Chapter 14

WING, FIN AND ENGINE DE-ICING

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LIST OF ILLUSTRATIONS

Introduction

1. The aircraft employs a thermal de-icing system by means of which the air intake to each engine, the leading edges of the main planes and the leading edge of the fin may be heated to prevent formation of ice. Hot air tapped from the engine compressors is mixed with cold air to give a regulated temperature and is then ducted round the inside of the leading edges, giving up heat to the skin. Three separate systems are used, i.e., port mainplane and No.1 and 2 engines, starboard mainplane and No.3 and 4 engines and fin de-icing. Each system can be selected to operate automatically, either individually or collectively, as a function of ice formation detection or to operate individually under manual control.

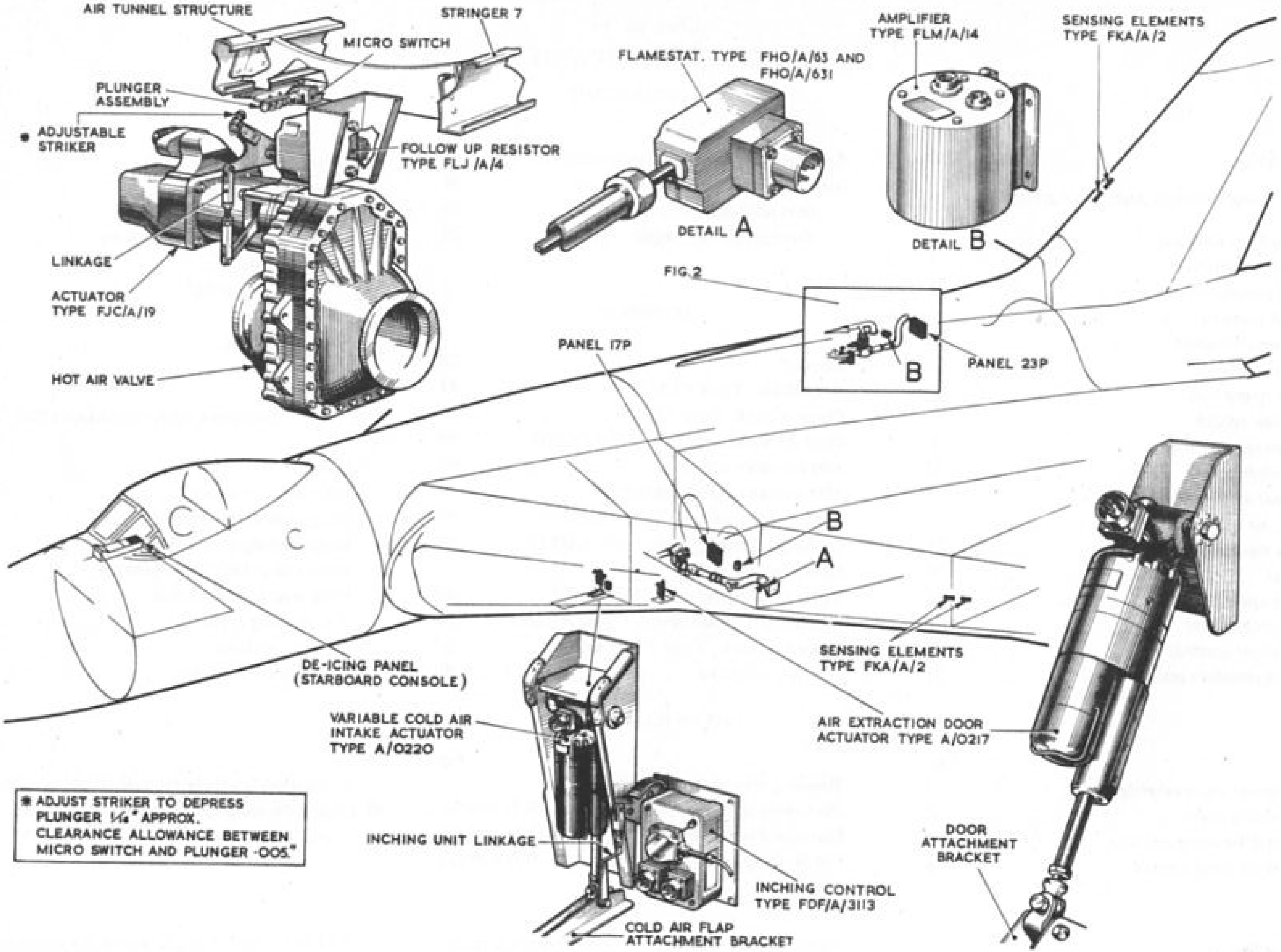


Fig.1 Location of components

Normal conditions

2. Under normal conditions automatic control will be employed, but manual control can be used in an emergency on failure of the automatic control circuits. Selection of automatic control can be made by three selector switches, labelled AUTO-MANUAL fitted on the de-icing panel forming part of the starboard console. Immediately below these switches are three ratiometer type indicators, which indicate the temperature of the air in the wing and fin leading edge ducts (see Sect.7, Chap.4). Below the indicators are fitted three manual heat control switches, labelled INCREASE-DECREASE. Two further switches, labelled PORT ENGINES and STARBOARD ENGINES respectively, provide separate control for the engine de-icing circuits for the purpose of ground engine runs.

NOTE . . .
The fin de-icing system is at present blanked off with fuses 257 and 586 removed and is therefore inoperative.

3. The controlling equipment consists of the following main items:-

Amplifiers (3)	Type FLM/A/14
Sensing elements, wings (4)	Type FKA/A/2
Sensing elements, fin (2)	Type FKA/A/2
Follow-up resistors (3)	Type FLJ/A/4
Inching controls (3)	Type FDA/A/3113
Hot air actuators, wings (2)	Type FJC/A/19
Hot air actuator, fin (1)	Type FJC/A/14
Cold air actuators, wings (2)	Type A/0220
Cold air actuator, fin (1)	Type C5520
Overheat switches (flamestats) (1)	Type FHO/A/63
, (2)	Type FHO/A/631
Extractor flap actuators (2)	Type A0217
Thermal delay switches (3)	Type 601V

4. The hot and cold air flow to the leading edges of the wings and fin is regulated by means of actuators, which are in turn controlled by the action of a temperature sensitive bridge circuit when the auto-manual switch is in the AUTO position.

5. The temperature control amplifiers, Type FLM/A/14, provide automatic control. Each amplifier embodes a balanced bridge network connected to two transductor circuits. External sensing elements, follow up resistors and setting up potentiometers are coupled into the bridge circuit. Any change in their value will cause a state of unbalance, resulting in a very small d.c. flow across the bridge in either one direction or the other depending on the way the sensing element has been affected. The control field windings of the two transductors are connected in series across the bridge output, and any change in the current flowing through them will appear amplified in the transductor output.

6. Each transductor has its own output circuit, which is d.c. fed from the a.c. field winding via a bridge-connected selenium rectifier unit. Connected into this circuit is the coil of a relay, and in series with it is the transductor feedback winding, which increase gain and sensitivity and makes the transductor directional. When the output of either one of the transductors rises to a predetermined value, its associated relay will be energised and its contacts will close to connect a supply to either the open or close fields of the hot air actuator. The two relays are so connected that there is no possibility of the amplifier attempting to drive the actuator in opposite directions should a condition arise whereby both relays are energised at the same time.

7. A transformer, which is part of the amplifier, steps down the a.c. supply from 115 volts to 14.5 volts for the transductor at a frequency of 400 c/s. The bridge and bias windings are supplied from the aircraft's 28-volt d.c. supply.

Setting potentiometers

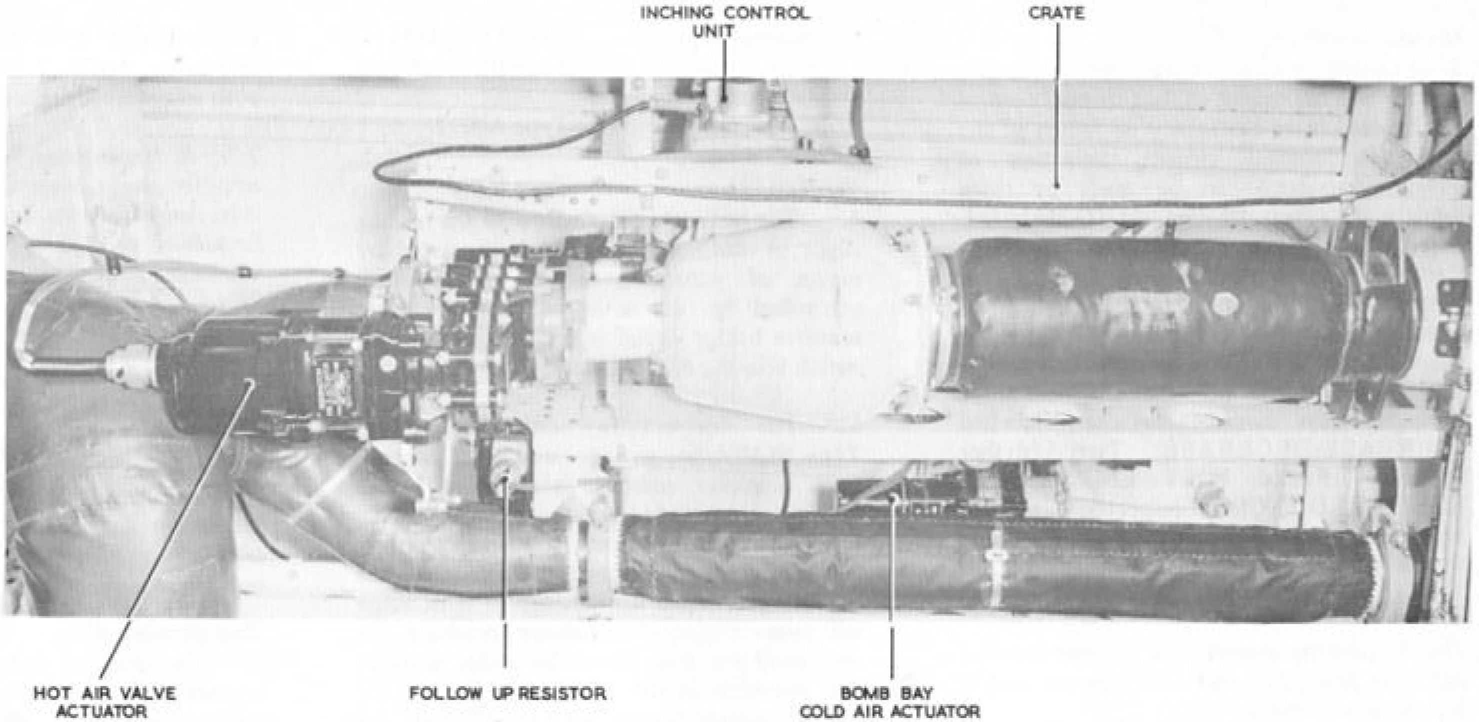
8. Three setting potentiometers, Type FHK/A/20, for selecting the temperature of the wings and fin, are mounted on a bracket attached to the pilots' floor below the aft end of the starboard console. The potentiometers are calibrated from 1-10, and should be selected to position 10 and locked for normal operation of the systems.

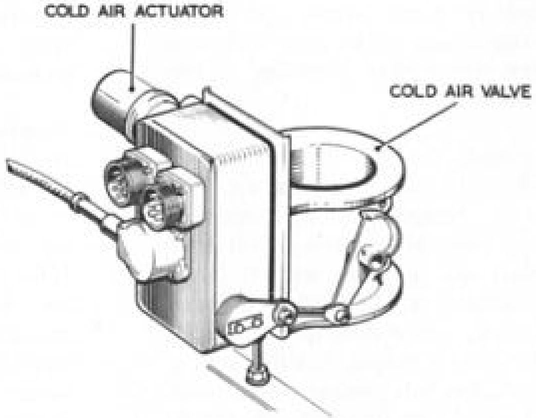
Cold air control

9. Operation of the cold air valve actuators is controlled by bellows-operated switches in each inching control. The action of the inching control is determined by the reaction of a temperature sensitive phial in each leading edge warm air duct. The phial is connected to the bellows by a capillary tube.

Automatic control

10. Under automatic control the operation of each circuit will be initiated by the selection of AUTO on the auto-manual switch fitted to the starboard console. Operation of the hot air valve actuator will then be controlled automatically by the action of relays in the amplifier control. These relays act as inching controls for the hot air valve actuator in accordance with the changes of temperature during flight. The extractor flaps will be operated to the fully open position and remain so during the period the auto-manual switch remains at AUTO. Having been fully opened on operation of the





DETAIL OF INCHING CONTROL UNIT

DETAIL SHOWING ACTUATOR ATTACHMENT TO COLD AIR VALVE

Fig. 2 Fin de-icing crate

auto-manual switch, the cold air valve will be switched back to the required position by the action of its associated inching control unit. Note that until ice detectors are fitted, the associated wiring is shorted out by linking the appropriate terminals of the operating relays 466, 471 and 461 for the port and starboard wings and fin respectively.

Micro switches

11. The distribution of excessively hot air through the ducting is avoided by the inclusion of a micro switch in each circuit. This micro switch controls the closing of the cold air valve, and is governed by the position of the hot air valve in such a manner that the cold air valve will not be closed until the hot air valve is fully closed. Further protection is afforded by a thermal overheat switch fitted in the leading edges. If the temperature in the leading edge duct exceeds 160 deg.C., this switch will be closed and the hot air valve will be closed.

Circuit operation

12. The following paragraphs describe the sequence of operations following the selection of AUTO on the auto-manual selector switch as applied to the port wing de-icing installation. The sequence is similar for the starboard wing and for the fin installation.

13. Reference to fig.3 will show that with the auto-manual switch in the auto position, relay 466 will be energised via fuse 581 to close contacts 466/1 and 466/3, which are linked to the d.c. supply via terminals 3-2 of the auto-manual switch, and contacts 466/4 A2-A1 which are directly connected to the d.c. supply at fuse 581. From the now closed contacts 466/3, the d.c. supply is fed to pin A of the magnetic amplifier plug and through the normally closed contacts 469/1 to the heater resistance of the thermal delay relay.

14. The d.c. supply from fuse 581 is fed via the now closed contacts 466/1 and the normally closed contacts 469/3 to the open field of the cold air valve actuator, which will operate the cold air valve to the open position. At the same time, a supply from the amplifier will be made via contacts 468/2 to the open field of the hot air valve actuator, which will open the hot air valve.

Delay switch

15. In the meantime, after a delay of 10 seconds, the delay switch, Type 610V, will operate to energise relay 469 via fuse 581, terminals 2-3 of the auto-manual switch and the closed contacts 466/3. Contacts 469/1 will operate to make D1 and D2 to maintain the supply to relay 469 Contacts 469/2 close to connect a supply to the centre contact of the inching control switch. Contacts 469/3 open to cut off the supply to the open field of the cold air valve actuator. At this stage, control of the hot and cold air valves will be taken over by the amplifier control unit and the inching control respectively (para.10). The actuators will be operated to positions determined by the reaction of the sensing elements and the temperature of the sensitive phial.

Manual control

16. When the auto-manual selector switch is placed to MANUAL, relay 467 will be energised via fuse 581 and terminals 2-1 of the auto-manual switch. Contacts 467/1 will close to connect the d.c. supply to the open field of the cold air valve actuator. Contacts 467/3 will close to connect the d.c. supply to terminal 2 of the manual heat control switch. Contacts 467/2 open to break the supply to the close field of the cold air actuator. Contacts 467/4 change over to make A1-A2 and so energise relay 342. Contacts 342/1 change over to make C1-C2 and feed a supply via fuse 742 to the open field of the flap extractor actuator.

17. The cold air valve will now be open and the opening and closing of the hot air valve will be controlled by placing the manual heat control switch to the increase or decrease position as required. When the manual heat control switch is in the increase position, a supply will be made to the open field of the hot air valve actuator via terminals 2-3 of the switch and the normally closed contacts 468/2.

18. With the manual heat control switch in the decrease position, the supply will be made via terminals 2-1 of the switch and the normally closed contacts 468/1 to the close field of the hot air valve actuator.

19. The cold air valve and the extractor flap actuator will remain in the fully open position during the period that the auto-manual switch is at MANUAL.

Switching off

20. When the auto-manual switch is placed to OFF, the supply to relay 467 will be broken and the relay will be de-energised. Contacts 467/4 will revert to their normal position (A2-A3 made), and relay 342 will be de-energised so that contacts 342/1 also revert to their normal position (C2-C3 made). The extractor flap will proceed to close. The closed contacts 467/4 also supply the close field of the hot air actuator via the normally closed contacts 466/4 and 468/1. As soon as the actuator closes its associated valve, the micro switch will be operated to make across contacts A-C and a supply will be connected to the close field of the cold air valve actuator via contacts 466/2 and 467/2.

Overheat switch

21. Should the temperature of the heated

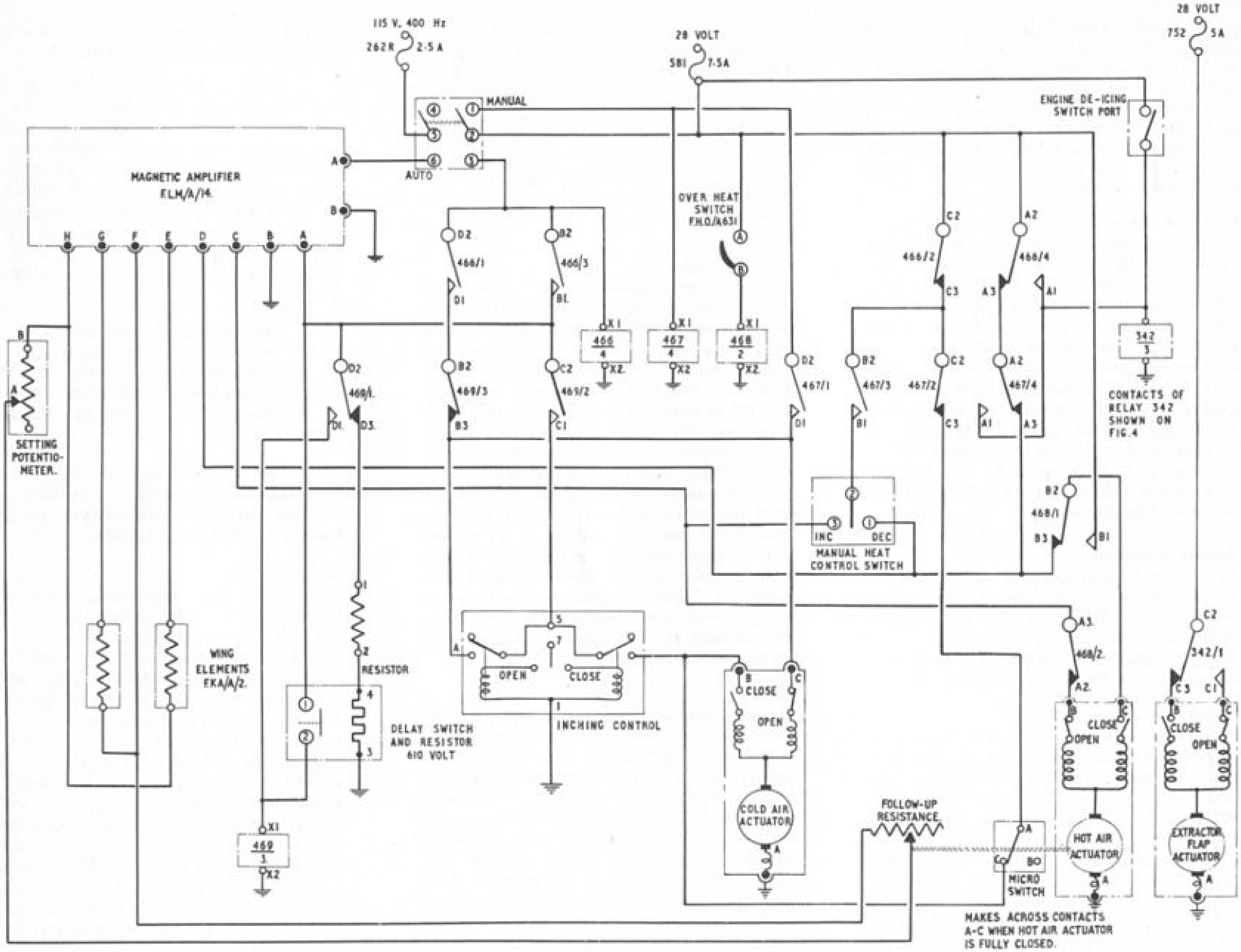


Fig. 3 Port wing de-icing control

Minor alterations

air exceed 165 ± 5 deg.C, the thermal overheat switch fitted in the leading edge will close. A supply from fuse 581 will energize relay 468 via contacts A and B of the thermal switch. Contacts 468/1 will change over to make B1 and B2 to connect the supply from fuse 581 direct to the close field of the hot air valve actuator. Contacts 468/2 will open to isolate the open field of the hot air valve actuator from the supply.

22. The hot air valve will close to restrict the flow of warm air to the duct, which will reduce the temperature. The overheat switch will revert to its normally open position and normal control will again be possible.

E.C.M. air intake de-icing

23. A de-icing heater fitted inside the ram air intake for the E.C.M. installation comes under the control of the fin de-icing switch. The control circuit is taken via relays 461 and 462 and either one, when energized by the fin de-icing switch will prepare the circuit for the heater. Further details of the system are contained in Chap.22.

ENGINE DE-ICING

24. A thermal system of de-icing is used for the engine air intake bullet. Hot air is bled from the low pressure side of the engine by means of an electrically operated valve actuator Type FKH/A/5006 fitted on the port side of the stator case. The hot air is piped to the engine annulus which surrounds the engine air intake bullet. Hot air is then directed to the interior of the air intake bullet and is then exhausted to atmosphere.

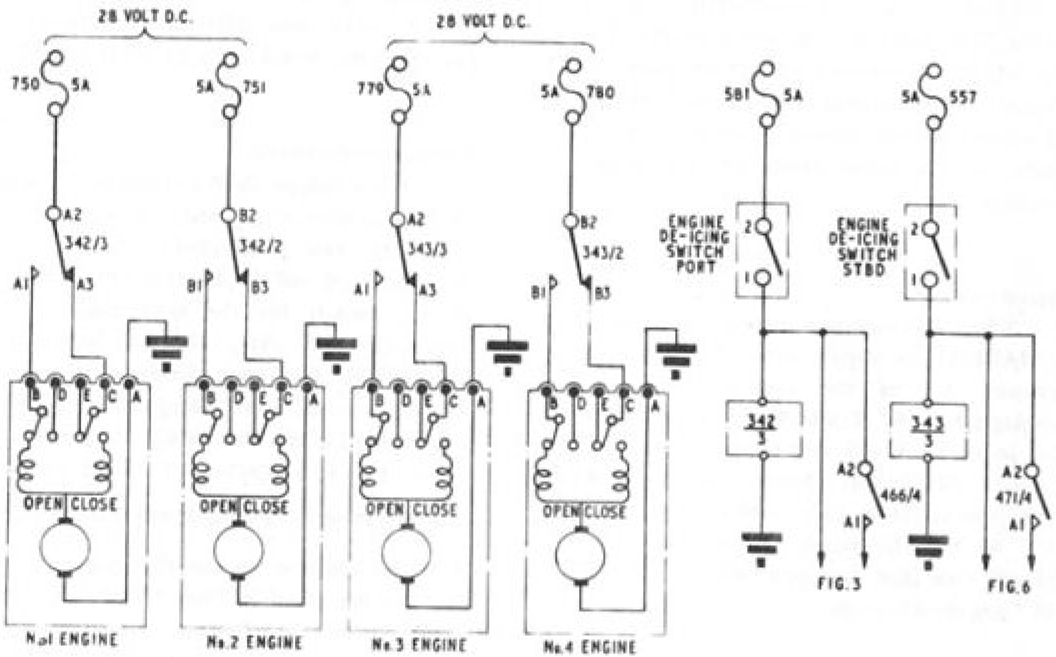


Fig. 4 Engines de-icing circuit

Control

25. In normal flight the engine de-icing actuators are operated as a function of the aircraft's wing de-icing system, No.1 and 2 engine actuators by the port wing de-icing controls and No.3 and 4 engine actuators by the starboard wing de-icing controls. As stated in para.2 however, two switches are provided to enable the engine de-icing actuators to be operated separately from the wing system for the purpose of engine ground runs.

Circuit operation

26. The operation of the No.1 and 2 engine circuits is described only, as similar operation takes place for the No.3 and 4 engines. A circuit diagram of the de-icing system is shown in fig.4 which should be read in conjunction with the port wing de-icing circuit diagram shown in fig.3.

Auto-control

27. Reference to fig.3 and 4 will show that with the port wing auto-manual switch at AUTO, relay 466 will be energized via fuse 581 and terminals 2-3 of the control switch. Contacts 466/4 will change over to make A1-A2. The supply via contacts A1-A2 will now energize relay 342. Contacts 342/2 will change over to make B1-B2 as also will contacts 342/3 to make A1-A2. The closed contacts A1-A2 will complete the supply from fuse 750 to the open field of the No.1 engine actuator. In the case of No.2 engine, the supply is fed from fuse 751 and the closed contacts B1-B2.

28. When the auto-manual switch is moved to OFF, the supply to relay 466 is broken. The relay will be de-energized and in turn relay 342 will also be de-energized The relay contacts will revert to their normal position to feed a supply to the close fields of the engine actuators.

Manual control

29 When the auto-manual switch is moved to MANUAL, a supply from fuse 581 and terminals 2-1 of the control switch will energize relay 467. Contacts 467/4 will change over to make A1-A2 and energize relay 342. Contacts 342/1 will change over to make B1 B2 and contacts 342/2 will change over to make A1-A2. The supply from fuses 750 and 751 will now feed the open fields of the No.1 and ? engine actuators.

30 When the auto-manual switch is moved to the OFF position, the supply to relay 467 will be broken and the relay will be de-energized Relay 342 will also de-energize and the supply to the open fields of the engine actuators will be isolated. The supply will now be fed to the close fields of the actuators via the normally closed contacts 342/1 and 342/2.

Independent control

31. When independent control of the engine de-icing system is required, e.g., during engine runs, the two associated switches on the de-icing panel will be placed to ON. In the case of the switch for the port engines, when selected to ON, relay 342 will be energized (fig.4), and the open fields of the engine actuators will be energized as before. Conversely, when the switch is at OFF, the close fields of the actuators will be energized.

AIR BOMBER'S WINDSCREEN DE-ICING

32. In addition to the thermal windscreen systems described in Chap 13 of this book, a fluid system of de-icing the air bomber's windscreen is used on this aircraft.

33. De-icing fluid is sprayed under pressure on to the windscreen the rate of flow of fluid being controlled by a dual solenoid-operated valve, Type AC.11320. Further information on the system will be found in Sect.3, Chap.9.

Air bomber's windscreen control

34. A 3-position control switch, Type D.5501, labelled NORMAL - OFF - EMERGENCY, and fitted to the air bomber's panel 8P, controls the operation of the dual solenoid-operated valve.

Normal operation

35. When the air bomber's control switch is placed to NORMAL the low pressure side of the valve is energized to allow a restricted flow of de-icing fluid to be sprayed on the windscreen.

Emergency operation

36. When the air bomber's control switch is moved to EMERGENCY, both coils of the valve are energized to fully open the valve and thus increase the flow of de-icing fluid to the windscreen

SERVICING

General

37 Due to operation of the electrical and mechanical controls of the aircraft de-icing system being so closely allied it is essential that co-operation of the highest order is maintained between the airframe, electrical and instrument trades

38 This co-operation will ensure that a high degree of serviceability is maintained, and also obviate unnecessary repetition of function tests etc., during inspection periods.

39. Servicing of the electrical components and wiring continuity checks are dealt with in the following paragraphs.

40. Servicing for the mechanical system is contained in Sect.3, Chap 9 of this publication.

Amplifiers, Type FLM/A/14

41 Three amplifiers form part of the wing and fin de-icing system. Each amplifier should be examined at the times and periods laid down in the appropriate Servicing Schedule General details of the amplifier are contained in A.P.107B-0207-16.

42. If on examination the desiccator shows a high moisture content the amplifier in question should be removed for examination. If a unit is found to be defective it should be returned to stores and a replacement fitted.

Delay switch, Type 601V

43. This switch, which is contained in an evacuated sealed tube, should be examined for

signs of damage. The switch is fitted with a 4-pin valve type base and the pins should be making good contact with their corresponding sockets.

NOTE . . .
The delay switch and its series resistance are matched in manufacture. In the event of failure of either item, both must be replaced by a matched set.

Cold air valve actuator, Type C5520

44. Normal servicing of the fin cold air valve actuator is confined to a general inspection of the actuator with particular attention to the brush-gear. Examination will necessitate the removal of the screw-end cap and the screws securing the brush spring retaining clips.

45. Examine for signs of damage, also inspect the supply plug for security and corrosion. Full details for servicing the actuator will be found in A.P.4343D, Vol.1, Book 3, Sect.16, Chap.14.

Hot air valve actuators

46. These actuators, of which there are three, used for controlling the hot air valves in the wing and fin de-icing systems, should be examined generally for signs of damage and security at the periods laid down in the appropriate Servicing Schedule.

47. Inspect the supplies plug for security, damage and corrosion. Faulty actuators should be removed and replaced by serviceable units.

Hot air valve micro switches

48. Examine for damage and security; setting details for these switches will be found in Sect.3, Chap.9, of this publication.

Follow up resistors, Type FLJ/A/4

49. Three follow-up resistors are used in the wing and fin de-icing systems. Each should be examined at the appropriate servicing periods for signs of damage and security. Linkages should be also examined.

50. Details of linkage settings will be found in Sect.3, Chap.9 of this publication.

Inching controls, Type FDF/A/3113

51. Three inching controls are used in the wing and fin de-icing systems. Each should be examined at the appropriate servicing periods for signs of damage and security. The supply plugs should be tight and no signs of corrosion present.

52. Inching controls which prove unserviceable should be removed and replaced by serviceable units. Minor adjustments should be in accordance with A.P.1275A, Vol.1, Sect.24, Sub-Sect.B, Chap.3.

Overheat switches, Type FHO/A/63 and FHO/A/631

53. Each wing de-icing system is fitted with a Type FHO/A/631 overheat switch and a Type FHO/A/63 is fitted to the fin de-icing system.

54. At the appropriate servicing periods each switch should be examined for security and signs of damage. Switches which prove faulty should be removed and replaced by serviceable units. Standard serviceability tests are contained in A.P.112G-1122-1.

Extractor flap actuators, Type A/0217

55. Two extractor flap actuators are fitted as part of the wing de-icing system. Each should be examined at the appropriate inspection periods.

56. Damaged or unserviceable actuators should be removed and replaced with serviceable units.

Wing elements, Type FKA/A/2

57. Six wing elements are used in the de-icing system, i.e., two in each wing and two in the fin.

58. They should require little servicing, the only faults likely to arise are corrosion around the terminal connectors or open-circuiting of the resistance. When measured the resistance value for each element should be approximately 494 ohms. at 20 deg.C

Manual switches

59. The auto-manual and the manual heat control switches should be examined for smoothness of operation. Suspected faulty switches should be removed for further checks and replacements fitted if found defective.

Engine de-icing actuator, Type FKH/A/5006

60. In conjunction with the engine tradesman check that the engine de-icing actuators operate, and are fully serviceable, when the switches controlling the port and starboard wing de-icing systems are placed to MANUAL.

61. Actuators which prove to be unserviceable should be removed and replaced by serviceable units.

Windscreen de-icing

62. In conjunction with the airframe tradesman, checks should be made at the

appropriate periods for correct functioning of the windscreen de-icing system.

63. The de-icing valve solenoids should require little servicing, except to check for damage and security. Solenoids which are found unserviceable should be removed and replaced by serviceable units.

Wing de-icing function checks

64. The following checks provide the means of testing the electrical controls of the wing de-icing system without a supply of hot air available, i.e., without the engines running. The checks should be carried out at the appropriate inspection periods or at any time when the function of the system is suspect. The appropriate a.c. and d.c. supplies should be available.

Port wing

65. Functional checks for the port wing de-icing system may be carried out as follows:-

(1) Unlock and select the setting potentiometer to position 1.

(2) With the auto-manual switch in the OFF position, check that the cold air flap and the extractor flap are closed and also that the hot air valve is closed.

NOTE . . .
The hot air valve will be closed when the associated micro switch is pressed.

(3) Select the auto-manual switch to MANUAL. Check that the cold air and extractor flaps are opened.

(4) Check that the hot air valve will open and close by selecting the manual heat control switch to INCREASE and DECREASE respectively.

(5) Select the manual heat control switch to INCREASE to open the hot air valve. Hold the switch in that position. Disconnect the socket from the overheat switch and provide a shorting link across poles A and B of the socket. The hot air valve should then close. Remove the shorting link and the hot air valve should open. Release the manual heat control switch.

(6) Select the auto-manual switch to OFF. The hot air valve, extractor flap and cold air flap should close.

(7) Select the auto-manual switch to AUTO and note that the cold air valve opens and after a slight delay inches to the closed position, and the extractor flap opens.

(8) The automatic operation of the hot air valve will depend on the selection of the setting potentiometer and the ambient temperature. Turn the setting potentiometer higher, step by step, until the hot air valve begins to open and finally reaches the full open position. Turn the potentiometer lower until the valve is closed. Again turn the potentiometer higher until the valve opens.

(9) Select the auto-manual switch to OFF. The hot air valve and the extractor flap should close.

(10) Select the setting potentiometer to position 10 for normal operating conditions (para.8) and lock.

Starboard wing

66. The function of the starboard wing de-icing system should be carried out in the same manner as that described for the port wing.

Fin

67. When operative, the functioning of the fin de-icing system should be carried out in the same manner as that described for the port wing. Note that the position of the fin cold air actuator can be determined by observing the position of the inching control linkage. The arm on the inching control rests against the stop when the cold air valve is closed.

Engine de-icing

68. The engine de-icing circuit should be checked by disconnecting the engine actuators and connecting 28-volt low wattage test lamps across the associated socket poles B and A for open and C and A for close. The checks can then be carried out as follows:-

Port engines

(1) Select the port wing auto-manual switch to MANUAL. The open lamps should light and the close go out.

(2) Select the auto-manual switch to OFF. The close lamps should light and the open lamps go out.

(3) Select the auto-manual switch to AUTO. The open lamps should light and the close lamps should go out. Return the auto-manual switch to OFF.

(4) Select the port engines de-icing switch to ON. The open lamps should light and the close lamps go out. Return the switch to OFF.

(5) Remove the test lamps and re-connect the actuators.

REMOVAL AND INSTALLATION

General

69. The removal and assembly of most of the components in this chapter does not present any great difficulty. Removal information therefore is given only for those items of equipment where considered necessary. In all cases the method of assembly is the reverse to that of removal. Prior to removals all associated cable assemblies must be disconnected and conveniently stowed.

Wing hot air valves

70. Each wing hot air valve and actuator is removed and replaced as a complete assembly. Access to each valve is gained by removing the appropriate panel under the engine air intake. The linkage to the follow-up resistor immediately above the valve should first be disconnected. The valve can then be removed from the ducting by releasing the two clamps, one at each side of the valve Note that the seals inside the clamps must be renewed when the valve is replaced.

Wing cold air actuators

71. Each wing cold air actuator should be removed as follows:-

(1) Locate the appropriate cold air flap under the engine intake.

(2) Remove the plate at the front end of the flap to expose the two hinges.

(3) Remove the split pins from the hinges and withdraw the hinge pins.

(4) Remove the two centre screws near the aft end of the flap to release the lower attachment bracket for the actuator.

(5) Remove the flap.

(6) Remove the V-shaped panel immediately above the aperture.

(7) Access can now be gained to unbolt the actuator from its mounting.

Wing inching controls

72. Access for removal of the wing de-icing controls is gained by removing each cold air flap and V-shaped panel as described in the previous paragraph. Note that the inching control must be removed with its linkage complete with capillary. The capillary is removed from the duct as follows:-

(1) Remove the two clips securing the capillary inside the cold air flap aperture.

(2) Locate and remove the round access panel outboard of the extractor flap under the engine air intake where the capillary bulb is screwed into the hot air duct.

(3) Unlock and unscrew the bulb from the duct.

(4) Withdraw the capillary and bulb through the conduit as the inching control is being removed.

Wing extractor flap actuators

73. Each wing extractor flap actuator should be removed as follows:-

(1) Locate the appropriate extractor flap under the engine air intake.

(2) Remove the six screws aft of the flap in order to release the hinge.

(3) Move the flap into a convenient position and unbolt the actuator from the lower attachment bracket.

(4) Reach up inside the aperture and remove the actuator from the top attachment bracket.

Wing overheat switches

74. Access panels for the wing overheat switches will be found immediately forward of the undercarriage main doors. When the panels are removed the switches can easily be unscrewed from their respective ducts.

Fin de-icing crate

75. The equipment on the fin de-icing crate in the bomb bay can be removed in situ, but where some difficulty may be experienced such as in the case of the cold air actuator, it may be more advantageous to remove the crate first. This can be carried out as follows:-

(1) Remove the clamp at the forward end of the hot air valve.

(2) Remove the clamp on the hot air duct at the aft end of the crate.

(3) Remove the clamp at the top of the cold air valve.

(4) Unclip the inching control capillary and remove the bulb from the duct.

(5) Remove the two securing bolts at the four corners of the crate structure and gently lower the crate.

(6) The crate may now be completely removed from the aircraft.

(7) Note that all duct seals must be renewed when the crate is replaced.

Fin hot air valve

76. The linkage to the associated follow-up resistor must first be disconnected. The fin hot air valve and actuator is then removed as an assembly by releasing the two clamps, one at each side of the valve. Note that the clamp seals must be renewed on replacement of the valve.

Fin cold air actuator

77. The fin cold air actuator can be withdrawn from the cold air valve when the two securing bolts are unlocked and removed. The eccentric washer on the actuator mounting plate is used to give slight adjustment when refitting the actuator. The actuator should always be re-fitted rotated to the fully closed position in line with the valve closed.

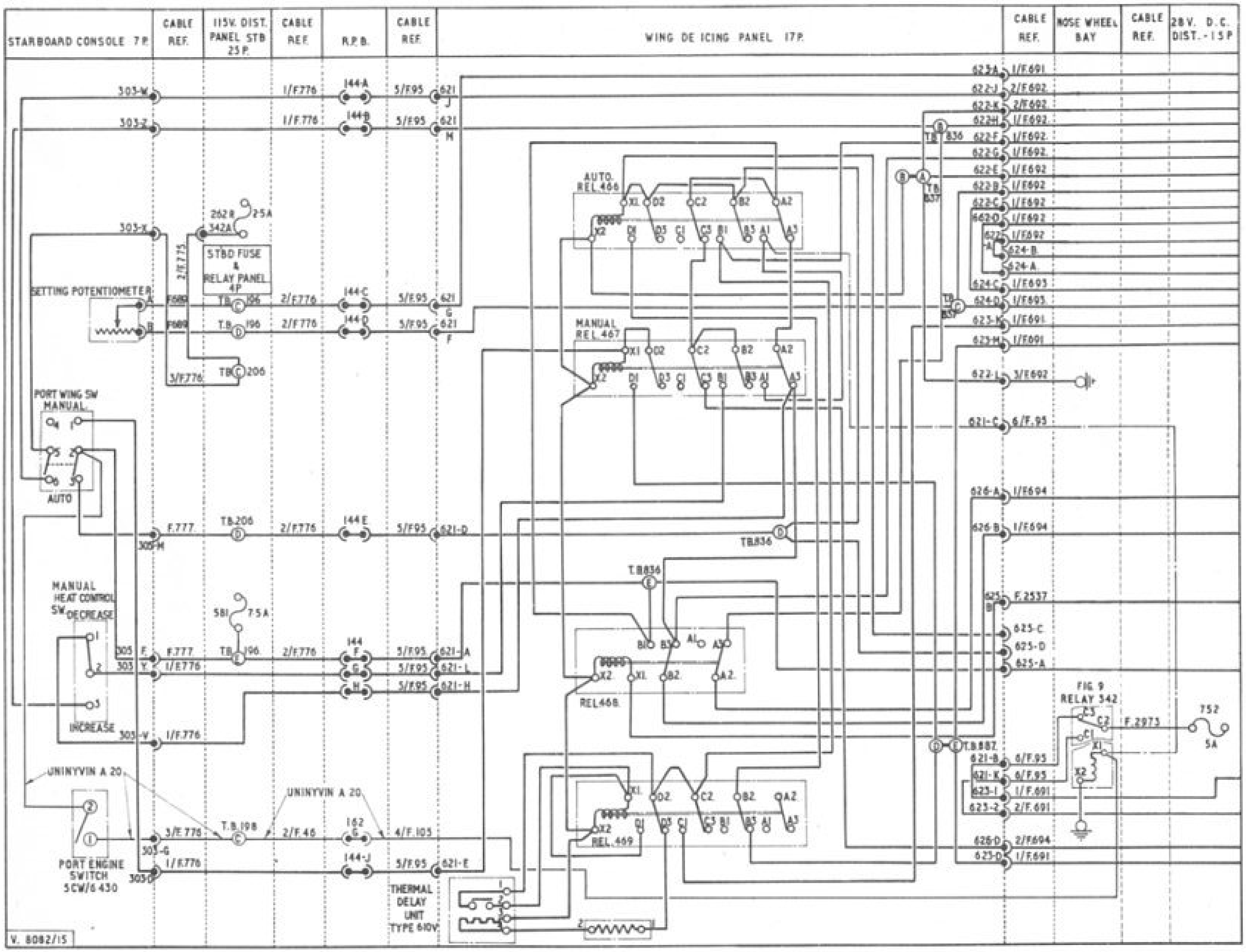


Fig. 5 (1) Port wing de-icing
(◄ Fuse 581 now 7·5A ►)

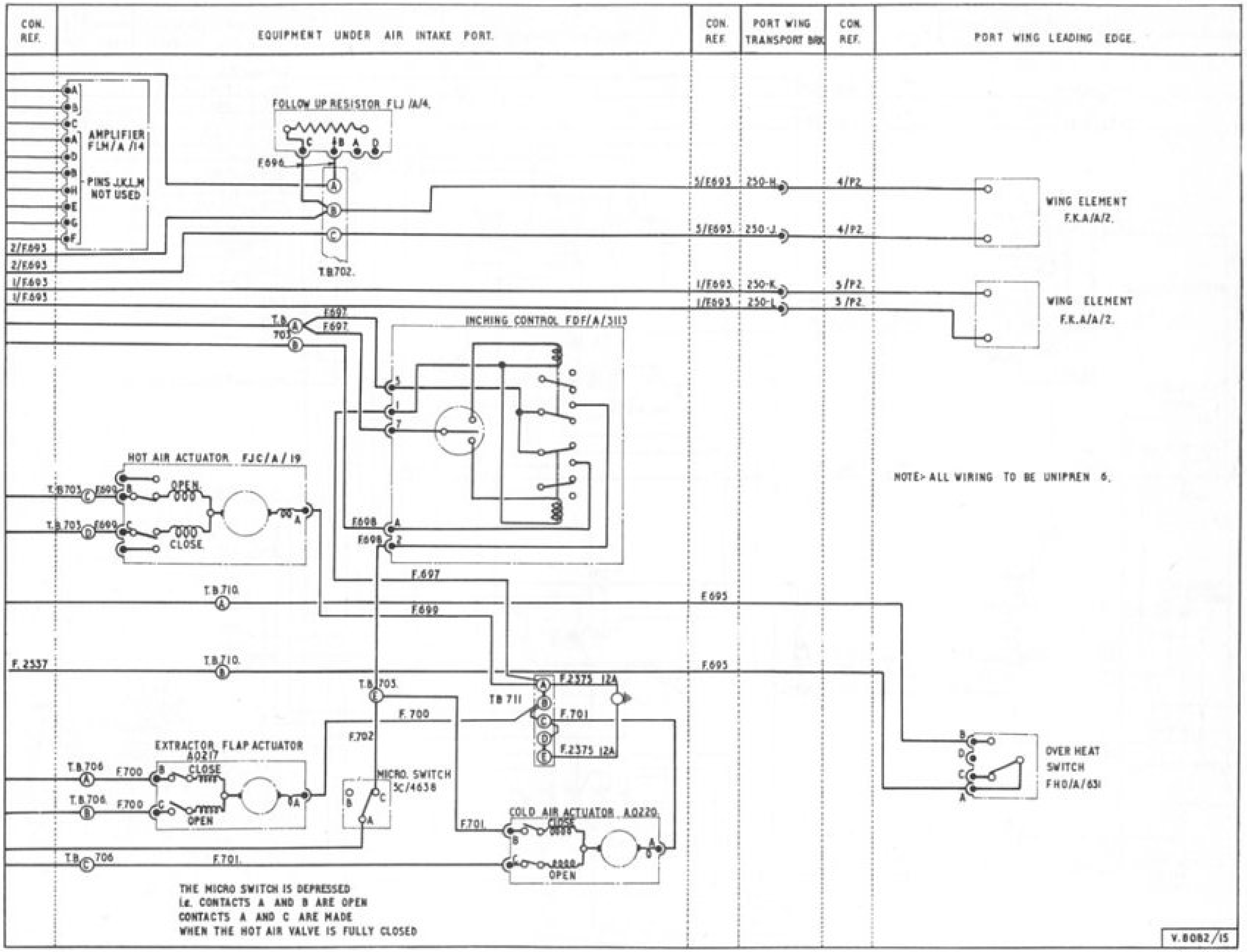


Fig. 5 (2) Port wing de-icing

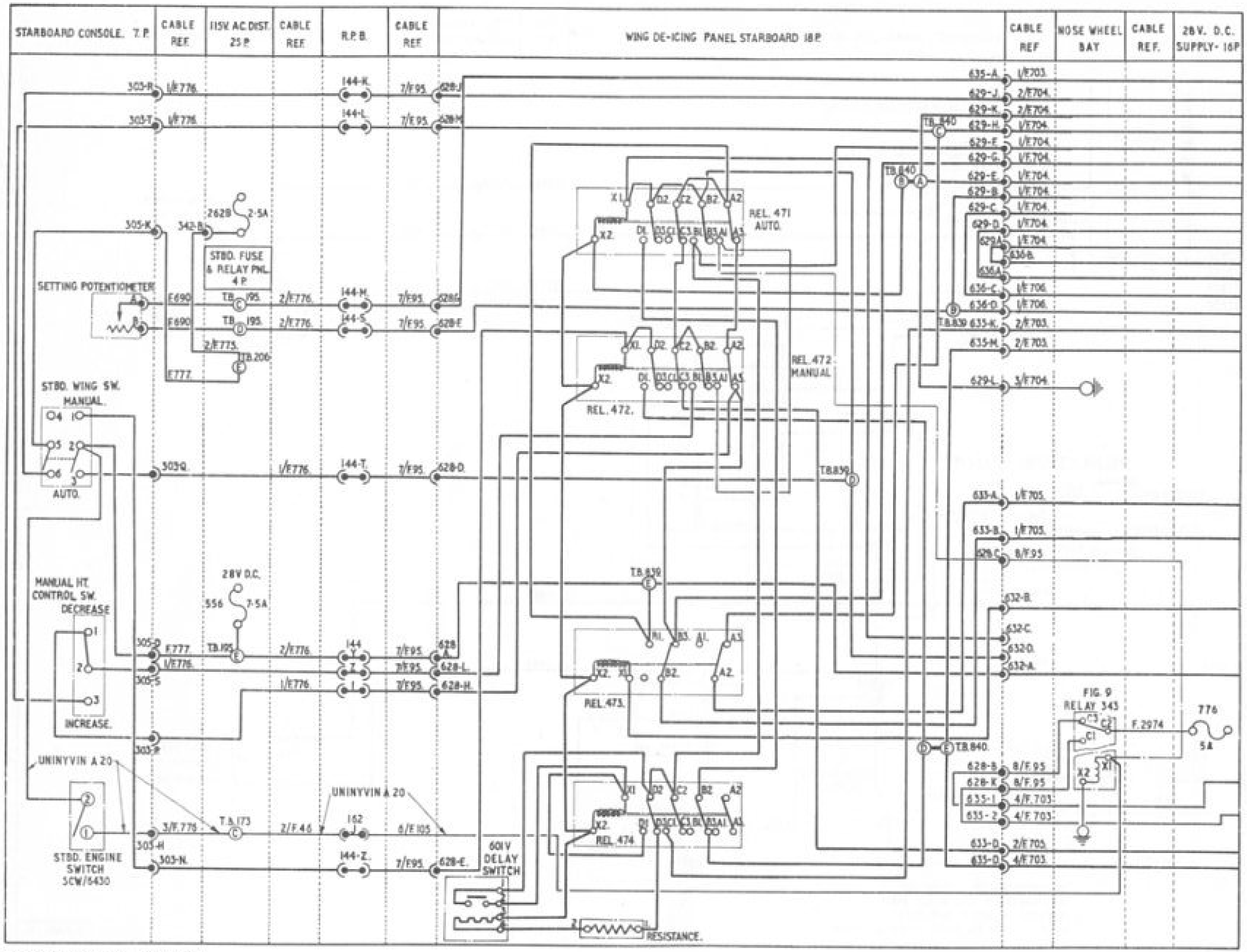


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Fig. 6 (1) Starboard wing de-icing

◄ *Mod. 2212 incorporated* ►

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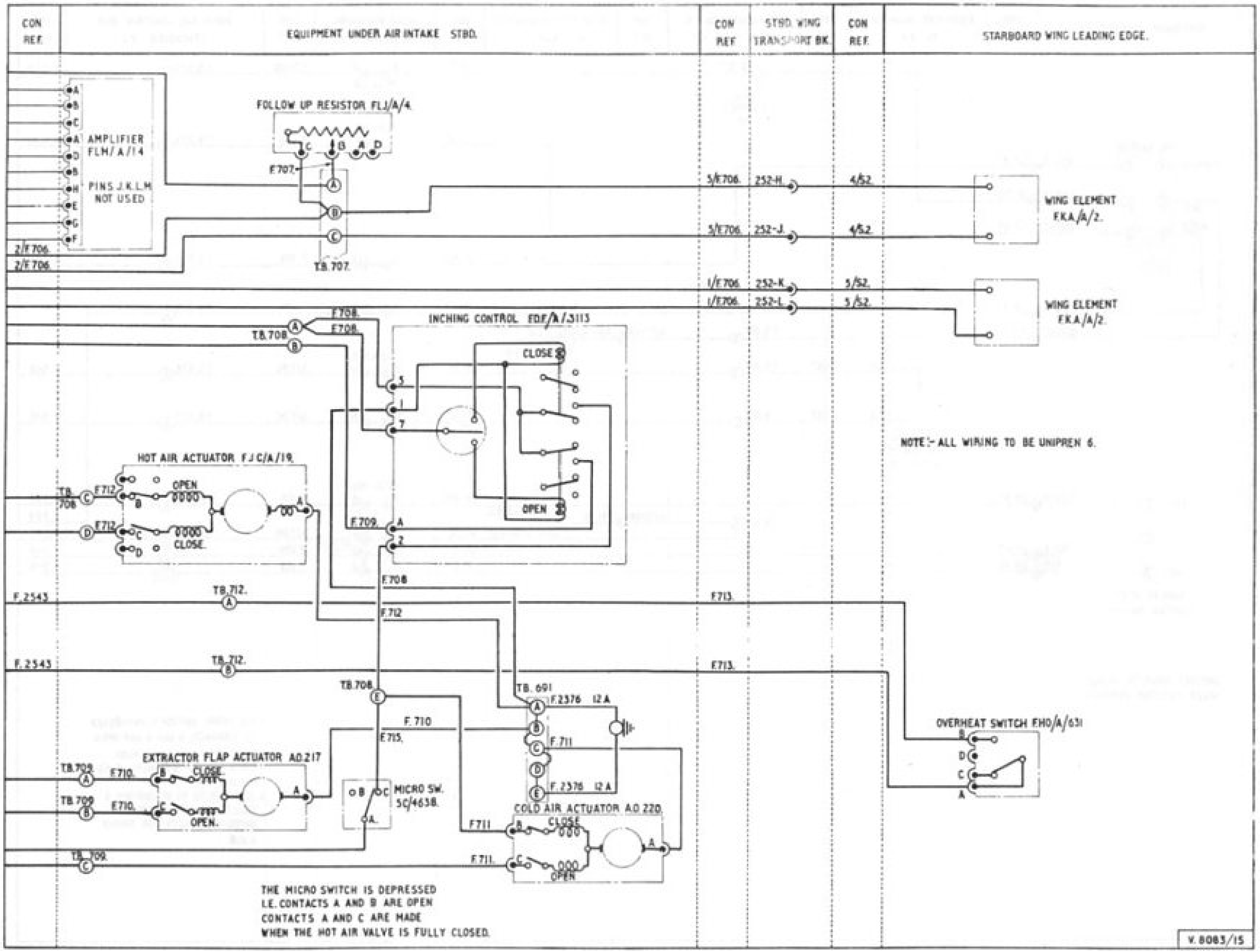


Fig.6(2) Starboard wing de-icing
(Mod.1704 Incorporated)

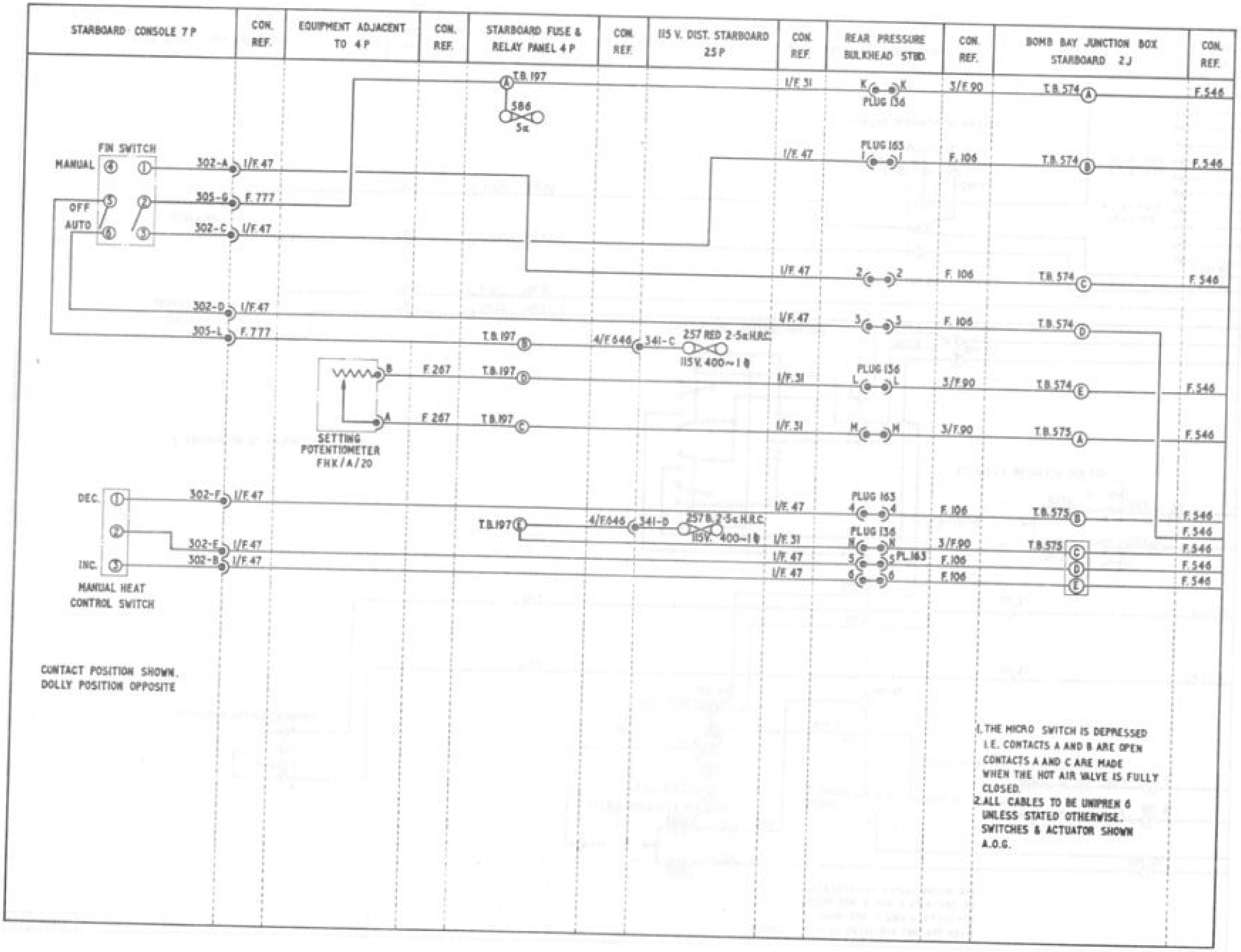


Fig. 7 (1) Fin de-icing

V.2.1B. 1113

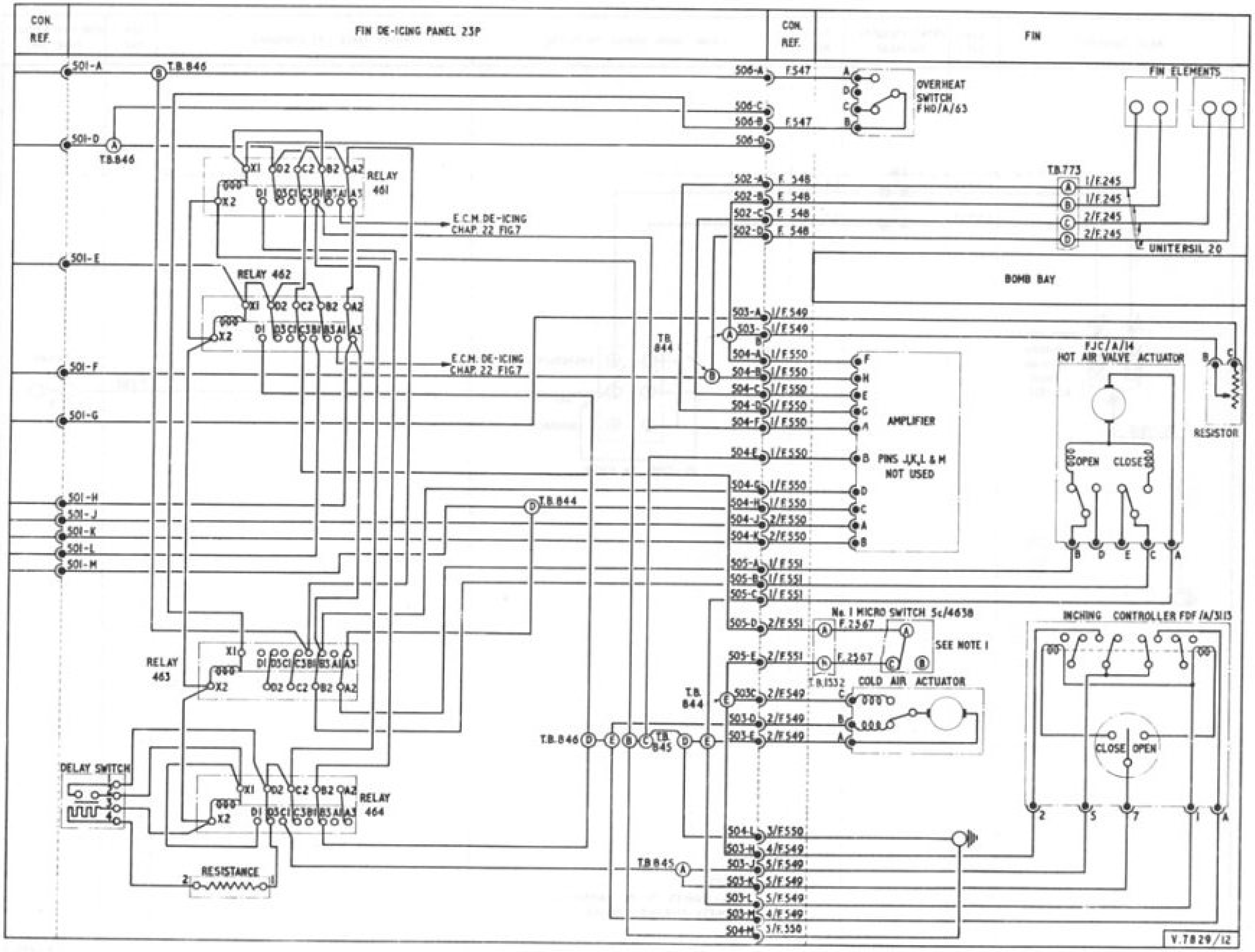


Fig.7(2) Fin de-icing

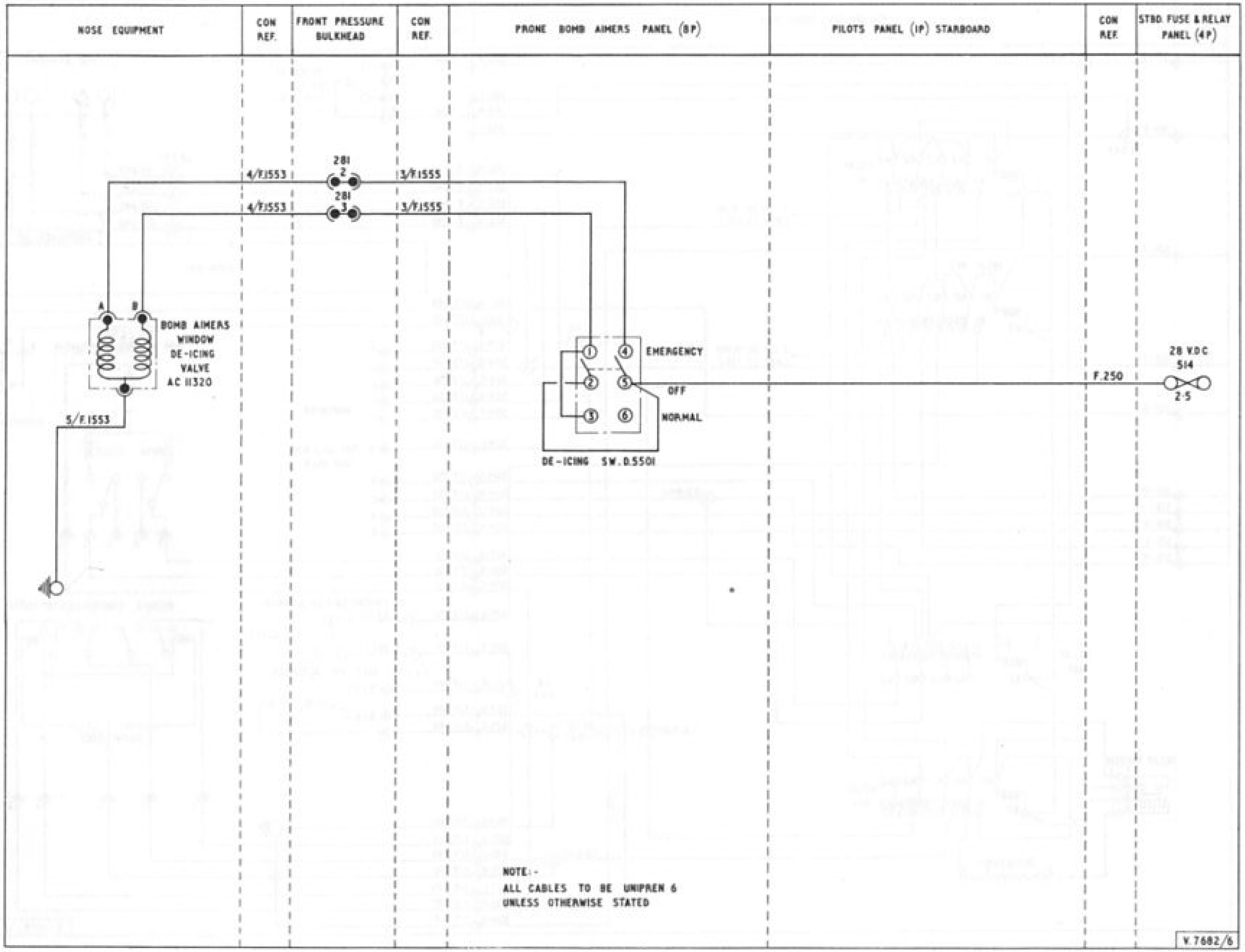


Fig.8. Air bomber's windscreen de-icing
(Mod. 969 incorporated)

Y.2.1B. 1094

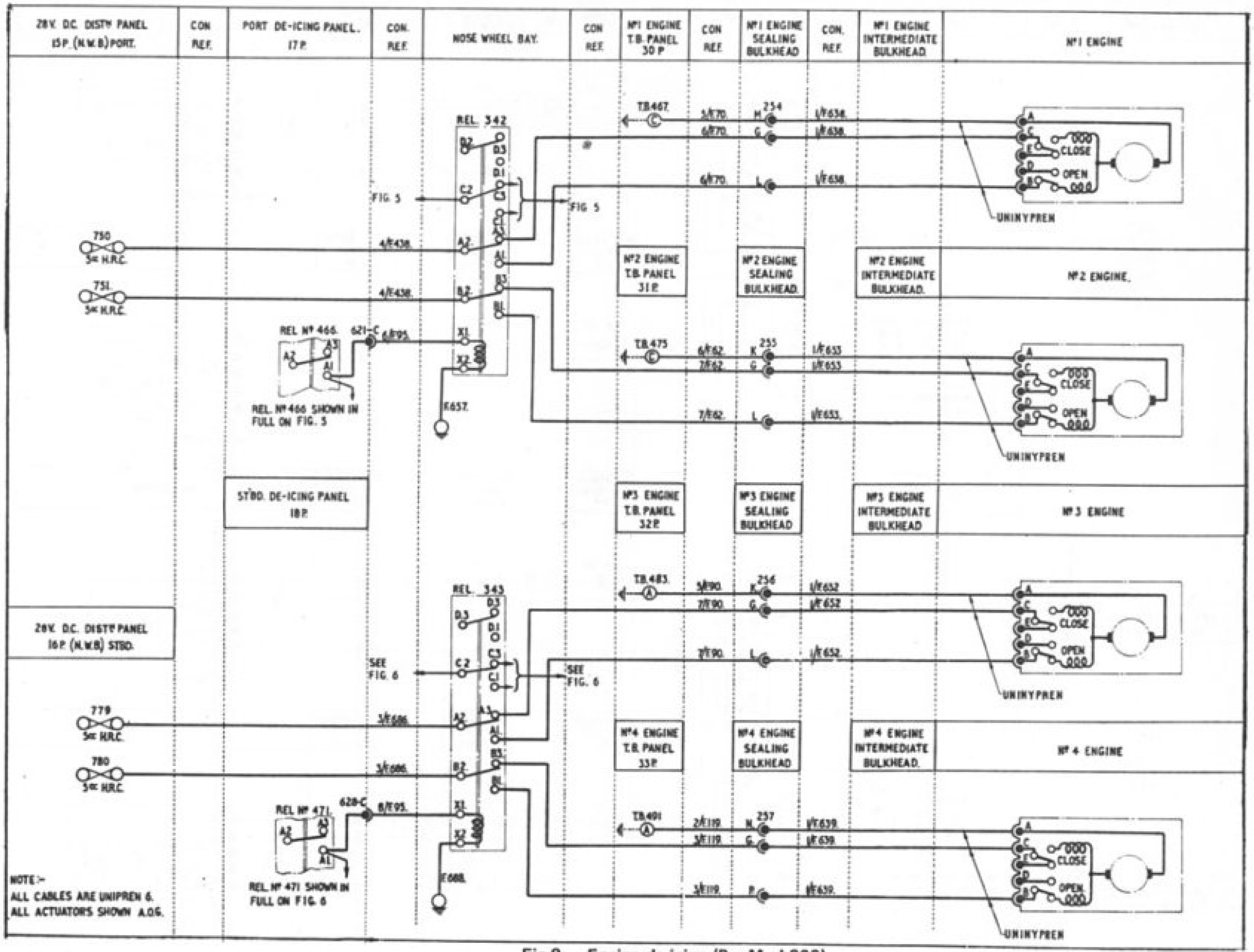
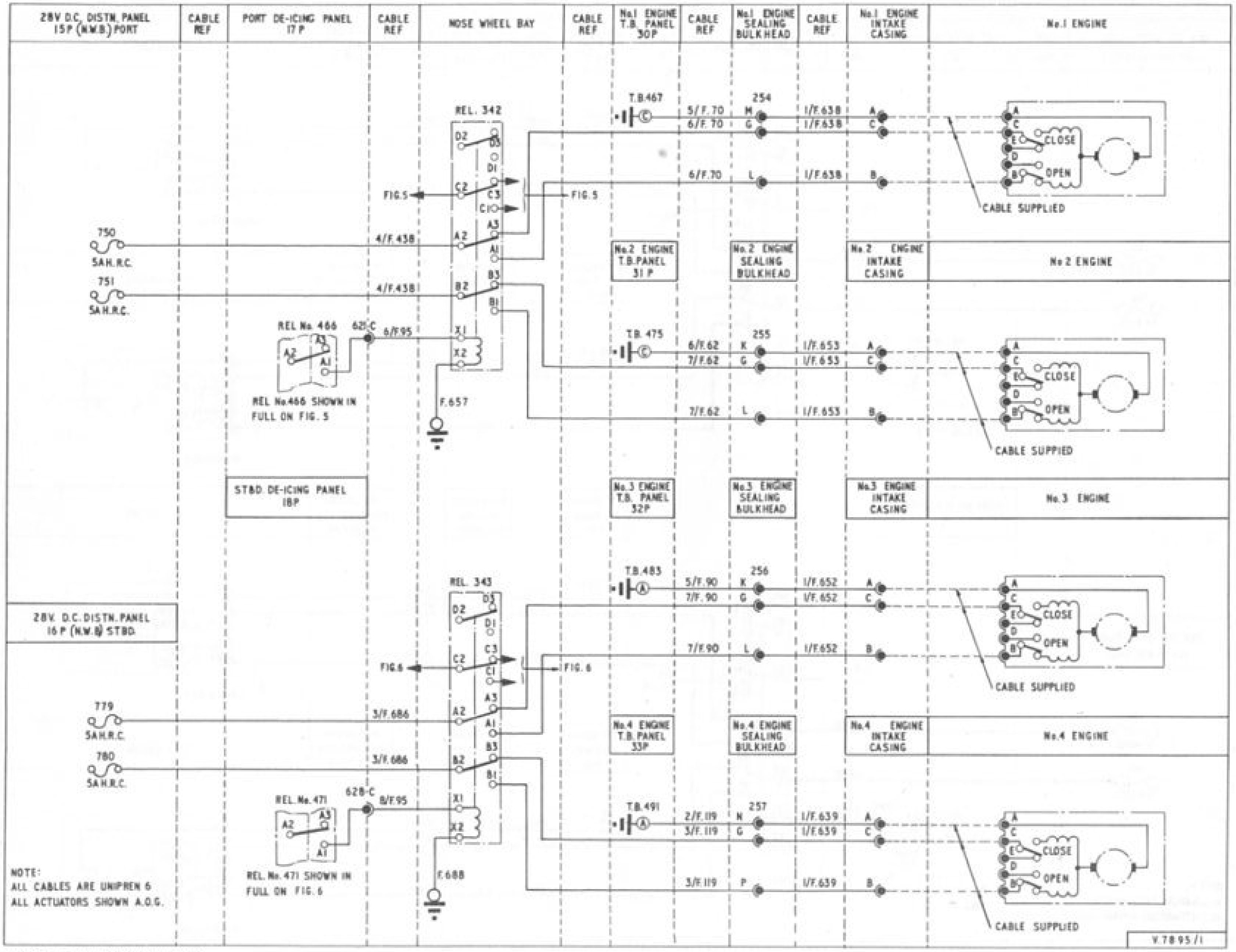


Fig.9 Engine de-icing (Pre.Mod.906)



176675 570 10,74 H.S.A. 1354

Fig.10 Engine de-icing (Post Mod. 906)


The P/Q family of
Masks
Why
"P/Q"?
The P/Q
Family
MC3A
"Warning"
Connector
A-13A/1
A-13A/2
Quick Don
V-Type