting screws each.
Connect and secure circuit wires.
Fit and secure switch cover.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check for security of mounting and electrical connection. Check switch actuation for distortion.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA
COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Interlock Relays, Internal (2)	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To prevent the internal and external canopy actuation switches operating the canopy actuator in opposition.

LOCATION

E6 relay panel on roof of nose wheel well.

ACCESS — MEN X MINUTES

Unobstructed when cover of E6 is removed - four quick fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Mount relays in E6 using two mounting screws.
Fit and secure five circuit connections.
Refit cover of E6 - four quick fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check circuit connections for security.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Interlock Relays, External (2)	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To prevent the external and internal canopy actuation switches operating the canopy actuator in opposition.

LOCATION

E3 in nose wheel well, RH side.

ACCESS — MEN X MINUTES

Unobstructed when cover of E3 is removed - four quick fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Mount relay in E3 using two mounting screws.
Fit and secure four circuit connections.
Refit cover of E3 - four quick fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check circuit connections for security.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Front Canopy Actuator	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1152-9	Winnett-Boyd (Airborne Accessories)	E1600 N48-1	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To open and close the front canopy.

LOCATION

Front cockpit - between the base of the canopy and the seat bulkhead.

ACCESS — MEN X MINUTES

Unobstructed when the front canopy is open.

REPLACEMENT PROCEDURE — MEN X MINUTES

Insert pip-pin holding actuator to canopy.
Refit nut and bolt securing actuator to seat bulkhead.
Fit and secure electrical connector.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check actuator for security. Check that the electrical connector is securely and properly fitted.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

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COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Rear Canopy Actuator	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1152-9	Winnett-Boyd (Airborne Accessories)	E1600 N48-1	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To open and close the rear canopy.

LOCATION

Rear cockpit - between the base of the canopy and the seat bulkhead.

ACCESS

MEN X MINUTES

Unobstructed when the rear canopy is open.

REPLACEMENT PROCEDURE

MEN X MINUTES

Insert pip-pin holding actuator to canopy.
Refit nut and bolt securing actuator to seat bulkhead.
Fit and secure electrical connector.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the actuator is securely mounted. Check that the electrical connector is securely and properly fitted.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Canopy Seal Valve	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1852-14	Surface Combustion	30C98	25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

Permits entry of air pressure to inflate the canopy seal.

LOCATION

Rear cockpit bulkhead.

ACCESS

	MEN X MINUTES	
Remove panel on underside of the fuselage aft of the rear cockpit bulkhead, between stations 224 and 225 - 76 x 3/16 inch screws. Disconnect antenna attached to panel. Remove HP pneumatics storage bottle.		

REPLACEMENT PROCEDURE

	MEN X MINUTES	
Fit and secure valve to structure - 3 x 10/32 inch mounting bolts. Fit and secure two pipelines to valve. Install HP pneumatics storage bottle. Fit and secure 10 bolts in storage bottle cradle and two screws securing bottle straps. Fit and secure one pipeline to bottle. Reconnect antenna. Fit and secure panel on underside of fuselage between stations 224 and 225 - 76 x 3/16 inch screws.		

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the connector is securely and properly fitted.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	CANOPIES	Latch Limit Switches, Front and Rear Canopy Seal	11-10

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-S-152			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To complete the power supply to the canopy seal valve solenoid when the canopies are locked.

LOCATION

Front cockpit; on index plate aft of the front canopy latch locking handle.
Rear cockpit; on index plate aft of the rear canopy latch locking handle.

ACCESS — MEN X MINUTES

Unobstructed in the front and rear cockpits.

REPLACEMENT PROCEDURE — MEN X MINUTES

Assemble seal latch limit switches.
Install on index plate aft of latch locking handle and secure with two mounting screws each.
Connect and secure circuit wires.
Fit and secure switch cover.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check for security of mounting and electrical connection. Check switch actuation for distortion.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

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SECTION 37

ELECTRICAL SYSTEM

POWER SUPPLIES

(This data supersedes previous issue dated 28 Nov 1956)

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DESCRIPTION

GENERAL

1 The prime source of power on the aircraft is two 30 kva, 120/208 volt 3-phase alternators fitted one on the LH engine and the other on the RH engine. The alternators are driven by the engines through constant speed units to produce an output frequency of 400 cps. Each alternator together with voltage regulation, fault detection and distribution control circuits constitutes an AC sub-system.

2 Under the normal conditions, the RH AC sub-system supplies the majority of the AC operated services. The remainder are supplied by the LH AC sub-system.

3 In the event of the RH sub-system failing, the LH sub-system isolates its load and assumes the RH sub-system load. Exceptions to this action are the LH and the RH transformer-rectifier units which satisfy DC power requirements, and the LH and the RH AC circuits of the engine intake de-icing system. These circuits derive their supply from the LH or the RH AC sub-system, as appropriate, and are rendered inoperative if the relevant AC sub-system fails.

4 Should both sub-systems fail, a hydraulically-driven 0.9 kva 3-phase alternator satisfies emergency condition AC power requirements. A constant speed control, integral with the drive motor, maintains the output frequency at approximately 400 cps.

5 The two transformer-rectifier units, one LH and one RH, are operated in parallel. Each unit together with voltage regulation, fault detection and distribution control circuits constitutes a DC sub-system.

6 As the DC sub-systems derive their AC supply from the corresponding LH or RH AC sub-system, failure of an AC sub-system renders its associated DC sub-system inoperative. A failure of either DC sub-system causes certain DC loads to be disconnected. This ensures that the maximum DC load demand cannot exceed the capacity of one sub-system. If both DC sub-systems are inoperative, a 15 ampere-hour nickel-cadmium storage battery satisfies emergency condition DC power requirements.

7 A receptacle is provided to facilitate the connection of an external source of AC power. When this is done, the external supply substitutes for the AC sub-systems which are automatically isolated.

8 The controls for the AC and the DC sub-systems are located in the front cockpit on the RH console. A control switch marked ON-OFF-RESET is provided for each AC sub-system. A single control switch marked RESET is provided for the DC sub-systems. A master switch is provided to isolate the service load from the sub-systems.

9 Indication of an AC or a DC sub-system failure is provided by indicator lights located on the master warning indicator panel. An indicator marked AC FAIL and an arrow to indicate LH or RH is provided for each AC sub-system. A single indicator marked DC L OR R FAIL is provided for the DC sub-systems. When the battery is supplying power, an indicator marked BATT USE is illuminated.

AC SUPPLY

GENERAL

10 The output lines from the alternators are connected to an AC/DC control panel, LH or RH as appropriate. Both panels are contained in an air conditioned cabinet, see fig 1. The AC portion of each control panel incorporates a voltage regulation circuit, an over-voltage detection circuit and a field contactor or shorting circuit. From the control panels, the lines are routed via a ground fault unit to their respective LH or RH line control relays.

11 The supply circuits to energize the line relays are completed when the master electrical switch is set to the ON position and the input speed to the constant speed unit reaches a minimum of 2250 rpm. When energized, the line relays complete the alternator lines to the appropriate LH and RH AC sub-system busbars.

ARROW 1 SERVICE DATA

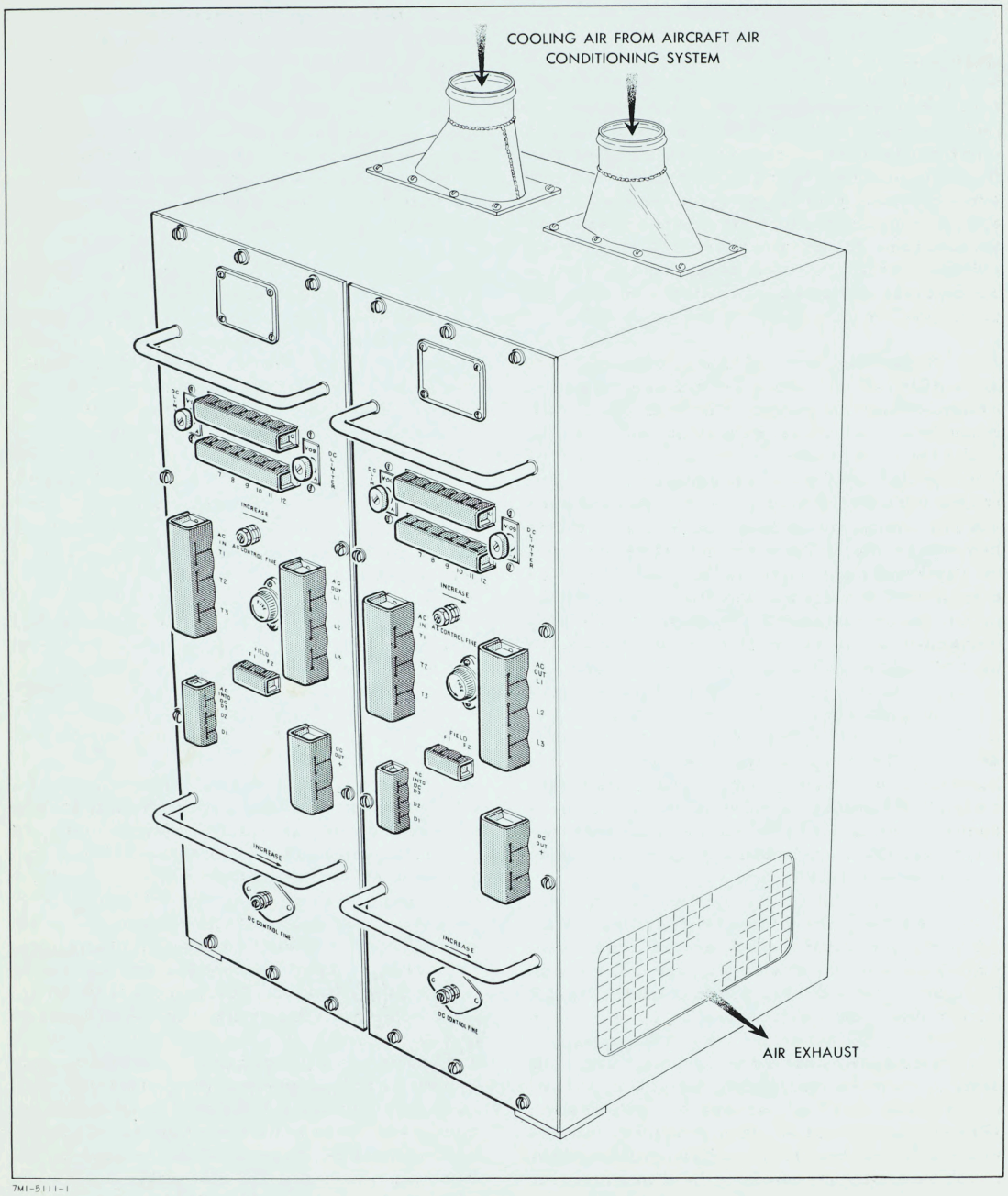

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FIG. 1 AC/DC CONTROL PANELS, LH AND RH

ARROW 1 SERVICE DATA

12 The only circuits which derive their supply directly from the sub-system bus-bars are the transformer-rectifier units of the LH and the RH DC sub-systems, the LH and the RH circuits of the engine intake de-icing system, and two power failure detectors, one LH and one RH, of the AC distribution control circuits. Each circuit derives its supply from the LH or the RH AC sub-system bus-bars, as appropriate. From the AC sub-system bus-bars the alternator lines are connected via current limiters to a transfer relay, LH or RH as appropriate. The transfer relays are operated by the distribution control circuits.

13 Normally, the distribution control circuits of the LH AC sub-system are overridden by the distribution control circuits of the RH AC sub-system which energize a transfer control relay to complete a supply circuit to the RH transfer relay and a shedding relay. The transfer relay, when energized, completes the RH alternator lines from the AC sub-system bus-bars to the main AC distribution bus-bars in panels E1 and E20. The shedding relay completes the LH alternator lines to the sheddable load of the electronics group, i.e. the X-Band Beacon and the electronics bay access door actuator.

14 In the event of the RH sub-system failing, the RH control circuits are inoperative. This de-energizes the shedding relay and the RH transfer relay and permits the LH control circuits to be completed. The LH control circuits energize the LH transfer relay which completes the LH alternator lines to the main AC bus-bars.

15 When the RH control circuits are inoperative, a supply circuit is completed to the RH AC FAIL indicator circuit and a preparatory supply circuit is completed to a failure relay. Should the LH sub-system fail also, the LH control circuits energize the failure relay which permits the RH sub-system preparatory supply to initiate the operation of the emergency AC system. The AC circuits supplied by the emergency system are the instruments, J4 compass, IFF installation and the emergency yaw damper system. Note that if the LH sub-system fails first, only the sheddable electronic load is affected. The failure relay will be energized in anticipation of the supply to the emergency AC system being completed due to failure of the RH sub-system.

16 As the component circuits of the LH and the RH sub-systems are identical the following descriptions are equally applicable to both.

ALTERNATORS (Fig 2)

17 The alternators are located in the nose bullet of their respective LH and RH engine and each is mechanically coupled to a constant-speed drive unit.

18 The constant-speed drive unit maintains the alternator at a practically constant 8000 rpm, thus providing a supply frequency of 400 cps. When the alternator speed is less than 7200-7500 rpm, i.e. alternator output of 360-375 cps, a centrifugal switch incorporated in the drive assembly is opened. This action interrupts the supply circuit from the master electrical switch to the line relay so isolating the appropriate AC sub-system. A governor valve, also incorporated in the drive assembly, functions to prevent the drive unit from overspeeding.

19 Further information on the constant speed drive unit is contained in the Arrow Service Data - Accessories Drives and Gearboxes.

20 The alternator is a 3-phase air-cooled machine with a continuous rated output of 30 kva at 120/208 volts. The output voltage is regulated to 115/200 volts, phase-to-neutral and between phases respectively.

21 Connections are made to the stator via six terminals, identified T1 through T6, located in a terminal block mounted on the alternator frame. Terminals T1, T2 and T3 are the power take-off connections; terminals T4, T5 and T6 are connected to a ground stud so forming a star or wye connected stator. A field connection terminal block containing two terminals, identified F1 and F2, is located adjacent to the stator connection terminal block. The field terminals are connected internally to the revolving field winding via slip rings and brushgear, and externally to the voltage regulation circuits.

22 Initially, field excitation is achieved by the magnetic remanance of the field poles. The output from the alternator due to this effect appears in the voltage regulation circuits and is returned to the field as a rectified DC voltage. Consequently, a progressive increase in the alternator output is obtained which is subject to control by the voltage regulation circuits.

VOLTAGE REGULATION CIRCUITS (Fig 3)

23 The voltage regulation circuits which are contained in the AC/DC control panel, provide field excitation in proportion to the line load and maintain the output voltage of the alternator at a practically constant level.

24 Field excitation in proportion to the line load is supplied by a compounding circuit. This circuit comprises a 3-phase transformer-rectifier assembly (TR1, MR2) connected between the alternator output lines and the field circuit. Each primary winding of the transformer (TR1) is connected in series with one of the alternator output lines. Each of the secondary windings is connected to a rectifier (MR2). Therefore, the voltage induced in the secondary windings will be proportional to the current flow in the primary which is in effect the load current. The greater the load current, the greater the induced voltage supplied to the rectifiers. As the rectified DC is supplied to the alternator field, the alternator output is increased in proportion to the load increase, and vice-versa.

25 An average output voltage across the three phases is maintained by a magnetic amplifier assembly. This assembly is, essentially, a variable impedance inserted between the alternator output and the alternator field, and functions to increase or decrease the field voltage when the voltage of one or more of the three phases is above or below a predetermined limit.

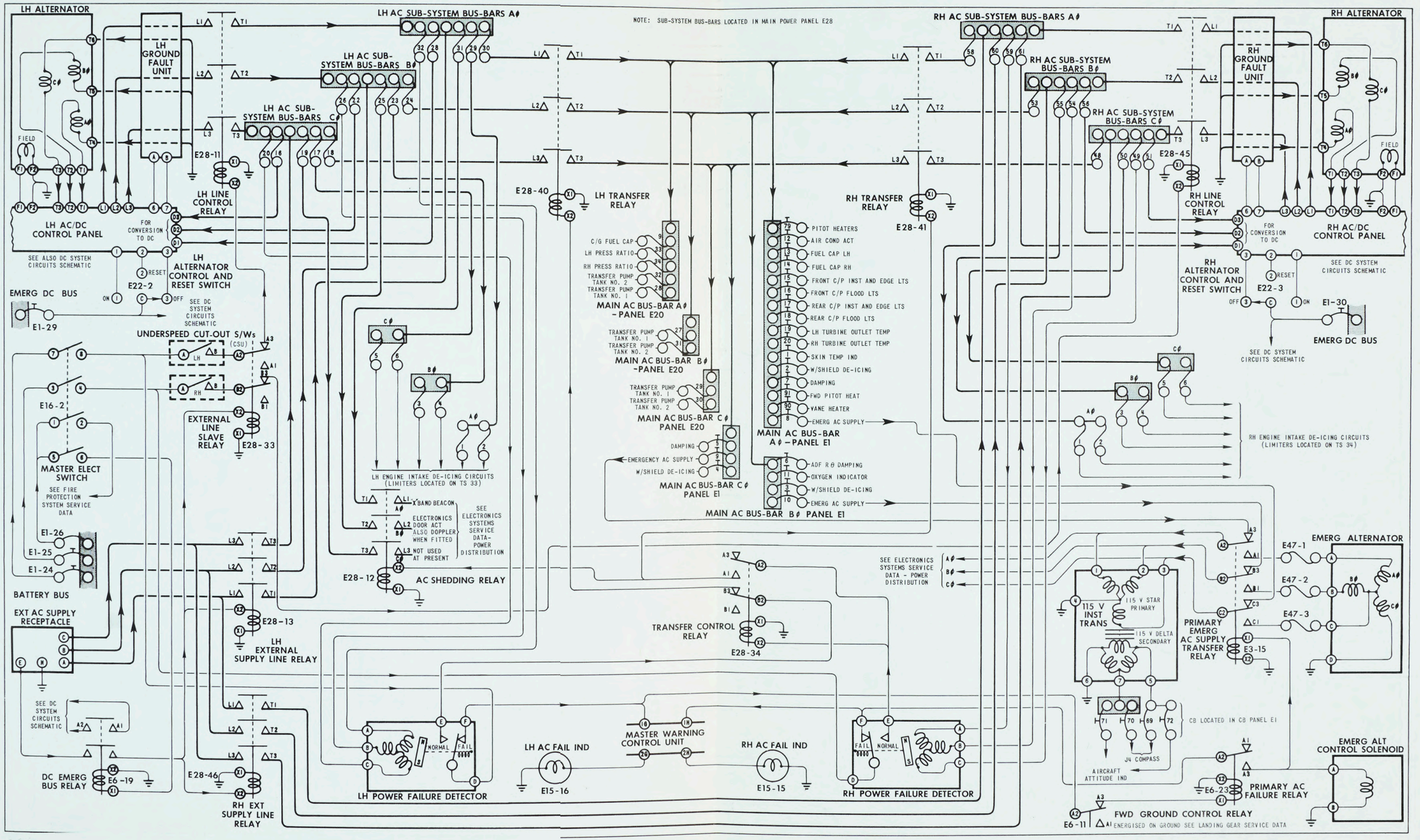
26 A magnetic amplifier consists of a coil and one or more control windings wound on a core of special metal which has an extremely low hysteresis loss. The operation of the amplifier is based upon the impedance, i.e. resistance offered to the flow of alternating current, produced in the coil due to inductive reactance. If a DC signal is supplied to the control windings, a field is set up in the core which causes the value of the coil impedance to alter due to the change in the inductive reactance. If the voltage to the control winding is progressively increased until the core is saturated, the impedance of the coil will progressively decrease to a minimum. Thus, as the flow of alternating current in the coil is inversely proportional to impedance, maximum current will flow when the core is saturated and decrease as the control winding voltage is decreased.

27 Regulation of the output can be obtained if the control windings are poled so as to oppose each other. The effect of this is such that when current flows in one winding, the resulting magnetic effect will oppose the magnetic effect of the coil; this results in an increased impedance. The opposite effect is obtained from the other coil. In this case the magnetic effect aids the magnetic effect of the coil and the impedance is decreased.

28 The magnetic amplifier (TD1) comprises three pairs of coils, one pair for each phase, and three control windings, namely a reference winding, a regulation winding and a damping winding. Throughout the descriptions the operation of one of the paired coils is described. The operation of both coils is identical, the second coil serving to provide full wave operation.

29 Each pair of coils is connected between one of the alternator lines and a primary winding of a three-phase transformer (TR2). The secondary windings of the transformer are each connected to a rectifier (MR3) fitted in the field circuit. Therefore, the rectified output to the field is proportional to the current flow in the transformer primaries. The current in the primary windings is determined by the impedance of the coils which is controlled by the reference winding and the regulation winding.

30 The reference winding receives a DC supply via the alternator control and reset switch. This supply is effective only during initial build-up of the alternator output and its effect is to reduce to a minimum the impedance of the coils. Due to this, the initial line


LH ALTERNATOR
LH GROUND FAULT UNIT
LH AC SUB-SYSTEM BUS-BARS A∅
LH AC SUB-SYSTEM BUS-BARS B∅
LH AC SUB-SYSTEM BUS-BARS C∅
NOTE: SUB-SYSTEM BUS-BARS LOCATED IN MAIN POWER PANEL E28
RH AC SUB-SYSTEM BUS-BARS A∅
RH AC SUB-SYSTEM BUS-BARS B∅
RH AC SUB-SYSTEM BUS-BARS C∅
RH ALTERNATOR
RH GROUND FAULT UNIT
FIELD
E28-11
LH LINE CONTROL RELAY
E28-45
RH LINE CONTROL RELAY
LH AC/DC CONTROL PANEL
FOR CONVERSION TO DC
SEE ALSO DC SYSTEM CIRCUITS SCHEMATIC
RH AC/DC CONTROL PANEL
SEE DC SYSTEM CIRCUITS SCHEMATIC
LH ALTERNATOR CONTROL AND RESET SWITCH
E22-2
RESET
ON
OFF
SEE DC SYSTEM CIRCUITS SCHEMATIC
RH ALTERNATOR CONTROL AND RESET SWITCH
E22-3
E1-30
EMERG DC BUS
E1-29
SEE DC SYSTEM CIRCUITS SCHEMATIC
UNDERSPEED CUT-OUT S/Ws
(CSU)
LH
RH
EXTERNAL LINE SLAVE RELAY
E28-33
E16-2
MASTER ELECT SWITCH
SEE FIRE PROTECTION SYSTEM SERVICE DATA
E1-26
E1-25
E1-24
BATTERY BUS
LH ENGINE INTAKE DE-ICING CIRCUITS (LIMITERS LOCATED ON TS 33)
X BAND BEACON
ELECTRONICS DOOR ACT ALSO DOPPLER WHEN FITTED
NOT USED AT PRESENT
SEE ELECTRONICS SYSTEMS SERVICE DATA - POWER DISTRIBUTION
E28-12
AC SHEDDING RELAY
E28-40
LH TRANSFER RELAY
RH TRANSFER RELAY
E28-41
C/G FUEL CAP
LH PRESS RATIO
RH PRESS RATIO
TRANSFER PUMP TANK NO. 2
TRANSFER PUMP TANK NO. 1
MAIN AC BUS-BAR A∅ -PANEL E20
MAIN AC BUS-BAR B∅ -PANEL E20
MAIN AC BUS-BAR C∅ PANEL E20
MAIN AC BUS-BAR A∅ -PANEL E1
MAIN AC BUS-BAR C∅ PANEL E1
MAIN AC BUS-BAR B∅ PANEL E1
PITOT HEATERS
AIR COND ACT
FUEL CAP LH
FUEL CAP RH
FRONT C/P INST AND EDGE LTS
FRONT C/P FLOOD LTS
REAR C/P INST AND EDGE LTS
REAR C/P FLOOD LTS
LH TURBINE OUTLET TEMP
RH TURBINE OUTLET TEMP
SKIN TEMP IND
W/SHIELD DE-ICING
DAMPING
FWD PITOT HEAT
VANE HEATER
EMERG AC SUPPLY
ADF R∅ DAMPING
OXYGEN INDICATOR
RH ENGINE INTAKE DE-ICING CIRCUITS (LIMITERS LOCATED ON TS 34)
EXT AC SUPPLY RECEPTACLE
SEE DC SYSTEM CIRCUITS SCHEMATIC
DC EMERG BUS RELAY
E6-19
E28-46
RH EXT SUPPLY LINE RELAY
E28-13
LH EXTERNAL SUPPLY LINE RELAY
TRANSFER CONTROL RELAY
E28-34
SEE ELECTRONICS SYSTEMS SERVICE DATA - POWER DISTRIBUTION
LH POWER FAILURE DETECTOR
RH POWER FAILURE DETECTOR
NORMAL
FAIL
LH AC FAIL IND
E15-16
MASTER WARNING CONTROL UNIT
RH AC FAIL IND
E15-15
EMERG ALTERNATOR
E47-1
E47-2
E47-3
115 V INST TRANS
115 V STAR PRIMARY
115 V DELTA SECONDARY
PRIMARY EMERG AC SUPPLY TRANSFER RELAY
E3-15
CB LOCATED IN CB PANEL E1
J4 COMPASS
AIRCRAFT ATTITUDE IND
EMERG ALT CONTROL SOLENOID
E6-23
PRIMARY AC FAILURE RELAY
FWD GROUND CONTROL RELAY
E6-11
ENERGISED ON GROUND SEE LANDING GEAR SERVICE DATA

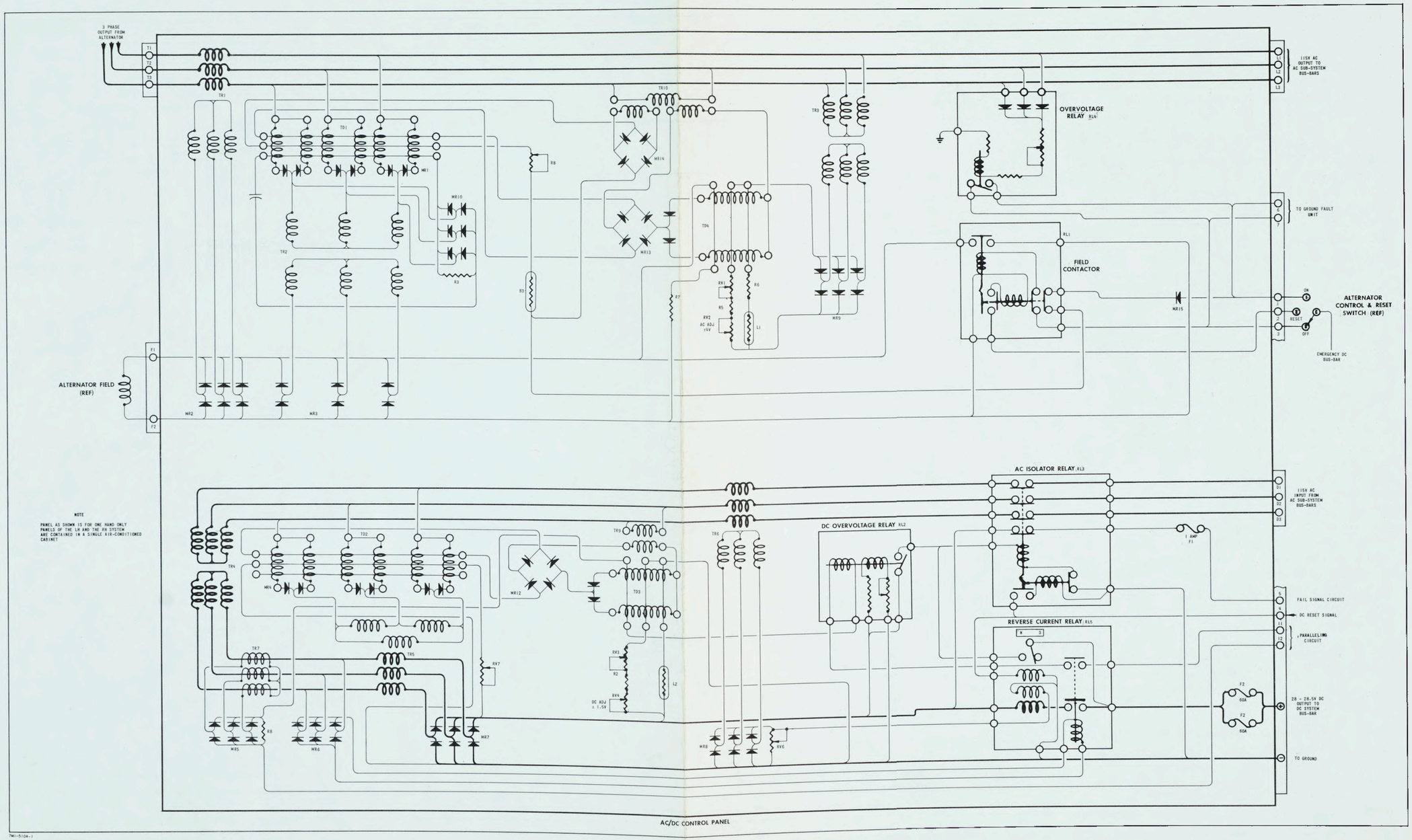


FIG. 3 AC/DC CONTROL PANEL SCHEMATIC

current will appear in the primary windings of the transformer (TR2). The resulting induced voltage in the secondary windings is rectified and supplied to the field circuit. This action has a cumulative effect as increasing output will result in increasing field voltage which further increases the output.

31 As the alternator output increases, the voltage appearing in the magnetic amplifier coil will also increase. This reduces the effectiveness of the initial current in the regulation winding and would result in an increasing impedance of the coil but for a voltage supplied by a transformer-rectifier assembly (TR10, MR14) connected across two of the alternator lines. This voltage holds the impedance at a given value dependant upon the alternator output and also serves as a reference. When the voltage applied to the regulation winding results in a greater current than that in the reference winding, the impedance of the coil will be increased, and vice-versa.

32 The regulation winding of the magnetic amplifier derives its DC control voltage from a pre-amplifier or sensing assembly. This assembly consists of a magnetic amplifier (TD4) and a full wave rectifier circuit (MR13). The coils of the pre-amplifier are in series with the full wave rectifier circuit and both are connected across the secondary of a transformer (TR10), the primary of which is tapped across two of the alternator lines. Thus the load on the transformer secondary will be proportional to the impedance of the pre-amplifier coils, i.e. an increasing impedance resulting in a decreasing current flow so decreasing the load.

33 The impedance of the pre-amplifier is controlled by three windings, namely a regulation control winding, a reference control winding and a balance control winding.

34 The reference winding and the regulation winding of the pre-amplifier derive their supply from a three-phase transformer-rectifier assembly (TR3, MR4) connected across the alternator lines. The rectified DC is supplied to the reference winding via a barretter (L1) which provides a constant current in the reference winding regardless of the voltage. The regulation winding is supplied via three resistors (RV1, RV5 and RV2) two of which are adjustable to permit the operating point to be preset. One resistor permits a coarse adjustment and the other a fine adjustment. Initially, the circuit is adjusted to provide 200 volts between phases at no-load. In this condition the current flow in the regulation and reference windings will be equal.

35 If the voltage of any line increases above the preset limit, the output of the transformer-rectifier assembly (TR3, MR9) is proportionately increased. Consequently, the current flow in the regulation winding will be greater than that in the reference winding. As the field set up in the core by the regulation winding is of the same polarity as that set up by the coil current, the impedance of the coil is decreased. The resulting increase in current flow through the coil loads the transformer secondary, so effecting a decrease in the voltage across the coil and the rectifiers (MR13). This, in turn, decreases the output from the rectifiers (MR13) and consequently the current in the regulation winding of the magnetic amplifier (TD1). Due to this, the current in the reference winding of the magnetic amplifier will be greater than that in the regulation winding. As the field produced by the regulation winding is of the opposite polarity to that produced by the coil current, the impedance of the coil is increased. The resulting decrease in current through the coil is reflected in the secondary of the transformer (TR2) as a reduction in the induced voltage. Consequently, the output of the rectifiers (MR3) is decreased with the accompanying decrease in field voltage and the alternator line voltage.

36 If the voltage of any line decreases below the preset limit, the current in the regulation control winding of the pre-amplifier is less than that of the reference control winding. As the reference winding polarity is such that it opposes the coil current, the impedance of the coil increases. Increasing impedance results in a decrease in current flow through the coil and a decrease in load on the secondary of the transformer (TR10). This results in an increase in voltage across the rectifiers and a proportional increase in output to the regulation winding of the magnetic amplifier (TD1). The current flow in the regulation winding being

greater than that of the reference winding will decrease the coil impedance. The increase in current through the coil increases the induced voltage to the rectifiers (MR3) so increasing the field voltage thus the alternator output voltage.

37 When the alternator output has been increased or decreased to the preset value by the action of the amplifier circuits, the current flow in the regulation winding and the reference winding will again be equal. But for the action of the balance winding, this would permit the alternator output to again increase or decrease. The balance control winding of the pre-amplifier is connected directly across the field and so the current flow in the winding is directly related to the field voltage. The action of the winding is such that it increases or decreases the impedance of the coil by an amount equivalent to that produced by the action of the regulation or reference control winding. The purpose of this being to maintain the field at the value required to produce the regulated output from the alternator, compatible with changing load conditions.

38 Should a failure occur in the voltage regulation circuits which results in an overvoltage condition or excessive current drain, these faults will be detected by, respectively, the overvoltage relay or the ground fault unit.

OVERVOLTAGE RELAY (Fig 3)

39 The overvoltage relay (RL4) incorporated in the AC/DC control panel effects the isolation of the relevant sub-system if the voltage of any output line exceeds a preset limit.

40 The relay derives its supply from a rectifier assembly connected across the alternator output lines. Thus the line having the greatest output voltage determines the value of the rectified DC supply to the relay. If the voltage of any line exceeds a limit preset by an adjustable resistor fitted in the circuit, sufficient current will flow to energize the relay. This results in the completion of a supply to trip the field contactor so ceasing alternator generation. The supply to the field contactor is derived from the emergency DC bus-bar in panel E1 via the ON position of the appropriate LH or RH alternator control and reset switch.

GROUND FAULT UNIT (Fig 4)

41 The ground fault unit detects current leakage from any phase wire in the alternator and in part of the output lines. The unit is effective only from the alternator to the point of the circuit in which it is fitted, see fig 2. Leakage in lines succeeding the unit will not be detected.

42 The ground fault unit consists of three independent and identical circuits each of which incorporates a circuit relay connected across a sensing coil via a rectification circuit. One phase line and its associated neutral line are routed through the sensing coil; thus the sensing coil will be influenced by the magnetic field set up by these lines. Normally, the current in a phase line and its neutral line are equal but of opposite direction of flow. Due to this, the field set up by the lines cancel each other. However, if a leakage occurs in any line, it will effect a change in the strength of the field compared with its associated neutral. If the leakage rate exceeds 30 amperes, sufficient voltage is induced in the sensing coil and rectified to effect the energizing of the circuit relay. When energized, the circuit relay completes a supply circuit to operate the field contactor and cease alternator generation. The supply circuit is derived from the emergency DC bus-bar in panel E1 via the ON position of the appropriate LH or RH alternator control and reset switch.

FIELD CONTACTOR (Fig 3)

43 The field contactor (RL1) operates and shorts the alternator field to ground so ceasing generation, if a supply is received from any one of three circuits. These circuits and the condition under which they provide a supply are as follows:

(a) The alternator control and reset switch when selected to the OFF position.

(b) The overvoltage relay when tripped.

(c) The ground fault unit when tripped.

ARROW 1 SERVICE DATA

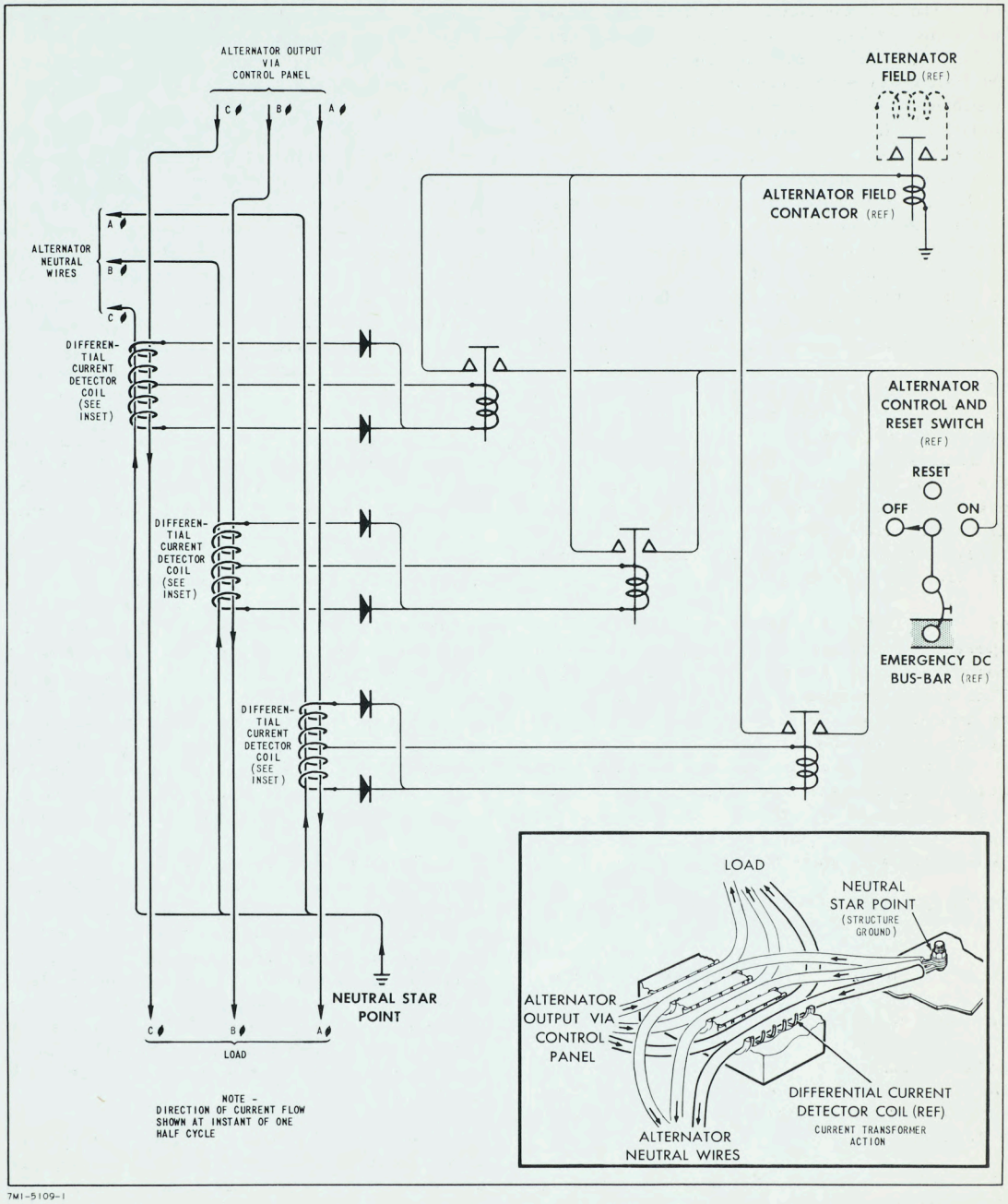


FIG. 4 GROUND FAULT UNIT

44 The field contactor consists of two relays, one being the field relay and the other the reset relay. Under normal operating conditions, the field relay is open and by means of a latching mechanism holds the reset relay in the closed position. In this position, the reset relay closes two sets of contacts. One set of contacts complete a preparatory circuit to the field relay coil. The other set of contacts complete the initial excitation circuit of the alternator field. A third set of contacts which serve the reset circuit are held open. If the alternator switch is selected to OFF, or a ground fault or over-voltage condition is detected, the field relay is energized so shorting the field to ground.

45 When the field relay is in the energized position, the latching mechanism permits the reset relay to return to the open position and in doing so the reset relay mechanically locks the field relay in the energized position to prevent the alternator attempting to generate. The reset relay when open, interrupts the field relay circuit and the initial excitation circuit, and closes the reset circuit.

46 The field contactor is restored to normal operating condition by selecting the alternator control and reset switch to the RESET position. This action energizes, i.e. closes, the reset relay and releases the latching mechanism holding the field relay locked. In doing this the latching mechanism will now hold the reset relay in the energized or closed position. The overvoltage and/or ground fault relay will not be operative until the alternator control and reset switch is set to the ON position.

DISTRIBUTION CONTROL CIRCUITS (Fig 2)

47 The distribution control circuits connect the sub-systems to their appropriate distribution bus-bars. Normally, the RH sub-system is connected to the main AC services load and the LH sub-system is connected to certain sheddable electronic services load. At present, the sheddable load consists of the X-Band Beacon and the electronics bay access door actuator.

48 In the event of the RH sub-system failing, the distribution control circuits isolate the sheddable load and transfer the main AC services load onto the LH sub-system. In the event of both sub-systems failing, the distribution control circuits complete a supply circuit which initiates the operation of the emergency AC system.

49 The operation of the circuits is controlled by two power failure detectors or phase failure indicators, one LH and one RH. The detectors are connected across the relevant LH and RH sub-system bus-bars. When the bus-bars are live, the supply operates a synchro-motor which holds a contact arm in the 'normal' position. This action is resisted by a spring. When the sub-system bus-bars are dead, or if one or more phases fail, the spring returns the contact arm to the 'fail' position.

50 The contact arm of each detector derives a supply from the battery bus via the ON position of the master electrical switch. When the contact arm of the RH power failure detector is in the 'normal' position, the supply is completed to the coil and a normally-open contact of a transfer control relay. This energizes the relay and completes a circuit to energize a RH transfer relay and a shedding relay. The transfer relay completes the RH alternator lines from the sub-system bus-bars to the main AC bus-bars in panels E1 and E20. The shedding relay completes the LH alternator lines to the sheddable electronic services. The supply from the 'normal' position of the LH sub-system detector is completed to a normally-closed contact of the transfer control relay.

51 Should the RH sub-system fail, the contact arm of the detector reverts to the 'fail' position so interrupting the supply to the transfer control relay and the shedding relay. This action permits the supply from the LH sub-system detector to be completed via the normally-closed contacts of the transfer control relay to the LH transfer relay. This connects the LH alternator lines from the sub-system bus-bars to the main AC bus-bars in panels E1 and E20.

52 In the 'fail' position, the RH sub-system power failure detector completes two supply circuits. One supply initiates the operation of the appropriate AC FAIL indicator circuit of the master warning system. The other

supply is maintained on the contact of a primary AC failure relay of the emergency AC system.

53 Should the LH sub-system fail, the operation of the power failure detector interrupts the supply to the transfer control relay. In the 'fail' position the detector completes a supply circuit to initiate the operation of the appropriate AC FAIL indicator circuit and to energize the primary AC failure relay of the emergency AC system. If the RH sub-system failed previous to the LH sub-system, the standing supply on the contact of the relay will initiate the operation of the emergency AC system.

EMERGENCY AC SYSTEM (Fig 2)

54 The emergency AC system comprises a hydraulically-driven 0.9 kva 3-phase alternator, a control solenoid, a transfer relay and a failure relay. The system is automatically operative should the LH and the RH AC sub-system fail.

55 The operation of the emergency AC system is initiated when a supply from the power failure detector of both AC sub-systems appears on the primary AC failure relay. The supply from the RH sub-system appears on the failure relay contact and that from the LH sub-system energizes the relay. In the energized condition, the supply from the RH power failure detector is completed to energize the control solenoid and the transfer relay. The control solenoid completes the hydraulic supply line to the alternator drive motor. The transfer relay transfers certain circuits from the main AC distribution bus-bars in panel E1 to the emergency alternator output lines.

56 The services supplied by the emergency AC system are:

(a) The 115 volts Star/Delta instrument transformer to provide supplies for the J4 compass and the attitude indicator.

(b) The 115/26 volt instrument transformer of the electronics group. The transformer provides 26 volts AC required by the J4 compass.

(c) The J4 Compass 115 volt AC supply.

(d) The IFF Installation.

(e) The Emergency Yaw Damper System.

EXTERNAL SUPPLY (Fig 2)

57 A receptacle is provided on the undersurface of the duct bay to facilitate the connection of an external source of 115/200 volts 3-phase AC power and, for control purposes, a 28 volts DC supply.

58 The external supply circuits are completed when the master electrical switch is selected to the ON position. This action energizes an emergency bus-bar relay, the function of which is to interconnect the battery bus-bar and the emergency bus-bar, see DC Supply: Emergency Distribution Circuits. When an external supply is connected, the control DC supply circuit will be completed by the emergency bus-bar relay to an external supply slave relay and a LH and a RH external supply line relay. The slave relay, via its normally-closed contacts, completes the supply circuits from the master electrical switch to the LH and the RH AC sub-system line relays. Energizing the slave relay isolates the line relays, thus eliminating the possibility of connecting the aircraft supply and the external AC supply to the sub-system bus-bars. The external supply line relays complete the external AC supply to the appropriate LH or RH sub-system bus-bars.

DC SUPPLY

GENERAL

59 DC power is supplied by two transformer-rectifier units one of which is incorporated in the LH AC/DC control panel and the other in the RH AC/DC control panel. Each transformer-rectifier unit constitutes a DC sub-system. In addition to the rectification circuits, the units incorporate circuits for voltage regulation, isolation, overvoltage and reverse current.

60 The DC sub-systems are operated in parallel, their respective output being supplied to the DC system bus-bar in the main power panel E28.

61 From the DC system bus-bar, distribution is made to four main DC bus-bars from which distribution is made to the majority of the DC services. The remaining DC services are connected to a battery bus-bar and emergency bus-bars. These bus-bars derive their supply from the battery unless the DC system voltage exceeds the battery voltage by at least 0.5 volt. In this condition the bus-bars are connected via a relay to the DC system bus-bars. Note that when this occurs the battery is charging from the DC system.

62 Certain of the main DC bus-bars are supplied via relays. These relays are operated by the distribution control circuits and are energized if both sub-systems are operating. If one sub-system fails, the relays are de-energized so isolating certain services. This ensures that the total possible DC load demand cannot exceed the capacity of one sub-system. In the event that both sub-systems fail, the only operative services are those connected to the battery and the emergency bus-bars.

63 As the component circuits of the LH and RH transformer-rectifier units are identical, the following descriptions are equally applicable to both.

RECTIFICATION AND REGULATION CIRCUITS (Fig 3)

64 The transformer-rectifier draws its AC input from the appropriate LH or RH AC sub-system bus-bars. The maximum 3-phase line current is 14 amperes. The maximum DC line load is 110 amperes, at 28 volts.

65 Prior to rectification the AC input is stepped-down by a three-phase transformer (TR4) to a value which would provide a rectified DC output of less than 28 volts. This permits voltage regulation to be obtained by inserting a three-phase booster transformer (TR5) in series with the stepped-down AC and controlling the degree of boost. This is accomplished by a magnetic amplifier circuit (TD2) fitted in the primary side of the boost transformer.

66 The magnetic amplifier is, essentially, a controllable impedance inserted between the primary windings of the boost transformer and the AC input lines. The effect of the amplifier is to increase or decrease the current flow in the booster transformer primary, so increasing or decreasing the voltage induced in the secondary. Therefore, the degree of boost to the stepped-down AC is determined by the current flow through the magnetic amplifier.

67 The magnetic amplifier is similar in construction and principle of operation to those of the AC regulation circuits described in paras 26 and 27. The operation of the amplifier in the DC circuits is described in the following paragraphs.

68 The magnetic amplifier comprises three pairs of coils, one pair for each input line, and three control windings. Only two of the control windings are used, namely a reference winding and a regulation winding. As the reference winding and the regulation winding oppose each other, there will be magnetic effect in the amplifier core unless the current in each coil is equal. In this instance the magnetic effect of one coil cancels that of the other.

69 The reference winding is connected across the DC output and its initial reference value is set by an adjustable resistor fitted in the circuit. The regulation winding derives its signal from a pre-amplifier or sensing assembly.

70 The pre-amplifier or sensing assembly consists of a magnetic amplifier (TD3) and a full wave rectifier circuit (MR12). The coils of the pre-amplifier are in series with the full wave rectifier circuit and both are connected across the secondary of a transformer (TR9) the primary of which is tapped across two of the AC input lines. Thus the load on the transformer secondary will be proportional to the impedance of the pre-amplifier coils, i.e. an increasing impedance results in a decreased current flow so decreasing the load. The output of the rectifiers is connected across the regulation winding of the magnetic amplifier.

71 The impedance of the pre-amplifier is controlled by three windings, namely a reference control winding, a regulation control winding and a paralleling control winding.

72 The reference winding and the regulation winding of the pre-amplifier derive their supply from the DC line. The DC is supplied to the reference winding via a barretter which provides a constant current in the winding regardless of the voltage. The regulation winding is supplied via three resistors, two of which are adjustable to permit the operating point to be preset. One resistor permits a coarse adjustment and the other a fine adjustment. Initially, the circuit is adjusted to provide 28.5 volts at no-load. In this condition the current flow in the regulation and reference windings will be equal.

73 An increase in the line voltage above the preset reference will increase the current flow in the regulation winding to a value greater than that in the reference winding. As the field set up in the core by the regulation winding is of the same polarity as that set up by the coil current, the impedance is decreased. The resulting increase in current flow through the coil loads the transformer secondary, so effecting a decrease in the voltage across the coil and the rectifiers (TD3, MR12). This, in turn, decreases the output from the rectifiers and consequently the current in the regulation winding of the magnetic amplifier. Due to this, the current in the reference winding of the magnetic amplifier will be greater than that in the regulation winding. As the field set up in the core by the reference winding is of the opposite polarity to that set up by the coil current the impedance of the coil is increased. The resulting decrease in current through the coil is reflected in the secondary of the transformer as a reduction in the induced voltage. Consequently, the degree of boost to the stepped-down AC will be decreased.

74 The paralleling control winding of one pre-amplifier is interconnected with the paralleling winding of the pre-amplifier of the opposite panel. The circuit of each panel is interconnected via the discriminator coil of the overvoltage relay and a normally-closed contact of the reverse current relay of their respective sub-systems.

75 Each paralleling control winding derives its supply from an induction transformer-rectifier assembly which is influenced by the stepped-down AC. Thus the rectified output to the paralleling winding in each panel will be dependent upon the load supplied by the particular sub-system.

76 When both units are sharing the load within 10-12 amperes the voltages developed in the paralleling circuits will be equal and they will balance out. Should the load become unbalanced, the sub-system carrying the greater load will develop a proportionately greater output from the induction transformer-rectifier circuit. The current flow in the paralleling circuit of the unit carrying the greater load will be such that the impedance of the pre-amplifier will decrease so reducing the signal voltage to the magnetic amplifier regulation winding with the resulting decrease in boost. The direction of current flow in the paralleling winding of the opposite panel will be such that the impedance of the pre-amplifier will increase so increasing the signal voltage to the magnetic amplifier regulation winding. This results in a decrease in the impedance of the coil which is accompanied by an increase in current flow in the boost transformer primary, and in turn, an increase in boost with the accompanying increase in output.

77 A resistor is fitted across the rectifier circuit. The value of this resistor decides the load spread difference at which the paralleling circuits operate. The resistor is not adjustable.

78 In the event of a fault in the voltage regulation or rectification circuits which results in a reversal of current, or high input current in relation to output current, this condition will be detected by the reverse current circuit. If the fault results in an output voltage in excess of a preset limit this will be detected by the overvoltage circuit. The operation of the overvoltage or reverse current circuits will trip the isolating circuit relay so disconnecting the AC input.

REVERSE CURRENT CIRCUIT (Fig 3)

79 The reverse current circuit (RL5) incorporates a polarized relay and a main contactor. The polarized relay incorporates three coils, namely a reverse current coil, a differential coil and a reset coil; either one of the three coils can operate the relay.

ARROW 1 SERVICE DATA

80 The reverse current coil is fitted in series with the DC output line and current flow in the proper direction holds the relay open. Should a fault occur which causes a drain from the main DC bus-bar, the direction of flow of current through the reverse current coil will be reversed. This action closes the relay which completes a supply to trip the isolating relay so disconnecting the AC input.

81 The differential coil is supplied from a transformer-rectifier assembly (TR6, MR8) connected across the AC input, but the direction of current flow is opposite to that of the reverse current coil. Therefore, unless it is counteracted by a corresponding increase in current flow through the reverse current coil, increasing current flow through the differential coil will correspondingly decrease the effectiveness of the reverse current coil. Should a fault develop which causes an increase in the input current and there is not a corresponding increase in the output current, the increased flow of current through the differential coil will reduce the effectiveness of the reverse current coil to the extent that the relay closes and so trips the isolating relay.

82 Due to the fact that the relay is polarized, it will remain in the position to which it is driven. Therefore, once tripped, the relay must be re-energized to the 'open' position. This is done by the reset coil which receives a DC supply when the DC reset switch is depressed.

83 The main contactor of the reverse current circuit derives its supply from a rectifier assembly connected across the stepped-down AC. When the AC output is at the correct level the rectified DC output will be sufficient to energize the relay, so completing the DC supply to the DC system bus-bar. A second set of contacts complete the paralleling circuit. See para 74.

OVERVOLTAGE CIRCUIT (Fig 3)

84 The overvoltage circuit (RL2) consists of a relay incorporating two coils, namely a voltage coil and a discriminator coil. The voltage coil is connected across the DC output and an adjustable resistor is fitted in the negative side to permit the trip voltage to be preset. If the output voltage exceeds the preset limit, the current flow is sufficient to energize the relay. This action completes a supply circuit to the isolating relay which disconnects the AC input.

85 The function of the discriminator coil is to prevent the overvoltage relay operating if the overvoltage condition is caused by the opposite sub-system. The coil is connected in series with the paralleling circuit, in effect the coil of LH and RH overvoltage circuits are in series. When an overvoltage condition occurs in a unit, there will be an increased flow of current in the paralleling circuit of the panel operating normally. The direction of current flow in the discriminator coils will be such that it will aid the voltage coil of the panel producing the overvoltage and oppose the voltage coil of the panel operating normally.

ISOLATING RELAY ASSEMBLY (Fig 3)

86 The isolating relay assembly (RL3) is energized by the operation of the overvoltage circuit or the reverse current circuit. When energized, the relay assembly interrupts the three-phase input and a shedding circuit of the distribution circuits, see para 91.

87 The assembly consists of two relays, one is the interrupter relay and the other the reset relay. Under normal conditions the interrupter relay is closed and by means of a latching mechanism holds the reset relay open. In this position the reset relay completes a preparatory circuit to the coil of the interrupter relay. If the overvoltage circuit or the reverse current circuit operate, the interrupter relay is energized so interrupting the AC input and the shedding circuit supply.

88 When the interrupter relay is in the energized position, the latching mechanism permits the reset relay to close and in doing so the reset relay mechanically locks the interrupter relay in the energized position. The reset relay in the closed position interrupts the energizing circuit of the interrupter relay and completes a reset circuit.

89 The isolating relay is restored to normal operating condition by depressing the DC reset switch in the front cockpit. This action energizes, i.e. opens, the reset relay which releases the latching mechanism. In doing this the latching mechanism will hold the reset relay in the open position which breaks the reset circuit and completes the preparatory circuit to the coil of the interrupter relay.

MAIN DISTRIBUTION AND CONTROL CIRCUITS (Fig 5)

90 Four main distribution bus-bars derive a supply from the DC system bus-bar in the main power panel E28. They are as follows:

(a) The main DC bus-bar in panel E1.

(b) The main DC bus-bar in panel E20.

(c) The electronics main DC bus-bar in JB R1.

(d) The main DC shedding bus-bar in the main power panel E28. This bus-bar supplies the following subsidiary shedding bus-bars:

(1) The DC shedding bus-bar in panel E1.

(2) The electronics DC shedding bus-bar in JB R1.

91 The supply to the main DC shedding bus-bar is controlled by two relays namely, a shedding cut-out relay and a shedding control relay. The LH sub-system is connected to the coil of the cut-out relay and the RH sub-system is connected to the contact of the cut-out relay. The supply in both cases is derived from the relevant LH or RH transformer-rectifier unit via the normally-closed contact of the isolating relay. When both units are operating, the LH sub-system energizes the cut-out relay so completing the supply from the RH sub-system to the coil of the shedding control relay. The control relay completes the supply from the DC system bus-bar to the main DC shedding bus-bar.

92 In the event of one unit failing the supply to the coil or the contact of the cut-out relay will be interrupted. Either condition will effect the de-energizing of the shedding control relay; this action isolates the DC services connected to the shedding bus-bars. At present these services consist of the landing light and the taxi light. No electronic DC services are shed.

93 The supply to the shedding cut-out relay from each transformer-rectifier unit is also supplied to a corresponding LH or RH signal relay. When energized, these relays complete parallel circuits to a battery reverse current relay assembly. In the de-energized condition, the signal relays complete a supply circuit to the L or R DC FAIL indicator circuit of the master warning system.

94 The battery reverse current relay assembly, see fig 6, completes a supply line from the DC system bus-bar to the battery bus-bar. The assembly consists of three relays namely, a pilot control relay, a main control relay and a main contactor.

95 When one or both sub-systems are operating a supply circuit is completed to the bias coil of the main control relay and to the pilot control relay. The pilot control relay when energized completes a supply circuit to the differential voltage coil of the main control relay. This coil is connected, in effect, across the DC system bus-bar and the battery bus-bar. If the system bus-bar voltage exceeds the battery bus-bar voltage by at least 0.5 volt, the combined effect of the bias coil and the differential coil will close the main control relay. This action completes a supply circuit to energize the main contactor which completes a supply line from the DC system bus-bar to the battery bus-bar. In addition to completing the main supply line, the main contactor completes a supply to energize the battery use indicator relay which interrupts the supply to the battery use indicator light circuit of the master warning system.

96 Should the differential voltage between the DC system bus-bar and the battery bus-bar decrease below 0.5 volt the effect on the circuit will be such that power will be demanded from the battery. In this condition the reversed flow of current through the current coil combined with that through the differential coil opposes

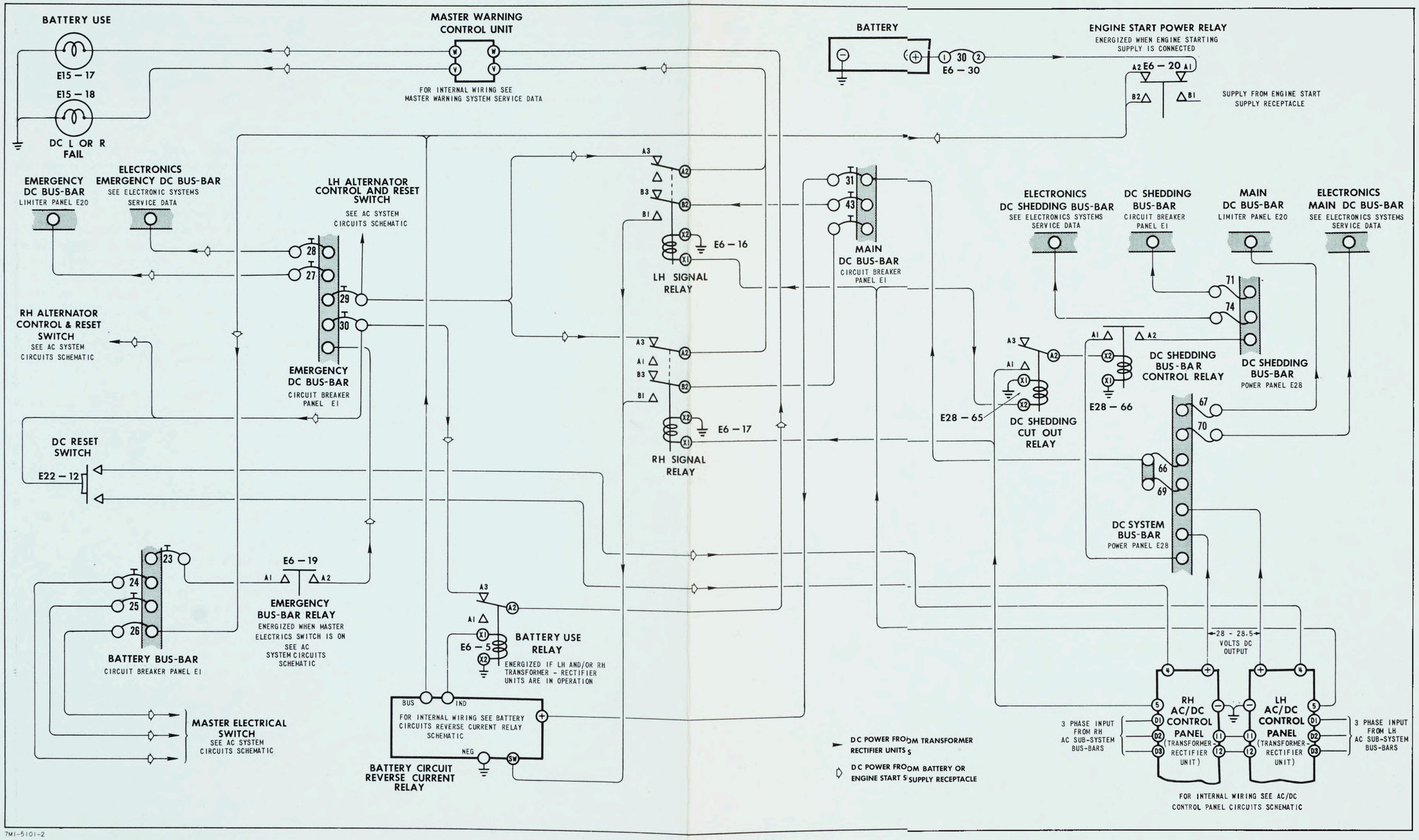


FIG. 5 DC POWER SUPPLY SCHEMATIC

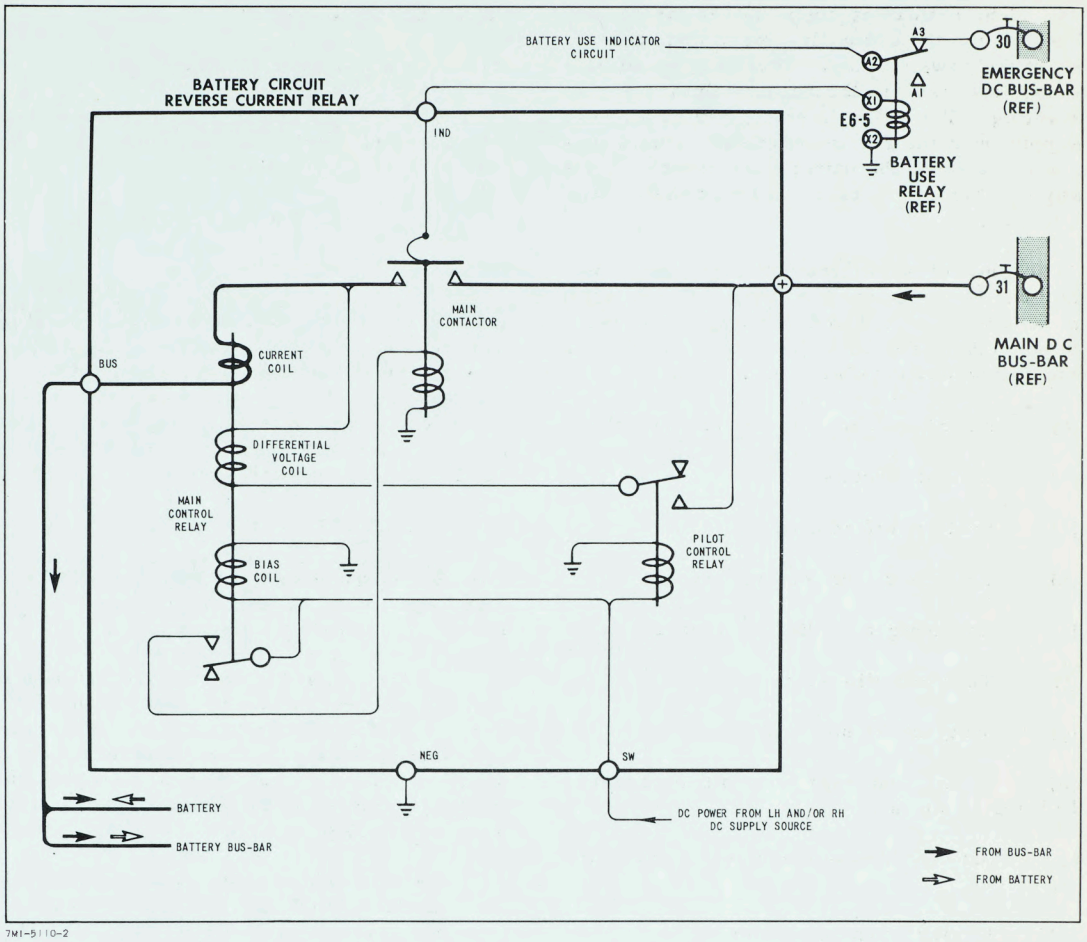


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FIG. 6 BATTERY CIRCUIT REVERSE CURRENT RELAY

the action of the bias coil and permits the main control relay to open. If both DC sub-systems fail, the bias coil and the differential coil are de-energized and the main control relay opens, since the effect of current in the reverse coil alone is not sufficient to hold the relay closed. When the main control relay is open the supply to the main contactor is interrupted which, in turn, interrupts the supply line from the main DC bus-bar to the battery bus-bar and also the supply to the battery use relay. This action permits the relay to complete the supply to the battery use indicator circuit.

EMERGENCY DISTRIBUTION AND CONTROL CIRCUITS (Fig 5)

97 DC services which are to be operative in the event of both DC sub-systems failing are connected to the battery bus-bar or the emergency bus-bars. The emergency bus-bars are located in panels E1, E20 and JB R1. The bus-bars in panels E20 and JB R1 derive their supply from the emergency bus-bar in panel E1. The emergency bus-bar in panel E1 is interconnected with the battery bus-bar via a relay which is energized when the master electrical switch is selected to the ON position.

98 The battery is connected to the battery bus-bar via the normally-closed contacts of a starting power relay. The function of this relay is to isolate the battery during engine starting. The relay is energized by a power supply from the starter cart and, when energized, isolates the battery and completes the supply from the starter cart to the battery bus-bar.

99 The following circuits derive their supply from the emergency bus-bars. Circuits (a) to (k) are connected to the emergency bus-bar in panel E1. The remainder are connected to the emergency bus-bar in panel E20:

(a) Engine starting and control circuits

(b) Relight circuits

(c) Fuel crossfeed circuit

(d) Emergency fuel control circuits

(e) Landing gear indication circuits

(f) Turn and slip indicator

(g) Speed brake solenoid

(h) Front and rear cockpit emergency lighting circuits

(j) Air conditioning dump switch and warning circuit

(k) Master warning system

(m) Ignition circuits (No. 2 igniters)

(n) Engine intake de-icing control circuits

(p) Fire detection circuits

100 At present, the bail-out circuit is the only service connected to the emergency bus-bar in JB R3.

101 The following services demand power from both the emergency bus-bar in panel E1 and the battery bus-bar.

(a) Fire protection system

(b) Canopy actuation

(c) Low pressure cocks circuits

102 The circuits routed via the master electrical switch derive their supply from the battery bus-bar, see fig 2.

FUNCTION TESTING

GENERAL

103 With the exception of the system function test, the aid of an Electrical Power Test Panel is required to test the power supply circuits. The test panel (see fig 7) incorporates components which facilitate checking the AC line voltage, line current and output frequency, and DC line voltage and current.

FUNCTION TEST

104 The engines must be running to function test the system. Check the operation of the AC sub-system proceeding as follows:

(a) Select the LH and the RH alternator control and reset switches to the OFF position. Check that the LH and the RH AC FAIL indicators on the master warning system indicator panel are illuminated. Check also that the master warning indicators on the main instrument panel are illuminated.

(b) Select both switches to the ON position. Note that the AC FAIL and master warning indicators are extinguished.

(c) Isolate the RH sub-system by selecting the RH alternator control and reset switch to the OFF position. Ensure that the transfer circuits have operated by checking that AC power is available, e.g. operate the cockpit flood lights. Check that sheddable loads are disconnected, e.g. it should not be possible to operate the electronics equipment bay centre access door actuator.

(d) Reset the RH alternator control and reset switch to the ON position.

105 Check the operation of the emergency AC system proceeding as follows:

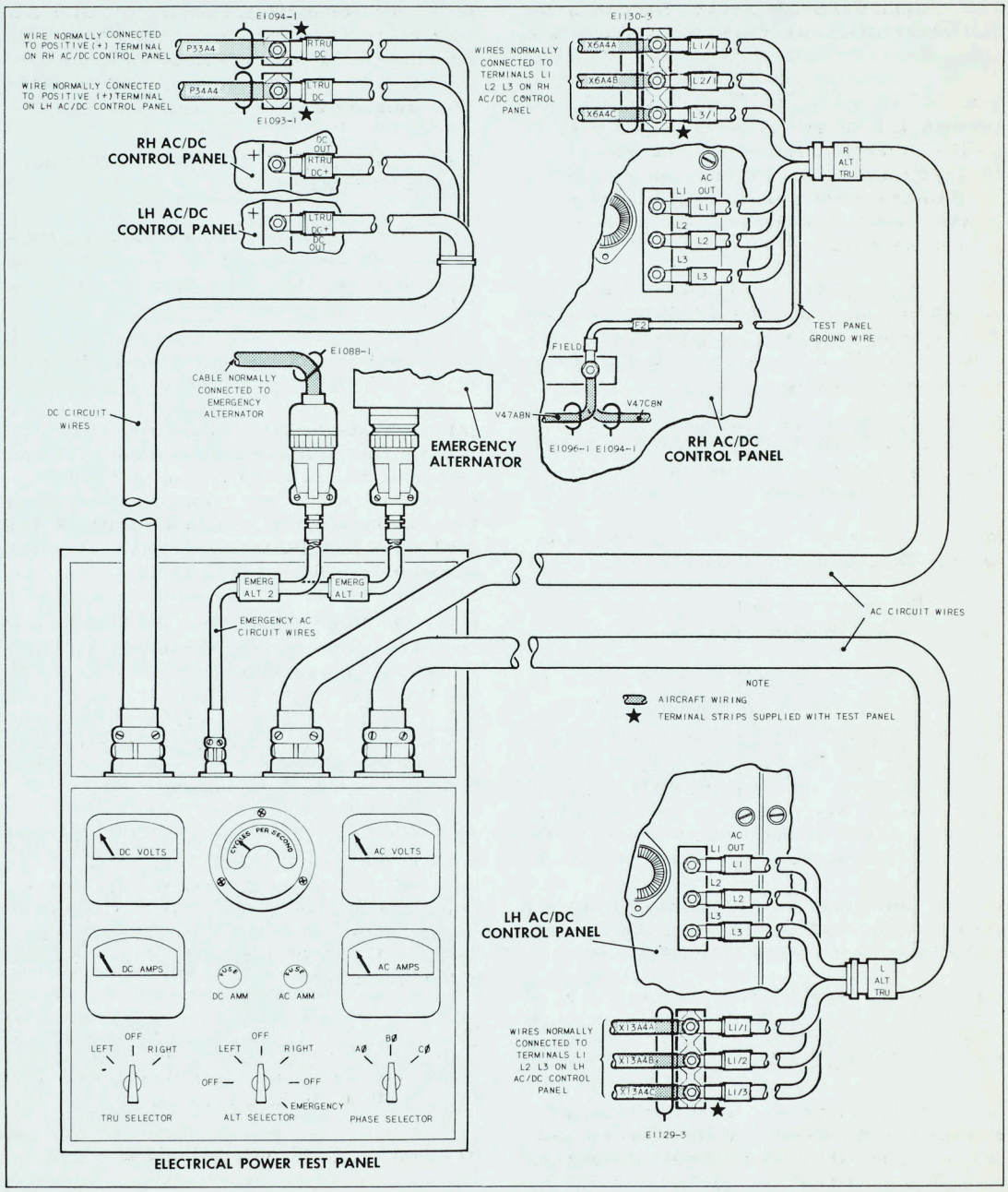

FIG. 7 ELECTRICAL POWER TEST PANEL

(a) Select the LH and the RH alternator control and reset switches to the OFF position.

NOTE

With both AC sub-systems inoperative, DC power is supplied by the battery. Therefore, reduce DC power demand to a minimum, or connect a DC source to the engine starting receptacle on the nose gear leg.

(b) On panel E21 which is fitted just aft of the bulkhead at station 485 LH side, select and hold in the test position, the ground test override switch. This action overrides the ground control relay (see fig 2).

(c) Check that the emergency alternator is operative by noting that the OFF flag of the attitude gyro indicator on the main instrument panel is not visible.

(d) Release the ground test override switch to the NORMAL position.

(e) Re-select the alternator control and reset switches to the ON position.

106 Check the operation of the DC sub-systems proceeding as follows:

(a) Select either the LH or the RH alternator control and reset switch to the OFF position and check that the L OR R DC FAIL indicator on the master warning system indicator panel and the master warning indicators on the main instrument panel are illuminated.

(b) Ensure that the sheddable DC load has been shed by checking that the landing and taxi lights do not illuminate when selected on.

(c) Select the remaining alternator control and reset switch to the OFF position then check that the BATT USE indicator on the master warning indicator panel is illuminated.

(d) Check that power is available from the emergency DC bus-bar by operating the map and emergency flood light. To ensure that the main DC bus-bars are isolated, check that the high altitude flood lights are inoperative when selected ON.

(e) Re-select the LH and the RH alternator control and reset switches to the ON position. Note that the LH and the RH AC FAIL indicator, the DC L OR R FAIL indicator and the BATT USE indicator are extinguished.

PROCEDURE PRIOR TO SYSTEM TESTING AND ADJUSTMENT

107 Prior to commencing the following tests, connect the Electrical Power Test Panel, see fig 7, into the electrical system proceeding as follows:

(a) Select the master electrical switch to the OFF position.

(b) On the RH AC/DC control panel, disconnect the circuit wires from the AC output terminals L1, L2 and L3, and the circuit wire from the DC output + (positive) terminal. Connect these wires to the appropriate R ALT TRU and R TRU DC terminals of the electrical power test panel.

(c) In lieu of the circuit wires removed from the RH panel, connect the circuit wires in the cable assemblies identified R ALT TRU and R TRU DC of the test panel. An additional wire identified F2 is contained in the cable. Connect this wire to F2 of the RH panel or a suitable ground point. This wire is contained only in the RH cable assembly.

(d) On the LH AC/DC control panel, disconnect the circuit wires from the AC output terminals L1, L2 and L3, and the circuit wires from the DC output + (positive) terminal. Connect these wires to the appropriate L ALT TRU and L TRU DC terminals of the electrical power test panel.

(e) In lieu of the circuit wires removed from the LH panel, connect the circuit wires in the cable assemblies identified L ALT TRU and L TRU DC of the test panel.

SYSTEM TESTING AND ADJUSTMENT

108 Check the output of the AC sub-systems and the DC sub-systems proceeding as follows:

ARROW 1 SERVICE DATA

(a) Connect a DC supply to the engine starting receptacle on the nose gear leg. This will prevent discharge from the battery during the tests.

(b) Have the engines running at idling speed.

(c) Select the LH and the RH alternator control and reset switch to the ON position. Note that the master electrical switch is in the ON position.

(d) Select the ALT SELECTOR switch on the test panel to LEFT and RIGHT in turn; the output frequency indicated on the frequency meter when each position is selected should be 400 cps $\pm$ 4 cps.

(e) Select the master electrical switch to the OFF position to obtain voltage readings with the system off-load.

(f) Select the ALT SELECTOR to the LEFT position. Select the PHASE SELECTOR to positions A $\emptyset$, B $\emptyset$ and C $\emptyset$. For each selection the indicated voltage should be 115 volts $\pm$ .5 volt. If necessary, obtain this figure by adjusting the control marked AC CONTROL FINE on the LH AC/DC control panel.

(g) Select the ALT SELECTOR to the RIGHT position. Select the PHASE SELECTOR to positions A $\emptyset$, B $\emptyset$ and C $\emptyset$. For each selection the indicated voltage should be 115 volts $\pm$ .5 volt. If necessary, obtain this figure by adjusting the control marked AC CONTROL FINE on the RH AC/DC control panel.

(h) Select the master electrical switch to the ON position. Select the ALT SELECTOR to the LEFT and then to the RIGHT. In each position select the PHASE SELECTOR to A $\emptyset$, B $\emptyset$ and C $\emptyset$. Note that in each position the indicated current is not excessive in any line. To provide a more complete test, definite figures for line current will be included when available.

(j) Select the TRU SELECTOR on the test panel to the RIGHT position and check that the indicated DC voltage is 28-28.5 volts. If necessary, obtain this figure by adjusting the control marked DC CONTROL FINE on the RH AC/DC control panel.

(k) Select the TRU SELECTOR to the LEFT position and check that the indicated DC voltage is 28-28.5 volts. If necessary, obtain this figure by adjusting the control marked DC CONTROL FINE on the LH AC/DC control panel. If adjustment was necessary, re-select the RIGHT position on the TRU SELECTOR and check the indicated voltage; adjust the DC CONTROL FINE of the LH and the RH panel in conjunction until a balance between the indicated voltages is obtained.

(m) Select the LEFT position and then the RIGHT position. Note the indicated current for each selection; the difference in load spread should not exceed 11 amps. If this figure is exceeded, re-check the DC voltages and adjust if required. If the difference still exceeds 11 amps remove the units for bench testing.

PROCEDURE UPON COMPLETION OF SYSTEM TESTS

109 Upon completion of system tests proceed as follows:

(a) Select the ALT SELECTOR to the RIGHT position.

(b) Have the RH engine shut down. During the run down note that when the output frequency decreases to 360-375 cps the indicated voltage drops to zero.

(c) Select the ALT SELECTOR to the LEFT position.

(d) Have the LH engine shut down. During the run down note that when the output frequency decreases to 360-375 cps the indicated voltage drops to zero.

(e) Disconnect and remove the test panel then reconnect the system wiring to their appropriate terminals.

(f) Connect an external source of AC supply to the external supply receptacle.

(g) Remove the DC supply source from the engine starting receptacle.

ARROW 1 SERVICE DATA

EMERGENCY AC SYSTEM TEST

110 Check the output of the emergency AC system using the electrical power test panel proceeding as follows:

(a) If the engines are not to be run, have a hydraulic test machine trailer connected to the aircraft.

(b) Connect the electrical power test panel into the emergency alternator output circuit proceeding as follows:

(1) Disconnect the electrical plug from the emergency alternator and connect it to the test panel cable receptacle marked EMERG ALT 2.

(2) Secure the test panel cable marked EMERG ALT 1 to the emergency alternator receptacle.

(c) To prevent discharge from the battery, connect a source of DC supply to the engine starting receptacle.

(d) If the engines are running, select the LH and the RH alternator control and reset switch to the OFF position. If an external source of AC supply is connected, switch it off or disconnect it.

(e) Select and hold the ground test override switch on panel E21 to the TEST position. This action overrides the ground control relay.

(f) Check that the alternator output frequency indicated on the test panel frequency meter is 400 $\pm$ 20 cps.

(g) Select the PHASE SELECTOR to positions A Ø, B Ø and C Ø, in each position check that the indicated AC voltage is 115 $\pm$ 5 volts.

(h) Check that the attitude gyro indicator on the main instrument panel is operative by noting that the OFF flag is not visible.

(j) Release the ground test override switch. Note that the alternator is inoperative.

(k) Re-select the alternator control and reset switches to the ON position or re-connect the external source of AC. Then disconnect the DC source from the engine starting receptacle.

(m) Disconnect and remove the test panel and reconnect the electrical cable to the alternator receptacle.

LOCATION OF POWER SUPPLIES ELECTRICAL EQUIPMENT

IDENT NO.	ITEM NO.	DESCRIPTION
1		CONSTANT SPEED UNIT - LH
2		ALTERNATOR - LH
3		GROUND FAULT UNIT - LH
4		ELECTRICAL POWER PACK (EMERGENCY ALTERNATOR AND CONTROL SOLENOID)
5	E47	EMERGENCY ALTERNATOR LIMITER PANEL
6		EXTERNAL POWER RECEPTACLE - SEE DETAIL "A"
7	E21	REFUEL AND TEST PANEL
	-7	GROUND TEST OVERRIDE SWITCH
8	E28	MAIN POWER PANEL – SEE MAIN POWER PANEL E28 ILLUSTRATIONS PARTS 1 AND 2
9	E4	DISTRIBUTION PANEL ★
10	E9-2	TERMINAL STRIP
11	E9-3	TERMINAL STRIP
12		ENGINE STARTING AND EXTERNAL D C SUPPLY RECEPTACLE
13		MASTER WARNING CONTROL UNIT
14		115V INSTRUMENT TRANSFORMER
15		BATTERY
16	E1	CIRCUIT BREAKER PANEL ★
17	E3	ACCESSORY PANEL ★
	-15	PRIMARY EMERGENCY A C SUPPLY TRANSFER RELAY
18	E6	RELAY PANEL ★
	-5	RELAY—BATTERY USE
	-16	RELAY—L H SIGNAL
	-17	RELAY—R H SIGNAL
	-18	RELAY—REVERSE CURRENT
	-19	RELAY—EMERGENCY DC BUS-BAR
	-20	RELAY—STARTING POWER
	-23	RELAY—PRIMARY AC FAILURE
19	E2	TERMINAL STRIP
20	E15	MASTER WARNING INDICATOR PANEL - SEE DETAIL "B"
	-15	AC FAIL INDICATOR R H
	-16	AC FAIL INDICATOR L H
	-17	BATTERY USE INDICATOR
	-18	DC L OR R FAIL INDICATOR
21	E16	POWER AND STARTING PANEL - SEE DETAIL "B"
	-2	MASTER ELECTRICS SWITCH
22	E22	OXYGEN PANEL - SEE DETAIL "B"
	-2	ALTERNATOR CONTROL & RESET SWITCH L H
	-3	ALTERNATOR CONTROL & RESET SWITCH R H
	-12	D C RESET SWITCH
23	E20	LIMITER PANEL ★
24		GROUND FAULT UNIT - RH
25		CABINET CONTAINING LH AND RH A C/D C CONTROL PANELS
26		ALTERNATOR - RH
27		CONSTANT SPEED UNIT - RH

★ SEE ELECTRICAL SYSTEM, GENERAL INFORMATION - SECT 36 FOR ILLUSTRATION OF PANELS E1 E3 E4 E6 AND E20

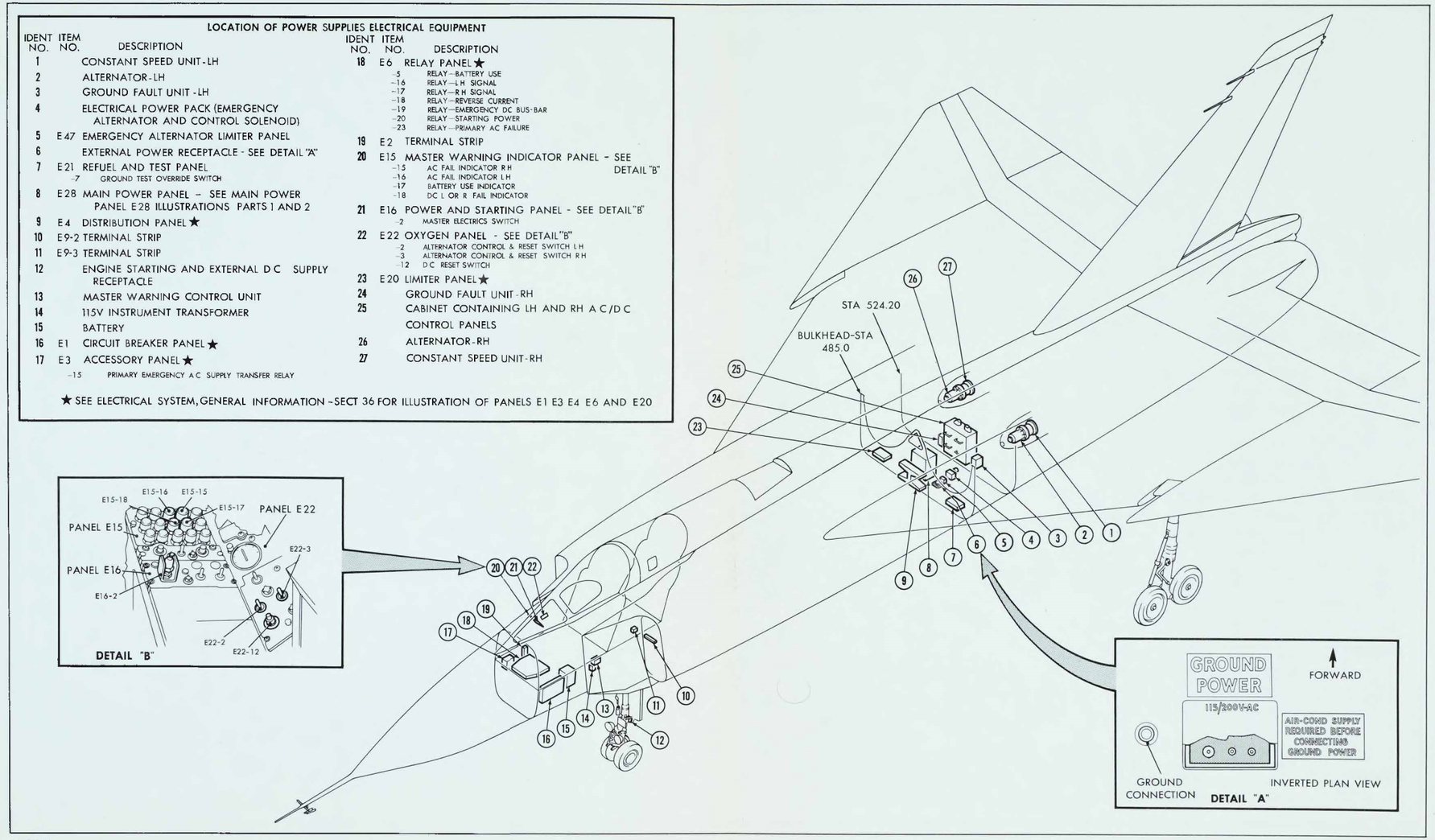

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FIG. 8 LOCATION OF EQUIPMENT - POWER SUPPLIES

ARROW 1 SERVICE DATA

IDENT NO.	DESCRIPTION
1 2 3 5 6	TERMINAL STRIPS—AC/DC CIRCUIT
7 8	CONNECTORS—PANEL
CABINET 36 37	CONNECTORS—PANEL
63	CONNECTOR—PANEL
9 10	CONNECTORS—TRAY
11	RELAY—LH AC LINE
12	RELAY—AC SHEDDING
TRAY NO. 1 13	RELAY—LH EXTERNAL SUPPLY LINE
16 17 18 19 20 22 23 24 25 26 28 29 30 31 32	LIMITERS—AC POWER SUPPLY (ANNOTATION SHOWN ON PART 2)
33	RELAY—EXTERNAL LINE SLAVE
34	RELAY—TRANSFER CONTROL
83	POWER FAILURE DETECTOR—AC LH
38 39	CONNECTORS—TRAY
40	RELAY—RH TRANSFER
41	RELAY—LH TRANSFER
TRAY NO. 2 45	RELAY—RH AC LINE
46	RELAY RH EXTERNAL SUPPLY LINE
48 49 50 51 53 54 55 56 58 59 60 61	LIMITERS—AC POWER SUPPLY (ANNOTATION SHOWN ON PART 2)
84	POWER FAILURE DETECTOR—AC RH
64	CONNECTOR—TRAY
65	RELAY—DC SHEDDING CUT OUT
TRAY NO. 3 66	RELAY—DC BUS-BAR SHEDDING CONTROL
67 68 69 70 71 74	LIMITERS—DC POWER SUPPLY (ANNOTATION SHOWN ON PART 2)

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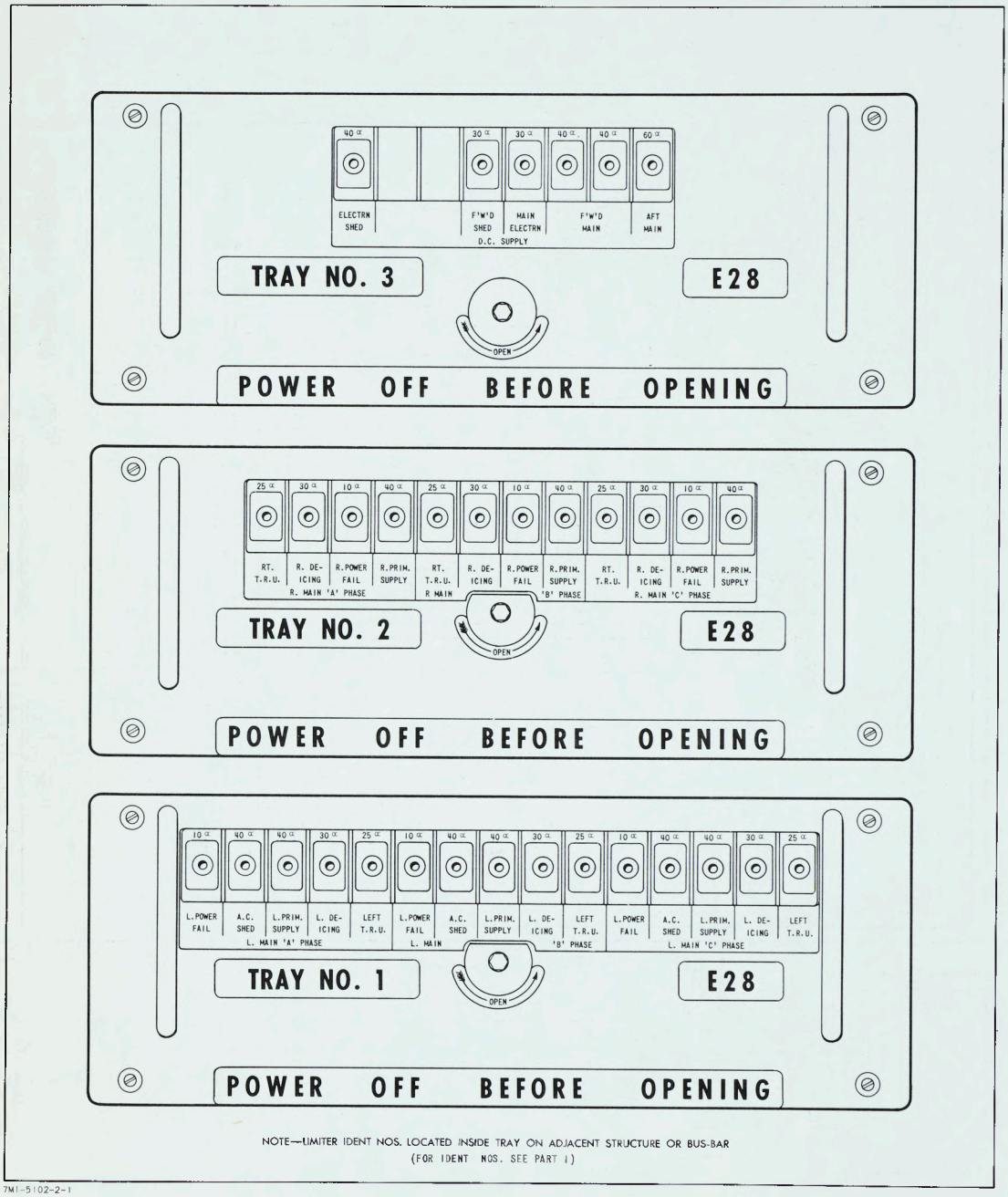
FIG. 9 LOCATION OF EQUIPMENT - MAIN POWER PANEL E28 (SHEET 1 OF 2)



NOTE—LIMITER IDENT NOS. LOCATED INSIDE TRAY ON ADJACENT STRUCTURE OR BUS-BAR
(FOR IDENT NOS. SEE PART 1)

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FIG. 9 LOCATION OF EQUIPMENT - MAIN POWER PANEL E28 (SHEET 2 OF 2)

ARROW 1 SERVICE DATA

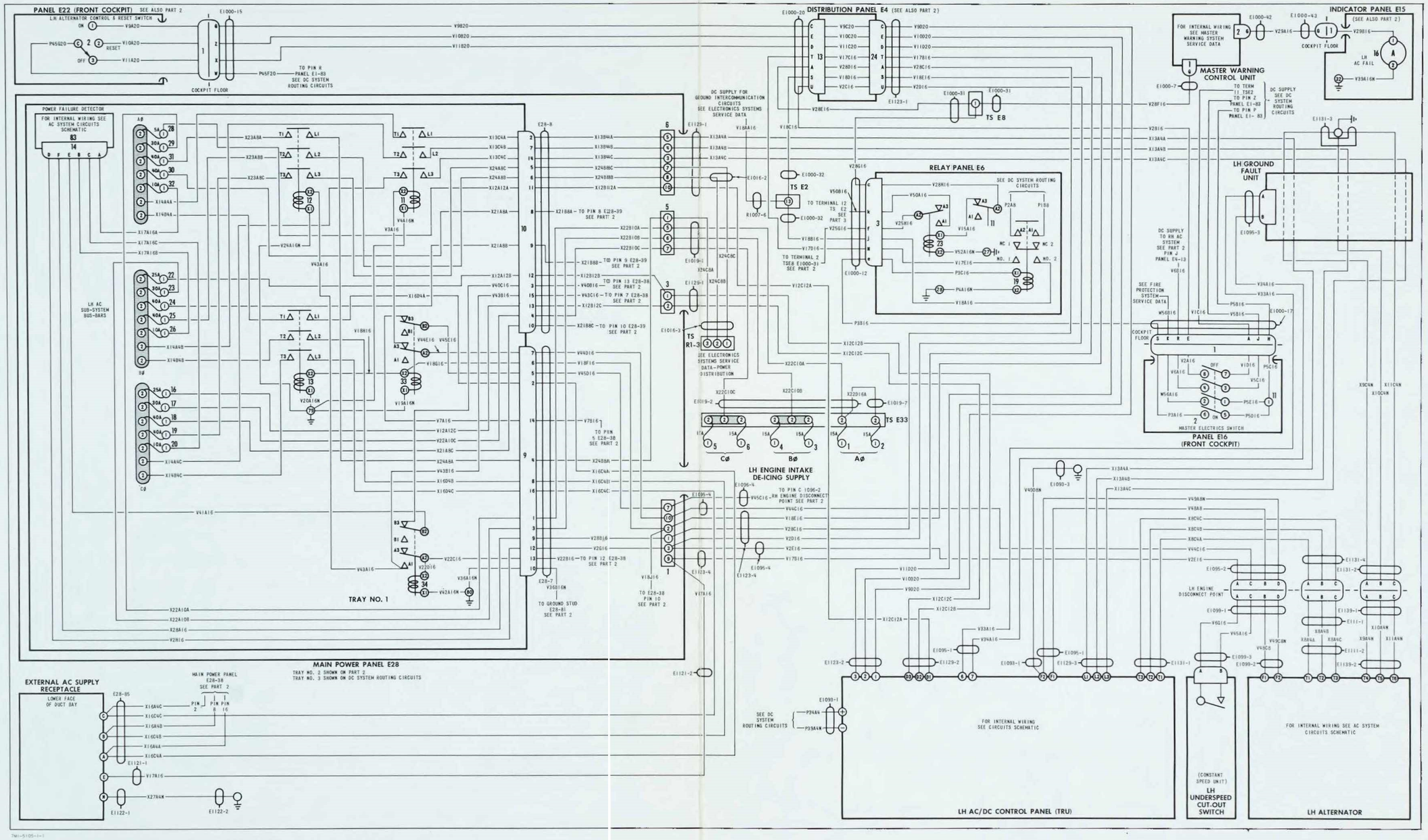

FIG. 10 AC POWER SUPPLY (SHEET 1 OF 3)

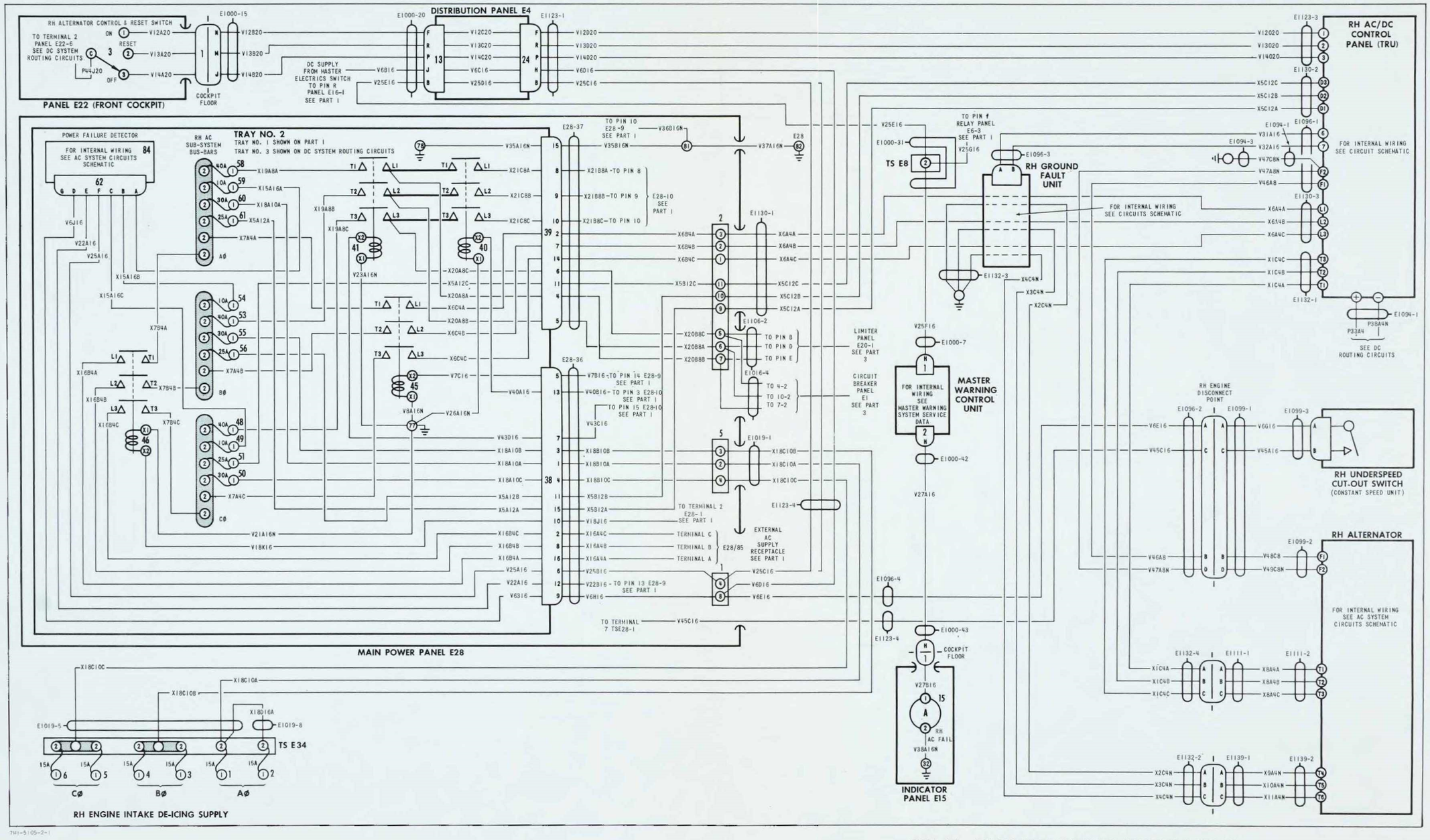

FIG. 10 AC POWER SUPPLY (SHEET 2 OF 3)

ARROW 1 SERVICE DATA

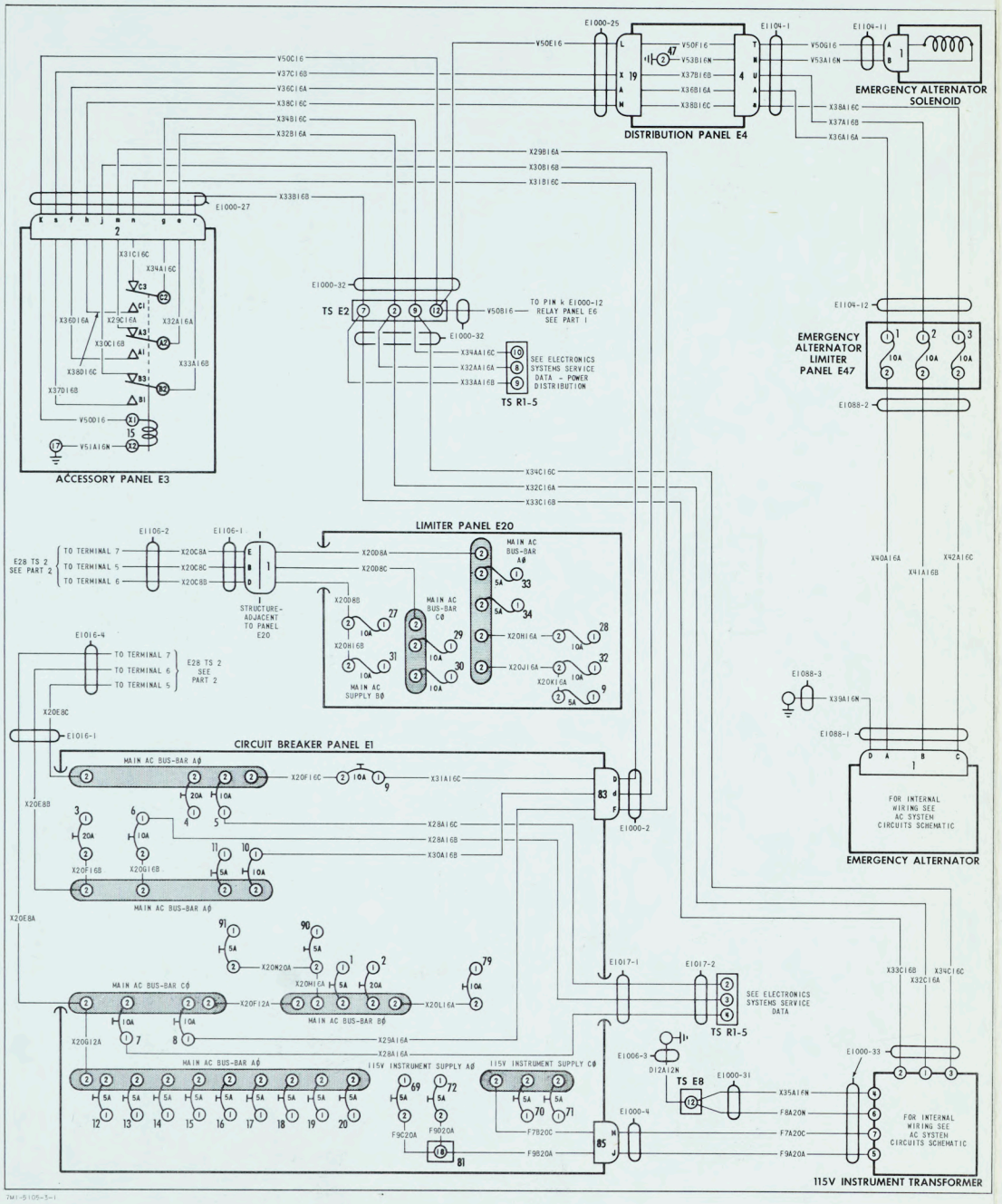

FIG. 10 AC POWER SUPPLY (SHEET 3 OF 3)

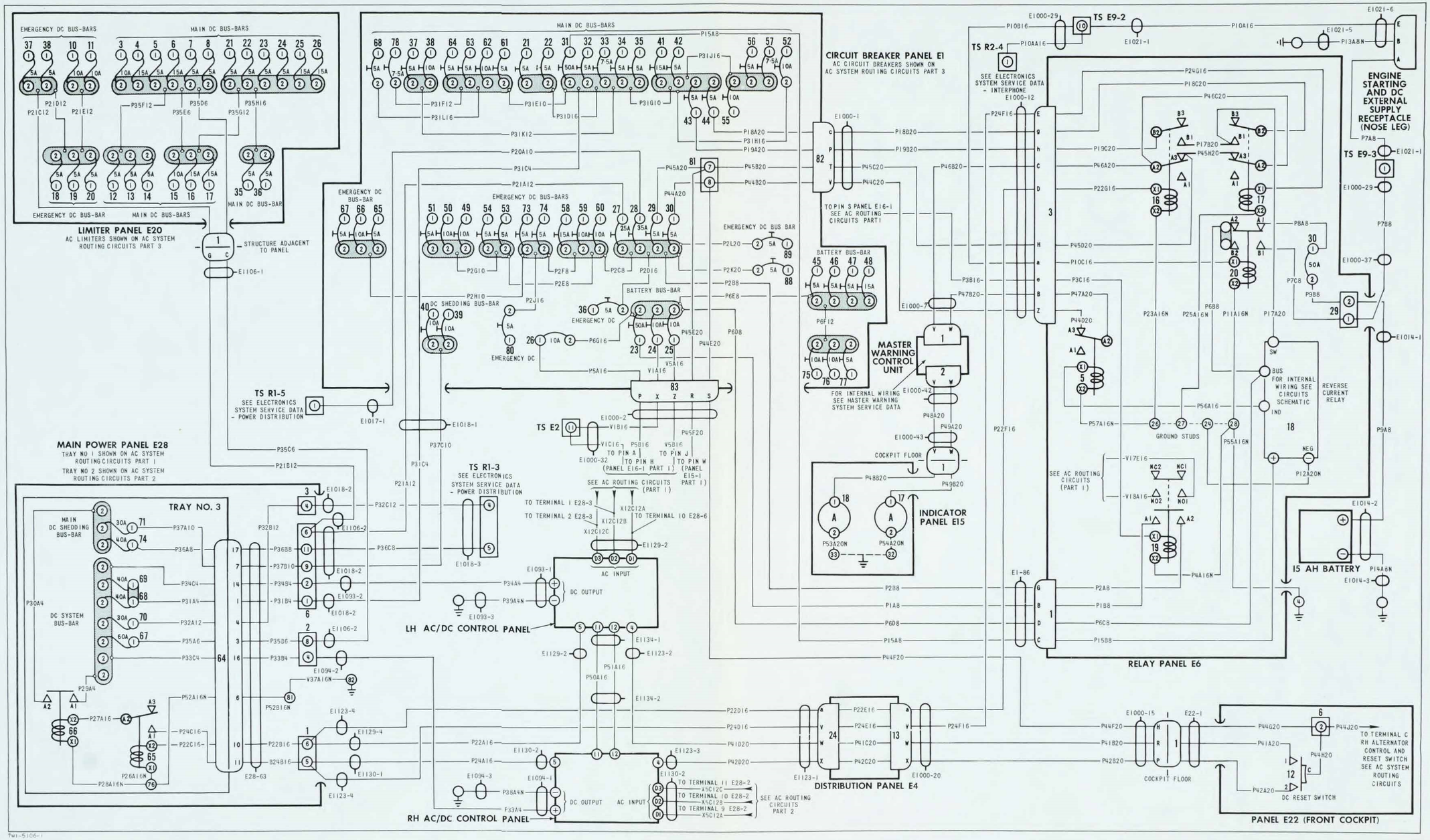

FIG. 11 DC POWER SUPPLY

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Master Electrics Switch	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
	Cutler-Hammer	7660-K9	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 1500 hours

FUNCTION

To permit the simultaneous interruption of the power supply to all the electrical circuits with the exception of those circuits which are connected to the battery bus-bar. Controls the line relays of the internal and external AC power supply.

LOCATION

Front cockpit - RH console, Power and Starting Panel E16.

ACCESS — MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Locate the switch in the keyway in panel E16.
Secure the switch to the panel with the lock-washer, securing nut and lock-nut supplied. Connect and secure circuit wiring.
Fit and secure panel E16 to the console four quick-fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Operate the switch, check that the lever action is smooth and that the make and break is not sluggish or rough.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	AC/DC Control Panel - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-17	Lucas Rotax Ltd	60900	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 350 hours

FUNCTION

To regulate and control AC and DC power, and rectify 3 Ø AC to 28 - 28.5 volts DC.

LOCATION

Duct bay, forward of Sta. 538.4. Both the LH and the RH control panels are contained in one air conditioned cabinet.

ACCESS — MEN X MINUTES

Accessible for inspection by releasing the RH electrical equipment access panel - 44 fasteners. To remove unit release left and right access panels - 77 fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

To install single panel:
Slide panel into cabinet and secure - ten screws.
Connect and secure external circuit wiring.
Refit access panels - 74 fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Remove panels, check security of equipment and wiring. Check for signs of overheating. Check that the external circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Main Power Panel E28 - Cabinet	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-36	Avro Aircraft		25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

Houses three trays which distribute AC and DC power to subsidiary centres of circuit supply. Also, facilitates the interconnection between the tray wiring and the aircraft wiring which is completed only when the relevant tray is inserted properly and securely.

LOCATION

Duct bay aft of bulkhead at station 485.

ACCESS — MEN X MINUTES

Inspection:

Remove electrical equipment access panel RH - 44 fasteners.

Removal:

Remove electrical equipment access panels, RH and LH - 74 fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Locate and secure unit to structure - four bolts.
Connect external wiring to panel.
Install trays 1, 2 and 3.
Refit access panels - 74 fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the panel and associated wiring is secure and undamaged. Check that the trays are securely fitted.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA
COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Main Power Panel E28 - Tray 1	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-37	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

Distribution of AC power from left hand alternator.

LOCATION

In main power panel E28 which is located in the duct bay aft of bulkhead at station 485.

ACCESS — MEN X MINUTES

Remove electrical equipment access panel, RH - 44 camloc fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Slide tray into panel E28.
Turn the locking device, located on front face of tray, in clockwise direction until tray is locked.
Secure with four fasteners.
Refit access panel - 44 fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Remove tray and check that the equipment and wiring is secure. Inspect receptacle at rear of tray for signs of arcing. Refit tray and note that it slides into position easily and is rigid and secure when locked.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Main Power Panel E28 - Tray 2	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-38	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

Distribution of AC power from RH alternator.

LOCATION

In main power panel E28 which is located in the duct bay aft of bulkhead at station 485.

ACCESS — MEN X MINUTES

Remove electrical equipment access panel RH - 44 fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Slide tray into panel E28.
Turn locking device located on front face of tray in clockwise direction until tray is locked.
Secure with four fasteners.
Refit access panel - 44 fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Remove tray, and check that the equipment and wiring is secure. Inspect receptacle at rear of tray for signs of arcing. Refit tray and note that it slides into position easily and is rigid and secure when locked.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Main Power Panel E28 - Tray 3	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-39	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

Distribution of DC power from transformer-rectifier units.

LOCATION

In the main power panel E28 which is located in the duct bay aft of bulkhead at station 485.

ACCESS

MEN X MINUTES

Remove electrical equipment access panel RH - 44 fasteners.

REPLACEMENT PROCEDURE

MEN X MINUTES

Slide tray into panel E28.
Turn locking device located on front face of tray, in clockwise direction until tray is locked.
Secure with four fasteners.
Refit access panel - 44 fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Remove tray and check that the equipment and wiring is secure. Inspect receptacle at rear of tray for signs of arcing. Refit tray and note that it slides into position easily and is rigid and secure when locked.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Circuit Breaker Panel E1	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1152-45	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED–500 hours

FUNCTION

To house AC and DC circuit control breakers and distribution bus-bars.

LOCATION

Nose wheel bay, LH side between stations 129-140.

ACCESS

MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE

MEN X MINUTES

Connect and secure power wiring to bus-bars.
Locate and secure the panel to the structure - six fasteners.
Secure panel hinge - six screws.
Fit and secure four connectors.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Open panel and check that the internal wiring connections to circuits breakers and bus-bars are securely and correctly connected. Check for chafing of cables. Check that the circuit breaker identification is legible.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Limiter Panel E20	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-18	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To house current limiters for certain AC and DC circuits.

LOCATION

Forward of RH speed brake, between stations 485-495.

ACCESS — MEN X MINUTES

Release hinged access panel - 13 quick-release fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Secure the panel to the structure - 11 fasteners.
Fit and secure two connectors.
Close hinged access panel - 13 quick release fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Remove panel and check that the connections are securely and correctly connected. Check limiters for signs of oxydization (yellow-green colour). Check that the limiters are securely held in their mounting.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Forward Accessory Panel E3	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1152-94	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED–500 hours

FUNCTION

Houses primary emergency AC supply transfer relay also relays and ground test switches of other systems.

LOCATION

Nose wheel bay between stations 129-137.

ACCESS

Unobstructed.

MEN X MINUTES

REPLACEMENT PROCEDURE

Secure panel to structure - eight bolts.
Connect the ground wire.
Fit and secure two electrical connectors.

MEN X MINUTES

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the connection and ground wire are securely and properly connected. Inspect wiring for cleanliness, physical strain and signs of chafing.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Distribution Panel E4	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1154-13	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED–500 hours

FUNCTION

To facilitate interconnection between circuits.

LOCATION

Forward face of bulkhead at station 485.

ACCESS — MEN X MINUTES

Unobstructed, after missile package has been removed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the panel to the structure - 16 bolts.
Fit and secure fuel contents circuit wiring to T-connectors.
Connect ground circuits.
Install four 12-way terminal blocks in their respective clips.
Fit and secure 50 electrical connectors.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the terminal blocks and fuel contents system T-connectors are secure. Check that the electrical connectors are securely and properly fitted.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

UNCLASSIFIED

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Relay Panel E6	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1152-78	Avro Aircraft Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To house relays of certain circuits and mount the battery circuit control breaker.

LOCATION

Roof of nose wheel bay, stations 129-149.

ACCESS — MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Locate and secure the panel to the structure - eight bolts.
Fit three AN connectors.
Connect and secure external battery circuit and ground circuit wiring.
Fit and secure three electrical connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that circuit wiring is securely and properly connected. Check that the electrical connectors are securely and properly connected.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Alternator 30kva - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1125-11	Lucas Rotax Ltd	60601	25201

OVERHAUL LIFE: KNOWN– ESTIMATED–350 hours

FUNCTION

To provide 120/208 volts 3-phase AC at 400 cps.

LOCATION

Engine nose bullet, LH and RH.

ACCESS	MEN X MINUTES
Remove engine from aircraft.	

REPLACEMENT PROCEDURE	MEN X MINUTES
Locate and fit the alternator on the drive pad of the constant speed unit. Secure the nuts removed from the constant speed unit pad-attachment studs. Reconnect the circuit wiring to the alternator terminal strips - see routing diagram. Fit and secure the nose bullet fairing with six clips.	

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
At each normal engine change - Check that the electrical connections are secure. Remove slip ring end covers: Inspect brushes for wear. Inspect slip rings for eccentricity and scoring. Check for dust, dirt, grime and grease. Check the insulation of the windings.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Alternator Control and Reset Switch - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-S-154			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 1500 hours

FUNCTION

To switch the alternator on and off, and provide a supply to reset the isolating circuit.

LOCATION

Front cockpit RH console on the oxygen Panel E22.

ACCESS — MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Locate the switch in the keyway in panel E22.
Secure the switch to the panel with the lock-washer, securing nut and lock-nut supplied.
Connect and secure the circuit wiring.
Fit and secure panel E22 to the console - four quick-fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Operate the switches, check that the lever action is smooth and that the make and break is not sluggish or rough.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	AC Line Relay - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS-24168-1			25201

OVERHAUL LIFE: KNOWN– ESTIMATED–500 hours

FUNCTION

To connect the output of the appropriate alternator to the AC sub-system bus-bars provided that:
(a) The master electrical switch is ON.
(b) The alternator is operating at the correct speed.
(c) An external power supply is not connected to the aircraft.

LOCATION

RH relay is located in tray No. 2 of the main power panel E28, located in the duct bay aft of station 485.
The LH relay is located in tray No. 1 of the same panel.

ACCESS

MEN X MINUTES

Unobstructed when appropriate tray is removed from panel E28.

REPLACEMENT PROCEDURE

MEN X MINUTES

Fit and secure relay to the appropriate tray of panel E28 - four screws.
Connect and secure the circuit wiring - eight connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is mounted securely. Check that the circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Instrument Transformer - Star-Delta Conversion	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1152-31	Canadian Atlas Transformer Co		25201

OVERHAUL LIFE: KNOWN- ESTIMATED-500 hours

FUNCTION

Converts the supply from the alternator which is star wound to a delta winding supply. This is necessary for certain aircraft instruments.

LOCATION

LH side of nose wheel bay on forward face of station 166.66

ACCESS — MEN X MINUTES

Nose wheel bay, unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure unit to structure - four bolts.
Remove terminal cover.
Connect and secure circuit wiring - seven connections.
Refit terminal cover.

UNCLASSIFIED

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Examine the unit and connections for cleanliness, damage and security. Check insulation of windings.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

1500 Volt Insulation Tester.

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Transfer Control Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To complete a supply circuit to the RH transfer relay of the distribution control circuits and, in the event of the RH system failing, to transfer the supply circuit to the LH transfer relay.

LOCATION

Tray No. 1 of main power panel E28 located in the duct bay aft of station 485.

ACCESS — MEN X MINUTES

Unobstructed, when tray No. 1 of panel E28 is removed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the relay to the tray - two screws.
Connect and secure the circuit wiring - eight connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the unit is mounted securely. Check that the circuit wiring is securely and correctly connected.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Transfer Relay - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS-24144-1			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

If the RH alternator is in operation the RH relay connects the RH AC sub-system bus-bars to the main AC bus-bars. If only the LH alternator is in operation the LH relay connects the LH AC sub-system bus-bars to the main AC bus-bars. To prevent the paralleling of the supply from each alternator it is arranged that when one relay is closed the other is open.

LOCATION

Both units are mounted in tray No. 2 of the main power panel E28 located in the duct bay aft of station 485.

ACCESS — MEN X MINUTES

Unobstructed when the tray No. 2 is removed from panel E28.

REPLACEMENT PROCEDURE — MEN X MINUTES

Attach the relay to the tray - four screws.
Connect and secure circuit wiring - eight connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is secured, and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Ground Fault Unit - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-123	Lucas Rotax Ltd	GS-13010-1	25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To trip the appropriate LH or RH alternator field contactor if a fault current leakage rate to ground in any one of the three phases exceeds 30 amperes.
Note that the relay is effective only for faults in the circuit preceding its point of installation.

LOCATION

Located in duct bay at station 532, RH and LH.

ACCESS — MEN X MINUTES

Remove the RH electrical equipment - access panel - 44 fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

To install one unit:
Fit and secure the unit to the structure - four bolts.
Insert each pair of phase wires into the appropriate hole in the cores.
Connect and secure the neutral wires to the ground stud.
Connect and secure the phase wires to the AC/DC control unit.
Fit and secure one electrical connector to the unit.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the electrical connector is fitted properly and securely. Examine the phase wiring for physical strain and signs of chafing.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Power Failure Detector - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-11	Canadian Diaphlex		25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

Trips the relevant alternator isolating circuit if a phase failure occurs or any of the phases are reversed.

LOCATION

Main power panel E28 which is in the duct bay on the aft face of bulkhead 485.
LH power failure detector - Tray No. 1
RH power failure detector - Tray No. 2

ACCESS — MEN X MINUTES

Remove electrical equipment access panel, RH - 44 fasteners.
Withdraw, partially, the appropriate tray from panel E28.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the unit to the tray - four screws.
Fit and secure one connector to the unit.
Close and lock the tray in panel E28.
Refit the access panel - 44 fasteners.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the unit is mounted securely. Examine the electrical connector for cleanliness, damage and security.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	AC Shedding Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS 24144-1			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To isolate certain electronic loads from the LH AC sub-system bus-bars if the LH alternator only is supplying power.

LOCATION

Mounted on tray No. 1 of the main power panel E28 located in the duct bay aft of station 485.

ACCESS — MEN X MINUTES

Unobstructed when the tray No. 1 is removed from panel E28.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the relay to the tray - four screws.
Connect and secure the circuit wiring - eight connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	DC Reset Switch	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS-25089-4D			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 1500 hours

FUNCTION

To complete a supply circuit to reset the fault protection circuits.
Switch is common to the LH and the RH DC sub-systems.

LOCATION

Front cockpit RH console on the Oxygen Panel E22.

ACCESS — MEN X MINUTES

Unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the switch to panel E22 with the lock-washer and nut supplied.
Connect and secure circuit wiring - three connections.
Fit and secure panel E22 to the console - six screws.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the circuit wiring is securely and properly connected. Operate the switch and check that the action is smooth and positive.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Emergency DC Bus-Bar Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS-24140-2			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To interconnect the main emergency DC bus-bar with the battery bus-bars and, when required, to complete supply circuits to the RH external supply relay and external line slave relay.

LOCATION

Relay panel E6, located on the roof of the nose wheel bay between stations 129-147.

ACCESS — MEN X MINUTES

Unobstructed when rudder quadrant guard and panel E6 is released.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure relay to panel E6 - two screws.
Connect and secure circuit wiring - six connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Signal Relay - LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To complete a supply circuit to the DC L OR R FAIL indicator in the event of the DC output from one transformer-rectifier failing and, provided that one transformer-rectifier is in operation, the relay completes the circuit for the battery circuit reverse current relay.

LOCATION

Relay panel E6, located on the roof of the nose wheel bay between stations 129-147.

ACCESS

MEN X MINUTES

Unobstructed when rudder quadrant guard and panel E6 is released.

REPLACEMENT PROCEDURE

MEN X MINUTES

Fit and secure relay to panel - two screws.
Connect and secure circuit wiring - eight connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the unit is securely mounted. Check that the circuit wiring is securely and properly connected.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	DC Shedding Cut-out Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To operate in the event of a failure of either transformer-rectifier unit and shed a portion of the DC load.

LOCATION

Mounted on Tray No. 3 of the main power panel E28 located in the duct bay aft of station 485.

ACCESS — MEN X MINUTES

Unobstructed when the tray is removed from panel E28.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the relay to the tray - two screws.
Connect and secure circuit wiring - four connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the unit is securely mounted. Check that the circuit wiring is securely and correctly connected.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	DC Shedding Control Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS 24141-1			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To complete the power supply circuit from the main DC bus-bars to the main DC shedding bus-bar provided that both transformer-rectifier units are in operation,

LOCATION

Tray No. 3 of the main power panel E28 located in the duct bay aft of station 485.

ACCESS

	MEN X MINUTES	
Unobstructed when tray No. 3 is removed from panel E28.		

REPLACEMENT PROCEDURE

	MEN X MINUTES	
Fit and secure the relay to the tray - two screws. Connect and secure the circuit wiring - four connections,		

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Battery Circuit Reverse Current Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-135			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

To isolate the main DC bus-bar from the battery, in the event of the failure of both transformer-rectifier units, thus preventing excessive load demand on the battery.
The reverse current relay also controls the operation of the battery use indicator light.

LOCATION

Nose wheel bay on panel E6, between stations 129-147.

ACCESS — MEN X MINUTES

Unobstructed, when the rudder quadrant guard is removed and panel E6 released.

REPLACEMENT PROCEDURE — MEN X MINUTES

Secure relay to panel E6 with four mounting screws.
Secure panel E6 to the roof of the nose wheel bay.
Connect the electrical wiring.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Examine the unit and electrical connections for cleanliness, damage, and security. Inspect the wiring for physical strain and signs of chafing.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICS	POWER SUPPLIES	Battery Use Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To complete a supply circuit to the BATTERY USE Indicator in the event of a DC power supply failure.

LOCATION

Relay panel E6 located in the nose wheel bay between stations 129-147.

ACCESS

MEN X MINUTES

Unobstructed when rudder quadrant guard and panel E6 is released.

REPLACEMENT PROCEDURE

MEN X MINUTES

Fit and secure the relay to the panel - two screws.
Connect and secure circuit wiring - four connections.
Secure panel E6 to its mounting.
Refit and secure the rudder quadrant guard.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the relay is securely mounted. Check that the circuit wiring is securely and properly connected.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA
COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Nickel-Cadmium Storage Battery, 15 Ampere-Hour	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1152-11	Societe Des Accumulateurs Fixes et de Traction (SAFT)	20-VO 15	25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

Supplies 24V DC power for certain services in the event of both transformer-rectifier units failing. Also provides power to initiate the operation of the LH and RH alternators and to open the canopy.

LOCATION

LH side of nose wheel bay.

ACCESS — MEN X MINUTES

Nose wheel bay, unobstructed.

REPLACEMENT PROCEDURE — MEN X MINUTES

Lift battery into receptacle and slide to the rear.
Refit bolt in angle bracket at bottom forward face of battery.
Refit nut on stud at the rear of the battery.
Refit two bolts on the angle plate, at the top of the battery.
Refit air connections.
Connect supply circuit wiring.
Reset battery supply circuit breaker located on Relay Panel E6.

UNCLASSIFIED

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the battery is secure in its mounting. Check the voltage of each cell. Ensure that the battery connections are free from corrosion.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Starting Power Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-128			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To permit the use of an external DC supply in preference to the aircraft battery for engine starting control circuits and the ground operation of load supplied from the battery and emergency DC bus-bars.

LOCATION

Relay panel E6 located in the nose wheel bay between stations 129 and 147.

ACCESS

MEN X MINUTES

Unobstructed when the rudder quadrant guard and panel E6 is released.

REPLACEMENT PROCEDURE

MEN X MINUTES

Fit and secure the relay to the panel using four mounting screws.
Connect and secure the circuit wiring - four connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Alternator (Emergency AC System)	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1956-567	Vickers Inc.	EA 50209	25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 100 hours (running time)

FUNCTION

To supply AC power for AC operated equipment considered essential for flight in the event of a failure of both the LH and the RH AC power source.

LOCATION

Mounted on the LH side of the duct bay at station 500, approximately.

ACCESS — MEN X MINUTES

Remove RH electrical equipment access panel - 44 fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Airframe;

Secure to mounting using four bolts.
Connect three hydraulic lines.

Electrics;

Fit and secure one electrical connector.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Examine the unit for cleanliness, damage, and security. Inspect for signs of oil leaks. Check the electrical connector for security and damage. Ensure that the wiring is free from physical strain and signs of chafing.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

UNCLASSIFIED

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Limiter Panel - Emergency Alternator Power	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
7-1156-485			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 1500 hours

FUNCTION

To mount limiters for the emergency alternator output lines.

LOCATION

LH side of duct bay between stations 494 - 499.

ACCESS

MEN X MINUTES

Remove RH electrical equipment access panel - 44 fasteners.

REPLACEMENT PROCEDURE

MEN X MINUTES

Fit and secure panel on mounting - four screws. Connect and secure circuit wiring - six connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the panel is securely mounted. Check that the circuit wiring is securely and properly connected. Check that the limiters do not show signs of oxydization (yellow-green colour).		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Primary AC Failure Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

To initiate the operation of the emergency alternator in the event of the LH and RH AC power supplies failing.

LOCATION

Relay panel E6, located on the roof of the nose wheel bay between stations 129-147.

ACCESS — MEN X MINUTES

Unobstructed when the rudder quadrant guard and panel E6 is released.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure relay to panel E6 - two screws.
Connect and secure circuit wiring - four connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the unit is securely mounted. Check that the circuit wiring is securely and correctly connected.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	Primary-Emergency AC Supply Transfer Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS-25024-1			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

Normally completes the three-phase supply circuits between the main AC bus-bars and services to be supplied by the emergency AC system. If the LH and the RH AC supplies fail during flight, the transfer relay isolates the main AC bus-bars and permits power to be drawn from the emergency alternator.

LOCATION

Accessory panel E3, located in nose wheel bay between stations 129 - 137.

ACCESS — MEN X MINUTES

Unobstructed, when panel E3 is released.

REPLACEMENT PROCEDURE — MEN X MINUTES

Mount relay on panel E3 - four screws.
Connect and secure circuit wiring - seven connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is securely and properly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	External Supply Receptacle	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-127	Powerlite Devices Ltd		25201

OVERHAUL LIFE: KNOWN– ESTIMATED–500 hours

FUNCTION

Facilitates connection of an external source of AC power supply to aircraft.

LOCATION

Underside of duct bay at station 495.

ACCESS — MEN X MINUTES

Remove electrical equipment access panel RH - 44 fasteners.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the receptacle to the structure - four bolts.
Remove terminal cover.
Connect and secure circuit wiring.

Refit terminal cover - four nuts.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check contacts for signs of arcing and pitting. Check for security of mounting and dust, dirt, grime and grease. Check that the circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	External Supply Line Relay LH and RH	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
MS 4168-1			25201

OVERHAUL LIFE: KNOWN– ESTIMATED– 500 hours

FUNCTION

When closed completes the three-phase AC supply circuits between the external supply receptacle and the LH and RH AC sub-system bus-bars.

LOCATION

LH relay is mounted on tray No. 1 of the main power panel E28 located in the duct bay aft of station 485. The RH relay is mounted in tray No. 2 of the same panel.

ACCESS

	MEN X MINUTES	
Unobstructed when the appropriate tray is removed from panel E28.		

REPLACEMENT PROCEDURE

	MEN X MINUTES	
Fit and secure the relay to the appropriate tray - four screws. Connect and secure the circuit wiring - eight connections.		

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES
Check that the unit is securely mounted. Check that the circuit wiring is securely and correctly connected.	

FUNCTIONAL CHECKS	MEN X MINUTES

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

ARROW 1 SERVICE DATA

COMPONENT DATA SHEET

SYSTEM	SUB-SYSTEM	COMPONENT	REF. NO.
ELECTRICAL	POWER SUPPLIES	External Supply Slave Relay	11-1

AVRO PART NO.	MANUFACTURER	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY
CS-R-122			25201

OVERHAUL LIFE: KNOWN- ESTIMATED- 500 hours

FUNCTION

Prevents the connection of the output from the alternators to the AC sub-system bus-bars if they are energized from the AC external supply source.

LOCATION

Mounted on tray No. 1 of the main power panel E28 located in the duct bay aft of station 485.

ACCESS — MEN X MINUTES

Unobstructed when the tray is removed from panel E28.

REPLACEMENT PROCEDURE — MEN X MINUTES

Fit and secure the relay to the tray - two screws.
Connect and secure the circuit wiring - seven connections.

ARROW 1 SERVICE DATA

INSPECTION	MEN X MINUTES	
Check that the unit is securely mounted. Check that the circuit wiring is securely and properly connected.		

FUNCTIONAL CHECKS	MEN X MINUTES	

GROUND HANDLING AND GROUND TEST EQUIPMENT

SPECIAL TOOLS TO REMOVE OR SERVICE

REMARKS

SECTION 38