

Revision F

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**REPORT NO.
PR-407H-900M**

**INSTALLATION INSTRUCTIONS
BELL MODEL 407 SERIES BLEED-AIR CABIN HEATER**

REVISIONS

<u>Rev.</u>	<u>Date</u>	<u>Description</u>	<u>By</u>
N/C	04/22/97	Original	R.E.B.
A	03/17/00	Added 407H-102, Manual Control Heater System	M.R.
B	10/01/02	Revised text as indicated by revision bar in margin.	J.B.
C	08/19/05	Revised to include 407H-102-2, Manual Control Heater System without Particle Separator installation.	R.E.B.
D	12/05/06	Para. 2.3.9, added instruction to cut control shaft to length	R.E.B.
E	11/07/07	Para. 2.1; Note –101 installation not available, ref. To SB-407H-2007-1112. Para. 2.3.15, added reference to views S1-S1 & S2-S2, Ejector installation was horizontal on note 2.	R.E.B.
F	04/06/09	Added paragraph 2.3.19	R.E.B.

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A	Flight Manual Supplement	A-0
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LIST OF REFERENCES

1. Drawing No. 407H-100; System Configuration
2. Drawing No. 407H-101; Cabin Heater Installation (Not Available, Electronic Controls) |
3. Drawing No. 407H-301; Electrical Installation
 1. BHT-407MM; Maintenance Manual, BHT-ALL-SPM
 2. Drawing No. 407H-102, Cabin Heater Installation, Revision B or Subsequent; |

1.0 INTRODUCTION

This document is a guide for the installation of the Bleed-Air Cabin Heater system. These instructions are intended to supplement and aid interpretation of the information contained on the installation drawings.

The Cabin Heater Installation uses bleed air from the engine compressor to provide cabin heat to both the forward and aft cabins. There are two controls, one which adjusts the flow rate of the hot air and a second for the forward/aft direction of heat. The heater controls for the Bleed Air Cabin Heater System are either manual or electronic. The electronic control panel can be located either in the overhead panel or in the cockpit sidewall panel.

2.0 INSTALLATION INSTRUCTIONS

2.1 Bleed Air Plumbing for 407H-101 (Electronic Controls)

NOTE: Existing provisions for particle separator installation are required.

Manufacture of Electronic Controls installation has been discontinued. If this configuration is installed, compliance with Service Bulletin SB-407H-20071112 may be required.

- 2.1.1. Reference drawing 407H-101, remove interior, access panels, and engine cowling as necessary to facilitate installation. Examine existing plumbing and electrical routing.
- 2.1.2. Reference Views A-A, K-K, locate Bleed Air Supply Valve assembly, by using the attaching tube assemblies to position on the upper deck. Secure valve using indicated hardware.
- 2.1.3. Refer to View B-B, Sheet 8, and to detail H to locate Heat Distribution Valve assembly, using the attaching tube assemblies to position. **CAUTION:** Verify flight controls clearance prior to installing inserts. Install 80-004-2-6 inserts in accordance with Bell maintenance instructions. Allow inserts installation adhesive to cure before final assembly installation.
- 2.1.4. Refer to Views M-M, F1-F1 to locate and install over temperature warning switches (two under forward seat box, one in vertical control tube tunnel, and one above forward ejector tee). Reference drawing 407H-301, electrical wiring should be routed and connected as each valve and sensor installation is completed. AWG 22 wire is provided.
- 2.1.5. Reference View B-B sheet 8, View C-C sheet 4, locate and drill 1.0 inch diameter holes in both longitudinal bulkheads of center seat box. Enlarge control tube penetration cutout as shown (right side only). Install indicated strip grommet.
- 2.1.6. Locate and drill holes near aft edge of outer seat box for fitting installation reference View B-B, View E-E Sheet 7.

- 2.1.7 For ease of plumbing installation, disconnect left and right vertical control tubes at the servo bell crank, reference BHT-407-MM-8. Attach Red Tags to bell cranks indicating that flight controls have been disconnected.
- 2.1.8 Reference sheet 2 and appropriate details, install bleed air plumbing from particle separator provision to S-9100-1 valve assembly. Complete bleed air plumbing through vertical control tunnel to Forward/aft control valve installation.
- Note:** Reference Views A-A, A1-A1, A2-A2, B-B, F-F, F1-F1, F2-F2, assure that minimum clearance to flight control components is greater than 0.25". Verify clearance through full range of flight control travel.
- 2.1.9 Reinstall control tubes to servo bell cranks per BHT-407-MM-8. Reference Views A-A, F-F, F1-F1, F2-F2. Assure that minimum clearance to flight controls is greater than 0.25" through full range of flight control travel.
- 2.1.10 If there is insufficient clearance, adjust tube installation as necessary. If necessary, repeat steps 2.1.7 through 2.1.9.
- 2.1.11 Refer to View B-B, Sheet 9, and detail H. Locate Control Valve assembly using the attaching tube assemblies to position. CAUTION: Verify flight controls clearance prior to installing inserts. Install inserts in accordance with Bell maintenance instructions. Allow adhesive adequate time to cure before completing Control Valve installation.
- 2.1.12 Enlarge control tube penetration cutout as shown (right side only). Install indicated strip grommet. View C-C sheet 4,
- 2.1.13 Locate and drill holes near aft edge of outer seat box for fittings installation reference View B-B, View E-E, Sheet 7.
- 2.1.14 Install AN823-6D with (2) NAS1149F1032P washers and AN924-6D nut through hole in left seat structure per view B-B Sheet 7. Install one 6-C6X-S elbow on each end of AN823-6D fitting.
- 2.1.15 Remove plastic plugs from both right and left door post then insert tubes S-5017-10 and S-5017-12 through door post. Per view B-B Sheet 7.
- 2.1.16 Install, MS35489-16 grommet in 0.813 hole in right hand seat box per view E-E Sheet 7. Install AN821-8 elbow on S-5017-11 tube and insert through grommet. Slip 3" fire sleeve over end of S-5017-12 tube then connect to AN833-6D elbow using 6-C6X-S elbow.
- 2.1.17 Reference Views B-B sheets 7, 8, and 9, View P-P, G-G, and J-J for completion of bleed air plumbing and ejectors installation. Install sound-proofing around aft ejector area as required

Note 1: Instructions to complete S-5019 hose assembly are provided in Appendix C.

Note 2: Forward ejectors are intended to face upward and outboard toward the lower outboard edge of the windscreen. See SB-407H-20071102.

- 2.1.18 Assure at least 0.25 inch clearance between plumbing installation and aircraft controls. Clearance must be checked with controls moved to all possible extremes.
- 2.1.19 Complete electrical power and controls installation in accordance with next chapter, 2.2 Electrical System and drawing 407H-301.
- 2.1.20 Replace access panels, interior, and engine cowling, reference chapters of BHT-407-MM.

2.2 Electrical System for 407H-101 (Electronic Controls)

- 2.2.1 Complete heater components installation in accordance with drawing 407H-101 prior to installing electrical system.
- 2.2.2 Remove center post fairing (-1 inst'n only) and other panels as necessary to gain access as indicated (see drawing 407H-301 sheets 2, 3, & 4).
- 2.2.3 Locating Electronic Control Panel.
 - 2.2.3.1 (-1 inst'n only) Reference View A-A, locate control panel on overhead liner. Match drill to control panel brackets. Install brackets using indicated hardware.
 - 2.2.3.2 (-2/-3 inst'n only) Reference Views B-B, C-C, remove right interior panel. Locate placard on panel. Mark and cut opening large enough to accommodate penetration of components on back of the control panel, but leave enough room on aircraft panel to attach hardware for securing control panel. Install as shown using indicated hardware.
- 2.2.4 Reference sheet 2 or 3 and wiring schematic sheet 5, complete heater electrical power supply installation. Use procedures described in BHT-407-MM-10. Follow existing electrical wire routing when possible.

Note: Two RG-14 grommets are provided on control panel cable for use in harness routing.

Note: As wiring is installed, cut to proper length and install terminal/connectors; reference wiring schematic.

2.2.5 Electronic Control Panel Installation

2.2.5.1 (-1 inst'n only) reassemble the control panel assembly on the previously installed brackets.

2.2.5.2 (-2/-3 inst'n only) reinstall right side panel using existing hardware.

2.2.6 Assemble all electrical connectors and control panel/valves. Provide electrical power to completed heater installation and verify controls operation. Test over-temp circuit by providing ground to the "HOT1A22" terminal at each switch.

2.2.7 Reinstall the center post fairing and other access panels.

Note: Installation to be accomplished using acceptable standard practices reference BHT-407-MM-10.

2.3 Bleed Air Plumbing for 407H-102 (Manual Controls)

2.3.1 Reference drawing 407H-102, remove interior access panels and engine cowling as necessary to facilitate installation. Examine existing plumbing and electrical routing.

2.3.2 Reference Views A-A, K-K, & P locate ON/OFF valve assembly by using the attaching tube assemblies to position on the upper deck. Secure valve using indicated hardware.

2.3.3 For ease of plumbing installation, disconnect left and right vertical control tubes at the servo bell crank, reference BHT-407-MM-8. Attach Red Tags to bell cranks indicating that flight controls have been disconnected.

2.3.4 Reference sheet 2 and appropriate details, install bleed air plumbing from particle separator provision to ON/OFF valve assembly. Complete bleed air plumbing through vertical control tunnel to Forward/Aft control valve installation.

Note: Reference Views A-A, A1-A1, A2-A2, B-B, F-F, F1-F1, F2-F2, assure that minimum clearance to flight controls components is greater than 0.25". Verify clearance through full range of flight control travel.

2.3.5 Reinstall control tubes to servo bell cranks per BHT-407-MM-8. Reference Views A-A, F-F, F1-F1, F2-F2. Assure that minimum clearance to flight controls is greater than 0.25" through full range of flight control travel.

2.3.6 If there is insufficient clearance, adjust tube installation as necessary. If necessary, repeat steps 2.3.3 through 2.3.5.

- 2.3.7 Refer to View B-B, Sheet 9, and View H-H. Locate forward/aft control valve assembly using the attaching tube assemblies to position. CAUTION: Verify flight controls clearance prior to installing inserts. Install inserts in accordance with Bell maintenance instructions. Allow adhesive adequate time to cure.
- 2.3.8 Reference View M-M sheet 9, locate and drill 0.625" diameter hole in forward bulkhead of center seat box.
- 2.3.9 Install forward/aft heater control valve using the previously installed inserts. Temporarily assemble the coupler and shaft to valve. Slide the control label/doubler and bearing over shaft and temporarily tape to forward face of seat box. Using the knob, mark the shaft length appropriate to final knob installation. Mark four holes through doubler. Remove doubler and valve controls components. Cut shaft to proper length (cut from the knob end, which has the longest machined flat). Drill 0.50" holes in face sheet of seat box. Install inserts in accordance with Bell maintenance instructions. Seal interior surface of 0.625" hole with adhesive. Allow adhesive adequate time to cure.
- 2.3.10 Enlarge control tube penetration cutout as shown (right side only). Install indicated strip grommet. View C-C sheet 4,
- 2.3.11 Locate and drill holes near aft edge of outer seat box for fittings installation reference View B-B, View E-E, Sheet 7.
- 2.3.12 Install AN823-6D with (2) NAS1149F1032P washers and AN924-6D nut through hole in left seat structure per view B-B Sheet 7. Install one 6-C6X-S elbow on each end of AN823-6D fitting.
- 2.3.13 Remove plastic plugs from both right and left door post then insert tubes S-5017-10 and S-5017-12 through door post. Reference view B-B Sheet 7.
- 2.3.14 Install MS35489-16 grommet in 0.813 hole in right hand seat box per view E-E Sheet 7. Install AN821-8 elbow on S-5017-11 tube and insert through grommet. Slip 3" fire sleeve over end of S-5017-12 tube then connect to AN833-6D elbow using 6-C6X-S elbow.
- 2.3.15 Reference Views B-B sheets 7, 8, and 9, View P-P, G-G, J-J, S1-S1, & S2-S2 for completion of bleed air plumbing and ejectors installation. Install sound-proofing around aft ejector area as required.

Note 1: Instructions to complete S-5019 hose assembly are provided in Appendix C.

Note 2: Forward ejectors are intended to face outboard and to the rear, and installed vertically on aft side of battery box.

- 2.3.16 Assure at least 0.25 inch clearance between plumbing installation and aircraft controls. Clearance must be checked with controls moved to all possible extremes.
- 2.3.17 Verify heater control operation.
- 2.3.18 Replace access panels, interior, and engine cowling, reference chapters of BHT-407-MM.
- 2.3.19 Test run engine and check for proper heater operation.
NOTE: First-time operation of the heater system may produce a slight smoky odor caused by installation residue within the system. This will clear itself within minutes.

3.0 WEIGHT AND BALANCE DATA

Installation Weight: 407H-100-1, -2, -3 Installation: 16 lbs,
407H-100-4, -5 Installation: 14.5 lbs.

at Fuselage Station 73.4 inches
Butt Line 7.0 inches RBL

Actual weight and center-of-gravity shall be determined after the heater kit is installed, and ballast readjusted as necessary to achieve empty weight Center-of-Gravity within allowable limits reference BHT-407-MM-1.

APPENDIX A

FLIGHT MANUAL SUPPLEMENT

APPENDIX B

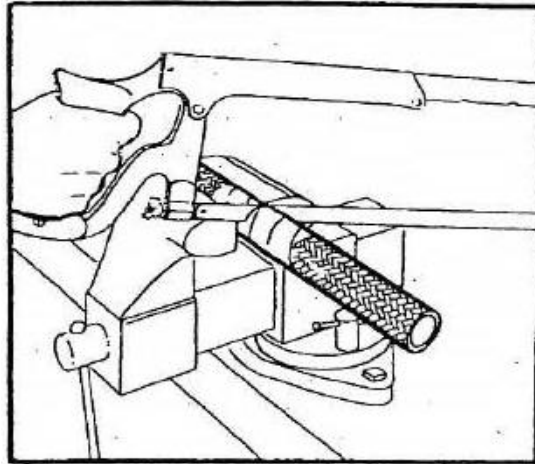
SUPPLEMENTAL TYPE CERTIFICATE

APPENDIX C

HOSE ASSEMBLY INSTRUCTIONS

HOSE FITTINGS INSTALLATION

Step 1

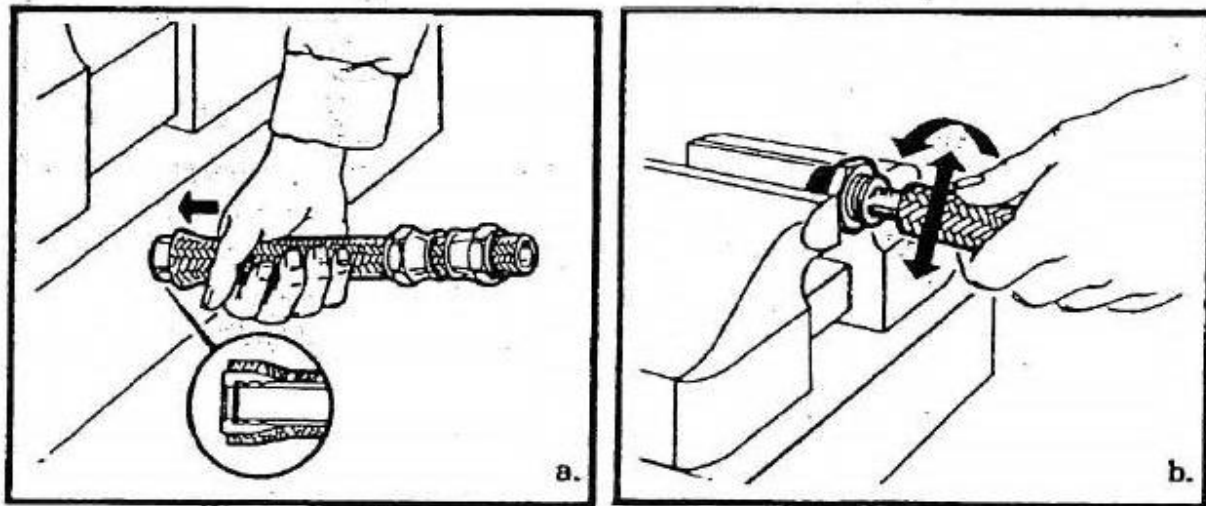


Wrap hose with masking tape at cut-off point. Cut to length through taped area using a cut-off machine or fine-tooth hack-saw. Remove tape. Trim loose wires. Burrs on the bore of the tube stock should be removed with a knife. Clean the hose bore.

Wire braid may tend to “neck down” on one end and flare out on the opposite end. This is a characteristic of wire braid and can be used to advantage in assembly of the sockets.

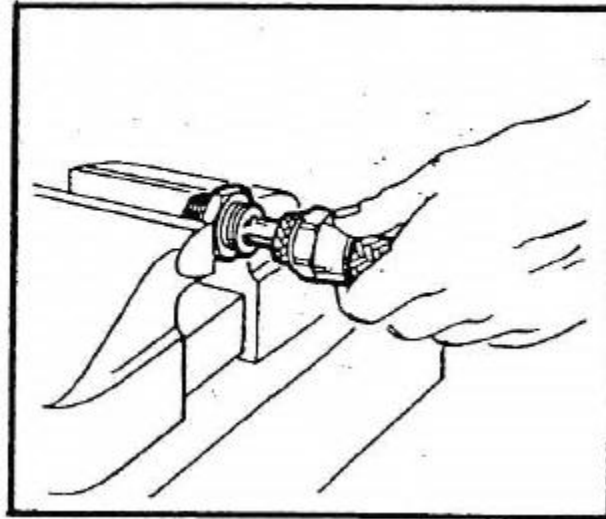
Slip two sockets back-to-back over the necked down end of the hose.

Step 2



- a. Push the sleeve over the end of the tube and under the wire braid by hand. Complete positioning of the sleeve by pushing the hose end against a flat surface. Visually inspect to see that tube stock butts against the inside shoulder of the sleeve.
- b. Set the sleeve barbs into the Teflon tube by using assembly tool FT1038A or working the hose bore over the nipple into the end of the sleeve and tube. Assembly kit FT1081 is also available.

Step 3



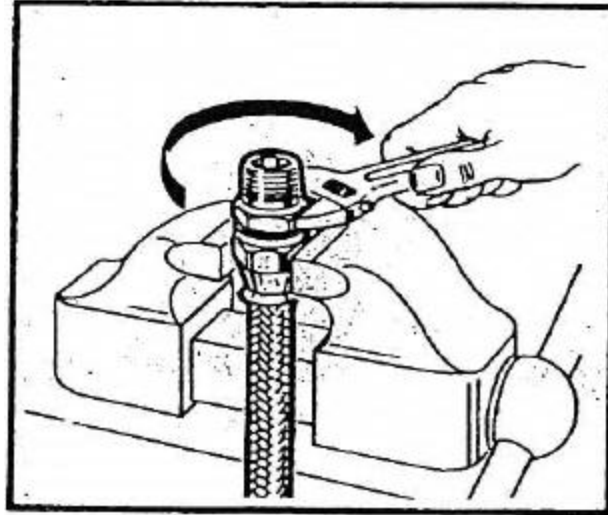
Lubricate nipple and socket threads.

- For Stainless Steel fittings, use a molydisulfide based lubricant (e.g. "Molykote" Type G). Lubricants containing chloride are not recommended.
- Other material combinations use standard petroleum lubricants.

Hold the nipple with hex in vise. Push hose over nipple with twisting motion until seated against nipple chamfer. Push socket forward and hand start threading of socket to nipple.

Wrench tighten nipple hex until clearance with socket hex is 0.032 inch(0.81mm) or less. Tighten further to align corners of nipple and socket hexes. Clean and inspect fitting installation

Step 4



DISASSEMBLY

To disassemble, unscrew and remove nipple, then slide socket back on the hose by tapping against flat surface. Remove sleeve with pliers. New sleeves are recommended when reusing the fitting.

*Molykote Type G is a registered trademark of the Alpha Molykote Corporation.