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ARROW 1 SERVICE DATA

SECTION 34

WINDSHIELD AND CANOPY DE-ICING

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ANNEXE
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ELECTRICAL SYSTEM

WINDSHIELD AND CANOPY DE-ICING

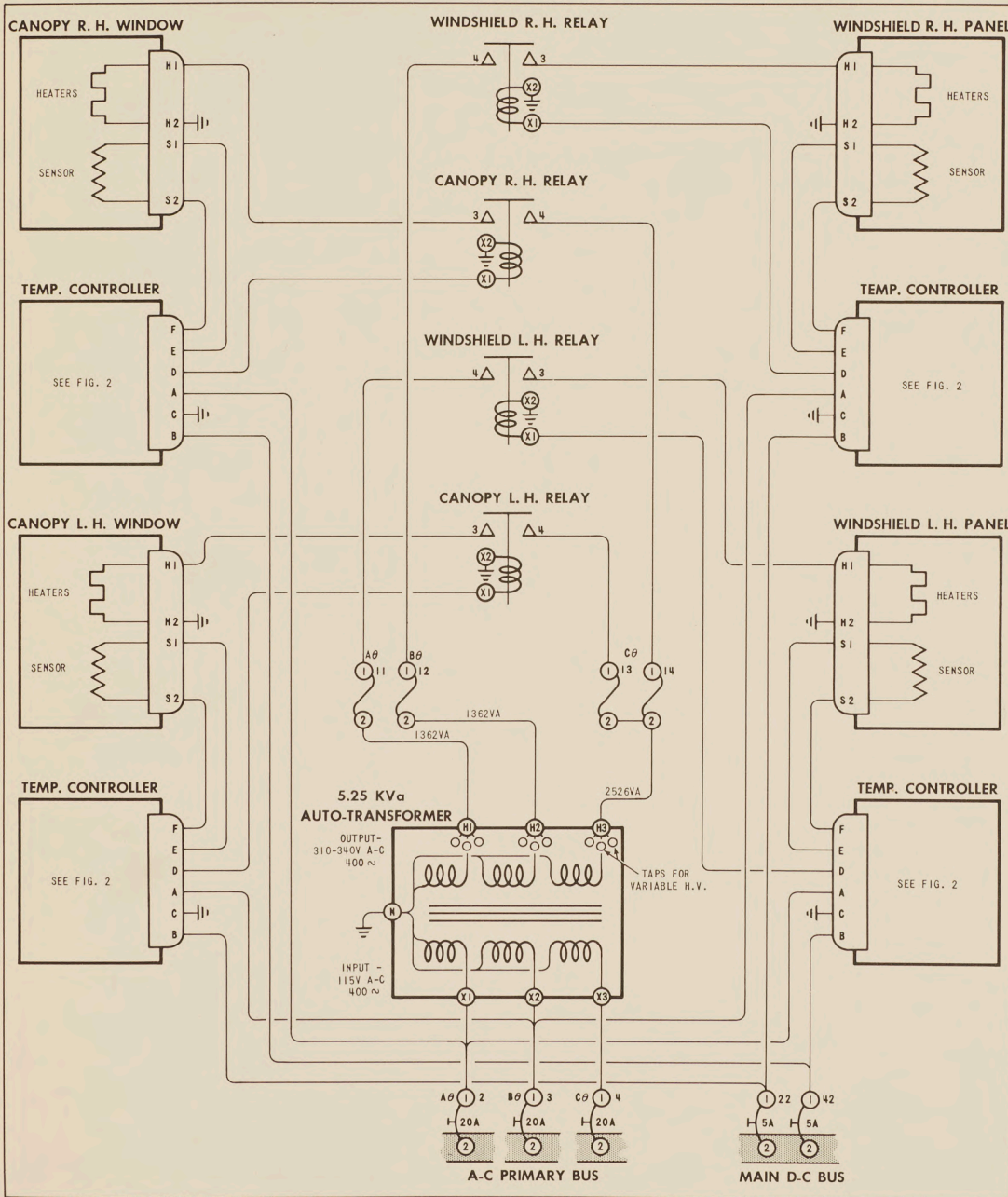
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FIG. 1 WINDSHIELD AND CANOPY DE-ICING SCHEMATIC

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11 The bridge circuit is balanced when the panel temperature is 43.3°C (110°F). Until this temperature is reached, the unbalanced condition of the bridge results in sufficient current flow through the magnetic amplifier to energize the control relay.

12 The control relay, when energized, completes the ground return for the coil of the supply relay. The supply relay then completes the supply circuit to the coil of the circuit relay which in turn closes the supply circuit to the heating element.

13 When the peak temperature is reached, the impedance of the magnetic amplifier will have increased to a point where insufficient current will flow to energize the control relay. In the de-energized condition, the control relay reduces the effective resistance of one segment of the bridge. The sensor must then decrease in resistance by an amount equivalent to that deducted by the action of the control relay before the bridge is again unbalanced.

FUNCTION TESTING

GENERAL

14 A windshield and canopy test panel is provided to facilitate function testing the canopy and windshield de-icing circuits. The test panel indicates the completion of the supply circuit to a selected panel heating element and the current flow in the associated sensing circuit. By correlating the sensing circuit current flow to temperature, a check that the circuit is cutting out at the correct temperature can be obtained.

15 At present, current values for the sensing element are not available. Therefore as an interim test, when checking each circuit note the current indicated at the cut-out point. By comparing the indications so obtained, malfunction of a sensing circuit will be evident.

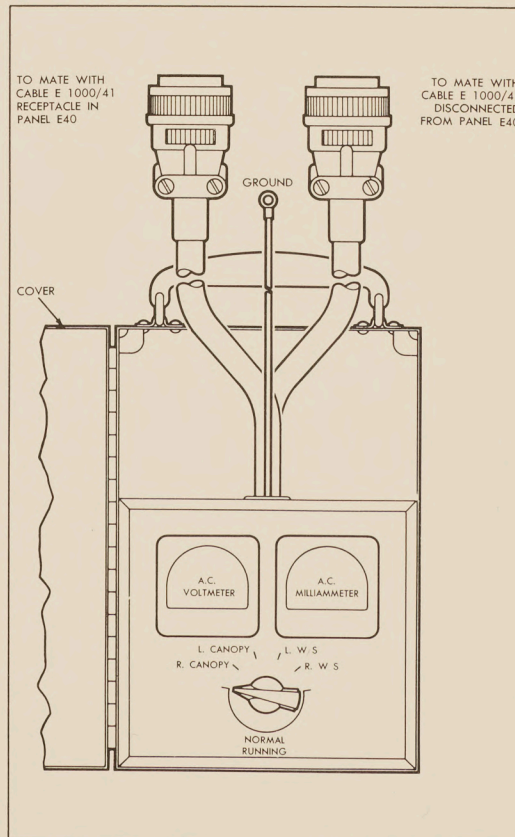
WINDSHIELD AND CANOPY DE-ICING TEST PANEL (Fig 3)

16 The test panel incorporates an AC voltmeter, an AC milliammeter, a five position wafer selector switch marked NORMAL RUNNING, and two connectors with associated

cabling which enable the test panel to be connected into the windshield and canopy de-icing circuits.

17 The AC voltmeter is connected to the normally de-energized side of the circuit relays and will affirm the closing of the appropriate circuit relay by indicating the line to ground voltage (310 ± 10 volts) of the supply transformer secondary winding.

18 The AC milliammeter circuit wiring is arranged to be inserted in series with the selected temperature sensor circuit. The AC milliammeter reading will register a decrease in relation to an increase in windshield or



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FIG. 3 WINDSHIELD AND CANOPY DE-ICING TEST PANEL

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DESCRIPTION

GENERAL

1 The two window panels of the pilot's canopy and the two panels of the windshield are electrically heated to prevent misting and icing. An independent heating and temperature control circuit is provided for each panel.

2 The circuit for each panel includes a temperature controller, a sensor and a circuit relay. These components operate in conjunction to restrict the temperature of the heating elements to 43.3°C (110°F).

3 The heating elements operate on 310-340 volts AC which is supplied by a 3-phase 5.25 KVA auto-transformer. The auto-transformer is operative when the AC primary bus-bars are live. The two windshield panels are supplied from separate phases. The two window panels derive their supply from a common phase.

4 There are no control switches for the system, the circuits being automatically operative when the main DC and primary AC bus-bars are live.

HEATING ELEMENTS

5 The windshield and canopy window panels are constructed of a number of plies of glass. The heating element is affixed to the inside of the outer ply and consists of a layer of transparent electrically conductive thermo-plastic.

6 The power supply circuit for each heating element incorporates a circuit relay, the circuit being completed when the relay is energized. The operation of the circuit relay is controlled by the appropriate temperature control circuit.

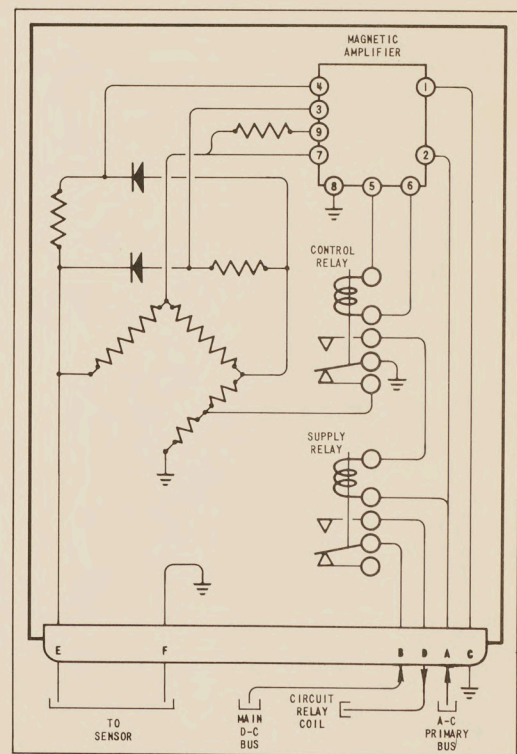
TEMPERATURE CONTROL CIRCUITS

7 The operating limits of each of the four temperature controllers and their associated temperature sensors are identical.

8 Each temperature controller incorporates a magnetic amplifier, a control relay, a supply relay and three segments of a bridge circuit. The fourth segment of the bridge is the temperature sensor.

9 The temperature sensor is embedded in the panel in contact with the heating element. It is a resistor with a positive co-efficient of temperature characteristic, i.e. as temperature rises, resistance increases; as temperature falls, resistance decreases.

10 Two segments of the bridge circuit are connected to two of the three core windings of the magnetic amplifier. These windings have a control function. The third winding, which has a constant voltage applied, serves as a reference winding.



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FIG. 2 TEMPERATURE CONTROL UNIT SCHEMATIC

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canopy temperature. At the cut-out temperature, the consequent drop out of the circuit relay will be indicated by the voltmeter.

19 To test the windshield and canopy de-icing circuits, the test panel is connected in series with panel E40 as follows:

(a) At panel E40 located on the LH side of the nose wheel well, disconnect cable E1000/41 and connect it to the mating plug of the test panel.

(b) Connect the remaining plug of the test panel to cable E1000/41 receptacle on panel E40.

(c) Connect the ground wire of the test panel to the ground terminal on panel E40.

(d) Ensure that the two W/S TEMP CONT and the three AC FWD DE-ICING circuit breakers on panel E1 located on the LH side of the nose wheel well are closed.

(e) Select the MASTER ELEC switch to the OFF position then withdraw the following fuses from panel E40:

- L-R, W. SCREEN #11. #12.
- L-R CANOPY #13. #14.

Ensure that they are serviceable, but do not refit them until the circuits are to be tested.

RIGHT CANOPY DE-ICING CIRCUIT

20 Check that an external source of AC power supply is connected to the aircraft external supply receptacle, and that the test panel is interconnected with panel E40 as described in para 5(a) to (e).

(a) Refit the CANOPY-R fuse in panel E40.

(b) Select the NORMAL RUNNING switch on the test panel to the R. CANOPY position.

(c) Select the MASTER ELEC switch to the ON position.

(d) The AC voltmeter should register 310 ± 10 volts.

(e) When the right canopy reaches the cut-out temperature, the voltmeter reading should drop to zero. When this occurs, note the milliammeter reading and compare it with those obtained for the remaining circuits.

(f) Select the MASTER ELEC switch to the OFF position.

(g) Remove the CANOPY-R fuse from panel E40.

LEFT CANOPY DE-ICING CIRCUIT

21 Repeat the procedure outlined in para 20(a) to (g) substituting left canopy for right canopy.

RIGHT WINDSHIELD DE-ICING CIRCUIT

22 Repeat the procedure outlined in para 20(a) to (g) substituting right windshield for right canopy.

LEFT WINDSHIELD DE-ICING CIRCUIT

23 Repeat the procedure outlined in para 20(a) to (g) substituting left windshield for right canopy.

PROCEDURE UPON COMPLETION OF TESTS

24 Upon completion of testing, check the following:

(a) That the test panel is disconnected from the windshield and canopy de-icing system.

(b) That cable E1000/41 is securely and properly connected to its receptacle on panel E40.

(c) That the windshield and canopy fuses have been refitted securely and properly in panel E40.

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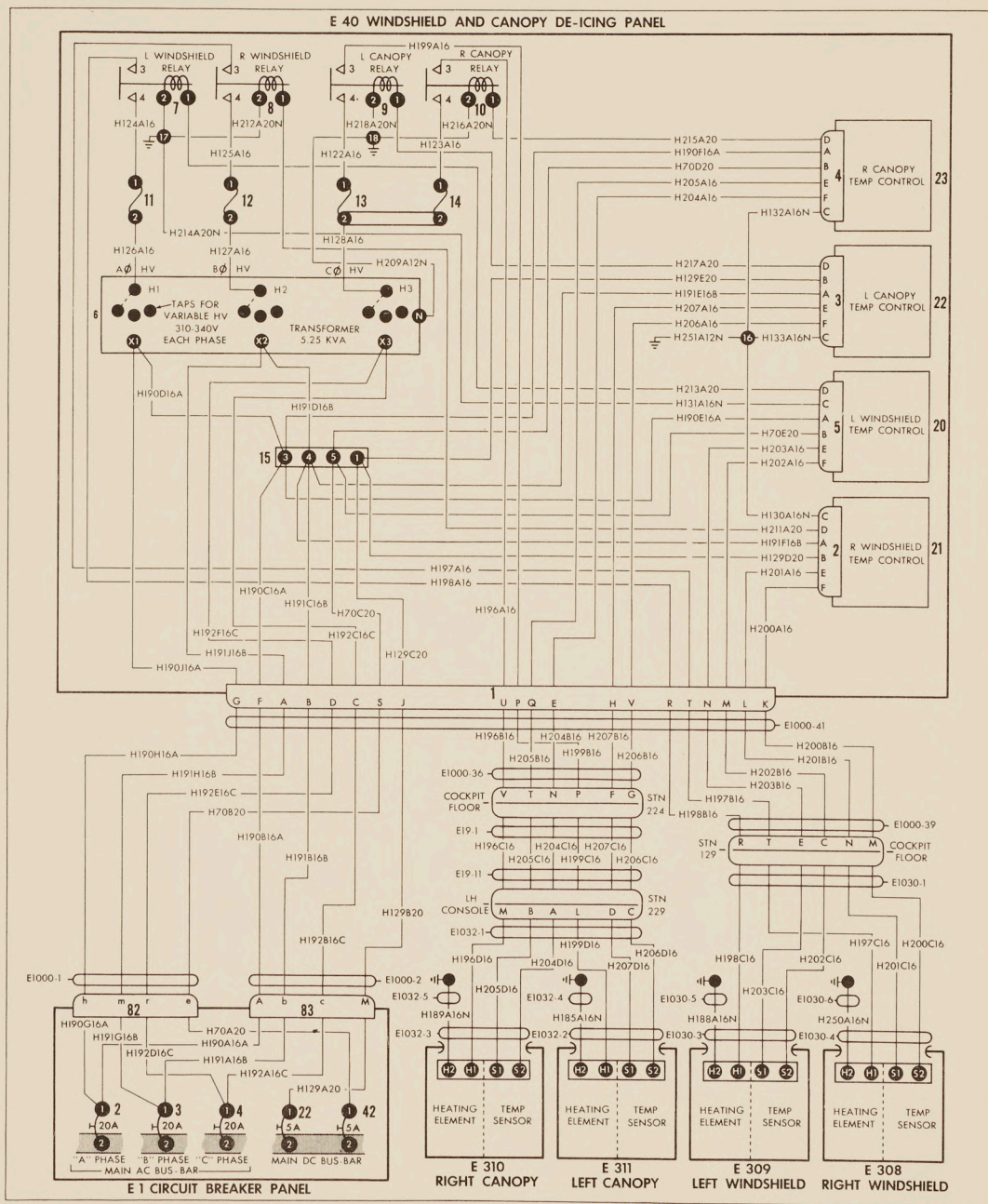


FIG. 5 WINDSHIELD AND CANOPY DE-ICING

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 COMPONENT DATA SHEET

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SYSTEM ELECTRICAL	SUB-SYSTEM WINDSHIELD AND CANOPY DE-ICING	COMPONENT De-icing Panel E40	REF. NO. 11-9
AVRO PART NO. 7-2052-1	MANUFACTURER Avro Aircraft Ltd.	MAN'FR'S PART NO.	AIRCRAFT EFFECTIVITY 25201
OVERHAUL LIFE:	KNOWN-	ESTIMATED- 1500 hours	
FUNCTION	To house temperature control units, supply transformer, relays and limiters used in the de-icing system.		
LOCATION	Nose wheel well between stations 195 to 208 - LH side, aft.		
ACCESS	Unobstructed.	MEN X MINUTES	
REPLACEMENT PROCEDURE	Fit and secure the panel to the structure - five screws. Connect and secure the air conditioning supply line to the transformer. Connect and secure one bonding lead. Connect and secure the circuit wiring to the transformer. Connect and secure one electrical connector.		
		MEN X MINUTES	

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INSPECTION	MEN X MINUTES	
<p>Check that the panel is securely mounted. Check that the units are securely mounted and undamaged. Check that the circuit wiring to the transformer is securely and properly connected. Check that the bonding lead is securely connected. Check that the air conditioning supply line is securely and properly connected. Check that the limiters are not discoloured.</p>		
FUNCTIONAL CHECKS	MEN X MINUTES	
GROUND HANDLING AND GROUND TEST EQUIPMENT		
SPECIAL TOOLS TO REMOVE OR SERVICE		
REMARKS		

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<p>INSPECTION</p> <p>Check that the transformer is securely mounted. Check that the circuit wiring is securely and properly connected. Check that the air conditioning supply line is securely and properly connected.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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SYSTEM ELECTRICAL		SUB-SYSTEM WINDSHIELD AND CANOPY DE-ICING		COMPONENT Temperature Controllers - 4		REF. NO. 11-9	
AVRO PART NO.		MANUFACTURER AiResearch		MAN'FR'S PART NO. 547150		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		1000 hours	
FUNCTION To control the temperature of the heated panels - one control unit to each panel.							
LOCATION Mounted on the de-icing panel E40.							
ACCESS Unobstructed.						MEN X MINUTES	
REPLACEMENT PROCEDURE Fit and secure the unit to the de-icing panel E40 - four 10/32 inch mounting bolts. Connect and secure one electrical connector.						MEN X MINUTES	

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INSPECTION Check that the unit is securely mounted. Check that the electrical connector is securely and properly fitted.	MEN X MINUTES	
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 ELECTRICAL		SUB-SYSTEM WINDSHIELD AND CANOPY DE-ICING		COMPONENT Relays, Canopy De-icing - 2		REF. NO. 11-9	
AVRO PART NO. 7-2052-15		MANUFACTURER Electronic Specialties		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE :				KNOWN-		ESTIMATED-	
FUNCTION To complete the AC supply to the heating elements of the canopy window panels.							
LOCATION Mounted on the de-icing panel E40.							
ACCESS Unobstructed.						MEN X MINUTES	
REPLACEMENT PROCEDURE Fit and secure the unit to the de-icing panel E40 - four screws. Connect and secure circuit wiring - two connections. Fit and secure the relay cover plate - four screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check that the unit is securely and properly mounted. Check that the electrical connections are securely and properly connected.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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SYSTEM ELECTRICAL		SUB-SYSTEM WINDSHIELD AND CANOPY DE-ICING		COMPONENT Relays, Windshield De-icing - 2		REF. NO. 11-9	
AVRO PART NO. 7-2052-15		MANUFACTURER Electronic Specialties		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED- 1500 hours			
FUNCTION To complete the AC supply to the heating elements of the windshield panels.							
LOCATION Mounted on the de-icing panel E40.							
ACCESS Unobstructed.						MEN X MINUTES	
REPLACEMENT PROCEDURE Fit and secure the unit to the de-icing panel E40 - four screws. Connect and secure circuit wiring - two connections. Fit and secure the relay cover plate - four screws.						MEN X MINUTES	

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INSPECTION Check that the unit is securely and properly mounted. Check that the electrical connections are securely and properly connected.	MEN X MINUTES	
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 ELECTRICAL		SUB-SYSTEM WINDSHIELD AND CANOPY DE-ICING		COMPONENT Front Canopy Panels - 2		REF. NO. 11-9	
AVRO PART NO. 7-1053-212, 211		MANUFACTURER Libby-Owens		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-			
FUNCTION To provide a mist and ice free glass panel in the RH and LH half shells of the front canopy.							
LOCATION In the canopy half shells, LH and RH.							
ACCESS Unobstructed.						MEN X MINUTES	
REPLACEMENT PROCEDURE See Arrow 1 Service Data - Structure.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check the terminal block is securely and properly mounted. Check that the electrical connections are securely and properly connected.</p>	<p>MEN X MINUTES</p>	
<p>FUNCTIONAL CHECKS</p>	<p>MEN X MINUTES</p>	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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 COMPONENT DATA SHEET

SYSTEM ELECTRICAL		SUB-SYSTEM WINDSHIELD AND CANOPY DE-ICING		COMPONENT Windshield Panels - 2		REF. NO. 11-9	
AVRO PART NO. 7-1052-1387, 1388		MANUFACTURER		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE :		KNOWN-		ESTIMATED-			
FUNCTION To provide a mist and ice free windshield.							
LOCATION The panels form the windshield.							
ACCESS Unobstructed.						MEN X MINUTES	
REPLACEMENT PROCEDURE See Arrow 1 Service Data - Structure.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check that the terminal block is securely and properly mounted. Check that the electrical connections are securely and properly connected.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		