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**INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
BELL HELICOPTER 429
HEATER SYSTEM**



LIST OF REVISIONS

Rev	Description	Date
0	(Original Issue)	4/6/2009
1	Added STC number, weight and balance information and minor corrections.	10/09/2009
2	Updated part numbers, minor corrections in Chapters 0, 2, 3, 5, 6 and 7.	11/11/2011
3	Expanded content in Chapter 6 to include installation steps.	12/29/2011

LIST OF EFFECTIVE PAGES

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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 429 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 429 that are equipped with the Air Comm Corporation kit number 429H-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.

Outside Ambient Air Temperature (OAT): The temperature of the air surrounding a person or object outside the helicopter.

Inside Ambient Air Temperature (IAT): The temperature of the air as measured at the inlets of the heater system.

6. ABBREVIATIONS

ADIU:	Air Data Integration Unit
cm:	Centimeters
Lbs:	Pounds
LH:	Left hand
OEI:	One Engine Inoperative
OVRD:	Override
RH:	Right hand

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.

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 429 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 **SR00692DE**.

11. DISTRIBUTION

This document is to be placed with the aircraft maintenance records at the time of system installation

Changes will be made to this document in response to "Safety of Flight", and or "Non-safety of Flight" issues. Any changes will result in a revision to this document. Revisions shall be noted in the Record of Revisions (page i), and on the List of Revisions (page ii) of this manual.

In addition to the revision of the manual, those changes categorized as "Safety of Flight" shall have a Service Bulletin issued to the operator providing the necessary information to comply with, and or to correct, the "Safety of Flight" issue.

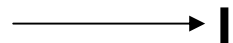
Replacement, and or revised copies of this manual may be acquired by contacting:

Air Comm Corporation Service Department
3330 Airport Road
Boulder, CO.80301
Phone No. 303-440-4075 Fax No. 303-440-6355
Service@aircommcorp.com

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).



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 and 3.2). The heater plumbing extends from the aft engine firewall forward across the cabin roof, and down the RH door post where it branches out under the pilots seats to supply heat to all the system ejectors, as well as the windshield defrosters.

The system consists of a series of small heater ejector assemblies which are located forward of the anti-torque pedals, below the cabin floor, and in the fuselage side panels. Two additional ejectors are included to provide warm air for windshield defogging. 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.

NOTE

Operation of the cabin heater above 70° F (21° C) ambient may result in excessive outlet temperature.

The heater and defogger systems are manually controlled by a single, crew operated valve. (see figure 3.13). The system control valve is located on the lower forward left hand side of the pilot's seat box. The valve is manually controlled by two bleed air flow control knobs. One knob controls flow of bleed air to the heater ejectors and the other controls flow to the defog ejectors. The knobs can be adjusted individually as required to maintain desired cabin temperature and a clear field of view.

The heater system is electrically controlled by the heater control switch. This switch is located on the overhead control panel and consists of three positions: "ON", "OFF" and "OVRD."

With the heater control switch in the "ON" position, power is supplied to the shutoff valve as long as all the snap switches are closed to ground and both engines are operational.

With the heater control switch in the "OFF" position, there is no power supplied to the normally closed valve, thus no bleed air is supplied to the heater.

With the heater control switch in the "OVRD" position, power is supplied to the shutoff valve regardless of snap switch position. The use of the "OVRD" position is for emergency defogging while experiencing an One Engine Inoperative (OEI) condition.

Bleed air flow from the engines is controlled by a solenoid operated firewall mounted ON-OFF valve. Bleed air for the heater is taken from the bleed air ports from each engine and combined thru a fitting located on the firewall. The line then goes forward to the system shutoff valve.

The system shutoff valve is an electrically operated, normally closed 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 3.11).

The power for the system shutoff valve is supplied from the emergency bus. A relay contained in the heater installation, directs power to the heater shutoff valve in the "ON" position. In the event of a OEI condition, the relay will direct power to the "OVRD" side of the heater control switch. The shutoff valve will remain open as long as all the snap switches are closed to ground. System defogging can be utilized in an OEI condition by placing the control switch in the "OVRD" position. (See Flight Manual Supplement for complete OEI procedures).

A series of snap switch temperature sensors are installed along the bleed air line routing. These sensors are designed to electrically disconnect the firewall shut-off valve in case of an excessive increase in temperature. These normally closed switches open when the switch temperature exceeds 180°F. When any of these switches open, the "Heater Duct Hot" is illuminated on the Air Data Integration Unit (ADIU) panel. The heater shutoff valve power is also removed, thus closing the flow of bleed air automatically. The shutoff valve will stay closed and the "Heater Duct Hot" will stay illuminated until the Heater Control Switch is moved to the "OFF" position. The heater can be re-engaged only if all snap switches are closed (below 180°F).

**CHAPTER 1
AIRWORTHINESS LIMITATION**

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

1. AIRWORTHINESS LIMITATIONS

None

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CHAPTER 2 INSPECTIONS

1. INSPECTION REQUIREMENTS

PERIODIC INSPECTIONS

NOTE

The 429 provisions kits do not require periodic inspection until the 429 component kits have been installed.

See Appendix A for a complete list of provision and component drawings.

Item	Annually Prior to Heating Season	Special Inspection Information	Ref. Figure
Heater System Control Valve	X	Check for ease of mechanical operation and security. Check placard installation for security.	3.13
Bleed Air Plumbing	X	Check for security and evidence of air leaks around fittings.	3.1 - 3.3
Heater Ejectors Defog Ejectors	X	Check for evidence of air leaks and corrosion around bleed air connection, and security.	3.5 - 3.9
Placards & Markings	X	Check for security and legibility.	4.1
Shutoff Valve	X	Conduct functional check during ground operation. <u>Functional Check</u> 1. Ensure heater control switch is in the OFF position. 2. With aircraft engines running ensure there is no airflow to the heater ejectors. 3. Place the heater control switch to the ON position. 4. Check for warm air at each of the air ejectors. 5. Return switch to the OFF position.	3.3 3.4 3.12

CHAPTER 3 LOCATION AND ACCESS

1. LOCATION OF HEATER FEATURES

Nomenclature	Figure	Description of Location
Cabin Heater General Arrangement	3.1	System overview
Cabin Heater General Arrangement	3.2	System overview
Engine Compartment Bleed Air Plumbing (Engines to Firewall Shutoff Valve)	3.3	Cabin roof
Bleed Air Plumbing – Firewall Shutoff Valve to Heater System Control Valve	3.4	Cabin ceiling, RH door post and floor.
Bleed Air Plumbing – Heater System Control Valve to Heater Ejectors	3.5	Under floor and center console
Bleed Air Plumbing - Defogger	3.6	Center console to instrument panel bulkhead
Forward Crew Heater Ejectors	3.7	Forward crew compartment near control pedals
Heater Ejector Installation	3.8	Under floor and near baggage compartment
Windshield Defog System and Defog Ejectors	3.9	In front of instrument panel and below floor
Cabin Heater System Thermal Snap Switches	3.10	Various locations near heater plumbing
Heater Control Panel	3.11	Aft end of center console
Heater System Electrical Schematic	3.12	For reference only
Heater System Control Valve	3.13	Under floor at aft end of center console.

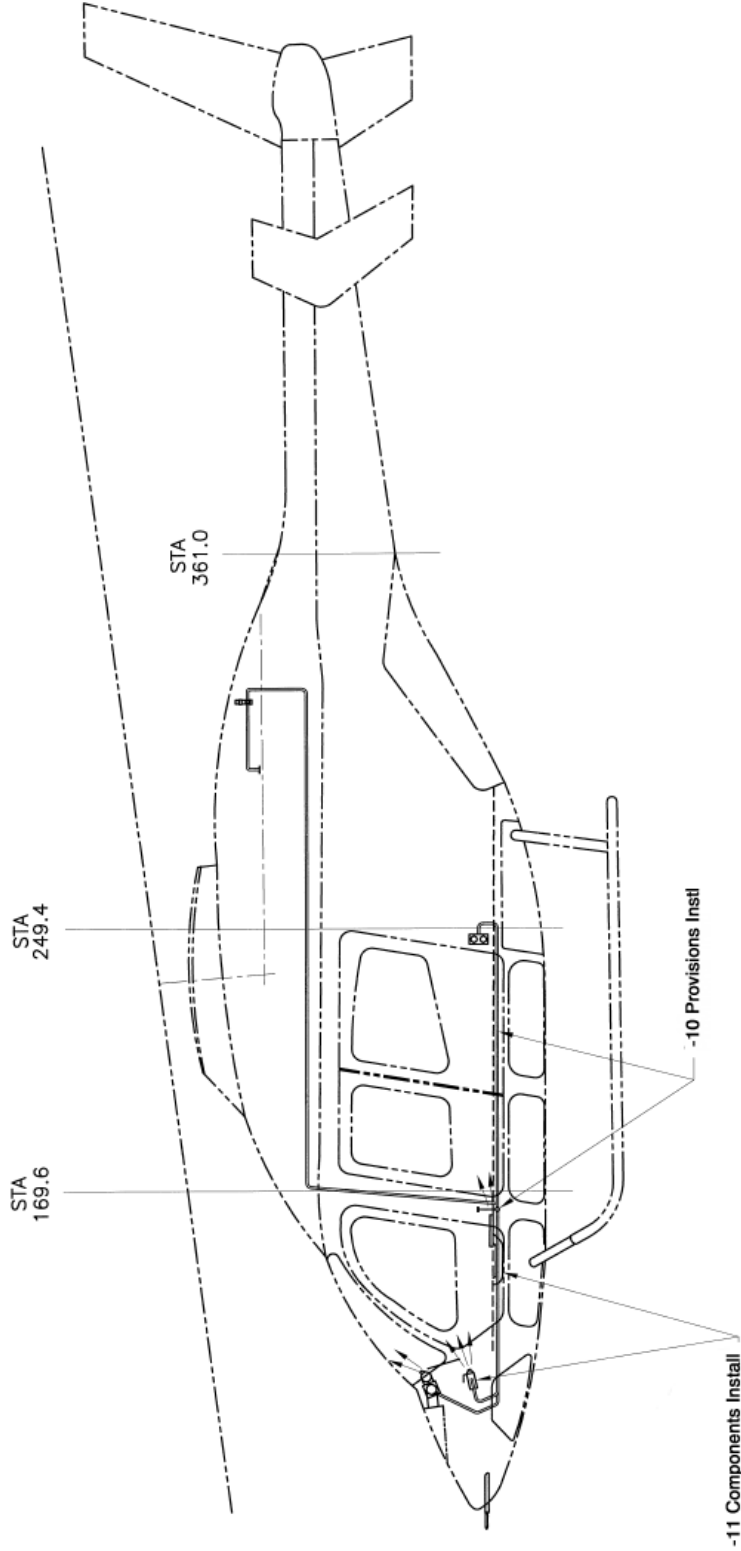


Figure 3.1 Cabin Heater General Arrangement
(View left looking inboard)

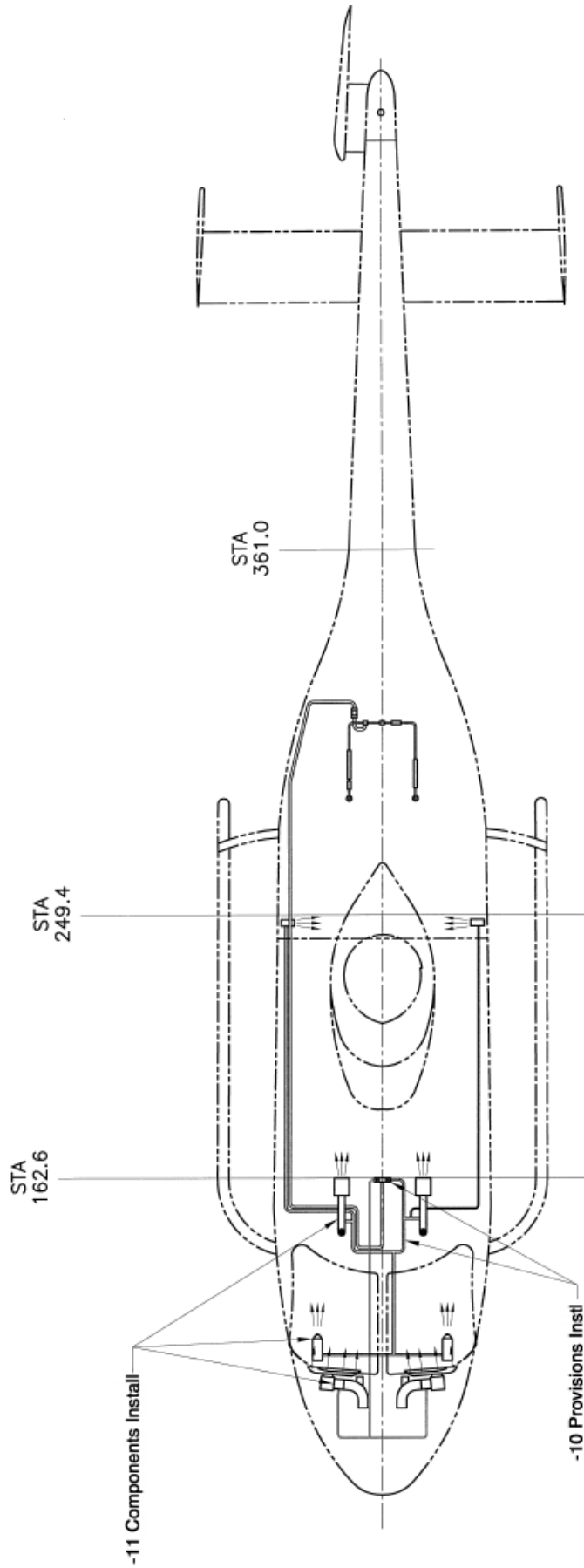
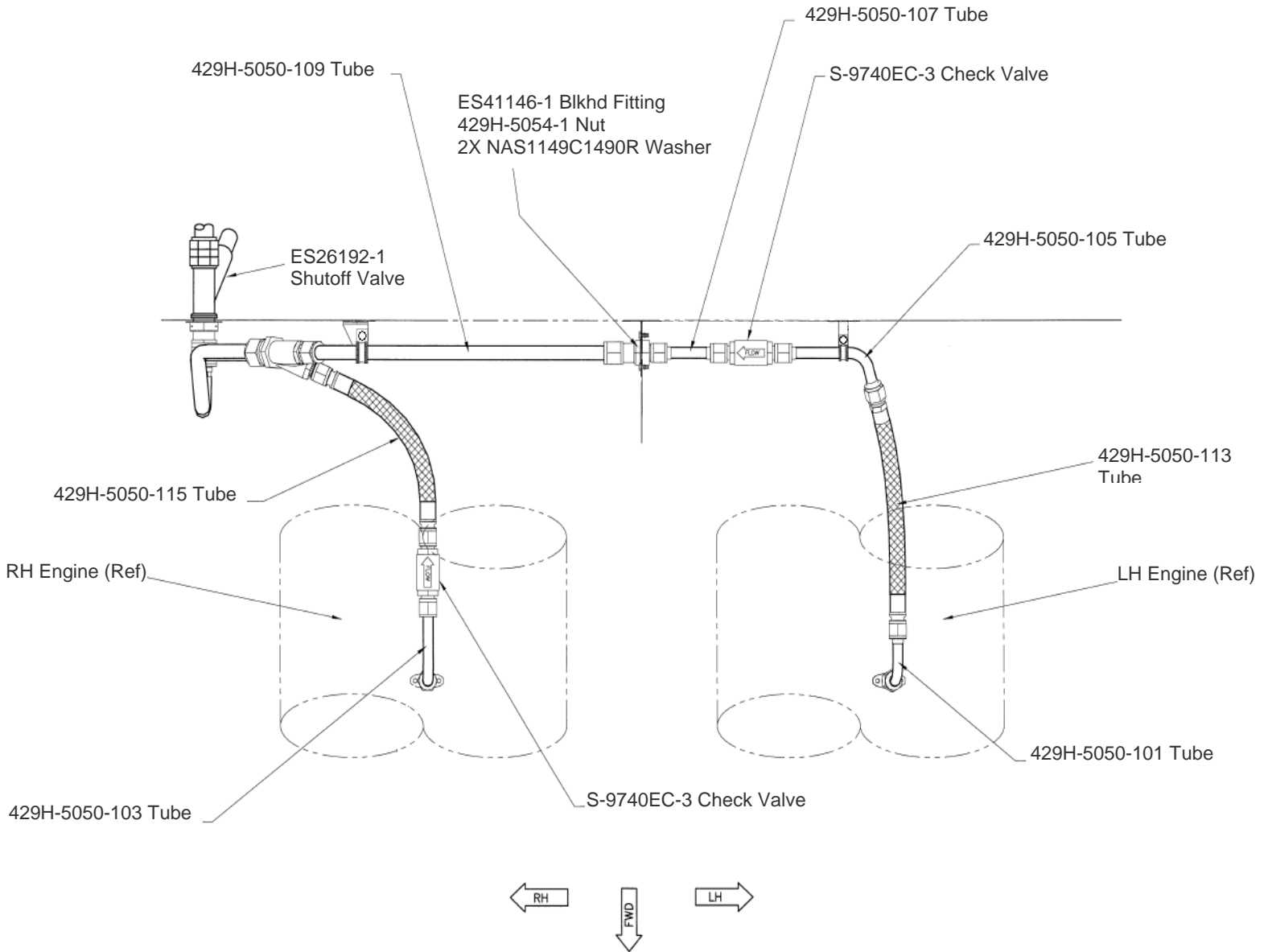


Figure 3.2 Cabin Heater General Arrangement
(View looking down)



**Figure 3.3 Engine Compartment Bleed Air Plumbing
Engines to Firewall Shutoff Valve**
(View looking down)

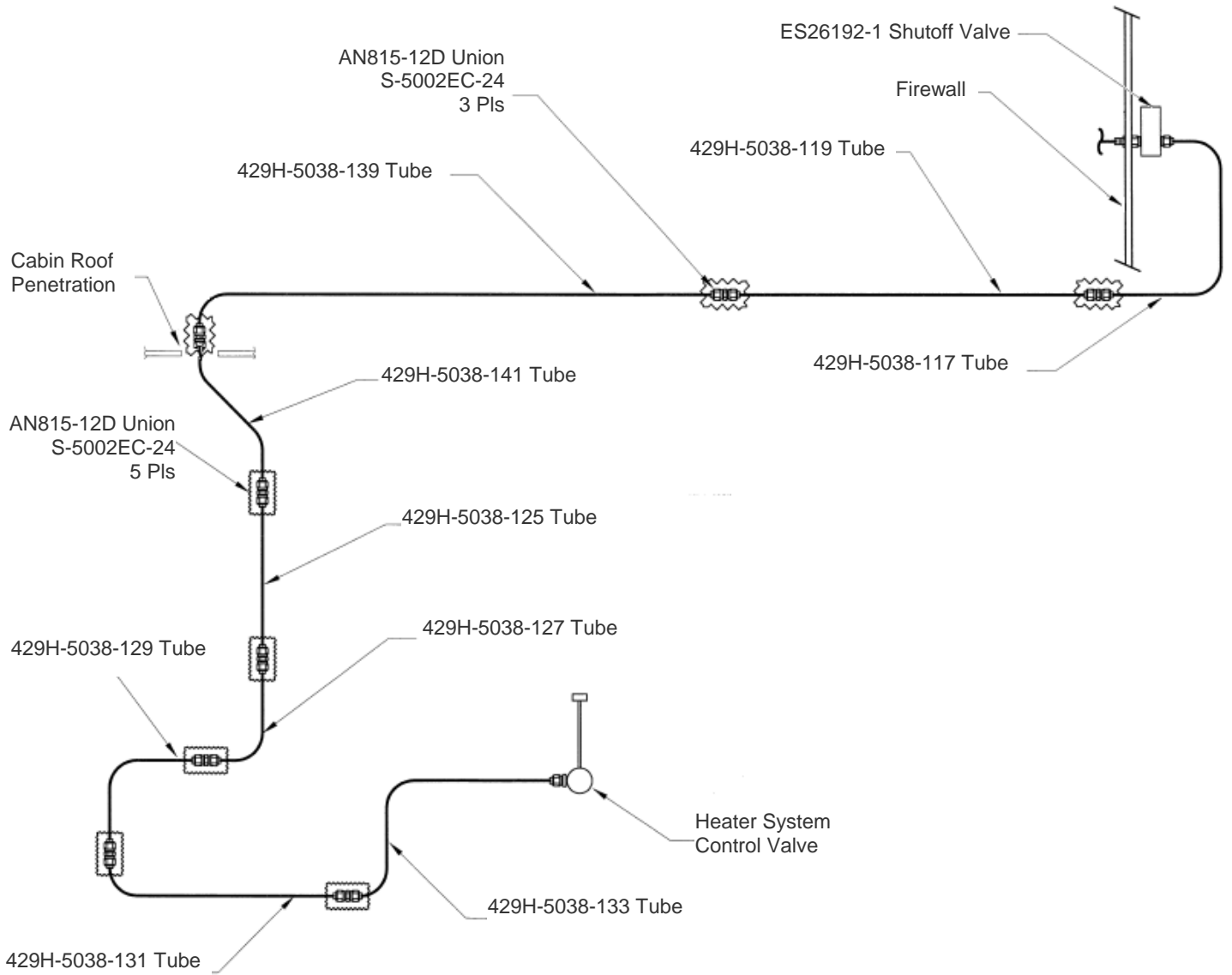


Figure 3.4 Bleed Air Plumbing Schematic – Firewall Shutoff Valve to Heater System Control Valve

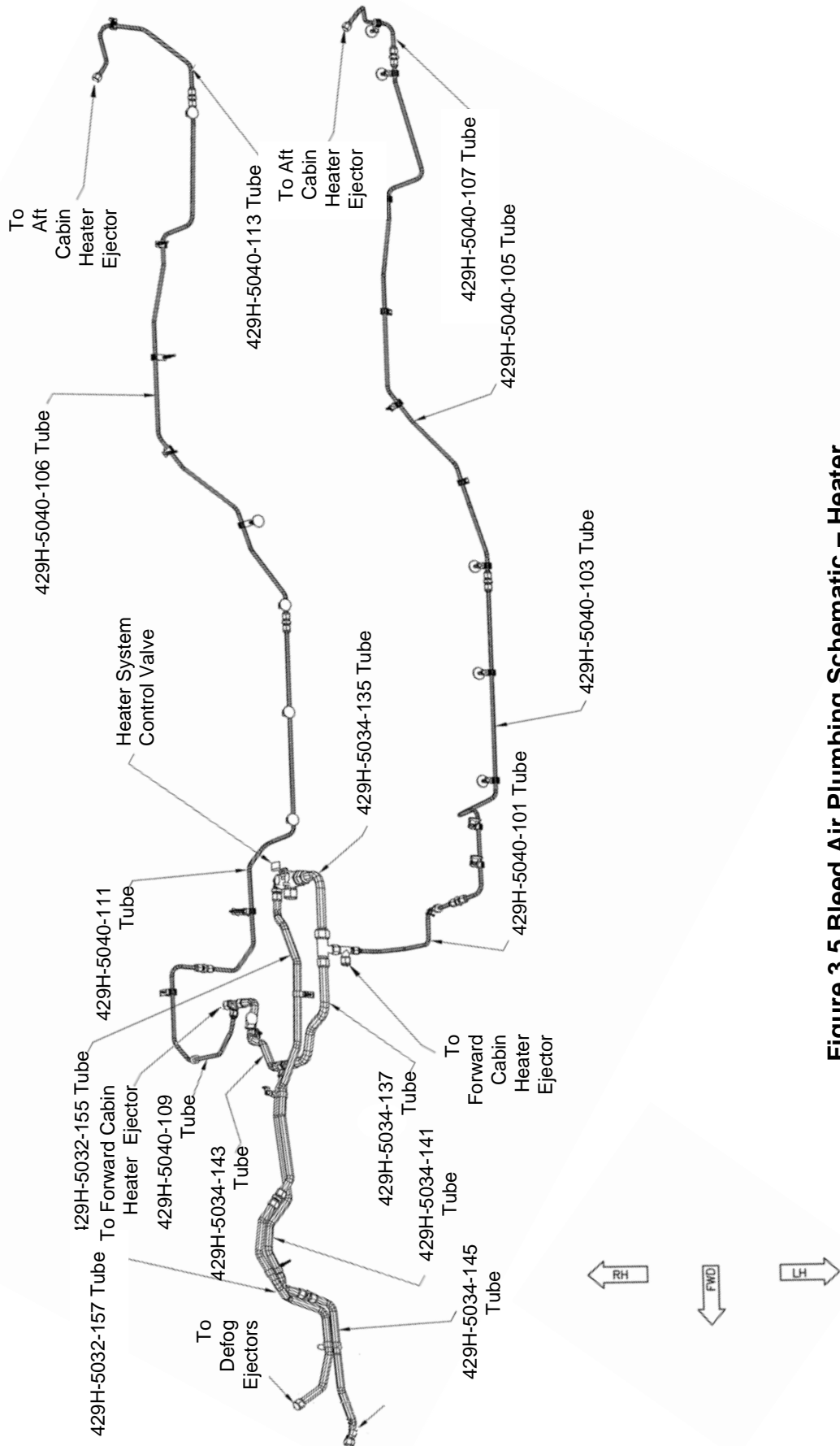


Figure 3.5 Bleed Air Plumbing Schematic – Heater System Control Valve to Heater Ejectors

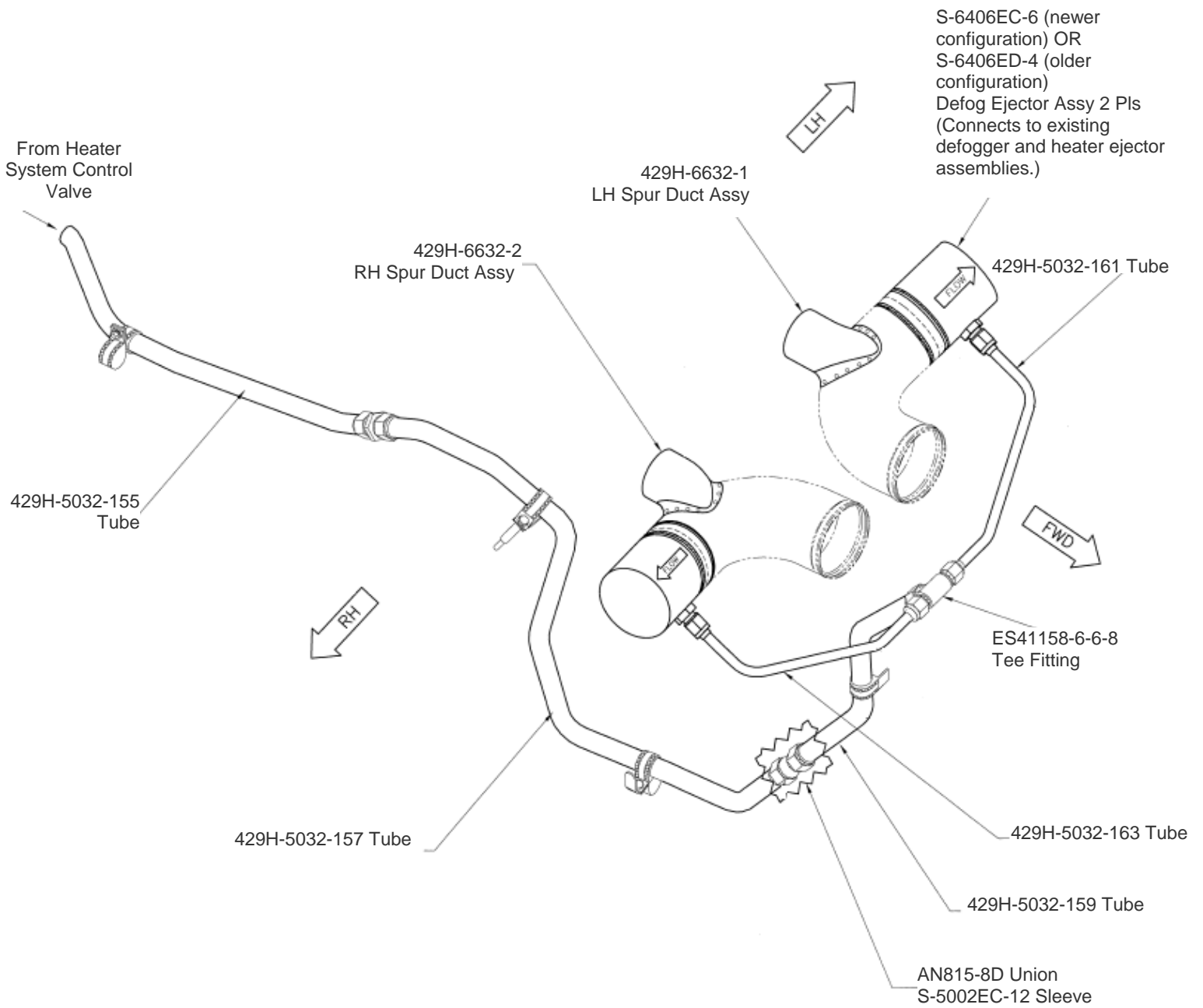


Figure 3.6 Plumbing – Defogger
(View looking down & aft)

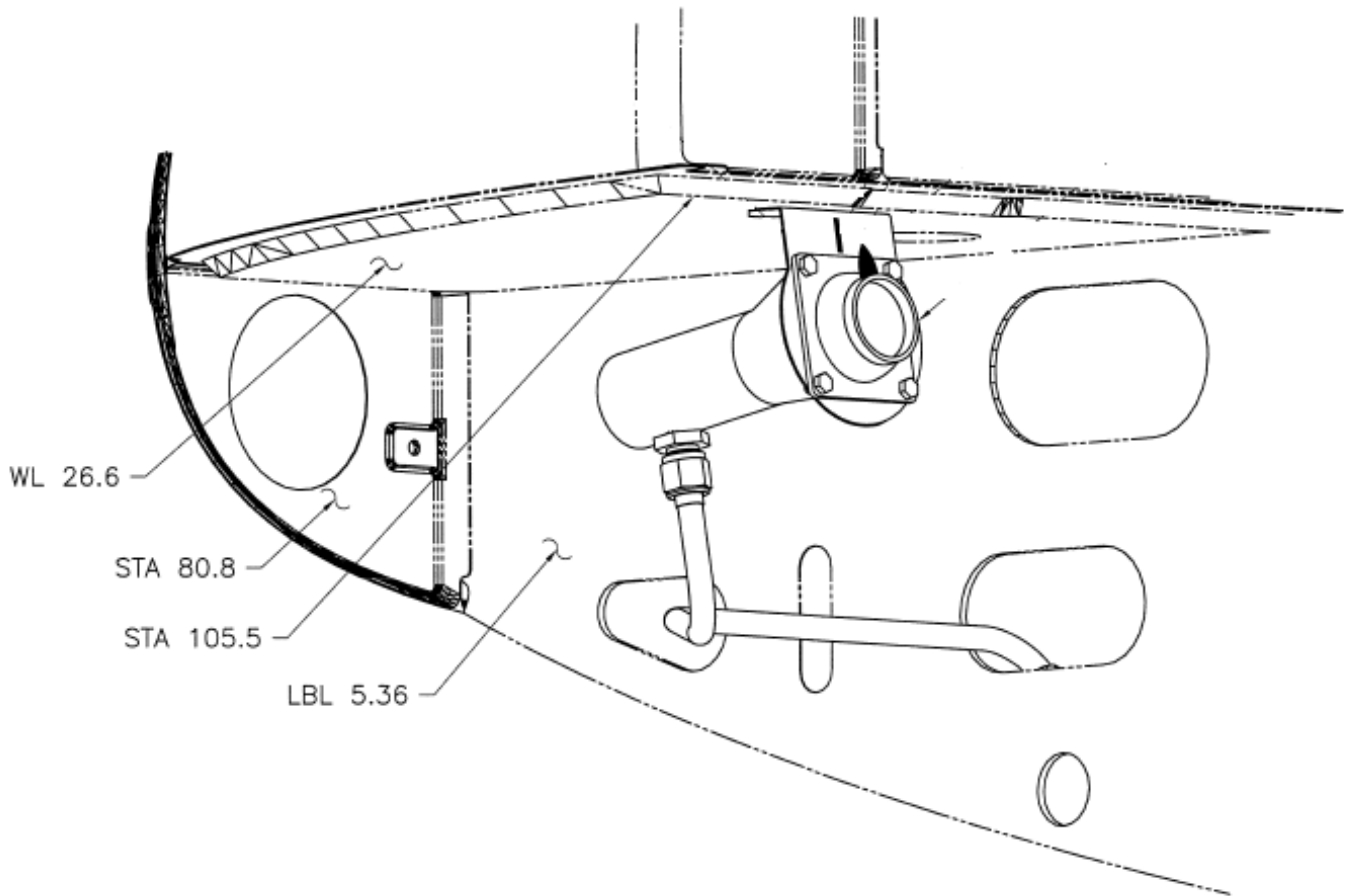


Figure 3.7 Forward Crew Heater Ejectors
(View looking forward and up)
(LH shown, RH opposite)

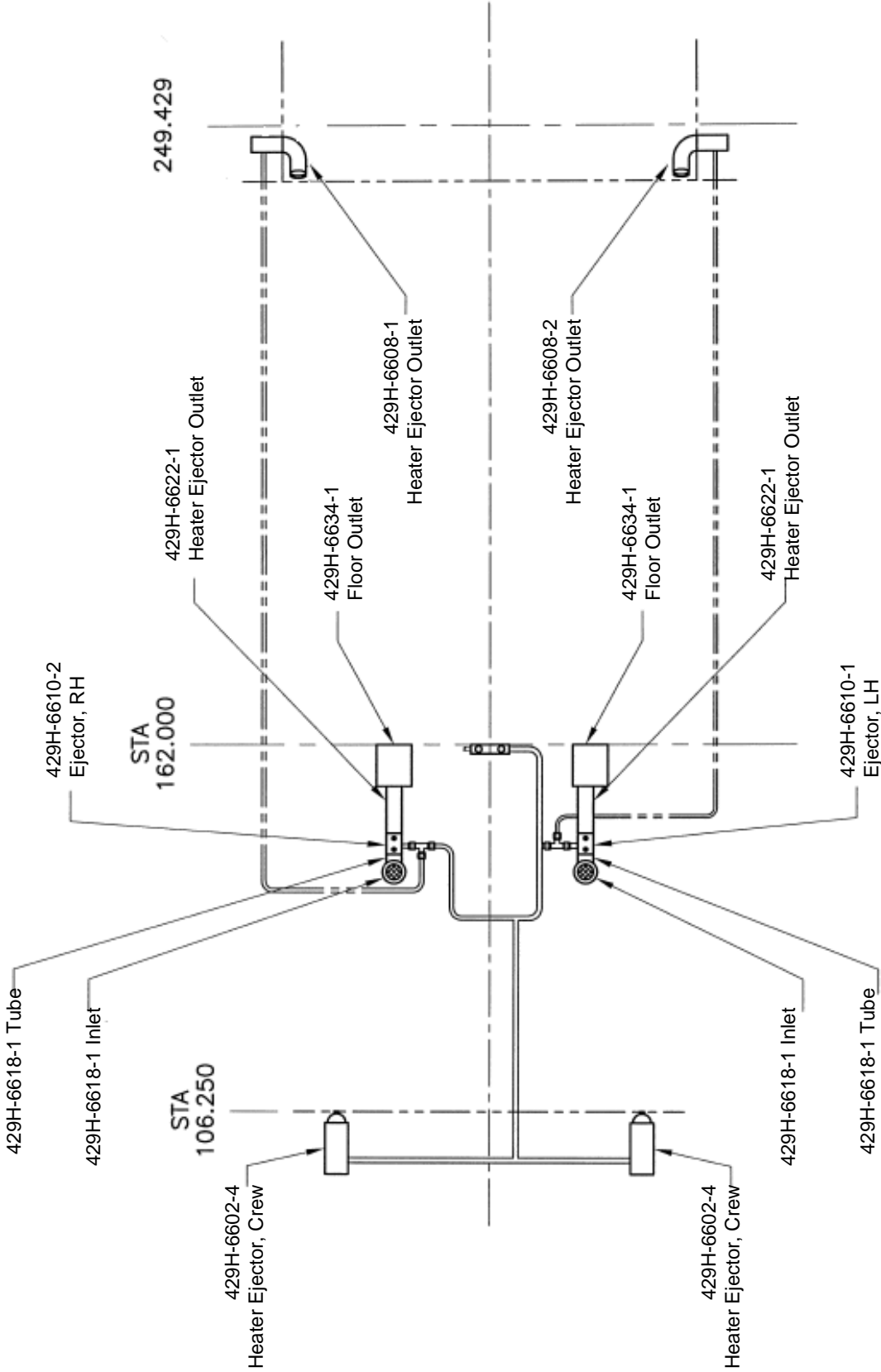


Figure 3.8 Heater Ejector Installation
(View looking down)

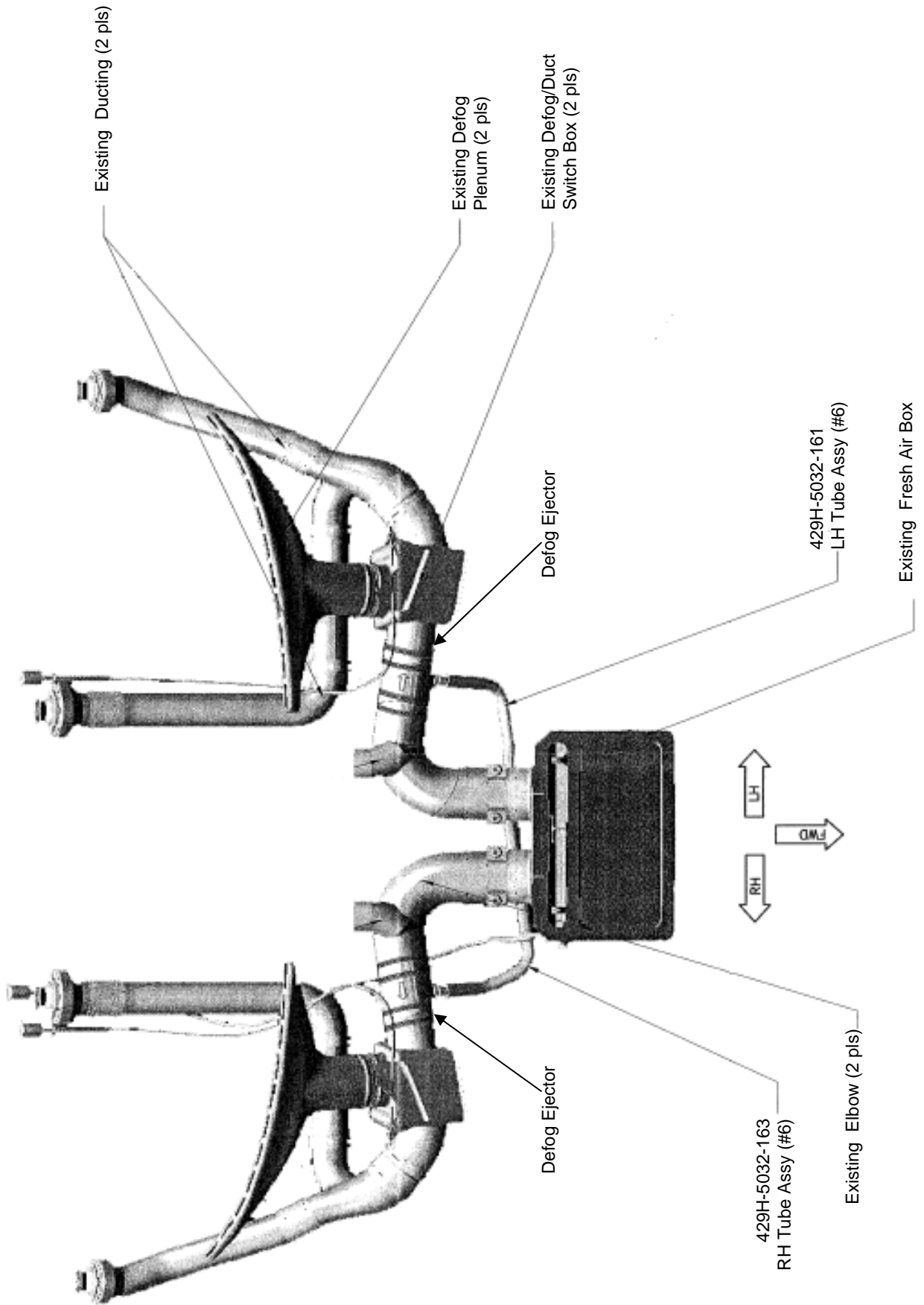
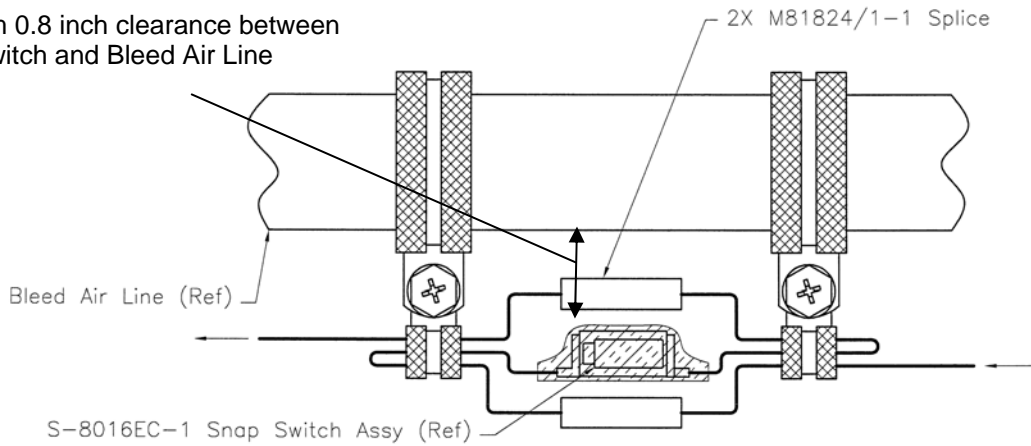
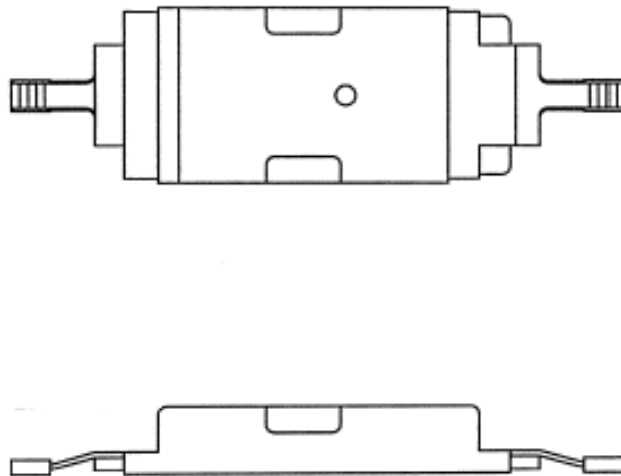


Figure 3.9 Windshield Defog System and Defog Ejectors
(View looking aft)

Minimum 0.8 inch clearance between
Snap Switch and Bleed Air Line



Snap Switch Installation – Typical



Thermal Snap Switch

Figure 3.10 Cabin Heater System Thermal Snap Switches

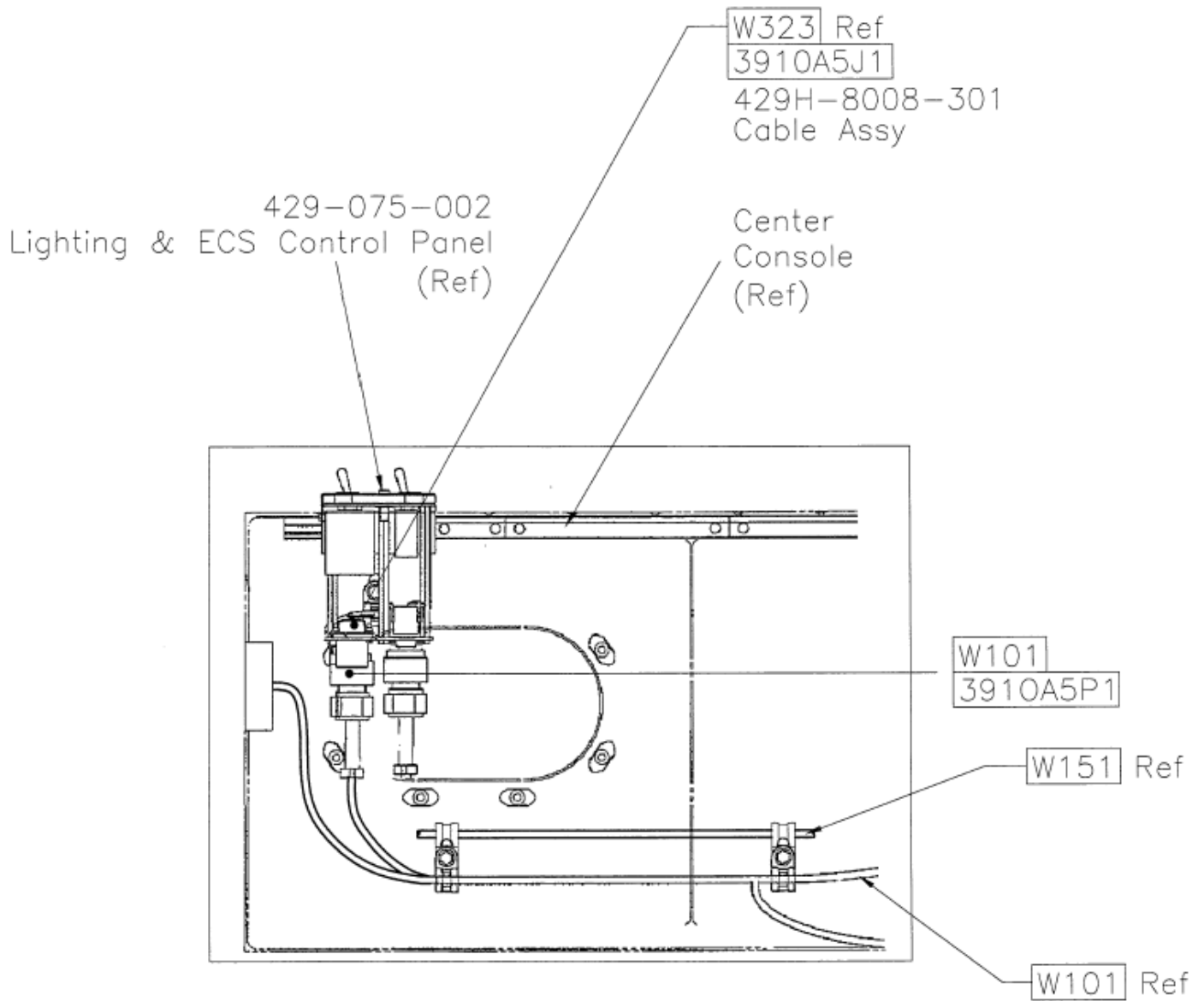


Figure 3.11 Heater Control Panel
(Aircraft right looking inboard)

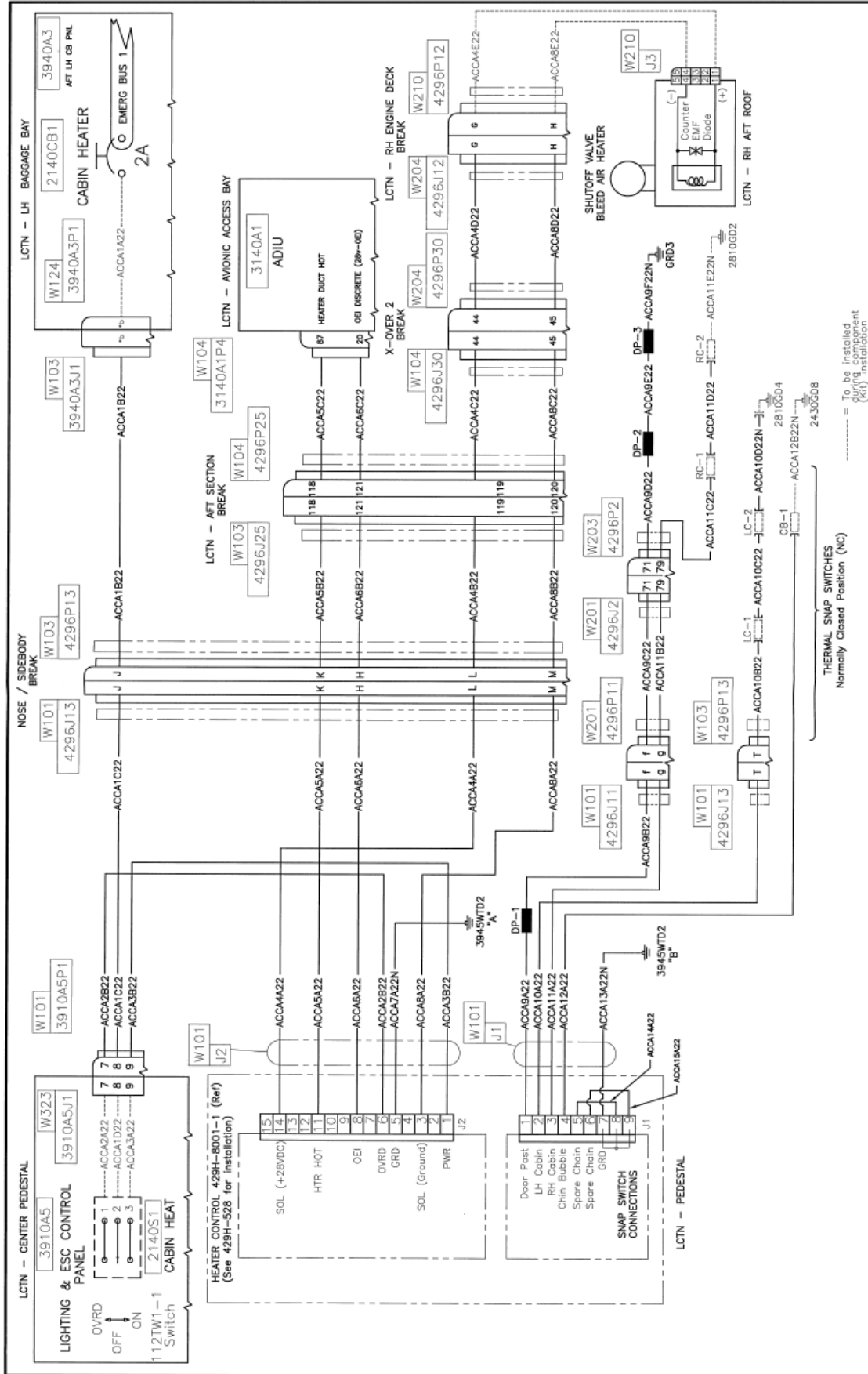
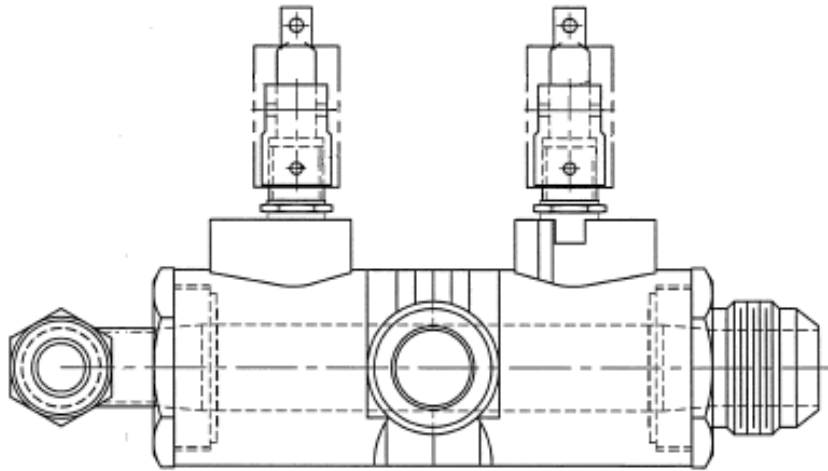
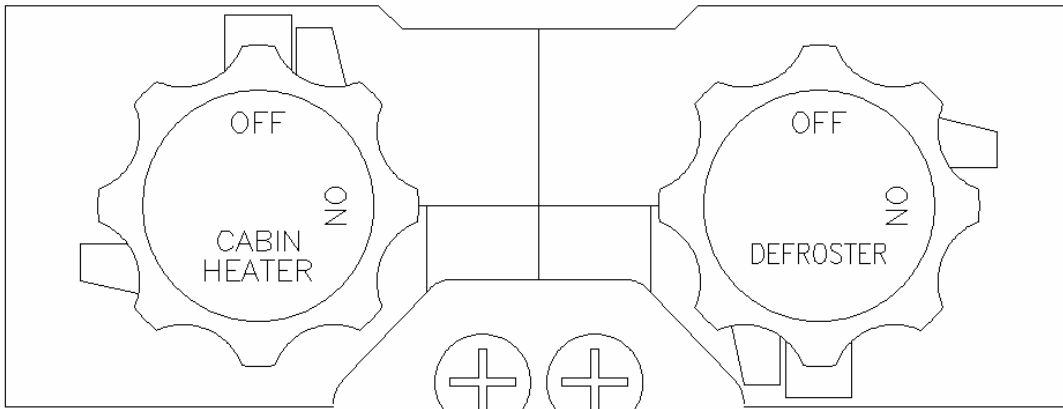


Figure 3.12 Heater System Electrical Schematic

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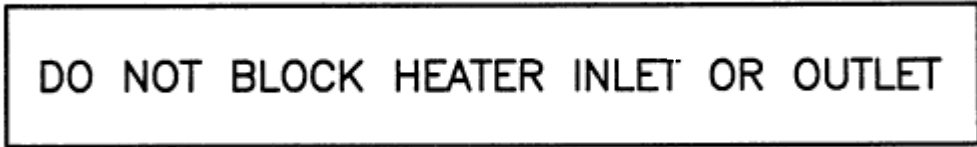
Heater System Control Valve Body
(View looking aft)



Heater System Control Valve Controls
(View looking down)

Figure 3.13 Heater System Control Valve

CHAPTER 4
PLACARDS AND MARKINGS



429H-6620-33



ES39300-14



ES39300-12

Figure 4.1 Placards and Markings

CHAPTER 5 SERVICING

1. SERVICING INFORMATION

No servicing required for the continued airworthiness of the 429 Heater System.

2. SUGGESTED SPARES LIST

Item	Description	Part No.
1	Heater Shut Off Valve	ES26192-1
2	Cockpit Heater Ejector	429H-6602-4
3	Cabin Heater Ejector Assy. FWD	429H-6610-1 Left Side 429H-6610-2 Right Side
4	Cabin Heater Ejector Assy. AFT	429H-6608-1 Right Side 429H-6608-2 Left Side
5	Defogger Ejector Assy. (older install)	S-6406EC-4
6	Defogger Ejector Assy. (newer install)	S-6406EC-6
7	Heater System Control Valve	429H-6670-2
8	Thermal Snap Switch	S-8016EC-1

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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.
 - i. Cut safety wire with excess length.
 - ii. Thread through safety wire hole in B-nut (or fitting).
 - iii. Pull ends even. Twist safety wire to ensure a tight fit against the safety wire hole on the B-nut (or fitting).
 - iv. Twist wire to achieve 8 to 12 twist per inch (2.5 cm).
 - v. Thread through safety wire hole in the next B-nut (or fitting). Ensure safety wire routing prevents loosening of B-nuts.
 - vi. Twist wire again to achieve 8 to 12 twists per inch (2.5 cm). Cut to form a "pigtail" with a minimum of 4 twists.

2. REMOVAL, INSTALLATION / REPLACEMENT OF COCKPIT HEATER EJECTOR ASSEMBLY
(See figure 3-7& 3-8).

REMOVAL

- A. Disconnect the ejector B-Nut from the inlet tube.
- B. Remove the AN526-6R6 screw from the side of the ejector body
- C. Slide the ejector away from the outlet assembly to remove it from the aircraft.

INSTALLATION / REPLACEMENT

- A. Slide the ejector into the outlet assembly.
- B. Install the AN526-6R6 screw into the side of the ejector body.
- C. Align connection and thread B-Nut until metal on metal contact is felt. Continue to tighten an additional 60 degrees of rotation and safety wire per step 1.

CHAPTER 6
STANDARD PRACTICES INFORMATION (cont'd)

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

REMOVAL

- A. Gain access to 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 heater shutoff valve from the aircraft.

INSTALLATION/REPLACEMENT

- A. Reinstall two MS27039C-1-15 mounting screws on the heater shutoff valve.
- B. Electrically connect the heater shutoff valve.
- C. Align the connection and thread until metal on metal contact is felt. Continue to tighten an additional 60 degrees of rotation and safety wire per step 1.
- D. Secure the Main Rotor Transmission Cowling.

4. REMOVAL INSTALLATION / REPLACEMENT OF THE HEATER SYSTEM CONTROL VALVE.

REMOVAL

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

INSTALLATION / REPLACEMENT

- A. Install two MS27039-0808 screws and install the valve on the aircraft.
- B. Install the valve control knobs.
- C. Align bleed air plumbing connections and thread B-Nut until metal on metal contact is felt. Continue to tighten an additional 60 degrees of rotation and safety wire per step 1.

CHAPTER 6
STANDARD PRACTICES INFORMATION (cont'd)

5. REMOVAL INSTALLATION / REPLACEMENT OF THE HEATER THERMAL SNAP SWITCHES

REMOVAL

- A. Remove NAS1802-3-7 Bolt, MS21043-3 Nut, NAS1149CO316R Washer (qty 2) and MS21919WCH2 clamp.
- B. Remove M81824/1-1(qty 2) environmental splice.
- C. Remove S-8016EC-1 Thermal Snap Switch

INSTALLATION / REPLACEMENT

NOTE

Maintain a minimum clearance of 0.8 inches between Snap Switch and Bleed Air Line

NOTE

See figure 3.10 for wire routing through the clamps.

- A. Connect S-8016EC-1 Thermal Snap Switch using M81824/1-1(qty 2) environmental splice.
- B. Install NAS1802-3-7 Bolt, MS21043-3 Nut, NAS1149CO316R Washer (qty 2) and MS21919WCH2 clamp per figure 3.10.

6. REMOVAL AND 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.

CHAPTER 6
STANDARD PRACTICES INFORMATION (cont'd)

INSTALLATION / REPLACEMENT

NOTE

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

- A. Align connection and thread B-Nut until metal on metal contact is felt. Continue to tighten an additional 60 degrees of rotation and safety wire per step 1.
- B. 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.

7. REMOVAL AND INSTALLATION/REPLACEMENT OF ENGINE HEATER CHECK VALVES

REMOVAL

- A. Cut attaching safety wire from B-nuts at each end of the section of the check valve 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 check valve to be removed.
- C. Remove any clamps securing the check valve to the aircraft.
- D. Remove check valve from the aircraft.

INSTALLATION / REPLACEMENT

CAUTION

Check valves must be installed with the words "INSTALL THIS SIDE UP" facing up. Ensure the "X" under the word "SIDE" is in the upmost position.

- A. Align check valve connections and thread B-Nuts until metal on metal contact is felt. Continue to tighten an additional 60 degrees of rotation and safety wire per step 1.
- B. Install any clamps removed during Step C of the removal procedure.
- C. After completion of check valve installation, check all joints for audible signs of leakage during operational run up of system. Apply Torque Seal to all fittings.

**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	Heater System Control Valve in the off position	Operate the heater system control 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 3.10 and 3.12)
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
HEATER DUCT HOT light illuminated.	Thermal Snap Switch too close to duct assembly	Inspect snap switches to ensure a minimum 0.8 inch clearance between the snap switch and the duct.

APPENDIX A**Weight and Balance Information**

Weight breakdown – Bell 429 Provisions:

Item	Drawing Number	Wt. (lbs)	X-Arm (in)	Y-Arm (in)	X-M (in-lb)	Y-M (in-lb)
Misc Heater Provisions Instl	429H-514-1	2.29	163.4	-1.4	373	-3
Plumbing Provisions, Cabin Roof to Control Valve Instl	429H-534-1	7.23	157.5	-19.0	1139	-137
Plumbing Provisions, Control Valve to Ejectors Instl (Tubes)	429H-544-1	5.84	154.0	0.4	899	2
Plumbing Provisions, Control Valve to Ejectors Instl (Fittings)	429H-544-1	1.17	151.6	0.2	177	0
Electrical Provisions Instl	429H-814-1	0.11	222.0	11.0	23	1
Total (English Units)	429H-201	16.63	157.1	-8.8	2612	-137
Total (Metric Units)	429H-201	7.54	3989.7	-223.9	30095	-1577

* Negative value indicates left of center

Weight breakdown – Bell 429 Components

Item	Dwg. No.	Weight (lb)	X-Arm (in)	Y-Arm *(in)	X-M (in-lb)	Y-M (in-lb)
Engine Compartment Bleed Air System	429H-506-1	5.95	295.3	-2.4	1757	-14
Control Valve Components	429H-528-1	1.04	159.8	-1.1	166	-1
Cabin Top Tubing	429H-538-1	5.81	312.7	0.0	1815	0
Firewall SOV to Cabin Roof Instl	429H-538-1	1.56	231.5	-20.4	360	-32
Ejectopr Components - Cockpit	429H-908-1	1.77	111.2	0.0	197	0
Ejectopr Components - Cabin	429H-908-1	1.93	245.3	0.0	473	0
Ejectopr Components - Tunel	429H-908-1	1.52	156.4	0.0	238	0
Defroster Components Instl	429H-928-1	1.50	101.7	0.0	153	0
Total (English Units)		21.07	244.8	-23.9	5159	-47
Total (Metric Units)		9.56	6219.2	-607.1	59438	-543

*negative value indicates left of center