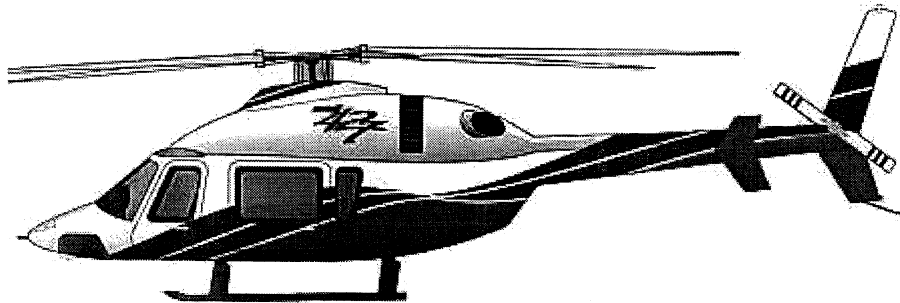


**HEATER SERVICE MANUAL 427H-201M-1**

**AIR COMM CORPORATION  
3300 AIRPORT ROAD  
BOULDER, CO. 80301**

**INSTRUCTIONS FOR CONTINUED AIRWORTHINESS  
BELL HELICOPTER 427  
HEATER SYSTEM**





**LIST OF EFFECTIVE PAGES**

LIST OF REVISIONS Revision 0 (Original Issue)..... 15 February 2000

LIST OF EFFECTIVE PAGES

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These Instructions for Continued Airworthiness (ICA), except for the Airworthiness Limitation Section, have been reviewed and found to comply with the applicable requirements of Appendix A to the Federal Aviation Regulations Part 27

FAA Acceptance [Signature] Date 20 OCT. 00  
Fort Worth Aircraft Evaluation Group

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**CHAPTER 0  
INTRODUCTION**

1. SCOPE

The scope of this manual encompasses the scheduled and unscheduled maintenance procedures for the continued airworthiness of the Air Comm Corporation heater system installed in the Bell 427 helicopter.

2. PURPOSE

The purpose of this manual is to provide the aircraft mechanic in the field the necessary information to maintain the heater system.

3. ARRANGEMENT

This manual is arranged by chapters which are broken down into paragraphs and sub-paragraphs. All of the chapters and paragraphs are listed in the front of this manual in the Table of Contents, and are further identified by their individual page number.

4. APPLICABILITY

This manual is applicable to Bell Helicopter models 427 that are equipped with the Air Comm Corporation kit number 427H-201 heater system.

5. DEFINITIONS

The following terms are provided to give a ready reference to the meaning of some of the words contained within this manual. These definitions may differ from those given by a standard dictionary.

**Ambient air temperature:** The temperature of the air surrounding a person or object.

6. ABBREVIATIONS

Lbs:                Pounds  
cm:                Centimeters

7. PRECAUTIONS

The following precautions may be found throughout this manual, and will vary depending on the seriousness of the Hazard or Condition:

**WARNING:** May be a maintenance procedure, practice, condition, etc., which could result in personal injury or loss of life.

**CAUTION:** May be a maintenance procedure, practice, condition, etc., which could result in damage or destruction of equipment.

**NOTE:** May be a maintenance procedure, practice, condition, etc., or a statement which needs to be highlighted.

8. UNITS OF MEASUREMENT

All measurements contained within this manual are given in the United States standard measurement, followed by the metric conversion in parentheses.

Chapter 0  
Introduction (continued)

9. INFORMATION ESSENTIAL TO THE CONTINUED AIRWORTHINESS OF THE HEATER SYSTEM.

This manual provides information which is required for operation and maintenance of the Air Comm heater system installed in the Bell model 427 series helicopter. After completion of the heater installation this document must be placed with the appropriate existing aircraft documents.

10. REFERENCE DOCUMENT

The approval basis of the system covered by this ICA is Supplemental Type Certificate **SR00419DE**.

11. DISTRIBUTION

This document is to be placed with the aircraft maintenance records at the time of system installation. It is not intended to update previously supplied manuals unless a change is required which involves safety issues. In this case a service bulletin shall be issued to provide the information.

12. CHANGES TO INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Changes made to a line or paragraph of this document will be indicated by a vertical bar in the right hand margin, while a complete page change will be indicated by a vertical bar next to the page number.

(Example: Any changes will appear with a vertical bar next to that change). 

(Continued)

Chapter 0  
Introduction (continued)

### 13. HEATER SYSTEM DESCRIPTION AND OPERATION

The cabin heater system is a bleed air type, which incorporates the mini ejector concept as shown by the General Arrangement drawing (figure 3.1). The heater plumbing extends from the aft engine firewall forward across the cabin roof, and down the control column tunnel where it branches out under the pilots seats to supply both the forward and aft heater ejectors, as well as the windshield and chin bubble defrosters.

The system shutoff valve (figure 3.3) is an electrically operated ON-OFF valve, and must be turned ON to operate the system by selecting the HEATER position of the HEATER-OFF-OVRD switch located in the overhead switch panel (figure 3.8).

The system control valve is manually operated and is used to control the flow of bleed air to the heater ejectors, as required to maintain the desired cabin temperature. This valve is located on the lower forward left hand side of the pilots seat box (figure 3.4).

The heater ejectors mix engine bleed air with re-circulated cabin air and exhausts warm air to the floor area of the cabin. The air circulation through the ejector is achieved by the bleed air pressure (figure 3.5).

A separately mounted manually operated valve is provided for windshield defrosters, and is located between the pilot & co-pilots seats in the center pedestal. The defroster ejectors are located at the inlet of the windshield diffuser (figure 3.1).

An optional chin bubble defroster system may be installed. If installed, this system shares the bleed airflow to the windshield defroster system (figure 3.6).

The heater system features two load-shedding systems and these systems are described below.

The heater shut-off valve is connected to the aircraft IIDS (Integrated Instrument Display System) through a control relay. Loss of either engine will result in automatic closure of the electrically operated ON-OFF valve. In this event, the heater operation can be restored by switching the HEATER switch to OFF and then to OVRD.

The heater system is equipped with a series of temperature sensors. These sensors, which are normally open, and will close at  $220^{\circ}\text{F} \pm 8^{\circ}\text{F}$ , the temp sensors will re-open at  $200^{\circ}\text{F} \pm 8^{\circ}\text{F}$ . These are mounted in the control column and seat box areas. An over temperature condition will result in automatic closure of the system shutoff valve. After the area which experienced the increased temperature has cooled, the heater can be restored by switching the HEATER-OFF-OVRD switch from HEATER to OFF to HEATER. However, use of the heater is not recommended until the cause of the occurrence has been determined.

**CHAPTER 1  
AIRWORTHINESS LIMITATION**

1. AIRWORTHINESS LIMITATIONS

**“No airworthiness limitations associated with this type design change”.**

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## CHAPTER 2 INSPECTIONS

### 1. INSPECTION REQUIREMENTS

#### PERIODIC INSPECTIONS

Item	Annually Prior to Heating Season	Special Inspection Information	Ref. Figure
Heater Control Valve	X	Check for operation and security. Check placard installation for security.	3.4
Bleed Air Plumbing	X	Check for security and evidence of air leaks around fittings.	3.1
Heater Ejectors	X	Check for evidence of air leaks and corrosion around bleed air connection, and security.	
Placards & Markings	X	Check for security and legibility.	Pages 4-1 thru 4-3
Shutoff Valve	X	Conduct functional check during ground operation. Confirm normal operation by switching heater switch to OFF-HEATER-OFF.	3.1 and 3.3
Temperature Sensors	X	<p>Check the function and operation of the heater over-temp system during an engine OFF ground test as follows:</p> <ol style="list-style-type: none"> <li>a) Apply power to system, turn heater ON by switching heater switch from OFF to HEATER.</li> <li>b) Verify 28 Volts at shutoff valve (red wire).</li> <li>c) Heat one temperature sensor to with heat gun to 220° F ± 8° F. The sound of the valve solenoid is noted and the "over-temp" light is observed on the annunciator panel.</li> <li>d) Verify 0 Volts at shutoff valve. (red wire)</li> <li>e) Allow temperature sensor to cool, at 200° F ± 8° F. cycle the heater switch from HEATER to OFF to HEATER. The sound of the solenoid should be noted and the "overtemp" light in the annunciator panel should not be illuminated.</li> </ol>	3.9 and 3.10

**CHAPTER 3  
LOCATION AND ACCESS**

**1. LOCATION OF HEATER FEATURES**

Nomenclature	Figure	Description of Location
Cabin Heater General Arrangement	3.1	For reference only.
Cabin Top Bleed Air Plumbing Routing	3.2	For reference only.
Heater Shutoff Valve Installation	3.3	Main Rotor Transmission Cowling. No special access.
Heater Control Valve Installation	3.4	Pilot's Seatbox. Pilots seat pan cover must be removed.
Forward Heater Ejectors	3.5	Pilot and Co-Pilot Seatbox. Panel below the Pilots / Co-pilots seat must be removed
Cabin Heater Assembly Installation	3.5	Cabin floor. Removal of carpet from cabin floor required.
Windshield and Chin Bubble Defog Ejectors	3.6	Forward cockpit area. No special access.
Cabin Heater System Electrical Components	3.7	Reference
Heater Components – Overhead Switch Panel	3.8	Reference
Heater System Electrical Schematic	3.9	Reference
Typical Temperature Sensor Installation	3.10	Reference
Cockpit Ejector Installation Details	3.11	Reference

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Chapter 3

Location and Access (continued)

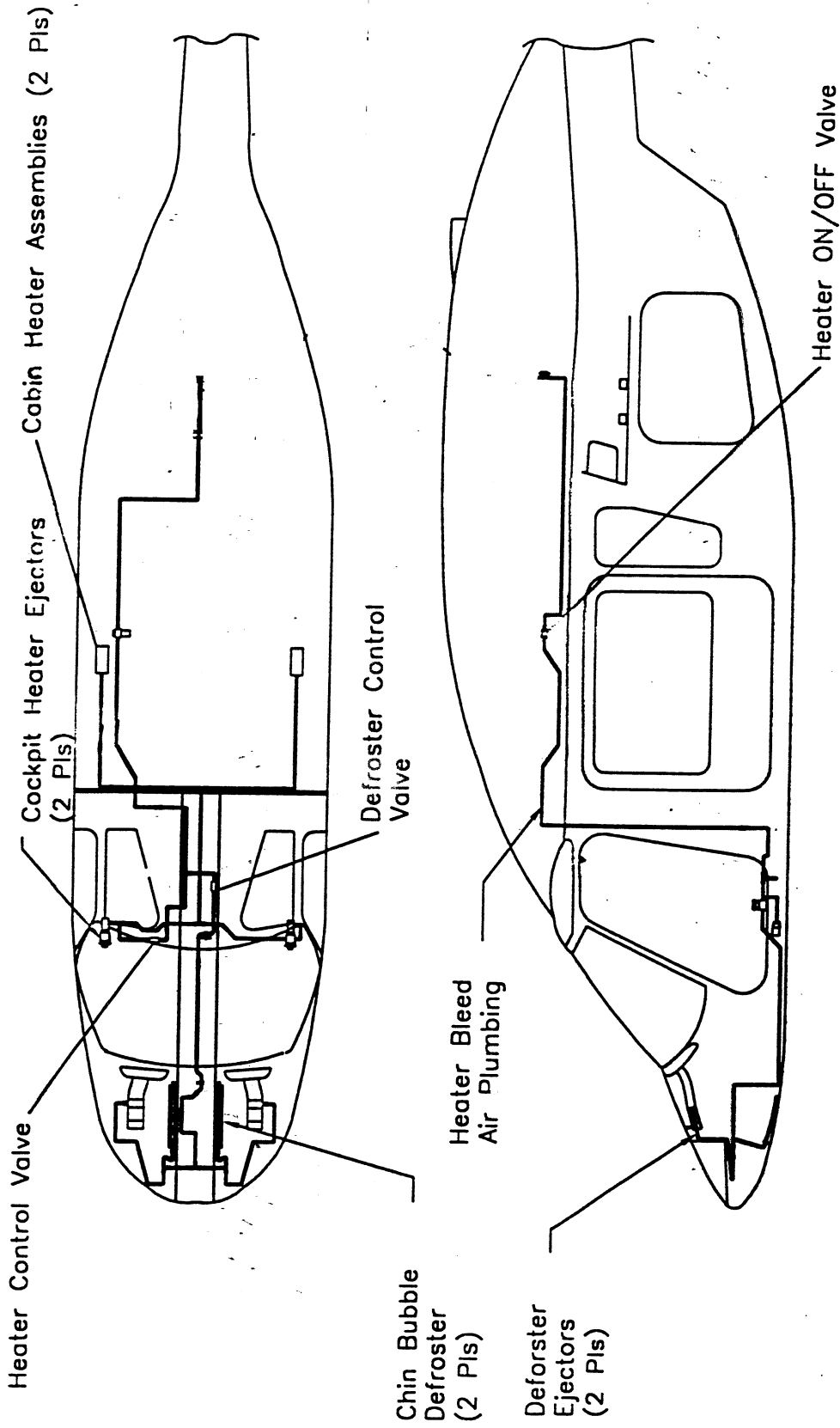
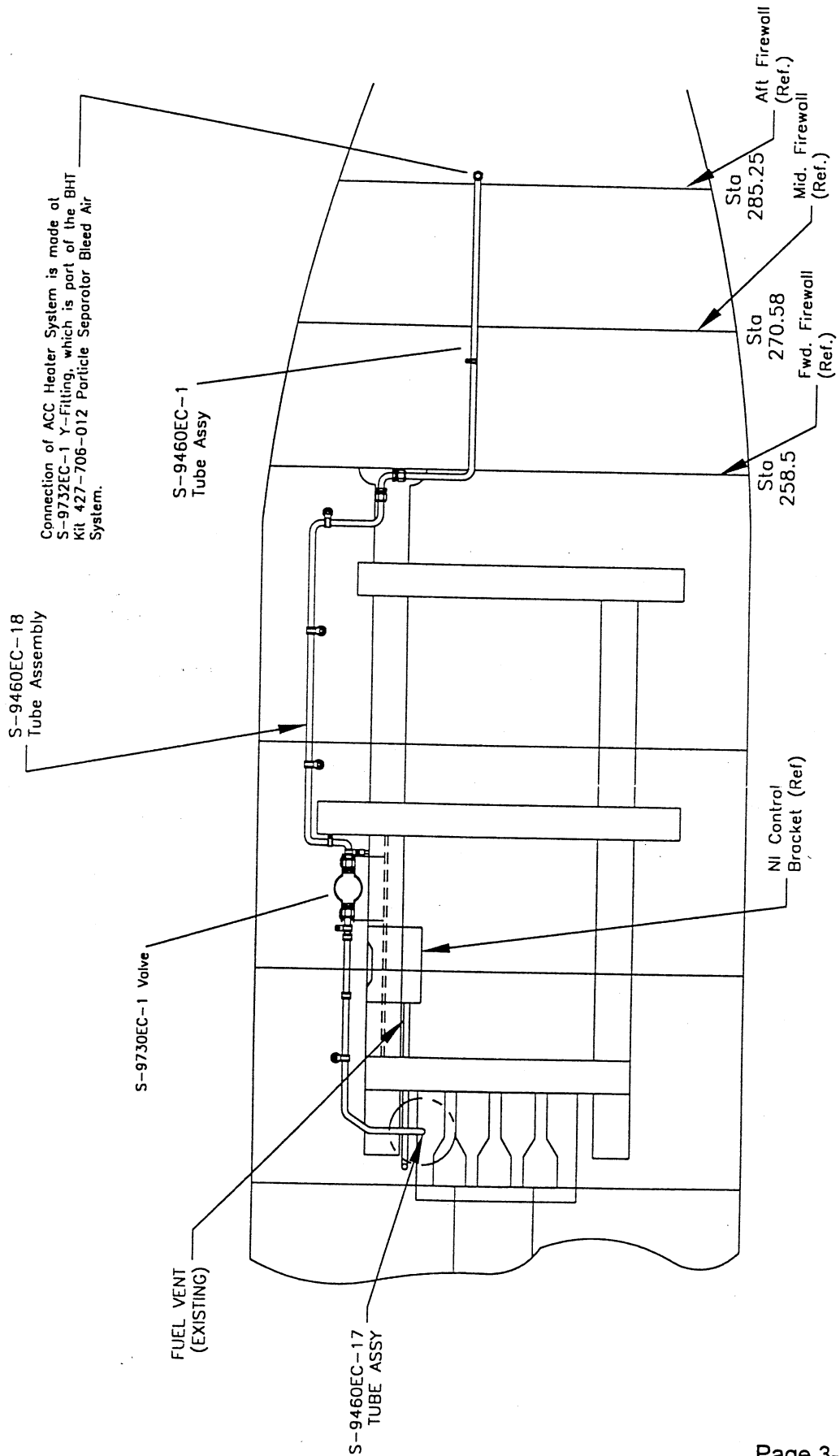
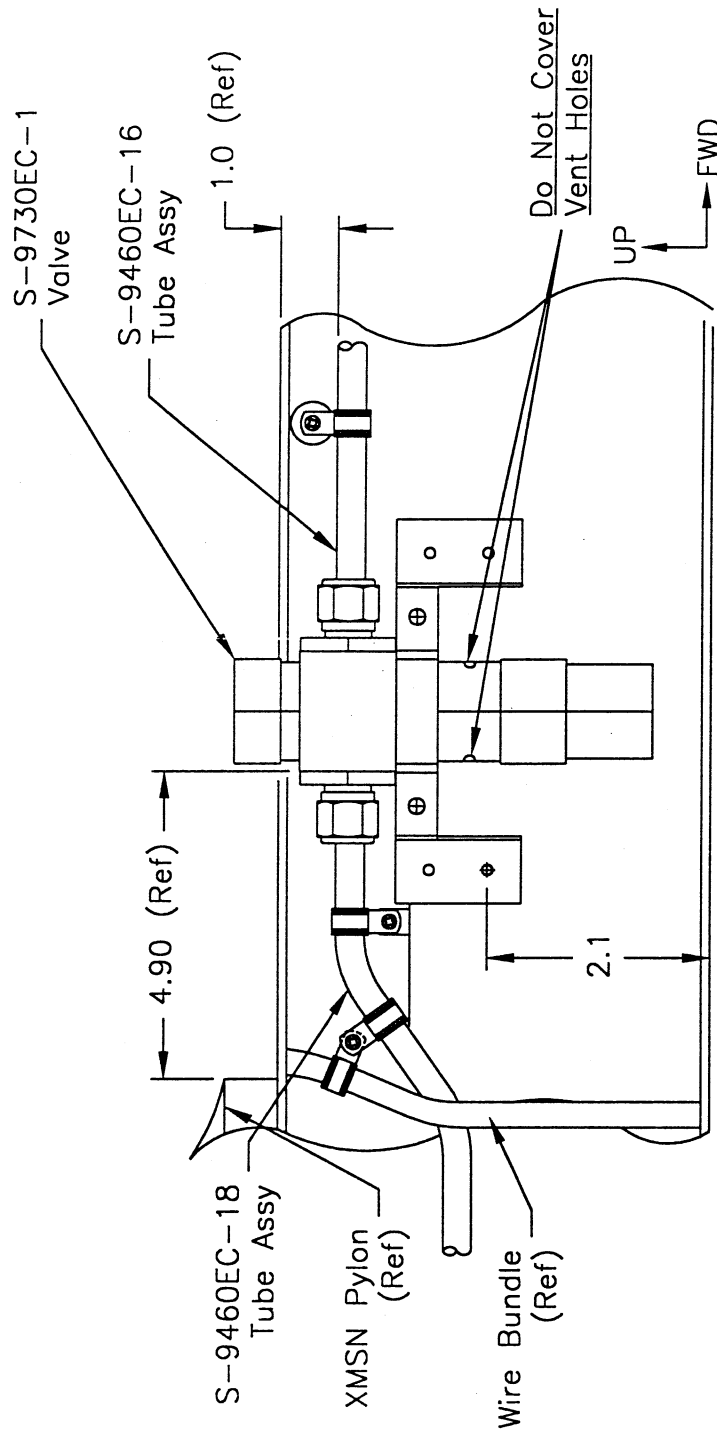


Figure 3.1 Cabin Heater General Arrangement



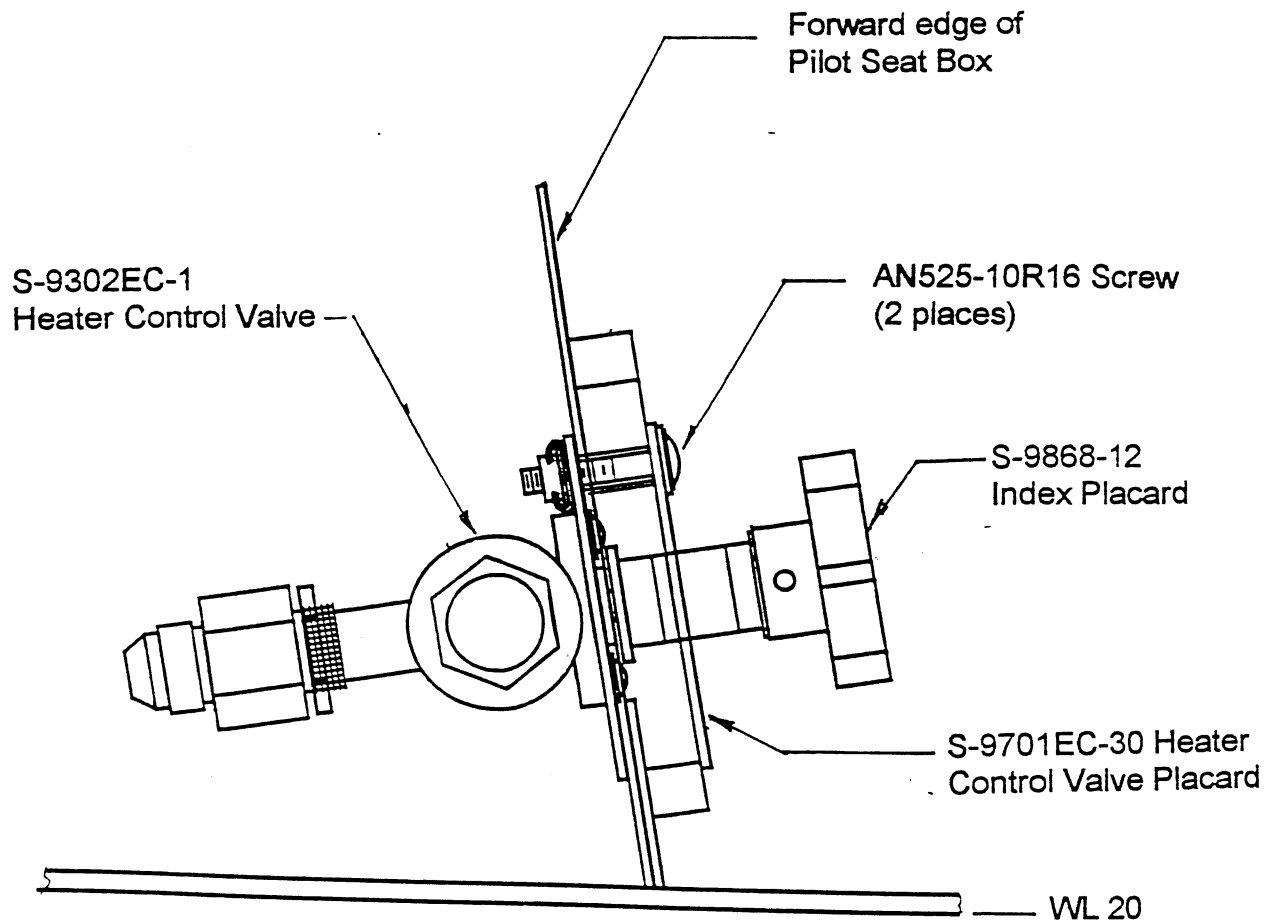
**Figure 3.2 Cabin Top Bleed Air Plumbing Routing**

(View looking down on roof. Cowls, Engines, and Drive train Components not shown for clarity).



View looking inboard, aircraft Left, just forward of the Main Transmission Support Pylon.

**Figure 3.3 Heater Shutoff Valve Installation**



**Figure 3.4 Heater Control Valve Installation**

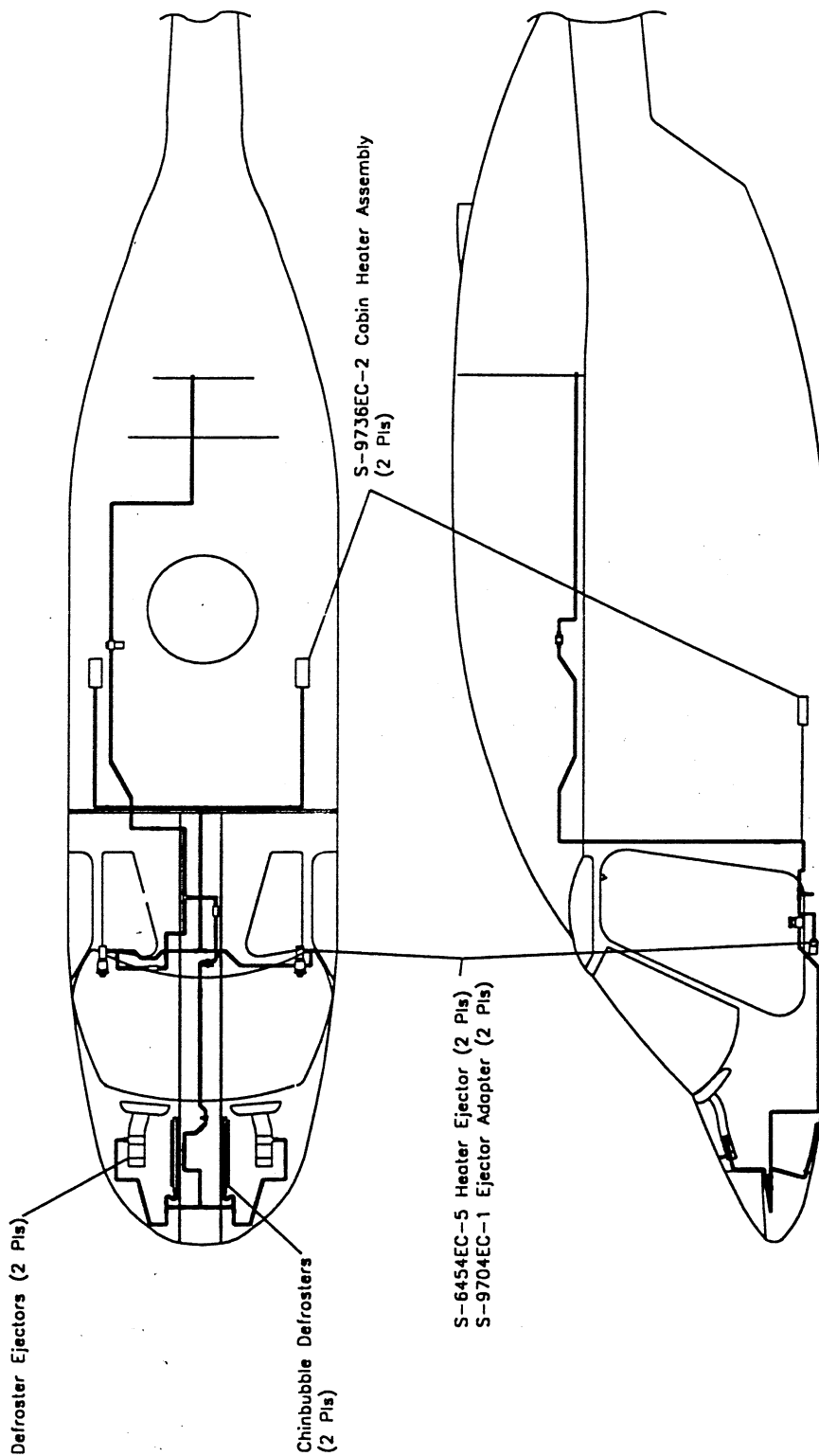


Figure 3.5 Heater Ejector Installation

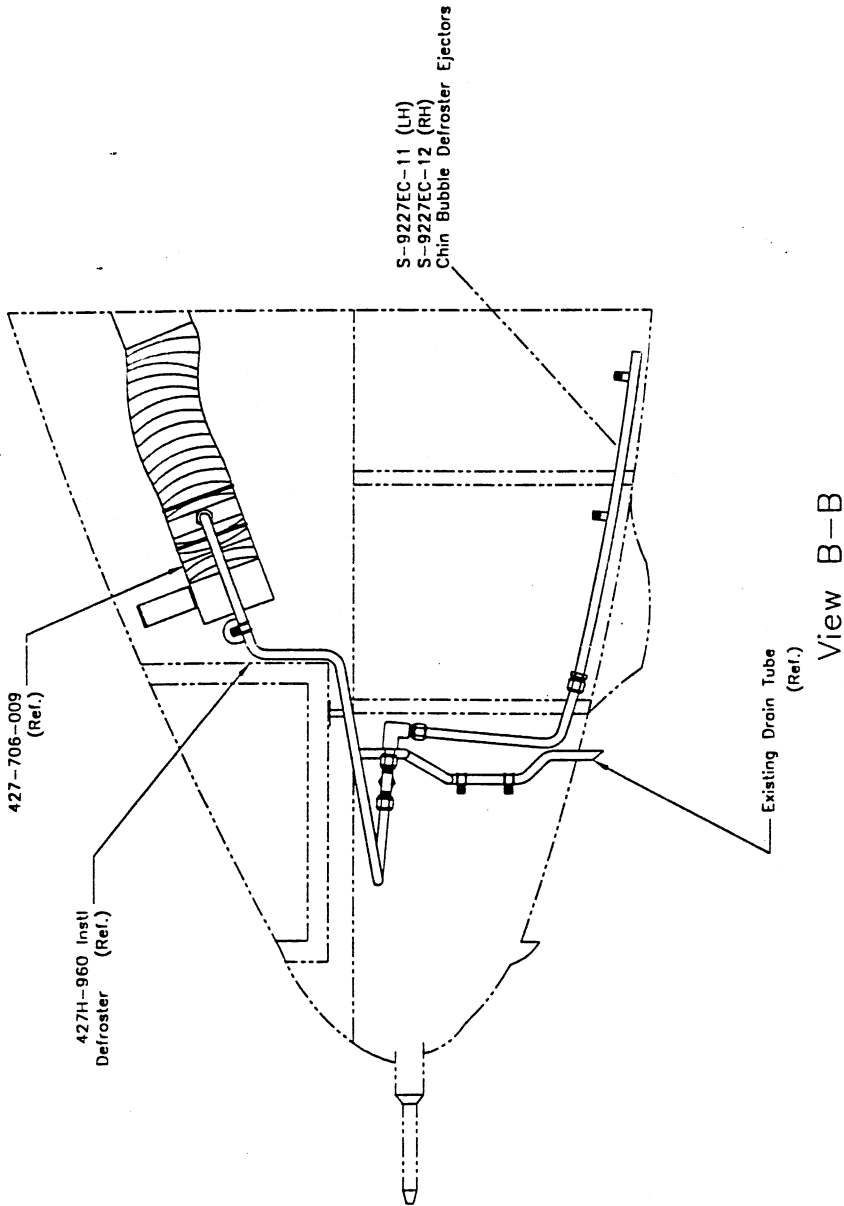
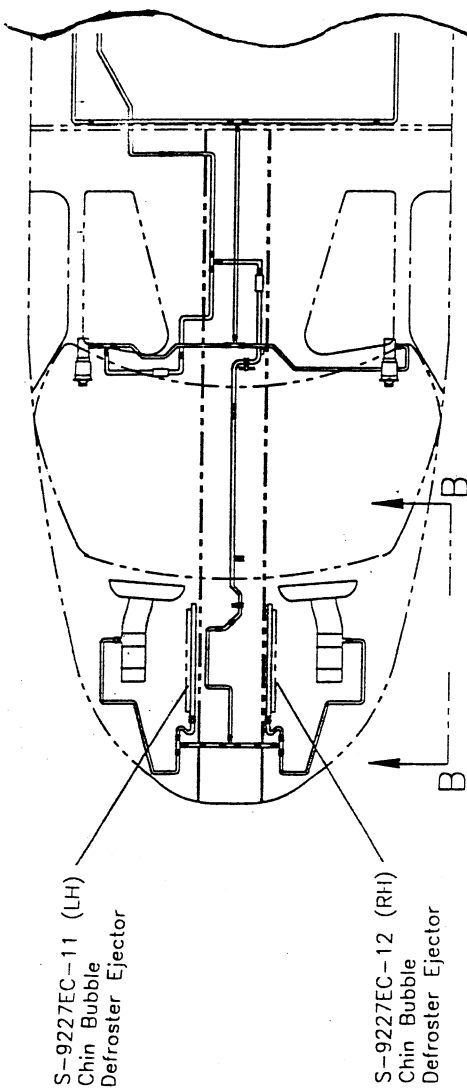


Figure 3.6 Windshield And Chin Bubble Defog System



Chapter 3

Location and Access (continued)

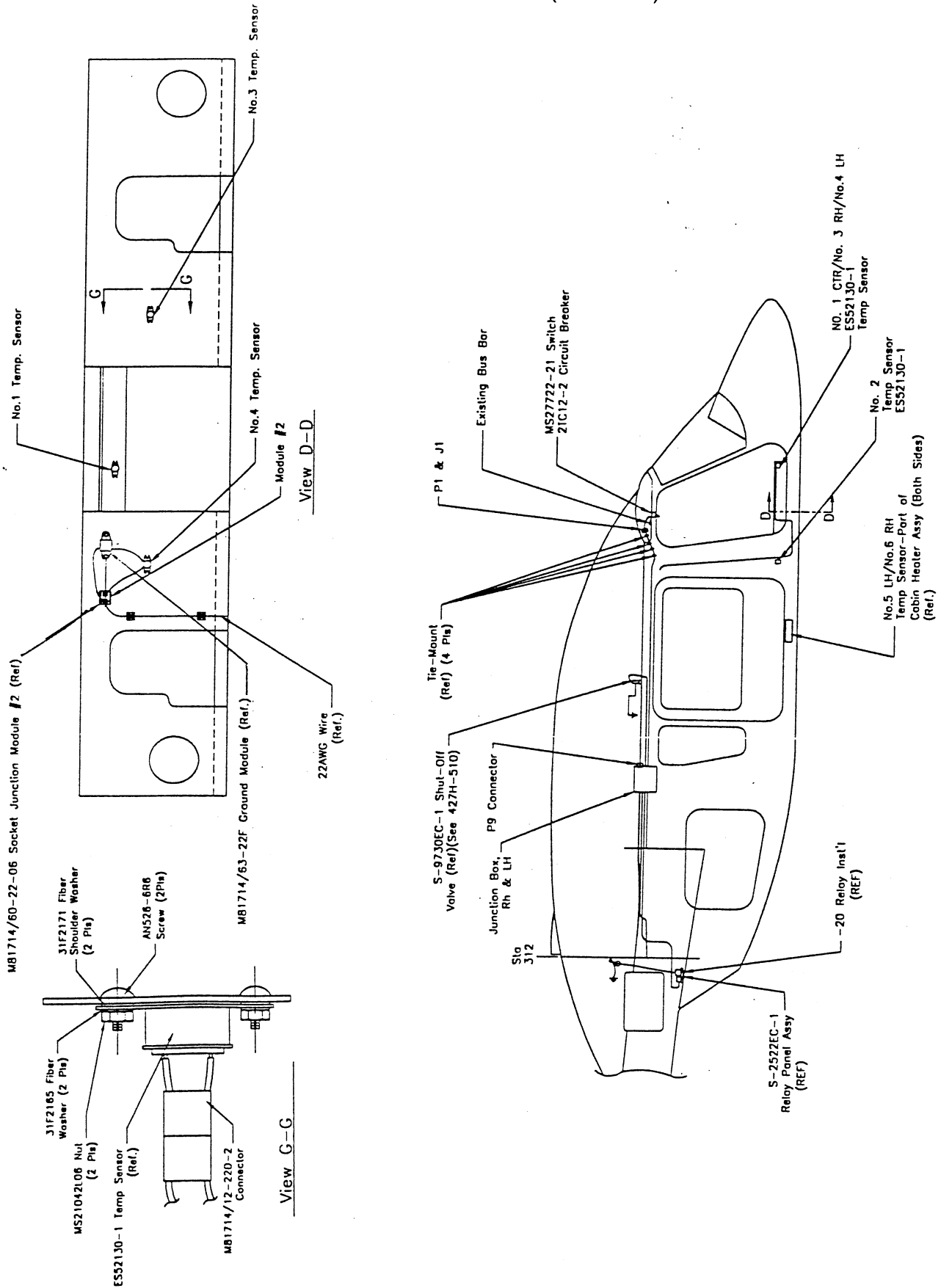


Figure 3.7 Cabin Heater System Electrical Components

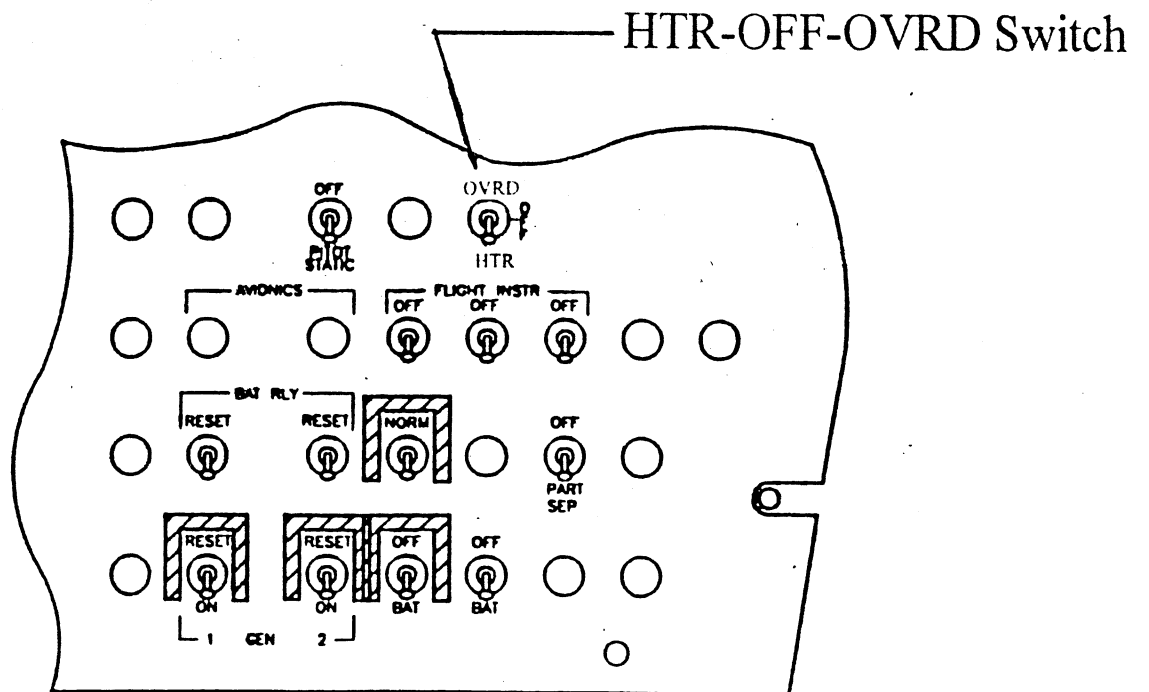
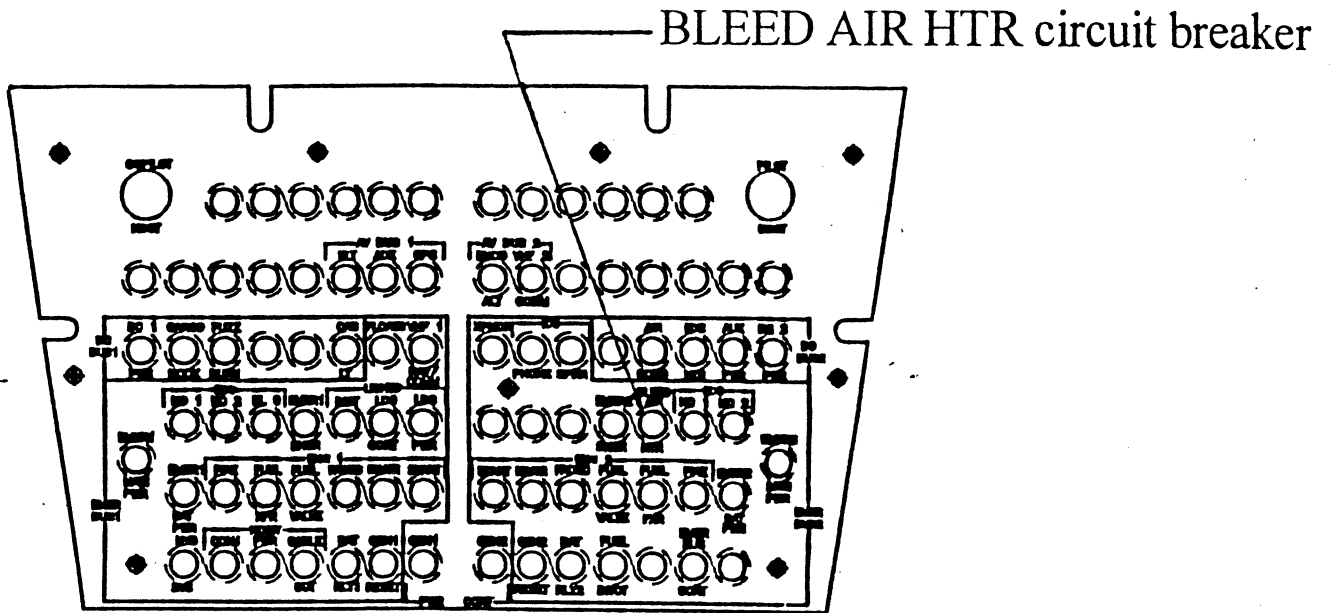
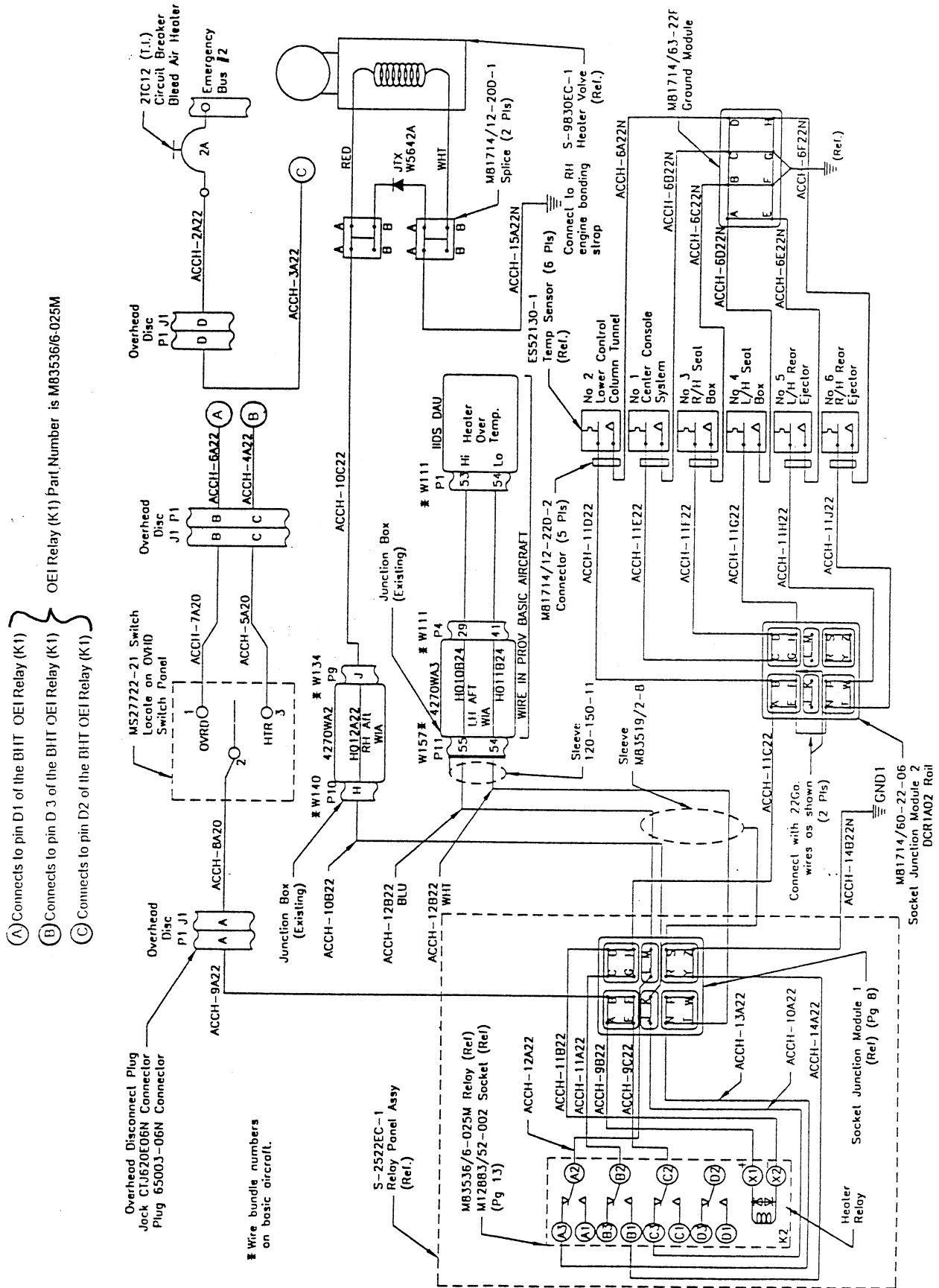
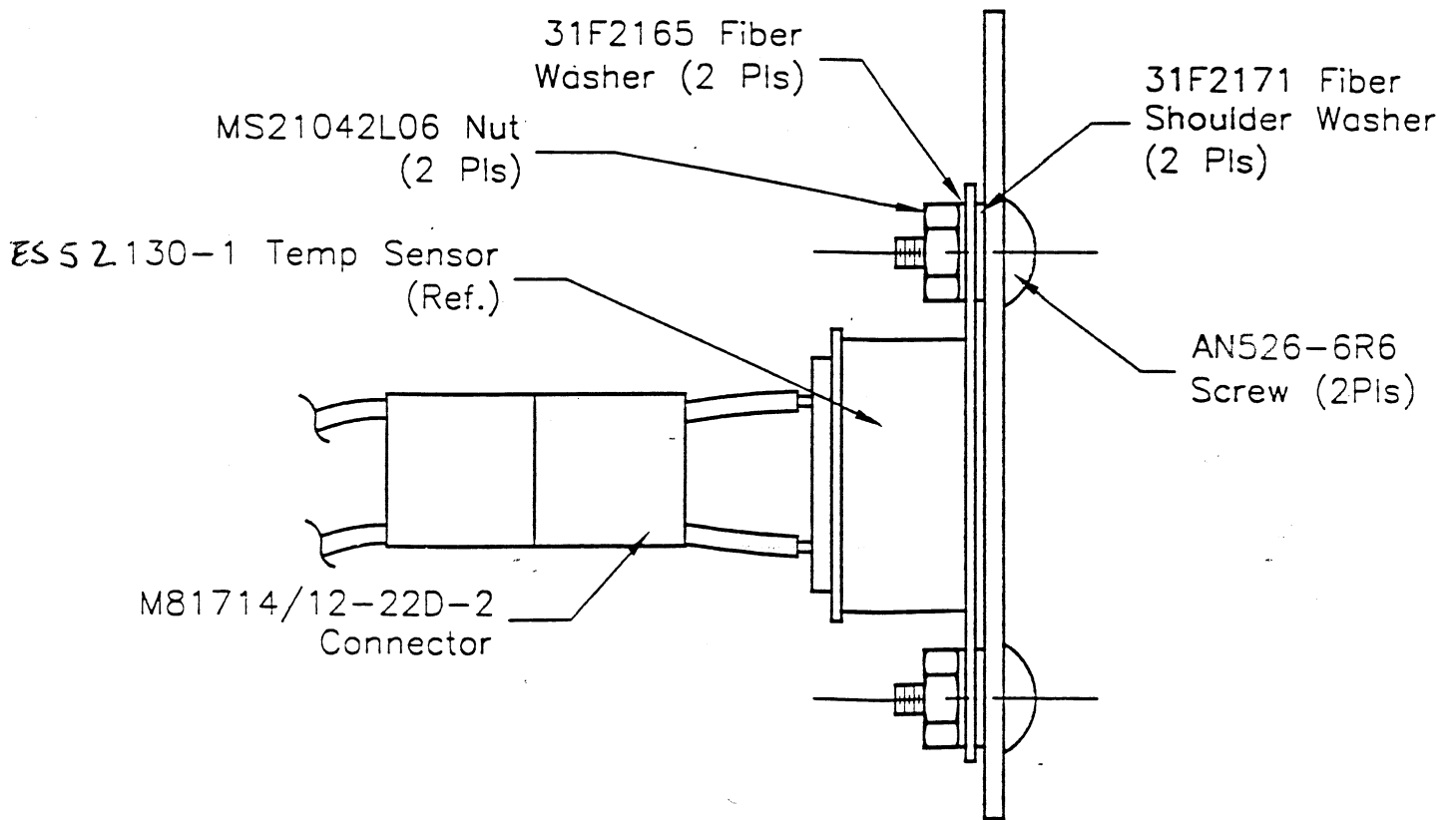


Figure 3.8 Heater Components - Overhead Switch Panel

Chapter 3  
Location and Access (continued)



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**Figure 3-10. Typical Temperature Sensor installation**  
See figure 3.7 for location of Temperature Sensor(s)

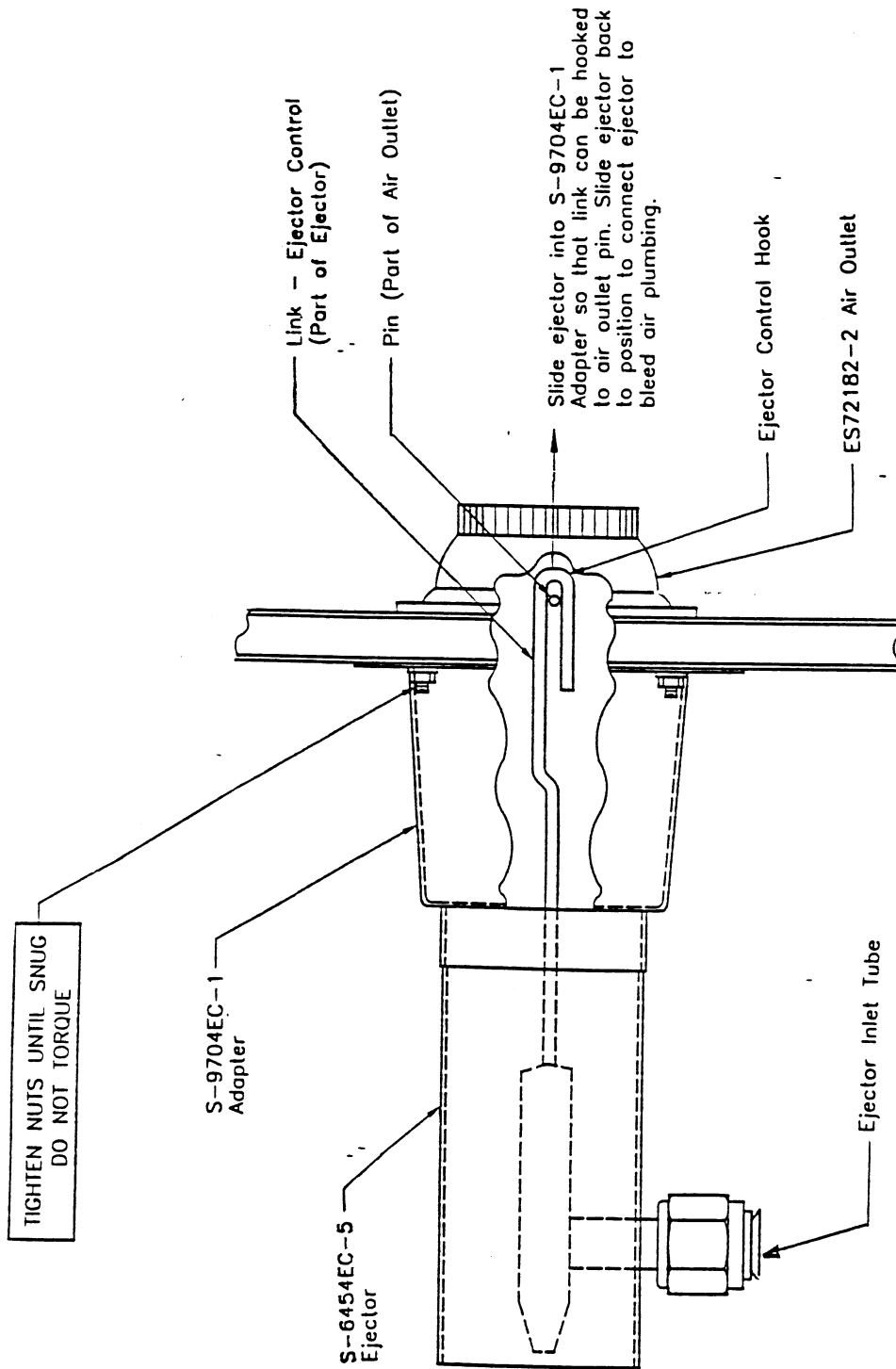
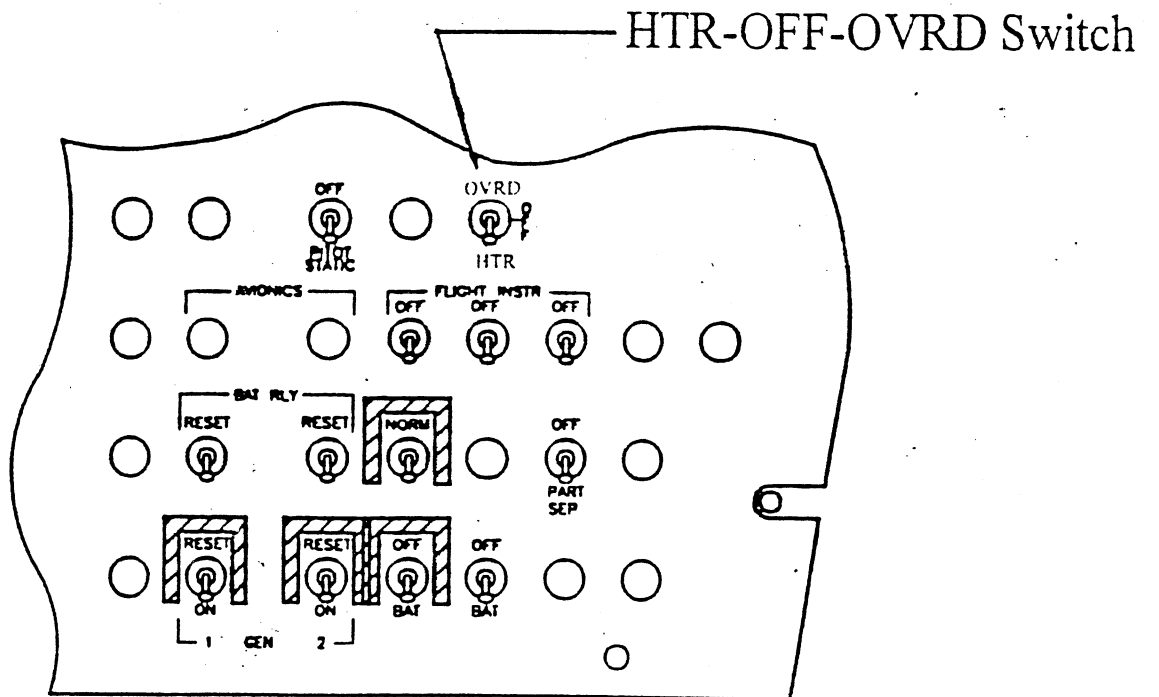
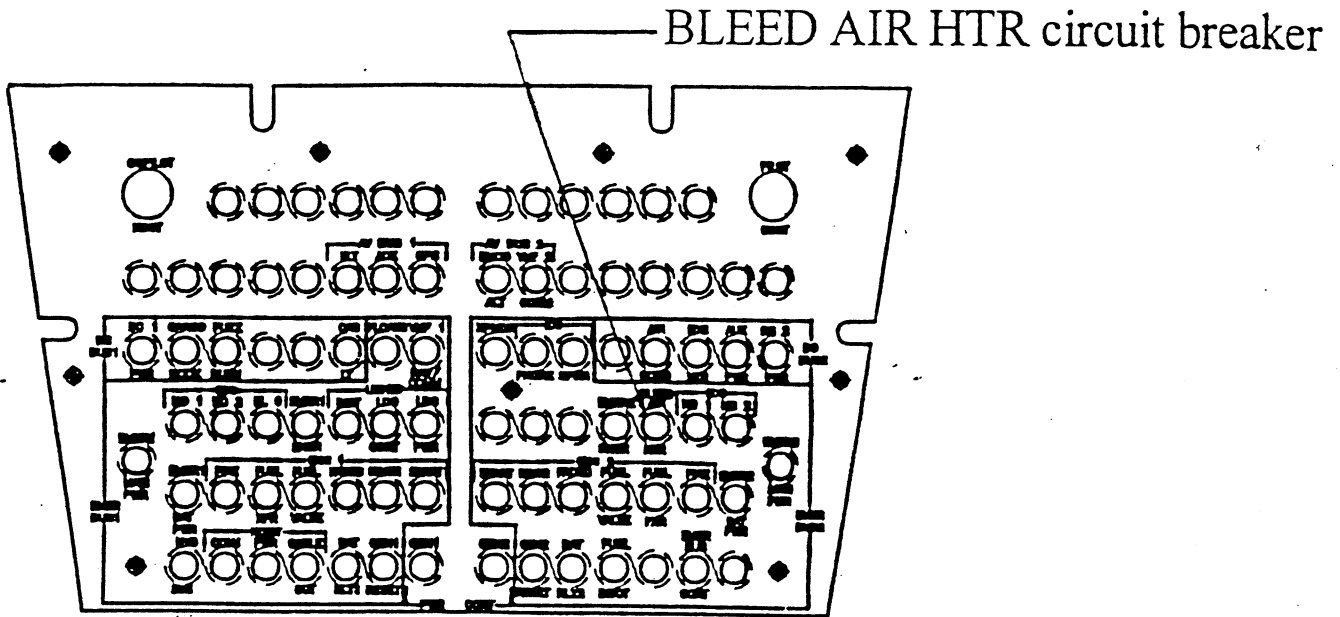


Figure 3.11 Cockpit Ejector Installation Details

CHAPTER 4  
PLACARDS AND MARKINGS

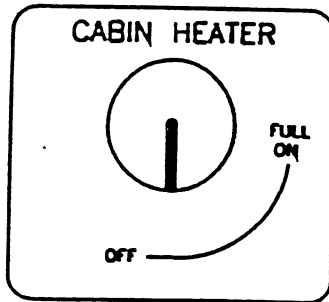


Located in overhead switch panel

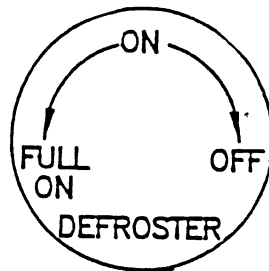
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**CHAPTER 4  
PLACARDS AND MARKINGS**

1.0 PLACARDS AND MARKINGS (continued)



Located on the front side of the RH seat box



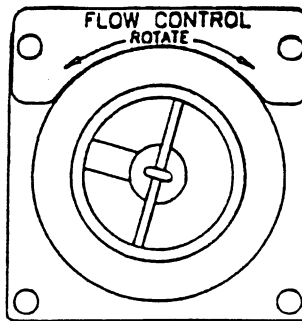
Located on the defroster control knob in the center console

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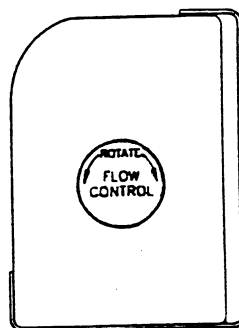


**CHAPTER 4  
PLACARDS AND MARKINGS**

1.0 PLACARDS AND MARKINGS (continued)



Located on the heater outlets on the front of the Pilot/Co-Pilot seat box



Located on the aft edge of the cabin heater shrouds

**CHAPTER 5  
SERVICING**

1. SERVICING INFORMATION

No servicing required for the continued airworthiness of the 427 Heater System.

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**CHAPTER 6  
STANDARD PRACTICES INFORMATION**

**1. B-NUT / FITTING SAFETY WIRE PROCEDURE**

- A. Use MS20995C-32 per QQ-W-423B Cond A Safety wire ( or Equivalent) to secure all B-nut / Fittings in the heater bleed air system.
  - a. Cut safety wire with excess length.
  - b. Thread through safety wire hole in B-nut (or fitting).
  - c. Pull ends even. Twist tight to B-nut (or fitting).
  - d. Twist wire to achieve 8 to 12 twist per inch (2.5 cm)
  - e. Thread through safety wire hole in B-nut (or fitting).
  - f. Twist wire again to achieve 8 to 12 twist per inch (2.5 cm), and cut to form "pigtail" of a minimum of 4 twist. Cut away excess.

**2. REMOVAL, INSTALLATION / REPLACEMENT OF COCKPIT HEATER EJECTOR ASSEMBLY  
(see figure 3-5 & 3-11).**

REMOVAL

- A. Remove the panel located under the Pilot and Co-Pilot seats to gain access to the cockpit heater ejector assemblies.
- B. Disconnect the Ejector B-Nut from the inlet tube.
- C. Slide the Ejector forward in the S-9704EC-1 Adapter sufficiently to allow the Ejector Control Hook to disengage the Air Outlet Pin.
- D. Slide the Ejector aft to remove it from the aircraft.

INSTALLATION / REPLACEMENT

- A. Install the Ejector Assembly in the reverse order of its removal.

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**CHAPTER 6**  
**STANDARD PRACTICES INFORMATION (cont'd)**

3. REMOVAL INSTALLATION/REPLACEMENT OF CABIN HEATER ASSEMBLY  
(See figure 3.5)

REMOVAL

- A. Remove the carpet from the floor in the cabin.
- B. Disconnect the B-Nut from the inlet tube.
- C. Remove the Heater Assembly attaching screw and remove the assembly from the aircraft.

INSTALLATION/REPLACEMENT

- A. Install the Heater Assembly in the reverse order of its removal.

4. REMOVAL INSTALLATION/REPLACEMENT OF THE HEATER CONTROL VALVE  
(See figure 3.4)

REMOVAL

- A. Remove the panel located under the Pilot and Co-pilots seats to gain access to the heater control valve assembly.
- B. Disconnect the bleed air plumbing from Control Valve.
- C. Remove the Valve Control knob.
- D. Remove the two AN525-10R16 valve support screws, and remove the Valve from the aircraft.

INSTALLATION/REPLACEMENT

- A. Install the Valve in the reverse order of its removal.

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**CHAPTER 6**  
**STANDARD PRACTICES INFORMATION (cont'd)**

5. REMOVAL INSTALLATION / REPLACEMENT OF THE HEATER SHUTOFF VALVE (see figure 3.3).

REMOVAL

- A. Remove the Main Rotor Transmission Cowling.
- B. Disconnect the bleed air plumbing from the Shutoff Valve.
- C. Disconnect the electrical connection to the valve.
- D. Remove the two MS27039C-1-15 mounting screws and remove the Valve from the aircraft.

INSTALLATION/REPLACEMENT

- A. Install the Valve in the reverse order of its removal.

6. REMOVAL INSTALLATION / REPLACEMENT OF THE DEFROSTER CONTROL VALVE.

REMOVAL

- A. Remove the panel located under the Pilots and Co-pilots seats to gain access to the defroster control valve.
- B. Disconnect the bleed air plumbing from Defroster Control Valve.
- C. Remove the Valve Control Knob.
- D. Remove the two MS27039-0808 Screws, and remove the Valve from the aircraft.

INSTALLATION / REPLACEMENT

- A. Install the Valve in the reverse order of its removal.

7. REMOVAL INSTALLATION / REPLACEMENT OF THE HEATER TEMPERATURE SENSOR

- A. Remove the panel under the Pilots and Co-pilots seats to gain access to the heater temperature sensors.
- B. Disconnect M81714/12-22D-2 Connector ES52130-1 Temperature Sensor
- C. Remove AN526-6R6 Screws, MS21042L06 Nuts, 31F2165 Fiber Washer, 31F2171 Fiber washer (2 Pls), and one each ES52130-1 Temperature Sensor from aircraft. (See figures 3.7 & 3.10)

INSTALLATION / REPLACEMENT

- A. Install the Temperature Sensor in the reverse order of its removal.

**CHAPTER 6**  
**STANDARD PRACTICES INFORMATION (cont'd)**

**8. REMOVAL INSTALLATION / REPLACEMENT OF THE BLEED AIR PLUMBING**

REMOVAL

- A. Cut attaching safety wire from B-nuts at each end of the section of Bleed Air Plumbing to be removed.

**NOTE**

Always use a back-up wrench to hold the union, bulkhead fitting, or component that the Bleed Air Plumbing is being removed from.

- B. Loosen the B-Nut at each end of the Bleed Air Plumbing to be removed.
- C. Remove any clamps securing the Bleed Air Plumbing to the aircraft.
- D. Remove Bleed Air Plumbing from the aircraft.

INSTALLATION / REPLACEMENT

- A. Install Bleed Air Plumbing in the reverse order of its removal.

**NOTE**

Always use a back-up wrench to hold the union, bulkhead fitting, or component that the Bleed Air Plumbing is being installed.

- B. Torque B-Nuts per MS21344, and Safety wire per B-Nut / Fitting Safety Wire Procedure (See item 1, page 6-1).
- C. After completion of Bleed Air Plumbing installation, check all joints for audible signs of leakage during operational run up of system. Apply Torque Seal to all fittings.

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## CHAPTER 7 TROUBLESHOOTING

### 1. SYSTEM TROUBLESHOOTING

Prior to troubleshooting a defective system, it is advisable to conduct a visual inspection for general condition, and obvious signs of damage or failure.

The following matrix lists the easiest checks, and the most likely problems.

Problem	Probable Cause	Solution
No Heat	Bleed air shutoff valve not open	Operate heater switch to ON position
No Heat	Manual heater valve in the off position	Operate the heater valve to the ON position
No Heat	Shutoff valve failure	Replace shutoff valve
No Heat	HTR Circuit breaker tripped	Reset breaker
No Heat. Heater OVER TEMP light illuminated	Malfunction of Temp Sensor Switch	Check switches – all switches should be electrically open (See figures 3-9 and 3-10)
No Heat. Heater OVER TEMP light illuminated	Air blockage of heater inlet or outlets	Remove blockage
No Heat. Heater OVER TEMP light illuminated	Bleed air line fitting loose causing an over temperature condition	Check all lines and fittings for security

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## APPENDIX A

**Suggested Spares List**

<b>Item</b>	<b>Description</b>	<b>Part No.</b>
1	Heater Shut Off Valve	S-9730EC-1
2	Cockpit Heater Ejector	S-9704EC-1
3	Cabin Heater Ejector Assy.	S-9736EC-2
4	Heater Control Valve	S-9302EC-1
5	Defroster Control Valve	S-9300EC-1
6	Temperature Sensor	ES52130-1

Source: Air Comm Corporation  
3300 Airport Road  
Boulder, CO. 80301

Phone: (303) 440-4075  
Fax: (303) 440-6355

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APPENDIX B

**Weight and Balance Information**

Weight breakdown – Bell 427 Heater System:  
Dwg. 427H-200-1

<b>Item</b>	<b>Wt. (lbs)</b>	<b>Arm (in) X</b>	<b>Arm (in) Y</b>	<b>M (in-lb) WX</b>	<b>M (in-lb) WY</b>
Total (427H-200-1 Installation) Bell 427 Heater System	19.3	183.3	1.7	3537	33
Total with optional (427H-988-1) Bell 427 Chin Bubble Defroster	20.5	178.7	1.6	3663	33

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